science summary

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Less water to waste

Impact of reductions in water demand on wastewater collection and treatment systems

Science Summary SC060066/SS

A new report by the Environment Agency looks at the impact that new regulations to increase efficiency in water use are likely to have on sewers and wastewater treatment works.

Increasing water efficiency is likely to result in reduced demand for water, with less water therefore flowing through drains and sewers. Some parties have suggested that this could lead to blockages, drainage problems and homes flooding due to backed up sewerage systems.

The aim of this project was to examine the impact of water demand management strategies, looking particularly at the effect that low-flush volume WCs could have on the flow of solids through sewers and drainage systems.

A range of literature was surveyed from both the UK and abroad, but the study found that very little research had actually been done looking specifically at the effect of reduced water demand on drains and sewers. Although earlier studies have suggested that low-volume flushes could lead to problems in drains and sewers, it is unclear whether these ideas were based on fact or were merely assumptions.

The project identified WCs as offering the greatest opportunity for reducing household demand for water, but also highlighted that flushes from WCs are very important in helping to move solids through sewers.

The project looked closely at the impact of reducing flush volumes in a conventional WC from six litres to three, and concluded that this level of reduction could cause significant problems in current drainage systems.

These problems could, however, be lessened by using new technologies and changing design standards for drainage systems.

For example, the 'Propelair' toilet, which uses air as well as water during the flush, could be used to help move solids whilst keeping the volume of water used to a minimum.

Other solutions that could help tackle possible blockages caused by reduced flush volumes could include using pipes with smaller diameters and steeper gradients, and to ensure there are fewer pipes taking only very low wastewater flows.

However, while these options create possibilities for new buildings, it is likely to be much more difficult and costly to retrofit existing properties.

This means that different approaches will have to be used to deal with reduced water use in new and existing properties. While the report suggests a revision of existing drainage design standards to accommodate the planned reduction in water demand for new build projects, older properties will require a thorough understanding of the existing drain layout before deciding whether to replace existing WCs with low-flush models.

The project also considered the effect of reduced water demand on water treatment works. However, definite conclusions as to the overall impact lower wastewater volumes could have on treatment works are difficult, particularly as effluent concentration depends not only on the volume of water discharged but also infiltration into the sewer system.

The report concludes that, while the full impact of reduced wastewater flows caused by a drop in demand is not fully understood, it could lead to an increase sewer blockages, flooding and other operational problems in drainage systems.

However, as there are many other factors that also contribute to these problems (such as poor drain condition or disposal of inappropriate materials through the sewer system), it is important to appreciate the wider context of water demand reduction initiatives in order to assess their implications.

To conclude, the report recommends that current drainage designs be reviewed, with new guidance compiled for both new build developments and for retrofitting existing properties to accommodate reduced water demand.

Additional research should also be carried out to assess the efficacy of recent campaigns to promote the responsible use of sewers (such as the 'bag it and bin it' campaign). The report also finally highlights the need for guidance to ensure that water efficiency initiatives are seen as just one part of a larger picture in terms of building and drainage design and sewer use.

This summary relates to information from Science Project SC060066, reported in detail in the following output(s):

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