

Specifications for SuDS

developing and implementing a sustainable drainage planning framework for Dŵr Cymru Welsh Water

by Paul Conroy

In order to develop and implement a sustainable drainage planning framework, Dŵr Cymru Welsh Water (DCWW) commissioned a project to provide a process to support delivery of AMP5 drainage planning targets and to inform the PR14 business plan and future investment to achieve catchment specific outcomes. DCWW appointed CH2M HILL to deliver the project, supported by Clear Environmental Consultants Ltd. The project commenced in Autumn 2011 and completed in the Spring 2013.



Rainfall inundation causing drainage flooding - Courtesy of Courtesy of CH2M HILL

What were the outputs?

The project has supplied a planning and delivery process that will enable delivery of an integrated drainage strategy. The project produced a detailed specification and delivery process that supports preparation of a Strategic Drainage Plan (SDP). The process has been consolidated by development of tools and documents that support the production of the SDP; help manage information and data and facilitate the development of a risk-based strategy for managing catchment drainage assets.

Project need

The SDP is a recent evolution of the traditional Drainage Area Plan (DAP). Historically, the generation of a DAP was seen as a core asset data collection exercise in order to better understand the drainage system and support activities such as rehabilitation planning. DAP preparation has become an end in its own right and the industry has recognized the need to re-refresh the approach, bringing a stronger risk and service focus and hence the evolution of the SDP. A key part of this project was to ensure that the strengths of the current SRM5 (WRC's Sewerage Risk Management approach, which is the current version of the *Sewerage Rehabilitation Manual*), the risk approach defined in the CMPCF (*Capital Maintenance Planning Common Framework - UKWIR 2004*) and industry good practice were incorporated into the new process.

Objectives and benefits of the project

- Develop process and supporting documentation to support delivery of a good practice, risk based and outcomes focused on drainage planning and management.
- Incorporate an innovative surface water reduction strategy and thinking; sound principles for drainage strategy and industry best practice into the process and undertake studies to test the approach.

The expected benefits of implementing the new SDP process, over and above the tradition DAP methodologies were threefold:

1. A forward-looking and consistent risk-based process to support better prioritisation and investment decisions.
2. A significantly improved integrated catchment strategy focussed on achieving outcomes.
3. A 'live' process that will improve awareness of catchment risk and facilitate communication of needs to all stakeholders.

Project approach

The starting point for the project was to examine the detail of SRM5 and develop the outline process described in the specification into

a comprehensive business process that could be implemented by DCWW. This was consolidated by procedure and tools to support the process and by pilot studies to test and refine the approach.

SRM review and development

The SRM is an iterative risk based planning approach, starting with setting objectives and defining spatial areas for analysis and leading ultimately to intervention planning and continuous improvement feedback activities. This iterative approach can be summarized in 5 broad stages:

(i) **Initialise**: involving preparation and initial planning activities, (ii) **Investigation**: gathering of existing data and evidence and preliminary risk assessment is carried out, (iii) **Assessment**: where the detailed risk analysis is undertaken if required, (iv) **Development**: where intervention options are scoped and assessed, and (v) **Implementation**: where schemes are delivered and feedback provided.

The SRM specification was examined and working with DCWW practitioners this was de-constructed and re-developed as a working process. The diagram in Figure 1 (below) shows an example of the top-level elaboration of the process.

It became clear that the new SDP process would need careful integration into the existing suit of DCWW business processes. The SDP is a holistic methodology and supports all phases of the drainage asset lifecycle. Therefore, it was necessary to develop procedures that would cover gaps and link the process to the other, *business-as-usual*, processes for asset creation and operational management.

In addition to written procedure, there was a need to identify data and analysis requirements, especially those to support long term risk assessment and to monitor the SDP status. As a result, the project involved integration of inputs and outputs with existing modeling tools and approaches as well as development on new approaches in those areas where gaps were identified.

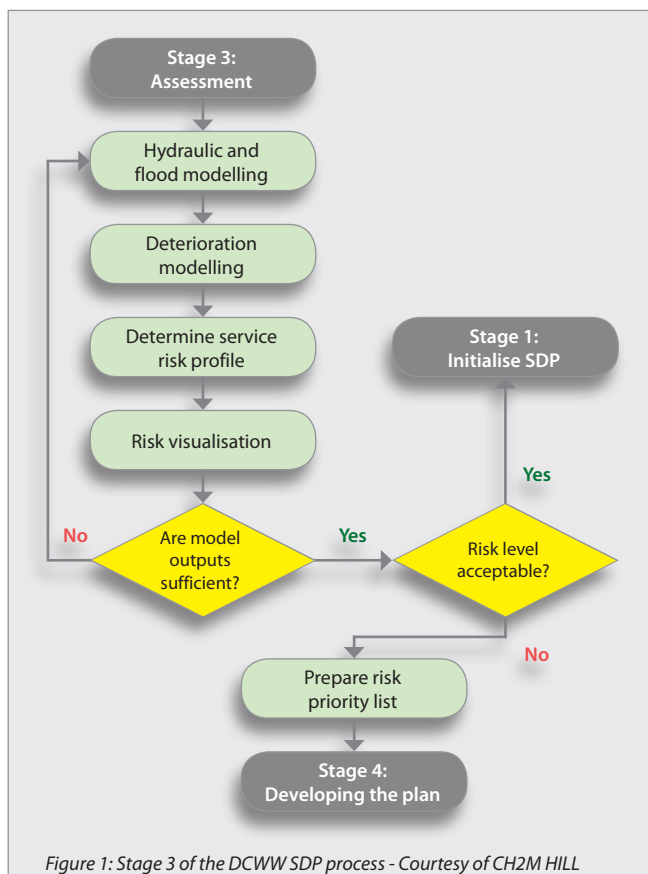


Figure 1: Stage 3 of the DCWW SDP process - Courtesy of CH2M HILL

Risk methodology and common measures of risk

At the heart of the SDP process, indeed any good asset management process, is a risk-based planning approach. The risk-based approach developed in this case had a number of very important attributes:

1. **It is iterative and proportionate and also consistent with SRM and CMPCF:** The significance of this is that the approach is consistent with industry good practice and also efficient and cyclical so as to support prioritization and justification for investigation, as well as helping ensure that ongoing appraisal will capture all future risks and any that may have been missed during the first iteration. The iterative methodology was embedded into the process, along with rules and guidance to help decide whether or not the risk assessment is sufficient to support decision making.
2. **It uses a common set of DCWW service measures to evaluate the probability and consequence of risk to service:** DCWW have previously implemented a set of service measures that provide a common and consistent basis for risk assessment and help ensure effective decisions across asset types and investment drivers. The SDP covers growth, quality and maintenance drivers and the service measures support a more integrated planning approach. The use of these measures was explicitly detailed in the SDP process and by the tools that were developed to support the risk assessment.
3. **It will be forward looking and based on whole-life cost benefit appraisal:** This will support forward looking and sustainable decision making. To enable a forward looking analysis, tools and models were specified and/or developed that would enable this forecasting of future service risks.

For example, hydraulic modeling runs were carried out in a pilot area that would enable estimation of the effects of growth, climate change and urban creep in terms of the service measures that relate to flooding and pollution.

Integration and live process

One of the aspirations for the project was to develop a tool that would enable 'at a glance' understanding of the key risks and to have this in a format that can be regularly updated and accessible for appropriate SDP contributors and stakeholders. To provide this functionality - on top of the iterative process, which encourages regular update - a SDP tracking tool was developed as well as trial assessment of risk visualisation using GIS.

The tracker developed by CH2M HILL was a spreadsheet tool, covering all parts of the process and linked to essential data, tools and results. The tracker provided a basis for seeing the current status of the SDP and understanding the risks and proposals for mitigation as and where appropriate. In addition, a risk visualisation tool was developed that provided a geospatial analysis of current and future risks.

Figure 2 (next page) shows one of the risk maps that were generated for a pilot study area. Essentially, hydraulic models were used to run scenarios and identify hazard zones, which are shown as a GIS sphere of influence, radiating from the hazard source. Important receptors e.g. basement properties were also mapped, so that potential risks could be identified.

These tools support appraisal of service measure risk impacts and enable change scenarios to be assessed. These tools are currently being developed and ultimately they will be used to present a comprehensive range of relevant risk types and also allow intervention benefits to be projected.

Other key needs for the project

During the course of the project, two additional needs became apparent. The first was an internal one; integrating surface water management policy into the SDP process; the second was an external challenge; addressing the emerging good practice principles of the Environment Agency and Ofwat Drainage Strategy Framework as part of the implementation of the new SDP process.

Managing surface water

DCWW has an industry recognised approach to managing surface water, which is to provide an effective, adaptable and sustainable approach to surface water drainage, based on consideration of opportunities for the elimination or reduction of surface water flows without causing detriment elsewhere in the catchment. It has been demonstrated that this can help achieve water quantity and quality improvements; amenity and biodiversity enhancement; effective water resource management; and reduced carbon emissions. In addition, identifying sustainable solutions encourages engagement with others within Welsh Water’s business, with other stakeholders and with customers, all of which are desirable behaviours.

To foster and enhance the surface water management strategy, the approach has been hard-wired into the SDP specification, so as to ensure advantageous and innovative water management solutions are explored and implemented where cost beneficial to do so.

The Environment Agency & Ofwat Drainage Strategy Framework

During the course of the project, a new set of principles for delivering a drainage strategy were developed as part of an Environment Agency and Ofwat study. This work was also delivered by the CH2M HILL project team who were able to encourage the incorporation into the SDP process and will continue to work on this alignment so that the SDP becomes the vehicle for delivering the Drainage Strategy Framework principles, which can be summarized:

- **Partnership focussed approach.** This is already being established as part of the surface water management strategy and will be supported further as part of the long term planning and outcome setting process.
- **Clarity on data available and uncertainty of data.** All SDP data is assessed for clarity and precision and this is a basis

for deciding whether more investigation is required in order to make effective investment decisions.

- **A risk-based approach: in both the approach to planning and in the resulting plan.** Risk based process, tools and measures are at the heart of the methodology.
- **Long-term, whole-life cost and benefit appraisal:** DCWW has implemented an industry standard methodology for undertaking this analysis. Change factors including asset deterioration, growth, climate, urban creep form part of the assessment of future risk and service impacts.
- **Continued review: a live process of update, review and improvement.** This is built into the process and will be subject to development and continuous improvement.
- **Innovative and sustainable: full evaluation of alternatives to traditional solutions.** This is a core aspect of the surface water management policy, incorporated into the SDP process.

Lessons learnt and what this means for DCWW

This project has delivered a good practice, new SDP process. It is envisaged that this will ultimately form the basis for all drainage investment planning as well as drive investment and day to day asset management i.e. ‘business as usual’ process. It is acknowledged that there is more work to do and there are a number of lessons that have been learnt:

1. Implementation of a process as comprehensive as the SDP requires significant change to embed it into existing process; this takes time and will be an ongoing activity for DCWW and suppliers of SDP services.
2. It is necessary to build on the work to-date in establishing working relationships with all catchment stakeholders and methodology and incentives for adopting a collective approach and allocating costs and benefits.
3. There is now a need for preparation of a narrative that connects assets to outcomes, based on an inclusive and affordable strategy for sustainable drainage .

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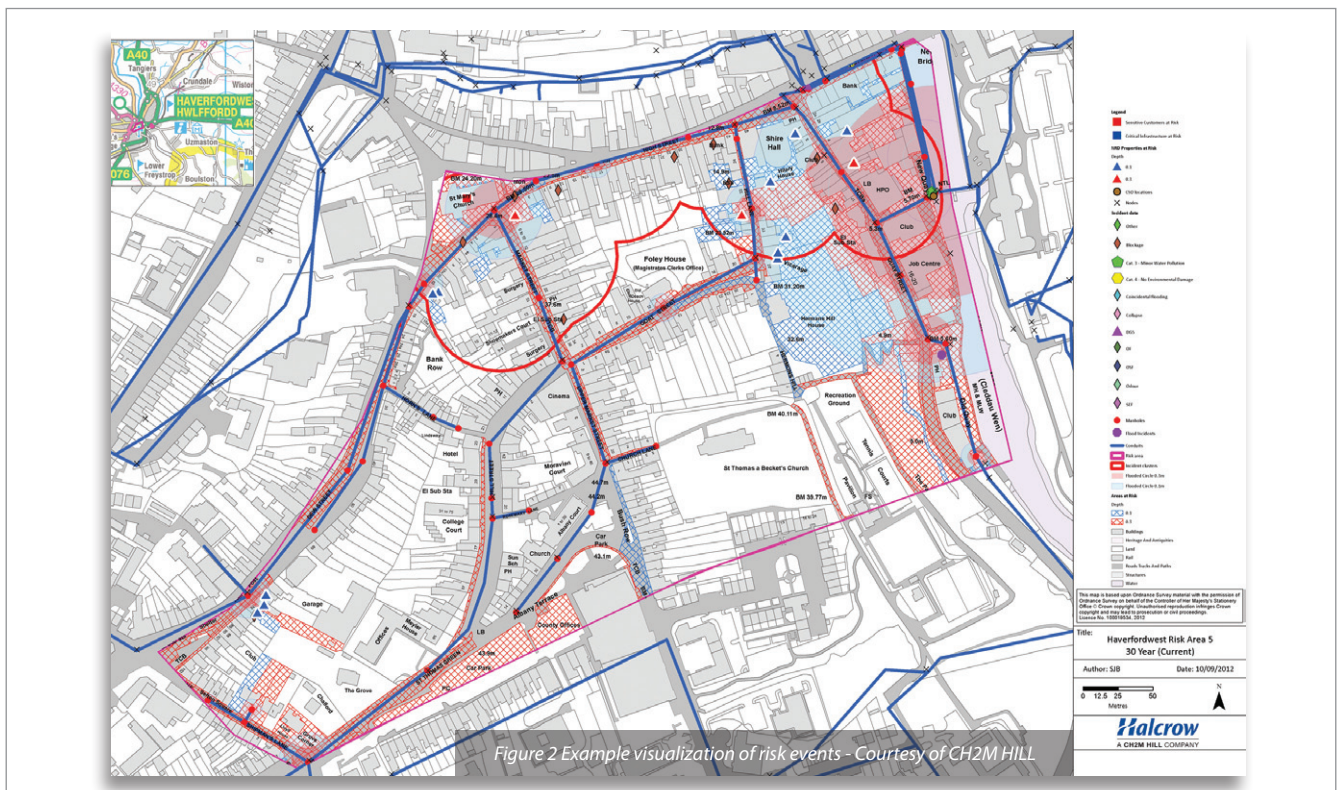


Figure 2 Example visualization of risk events - Courtesy of CH2M HILL