



## RIVER MEDWAY (FLOOD RELIEF) ACT 1976

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Inquiry into the Environment Agency's Revised Scheme for the Leigh Flood Storage Area, Kent.

Proof of Evidence by Tim Connell

1 April 2021

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## Glossary

The 1975 Act	The Reservoirs Act 1975
The 1976 Act	The River Medway (Flood Relief) Act 1976
AEP	Annual Exceedance Probability. A flood event may be referred to as having a 1% probability of being equalled or exceeded in any one year, also referred to as an Annual Exceedance Probability (AEP). This chance of the event occurring is present each and every year.
The Application	The Environment Agency's application for the Revised Scheme
CFMP	Catchment Flood Management Plan
COW	Critical Ordinary Watercourse. A watercourse that is not designated as a Main River but which the Environment Agency and other operating authorities agree are critical because they have the potential to put at risk from flooding large numbers of people and property.
Defra	Department for the Environment, Food and Rural Affairs
Eden	River Eden
FCERM	Flood and Coastal Erosion Risk Management
Flood risk	A combination of the statistical probability of a flood event occurring and the scale of the consequences if it does. So high risk can include circumstances that might not occur very frequently but have very substantial consequences, such as a dam failing and also circumstances that occur relatively frequently and have more moderate consequences, causing relatively frequent but less severe harm.
Freeboard	A safety margin added to give a high degree of confidence that an embankment is not overtopped.
FRA	Flood Risk Assessment. This is a document that assesses the flood risk to and from a proposed development or scheme. Flood Risk Assessments are prepared to accompany a planning application submitted to the local planning authority. An FRA reviews a proposed development or scheme against the risk of flooding from all relevant sources (e.g. river (fluvial), surface water (pluvial), groundwater etc) and understands any changes in flood risk to or from the development compared with the current (baseline) position.
FSA	Leigh Flood Storage Area

Impounding	Diverting the flow of any inland waters in connection with the construction or alteration of any dam, weir or other works.
LEHES	The Leigh Expansion and Hildenborough Embankment Scheme
LSFAO	Leigh Flood Storage Area Operator. A LFSAO is on duty 24 hours a day, 365 days a year.
Main river	Main river means all watercourses shown as such on the statutory main river maps held by the Environment Agency and Defra, and can include any structure or appliance for controlling or regulating the flow of water into, in or out of the channel. Main rivers are usually larger rivers and streams, and the Environment Agency has permissive powers to carry out works of maintenance and improvement on these rivers.
m AOD	metres Above Ordnance Datum
Medway	River Medway
MFP	Medway Flood Partnership
MFAP	Medway Flood Action Plan
MMS	Middle Medway Strategy
Model	River Medway Flood Forecast Model
Operating Procedures	The procedures by which the FSA is operated
Partnership	Medway Flood Partnership
Probability of flooding	The likelihood of a flood event happening is usually expressed in terms of its predicted frequency. This is most often communicated in terms of a percentage. For example, a flood event may be referred to as having a 1% probability of being equalled or exceeded in any one year, also referred to as an Annual Exceedance Probability (AEP). This chance of the event occurring is present each and every year.
Revised Scheme	The proposed variation to the Scheme
RBS	Reservoir Balance Sheet
The Scheme	The scheme approved under the 1976 Act which sets out key parameters of how the Leigh Flood Storage Area radial gates can be operated (see Appendix D of the Application)
SELEP	South East Local Enterprise Partnership
SEP	SELEP Growth Deal and Strategic Economic Plan (2014)
SMD	Soil Moisture Deficit A measure of the effective rainfall which would theoretically be necessary to saturate the soil. When the SMD is 0, the soil can accept no more rain and the rain will run off the land into rivers faster. Flood conditions and use of the FSA are more likely when there is a low SMD.
Specified Interests	Named organisations and “such other persons representative of interests likely to be substantially affected by the scheme as the Minister may direct” (see section 17(3)(d) of the 1976 Act) to be consulted in the event the scheme is varied, replaced or revoked.
SWA	Southern Water Authority

## **1. Personal details and introduction**

- 1.1. My name is Tim Connell. I have a BSc in Civil Engineering. I became a Chartered Engineer in 1988 and I am a Member of the Institution of Civil Engineers.
- 1.2. I have worked within the water industry for the past 40 years in civil engineering construction, local government, civil engineering consultancy and the water infrastructure sector.
- 1.3. I joined the Environment Agency in November 2002. I have held a number of positions within the Flood and Coastal Erosion Risk Management (FCERM) function, focused on asset management, fluvial and coastal engineering, the delivery of maintenance and investment programmes, as well as incident management and asset operations.
- 1.4. My current role is Area Operations Manager for the South London, West Kent and East Sussex Area. My operational area includes the River Medway catchment area in which the Leigh Flood Storage Area (FSA) is situated.
- 1.5. My duties include acting as Project Sponsor for a number of major capital investment projects including the Leigh Expansion and Hildenborough Embankment Scheme (LEHES), which when completed will provide an improved level of flood protection to vulnerable homes and businesses in Tonbridge and Hildenborough.
- 1.6. Additionally I act as Area Duty Manager in managing the Environment Agency's response to significant environmental incidents including severe weather and heavy rainfall events such as those experienced during December 2013 and the early months of 2014 when the FSA was operated on numerous occasions.
- 1.7. My proof of evidence will be set out as follows:
  - definition of key terms and their meaning in a flood modelling context;
  - the history of flooding in Tonbridge and in the wider Medway catchment;
  - the approach to managing flood risk;
  - the FSA and the benefits that it provides;
  - the Medway Flood Partnership;
  - the Medway Flood Action Plan;
  - the LEHES and the benefits that it will provide; and
  - the wider impacts of the LEHES.
- 1.8. The Environment Agency will call three further witnesses:
  - Charlie Overs of Dalcour Maclaren, who will set out how the Environment Agency has consulted and engaged with the public on the Revised Scheme and will also consider the easements that have been agreed under the 1976 Act with relevant landowners;
  - Andrew Irvine of the Environment Agency, who will explain the operation of the Leigh Flood Storage Area; and

- Ben Gibson of JBA Consulting Limited, who will deal with the flood risk modelling for the Revised Scheme.

## 2. The history of flooding in Tonbridge and in the wider Medway catchment

### 2.1. General description of Tonbridge and Hildenborough in relation to the River Medway catchment

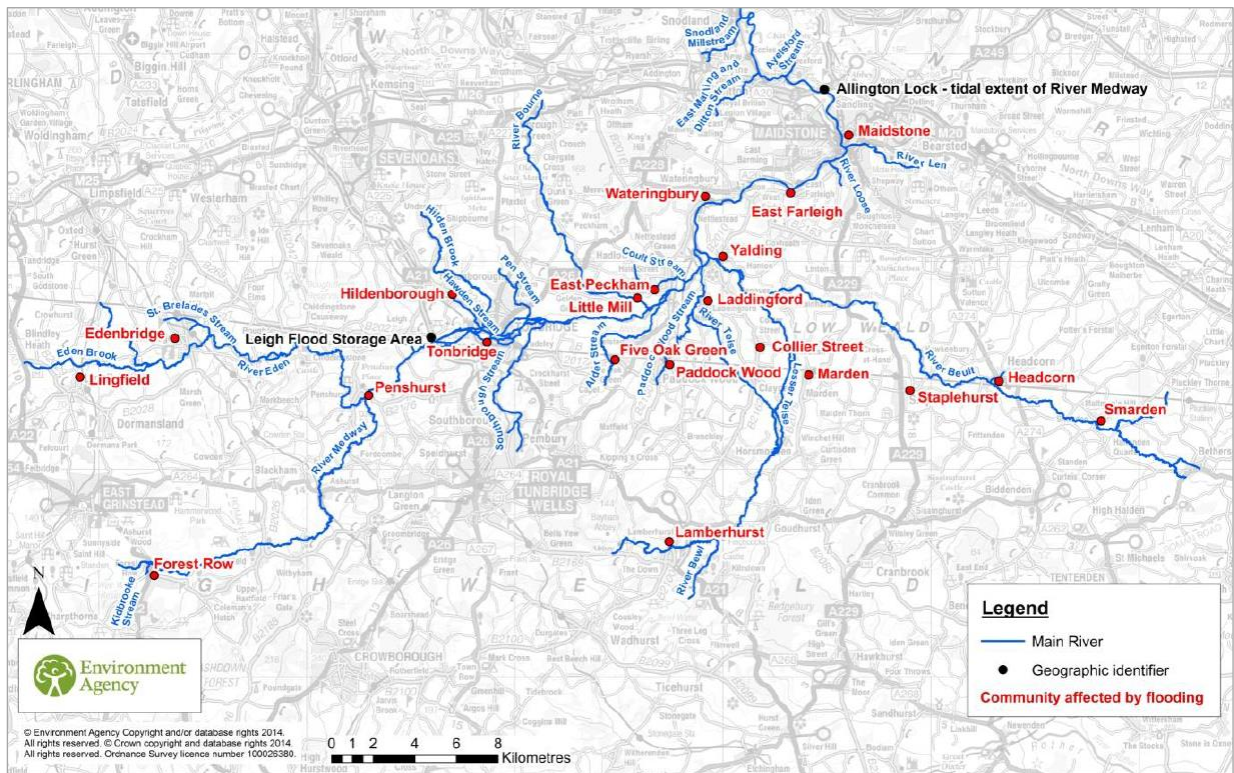


Figure 1: Map of the Medway catchment taken from the Kent and South London Winter 2013/14 Flood Report for the Medway catchment

2.1.1. The River Medway (the Medway) rises in the High Weald in Sussex and flows generally in a north-easterly direction through Kent into the Thames Estuary near Sheerness. It flows through Tonbridge, Maidstone and the Medway Towns conurbation. It has a length of approximately 113 km and a catchment area of approximately 2,400 km<sup>2</sup>.

2.1.2. The River Eden (the Eden) flows into the Medway at a confluence just upstream of Rogues Hill in Penshurst. There are a number of other tributaries to the Medway downstream of Tonbridge, notably the River Bourne at East Peckham and the Rivers Teise and Beult at Yalding.

2.1.3. The Medway flows through the centre of Tonbridge where it splits into several branches including the Botany and Gasworks Streams. At Remembrance Gardens in the town centre at the confluence with the Gasworks Stream there is a weir structure known as Buley's Weir, which controls the flow from the River Medway into the Gasworks and Botany Streams. The Botany Stream is culverted between the Sainsbury's car park and the Vale Road area.

2.1.4. The Medway is joined by a number of tributaries around the town including the Hilden Brook, Hawden Stream, Southborough Stream (also known as

the Somerhill Stream), Tonbridge Mill Stream and Pen Stream. In the early 2000s, these watercourses were categorised as Critical Ordinary Watercourses and so became reclassified as Main River. A Main River is a river over which the Environment Agency has jurisdiction for its operational and regulatory functions.

2.1.5. The Medway is navigable from Lucifer Bridge just downstream from the FSA to Allington Lock near Maidstone. The first of 10 locks and weir structures is located in the eastern part of central Tonbridge. This is known as Town Lock. This lock also contains a radial sluice and a weir, which maintains the levels of the Medway under normal conditions for navigation purposes.

## *2.2. Areas at risk of fluvial flooding within the Medway catchment*

2.2.1. Over the centuries, many towns and villages have developed in the floodplain of the Medway and so flooding has always been a key risk, particularly in the Medway from Penshurst to Maidstone.

2.2.2. Historic records show that, prior to the construction of the FSA, major floods affected Tonbridge on average once every 10 years with floods in the 1920's, 1947, 1960, 1963, 1968, 1974, and 1979.

2.2.3. Since construction of the FSA Tonbridge has been flooded on two occasions, in 2000 and in December 2013. On each of these occasions, storing flood water in the FSA reduced the flood depths that would otherwise have been experienced.

2.2.4. The flood of December 2013 affected numerous homes and businesses in locations including Hildenborough, Tonbridge, Five Oak Green, East Peckham, Laddingford, Collier Street, Yalding, Watlingtonbury and Maidstone. In addition, flooding of land and isolated property flooding occurred widely throughout the Middle Medway area.

2.2.5. All of these floods had a significant impact – damage to property, disruption to business, upheaval to people's lives and the continued uncertainty of the threat of another flood.

## *2.3. Historical flood events affecting Tonbridge prior to construction of the Leigh Flood Storage Area*

2.3.1. Tonbridge has been susceptible to flooding for hundreds of years, with reports of flooding recorded as early as 1814.

2.3.2. Possibly the most severe flooding occurred on 16 September 1968. The first 2 weeks of September had been exceptionally wet, and over the weekend of 14/15 September around 100mm of rainfall caused extensive flooding in Tonbridge and Hildenborough. I attach Appendix A which



contains photos showing some of the impacts of the flood events in 1937, 1968, 2013 and 2020.

- 2.3.3. Various engineering works had been undertaken over the years to improve conveyance and manage river flows. However, it was this 1968 flood event that prompted the construction of the FSA to seek to better protect Tonbridge and Hildenborough.

#### *2.4. Locations at risk of fluvial flooding within Tonbridge and Hildenborough*

- 2.4.1. The 2013/14 flood event illustrated very clearly those areas of Tonbridge and Hildenborough that are susceptible to fluvial flooding. I attach Appendix B which contains a map of the area affected by the 2013 flood.
- 2.4.2. In Tonbridge the areas at risk of river flooding from the Medway are located to the north of the railway line. This includes the eastern part of Barden Road, extending across the High Street and then into the commercial areas around Sovereign Way and Medway Wharf Road. Flood risk in the town centre is reduced to some extent by the presence of the Tonbridge Town Wall, which runs along the south bank of the river.
- 2.4.3. The Medway is joined by the Hilden Brook, and Hawden Stream at Hildenborough, just upstream of Tonbridge. In Hildenborough the areas at risk of river flooding are along the south-west boundary of Hilden Park. The Hilden Brook and Hawden Stream flow through this area. However, the main threat from fluvial flooding to Hildenborough is from rising levels in the Medway floodplain.

### **3. The approach to managing flood risk**

#### *3.1. Why flooding occurs*

- 3.1.1. Rivers are a natural feature of our landscape and are formed through the drainage of surface water run-off from land. Local topography and catchment characteristics determine the route and dimensions of river channels, although these are further influenced by human intervention.
- 3.1.2. Flows within river channels vary with prevailing weather conditions. In times of drought, flows reduce and water levels fall. Rainfall will cause flows to increase, and river levels will typically increase accordingly. In times of prolonged and heavy rainfall ground can become saturated so less, or no, water is absorbed by the soil. As a result surface water run-off into rivers increases. River flows then increase further, which can cause levels to rise above the river bank level. Water then spills out into adjacent land, known as the floodplain. This will continue until such time as flows reduce and water levels subside.

### 3.2. *How flood risk can be managed*

3.2.1. Flood risk can be considered as a product of the probability of flooding occurring at a given location, and the severity of the consequence of that flooding:

$$\text{Flood risk} = \text{consequence} \times \text{likelihood}$$

3.2.2. In undeveloped areas the flow of water into floodplains generally has little adverse impact (lower consequences), and so flood risk is lower. In developed areas the flow of water into floodplains can result in damage to property, business and infrastructure, as well as disruption to communities, and so the consequences of flooding are higher. Therefore, flood risk is higher.

3.2.3. To manage flood risk the Environment Agency needs either to reduce the probability of flooding, or reduce the consequences of flooding. Flood risk to a particular area or location can be managed by approaches that include:

- improving downstream conveyance, which reduces water levels for a given rate of flow – this can reduce the probability of flooding occurring, and reduce the consequences of flooding arising from any specific rainfall event
- reducing flow (and therefore water levels) through upstream attenuation – this too can reduce the probability of flooding occurring, and reduce the consequences of flooding arising from any specific rainfall event
- improving flood resilience – this will not affect the probability of flooding, but can limit the consequences of flooding to properties, businesses, infrastructure and communities.

3.2.4. Expanding upon each element:

#### 3.2.4.1. Improving downstream conveyance

3.2.4.1.1. Conveyance is the capacity of a river to carry flow. Improving the conveyance, both within and downstream of vulnerable areas, can reduce flood risk. This improvement can be achieved by widening, or in some cases by deepening the channel. It can also be achieved by constructing flood walls or embankments to contain high flows.

3.2.4.1.2. The success of such an approach depends on a number of factors including:

- the availability of spare capacity downstream of any proposed improvements
- adequate space to enlarge the channel, or to construct flood walls and embankments

- any downstream impacts must be manageable, such that flood risk is not simply moved from one vulnerable location to another.

#### 3.2.4.2. Reducing flow through upstream attenuation

3.2.4.2.1. Attenuation is the storage of flood water, either naturally, or through man-made intervention. Reduction of peak flows through attenuation can be achieved by constructing flow control structures within a river to regulate flow upstream of vulnerable areas. This reduces downstream flood risk. Flow that exceeds the flow through the control structure is stored behind a dam or impounding structure in a flood storage area. This impounded water is released at a controlled rate after the flood event.

3.2.4.2.2. The success of this approach depends on the availability of suitable land, and the suitability of local geography for the purpose of occasional flood storage.

3.2.4.2.3. All flood storage areas have a maximum capacity, which is dictated by the local geography, the available land and the selected height of the embankment and/or top water level to which water levels can be stored. This capacity determines the standard of protection that can be provided to downstream areas.

#### 3.2.4.3. Improving flood resilience

3.2.4.3.1. There are a variety of measures people can take to manage flood risk to their home or business. Resistance measures help stop flood water flowing into a property. These include flood doors, removable flood boards and barriers, airbrick covers, or installing non-return valves to drains and pipes. Resilience measures help minimise the damage flood water can cause if it does flow into a property. These include tiled floors, lime plaster for walls, or raised plug sockets.

## **4. The FSA and the benefits that it provides**

### *4.1. The 1968 floods*

4.1.1. Significant flooding occurred in Tonbridge in 1958, 1960 and 1963. In July 1968 consultants were appointed to study the problem and to propose solutions to reduce flood risk.

4.1.2. Shortly after this, a major flood event occurred. The flooding experienced

in September 1968 was caused by a pronounced trough of low pressure which brought exceptionally heavy rain and thunderstorms to South East England and France in mid-September 1968, with the worst on Sunday 15 September 1968. This was amongst the most severe inland flooding on record to be experienced in the Home Counties. Tonbridge was badly affected, with deep flooding occurring in low lying areas of the town.

- 4.1.3. The Southern Water Authority (SWA) considered various channel improvements and schemes to protect Tonbridge, and neighbouring villages from further devastation.
- 4.1.4. The vulnerability to flooding of communities downstream of Tonbridge, coupled with extensive riverside development within Tonbridge, made improved conveyance both unattractive and impractical. The SWA identified the construction of an online flood storage reservoir immediately downstream of the confluence of the Eden and Medway was the most appropriate option to manage flood risk in Tonbridge.

#### *4.2. The Scheme and the River Medway (Flood Relief) Act 1976*

- 4.2.1. The Environment Agency operates the FSA in accordance with a scheme (the Scheme) approved under the River Medway (Flood Relief) Act 1976 (the 1976 Act) (see Appendices C and B of the Application respectively for these documents). The Scheme is explained in paragraph 1.2 of the Environment Agency's application to vary the Scheme for the operation of the FSA (the Application) (see Appendix 1 of the Environment Agency's Statement of Case).
- 4.2.2. As a result of recent flooding in Tonbridge and the surrounding area (outlined above), the Environment Agency made the Application on 10 June 2020 for the Revised Scheme.
- 4.2.3. The 1976 Act had authorised the SWA to construct works and to acquire lands to alleviate flood risk in Tonbridge and Hildenborough.
- 4.2.4. The 1976 Act accepts through section 17(4) that property may be affected by the operation of the FSA since it gives landowners the right to be compensated when they sustain damage as a result of the Environment Agency exercising its powers under section 17 – i.e. operating the FSA in accordance with a scheme. Further, landowners may enter into easements with the operator of the FSA to allow the FSA to flood their land under sections 24 and 25 of the 1976 Act.
- 4.2.5. At the time of construction, the SWA entered into easements with landowners under section 25 of the 1976 Act. These easements gave the SWA the right to flood the land identified on the plan with the agreement "for any duration and to any depth". The consideration paid for those agreements satisfied the landowner's right to compensation under section 17(4) of the 1976 Act.

- 4.2.6. The Environment Agency acknowledges that it has an obligation to compensate for damage caused due to the operation of the FSA in accordance with section 17(4) of the 1976 Act. Indeed, the Environment Agency has paid compensation for damage caused by the FSA to land not covered by easements.
- 4.2.7. Two claims for compensation were received following the flooding which occurred on 24 December 2013. These claims related to Bridge House, Rogues Hill, Penshurst and Colquhouns Cottage, High Street, Penshurst. Both claims arose from flood damage which occurred to the properties beyond the limits of the area identified in the respective easements. In both cases these claims were assessed, and full and final settlement sums were agreed by all parties.
- 4.2.8. Much of the additional land that will be flooded as a result of the expansion is already covered by these original easements. If a landowner wishes, the Environment Agency will enter into easements with those whose land will be affected by the expansion of the FSA. Alternatively, a landowner may seek compensation from the Environment Agency in the event that any of their land not covered by the original easements is damaged through the operation of the FSA.
- 4.2.9. Please note that there is a correction needed to the Application in that Appendices G and I have been mislabeled in the contents page. Appendix G is in fact, Appendix I and vice versa. I apologise for this error.

#### *4.3. How Leigh FSA improves flood protection*

- 4.3.1. The FSA allows flow in the Medway to be regulated upstream of Tonbridge when the need arises. In these circumstances, and subject to available capacity within the FSA, flood flow above the regulated flow rate is contained within the FSA until such time as it can safely be released at a controlled rate.
- 4.3.2. Flow in the river can vary from virtually no flow in drought conditions to 250 m<sup>3</sup>/sec or more during very severe rainfall events. Flow up to 75 m<sup>3</sup>/sec presents little risk to properties and businesses in Tonbridge, but flow above this rate increases risk progressively. Environment Agency operational records of flow in the River Medway at Tonbridge indicate that this reached 226 m<sup>3</sup>/sec in 1968, resulting in widespread flooding. In December 2013 peak inflows to the FSA reached 261 m<sup>3</sup>/sec, but it was possible to regulate outflow to a maximum of 160 m<sup>3</sup>/sec through operation of the FSA.
- 4.3.3. The FSA is designed to regulate the flow upstream in order to reduce the extent and depth of flooding which occurs in Tonbridge and Hildenborough. However in extreme flood events the scope for reduction in outflow may be very limited.

4.3.4. More detail can be found in section 1.4 of the Application. The Environment Agency has also produced an animation about how the FSA works. This can be viewed on YouTube video on the home page of the Inquiry's website.

#### 4.4. Quantifying the benefits

4.4.1. In simple terms, the benefit provided by the FSA is that, when operated during flood conditions, it reduces the depth of flooding in Tonbridge and Hildenborough which would otherwise result from any specific rainfall event.



4.4.2. The extent to which the depth of flooding is reduced varies, depending on the duration and intensity of rainfall.

4.4.3. The photograph (left) was taken at the Model Railway site in Tonbridge soon after the 2013 flooding. The Tonbridge Model railway site is in the centre of the town. The blue line on the sign shows the peak flood level that was reached during the 1968 flood, a depth of 2.4m. This was before FSA was built.

4.4.4. The level being pointed to in the photograph shows the peak flood level reached during the Christmas 2013 flood, a depth of 1.5m. The two flood events were comparable in terms of resulting river flows, and so this shows the benefit that the operation of FSA provides in terms of reducing flood depth, and so reducing the consequences of flooding.

Figure 2. 1968 and 2013 flood levels at the Model Railway site in Tonbridge

4.4.5. With reduced flood depth there is a corresponding reduction in the extent and severity of flooding. I attach Appendix C which is a report dated

February 2019 produced by VBA Joint Venture Ltd in support of the Outline Business Case for the LEHES. The Outline Business Case is an internal Environment Agency document setting up the justification for a project. Section 3.1 of the VBA report showed that without the benefit of the Leigh FSA there are 1,570 residential properties that are at risk from flooding in Tonbridge and Hildenborough for a 1.3% AEP design event. For a 1% AEP design event this figure rises to 1,827 properties.

- 4.4.6. With the benefit of the FSA under the current Scheme, 318 of these properties will be protected from flooding in a 1.3% AEP design event, and 310 properties will be protected from flooding in a 1% AEP design event. In both scenarios the severity of flooding to the remaining properties will be reduced.
- 4.4.7. Prior to the construction of the FSA, flooding in Tonbridge was a relatively frequent occurrence, with significant flooding affecting the town on average every 10 years.
- 4.4.8. Since the construction of the FSA in 1981 flooding in Tonbridge has occurred on only two occasions, in October 2000 and in December 2013, indicating that the probability of flooding has been effectively reduced. Whilst flooding did occur on those two occasions, the FSA still provided benefits in terms of flood reduction, but the scale of events meant that flows could not be reduced enough to prevent flooding entirely.

#### *4.5. The Middle Medway Strategy*

- 4.5.1. Catchment Flood Management Plans (CFMPs) identify general flood management policies for river catchment areas such as the Medway.
- 4.5.2. After the 2000-2001 floods, the Environment Agency completed the Medway CFMP. This CFMP set broad flood management policies for communities. In the CFMP, Tonbridge sits within Policy Unit 4 which covers the urban area of Tonbridge and the Medway that flows through it. Policy P5 was agreed for Tonbridge which means that further action should be taken to reduce flood risk (now and/or in the future).
- 4.5.3. Once a CFMP has set the flood risk policy for an area, a flood risk strategy is developed to consider how that policy might be achieved. The strategy will investigate a long list of options and assess them for technical, economic, social and environmental viability. This process will identify the preferred options for achieving the policy, subject to the availability of funding.
- 4.5.4. One of the preferred options identified in the Middle Medway Strategy (See Appendix 8 of the Environment Agency's Statement of Case) was to increase the storage capacity of the Leigh FSA by raising the operating level.

#### **4.6.    *The 2013/14 floods***

- 4.6.1. During the latter part of 2013 the Medway catchment responded to a number of rainfall events into the winter period. December had been a wet month and by the 17 December the Soil Moisture Deficit (SMD) in the Medway catchment was 0mm and rivers were highly responsive to rainfall. The main rainfall, which caused widespread flooding in the catchment was the storm of the 23 December. This event saw 76mm of rain fall in a 24 hour period at the top of the Medway catchment at a time when river levels were still high and responding to 43mm of rainfall that had fallen over the previous weekend (21 to 22 December). The resultant flows recorded on the Upper Medway during this event exceeded those recorded during the 1968 floods and those recorded during the last major catchment wide flood event in 2000.
- 4.6.2. By Christmas morning, 180 properties had been flooded in Hildenborough. The cause of this flooding was the high water level in the Medway.
- 4.6.3. In total, across Tonbridge 84 residential properties and 50 businesses were flooded on Christmas Eve and Christmas Day. The Tonbridge town flood walls and operation of the FSA protected 701 homes and 250 businesses in Tonbridge and Hildenborough from flooding on Christmas Eve. The presence of these defences also greatly reduced the flood depths in the town. I attach Appendix B which shows a map of the area affected by the 2013 flood.
- 4.6.4. The heavy rainfall on 23 December 2013 also affected the village of Penshurst. As well as causing flooding at Bridge House, The Yews and Colquhouns Cottage, the Medway overtopped the Rogues Hill causeway. This is illustrated in the photograph on the front of the Joint Statement of Case submitted by Messrs Storey, Thompson, Burraston and Pallen. This shows the peak of the flood at 09:09 on 24 December at 29.50m Above Ordnance Datum (AOD).
- 4.6.5. Impounding within the FSA commenced at 05:55 on 24 December 2013, but by 09:09 operational records show that the level at the control structure had only reached 26.60m AOD. The peak level in the FSA was 28.05m AOD, reached at 20:40, some 11 hours and 31 minutes after flows had peaked in Penshurst. This shows that the flooding in Penshurst resulted from high fluvial flows in the Medway. Mr Irvine deals with this in more detail in his proof of evidence.

### **5. The Medway Flood Partnership**

#### **5.1.    *Why the Medway Flood Partnership was formed***

- 5.1.1. After the 2013/14 floods when more than 900 homes flooded throughout the Medway catchment, managing flood risk in the catchment gained a high profile, both locally and in government.



- 5.1.2. Reducing the risk of flooding in the Medway catchment is a complex problem. Communities, the media and MPs have high expectations of what can be achieved and whilst hard engineering and maintenance is important, it can be challenging to fund and is only part of the solution. Flooding cannot always be prevented but upstream land management, and community resilience and preparedness offer opportunities to reduce flood levels and speed up the time taken for individuals and communities to recover from flooding. Many of these activities require significant coordination across a variety of organisations and need a joint, partnership approach to prioritisation and communication.
- 5.1.3. The then-Defra Minister, Dr Thérèse Coffey MP, announced her support for a flood partnership in on 22 November 2016 during an adjournment debate raised by Tom Tugendhat MP for Tonbridge and Malling. Following this, the Medway Flood Partnership (the Partnership) was established in January 2017.
- 5.1.4. The Partnership brings together local partners, national agencies, non-governmental organisations and community representatives in a strategic, multi-agency partnership, taking a whole catchment approach. The partnership covers the entire Medway catchment upstream of Allington Lock and includes all the land draining into the rivers Medway, Beult, Teise and Eden, and their tributaries.

## 5.2. *Membership*

- 5.2.1. The membership of the Partnership includes the following organisations:

Country Land and Business Association	Environment Agency
Forestry Commission	Joint Parish Flood Group
Kent Association of Local Councils	Kent County Council
Maidstone Borough Council	National Farmers Union
Natural England	Sevenoaks District Council
South East Rivers Trust	Southern Water
Tonbridge & Malling Borough Council	Tunbridge Wells Borough Council
Upper Medway Internal Drainage Board	

## 5.3. *Aims and objectives*

- 5.3.1. The Partnership agreed the following objectives:

- Develop a shared understanding of the strategic challenges and opportunities within the catchment and the need for collaboration to address them;
- Develop a shared action plan for the next 5 years, and a 25 year vision for the future;
- Improve communications and engagement by adopting a joined up approach to engagement with communities, government and MPs;
- Broker strategic solutions to problems identified through the partnership; and

- Identify the inter-relationships between partner projects and ensure coordination between them.

## 6. The Medway Flood Action Plan

### 6.1. *What is in the Medway Flood Action Plan*

6.1.1. In December 2017, the Partnership published the Medway Flood Action Plan (MFAP) which sets out actions under 3 themes to help reduce flood risk and increase preparedness and resilience to flooding (see Core Documents 14\_01 and 14\_02). The themes are:

6.1.1.1. Capital Investment and Maintenance – led by the Environment Agency.

6.1.1.1.1. This theme of work includes traditional, engineered flood defence projects which help to reduce the risk of flooding to people, property and businesses in an area. It also includes maintenance of flood risk assets, such as sluices, to ensure they are in good operational condition and the maintenance of river channels which includes ditch and highway gully clearance, weed cutting, tree and debris removal and desilting of river beds. The Environment Agency takes the lead for this theme, working in close collaboration with other risk management authorities such as Kent County Council, Tonbridge & Malling Borough Council and Southern Water Services Limited.

6.1.1.1.2. The LEHES is an important action within the MFAP. It is being delivered by the Environment Agency in partnership with Kent County Council and Tonbridge & Malling Borough Council. The project also benefits from funding contribution from the South East Local Enterprise Partnership.

6.1.1.2. Community Resilience – led by Kent County Council

6.1.1.2.1. This theme considers a range of options to improve community resilience, which not only aims to reduce the impact of flooding on communities, but also helps them to continue to function during a flood. This might be by ensuring that the power supply is uninterrupted or by managing traffic to prevent properties flooding from road wash. The Partnership will bring together a wide variety of organisations responsible for community resilience including local authorities, the Environment Agency, water and energy companies, communications providers and other infrastructure suppliers. Kent County Council will take the lead for this theme, building on the existing work of the Kent Resilience Forum.

6.1.1.3. Natural Flood Management – led by the South East Rivers Trust and Natural England

6.1.1.3.1. This theme examines the role that natural flood management can play in helping to reduce the impacts of flooding in conjunction with

engineered solutions. There are a wide range of potential techniques to reduce the risk of flooding by slowing and reducing flows, whilst achieving other environmental and social benefits. Measures include re-meandering rivers, targeted woodland planting, and techniques to hold water temporarily on the land. Natural England with the South East Rivers Trust will take the lead for this theme working in close collaboration with the Partnership and other local partners.

## **7. The Leigh Expansion and Hildenborough Embankment Scheme and the benefits that it will provide**

### *7.1. Description of the Revised Scheme*

7.1.1. The proposed scheme has two key elements.

7.1.2. Firstly, under the Application, the Environment Agency proposes to increase the maximum operating water level within the FSA from 28.05m AOD to 28.60m AOD. This change does not require the crest of the main embankment to be raised, and it will increase the number of households benefitting from a reduction in flood risk. It will increase the permitted storage volume from approximately 5,580,000m<sup>3</sup> to approximately 7,200,000m<sup>3</sup> thus enabling greater reduction in peak flow rates downstream during future flood events.

7.1.3. More details of the works can be found in section 3.2 of the Application.

7.1.4. Secondly, increasing the permitted capacity of the FSA will allow a new flood defence to be built at Hildenborough (subject to necessary approvals). Without the increase in the permitted capacity of the FSA, a new defence in Hildenborough would not be feasible as it would reduce flood storage in the natural floodplain and increase flood risk in Tonbridge. The proposed increase in the permitted capacity of the FSA will offset this loss of storage at Hildenborough.

### *7.2. The benefits of the Revised Scheme*

7.2.1. The Revised Scheme reduces flood risk downstream of the FSA and so flood extents are reduced compared with the existing scenario (when the maximum stored water level is limited to 28.05m AOD).

7.2.2. The benefits of the Revised Scheme in terms of the reduction in flood risk are set out in Section 6.5.2 of the Leigh FSA Expansion Flood Risk Assessment prepared by JBA Consulting and dated August 2020 (FRA) (see Appendix 4 of Environment Agency Statement of Case).

7.2.3. With reduced flood depth there is a corresponding reduction in the extent and severity of flooding. Section 3.1 of the Economics report produced by VBA Joint Venture Ltd (see Appendix C) in support of the Outline Business Case for the LEHES showed that without the benefit of the Leigh

FSA there are 1,570 residential properties that are at risk from flooding in Tonbridge and Hildenborough for a 1.3% AEP design event. For a 1% AEP design event this figure rises to 1,827 properties.

7.2.4. With the benefit of the FSA under the Scheme, 318 of these properties will be protected from flooding in a 1.3% AEP design event, and 310 properties will be protected from flooding in a 1% AEP design event. In both scenarios the severity of flooding to the remaining properties will be reduced.

7.2.5. With the benefit of the FSA under the Revised Scheme, a further 216 residential properties will be protected from flooding in a 1.3% AEP design event, and a further 248 properties will be protected from flooding in a 1% AEP design event. In both scenarios the severity of flooding to the remaining properties will be further reduced.

7.2.6. Ben Gibson's proof of evidence explains the modelling that underpins these conclusions on the benefits of the FSA.

### *7.3. Funding*

7.3.1. The LEHES is expected to cost £21.3 million. The project has secured funding for development and construction through government's Flood Defence Grant in Aid, and significant contributions of £2,575,000 from Kent County Council, £575,000 from Tonbridge and Malling Borough Council and £2.3million from the South East Local Enterprise Partnership (SELEP).

7.3.2. In order to gain SELEP funding the project had to demonstrate how it contributes to delivery of the SELEP's wider policy and strategic objectives. At the time of bid submission, Tonbridge & Malling Borough Council were at a key stage in the development of their Local Plan with work being done to identify a supply of sites that will meet the housing and employment needs of the borough up to 2031. Significant parts of the borough fall within the flood zone. So Tonbridge & Malling Borough Council identified that urgent work was needed to increase the capacity of the Leigh FSA in order to achieve greater protection for both existing homes and businesses, and to enable new residential and commercial development to take place to meet the objectively assessed need of the area and stimulate sustainable economic growth.

7.3.3. In addition to the existing homes and businesses that the Revised Scheme will help, it will also enable economic benefits of:

- 70 direct jobs created and safeguarded
- 200 associated jobs created (2,900 new jobs created on unlocked employment sites by 2031)
- 1.25ha of new employment land (Over 13ha of new employment land in use by 2031)

#### *7.4. Planning approval*

- 7.4.1. In its Statement of Case, dated 22 December 2020, the Environment Agency referred to the application for planning permission that is required for the works related to this Scheme under the Town and Country Planning Act 1990 (as amended). The planning application also seeks permission for other improvement works at the Leigh Embankment which are required under the Reservoirs Act 1975 (and referred to as 'Measures in the Interests Of Safety' under the 1975 Act, or 'MIOS').
- 7.4.2. Given the location of the FSA, three different local planning authorities are affected: Sevenoaks District Council, Tonbridge & Malling Borough Council and Tunbridge Wells Borough Council (see Fig.1, from the Planning, Design and Access Statement). The Statement of Case (at Paragraph 5.2) refers to Sevenoaks District Council acting as the nominated local planning authority for the three local planning authorities.
- 7.4.3. A number of the planning application documents are also listed as being of relevance for this application under the 1976 Act, and they are now on the inquiry library website. These have been selected from the full set of planning application documents and copies of these further documents can be provided to this inquiry if necessary. They are all publicly available on the relevant local planning authorities' websites.
- 7.4.4. At the time that the Statement of Case was prepared, it was anticipated that it was likely that a decision on the planning application would be made in January 2021. The works have now obtained planning permission, from each of the three local planning authorities with regard to their own area. The time limit for any statutory challenge to them has also now passed.

### **8. The wider impacts of the LEHES**

- 8.1. Modelling has shown that the additional level of water permitted to be impounded as part of the Revised Scheme would reduce in impact as one progresses upstream from the radial gates. Consequently at Penshurst there is no further increase in either depth or extent. However, the Environment Agency does acknowledge that there is a residual risk of increased duration of flooding from the Revised Scheme at Penshurst, as set out in its FRA submitted as part of the Planning Application (see paragraph 5.1.3 of the FRA in Appendix 4 of the Environment Agency's Statement of Case), and discussed in Ben Gibson's proof of evidence.
- 8.2. The compensation provisions of the 1976 Act continue to apply to protect the interests of landowners in the area. Section 17(1) of the 1976 Act authorises the Environment Agency to operate the control structures to control the flow of the river downstream, in accordance with the approved Scheme.
- 8.3. The Environment Agency has already been in discussion with those owners who are likely to be affected by the Revised Scheme, and it will be able to negotiate

compensation and/or easements with affected landowners as appropriate.

#### *8.4. Objections to the Application*

- 8.4.1. We are very aware of the strength of feeling within the community at Penshurst over the Revised Scheme. Whilst the concerns that the Revised Scheme would increase flood risk in Penshurst are understandable, these concerns are not supported by evidence. Historic flooding in Penshurst has occurred either prior to, or during the early stages of impounding in the FSA, so has arisen as a consequence of high fluvial flows.
- 8.4.2. The modelling that we have undertaken to assess the impact of raising the impounding level shows minimal impacts as far up as Rogues Hill Bridge under even the most testing conditions.
- 8.4.3. Paragraph 6.5 of the Environment Agency's Statement of Case lists those who have objected to the Application and Appendix 3 of the Environment Agency's Statement of Case sets out our replies to the objectors. We have responded in writing to all those who raised objections during the summer 2020 consultation period and addressed all of the points that each has raised. None of these objections has been negotiated away.
- 8.4.4. We have recently received an objection following service of our Statement of Case from Mr Bowes of the Leicester Arms in Penshurst.
- 8.4.5. We have also received correspondence from Mr Callum Findlay OBE of Yalding.
- 8.4.6. We shall respond to both of these letters before the Inquiry and ensure the objections and our responses are uploaded to the Inquiry website.
- 8.4.7. Following receipt of objections I visited Mr Thompson at The Yews on 26 August 2020 and Mr Storey at Bridge House on 24 September 2020 to discuss their concerns.
- 8.4.8. A number of the objections received raise concerns over the flooding of local public highways, including a section of Rogues Hill, which already occurs during periods of heavy rainfall. The FRA confirms that the Revised Scheme will not change the flood water levels at Rogues Hill (see section 5.1 of the FRA). I attach Appendix D which shows in greater detail the properties of those near to Rogues Hill who have objected. Comparing these with Appendices A and B of the FRA it can be seen that the modelled effect of the Revised Scheme does not extend to these properties.
- 8.4.9. The Environment Agency has engaged the National Flood Forum to help the local community to set up a flood action group. This will allow the concerns of the community to 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. We understand that the National Flood Forum will be meeting with residents of Penshurst shortly.

#### *8.5. MP involvement*

8.5.1. We have been in correspondence with the local Member of Parliament, Tom Tugendhat with regard to our Application.

8.5.2. In his letter dated 13 August 2020 (see Appendix E) to the Environment Agency's Chief Executive, Tom Tugendhat MP asked whether the Environment Agency could look at three issues raised with him on behalf of residents by the owner of Bridge House, these being:

- that a measuring station be installed at Penshurst to provide evidence of timing and levels so that actual flood levels after the confluence of the River Medway and River Eden would be known;
- that the Environment Agency pay the cost of making Mr Storey's neighbour's studio resilient to flood; and
- that agreement is reached towards the implementation of already given planning permission at Bridge House to defend it from flood water.

8.5.3. Our response to Tom Tugendhat can also be found in Appendix E. In summary:

- We have agreed to the installation of a gauging station downstream of Rogues Hill Bridge so that we can confirm our understanding of any effect of future operation of the FSA at Penshurst. We aim to complete this by the end of Summer 2021.
- With regard to paying the cost of making Mr Storey's neighbour's studio resilient to flood (i.e Colquhoun's Cottage), we plan to discuss the issue of flooding at this location with the owners of the property. We do not consider that the Revised Scheme will result in any increase in flood risk to the property. The compensation provisions of the 1976 Act continue to apply to protect the interests of landowners in the area.
- At Bridge House, Mr Storey's property, we are working with him to establish the likely cost of the modifications to the property to improve its resilience to flooding, and we have agreed to reimburse his professional fees for this. We do not consider that the Revised Scheme will result in any increase in flood risk to the property. The compensation provisions of the 1976 Act continue to apply to protect the interests of landowners in the area.

## 9. Conclusion

- 9.1. Since its construction the FSA has been highly effective in reducing both the frequency and the severity of flooding in Tonbridge and Hildenborough. The benefits of this, financial, economic and social, are substantial.
- 9.2. Flooding continues to occur, however, and there is still further significant benefit to communities in Tonbridge and Hildenborough to be gained through the implementation of the Revised Scheme.
- 9.3. The Environment Agency seeks approval to operate the FSA in accordance with a new scheme under section 17(3)(a) of the 1976 Act, called in the Application the Revised Scheme having regard to:
- the extra protection from flooding to the residents of Tonbridge;
  - the extra protection from flooding to the businesses in Tonbridge;
  - that there is no increase in risk from flooding to residents and businesses downstream of Tonbridge;
  - facilitating the construction of flood defences in Hildenborough;
  - the available funding for the LEHES to expand the FSA;
  - that no person's human rights are prejudiced;
  - extensive modeling demonstrating that the impact of the Revised Scheme is minimal;
  - the Environment Agency's extensive consultation;
  - the Environment Agency's continuing efforts to negotiate with objectors; and
  - that the 1976 Act protects landowners.
- 9.4. The Environment Agency requests that the Minister approves the Revised Scheme.



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Tim Connell