

# National Infrastructure Commission

## UK Levels of Infrastructure Service Review

v02 January 2019



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*Erewash Valley Line, Derbyshire, during heavy snow in 2010. CC BY 2.0, Phil Sangwell*

## 1. Introduction

The National Infrastructure Commission (NIC) commissioned Arup in December 2018, to undertake a review of the Levels of Service expected from UK infrastructure sectors.

The review focused on the infrastructure sectors that are under the remit of the NIC, alongside consideration of the differences between devolved administrations, where possible (see Table 1).

The scope did not include the Waste sector or Flood risk as a sector; however, we considered flood risk from the perspective of other infrastructure operators.

The objective of this work was to provide the NIC with an assessment of the current levels of service expected from or required by the sectors. The drivers, responsibilities and processes for deriving these levels were also considered. A particular focus was on metrics that considered the continuity of service.

The findings presented in this work will inform the NIC's scope for their planned resilience study<sup>1</sup>. Ultimately, this will ensure that the UK's infrastructure networks or systems provide a level of service that can cope with both current and future challenges.

This work commenced in December 2018 and concluded in January 2019.

### Defining 'Levels of Service' and 'Performance'

A **Level of Service** is defined as “*What the organisation intends to deliver*”<sup>2</sup>, and describes the amount and kind of service that is appropriate to the needs and desires of the organisation's customers whilst at the same time being affordable to the organisation<sup>3</sup>.

They are typically focused on the organisation's outputs (e.g. provision of good quality roads), rather than on outcomes (e.g. happy communities).

The *International Infrastructure Management Manual* states that defined levels of service can be used to:

- Inform customers of the current levels of service provided and any proposed changes to levels of service and the associated cost.
- Measure performance against these defined levels of service.
- Develop Asset Management strategies to deliver the required levels of service.
- Identify the cost and benefits of the services, and;
- Enable customers to consider the levels of service provided within the context of affordability.

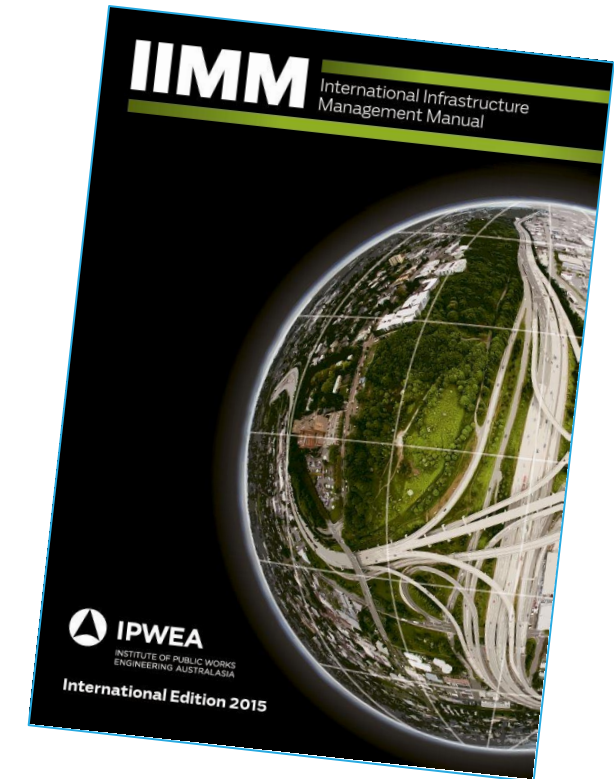
**Performance** is the means by which organisations “*demonstrate they are delivering the agreed levels of service*”<sup>1</sup>.

### Our Approach

Arup undertook a high-level review of expected levels of service for UK infrastructure. Our review included:

- **Literature review** – which was predominantly based on publicly available documentation and has been referenced appropriately in summary tables.
- **Expert consultation** – utilising expertise within Arup to further understand issues around levels of service within UK infrastructure sectors.

This short report provides an overview of each sector, and presents the key findings from our review. More detailed tables are provided separately in an Excel Spreadsheet, for each sector.



*International Infrastructure Management Manual (2015)*

<sup>1</sup><https://www.nic.org.uk/our-work/resilience/>

<sup>2</sup>International Infrastructure Management Manual: International Edition 2015, Institute of Public Works Engineering Australasia.

<sup>3</sup><http://www.businessdictionary.com/definition/level-of-service.html>



## 2. Study Scope and Key Observations

Table 1 below sets out the scope and key observations of this short project.

**Table 1: Infrastructure sectors considered in the study, alongside key observations.**

Sector	Subsector	Key Observations	
Transport	Rail	Safety and availability driven.	
	Highways	Customer driven. Predominantly availability and condition based.	
	Maritime	Safety driven. Limited information available.	
	Aviation	Customer satisfaction and EU law driven.	
Energy	Electricity	Transmission	Availability, reliability and safety driven.
		Distribution	
	Gas	Transmission	
		Distribution	
Water and Wastewater		Customer driven. Mix of everyday and resilience-based metrics. Longer-term approaches.	
Digital	Mobile communications	Government and service provider led to set service obligations. Voluntary codes.	
	Fixed-line communications		
	Broadband		
Flood risk		Study only considered approach taken by other infrastructure operators/owners. Varied and inconsistent approach taken.	



### 3. Digital

## Fixed-line telecommunications, Mobile telecommunications and Data centres

#### Sector Overview

Core Digital infrastructure in the UK represents multiple systems and networks that interoperate, that include<sup>1</sup>:

- **Fixed line telecommunications** – made up of the high capacity and highly resilient core network plus the access network which runs from the exchanges to tens of millions of individual customer premises.
- **Mobile telecommunications** – that interacts with the core network but provides customer coverage through a cellular network.
- **Data centres** – that manage, transmit, process and store data for government, businesses, individuals and academia.

We recognise that **satellite and broadcast communications** also play an important role in the UK's digital infrastructure, but these have not been considered in this review.

The UK's infrastructure networks are ever increasingly '**digitally-connected**'. This refers to the "*deployment or integration of digital technologies with physical infrastructure to deliver efficient, connected, resilient and agile assets*"<sup>2</sup>.

Ofcom is the regulator for the UK's communications services. A particular remit of Ofcom includes making sure that people are able to use communications services, including broadband.

#### Key Findings

From our high-level review we found that:

Ofcom's *General Conditions of Entitlement* set out the regulatory conditions that all providers of electronic communications networks and services must comply with if they want to provide services in the UK<sup>3</sup>.

HM Government and Service Providers have agreed upon a range of service obligations, that include for example:

- **Mobile Coverage Obligation** – 90% UK coverage of voice service by 2017<sup>4</sup>
- **Universal Service Obligation**<sup>5</sup>.

Ofcom has **Voluntary Codes of Practice** that set residential and business broadband speeds. Under this, Internet Service Providers agree to provide their customers clear information on broadband speeds provided.

A **new voluntary code of practice** is planned for March 2019, and a number of major providers have initially signed up to. The new code will make four key changes, that include:

- Improved relevancy of speed estimates by reflecting peak time speeds.
- Providing a minimum guaranteed download speed at point of sale.
- Improving access of right to exit.
- Widening the scope of the codes to cover all technologies.

**Service Level Agreements (SLA)** set out agreed levels of service between the customer and service provider. They are supported by **Service Level Guarantees (SLG)** that specify the level of compensation that the customer is entitled to if the service delivery was late<sup>6</sup>. For example, SLAs typically include fault repair and installation times and maximum number of days without service.

Data centre services (e.g. Amazon Web Services) offer **Service commitments** to their customers. Failure to meet these will mean providing 'Service Credit's' to customers.

Service providers don't appear willing to compensate against '**force majeure**' type events (e.g. flood, earthquake or other similar natural hazards), for example:

*"Openreach said it would pay compensation even when others prevented it from accessing its network - if, for example, a vehicle is parked in front of a cabinet or it is unable to access a pole on private land. But it said it would not pay in the event of "measures beyond reasonable control", such as flooding."* (BBC, December 2018)<sup>7</sup>



(© Arup)

<sup>1</sup>[http://www.techuk.org/images/ICT\\_ARP\\_response\\_to\\_DEFRA\\_2016.pdf](http://www.techuk.org/images/ICT_ARP_response_to_DEFRA_2016.pdf)

<sup>2</sup><https://www.nic.org.uk/publications/resilience-digitally-connected-infrastructure-systems/>

<sup>3</sup><https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/telecoms-competition-regulation/general-conditions-of-entitlement>

<sup>4</sup>[https://www.ofcom.org.uk/data/assets/pdf\\_file/0015/130812/Improving-mobile-coverage.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0015/130812/Improving-mobile-coverage.pdf)

<sup>5</sup><https://www.ofcom.org.uk/consultations-and-statements/category-1/uso>

<sup>6</sup>[https://www.openreach.co.uk/org/home/products/serviceproducts/serviceharmonisation/serviceharmonisation/downloads/SML\\_fact\\_sheet\\_web\\_vers\\_phme\\_61163\\_2011\\_09.pdf](https://www.openreach.co.uk/org/home/products/serviceproducts/serviceharmonisation/serviceharmonisation/downloads/SML_fact_sheet_web_vers_phme_61163_2011_09.pdf)

<sup>7</sup><https://www.bbc.co.uk/news/technology-46523270>



## 4. Energy Electricity and Gas

### Sector Overview

Energy Infrastructure in the UK represents:

- **Electricity** - including generation, transmission and distribution.
- **Gas** – including transmission and distribution.

Ofgem is responsible for setting levels of service for the England, Scotland and Wales Gas and Electricity Infrastructure at Transmission and Distribution level. The Utility Regulator is responsible for Northern Ireland.

### Ofgem approach

In its most recent price review (reviewed every 8 years), Ofgem set out its RIIO (Revenue = Incentives + Innovation + Outputs) framework (see right hand figure)<sup>1</sup>.

The RIIO framework is designed to encourage network companies to:

- Put stakeholders at the heart of their decision-making process.
- Invest efficiently to ensure continued safe and reliable services.
- Innovate to reduce network costs for current and future consumers.
- Play a full role in delivering a low carbon economy and wider environmental objectives.

The regulator asks companies to submit well-justified business plans that should detail how the business plans to meet the objectives set out in the

RIIO Framework.

### Northern Ireland Approach

The Utility Regulator is aligning its approaches to levels of service with that of Ofgem's RIIO framework, that broadly covers the same themes.

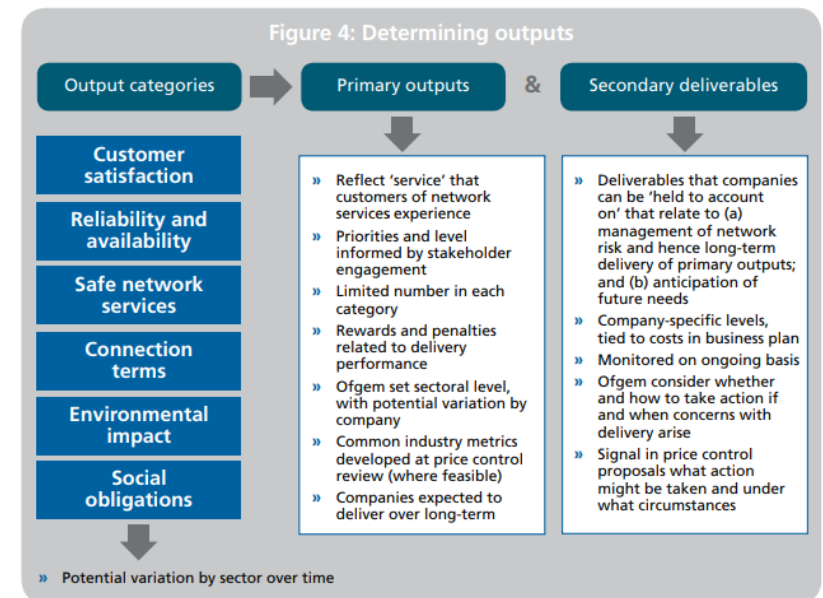
The Utility regulator has also adopted Ofgem's approach to the reliability incentive measure around Customer Minutes Lost<sup>2</sup>.

### Key Findings

From our high-level review, we found that:

- The energy sector focuses on an **Output-based approach** to levels of service.
- **Reliability and availability** of service are key drivers for levels of service.
- Focus is primarily on **everyday operations** in terms of levels of service, except for demand management at transmission level.
- Power generation is not subject to regulation or mandated levels of service. National Grid, as electricity system operator for Great Britain, is responsible for completing an annual **Electricity Capacity Report**<sup>3</sup> which sets out how National Grid plans to meet the 'Reliability Standard' in different combinations of credible scenarios and sensitivities<sup>4</sup>.
- Reliability standard is based on the '**Loss of Load Expectation**' (LOLE) which is the number of hours per annum in which, over the

long term, it is statistically expected that supply will not meet demand.



Ofgem RIIO Framework<sup>1</sup>

<sup>1</sup>[https://www.ofgem.gov.uk/sites/default/files/docs/2010/10/riio\\_handbook\\_0.pdf](https://www.ofgem.gov.uk/sites/default/files/docs/2010/10/riio_handbook_0.pdf)

<sup>2</sup><https://www.uregni.gov.uk/sites/uregni/files/media-files/Annex%20M%20-%20Reliability%20Incentive.pdf>

<sup>3</sup>[https://www.emrdeliverybody.com/Lists/Latest%20News/Attachments/189/Electricity%20Capacity%20Report%202018\\_Final.pdf](https://www.emrdeliverybody.com/Lists/Latest%20News/Attachments/189/Electricity%20Capacity%20Report%202018_Final.pdf)

<sup>4</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/223653/emr\\_consultation\\_annex\\_c.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/223653/emr_consultation_annex_c.pdf)



## 5. Transport Highways

### Sector Overview

In the UK, highways transport infrastructure includes:

- **England's Strategic Road Network** (Motorways and Trunk Roads), operated, maintained and improved by Highways England (HE)<sup>1</sup>.
- **Scottish Trunk Road Network**, maintained, updated and monitored by Transport Scotland<sup>2</sup>.
- **Welsh Trunk Road Network** with the Welsh Assembly Government having overall responsibility, while maintenance and improvement plans are delivered by<sup>3</sup>: North and Mid Wales Trunk Road Agent, and; South Wales Trunk Road Agent.
- **Local Authority** own and maintain roads that include some 'A' class and all 'B', 'C' and unclassified roads.

This study did not consider the levels of service associated with Northern Ireland's highways infrastructure.

### Key Findings

#### England's Strategic Road Network

- The **Road Investment Strategy** sets out HE's performance specifications for the Strategic Road Network<sup>4</sup>.
- Performance measures are driven by **safety**, **network condition**, journey time **reliability**, supporting **economic growth** and preserving the **environment**.
- Performance requirements informed by **customers** through the DfT's Roads Reform

Social Research Programme<sup>5</sup> and Office for Rail and Road (ORR)/Transport Focus report on 'What Users Want'<sup>6</sup>.

- **Statutory function** of HE to report on its performance.
- HE is monitored by ORR through criteria set out in Highways England's **Operational Metrics Manual (OMM)**<sup>7</sup>.
- Typically, performance measures are **deterministic** and **everyday** measures.

#### Scottish Trunk Road Network

- Performance measures are **informed by users** e.g. '*Perceptions of the trunk road network in Scotland*'<sup>8</sup>
- Performance measures set out in the **Performance Management Framework**<sup>9</sup>.
- Measures **deterministic** and **everyday**.
- However, do consider strategies and plans to reduce risk of **unplanned events on network**.

#### Welsh Trunk Road Network

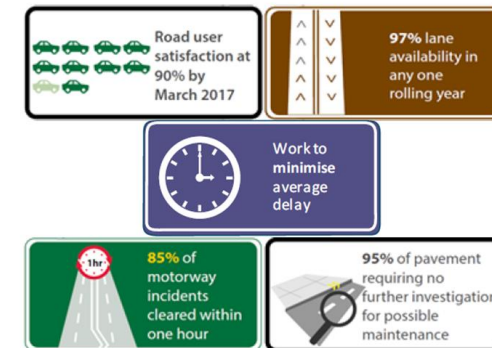
- **Limited information available** on levels of service and performance requirements.
- The **Welsh Government Trunk Road Maintenance Manual** likely defines overall performance requirements. However, this study could not access. For example, incident response resilience arrangements are defined<sup>11</sup>.

#### Local Authorities (England, Scotland and Wales)

- Local authorities **do not have mandated levels of service**.
- **Road condition** is used as a method of

securing funding from DfT.

- **Efficient maintenance practices** act as incentive for additional funding from DfT (i.e. asset management plans).
- **Voluntary Performance Indicators** have been set out by the Association for Public Service Excellence; a number of Local Authorities have adopted these<sup>10</sup>.



Highways England Key Performance Indicators (Highways England)<sup>4</sup>

<sup>1</sup><https://www.gov.uk/government/publications/roads-managed-by-highways-England>

<sup>2</sup><https://www.transport.gov.scot/transport-network/roads/>

<sup>3</sup><https://beta.gov.wales/road-network-and-our-involvement>

<sup>4</sup><https://www.gov.uk/government/collections/road-investment-strategy>

<sup>5</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/395133/roads-reform-summary-main-findings.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/395133/roads-reform-summary-main-findings.pdf)

<sup>6</sup>[http://orr.gov.uk/\\_data/assets/pdf\\_file/0017/24533/measuring-performance-of-englands-strategic-roads-what-users-want-march-2017.pdf](http://orr.gov.uk/_data/assets/pdf_file/0017/24533/measuring-performance-of-englands-strategic-roads-what-users-want-march-2017.pdf)

<sup>7</sup><https://www.gov.uk/government/publications/highways-england-operational-metrics-manual>

<sup>8</sup><https://www.transport.gov.scot/media/35696/2013-trunk-roads-report.pdf>

<sup>9</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/674583/road-conditions-guide.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/674583/road-conditions-guide.pdf)

<sup>9</sup><https://www.transport.gov.scot/publication/road-asset-management-plan-for-scottish-trunk-roads-january-2016/j408891-08/>

<sup>10</sup><http://www.apse.org.uk/apse/index.cfm/performance-networks/information-hub/spring-into-membership-with-our-welcome-and-learning-package/roads-highways-and-winter-maintenance/>

<sup>11</sup><http://senedd.assembly.wales/documents/s37875/MTR%2005b%20-%20North%20and%20Mid%20Wales%20Trunk%20Road%20Agent%20Additional%20Information.pdf>



## 5. Transport Rail

### Sector Overview

Network Rail are responsible for running, looking after and improving the railway network in England, Scotland and Wales. The Office of Rail and Road (ORR) regulate and monitor Network Rail's performance.

This review did not consider the levels of service required across Northern Ireland's rail network.

### Key Findings

Network Rail's performance is measured on:

- **Punctuality** on the national rail network<sup>1</sup>. The Public Performance Measure is used to combine measures of punctuality and reliability of train services.
- **Safety performance** – that adopts the ALARP approach as set out by the Health and Safety Executive<sup>2</sup>. Considers safety of workforce, passengers and general public.
- **Network availability**<sup>3</sup> – that is based on the Possession Disruption Index developed with RSSB. Network Rail has also developed a range of further non-regulatory metrics<sup>4</sup>.

Network Rail also has **Schedule 4** performance regime that compensates train operators for the impact of planned service disruption, and **Schedule 8** performance regime that compensates train operators for the impact of unplanned service disruption<sup>5</sup>.

Measures are **everyday** and **deterministic**.

**New suite of performance metrics** proposed for Control Period 6 (begins April 2019)<sup>6</sup>:

- Train punctuality to be measured to the minute

– the current measure is within 5 or 10 minutes.

- Plan to measure punctuality at every station on a train's journey rather than just at the destination.

Drive to encourage even greater focus on running trains on time, benefiting the whole of Britain.

ORR in CP6 supporting further devolution to routes and the development of the **System Operator**<sup>7</sup>; same applied to Scotland<sup>8</sup>.

Reinforcing relationship with customers through **scorecards**.



Dawlish Rail Line, Devon  
Geoff Sheppard CC BY-SA 3.0

<sup>1</sup> <https://www.networkrail.co.uk/who-we-are/how-we-work/performance/railway-performance/punctuality-on-the-national-rail-network/>

<sup>2</sup> <https://www.networkrail.co.uk/who-we-are/how-we-work/performance/safety-performance/>

<sup>3</sup> <https://www.networkrail.co.uk/who-we-are/how-we-work/performance/network-availability/>

<sup>4</sup> <https://cdn.networkrail.co.uk/wp-content/uploads/2019/01/Possession-Indicator-Report-for-09-2018-19.pdf>

<sup>5</sup> <https://www.networkrail.co.uk/industry-commercial-partners/information-operating-companies/payments-for-planned-disruption-on-the-railway/>

<sup>6</sup> <https://www.networkrail.co.uk/who-we-are/how-we-work/performance/railway-performance/punctuality-on-the-national-rail-network/>

<sup>7</sup> [http://orr.gov.uk/\\_data/assets/pdf\\_file/0018/39303/pr18-final-determination-england-and-wales-conclusions.pdf](http://orr.gov.uk/_data/assets/pdf_file/0018/39303/pr18-final-determination-england-and-wales-conclusions.pdf)

<sup>8</sup> [http://orr.gov.uk/\\_data/assets/pdf\\_file/0020/39305/pr18-final-determination-scotland-conclusions-and-route-settlement.pdf](http://orr.gov.uk/_data/assets/pdf_file/0020/39305/pr18-final-determination-scotland-conclusions-and-route-settlement.pdf)





## 5. Transport Aviation

### Sector Overview

The Civil Aviation Authority (CAA) is the UK's specialist aviation regulator. Specifically, they have responsibility for<sup>1</sup>:

- Airports – CAA regulates all UK airports to ensure they comply with relevant international and UK safety standards.
- Airlines – CAA regulate all UK airlines to ensure they comply with relevant international safety standards including European-wide safety regulations set by the European Aviation Safety Agency (EASA).

### Key Findings

Airport performance has a focus on<sup>2</sup>:

- **Quality of Service** (e.g. queue times and seat availability)
- **Asset availability** (e.g. pier served passenger)

Service Quality Rebate and Bonus Scheme incentivises airports to improve their level of service to customers<sup>3</sup>.

Airline performance is mainly measured around customer satisfaction. For example, **delays and cancellations**, where customers' rights are set out in EU law.

'Extraordinary circumstances' that are out of the control of the Airport or Airline typically negate compensation.



Take off queue Heathrow  
Phillip Capper, CC BY 2.0

*“EU law on flight compensation uses the term 'extraordinary circumstances' to refer to situations where delays or cancellations have been caused by things that are not the responsibility of the airline”. (CAA Website)*

*“The Civil Aviation Authority has confirmed this incident [Gatwick Drone] is "an extraordinary circumstance" so no extra compensation should be paid”. (BBC, 20<sup>th</sup> December 2018)*

<sup>1</sup> <https://www.caa.co.uk/Our-work/About-us/Our-role/>

<sup>2</sup> [https://www.heathrow.com/file\\_source/Company/Static/PDF/Companynewsandinformation/SQR/LHR\\_SQRB\\_Oct18.pdf](https://www.heathrow.com/file_source/Company/Static/PDF/Companynewsandinformation/SQR/LHR_SQRB_Oct18.pdf)

<sup>3</sup> <https://www.heathrow.com/company/company-news-and-information/performance/airport-operations/service-quality-rebate-and-bonus-scheme>



## 5. Transport Maritime

### Sector Overview

The majority of ports and harbours in the UK are privately owned.

This study found limited information relating to levels of service for the maritime sector.

### Key Findings

There are no defined levels of service.

The Marine Safety Management System guidelines are set out in the *Port Marine Safety Code*<sup>2</sup> (PMSC). The PMSC sets out a national standard for every aspect of port marine safety. It includes, for example, the:

- Safety of berths, and;
- Maintaining channels.

The focus for ports is (e.g. Port of Dover Performance objectives<sup>4</sup>):

- Safety
- Environment
- Asset Condition

The focus for shipping is:

- Safer Lives
- Safer Ships
- Cleaner Seas

**Ports Good Governance Guidance**<sup>3</sup> for Statutory Harbour Authorities (SHAs) helps deliver their key aims of improving and maintenance of their harbours according to their powers and duties as set out in Acts of Parliaments and legislation.



Felixstowe Container Port  
Oliver Dixon, CC BY-SA 2.0

*“We also have a proactive approach to interruptions to our services and monitor outages of key assets and hold levels of spare parts which minimise the time taken to get assets working again” Port of Dover Annual Report 2017<sup>1</sup>*

<sup>1</sup>[https://www.doverport.co.uk/administrator/tinyMCE/source/Annual%20Reports/Annual%20Report%20and%20Accounts%202017\\_Web.pdf](https://www.doverport.co.uk/administrator/tinyMCE/source/Annual%20Reports/Annual%20Report%20and%20Accounts%202017_Web.pdf)

<sup>2</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/564723/port-marine-safety-code.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/564723/port-marine-safety-code.pdf)

<sup>3</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/684839/ports-good-governance-guidance.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/684839/ports-good-governance-guidance.pdf)

<sup>4</sup><https://www.doverport.co.uk/administrator/tinyMCE/source/PDF/Port%20of%20Dover%20Safety%20Management%20Plan%202015.pdf>



## 6. Water and Wastewater England and Wales

### Sector Overview

In the most recent price review (PR19), Ofwat has placed more focus on **long-term thinking** around levels of service and performance commitments. UK water and wastewater companies recently submitted their PR19 Business Plans in September 2018.

In their ‘*Delivering Water 2020 methodology*’ Ofwat set out expectations for water and wastewater companies to consider ‘**resilience in the round**’<sup>1,2</sup>. The methodology focused on four key themes to provide benefit to the customer:

- Great Customer service
- Resilience
- Affordable bills
- Innovation

Ofwat’s ‘Service delivery report 2016-17’ summarises the overall performance against commitments delivered by 17 largest water and wastewater companies in the 2014 Price Review (2015-2020)<sup>3</sup>.

### Key Findings

From our high-level review, we found that Ofwat has set out a number of **common Performance Commitments (PC)**<sup>4</sup>.

Financial **Outcome Delivery Incentives (ODIs)** apply to most PCs in the water industry. ODIs are the reputational and financial incentives that companies have to help ensure that they deliver on

their performance commitments to customers. ODIs help to align the interests of investors and companies, with those of their customers, by incentivising them to improve services.

- “*Our approach means there will be more incentive for companies to fulfil their service commitments to customers and more penalties for those that do not.*”<sup>5</sup>

Water companies then set specific thresholds or targets, the majority being informed by customer consultation. This means that **customers are at the heart of decision making** and setting the ultimate levels of service required from service providers.

Range of **everyday issues** and **long-term stresses** considered in Levels of Service.

Ofwat expecting water companies to meet upper quartile in several key areas.

Water Resource Management Planning has a long-term **25 year look ahead** and is focused on drought monitoring<sup>7</sup>.

Thresholds for levels of service are **customer driven**. Customers are consulted on every commitment.

Individual **companies measure and report slightly differently** depending on their individual challenges, e.g. Thames Water will measure water supply interruptions over 4 hours, whereas all other companies use 3 hours as the threshold.

Some don’t have a universal threshold but are just

monitored and reported on.

Bespoke Performance Commitments allow companies to focus on their own specific issues. Bespoke thresholds/commitments for this planning period, include:

- Customers in vulnerable circumstances satisfied with the service
- River Restoration
- Low pressure

### Developing future performance measures

There are a number of ongoing initiatives which are looking at the development of additional service level measures, that includes:

- Consumer Council for Water (2017) ‘*Water, water everywhere?: Delivering a resilient water system*’ (2016-17)<sup>8</sup>.
- UKWIR (2017) ‘*Resilience – performance measures, costs and stakeholder communication*’<sup>9</sup>.
- Water UK (2018) ‘*Annual Review 2017/18*’<sup>10</sup>.

<sup>1</sup><https://www.ofwat.gov.uk/consultation/delivering-water2020-consulting-on-our-methodology-for-the-2019-price-review/>

<sup>2</sup><https://www.ofwat.gov.uk/wp-content/uploads/2017/09/Resilience-in-the-Round-report.pdf>

<sup>3</sup><https://www.ofwat.gov.uk/wp-content/uploads/2018/01/Service-Delivery-Report-2016-17-final.pdf>

<sup>4</sup><https://www.ofwat.gov.uk/outcomes-definitions-pr19/>

<sup>5</sup><https://www.ofwat.gov.uk/wp-content/uploads/2017/12/Appendix-2-Outcomes-FM-final.pdf>

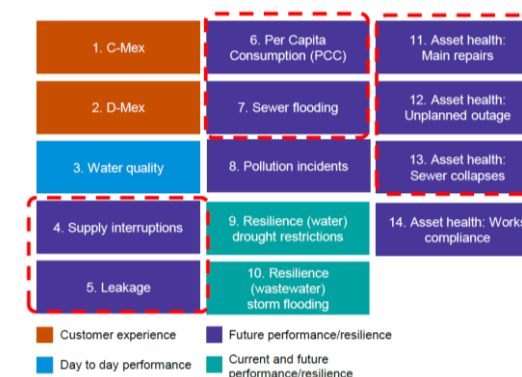
<sup>6</sup><https://www.ofwat.gov.uk/wp-content/uploads/2018/03/Targeted-review-of-common-performance-commitments-final-report-16-March-2018.pdf>

<sup>7</sup><https://www.gov.uk/government/publications/water-resources-planning-managing-supply-and-demand/water-resources-planning-how-water-companies-ensure-a-secure-supply-of-water-for-homes-and-businesses>

<sup>8</sup><https://www.ccwater.org.uk/wp-content/uploads/2018/08/Water-water-everywhere-delivering-resilient-water-and-waste-water-services-2017-18.pdf>

<sup>9</sup><https://ukwir.org/resilience-performance-measures-costs-and-stakeholder-communication>

<sup>10</sup><https://www.water.org.uk/wp-content/uploads/2018/12/Water-UK-Annual-Review-201718.pdf>



Ofwat’s common Performance Commitments for AMP7<sup>6</sup>



## 6. Water and Wastewater Scotland and Northern Ireland

### Sector Overview

#### Scotland

Scottish Water is regulated by the Water Industry Commission for Scotland.

The **Overall Performance Assessment** (OPA)<sup>1</sup> measure is used by Scottish Water to understand their performance. OPA was a previous Ofwat measure for England and Wales before they moved to 'Service Incentive Measures' (SIM)<sup>2</sup>.

For the period 2015-2021, Scottish Water is retaining the OPA, with minor amendments as agreed with the Scottish Environmental Protection Agency (SEPA) and the Drinking Water Quality Regulator (DWQR).

#### Northern Ireland Water

The Utility Regulators requirements for Price Control 15 (PC15) are set out in their document '*Price Control for water and sewerage services 2015-21: Our overall approach*'<sup>3</sup>.

Northern Ireland's Department for Regional Development announced a £22.7m shortfall in the 2015/16 budget compared to the Price Control Final Determination that was set and agreed with the Utility Regulator<sup>3</sup>.

In response to this, Northern Ireland Water prepared a 1-year Monitoring Plan, based on the reduced funding.

### Key Findings

#### Scotland

OPA measures are **everyday** and **deterministic** in their current form.

Scottish Water, in the current regulatory period (2015-2021), is looking to develop new service measures for:

- **Security of Supply**
- **Resilience of Supply**
- **Sewer external flooding risk to properties,**
- **Embodied carbon**

#### Northern Ireland

Similarly adopt **OPA** measures.

Mainly focused around **availability** of service.

Measure to be reported	Expected performance 2015	Expected performance 2021
<b>Measuring customer service</b>		
Overall Performance Assessment (OPA)	380 - 400	380 - 400
Customer Experience (CEM)	n/a	tbc
Wholesale key performance indicator	98%	98%
<b>Monitoring financial performance</b>		
Adjusted Cash Interest Cover II	1.66	1.61
Funds from operations to net debt	10.8%	10.7%
Gearing	55%	50%
Cash out-performance	n/a	>0
<b>Monitoring Output Delivery</b>		
Delivery of Q&SIV Outputs (OMD Measure)	n/a	To be determined as part of the delivery plan
Q&SIIIB completion OMD	tbc	250
<b>Measuring corporate performance</b>		
Carbon footprint (kg/household)	125	<125
<b>New service measures to be developed</b>		
Security of Supply Index	Band B (97%)	Band B (99%)
Resilience of Supply Index	To be developed	To be developed
Number of properties at risk of external flooding from sewers due to hydraulic overloading	tbc	tbc
Annual number of properties externally flooded from sewers	tbc	tbc

Scottish Water Proposed Performance Dashboard 2015 to 2021<sup>4</sup>

<sup>1</sup><https://www.watercommission.co.uk/UserFiles/Documents/Updated%20Public%20Information%20Note%20OPA.pdf>

<sup>2</sup>[https://www.watercommission.co.uk/view\\_Monitoring\\_Performance.aspx](https://www.watercommission.co.uk/view_Monitoring_Performance.aspx)

<sup>3</sup><https://www.niwater.com/sitefiles/resources/pdf/reports/pc15/201516monitoringplanv1.0.pdf>

<sup>4</sup><https://www.scottishwater.co.uk/assets/about%20us/files/strategic%20projections/appendix17performancemonitoring.pdf>



## 7. Infrastructure Operators approaches to Flood Risk

### Sector Overview

There is **no single body responsible** for managing flood risk in the UK<sup>1</sup>. Key organisations include:

- Defra
- Environment Agency
- Lead Local Flood Authorities
- Water and sewerage companies
- Internal drainage boards
- Highways authorities

Flood risk was not in the scope of this review. However, the Commission are interested in understanding the levels of flood risk performance and approaches taken by different infrastructure operators.

### Key Findings

Lack of guidance and therefore an **inconsistent approach** to flood risk management.

Ciria Guidance (C688) ‘**Flood resilience and resistance for Critical Infrastructure**’ considers design standards and performance levels for flood risk<sup>2</sup>.

The Pitt review (2007) recommended a **minimum level of performance** to a 0.5% (1 in 200) annual probability flood<sup>2</sup>. Traditionally a 1% (1 in 100) annual probability is often used in the UK.

In the UK each responsible party sets their own priorities and investment levels in resilience to flood risk. These include, for example:

- Environment Agency – adopt a 1% (1 in 100) annual probability as a minimum acceptable standard for new developments<sup>2</sup>.
- Highways England - adopt a 1% (1 in 100) annual probability to set bridge soffit levels<sup>2</sup>.
- Water (Severn Trent) – 0.5% (1 in 200) annual probability as a company standard of protection and to protect seven vulnerable sites<sup>3</sup>.
- Sewers – adopt a 3.3% (1 in 30) annual probability<sup>2</sup>. However, Severn Trent design for a 1 in 40 year flood<sup>3</sup>.
- National Grid and primary substations - 0.1% (1 in 1000) or 0.5% (1 in 200) where unachievable<sup>4</sup>.
- HS2 – are designing their assets to be resistant to a 0.1% (1 in 1000) annual probability<sup>5</sup>.

In respect of water storage reservoirs<sup>2</sup>:

- High risk (Category A) reservoirs are designed to the probable maximum flood.
- Category B are designed to 0.01% (1 in 10,000) annual probability.



Design standards vs performance levels (Male, 2009<sup>6</sup>)

*“In the absence of any specific guidance on what is an acceptable level of flood risk or any regulatory impact assessment, the extent of the duty has been unclear.”* Energy Networks Association, 2018<sup>4</sup>

<sup>1</sup><https://www.gov.uk/government/collections/flood-and-coastal-erosion-risk-management-authorities>

<sup>2</sup>[https://www.ciria.org/Resources/Free\\_publications/Flood\\_resilience.aspx](https://www.ciria.org/Resources/Free_publications/Flood_resilience.aspx)

<sup>3</sup>[https://www.stwater.co.uk/content/dam/stw/about\\_us/documents/Full-Climate-change-adaptation-report-2015-2020.pdf](https://www.stwater.co.uk/content/dam/stw/about_us/documents/Full-Climate-change-adaptation-report-2015-2020.pdf)

<sup>4</sup>[http://www.ena-eng.org/ENA-Docs/D0C3XTRACT/ENA\\_ET\\_138\\_Extract\\_180902050400.pdf](http://www.ena-eng.org/ENA-Docs/D0C3XTRACT/ENA_ET_138_Extract_180902050400.pdf)

<sup>5</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/260116/HS2\\_London\\_to\\_West\\_Midlands\\_EIA\\_Scope\\_Methodology\\_Report\\_revised\\_0.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/260116/HS2_London_to_West_Midlands_EIA_Scope_Methodology_Report_revised_0.pdf)

<sup>6</sup> Male S (2009) Presentation to the Leeds asset management forum. Institute for Resilient Infrastructure, University of Leeds, 12 May 2009.



## 8. Key Findings

The key findings from this short review include:

**Water, Wastewater, Transport (Highways and Rail) and Energy** are typically expected to provide a continuity of service. Combined with operating in a highly regulated environment, this means that they have more developed and defined levels of service. A loss of service in water and energy in particular could have significant impacts on more vulnerable customers.

There is **significant variability** within and across infrastructure sectors in terms of levels of service.

**Safety and availability of service** are predominant focus of levels of service across sectors, but there is no consistent definition or thresholds of either.

Levels of service are predominantly set in the UK through:

- **Customer engagement** – to understand the expected levels of service (e.g. water and highways sectors)
- **Safety** – with understanding that some risks are unacceptable (e.g. Health and Safety Executives ALARP approach)
- **Legislation** – where operators are required by law to deliver a specified standard of service that includes safety. (e.g. obligation of telecoms providers to ensure uninterrupted access to emergency services).

Levels of service typically focus on **‘everyday’** or **‘business-as-usual’** activities (e.g. train punctuality or leakage from water pipes).

Lack of consideration of **long-term levels of service**, excepting:

- Water – drought and 25 year Water Resource Management Plans.
- Energy (Electricity) – supply/demand balance forecasting (i.e. National Grid)

Most levels of service are **not hazard specific**, except for some in Water and Wastewater (e.g. drought).

Lack of consideration of **cascading impacts** between and within infrastructure sectors.



Traffic on the M42 Motorway (©, Arup)



# ARUP

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