

Congestion, Capacity, Carbon: Priorities for National Infrastructure Consultation on a National Infrastructure Assessment

January 2018

Wildlife and Countryside Link (Link) brings together 47 environment and animal protection organisations to advocate for the conservation and protection of wildlife, countryside and the marine environment. Link is the biggest coalition of environmental and animal protection organisations in England. Our members practice and advocate environmentally sensitive land management, and encourage respect for and enjoyment of natural landscapes and features, the historic and marine environment and biodiversity. Taken together we have the support of over eight million people in the UK and manage over 750,000 hectares of land.

This response is supported by the following organisations:

- Angling Trust
- Environmental Investigation Agency
- Friends of the Earth England
- Marine Conservation Society
- National Trust
- Open Spaces Society
- RSPB
- Salmon & Trout Conservation
- The Rivers Trust
- The Wildlife Trusts
- Waterwise
- Wildfowl & Wetlands Trust
- Woodland Trust
- WWF

Introduction

Natural infrastructure has a vital role to play in the resilience of our built infrastructure and in adapting to climate change. However, natural infrastructure is also vulnerable to climate change and poorly planned development.

We welcome the recognition that *'the environment, as well as people, can benefit from the provision of green infrastructure, such as wetlands that mitigate flooding, clean polluted water and are an enjoyable place to visit. This is the case where the design of infrastructure works in concert with environmental processes'*.

Design is hugely important and multiple benefits should be considered from the outset of any infrastructure project. However, environmental benefits should not just be considered when thinking about green infrastructure. Integration of natural infrastructure and how to deliver multiple benefits should be considered within the design of all built infrastructure.



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"Wildlife and Countryside Link is a unique coalition of voluntary organisations concerned with the conservation and protection of wildlife and the countryside"

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The interdependence of natural and built infrastructure and the need for an integrated approach to both is not clear in the consultation and should be core to a National Infrastructure Assessment.

CHAPTER 2: Connected, liveable city-regions

Question 9) What strategic plans for transport, housing and the urban environment are needed? How can they be developed to reflect the specific needs of different city regions?

Strategic planning is a significant opportunity to identify what infrastructure is needed where. This should include green infrastructure and accommodate important consideration factors such as flood risk and environmentally valuable areas.

Strategic plans should better identify the need for designing space for people and wildlife into new development. They should be developed so that new development meets the Access to Natural Greenspace and Woodland Access Standards. Creating communities which have easy access to wildlife-rich spaces leads to increased health and well-being. Poor quality, badly designed development should be recognised as having a negative impact on productivity and a barrier to progress. We recommend a mapping exercise to understand ecological opportunities at a landscape scale, and to plan intelligently for what interventions are needed where. This would help formulate a best value (economically, socially and environmentally) package of measures to deliver resilient infrastructure and identify where green infrastructure may be most cost-beneficial.

CHAPTER 3: Infrastructure to support housing

We understand that there is a need for new housing. However, housing should not be rushed and unconsidered to the detriment of high quality homes and places. We welcome the statement that infrastructure and housing must be planned in tandem from the outset. This must include consideration of natural infrastructure as well as built infrastructure.

We also support the need for better strategic planning to identify what infrastructure is needed where to support housing. This should identify where best to accommodate housing around current infrastructure capacity. Again this must also include provision for natural infrastructure and protecting existing land of high environmental value. For example together, Berkeley Homes (the developers), Thames Water, Hackney Council and London Wildlife Trust have linked the development of Woodberry Down estate, which is planned to grow from 1,900 homes to 5,400 by 2041, with Woodberry Wetlands, a Local Wildlife Site (Site of Metropolitan Importance for Nature Conservation), providing current and future residents with new access to natural greenspace whilst creating new habitats. Extensive community engagement before and after implementation has improved social cohesion and Woodberry Wetlands is rapidly becoming a go-to destination in the neighbourhood, whilst the wildlife of the site is thriving. London Wildlife Trust also influenced the landscaping of the Woodberry Down estate, resulting in ecologically informed features like swales and biodiverse planting. This helped launch a collaborative relationship with London Wildlife Trust advising Berkeley Homes on other residential schemes in London.

However, it is important that the National Infrastructure Assessment acknowledges that infrastructure provision is not practical and affordable in every location without appropriate planning by developers. Developers need to take responsibility for providing high quality housing and design developments which minimise the need for new infrastructure and utility supply and optimise community resilience to climate change. For example, new housing should meet high standards for water and energy efficiency and be built to be resilient to

flooding. Equally, homes must not be built in locations that will increase the risk of flooding elsewhere. Significant funding to reduce the risks of drought and flooding should not need to be spent retrospectively in new developments, nor should it be down to the utility companies to provide capacity for poor development.

With regards to high-density housing, we support this where it is executed well, but are concerned that the proposals will not guarantee high quality, as well as high-density, housing. High quality and high-density spaces can be achieved by incorporating green and blue spaces, as has been shown in other countries, such as the Netherlands. Local consultation and drawing on local expertise (such as ecological and environmental knowledge) is vital in creating such communities. Understanding how local assets and development will impact landscape and catchment scale should also be incorporated into intelligent and sustainable design. It is important to note that in many situations, on-site management of resources and initial avoidance of environmental damage is often the best approach. However, this could be disregarded in attempts to increase housing density, which would not be acceptable.

Housing developments can make a positive contribution to wildlife and to the health and wellbeing of the people who live there. In order to achieve this, as well as prioritising places for housing that are already well served by infrastructure, it is important to identify where development can avoid harming existing environmental assets, many of which will provide a natural infrastructure element. Development should be targeted at places and designed to have a positive environmental impact to help achieve landscape restoration and recovery. This requires an up-to-date and well-informed ecological network map, which identifies existing natural features and habitat, alongside areas where new habitats are needed.

CHAPTER 4: Eliminating carbon emissions from energy and waste

Climate change poses one of the greatest threats to UK wildlife. Offshore wind and other renewable energy sources have a key part to play in mitigating this threat and will help us meet the UK's climate change commitments. Future locations for all forms of renewable energy must be selected with the best available environmental information, using tools such as marine planning proactively to avoid areas of greatest environmental sensitivity and better understand and minimise cumulative impacts. It is important that ongoing monitoring is undertaken to better inform decision making around deployment and design of renewable energy to minimise their environmental impact.

Question 19) Could the packaging regulations be reformed to sharpen the incentives on producers to reduce packaging, without placing disproportionate costs on businesses or creating significant market distortions?

We highlight that the Environmental Audit Committee report on disposable packaging, coffee cups determined that businesses only contribute around 10% of the cost of waste disposal through the Producer Responsibility Obligations (PRO) leaving the taxpayer to foot the bill for the rest. In fact, we argue that the producers and retailers should be more financially responsible for their waste production in relation to the polluter pays principle (this is

supported in both Environmental Audit Committee reports on disposable packaging, coffee cups and Plastic Bottles: Turning Back the PlasticTide¹).

We support the Environmental Audit Committee's recommendation that the Government introduce a varied compliance fee structure that rewards design for recyclability and the use of recycled and compostable packaging material and raises costs on packaging that is difficult to recycle. The report also suggests that the *de minimis* level for companies covered by PRO schemes should be reduced. This would give the industry a greater financial incentive to produce and use only packaging that can be recycled or composted within the UK's current infrastructure.

We also support the following recommendations made by the Environmental Audit Committee:

- to use the Government's Waste Strategy to reduce the number and type of plastics in use in the UK to move to a truly sustainable, resource efficient economy. The former would create demand for recycled plastics even when the oil price is low and incentivise greater capture and collection of all plastic bottles;
- phase in a mandated 50% recycled plastic content in plastic bottles, to be achieved by 2023 at the latest;
- establish a Deposit Return Scheme for plastic drinks bottles with the aim of boosting the recycling rate to 90%. In order to not disproportionately affect industry such a scheme should be designed together with industry stakeholders and local authorities. The Environmental Audit Committee reports that "*The monies raised from this scheme should be reinvested in plastic reprocessing facilities in the UK. We currently export 280,000 – 320,000 tonnes of mixed plastic to China each year. Given the recent Chinese ban on mixed plastic waste from the UK, this investment is both urgent, to avoid a huge increase in landfill, and will save money and create jobs in the long run.*"

CHAPTER 6: Reducing the risks of drought and flooding

We welcome the inclusion of infrastructure contributing to a thriving environment within the Commission's vision.

We highlight the importance of a healthy and resilient environment in adapting to and mitigating climate change. We support the NIC's approach to considering water management in the round and the role that water and flood management has to play on our environment.

Water is an important resource, but so are many of the substances washed away with it such as phosphorous and sediment. We propose that water becomes much more ingrained within circular economy thinking (reduce, reuse, recycle) and should be considered within the NIA. For example, opportunities for grey water reuse and phosphorous and nitrogen recycling.

We agree with the NIC's analysis that there is low public awareness of water management issues and a focus on short-term value; a lack of a joined-up picture of where infrastructure

¹ Parliament.uk (accessed 08/01/2018) Environmental Audit Committee inquiry; [Disposable Packaging: Coffee Cups and Plastic Bottles inquiry](#)

needs replacing or systems enhancing; and limited progress in implementing even 'low regrets' opportunities for increasing resilience and getting the most from the existing infrastructure.

We recommend that the Commission considers the barriers and possible incentives to implementing water management options such as water re-use. Community scale water re-use schemes reduce the amount of surface water runoff and therefore reduce flood risk as well as storing water for use, reducing the need for abstraction elsewhere and easing the pressure on water supply. Such schemes are not widely considered in the UK, yet they are being adopted abroad on a large scale.

On a building estate in Berlin, rainwater from all roof areas (with an approximate area of 7,000 m²) together with the runoff from streets, parking spaces and pathways (representing an area of 4,200 m²) is collected. The water is treated in several stages and used for toilet flushing as well as for garden watering. It is estimated that 58% of the rainwater can be retained locally through the use of this system. Based on a 10-year simulation, the savings of potable water through the utilisation of rainwater are estimated to be about 2,430 m³ per year. These systems not only conserve water and reduce flood risk but also reduce the potential for pollutant discharges from sewerage systems into surface waters that might result from storm water overflows².

It is important that such schemes are considered for their ability to buffer water supply issues as well as surface water management. One possible incentive would be to offer developers a reduction in their tax or planning charges for meeting certain environmental and sustainability standards.

We support the Commission's vision for the future, however, the consultation is not clear about what recommendations and actions the Commission would like to see taken for England to achieve that vision.

Question 23) What should be done to reduce the demand for water and how quickly can this have effect?

Awareness campaign

We propose a partnership campaign (to include water companies, public sector and third sector) to drive water efficiency in homes and raise awareness. This should be part of a larger national strategy to reduce the volume of wasted water and demand management.

Currently less than a third (30%) of people realise they could request free water efficiency kits, such as an eco-shower head, from their water company³.

Large-scale reductions in water demand have been seen elsewhere within 15 years. For example, Copenhagen reduced average water consumption from 170lpppd in 1987 to 108lpppd in 2010. The campaign involved information on how to save water, given on websites, facebook, fun runs, competitions and events in the city.

² United Nations Environment Programme Division of Technology, Industry and Economics (accessed 17/11/2017) [Examples of Rainwater Harvesting and Utilisation Around the World](#)

³ WWF (2017) [Water for Wildlife: Tackling drought and unsustainable abstraction](#)

Between 1997 and 2012 Zaragoza, Spain, reduced per capita use of water from 150 litres/day to 99 litres/day. The drop sustained an increase in population of 12% but daily water use dropped by 27%. The campaign mainly involved widespread media coverage and school outreach campaigns; implementation of 50 examples of water efficient technologies and practices in parks, gardens, public buildings and industry to demonstrate performance and encourage uptake on a wider scale throughout the city; and invitation of citizens and businesses to make online public commitments to save water⁴.

National compulsory metering

Successful demand management has been seen in the UK too, but is most effective where underpinned by universal metering (for example, between 2010 and 2015, Southern Water nearly doubled its household meter penetration to 83%, achieving a 12% reduction in per capita water consumption). A number of water companies are prevented from embarking upon compulsory metering programmes due to the 'seriously water stressed' designations, last reviewed in 2013. This prevents companies in water-rich areas making water efficiency savings which could then allow surpluses to be redeployed to support companies in areas with supply-demand deficits. We would recommend a review, or removal, of this restriction in order to make best use of our national water resources.

Water efficiency standards

There are currently inadequate water efficiency standards for new housing – greater water efficiency should be a requirement in building regulations for example the equivalent of Code for Sustainable Homes 4 (Energy efficiency regulations have already been upgraded to CSH4 equivalence).

There are also more water savings which could be made by industry and we recommend promoting the Water Stewardship Standard <http://a4ws.org/our-work/> and the [Waterwise Recommended Checkmark](#).

Question 24) What are the key factors that should be considered in taking decisions on new water supply infrastructure?

It is essential that ambitious demand management measures are put in place before any new water supply infrastructure proceeds. Water companies should identify options which most efficiently meets abstraction targets and the reasonable needs of people whilst minimising impacts and optimising benefits on the environment. The current Water Resource Management Plan process is a least cost, single sector way of planning water resources at a relatively localised scale. There is a need for a more national and regional multisector planning of water resources to support the justification that such schemes are nationally significant. Regional scale water resource planning initiatives such as Water Resources East (WRE) and Water Resources South East (WRSE) are showing us that you can get a different solution set when you look regionally compared to looking from an individual water company WRMP perspective or when you undertake multi-sector approach to water resource planning as opposed to single sector planning. There is a need to recognise the need for planning at the

⁴ European Climate Adaptation Platform (accessed 24/11/2017) [Zaragoza: combining awareness raising and financial measures to enhance water efficiency \(2014\)](#)

regional and national scale, potentially over-riding individual water company interests. This applies particularly to water transfer projects.

We support the Commission's recommendation that the full range of costs and benefits are captured in appraisal of investment options under water resource planning. This includes taking account of the true costs of failing to address leakage, environmental impacts, taking a sufficiently long-term view, and considering public acceptability. We have concerns that the current WRMP process does not adequately consider environmental and social cost benefits in its appraisal process. We have seen over 30 years of statutory water resource planning and yet we still have overexploited aquifers and rivers, and companies where ambition on demand management is limited. As such we have concerns that WRMPs although identifying least cost options, do not identify best value options which optimise multiple benefits and minimise environmental risk. Solutions should be selected through a multi-criteria analysis which considers the whole range of possible benefits and costs accrued by different societal groups, including the building of natural capital. Environmental damage should not be allowed just because overall benefits are positive, instead the decision making process should identify the least damage, most beneficial options. The selection process should consider a number of packages of options in order to identify the optimal combination of projects at a national scale rather than a water company scale.

Large scale water supply schemes can benefit the environment if designed appropriately and provide valuable water resources to support the environment as well as public water supply. However, schemes can adversely affect river flows and water levels; transfer invasive non-native species; require high energy use; result in morphological changes to watercourses and surrounding land and cause significant changes in water quality.

Given the uncertainties inherent in long-term modelling of climate and water scarcity an adaptive approach to investment planning and sequencing is preferred with no regrets options progressed earlier.

Each water supply option will have a unique set of environmental risks (and opportunities) which will need to be minimised and mitigated (and optimised). As such, each option (whether a single scheme or a combination of schemes) needs to be considered on a case by case basis. The cumulative risks and opportunities of different project portfolios also need to be taken into account.

Location is a key factor in the potential impact of a scheme. As such the site of a scheme should be carefully considered to minimise negative impacts. This should include both downstream, upstream and cumulative effects, groundwater impacts and impacts on hydrologically connected habitats. Schemes should contribute to maintaining and enhancing natural capital and appropriate baseline monitoring and continued monitoring is paramount to understanding impacts and benefits.

Water supply options should be designed to incorporate benefits for the environment. For example, opportunities should be sought to:

- create or restore habitat and enhance biodiversity,
- enhance resilience of catchments and ecosystems,
- sustain a more natural flow regime,
- support the environment in times of water scarcity.

For example through creating or restoring wetlands⁵ and woodlands⁶ or through changing land management such as enhancing culm grasslands providing a range of ecosystem services⁷. Options should also seek to deliver wider benefits to other sectors such as agriculture or in terms of other services such as flood attenuation, recreational opportunities or green space.

Question 25) How can long-term plans for drainage and sewerage be put in place and what other priorities should be considered?

Long-term wastewater planning should help water companies to better understand the risks and long-term pressures to service delivery that their networks face, encouraging investment in both operational and environmental resilience. Strategic planning will enable identification of the most efficient and necessary areas to increase network capacity. This in turn will help prevent pollution and flooding risk for customers and the environment, whilst also offering best value for current and future customers. In particular, by adopting a long-term planning approach, as is seen for Water Resources, the impacts upon customer bills of delivering a sustainable, resilient and fit-for-purpose network can be tempered; a move that should benefit customers. Ultimately this needs to be standardised and statutory in order to have a comparative national outlook and approach in order for England to better manage surface water, flood risk and pollution. In addressing options, take account of whole life environmental and social benefits, as well as economic costs and benefits of wastewater infrastructure. This will help identify the most long-term, multi beneficial options to take forward.

Priorities should include:

- Environmental health, for example by eliminating chronic impacts of pollution caused by inadequate treatment at sewage treatment plants, and reducing the risk of acute pollution from combined sewer overflow discharges and unplanned failure,
- A better understanding of the state and risk of aging infrastructure and how to make it fit for purpose/increase resilience,
- A system to enhance natural capital as part of water company business planning, through improving water quality and identifying potential opportunities for using natural measures to enhance resilience and increase capacity, and
- Water cycle management, linking clean water and wastewater planning to ensure risks (e.g. low flow water quality impact on drinking sources/environment) and opportunities (e.g. wastewater recycling for public or other supplies) are integrated.

In order to achieve this, wastewater plans should incorporate the following principles:

- Focus on outcomes not assets, to encourage innovation in how services are maintained and improved now and into the future. For example, outcomes could be improved water quality, and reduced impact of sewage on protected areas,
- Embrace customer, citizen and third sector participation in:

⁵ <https://walthamstowwetlands.com/>

⁶ <http://www.sussexflowinitiative.org/>

⁷ Cowap, C. *et al.* (2015) The economic value of ecosystems services provided by Culm grasslands, Devon Wildlife Trust

- Characterising / verifying existing performance of the current system and future pressures
 - Ensure honesty and transparency in all communication
 - Co-creating an unconstrained list of potential solutions
 - Capturing the widest range of monetary and non-monetary benefits and costs in option appraisal
 - Being part of the solution, e.g. behavioural and community approaches to reducing sewer abuse and managing surface water.
- Use water efficiency measures to improve wastewater capacity, understanding that whilst increased water conservation may reduce future wastewater infrastructure needs, or delay their timing, it may also result in higher strength wastewater influent, which could create additional challenges for sewerage conveyance systems and wastewater treatment at facilities,
 - Be risk based; assess the drivers of risk, such as growth, climate change and aging infrastructure, and quantify risks in terms of likelihood and uncertainties, and
 - Consider resilience in the round, including environmental resilience and assess all forms of risk to the serviceability of the sewerage network and the outcomes it delivers.

Further information can be found in our [briefing note](#).

Question 26) What investment is needed to manage flood risk effectively over the next 10 to 30 years?

We commend the Government in its improvement in flood risk management over the past ten years. There are a few recommendations in the Pitt review⁸ which have yet to be enacted, including:

- A strategic 25 year plan to invest in flood risk management (whether through existing mechanisms such as the Flood and Coastal Erosion Risk Management Strategy or the 25 year plan for the environment). This should include catchment scale ecosystem service valuation and opportunity mapping. This should highlight the highest value management option at a catchment scale and facilitate partnership funding for multiple benefits to deliver these measures,
- Re-establish the cabinet committee on flooding which met once in 2014.

We support the Commission's view that a more open and strategic approach to flood risk management is needed, considering the full range of options at the outset of project development rather than setting aside separate funding for environmental or natural projects. However, this can only work if decision making and cost benefit analysis better adopts a multi benefit approach, with improved integration of social and environmental benefits. The way in which funding for flood risk management projects is scored through the Environment Agency's Partnership Funding Formula assesses risk in a way that makes it very difficult for natural solutions to be considered. Natural measures are often most cost beneficial where more traditional measures are too expensive but where small communities are nevertheless at risk. These vulnerable communities currently often miss out on funding for flood management

⁸ Pitt, M. (2008) [Learning Lessons from the 2007 Floods](#)

measures. Schemes to be funded under Outcome Measure 2 (households better protected against flood risk) require certainty that homes are moved from one risk category to another. This is more easily demonstrated for engineered solutions, meaning that natural flood management projects are difficult to fund. We suggest a review to this approach. The Partnership Funding Formula should be revised to allow Flood Defence Grant in Aid funding of lower cost, lower certainty FCERM projects that utilise natural flood measures, accepting that these measures may reduce the impact of flooding by reducing / delaying peak flows (rather than necessarily by preventing flooding or moving properties from one risk category to another).

In addition, the Climate Change Adaptation Sub Committee recommends encouraging Local Enterprise Partnerships and Local Nature Partnerships to integrate investment in natural capital and climate change adaptation into regional economic growth plans.

We welcome the Commission's support of green infrastructure, which includes sustainable drainage. However, there remain barriers to the delivery of sustainable drainage, the biggest being Government policy. In new development such barriers and solutions are explored in the WWT and CIWEM report "*A place for SuDS*"⁹ and also in the Welsh Government Commissioned report "*SuDS on new developments: Analysis of evidence*"¹⁰.

We support the proposals that:

- Discharge of surface water to the sewer system should be conditional on the inclusion first of high-quality SuDS in new developments,
- A clear decision is taken regarding the adoption and maintenance responsibilities for SuDS. This should have a clear and established mechanism for raising funds to ensure continued effective maintenance and eventual replacement of all adopted SuDS, and
- Statutory new standards are developed aimed at optimising opportunity to achieve amenity, biodiversity and water quality benefits as well as flood risk reduction. These should reflect the needs of the adopting authority so that they can set out an approval process and adopt with confidence.

However, the potential for sustainable drainage to reduce surface water flood risk and provide benefits such as improving quality of run-off and biodiversity can only be fully realised through roll out of SuDS retrofit.

There are currently few drivers for retrofitting sustainable drainage despite growing evidence that retrofitting SuDS is cost effective¹¹¹². They are extremely valuable in improving quality of life, enhancing people's sense of place and community, and have direct mental health benefits¹³¹⁴.

⁹ Grant, L., Chisholm, A. & Benwell, R. (2017) [A Place for SuDS](#), CIWEM & WWT

¹⁰ Environmental Policy Consulting (2017) [SuDS on new developments: Analysis of evidence](#), Welsh Government

¹¹ Wolf, D.F., Duffy, A.M. & Heal, K.V. [Whole Life Costs and Benefits of Sustainable Urban Drainage Systems in Dunfermline, Scotland](#)

¹² BeST Case Study: Reducing Combined Sewer Overflow Spills in Roundhay (accessed 20/07/2017) http://www.susdrain.org/files/resources/BeST/best_case_study_roundhay_v2.pdf

¹³ Kaźmierczak, A & Cavan, G. (2011) Surface water flooding risk to urban communities: Analysis of vulnerability, hazard and exposure, *Landscape and Urban Planning*, 103(2): 185-197

¹⁴ BITC, WWT (2017) Water Resilient Cities: The multiple benefits of a strategic retrofit of SuDS in schools across Greater Manchester <http://environment.bitc.org.uk/environment-knowledge-hub/multiple-benefits-report-2>

We propose that a national SuDS retrofit plan, using financial and planning levers to encourage uptake, would be an important contribution to long-term provision of green infrastructure services. As SuDS in new development has shown local authorities need national policy drivers to facilitate delivery. Area based surface water charging, as recommended by Ofwat but only taken up currently by four water companies, would also provide a financial incentive. This could provide a water equivalent of home energy efficiency retrofitting potentially developing new markets.

The consultation does not adequately consider coastal defences which provide significant opportunities for major national natural infrastructure projects. Intelligent investment in environmental assets can enhance natural infrastructure and buffer communities and hard infrastructure from storm surges. For example, salt marsh habitat can dissipate wave energy and provide the first line of defence against tides and waves, particularly during storms. Hence, they can reduce the capital and maintenance costs of fixed flood defences whilst also acting as sinks for pollutants and carbon and providing valuable opportunities for recreation.

It is important to not only create natural infrastructure but to protect current natural infrastructure, such as remaining salt marshes. Approximately 100 hectares of salt marsh per annum in the UK continues to be lost. Investments in habitats like salt marsh offer value for money once wider benefits are assessed¹⁵¹⁶. Protection of such key areas of natural infrastructure should be identified within the National Infrastructure Assessment.

We recommend that the National Infrastructure Assessment considers whether coastal infrastructure is adequately assessed within the current consultation to understand the risks to infrastructure from storm surges and coastal erosion and the need for infrastructure to protect communities.

CHAPTER 7: Financing and funding infrastructure in efficient ways

The consultation gives no estimate as to what scale of financing over what time period may be needed to meet its proposals, for example through expanding the timeframe in table 7.1 into the future. This would be extremely useful in the final National Infrastructure Assessment.

Fully understanding the range of economic, social and environmental cost benefits of a scheme could help unleash various funding opportunities. For example, opening up opportunities for a greater range of collaborative funding, social impact bonds or green bonds.

Appendix A: Performance measures

We support the development of performance measures and in particular the performance measures around environmental externalities; quality of rivers and sea; degree to which environmental flows are maintained; and measure of habitat improved or created. We also

¹⁵ Tinch, R., & Ledoux, L (2006) [Economics of Managed Realignment in the UK](#). Environmental Futures Limited. Turner, R. K., *et al.* (2007) A cost-benefit appraisal of coastal managed realignment policy. *Global Environmental Change* 17: 3-4: 397-407

Shepard, C.C., Crain, C.M. & Beck M.W. (2011) [The Protective Role of Coastal Marshes: A Systematic Review and Meta-analysis](#), *PLoS One*, 6(11): e27374. Published online 2011 Nov 23.

¹⁶ Natural Capital Committee (2015) [The State of Natural Capital, Third Report: Protecting and Improving Natural Capital for Prosperity and Wellbeing](#)

support the NIC to develop, with the Natural Capital Committee, a performance measure on the interaction between infrastructure and natural capital.

We propose an additional performance measure around number, frequency and duration of combined sewer overflows as an indication of sewer capacity and waste water resilience.