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## River Thames Scheme

Walton Bridge to Richmond (downstream of  
the proposed flood channel)

Questions and Information Requests

November 17<sup>th</sup> 2016

Process sponsored by:



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## Explanation

During the Downstream Discussion Group workshop attendees were asked what information they wanted and what questions they had.

All the questions asked throughout the workshop have been collated into this single document and similar questions put together. Those questions that were asked during the Q&A session at the workshop are shown in [blue text](#).

The people responding have provided an indication of how confident they are in their answer based on the following:

1. Highest possible confidence (e.g. based on extensive research over many years on this topic in this area, or this is what a law or other legal instrument says, or it is a widely accepted or evidenced fact)
  2. Good Evidence (e.g. based on evidence from similar situations, modelling, other evidence)
  3. Based on best professional judgement/experience
  4. Tentative
  5. We do not yet have an answer to this
- DG This means it is something for the Discussion Groups to discuss and work out
- N/A Used in Section 3 - Community Resilience Measures (CRM), as at the moment, answers are a statement of our proposed route forward.

Question	Answer	Level of confidence
<b>1 Modelling</b>		
1.1 Why was Trowlock Island gauge not used in the modelling?	The model was calibrated using the upstream and downstream gauges at each of the Thames locks and at the flow gauging stations on the Thames. As this gives a large number of gauges within the study area it was felt to be sufficient for the calibration exercise. The Trowlock Island gauge is around 1km away from the gauge at Teddington so with a good match at Teddington we would expect water levels to match well at Trowlock Island. The model results could be further verified using the observed water levels at Trowlock Island.	1
1.2 Please explain the assumptions and how they are used to show flood risk at Teddington will be improved.	Modelling has shown that the increase in flow at Teddington resulting from the scheme is very small, up to 2%. The additional gates at Teddington provide sufficient addition capacity to reduce the current bottleneck at Teddington and to allow for this increase in flow. The removing of this bottleneck is sufficient to provide a small reduction in levels when compared to the current condition.  In addition to this Community Resilience Measures are being considered to help manage flood risk locally for those who would remain at highest risk. We have a dedicated team managing this.	2
1.3 We have been led to believe the 2D modelling would be Trowlock Island specific and add reassurance related to possible reduction to flooding. Is this not so?	Trowlock Island is represented in the 1D-2D modelling. The model covers a large area, extending a long distance upstream and downstream of Trowlock Island. This means it is able to more accurately capture the sources of flooding for Trowlock Island and impact of the River Thames Scheme than a localised model would do. The modelling work is looking at the impact of the scheme at all locations along the Thames to ensure they all benefit from reduced flood risk.  The modelling work has consistently shown a reduction in flood levels at Trowlock Island for all flood conditions. This is due to the impact of the additional gates at Teddington Weir. We expect the 1D-2D modelling to confirm this benefit, which should add further reassurance about the effectiveness of the River Thames Scheme.	2
1.4 What can Trowlock Island expect from flooding heights?	The latest modelling results predict that flood levels are reduced by 0.04m to 0.12m. The reduction in flood level at Trowlock Island is dependent on the flood magnitude.	2

<p>1.5 The modelling all seems to be fairly high level. My concerns are very micro! Impact on river flows over a 100m depth immediately below Molesey Weir C. What micro modelling has or will be done?</p>	<p>The model is very detailed for both the river channel and floodplain. As far as we are aware it is the most detailed model in Europe of its type. The floodplain is represented as 10m by 10m grid squares in the 1D – 2D model. We are happy that the model gives accurate flood predictions.</p> <p>In addition, Computational Fluid Dynamics (CFD) modelling is about to begin. This is 3D modelling with an extremely fine resolution to investigate local flow velocities. There will be CFD modelling of the new gates at Molesey Weir C, Sunbury and Teddington, and for key structures along the flood channel.</p>	<p>1</p>
<p>1.6 When will the new flood risk modelling be made public?</p>	<p>The flood model outputs can be considered in two parts:</p> <ol style="list-style-type: none"> <li>1) The Catchment Flood Model for existing flood risk. Once all of the baseline modelling has been completed the Risk of Flooding from Rivers and Sea and the Flood Map for Planning will be updated. Once complete the data will be available to our partners and to members of the public. The outputs are expected to be available in summer / autumn 2017.</li> <li>2) Modelling work related to the impact of the River Thames Scheme. The scheme design will continue to be refined until the Outline Design is finalised. As such, whilst a large amount of modelling work has been completed, outputs from this work remain provisional. We expect the Outline Design to be finalised in summer 2017.</li> </ol>	
<p>1.7 When will revised flood model outputs be released?</p>	<p>See 1.6</p>	<p>2</p>
<p>1.8 How is the proposed scheme affecting river flow rates in Kingston?</p>	<p>The flood modelling predicts that peak flow rates in the Thames at Kingston will increase when the River Thames Scheme is operating by up to 2%.</p>	<p>2</p>
<p>1.9 How reliable are the models? After Jubilee Channel opened areas downstream flooded for the first time.</p>	<p>As far as we are aware it is the most detailed model of its type in Europe. It has been calibrated against previous events to check that the outputs from the model match recorded observations from real events.</p> <p>The modelling is also being peer reviewed by an independent team of experienced modellers.</p> <p>Areas downstream of the Jubilee River have a long history of flooding. The operation of the Jubilee River in 2002/03 and 2013/14 was in response to the largest floods in the Lower</p>	<p>2</p>

	Thames since 1947. These areas would have flooded with or without the Jubilee River in place.	
1.10 Model outputs before or after Jubilee River?	The flood model includes the Jubilee River. The intake gates to the Jubilee River at Taplow are opened and closed in the model according to their defined operating rules.	1
1.11 Impact of water flooding and re-entering Thames via relief channel. What effect does that have on total flow immediately downstream?	<p>This mechanism, if and when it occurs, is captured in the modelling. The model allows overland flows from the Thames to enter the flood channel downstream of the intake gates if flood levels are high enough.</p> <p>The flood modelling predicts that peak flow rates in the Thames downstream of the flood channel will increase when the River Thames Scheme is operating by up to 2%.</p>	2
1.12 More validation of models. Have team carried out this sort of modelling in other rivers?	<p>Yes, the engineers undertaking the modelling for the River Thames Scheme each have well over 10 years' experience working on flood modelling studies testing flood alleviation options. This includes using and developing 1D and 1D-2D flood models for many other rivers in the UK and overseas.</p> <p>The modelling is also being peer reviewed by an independent team of experienced modellers.</p>	1
1.13 How will the Scheme affect flow rates below Teddington, To Putney?	The flood modelling predicts that peak flow rates in the Thames immediately downstream of Teddington will increase when the River Thames Scheme is operating by up to 2% max. The percentage increase in flows diminishes moving downstream of Teddington because the tidal influence becomes much stronger. At Putney the predicted increase in peak flows is less than 0.5%.	2
1.14 Does the model consider the reduced flows over Molesey Weir during the upgrade? (shutters in place)	There was no need to represent this temporary condition in the model. For the 'design events', such as the 1 in 20 or 1 in 100 floods, the post-upgrade Molesey Weir layout is represented.	2
1.15 What water level is used to give the 1 in 100 flood map for Kingston?	The 1 in 100 flood map displayed at the workshop is the flood outline for a 1 in 100 event taken from the Environment Agency's current published flood map i.e. without the RTS in place. This outline is a modelled water surface and is not defined by a single water level. A level could be provided but this would require a specific location.	2

<b>2 Flood Channel</b>			
2.1	What steps will be taken to ensure no contamination of the river when [the] channel [crosses] former landfill?	Landfill on the route of the channel will be removed. The sides of the channel will be formed by steel sheet piling with sealed clutches to isolate the channel from the remaining landfill material and associated leachate. The need for any additional sealing measures will be based on an assessment of the risk posed to the channel water quality by the leachate tested from the particular landfill under consideration. We are considering all options to avoid the most contaminated sites.	2
2.2	How are you going to ensure sufficient flow around Desborough Island, given bridges across Desborough Island, without threatening the amenity of the Thames Path (and national cycle route) on the south bank?	Our preferred option for capacity improvement at Desborough Island is to widen the Cut on the northern side by approximately 3m. This will also include deepening the channel where it passes under the two bridges over the Cut as it cannot be easily widened at those points. One of the advantages of northern widening is to minimise impacts on the Thames Path.	2
2.3	Why can't the channels be used for leisure and sport?	The channel can be used for leisure and sport and we are seeking to gather ideas through these discussion groups to promote this as part of the scheme.  We will need agreement from stakeholders to allow this to take place.	3
2.4	Will there be an impact on Thames Meadow from widening Desborough Cut?	No	1
2.5	What does the model show in terms of options for Desborough cut? [In terms of water flow]	All the shortlisted options were sized to ensure sufficient flow capacity to provide the required additional conveyance. The costs and impacts of each option were then compared in the appraisal and reviewed at community workshops.	2
2.6	Do channels always have water in them?	Yes except for the Abbey Meads section at the end of Channel Section 2 which has been designed as a wide shallow floodway which will be relatively dry in the summer and wetter and boggy in the winter.	2

<h3>3 Flood Defences (including Property Level Products [PLP] and Community Resilience Measures [CRM])</h3>		
<p>3.1 Are all options going to be considered for protecting people and homes on Trowlock Island in the next Spring Consultation? E.g. floating, lifting, sealing, raising electrics, providing waders, bridges.</p>	<p>Where neither permanent nor temporary community level measures are viable options to reduce or manage flood risk (such as Trowlock Island) we will review the available property level options for how homeowners in these communities can be supported. Whilst we have previously been limited in terms of what measures are financially supported as part of the PLP project, we will review the wider alternative property level options that may be considered appropriate to support going forwards. Including options implemented by homeowners.</p>	<p>N/A – answer is a statement of our proposed route forwards</p>
<p>3.2 Can TI [Trowlock Island] be assured when we are looked at next spring all options will be considered? Including the more expensive options like lifting houses.</p>	<p>See above answer to 3.1.</p>	<p>N/A – see 3.1</p>
<p>3.3 Talk of localized flood defences – but flood defences are not taken into account as a solution to flooding because they can always fail?</p>	<p>Question not understood</p>	
<p>3.4 <a href="#">Has your survey of high risk properties been completed i.e. you have identified all properties that fall into the category? I am asking this as an Eel Pie Resident.</a></p>	<p>No we have not completed our surveys of high risk properties. Our assessment is based on two pieces of information; outputs from the hydraulic model are needed to confirm flood extents and which properties may be at risk, and for those properties we need to establish the threshold level (lowest point of entry to the property).</p> <p>Eel Pie Island will be considered in the review of the potential implications of reduced use of the Thames Barrier and any potential impact from the River Thames Scheme.</p>	<p>N/A – see 3.1</p>
<p>3.5 <a href="#">Which ones [properties] are high risk?</a></p>	<p>We are currently undertaking additional threshold surveys to confirm individual property levels.</p>	<p>N/A – see 3.1</p>

	<p>We will use the 1D-2D model to gain a greater accuracy of water levels in the flood plain.</p> <p>We are expecting to complete these exercises in Spring 2017 and will be in a better place to confirm high risk properties at that point.</p>		
3.6	<p>For one of the communities for whom there have been no appropriate PLP flood defences, will all options be looked at going forward?</p>	See answer to 3.1	N/A – see 3.1
3.7	<p>This workshop seems to focus on Shepperton to Teddington. Eel Pie Island is further downstream. Is it being considered?</p>	See answer to 3.4	N/A – see 3.1
<b>4 Thames Barrier</b>			
4.1	<p>What constitutes a non-fluvial closure?</p>	<p>Generally speaking this is a closure based predominantly on high sea levels, rather than river flows.</p> <p>An example would be an east coast surge like we saw in December 2013. Such a closure would be driven by the large tidal surge from the North Sea with little to no influence from the fluvial (river) flow. However, it is much more complex than that as all forecasts for river levels are based on the fluvial flow and the incoming tide, with one having more influence than the other.</p>	2
4.2	<p>What is the time scale to 2034?</p>	<p>The work will need to proceed in several stages over the next few years.</p> <ol style="list-style-type: none"> <li>1. By spring 2017 complete two separate computer modelling tasks to enable the development of potential solutions, these are;           <ul style="list-style-type: none"> <li>• Modelling fluvial flood risk for the River Thames Scheme so that we understand what residual flood risk will look like in the area following completion of the scheme.</li> <li>• Modelling the tidal/fluvial interface to identify those communities that currently benefit from closures of the Thames Barrier for high river flows and produce maps of the risk.</li> </ul> </li> <li>2. By spring 2018 use the modelling results to identify potential options to manage the risk of river flooding that is currently</li> </ol>	3

	<p>managed using the Thames Barrier.</p> <ol style="list-style-type: none"> <li>3. In the Spring/Summer 2018 to share the potential options with Local Councils and affected communities in order to identify a preferred option and discuss how and when the operation of the Thames Barrier to manage high river flows will be changed in line with the Thames Estuary 2100 plan.</li> <li>4. Any alternative measures will need to have been appraised, designed and implemented by 2034 so that we can make changes to the way the Thames Barrier is currently operated to manage high river flows. We are not planning to make any changes to the way the Thames Barrier is currently operated to manage these events until we have considered and consulted on alternative options as outlined above.</li> </ol>	
<p>4.3 Can you completely confirm that the Thames Barrier will continue to be used for fluvial flood risk until 2034? Does this mean you have changed previous undated policy that the Thames Barrier will be used substantially less for fluvial risk and that we must look to our floodplain?</p>	<p>The TE2100 plan, published in 2012, states the need to agree a programme for planning and putting in place alternative measures for managing fluvial flood risk in the west London area by 2034. These alternative measures are designed to reduce the use of the Thames Barrier for more frequent, less severe fluvial flood events, in order to preserve it for managing tidal risk for the whole of London. This policy remains in place.</p> <p>We will initially work to understand the risk that will remain to residents when this happens and then work with the affected communities and Local Councils to come up with mutually acceptable solutions to manage this risk in the longer term.</p> <p>It is our intention that the Thames Barrier will continue to be used for these lower order fluvial events as needed out to 2034. However, should such solutions be in place before 2034 then the Thames Barrier would revert to its original operating matrix at that time. Furthermore the TE2100 plan is subject to regular reviews regarding amount of sea level rise and as such, timescales could be subject to revision.</p>	<p>2</p>
<p>4.4 What ideas are there for options to mitigate flood risk in the west London section post 2034 only 10 years after completion of the RTS in 2024?</p>	<p>We do not know yet. We are at the starting point of this piece of work and first need to understand which properties are at risk and to what extent before options can be developed. The models currently being developed should help to provide information for this.</p>	<p>5</p>

<p>4.5 Will the RTS model be useful to assess the consequences of not closing the Thames Barrier after 2034?</p>	<p>Yes. An initial assessment of the consequences of not closing the Thames Barrier has been started based on existing models to enable us to get an early understanding of potential impacts and to start looking at options. The new model currently being developed will be used to validate these studies and bring improved accuracy on potential impacts. It will also ensure any combined impact from the River Thames Scheme is understood.</p>	<p>2</p>
<p>4.6 Definition of what Tidal Thames means?</p>	<p>The tidal Thames is considered to be that part of the Thames River which is subject to the tides. This has long been held to be the stretch downstream of Teddington Weir extending out to the mouth of the estuary. The weir being the natural dividing element between the river and the estuary. Although a subtle tidal influence can be seen as far as Molesey, Teddington Weir is still considered to be the cut off from river to estuary.</p>	<p>2</p>
<p>4.7 What would 2014 flood have looked like without Thames Barrier?</p>	<p>The flooding in the winter of 2013/14 was a long duration event with a complex interaction of a range of fluvial flows and tidal levels over the period of several months. We have not carried out direct modelling of the benefit from the Thames Barrier during this event. Initial modelling of one of the larger combinations of flows and tides has shown that the Thames Barrier reduced or prevented flooding to approximately 300 properties between Richmond and Molesey, with the greatest reduction in water levels being around Teddington.</p>	<p>2</p>
<p>4.8 Why not put in an enhanced maintenance programme for the Thames barrier and continue to use it for fluvial flood risk?</p>	<p>A comprehensive maintenance programme is in place. However during fluvial events and back-to-back closures such as those experienced during 2014, this maintenance is put on hold while we operate and would therefore become impossible to implement in future years with increased a greatly frequency of operation. The nature of fluvial flood events is different to those we experience on tidally driven closures. For instance of the 50 closures during 2013/2014, 20 of them were back-to-back, we closed every tide for 10 days, this places a much greater strain on the structure than closing for 2-3 tides during tidal events.</p> <p>The likelihood of failure of some element of the Thames Barrier in any one year increases very slightly the more times it has to close. If the barrier is required to close too frequently</p>	<p>2</p>

	its reliability may reduce and the annual probability of failure will increase. The TE2100 Plan says that 50 closures per year is the maximum amount of closures (on average) the barrier can sustain to maintain its high standard of reliability.	
4.9 Does the modelling for 2014 include use of Thames barrier?	Yes, in order to give a direct comparison for this event the use of the Thames Barrier to help manage flooding during 2014 has been included in the modelling.	1
4.10 Why is Thames Barrier considered to be worn out? By greater than design use, why should it matter how many times it's opened/closed?	<p>The Thames Barrier is a fully operational structure and continues to provide a high standard of flood risk protection to London. When the Thames Barrier was built it was expected that it would meet its design and potentially need to be replaced in 2030. However, detailed assessments were carried out under the TE2100 project on such things as climate change scenarios and sea level rise as well as the condition of machinery, structures and systems. This assessment showed that on current forecasts and continued maintenance and renewals the Thames Barrier will continue to provide a high standard of protection to London through to 2070.</p> <p>The likelihood of failure of some element of the Thames Barrier in any one year increases very slightly the more times it has to close. If the barrier is required to close too frequently its reliability may reduce and the annual probability of failure will increase. The TE2100 Plan says that 50 closures per year is the maximum amount of closures (on average) the barrier can sustain to maintain its high standard of reliability and allow for maintenance and renewal.</p>	2
4.11 [With] Increasing flow, how does this effect levels at Teddington? What is the real figure when Thames Barrier is closed?	<p>The flood modelling predicts that peak flow rates in the Thames at Teddington will increase when the River Thames Scheme is operating by up to 2%. Upstream of Teddington weir, the additional gates lead to a reduction in flood risk. The Ham Lands conveyance channel is intended to prevent any increase in flood levels downstream of Teddington.</p> <p>The impact of the River Thames Scheme has been modelled with the Thames Barrier closed and with the Thames Barrier open. Closure of the Thames Barrier affects flood levels but the relative impact of the River Thames Scheme at Teddington remains the same.</p>	2

<h2>5 Scheme Finance / Funding</h2>		
<p>5.1 [What is the] Estimated cost of the work carried out so far. Including modelling, survey work etc.?</p>	<p>To date, the spend on the project is approximately £19 million. This includes for individual Property Level Protection to nearly 400 homes, ground investigation incorporating over 1,000 boreholes and trail pits, the production of an advanced hydraulic model, design of the scheme, the purchase of some properties in negotiation with home owners as well as general running costs.</p> <p>A business case to take the scheme to Outline Business Case have been submitted to Defra and the Treasury with a value of £34 million pounds - this is expected to be approved in the New Year.</p>	<p>1</p>
<p>5.2 Landfill tax was discussed at the previous workshop. Has there been any process for a nil rate banding for this tax.</p>	<p>We are working extremely hard to avoid those landfill cells that contain the most hazardous waste, which will be difficult to manage during construction and for the long term operation of the scheme. We are aiming to process, treat and utilise the remaining excavated material in a number of ways through construction to meet long term operational needs such as access roads and landscape features for the scheme. We do not want to set a precedent of avoiding wholesale landfill tax unless it is necessary. Apart from the financial implications we are considering the environmental impacts of taking excavated materials over long distances to alternative landfill sites, an objective of the team is to keep carbon and transport movements to an absolute minimum.</p>	<p>2</p>
<h2>6 River Users</h2>		
<p>6.1 How much consideration has there been given to the impact of the scheme (increased flows) on sport river users during winter? Some 300,00 to 450,00 person outings Sunbury to Teddington.</p>	<p>We cannot stop flooding events from having an impact on sport river users, the likely impact downstream of the weirs is an increase of 2-3% when weirs are all fully drawn in an extreme event, the Environment Agency Waterways will continue to issue warnings to River Users as currently.</p> <p>The River Thames Scheme flood channel will only operate when river flows are above around 200m<sup>3</sup>/s. We understand that 200m<sup>3</sup>/s is the threshold above which it would always be unsafe for sports users to go out in the river. There should be no change in river flows below 200m<sup>3</sup>/s.</p>	<p>2</p>

	The flood modelling predicts that peak flow rates in the Thames at Teddington will increase when the River Thames Scheme is operating by up to 2%.		
6.2	What about boat moorings? Is there any scope to include these?	Yes there is consideration in the options analysis for new, refurbished or additional moorings particularly at the navigational weir complexes.	1
6.3	Are residential and commercial boats being considered? [In relation to PLP]	The expenditure of Flood Defence Grant in Aid or Levy funding does not include for the protection of commercial boats. That remains the responsibility of the individual boat owner.	2
<b>7 Ham Lands</b>			
7.1	Has an environmental survey of Ham Lands Nature Reserve been undertaken (regarding the proposed excavation of the channel)?	That is part of the next stage of the work.	2
7.2	Are projects like Ham lands, if okayed, going to use barges to take the spoil away?	Options for removal/disposal/re-use of spoil are still being investigated. Use of barges is an option. It is an ambition of the scheme to re-use material locally where possible.	4
7.3	Clarification that the area is only Ham Lands Northern section and not lagoon and southern Ham Lands	Confirmed.	1
<b>8 Flood Risk</b>			
8.1	Shortcuts like the jubilee river are proposed – will the ‘overtaking’ water create a bulge that might overtop river banks when it re-joins the Thames? Did this happen with the Jubilee River?	The operating procedures for the Jubilee River, including making only small gate movements, ensures that any small ‘blip’ in water level due to the different timing of the flows is very short lived. This occurs early during an event and will not increase the maximum water level in the Thames.  Gates at new RTS channel inlets will also open and close in small increments so that no sudden surge expected or proposed.	2
8.2	What level is the scheme protecting to?	The RTS channel is different to a flood wall and there is no single level it is protecting to. The level of flood risk reduction varies depending on the location of a property and on the magnitude of the flood event.  The channel will operate at 1:20 level or 150 cubic metres per second but the increase in capacity will also bring benefits in larger events.	1

<p>8.3 What is the policy on measures that help one area but at increased risk to others?</p>	<p>We are committed to building a scheme which will not make flooding worse elsewhere, and we would be unable to gain approval for a scheme which is likely to do so.</p> <p>The River Thames Scheme will benefit all communities between Datchet and Teddington.</p> <p>Using the most up to date modelling technology, we have modelled a large range of scenarios of different types of flood event on the River Thames which ensures that all likely scenarios can be planned for. This has demonstrated that, on average, everyone will benefit from the scheme.</p> <p>In addition to the flood channel and capacity improvements discussed previously, we have also commenced work to identify additional mitigation measures to maintain our confidence that no community's flood risk will be made worse once the scheme is built.</p>	<p>1</p>
<p>8.4 What are the projections for river flow and sea level change (if any) behind this?</p>	<p>It is assumed that this question relates to the approach in the RTS to future climate change. Work is currently ongoing in respect of the impact of climate change. Recently released advice indicates that peak river flows could increase by about 25% by the 2080s. However there remains considerable uncertainty in these estimates. This change has already been incorporated in the analysis although further sensitivity testing is required.</p> <p>The interaction between future sea level rise, the operation of the Thames Barrier and the impact on the RTS is being considered at the moment. Whilst the Thames Barrier (or a future replacement) will manage future high tide levels the implications of generally higher water levels in the tidal Thames requires more study which will be undertaken in early 2017.</p>	<p>2</p>
<p>8.5 Better definition of 1 in x many years flood</p>	<p>The likelihood of flooding is described as the chance that a given location will flood in any one year. If a location has a 1% chance of flooding each year, this can also be expressed as having:</p> <ul style="list-style-type: none"> <li>- A 1 in 100 chance of flooding in that location in any year.</li> <li>- Betting odds of 100 to 1 against a location being flooded in any year.</li> </ul> <p>The table below has further examples.</p>	<p>1</p>

	<p>However, this doesn't mean that if a location floods one year, it will definitely not flood for the next 99 years. Nor, if it has not flooded for 99 years, will it necessarily flood this year.</p>																																							
	<table border="1"> <thead> <tr> <th data-bbox="639 463 879 539">One in (x) year flood event</th> <th data-bbox="879 463 1214 539">Annual Exceedance Probability (%)</th> </tr> </thead> <tbody> <tr><td data-bbox="639 539 879 589">1 in 1</td><td data-bbox="879 539 1214 589">100</td></tr> <tr><td data-bbox="639 589 879 638">1 in 2</td><td data-bbox="879 589 1214 638">50</td></tr> <tr><td data-bbox="639 638 879 687">1 in 3</td><td data-bbox="879 638 1214 687">33.33</td></tr> <tr><td data-bbox="639 687 879 736">1 in 4</td><td data-bbox="879 687 1214 736">25</td></tr> <tr><td data-bbox="639 736 879 786">1 in 5</td><td data-bbox="879 736 1214 786">20</td></tr> <tr><td data-bbox="639 786 879 835">1 in 10</td><td data-bbox="879 786 1214 835">10</td></tr> <tr><td data-bbox="639 835 879 884">1 in 20</td><td data-bbox="879 835 1214 884">5</td></tr> <tr><td data-bbox="639 884 879 934">1 in 25</td><td data-bbox="879 884 1214 934">4</td></tr> <tr><td data-bbox="639 934 879 983">1 in 30</td><td data-bbox="879 934 1214 983">3.33</td></tr> <tr><td data-bbox="639 983 879 1032">1 in 40</td><td data-bbox="879 983 1214 1032">2.5</td></tr> <tr><td data-bbox="639 1032 879 1081">1 in 50</td><td data-bbox="879 1032 1214 1081">2</td></tr> <tr><td data-bbox="639 1081 879 1131">1 in 60</td><td data-bbox="879 1081 1214 1131">1.67</td></tr> <tr><td data-bbox="639 1131 879 1180">1 in 70</td><td data-bbox="879 1131 1214 1180">1.43</td></tr> <tr><td data-bbox="639 1180 879 1229">1 in 80</td><td data-bbox="879 1180 1214 1229">1.25</td></tr> <tr><td data-bbox="639 1229 879 1279">1 in 90</td><td data-bbox="879 1229 1214 1279">1.11</td></tr> <tr><td data-bbox="639 1279 879 1328">1 in 100</td><td data-bbox="879 1279 1214 1328">1</td></tr> <tr><td data-bbox="639 1328 879 1377">1 in 200</td><td data-bbox="879 1328 1214 1377">0.5</td></tr> <tr><td data-bbox="639 1377 879 1426">1 in 1000</td><td data-bbox="879 1377 1214 1426">0.01</td></tr> </tbody> </table>	One in (x) year flood event	Annual Exceedance Probability (%)	1 in 1	100	1 in 2	50	1 in 3	33.33	1 in 4	25	1 in 5	20	1 in 10	10	1 in 20	5	1 in 25	4	1 in 30	3.33	1 in 40	2.5	1 in 50	2	1 in 60	1.67	1 in 70	1.43	1 in 80	1.25	1 in 90	1.11	1 in 100	1	1 in 200	0.5	1 in 1000	0.01	
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<p>8.6 Does flow equate to river height?</p>	<p>Although flow is related to river level it is not interchangeable. Flow is related to the speed that water can travel and to the size of the channel it is travelling through.</p> <p>If water can be made to flow more quickly, for example by removing restrictions such as vegetation or debris, then water can pass more easily and the depth will reduce.</p> <p>The change in depth is also dependant on the width of a channel. Generally speaking a wider channel can carry a larger volume of water and therefore an increase in flow would create a smaller increase in depth when compared to a narrower channel.</p>	<p>1</p>																																						

<h2>9 Ham Hydro</h2>		
<p>9.1 In examining options at Teddington Lock have you engaged with the Teddington and Ham Hydro proposed team and if so what are the potential mutual benefits which could be realised?</p>	<p>We have engaged with Teddington and Ham Hydro. We have appraised options for capacity improvements at Teddington Weir both with and without the hydro power scheme in place. The modified hydro power proposal with liftable gates would mean that the River Thames scheme would be able to reduce the number of additional gates required at Teddington from five to three.</p> <p>Teddington &amp; Ham Hydro Cooperative Ltd were granted planning permission for the scheme in 2015. The decision was challenged through the Judicial Review process which has overturned the planning approval given. The result is there is currently no planning approval for the scheme at Teddington Weir. The hydropower developer has therefore lost the pre-accredited Government subsidy (Feed in Tariff) and this affects the financial viability of any future scheme.</p> <p>Teddington &amp; Ham Hydro Cooperative Ltd are considering the future. Unless new approvals are obtained and a financially viable scheme is presented to us there can be no progress on hydropower at Teddington Weir.</p>	<p>1</p>
<p>9.2 What would the impact of Ham Hydro be?</p>	<p>See 9.1</p>	
<p>9.3 Have you thought about asking Ham Hydro to put smaller / cheaper hydro units along overspill section at point 3/3a – copy Romney Design? Probably acceptable to everyone, as no environmental noise etc. That would release weir section by Lensbury Club (Hydro Location etc.) to become a major increase in flow and remove the need for current option 1 which will have adverse effects on boat moorings and businesses</p>	<p>Hydro power proposals are by Teddington &amp; Ham Hydro Cooperative Ltd who would need to develop a technical feasible scheme that is financially viable.</p> <p>Modified proposal by Ham Hydro with liftable gates would only have provided the equivalent benefit of two gates on the lock island; therefore additional gates would still be required across the lock island.</p>	<p>2</p>
<p>9.4 Why not concerted effort to put electricity generation in at every weir. 1000s of</p>	<p>We are not funded to build renewable energy schemes. What we have done is looked at all the weir sites on the River Thames and selected those which offer the</p>	<p>1</p>

gallons there all the time	best opportunity for hydropower development by others. Many of the River Thames Weirs have a small fall (less than 1.5m) so are not suitable. Some are too remote for connection to the National Grid or too difficult to access. We will consider any viable hydropower project on our assets.	
9.5 Environment Agency should be thinking beyond just flood control and management and taking the opportunity to harness the energy in the flow of the Thames for sustainable electricity production. What is the EA policy on renewable energy and climate change?	<p>We support renewable projects where these can demonstrate no adverse impact on the environment. Our role is primarily a regulatory one. We assess water resources impoundment applications to fully consider the effects the scheme could have on water resources and the environment. The evidence must confirm that there will be no detrimental impact on the river habitat.</p> <p>A flood risk assessment must demonstrate there would be no increase in the risk of flooding to the area from the project.</p> <p>We would assess any proposals to ensure they complied with the industry accepted standards and best practice which we have set out in published guidance for 'run of river' hydropower schemes.</p>	1
9.6 Could we include hydroelectric power to all of the weirs?	See 9.4	
<b>10 Planning</b>		
10.1 <b>Building on flood plain – has this stopped? It must stop! It sets a precedent where it is allowed.</b>	National Planning Policy steers development to areas of lower flood risk but it is the responsibility of the local authorities to determine the appropriateness of any development proposals. The applicant has to demonstrate that their proposal is in line with both national and local planning policy, that it is safe for future occupants and that it does not increase the flood risk to surrounding areas. The Environment Agency can provide maps and models to applicants when they are preparing their flood risk assessment.	2
10.2 Will existing designated floodplain be re drawn in view of the new modelling.	<p>Yes, although it should be noted that there are two parallel modelling projects discussed by the Scheme (see question 1.7).</p> <p>Once the catchment modelling for the scheme is complete and ratified the Environment Agency can advise on the revised extent of the floodplain once the scheme is built and in operation.</p>	1

	The Environment Agency's published flood maps will be updated again once the scheme is ready for operation based on the River Thames Scheme modelling results, areas benefiting from the scheme will be marked as such	
10.3 Why are new builds not required to have flood defence built in?	<p>The Environment Agency will advise on the potential flood level to any new builds, the ultimately planning decision will rest with the local authority to consider as appropriate. If a new build is to be take place the potential level of flooding that may damage the property should be considered in the design and threshold level.</p> <p>As a statutory consultee in the planning process the Environment Agency reviews planning applications including Flood Risk Assessments(FRAs) for development proposals in areas of flood risk. FRAs should include assessment of residual risk and provide details of resilience and resistance measures that are to be incorporated into the design, including finished floor levels.</p>	2
<b>11 Businesses</b>		
11.1 <a href="#">Are businesses going to be included in the scheme to help protect them?</a>	<p>Yes they will benefit from scheme. The Top 50 businesses have been identified. They benefit they get to contribute to the scheme. Top 7 and top 43 businesses need to be persuaded to contribute.</p> <p>No PLP has been installed at commercial properties to date. We will be consulting with both the community and businesses as part of the process.</p> <p>The protection of commercial properties is a fundamental element of the RTS. The RTS seeks to support businesses, improve resilience and support economic growth. We are also focussing on key infrastructure which is essential for both residents and local businesses.</p> <p>We are focussing particularly on the highest value businesses to encourage contributions to the scheme but are also improving our database of all companies that are at risk but could benefit. In general property level protection (PLP) has been directed at residential rather than commercial properties, but many businesses will also benefit from community defences.</p>	2
11.2 <a href="#">Are commercial properties being considered?</a>	See 11.1	2

<b>12 Weirs</b>			
12.1	Has consideration been given to having both sets of lock gates open at the same time? [probably in relation to Molesey Weir]	Lock gates are designed for the passage of boats not flow control. The use of the lock gates as an alternative to weir gates was investigated at the Strategy stage and dismissed due to need to substantially rebuild historic structures in limited space and additional gates would still be required to give the necessary benefits.	2
12.2	The preferred option for Teddington will create major problems for moorings and businesses – how will current mooring etc. facilities be replaced?	The potential impact on moorings downstream of the new gates is being investigated by numerical modelling. If the impact is considered significant than the provision of alternative moorings will be considered.  It should be noted that at Sunbury and Teddington, it is planned that the new gates will be the last to be opened during a flood. Therefore, these gates will not be opened before flows reach 250m <sup>3</sup> /s. Flows over the new weir gates compared to that in the main channel will be relatively low.	4
12.3	How will increased capacity at Teddington Lock help flow at high tide?	In general high tide at Teddington lock does not prevent flow downstream. Increased capacity provides additional flow area, when gates open. This reduces the hydraulic head loss at the weirs allowing increased flow.	1
12.4	When will further study re concerns of whereabouts be performed? [regarding Molesey Weir option 6]	Computational fluid dynamic modelling of Molesey Weir will be completed by summer 2017.	2
12.5	Will the EA man Locks 24-7 during the winter? If not how will locks be managed sufficiently responsively?	During the winter season 1 November to 31 March, River Thames locks (excluding Teddington Lock) are manned between the hours of 09:15 and 16:00 with a lunch break 13:00 to 14:00. Teddington Lock is manned 24/7 throughout the year. Weir movements are made when necessary whether within or out of hours as staff are on call.	1
12.6	Can we run the river 'lower' but with more increased flows? [discussion about using new weir gates at times before flood event hit]	River Thames weir gate operation is linked to maintaining navigation levels to tolerances that enable river traffic to navigate the River Thames. Operation is linked to river level until they are fully open.	2
12.7	Will the development of a sports club here [Land on South bank of Sunbury Weir] effect flooding?	All planning applications are considered on a site by site basis. Any development proposal needs to demonstrate that it does not increase flood risk to others upstream or downstream. An application for a sports club would be considered as per any other development to ensure that it does not	1

	increase flood risk.	
12.8 How will this work [regarding suggested Canoe pass at Sunbury Weir]?  Many major accidents of canoeists going through gate. When gates are open, only extreme kayakers will go through – who will take responsibility of this?	Only a suggestion at this stage all opportunities will have to be assessed to check they are viable and safe	5
12.9 Would like to know if the preferred option at Sunbury is the one that will go ahead.	As this is the preferred option it is the option that will be taken forward, unless there is an overriding reason that this should change.	3
12.10 Could lock gate be re-designed so both sets open at the same time? This would be a much cheaper option than rebuilding weirs.	See 12.1	2
12.11 When will further study re concerns of whereabouts be performed? [In regards to Molesey weir option 6]	Assessment has moved on to the detailed design stage of the preferred option. There are no further optioneering studies planned for the weir locations.	2
<b>13 Flood Plans</b>		
13.1 Who determines a 'community' for using a plan	Residents (and businesses) will decide who forms a community and if they want to take forward a plan. More often than not this will be on a geographical basis. The community will need to use and update the plan.	3
13.2 Who determines who the community is? How is it recognized and organized before the community flood plan is determined.	Residents (and businesses) will decide who forms a community and if they want to take forward a plan. We can work with a community group to develop the plan. We can suggest groupings and members but ultimately the community will need to lead and action the plan.	3
13.3 Are the RTS community resilience advisors helping with the flood plans?	Yes River Thames Scheme community resilience advisors and local councils are helping communities to write plans. Communities can get in touch through <a href="mailto:rts@environment-agency.gov.uk">rts@environment-agency.gov.uk</a>	3
<b>14 Miscellaneous</b>		
14.1 Who should I contact at the EA about unlicensed boats?	Enquiries regarding unlicensed boats should be directed to the West Thames Enquiries team using the following email address: <a href="mailto:wtenquiries@environment-agency.gov.uk">wtenquiries@environment-agency.gov.uk</a>	1
14.2 Is the waste from illegal moored boats being addressed?	We are working closely with local councils and the police. We are in contact with local pressure groups concerned about	

	<p>unauthorised moorings.</p> <p>The right of navigation means we cannot stop boats from navigating.</p> <p>Even though boats may look very scruffy and unsightly if they are registered and have valid Boat Safety Certificates and are n We are working closely with local councils and the police. We are in contact with local pressure groups concerned about unauthorised moorings.</p>	
<p>14.3 Despite red flood boards it seems as though some people consider going out on the river. The wash created can be significant and may be enough to over-top flood boards. Can consultation be given to making it illegal for bigger craft to go out?</p>	<p>The non-tidal Thames is a public right of navigation. We are not legally able to stop people using it but we provide safety guidance to protect boaters' liabilities when using the river in elevated floods.</p> <p>Red boards do not indicate the river is flooding but the flow is considerably increased. Additionally the size of the vessel does not correlate to the size of the wake. This suggestion is not feasible using our guidance. However evidence of a vessel causing wash and wake is an offence under our management legislation "The Thames Conservancy Act 1932" and can lead to prosecution.</p>	
<p>14.4 Consultation with the RNLI about river safety along the river banks. Training for bar and restaurant staff is done with RNLI expertise. Can this be extended up the river?</p>	<p>Many riparian authorities are looking at how they deliver the principles of the recently launched "National Drowning Prevention Strategy". As part of this community led initiative the Environment Agency will be working with riparian boroughs to address their local objectives. This may be working with RNLI to provide local training. However this will need to be led by the Local Authority or RNLI as the training provider and funding partner.</p> <p>The Environment Agency fully supports the national document and is working along the whole river to ensure the best local provision.</p>	
<p>14.5 The RTS shows there will be minimal benefits for Lower Sunbury – what additional solutions are being considered? Dredging for example?</p>	<p>We are planning to work closely with communities, to agree with them the best way to manage and reduce their flood risk, if they remain at high risk of flooding following the completion of the River Thames Scheme flood channel. We will first look at options for providing a permanent or temporary community level solution, to reduce the risk of flooding to a group of homes, or the whole community.</p> <p>Dredging has been looked at but is not cost beneficial. In certain areas dredging can be the most cost effective approach. In others,</p>	

	it can make flooding worse downstream, be ineffective or divert resources away from other activities which are far more beneficial in reducing flood risk to local communities.	
14.6 What happened to flood wardens?	There are volunteer named flood wardens working with the Environment Agency and other emergency responders in many Thames-side and island communities.  The roles of flood wardens will form part of the community flood plans. (Refer to Section 13.1)	1
<b>15 Information Requests</b>		
15.1 Instead of just the flood extent being shown, for the 2014 flood event and for a 1 in 100 year flood event - we need to know the flood level in AOD	The flood extents presented at the workshop were the observed 2014 flood extents and the 1 in 100 year extent from the current published flood maps and do not include the RTS.  Work is currently underway to update this baseline modelling. Once all of the baseline modelling has been completed the Risk of Flooding from Rivers and Sea and the Flood Map for Planning will be updated. Once complete the data will be available to our partners and to members of the public. This is expected in Summer 2017.  We would not usually generally publish levels in AOD has this information is highly specific to a particular location. This can however be provided on specific request	
15.2 When it is available, please issue the highest definition map (10m <sup>2</sup> ) Showing the depth in AOD for red / blue flood areas rather than just red and blue areas. [2014 flood extent and 1 in 100 year flood extent]	See 15.2	
15.3 Can individual property level thresholds be made available?	Not all properties will have surveyed thresholds. If available it can be provided on an individual property basis on request from the resident/property owner.	
15.4 Please provide detailed data for Trowlock Island on RTS effect at peak flood times. (10m <sup>2</sup> ) 2-3cm benefits – Please present the above to the Islanders on site	A meeting has been arranged with Trowlock Island to discuss this.	

15.5 Can individual property level thresholds be made available?	See 15.3 above	
15.6 Would like to see an organogram of the RTS team structure.	Please see below figure 1.(below)	

# River Thames Scheme Organogram

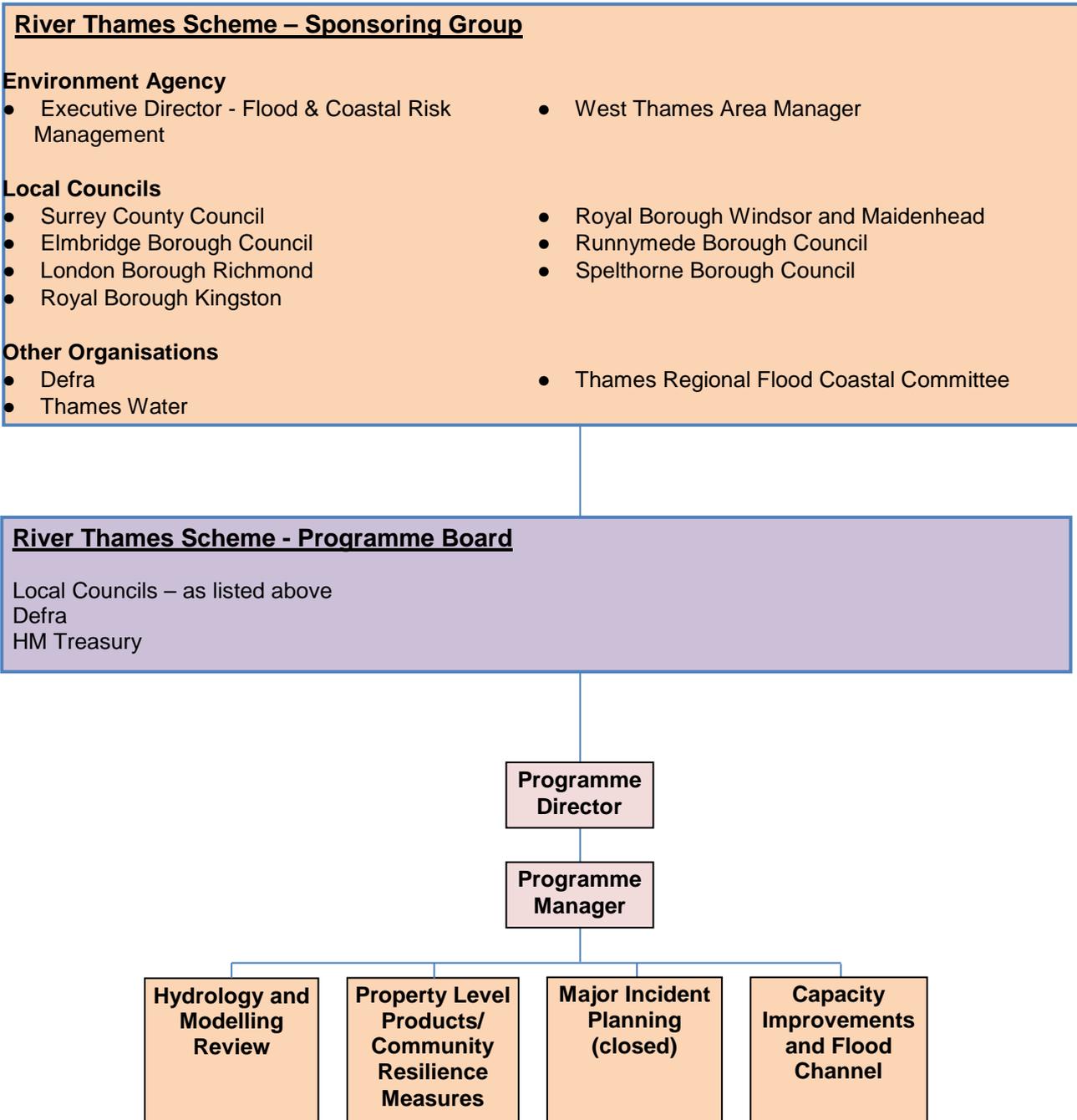


Figure 1 River Thames Scheme Organogram