

## **Hydrodynamic modeling with HEC-RAS Assignment**

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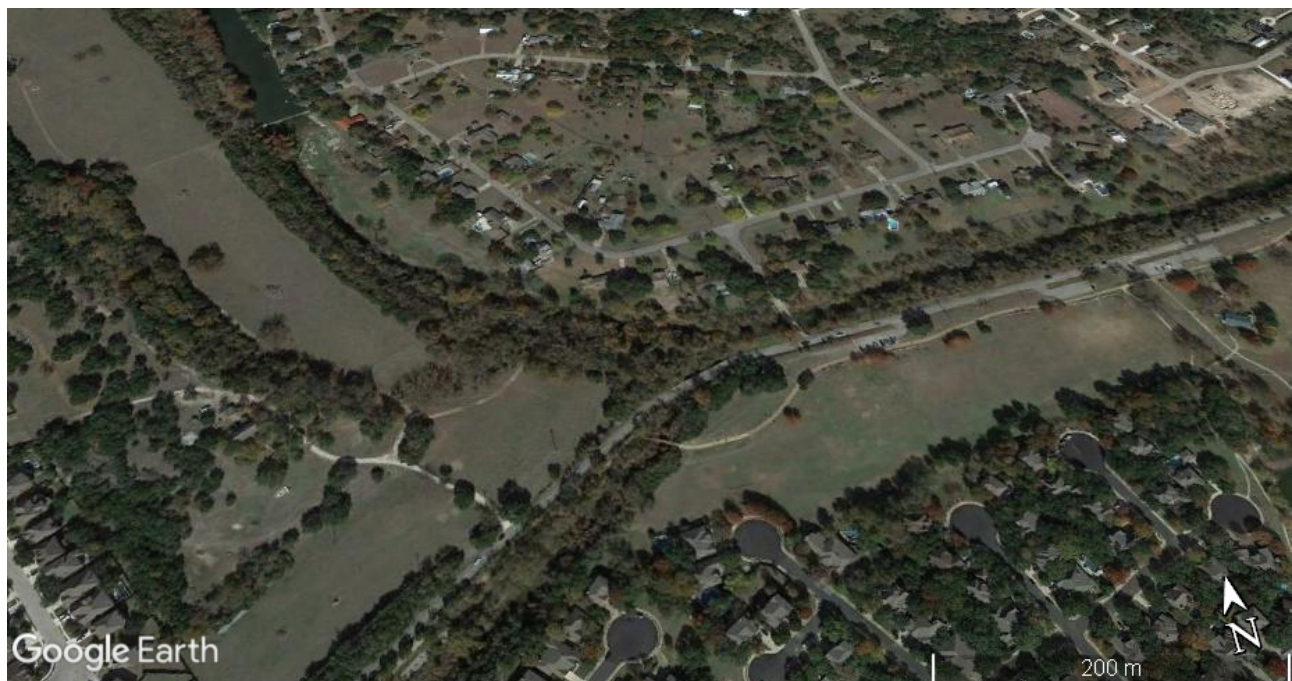
## **Assignment on Hydrodynamic modelling with HEC-RAS**

The purpose of this assignment is for you to get experience with the HEC-RAS modelling system and to report on it. The assignment on HEC-RAS is composed of building, testing, implementing changes and analysing results of a model. The problem you will need to prepare a model for is explained bellow.

A small dam releases its water into a river creek (See Figure 1). A 1D model HEC-RAS model was built by the authorities in the area to assess the flooding situation. Data for this 1D model is available as follows:

- The projection for the area under study (a .prj ESRI file)
- DEM (geotiff)
- Four possible HEC-RAS geometry representation of the river (as .g0\* HEC-RAS file)
- Flow data (available in an xlsx file)
- The location of 4 new areas proposed by the authorities for further housing developments (as .shp type of file).

(All data are available in SI unit system)



*Figure 1. River creek with a small weir/ dam on the upstream of River, Upper branch*

Using the flow dataset assigned to you, your task is to evaluate flooding conditions and to improve the modelling approach. The overall goal is to assess flood hazard to the population living in the area. This is achieved by:

- Model evaluation for current 1D available data: Build a one 1D model only, by selecting one of the 4 available geometries. Justify why you used a particular geometry. Evaluate how accurate this 1D model is, both in terms of good modelling practices and in terms of applicability to the case study.
- Model improvement: Develop further a 1D/2D model, as a second model, for the given

river stretch. The aim is to improve the model representation of the flooding situation. In order to do that, change the given Xsections such that you build a 1D/2D model that represents the situation. Inspect the area (e.g. with aerial view) and see how to change elements of the model. Report what you did, justify your changes and analyse the obtained results. Identify where are the flooding areas and how severe is the flooding in terms of flood depth and flood extent.

- Scenario testing for future conditions: The authorities are proposing four areas for housing developments. Select from the 4 given development areas, the one that is the best for development. Briefly justify why. Further, implement in the 1D/2D model two measures to alleviate flooding conditions for the current and future areas where housing is located. Maybe by implementing the proposed measures a different development area would be more suitable. Justify your choices and analyse your results. *Remark: It is not requested to implement the best possible solution, just to test two possible measures that you would consider. Do not try to find the best solution.*

Important: There is no one ideal 1D/2D model. Each one of you will have his particular model after changing some of the geometry data. Just implement an approach you think it is good and as close to reality as possible.

You are requested to make a report explaining what you have done, the solutions that you implemented, i.e:

- Evaluation of the initial 1D model you built
- How did you change the initial model to implement the 1D/2D solution
- Comment on obtained results. Make comparisons between the initial model and the proposed solution for all tasks (i.e. between the 1D and 1D/2D; and between 1D/2D and the 1D/2D with proposed measures).

Assignment consists on submission of 2 files on eCampusXL:

- your models as zip files (no model runs, just set-up),
- the report in pdf format

Submission deadline **Wednesday 19 May 2020, 17:00 o'clock.**