Drainage and Wastewater Management Plan

Summary of the methodology for the Baseline Risk and Vulnerability Assessment (BRAVA) on:

Sewer Collapse Risk

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from Southern Water

Contents

1. Background

1.1. Purpose

The purpose of this document is to provide a summary of the method for undertaking the Baseline Risk and Vulnerability Assessment (BRAVA) for the planning objective on **Sewer Collapse Risk**.

The BRAVA is an important step in the development of Drainage and Wastewater Management Plans (DWMPs). It is an assessment of current and future risks for each of the planning objectives below, and is undertaken for the sewer catchments that were flagged during the Risk Base Catchment Screening (RBCS).

All Water and Sewerage Companies (WaSCs) are required to complete a BRAVA and report to Water UK on the following six common planning objectives:

1. Risk of sewer flooding in a 1 in 50 year storm
2. Storm overflow performance
3. Risk of WTW compliance failure
4. Internal sewer flooding risk
5. Pollution risk
6. Sewer collapse risk

We have developed this methodology in accordance with the Water UK guidance on 'BRAVA planning objectives for national reporting' published on 29 July 2020. An extract from the Water UK guidance on the planning objective for sewer collapse risk is provided in the Annex to this document.

1.2. Definitions

A sewer collapse is defined by Ofwat in their reporting guidance – sewer collapses as failures in the asset causing an impact on service to customers or the environment that requires replacement or repair to reinstate service. A reportable failure to a sewer is when it results in a customer advising us of a disruption to the flow of wastewater, or any unplanned escape, that requires us to replace or repair the pipe to reinstate normal service. The definition includes rising mains (sewers where the wastewater is pumped to a higher level), pipe bridges, and failures elsewhere on the sewer network, including at the inlet to our treatment works and terminal pumping stations.

1.3. Reporting Requirements

Water UK guidance requires all WaSCs to report on the risk of sewer collapse as a common Planning Objective.

Water UK requires water companies to report only for the baseline 2020 assessment in December 2020 under this planning objective.

To inform our DWMPs, we will also complete future risk assessments for 2025, 2030, 2035 and 2050 which will be used in conjunction with outputs from the 2020 baseline assessment of sewer collapse and rising main bursts to evaluate current and future risks. The data will be used within the DWMP process to inform our investment decisions.

2. Data Sources

The following is a short description of the data that has been used and where it has been obtained from.

2.1. Historic Sewer Collapse and Rising Main Burst Data

Sewer collapse data is obtained from Sewer Incident Record Form (SIRF) database which contains records of historic sewer collapse incidents and information about their occurrences. This data includes incidents that have also been recorded as flooding or pollution failures, if the primary cause of the flooding or pollution was a sewer collapse.

Rising main burst data is also held on SIRF. This data is used in the BRAVA to ensure consistency with our annual reporting to Ofwat. Our Sewer Rehabilitation team also use the SIRF data in conjunction with a Geographic Information System (GIS) database called 'Rising Main Categorisation' (RMCat). The RMCat database includes various attribute data for each 100m length of rising main including any burst history. There is a process at year end whereby the data is RMCat is reconciled against the SIRF data.

Together, these provide the number of sewer collapse and rising main burst incidents to be used in the BRAVA.

2.2. Sewer Length

For the BRAVA, the number of sewer collapses per annum is normalised per 1,000km of wastewater network as set out in the Water UK guidance. Normalising the data allows the catchments to be compared with each other using the same scale, illustrated in the example below.

Catchment	Average Annualised Number of Sewer Collapses & Rising Main Bursts	Adjusted Sewer Length (km)	Normalised per 1,000km
Budds Farm Havant	12.7	2984	4.24
East Worthing	3.7	1167	3.14

Data has been obtained from our digital mapping database (called Asset Miner) to identify the sewer length in each of our sewer catchments. Recently adopted sewers that transferred ownership to us from private ownership under Section 105A of the Water Act 2003 (S105a) are largely unmapped. However, an estimate of the length of these sewers is included in the total sewer length based on study carried out by WRC in 2008 . An uplift factor of 1.70 was applied to take account of the length of unmapped adopted sewers. The total length of all our sewers assessed in the BRAVA is 39,886 kilometres.

2.3. Repaired / Replaced Sewers or Rising Mains

Data is obtained from our Prioritised Asset Deficiency Listing for Sewerage (PADLS) database which provides a record of completed and planned repairs and replacements of sewers and rising mains.

2.4. Asset Performance

We use an investment planning suite (called Pioneer) to support our planning for future investment in our sewer networks. Within Pioneer are asset performance deterioration models that are used to predict performance of assets, including the predicted future number of sewer collapses and rising mains bursts.

The deterioration model works primarily on asset age and a deterioration rate we would anticipate based on material, location and land use.

The predicted number of sewer collapses and rising main bursts is available from Pioneer for 2020, 2025, 2030, 2035 and 2050. Outputs from the deterioration model are represented as 2020 (current) and 2025, 2030, 2035, 2050 (future) incidents per wastewater catchment.

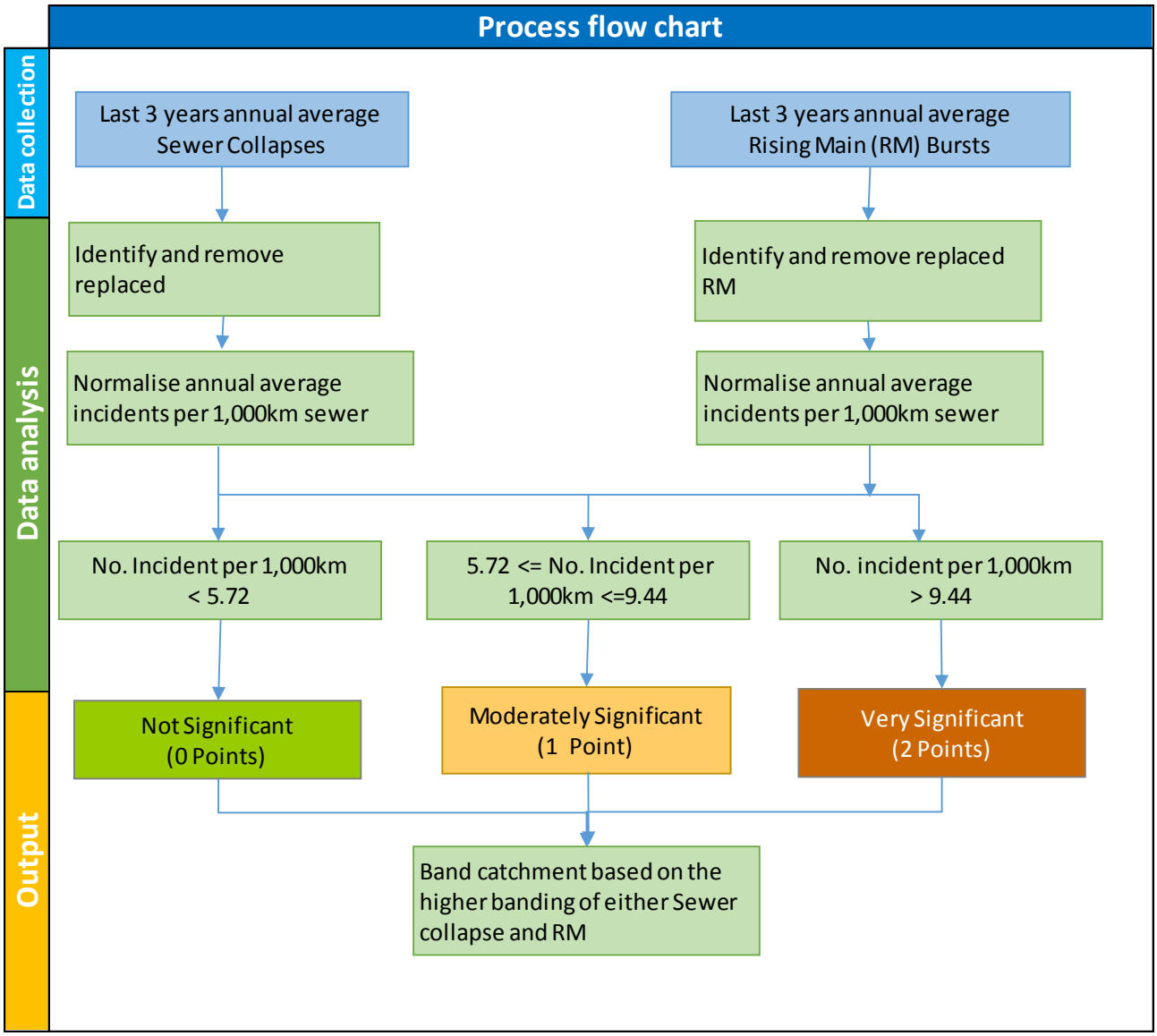
3. Method of Assessment

The following methodology has been developed to assess the risk of sewer collapse.

3.1. Process – Baseline 2020 Assessment

The baseline assessment uses sewer collapse and rising main burst data from the previous three financial years (2017-18 / 2018-19 / 2019-20) from the Sewer Collapse and Rising Main burst data and the adjusted sewer length to produce normalised data. The process developed for this assessment is shown in Figure 1.

Figure 1 - Process flow chart for the baseline Sewer Collapse



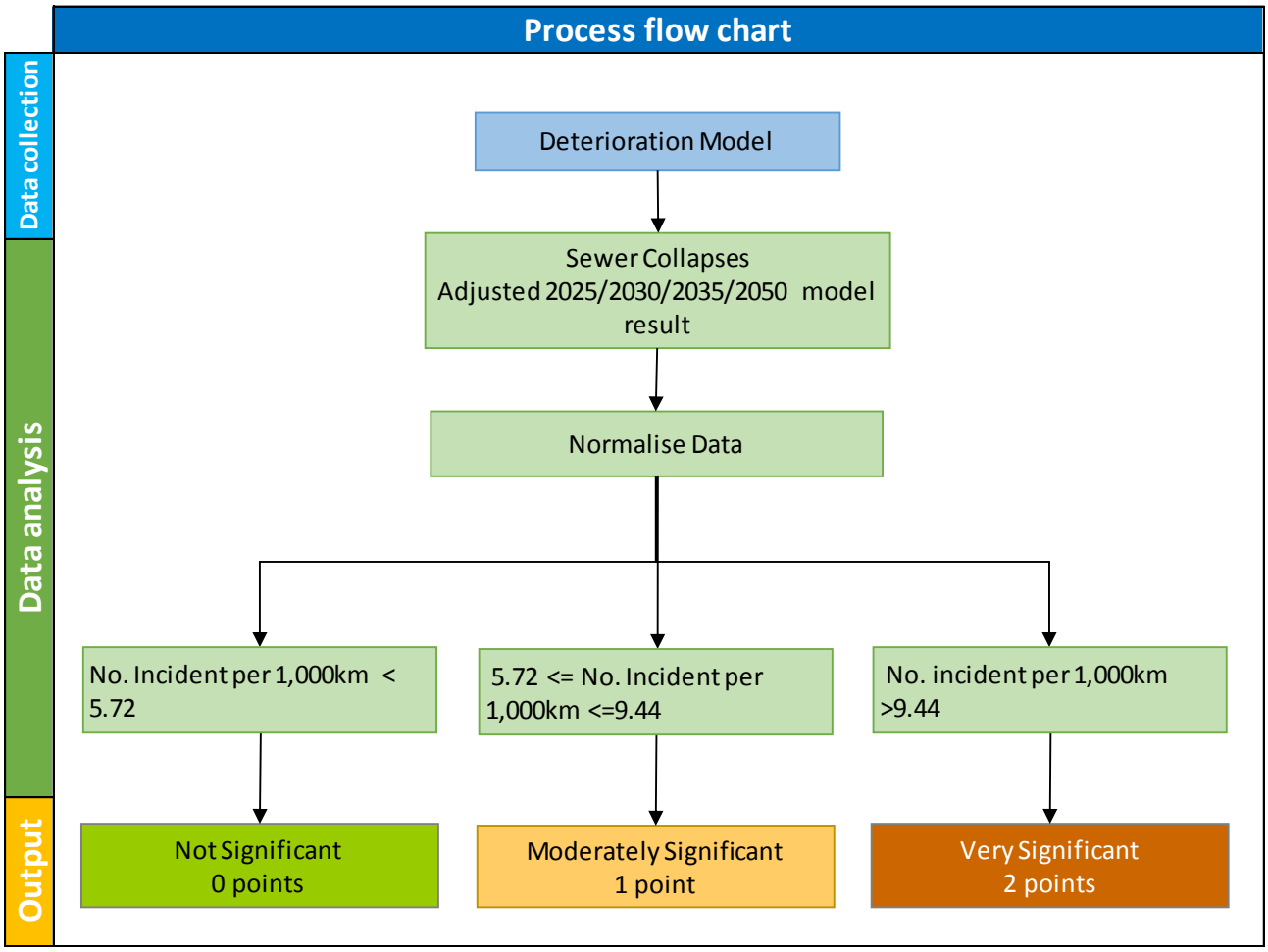
The repaired or replaced sewer and rising main data identifies assets that have been remedied after a collapse or burst incident has occurred. These incidents are removed from the number of incidents considered in the current BRAVA risk assessment as the risk has been reduced or removed due to the investment in those assets.

The results are then assigned a band (0, 1 or 2) to meet the Water UK reporting requirements, set out in section 3.3 below.

3.2. Process – Future Assessments

The future assessments use the predicted change in number of incidents from the Pioneer deterioration model. The process we have developed is shown in Figure **2**.

Figure 2 – Process flow for the future (2025 / 2030 / 2035 / 2050) sewer collapse risk



The change in predicted collapses and bursts, based on the outputs from the deterioration model, is applied to the 2020 baseline assessment for each sewer catchment to produce a predicted number of incidents per 1,000km for each future scenario.

The Pioneer deterioration model has used data up to 2017. Therefore, to align the results in the Pioneer deterioration model with the recent recorded incidents (up to 2019/20), the deterioration model results have been adjusted as follows:

				Predicted Increase		
Modified Sewer collapse (Planning Horizon e.g. 2025)	=	Average record for the last 3 years	+	Model prediction (Projected Year e.g. 2025)	-	Model prediction (2020)

3.3. Outputs from the BRAVA

The output from the BRAVA on Sewer Collapse Risk is a risk score for each sewer catchment. These scores are assigned to one of three bands as specified by Water UK. The thresholds for these bands are determined by each water company.

We have set one threshold based on our AMP7 performance commitment as agreed with Ofwat. Band 0 (not significant) is for the sewer catchments that are performing better than the 2020 performance commitment (set by Ofwat at 5.72). A penalty cap was not provided by Ofwat for sewer collapses and therefore Band 2 (very significant) is based on a figure that would be higher than the national average collapse rate performance (between years 2017, 2018, 2019 based on Ofwat data tables) by all wastewater companies. The threshold has been calculated to be 9.44. Band 1 (moderately significant) then, is the gap or range between Bands 0 and 2.

The assessment criteria shown in the below table applies to the Baseline 2020 and future 2025, 2030, 2035 and 2050 assessments.

Assessment Criteria / Thresholds	Bands	
Below AMP 7 performance commitment target (<5.72 incidents per 1,000 km)	0	*Not Significant*
Greater than or equal to AMP7 PC target, and below or equal to the national average performance over last three years (>=5.72 and <= 9.44 incidents per 1,000 km)	1	*Moderately Significant*
Exceeds national average performance over last three years (>9.44 incidents per 1,000 km)	2	*Very Significant*

We have quality assured the draft results to ensure the sewer catchments at greatest risk have been correctly identified for further consideration in the DWMP process. In “normalising” the data for sewer catchments based on the length of sewers, the results can be skewed for catchments with a relatively short length of sewer. We have therefore applied a moderation to ensure that any sewer catchments in the very significant band, where the annual average number of collapses over the last 3 years is less than 1, are re-assigned to not significant (i.e. band 0) to be consistent with other catchments.

Southern Water
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4. Annex: Water UK guidance on the Planning Objective

Planning Objective: Sewer Collapse Risk		
	Objective/Definition To be applied to all catchments that have triggered a BRAVA assessment through the RBCS process. This planning objective defines the 'Sewer Collapse Risk'. The definition of the measure is in accordance with the Ofwat reporting guidance for sewer collapses. It includes rising mains, pipe bridges and failures on the infrastructure network, including inlets to WwTW and terminal pumping stations. Results are to be presented at a Baseline (2020) case only.	**Definition clarifications** **Thresholds** Bands of 0, 1 & 2 to be applied; with 0 as 'Not Significant', 1 as 'Moderately Significant' and 2 as 'Very Significant'. Where a catchment does not trigger BRAVA, these will be flagged as 'Not applicable'. Thresholds for bands to be developed by each company appropriate to their needs and to ensure outputs are meaningful to inform stakeholder engagement. **Maps** To be produced for L2 based on bands 0, 1 & 2. **Tables** To be produced for L1, L2 & L3 and include only 0, 1 & 2 banding.
	Baseline Assessment • The baseline performance is to be based on best available model data. • Where a suitable model is not available, companies will use an average of last 3 years of annual performance. • The results are to be normalised based on km of sewer to move between level 3, level 2 and level 1. • Each company will determine the thresholds it will use to ensure the results appropriately reflect their risk and provide an overview of their calculations.	**2050 Assessment** • Not to be produced for Cycle 1 but the potential for 2050 assessments to be produced for Cycle 2 to be considered in the 'Cycle 1 to Cycle 2 review'.