

National Infrastructure Commission Call for Evidence Response

Call for evidence for the second National Infrastructure Assessment

January 2022

Private

United Utilities PLC response to the National Infrastructure Commission's call for evidence to inform the second National Infrastructure Assessment

Executive Summary

We welcome the opportunity to support this call for evidence, and to work with the Committee in understanding and developing solutions for the challenges facing the UK's infrastructure. We agree with the Committee that the nine challenges identified are a fair representation of the target areas for infrastructure resilience. However, we also highlight critical opportunities and focus areas relating to water and wastewater services that do not yet seem sufficiently represented.

The water sector has an important role to play in understanding and mitigating the challenges facing national infrastructure. We are actively working on these issues in the North West and we are committed to supporting the Committee and others. We observe a priority to explore interdependencies across infrastructure sectors and the risk of cascade failure, which is being compounded by aging assets and climate change.

The water sector's critical role in securing resilient national infrastructure

The water sector plays a critical role in supporting the health, economy and environment of the UK by providing reliable water and sewerage services that enable businesses and industry to remain productive while also delivering essential services to domestic customers.

Our strategic approach to developing long term water resources management plans (WRMP) and drainage and wastewater management plans (DWMP) ensures that we continue to provide a resilient service to domestic and business customers across the North West, now and in the future. This includes identifying opportunities to work together as a sector and across sectors, for example with Water Resources West and the Regulators' Alliance for Progressing Infrastructure Development (RAPID) to develop strategic resource options and inter-regional water distribution networks that can secure and optimise long term water resilience across the country.

Within the identified challenges there needs to be wider recognition of the important role that the water and wastewater sector plays in securing health and prosperity for the UK. While drainage is visibly considered in this call for evidence, we highlight the importance of aligning to the outputs of the Committee's 'Preparing for a drier future' publication¹ to help capture the pressures on water sources, supplies and associated infrastructure.

We have previously provided a detailed response to the surface water management challenge (challenge 6), summarised again here in this response, and we would welcome the opportunity to further support the Committee in developing its approach to these critical challenges.

Aligning ambition and targets, supported by policy, governance and legislation, to ensure cohesive action

There is increasing consensus and momentum around the need for further reform and investment in order to maintain and enhance water and wastewater infrastructure and essential services in the face of many challenges and opportunities. The Committee can help promote a joined up approach to evaluating and mitigating these important issues by supporting clarity and alignment across the responsibilities and capabilities of relevant organisations, industries, regulators, and stakeholders. This need for alignment has recently been recognised by the Environmental Audit Committee in their report on water quality in rivers². Currently, the lack of alignment can result in unnecessary costs and delays stemming from disjointed decision making and stifled innovation.

The water sector observes, and often responds to the impacts of, many examples of disjointed or outdated policies that cut across sectors. This often results in water customers subsidising other sectors, and also avoidable pressure on already stressed infrastructure, and ultimately unsustainable approaches. For example, the right to connect for sewerage services is a case in point. Sewerage undertakers retain the obligation to manage the additional drainage volume from new development, with no obligation on the developer to mitigate the impact of their actions. This compounds the effects on existing infrastructure assets already stretched by the effects of climate change, population growth and other pressures. The contribution to the issue is shared, but the obligation to prevent pollution to water courses is borne solely on the sewerage undertakers and their customers. On this

¹ [Preparing for a drier future: England's infrastructure needs](#), April 2018 – National Infrastructure Committee

² [Water quality in rivers](#), January 2022 - Environmental Audit Committee

specific example we welcome the announcement that Ministers are to review whether to implement Schedule 3 to the Flood and Water Management Act 2010. We would welcome implementation because it would end the current automatic right to connect to sewerage systems, and mitigate the accompanying risks of overloading sewer capacity. This would support uptake of local sustainable drainage solutions (SuDS). There are many other examples of disjointed or outdated policies, and we would value a faster and stronger policy review mechanism to help unlock potential improvements and efficiencies.

Addressing the risks associated with aging infrastructure

The asset base in the water sector continues to age given current investment rates in many aspects of the sectors infrastructure. Significant improvements in our service levels have been achieved and more will be achieved in the short term through our continued focus on digitalisation, systems thinking, and operational efficiencies. However, there needs to be recognition that there is a limit on the returns from these types of intervention. For example, at present, the average sector water mains are estimated to be over 55 years old, while the replacement rate is estimated at only 0.3% per year³. Investment needs to be accelerated in order for the sector to improve asset health and continue maintaining and improving services.

Ofwat's regulatory approach to date appears to have placed insufficient emphasis on facilitating the investment necessary to ensure that the sewerage system in England is fit for the challenges of the 21st century, and able to cope with housing growth and the impact of climate change while restoring good ecological health to rivers⁴.

The mature asset base of the sector, and long asset lives, mean that the investment required to maintain and enhance resilient services needs to accelerate, both in new infrastructure and also retrofitting of existing assets. Failing to maintain and improve water and wastewater infrastructure is currently growing an unfair burden that will fall on future generations, and this will be compounded by their need to address increasing climate change.

Innovating for sustainable approaches

We agree that decarbonising the generation of energy is a critical objective for the UK. The water sector has an important and often overlooked role to play as large energy users and generators of renewable energy. We are committed to achieving bold carbon targets, including our own verified 'science-based' targets and a water industry combined goal for Net Zero 2030. We and many other UK water companies have invested in renewables to create more value from our land, sewage and water resources. There is substantial opportunity to go further on renewables and energy efficiency in the water sector, with the right policy framework and incentives.

We face escalating pressures in our energy use as we extend services to a growing population, and with aging assets that become less efficient over time. Further environmental water quality requirements are important, but the regulatory regime of absolute standards and tight delivery timescales often forces the sector towards energy-, chemical- and concrete-intensive engineering solutions that are not sustainable or optimised. We would like to see reform of the regulatory regime to prioritise behavioural, nature-based and innovative solutions that seek to address issues at source for the long term and which deliver multiple benefits and greater overall cost-benefit.

Recognising and addressing interdependencies and the risk of cascade failure

The water sector's reliance on energy highlights the need to better understand and manage interdependencies across infrastructure sectors. More generally we observe that there are areas of confused accountabilities, insufficient mutual understanding, and a lack of alignment in planning standards which combine to challenge levels of resilience. This is particularly evident in relation to duties for flood management, and resilience of infrastructure to flooding or other extreme events that cause damage and disruption. Risks are growing with aging assets, increasing complexity, and climate change. We would therefore welcome policies and support that clarify accountabilities and strengthen levels (or minimum standards) of resilience across different infrastructure.

We would welcome the opportunity to work and liaise further with the Committee, and others, to improve understanding and co-create effective recommendations and solutions across these complex challenges.

³ [APR 2019-20 Tables](#), April 20 - Ofwat

⁴ [Water quality in rivers](#), January 2022 - Environmental Audit Committee

Response

Question 1

Do the nine challenges identified by the Commission cover the most pressing issues that economic infrastructure will face over the next 30 years? If not, what other challenges should the Commission consider?

While the nine key challenges identified by the commission are all sensible target areas, we would propose further consideration be made on the impact of delivering and sustaining a resilient national water supply. The challenges associated locally within regions and with increasing focus on supra-regional supplies and large scale water transfers should not be underestimated, especially in the context of aging water supply infrastructure and continuing pressures on headroom in the supply system through regulatory efficiency challenges and the need to ensure the sustainability of all sources and uses of water.

The challenges themselves should not be considered in silo, nor within their strategic theme, but understood by their independencies and sensitivity to cascade failure that may result from the interaction of a driver on any single challenge, or across infrastructure sectors.

Recognition of how planning addresses risk associated with aging infrastructure should also be considered across each of the challenges in the development of ambitions. Planning and ambition should be aligned across the challenges, supported by policy, incentives, governance and legislation, to ensure actions included in the second National Infrastructure Assessment are cohesive and have mechanisms in place for actual progress to be made.

Question 2

What changes to funding policy help address the Commission's nine challenges and what evidence is there to support this? Your response can cover any number of the Commission's challenges.

Support between short-term performance and long-term resilience needs to be better reflected in the regulatory regime. Longer term resilience is typically underpinned by a minimum level of asset health that requires significant investment to maintain, and which must be better recognised in the regulatory process.

Funding policy for all infrastructure sectors needs to deliver efficient and sustainable asset health investment to provide long-term resilience. As a monopoly regulated infrastructure provider, the water sector has been funded based on historic expenditure profiles which are no longer representative of future investment requirements, for example because of climate change and the age of assets. The Competition and Markets Authority recognise this in the following statement⁵:

[We acknowledge that regulatory] cost assessment is backward looking and that potential issues with capital maintenance may be forward looking [...] We therefore suggest that Ofwat considers developing indicators to track this issue and to enable it to enhance its analysis with a forward-looking element that will assist in triangulating results from its econometric modelling of historic costs.

We welcome the ambition provided by Ofwat for the sector to develop long-term delivery strategies to determine the short, medium and long-term investment programme which are required to maintain asset health and address each of the identified key challenges.

Question 3

How can better design, in line with the [design principles for national infrastructure](#), help solve any of the Commission's nine challenges for the next Assessment and what evidence is there to support this? Your response can cover any number of the Commission's challenges.

The integration of climate, people, places and value into long-term planning is fundamental to long-term resilience. Consideration of how assumptions and data from each of the design principles are made should be co-

⁵ [Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations](#), March 2021 - Competition and Markets Authority

developed to ensure alignment (i.e. population growth metrics) when defining ambition and to promote an integrated resilient system.

Context, engagement and measurement ensure the considerations of elements such as existing infrastructure and their co-dependencies within a wider system, and the promotion of the design principles aligned to each of the key challenges will ensure that these considerations are universal. This must be considered fundamental if systems resilience is to be achieved, and currently this is not sufficiently developed and results in resistance to effective investment.

For example, this has not been considered in the alignment of sustainable sewerage networks with new housing development. The Environmental Audit Committee highlights that⁶:

New housing developments must be used to set the standard for the sustainable sewerage networks required in the 21st century. It is unacceptable for developers to increase the pressure on overloaded combined sewerage systems and not to contribute to improvements.

By alignment of design principles, such situations would be mitigated as this supports shared ambition, which should be aligned through shared obligation. Current misalignments on where the responsibility is placed for actions to achieve ambitions is evidence of the need for improved partnership and interdependent investigation.

Question 4

What interactions exist between addressing the Commission's nine challenges for the next Assessment and the government's target to halt biodiversity loss by 2030 and implement biodiversity net gain? Your response can cover any number of the Commission's challenges.

In addressing the Commission's nine challenges there is an opportunity and imperative for an increased focus on nature-based solutions to align to the government's biodiversity targets. The assessment of the value generated by actions to address the challenges should be considered holistically, considering natural and social capital to generate opportunities for biodiversity benefits. A topic explored further in our discussion document on 'Unlocking nature-based solutions to deliver greater value', which was developed in partnership with The Rivers Trust⁷.

Currently there are several key barriers that are preventing exploration and implementation of nature-based solutions. At present, there is limited standardisation as to how nature-based solutions are assessed and how their effectiveness is measured and reported, which leaves innovation costly and siloed.

The water industry has a fundamental relationship between infrastructure and ecosystems, and is therefore well placed for providing insight into how action to address the challenges can support biodiversity. We are currently committing to deliver improvements for biodiversity in our capital programmes and across our landholdings, and recognise the additional biodiversity requirements and opportunities that will arise through the Environment Act. We encourage the Commission to look to the water sector to ensure we will meet these requirements, to draw value from the sector's long history in investing in the environment to provide value, resilience, and biodiversity improvements.

Question 5

What are the main opportunities in terms of governance, policy, regulation and market mechanisms that may help solve any of the Commission's nine challenges for the Next Assessment? What are the main barriers? Your response can cover any number of the Commission's challenges

Alignment of targets through policy and regulatory frameworks will encourage co-delivery of solutions and can encourage further consideration of the interdependency of the challenges. The targets and aspirations themselves should be considered into the long term, extending through existing frameworks to account for changes to existing infrastructure which aligns to the best whole life assessment of intervention. Failures to

⁶ [Water quality in rivers](#), January 2022 - Environmental Audit Committee

⁷ [PR24: Unlocking nature-based solutions to deliver greater value](#), 2021 – United Utilities, The Rivers Trust

adequately consider the context of ambition in long-term results in siloed short-term fixes which fail to recognise the requirements of the wider infrastructure system.

The development of new or updated governance, policy and regulation to progress our position against these challenges is a good opportunity for consultation and cross-sector co-development.

Barriers to addressing these challenges can arise from the short-cycle approach to planning and investment that is currently common within sectors, which can limit long-term strategic planning. This not only results in short-term biased decision making, but the fixed terms result in cycles which can delay opportunities for innovation and necessary action. Longer-term structure with within-period funding mechanisms is a requirement for agile and sustainable resilience.

The availability of funding and public affordability is a barrier to progress against these challenges, which can be supported through evidence-based co-development of solutions. Such consideration of multi-beneficial solutions can support funding options, however can also present barrier from competing needs and requirements.

Question 6

In which of the Commission's sectors (outside of digital) can digital services and technologies enabled by fixed and wireless communications networks deliver the biggest benefits and what how much would this cost?

Within the Commission's 'Water and Wastewater' sector, significant progress has been made on the proactive management and operation of networks by utilising digital services through regionally connected sensors utilising wireless communications networks. Installation of 100,000 sensors across 42,000 kilometres of our water network enables us to integrate modern methods with our existing network.

Applying such connectivity to our wastewater networks as part of our Dynamic Network Management, we are also installing 19,000 sensors across 78,000 kilometres of wastewater network pipes, and utilising technologies such as machine learning to maximise the opportunity for proactive management of our network.

Such projects as these demonstrate the capacity for maximising the value from visiting infrastructure through the development of compatible, modular systems which can be applied to infrastructure that has been previously designed and developed before these capabilities were available. These improvements bring increasing dependence on communications and digital sectors which merits further exploration to ensure resilience. These digital and monitoring improvements can be susceptible to security issues if proper governance is not suitably advanced, as discussed in our response to Question 7.

Question 7

What barriers exist that are preventing the wide scale adoption and application of these new digital services and technologies to deliver better infrastructure services? And how might they be addressed? Your response can cover any number of the Commission's sectors outside digital (energy, water, flood resilience, waste, transport).

Implementation of new technologies carries inherent risk which can be minimised through testing and comprehensive development. This carries increased cost and time, and current risk management frameworks should be encouraged to promote innovation culture to support this. The speed of development for digital service based technology creates a real challenge from a number of perspectives but specifically from a security angle, rapid technology development doesn't always sit well alongside robust security design and testing. Sometimes the forced speed of delivery can see compromises within security and be without authority backed accreditation.

Further to this, the scale of some deployments makes essential operational management challenging. Devices such as these are efficient to produce and rollout, but without governing body standards are likely to represent a security risk. At present, architectural and security standards lag too far behind adoption cycles. The National Cyber Security Centre (NCSC) currently do not produce standards for enterprise Internet of Things (IOT) despite this being in use widely, across critical national infrastructure sectors.

Question 8

What are the greatest risks to security of supply in a decarbonised power system that meets government ambition for 2035 and what solutions exist to mitigate these risks?

The move towards low carbon, renewable energy generation must be accelerated if global climate change mitigation ambitions are to be met. Resilience and affordability are also priorities for energy, in which further UK-based renewable energy generation can play an important role. The increasing complexity of the UK energy system, and the further relatively rapid change to come, presents an increasing risk to the consistency and security of energy supply alongside ever increasing demand. This is masked by a lack of understanding on the risk of cascade failure, arising from a lack of co-development and assessment of interdependencies supported across infrastructure sectors.

Future UK energy systems are expected to have lower inherent stability resulting from the inertia inherent in dominant non-renewable energy sources⁸. Power instability has the potential to cause significant cascade failure which would have important knock-on consequences for essential water and wastewater services, and other critical public infrastructure operators and service providers. Such interdependencies should a fundamental consideration by the Commission within this challenge.

Energy markets are sensitive to changes in available output and the cost of energy generation, resulting energy costs can threaten the affordability of the supply. Some essential industries will always have high energy demand requirements to meet service levels (including the water sector), and the financial resilience of organisations and sectors must be able to meet these demands.

By generating more energy and using less from the grid, organisations can improve their energy resilience and that of the national grid system. Our strategy of using less, generating more and using the company's assets in a smarter way has enabled us to improve our own energy resilience in this way. Please see our further notes on this point in our cover letter for this response.

Question 9

What evidence do you have on the barriers to converting the existing gas grid to hydrogen, installing heat pumps in different types of properties, or rolling out low carbon heat networks? What are the potential solutions to these barriers?

As a water utility we are not experts on hydrogen networks, but we do recognise a potential long-term innovation for the water sector to produce green hydrogen, either through electrolysis of final waste effluent or using biogas/bioresources, and to perhaps utilise it in operations and fleets. We and the sector are in the early stages of exploring this long term potential and it merits further national consideration as part of efforts to embrace circular economies and maximise the value of resources like sewage.

Low carbon heat networks are well suited to use heat extracted from wastewater flows, either at a WWTW or potentially from large sewers. The recent consultation around heat network zone by the Department for Business, Energy & Industrial Strategy is helpful in many ways in reducing barriers to investment in these networks, and potentially requiring connection of heat sources and heat users to them. Specific barriers for extracting heat from sewers relate primarily to third party interaction with the sewer, through concerns around operability and/or liability for potential flooding as a result of third party operations.

Question 10

What evidence do you have of the barriers and potential solutions to deploying energy efficiency in the English building stock?

Heating water is the second largest source of household greenhouse gas emissions after space heating, accounting for 17% of home energy use⁹. Through the promotion of water efficiency in the home, the amount of water requiring heating has the potential to decrease significantly. There could be substantial multiple benefits from a national multi agency focus on the nexus in the home and other buildings where customers combine their uses of heat, water and chemicals (i.e. cleaning products).

⁸ [Operability Strategy Report 2022](#), December 2021 - National Grid ESO

⁹ [UK housing: Fit for the future?](#), February 2021 – The Climate Change Committee

For water efficiency specifically, currently there is a lack of legislation around product labelling which could promote such efficiencies, and a lack of minimum standards in this area for home and business appliances.

Support for this from the government provides opportunities to address this barrier:

[The Government will] make regulations to introduce a mandatory water efficiency label to inform consumers and encourage the purchase of more water efficient products for both domestic and business use. We will consider the potential to achieve energy savings, as well as further water savings, and explore how these can be achieved in a way that minimises the impact on consumer¹⁰.

A large proportion of energy demand comes not from building stock but other uses in industry and infrastructure. For example, the water sector is a large energy user in its pumping and treatment processes. We have an ongoing focus on energy efficiency in our approach, with a natural financial incentive in the cost. However, we observe substantial growth pressures on our energy use and opportunity to help support further efficiency and optimisation. Please see our further notes on this point in our cover letter for this response.

Question 11

What barriers exist to the long term growth of the hydrogen sector beyond 2030 and how can they be overcome? Are any parts of the value chain (production, storage, transportation) more challenging than others and if so why?

No response

Question 12

What are the main barriers to delivering the carbon capture and storage networks required to support the transition to a net zero economy? What are the solutions to overcoming these barriers?

There is a lack of alignment of regulatory requirements and ambition for carbon capture and storage to support net zero targets and multiple other co-benefits.

United Utilities has a history of leadership on carbon and land management and we welcome increasing focus in this area. A bold and leading approach to carbon reduction and land management are both sector priorities because of their importance to the efficiency and resilience of our water and wastewater services. For example, United Utilities has worked in partnership over recent years to plant vast scales of woodland and to protect and restore areas peatlands and other habitats, and we are delivering much more through pledges to 2030. Nature-based solutions and catchment management can deliver carbon capture and storage alongside other benefits for water quality, flood storage, nature and recreation. This is an area the water sector, as a significant land owner, has existing leadership and opportunity on, but would benefit from further support through existing regulatory frameworks.

Conversely, poor land management has and continues to damage carbon-rich habitats that is releasing greenhouse gas emissions and causing water quality problems. Left degraded, these habitats are exposed to increasing pressure from the changing climate which risks further and substantial release of emissions. We welcome the recent national policy and funding announcements on peatland restoration and woodland planting, however more pace, scale and practical deployment is needed as a priority.

By adopting the use of alternative market mechanisms and innovative business models to align our interests with others in catchments, and incentivise different ways to deliver improvement, nature-based solutions can become more viable. Through this combined approach, we are exploring the concept of 'blended finance' (which offers both financial and non-financial returns) to deliver environmental schemes that go beyond statutory requirements because they seek added natural capital value. Policy and legislation to support such markets would provide further opportunity for innovation and practical deployment.

Question 13

In what ways will current asset management practice need to improve to support better infrastructure resilience? Your response can cover any number of the Commission's sectors.

¹⁰ [Reducing demand for water](#), July 2021 – Parliamentary Statement UIN HCWS140

The water sector has long been at the forefront of good asset management practice and in recent years has seen significant performance improvements delivered through excellent targeting of investment and wider interventions. However, it should be recognised that efficient and effective targeting of work must be supported by a sustainable, long-term, regulatory funding mechanism that enables service improvements, environmental improvements and maintains an adequate level of asset health for current and future generations.

It is recommended that regulatory mechanisms that better support long term investment are developed, that also account for arising shocks and stresses from external drivers such as climate and demographic change.

Asset management approaches to better account for system or cascade failures should also be supported, ideally across multiple sectors. We would welcome review and development of existing and needed asset management resilience standards for the water and all other infrastructure sectors to help drive systemic and aligned improvements over time to secure desired minimum levels of resilience in essential public infrastructure and services. There are many areas effective standards, and which are not fit for the future, for example in flood management of critical infrastructure and communities.

Challenge 6 – Comment

Despite significant water industry investment to lower flood risk and boost environmental performance since privatisation, surface water flooding and spill frequency from the public drainage networks has increasingly become a risk of national importance.

This risk is heavily dependent on many factors outside of water company control. The core factors include climate change increasing the likelihood of extreme rainfall events; sewer misuse that blocks drains, including plastic wet wipes that do not breakdown combining with fats, oils and greases to produce ‘fatbergs’; and rapid, uncontrolled and often hidden urbanisation that increases the volume and speed of surface water runoff.

The UK has old combined sewerage systems that are not the ideal for managing drainage and flood risk because they take (and ‘combine’) both surface water from roads and roofs along with sewage. Insights show that increasing separation of sewers is heavily correlated with reduced surface water flooding risk. However, traditional engineering approaches to sewer separation require significant investment and cause substantial carbon emissions and disruption to local communities. Traditional engineering alone is not a sustainable solution but must play its part alongside the large scale removal of surface water from sewage networks. We consider key enablers to be reforms to the planning system, enhancements of existing incentives and the introduction of new incentives that achieve high uptake. A national long term strategy is needed to secure alignment across multiple agencies and recognising the wide range of associated positive and negative impacts to secure optimal, sustainable approaches.

As surface water flooding is not something that water companies can address in isolation, we are developing our systems, tools and processes around working in partnership, evidenced by our Catchment Systems Thinking approach. An integrated approach is essential across planning, data, funding and communication to enable this.

We welcome the announcement that Ministers are to review whether Schedule 3 to the Flood and Water Management Act 2010 is to be implemented in England.

Question 14

What are the barriers to and solutions for expanding recycling capacity, both now and in the future to deliver environmental and net zero targets?

The recognised approach to sustainability in this case is to reduce the generation of waste, reuse where possible, and lastly, recycle. These considerations support the move towards a more circular economy, and should be key to the Commission’s decision making to prioritise efficiency in waste management.

The tightening of water quality standards results in the increased generation of waste in the water and wastewater sector, but these tighter standards support environmental targets through biodiversity improvements. Companies are having to strive to achieve ever tightening limits or standards rather than investing in new and better routes for certain wastes. We are finding it increasingly critical to challenge traditional, siloed targets that drive one particular priority, and instead promote consideration for a wide range of economic, environmental and social criteria, and inherent trade-offs across each, to secure the overall optimal. We call this

the Six Capitals approach, recognising priorities in financial capital, manufactured capital, natural capital, human capital, intellectual capital and social capital.

Understanding the value of generated waste can support this, through the development of markets in place for nutrient trading and trading of organics. This can be further supported by legislation changes to encourage circularity and the reuse of compounds generated through treatment processes.

There are some waste exemptions within the current permitting regulations that allow for trials but these can be limited and sometimes proving a concept can be prohibitively difficult. This will often require new permits, or permit variations to existing permits. When this goes into permitting it brings with it the associated permit conditions – this might then deter companies due to the risk to compliance.

Question 15

What is the likely environmental impact of waste streams from construction across economic infrastructure sectors, over the next 30 years, and what are the appropriate measures for addressing it?

An understanding of the concept of waste in this case should consider the value of waste in a circular economy. New waste management should lead to fewer products being considered waste due to this value shift.

An increased focus on asset health, and subsequent increase in asset replacement, may lead to an increase in waste stream volume. Due to biodiversity net gain approaches however, this can lead to environmental impacts both from waste reuse and future asset development considerations.

Future considerations should be aligned to the Environment Act 25-year plan and follow the principles of the waste hierarchy, prioritising prevention in the first instance and disposal as a last resort.

Pre-qualification questionnaires for waste management have supported our ability to better understand how we manage waste, and ensure that proper considerations are integrated throughout our supply chain.

Reuse of construction waste within infrastructure projects, which may require regulatory change, could drive efficiencies in waste management. Furthermore, the reduction in transportation of wastes from construction sites to suitable recycling sites will enable lower carbon output, and decrease the trade-off between impacts.

Question 16

What evidence is there of the effectiveness in reducing congestion of different approaches to demand management used in cities around the world, including, but not limited to, congestion charging, and what are the different approaches used to build public consensus for such measures?

No response

Question 17

What are the barriers to a decision making framework on interurban transport that reflects a balanced approach across different transport modes?

No response