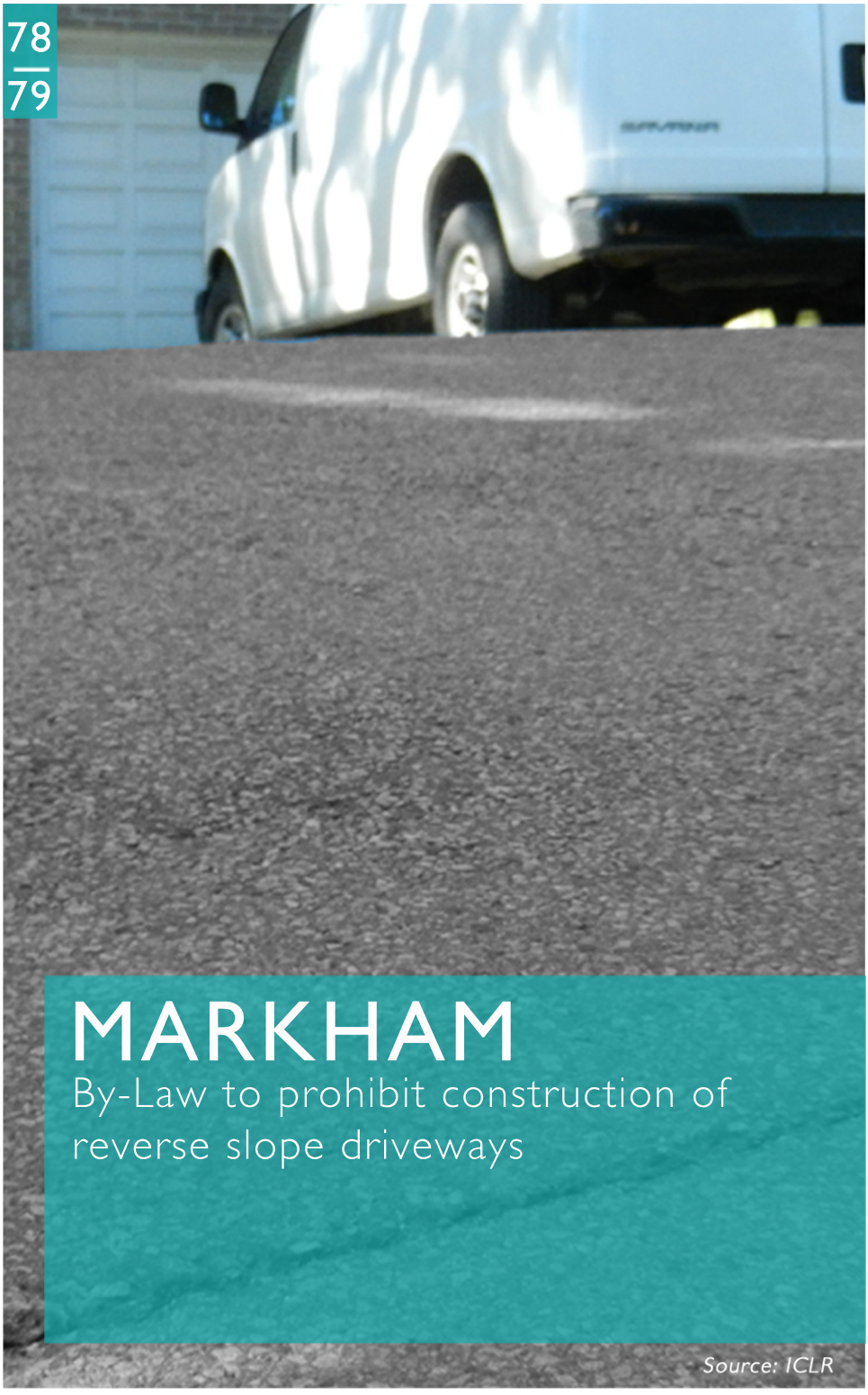

MARKHAM

By-Law to prohibit construction of reverse slope driveways

Source: ICLR

THE SCIENCE

Reverse slope driveways are present in many communities across Canada. This kind of driveway tends to be found in high-density areas where there is limited area to build external garages. However, reverse slope driveways increase the risk of basement flooding.

Reverse slope driveways have a high potential to direct overland stormwater into homes. Stormwater directed into a house through a reverse slope driveway may also increase the risk of sewer backup when the water enters the sanitary sewer system through basement floor drains. In some cases reverse slope driveways have catch basins connected into the weeping tile system or sanitary sewer lateral increasing sewer backup risks for the home and the neighbourhood. Connections into storm systems can be a problem. The resulting surcharge in the municipal sewer system may force stormwater back into catch basins, where it may flow into basements, garages and weeping tiles. Catch basins may also be blocked by debris which can reduce their draining capacity and further increase the risk of basement flooding.

THE TRIGGER

In August 2005, a major storm struck Southern Ontario. Until July 2013, this was the most expensive natural catastrophe in Ontario history costing insurance companies $718M (2013 dollars). As much as 153 mm of rain fell on the Northwest area of Toronto in less than three hours, causing extensive damages in Southern Ontario.

There was significant basement flood damage in the West Thornhill area of Markham. Damage to residences in this area, like other older neighbourhoods in the storm's path, was affected by limitations in the capacity of the surface drainage system and high infiltration overwhelming the wastewater system. Storm flows and volumes exceeded the storm and wastewater infrastructure capacities in the area. In the aftermath of the August 2005 storm, residents petitioned the City of Markham for remedial measures to prevent future problems. The public was seeking a long-term and comprehensive plan for reducing the risk of basement flood damage in Markham.

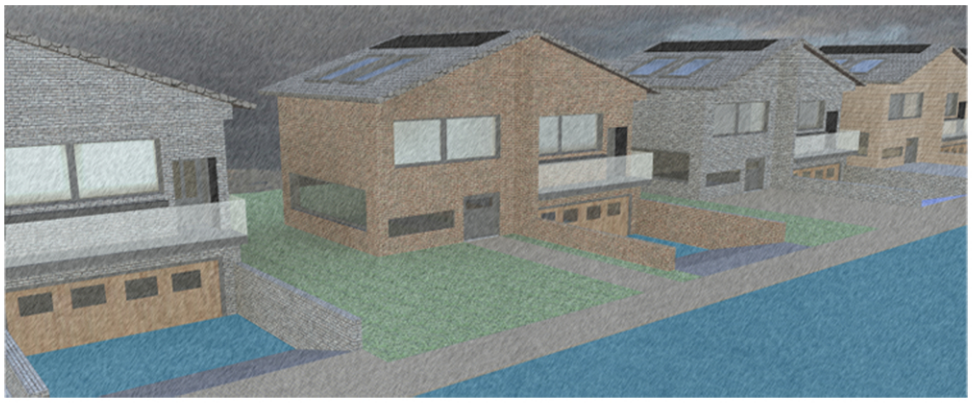

Figure 22: *Flooded driveways following an extreme rain event. (Source: ICLR)*

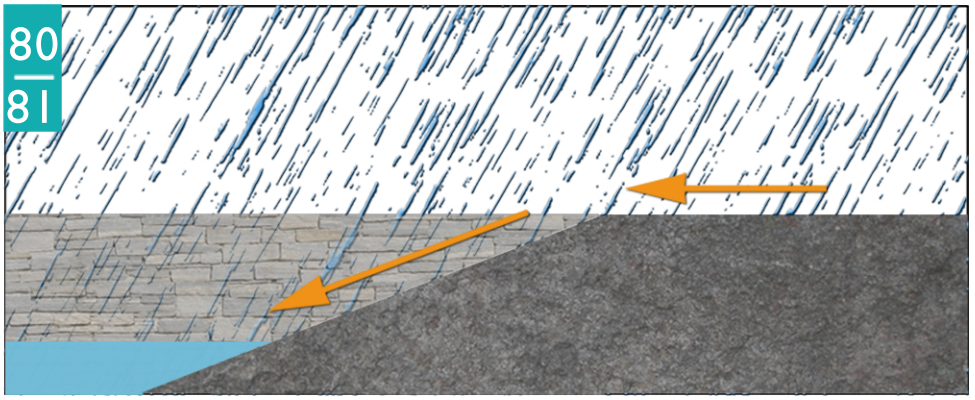

Figure 23 : *Reverse slope driveway before minor asphalt grading (Source: ICLR)*

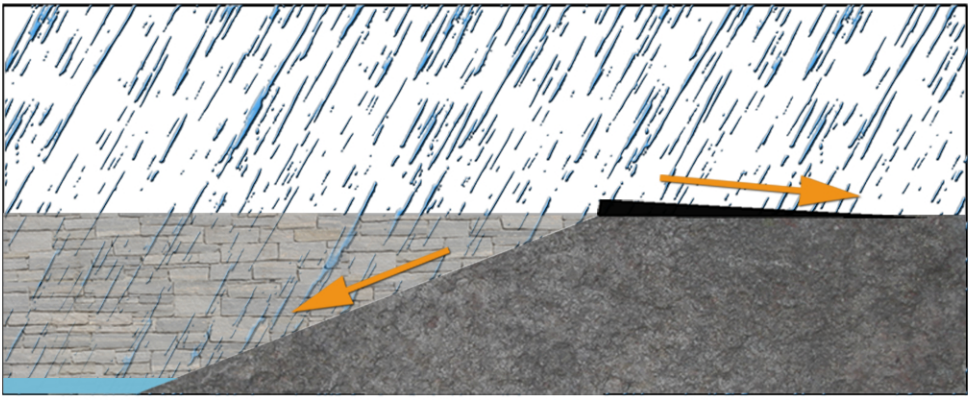

Figure 24 : *Reverse slope driveway after minor asphalt grading (Source: ICLR)*

THE APPROACH

The City of Markham initiated a Municipal Class Environmental Assessment study and hired a consulting firm to identify preferred alternatives to improve current storm system performance in West Thornhill and increase it to an appropriate level of protection. The City also initiated an internal review of wastewater system capacity to identify required upgrades and infiltration reduction opportunities.

In addition to an assessment of the City's storm sewer capacity, other measures were identified that could reduce the amount of run-off entering the sewer system. The study was to identify and assess a broad range of measures that could be undertaken by the City and by property owners. The external consultant and internal reviewers sought to provide a comprehensive assessment of alternative

actions to better manage and reduce the risk of basement flooding in the City. For example, one of the measures considered for new residential dwellings was prohibiting the construction of new homes with reverse slope driveways.

THE OUTCOME

In April 2012, a by-law amendment was approved by the City of Markham prohibiting reverse slope driveways for new home construction. Where a private driveway leads to a parking garage attached to a dwelling unit, the finished floor elevation of a garage must be higher than the elevation of the public street or public lane from which access to the parking garage is provided. The by-law is enforced when developers and property owners submit their construction plans to the City.

Markham is also taking action to reduce the risk of basement flooding for existing homes with reverse slope driveways. The City is seeking to limit the depth of water on the street by adding more sewer and inlet capacity to reduce the risk of spill onto driveways. This measure has been taken in areas that have faced historical flooding problems. Markham also has a road operations group that is doing minor asphalt grading at locations where the grade is not sufficient between the road gutter and the high point in the driveway (see illustration 23 & 24).

Recently, while conducting sewer smoke testing, the City of Markham found that some reverse driveway catch basins were potentially connected to the sanitary sewer. Once connections are verified, the risk of basement flooding in these neighbourhoods will be reduced by requiring homeowners to fix the cross-connection.

A WORD FROM MARKHAM

When asked for his thoughts on the prohibition of construction of reverse sloped driveways, Robert Muir, Manager of Stormwater at the City of Markham said that "[the by-law amendment] represents a small change for a lot of gain. It is the kind of adjustment that is usually very well perceived by homeowners and developers since its first objective is to protect the homeowners themselves."