Department for Environment Food & Rural Affairs

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Reducing the risks of flooding and coastal erosion

An investment plan

December 2014

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Ministerial foreword from Defra Secretary of State

The widespread flooding we saw in 2007 and the tidal surge and devastating storms of last winter are a stark reminder of the threat we face from flooding.

This is why reducing the risks of flooding is one of my top priorities and why the Government has prioritised investment in flood risk management. We are on course to spend £3.2 billion over this Parliament, compared to £2.7 billion in the last Parliament. This is more than ever before and represents a real-terms increase. By the end of this Parliament we will have delivered better protection from flooding to 230,000 households.

While last winter's events showed how far our flood defences have come in recent decades, there is no room for complacency. Defences need maintaining, repairing, and renewing when they come to the end of their useful life. And the risks are set to increase over time due to climate change.

Last year, we made a record long-term commitment to invest a further £2.3 billion in capital alone over the next six years. The length and value of this commitment has allowed the Environment Agency to build the largest and most ambitious programme of flood and coastal defence improvement ever undertaken in England.

As part of our Long-Term Economic Plan, we are now able to announce which communities will benefit from this record investment, with over 1,400 schemes going ahead across the country. From Bridgwater to Oxford to the Lower Thames and Lowestoft, these schemes will protect homes and businesses and generate jobs and growth. We are also aiming to attract record levels of investment from local partners, and to deliver tough efficiency targets.

This record programme of investment will reduce risk to at least 300,000 households and avoid an estimated £30 billion of economic damages. For the first time ever, we are also able to calculate the impact on the overall national flood risk from our investment, whether we are "winning the war". We estimate that this investment programme will drive down overall flood risk by 5% by 2021.

We can never entirely eliminate the risk of flooding and coastal erosion but the certainty of this record investment programme will help improve our resilience as a nation, and reduce the devastating impacts on people's lives, communities, and the economy. Above all, it will help provide security and peace of mind for families and businesses across the country.

Executive summary

Why flood and coastal erosion defences matter

Many households, businesses and infrastructure are at risk unless they are protected from flooding and coastal erosion. One in six properties in England is at risk of flooding from rivers or the sea. Some of our major commercial centres and key infrastructure are in areas of risk.

Better defence against flooding supports economic growth. Investment in flood defences avoids damages many times greater than the cost. It can also support more resilient infrastructure networks and enable economic development.

Flood risk is expected to increase making investment in defences even more important. Even with regular maintenance, our existing defences will deteriorate over time. Climate change will increase risks further.

Government action so far

The Government has already prioritised spending on flood and coastal risk management. Returning the public finances to a sustainable course to support economic recovery has been the Government's driving responsibility. Within this context, we will have increased spending over this Parliament – in cash and real terms – on flood and coastal erosion risk management. Over £3.2 billion will have been invested by the end of 2014-15.

This has delivered new defences and better protection for households and businesses. Additional funding has been provided to repair defences which were damaged in last winter's storms, so that no communities are at greater risk going into this winter than last year.

A long-term investment programme

We have gone further, committing to an unprecedented £2.3 billion capital investment in defences over the next six years. This represents a 9% real terms average increase in capital investment compared with the current spending review period. The investment programme published today sets out how this funding will be used.

As a result of this 6-year capital investment programme, over 300,000 homes will be better protected by 2021. Over £30 billion of benefits will result through damage avoided to homes, industry, infrastructure and farmland - including around 420,000 acres of agricultural land, 205 miles of railway, 340 miles of roads and 4 airports. As well as the national economic benefits, we estimate that tackling the risk of flooding also brings an additional £4-9 per £1 invested in terms of benefits to the local economy.

This record investment programme will reduce the nation's flood risk. We are also publishing updated analysis showing that our investment plans match the levels needed to fund all cost-effective activities. We will never be able to stop all flooding or erosion but we can reduce the risks. We expect this programme to reduce current levels by 5% by 2021.

The programme published today sets out over 1,400 schemes which will benefit from this funding. Communities across the country are being given greater certainty about the funding available for projects in their area. The full list is published alongside this document. This includes major construction projects with transformative potential for towns, cities and districts, and which will help communities affected by last winter's flooding such as Boston in Lincolnshire, Hull, and Yalding in Kent. In the Lower Thames, Oxford, Somerset, Lowestoft, and the Humber major new strategic plans to alleviate risk will be progressed.

Partnership funding from local communities and the private sector is essential. Our partnership funding policy prioritises investment on a transparent and objective basis. It increases certainty, local ownership and choice, and incentivises communities to reduce costs and maximise benefits. Contributions from partners have already increased significantly, and our long-term investment programme will strengthen partnership working in future. We estimate that this programme could benefit from over £600 million additional contributions through partnership funding.

Reforming how the programme is managed

Long term funding certainty allows us to transform how our investment programme is managed. The Environment Agency will put in place an ambitious set of improvements to deliver new ways of working, transform relationships between communities, risk management authorities and their suppliers, and maximise the benefits which can be delivered. Building on Defra's role as sponsor of the Environment Agency, we are reviewing flood and coastal erosion risk management outcome and performance measures. In doing so we will learn from techniques developed in the private and regulated sectors, to maximise the benefits of our investments at all levels. New measures being developed will clarify the objectives and outcomes we expect the Environment Agency to achieve.

The changes set out here will deliver efficiency savings of at least 10% across the period of the programme. These savings are being reinvested to allow more projects to go ahead. Reducing costs and improving efficiency will also position us better to drive down flood and coastal erosion risk in the longer-term beyond 2021.

Improvements to how we work, and bringing forward money from later in the programme, means that we can protect more communities more quickly. To accelerate delivery, £60 million of funding is being brought forward within the programme to earlier years. Better management of risk and contingency has also freed up significant funding within the programme. The Environment Agency will now consult Regional Flood and Coastal Committees and local partners about which schemes will benefit from this accelerated investment, and will publish an updated investment programme in February.

1. Introduction

Over the course of this Parliament (2010-2015) we will have spent over £3.2 billion on flood risk management compared to £2.7 billion in the previous 5 years. Achievements in this period include:

- 522 schemes completed since 2010 have already reduced the risks of flooding or coastal erosion to more than 230,000 households.
- Defra funded projects completed during the past three years alone have provided an improved standard of flood protection to more than 16,000 commercial properties, 3,635 miles of road, 147 miles of railway line and more than 580,000 acres of farmland.
- Just 12 months after the devastating storms and flooding of last winter, every community that was affected will have the same or better standard of protection as they had before last winter. Protection has been restored to more than 200,000 households.
- The Environment Agency has positioned itself to rise to the challenges ahead by simplifying its structure, reducing its administrative costs by 33% and making 15% efficiencies on capital procurement.

This document sets out our future plans for managing and improving flood and coastal erosion defences over the 2015-2021 period. The certainty of this six year government commitment together with the 9% real terms average increase in the value of this funding provides the opportunity to both do more and improve the way things are done.

Box 1. Boston Barrier

The East coast tidal surge on 5th December 2013 flooded over 800 properties and businesses and approximately 500 acres of prime agricultural land. Delivery of the Boston Barrier has been accelerated. The Environment Agency is working closely with Local Authorities, Internal Drainage Boards, the Port Authority and other key stakeholder groups. Construction is scheduled to start in summer 2017. The completed scheme will protect over 20,000 residential properties and 1,000 businesses and support the economic regeneration of the area.

2. Context

Defra's overall aim is to reduce the risks of flooding and coastal erosion, and in doing so to:

- support economic recovery and growth
- build a fairer society, and
- improve the environment

The risks we face are significant and will increase with climate change:

- One in six residential and commercial properties (2.4million in England) are at risk of flooding from main rivers or the sea.
- An estimated 3 million properties are in areas susceptible to flooding from surface water.
- Eleven percent of the country by area benefits from defences, including some of our most important centres of commercial and economic activity.
- Important infrastructure is located in areas at risk of flooding and erosion. 55 per cent of water and sewage pumping stations/treatment works, 20 per cent of railways, 10 per cent of major roads, 14 percent of electricity and 28 percent of gas infrastructure is located in areas at risk of flooding.
- In rural areas 3.2 million acres of agricultural land, including the majority of the most versatile and productive farmland, are in areas of flood risk.

Wellbeing and economic growth and activity in these areas depends on the maintenance of a complex network of flood and

Box 2. River Thames Datchet to Teddington flood scheme

The River Thames Scheme will reduce flood risk in communities near Heathrow, including Datchet, Wraysbury, Egham, Staines, Chertsey and Shepperton. The scheme consists of large scale engineering to construct three new flood channels as well as improvements to three of the Thames weirs. The Environment Agency is working in partnership with local authorities in the area to develop the scheme. The scheme has all the funding needed for development and preconstruction works, and £160m of Government funding. In addition, the Government is also committing new funding of an extra £60m from 2021. This takes the Government contribution to £220m. This is around 75% of the estimated costs, with around 25% of the estimated cost remaining for local authorities and their partners to meet.

coastal erosion risk management assets. The total value of these assets is £35[1] billion, of which the Environment Agency maintains £24 billion.

Capital investment is needed to both maintain and improve these defences. Regular maintenance is also important to ensure that we get the best possible value from defences. However, no matter how much is spent on routine maintenance, the natural cycle of deterioration makes capital expenditure necessary as assets near the end of their effective design life. The impacts of climate change can accelerate this process due, for example, to increasing volumes of water in rivers or sea level rise.

The Environment Agency is working with Defra, Infrastructure UK and HM Treasury to improve its asset management and maintenance approach. The goal is a better understanding and most efficient allocation of resources, in a 'whole life' approach, which takes full account of the benefits of routine maintenance as well as capital replacement and improvement.

This six-year capital improvement programme and parallel improvements in asset management planning will strengthen the Environment Agency's capacity to meet the government's objectives.

3. The six-year capital programme

This investment programme is the culmination of extensive national and local collaboration. It is built up of projects developed and promoted by local authorities, internal drainage boards and Environment Agency area teams, in liaison with communities and with the agreement of Regional Flood and Coastal Committees (RFCCs). The final programme has been consented to by each of the RFCCs in their own areas and approved by the Environment Agency's Board.

The programme provides improved visibility and confidence for local communities, by setting out where

Box 3. More than 1,400 projects with a place in the programme

The programme includes flood and coastal erosion risk management schemes at three stages of development. Within the first two of these stages there are sub-headings in the programme which further define the status of projects.

1) **The construction programme**
   a) Projects already in construction
   b) Fully funded projects scheduled to start construction in the coming financial year
   c) Projects scheduled to start construction in the coming financial year, subject to securing other funding contributions
2) **The development programme**
   a) Projects in development with full funding packages agreed, expected to start construction in future years, subject to approval of a full business case.
   b) Projects in development, expected to start construction in future years, subject to approval of a full business case and securing other funding contributions.
3) **The pipeline** includes project proposals that are likely to qualify for some government funding before 2021 and have been given an indicative allocation. However, they have not yet identified sufficient contributions and/or do not have a sufficiently well-developed case to enter the development programme at this stage.

[1] Operational Assets Valuation, WS Atkins, Sep 2010 - £35bn includes EA asset valued at £24bn and third party assets valued at £11bn figures dated April 2010. This does not include the value of assets designed to manage surface water.

projects fit in three stages of development (see Box 3). Details of the programme are published by the Environment Agency, including a list and status of projects, on GOV.UK.

The three stages of the programme reflect increasing levels of certainty around the development and delivery of individual schemes. The visibility that this provides will enable the construction industry to better support the Environment Agency and its partners in identifying where additional efficiencies or delivery improvements could be introduced.

For schemes entering the **construction programme** an indicative funding allocation is made through to completion. Funding may be re-profiled to ensure the overall programme remains affordable and efficient. This will ensure that any unused contingency and efficiencies can be effectively applied to support accelerated delivery of the programme. There are 310 schemes in this category, including flood and erosion protection works on the Humber; tidal defence improvements at Congresbury Yeo in Somerset, sea wall refurbishments at St Ives and projects to improve surface water management at Horncastle in Lincolnshire and tidal river defences at Warrington in Cheshire.

Projects are only introduced into the **development programme** if they have a prima facie case for government support in the construction phase. Confirmation of the timing and amount of grant in aid for the scheme is subject to assurance and approvals. As a general rule the maximum funding available for the development phase of a project is 20% of the eligible total grant in aid for that scheme. There are 1119 schemes in this category, including projects to improve defences in Lowestoft that were affected in the December 2013 surge, at Paignton seafront, to increase protection from fluvial flooding at Thornton in Lancashire, Beadnell sea wall improvements and work to reduce river flooding risk from the Great Stour at Canterbury.

The remainder of the programme is the future **pipeline.** This includes project proposals that are likely to qualify for some government funding before 2021 and have been given an indicative allocation. However, they have not yet identified

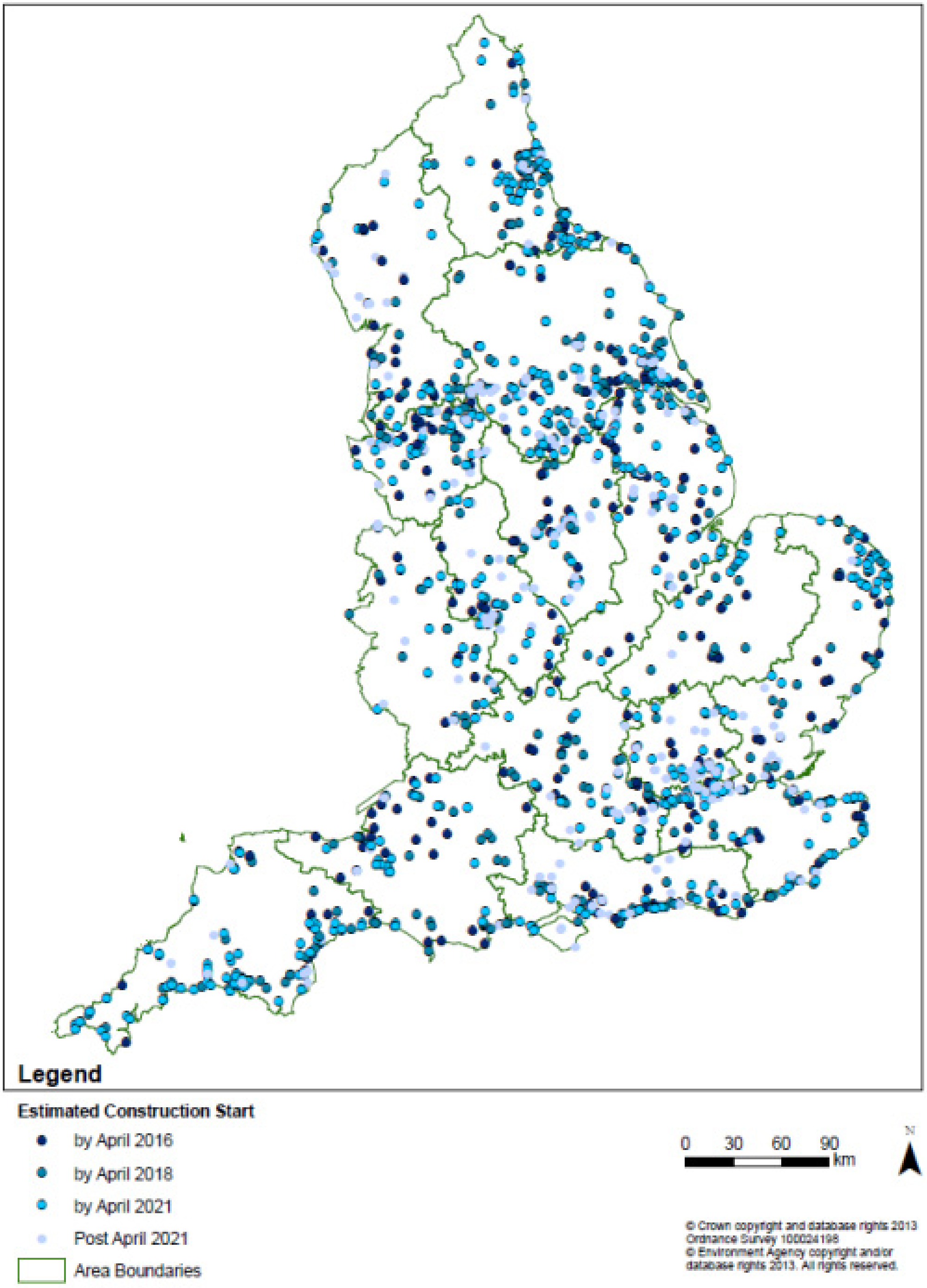
Box 4. A strategic solution for Oxford

Following the winter flooding in 2014 the Environment Agency is investigating flood reduction measures including a new channel to the West of Oxford to allow water to pass through and around the town more efficiently, reducing the risk of flood water entering homes, businesses and disrupting transport links during a flood. Allocations to this project in the six year programme together with local contributions mean that the funding needed for pre-construction works is now available. The scheme is being developed in partnership with Oxford City Council, Oxfordshire County Council, the local enterprise partnership and other infrastructure providers in the area such as Network Rail and Thames Water.

sufficient contributions and/or do not have a sufficiently well-developed case to enter the development programme at this stage. These projects may move into the development, and potentially construction, programme at any time subject to meeting the normal criteria. The pipeline projects will be regularly reviewed to take full advantage of any opportunities to accelerate their delivery. Schemes in this category include Shoreham western harbour defence improvements, surface runoff improvements at the Upper Calder in Yorkshire, reducing erosion risk in Shoeburyness and works at Seahouses Harbour in Northumberland.

Table 1 **Examples of projects protecting large numbers of households by 2021**	
Humber: Hull frontage	22,000
Pevensey Bay Sea Defences	18,606
Boston Barrage/Barrier Works	15,129
Hull River Defences	15,000
Anlaby and East Ella Flood Alleviation Scheme	12,779
Thames Estuary Phase 1 Programme	12,772
Humber Grimsby Docks	12,179
Lincshore 2010 - 2015	10,930
Morecambe Wave Reflection Wall Phases 1 - 3	8,127
Willerby and Derringham Flood Alleviation Scheme	8,085

Figure 1 Distribution of flood and coast erosion risk management schemes with scheduled start dates between 2015 and 2021



4. What the programme will achieve

Over the coming six years, we expect to start construction of more than 1,000 schemes. Together with the projects that are already in construction and in development for the future, government will be investing in more than 1,400 projects to better protect communities, businesses and the infrastructure upon which they depend.

By 2021 the government will have invested more than £2.3 billion and the projects in the programme will have reduced flood risk for at least 300,000 households. We estimate that this investment will help avoid more than £30 billion in economic damages giving an average of over £8 of benefit for every Government £1 invested. This includes a £1.5 billion boost to the farming sector, and £5.2 billion in long term benefits to transport, infrastructure, commerce and industry. Within the 6 years of the investment programme we estimate that projects will improve protection to around 420,000 acres of agricultural land, 205 miles of railway, 340 miles of roads and 4 airports.

Tackling the risk of flooding will also help local economic development and growth, unlocking opportunities for inward investment and helping to create and sustain jobs. As well as the national economic benefits, we estimate that this is worth an additional £4-9 per £1 invested in terms of benefits to the local economy.

Table 2. A regional view: Number of Schemes in RFCC areas

	Anglian Central	Anglian Eastern	Anglian Northern	English Severn and Wye	North West	Northumbria	South West	Southern	Thames	Trent	Wessex	Yorkshire
In Construction	10	22	21	13	42	17	24	34	36	27	33	31
In Development	25	64	65	52	119	96	137	126	118	101	52	164
In Pipeline	0	6	3	1	1	3	2	3	8	4	0	12
Estimate of households better protected by 2021	4,000	15,000	38,000	2,000	30,000	4,500	16,000	54,000	25,000	24,000	12,500	75,000

We will never be able to stop all flooding or erosion but we can reduce the risks. We expect this programme to reduce current levels of risk in England by 5% by 2021. In order to deliver this programme, we will need to make efficiency savings of at least 10% and attract contributions from other sources of £600 million or more. We are committed to achieving these goals. However, these figures do not describe the limit of our ambition. The Environment Agency together with its partners and suppliers will use the sorts of changes described in this plan to explore what more can be achieved.

5. How this programme will be different

Certainty of government funding for six years allows us to make a number of changes which will transform the way that flood and coastal erosion risk management schemes are delivered. Both the value of the settlement – larger than ever before – and the length of the commitment are important. The longer term settlement provides the stability needed to realise significant benefits in terms of efficient delivery and securing contributions. Key themes in these changes are outlined below.

Before 2011, annual allocations meant the Environment Agency needed to carefully control future commitments. The Agency did its best to give an indication of the capital funding that might be allocated to projects in future years. However, this did not provide enough certainty for communities about when government funding would be made available or what conditions would need to be met to allow their projects to start. This, in turn, limited risk management authorities' ability to realise potential synergies with other initiatives in their areas. It also made it difficult to leverage contributions, effectively limiting the number of schemes that could progress in any one year to whatever central government alone could afford.

A step change in partnership working

In 2011 Defra changed the funding approach to increase certainty and transparency over the level of government grant that could be made available for projects. The new partnership funding approach has been a success. See Box 5. However, on its own, this still did not provide enough certainty about *when* funding could be made available to specific projects in future years due to competition for a finite annual government grant. The six-year capital programme now gives a much clearer line of sight of what will be needed and when.

Box 5. Early successes of partnership funding

Changes in the funding approach have already led to an increasing number of partners gaining a stake in projects. This means that more can be done than would be possible with central government funding alone and local beneficiaries have a stronger interest in keeping down costs and maximising benefits. An independent evaluation of Partnership Funding, published in 2014, concluded that the approach was performing well in meeting its policy objectives.
25% more schemes would go ahead in the coming years than if project costs were met by central Government alone.
The new approach is expected to bring in up to £140 million in external funding over the four years to 2015, compared with just £13 million during the previous four years.

The improved visibility of projects in the pipeline and when they are likely to be funded will enable risk management authorities to better align their schemes with other developments in their areas and leverage the contributions necessary to maximise the benefits of the work. It will allow the demand for work and availability of funding to be much better matched over a more effective planning period.

The clearer visibility of the pipeline of work will also provide a firmer basis for discussions between delivery bodies and their supply chains (the consultant and contractor they employ to design and build defences) to explore the efficiencies that could be achieved in return for larger packages of work over longer periods of time. The savings from these contributions and efficiencies will be reinvested in projects to reduce flood and coastal erosion risk.

Recent improvements in partnership working are already driving innovation. The certainty and stability of a six-year capital programme will now allow us to make a step change towards a more integrated approach. This will act as a spur to even greater efficiencies which would not have been possible in a world in which government contributed all or nothing to projects.

Box 6 Partnership Funding and multiple benefits for the economy and environment

The Lower Dove flood management scheme in Derbyshire is a £9.33 million scheme offering improved protection to three villages (Hatton, Scropton, and Eggington). The majority of the funding (£7.23 million) came from Defra Grant in Aid, with the remaining coming from Nestlé. The scheme protected over 1,619 households, as well as a local sewage treatment works, vulnerable local roads and Nestlé's site at Hatton. It has also protected 400 jobs and allowed Nestlé's to create an additional 400 jobs on the site. The economic benefits of this scheme are estimated to total £363 million. In addition to the economic benefits and properties protected, the scheme has also helped improve recreational access and assisted fish passage to support salmon stocks.

In future a combination of partnership funding and shared objectives will mean that relationships between communities, the Environment Agency, other risk management authorities and their supplier will be increasingly characterised by:

- early contractor involvement in programme development, scheme design and innovations;
- incentivisation to drive behaviours which deliver improved outcomes at a programme level;
- integrated teams;
- greater packaging of work and longer contracts to enable suppliers to reduce costs; and
- a wider community of interest having a stronger stake in getting the best possible outcomes.

The six-year programme will support communities, risk management authorities and their suppliers to develop shared objectives, promote innovation and get the best possible outcomes from the whole programme of work. We are now asking delivery bodies and their supply chains to work together to achieve the maximum possible for communities - not to limit their aspiration to targets set in Whitehall.

A step-change in efficiencies

New ways of working, made possible by the scale, certainty and length of the government's capital commitment will unlock potential efficiencies. At least 10% efficiencies will be delivered on the total £2.3 billion commitment over the six years. This will include:

- more packaging of work to enable suppliers to reduce costs
- improved contracting approaches,
- innovation and value engineering,
- greater standardization, and
- streamlining.

The value of these efficiencies over the six year period will be over £230 million. These savings are being ploughed back in to the programme allowing us to progress more schemes and improve defences for communities sooner than would otherwise be possible.

Thanks to better management of risk and contingency at a programme level we have already been able to free up around 3% of the budget over the six year period. In addition to this, the Chancellor has agreed to bring forward up to £60 million from within the total £2.3 billion budget. These changes will allow us to accelerate our work and protect more communities from flooding more quickly. The Environment Agency will consult Regional Flood and Coastal Committees and local partners about which schemes will benefit from this. A further announcement will be made about which schemes will benefit in February.

Box 7. Programme management, packaging and partnership in practice

The Thames Estuary Asset Management Programme (TEAM2100) is the first 10 years programme of asset management work to protect London and the Thames Estuary from tidal flooding. The programme will reduce the risk of flooding for 1.25 million people across Kent, Essex and London including £200 billion worth of property, UK Government, major infrastructure and businesses. By packaging work and developing an integrated, co-located team with its partner CH2M Hill, the Environment Agency is aiming for 20% efficiencies over a 10 year period. This partnership will focus on programme level benefits, innovation and continuous learning.

Making the necessary changes

The Environment Agency has a pivotal role in securing the benefits of the new approach. Defra, as the Agency's sponsor, also has an important role in providing the necessary direction. The Agency is strengthening its programme management office to:

- Publish and share the pipeline of work with industry.
- Group schemes into more efficient programmes of delivery.
- Introduce more effective programme management processes and controls.
- Establish the most effective approach to managing risk and contingency at the programme level.
- Develop alternative procurement models based around collaborative programme delivery, starting with the recently agreed Thames Estuary Asset Management Programme.
- Engage earlier with local communities as part of a more strategic approach to securing partnership funding commitments.
- Improve its flood risk, asset and programme management datasets and programme intelligence.
- Explore the opportunities for further efficiencies through more effective and flexible 'whole life' planning and delivery.

The Environment Agency's improved programme management function will provide targeted support for its local area teams and local authorities to help their capability to deliver, and will monitor and intervene early if obstacles pose a risk to successful delivery. Defra and the Environment Agency will continue to work with Infrastructure UK through its Project Initiation Routemap and other initiatives to support the changes which are needed to deliver this.

Box 8. Bring flood reduction together with local growth opportunities on the Humber

The six year programme includes more than £80 million for schemes on and around the Humber Estuary, which will improve the level of protection to more than 50,000 households. The Environment Agency will also conduct a review to consider the ambitious proposal put forward by the Local Enterprise Partnership and local authorities as part of its update of the Flood Risk Management Study, to take full account of the lessons learned from the tidal surge in 2013. This review will be published in July 2015.

Defra will work with the Agency and Infrastructure UK to put in place improved programme and project monitoring tools to ensure a smooth passage of projects from the pipeline, through development and construction phase to completion. We will use intelligence gained from monitoring to highlight and tackle issues which unnecessarily slow delivery or add unavoidable costs. The Environment Agency will develop an integrated approach to deliver these enhancements by Spring 2015.

Box 9. Somerset

In response to severe flooding on the Somerset Levels, the Somerset Flood Action Plan was published in March. Dredging of 8km of the Rivers Tone and Parrett is now complete. We are planning to spend £15.5m in Somerset in capital investment on flood defences over the next 6 years, including £4.2m on the Somerset Levels and Moors alone. 7000 properties across Somerset will be better protected. Somerset also has funding to complete the appraisal, scheme development and design for a Bridgwater Barrier over the next 5-6 years. Local partners are working closely with the Environment Agency and they will together be able to apply for partnership funding once the local community has agreed on a preferred option.

6. How we will measure success

Building on Defra's role as sponsor of the Environment Agency, we are reviewing flood and coastal erosion risk management outcome and performance measures. In doing so we will learn from techniques developed in the private and regulated sectors, to maximise the benefits of our investments at all levels. New measures being developed will clarify the objectives and outcomes we expect the Environment Agency to achieve. The Environment Agency will monitor and report on the progress of the programme as a whole and on schemes within the programme. It will also continue to measure the programme outcomes so that we are not only able to see how the work is progressing but, even more importantly, what is being achieved in terms of reducing flood and coastal erosion risk. A clear distinction will be made between *indicators* of success, which will help monitor the mechanisms of delivery, and *outcomes*, which describe the benefits of the investment.

The Environment Agency will report the following **outcomes** to Defra on a quarterly basis:

- The economic benefits of capital projects. (The principal measure will be the net present value of projects completed in the programme. The EA will also continue to report on the benefit cost ratio of projects in the programme and the overall programme level benefit cost ratio of Defra's investment.)
- The number of households better protected from flooding or coastal erosion as a result of capital projects completed in the programme.
- The number of households at an increased risk of flooding from main rivers or the sea due to defences which are below the required condition.

On an annual basis the Environment Agency will also report the following outcomes:

- The expected average annual economic damages of flooding and coastal erosion (For the first time ever, this will enable us to assess whether we are reducing the overall level of risk.)
- The number of households at a greater than 1:100 probability of flooding from main rivers or the sea in any one year.
- The area of agricultural land in areas benefiting from improvement schemes completed in the programme.
- The number of industrial and commercial properties in areas benefiting from improvement schemes completed in the programme.
- The length of road and railways in areas benefiting from improvement schemes completed in the programme.
- The number of critical national infrastructure sites in areas benefiting from improvement schemes completed in the programme.
- The area of habitat improved or created as a result of flood and coastal erosion risk management works.

Other important **indicators of success** which will be measured by the Environment Agency and reported to Defra on a quarterly basis are:

- The value of contributions *secured* toward projects in the 6 year capital programme.
- The *anticipated* total value of contributions to projects in the 6 year capital programme.
- The value of efficiencies achieved to date.
- The number of Environment Agency managed flood defence assets in target condition.
- The number of third party managed assets which reduce the risk of flood from main rivers or the sea in target condition.
- The number and location of projects starting in development, in construction and completing as well as the reason for any delays.
- The progress on individual projects over £50 million in the government "Top 40", in line with the Infrastructure UK Major Infrastructure Tracking unit requirements.
- The number of overdue inspections of flood defence assets.

7. Long term investment scenarios

Investment in managing flood and coastal erosion risk repays over many years. It is therefore important that we understand how spending over the next six years fits in with the even longer term need. The Environment Agency's Long Term Investment Scenarios study (December 2014) [link] sets out national long-term of investment scenarios for flood and coastal risk management over the next 50 years. The new report replaces the 2009 Long Term Investment Strategy. It is an economic assessment of investment scenarios, based on a more robust analysis of risk and the value of future investment options.

Key findings of the report are:

- Current spending plans (about £750m, including all public and third party sources) are broadly in line with optimum levels of investment over the next 10 years.[2]
- This level of investment provides an average benefit cost ratio at a national level of 5:1.
- From the mid-2020s to mid-2040s the average annual investment needed to continue to reduce risk could rise to £850m-900m per year.
- There is scope to influence future investment needs through policy choices.

8. Our vision for 2021

The six-year programme is a step towards our vision for 2021.

- A 5% net reduction in risk at a national level.
- Effective processes in place to build and manage defences.
- A wider range of beneficiaries given a stake in the delivery of flood and coastal erosion risk management schemes.
- Better alignment between those who pay for flood and coastal erosion risk management schemes and those who benefit.
- Much better integration and clarity of purpose at a programme level between the Environment Agency, other risk management authorities and the supply chain to serve the interests of benefiting communities and taxpayers.
- Stable financing for flood and erosion risk management and a visible forward looking, integrated six year programme of measures to reduce risk.
- Continuous improvement through programme level delivery and an improved understanding of the scope for further efficiencies.

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[2] The Long Term Investment Scenarios model takes account of all expenditure, both capital and revenue, on projects which are cost beneficial (i.e. the optimum level of investment assumes that all projects with a benefit cost ratio of greater than 1 are progressed).

- The Environment Agency increasingly playing an enabling role where others are better placed to lead the management and improvement of defences.

- Improved asset management and programme management datasets and tools.

- A clear understanding and operation of the most cost effective whole-life asset management regime, integrating the management of resource and capital expenditure on improvement, maintenance and renewal in the face of climate change and other risks.

- All infrastructure providers building flood resilience into their business planning (including roads, rail, energy, water).

- A greater understanding and awareness of flood and coastal erosion risk and what business, authorities and individuals can do to reduce it.

- A high level of confidence amongst communities, authorities and industry that flood and coastal erosion risk is being effectively managed and reduced together with realistic expectations about what can be done in areas where conventional measures are not cost effective.

- Flood and erosion risk management measures which increasingly improve the natural environment and support a secure and growing economy.