

## DWMPs, DAPs, SMPs, & UPM – Fitting it all together

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### Abstract

Drainage Area Plans (DAPs) or Sewerage Management Plans (SMPs) have provided the basis for investment planning for sewer networks since the publication of the first edition of the Sewerage Rehabilitation Manual (SRM) in 1983. The SRM emphasises the importance of an integrated approach to sewerage planning taking into account all the hydraulic, environmental, structural and operational problems together to find the most cost effective solutions even if the subsequent prioritisation gives emphasis to a few priorities.

The SRM procedures have been used in conjunction with the Urban Pollution Management (UPM) procedure for investigating the Environmental Performance of sewer networks. UPM often needs to be carried out at a larger scale than a DAP.

More recently SWMPs have introduced the wider catchment flooding aspects in collaboration with other stakeholders.

Drainage and Wastewater Management Plans (DWMPs) concentrate on the hydraulic and environmental performance of sewer system, but do not address the structural and operational issues. Operational issues need to be considered as they can be vital to the environmental and hydraulic performance of networks (pollution incidents and flooding due to 'other causes') and we still need to address the structural performance of networks. Also, while the Storm Overflow Assessment Framework (SOAF) concentrates only on the impact of frequent wet weather discharges; other less frequent discharges may still have a significant environmental impact.

As companies start to build DWMPs into their business as usual planning this paper will look at the interactions between these frameworks to see how they can be integrated together to the benefit of the industry and wider society.

### Background

Originally local authorities were largely responsible for all sewerage and drainage functions in urban areas. However, concerns about under-investment in the sewer system led to reorganisation of the water and sewerage functions in the UK in the 1970s. Following this reorganisation, a number of investigations were carried out into the state of the nation's water and sewerage assets <sup>[1],[2],[3],[4]</sup>. Two of the main conclusions of these investigations included the need to substantially improve information about all aspects of sewer systems, and to develop fully integrated strategies to improve the cost effectiveness of the rehabilitation work carried out on sewer systems.

WRc was at that time developing new procedures for planning sewer rehabilitation work. Capitalising on these developments, the House of Lords Select Committee<sup>[4]</sup> recommended that *"the WRc's strategy for selective inspection and repair, with an increase in short term expenditure, should be adopted"*. These procedures were later published as the first edition of the Sewerage Rehabilitation Manual (SRM)<sup>[5]</sup> in 1983. With privatisation of the water industry in England and Wales in 1989 certain aspects of the SRM procedures were incorporated into the regulation of the water industry.

One of the key principles of the SRM planning procedure is that, in order to get the most cost effective solutions, all the problems in the study area should be considered together, and integrated solutions should be developed. This was termed 'the integrated approach'. More detailed complementary procedures were developed for the planning of environmental upgrading works on sewer systems and are contained in the Urban Pollution Management Manual, FWR 1994, 1998 and 2012 but under

incremental review. The UPM process often needs to work at a larger catchment scale than SRM Drainage Areas which are typically more local.

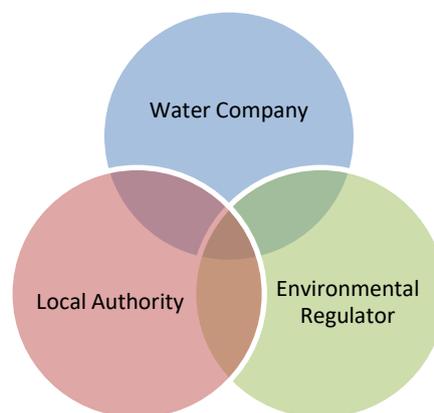
Pressures to improve the water environment from customers and regulators, particularly through the implementation of various EU environmental directives<sup>[7],[8],[9],[11]</sup> and customer and regulatory pressures to reduce sewer flooding, led to a series of major work-streams that dominated water company capital programmes. The pressures to complete these very large capital programmes in very short timescales made taking the integrated approach very difficult, particularly as water companies and regulators are responding to different deadlines. Under the Water Framework Directive (WFD)<sup>[11]</sup>, the environmental regulator is required to produce River Basin Management Plans (RBMP) on a six yearly cycle.

Following severe surface water and fluvial flooding in the 2005 and 2007, the Pitt Review<sup>[10]</sup> highlighted the fractured responsibilities for flood risk management and the need for collaborative surface water management planning. Defra subsequently issued guidance on this in 2010<sup>[12]</sup>. The need to obtain approval for and align funding streams and timescales from different bodies has placed further barriers to the implementation of fully integrated solutions. In 2009, the EU Floods Directive (FD)<sup>[11]</sup> also introduced a framework for management of flood risk. This was implemented in England through the Flood Risk Regulations 2009<sup>[14]</sup> and supplemented by the Flood and Water Management Act 2010<sup>[15]</sup>.

Recognising the need for a longer term strategic approach to water company planning, Ofwat and the Environment Agency commissioned a Drainage Strategy Framework<sup>[14]</sup> which was published in 2018.

These various planning frameworks all require some level of consultation or collaboration between various stakeholders including water companies' environmental regulators and local authorities. The planning functions of these different organisations are therefore overlapping (see Figure 1).

**Figure 1 - The overlapping planning functions of water companies, environmental regulators and local authorities**



In 2018 a collaboration between the water industry, regulators and local government developed a framework for producing Drainage and Wastewater Management Plans (DWMPs)<sup>[17]</sup> covering planning for surface water management including flood risk and water quality aspects. Ofwat have requested water companies to produce a first round of DWMPs as part of the 2024 price review process.

On 15<sup>th</sup> October 2019 the government published an Environment Bill<sup>[18]</sup> which includes a provision that would put a duty on Water Companies to produce "Drainage and Sewerage Management Plans" (DSMP) every review period (5 years).

The change of term from Wastewater to Sewerage is to align with the terminology in the Water Industry Act 1991. However, in this paper the term DSMP will be used to describe the proposed statutory requirement and the term DWMP in a broader sense to describe the practical implementation of the procedures including collaboration with other stakeholders.

If the DWMP is only part of water companies' overall planning activity there is a danger that this could become an additional planning work-stream that is semi-detached from the mainstream. What is required is that DWMP is a part of a single integrated planning framework that meets all their requirements.

### **What are DWMPs?**

The framework describes a DWMP as follows:

"A DWMP will set out how water and sewerage companies intend to extend and maintain a robust and resilient drainage and wastewater system. The plan must take a long term view, setting out planning period that is appropriate to the risks faced by each company, but with a minimum period of 25 years.<sup>[17]</sup>

The Environment Bill<sup>[18]</sup> requires the statutory DSMP to address in particular:

- "(a) the capacity of the undertaker's drainage system and sewerage system,*
- (b) an assessment of the current and future demands on the undertaker's drainage system and sewerage system,*
- (c) the resilience of the undertaker's drainage system and sewerage system,*
- (d) the measures the undertaker intends to take or continue for the purpose in subsection (2),*
- (e) the likely sequence and timing for implementing those measures,*
- (f) relevant environmental risks and how those risks are to be mitigated, and*
- (g) any other matters specified by the Minister in directions."*

The Bill defines drainage system as assets constructed by the water company in accordance with Section 114A of the Water Industry Act<sup>[19]</sup>. The Bill makes no reference to the wider drainage system or collaboration with other stakeholders.

The proposed DSMP definition puts a heavy emphasis on the hydraulic and environmental performance of the systems but to properly consider the resilience of the long term system it is essential also to consider the structural and operational performance, particularly as most sewer flooding incidents are now caused by operational issues such as sewer blockages.

The plan will be developed in collaboration with relevant stakeholders. Although the final plan will be at a company level the process will involve working in at least three different levels; level 1 (company), level 2 (catchment) and level 3 (tactical).

The stages of the DWMP framework are:

1. Strategic context;
2. Risk based screening;
3. Baseline risk and vulnerability assessment – a staged risk assessment with more detail only when required;
4. Problem characterisation;
5. Option development and appraisal;

6. Programme appraisal;
7. Final DWMP programme.

### Existing planning requirements

DSMPs will be one of a number of different, but related plans which water companies, environmental regulators or local authorities must develop.

#### Statutory plans

**River Basin Management Plans (RBMP)** – The implementation of the WFD<sup>[11]</sup> gives environmental regulators the duty to produce RBMPs including a programme of measures to achieve 'good ecological status' of all surface water bodies.

**Flood Risk Management Plans (FRMP)** – The implementation of the FD<sup>[13]</sup> means that environmental regulators have a duty to produce FRMPs in respect of flooding from the sea, from main rivers and from reservoirs. Lead local flood authorities have a duty to produce FRMPs in respect of other sources of flooding including flooding from ordinary watercourses, sewers and surface water. These are aggregated by the environmental regulator to produce a single plan at the same level as RBMPs.

**Local Flood Risk Management Strategies (LFRMS)** - The Flood and Water Management Act 2010<sup>[15]</sup> requires each LLFA to produce local flood risk management strategy which must assess the local flood risk, set out objectives for managing local flooding, and list the costs and benefits of measures proposed to meet these objectives, and how the measures will be paid for. This is binding on all flood risk authorities and must be taken into account when carrying out any of their functions.

**Local Development Plans (LDP)** - The LDP is fundamental to the management of drainage in new developments. This must be supported by a Strategic Flood Risk Assessments (SFRA). The LPA may also include *Supplementary Planning Documents* (SPDs) relating to the drainage aspects of development frameworks. Local authorities have used SPD in this context to regulate the design of SuDS and to provide drainage frameworks for major developments. When produced these are considered in determining any planning applications.

#### Other plans

**Water company business plans** – Water companies are required by Ofwat to submit business plans each review period (5 years) setting out what they intend to deliver for customers and the environment as part of the price review process. These are by nature produced at a company level (Level 1)

**Sewerage Management Plans (SMP) or Drainage Area Plans (DAP)** – Companies have been required to report coverage of their system. SRM planning procedures cover structural, environmental, hydraulic and operational aspects of the drain and sewer system at a tactical level (Level 3).

**Surface Water Management Plans (SWMP)** – These are produced by collaborations between local authorities and other stakeholders, including water companies, to investigate surface water flood risks in an area. The procedures<sup>[12]</sup> provide a framework for the collaboration between stakeholders that is required by the Flood and Water Management Act 2010. It was not intended that they should be universal, but concentrated on areas where there are particular problems or challenges due to new development. SWMPs can inform RBMPs, FRMPS, spatial planning and development control.

The local highway authority also has a key function as an owner of drainage assets (including some SuDS assets especially in Wales). Highway authorities also need to play their part in the management of their highway drainage assets.

### Other planning procedures

UPM is a process for investigating all wet weather related water quality issues in a catchment at either level 3 or level 2. The UPM procedure gives guidance on how to undertake an assessment of the urban wet weather load contribution to receiving waters (inland and coastal) failing their environmental quality standards and to identify cost effective upgrading options for both intermittent and continuous discharges.

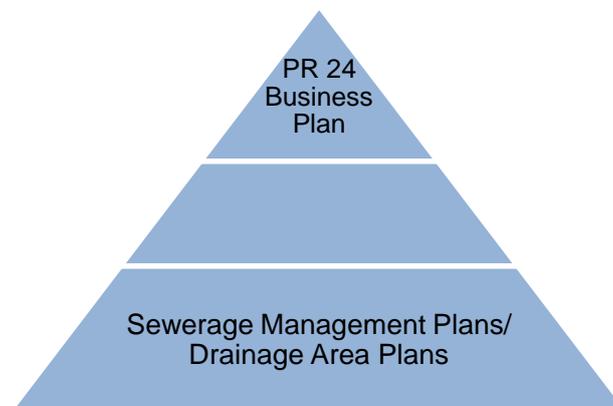
### Integrating DWMPs with other water company plans

If DWMP is to become part of business as usual, companies need to integrate this within a single planning process that meets all their needs for both the foul and the surface water sewer networks and wastewater treatment. Such a framework would provide plans for:

- Tactical operation and management of the wastewater system
- Management of their capital programme to meet regulatory requirements in a cost effective way
- Provides the basis for their business plan as part of the periodic review process
- Provides water company input to other stakeholders plans

This needs to cover both the sewer network (foul and surface water) and the wastewater treatment plants.

**Figure 2 DWMP and its relationship to other water company planning outputs**



The SRM procedures have evolved over time. The original SRM planning procedures considered only structural and hydraulic performance, but has since been expanded to consider environmental and operational performance. The original procedures were largely based at level 3 and assumed that any level 2 or level 1 plan, will be an aggregation of level 3 data. More recent editions anticipate that more strategic studies could also be done at a larger geographical area. The procedures do not explicitly provide for the implementation of top down implementation at a lower level (for example where UPM studies are carried out at level 2 and need implementation into a level 3 tactical plan), but this would not be a major change.

Companies existing procedures for sewer network planning (SMPs/DAPs) are largely based on the SRM procedure, though most companies have adapted and supplemented the SRM procedure to meet their own contexts. In order to produce the business plan they have also added more strategic

elements for example, estimating rates of sewer deterioration to identify necessary overall requirements for structural rehabilitation to maintain the asset base in a stable condition.

The DWMP has brought some new tools that can be used in the development of Sewerage Management Plans namely the Capacity Assessment Framework (CAF)<sup>[20]</sup> and the Storm Overflow Assessment Framework (SOAF)<sup>[21]</sup>. There are also some more subtle differences between the SRM Risk Assessment and the DWMP Baseline Risk and Vulnerability Assessment (BRAVA).

The hydraulic models that companies have developed as part of the SRM procedures will be the key tools in the current DWMP BRAVA outputs. While DWMP introduces the SOAF as a water quality planning procedure for frequently operating CSOs, the UPM process will continue to be an important part of water quality planning in more complex situations.

The big change is the greater transparency including the inclusion of public consultation on the Draft DWMP.

As the DWMP process moves towards the development of solutions, the key challenge will be to ensure that these are truly integrated to ensure that solutions offer best value to the customers. To do this the structural and operational aspects must be brought into the BRAVA framework.

### **Linking DWMPs to other stakeholders' planning activities**

DWMPs require companies to collaborate with other stakeholders during the process. These may be mirrored in points of collaboration in the processes used by those other stakeholders. It would be helpful if the process used by each stakeholder to produce their own plans could be aligned to minimise any additional work.

It should be recognised that some of the other stakeholder's plans will also interact with the Water Resource Management Plan which is also produced by the water companies.

Other stakeholders who own or manage flood risk assets such as local highway authorities, strategic highway authorities (e.g. Highways England, Transport for Scotland) need to have asset management plans for their respective drainage assets

There is a core of work that needs to be done collaboratively that potentially feeds into all these different outputs. This core will largely centre on the hydraulic performance and environmental status of the different natural and man-made drainage systems.

### **Engagement with other stakeholders**

The Pitt Report pointed to the difficulty of managing drainage in an environment where responsibilities are split between many organisations. The Flood and Water Management Act 2010 requires all risk management authorities to collaborate in carrying out their flood risk management functions, including the Environment Agency, local authorities, and, when discharging their sewerage functions, water companies. The Act also requires water companies to carry out their sewerage functions in accordance with the National Flood and Coastal Erosion Strategy and the relevant Local Flood Risk Management Strategy. The activities of a local planning authority are, however, not considered to be flood risk management functions and so there is no duty to cooperate.

As the Pitt Report pointed out, the local drainage systems are highly integrated and the DWMP procedures envisage consultation. The Environment Bill proposes to give powers to Ministers to make regulations about the DSMP procedure. The SWMP technical guidance provided a framework for collaboration at a tactical level.

***However DWMP is not just about flooding!***

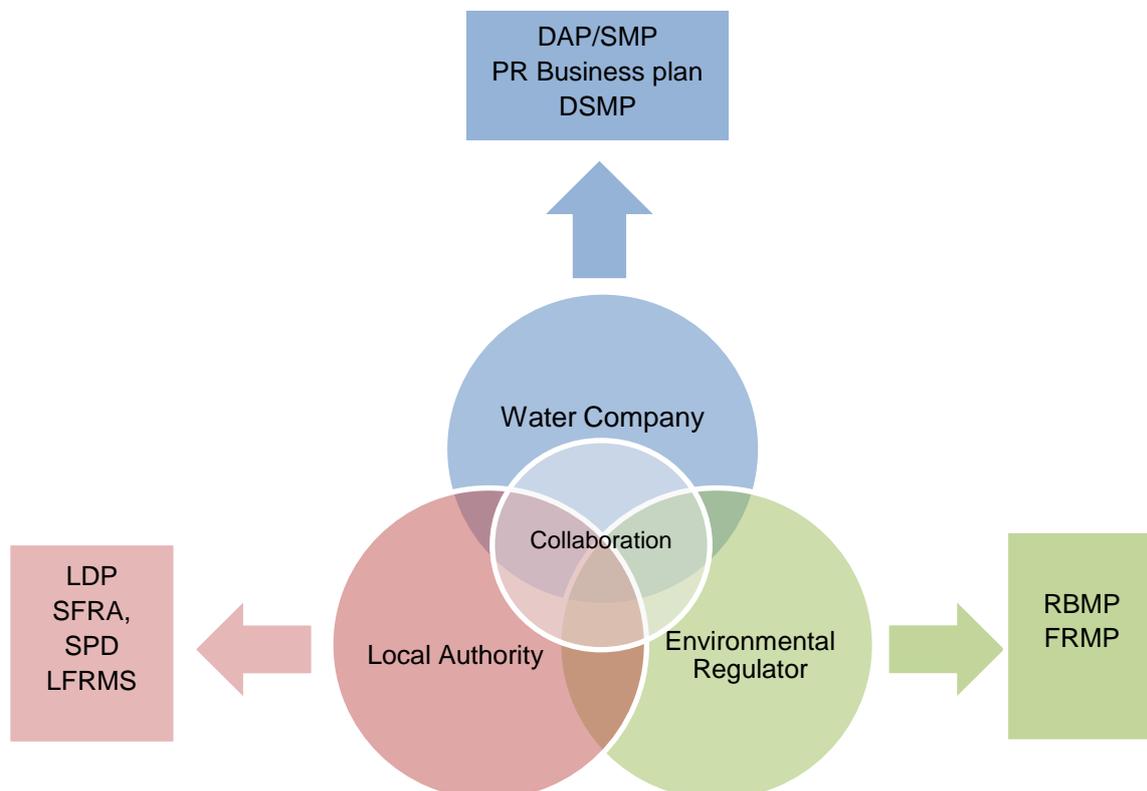
The issues and difficulties which surround engagement with others are not confined to flooding. Frequent CSO activity (quantified through the EDM programme) can exert a chronic polluting effect, but CSO load is only part of the load which water companies need to control. Addressing their commitments under the UWWTD for continuous and intermittent discharges plus compliance with WFD requires a collaborative approach to understand both their contribution and that of others. The Water Industry National Environmental Programme (WINEP) provides the driver for water company investment but the planning for this is undertaken as a separate activity to that for the DWMPs.

However water quality is not just a water company issue. Local planning authorities now regulate surface water discharges from new developments and must consider both the flood risk and water quality impacts of these discharges. Local highway authorities discharge surface water both to sewers and direct to watercourses.

The “Systems Thinking” philosophy encourages wider collaboration between stakeholders, for example: with the regulator to maintain sustainable environmental flows within some water courses through the discharge of good quality final effluent, and; with water supply companies to balance the need for adequate assimilative capacity for dilution of discharges vs. the abstraction requirements for supply. Collaborative opportunities exist within each water company's own business, for example to explore the potential for demand efficiencies to offset growth impacts at WwTWs and to understand whether this would lead to a possible commensurate increase in blockages?

The SWMP Technical Guidance has provided a framework for engagement between the various stakeholders on local surface water management covering flood risk and water quality performance. It is recommended that this reviewed to ensure that it provides the necessary framework for collaboration in the light of DWMP at both level 2 and level 3. As a minimum, there needs to be a consistent terminology and a cross mapping of planning processes showing where they should interact.

**Figure 3 Collaborative core for integrated planning**



## **Managing Uncertainties**

Long term planning will always include uncertainties. These include the location and timing of new developments and new infrastructure. In the past decisions have often been made only when the uncertainties have been resolved leading to short term sub-optimal decisions. The rate and magnitude of climate change is another uncertainty. Collaborative solutions bring further uncertainties with the availability and timing of funds to deliver those solutions.

The DWMP procedure proposes the use of an adaptive pathway approach to manage the uncertainties, but there also needs to be economic tools to provide a basis for deciding between pathways that provide more or less flexibility.

One such approach is Real Options Analysis which applies probabilities to the costs and benefits of different pathways. It has been used in making decisions on climate change adaptation.

## **Conclusions**

The SRM planning process is an integrated process including hydraulic, environmental, structural and operational performance issues. SRM process aligns well with level 3 of the DWMP process. The SRM can also be applied on larger scales where appropriate.

A key aspect of the SRM procedure is the improved capital efficiency by the development of integrated solutions taking account of all aspects of performance.

Companies have implemented the SRM procedures in their own contexts and these form the basis of their company's sewerage planning activities.

Regulatory priorities, focussing on particular aspects of performance has had the unintended consequence of a reduced emphasis on integrated solutions.

UPM provides a process for the investigation of urban wet weather water quality issues and identification of cost effective solutions for continuous and intermittent discharges; though the SOAF now provides additional guidance on assessment of the most frequently operating intermittent discharges.

DWMP process at the moment really only considers the hydraulic and environmental aspects of performance. It incorporates some new tools developed under the 21<sup>st</sup> Century Drainage Programme (CAF<sup>[20]</sup> and SOAF<sup>[21]</sup>).

The structural and operational performance is also important to the understanding of resilience of the system and for the development of integrated solutions.

## **Recommendations**

The SRM should be updated so that its terminology corresponds to that used in DWMP to show how it contributes to the DWMP process and to more explicitly include links between Level 3 scale plans and the level 2 and 1 policies and plans. The economic tools in the SRM should also be updated to show how to take account of external uncertainties related both to environmental factors (e.g. climate changes) and the actions of other stakeholders.

The SWMP process should be updated to take account of the need for water companies to produce DWMPs and to provide a framework for stakeholder collaboration in the DWMP process at this level. If other stakeholders (e.g. LPAs) are to give DWMPs the resources they require, then this process must be seen by them as integral to their own planning process too.

The DWMP planning process in water companies should be part of an integrated planning work stream that meets all the water company's relevant planning needs. These address issues of structural dereliction and operational performance issues in addition to the hydraulic and environmental performance so that integrated solutions can be developed to minimise overall costs to the water company.

SOAF describes the process for dealing with frequently operating CSOs and UPM provides the procedure for dealing with failing water quality targets due to urban wet weather discharges (CSOs and continuous discharges). There is considerable overlap here and incorporating the SOAF<sup>[21]</sup> procedure into the UPM (or vice versa) would ensure that there is a seamless mechanism for understanding all CSO impact.

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