HYRDOEUROPE HES

TEAM 12
OUSEBURN

WEEK 2

UNIVERSITÉ CÔTE D'AZUR

Brandenburgische Technische Universität Cottbus - Senftenberg

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Newcastle University

POLITECHNIKA WARSZAWSKA WARSAW UNIVERSITY OF TECHNOLOGY

VUB VRIJE UNIVERSITEIT BRUSSEL

TABLE OF

01 ONLINE AND WEEK 1 SUMMARY

SUMMARY

ONLINE TASK

- Catchment presentation
- Rainfall and Flow data processing.
- Synthetical rainfall series generation for current and future climate scenarios.

SHETRAN

WEEK 1

- Storm shape generation
- Hydrological modelling using SHETRAN
- Climate change effect assessment.

TELEMAC

WEEK 2

- Hydraulic modeling using Telemac.
- Flood maps and hazard maps creation.
- Assessing flood risks and planning interventions.
- Climate change assessment.

HES

02 MODELING METHODOLOGY

METHODOLOGY

1

Data recovery

DTM on IGN Geoservice

Accuracy of 2m

3

Bluekenue

Interpolation (TIN - Triangulaire

Mesh size: 5m - Minor bed

10m - Major bed

25m - Catchment area

Boundary conditions - Downstream

5

Bluekenue - QGIS

Visualisation of results

Animation flood / risk

2

QGIS - Arcgis

Merging of 8 rasters

Removal of bridges

Study area delimitation - Major bed-Minor bed

Bathymetry extraction

4

TELEMAC

Input data (.cas) RP 1000 - Output file (.slf)

Modelling 3 scenarios min, median, and max from the climate model hadgem3, 4 degrees 2080

Downstream flow recovery

6

HEC-RAS

DTM 2021 1m

River shapefile - geometry

Boundary conditions

Manning : 0.035 (main channel)

0.05 (banks)

HES

03 HYDRAULIC MODELING RESULTS:

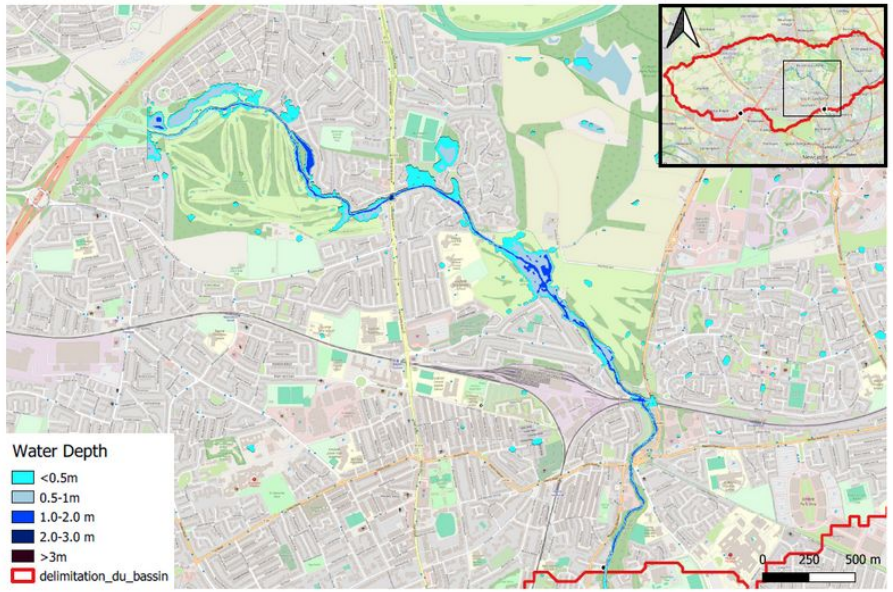
- WATER DEPTH MAPS
- HAZARD MAPS

FOR 24 HOURS – 1000 YEARS RETURN PERIOD

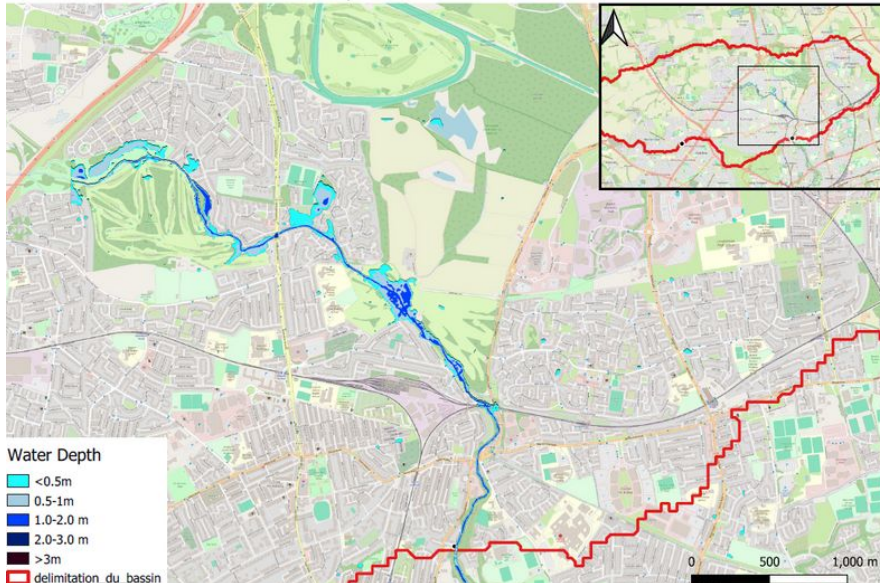
WATER DEPTH MAPS

Flood Map _ Baseline scenario

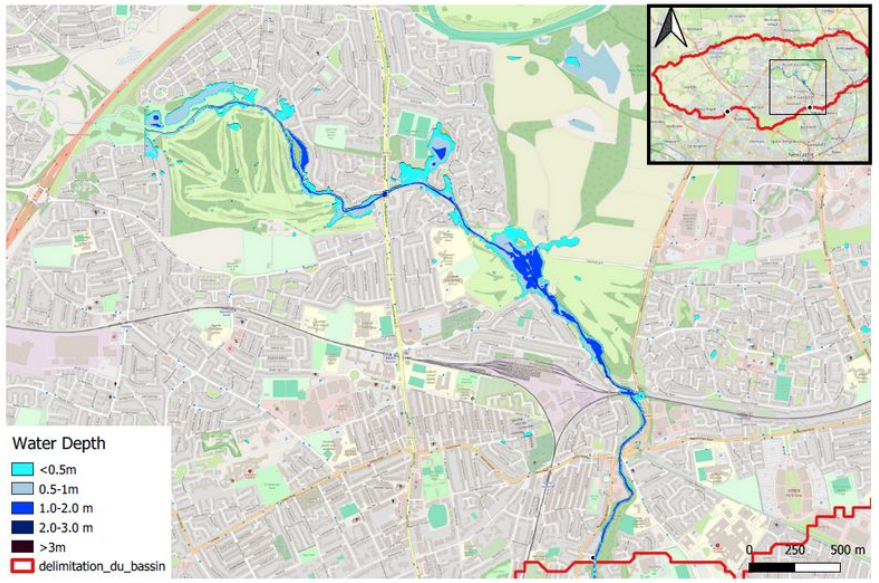
Flood Map _ Min scenario



Flood Map - Median Scenario



Flood Map _ Max scenario



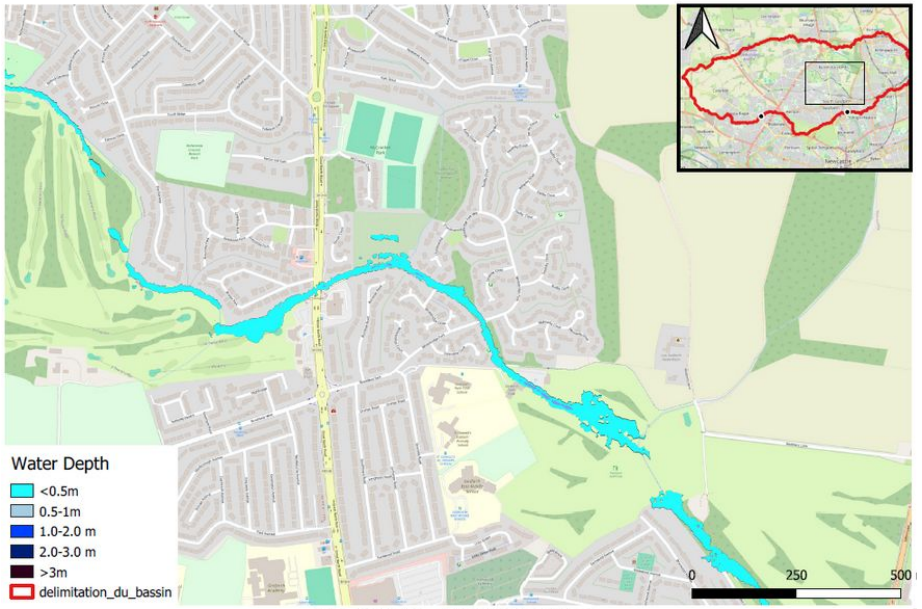
Water Depth

- <0.5m
- 0.5-1m
- 1.0-2.0 m
- 2.0-3.0 m
- >3m
- delimitation_du_bassin

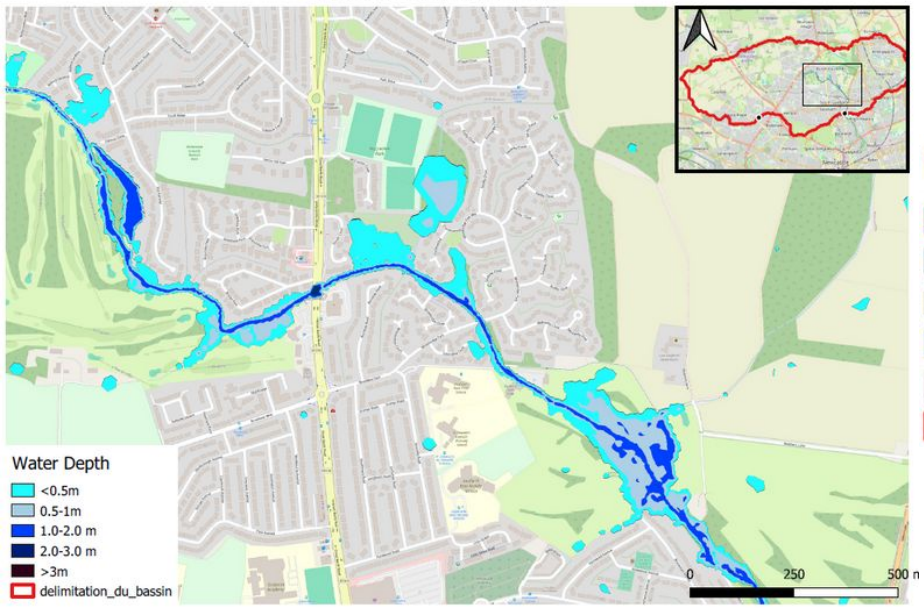
HES

WATER DEPTH MAPS, HIGH EXPOSED ZONES

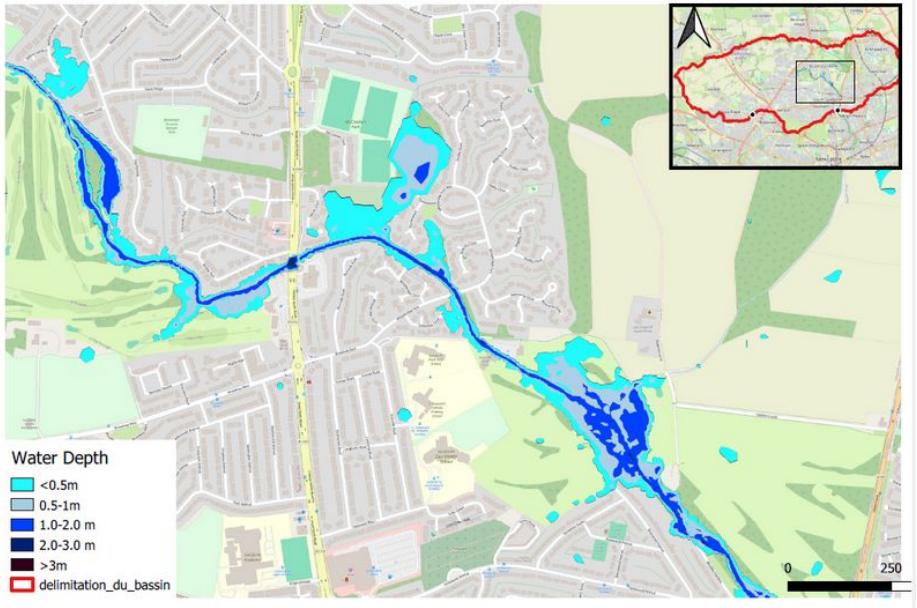
Flood Map _ Baseline scenario



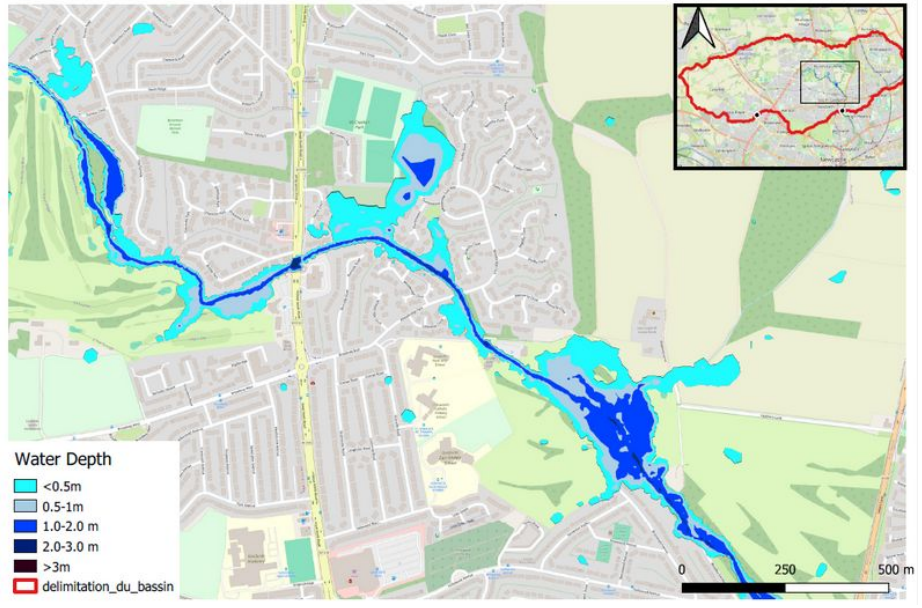
Flood Map _ Min scenario

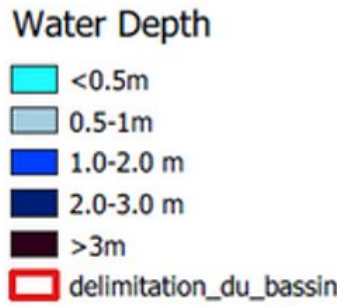


Flood Map _ Median scenario



Flood Map _ Max scenario





Parks

Golf Club

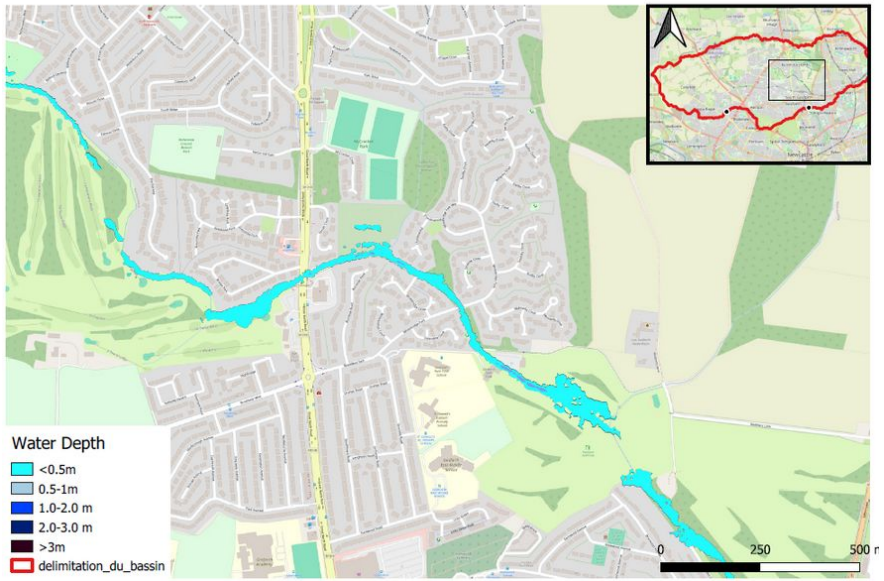
Small houses

HES

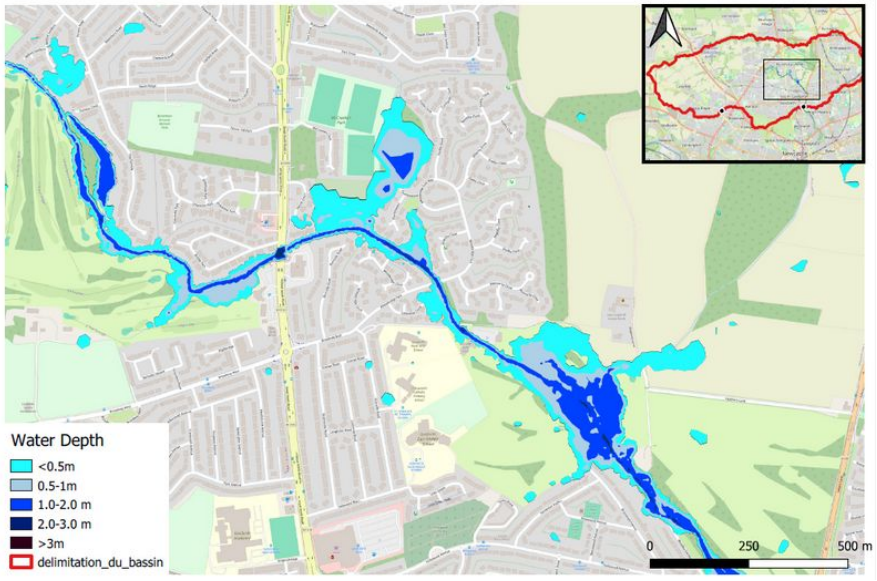
HYDRO-EUROPE-SERVI

WATER DEPTH MAPS, HIGH EXPOSED ZONES

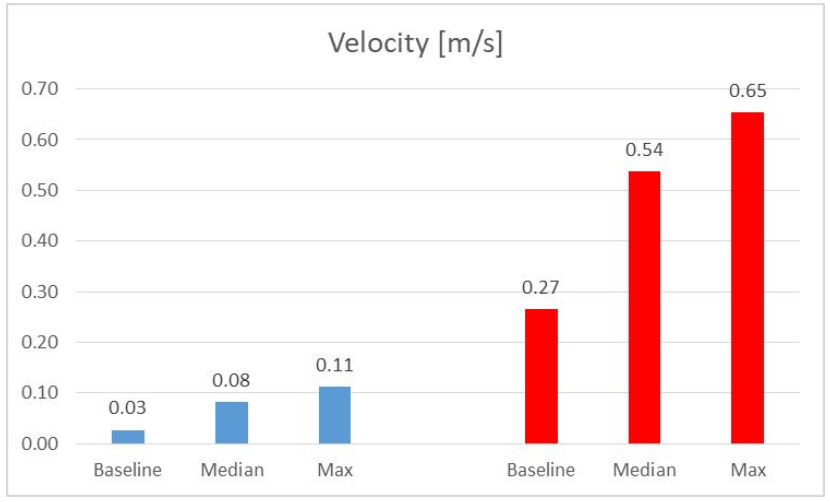
Flood Map _ Baseline scenario



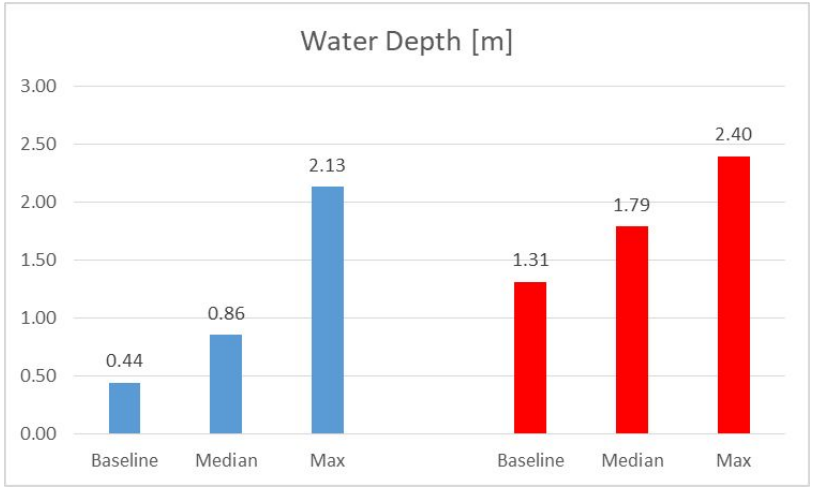
Flood Map _ Max scenario



Water Depth
<0.5m
0.5-1m
1.0-2.0 m
2.0-3.0 m
>3m
delimitation_du_bassin



Q95 Q99



Q95 Q99

HAZARD MAPS PREPARATION USING TELEMAC RESULTS

01

02

03

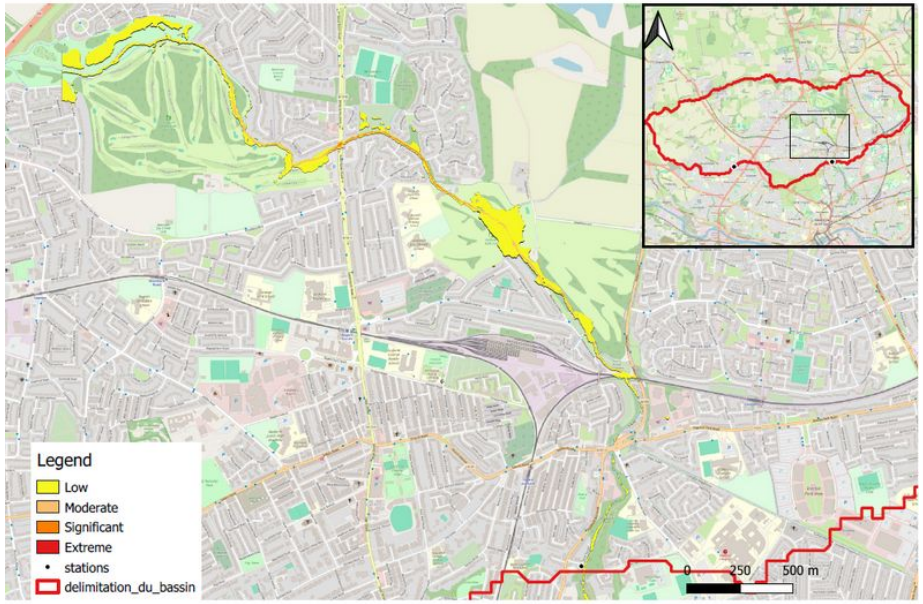
Calculate the flood hazard in the study region and present the risk increase between your baseline and climate change scenarios

d x (v + 0.5)	Degree of Flood Hazard	Description
<0.75	Low	Caution *"Flood zone with shallow flowing water or deep standing water"*
0.75 - 1.25	Moderate	Dangerous for some (i.e. children) *"Danger: Flood zone with deep or fast flowing water"*
1.25 - 2.5	Significant	Dangerous for most people *"Danger: flood zone with deep fast flowing water"*
>2.5	Extreme	Dangerous for all *"Extreme danger: flood zone with deep fast flowing water"*

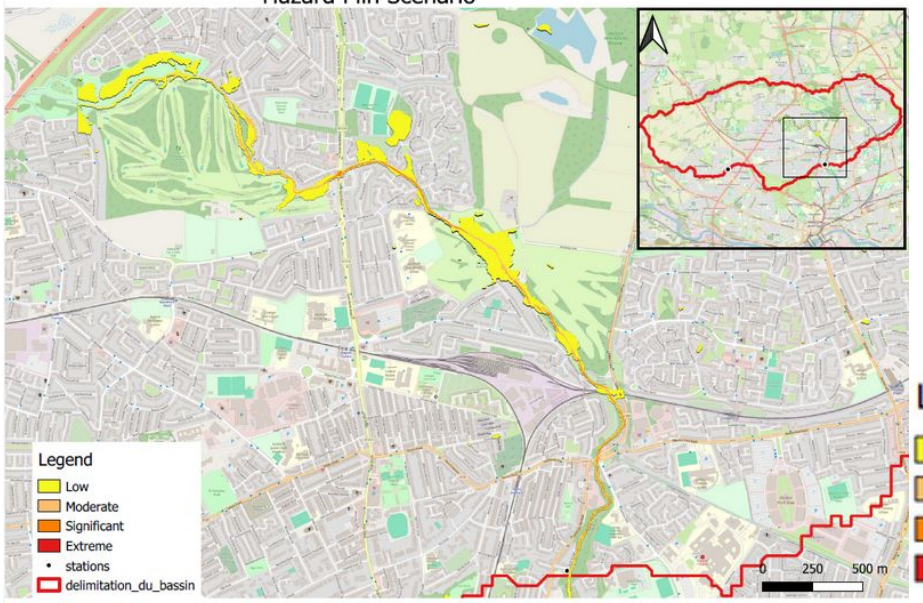
Qgis, prepared the hazard maps

HAZARD MAPS

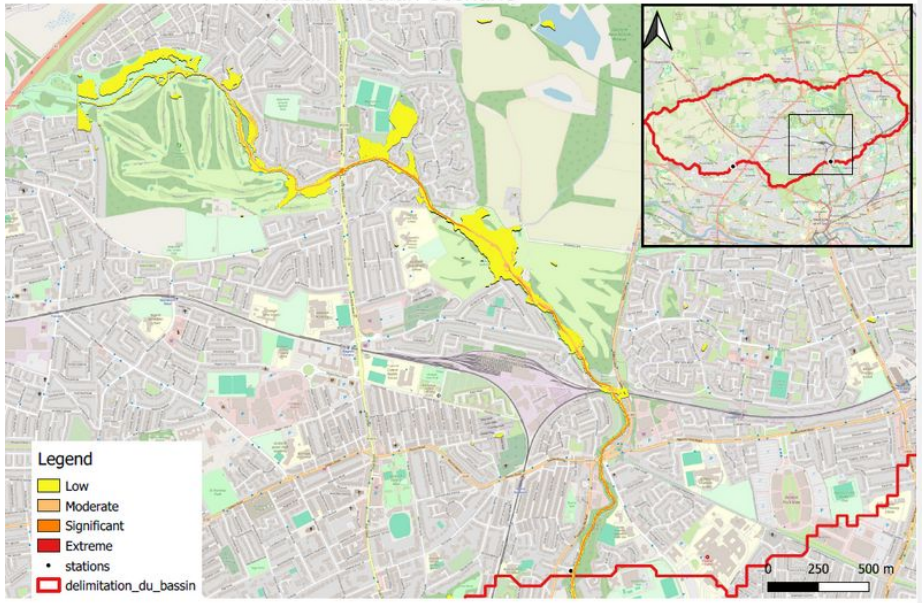
Hazard Base Scenario



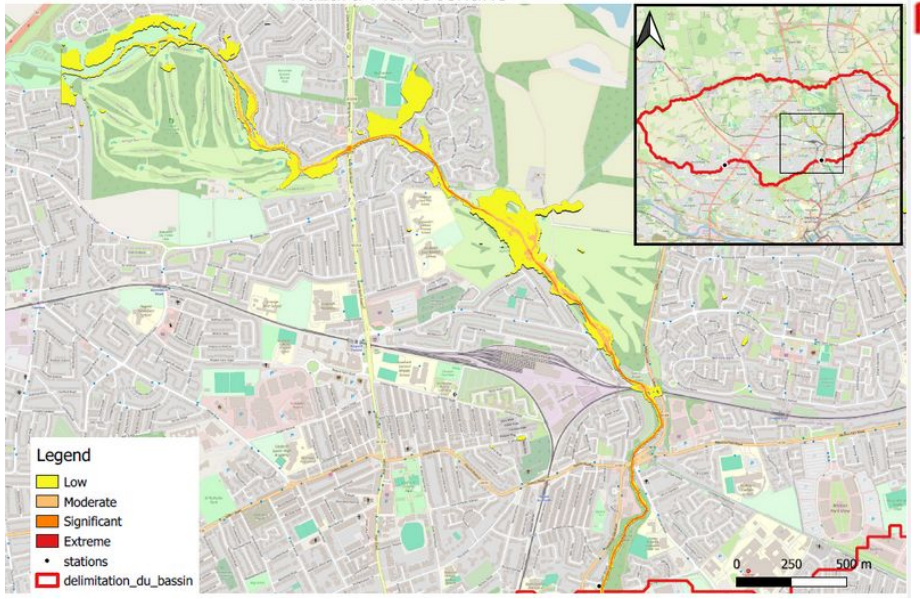
Hazard Min Scenario



Hazard Median Scenario



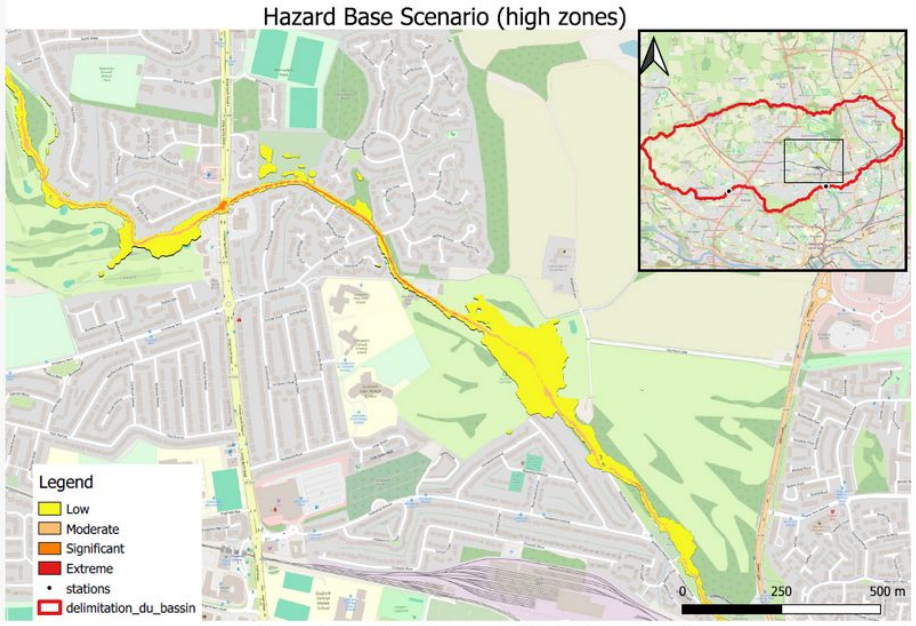
Hazard Max Scenario

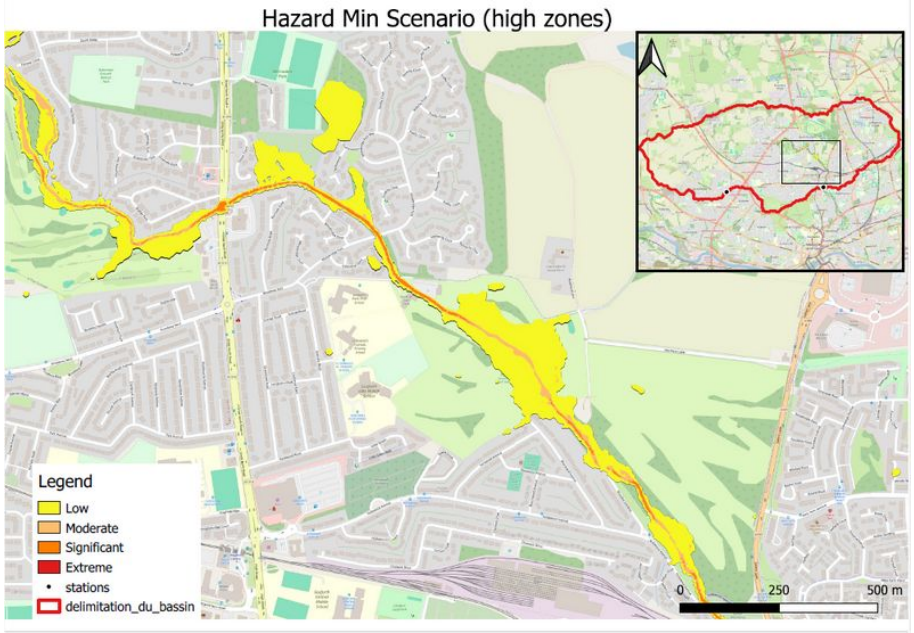


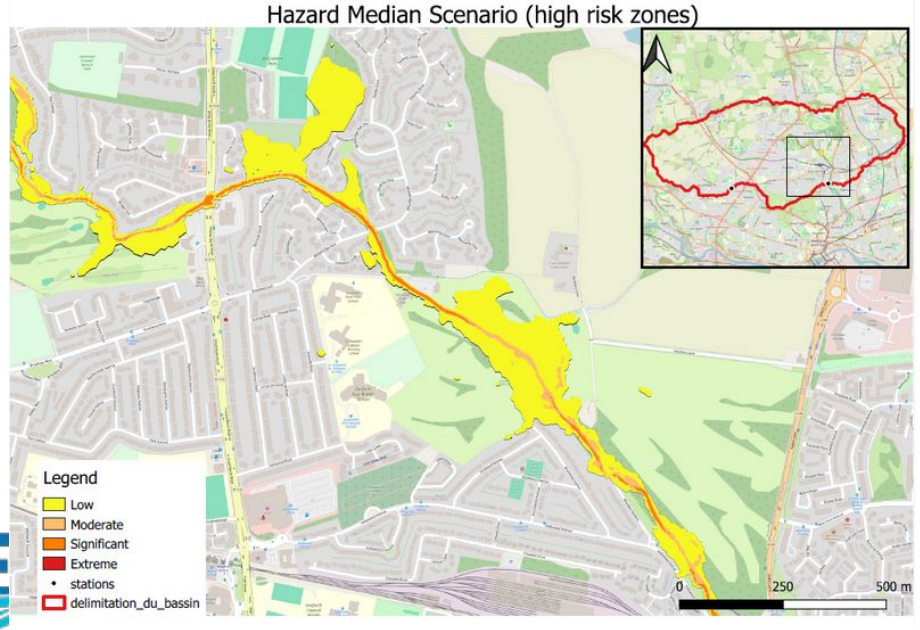
Legend

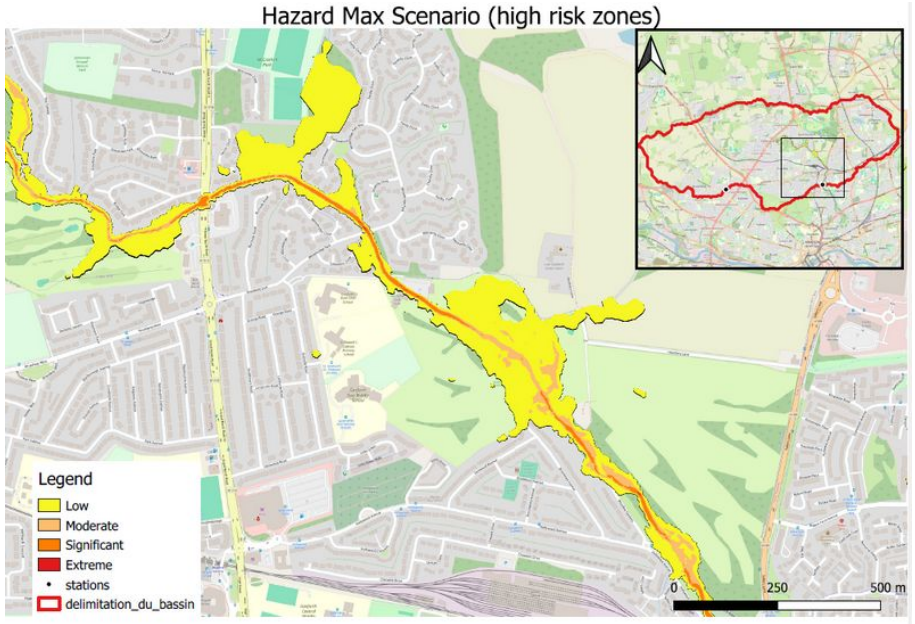
- Low
- Moderate
- Significant
- Extreme
- stations
- delimitation_du_bassin

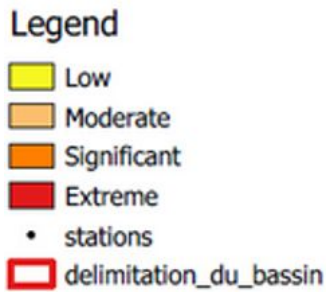
HAZARD MAPS, HIGH EXPOSED ZONES







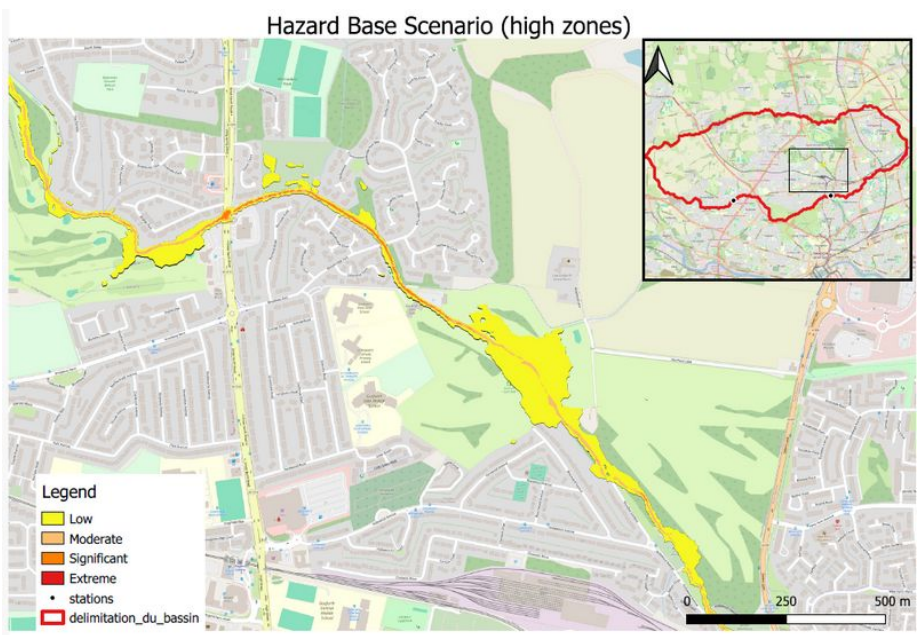


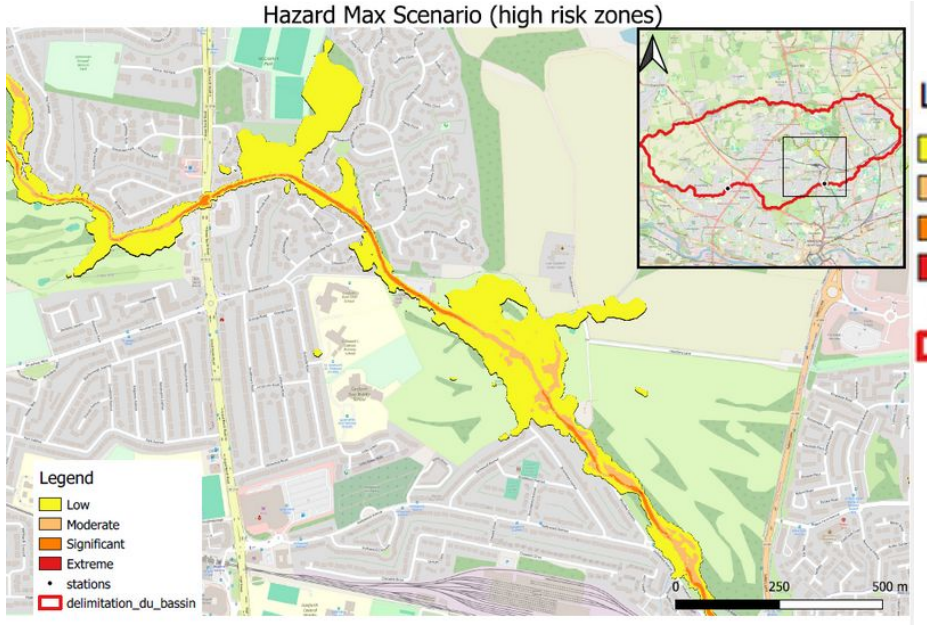


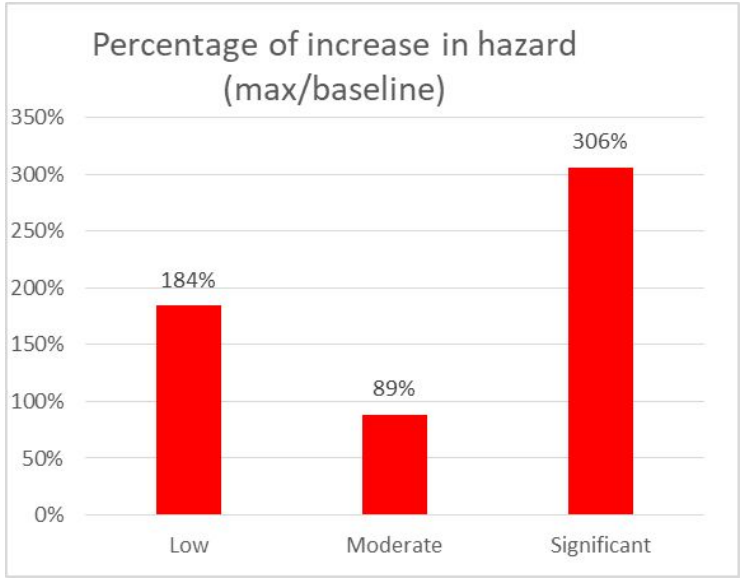
Areas that will be impacted from flooding:

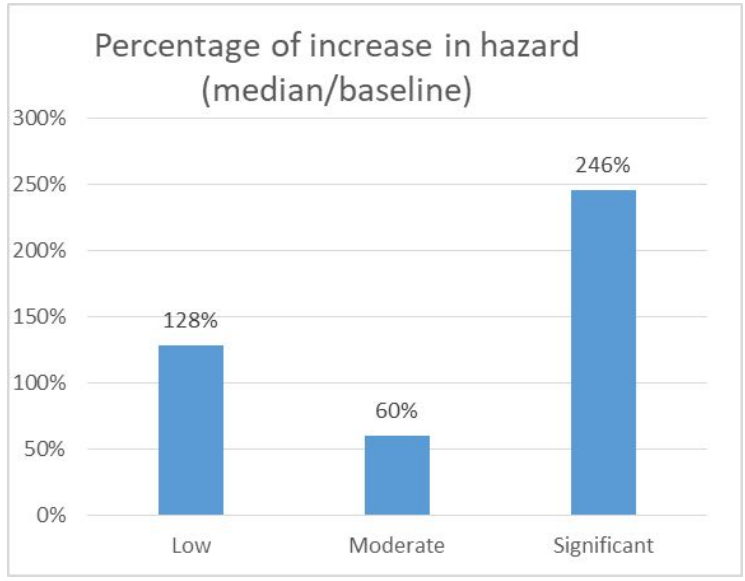
- Gosforth Golf Course
- Newcastle Golf Course
- Small sections of housing estates

HAZARD MAPS, HIGH EXPOSED ZONES









05 CONCLUSION

CONCLUSION

RESULTS

- Most of the flooded zones are parks and golf club, with few residential areas.
- Adding flood barriers in these zones will further protect the population.

UNCERTAINITY

- Input Data/ data resolution.
- Model Structure (Mesh).
- Future Scenario Uncertainty.

RECOMMANDATIONS

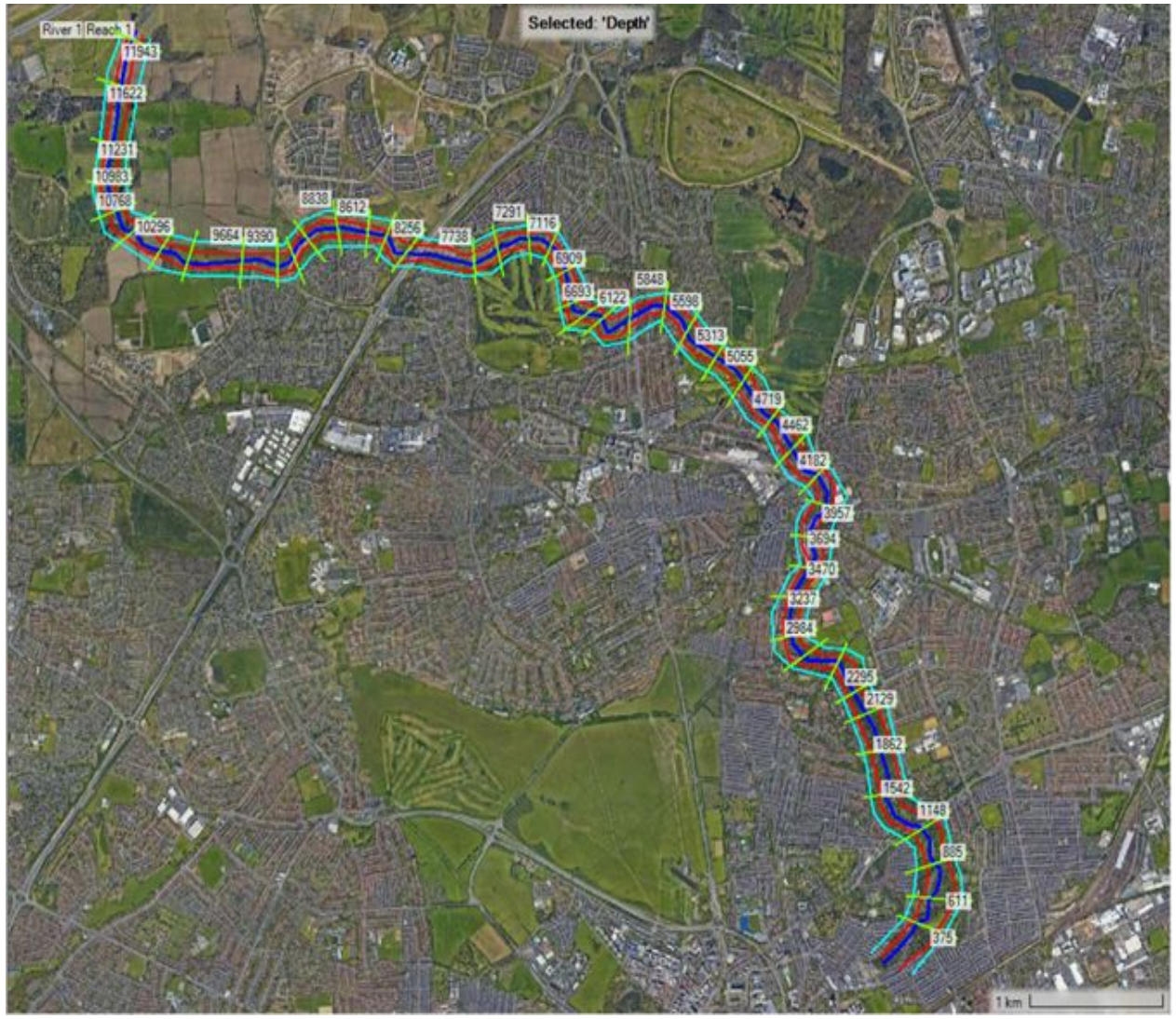
- Hydro-dynamic modeling (pluvial flooding)
- Model all the watershed.

THANK YOU

HES
HYDRO-EUROPE-SERVICE

ATTACHEMEN T

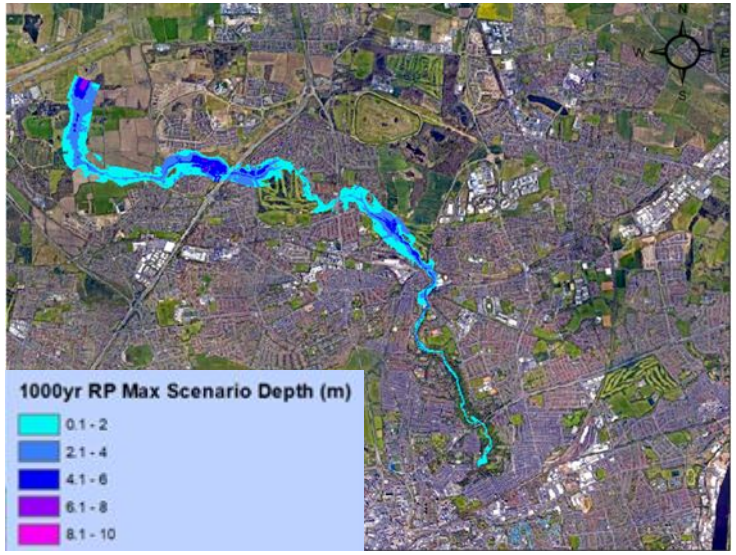
TRIANGULATION USING HEC-RAS



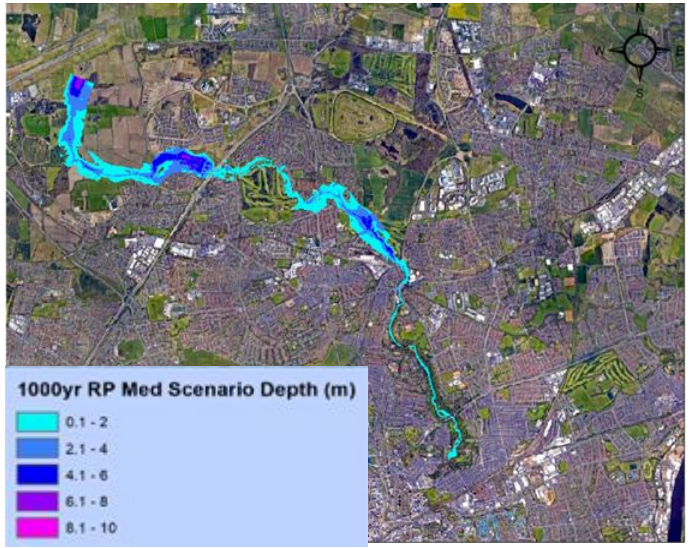
- DTM 2021 (1m resolution)
- River shapefile
- Defining the river geometry in the RAS Mapper
- Boundary conditions:
  Upstream: Flow hydrograph
  Downstream: friction slope (0.003)
- Manning's: 0.035 (main channel)
  0.05 (banks)

HES
YDRO-EUROPE-SERVI

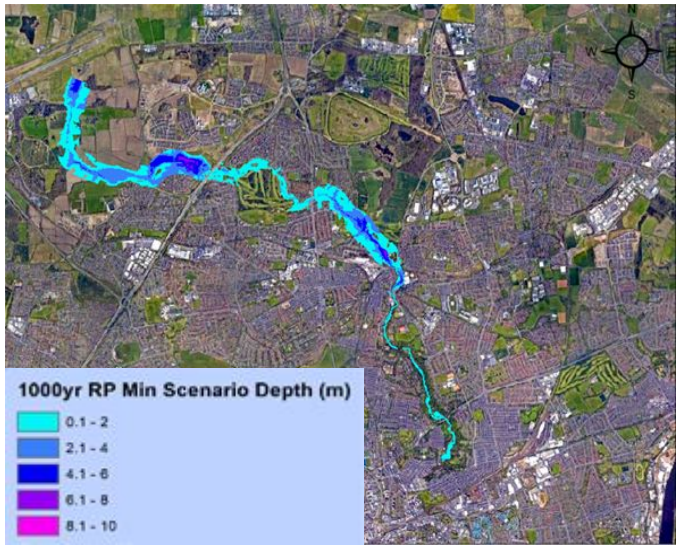
HEC-RAS MODEL RESULTS



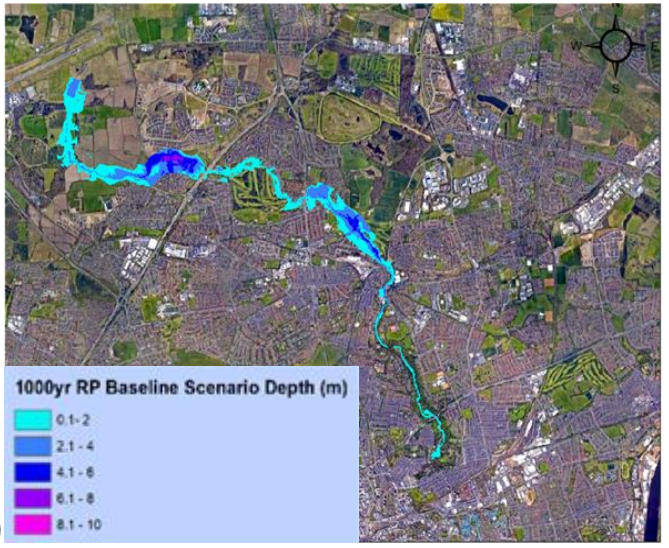
1000yr RP Max (D = 0.63 to 5.8 m)



1000yr RP Med (D = 0.57 to 5.8 m)



1000yr RP Min (D = 0.0009 to 5.5 m)



1000yr RP Baseline (D = 0.39 to 5.5 m)