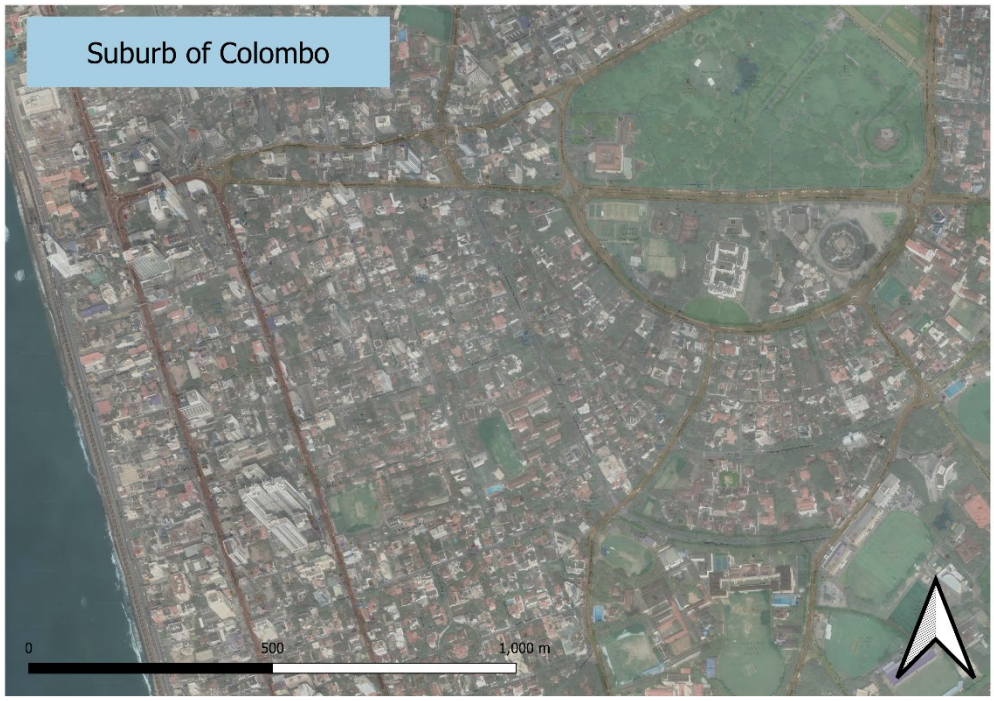
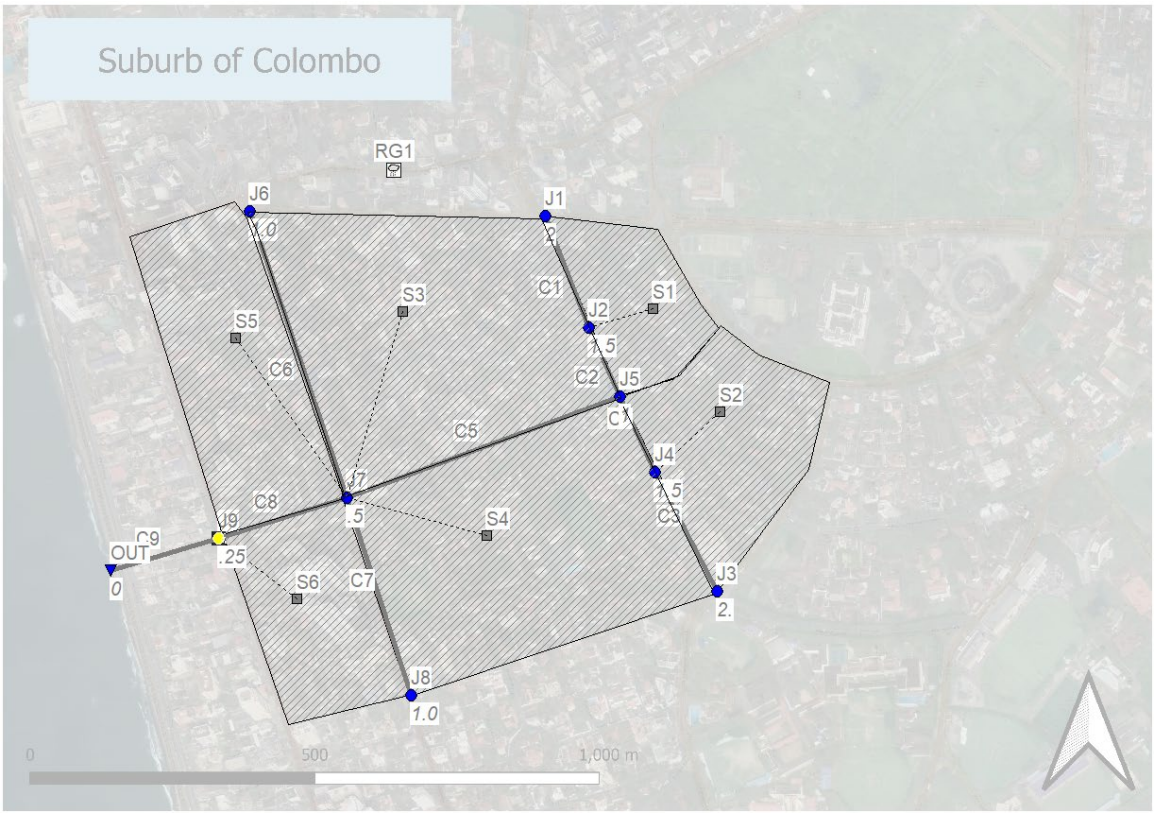
1D flood model for a small urban area

We are going to create a (hypothetical) storm drain system for a part of the area shown in the map below.

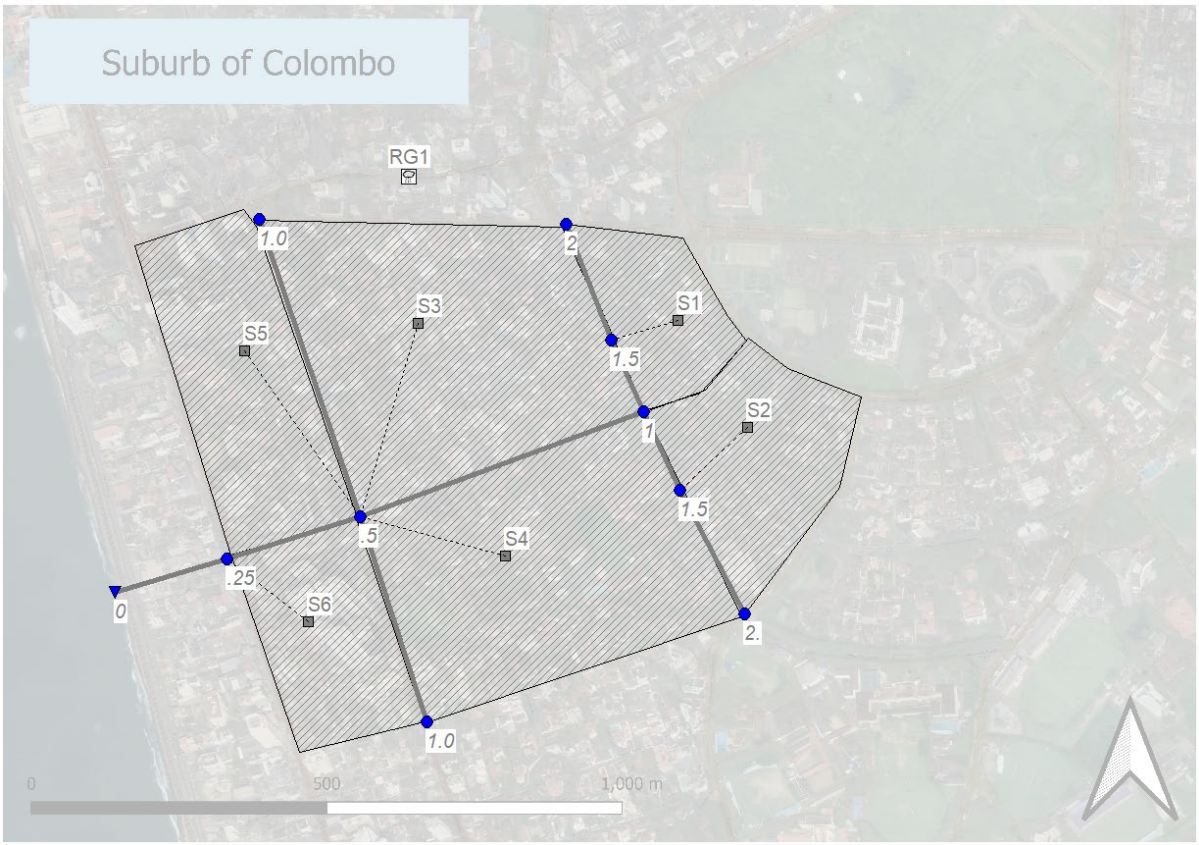


The topology of the network would look like shown below.



We use circular conduits for the lateral branches (C1, C2, C3, C4, C6, C7) and rectangular open channels for the central drain (C5, C8, C9) all made of smooth concrete. This is a relatively flat, highly urbanized area, so the pipe slops are governed by the engineering design rather than topography.

Set the 'invert elevations' as shown below:



Use a maximum depth (height from the invert level to the surface) as 3m for all junctions.

The areas of sub catchments and lengths of the conduits are automatically calculated from the map.

This is a highly urbanized area, use an impervious fraction of 75%.

The soil type of the area can be classified as 'Loamy'.

USDA Soil Type	Suction (mm)	Hydraulic Conductivity (mm/hr)	Porosity (Fraction)
Clay	316.3	0.3	0.385
Silty Clay	292.2	0.5	0.423
Sandy Clay	239	0.6	0.321

Clay Loam	208.8	1	0.309
Silty Clay Loam	273	1	0.432
Sandy Clay Loam	218.5	1.5	0.33
Silt Loam	166.8	3.4	0.486
Loam	88.9	7.6	0.434
Sandy Loam	110.1	10.9	0.412
Loamy Sand	61.3	29.9	0.401
Sand	49.5	117.8	0.417

Activities

1. Layout the storm drainage network model as shown above.
2. Set the appropriate parameter values for sub catchments, junctions and the conduits.
3. Input two rainfall time series (a) 2-year return period, 2h design storm (b) 25-year return period 2h design storm.
4. Design the system (by changing the dimensions of the conduits) so that there is no flooding for 2-year storm.
5. Examine the flooding situation under 10-year storm.