

**ANNEX**

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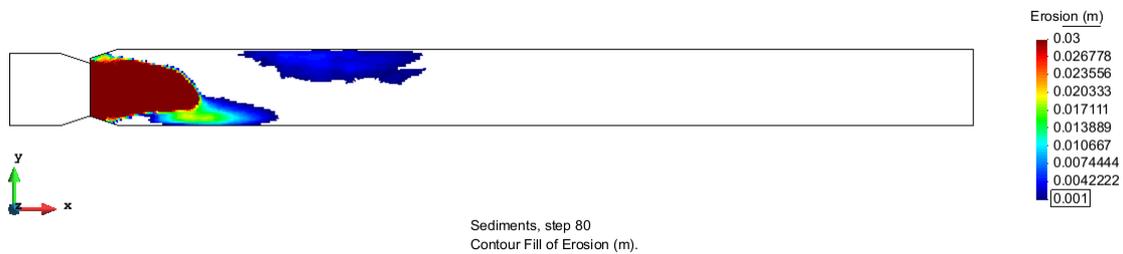
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## Introduction

This Annex pretend to present the rest of the scenarios that have been mentioned on the mean report. As it has been done previously, both scenarios (sandy and organic material) are shown in the following chapters.

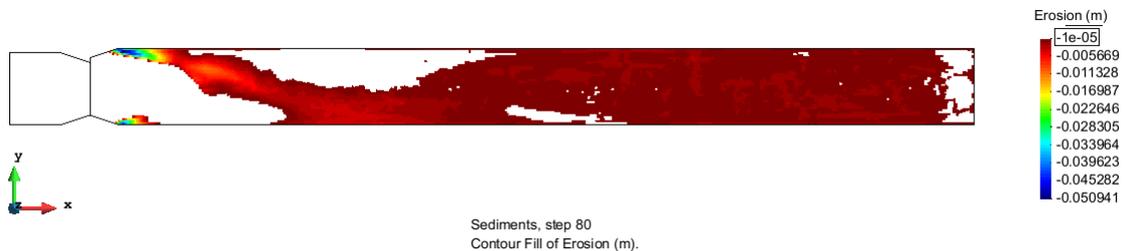
## Sandy Sediment

By the same procedure than in previous cases, the first scenario simulated in this annex is 3 centimetre of sandy over the lane.



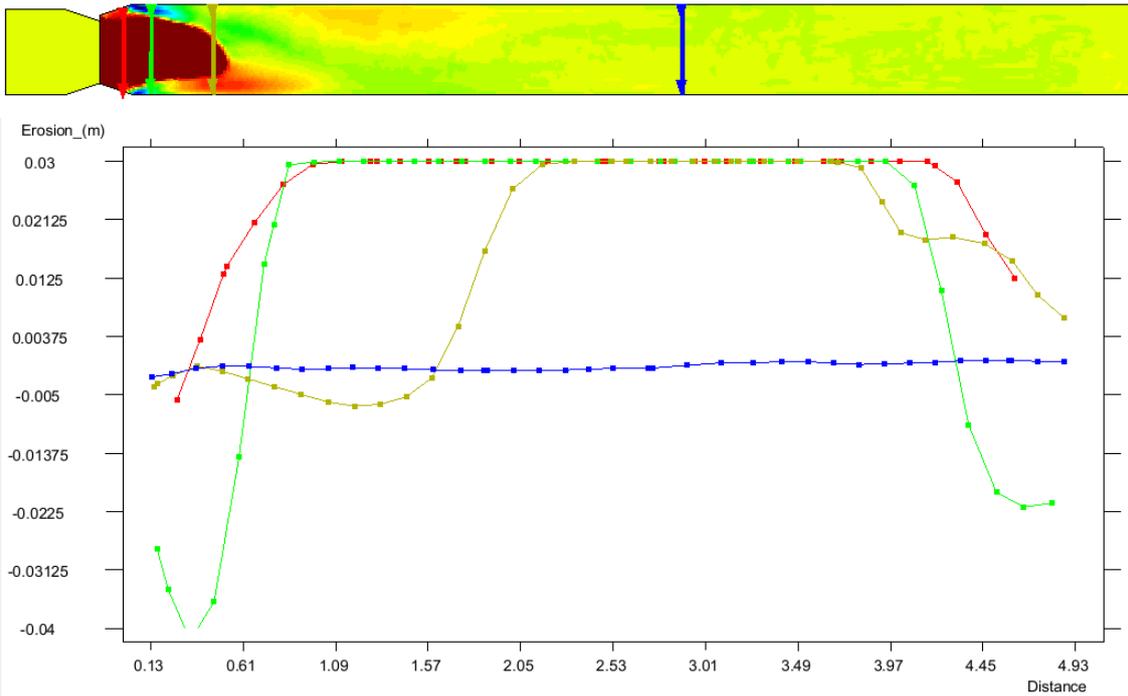
**Figure 1.** Erosion produced in 3 cm sand case.

Once again, the sediment transport is acting as it was shown in the main report of the current thesis, the maximum erosion is produced on the middle of the lane and at the beginning of the gate. This time the total erosion distance from the gate is around 7 meters, result between the 15 meters (1 cm sediment elevation) and 5 meters (5 cm sediment elevation).



**Figure 2.** Sedimentation produced in 3 cm sand case.

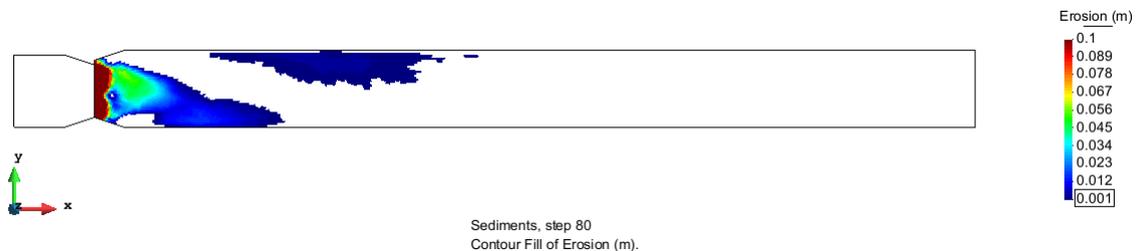
Deposition over the lane reaches the highest values of 5 cm deposition in the left side where the recirculation is occurring.



**Graph 1.** Several transversal section of the erosion.

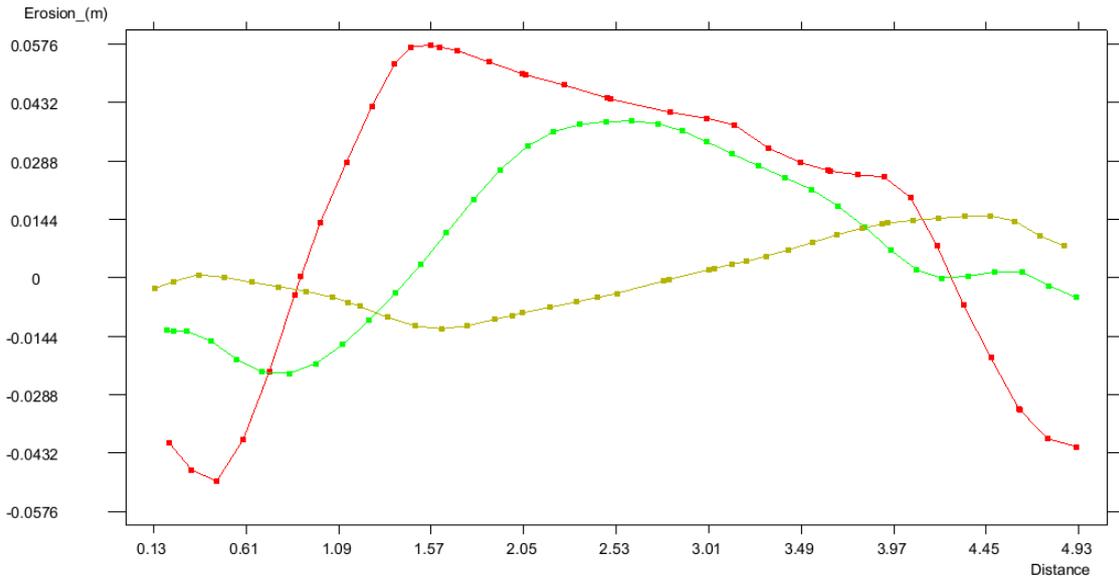
Red line represents the area just in front of the gate where almost all the width is eroded except a small part in the left side where there is deposition. The highest deposition occurs in the green transversal section where almost the 5 cm are reached. As it happens in the other scenarios, at the end of the lane the bed load transport has not effect if is simulated using conventional Van Rijn formula.

Next scenario is assumed with 10 cm of sediment. It is important to be aware that to impose 10 centimetre of material over the lane is around 25 m<sup>3</sup> of sediment versus 28 m<sup>3</sup> of water. It is not a real case, it is just to study how sediment transport is working with not common and high quantity of material inside the lane.



**Figure 3.** Erosion produced in 3 cm sand case.

The wall of sediment is too much to be eroded. The total cleaning is reaching just 1.5 meters from the gate.



**Graph 2.** Several transversal section of the erosion.

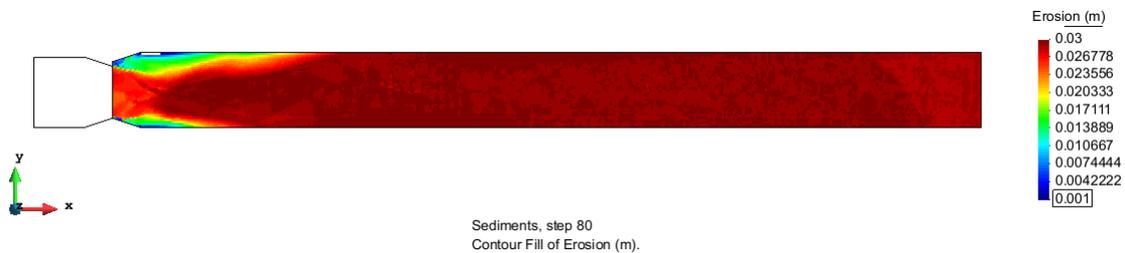
All the material eroded is deposited over the lane. In this case also, the material eroded from the middle of the lane is deposited on its sides, near the walls where the recirculation phenomenon appears. 7 meters from the gate (yellow line) the sediment transport has no effect over the lane.

## Organic Sediment Behaviour

In the main report of the current thesis, trying to analyse the sensitiveness of the erosion rate parameter, several simulation were run in order observe which erosion rate value could clean all the lane by only one flushing event.

In both previous scenarios 1 and 5 cm of cohesive organic material the erosion rate which could remove almost all the material were 0.0001 and 0.0003 m/s respectively.

For the scenario where the sediment elevation is 3 cm by using an erosion rate 0.0002 m/s the lane is cleaned.



**Figure 4.** Erosion produced in 3 cm organic material case.

In front of the gate the erosion achieved is a little bit more than 2.5 cm while as in all the scenarios, the walls of the lane are the most difficult zones to be cleaned, around 1.7 cm are removed from the sides except the part which is touching the wall where less than 1 cm is removed and also there is a deposition area.

Special hydrodynamic conditions of the self-cleaning process in detention tanks requires to calibrate and validate the model. For that reason, the only way to obtain right parameters will be from real data measured in the tank lane during the cleaning operation.