

Sewerage Management Plans – Implementation within Severn Trent Water

David Terry (Severn Trent), Neerja Upadhyay (Mouchel), Amrik Randhawa (Clear) and David Baldwin (Severn Trent)

1. Synopsis

Network Modelling and Drainage Area Plans (DAPs) have been a key strategic asset management tool used within Severn Trent (ST) in AMP3 and AMP4.

The recently published Sewerage Risk Management (SRM) guidance introduced an iterative comprehensive risk based approach to the management of sewer system assets compatible with the UK Water Industry Research (UKWIR) Common Framework with the added ability to integrate strategic drivers such as climate change and Integrated Urban Drainage (IUD) management. ST evolved their DAP specification to align with the SRM5 (2008) guidance developing the Sewerage Management Plans (SMPs) as part of the current AMP.

It was envisaged that embracing the SMPs would be a journey of change leading to a holistic approach to providing a “least cost long term wastewater plan” for each catchment. This paper will focus on the implementation of the SMPs and the process involved in embedding the SMPs within the company making it a tool that effectively contributes to the assessment of risk for various stakeholders.

The SMP journey is currently very much in its initial stages. The first set of “Live” SMP catchments have been completed as part of the Year 1 AMP5 deliverables. The process involved in achieving “Live” status and the journey moving forward will be discussed. Tools and Programmes with specific emphasis on the Model Maintenance (MM) Programme embedded within the wider SMP programme key to the success of the SMPs are also included within this paper.

2. Interpretation of the SRM5 guidance into Risk Based SMPs

A New Process:

The process of implementing the risk based SMPs within ST started with the development of a tailored specification involving multi consultant input and development of bespoke tools.

The interpretation of the SRM guidance involved splitting the SRM process into three levels of risk (Figure 1). Each level becomes increasingly more involved in the understanding of risk, and the confidence in that risk score increases through more analysis or data collection.

Risk is defined as the **likelihood** of flooding or pollution x the **consequence** of this happening.

New SMP Tools:

Bespoke tools for the different SRM levels were developed:

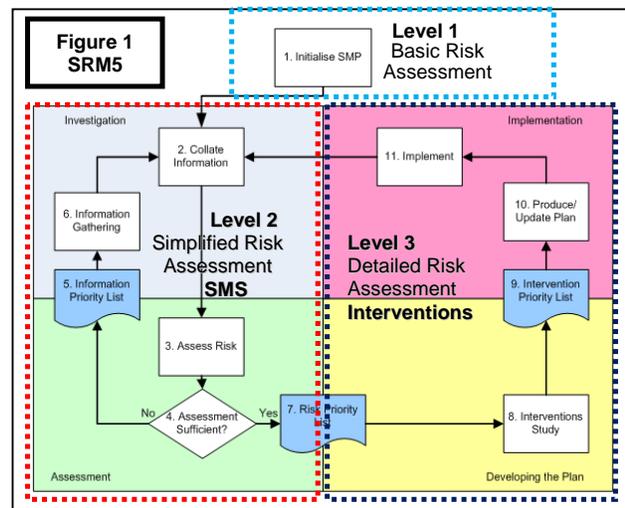
Level 1 Tool - A basic high Level 1 Risk Assessment Tracker for prioritising which catchments should be subject to a Level 2 (SMP) Risk Assessment.

Levels 2 & 3 Tools - A Flood Risk Tool which calculates flood risk on any geo-spatial risk zone; A Pollution Risk Tool which calculates pollution risk and a Model Investment Confidence Assessment Score (MICAS) which objectively demonstrates the model confidence on any geo-spatial risk zone.

These tools were developed for the SRM interpretation and understanding of risk and confidence as part of the SMP specification development (Terry et al 2009).

New SMP Boundaries:

Due to the advancement in computing/modelling power the SMP boundaries were redrawn to encompass the entire sewer network to the treatment works. These new SMP boundaries are now ‘flexible’ to catchment boundary changes unlike the former fixed DAP boundaries. This essentially means that changes in development sites or treatment facilities can enable forward looking strategies



to be accommodated into a holistic catchment risk based approach. The total number of SMP boundaries on the 0-5 year time horizon is 188 whilst on the 6-25 year time horizon is 186 because there are two treatment works programmed to be closed in the future.

The Trial:

Prior to the roll out of the SMP specification, an initial trial on the Clay Mills catchment was undertaken. The trial was aimed at further refining the specification and streamlining the application of the SMP Process. Using a real catchment proved that the SRM approach worked in practice. It was also realised that the client and consultant skill base needed new roles such as the "Catchment Planner" role, specifically providing a high level holistic approach to catchment planning. Thus resource plans needed to be enhanced for the SMP Programme.

New Roles in the ST SMP Team:

In addition to new roles within the SMP Consultant team, a dedicated SMP Level 1 Team was set up in ST aimed at supporting the SMP framework. Key roles were defined within this team which included an SMP Level 1 Team Leader, a Business Development Manager and an IUD co-ordinator. The main aim of the team is to ensure efficient operation of the SMP framework, continued specification development in line with changing business requirements and raising the SMP profile.

The Level 1 Risk Assessment:

The Level 1 Risk Assessment (Tracker) brought together a variety of datasets which were used to rank all SMP catchments in terms of potential risk (Terry et al, 2009). 28 out of a total of 188 SMPs were identified for further detailed investigations via an SMP study at SRM Level 2 covering 50% of the population within the ST region. These SMPs were mainly in urbanised areas where major catchment changes with higher risk priority were forecasted.

Ten months after the initial Level 1 Risk Assessment, one additional catchment, Coalville was escalated in the risk ranking following the provision of data indicating a significant increase in short and long term growth. This had not previously been included in the original datasets feeding into the Level 1 Risk Assessment Tracker. This change in catchment risk demonstrates that the Level 1 Risk Assessment needs to be undertaken at least annually if not more frequently.

3. "Live" catchments

Of the 28 SMP catchments started as part of AMP5, the Year 1 target was to achieve a live population of one million by March 2011. Four catchments – Coventry, Clay Mills, Netheridge and Stoke Bardolph were identified for this purpose. The key challenge lay in defining "Live" status and ensuring its effective application. The SMPs being a fairly complex concept primarily stakeholder focussed, does not always enable a prescriptive one for all approach to be adopted. This was evident based on experiences from the different consultants as listed below:

- A key part of working through an SMP is Stakeholder Engagement and the formation of a "SMP Stakeholder Strategy Team" for the catchment, ensuring that all risks are captured and stakeholder buy-in is obtained. This posed some key challenges due to the ongoing "Transformation Programme" within ST which meant that teams and roles within ST were being re-defined thus altering the SMP Stakeholder Strategy Team and their associated business needs along the process.
- Managing stakeholder expectations and effective prioritisation of the stakeholder requirements by the framework consultant was an important aspect of catchment ownership.
- Outputs from the Flood Risk Tool essentially defines the flood risk within a catchment based on the understanding of risk = likelihood x consequence. However the business is currently focussed on reducing flooding based on incidences reported in the Floods Register. Thus the risk based approach in this instance is subject to OFWATs and the Water Industry's review to managing flood risk in the future.
- It was identified that use of the Digital Terrain Model data would be crucial to ensure higher confidence levels in the understanding of flood risk. Thus the associated investment for this data has been identified for future years.
- The capturing of "risks" and the definition of the associated interventions introduced some key alterations within the SMP specification based on the stakeholder needs and the captured data.

- Working through the new tools and the new specification, posed some challenges which identified the need for regular workshops, training sessions and a dedicated portal for capturing key learning points and responding to queries from ST stakeholders and SMP Framework Consultants.

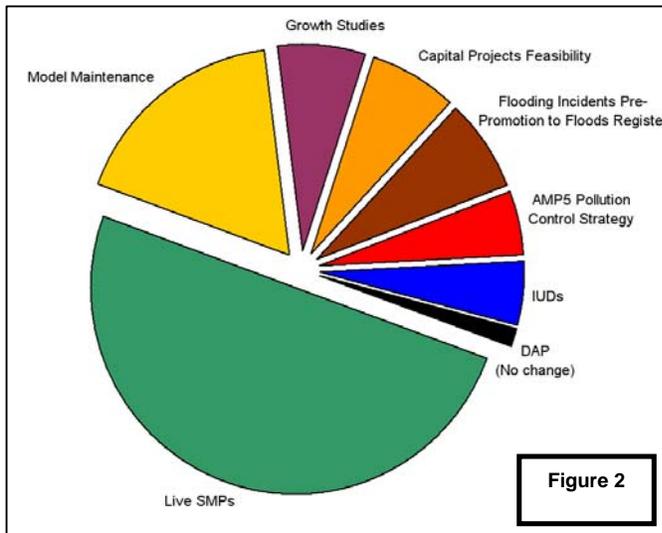
Thus “Live” is essentially defined as an investment plan which captures the risk, the associated interventions and the least cost long term wastewater strategy for a catchment. Once a catchment has been defined as “Live” it requires continued management to maintain its “Live” status. There could be multiple catchment strategies in place depending on the implications of the change in “risk” within a catchment. This process is catchment specific and hence a minimum mandatory level guidance has been incorporated within the specification recognising that the experience of the Catchment Planner will be paramount in developing the ongoing strategy.

3.1 Stakeholder Engagement Programme

Whilst the journey to achieving “Live” status was being undertaken, it was recognised that in addition to the stakeholder engagement undertaken at a catchment level (where the 28 SMPs are currently being progressed) stakeholder engagement also needs to be undertaken at a strategic level encompassing both internal ST stakeholders and external stakeholders such as the Environment Agency (EA) and the Local Authority (LA). This would ensure that internally, the SMPs are used by development control on a regular basis, business planning, asset creation (solution design risk impacts), service delivery etc. Externally, it will work across agencies (EA, LA), having its part to play in Surface Water Management Plans (SWMPs), and Water Cycle Studies (WCSs), such as informing Local Authority Planning Departments where too much area is connected to the drainage systems and advice on how to control it; or by providing data for IUD or flood defence investigations.

The Programme follows the ST “Safer Better Faster” approach and methodically works through a multitude of stakeholders effectively identifying the key “promoters” and the potential “resisters” ensuring that the engagement is targeted accordingly. The aim is to ensure buy-in from a high level within ST whilst informing the business planning needs at a regional level, thus effectively supporting the stakeholder engagement that occurs at catchment level when an SMP is ongoing.

4. Additional Programmes within the SMP Programme



The ST business plan is to get 50% of the ST population covered by “Live” SMP’s using the full SRM5 approach. One of the key questions posed by OFWAT is how will risk and the associated catchment strategy be assessed for the remaining 50% of the population?

The Level 1 Risk Assessment Tracker monitors risk for the entire ST population at a strategic level on a minimum annual basis along with the AMP3 and AMP4 DAP Programme covering the entire ST region. Whilst the main SMP programme covers 50% of the ST population, additional programmes have also been introduced aimed at better understanding the underlying risk for the entire ST region. As illustrated by Figure 2, these include the following Programmes:

Model Maintenance (MM), Capital Projects Feasibility, Growth Studies, Flooding Incidents (prior to being promoted to the floods register), Pollution Control Strategy and IUDs. Model Maintenance being a key programme within the wider SMP Programme is explained in greater detail below.

5.1 Model Maintenance

Rather than undertaking model updates when a model is required to assist with significant capital investment, a protocol has been developed to trigger Model Maintenance (MM) as soon as any significant changes to the sewer network has occurred. This ensures a library of updated network models which is based on a planned MM programme.

The MM Programme:

MM is aimed at providing incremental updates to hydraulic models for any changes that have occurred within a catchment, such as completed capital schemes, asset renewal schemes and new developments. Fundamental to the success of this programme is a 'change' tracking system which monitors alterations to the sewer system within the SMP catchments. This tracking system is driven by the assessment of numerous datasets such as the S104s (development sites) and the promoted capital schemes. One of the key challenges is the limited visibility of the S104 adoption dates making it difficult to accurately forecast when these changes may actually occur. This was evident in the Year 1 Programme deliverables.

It was initially envisaged that approximately 500 updates (from several data sources) would be undertaken in Year 1. However due to the downturn in the housing market the number of development data updates reduced significantly. Thus within Year 1, only 300 updates were completed. Moving forward, approximately 400 updates have been forecasted for the Year 2 MM programme.

MM Methodology:

As-built drawings and project hydraulic models are the main source of information for updating model networks. Re-verification against flow survey data is not undertaken as part of the MM programme. The re-verification of any hydraulic model to increase confidence in the catchment risks would be considered as part of the SMP risk-based process. Model maintenance is carried out on a monthly basis by the SMP Consultants. In addition to updating the model network, model confidence and flood risk are also assessed using the SMP Level 2 & 3 tools.

To track the evolution of the model and provide an audit trail a reporting aid called the Model Update Log (MUL) has been introduced. This reporting aid is aimed at providing future users an understanding of the recent updates that have been made to the model, so that in addition to a documented audit trail tracking the changes to the model an understanding of the implications on the verified status of the model as a result of these changes can also be ascertained.

Benefits of the MM Programme:

The key benefits of the work are as follows:

- A library of updated models encompassing alterations to the sewer network within a catchment from April 2010 onwards ready for use for other ongoing programmes within ST.
- The Model Update Log has proved to be a useful reporting aid clearly defining the status of the model.
- Flood risk plans for a wider ST area as opposed to only those covered by the ongoing SMPs.
- Model confidence scoring for a wider ST area as opposed to only those covered by the ongoing SMPs.

5. Conclusion

The current AMP5 journey of incorporating SMPs within ST and achieving "Live" status has been a challenging process, one that is still evolving. Implementation of a risk based approach to the development of a least cost long term catchment strategy has involved a steep learning curve both for ST and its SMP Framework Consultants.

The SMP programme outputs provide invaluable input into the business plan and price review needs allowing various users (Operations, June Reporting, Business Plan strategists, developer enquiry and growth assessment teams) to base future decisions and reporting on a risk based catchment strategy.

6. References

Sewerage Risk Management, 2008, WRc, <http://srm.wrcplc.co.uk/>

David Terry, Jamie Margetts, David Kinston and James Hale, Sewerage Management Plan – What it means to a water company, 2009 WaPUG Autumn Conference

Author Contact Details

David Terry: David.Terry@severntrent.co.uk; 024 7771 5000

David Baldwin: David.Baldwin@severntrent.co.uk; 024 7771 5000

Severn Trent Water Limited, Severn Trent Centre, PO Box 5309, Coventry, CV3 9FH.