StormTac
Stormwater solutions

Memo StormTac. The use of StormTac Web, data and uncertainties

It is accepted that calculations of pollution in stormwater and its treatment are associated with uncertainties, not least due to uncertainties in sampling and the great variation of the pollution content in stormwater. We believe that this can best be handled by using the experience in the form of methods, models and data that are available. We believe that more general assumptions give even greater uncertainty. The alternative of always sampling would involve too much cost, and a stormwater investigations also includes a calculation of a planned situation, which means that model calculations are needed to calculate future amounts of pollution before and after treatment.

StormTac is continuously making a major effort to supplement the StormTac database https://data.stormtac.com/ with more flow-weighted data, especially for less common substances, land uses and types of stormwater facilities. This provides better calculations in the StormTac Web model for all substances covered by the Water Directive. The inclusion of these substances with the possibility of simulating many different types of treatment facilities for stormwater and especially the impact on the recipient (watercourses, lakes and oceans) is not covered by any other inventoried model (Larm et al., 2022). In the article by Larm et al. (2022) which can be downloaded from https://www.stormtac.com/ StormTac Web was reviewed for methodology, calculated uncertainty, and its usefulness when input data is limited, such as in most stormwater investigations and projects with areas planned to be developed. The uncertainty is directly linked to the data in the database and is continuously updated with new data, which gives increasingly better reliability in the calculations with more available data; this particularly applies to substances with currently insufficient data that are constantly supplemented via literature searches. The model can be used in stormwater investigations that include developed areas and normally do not have available detailed data, which more dynamic models normally require (such as high-resolution rain data and detailed soil data). At the same time, the mentioned article shows that the uncertainty is not greater in StormTac Web compared to more dynamic models.

To enter volumetric runoff coefficients and pollutant concentrations in the model, users have two options: (a) select typical values from the model application based on data from the StormTac database, or (b) provide and use their own site-specific data. Please note that the typical concentrations that StormTac Web uses and that are default at project start are only recommendations. They are adjusted by the user if necessary according site-specific conditions and with the support of the database. Regarding the comparison between calculated and measured concentrations, the model's default values are there to make it easier; they are just typical concentrations that come from an expert assessment based on the database's flow-weighted values. It is neither relevant nor fair to compare a calculation based on them directly with sampled values. It does not give a measure of how reliable the calculations with StormTac Web are, which is partly explained by the fact that the sampling must be well carried out and partly because you may need to adjust the values according to site-specific conditions.

In order for measured concentrations to be comparable to the typical concentrations, they must be taken with automatic flow proportional sampling for longer periods (several months in different seasons to one or more years). One explanation for the fact that calculated concentrations can be higher than measured concentrations is that the sampling was carried out with grab samples, which usually miss the “first flush" with increased concentrations, while the calculations are based on flow-weighted samples. Another explanation is that there may have been greater retention in the transport systems upstream than what is included in the specified land uses. There may also be existing treatment facilities upstream that may not have been included. In such cases, these need to be simulated to obtain a more site-specific calculation. Differences between calculated and measured concentrations can also be due to differences in building materials, traffic intensities, etc. If there, e.g., are copper roofs in the area, the typical copper concentrations need to be increased.

The typical concentrations for different land uses are continuously calibrated against measured concentrations from areas with the same type of land use. This is partly carried out for individual land uses such as from sampling directly downstream of a residential area or from a stormwater drain inlet from a road with a certain measured traffic intensity. On the one hand, they are carried out from different large catchment areas through calibration. This has been carried out and is being carried out continuously from in the order of a roof which may not be much larger than 100 m^2 (0.01 ha) to more than 10 km^2 (>1 000 ha) large areas from which there is good flow proportional sampling (Larm, 2000). This means that some reduction of concentrations in technical and natural transport systems is included. StormTac Web employs a method for the quantification and presentation of uncertainties that was presented in the aforementioned article and which show relative standard errors (%) and absolute errors (+/-) that are specific from data from the database regarding concentrations of different substances for different land uses and regarding treatment effects for different types of treatment facilities. These will be changed automatically with newly entered data in the database, creating a direct link to the data in the database.

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