

# A framework for the production of Drainage and Wastewater Management Plans

Commissioned by Water UK in collaboration with Defra,  
Welsh Government, Ofwat, Environment Agency, Natural  
Resources Wales, Consumer Council for Water, ADEPT  
and Blueprint for Water

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		This report is supported by a number of appendices (listed below) that have been published as separate documents. The appendices provide additional detail relating to the drainage and wastewater management plan framework process steps.	
		Appendix A – Collaborative drainage and wastewater planning	
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		Appendix E – Case studies	
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# Acronyms

<b>ADEPT</b>	Association of Directors of Environment, Economy, Planning and Transport	<b>PCC</b>	Per Capita Consumption
<b>AMP</b>	Asset Management Period or Plan	<b>PE</b>	Population Equivalent
<b>BRAVA</b>	Baseline Risk And Vulnerability Assessment	<b>PR</b>	Periodic or Price Review
<b>CaBA</b>	Catchment Based Approach	<b>RBD</b>	River Basin District
<b>CAF</b>	Capacity Assessment Framework	<b>RBMP</b>	River Basin Management Plan
<b>CCG</b>	Customer Challenge Group	<b>RMA</b>	Risk Management Authority
<b>CSO</b>	Combined Sewer Overflow	<b>SAC</b>	Special Area of Conservation
<b>DAP</b>	Drainage Area Plan	<b>SAGIS</b>	Source Apportionment Geographical Information System
<b>DAZ</b>	Drainage Area Zone	<b>SEA</b>	Strategic Environmental Assessment
<b>DEFRA</b>	Department for Environment, Food and Rural Affairs	<b>SIMCAT</b>	Simulated Catchment
<b>DSF</b>	Drainage Strategy Framework	<b>SOAF</b>	Storm Overflow Assessment Framework
<b>DST</b>	Decision Support Tool	<b>SPA</b>	Strategic Planning Area
<b>DWMP</b>	Drainage and Wastewater Management Plan	<b>SPG</b>	Strategic Planning Group
<b>EDM</b>	Event Duration Monitoring	<b>SSSI</b>	Site of Special Scientific Interest
<b>EPA</b>	Environmental Performance Assessment	<b>SuDS</b>	Sustainable Drainage Systems
<b>FRMP</b>	Flood Risk Management Plan	<b>TPU</b>	Tactical Planning Unit
<b>GiA</b>	Grant in Aid	<b>UKCIP18</b>	UK Climate Projections 2018
<b>GIS</b>	Geographical Information System	<b>UKWIR</b>	UK Water Industry Research Ltd
<b>L1, L2, L3</b>	Level 1, Level 2, Level 3 (see section 3.5)	<b>WINEP</b>	Water Industry National Environment Programme
<b>LDP</b>	Local Development Plan	<b>WFD</b>	Water Framework Directive
<b>LLFA</b>	Lead Local Flood Authority	<b>WRMP</b>	Water Resources Management Plan or Planning
<b>LPA</b>	Local Planning Authority	<b>WRZ</b>	Water Resource Zone
<b>NIDP</b>	Northumbria Integrated Drainage Partnership	<b>WtP</b>	Willingness to Pay
<b>ODA</b>	Options Development and Appraisal	<b>WwTW</b>	Wastewater Treatment Works
<b>Ofwat</b>	Water Services Regulation Authority		



The vision of the Drainage and Wastewater Management Plan framework is to enable the UK water industry, working in partnership with others, to make plans for the future that will ensure the sustainability of our drainage infrastructure, and the services it provides to customers and the environment.

Over the last few decades, the drainage and wastewater management planning processes employed by the water industry have constantly evolved to address the ever-growing challenges and demands placed upon our drainage and wastewater systems. This has facilitated billions of pounds of investment, to deliver the outcomes desired by us all.

However, if the water industry is to meet future pressures such as climate change and population growth, a step change is needed in our approaches. Greater transparency and consistency across the industry is required, underpinned by a framework to derive future actions, whilst balancing competing needs.

The Drainage and Wastewater Management Plan framework recognises the need to move towards a more consistent basis for long-term planning of drainage and wastewater services.

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This document outlines a framework for undertaking drainage and wastewater management plans.



# Background

Decisions made by water and wastewater companies today can impact the service provided to customers and the environment for generations. Unlike water resources, there is currently no statutory requirement for water and wastewater companies to produce collated and outward facing long-term drainage and wastewater plans.

As a result, while companies do undertake long-term planning of drainage and wastewater services, each company has flexibility, within broad guidelines, to adopt its own approaches toward ensuring that services to customers are resilient against the impacts and uncertainties of factors like population growth and climate change. This has resulted in a range of, and lack of consistency in, planning approaches. There is a broad range of bodies with responsibilities for drainage and their drainage systems interact with the systems of water and wastewater companies; therefore, a collaborative, integrated approach to long-term planning is required.

Working with a wide range of partner organisations, the industry has built on the principles outlined in the Drainage Strategy Framework<sup>1</sup> to embed consistency of approach across drainage and wastewater planning throughout England and Wales, whilst drawing upon best practice regardless of geographic boundaries. This work is also expected to be of relevance to other parts of the UK. Tools and approaches have been developed that enable companies to target investments more effectively and provide customers and stakeholders with better information about their drainage and wastewater services.

Specifically, the following key tools and approaches have been developed in relation to consistent long-term planning:

- > **Capacity Assessment Framework** – a standard way to assess how much capacity is currently available in the foul and combined sewer networks, and what might be available in the future. The framework could be extended to include surface water sewers; an initial trial has been commissioned to understand the practicalities of this.
- > **Storm Overflow Assessment Framework** – a framework which includes valuing the benefits of improvements to storm overflows. This is building on the significant investment already from the water industry to reduce the impacts of storm overflows on the environment and a major programme to improve monitoring which is due for completion in 2020.
- > **Wastewater resilience metrics** – a standard basis for assessing the resilience of wastewater services which has been confirmed as a common performance commitment in the 2019 price reviews in England and Wales<sup>2</sup>.

Frameworks, tools and documentation from the above projects are available from the Water UK website<sup>3</sup>.

These metrics and approaches have been assimilated into an overarching methodology – the Drainage and Wastewater Management Plan framework. Utilisation of this defined and standardised approach will, in deriving management plans aligned across all risk management authorities, help to provide greater transparency to customers and other stakeholders who need to engage with the water companies thereby facilitating achievement of individual and common goals and outcomes.

By following the framework, companies and partners will reap the benefits of these metrics and tools and improve the evidence base and quality of strategic planning for drainage. A consistent framework means partners can more easily align their management plans, to identify and agree objectives and actions.

This will also assist in meeting stakeholder expectations. In the UK government's Strategic Policy Statement to Ofwat<sup>4</sup>, the Welsh Government's Water Strategy for Wales<sup>5</sup> and Ofwat's final PR19 methodology<sup>6</sup>, the need to make improvements in the approach to long-term drainage and wastewater planning was made clear, not least to provide greater transparency, robustness and line of sight to investment decisions that lead to cost to customers.

<sup>1</sup> [https://www.ofwat.gov.uk/wp-content/uploads/2015/12/rpt\\_com201305drainagestrategy1.pdf](https://www.ofwat.gov.uk/wp-content/uploads/2015/12/rpt_com201305drainagestrategy1.pdf)

<sup>2</sup> <https://www.ofwat.gov.uk/outcomes-definitions-pr19/>

<sup>3</sup> <https://www.water.org.uk/policy-topics/managing-sewage-and-drainage/drainage-and-wastewater-management-plans/>

<sup>4</sup> The government's strategic priorities and objectives for Ofwat. Published 13th September 2017, Defra

<sup>5</sup> Water Strategy for Wales, published August 2015, Welsh Government

<sup>6</sup> Delivering Water 2020: Our final methodology for the 2019 price review, published 13th December 2017, Ofwat

## Basis of this report

The framework has built on existing approaches developed by the water industry, local authorities and other stakeholders, enabling it to be readily adopted by water companies and integrated into the strategic planning approaches of other organisations. It aims to facilitate the development of planning processes that are flexible (but at the same time incorporate standardisation where considered necessary), transparent and aligned to the requirements of a wider group of stakeholders and the needs of the environment.

The main report has the following structure:

- > Section 1 - Introduction
- > Section 2 - Planning for robust and resilient drainage and wastewater services
- > Section 3 - Creating and maintaining a drainage and wastewater management plan
- > Section 4 - Understanding the problem

- > Section 5 - Developing the options
- > Section 6 - Deciding on the future
- > Section 7 - Implementing and reviewing a drainage and wastewater management plan

This report and associated appendices have been developed with the extensive engagement of a Steering Group comprising of Adept, Blueprint, the Consumer Council for Water, Defra, the Environment Agency, the National Infrastructure Commission, Natural Resources Wales, Northern Ireland Water, Ofwat, Scottish Water, the water and wastewater companies of England and Wales, and Water UK.







## Summary

### The need for drainage and wastewater management plans

A drainage and wastewater management plan (DWMP) will set out how water and wastewater companies intend to extend, improve and maintain a robust and resilient drainage and wastewater system. The plan must take a long-term view, setting out a planning period that is appropriate to the risks faced by each company, but with a minimum period of 25 years. The framework for DWMPs has been developed in response to the need to improve the approaches taken by the water sector to long-term drainage and wastewater planning with a view to providing greater transparency, robustness and line of sight to investment decisions that lead to cost to customers.

The eleven England and Wales water and wastewater companies (hereinafter referred to as 'companies' or variations thereof), that are subject to regulatory price controls, have committed to produce DWMPs in accordance with this

framework. The DWMPs will inform their business plan submissions for the next price review in 2024. It is anticipated that for subsequent planning periods the DWMPs will become embedded within companies' planning processes as business as usual. The framework has the potential to be used by other wastewater service providers within England and Wales and is also expected to be of relevance to other parts of the UK.

The framework provides the basis for more collaborative and integrated planning with and alongside organisations that have responsibilities relating to drainage, flooding and protection of the environment. Whilst the companies have a direct regulatory focus in relation to providing evidence in support of their strategic business plans, it is important to recognise that the responsibility for developing the drainage and wastewater plan is shared between all stakeholders and collaborative engagement is essential.



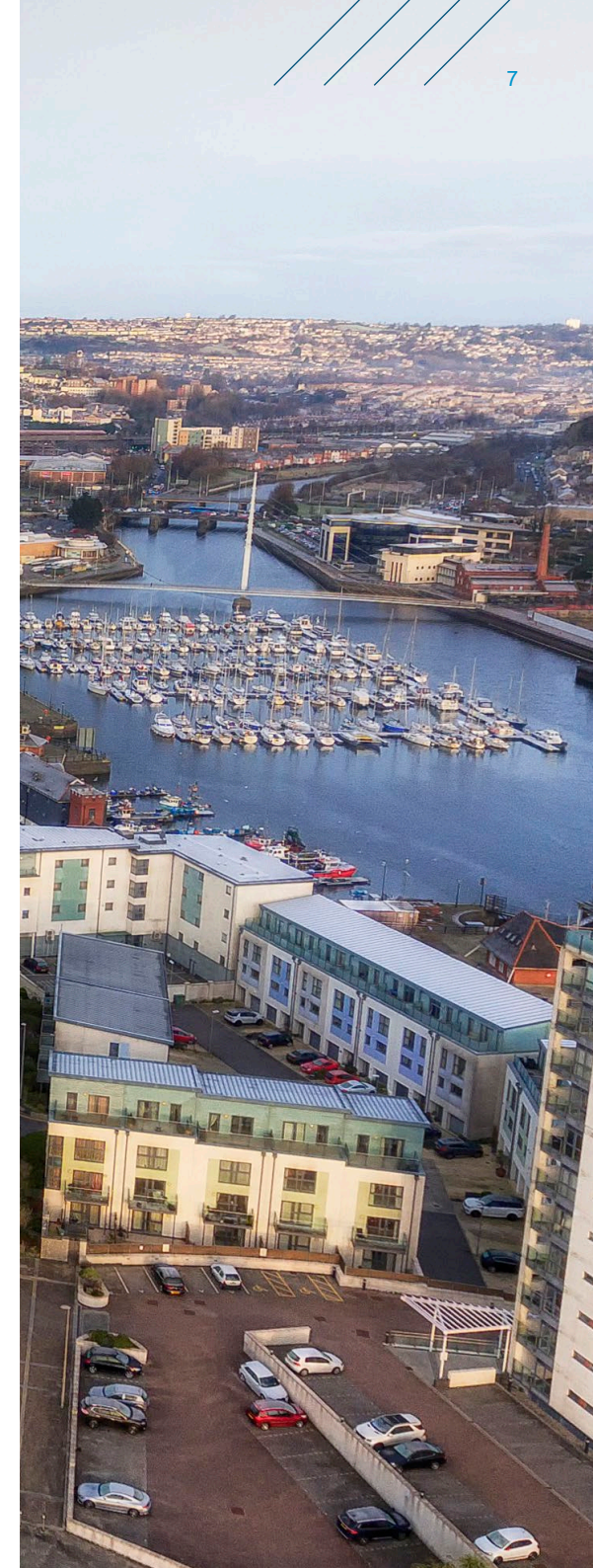
## Role and benefits of DWMPs

In supporting the business planning process, the framework has been developed such that, through their DWMPs, companies will:

- > Set out the company's assessment of long-term drainage and wastewater capacity and the drivers, risks and scenarios being planned for.
- > Assess where (largely drainage) infrastructure managed by other stakeholders may impose additional risks to drainage and wastewater services.
- > Identify those options that offer best value to customers and the environment, ensuring robust, resilient and sustainable drainage and wastewater services in the long-term.

The benefits of the framework are that company DWMPs will:

- > Show how their long-term plans support economic growth, resilient communities and how they protect and enhance the environment, providing greater environmental resilience and long-term sustainability.
- > Provide a systematic understanding of service and system risks and vulnerability.
- > Demonstrate a structured and auditable approach to identifying and developing options and presenting a robust best value investment plan.
- > Facilitate the integration of partnership working and co-creation of solutions to understand the related works of others and deliver, where possible, integrated solutions that provide multiple benefits to achieve best value to the economy, society and the environment over the long-term.
- > Facilitate innovation (instigated by identifying future challenges that will need new approaches to address them) and the development of affordable, sustainable plans.
- > Provide a clear, transparent and consistent planning approach, with sufficient agility and adaptability to respond to long-term drivers for drainage and wastewater services.
- > Promote informed debate about acceptability of different levels of risk.
- > Provide greater confidence to customers, regulators and stakeholders in strategies identified, and resultant plans.
- > Provide the basis for effective engagement with customers and stakeholders on levels of service, environmental performance and resilience, now and for the future and on the choices and costs to customers in providing that service.



## DWMP management structure

A key element of the framework is to ensure that there is early, continued and effective engagement between companies and regulators/stakeholders at both a company-wide level and more locally. Partnership working and collaborative planning will be essential to delivering resilient wastewater and drainage systems.

To achieve this a DWMP management structure has been developed that takes consideration of:

- > The need for a company level output;
- > The need for greater transparency and rigour in planning to maintain and increase levels of service in respect of drainage and wastewater (infrastructure and non-infrastructure) systems;
- > The increased granularity required to define the risks and reflect investments at a sub-company scale;
- > The need to include at the heart of the planning process impacts on customers and the environment;

- > A planning structure that is proportionate in respect of risk as well as the effort required.

To address the above the structure underpinning DWMPs has three levels (shown schematically in the diagram that follows):

- > **Level 3** – the basic tactical planning unit will be the wastewater treatment works and its catchment (or aggregations thereof for small catchments, or discrete sub-catchments for larger wastewater treatment works catchments). Companies can disaggregate level 3 tactical planning units further where appropriate (designating as level 4).
- > **Level 2** – an aggregation of level 3 units into larger level 2 strategic planning areas. The level 2 strategic planning areas are to describe strategic drivers for change (relevant at the level 2 strategic planning area scale) as well as facilitating a more strategic level of planning above the detailed catchment assessments.
- > **Level 1 water company DWMP** – planning at level 2 and level 3 to be brought together within an overarching company level DWMP to provide a

strategic, long-term plan for drainage and wastewater resilience and associated investment over the plan period.

The DWMP framework provides a management structure that operates at level 1 and level 2, drawing upon (and influencing) activities undertaken at level 3.

The management structure will enable effective engagement across the defined levels:

- > **Level 1 DWMP** – engagement and challenge provided through the existing customer challenge group process and to support strategic discussions with regulators and other key stakeholders.
- > **Level 2 strategic planning area** – stakeholder and customer engagement processes will be more formalised at this level. For each level 2 strategic planning area, a stakeholder engagement strategic planning group led by the water company should be established. The level 2 strategic planning groups should include all key stakeholders relevant to the level 2 area. The establishment of level 2 strategic

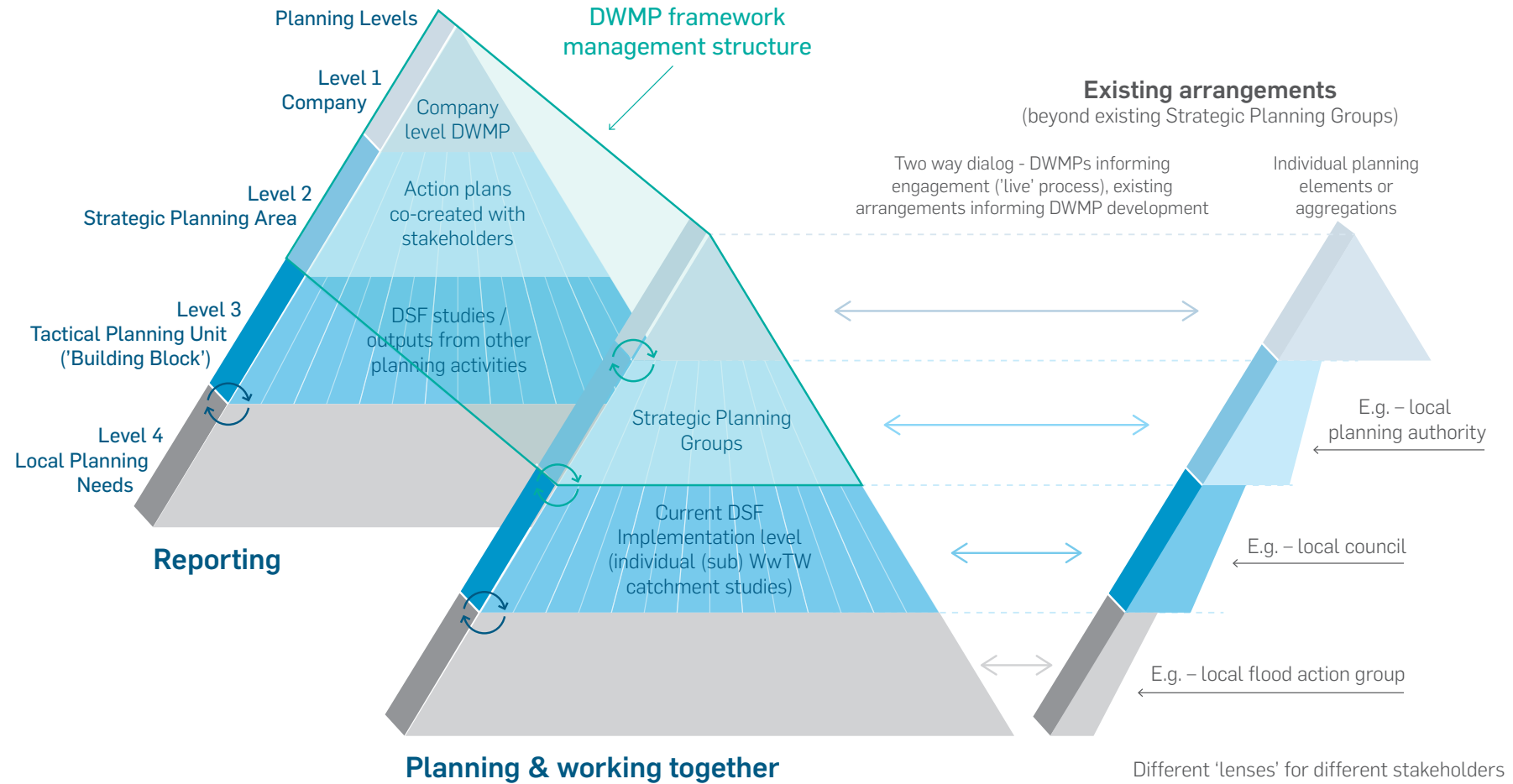
planning groups should not be seen as the introduction of another level of bureaucracy into the planning process but should, where possible, build on and where necessary enhance existing partnership arrangements (e.g. catchment partnerships, regional flood and coastal committees and others).

- > **Level 3 tactical planning unit** – engagement with local interested parties to understand risk and inform the development of options to mitigate identified risk.

The level 2 strategic planning groups are a response to the need to ensure transparency on issues affecting (and the assessment of) vulnerability, engage in the identification and assessment of potential options, facilitate plan/data sharing, provide a mechanism for defining ownership of interventions and, potentially, the means of resourcing them. The level 2 engagement will also facilitate coordination of strategic planning activities undertaken by all parties (e.g. risk assessments and consultations), saving time and effort.



## DWMP framework management structure



## DWMP planning processes

The framework outlines the following key areas (described below and shown schematically in the figure that follows):

An approach to understanding company drivers and objectives, through to potential catchment problems (outlined in section 4) which defines:

- > The strategic context (outlined in section 4.2) which defines:
  - The objective of the DWMP;
  - The key drivers behind the need for a long-term plan;
  - The planning objectives against which current and future performance is to be measured at a company and local planning level.
- > A risk-based approach to catchment screening designed to focus effort where there is evidence of system vulnerability (section 4.3 and appendix B);
- > A baseline risk and vulnerability assessment (section 4.4 and appendix C) designed to:
  - Develop an understanding of impacts on planning objectives as a function of future changes to catchments based on an established base year position;

- Develop an understanding of wider catchment resilience issues that are not directly linked to system characteristics.
- > A problem characterisation step (section 4.5 and appendix C) that identifies the nature and complexity of the interventions required and assigns the catchments to different levels of options development and appraisal.
- > An options development and appraisal methodology (section 5 and appendix D) that covers:
  - The hierarchy of options for consideration;
  - The development of, and criteria for movement between, unconstrained, constrained and feasible options lists;
  - An appraisal process to define preferred options based on 'best value' and incorporating ecosystem services assessments / natural capital approaches.
- > A programme appraisal methodology (section 6) that defines a prioritised list of interventions as a function of planning level;
- > The requirements of the final company level DWMP document (section 3.5 and appendix F).

## DWMP implementation and review

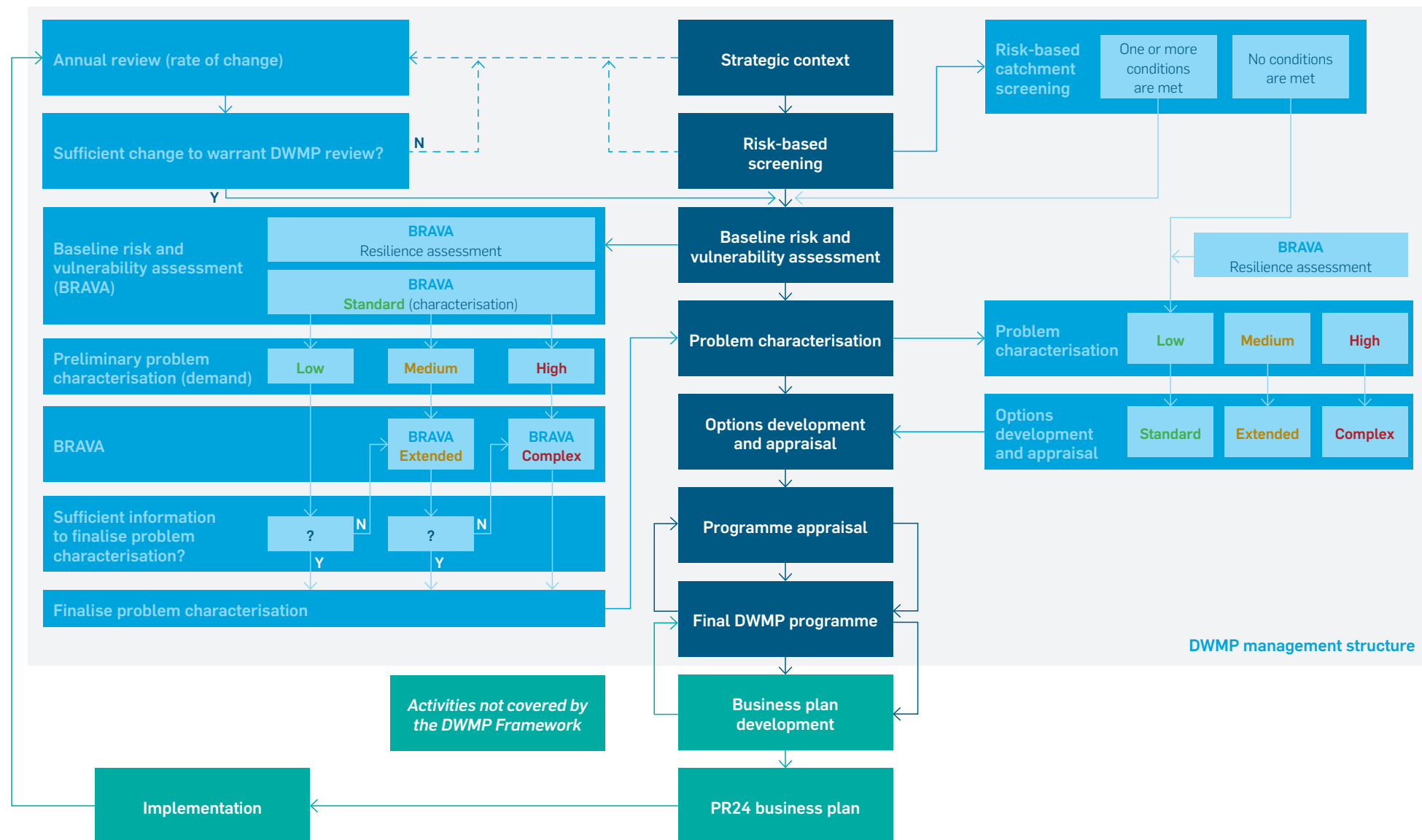
It is anticipated that each company's full DWMP will be re-assessed and produced on a cycle consistent with the price review cycle (currently every 5 years in England and Wales) and sufficiently in advance of the submission of the companies' business plans to allow time for customer and stakeholder engagement on the plan. Translation of the DWMP into the business plan, where it is then considered within the context of all the other investment programmes and where there may be overall affordability constraints, may require that the DWMP inputs are re-focussed and re-prioritised to deliver outcomes that are within overall affordability limits set by customers.

Companies will be expected to review the position of the level 2 and 3 planning units annually. It is anticipated that in most cases this annual review will be a 'light touch' approach that will focus on any material changes. The review should:

- > Identify potential/material changes (e.g. new planning applications, new growth forecasts);
- > Report on progress in delivery of interventions and planned outcomes (e.g. 'on-track' or highlight where issues, such as planning process constraints, are likely to impact on the timing of delivery);
- > Ensure that planning activities are commensurate with the rate of change identified (e.g. is there evidence that future risks are occurring earlier than previously assessed, requiring a modification to the approach being taken).



Schematic of the DWMP process steps





# 1. Introduction

The primary aim of this document is to provide water and wastewater companies, operating within England and Wales, with a framework within which drainage and wastewater management plans (DWMPs) can be developed. This will provide companies with a consistent, standardised and more robust framework towards long-term planning that also facilitates consideration of the wider drainage networks which interact with their drainage and wastewater systems.

The framework provides the basis for a more integrated and collaborative approach to drainage and wastewater planning in association with other risk management authorities and stakeholders. Further development of the methodologies and any guidance is expected to follow adoption of this framework.

The eleven England and Wales water and wastewater companies (hereinafter referred to as 'companies' or variations thereof), that are subject to regulatory price controls, have committed to produce DWMPs in accordance with this framework. The DWMPs will inform their business plan submissions for the next price review in 2024 (PR24). The framework has the potential to be used by other wastewater service providers within England and Wales and is expected to also be of relevance to other parts of the UK.

The DWMP will provide transparency and line of sight to customers and other stakeholders who need to engage with the companies on strategic decisions and investments in drainage and wastewater. The framework provides the basis for more collaborative and integrated planning with and alongside organisations that have responsibilities relating to

drainage, flooding and protection of the environment. This will enable the alignment of management plans across the organisations (noting the interdependencies present), supporting achievement of common goals and shared outcomes. Whilst the companies have a direct regulatory focus in relation to providing evidence in support of their strategic business plans, it is important to recognise that the responsibility for developing the drainage and wastewater plan is shared between all stakeholders and collaborative engagement is essential.

The framework is designed to help water companies in collaboration with others produce a plan that complies with relevant statutory obligations, governments' and regulators' policy expectations and customers' priorities for drainage and wastewater services. It is underpinned by the Drainage Strategy Framework (DSF)<sup>7</sup>, and the principles contained therein. It also assimilates previously developed metrics and approaches into an overarching methodology<sup>8</sup>. Supporting information and technical methods can be found in the appendices or are referenced where appropriate within this guidance document.

<sup>7</sup> [https://www.ofwat.gov.uk/wp-content/uploads/2015/12/rpt\\_com201305drainagestrategy1.pdf](https://www.ofwat.gov.uk/wp-content/uploads/2015/12/rpt_com201305drainagestrategy1.pdf)

<sup>8</sup> <https://www.water.org.uk/policy-topics/managing-sewage-and-drainage/drainage-and-wastewater-management-plans/>



The framework will encompass and provide a platform for enhancement of existing drainage and wastewater planning processes, so that comprehensive, fully-developed, risk-based DWMPs are produced to support company business plans. It is acknowledged that companies and partners will learn from the first round of DWMPs; it is anticipated that areas for enhancement/ development of the framework will emerge as companies gain familiarity with implementation, for the outputs from all planning approaches to be assimilated into a comprehensive DWMP. Processes supporting framework implementation will also evolve as organisations commence the first iteration of DWMPs. There is flexibility for companies to modify the approaches outlined in the framework to suit their existing planning process, provided that the minimum requirements and overall principles are adhered to, thereby ensuring that stakeholder expectations and overall DWMP objectives are fulfilled.

### 1.1. Definitions

The term drainage is used in this document to indicate that the framework encompasses all bodies that have a role in drainage. This incorporates assets such as: foul and combined sewerage, surface water, land drainage, highway drainage and culverted watercourses. That is, any assets that could contribute to a customer impact through connectivity (designed or not) with water companies' infrastructure (and vice versa). Noting that DWMPs will be produced and led by water companies, however, broader surface water management (i.e. planning across all drainage systems) has not been included within the definition at this stage. Notwithstanding this, there is an implicit recognition within the DWMP framework of the need to foster interaction and engagement in collaborative planning with other stakeholders and interested parties to ensure broader management issues and risks are appropriately considered within the DWMP.

This will be achieved through the assessment of the impact of other drainage systems upon the performance of water companies' drainage systems (and vice versa), together with engagement with others in developing their own management plans.

Therefore, besides covering water company drainage systems (i.e. the total water company network served by a wastewater treatment works (WwTW) and surface water assets not draining to a WwTW), the term 'drainage' (within DWMPs) may extend to any point of any drainage system, where risks and/or opportunities are identified and their resolution/realisation provides mutual benefit (or an overall benefit), arising from changes to / impacts upon water companies' drainage systems and/or those systems that are the responsibility of other organisations. This framework therefore explicitly acknowledges the roles and responsibilities of the many different stakeholder organisations that have responsibilities and interests in drainage and wastewater planning.

Where water company surface water assets do not drain to a WwTW, these should be assigned to an appropriate WwTW catchment for the purposes of DWMP assessment. 'Wastewater' (being the matter conveyed and/or treated by water company assets) is also included (within DWMPs), to indicate that DWMPs also encompass the assets associated with conveying and treating wastewater, where not included within the drainage definition stated above.

For clarity, the WwTW catchment (within DWMPs) is the spatial extent of (or area covered by) sources of flows that are served by a WwTW, and also includes the spatial extent of (or area covered by) sources of flows served by surface water assets that do not drain to a WwTW, where these have been assigned to the WwTW for the purposes of DWMP assessment.



## 2. Planning for robust and resilient drainage and wastewater services

A DWMP will set out how companies intend to extend, improve and maintain a robust and resilient drainage and wastewater system. The plan must take a long-term view, setting out a planning period that is appropriate to the risks faced by each company, but with a minimum period of 25 years. Given the potential for investment in long life assets, and for more complex programmes or projects, the framework provides flexibility to incorporate longer planning horizons.

In producing their DWMP, companies:

- > Must take account of legal requirements (see section 3.1).
- > Will address the actions and expectations as set out in the strategic policy statements from governments, the Environment Agency, Natural England, Natural Resources Wales or other regulators, as relevant to their operating area.
- > Should engage with other risk management authorities (RMAs) and stakeholders in identifying any additional risks arising from interdependencies with non-water company drainage systems.

DWMPs are to be developed and completed in sufficient time to support company business plan submissions to Ofwat (from PR24), as part of the price review process.

Through their DWMPs, companies will:

- > Set out the company's assessment of long-term drainage and wastewater capacity and the drivers, risks and scenarios being planned for.
- > Provide a clear, transparent and consistent planning approach, with sufficient agility and adaptability to respond to long-term drivers for drainage and wastewater services.
- > Assess where (largely drainage) infrastructure managed by other stakeholders may impose additional risks to drainage and wastewater services.
- > Identify those options that offer best value to customers and the environment, ensuring robust, resilient and sustainable drainage and wastewater services in the long-term.
- > Show how their long-term plans support economic growth, resilient communities and how they protect and enhance the environment, providing greater environmental resilience and long-term sustainability.



- > Demonstrate a structured and auditable approach to identifying and developing options and presenting a robust investment plan.
- > Facilitate the integration of partnership working and co-creation of solutions to understand the related works of others and deliver, where possible, integrated solutions that provide multiple benefits to achieve best value to the economy, society and the environment over the long-term.
- > Facilitate innovation (instigated by identifying future challenges that will need new approaches to address them) and the development of affordable, sustainable investment plans.
- > Promote informed debate about acceptability of different levels of risk.
- > Provide greater confidence to customers, regulators and stakeholders in strategies identified, and resultant plans.

- > Provide the basis for effective engagement with customers and stakeholders on levels of service, environmental performance and resilience, now and for the future and on the choices and costs to customers in providing that service.

Following the DWMP framework should allow companies to develop plans with their customers and stakeholders that follow a more consistent and transparent approach, thereby fostering greater confidence in investment decisions and costs to customers, demonstrating that long-term planning is embedded into their plans.







## 3. Creating and maintaining a drainage and wastewater management plan

This section contains information on the steps required to produce a DWMP, from early engagement with regulators, customers and organisations that have responsibilities relating to drainage, flooding and protection of the environment, through to completion of a DWMP that supports the company business plan.

### 3.1. Legal requirements

In producing a DWMP, companies must take account of the following key legislation as relevant to their plans:

- > Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006
- > Water Industry Act 1991
- > Urban Wastewater Treatment Directive 1991
- > Habitats Directive 1992
- > Environment Act 1995
- > Water Framework Directive 2000
- > Strategic Environmental Assessment Directive 2001
- > Revised Bathing Water Directive 2006
- > Climate Change Act 2008
- > Flood and Water Management Act 2010
- > Well-being and Future Generations (Wales) Act 2015
- > Environment (Wales) Act 2016

### 3.2. Links to other plans

Companies have a duty (under the Flood and Water Management Act, 2010) to cooperate with other RMAs, when undertaking drainage and wastewater planning (having been defined a RMA due to their duties arising from the Water Industry Act, 1991). In return, other RMAs "must co-operate with other relevant authorities in the exercise of their flood and coastal erosion risk management functions". Companies "must act in a manner consistent with the national strategy" and "have regard to local strategies". A DWMP developed in collaboration with other RMAs will help demonstrate discharging these duties. Therefore, a DWMP must demonstrate strong links with the plans of other RMAs:

- > River basin management plans (RBMPs)
- > Flood risk management plans (FRMPs)
- > Local plans produced by local authorities (e.g. local flood risk management strategies, local development plans)

The DWMP should also demonstrate strong links where activities being promoted may significantly impact other plans (e.g. nutrient management plans, diffuse water pollution plans).

Companies will need to provide an explanation of how the DWMP will be used to inform their business plans.

### 3.3. Early engagement with regulators, customers and other interested parties

Early engagement in the DWMP process is fundamental to ensure alignment of objectives and plans, to identify issues, risks and potential opportunities for efficiency in planning, and to reduce the risk of issues being identified at later stages in the process, or being overlooked completely. Whilst the DWMP will be produced and predominantly led by water companies, there are a wide range of stakeholders who have significant roles in ensuring that long-term drainage and wastewater planning is robust for existing and future challenges and with whom engagement is essential to the DWMP:

- > The Environment Agency / Natural Resources Wales
- > Lead local flood authorities
- > Highway authorities
- > District, metropolitan, unitary and borough councils
- > Internal drainage boards
- > Private owners / industry
- > Highways England / Welsh Assembly

Early engagement from the outset will enable all parties to understand their roles in relation to the DWMP. This will support early identification of capacity or capability constraints, increasing the likelihood of addressing issues that may arise. It is also recommended that the early development phase of the plan is used to discuss the methods and approaches companies will use with the management groups set up to oversee DWMP activities (see section 3.5). Recommended mechanisms of engagement throughout the DWMP process are detailed in section 3.4.1.3 in this document and in appendix A.

### 3.4. Drainage and wastewater management plan framework

The framework presents a structured approach to achieve the outcome of a robust, resilient long-term plan. The framework is presented schematically in Figure 3-1.

As outlined in the schematic, the framework covers:

- > An approach to understanding company drivers and objectives, through to potential catchment problems (outlined in section 4) which defines:
  - The strategic context (outlined in section 4.2) which defines:
    - The objective of the DWMP;
    - The key drivers behind the need for a long-term plan;
    - The planning objectives against which current and future performance is to be measured at a company and local planning level.
  - A risk-based approach to catchment screening designed to focus effort where there is evidence of system vulnerability (section 4.3 and appendix B);

- A baseline risk and vulnerability assessment (section 4.4 and appendix C) designed to:
  - Develop an understanding of impacts on planning objectives as a function of future changes to catchments based on an established base year position;
  - Develop an understanding of wider catchment resilience issues that are not directly linked to system characteristics.
- > A problem characterisation step (section 4.5 and appendix C) that identifies the nature and complexity of the interventions required and assigns the catchments to different levels of options development and appraisal.
- > An options development and appraisal methodology (section 5 and appendix D) that covers:
  - The hierarchy of options for consideration;
  - The development of, and criteria for movement between, unconstrained, constrained and feasible options lists;

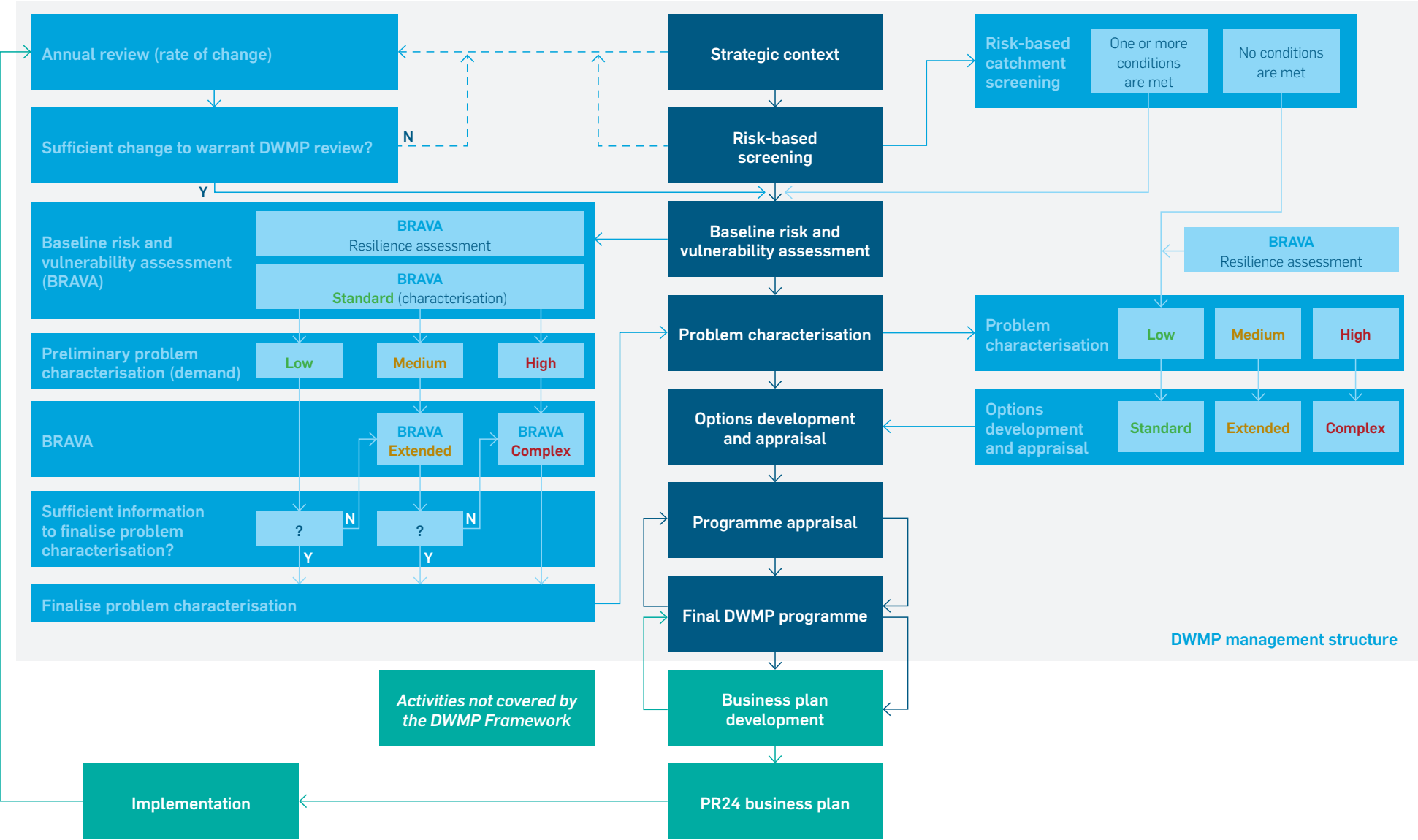


Figure 3-1 - Drainage and wastewater management plan framework



- An appraisal process to define preferred options based on 'best value' and incorporating ecosystem services assessments / natural capital approaches and multi-sector benefits.
- > A programme appraisal methodology (section 6 and appendix E) that defines a prioritised list of interventions as a function of planning level;
- > The requirements of the final company level DWMP document (section 3.6 and appendix F).

The framework also covers the management structure which defines the levels at which detailed and strategic planning are undertaken and the expected levels of stakeholder engagement with the planning process (see section 3.5).

The specific methodologies developed consider the fact that companies already undertake significant amounts of long-term planning. As such, the methodologies provide, where appropriate, a minimum set of criteria that should be utilised in developing the assessments and outputs but allow companies the flexibility to go above and beyond the minimum if their processes are significantly advanced. The approach is intended to build on the best of companies' existing processes and to

provide greater consistency, taking account of the overlaps with planning processes and assets from other RMAs, and giving appropriate weight to the potential impacts on customers and the environment.

The methodologies have been designed as a proportionate and pragmatic bottom-up approach to defining the intervention requirements to deliver a wastewater service that is robust and resilient in the long-term in the face of a range of challenges. The overall planning framework allows companies to explore future uncertainties, particularly with respect to climate change and socioeconomic growth (planned and unplanned) impacts on their planning and decision making. Scenario planning approaches developed for the water resources management planning (WRMP) framework can also be applied, providing potential efficiencies in planning processes.

### 3.5. Defining planning levels and stakeholder arrangements

#### 3.5.1. Drainage and wastewater management plan - management structure

The DWMP management structure is intended to provide a level of consistency across all companies but also allows for

some flexibility to take on board companies' existing arrangements. The following sections set out the management structure and mechanisms to enable early stakeholder engagement.

#### 3.5.2. DWMP boundaries

The DWMP will:

- > Provide a mechanism to understand the status of a company's wastewater infrastructure and non-infrastructure assets and related drainage infrastructure that could impact on their systems, in the face of a range of drivers including growth, climate change, urban creep, etc.
- > Promote interventions to meet identified needs.
- > Highlight how the interventions will meet desired outcomes, primarily in respect of risks associated with sewer / surface water flooding and environmental impact.

In developing a management structure for the DWMPs the following have been considered:

- > The need for a company level output;
- > The need for greater transparency and rigour in planning to maintain and increase levels of service in respect of

drainage and wastewater (infrastructure and non-infrastructure) systems;

- > The increased granularity required to define the risks and reflect investments at a sub-company scale;
- > The need to include at the heart of the planning process impacts on customers and the environment;
- > A planning structure that is proportionate in respect of risk as well as the effort required;
- > The structure and geography of partner organisations.

To address the above there will be a three-level system, shown schematically in the following diagram (Figure 3-2):

- > Level 3 (L3) – the basic tactical planning unit (TPU) will be the WwTW and its catchment (or aggregations thereof for small catchments, or discrete sub-catchments for larger WwTW catchments). Companies can disaggregate L3 TPUs further where appropriate (designating as Level 4 (L4)). However, it is recognised that the detailed planning at this level will inform the strategic plan, rather than being a key component of the assessment. This is particularly the



case where, for example, models are at a level of detail that will be impractical for DWMP planning.

- > Level 2 (L2) – an aggregation of L3 units into larger L2 strategic planning areas (SPAs). The L2 SPAs are to describe strategic drivers for change (relevant at the L2 SPA scale) as well as facilitating a more strategic level of planning above the detailed catchment assessments. In defining the L2 areas, the principle is that companies should endeavour to align these with the river basin district (RBD) management catchments (further details are provided in appendix A). These management catchments represent the level, within RBMPs and FRMPs, at which actions in respect of receiving water quality and flood risk management are taken. Aligning the L2s in this way reflects the need for L2s and the DWMP to take on board potential impacts on the environment and the potential impacts that flood management activities by other responsible bodies may have on company and related systems. However, the framework provides flexibility for companies to establish L2 boundaries appropriate to their operational circumstances, but, given that the ultimate objective is to manage issues within the context of a

multi-stakeholder plan for flooding (fluvial, pluvial, coastal, sewer) and environmental risk, the alignment of L2s to those areas at which action plans for water quality and flood risk assessment are undertaken is an important principle and key consideration.

- > Level 1 (L1) water company DWMP – planning at L2 and L3 to be brought together within an overarching company level DWMP to provide a strategic, long-term plan for drainage and wastewater resilience and associated investment over the plan period. The L1 DWMP will describe the baseline planning objectives, an assessment of risks and vulnerability of the drainage and wastewater systems, the actions proposed to mitigate those risks, and highlight the investments necessary to deliver the outcomes identified. In this regard, the L1 DWMP will sit alongside the current WRMP process and in doing so provide a mechanism for greater integration with wholesale water services. It is envisaged that in a similar vein to the WRMP, although probably not to as great an extent, this level of aggregation should enable consideration of 'regional' options across company boundaries.

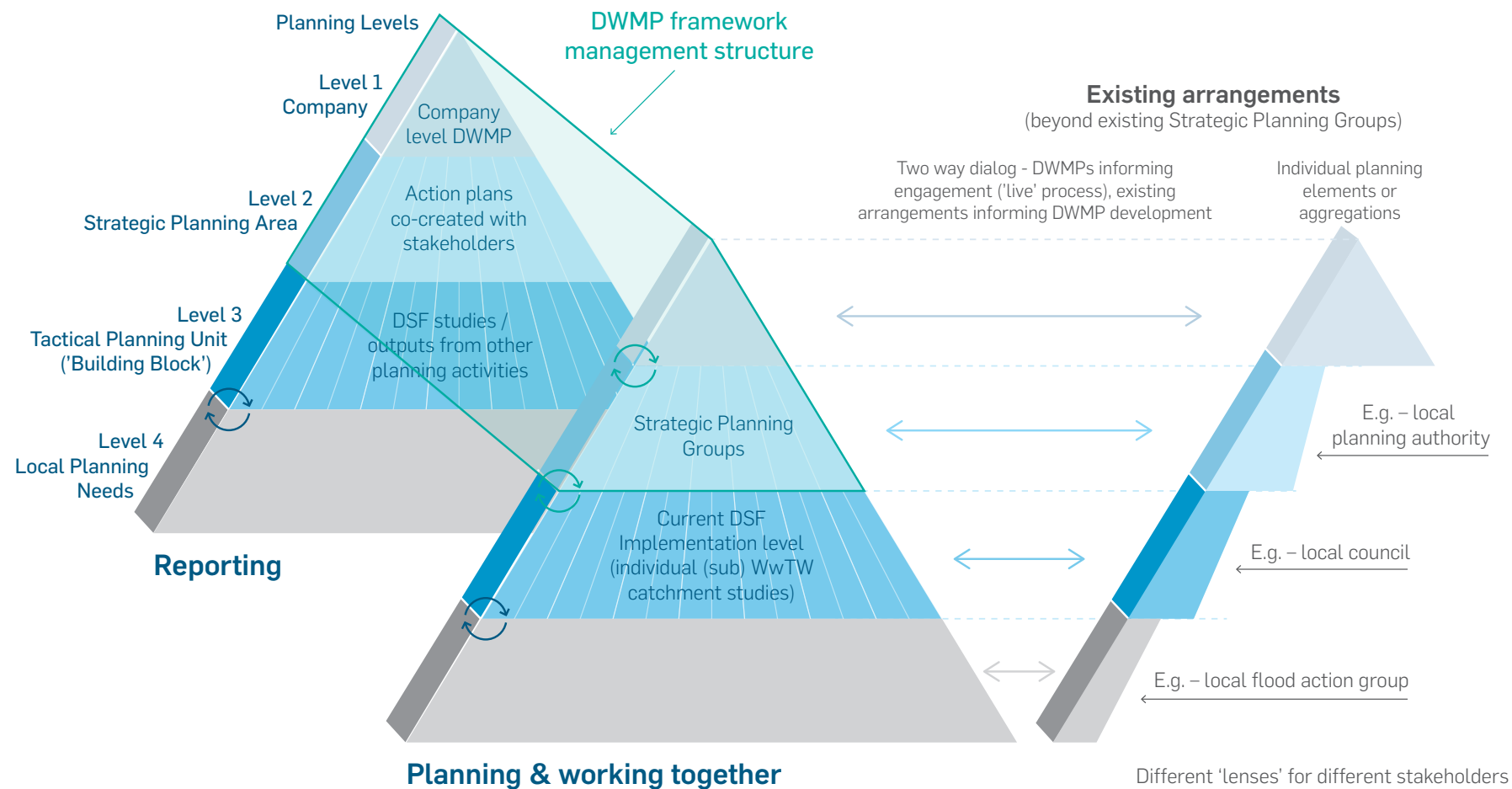


Figure 3-2 - Drainage and wastewater management plan - framework management structure



The DWMP framework provides a management structure that operates at L1 and L2, drawing upon (and influencing) activities undertaken at L3.

It is acknowledged that in developing their existing long-term planning approaches, companies will have developed planning structures that best reflect their needs. As such, it is considered appropriate that in practice there be some flexibility around how the L2 and L3 structures are established. The schematic diagram that follows (Figure 3-3) coupled to the text below outlines examples where such flexibility might be appropriate:

- > Companies can aggregate WwTW catchments to form larger L3 planning areas. Individual WwTW catchments might be considered in isolation as L4 components.
- > Companies may decide that a significantly large, predominantly urban, catchment should be a L2 SPA in its own right. In this case sub-catchment elements, e.g. a terminal pumping station and upstream network, would represent a L3 TPU. In such cases, companies would need to be able to demonstrate how the stand-alone L2 management area tied in with others linked to the same RBD catchment management area or areas (where the stand-alone L2 management area crosses more than one).

- > It is noted that for some companies the approach outlined could result in a considerable number of L2 SPAs. Companies may consider aggregating L2s to form larger L2 SPAs.

This approach aims to provide a proportionate and pragmatic mechanism for planning drainage and wastewater services, balancing the need for understanding and action at a local level with a requirement to provide a more strategic company-wide view.

### 3.5.3. Stakeholder engagement arrangements

A key element identified by water companies, other RMAs and stakeholders is that partnership working and collaborative planning will be essential to delivering resilient wastewater and drainage systems. Working with partners, it is important to understand the problem and explore the opportunities for integrated interventions to common problems. To enable effective engagement the following guidelines are provided (additional guidance on facilitating effective, collaborative planning is provided in appendix A):

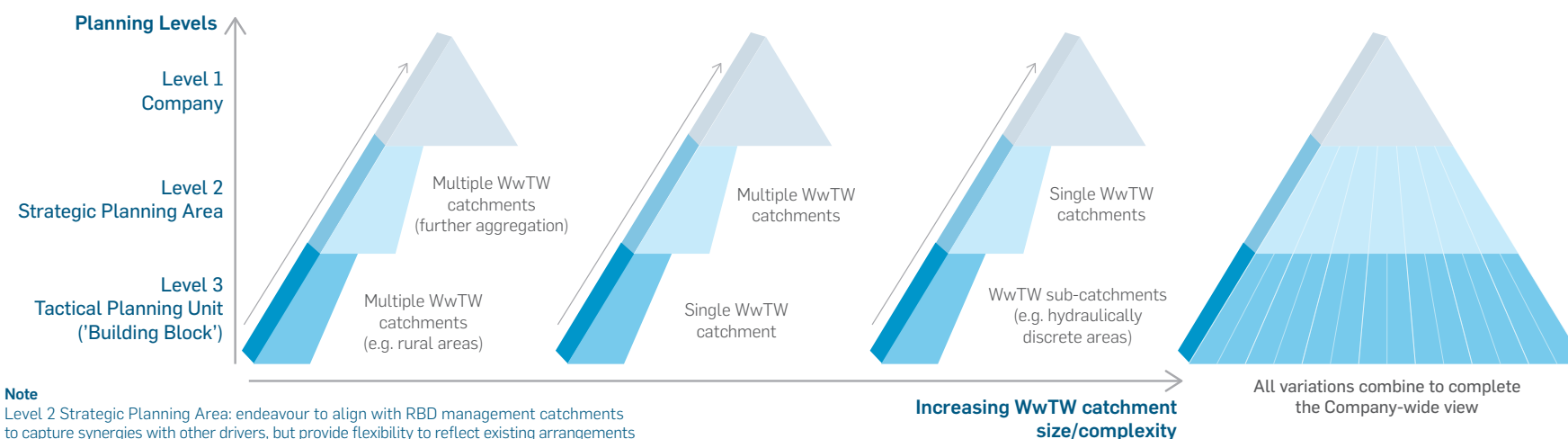
- > L1 DWMP – engagement and challenge provided through the existing customer challenge group (CCG) process and to support strategic discussions with regulators and other key stakeholders.

- > L2 SPA – cross stakeholder and customer engagement processes will be more formalised at this level (compared to current practice). For each L2 SPA, a stakeholder engagement strategic planning group (SPG) led by the water company should be established. This could be in the form of a formal management Board / steering group or a more flexible engagement structure. It is envisaged that the SPG would comprise:

- All key stakeholders relevant to the L2 area including local planning authorities (LPAs), lead local flood authorities (LLFAs), the Environment Agency / Natural Resources Wales, the Highways Agency, customer representatives and non-government organisations such as key environment groups (e.g. river trusts).
- Third party providers; recognising that there are a range of potential providers of drainage and wastewater services, companies should seek to engage and enable the participation of third party providers on the L2 SPGs. The transparency required in engaging with L2 SPGs should provide the focal point at which potential risks/vulnerabilities are exposed and shared. Companies should invite third party proposals to seek

alternative, innovative or more efficient ways to manage future risks identified through the baseline risk and vulnerability assessment (BRAVA) process step (see section 4.4). Examples include an expectation that risks arising from mixed use green or brown field developments would be identified and alternative solutions sought.

- > L2 SPGs should not be seen as the introduction of another level of bureaucracy into the planning process but should, where possible, build on and where necessary enhance existing partnership arrangements (e.g. catchment partnerships, regional flood and coastal committees and others) to provide a more robust and collaborative approach to planning and managing drainage and wastewater services. The objective would be that the SPGs would facilitate both early stakeholder engagement and partnership working but also act to, where necessary, challenge the water companies and other responsible bodies in their delivery of the DWMP planning processes. In addition, the inclusion of the customer representatives in the management groups would provide the basis for early and inclusive customer engagement. In this way, companies will define levels of engagement appropriate to their circumstances and issues.



**Figure 3-3 - Options for developing L2 and L3 boundaries**

- > L3 TPU – engagement with local interested parties to understand risk and inform the development of options to mitigate identified risk. Companies should use existing processes for establishing such relationships as and when needed.

The L2 SPGs are a response to the need to ensure transparency on: issues affecting (and the assessment of) vulnerability; the identification and assessment of potential options; the facilitation of plan/data sharing; and to provide a mechanism for defining ownership of interventions and, potentially, the means of resourcing them. Besides co-creating action plans to address the risks and realise opportunities identified, the L2 SPGs will facilitate

alignment with and linkage to the development of other plans (and resultant delivery programmes) led by L2 stakeholders. The L2 engagement will also facilitate coordination of strategic planning activities undertaken by all parties (e.g. risk assessments and consultations), saving time and effort. At this stage, the practicalities of SPG operation are not being specified; companies will have the flexibility to operate these in a way that delivers efficient and effective engagement (e.g. avoiding unnecessary meetings). However, within the DWMP documentation it is anticipated that companies will need to demonstrate how they have engaged with stakeholders and customers, and how that engagement has influenced the development of the plan.

Where RBD catchment management areas overlap with other water company boundaries, it is anticipated that representatives from both companies would be included within the relevant L2 SPG; this would ensure that, for example, any work undertaken to manage flood risk (fluvial or other) in one L2 area did not adversely affect the situation in the other.

The establishment of L2 SPGs also aims to address the issue of consultation overload that has come to light in respect of the WRMPs; the inclusion of a wide range of stakeholders at an early stage in the development of plans will make subsequent consultation phases, within the context of business plan development, more effective as understanding and consensus has already been developed

(other than, for example, engagement with CCGs).

As indicated in the previous section, the framework allows the flexibility for companies to modify the L2 arrangements to reflect their existing planning processes and to manage the resources required to effectively deliver the management structure. However, the DWMP process is intended to result in a step change in how overall drainage flood and environmental risk is managed and the level of integration and engagement that is undertaken; as such, companies need to consider carefully how they aggregate, and justify the aggregation of, L2/L3 boundaries.

### 3.6. Reporting

It is anticipated that the overarching DWMP will be composed of:

- > **A customer facing document** that will outline in easy to understand language why the plan has been developed, what it represents and how it has been produced. Alongside this it is envisaged that companies will provide a high-level summary of what the company is proposing to deliver in the near, medium and long-term to maintain agreed levels of service.
- > **A non-technical summary** that outlines the plan in an easily accessible and readable format including the background, high level drivers and levels of service against which risk is assessed, the stakeholder and customer engagement process, links to other plans and proposed solutions at the appropriate level of detail. The audience is envisaged to be those in organisations who have a stake in the outputs but who may not necessarily have the knowledge or need to understand in detail the technical attributes of the plan.
- > **A technical summary** that follows a similar structure to the non-technical summary but goes in to more detail around the approaches taken in delivering the plan including approaches to uncertainty, scenario planning and adaptive pathway approaches where appropriate and the cost benefit analyses. It is envisaged that the technical summary will provide greater detail on the outputs of the assessment and the mechanisms used to derive the final preferred near, medium and long-term plan.
- > **The plan** that provides the detail of the approach, outputs and interpretation of the assessment and derivation of the draft preferred plan and, subsequent to consultation, the final plan to be used as the basis for the strategic business plan. Drawing on detailed technical assessment reported in the appendices, the plan will provide a step by step description of the development of the DWMP.

- > **Technical appendices** to provide supporting detail on the assessments and outputs undertaken at a more granular level, that have been aggregated to form the company-wide view. This will cover a summary of the approach and outcomes of the framework process stages, for defined levels below the company operating area.

Appendix F provides an indication of expected content of a DWMP. It is considered that the content could be delivered to the various interested parties in a variety of formats, making use of the expanding digital capabilities of companies. For example, it is anticipated that the DWMPs will be made available to stakeholders and customers through companies' websites, and similarly the evidence base supporting the final plan could be provided on-line through platforms spatially displaying data and information. However, subject to requirement, companies will need to ensure that information is presented and maintained in such a manner as to enable effective audit and assurance.

The WRMP requires that companies provide further details in a set of tables that include both company level and individual water resource zones (WRZs) datasets. At this stage, no such tables are being proposed; however, it is considered that future development of the DWMP documentation may result in greater standardisation (to include tabulated data) to facilitate company comparisons and stakeholder understanding. Companies should aim to share data in a format and at a level that facilitates collaborative planning and engagement.

It is expected that companies will provide stakeholders with visibility of progress towards DWMP completion and subsequent (annual) reviews, either 'live' (e.g. via dedicated websites / web pages, potentially with geographical representation of L3/L2 areas, highlighting progress) or through progress reports at key milestone stages. Subsequent sections within this document provide details of the framework process steps. It is expected that companies will provide visibility on the number of L3/L2s within each process step, and their completion status.



### 3.6.1. Security assessment of technical documents

Technical documents are likely to be subject to a security assessment by the company security manager to meet Security and Emergency Measures Direction (2006) requirements, to ensure they do not contain any information that might otherwise compromise national security interests or any information that may be considered commercially confidential. Such assessments are routinely applied to the WRMPs. Typically, this would include removal of asset specific references and information.





## 4. Understanding the problem

### 4.1. Introduction

As outlined in section 3.4 the process to develop an understanding of potential catchment problems encompasses:

- > Setting the strategic context for a DWMP
- > A risk-based screening stage
- > A BRAVA, and
- > A problem characterisation stage

The BRAVA includes for an initial element of the problem characterisation process. The objective is to ensure that the planning assessment is proportionate to the issues driving change in the catchment.

### 4.2. Strategic context

#### 4.2.1. Drivers

There are a range of drivers which will act to challenge companies' systems in the future<sup>9</sup>. These may be summarised as:

- > Environmental challenges – climate change, population growth (including demographic shifts, changes to occupancy rates, etc.) will place increasing pressure on companies to ensure effective drainage and environmental quality.
- > Customer expectations of the service and information they receive are growing, driven by ever greater improvements in the service provided by other competitive sectors and new opportunities from changes in technology. Changes in customer behaviour (e.g. reductions in water consumption) will also impact on companies' operations.

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<sup>9</sup> Ofwat, 2017, Delivering Water 2020: Our final methodology for the 2019 price review

- > Resilient systems and services – in meeting the challenges above companies will need to do more to anticipate trends and variability. Companies will need to be able to cope with, and recover from, disruption, to maintain services for customers and the economy and protect the natural environment, now and in the future.

In addition, future regulatory/legislative changes could have significant impacts across a broad spectrum of companies' operations. In addressing the challenges, companies will need to utilise approaches that can take on board the potentially high levels of uncertainty associated with a number of the key drivers.

#### 4.2.2. Planning objectives

Companies will be expected to establish planning objectives (for their selected DWMP planning horizon, a minimum period of 25 years, see section 4.2.3) against which catchment constraints are to be assessed and interventions developed. DWMP planning objectives should reflect performance commitments, common or bespoke (e.g. covering asset health metrics not included in the set of common performance commitments), that provide a significant

contribution to achievement of outcomes relating to drainage and wastewater services to be delivered within the business plan and over the longer term. As a strategic plan, the DWMP sets both the detailed, near to medium term investment requirements as well as the long-term strategy, covering a minimum 25-year horizon. In doing so, companies will need to consider stretch/aspirational planning objective levels and, where appropriate, longer term risks and uncertainties that may require assessment beyond the standard 25-year timeframe.

Companies in England and Wales will need to pay particular attention to ensuring that their DWMP planning objectives are consistent with the methodology set by Ofwat for price reviews, and as Ofwat develops its approach to PR24 and subsequent price reviews may need to adapt their DWMP processes accordingly. As the methodology for PR24 has not yet been developed, relevant aspects of the PR19 methodology are outlined below.

A key direction in Ofwat's PR19 methodology is that *'Companies must... adopt a long-term approach, providing assurance that their plans address long-*

*term issues and setting indicative performance commitment levels for at least ten years beyond 2025*<sup>10</sup>. To support long-term planning, it can be anticipated that a similar objective will be specified for PR24. Companies are encouraged to include in their business plans indicative long-term performance commitment levels, as defined by Ofwat, that align with their DWMP planning horizon. In addition, companies should identify standards of service and metrics of performance that are consistent with existing performance commitments and set out clear objectives for the future performance of the business. These may become defined performance commitments in due course, subject to customer views and where monitoring confirms these as drivers for investment.

Companies and other organisations are encouraged to work together to devise shared objectives, which will drive co-ordination of planning approaches (and resultant implementation of projects that deliver against the stated objectives).

Common performance commitments and asset health metrics specified by Ofwat for PR19, that are of particular significance to drainage and wastewater planning, are outlined in Table 4-1 and

Table 4-2. Companies can also include additional performance commitments from either Ofwat's 'long-list' of asset health metrics<sup>11</sup> or bespoke measures that reflect the company's and its customers' specific concerns.

Companies will need to consider how planning objectives are translated from those defined at a company level to those that can be utilised to assess risk at a L2 SPA and L3 TPU. In addition, companies will need to develop, in consultation with either L2 SPGs or at a higher level, an understanding of what levels of risk are acceptable in the medium and long-term. For example, is a 5% exceedance of a planning objective in the medium-term, low, medium or high risk and can a 'standard' be applied across all L3 TPUs or should this be decided on a case by case basis? Aligning to the WRMP there is an expectation that, given the uncertainties coupled to having the time to develop interventions should risk materialise, companies should accept a higher level of risk in the longer term.

<sup>10</sup> <https://www.ofwat.gov.uk/publication/delivering-water-2020-final-methodology-2019-price-review>

<sup>11</sup> <https://www.ofwat.gov.uk/publication/delivering-water-2020-final-methodology-2019-price-review-appendix-2-delivering-outcomes-customers>



**Table 4-1 - Key planning objectives based on Ofwat's PR19 common performance commitments (as per definitions in Ofwat's PR19 final methodology document)**

**Note:** Detailed definitions are provided on the Ofwat website<sup>12</sup>

Performance commitment	Summary definition
Internal sewer flooding	The number of internal flooding incidents per year (hydraulic overload and other causes), including sewer flooding due to severe weather events, per 10,000 sewer connections.
Pollution incidents	Category 1 – 3 pollution incidents per 1,000km of wastewater network, as reported to the Environment Agency and Natural Resources Wales.
Risk of sewer flooding in a storm (new risk-based resilience metric)	Percentage of population at risk of sewer flooding in a 1-in-50-year return period storm.
Sewer collapses (asset health metric 3)	Number of sewer collapses per thousand kilometres of all sewers. Include bursts to rising mains, even where failures are accidental rather than due to weakness in pipe condition.
Treatment works compliance (asset health metric 4)	Performance of wastewater assets to treat and dispose of sewage in line with the discharge permit conditions imposed on sewage treatment works. Measure includes the performance of water treatment assets for the water supply service in line with the discharge permit conditions imposed on water treatment works. The discharge permit compliance metric is reported as the number of failing sites and not the number of failing discharges.

**Table 4-2 - Potential planning objectives based on Ofwat's PR19 asset health metrics (as per definitions in Ofwat's PR19 final methodology document)**

**Note:** Detailed definitions are provided on the Ofwat website<sup>12</sup>

Asset health metric (potential bespoke performance commitment)	Summary definition
Sewer blockages	Number of sewer blockage events that required clearing.
External sewer flooding	Number of incidents.
Sewage treatment works compliance	The percentage of population equivalent served by sewage treatment works discharges which were sampled during the calendar year and found to be noncompliant with sanitary look-up table limits or nutrient limits, Urban Wastewater Treatment Directive look-up table limits or nutrients limits.

<sup>12</sup> <https://www.ofwat.gov.uk/outcomes-definitions-pr19/>



#### 4.2.3. Planning horizons

Companies should define long-term planning horizons that are appropriate to their strategic planning context, anticipated drivers and risks, and the performance and business objectives identified. The DWMP is intended to be an integrated plan across the planning horizon that shows the direction that the company is taking; however, it may be useful in aligning the overall strategic plan to the business planning process to consider changes/impacts that occur:

- > Within a 5-year horizon – the 5-year horizon provides a focus for prioritising investment in the near term where there are greater levels of confidence around all potential factors affecting the plan.
- > Within a 10-year horizon – the 10-year horizon has the advantage of lower levels of uncertainty over growth, climate change and other related regulatory factors (compared to subsequent horizons). The horizon also

provides an opportunity to balance investment needs over two AMP periods which could help in addressing affordability issues but also, where complex interventions may be required, enables investment to spread across longer project implementation timescales.

- > Within the 25-year horizon – this represents the minimum 'long-term' horizon. Through understanding potential impacts in the long-term the aim is to drive appropriate 'least regret' and best value investment that encompasses a range of approaches to future uncertainty.
- > A longer-term horizon may also be appropriate where longer term drivers of change are evident but uncertain, and the planning problem that results is complex and potentially significant. This may drive investment in an adaptive planning approach.

#### 4.2.4. Planning tools

In developing a detailed understanding of system risks it is envisaged that a range of tools will be used:

- > WwTWs – it is anticipated that companies will have process models for their WwTWs; the complexity of the models will likely vary from simple, Excel based tools to those that use proprietary modelling software.
- > Networks (infrastructure and non-infrastructure components) – hydraulic models will be the primary tools required to understand the impacts on the network and its associated components.
- > Receiving water quality – it is not proposed that all scenarios should be examined using water quality models (e.g. SIMCAT-SAGIS). Indicative risks can be examined using, for example, the Environment Agency's River Quality Planning tool or Excel based mass balance approaches.







#### 4.3. Risk-based catchment screening

There will be many L3 catchments that will have operated without any issues and for which there is no evidence to suggest vulnerability to future changes that will impact the status quo. The DWMP should focus effort where there is an identified risk or vulnerability which requires further investigation to determine whether future system changes result in a negative impact which may require mitigation (whether in the near, medium or long-term).

A risk-based L3 catchment screening process has been developed with a view to identifying those catchments that require further, more detailed, investigation. The approach involves the assessment of each L3 catchment against a range of indicators; the information required should be readily available from company reporting systems or from other relevant stakeholders. The following provides brief details of the risk-based screening indicators:

- > **Catchment characterisation (stage 2 of the wastewater resilience metric methodology)** - catchment characterisation score from PR19 common performance commitment which provides a mechanism to understand the vulnerability of the catchment/sub-catchments to sewer flooding as a result of an extreme wet weather event (1-in-50-year storm event). It is noted that for PR19 there is an exclusion principle for catchments with < 2,000pe; however, it is anticipated that all catchments will be assessed for the metric for PR24.
- > **Intermittent discharges impact upon bathing or shellfish waters** - mechanism to understand the significance of any impact of water company operations on bathing or shellfish waters.
- > **Continuous or intermittent discharges impact upon other sensitive receiving waters** - a further mechanism to understand the significance of any impact of water company operations on sensitive receiving waters not addressed by other indicators.

- > **Storm Overflow Assessment Framework (SOAF)** – considers current / potentially future activity instigated by SOAF procedures.
- > **Capacity Assessment Framework (CAF)** – the focus is on the outputs from either the 'initial' or 'enhanced' approaches for the 'present day' case. There are accepted issues around the confidence in outputs from the Initial model which does not include for surface water inputs; in this case some engineering judgement may be required to supplement the outputs. The measure provides an indication of capacity constraints in the network as a leading indicator to service failure.
- > **Internal sewer flooding** – PR19 common performance commitment; a historical measure that records the number of internal flooding incidents per year, indicative of capacity constraints.
- > **External sewer flooding** – PR19 asset health performance commitment; a historical measure that records the number of external flooding incidents per year, indicative of capacity constraints.
- > **Pollution incidents (categories 1, 2 and 3)** – as per the 2017 definition (or subsequent updates) of the Environmental Performance Assessment (EPA); a historical measure that identifies incidents of unexpected release of contaminants that have resulted in environmental damage.
- > **Sewer collapses** – PR19 common / asset health performance commitment; a historical measure that identifies risks to the integrity of the sewer system.
- > **Sewer blockages** – PR19 asset health performance commitment; a historical measure that records obstructions in a sewer (that require clearing) which causes a reportable problem (not caused by hydraulic overload), such as flooding or discharge to a watercourse, unusable sanitation, surcharged sewers or odour.
- > **WwTW quality compliance** – as per the 2017 definition (or subsequent updates) of the EPA; a historical measure relating to the performance of the wastewater treatment works.
- > **WwTW dry weather flow compliance** – based on measured flow volumes where available and calculated flows where measured flows are not available; a historical measure of compliance with dry weather flow permits.
- > **Storm overflows** – a measure that focuses on using available data to examine permit risks that have not been captured by other indicators (e.g. pass forward flow conditions). Where monitoring is not in place consideration will need to be given to reported concerns.
- > **Risks from interdependencies between RMA drainage systems** – a mechanism to understand risk posed by interdependencies/interactions between RMA drainage systems in the catchment.
- > **Planned residential new development** – a measure to understand the risks from forecast residential population growth based on company specific existing long-term forecasts.
- > **The Water Industry National Environment Programme (WINEP)** – the WINEP sets out the actions that companies will need to complete to meet their environmental obligations and details the specific drivers for mitigating measures; where there are specific WINEP drivers it is considered necessary that a long-term approach to managing the issues is developed.

Companies have the flexibility to include additional (bespoke) risk screening metrics which either reflect specific company or customer priorities. It can be expected that partners and other stakeholders may propose bespoke metrics during L2 SPG engagement, for collective endorsement. Where additional metrics are included these should be applied across all L3 catchments and companies should provide an explanation in the DWMP documentation that defines the measure and the reason for its inclusion in the screening process.



Further details of the 'base' indicators and screening criteria are provided in appendix B. Indicators have been classified into two tiers, providing a mechanism to differentiate between the priority of each indicator tier when assessing whether further assessment is justified. The following two indicators have been classified as 'second tier' (with all other indicators being 'first tier):

- > Catchment characterisation (stage 2 of the wastewater resilience metric methodology).
- > Continuous or intermittent discharges impact upon sensitive receiving waters (in part, see appendix B for further details).

In summary, when summing the total number of indicator breaches (of screening criteria as defined in appendix B) across both indicator tiers:

- > If **two or more** indicators are breached (excluding sewer collapses and

blockages – see third bullet) then a BRAVA is required to identify whether and to what extent changes in future inputs impact on planning objectives.

- > If **one** indicator is breached (again, excluding sewer collapses and blockages – see next bullet) then a BRAVA is required, **if the indicator causing the single breach is included within the first tier.**
- > If **only** the sewer collapses and/or blockages indicators are breached then at present this is to be treated as if **no** indicators are breached, i.e. there is no requirement to undertake the DWMP BRAVA and problem characterisation process steps, and current planning approaches to risk assessment and option development and appraisal are to be continued. Further development of the DWMP process is required to define a specific and consistent extended and complex planning approach for these supply-side risks;

however, companies have the flexibility where current planning processes allow to define their own extended and complex approaches to asset deterioration assessments.

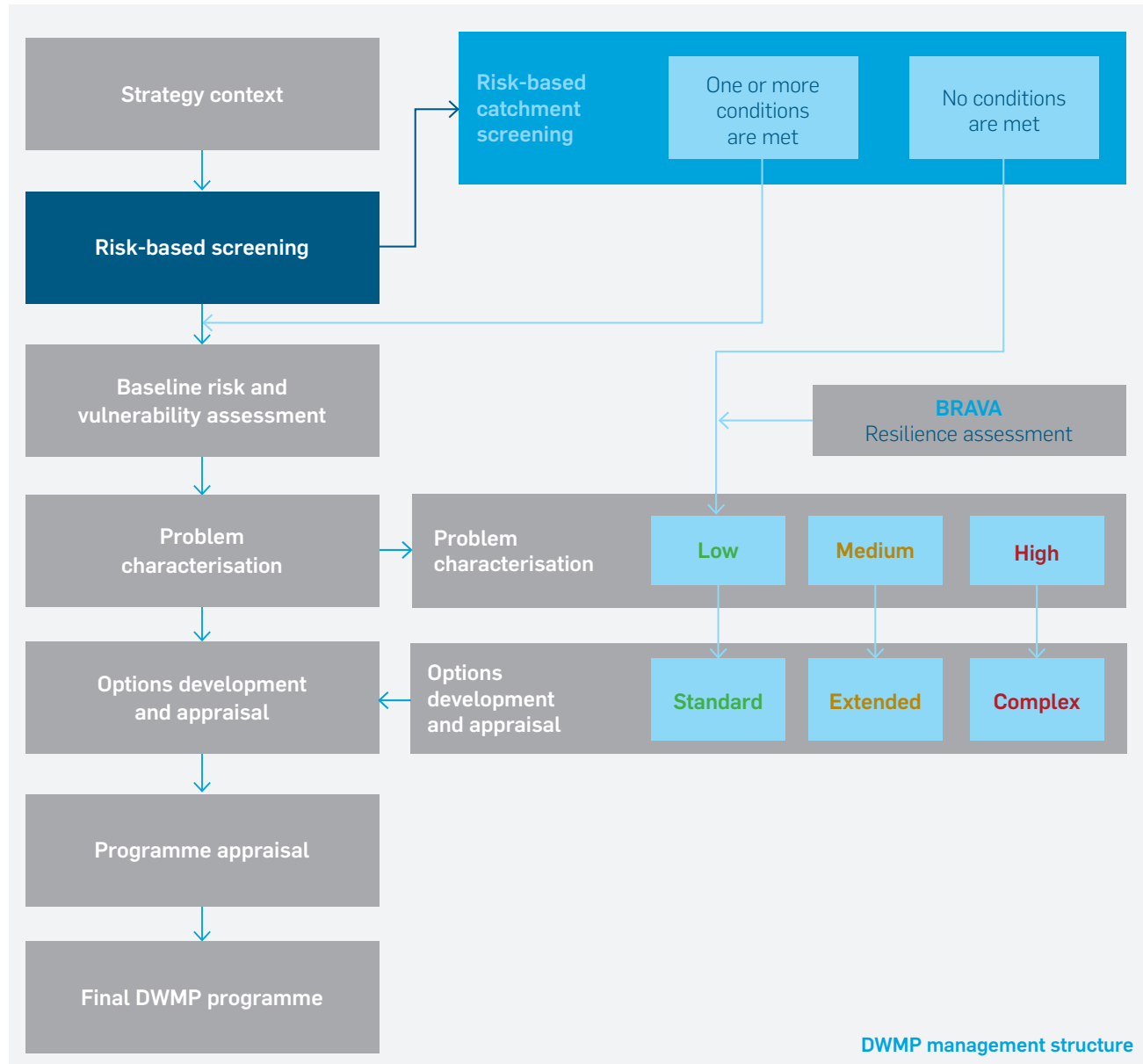
- > If **no** indicators are breached, this implies that there is no current evidence to suggest that the L3 catchment is likely to be vulnerable to changes in future inputs. Companies will be expected to apply existing approaches for long-term planning against asset deterioration, but no detailed baseline risk assessment is required. Companies will still need to undertake the wider resilience assessment for the catchment (see section 4.4.2).

The inclusion of only two indicators in a second tier means that for these to influence the decision to proceed to BRAVA, they must both be breached (independently of others). However, the introduction of this mechanism also

provides water companies with the opportunity to include bespoke indicators in the second tier, where considered more suitable than assigning first tier priority.

In respect of outputs from the assessment and expected further activities, these are shown schematically in Figure 4-1.





The focus of effort recognises that companies will need to undertake an annual review of L3 catchments (this review is intended to be 'light touch' focussing on known changes to the catchment – see section 7 for further details) and that a full review will be required every five years. As such, while there are currently limited forward looking criteria in the risk screening approach (these can be included in future developments of the DWMP framework), should changes occur in those catchments where currently no conditions are met, and hence no detailed assessments are required, it would be anticipated that these will be identified in the review process. Once identified, it will change the approach that is taken either through reactive interventions if the change is acute, or in the planning process for the subsequent DWMP.

Figure 4-1 - Schematic indicating outputs and relevant further assessment

#### 4.4. Baseline risk and vulnerability assessment

The objectives of this element of the DWMP are two-fold:

- > To assess the baseline position of system performance:
  - For the base year assumed for the DWMP (for the DWMP produced to support PR24 this is assumed to be 2020; companies can select an alternative base year provided this is clearly documented and justified);
  - Against planning objectives arising from future changes to the system (to the defined planning horizon).
- > To understand wider resilience issues within each catchment that could impact on maintaining compliance with planning objectives.

The baseline position of system performance is reported in section 4.4.1, with the wider resilience in section 4.4.2. As outlined in section 4.3, only those L3 catchment that meet one or more of the screening criteria conditions (excluding sewer collapses and blockages) will require baseline risk assessments; however, **all** L3 catchments will require a wider resilience assessment.

The schematic shown in Figure 4-2 outlines the overall BRAVA process.

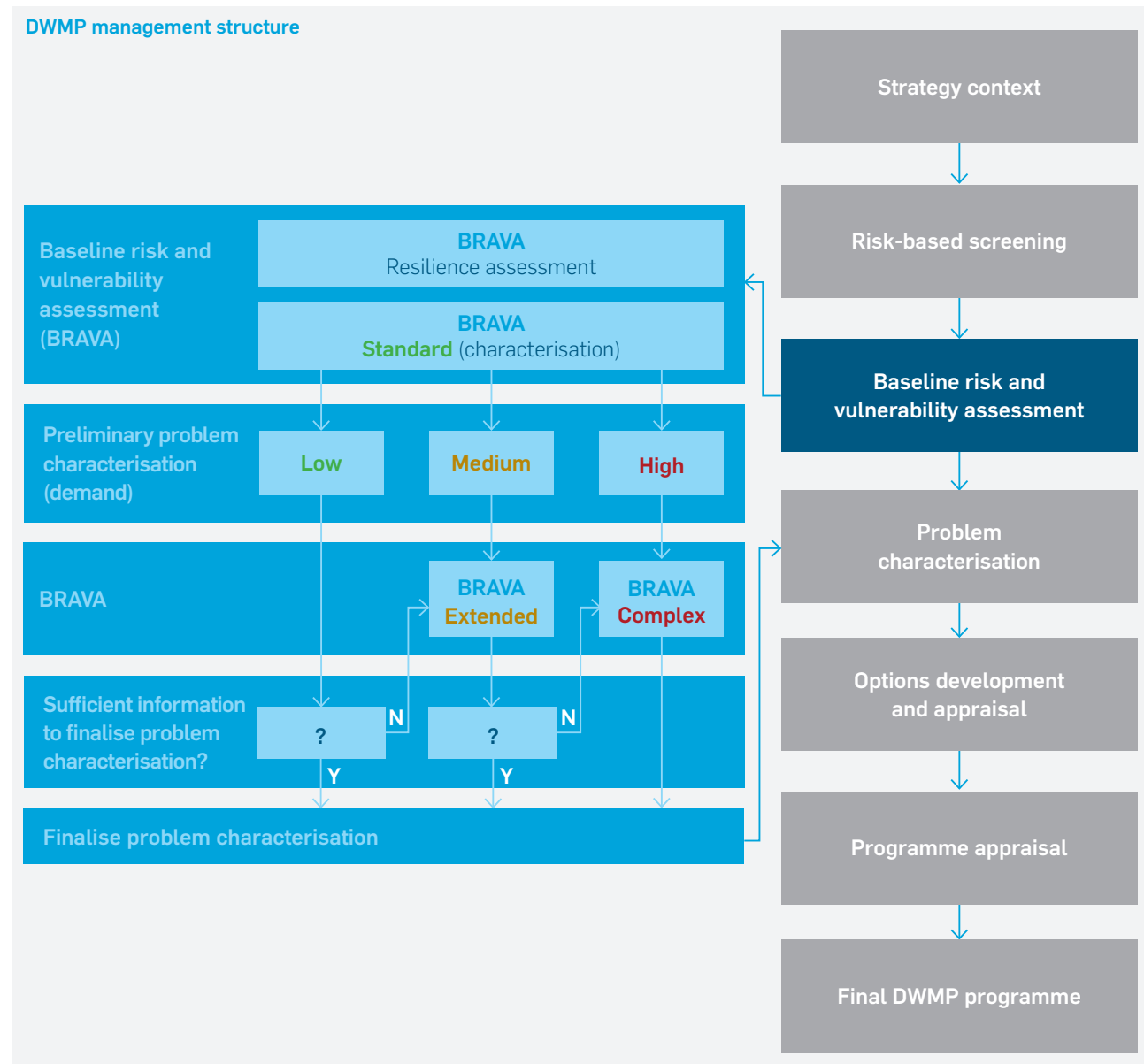


Figure 4-2 - Schematic of the BRAVA process

#### 4.4.1. Baseline risk assessment

The baseline risk assessment is designed to provide a mechanism to focus effort as a function of both the complexity of any problems identified and the confidence in the information that is input into the assessment.

Where L3 areas have been captured within the risk-based screening process based on a single issue (e.g. WwTW flow compliance is a risk but there is no evidence that other aspects are a concern), companies will need to take a view on the extent of the wider assessment that is undertaken. In taking such a view companies will need to consider:

- > The primary issue specific driver e.g. in the case of dry weather flow compliance is this residential/non-residential growth, asset deterioration (e.g. causing infiltration), or ingress from other drainage systems;
- > Whether the assessed primary driver is likely to have had 'capacity' impacts elsewhere in the system but for which there is no current evidence of exceedance in the area being assessed? If no, then it would be pragmatic for the company to focus effort solely on the extent of the

problem (and subsequently developing options) associated with the single issue. If yes or there is uncertainty then companies would need to undertake a wider assessment to ensure that what is driving the single-issue risk is not impacting on other elements in the system.

The DWMP is about understanding system risks, while a single-issue concern might suggest that a localised single-issue solution is all that is required, the wider system risk cannot be ignored unless there is evidence to the contrary. Where it is pragmatic for the single-issue risk to be assessed in isolation, companies will still need to undertake a long-term approach in defining the management requirements.

The steps contained in the BRAVA process may be summarised:

- > **Base year assessment** – companies should develop a base year position (defined as the starting year of the DWMP planning period). This should reflect existing demand (load/flows) from populations (resident/non-resident/transient) in the catchment and reflect known issues associated with infiltration and groundwater risks. In understanding the flow elements, it





is anticipated that companies would run, as a minimum, the storm events and time series rainfall as outlined in the CAF 'present day' scenario through available models. The outputs (flow/load) should be used to confirm the performance of the WwTW. It is anticipated that the outputs will define:

- Current performance against all relevant planning objectives;
- Where there are system constraints and/or available capacity;
- Appropriate thresholds against which future pressures could be rapidly assessed, e.g. in the case of WwTWs this could be available process/permit capacity which could be translated to a population that could be accepted. Thresholds are a useful tool to provide a rapid indication as to whether future pressures are likely to be a significant factor in impacting system performance.

Where no hydraulic models are available companies will need to consider the need for such developments and the level of complexity that should be applied. Where it can be justified based on the

understanding of risk in the planning area, high level assessments in the absence of, for example, hydraulic models can be an acceptable approach subject to agreement with L2 SPG stakeholders.

- > **Standard BRAVA** – designed to provide an understanding of the primary drivers behind potential exceedance in the L3 TPU. The standard BRAVA involves:
  - Examining future scenarios within and up to the 25-year planning period (and beyond, if a longer planning period has been deemed appropriate). As a minimum, the future scenarios should be based on the CAF 'future' requirements and, where appropriate, the wastewater resilience metric, but initially only using a **central estimate** for growth projections; however, companies can go further if this is standard practice. The outputs from the future scenarios as applied to the networks should subsequently be tested within the context of WwTW performance and the impacts on discharges and receiving water quality;

- An assessment of the outputs against the defined planning objectives;
- An evaluation of the outputs to determine the nature of any problems identified (severity/consequence, timing) and the primary drivers. Growth is likely to be a key factor in the level of certainty associated with the outputs. At this stage it is considered that companies should test the certainty of the growth forecasts against the extent of exceedance of planning objectives. This preliminary problem characterisation makes use of a strategic needs score (see appendix C for a definition and the question set from which the score is defined) assessed against growth uncertainty (this will involve some subjectivity and companies should seek endorsement for their approach in consultation with L2 SPGs). Table 4-3 provides an example of the output:
  - Where the output from the preliminary problem characterisation is 'green', i.e. the problem is well defined and there

is confidence in the growth forecasts such that further sensitivity testing is not considered necessary, the assessment moves on to completion of the full problem characterisation process.

- Where the output from the preliminary problem characterisation is either 'amber' or 'red' i.e. further assessment of the impacts of growth is required to provide an increased level of confidence in the impacts, the assessment moves on to a higher level of complexity.

- > **'Amber' (extended) or 'red' (complex) BRAVA** – a step-wise approach moving through the levels of complexity should be considered to focus effort; however, where it is clear that the growth forecasts coupled to the nature of the problems are such that wide-ranging scenario testing will be required then companies may then move directly to the complex BRAVA. The objective is to get to a position where the problem is well defined such that the problem characterisation step can be completed.



**Table 4-3 - Preliminary problem characterisation as a function of growth uncertainty**

		Strategic needs score ("How big is the problem?")			
		Negligible	Small	Medium	Large
		1-2	3-4	5-6	7-8
Growth (demand) forecast uncertainty	High				
	Medium				
	Low				

Details of the standard, extended and complex BRAVA assessments can be found in appendix C. The following section considers elements within the BRAVA process required to complete the assessments.

#### 4.4.1.1. Inputs to the assessments

Where companies have accepted procedures for assessing future system impacts these should be used, provided they meet the minimum requirements summarised in the following sections (details can be found in appendix C).

##### ***New development (residential and non-residential)***

Companies will already have in place procedures for developing growth forecasts across their operating areas. While there are a range of approaches that can be taken to improve the granularity of high level forecasts it is important that procedures are: applied consistently across all L3 TPUs; align with LPA planning processes; and robust to scrutiny by stakeholders. Companies will need to engage early in the planning process with LPAs on their L2 SPGs to identify and ensure 'buy-in' to the forecasts to be used for each L3 catchment that requires assessment.

##### ***Urban creep, infiltration, per capita consumption changes and climate change***

It is recommended that, as a minimum, companies follow procedures as outlined in the CAF for the future scenarios<sup>13</sup>. Of particular note is that per capita consumption changes, as reflected in returns to sewer, should align with the assumptions made in the WRMP at a level appropriate to the L3 TPU that is being evaluated.

##### ***WwTws discharges and receiving water quality***

Companies should apply their standard practices to assessing the additional loads arising from changes in populations and consider impacts of flow changes from modelled scenario outputs. The assessments should consider impact on permit conditions and the need to meet requirements under environmental legislation.

<sup>13</sup> Processes specified in the CAF will need to be reviewed once the results from UKCIP18 have updated current practices

#### 4.4.2. Resilience assessment

The DWMP is aimed at driving long-term planning that delivers a robust and resilient service in the future. Ofwat has adopted the following definition *'Resilience is the ability to cope with, and recover from, disruption, and anticipate trends and variability in order to maintain services for people and protect the natural environment now and in the future'*<sup>14</sup>. While there are elements of resilience that are effectively deliverable only at a company level (e.g. 'black sky' events, cyber security, business continuity plans, 'knowledge drain', personnel resourcing as a function of, for example, pandemics, etc.), there are specific elements that may be catchment specific which, should they occur, could impact on a company's ability to maintain planning objectives both in respect of customers and the environment. In this context, the environment may be considered both as a driver (future change) as well as a potential impact receptor and the assessment should aim to maintain services / operational performance whilst also ensuring current and future environmental resilience.

In tandem with the baseline assessments, companies should undertake a high-level assessment of wider resilience needs on **all** L3 catchments irrespective of whether or not the catchment has been identified as requiring more detailed baseline risk assessments. It is noted that any existing resilience issues arising from the wastewater resilience metric will already have been considered in the framework. Resilience can be a very wide-ranging area; in the context of the DWMP the evaluation will be focused to a limited set of events (that could arise from a range of hazards) the consequences of which would impact directly on companies' planning objectives in respect of customers and the environment. These are: fluvial and/or coastal flooding of WwTWs / major pumping stations; power outages; outages to remote communications; and response recovery plans. Companies can add additional elements (e.g. low flows and septicity risk; low flows / storm events and first flush risk) to the assessment to fit with their own approaches. Further details are provided in appendix C.

#### 4.5. Problem characterisation

The preliminary problem characterisation question set was aimed at defining the need for more detailed approaches to understand the nature of any problems as a function of growth uncertainties. The final element of the problem characterisation is aimed at ensuring that the approach to the options development and appraisal process is proportionate to the nature of any problems identified. It is anticipated that the outputs from the BRAVA should be an indication of:

- > Exceedances (or changes from baseline based on current position, i.e. delta) against planning objectives;
- > Timing of exceedances (or delta) within the planning horizon;
- > Primary drivers behind the exceedance.

In undertaking the problem characterisation companies will need to define the level of risk around the exceedances identified, e.g. does a 5% increase in the risk of internal sewer flooding represent a high, medium, or low, risk? In addition, consideration would need to be given to whether timing influences the risk level e.g. 5% exceedance risk in a 10-year horizon may be considered medium risk but could be considered low within a 25-year horizon – in terms of when the planned risks are likely to occur (the potential need to develop more consistent approaches to risk across companies needs to be considered as the DWMP process evolves). Companies will also need to consider wider issues associated with the exceedances (e.g.

interdependent RMA issues) and have a view (expert judgement) on the potential complexity of solutions (a function of the number of planning objective exceedances but including timing of need and potential lead in times).

The problem characterisation stage draws heavily from established WRMP processes as detailed in the UKWIR report 'WRMP 2019 Methods – Decision Making Process: Guidelines'<sup>15</sup> (subsequently referred to as 'WRMP guidance'). It has been used as the basis for this section and modified to suit drainage and wastewater needs. The approach is considered equally applicable to the DWMP, noting that this stage will guide companies towards the appropriate level of optioneering complexity, when using the available tools that predict risk, and identify interventions to resolve them (i.e. it is envisaged that the same tool may be used across groupings of characterised problems, but with varying levels of sophistication).

Companies may need to undertake several iterations of the problem characterisation assessment to develop the supporting case for the classification of vulnerability. It therefore requires expert judgement from within a company (potentially across a range of teams) to complete the assessment and present the results to L2 SPGs for consultation. Where that is the case, the key factors and considerations in determining vulnerability should be clearly demonstrated in the DWMP.

<sup>14</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2017/09/Resilience-in-the-Round-report.pdf>

<sup>15</sup> UKWIR, 2015-2016, WRMP 2019 Methods – Decision Making Process: Guidelines (16/WR/02/10)

There are two elements to the problem characterisation assessment:

- > Strategic needs ("how big is the problem?") – a high-level assessment of the scale of need for interventions to address near, medium and long-term performance concerns; and
- > Complexity factors ("how difficult is the problem to solve?") – an assessment of the complexity of issues that affect investment in a particular drainage and wastewater planning area.

In many cases water companies will only need to carry out the problem categorisation based on their own needs. However, where wider system interdependencies extend beyond company boundaries (e.g. coastal areas affected by discharges from more than one company), or there are opportunities to maximise supply surplus, then the characterisation may need to account for potential future cross-boundary strategic options.

A simple matrix, shown in Table 4-4, is used to provide companies with a categorisation that provides a guide to the subsequent approach deemed applicable for option development and appraisal. The categorisation is derived from responses to questions relating to complexity factors and strategic needs (full details of the question set, and further guidance, are provided in appendix C).

A degree of flexibility can be exercised in the interpretation of the outputs from the matrix, where the categorisation is marginal. The intention is not to dwell on a precise score, but to identify a justifiable course of action for commencement of option development. There will be scope for refinement as progress is made through the option development process (e.g. in moving from unconstrained option listings, to constrained, to a feasible listing).

It is acknowledged that companies may have existing processes that are used to inform optioneering complexity. The availability of such a supporting evidence base will facilitate rapid progression through this process step.

Appendix C contains further information relating to the problem categorisation stage.

**Table 4-4 - Problem characterisation matrix**

		Strategic needs score ("How big is the problem?")			
		Negligible	Small	Medium	Large
		1-2	3-4	5-6	7-8
Complexity factors score ("How difficult is it to solve")	High (8+)				
	Medium (5-7)				
	Low (<4)				

#### Required complexity of optioneering and decision-making approaches

Level of concern	Optioneering and decision-making approach	
Low	Standard	Generally, 'current' approaches should be adequate to determine and justify interventions and resultant investment proposals to ensure planning objectives are met (noting earlier guidance on the usage of additional future scenarios, as defined within the CAF).
Medium	Extended	'Extended' approaches to optioneering may add considerably to a company's understanding. 'Extended' refers to methods not previously widely used in drainage and wastewater planning, but which have been utilised previously on specific catchment investigations that are deemed to be at the 'leading edge' of current planning approaches, or tested to at least the 'proof of concept' stage for actual UK drainage and wastewater systems and have outputs that can be readily understood by planners.
High	Complex	Consider whether it would be useful to go beyond the 'extended' approaches to decision making (referred to as 'complex'), as this could add considerably to the company's understanding. Here, 'complex' approaches refer to more advanced, conceptually complex methods not yet applied to the UK drainage and wastewater planning context, although these may be under current investigation in academia/currently developed by companies.



## 5. Developing the options

### 5.1. Introduction

Consistent with the overall aims of the DWMP framework, the options development and appraisal (ODA) methodology has been developed to focus the level of planning effort, i.e. proportionate to the risks identified, with a view to providing a measure of consistency across the industry. The approach developed utilises some of the primary processes employed in producing the WRMP; as such, many of the techniques will be familiar to companies but with adaptations where required to make them more appropriate to drainage and wastewater systems.

A key principle in developing options is the need to work in collaboration with customers and stakeholders (including 'third parties') in their identification, co-creation and assessment. This will help promote and encourage optioneering on the broadest scale possible without losing the desired level of granularity to address priority risks. It also facilitates approaches that test aggregation of L3 TPUs and planning objectives, to define those options to provide the widest range of benefits to the drainage and wastewater system as a whole or in (combination of) parts. This will be key in unlocking funding, removing constraints and ensuring the DWMP delivers multiple benefits across all drainage and wastewater systems.

The following sections provide a high-level summary of the ODA process; further details can be found in appendix D.

### 5.2. Overall approach to options development and appraisal

The overall approach to the ODA process is shown schematically in Figure 5-1. The approach outlined is to be applied to each L3 TPU.

In summary, the outputs from the BRAVA and problem characterisation step will provide an indication of the planning approach to be taken for the L3 TPU that is appropriate to the complexity and scale of risks identified. In focussing optioneering effort, the following list indicates the broad categorisation of option development approaches and provides guidance on the L3 TPU characteristics that would likely be covered:

- > **Standard** – process defaults to companies' existing investment planning practices to maintain or enhance existing levels of service.
- > **Extended** – the options development and appraisal process will build upon standard processes to provide extended analytical approaches in support of investment planning practice (where DWMP minimum requirements are not met).
- > **Complex** – the options development and appraisal process is undertaken considering a wide range of tools and approaches to explore:
  - Uncertainties in the forecasts;
  - The likely complexity of the interventions required to meet all planning objective exceedances is high, involving multiple options and/or stakeholders and the potential lead in times are long.



It is acknowledged that optioneering complexity is a continuum and that, for simplicity, this has been represented as three distinct categories for decision making approaches. It is important that companies do not get too focussed on trying to categorise the scenarios into an optioneering approach. The approach outlined is not intended to be prescriptive but demonstrates the principle that the outputs from the BRAVA and problem characterisation step should provide an indication of the level of optioneering required as a function of complexity, scale of risks identified and the timing as to when the risks materialise.

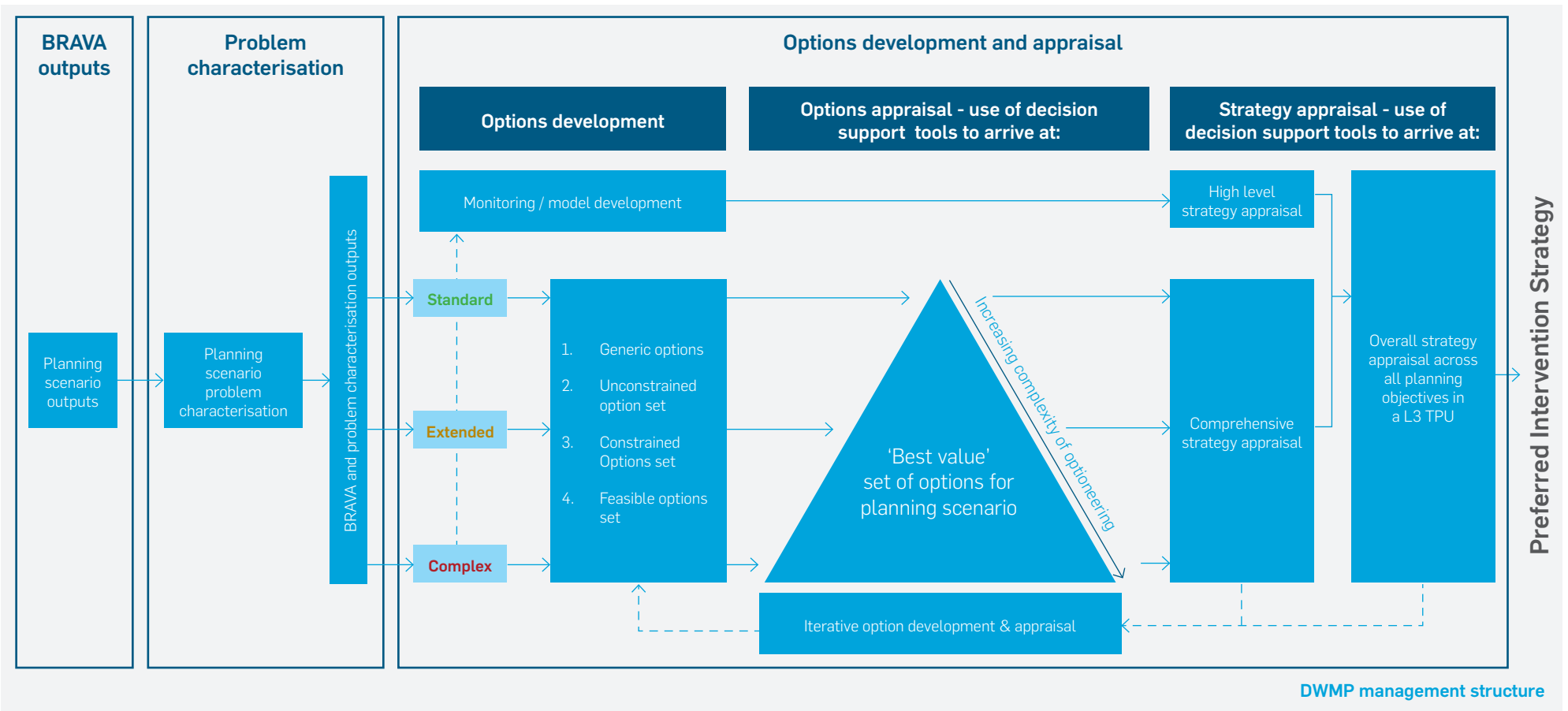


Figure 5-1 - Schematic outlining the options development and appraisal process

### 5.3. Options development

A key principle in the development of the DWMP is that the ODA process should be undertaken for any L3 TPU where an issue is identified within the overall planning period.

In addition to options developed by companies alone or in association with other RMAs, consideration needs to be given to those risks that could be addressed by other non-RMA third parties. As outlined in the description of L2 SPG members (section 3.4.1.3), companies should seek to engage and enable the involvement of third parties in L2 SPGs. Such third parties should be provided with the opportunity to propose alternative options to be considered alongside those identified by the incumbent company. It is envisaged that any third-party options would be included in the unconstrained options list and assessed in the same manner as other options. Incumbent companies will need to ensure, and be able to demonstrate, consistency in approach to their options development and that appropriate comparative assessments of all options, including those proposed by third parties, has been undertaken. This transparency of approach is essential to demonstrate that the third-party options have been appropriately assessed<sup>16</sup>.

#### 5.3.1. Proportionate optioneering

The level of detail/complexity associated with the ODA process adopted should be proportionate to the levels of risk identified, the timing of the risk materialisation and the confidence in the information being used to define the inputs. The following elements outline key areas where proportionate approaches may be taken:

- > Optioneering where risks are identified late in the planning horizon - the overall optioneering principles may appear onerous in circumstances where the risks are not forecast to appear until late in the planning horizon; however, it is considered important that companies should still follow the ODA process and demonstrate there are plans in place to address all risks that are forecast to arise within the planning horizon and that the DWMP is resilient and adaptable to future uncertainties that may bring forward (or defer) the need for intervention. For example, where appropriate, having identified the key drivers for exceedance and commenced the ODA, companies can develop selected options based on a more aggregated approach, grouping similar risks and addressing with non-specific options e.g. removal of 'x' hectares of impermeable surface (with location, etc. undefined), and costed on the basis of standard company cost curves. In respect of benefits, companies can consider establishing benefit values at a high level which can be applied to such options.
- > Optioneering for significant uncertainty in the near term - the non-specific options approach outlined above supports decision making in the medium to long-term but is not considered appropriate where the risks are forecast to materialise in the near term (defined as within the 5-year horizon) or where lead in times may be such that significant (but not necessarily material) investment may be required in the medium term. In systems which might include significant future uncertainties, companies will need to consider the benefits of implementing different options (or sizes of the same option) over time to address capacity constraints as and when they are projected to materialise.
- > Foreshortening of the options development process - while the principle is that the overall ODA process should be followed for all risks identified, a proportionate approach can lead companies to move from the unconstrained to feasible options list (bypassing the constrained options stage) in circumstances where the options set can be shown to be limited. In such circumstances, and aligning to the SOAF approach, it is recommended that where possible a minimum of two options are taken forward for consideration within the feasible options list and which will be subjected to more detailed cost and benefit assessments.

#### 5.3.2. Options development process

In the WRMP the options development stage tends to follow a generic approach that is outlined in the following sections. It is noted that in the SOAF a minimum of two options are recommended for consideration. In the context of the DWMP the expectation is that in the unconstrained options process all potential options should be considered; the screening process can rapidly remove unfeasible options such that a limited set will require greater evaluation at the feasible options stage.

- > **Generic options** – defines the range of potential option types for consideration across all aspects of drainage and wastewater planning.
- > **Unconstrained options** - a broad spectrum of specific options that should be considered with the following hierarchy (noting that the fourth and fifth bullet should be considered as having a similar priority):
  - Behavioural – can measures be developed that are designed to change customer behaviour (e.g. promotion of water butts) address the issues;
  - Planning area – are there inter-catchment, cross L2 SPA or inter-company options that could be utilised to address the issues;
  - System operation (WwTW and networks / network assets) – are there operational measures that can be adopted to address the issues;

<sup>16</sup> Key challenge from Ofwat as outlined in Ofwat, June 2018, IN 18/12 Draft water resources management plans 2019: Overview of Ofwat's responses

- Partnership/'third parties' – are there measures that can be co-created with other RMAs or interested parties on the basis of apportioned risk or can services be provided by a third-party operator;
- Catchment – are there 'green' measures (e.g. sustainable drainage systems) that can be developed (alone or in partnership) that could resolve the issues;
- System upgrades / new assets – are there upgrades to the system that can be used to address the issues;

Importantly, consideration needs to be given to:

- Adoption, where possible, of a range of options (moving through the hierarchy – option types are considered further in appendix D) with a view to ensuring the ultimate solution can demonstrate that system thinking and collaborative approaches are, or have been, core to developing the options required to managing the risks.
  - Multiple benefits – are there measures that could be implemented that could deliver multiple benefits (potentially above and beyond that solely required for DWMP purposes) and address more than one driver or deliver more than one outcome.
- > Constrained options - devised by assessing the unconstrained option list against a set of screening criteria

created through engagement with L2 SPGs. It would be expected that the criteria agreed would be applicable to all L3s in the L2 SPA.

- > Feasible options - a range of criteria, based on more detailed information, is used to refine the constrained list to a range of feasible options. In the WRMP it is these options that would then be taken forward for inclusion in any investment modelling. However, for the DWMP it is recommended that a preferred option from the list of feasible options is selected through engagement within the L2 SPGs.

The WRMP guidance<sup>17</sup> approach is unconstrained options refined to feasible options; however, for some companies a constrained list is also derived either as a stage between unconstrained and feasible or as a selection stage after the feasible option refinement. The key point is that screening should be auditable and robust to ensure that all appropriate options are fully considered whilst also refining the number of options down to a manageable number for decision support tools to handle. The results of that screening should also be captured in a rejection register where options are screened out from further consideration.

The criteria for assessing the options and moving between the different lists is based on:

- > Stakeholder and customer acceptability
- > Technical feasibility
- > Ability to achieve desired outcome / anticipated benefits of implementation

- > Environmental impact (to include for carbon impacts both positive and negative)
- > Societal impacts
- > Resilience
- > Planning and regulatory constraints
- > Timing for delivery
- > Costs and benefits (e.g. use of a cost benefit ratio) - the level of accuracy involved in cost and benefit estimates will increase with progression through the appraisal process (costs are to consider both capital and operating; however, even at the feasible option stage, detailed design for costing purposes would not be anticipated)

Further details are provided in appendix D.

In moving from the unconstrained to the constrained and subsequently to the feasible list of options the screening process can be at a high level without the need to monetise benefits (which may not always be possible). In determining the preferred option within the context of the feasible options list, it is recommended companies seek to formally define the benefits and utilise a cost benefit analysis approach. Guidance on this approach is already available through the SOAF<sup>18</sup> in which the benefits valuation project examined the assessment of benefits (determined using an ecosystems services assessment approach) to be utilised in the application of cost benefit analysis to options to mitigate identified issues associated with a range of storm overflows.

<sup>17</sup> Environment Agency, Final Water Resources Planning Guideline, May 2016

<sup>18</sup> Water UK, Valuing the benefits of storm discharge improvements for use in cost-benefit analysis, Report ref. NL5946, 2017

Photo courtesy of susdrain (<https://www.susdrain.org/resources/images.html>)



It is considered that a similar approach can and should be more widely adopted for all options within the feasible options list (note that alternative benefits appraisal methods are considered in appendix D).

The ultimate objective is that the 'best value' option is selected in consultation with L2 SPGs. This should consider economic, social and environmental costs and other non-monetised impacts and benefits. Whilst DWMPs are not currently a statutory obligation for companies, they do not fall within the Strategic Environmental Assessment (SEA) regulations (see section 6.3). Nonetheless, as the DWMP is a strategic plan, it would make sense to align the assessment of impacts and benefits to the requirements of an SEA, to demonstrate that the plan delivers the best, sustainable outcomes for customers, stakeholders and the environment, including consideration of natural capital / ecosystem service provision as a result of planned investment / operation.

### 5.3.3. Optioneering approaches to more complex problems

As indicated, in more complex systems which might include significant future uncertainties, companies will need to consider the benefits of implementing different options as a function of whether or not the risks materialise. More complex approaches to optioneering may be considered where the risks are likely to be significant should an uncertain future become more certain; however, the principles can be applied at a lower level of complexity.

At this stage in the DWMP development a single approach that companies should be adopting is not being specified; however, it is considered useful to highlight the types of processes that could be utilised. Adaptive pathways are one mechanism by which uncertain futures can be taken on board within the context of the long-term. In summary, the adaptive pathway approach:

- > Examines how uncertainty changes the impact (in the DWMP context specific drivers around flows/loads within the system);
- > Defines the outcome to be achieved irrespective of the uncertainty (e.g. compliance with planning objectives);
- > Provides a range of solutions that could be adopted depending on the extent to which the uncertainty materialises and impacts on defined system thresholds; and

- > Provides triggers which, based on appropriate monitoring, move the intervention pathway to secondary options if trigger values are exceeded.

Such approaches are likely to provide greatest benefit where more complex options or programmes are being considered; however, **simpler optioneering approaches that utilise similar concepts should be considered for less complex plans to test the 'route' being taken.** For example, managing the issues associated with surface water flows could involve an adaptive pathway approach that examines operational measures (real time weather and flow management) as an initial option with residual risks managed by a 'green' intervention as and when flow triggers indicate that thresholds are being exceeded.

Adaptive pathways are one option to formalise scenario planning approaches; the level of complexity associated with the optioneering process should be proportionate to the risks being managed, suffice to say that, when planning for the longer-term, companies will need to develop/adopt mechanisms that allow for decision making that takes account of all plan uncertainties.

## 5.4. Resilience measures

The resilience assessment outlined in section 4.4.2 will have identified key areas that will be required to be addressed. Given the hazards/consequences included in the assessment it is likely that many of the options will be non-specific (but, for example, sized to the specific catchment needs); as outlined in appendix D, it is not considered necessary for the resilience options to undergo the same level of development and appraisal. Costs should be developed based on companies' existing costing practices. It is recommended that the options are collated at L2, to demonstrate that 'local' resilience issues have been addressed, and in the L1 DWMP documentation to demonstrate a company's overall resilience position.



## 5.5. Level 2 options appraisal

The plan should be developed in consultation with L2 SPGs but should reflect that which offers 'best value' (considering costs and benefits) as opposed to simply least cost because more expensive interventions may have greater customer support and provide wider environmental benefits.

In the following outline of the L2 appraisal process, reference is made to the establishment of an 'initial' prioritised L2 plan; this reflects that the L2 plans are one step in the process of deriving the L1 DWMP. There has to be an understanding from all stakeholders in L2 SPGs that the 'initial' prioritised L2 plan is one which, if funding was not constrained, all interventions selected would be undertaken to meet the identified standard of service. Under the current planning regime there are clearly funding constraints and, outside of those interventions that are mandatory, these drive 'competition' between the needs of each L2 SPA with interventions that are taken through to the L1 DWMP (and potentially to the business plan). A balance needs to be achieved between an appropriate level of risk, and an acceptable level of service and overall bill impacts. This stage of the DWMP, therefore, will provide a key engagement and positioning point with stakeholders, informing them of the issues and risks and the indicative plan that results. In turn, this will inform their decisions on willingness to pay, based on a fuller and richer appreciation of the issues and opportunities, and costs versus trade-offs in standards of service that may result from the decisions they make.

As such there will be iterations between the developed L1 DWMP and the L2 plans which could see elements of L2 plans, which may have been prioritised, excluded and deferred for consideration in the next planning period subject to the trade-offs agreed. The L2 prioritised plan should not therefore be seen as a delivery plan but part of the wider assessment required to derive an overall plan for investment to achieve a level of service (against planning objectives) that customers are willing to pay for.

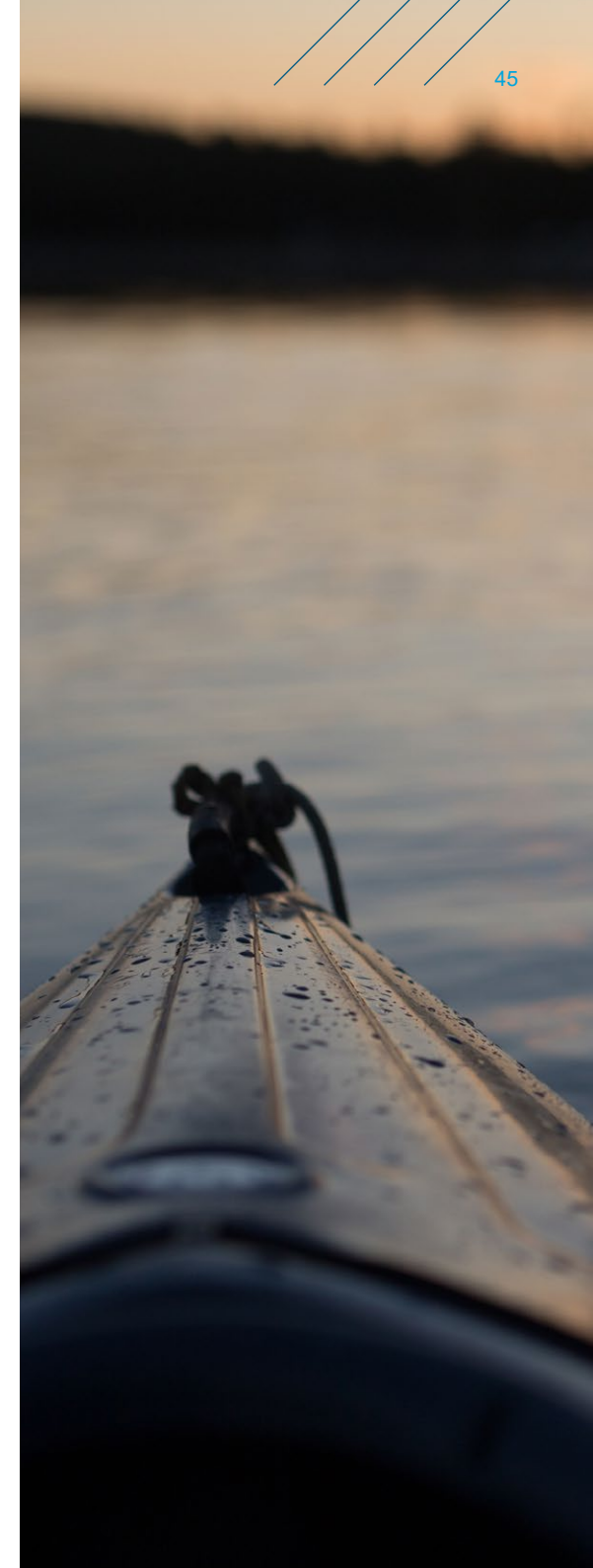
The prioritisation process itself is outlined in more detail in appendix D but utilises common approaches including, for example, the net present value of costs and benefits, the certainty associated with the need, and the outcomes delivered against planning objectives. It is likely that for many L2 SPAs the 'initial' prioritised plan will be clear from the assessments undertaken; for more complex systems companies may need to undertake more extensive analyses particularly where multiple planning problems have been identified.

No specific decision support tools (DSTs) are being set out in this document; it is recommended that companies examine the alternatives (company optimisers; commercially available optimisers) with a view to utilising that which best suits their needs.

## 5.6. Level 2 area plans

Companies should present the outputs from the ODA within L2 area plans; these should detail the assessments undertaken and the options identified, and outline how it has derived the 'initial' L2 prioritised plan that will, in isolation from other L2 plans, meet planning objectives in the near, medium and long-term. An example of the form of presentation of outputs is provided in section 3.5 and appendix F.

It is these 'initial' L2 prioritised plans that will be taken through to the L1 optimisation process. As outlined previously, there will be an iterative process; in defining the L1 optimised plan, the outputs from each L2 will need to be assessed as part of the whole which could result in a trade-off of interventions meaning that some proposed interventions are deferred and omitted from the final plan. To reiterate, the L2 plans are not delivery proposals but a key element that feeds into the development of the final DWMP.





## 6. Deciding on the future

### 6.1. The DWMP

The DWMP is a company's strategic long-term plan that defines how the company proposes to manage the risks to its networks, network infrastructure, and WwTWs from a range of different, and often uncertain, future pressures. The process outlined in previous sections will have enabled companies to define a range of interventions in the near, medium and long-term, that it considers will be necessary to implement for it to meet its planning objectives. Such objectives will have been set to ensure that an appropriate level of service can be provided to its customers and that the environment is protected.

In defining the overall DWMP, companies will need to be able to demonstrate that:

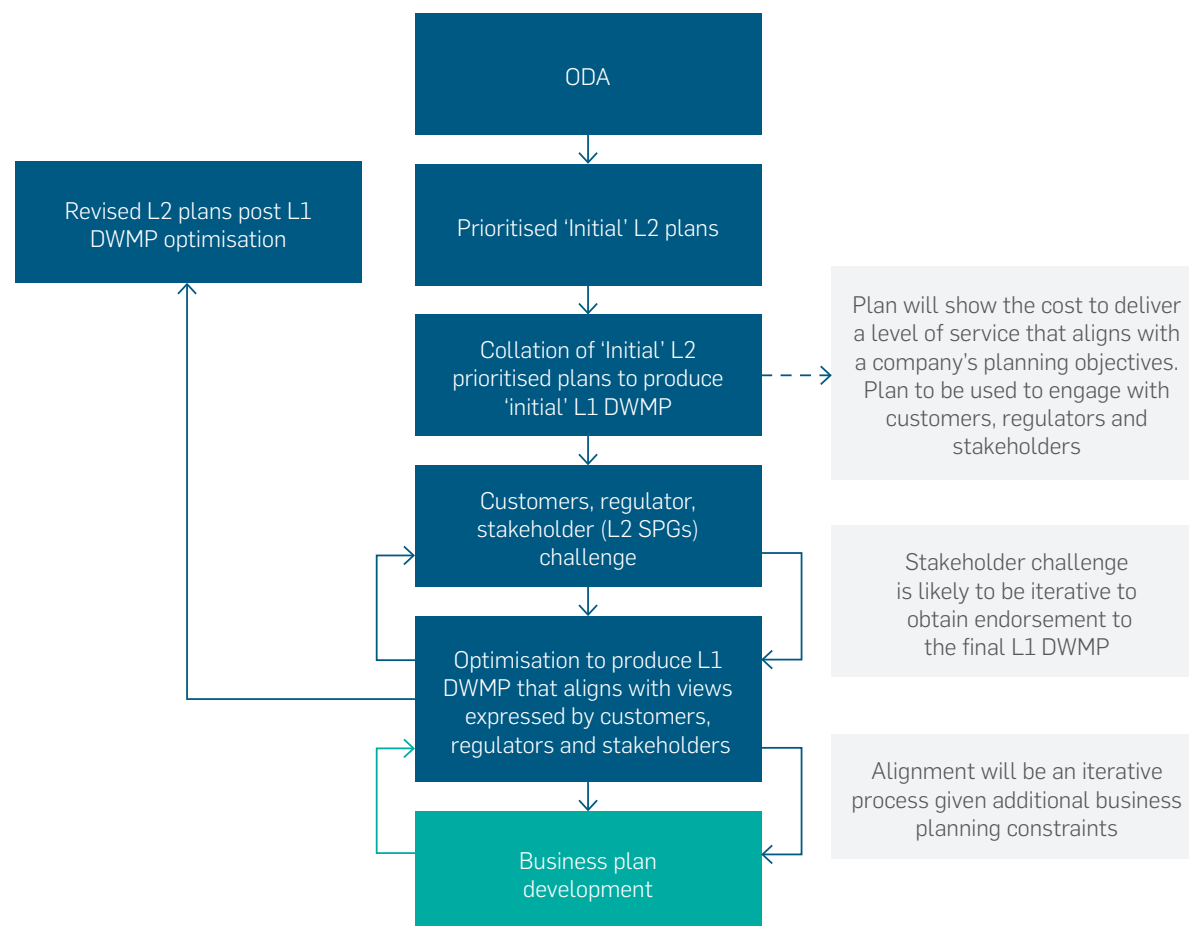
- > The programme of measures developed will align with the company's overall planning objectives and commitments that it has made to its customers in respect of the level of service it intends to provide to them and the environment;
- > The overall programme offers 'best value' to its customers;
- > They have taken a systems-thinking approach to solution development;
- > Partnership working and scheme co-creation has been embedded within the processes whereby interventions have been identified;

- > They have engaged effectively with customers in identifying and prioritising planning objectives;
- > They have effectively engaged with customers and stakeholders on the risks and the interventions developed to mitigate them.

In most cases the DWMP will encompass a high degree of 'horizon scanning' in order to identify, conceptualise and incorporate future pressures. While there is likely to be greater certainty around the near and medium-term (defined here as 10-15 years), the long-term is less certain. In developing the final plan, companies will need to consider how they will optimise the proposed interventions in the near, medium and long-term, and how they will align the DWMP with the business plan.

### 6.2. Defining the level 1 DWMP and alignment of DWMPs with business plans

The L1 DWMP represents an optimised 'best value' plan of measures to achieve a company's planning objectives. The schematic in Figure 6-1 outlines the mechanism for defining the optimised L1 DWMP, based on prioritised L2 plans, and the mechanism for aligning the L1 DWMPs with companies' business plans.



**Figure 6-1 - Schematic outlining process to achieve an optimised L1 DWMP and alignment to companies' business plans**

The process outlined may be summarised as follows:

- > Collate and consider all 'initial' L2 prioritised plans into an 'initial' L1 DWMP and assess overall investment requirements at a company level and the level of service to be delivered within the context of the 5-year, 5 to 10-year and >10-year planning horizons; the purpose is to provide customers and regulators with a view of the potential risks to defined standards of service for customers and the environment, and set out the actions required within an otherwise unconstrained optimised plan, assuming all things being equal that finance and costs to customers were not constrained. This 'initial' L1 DWMP will provide the background and transparency of

planning to inform stakeholder engagement about the risks to the service, the options necessary to deliver desired standards of service and resilience, and any necessary trade-offs to be made in the context of willingness to pay (WtP). In this context, this will also include regulator engagement around the magnitude of investment required. The DWMP will provide better line of sight to key investment decisions and outcomes for customers. This 'initial' L1 DWMP will provide the background and transparency of planning to inform stakeholder engagement about the risks to the service, the options necessary to deliver desired standards of service and resilience, and any necessary trade-offs to be made in the context of willingness to pay (WtP). In this context, this will also include regulator engagement around the magnitude of investment required. The DWMP will provide better line of sight to key investment decisions and outcomes for customers.

- > In setting out the collated 'initial' L1 prioritised plan it is important that it is structured in such a way that it clearly shows:
  - Those interventions that are mandated based on regulatory drivers;
  - Those interventions that are co-created with other RMA's/'third parties' which deliver broader value to customers;
  - Those interventions that deliver multiple benefits against a range of drivers and planning objectives;
  - Those interventions developed to address single drivers. It is suggested that these are presented based on the priority given to the driver by customers and the level of certainty associated with the need;
  - The benefits to be delivered in implementing the proposed plan.

- > Structuring the 'initial' L1 plan in this way provides a mechanism by which trade-offs can be more transparently made with a view to deriving an optimised L1 plan that would align with existing business planning objectives.
- > At this stage it is expected that companies would engage with all L2 SPGs and undertake further customer engagement to understand the level of support and whether there was a preference to modify planning objectives based on a change in WtP.
- > In the context of the engagement process it is important that customers/stakeholders are made fully aware that any measures that may not be in an optimised plan would be deferred; testing this with customers would provide them with the opportunity to challenge, confirm or seek delivery of more through an increased WtP. Given the requirement to revisit DWMPs on a 5-year basis, customers/stakeholders would have a degree of confidence that if it became clear that identified risks were likely to materialise then options to mitigate would have already been identified and could be re-programmed at an earlier date. Equally, where those risks become less likely, the plan can be adjusted to defer investments. In addition to gaining a more robust assessment of the longer-term strategy, the approach should provide greater confidence in the investments and service outcomes required in the near to medium-term (i.e. the first 10 years of the plan).
- > Subsequent to the initial round of customer/stakeholder engagement, companies should undertake to optimise the L1 DWMP on the basis of

an agreed set of views from customers/stakeholders. This will also drive further optimisation of each L2 plan (updating the process outlined in appendix D). In deriving this optimised plan, it is likely that an appropriate DST will be required. No recommendations are made here for this initial iteration of the DWMP; companies can seek to develop their own or utilise one of a range of optimisers that are commercially available.

- > It is envisaged that, except for those interventions that are mandated based on regulatory drivers, optimisation of the L1 DWMP would primarily be based on:
  - 'Best value' as a function of the planning objective benefits to be gained;
  - Certainty associated with the need;
  - Overall benefits in respect of planning objectives being addressed.

Companies can introduce additional criteria to the optimisation process and prioritise these appropriately, e.g. interventions co-created with other RMAs.

- > It is expected that companies would undertake an SEA on the optimised L1 plan (see section 6.3).
- > It would be expected that the optimised L1 DWMP would subsequently be tested with customers and stakeholders and where necessary revisions made. It is not intended that this should be an exhaustive and repeated engagement process; however, it is important that

sufficient engagement is undertaken to ensure that the draft and final plans are tested and endorsed by stakeholder groups.

- > Engagement with stakeholders should be formally collated and a consultation response document produced that summarises the views received, the actions taken to address any representations and key changes to the plan that have resulted so that stakeholders can see the value of their input.
- > Subsequent to the engagement process companies would be in a position to derive a final optimised L1 plan which would have broad customer and stakeholder support. It is this plan that will be used to inform the investments for inclusion in the business plan.

For those measures defined and developed to meet wider resilience needs; it is envisaged that resilience only measures would be collated separately and not included in the optimisation process but considered within the bounds of affordability in the business plan.

The process outlined sets out the derivation of an optimised investment plan for the 25-year (or longer) period. Translation of the L1 DWMP into the business plan, where it is then considered within the context of all the other investment programmes and where there may be overall affordability constraints, may require that the DWMP inputs are re-focussed and re-prioritised to deliver outcomes that are within overall affordability limits set by customers.

The process of developing the optimised L1 DWMP should ensure that there is overall customer support for the


proposals such that the iterative process between the business plan and the L1 DWMP is minimised.

### 6.3. Strategic Environmental Assessment

DWMPs will provide a strategic plan (completed by a responsible authority) that supports stakeholders' investment/business planning by setting out the long-term investment plan for drainage and wastewater. In doing so, it will define priorities for investment in companies' business plans. DWMPs are not currently a statutory obligation for companies and, as such, they do not fall within the SEA regulations. However, undertaking an SEA on the final optimised plan would be 'best practice' and is recommended. In developing the options (section 5) the approaches outlined include a requirement to assess their overall environmental and societal impact, aligned to the requirements of an SEA, (e.g. production of a Habitat Regulations Assessment if an option could affect any designated European sites). Collation of this information based on those interventions included within the optimised plan should enable an SEA to be readily undertaken and be able to demonstrate that the plan delivers the best, sustainable outcomes for customers, stakeholders and the environment.







## 7. Implementing and reviewing a drainage and wastewater management plan

### 7.1. Five-year DWMP cycle

AMP7 (2020-2025) will be a period of transition with the aim that the DWMP framework and tools are used to support the development of business plans for PR24; it is expected that companies will build on their existing planning processes to ensure consistency with the DWMP guidance. By AMP8 (2025-2030), the aim is that the DWMP processes will be embedded in companies' planning systems to become business as usual and better understood by stakeholders.

It is anticipated that each company's full DWMP will be re-assessed and produced on a cycle consistent with the price review cycle (currently every 5 years in England and Wales) and sufficiently in advance of the submission of the companies' business plans to allow time for customer and stakeholder engagement on the plan. It will also provide the basis of a more robust programme for gathering any additional data, implementing new monitoring or undertaking new investigations or planning studies to support development of the plan. Figure 7-1 is a schematic representation of the DWMP timescales described above.

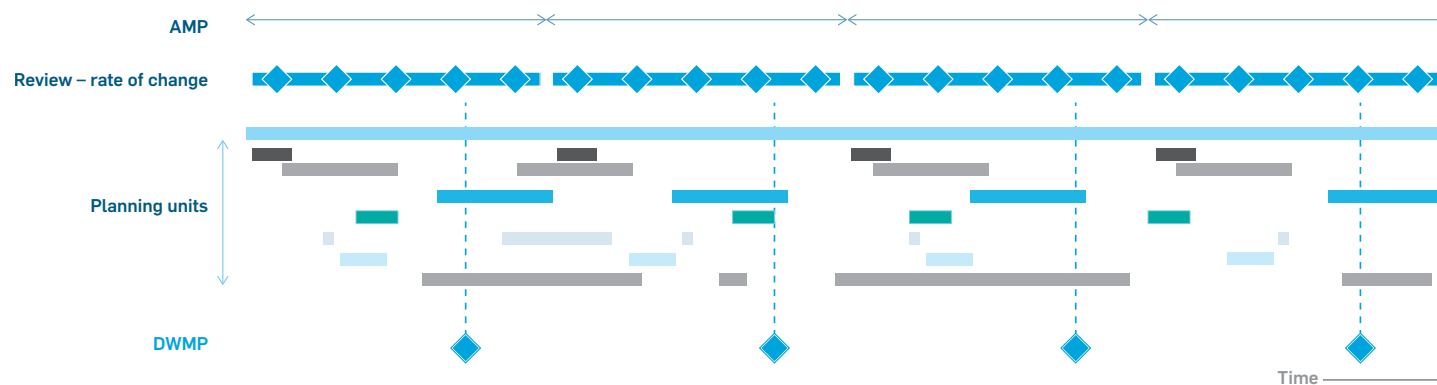
Figure 7-2 provides an indicative timeline for the first cycle of DWMP implementation by companies in England and Wales, within the context of the known, or anticipated, dates for other regulatory planning submissions. The following working assumptions have been identified for companies and stakeholders to use in their planning:

- > Complete BRAVA assessments for all catchments by no later than the end of 2020;
- > 2021/22 National Infrastructure Commission to provide strategic perspective of national needs in relation to wastewater and drainage infrastructure (informed by BRAVA and emerging information on options assessment and development);
- > 2022 Strategic Policy Statement from UK and Welsh governments to provide strategic policy objectives to inform L1 and L2 engagement. Pre-consultation following Strategic Policy Statement publication to ensure companies, Defra and Welsh Government and regulators are fully aligned;
- > Draft DWMP (L1 plan) published for consultation Q2, 2022;
- > Consultation responses from stakeholders (Defra, Welsh Government, Ofwat, Environment Agency, Natural Resources Wales, other non-governmental bodies, third parties and interest groups) by Q1, 2023 to enable and incorporate feedback into the DWMP by Q3, 2023. Summary response to consultation published by Q3, 2023;
- > 2023 Q3 business plans submitted.

Whilst the indicative timetable is challenging, it is important to emphasise the opportunity for, and importance of, engagement throughout the plan process.

The DWMP will set out the 25-year plan and in support of the business plan will





**Figure 7-1 - Drainage and wastewater management plan review timescales**

identify priorities for the next AMP. In identifying priorities, the focus will be on identifying outcomes rather than necessarily specific schemes.

For subsequent cycles of DWMPs, the timeline may change. Where the framework is adopted by other companies within the UK, it can be expected that implementation will follow similar timescales (with amendment to suit differing price control processes where required).

Beyond this, it is expected that English and Welsh companies will publish their own specific timeline for the first cycle of

DWMP implementation, by no later than the end of August 2019. As a minimum, companies are expected to present timelines in a similar format to the indicative timeline (and using the same colour scheme to aid comparison between companies). Where companies provide a more detailed timeline, information corresponding to the indicative timeline should be readily identifiable.

To meet this ambition, supporting plans at all levels will need to be completed by the summer of 2022 (e.g. L2 strategic area plans, L3 plans in accordance with the DSF) to produce a robust and comprehensive L1 DWMP, except where it is clear that

specific L3 plans will have no material impact on the resultant L2 (and L1) plan. In these instances, a fully completed L3 plan (in accordance with DSF requirements) is not expected, but sufficient development of a plan will be required to demonstrate immateriality at higher levels. It is expected that L2 SPGs will engage in reviewing and endorsing such cases.





## 7.2. Annual review

As outlined in Figure 7-1, companies will be expected to review the position of the L2 and L3 planning units annually. Companies may wish to carry out a proportionate review more frequently than this, if there are significant regional events that impact materially on risks in the catchment.

It is anticipated that in most cases this annual review will be a 'light touch' approach that will focus on any material changes. The review should:

- > Identify potential / material changes (e.g. new planning applications, new growth forecasts);
- > Report on progress in delivery of interventions and planned outcomes (e.g. 'on-track' or highlight where issues, such as planning process constraints, are likely to impact on the timing of delivery);
- > Ensure that planning activities are commensurate with the rate of change identified (e.g. is there evidence that future risks are occurring earlier than previously assessed potential requiring a modification to the approach being taken).

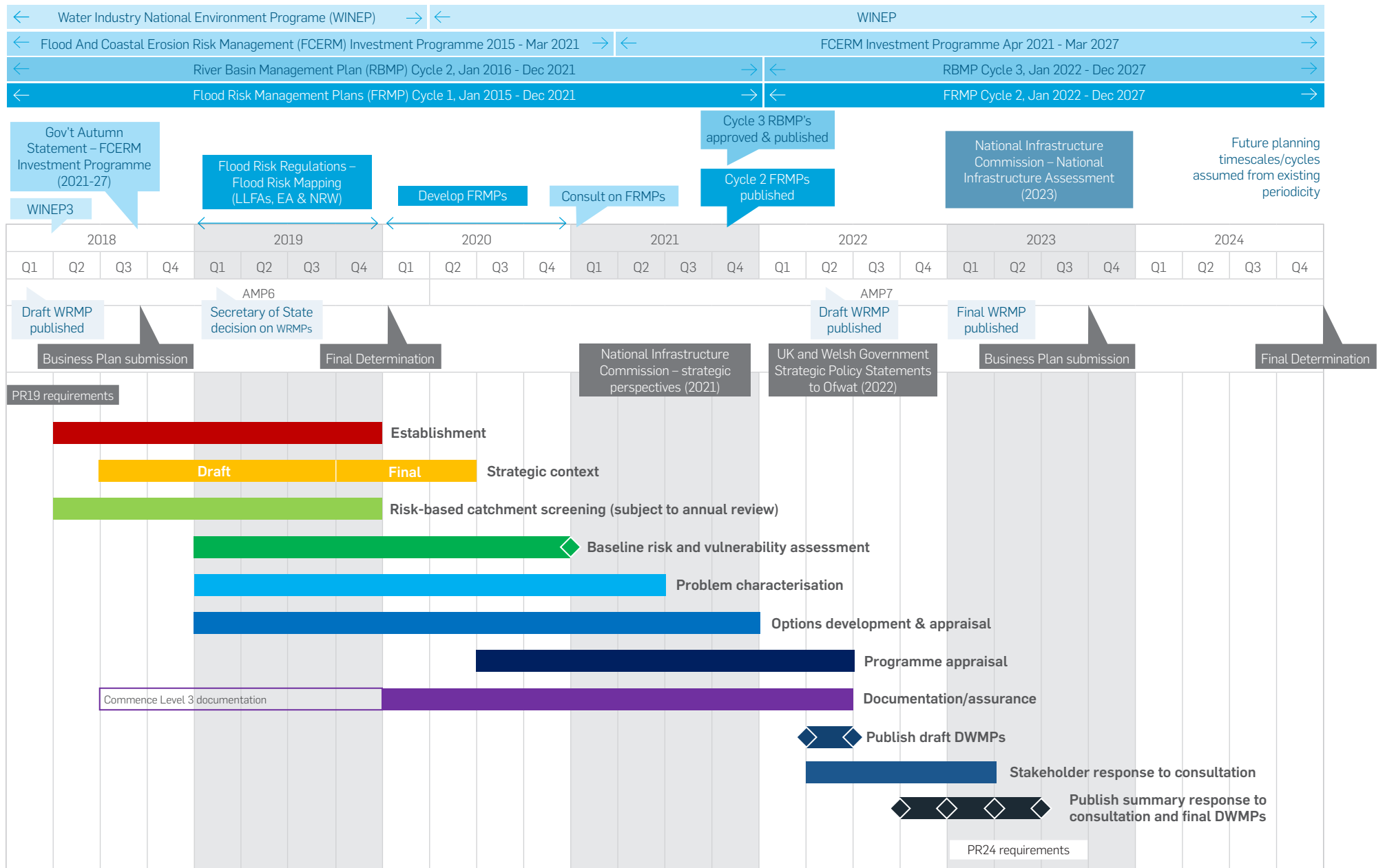
Companies should ensure that, where there are deviations from the plan that require changes to on-going programmes of work, relevant L2 SPGs are kept appraised of the issues and the response from the company. Companies should also document and inform L2 SPGs where there are new or not previously considered risks and/or opportunities that, while not requiring immediate attention, will be important in informing the development of the next round of DWMPs.

In line with the DSF requirements, the process should be kept 'live', and subject to regular review (as outlined previously). In this context 'live' means that information available to customers and stakeholders is regularly updated. This will enable 'snapshots' of the DWMP (or the supporting evidence base, at a more granular level) to be available to support the management planning processes of other RMAs and L2 stakeholders. For a fully accessible plan, all companies are required to ensure that appropriate 'live' plan scale information can be made accessible to stakeholders.

## 7.3. Process review

After the first iteration of the DWMPs, and as they become embedded within companies' business as usual planning processes, it is recommended that companies/regulators establish a review process (undertaken at a company level and across companies) to ensure that approaches being taken are consistent, that implementation reflects the needs identified and that lessons are learnt with 'best practice' identified and communicated. With a review process in place, the DWMP can continue to evolve to meet new challenges and respond to any changes in customers' priorities for drainage and wastewater services.





**Figure 7-2 - Indicative timeline for PR24 (and subsequent PRs) DWMP implementation and alignment with other planning processes**



**ATKINS**  
Member of the SNC-Lavalin Group

John Sutherland / Gian Illari / Brian Arkell  
Atkins Limited  
Woodcote Grove  
Ashley Road  
Epsom  
Surrey  
KT18 5BW

Tel: +44 (0)1372 726140  
Fax: +44 (0)1372 740055