1. Barriers to Flooding - Past, Current and Future

January 14, 2026, 12:00PM

58m 58s

Smith, Madison 0:20

Hi all, we'll just give a few more minutes for people who are joining late today.
Well, good afternoon and welcome to the first session in the City of London Flood Resilience Webinar series. My name is Maddie Smith and I am one of the emergency planning and resilience officers at the City of London. I'll be hosting today's session.
I'm also pleased to be working alongside my colleague Ella Brown, one of the city's environmental resilience officers who will be Co hosting the series with me over the next eight weeks, we'll be exploring a range of themes around flood resilience to sharing practical, easy actions to help better protect yourself, your family and your workplace.
Answers at the end of the presentations and we encourage you to use the Q&A box throughout the session. Please note that today's session is being recorded and we will be uploading the video to the City of London's website. For those who aren't able to attend Live Today.
If you prefer not to be recorded, please keep your cameras off. Microphones have been muted automatically. If you are experiencing any technical issues, please use the track function, so I'm delighted to be joined today by our two wonderful guest speakers who will be discussing barriers around flooding, including the history of flooding in.
London and the development of flood defences around the city. Our first speaker is Tom Ferber. Tom is an engagement and learning officer at the London Archives, where he delivers bimonthly talks on a wide range of London history topics.
His work forms part of the broad portfolio of activities and projects across the London Archives, formal education information, adult education and community programmes, all aimed at connecting people with over 950 years of London's history.
Thanks Tom. I'll hand it over to you.
Yeah.
And I think you'll have to reshare your slides and take yourself off.

Furber, Tom 3:11

Sorry about that. Yeah, I got. I got all my, my, my windows. All in all in tangle. What?

What a great way to start the start. The presentation. Well, thank you. Ella and Maddie, for having me along. And thank you, everyone, for joining us this afternoon. If you give me just one moment, I'll sort out that little tangle with my slides, and we'll begin. We'll begin properly.

Smith, Madison 3:15
Yes.

Furber, Tom 3:32
I'm just click one more time because I've done something silly that will catch us out later, so I better get it right the first time.
There we go.
Now you should all be able to see by my screen. I hope see a nice intro slide and I'll just make sure I can see my notes and all will be all will be well there we go. So hopefully that's all in order.
I'm afraid I can't now see that the the meetings. If anything's awry, someone needs to sort of say something rather than rather than wave so I can see what's going on. That's OK with everyone. Great. So let me just introduce myself. So as you heard, my name's Tom and I'm an engagement learning officer at the London Archives, and I'd like to start this talk with a little caveat.
Which is that I'm not an expert in sort of geography environment or anything water related. My background is very much in history and the nature of that knowledge and my role London archives. It's my job to know a little bit about a lot so I can help people sort of make best use of our collections that we have at London Archives. So big thank you again to Ellen.
Maddie for inviting me along today. I think there's something really valuable and grounding about seeing kind of contemporary issues in historical context. And that's something that the archive can provide very well. Hope some of you have heard of us, but I wouldn't expect you all to have done. Indeed, I wouldn't expect all of you to be familiar with what archives are.
So just in general you can think of as an archive as a cross between a museum and the library. We're like a museum in that we're a place that looks after rare, often unique, precious objects from the past. But we like a library in that one of the primary roles of an archive is it's a place where you can come and do research where you can kind of find out what it is.

Is that you want to know about? In our case about London. But other archives, of course, other subjects as well. And then the London Archives is one of the biggest archives in the country, the second largest public archive in the country. And you measure the size of an archive by sort of thinking, if you made a giant shelf out of all our shelves, how big that shelf would be. So we're very lucky to be.
Since you want 100 kilometres of collections, as I say, go back in 950 years, which include over three and a half million books, manuscripts, photos, prints and films, all different, all different documents that give you a sense of London's London's history. And I should say as well. We're open to the public without an appointment, and if you want to come and see us in person.
We are in Clark and well, just behind Exmouth Market, if you know that area. And I've been doing this a little a little a little while now. And so I have a bit of a sense on what archives people know about and what they do. And I would say for my money, the most famous archival document is that is the Magna Carta.
And we are very lucky in that we have two Magna Cartas in the collections of the London, the London Archive, which might sound a bit strange. The Magna Carta is actually fairly common as these things go because it was issued multiple times to multiple people to help spread the help sort of spread the spread, the King's word. And although this very famous document.
Doesn't mention flooding directly. It does talk about water, water management. There's a alongside the more sort of high minded and politically consequential clauses around rights and jury trials and things like that. There's a clause 33 which talks about.
Fish weirs on the Thames, the idea being that these were used for for fishing and that they were causing an obstruction to navigation. So even documents are often quite high minded and they go back a long way. Do kind of have concerns about water management in them, but flooding itself is mentioned more directly.
Until the very famous and and fairly old archival documents. So the Anglo Anglo-Saxon chronicle, which I'm afraid we don't, we don't look after of 1099 talks about the sea flood springing up to such a height and did so much harm as no man remembered that it ever did before.
600 years later, in what probably has a equally viable claim to a very the most famous archival document Samuel Peeps in his diary from the 7th the 7th of December 1663, talks about the greatest tide that ever was remembered. England to have been in this river.

All Whitehall being have all Whitehall having being drowned and on the screen. Now you can see an image of Whitehall not quite contemporary with Samuel, with Samuel Peter's diary. This is an image from 16/16/16 called the Bishop Panorama. And this is a really wonderful what we call Longview of Thames. So it covers the Thames from Westminster.
To the city. But what we can see here was a close up detail of this of this panorama, and I invite your attention to the sort of the second-half, the second the left hand side of the image, where you can see Whitehall, you can see Whitehall, Whitehall, stairs. And if you go and then you sort of follow that image around, you can see these stairs or access to the river.
The bank, but also there is a river wall in in in place there. So even you know 400 odd 400 odd years ago there are kind of practical concerns about defend defending sort of land alongside the Thames from from from flooding and accounts of it going of it going wrong.
Yeah.
And what that quote about the, the the greatest tide reminds us of is something that we can take for granted. The Thames is a tidal river, at least as far as, at least as far as Teddington. And indeed the Thames has a large tidal amplitude amplitude, which just means that there's a large difference between the water at a high level at high tide and at low level.
Indeed, much of present day London is recovered recovered marshland and although this recovery process has been going on for as long and has existed sort of accounts and speculation of the Romans undertaking such such work and accounts before that as well, it really accelerates from the mid to the mid 18th, 18th century. That's when we see various.
Projects designing to both sort of tame the river, improve the environment around the river and just to get more land become available, and this map is from 1746 and it's I think quite a special map for a couple of a couple of reasons. One, it's the the map maker himself, John John Rock, the surveyor and photographer is.
Widely regarded as one of the finest, if not the finest, 18th century map maker. And so it's just, you know, special to have his work so well, so well preserved and on display here, but also the sort of middle of the 18th century is a very important time in London history.
That's really when London starts this process of of of growth that will take it from a large but unremarkably large large city to at its height the the most populous and

biggest city in the world. Throughout the 19th 19th century and one of the very interesting things about studying London history is in many ways London got the. There, first with some of the problems and our more widespread when it comes to urban urban living. So we see all manner of different changes come to London in the middle of the 18th century. As I say, one one that starts accelerate is the gradual reclaiming of land from from the town. So in fact present day London, much present day, London.
And it's sort of reclaimed, reclaimed marshland. And the reason I brought this map out other than I rather like it is because it gives us a sense of the what the footprint of London was like before this process and specifically for our purposes this afternoon. It gives us a sense as well of the.
The different profile of the Thames along along the river is much, much wider than it is that it is that it is today, and I think you can see that, particularly in the sort of middle section around the around the map near West of Blackfyres Bridge would be those sorts of those sorts of places there. Interestingly as well, this is this is pre they're kind of the bridge building. So a lot less obstruction on the river.
As as well.
One of the very big changes that comes to the to the River Thames in the 19th century is, of course, the building of the Victorian embankment, which was built in the 1860s. The story of the building, the Victorian Embankment is most closely linked to the huge sort of sanitation and sewage problems that London faced in the 19th the 19th century.
The increase in in population, the kind of the rudimentary and sort of incremental but not full progress when it came to the dealing of human and other waste and more, more to try to sort of human, industrial and otherwise, was ending up in the river than ever than ever before, causing all all manner of problems and.
New sewerage system was built by under the auspices of the Metropolitan Board of Works, and so Joseph Basiljet to deal with that sewage, that sewage problem. So that's sort of the most famous story that we think of when it comes to the embankment. But as this image from the Illustrated London news shows, there is much more to the embankment.
Than a sewage than a sewerage system. So we can see the sewerage system there. We can also see two types of railway, the more familiar sort of steam railway, but also a briefly briefly around pneumatic railway and we can see for our purposes the that a river wall, a sea, a sea wall is being built as well alongside.

And this is now today part of over 200 miles of walls that line the river from the mouth river to Teddington, where the tidal portion of the Thames ends. Indeed, as a sort of an aside, 11 speculation of the etymology of Teddington is tide ending Tide, ending town.
One way we can we can kind of compare and get a sense of of the changes of the of the River Thames and indeed other changes in London as well is with a really great online resource called layers, layers of London, which is something that the London Archives and many other archives and libraries and institutions have contributed to interesting.
In London, history of interest in the course of the river, I really can't recommend this. This source enough. What layers of London allows you to do? As the name suggests, is that you can overlay various maps of London on top of each other. These are historical maps and sort of contemporary maps as as well.
The maps of what have been what's called Geo rectified which Geo rectification is a process where you take an older an old older map which has a lower standard of accuracy and you basically take a modern satellite derived map. You find matching points on the map and then you make the older map.
Forms the accuracy standards of the modern map. You lose something of the artistry when that happens, because it will kind of distort and pull the older map into different different directions. But what you gain is you can make a direct comparison of then and now on a geographical basis, and if we do that with the rock map again from 1746, you really get a sense of how much.
Much of the river had was was reclaimed during the 19th and 20th centuries. Indeed, one Victorian engineer, James Walker, puts it very, very vividly. He says that if the walls of the walls removed the Thames Wood at the very next tide, take possession of a large space that's been so long abstracted.
From it, and would be generally five times its presence width its present width, so you get there a sense of really how man made the modern River Thames is and these these flood defences have provided, you know, the defence and respite against the sort of the encroachment of the river for for centuries. But they are by no means perfect and.
Right at the building of these these flood defences, we do see kind of flooding incidents that are reflected in the archive sort of time and time again on the screen. Now you can see one such one such image from a flood from 8:00. I believe the flood is 1877 or the.

The book the publication of the book is 1878, but there might be some discrepancy there and this is entitled sufferers from from the floods and we can see here a property that has been flooded. So we hear that that property was flooded up to a depth of four of four feet.
And this is part of a really quite a special volume called St Life in London by the journalist Adolfi Smith and the photographer John Thompson. And so it's not in any way primarily focused on flooding, as the title suggests, it's a general. It's a general survey of of St Life and photography is a new.
A relatively new medium at at this point, and so the journalists were using this to really capture their point, and it was in many ways a political text as well. Talking about really how hard it was for many people to make a living and sort of survive as they go on so chosen this both as an interesting and really beautiful historical image. I love the tones, the tones of this particular style of photography, but also it gives us that reminder of the kind of the human consequences of flooding, and that these are kind of a perennial threat and a perennial challenge for people. And it provides, I think, quite a nice contrast to this nice image, which is several generations later from 1924.
This is from another photojournalist George WF Ellis, and we have a whole series of photographs from this from this photographer, pretty much all from the year 1923, nineteen 1924, capturing all different slices of London of London life. And I've included this one because it's very much the, you know, the 1920s version.
Or something. We're all very familiar to seeing on the news today. There's been a flood. They send the camera crew down and they get a photograph of a car or a bus driving through a flooded St. You know, if they're really lucky, they'll get someone going through on a kayak or a boat or something. And that person feels extra smug. And they're generally sort of congratulating themselves on a good work of photojournalism, which is all all well and good. But I think what that can do is that can remind that can make the consequence of of flooding seem sort of sort of quaint of which, of course it isn't. And that was a reality that was brought home to Londoners very, very vividly only four years later.
So 1928 is usually described as London's worst, worst, modern worst modern flood killing fourteen people and damaging many homes and businesses. And as a kind of a reminder, back to that that image from 1878 that some problems don't seem seem to not not go away. The people that most suffered from those floods.
Were the were the poorer people so the people that were that were killed were

people living in in sort of basement basement accommodation.
But the the two images on the screen are from are from Poplar and it took me a minute actually to realise what I was seeing in the image on the on the left hand, the left hand, the left hand side. So what you're seeing there is that the the river wall has collapsed under the weight of the weight of the weight of the water.
And if once you sort of know that's what you're looking for, it does become a lot a lot easier to see. You can see kind of the cracks and the collapsed wall kind of running down the middle of the middle of the image. And we can see that the policeman just sort of guarding guarding the scene and then on the left hand, the left hand side.
And on the right also from the same, the same flood, we have the orchard pump in in Poplar nearby to that Weather River War River War burst again bringing the human consequences of flooding home very, very vividly. But I'd also and without to make light of that issue, this is an interesting image as well. And 1:00 I've used to illustrate totally different topics of London history.
Which is it's quite interesting to see as an ale drinker myself, it's quite interesting to see you know what's going on under the bar when someone's pulling that, pulling that pint of ale ale for you.
So in sort of a procure London sense 1928 is seen as the worst modern flood, but if we're to take a kind of a wider national and international perspective, the most infamous flood comes in 19/19/53. I won't talk much about this because Peter will tell you a bit more about that in his his presentation. But just so there was huge loss of life.
In London, 307 people. Excuse me, no loss of life in London, but outside of London in this country, 307 people killed and even high numbers into the thousands were killed in in, in the Netherlands. These images are from Putney on on the left and cross nest on the on on the right. So this storm.
The storm that caused the flooding occurred on the night of the 31st of January to the morning of the 1st of February. An image on the left is dated first of first of February. Notice the the swan swimming on the on the wrong side of the of the river on alongside of the barrier and then on the right. This is that cross nest and this is actually 10 days.
After the flood, we can see how long it's taking for the water to subside or not subside in this case, and as you might imagine, this prompted many concerns about flood defences and flood flood for the future and these are addressed in a sort of a

public information film from 1975, which I'll play now. Any issues with the sound or anything?
Please let me know but I will just say it is an old film. There is a bit of an issue with the quality. It's sort of not quite short. The word is that sort of pulsates slightly, giving it a sort of slight unintentional psychedelic effect which I hope adds to the charm rather than is a distraction.
So I'll play that for you. Now tide levels have been increasing steadily.
Particularly since the late 18th century, when a recorded tide reached almost 14 feet above the Newland Sea level line.
Yeah.
During the next 100 years, a clear pattern was emerging.
Yeah.
Each isolated exceptional high tide was higher than the last.
By 1928.
A high tide had reached 17 feet above the Newlin Line and London's defences were overtopped.
Those defences were improved and strengthened in 1930, but in 1953 a high tide again overtopped them and breached defences in many places in the lower estuary.
By 1972, new defences have again restored the safety margin.
But even these defences are not a permanent solution and as the trend of higher tides continues, the question must be asked when will London be faced with a total flood disaster?
Yeah.
Yeah.
Yeah.
Yeah.
Tide level.
And the the sort of the the long term defence that was reported as a solution to that, that total flood disaster would become that would become the Thames barrier as the barrier was being built though there were interim measures that needs to be put in place and you get a sense of them from this. This post produced in 19/19/79 which both issues the describes.
The warning system, should there be a London flooding event and also gives a sort of vivid illustration of how catastrophic that could be with the light blue area spilling out from the dark blue course of the Thames there.

In 1983, the Thames Barrier opens. I won't. I'll save. I'll save the details about about its construction, how it works, all of those things, what might supersede it to the next repeat in the next presentation. But before that, I just want to say 22 last things.
The first is that although today I focused on visual sources, maps, videos, photographs, those sorts of things, I do want to just stress that we do have a huge amount of more kind of technical archival sources that are relevant to this topic as well. You can see just as an example there a more technical report from the 1928 floods we have.
Records of.
Various municipal bodies going back to the 19th century and beyond actually. So if that's the kind of research that you're interested in, we are a very good source for that as well. And the second point, the way that you could follow up on that research is you can go to our website, London Archives, that's information about our events, our catalogue getting started. All of those things.
But if you've enjoyed the pictures that we've seen today, many of them are available on that website. There, the London, the London Picture Archive and that's available from home quarter million images of London. You're interested in infrastructure, London history, any of those things you can while away, many at pleasant hour on that on that website.
So thank you again for having having me along. That's that's that's me done. I'll. I'll stop my share and hand over to you and hand over back to you guys Ellie and Maddie.

Smith, Madison 23:47
Thanks, Tom. That was really interesting. I love seeing the flood stories and the video of the title changes even back from the 1800s. I didn't know they changed that much. So thank you for that. For anyone who has question and answers, please put them into the chat box and we will come to them after Pete's presentation.

Furber, Tom 23:58
Welcome.

Smith, Madison 24:05
So next I'm really pleased to introduce to you Pete Thomas from the Environment Agency. Pete is a senior advisor in flood risk management with over 20 years

experience covering Hertfordshire, north London and the Thames Estuary. His work focuses on capital programme and project delivery the Thames Estuary.
100 plan, technical leadership and instant response. Thanks, Pete. I'll pass it to you.

Pete Thomas 24:36
Thanks, Maddie. Thanks, ella. And yeah, thanks Tom for your really, really interesting presentation there. So a tough act to follow, but here it goes. So, yeah, thanks everyone and good afternoon. I'm Pete from the Environment Agency.
For those who don't know, the Environment Agency is the environmental regulator in England, responsible for regulating major industry and waste contaminated land, water quality, water resources, fisheries, ecology. We operate some navigations on various rivers.
And we're also responsible for the small matter of managing the risk of flooding in England from rivers, reservoirs and the sea. And I'll be talking about some of the existing tide of defences on the River Thames and also the plan for the future, which is Thames Estuary 2100.
So just a couple of slides to start with. Looking at most recent flooding in London, adding to some of Tom's information. So 1928 sort of the last major flooding in London, sadly 15 people drowned.
And thousands were made homeless. You can see the kind of red affected areas on that map and you know, a couple of old images from then, you know, almost 100 years ago, particularly affected were basements in the Westminster area, trapping many people while they slept.
And then Tom also touched on 1953. So it was a huge East Coast tidal surge came down the North Sea. London was largely spared, but that was only because of very significant flooding towards the the mouth of the Thames Estuary.
So water levels were almost half a metre higher at Southend than in 1928, although only 16 centimetres higher at Silver Town in London, over 300 people died in England. Many of those in Essex.
One person died in London and that was due to gas exposure rather than directly from the flooding.
Over 25,000 properties were damaged, 30,000 people evacuated and over 100,000 acres of land was flooded along the coast. And as Tom alluded to, the impacts were even greater in the Netherlands, where over 1800 people died.
So although there's now the Thames barrier and the raised defences which I'll come

on to in a couple of slides time, this map shows the areas that are potentially at risk from a failure of those defences or overtopping and the kind of previous natural floodplain is those sort of blue areas. And that could be both.
Flooding from Flewville sources say river or tidal floodplain, and as you can see, it's quite extensive through W London through many parts of central London, the Docklands and out into the estuary.
Yeah.
So a bit of information about some of the existing flood defence in London. Some of them are now well over 150 years old, deteriorating with age and through increased use through climate change. Some of the defences are part of buildings.
Others intersect with bridges and wharves, and some are close to or actually part of World Heritage sites. This photo here is a is a photo of the defences near Trinity Hospital in Greenwich on the South Bank.
And in the top right you can just see that White tower with the clock face. That's that's Trinity Hospital there. And this photo. It's regularly used by the EA. You can see multiple lines of defence raising over the decades up to about 5 levels of.
Of of raising here, that's been reactive to past flooding rather than kind of strategic looking ahead, it's not been planned. So you've got 1879 flood acts, you've got another raise later in the 19th century.
After the 1928 flooding, the 1930 Flood Act, which then raised even further, and then the top concrete section, those were the interim defences constructed in the 1970s. During the construction of the Thames Barrier Post 1953 flooding and it would be a significant challenge to raise the defences any further, particularly somewhere like this if they need to be fully rebuilt. Given the age and without affecting heritage. Buildings that might form part of the defence, any immunity spaces and also quite crucially, kind of views of the river.
So onto the Thames barrier. So the decision to build a barrier was based on a report by Sir Herman Bondy in the 1960s who reported that a major surge tied in London would be a disaster of the singular and immense kind.
It would be a knockout blow to the nerve centre of the country. Many designs were submitted. There's a couple of examples here. That top photo kind of big drop down gates or guillotine gates. The bottom one. Again. Similar locks of Gates, but they're with locks for boats.
Ultimately, Charlton or Willage reach was chosen because it's straight. It's quite deep, but it's not over wide and that kind of straight reaches is important for navigation so

boats can straighten up around a bend.
And and safely pass through.
And construction of the barrier as we know it began in the 1970s, led by the Greater London Council, as it then was.
So main objective of the Thames barrier is to prevent tidal flooding in London.
It has multiple power sources and the gates operate independently. It needs to have total reliability when it's and operate when it's needed. We work closely with the Port of London Authority on navigation.
And we think the annual closure limit is about 50 to minimise the impact on navigation and ensure we've got sufficient time to maintain the barrier. It's a couple of slides here from when the barrier was being constructed, the top one.
That's one of the Piers that sits in the river. You can see the concrete shape of it there starting to take shape and the bottom photo that is now actually in the bed of the river. You can see there's the access or service tunnel that runs right underneath the Thames from one side to the other. So you can actually access.
Here's and this semicircular shape here. That's where the gates actually sit in the riverbed in the open position.
Yeah.
So there's the Thames barrier. I'm sure you probably all know what it looks like. That was completed in 1982. It was first operated in 1983 and officially opened by Her Majesty the Queen Elizabeth the 2nd in 1984.
It cost £461 million in 1982 and that's about 1.5 billion in today's money and about £100 million or £300 million in today's money was used on those interim defences. That kind of extra concrete section on top of the defences.
Through London, while the barrier was being constructed, it's one of the largest movable flood barriers in the world. The upstream walls and embankments are lower to allow greater use and enjoyment of the river while keeping the day-to-day tides within that river channel.
And then the Thames barrier itself is closed. When surge conditions threaten to overtop those defences in central London.
Yeah.
And the next slide is a fairly basic video of actually how the barrier works and hopefully this sound works. Now please shout if it doesn't.
The Thames Barrier is the main defence against flooding for London and is sighted across a 520 metre section of the River Thames.

The Thamesbury has two types of gates.
Falling radial gates. These gates sit above the river, making these sections non navigable.
Rising sector gates. These gates rest on the riverbed, which allows river traffic to pass through the barrier.
In the open position, the gate lies flat with the riverbed.
This allows the tide to urban flow naturally and river traffic to pass through the gates.
Hydraulic cylinders are used to rotate the gates into position.
Individual gates can be closed in 10 minutes, but the whole barrier closure takes 1 1/2 hours. The closure usually takes place soon after low tide, when fully raised, the barrier creates a solid steel wall, preventing water flowing upstream towards the capital.
The four main gates span 61 metres and weigh over 3300 tonnes each.
Each gate is 20 metres high and can hold back loads of up to 9000 tonnes.
The Underspilled position assists the opening process as a controlled amount of water is passed under the gate and up the Thames. The Thames barrier can only be reopened once the water level upstream of the barrier matches the level downstream.
The maintenance position allows the barrier engineers to service their gates and keep them in working order.
The falling radial gates are sighted towards the banks of the river.
These gates are held in position above the river, unknown, navigable and adjudicable when required.
The protective walls downriver have been raised to provide the same standard of protection as the Thames barrier.
Right, so the title defence network is more than just the Thames barrier and a few walls though, so there are in total nine major barriers for the Thames barrier and eight other major barriers, one of which is below in that photo. That's Dartford Creek barrier.
More than 300 kilometres, or 200 miles of walls and embankments, over 400 other active assets or active defences like floodgates and outfalls. And they all work together to protect the Thames Estuary.
These defences are vital for allowing us to get on with our day-to-day lives in London and the estuary, while the major barriers and embankments in Kent and Essex keep out, the biggest storm surges the river walls in London contain the daily high tides.

The system works as one.
Without the barriers, we would be at risk from major storms and without the walls, we would need a permanent barrage across the mouth of the estuary and London would lose its daily ebb and flow of the tide and the vital biodiversity and habitats that brings.
Just a quick look at some of the outer estuary defences and the sheer scale of some of them. This is the lobster smacking on Canby Island in Essex. Over 50 people died on Canby Island in 1953. Most of it is at sea level.
And over the years, so looking back at 19 O2 this sketch here, a very kind of low, rudimentary raised embankment here and then today a huge earth embankment. With a 1 1/2 to two metre high concrete wall on the top to the height of the roof of that particular building there. So really, really substantial defences in the outer estuary.
And this is what's protected by the network of defences throughout the estuary. The Thames barrier shown in yellow there and the other defences has protected us from flooding 221 times since it was completed in 1982.
And on average it closes about 5 * a year, protecting over £400 billion worth of residential property, and over 1.5 million people. Many businesses, some of the country's most valuable assets.
Critical infrastructure transport networks as well as internationally protected habitats, valuable heritage and cultural assets, millions more people who work in London or the estuary, or who visit could be impacted if flooding caused closure of major transport hubs or hospitals and schools.
Businesses could suffer from lost time and customers and the region's reputation as a major business and tourist hub could be at risk.
And all of these risks are disproportionately felt by low income households, elderly people, minority groups and vulnerable health groups as well. And the poorest communities are more likely to live in areas at risk of flooding and less likely to have insurance.
And now the the challenge we're facing at the top right. Local temperatures in the UK are increasing as well as around the world. Winters are getting wetter on the left sea level rise.
Is accelerating observed water levels in London and the estuary are increasing roughly in line with recent climate projections.
So what does it mean for the estuary? We're planning for up to 1.15 metres of sea

level rise by 2100 and alongside rising sea levels, we're also seeing more frequent storm events.
Testing those defences more than ever and on top of that, the defence system is actually getting quite old. You can see here these defences this is or was Duke Shaw Wharf in Limehouse.
We had to apologies, we had to undertake emergency works here back in 2017, I think because that defence was at imminent risk of failure and could have led to the collapse of the buildings behind.
Yeah.
So what's the plan? So the Thames Estuary 2100 plan was first published in 2012 and had a full update in May 2023. It's the first adaptive flood risk strategy developed in England.
And it uses a flexible approach for adapting to an uncertain and changing situation like climate change. We monitor key indicators like sea level rise, like new climate change science and the adaptive nature of the plan allows us to respond or take a different course.
Or change some deadlines depending on changes in the estuary and changes in the climate.
The plan maps out a series of flood defence options and decision points that, if delivered successfully, can continue to protect people, property and the environment of the estuary. However, this is quite key. The Environment Agency is only responsible for Maining 12 for maintaining 12%.
The flood defences in the estuary, so it's vital that we work together with land owners and other organisations who are responsible for the remaining 88%.
And a bit of a plan here on a page, it's quite a lot of information here, but I'll try and condense it down the review that we completed in 2023 confirmed we're on the right path still, but we need to really start planning for the future.
The top blue arrow here we need to continue maintaining, refurbishing and replacing what we've already got.
We also need to start raising defences. It's going to be quite challenging as I've alluded to before, downstream of the barrier, this orange diamond here, we need to raise the fences downstream. The barrier by 2040.
And upstream of the barrier, including through central London by 2050 and that's by up to half a metre, some of the defences are already at the right height for others aren't and this will reduce reliance on the Thames barrier. It will keep the number of

closures at a manageable level.
And prolong its lifespan to 2070.
By 2040, we've got a really key decision point as well and we need to decide what that end of the century option is going to be. So it's in place for 2070 by the time the existing Thames barrier is at the end of its life.
We know that it will take several decades to fund legislate for design and construct and test such a major piece of infrastructure, so it's ready for 2070, so that key decision point is 2040.
And as it notes there the at the moment the options are a replacement Thames barrier in a similar position, a new barrier at long reach or Gravesend reach, they're further downstream and I've got a map on the next slide.
Potentially a series of large flood storage areas in the outer estuary to store water during times of kind of high surge or very high water levels, or potentially a new barrier with locks that might be closed more often and therefore need locks for ships to navigate through.
Lots of different factors will contribute to the final choice, and that decision, and it's likely to be a decision for the government at the time. So a kind of cross government decision by 2014.
Just a quick map of where those kind of future end of the century options might be. So Woolwich reach or Charlton, which is where the existing barrier is long reach just upstream of the M25 crossing of the River Thames.
And then Gravesend, reach further out into the estuary and those are the three possible locations that have been identified, mainly through navigation modelling because you know large ships need time and space to be able to straighten up after coming.
Through a bend in order to navigate safely through a barrier, the blue locations are possible areas for very large flood storage, and all of those options will be tested over the next 10 to 15 years to see which is the most.
Appropriate.
And now kind of changing tack just to some wider messages about flood risk and what you can do to prepare for flooding. We have a page on gov.uk where you can check your long term flood risk. You can put in your post code.
And check if you're at risk of river or tidal surface water and also the impacts of climate change on those risk sources. If you're at river or tidal flood risk or groundwater risk in some areas, you can sign up to receive our flood warning service.

That's all free.
And you can receive alerts by text, phone or e-mail.
If you're at surface water risk, we recommend you sign up for the Met Office weather warnings, as it's not currently possible to give flood warnings at a property level for these short, sharp downpours that cause surface water flooding.
We have guidance for preparing a floodplan, whether that's a personal one at a Community level or for a business, and if you own property or land next to a river, you may be you may be a riparian owner of the river and the defences.
And more information on that is on gov.uk and then final slide is just just some links around information preparing for flooding. So that's the end of my presentation. So thank you very much for listening.

Smith, Madison 46:50
Hey, that was really interesting. We have we got a few questions and the first one is directed at you. I know you might have briefly mentioned it, but how often are the Thames Barrier Gates closed and is it mostly for emergencies or is it more of an everyday occurrence?

Pete Thomas 46:50
I'll stop sharing.
So I think I mentioned it's been closed 221 times. So on average 5 * a year there are kind of clusters of closures depending. You know when when there's, you know, particular spells of bad weather.
The foreclosures are just for emergency use, so that's that kind of 221 times. But we do partial test closures every month just to make sure things are in working order.
And we also do.
A yearly full test closure of all of the barriers and gates. I think every September during kind of high spring tides.

Smith, Madison 47:54
Are there any other significant flood barriers around the world that are similar to the Thames flood barrier?

Pete Thomas 48:02
There are. There are quite a few dotted around the world. I'm I'm by no means an

expert on those. There are several large moveable flood barriers in the Netherlands. There are some in the USI think there is one proposed in Venice.
But yeah, there are. Yeah. Various barriers dotted around the world and there is a a group called I Storm that the EA is part of with other, you know, similar organisations to the EA with similar responsibilities that do meet to, to share expertise.
To share knowledge just so we can, you know, help each other improve.

Smith, Madison 48:48
We've had a few more questions come through, so if the barrier is closed, what is the risk of a major storm producing enough water to threaten flu fuel flooding so overtopping the barrier?

Pete Thomas 48:59
To over top the barrier.
Every I guess every every defence or barrier in theory could be overtopped, but it's, you know, the Thames barrier and the defence is downstream. It's a world class standard of protection. It's it's well over. One in 1000, year or not point 1% chance in any year.
So it's it's kind of world leading protection.

Smith, Madison 49:30
And how does the Environment Agency work with insurance companies when you propose future plans? I mean, how will the do you know how the future upgrades will be paid for?

Pete Thomas 49:44
In terms of insurance companies, all of our all of our data, all of our flood mapping, all of our risk data is provided externally. That's free to access for the insurance companies, they often have their own data sources as well. So we don't necessarily work directly with them.
All of our information is out there and they use that data to set their insurance premiums.
In terms of who pays for infrastructure, currently the government has a a partnership funding policy for investment in flood defences. Depending on the the benefits of.
A particular scheme versus the costs the government will pay for a certain amount

that could be anything up to 100% if you're below that 100% mark, you then have to find or we as the EA have to find funding from third parties.

Smith, Madison 50:48
Thanks, Pete. Tom, we've had a question come in through for you. What is the most surprising archival piece you've discovered when you were looking through all the flooding images and archive collection?

Furber, Tom 51:01
Oh, I don't. I don't know. That's a good question. Surprising.
Uh.
I can't think so. I think I don't think I was sort of overly surprised by anything, but I did.
One thing I've that struck me during I said it's for the opposite of a surprise, but struck me during your presentation, Pete, as well as actually how many of the same issues are coming round again that we from the historical situation we talk about, there's less money and resources being on the.
At most at risk from the from the flooding, and then that being the same thing going on. So maybe that's the opposite of surprise, but that's probably one of the big takeaways from the from the presentation, if that sort of answers the question.

Smith, Madison 51:47
Someone also asks, are you still collecting pieces for current day flooding so that they will be archival in the future?

Furber, Tom 51:56
Yeah, absolutely. So we have a very active collecting policy at the London Archives, which covers different aspects of our business. So in broad terms, there are various statutory collecting that we do as we are should have said, maybe we're funded by the City London Corporation and we are the record office for the City, London. Cooperation. So the work that the city does in terms of these, these things, both within the city and it's sort of broader suite of responsibilities across across London would come to us as a matter of matter of course. But we also do various collecting based on the needs of.

Of telling the story of London. London isn't kind of all its all its variety as as well. So yes, active in both. Both regards.

Smith, Madison 52:43
That's good news, Pete. We had a great question about sediment control at the barrier. Do you have to have a strong cleaning process? Does it clean itself normally through the tidal waves? How does that happen?

Pete Thomas 52:59
That's a very good question. Personally, I don't know for certain, but I I expect it's mainly kind of self cleaning as as the water moves up and downstream and particularly I don't know if you remember the the schematic video.
So when the when the barrier has been closed in order to open it, we have to wait for water levels to equalise and we do that through the kind of under under shock position. So water then flushes underneath the gates, flushes out the.
The the sills where the gates would normally sit to enable them to drop back into place. So I think it's probably self cleaning.

Smith, Madison 53:48
Sorry, just bringing some of the other questions. Is there possibilities for producing electricity from the tidal waves and has this been explored for future designs of any flood barriers?

Pete Thomas 54:01
Very good question. I'd like to hope so. It probably wasn't a consideration back in the 60s and 70s when the current barrier was being being built and designed. I'd like to think it would be.
Part of the mix in any future barrier designs or replacements, I guess it's it's balancing the the need for flood defence for maintenance, for navigation for and certainly now in the future for ecology, environmental.
Considerations and hydropower for for generating electricity. So there's there's lots more things that would need to be considered in any future barrier, but hopefully hydropower could be one.

Smith, Madison 54:47

And you were mentioning that 2040 is the big year that you have to make all your decisions. Are there any little steps that you'll be taking in the lead up to that to improve the flood defences?

Pete Thomas 55:00
Yeah. So there's there's work that that needs to be done to to maintain and improve what we've got all the way to 2040. So we've just finished one major programme of defence maintenance and another one will be starting very soon.
So we're continuing to invest money in the defences, taking action where we need to and and continuing to maintain a Thames barrier.

Smith, Madison 55:27
We have a final question for you both, Pete. If there has been any historical pieces that have stuck out to you as a Monday flood professional and Tom as a historian, how could our current day flood and climate situation be looked at?

Pete Thomas 55:44
Yeah.

Smith, Madison 55:45
That from a future archival perspective.

Pete Thomas 55:52
Historical it's probably 1953, I think, because that was just, you know, such a huge, huge flood event. The the impacts were felt in our country and you know, surrounding countries around the North Sea, particularly in Netherlands, it led to, you know, huge step change.
Change in how they approach flood risk management and how we approach flood risk management in our country. You know, led to the construction, the Thames barrier led to defence being raised again. So yeah, I'd probably say 53.

Smith, Madison 56:22
Hmm.

Furber, Tom 56:25

So one thing I think is really important in terms of contemporary archive collecting is making sure we get sort of different sort of perspectives and voices in it. So somewhere like the London archives is traditionally very strong on sort of institutional voices, things like the Great London Council, their various predecessors. Those things quite naturally come into into the world of archives, which means we have very good records on decision making, infrastructure, technical, technical specifications. But actually that human side of thing comes into an archive a bit less bit less naturally. There needs to be more effort in that. So I think it's.
It's it's the work that we do that people who are just coming to us as people to know that their histories are important, that human side of things is captured as well. And then the challenge for the future and that is obviously as things move towards, have moved into the digital, it's how we adapt our digital preservation, which is a very flourishing field of archives. I should.
Reassure in that regard is how we kind of keep that digital preservation so it can sit alongside the records we already have.

Smith, Madison 57:26
All really good points and thank you for those answers. That's the end of the Q&A and the presentation today. Thank you for all your wonderful questions. If anything does come to mind after the session, please do feel free to reach out to us. Our contact details will be shared after the webinar.
Before we finish, I just want to briefly summarise this week's flood Resilience toolkit takeaway. These are the actions that you can take following today's sessions to help you improve your flood resilience, and these were sent in the chat and you can sign up to the Met Office weather Warnings, Register for the Environment Agency flood warnings.
And make sure to check your local flood risk. They're very simple steps, but they can provide vital early information and help you make informed decisions during severe weather. All links are in the chat and we'll be sending out the slides as well as the webinar recording, so looking ahead, our next session is on the 28th of January where we'll be focusing on.
Water underground, exploring London's Hidden River system and vulnerabilities of underground infrastructure. We'll be joined by David Harding from Thames Water and Nicholas Grucel, from Transport for London, who will share their perspectives on how flooding effects systems beneath the city.

Thanks again for joining us and taking the time to be part of the flood Resilience Webinar series. We hope you've all enjoyed the session and we hope you can enjoy us. Join us for the next song. Thanks all.

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