

# FUTURE FUNDING FOR FLOOD AND COASTAL EROSION RISK MANAGEMENT IN ENGLAND

## Draft Technical Guidance

Issued for consultation by Defra

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<http://www.defra.gov.uk/corporate/consult/flood-coastal-erosion/index.htm>

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## Purpose

This document has been published in parallel and as part of a consultation on the future capital grant-in-aid allocation system for flood and coastal erosion risk management projects in England.

The sections within this document have been prepared to provide more detail on the outcomes, assumptions and methodology underpinning the proposed capital allocation system, in order to give readers a fuller understanding of how such a system might work.

The draft guidance is closely tied to the proposals in the main consultation document. The guidance is therefore subject to change in line with ministers' decisions regarding the overall framework following the consultation stage.

The guidance is necessarily technical and detailed in some places. It is primarily intended for consideration by the Environment Agency, Local Authorities, Regional Flood Defence/Coastal Committees, Internal Drainage Boards and other professional partners in the private and public sector involved in the management of flood and coastal erosion risk.

However, some aspects will be of interest to a wider audience, and feedback from all parties is encouraged. Additional consultation questions have been posed within these sections if points have not already been covered within the main consultation document.

## Consultation responses

This consultation is running in parallel with one being conducted by Defra and the Environment Agency on a National Flood and Coastal Erosion Risk Management Strategy for England, as well as other draft guidance and proposals prepared under the Flood and Water Management Act 2010. These are available at the following website:

<https://consult.environment-agency.gov.uk/portal/ho/flood/fcerm/strategy>

Defra would be grateful if responses to the consultation on potential funding reforms are sent directly to the email address below:

[floods.funding@defra.gsi.gov.uk](mailto:floods.funding@defra.gsi.gov.uk)

All responses should be received at the latest by 16<sup>th</sup> February 2011.

Questions 1 to 10 are contained in the main consultation document.

If you have any queries, please call the Defra Flood Management helpline on 020 7238 6239.

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## Section A: Future outcomes and indicative payment rates

The following table presents the outcome measures that are proposed for future periods. The table also provides potential payment levels and the rationale for them in each case.

All payment rates below are indicative only, based on the assumptions presented. The rates indicate the maximum that may be paid by Government per outcome in each case. The total grant value would always be capped at the actual cost of a project. All payment rates over time have been discounted at 3.5%, in keeping with and as a result of whole-life costs and benefits being similarly discounted when appraised within projects.

Where relevant, the indicative payment rates below assume that the assets being built have a design life of fifty years. Schemes that deliver benefits for a longer period would be offered higher payment rates, and those delivering benefits for a shorter period of time would be offered lower rates, in direct proportion to the benefits achieved in each case.

	<b>Proposed SR10 Outcome Measures</b>	<b>Change from the previous period?</b>
<b>OM1</b>	<p><b>Value of long-term discounted economic benefits</b> against the 'do nothing' scenario:</p> <p>These include avoidance of damages/costs not covered by other OM payments e.g.:</p> <ul style="list-style-type: none"> <li>• Businesses (buildings, contents and disruption)</li> <li>• Agriculture (plus any drainage benefits)</li> <li>• Local Government, emergency services and other public bodies</li> <li>• Communications (roads, rail, telecoms)</li> <li>• Utilities (gas, electricity, water)</li> <li>• Public health (incl. fatalities, distress, impacts on education etc)</li> </ul> <p>Excluding:</p> <ul style="list-style-type: none"> <li>• All properties (all sectors) built or converted into domestic dwellings since January 2009</li> <li>• All households built prior to January 2009 (as these benefits will be paid for separately, see OM2, 3 &amp; 4)</li> <li>• All environmental benefits paid for as part of OM5, 6 &amp; 7</li> <li>• Any subsequent investment that may be required to replace the asset at the end of its design life</li> </ul>	<p>The basis for OM1 is the same as for Comprehensive Spending Review 2007 ("CSR07"), other than the subtraction of benefits valued by other OMs (to prevent double-counting), and to ignore properties built after January 2009, to encourage any necessary development to be suitably protected or resilient. The benefits of any future investment not part of the scheme being approved for funding at this stage are also removed to avoid national budgets and local contributors paying now for benefits that rely on decisions around future investment, which in the event may not be required.</p>
<p><b>Indicative payment per outcome</b></p> <p>Government would pay <u>£1 for each £18 of OM1 benefit</u> based on several assumptions. This is based on national budgets paying for typical levels of 'national' benefits within projects such as protecting public infrastructure, public health, and avoiding emergency response costs. These are assumed to be 27% of the total non-household damages of a flood<sup>1</sup>, with national budgets expected to pay a maximum of £1 for each £5 of national benefit delivered.</p>		
<b>OM2</b>	<p><b>Households built before January 2009 moved from one category of flood risk to a lower category</b> in comparison with the do nothing case</p>	<p>Same as CSR07, other than to ignore properties built or converted since January 2009. Coastal erosion now treated separately, see OM3.</p>

<sup>1</sup> Source: *The costs of the summer 2007 floods*, Environment Agency

	<b>Proposed SR10 Outcome Measures</b>	<b>Change from the previous period?</b>
	<p><b>Indicative payment per outcome</b> Protecting a household from moderate risk is assumed to reduce expected damages by £150 a year, based on reducing the annual likelihood of flooding from 1% to 0.5%, and typical flood damages being £30,000<sup>1</sup> per home. Based on this Government would pay <u>£30 per household per year of protection</u> to achieve a minimum 5 to 1 benefit to cost ratio. In present value terms, this equates to paying up to around £710 per household protected from moderate risk for 50 years.</p>	
<b>OM2b</b>	<b>Of OM2 households moved from significant or very significant risk of flooding (1.3% or greater) to moderate risk or a lower category</b>	Same as CSR07, other than to ignore properties built or converted since January 2009.
	<p><b>Indicative payment per outcome</b> If the household would otherwise be at significant or very significant risk (5% assumed), expected annual damages of £1,500 are reduced to £300 as a result of protection being improved. Therefore, in addition to OM2, Government would pay <u>an extra £240 a year per household better protected against very significant or significant risk</u>. This would equate to providing operating authorities with up to £6,415 per household moved from very significant or significant risk to low risk, if protection is expected to last 50 years.</p>	
<b>OM2c</b>	<b>Of OM2b households within the 20% most deprived areas of the country according to the index of multiple deprivation</b>	Same as CSR07 OM3, other than to ignore properties built since January 2009.
	<p><b>Indicative payment per outcome</b> Benefits in deprived areas would be valued 2.25 times higher than elsewhere to take account of the potential impact of flooding on those least able to afford to insure themselves or recover from flood events without additional help from the State<sup>2</sup>. Therefore, in addition to OM2 and OM2b, Government would pay <u>an extra £338 per household per year protected in deprived areas</u>. This would equate to up to £14,430 per household moved from very significant or significant risk to low risk in deprived areas, if protection lasts 50 years.</p>	
<b>OM3</b>	<b>Households built before January 2009 better protected against coastal erosion</b>	Same as CSR07, but now as a separate OM as the nature of the risk is different and the damages potentially higher
	<p><b>Indicative payment per outcome</b> Defences delay the natural processes of erosion and mean properties can be occupied for longer than otherwise. The benefits of defences are therefore equivalent to delaying the loss of rental income on the properties affected, assumed to be a present value of £3,050 per household per year (loss assumed to be in 50 years). Therefore, Government would pay up to <u>£209 per year a household is protected against loss</u>. This would equate to paying up to around £4,975 per household if protection is expected to last 50 years.</p>	
<b>OM3b</b>	<b>Of OM3 households protected against loss within twenty years due to coastal erosion</b>	As above
	<p><b>Indicative payment per outcome</b> In addition to OM3, Government would pay <u>an extra £400 per year per household if they would otherwise be damaged or lost to coastal erosion within twenty years</u>. This would equate to paying up to a total of around £14,490 per household if protected for 50 years.</p>	
<b>OM3c</b>	<b>Of OM3b households protected against loss within twenty years, within the 20% most deprived areas</b>	As above
	<p><b>Indicative payment per outcome</b> In addition to OM3a and OM3b, Government would pay <u>an extra £762 per year per household protected against loss within 20 years</u> based on benefits being worth 2.25 times more in deprived areas<sup>2</sup>. This would equate to paying up to a total of around £32,600 paid per household if protected for 50 years.</p>	

<sup>2</sup> The 2.25 figure is based on Gross Distributional Weightings within HM Treasury's 'Green Book', Annex I.

	<b>Proposed SR10 Outcome Measures</b>	<b>Change from the previous period?</b>
<b>OM4</b>	<b>Households at very significant risk built or converted before January 2009 provided with appropriate property-level measures</b> such as resistance and resilience	New OM. Previously, grants for property-level protection were handled separately.
<b>Indicative payment per outcome</b> Government may pay up to <u>£2,100 per household protected from very significant risk through resistance and resilience measures</u> , based on these being able to reduce damages by £10,500 over ten years, equivalent to reducing the annual likelihood of flood damages from 6.67% to 2.5% for that period.		
<b>OM4b</b>	<b><i>Of OM4 households in receipt of low income benefits helped through property-level protection</i></b>	<i>As above</i>
<b>Indicative payment per outcome</b> <i>In addition to OM4, Government may pay up to <u>an extra £2,625 to help low income households</u>, meaning up to £4,725 would be available to help protect low income households through property-level measures.</i>		
<b>OM5</b>	<b>Kilometres of protected<sup>3</sup> rivers improved to help meet the objectives of the Water Framework Directive</b>	Similar to CSR07 OM4 but with greater emphasis on meeting the requirement of the Water Framework Directive.
<b>Indicative payment per outcome</b> Based on the estimated costs of improving each kilometre of watercourse, up to <u>£80,000 per kilometre of rivers improved</u> may be made available. Unless this activity is undertaken, the UK risks being fined by the EU Commission for failing to meet the requirements of the Water Framework Directive.		
<b>OM6</b>	<b>Hectares of intertidal habitat created</b> to help meet the objectives of the Water Framework Directive for protected areas <sup>3</sup>	Similar to CSR07 OM5 but with greater emphasis on meeting the requirement of the Water Framework Directive.
<b>Indicative payment per outcome</b> Based on the estimated costs of creating inter-tidal habitat, up to <u>£50,000 per hectare</u> may be made available. Unless this activity is undertaken, the UK risks being fined by the EU Commission for failing to meet the Water Framework Directive.		
<b>OM7</b>	<b>Hectares of water dependent habitat improved</b> by flood, water level and coastal management works to help meet the objectives of the Water Framework Directive	Similar to CSR07 OM5 but with greater emphasis on meeting the requirement of the Water Framework Directive.
<b>Indicative payment per outcome</b> Based on the estimated costs of improving water dependent habitat, up to <u>£15,000 per hectare</u> may be made available. Unless this activity is undertaken, the UK risks being fined by the EU Commission for failing to meet the Water Framework Directive.		

Q11. Do you agree with these outcome measures for future periods? If not, which would you change, or what others would you add?

Q12. Do you have any comments on the indicative payment values for each outcome, or the underlying assumptions used in their calculation?

<sup>3</sup> Under the EU Habitats Directive or Birds Directive

## Section B: Prioritisation and funding allocation

Based on the outcome measures and payment values in the previous section, each potential risk management project over time could have access to an amount of funding from central Government. In many cases this will be sufficient to fund the full costs of the project.

In other cases, the amount of FDGiA on offer will be less than the total amount the project requires. In these cases, the project can only proceed if costs are reduced to the amount implied by outcome payments, or if sufficient alternative funding can be found to meet the difference.

Calculations can be made to determine which category a project falls into, based on the following metrics:

- The “**FDGiA Contribution**”: this is the maximum possible amount of FDGiA available towards the whole-life costs of a project, based on the outcomes to be delivered.
- A projects’ “**Raw OM Score**” (Outcome Measure Score): this is the percentage of a project’s whole-life costs that are payable by FDGiA (i.e. the project’s FDGiA Contribution divided by its whole-life costs). An OM score above 100% means a project could potentially be fully-funded. A score of 75% means whole-life costs will need to be reduced by at least 25% or sufficient alternative funding found in order for the project to proceed.
- “**External Contributions Required**”: this is the minimum amount of money needed to be found from other sources (or saved from project costs) in order for the project to proceed.
- A projects’ “**Adjusted OM Score**”: this is the Raw OM Score (as above) adjusted for the impact of the external contributions on offer. An Adjusted OM Score above 100% means a project can potentially proceed if the identified contributions are secured.

Where project costs are not fully justifiable to national budgets (i.e. where the Raw OM Score is less than 100%) the costs of the project will have to be reduced or sufficient alternative funding found before the amount on offer from FDGiA can be made available. Contributions from other public bodies are acceptable and can count towards increasing the Adjusted OM Score. This includes from Regional Flood and Coastal Committees themselves, through them deciding to spend ‘local levy’ on the unmet costs of a project.

For example, if a project has whole-life costs of £2,000,000, whole-life benefits of £10,000,000 and is expected to remove 200 households from significant risk for 50 years:

- The maximum FDGiA Contribution would be £1,482,000: £1,283,000 as a result of the households being protected (£6,415 from the table in Section A, multiplied by 200), and a further £199,000 as a result of the other economic benefits being delivered (see Section D for how to derive OM1 payments).
- The Raw OM Score would be 74% ( $£1,482,000 \div £2,000,000$ ), meaning almost three-quarters of the whole-life costs are justifiable to FDGiA.
- The reduction in whole-life costs or external contribution required for the project to proceed would be £518,000.
- If this level of contribution is achieved, the local area would receive benefits worth £10,000,000 at a direct cost of £518,000, a 20 to 1 return to the local area in this

example. If ways can be found to reduce the whole-life cost by £518,000, no local contribution may be necessary.

### ***Establishing the National Priority Programme***

For main-river or tidal flooding investments, projects with an Adjusted OM Score greater than 120% (i.e. where costs to the taxpayer are more than fully justified by some margin) could automatically become part of a National Priority Programme. This element of the overall programme would work on five-year forward look and allow the Environment Agency to exploit economies of scale and relative certainty over future-years' funding to achieve significant efficiencies in delivery. Main-river or tidal flooding projects scoring less than 120% could be promoted into the National Priority Programme if sufficient contributions can be secured or cost reductions achieved in order to increase the Adjusted OM Score to over 120%. The figure of 120% is proposed so that only the most beneficial projects are candidates, but when taken together, the set of projects are likely to be of sufficient total value to allow the Environment Agency to exploit economies of scale.

### ***Agreeing the regional programme***

Once the National Priority Programme is established, each Regional Flood and Coastal Committee would be allocated a share of the remaining FDGiA. The division of funds between regions could be achieved in various ways, for example based:

- on relative risk, i.e. in line with estimated annual damages within each region;
- on the strength of the pipeline of projects within each region, i.e. in line with the sum of raw outcome measure scores, with each weighed by project costs.

It is proposed that the total amount allocated to RFCCs would not be less than half of the non-committed capital available to the Environment Agency in the relevant year(s). RFCCs would be able to use their allocations, together with the value of 'local levy' they decide upon, to agree a regional programme encompassing all other flood and coastal erosion risk management investments in their area that they decide to fund. Each regional programme would have to be based on projects with Adjusted OM Scores above 100%, including as a result of contributions secured, together with any projects below 100% that an RFCC decides to promote into the regional programme by spending local levy on the unmet costs of a project.

If possible, RFCCs should plan regional programme investments several years in advance, by agreeing a minimum level of future local levy values up to four years ahead, and the minimum set of projects it is willing to support. In this way, projects part-funded by the local levy could (by agreement with the sponsoring authority) be combined with EA's National Priority Programme, and therefore potentially benefit from better contractual terms and cost efficiencies that EA are able to negotiate. This would also help create further certainty of funding for each potential project within the region.

### ***Using FDGiA to deliver multiple benefits***

In all cases, the amount of FDGiA made available would be capped at the amount needed to deliver the optimal level of flood and coastal erosion risk management benefits from the project. For example, if a higher standard of protection is desired than can be justified in cost/benefit terms, the additional whole-life costs would have to be met from other sources. Similarly, projects may involve optional extras included in pursuit of wider objectives or benefits that are not needed to achieve the outcome measures, nor are necessary for the safe operation and maintenance of the asset. These elements, such as additional

landscaping, car parks, cycle paths and other local amenities etc, can be delivered as part of a combined project but would need to be funded through other means.

It is important that FDGiA is focused on delivering as much in the way of flood and coastal erosion risk management as possible, and its impact is not diluted by being drawn in to deliver other aspects. Instead, FDGiA should increasingly be used to part-fund wider infrastructure or regeneration projects that deliver flood and coastal defence amongst other benefits. Alternatively, other sources of funding should be leveraged into flood and coastal defence projects if they are set to deliver multiple objectives at the same time.

### ***Funding for scheme development, e.g. strategies, plans and appraisals***

Under the proposed system, FDGiA would be allocated to project appraisal reports and other pre-construction phase works on the same basis – in line with the expected outcomes from the eventual scheme being investigated. If the Adjusted OM Score relating to pre-construction costs is 120% or above, it is proposed that projects would automatically be taken forward and funded by the Environment Agency subject to overall budget constraints. Scheme development work scoring 100% or above can also be fully funded, subject to agreement by the RFCC and the availability of funding. Work scoring less than 100% would need to have the relevant costs reduced and/or contributions found. RFCCs may decide to fund such costs through the local levy if the eventual scheme is seen as a priority for the committee.

For example, if £500,000 is needed to develop a project appraisal report for a scheme expected to score 85%, £75,000 would need to be found from other sources before the appraisal can proceed. Alternatively, if the costs of the appraisal can be reduced to £400,000, then a £60,000 contribution would be required.

In all cases, pre-construction costs would form part of a projects' whole-life costs when it comes to approving funds for the construction phase. Any contributions made towards pre-construction phase costs, including by the RFCC, would be used to adjust the OM Score appropriately.

For example, if a project is due a FDGiA contribution of £1,500,000 towards whole-life costs of £2,000,000, the external contribution necessary for it to proceed would be £500,000. If a £75,000 contribution was paid towards the project's pre-construction costs, the contribution required at the construction phase would be reduced to £425,000.

Q13. Do you have views on the National Priority Programme and the threshold above which projects would be selected for it?

Q14. Do you have any suggestions or preferences for determining what each RFCC's share of FDGiA should be, once funding has been allocated to the National Priority Programme?

Q15. Do you have any other comments or suggestions on how prioritisation and funding allocation should work?

## Section C: Funding and delivery arrangements

As the proposed funding system would be based on the whole-life costs of each investment need, not just construction costs, the amount of grant funding made available would need to take account of who will bear the future costs of maintenance if any is needed. In all cases, local beneficiaries should be expected to fund their share of future maintenance costs, to avoid added pressure on the general taxpayer arising from schemes that would otherwise not be built.

The following table describes funding and delivery arrangements for each source of risk and scale of benefit:

Source of risk	Adj. OM Score >120%	Adj.OM Score <120%	Commentary
<p><b>Local flooding including surface water, plus coastal erosion/ protection</b></p> <p><b>Plus property-level protection</b></p>	<p>If approved by the relevant RFCC, capital grants would be provided to the relevant operating authority. The value of grants would be for the FDGIA share of the costs for approval, as determined by the Raw OM Score, up to a maximum of 100%. So if the Raw OM Score is 55%, capital grants worth 55% of the phase approval costs (not whole-life costs) would be provided. Formula Grant (for LAs) and Special Levy (for IDBs) will continue to be available to support future maintenance costs. Operating authorities would be able to delegate to others or use EA's contractual frameworks if desired.</p>		<p>This is the same situation as now, other than the possibility of part-funding in cases where costs aren't fully justifiable to national budgets. The purpose of each grant would be in the public domain, allowing oversight and scrutiny as part of local flood risk management strategies.</p>
<p><b>Main river and tidal flooding</b></p>	<p>As now, the Environment Agency would deliver the project and maintain the relevant assets over time. EA's external contributions policy would still apply to these projects, in order to reduce costs to national budgets and allow the overall funding available to be spread further. Any contributions would need to be forthcoming as agreed in order for the project to proceed.</p>	<p>As left, if promoted into the regional programme through the RFCC levy alone, or if the required contributions towards whole-life costs are available in advance. If not, capital grant would be provided to the sponsoring local authority, at an amount equal to the construction costs less the local share of whole-life costs. This may be a negative amount in some cases, meaning the relevant amount would need to be paid to EA before consent can be granted.</p>	<p>This would be the same as the current situation in most cases. In cases where relatively low benefit (&lt;100%) projects are promoted into the regional programme, the local authority would be responsible for delivery unless otherwise agreed with EA. The amount of grant to LAs in this situation needs to be adjusted to compensate national budgets in advance for the maintenance legacy created for the Environment Agency by the scheme going ahead.</p>

In all cases, additional capital grants would not be available to protect the same households again until the expected duration of benefits has expired (other than for emergency works to repair damage to an otherwise functional asset). Given the extra emphasis being placed upon outcome measures in order to allocate funding, the Environment Agency and Defra would place additional scrutiny on all outcomes being claimed by projects.

### ***Counting households indirectly at risk***

In the past, projects have been able to claim that households have been “better protected” even though the fabric of the buildings themselves were not at risk. Examples include the upper floors of apartment buildings, where better protection means people are less likely to need to be evacuated and provided with temporary accommodation. Also, some coastal erosion schemes have claimed household OMs because their gas, electricity or water supplies have been better protected, even though the households themselves were not at risk of erosion.

Under the proposed system, payment levels would reflect the potential for actual damage to properties and their contents. It would therefore be inappropriate to allow households not at risk of such damage or loss to be claimed against OMs 2, 3 and 4. The actual financial benefits to such properties and their utility providers, and the costs avoided for example in terms of temporary accommodation and loss of utilities should be fully valued within the whole-life benefits of a project. As such, these benefits would be supported by FDGiA as part of Outcome Measure 1.

### ***Avoiding the double counting of benefits and outcome measures***

In many cases, households and other beneficiaries are protected by a system of assets working together, and only parts of a system may need to be refurbished or upgraded at any point in time. In these cases it would be inappropriate to claim against a single project all the benefits and households that are at risk and protected by the entire system. If they were, such benefits would be double-counted and paid for twice when the next part of the system needs to be improved. Instead, whole-life benefits and outcome measures should be claimed based upon the value of assets being replaced or upgraded, as a proportion of the total replacement value of the entire asset system.

For example, if 100 households are protected as part of an asset system which overall has a replacement value of £20 million, a project to replace 10% of the system (by value) should claim 10 households. This leaves a further 90 households and 90% of the other benefits to be claimed when future parts of the system are replaced.

- Q16. Do you have any comments or suggestions on these funding and delivery arrangements?
- Q17. Do you agree that it would be inappropriate under the new system to allow payments to be made under OM2 and OM3 in relation to households not actually at risk of physical damage?

## Section D: Calculating OM Scores and contributions

The maximum amount of FDGiA available to a project, together with the level of necessary contributions, would be calculated as set out below. These calculations are based on the value attached to each outcome measure, the costs involved in achieving them, and the duration that benefits are expected to last for. The basic principle, as explained in the main consultation document, is that national budgets would pay for a share of the benefits achieved when outcomes are delivered.

First of all, OM1 needs to be calculated. OM1 reflects all the possible financial benefits associated with the current investment over its expected lifetime, less those benefits associated with the other specific outcome measures. The starting point for OM1 is therefore the present value of whole-life benefits (“PV WLBs”) for the current investment. See Section E of this guidance for how the ‘current investment’ is defined.

Present values for whole-life costs and benefits, and therefore payment rates, need to be used throughout the calculations to take account of the time value of money – standard economic convention says that a £1 today is worth more than the promise of a £1 in a year’s time. Costs and benefits, and therefore payment rates, in future years are discounted back to the present day at 3.5% a year. This discount rate is set by HM Treasury within the ‘Green Book’.

In order to avoid double-counting economic benefits within OM1 and the other outcome measures, the benefits associated with the other OMs, i.e those relating to households and the environment, are removed from the whole-life benefits. Otherwise, such benefits would be paid for twice under OM1 and the relevant other outcome measures.

As payment rates for outcome measures 2 to 4 - including their sub indicators b, c, etc - are based on national budgets paying a fifth share of the benefits delivered, we need to multiply payment rates by 5 when removing each outcome measures’ value from the whole-life benefits. Otherwise the remaining 4/5<sup>th</sup>s of the benefits associated with OMs 2 to 4 would still be paid for under OM1.

The value of the environmental outcomes 5, 6 and 7 also need to be subtracted for the purposes of calculating OM1. As these outcomes are paid for based on average actual costs, as opposed to a fifth share of their benefits (as benefits are more difficult to quantify for environmental outcomes), there is no need to multiply their payment rates by five.

For readers familiar with mathematical notation, the precise calculation of OM1 would be as follows:

OM1 =

$$PV\ WLBs - \sum_{OMs, i = 2-4} \text{Number of outcomes expected}_{OMi} \times (\text{Payment rate}_{OMi} \times 5) + \sum_{OMs, i = 5-7} \text{Number of outcomes expected}_{OMi} \times \text{Payment rate}_{OMi}$$

The  $\Sigma$  summation symbol means “sum over”. In this case we take each outcome measure in turn, multiply the number of outcomes by the relevant payment rate, add up all the results, then subtract the total from the whole-life benefits.

The maximum amount FDGiA payable towards the project's benefits over the lifetime of the scheme, the "FDGiA Contribution", could then be calculated. The FDGiA Contribution is equal to the value of the residual benefits claimed against OM1 divided by 18, plus each of the other outcomes multiplied by their relevant payment rates. The rationale for dividing the value of these benefits by 18, as opposed to 5, is explained in the main consultation document and in Section A.

Again in mathematical notation this would be as follows:

*FDGiA Contribution:*

$$OM1 \div 18 + \sum_{OMS, i = 2-7} \text{Number of outcomes expected}_{OMi} \times \text{Payment rate}_{OMi}$$

The FDGiA Contribution can then be converted into an Outcome Measure Score, which describes the proportion of project whole-life costs that can be justified to national budgets. "PV WLCs" means the discounted or present value whole-life costs of the current investment:

*Raw OM Score =*

$$FDGiA \text{ Contribution} \div PV \text{ WLCs}$$

Similarly, the total value of any necessary external contributions can be calculated. This will differ based on whether the asset being created will be maintained at EA's expense, funded through revenue FDGiA, or by other means.

If the investment being approved will create or upgrade an asset that will require ongoing maintenance at EA's expense, then the contribution would need to help fund these ongoing costs as well as the up-front costs. Otherwise EA, and national budgets, would be left with an unfunded maintenance legacy. If the asset will be maintained at the expense of others, capital FDGiA should fund the appropriate share of the up-front costs of the scheme, the "Costs for Approval", with ongoing costs met locally under existing arrangements.

If the investment will create an asset that EA will need to maintain:	If no maintenance is required, or if someone else will fund ongoing maintenance:
<p><i>External Contribution Required =</i></p> $PV \text{ WLCs} - FDGiA \text{ Contribution}$ <p>( or zero, if <math>FDGiA \text{ Contribution} &gt; PV \text{ WLCs}</math> )</p>	<p><i>External Contribution Required =</i></p> $Costs \text{ for Approval} \times ( 1 - ( FDGiA \text{ Contribution} \div PV \text{ WLCs} ) )$ <p>( or zero, if <math>FDGiA \text{ Contribution} &gt; PV \text{ WLCs}</math> )</p>

The value of any contributions secured will increase the Adjusted OM Score (i.e. the Raw OM Score adjusted for contributions). Contributions from other public bodies are acceptable, including from RFCCs. The Adjusted OM Score will also differ depending on who is expected to fund ongoing maintenance costs.

If the investment will create an asset that EA will need to maintain:	If no maintenance is required, or if someone else will fund ongoing maintenance:
<p><i>Adjusted OM Score =</i></p> $FDGiA \text{ Contribution} \div ( PV \text{ WLCs} - External \text{ Funding} )$	<p><i>Adjusted OM Score =</i></p> $( FDGiA \text{ Contribution} \div PV \text{ WLCs} ) + ( External \text{ Funding} \div Costs \text{ for Approval} )$

The Adjusted OM Score needs to exceed 100% before the project can proceed and FDGiA awarded.

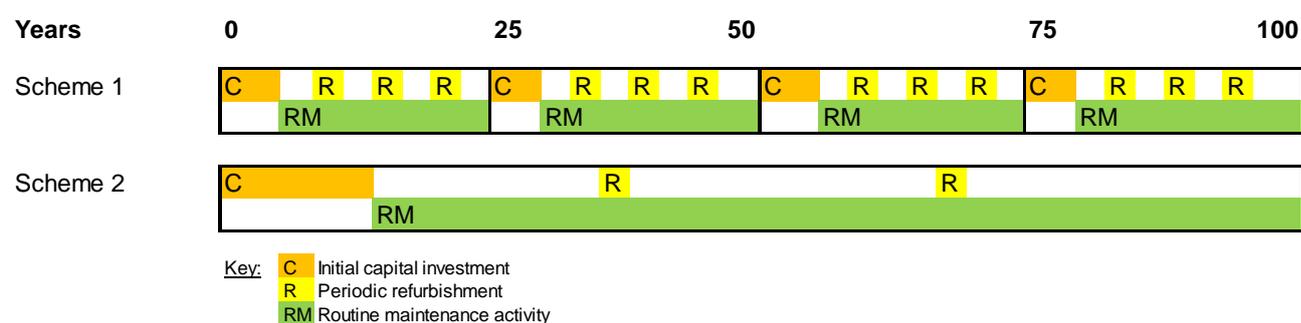
Q18. Do you have any comments or suggestions on the key project metrics or the way in which they would be calculated?

## Section E: Duration of benefits, and costs and benefits for the current investment

The previous set of household outcome measures did not take into account the expected useful life of defence assets being constructed, nor the duration of benefits being delivered. This has meant that schemes that provide protection for a short period of time have had the same access to funding as schemes that deliver similar benefits to households but for a much longer period of time.

To overcome this, the proposed system takes into account the duration of benefits being delivered by the investment seeking approval at this stage. Any future full replacement of assets (beyond maintenance and refurbishment) that may be required to maintain levels of protection would be ignored, as otherwise national budgets would be paying now for benefits that rely on future investment and approvals, and would end up paying for those benefits twice. It would also be unfair to expect local contributors to pay now for their share of future investment that may not be required for several decades.

The diagram below illustrates this using two schemes over a 100-year time period (the period often used for project appraisal). One involves a single, large, initial investment, and the other a series of smaller investments every 25 years, to maintain levels of protection over time. In both cases, the initial investment is supported by ongoing routine maintenance (RM) and refurbishments (R) which are necessary for the initial investment to reach its design life.



Scheme	Costs over appraisal period	Benefits over appraisal period	Appraisal period	Whole Life Costs for initial investment	Whole Life Benefits for current investment	Duration of benefits
Scheme 1	£5m	£80m	100 years	£2m	£30m	25 years
Scheme 2	£5m	£80m	100 years	£5m	£80m	100 years

For the purposes of the illustration, both schemes are assumed to have the same overall costs and benefits identified over the whole appraisal period; each based on a 100 year outlook. Whilst Scheme 1 will need less initial investment, levels of protection and benefits over the full 100 year period rely on additional investment (asset replacement) in years 25, 50 and 75. Therefore the funding approved at this stage for Scheme 1, and the whole-life costs and benefits recognised, should be those anticipated for the next 25 years, i.e. up to the point at which further investment is required. For Scheme 2, where a single investment is expected to deliver benefits for the full appraisal period, the whole-life costs and benefits will be as in the full appraisal, and the duration of those benefits will be 100 years. In both cases, the whole-life costs of the current investment should include all project development

costs, plus any anticipated maintenance and refurbishment costs expected up to the point of the next major investment (defined as a full replacement of the initial asset), i.e. during the next 25 years for Scheme 1.

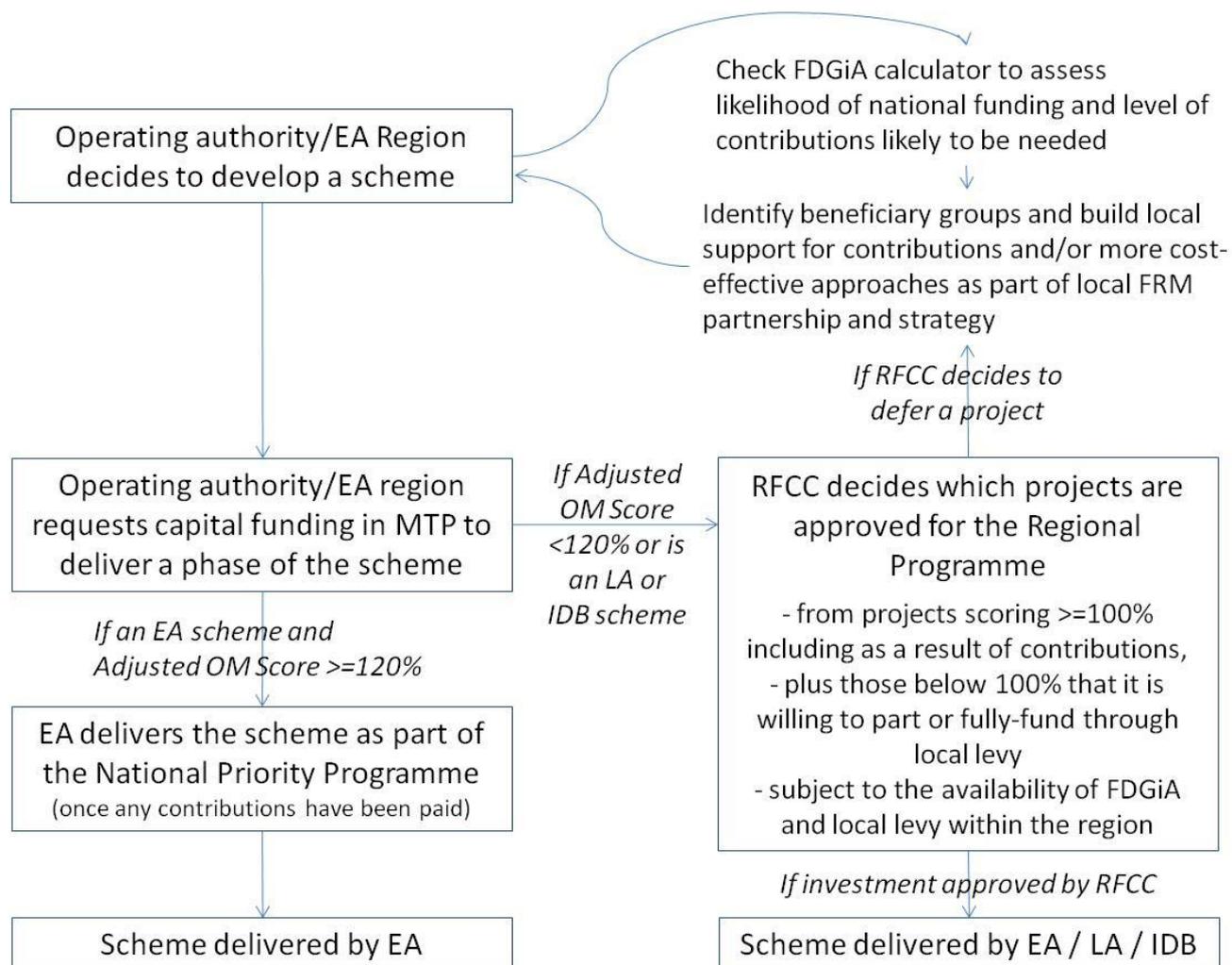
***Managed adaptive approaches to climate change adaptation***

A 'managed adaptive' scheme, involving a series of decision points through time, each potentially leading to investments to adapt a system to climate change, may be similar in character to Scheme 1 in the above example. However, at each decision point, the relevant period over which benefits and costs should be considered when determining an OM score is the whole life of the investment being considered, which is not necessarily the same as the time to the next adaptation decision.

For example, a defence constructed now with the option to raise its height in year 25 as a response to climate change, may have a design (economic, or whole) life of 50 years with ongoing maintenance. The relevant duration of benefits under this example would be 50, not 25 years. Any decision in or around year 25 would need to be made on the basis of the additional outcomes, costs and benefits expected at that stage in comparison with continuing with the defence at its original height.

## Section F: High level investment planning and funding allocation process

The following diagram illustrates how the investment planning cycle could work. At the heart of investment planning and funding allocation would remain the Environment Agency's 'Medium-Term Plan' (MTP). In all cases costs and benefits would need to be appraised in line with Defra policy and Environment Agency guidance.



## Annex: Consultation questions

- Q11. Do you agree with these outcome measures for future periods? If not, which would you change, or what others would you add? 8
- Q12. Do you have any comments on the indicative payment values for each outcome, or the underlying assumptions used in their calculation? 8
- Q13. Do you have views on the National Priority Programme and the threshold above which projects would be selected for it? 11
- Q14. Do you have any suggestions or preferences for determining what each RFCC's share of FDGiA should be, once funding has been allocated to the National Priority Programme? 11
- Q15. Do you have any other comments or suggestions on how prioritisation and funding allocation should work? 11
- Q16. Do you have any comments or suggestions on these funding and delivery arrangements? 13
- Q17. Do you agree that it would be inappropriate under the new system to allow payments to be made under OM2 and OM3 in relation to households not actually at risk of physical damage? 13
- Q18. Do you have any comments or suggestions on the key project metrics or the way in which they would be calculated? 16

Note: Questions 1 to 10 are contained in the main consultation document.