

A guide to how we fund and deliver Flood Risk Management Schemes

We are currently in the appraisal stages of many projects investigating whether schemes to manage flood risk can be provided throughout Cumbria.

What is Appraisal and why do we do it?

In summary we are spending Government's money in providing flood risk management and we must follow their rules if we want to use their money. The first thing we are required to do in delivering a scheme is an appraisal.

According to the "Appraisal of flood and coastal erosion risk management, A Defra policy statement";

- Flooding and coastal erosion are natural processes with highly variable impacts across the country. Flood and coastal erosion risk management legislation is largely permissive in England. This means that there is no right to be protected from the effects of flooding or erosion and generally no entitlement to any particular standard of defence where risk management action is taken.
- To take account of this variability and the permissive nature of its investment, Government promotes nationally consistent approaches to the assessment and management of flood and coastal erosion risk, rather than to set national standards for protection which would be inappropriate and unaffordable in some areas.
- The appraisal process should point to how value for money can be maximised from any public investment. This is needed to help decision makers ensure that taxpayers' money is invested in those projects that will deliver the greatest benefits for society as a whole, bearing in mind that many of those taxpayers are not at flood risk.

All appraisals should;

Define the issue	<i>Define</i> the issue and consider the case for Government intervention. Set Specific, Measurable, Achievable, Realistic and Time related objectives if there is a case
Develop, Describe and Value	<i>Develop</i> a full range of possible options, <i>describe</i> the options, and then <i>value</i> the positive and negative impacts of each of the options.
Compare and Select	<i>Compare</i> options in a systematic way and <i>select</i> the most effective and deliverable solution.

How we are funded determines the work we must do to be able to provide a scheme to manage flood risk.

For every possible Flood and Coastal Erosion Risk Management scheme around the country we must make the case to Government to provide the money to cover the scheme costs. Before giving us any money the Government require us to demonstrate that money spent on managing flood risk benefits the nation as a whole rather than just locally or specifically for a homeowner.

Government funds are limited and cannot fund all schemes or provide schemes that manage all flooding. There will always be schemes elsewhere in the country that are of more benefit to the nation than others. These schemes will be the first to attract funding from Government. There will always be some flood risk that the Government is prepared for the nation to live with, which means a scheme might not be funded. There comes a point when the costs of providing a scheme would be more than the costs of flooding.

Seeing as we are using Government's money they set the rules and guidance for us to use to demonstrate the case to provide a scheme. Most importantly, because they are considering spending money for the nation's benefit, we must consider damage caused by flooding from a national perspective also.

This means a homeowner may incur costs of £70,000 to fix and replace damage caused by 30cm of floodwater in their property. When using the guidance for this same flooding we can only count the economic damage to the nation of this flood which might be as low as £20,000.

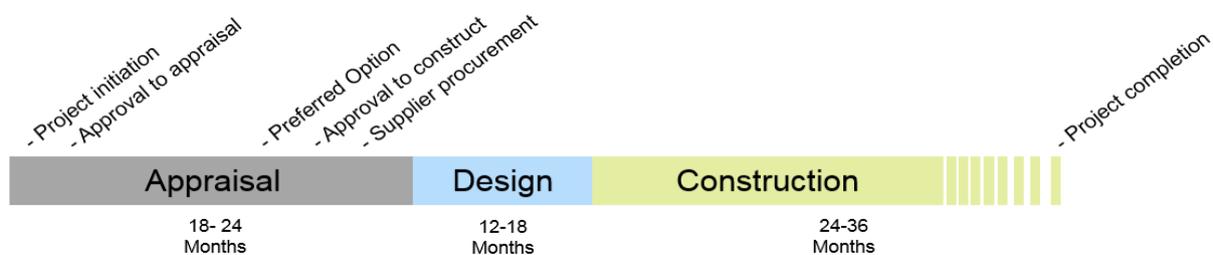
We also have to consider the probability of that flood happening to the house in the above example. If the 30cm of flooding was assessed to have a 1.3% (1 in 75) probability/chance of flooding per year, annually we can only claim 1.3% of £20,000 flood damage which is £260.

This makes the job of getting enough flood damages to outweigh scheme costs, as Government view flooding, a much harder task than it might appear at first.

How long does it take to deliver a scheme?

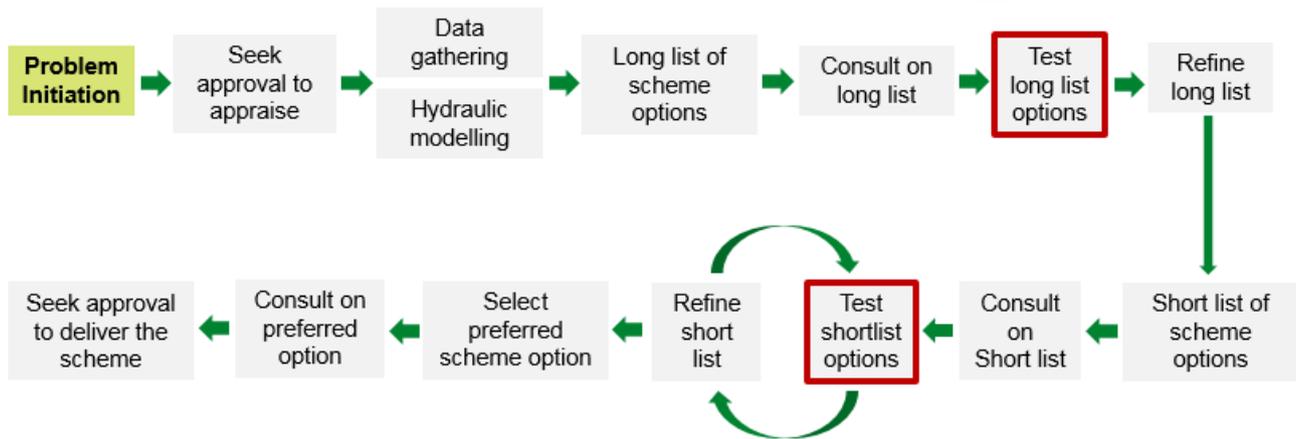
The rules we follow to satisfy Government lead us through a process involving a number of stages, tests and approvals that must be undertaken before construction can begin.

The three key stages of a scheme are its appraisal, design and construction. From start to finish these stages combined can take anywhere between two to six years depending on their size and complexity. A simple small project might cost around £2-3 million. A large complex project £15 million or more.



What is involved in delivering a scheme?

The appraisal stage is about establishing a range of options to manage flood risk and comparing them to determine the best option overall. We are required to use the [Flood and Coastal Erosion Risk Management Appraisal Guidance](#). The appraisal compares and “tests” the economic viability (costs and benefits), technical feasibility (engineering difficulty) and environmental impacts, including public acceptability. An overall summary of the stages we go through is shown in the flow chart below:



Detailed work that can take us quite some time to complete within the flow chart include:

<ul style="list-style-type: none"> • Site Data Gathering (physical, written, historic, local opinions etc.) • Hydrology Calculations (flood flow and volume estimation) • Site Surveys and Condition assessments • River Modelling (Model build and running of flood flows against scheme options) • Flood Risk Mapping • Economic Damage Calculation • Options Long Listing and assessment 	<ul style="list-style-type: none"> • Borehole Ground Investigations • Detailed Option Short List assessment • Consultation sessions • Options Costing • Environmental Analysis • Outline Scheme Designs • Economic Benefit Calculation • Project Risk Analysis • Full Business Case production
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The flow chart shows that we start at a simple summary level (long list) and try to narrow options down to a short list that have the best chance of appealing to Government and attracting funding. As we move through the flow chart the level of detail we have increases. It doesn't make much sense spending lots of time and money on options we know will struggle to make it through the process;

For example, at long list stage if we know one option costs twice as much as another option but provides the same level of protection (benefit) we would rule this option out and consider it no further. With the rules we must follow it is almost impossible to choose something costing twice as much for the same or similar outcome when considering that Government funds are limited and we must maximise value for money for the tax payer nationally.

Options we consider typically fall into one or a combination of the following themes;



Strengthening Defences



Upstream Management



Maintenance



Resilience

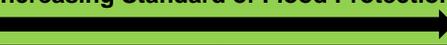
At key stages we consult with partner organisations and the public to make sure we are taking on board the pro's and cons of options from their perspective.

Selection of the final preferred option is typically the option that best balances economic, technical and environmental aspects. However, the economic case carries the most weight in decision making.

How far can we go in managing flood risk?

Within the guidance we must follow rules that determine how far we should go in terms of scheme costs and standards of flood protection.

- **STAGE 1;** First we identify the option with the highest benefit cost ratio, which is Option 2 with a benefit cost ratio of 13 in the table below;

	Increasing Standard of Flood Protection 			
	Option 1 5% (1 in 20) Scheme	Option 2 2% (1 in 50) Scheme	Option 3 1.3% (1 in 75) Scheme	Option 4 0.5% (1 in 200) Scheme
Cost	£2M	£3M	£6M	£15M
Benefit	£20M	£40M	£50M	£60M
Benefit:Cost Ratio	10:1	13:1	8:1	4:1
STAGE 1 Lead Option	-	★	-	-
Additional cost from previous option	-	-	£3M	£9M
Additional benefit from previous option	-	-	£10M	£10
Incremental Benefit: Cost Ratio	-	-	3.33:1	1.11:1
STAGE 2 Preferred Option	-	-	★	-

- **STAGE 2;** Next we see if we can provide a higher standard of protection or a more expensive option that delivers more benefit. We must do this by looking at whether the additional costs are outweighed by the additional benefits from choosing the next option. This is the “incremental cost benefit ratio”. Going from Option 2 to Option 3 costs an extra £3M but it also generates an extra £10M of benefits (avoided flood damage) giving an incremental cost benefit ratio of 3.33.
- Guidance tells us that to move to a 1.3% (1 in 75) standard of flood protection we must have an incremental benefit cost ratio of 3 or higher. As shown in the example above this is achieved and Option 3 becomes the “preferred option”.
- Next we test whether we should move to Option 4 from Option 3. However, in the example above we wouldn’t be able to. The incremental cost benefit is only 1.11, which means the benefits only just outweigh the costs. The guidance states that at this high standard of protection (0.5%) we must have an incremental cost benefit ratio of 5 or more to select the option.

The example above shows that the 1.3% standard scheme offers the best value to the Government and stands the best chance of being funded as it complies with their guidance and rules.

It also shows that flooding above a 1.3% chance will not be dealt with. A 0.5% flood could still happen and would overtop the 1.3% scheme we can justify. This means there is some flood risk that remains unmanaged, albeit with a low chance of happening.

Typically, the majority of flood damages avoided (benefits) come from frequent lower order flooding. Once we have dealt with this by offering the 1.3% (1 in 75) option, the flood risk from low probability high consequence flooding (0.5% / 1 in 200) is often small relative to additional scheme costs for dealing with it.

As scheme costs increase flood damages to offset the costs of providing a high standard tend to reduce. There are exceptions to this relationship linked to the geography of the site; flood mechanisms, type of property that floods and how costly / difficult it is to provide a scheme for a given standard of protection.

How do we get the funding?

Before the scheme can progress to the design and construction stages we are required to submit a business case report to an independent assurance board for approval.

It is reviewed to make sure the work we have done and recommendations being made comply with the guidance and rules set by Government. The board also ensures the case is being made clearly and thoroughly enough to satisfy our own and Government's quality standards. The review typically involves changes and updates to the business case requested by the assurance board, before they can recommend it for final approval.

Part of the business case includes the "Partnership Funding Calculator". We must use this to calculate what percentage of total scheme costs the Government is prepared to pay for by using;

1. The overall benefit cost ratio of the scheme
2. How long the scheme will last, in terms of dealing with climate change
3. How many homes the scheme will move from specific bands of flood risk.
4. How much high quality habitat the scheme creates

The Government is most interested in spending money to move homes out of high probability flood risk. In the Partnership Funding Calculator we must count homes moving from one band of flood risk to another using the following classifications;

- Very Significant Risk - 5% (1 in 20) and greater chance of flooding
- Significant Risk - 1.3% to 5% (1 in 75 to 1 in 20) chance of flooding
- Moderate Risk - 0.5% to 1.3% (1 in 200 to 1 in 75) chance of flooding

Within the Partnership Funding Calculator, homes moving from very significant risk attract the most funding, then homes at significant and lastly moderate. A town made up of homes only at moderate flood risk would not stand a good chance of being funded.

Why can't we count businesses?

The Partnership Funding Calculator prioritises reducing the flood risk to residential properties because this is primarily what the Government make funding available to us for. However, we can include the benefits from protecting businesses within the Partnership Funding Calculator in the overall benefit cost ratio, so business does not get missed out entirely.

The Government makes available other funding that aims to help business typically through Local Government/Councils or dedicated national initiatives more closely tied to the Government. We often try to help business and councils tap in to these sorts of funding streams.

What does the partnership funding calculator tell us?

The final output of the PF Calculator is a percentage score that is either above or below 100%.

If it's above 100% this means all of the money we are seeking can come from Government. The higher the score above 100% the higher the chance of getting allocated the funding needed. The Government cannot afford all schemes at once that are above 100% so there no guarantee of getting funding when we want it just because we have a scheme at 100%.

Example:

- Using Option 3 in the example earlier which costs £6M in total.
- If we assume the Partnership Funding Calculator score is 80% this means the Government is only prepared to cover 80% of £6M which is £4.8M and there is a £1.2M shortfall.
- We and others wanting the scheme to happen would need to find the remaining £1.2M from elsewhere.
- If no other organisations are prepared to fund the £1.2M shortfall the scheme will not proceed to Design and Construction stages and we will not receive the £4.8M from the Government.
- The Government will make the £4.8M available to another scheme elsewhere in the country that is either above 100% or where a score is below 100% with the shortfall willingly made up by others.

Useful Links:

Flood and Coastal Erosion Risk Management Appraisal Guidance;

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/481768/LIT_4909.pdf

Multi-Coloured Manual;

<http://www.mcm-online.co.uk/>

Partnership Funding Calculator;

<https://www.gov.uk/government/publications/fcrm-partnership-funding-calculator>