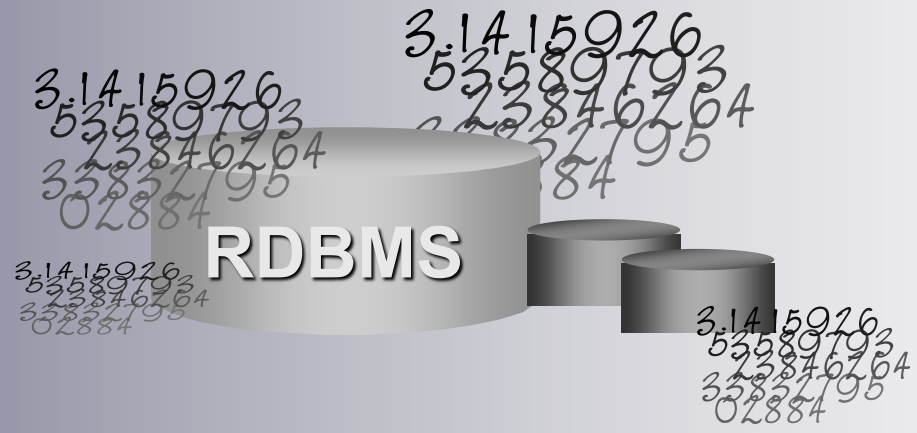
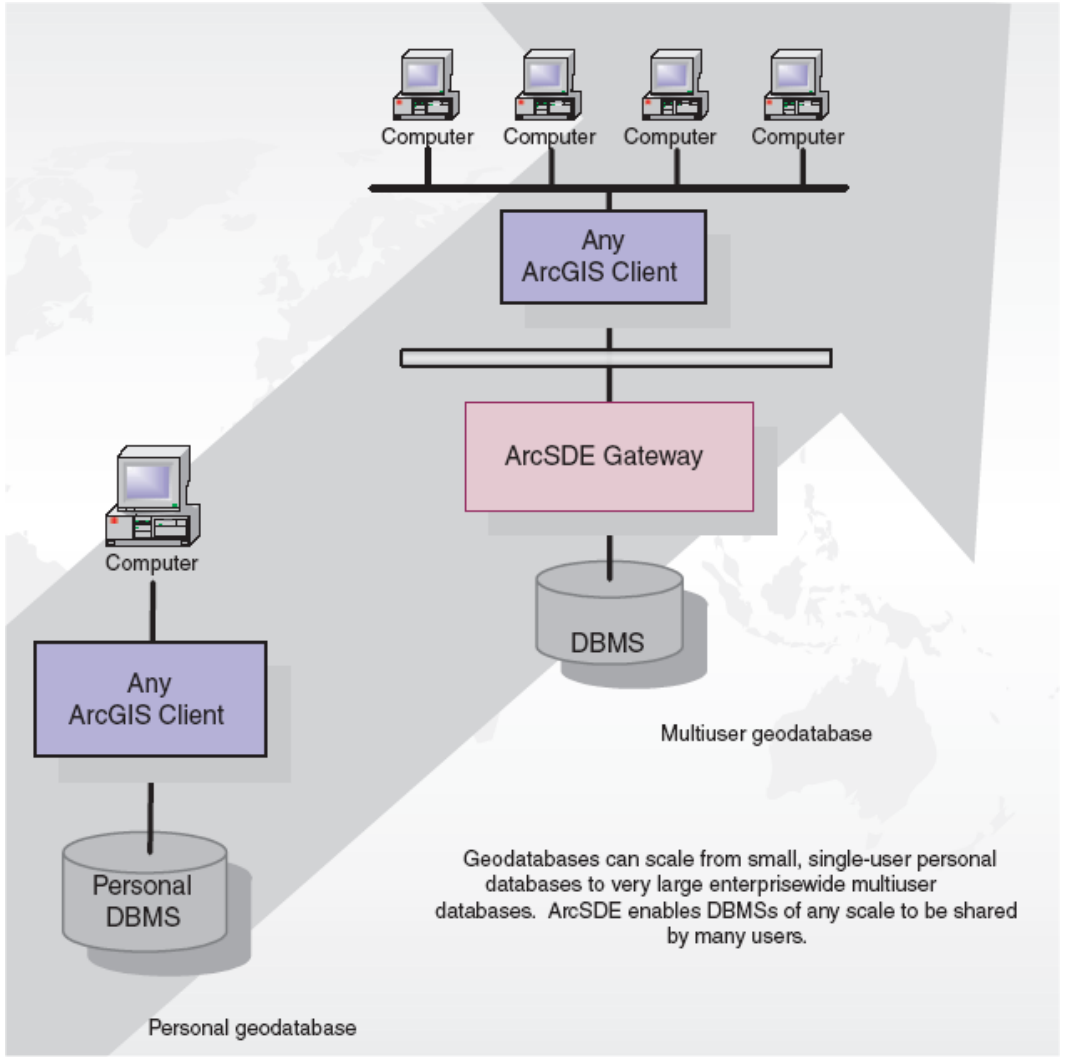
GIS
Geographic Information Systems

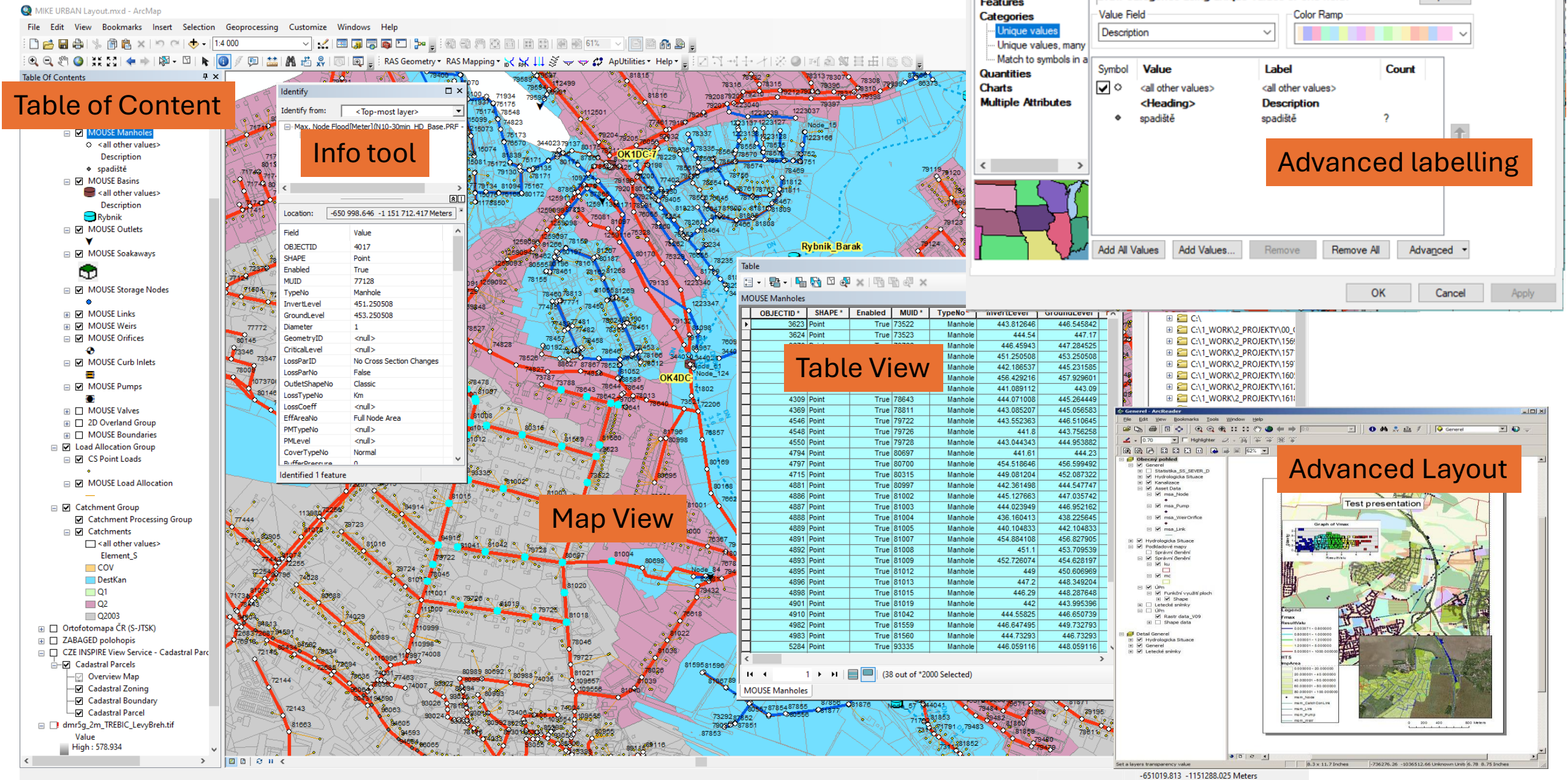


Geographical Information Systems

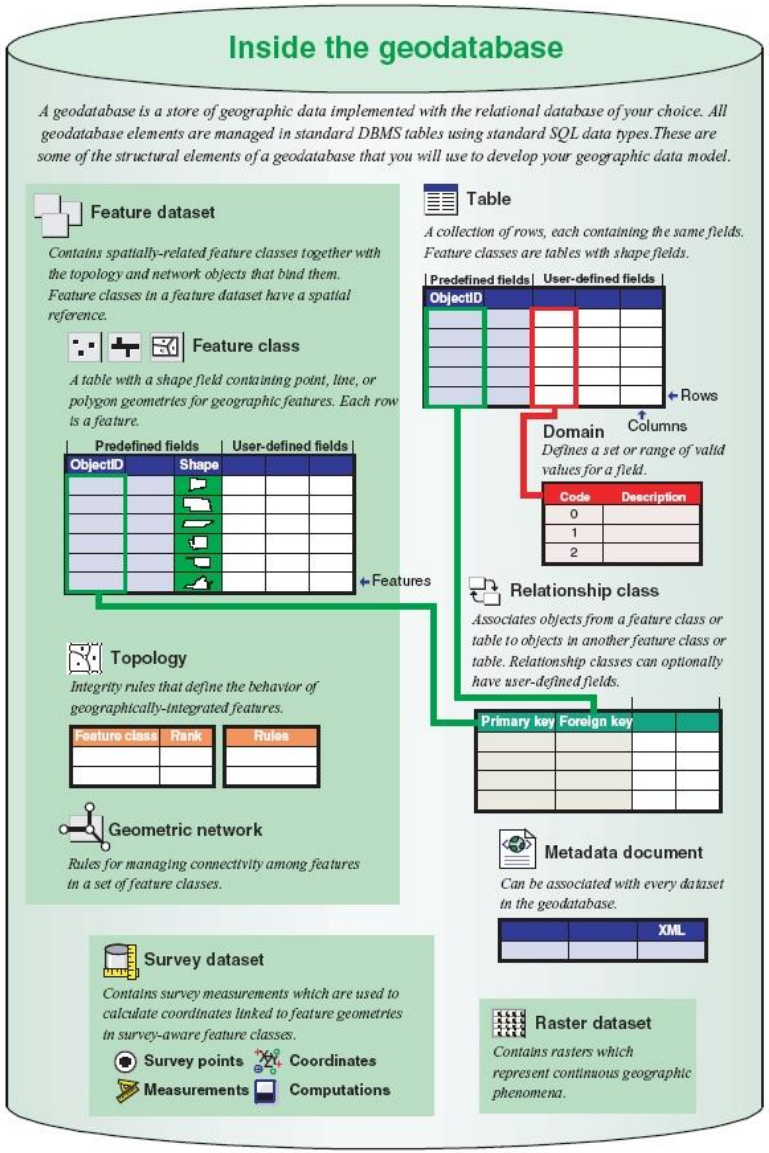
- Combination of Database and Spatial Information - FEATURES
- Layer structure
- Coordinate systems
- Labeling, merging, thematising,…
- Use of geodatabase, SHP, …
- Geocoding
- Use of spatial queries
- Selections,
- Editing, Joining tables
- Export/Import

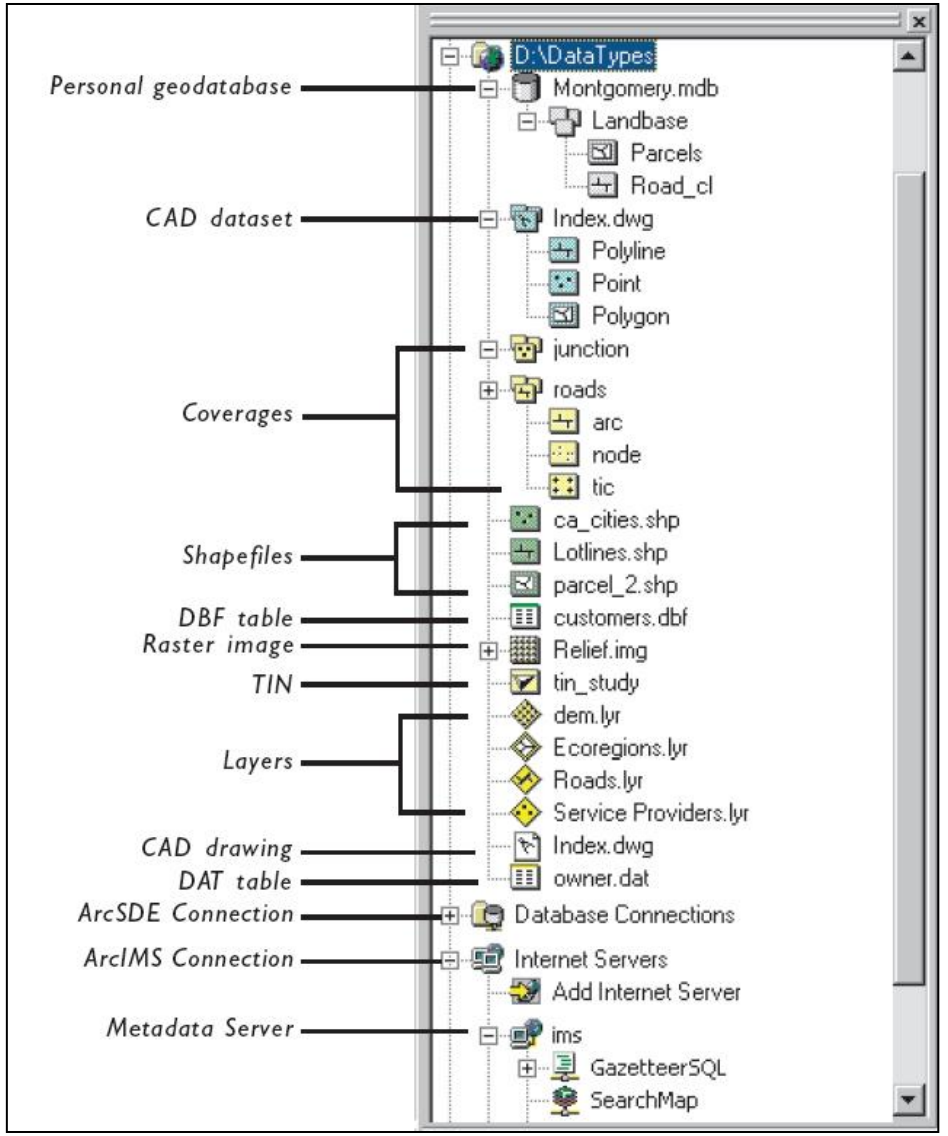


ArcGIS environment



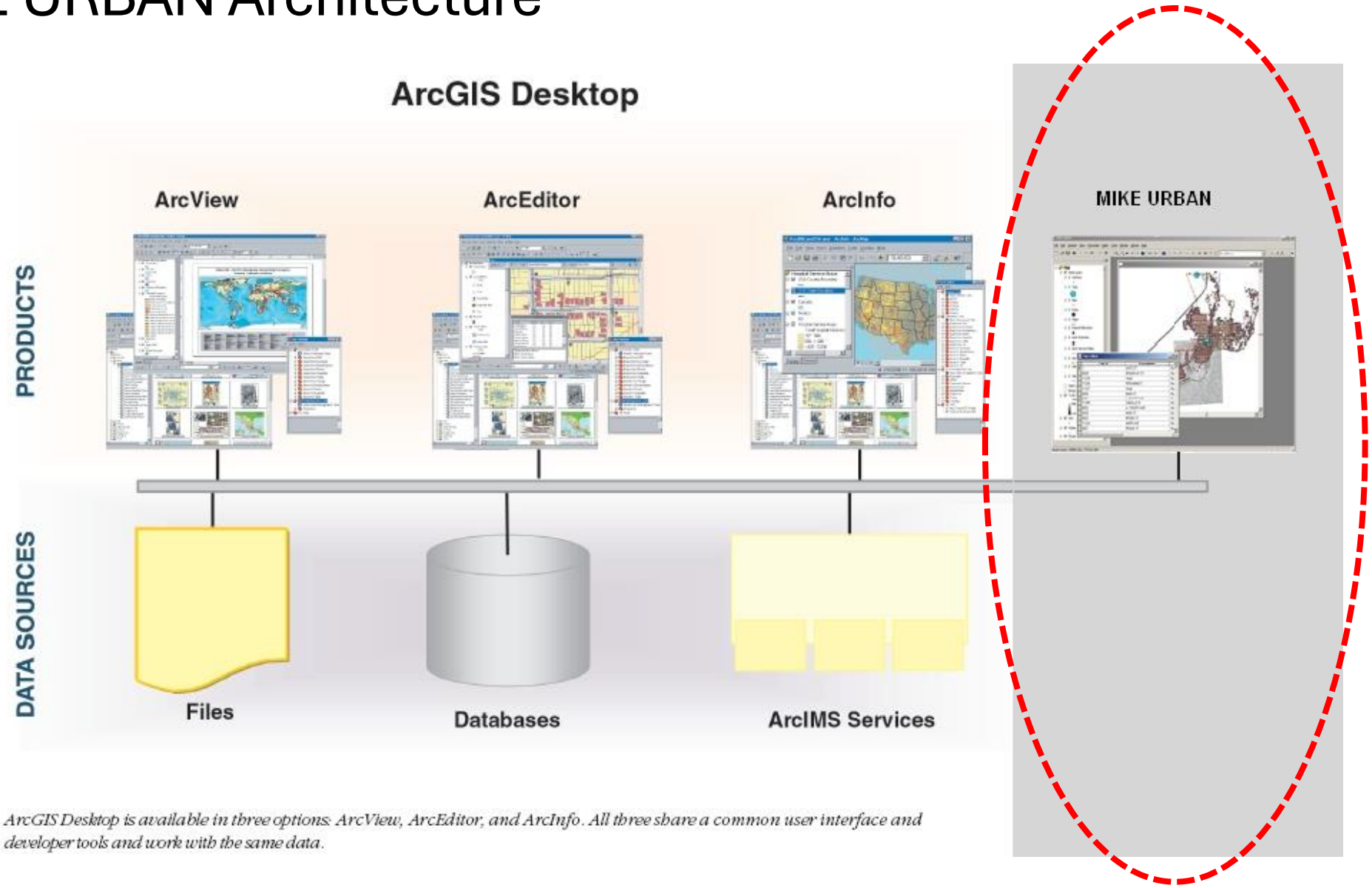
ArcGIS Data Structure





Model and GIS coupling

MIKE URBAN Architecture

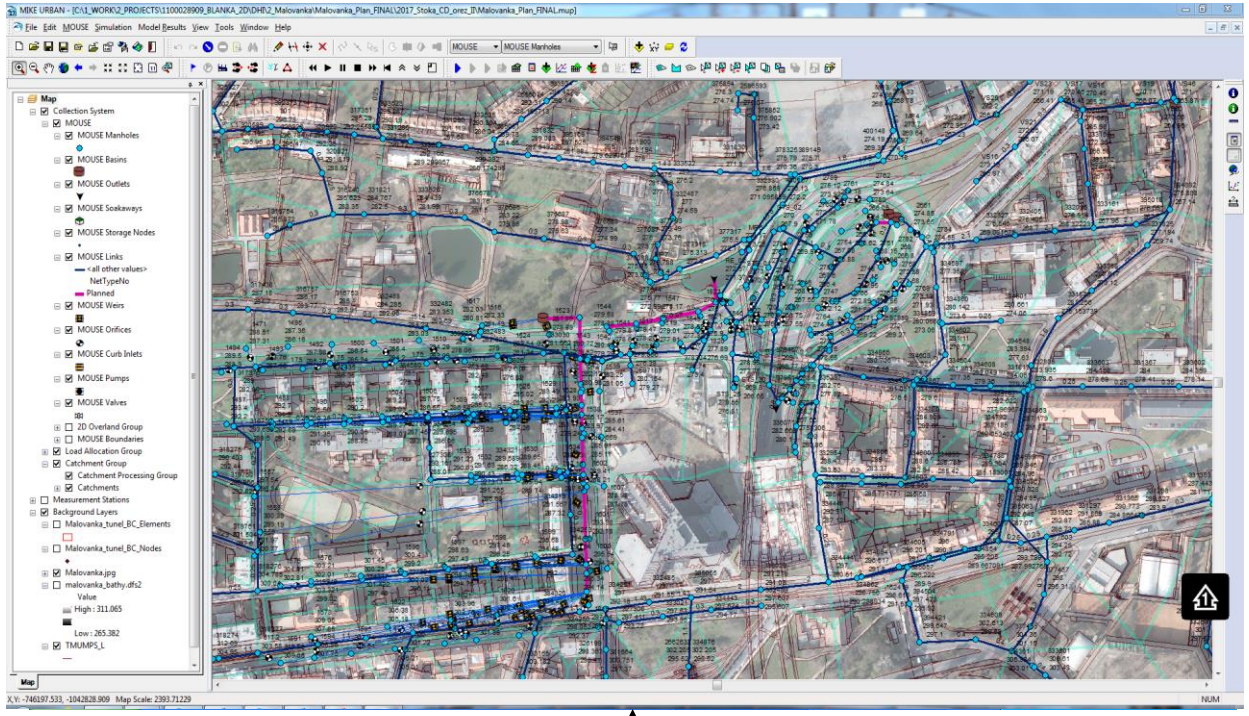


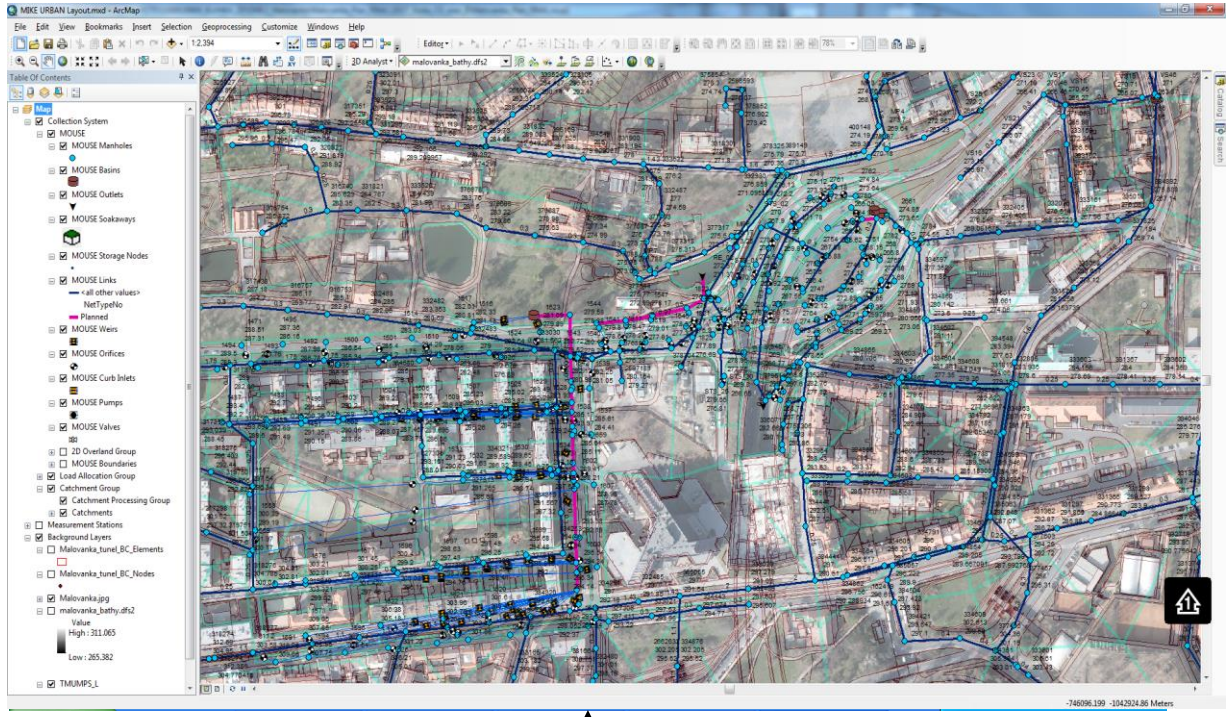
ArcGIS Desktop is available in three options: ArcView, ArcEditor, and ArcInfo. All three share a common user interface and developer tools and work with the same data.

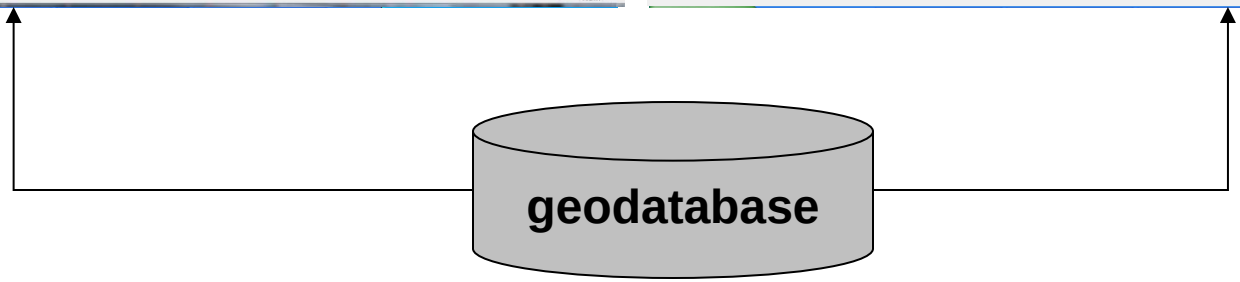
Model and GIS coupling

MIKE URBAN project

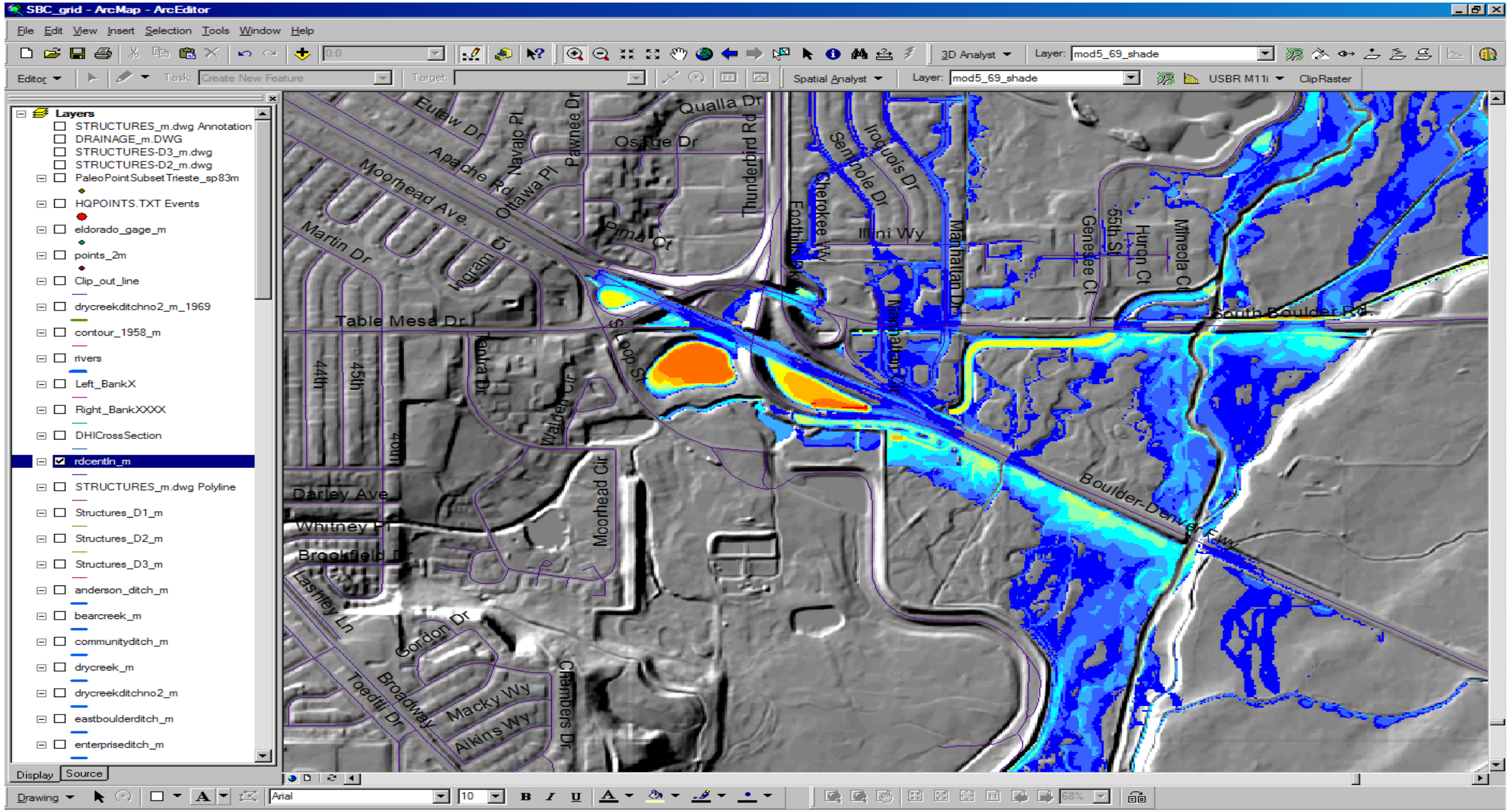
ARCMap project





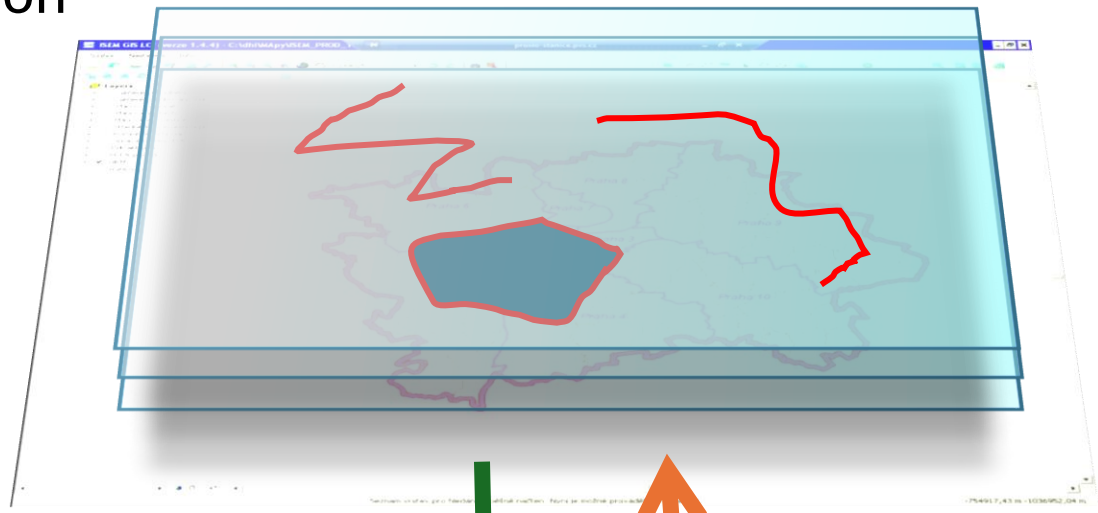


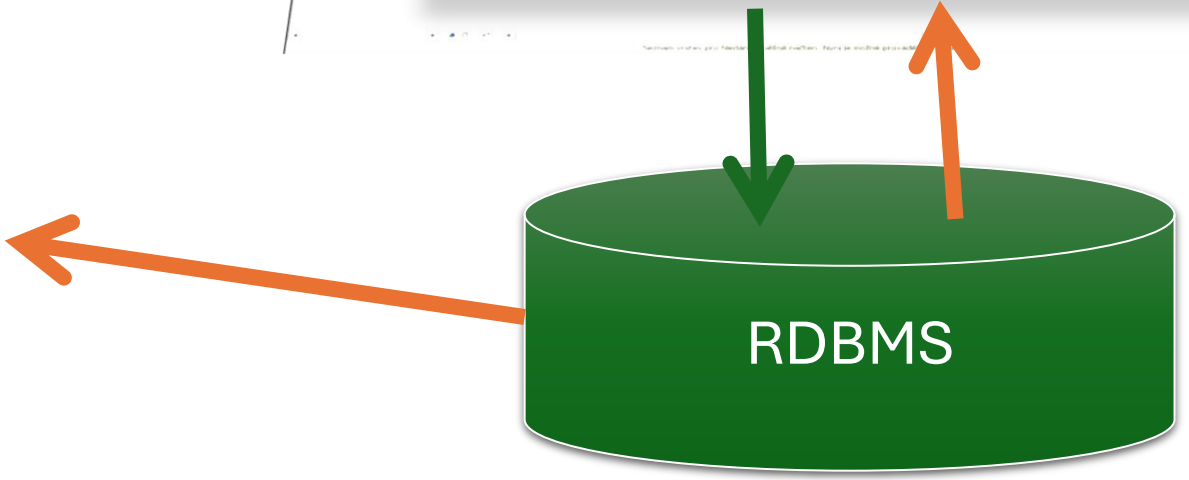
GIS + model Result analysis



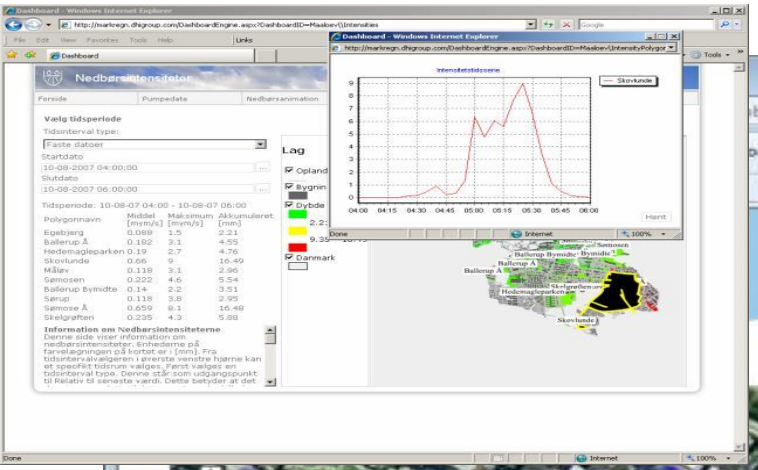
GIS as service in the Internet

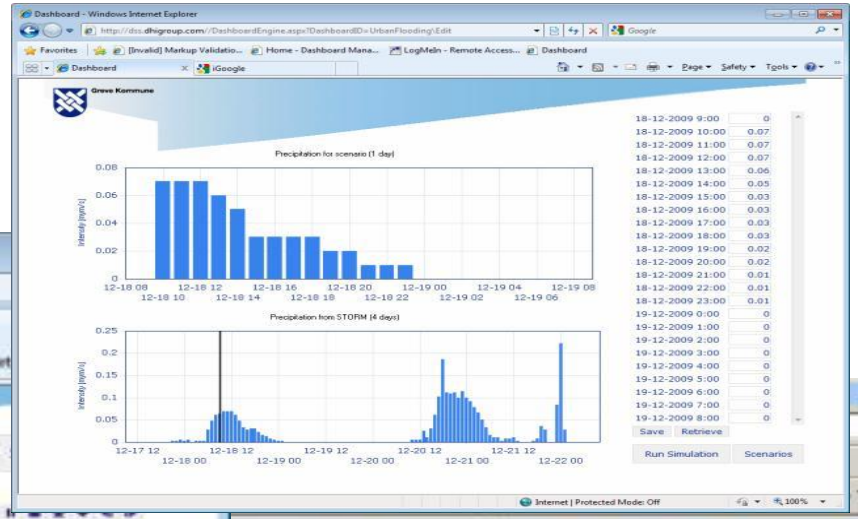
- Easy representation of geographically oriented data
- Easy combination of distinct data layers
- Combination of graphical and database information
- Advanced statistics
- Topological functions
- Connection to internet

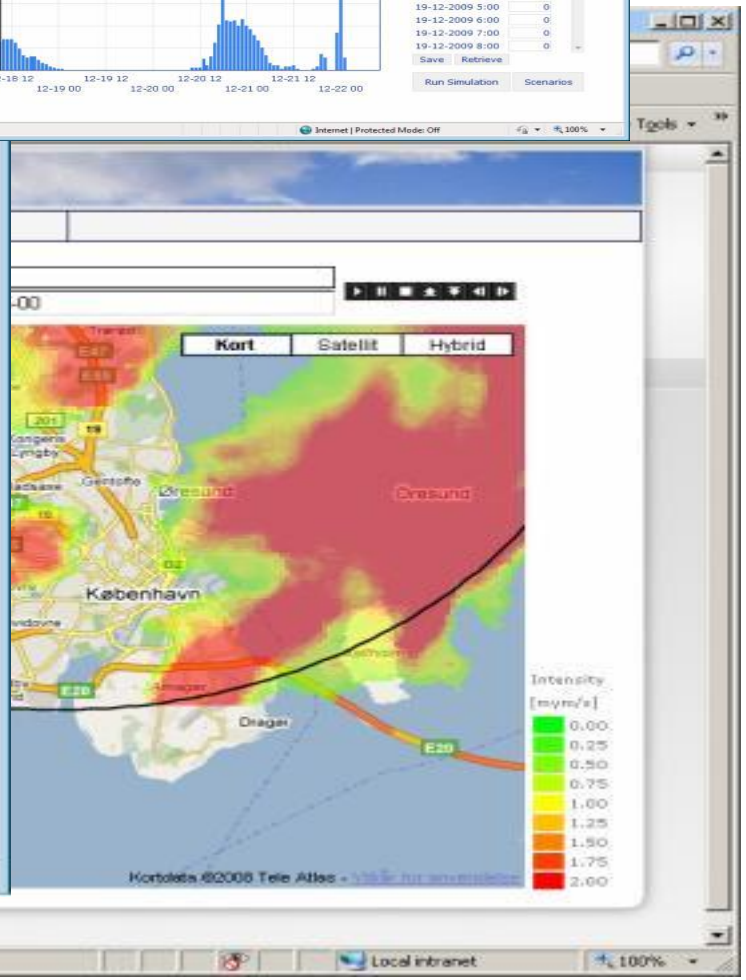




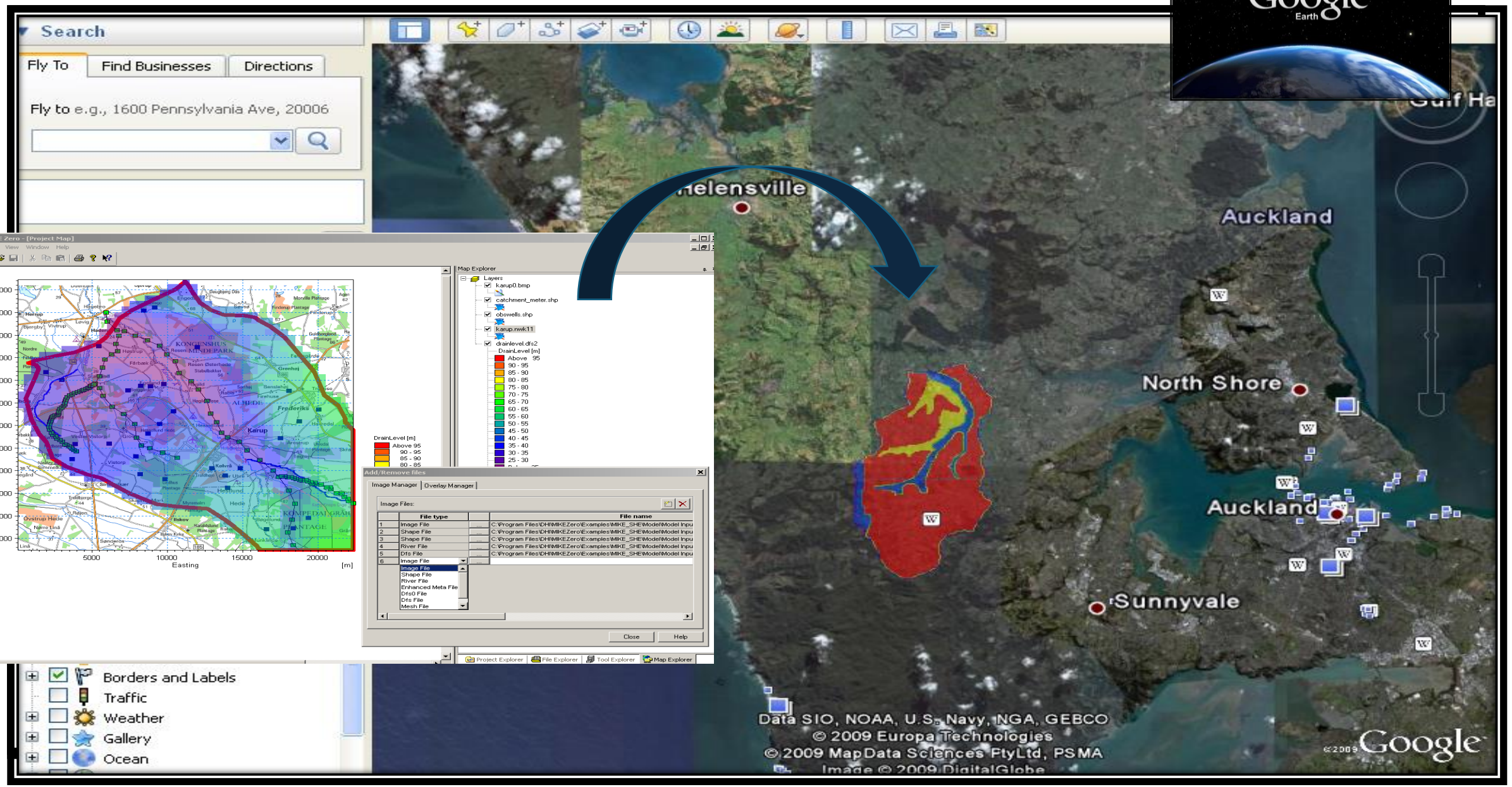
Model on Internet







Model in Google Earth



Hydroinformatics
Tools and Technologies

Technology providers

DHI WATER & ENVIRONMENT

www.haestad.com METHODS

Bentley

Wallingford Software

wl | delft hydraulics

FlowMaster®
The Hydraulic Toolbox

MIKE BASIN
GIS-based river basin management

EFOR
Waste water treatment

MIKE SHE
Integrated surface water and ground water

MOUSE
Waste water and storm water

MIKE 11
Rivers, channels, reservoirs

MIKE 21
Coastal and inland waters in 2D

HYPRESS
Water hammer simulation

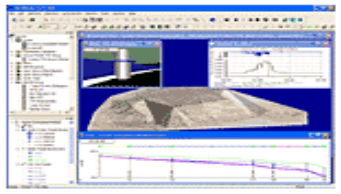
MIKE SWMM
Waste water and storm water

REV
Resen

MIKE NET
Water distribution networ

SewerCAD® for AutoCAD
Sanitary Sewer Design & Modeling Software

InfoWorks™



Sobek is named after the ancient Egyptia river god. Crocodiles were believed to ha powers, as they were laying their eggs ju level of the next Nile flood.

Click for next slide

wl | delft hydraulics

Download your free trial copy here or send off for a CD ROM

Brbab

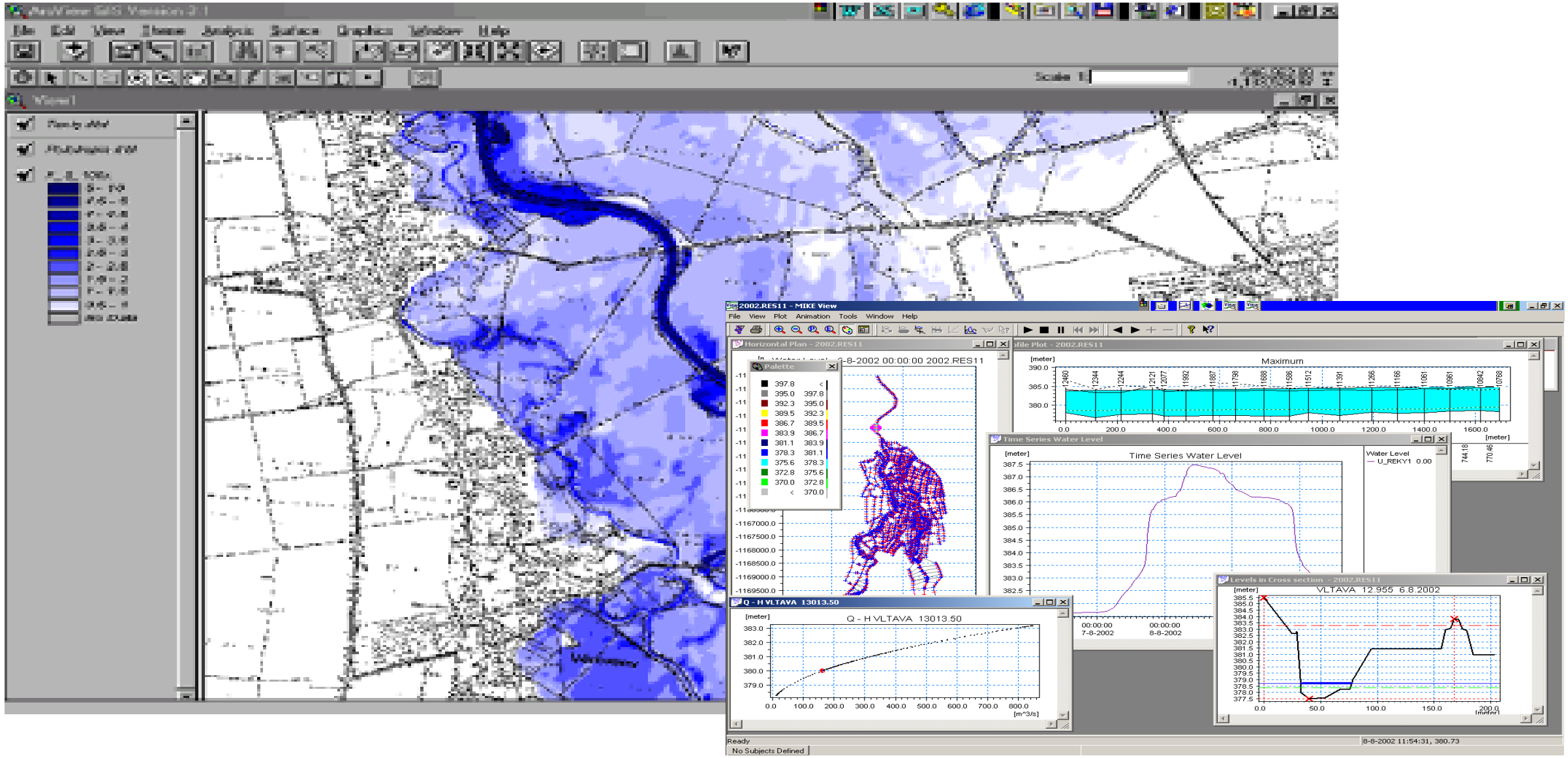
DELFT FLS
Delft Flooding System

FloodWorks

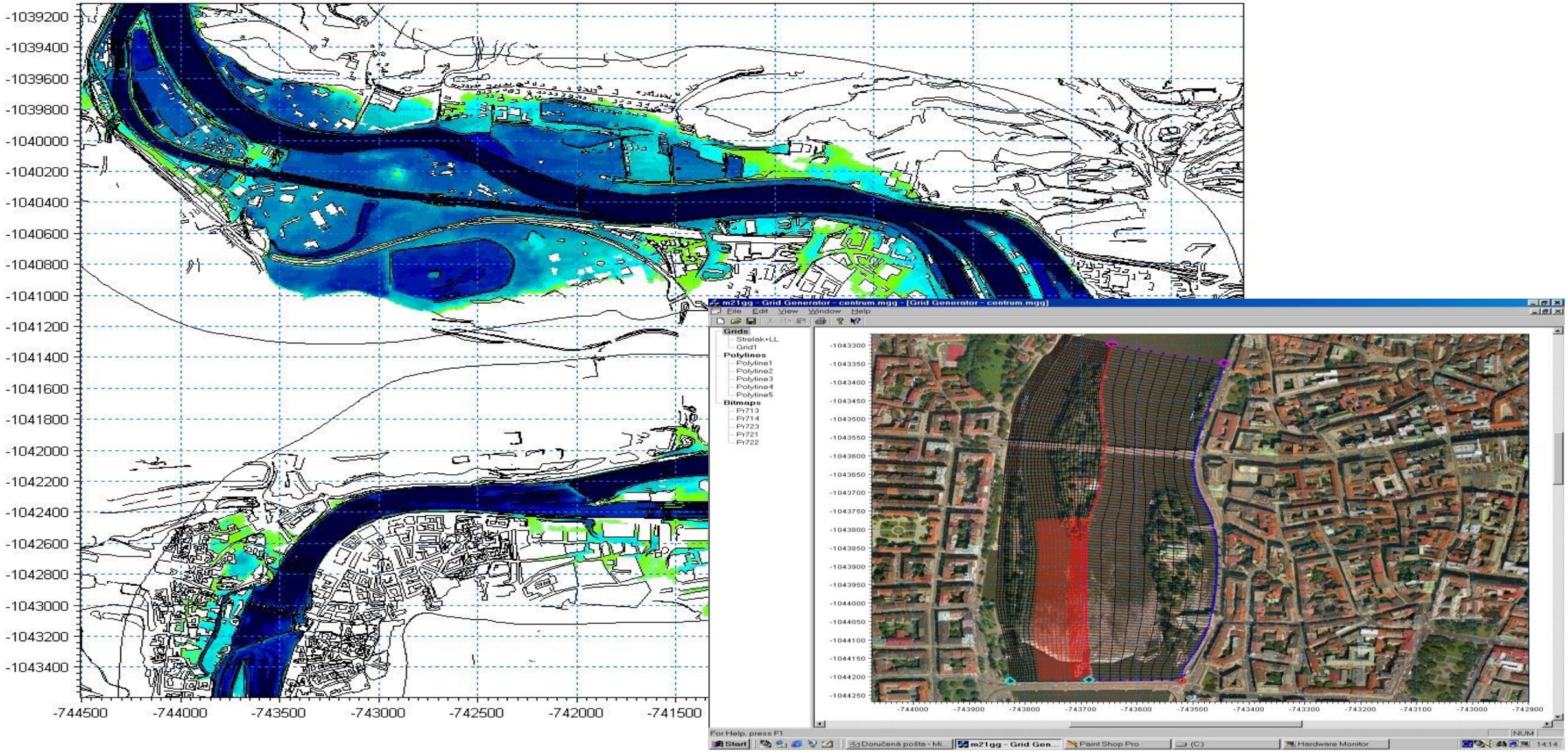
InfoNet

DHI software products

MIKE 11 river model

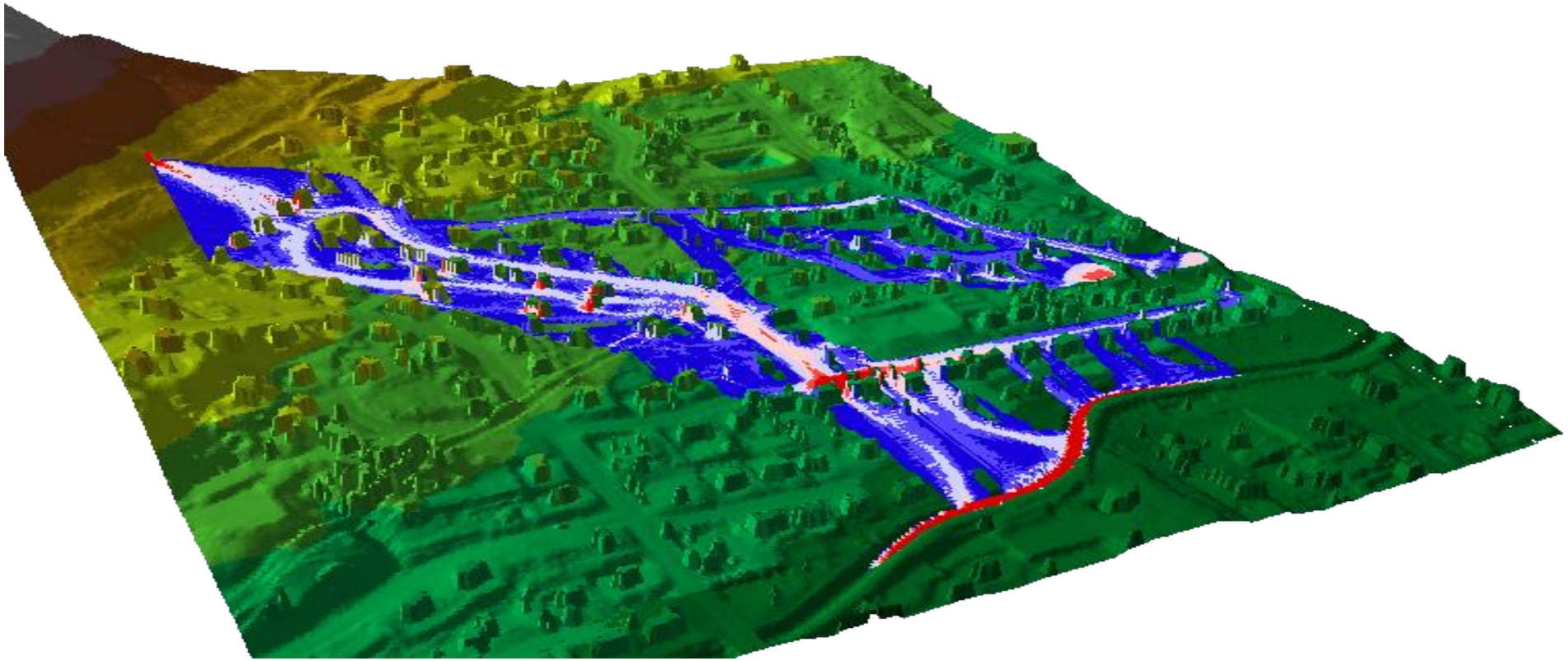


MIKE 21 flood model



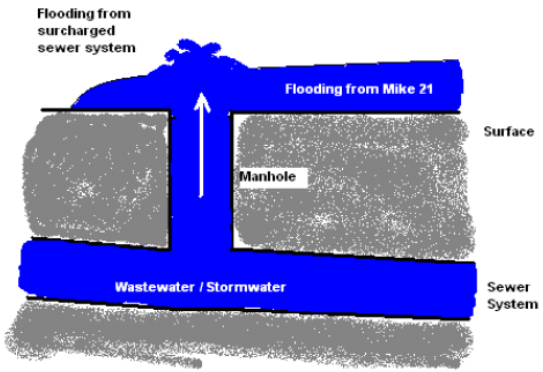
MIKE FLOOD

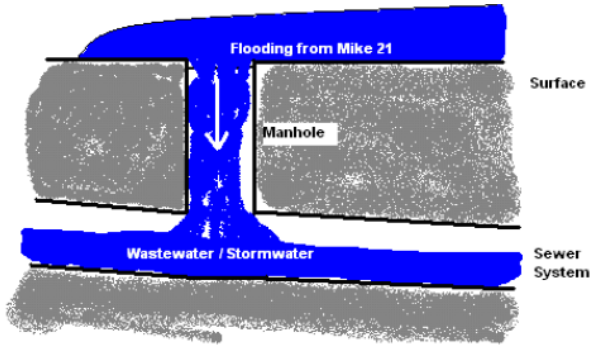
Flood plain and storm surge



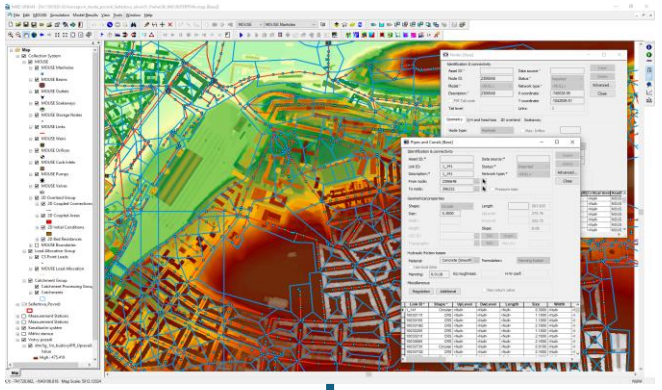
Urban Drainage Model Coupling

Need for assessment of mutual water Exchange between surface and drainage





Coupled 1D + 2D model



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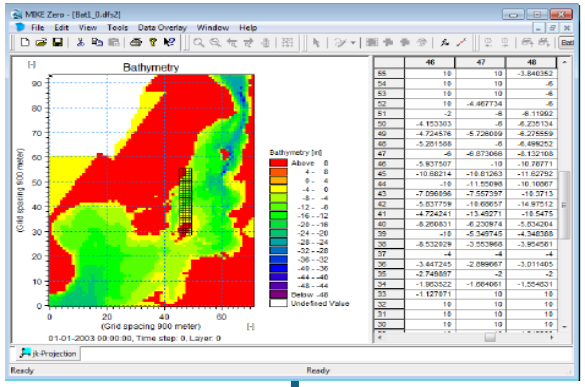
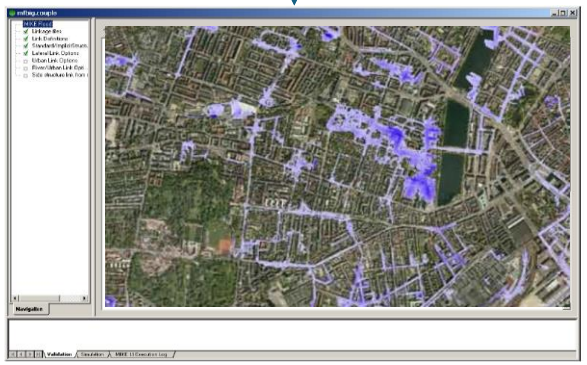
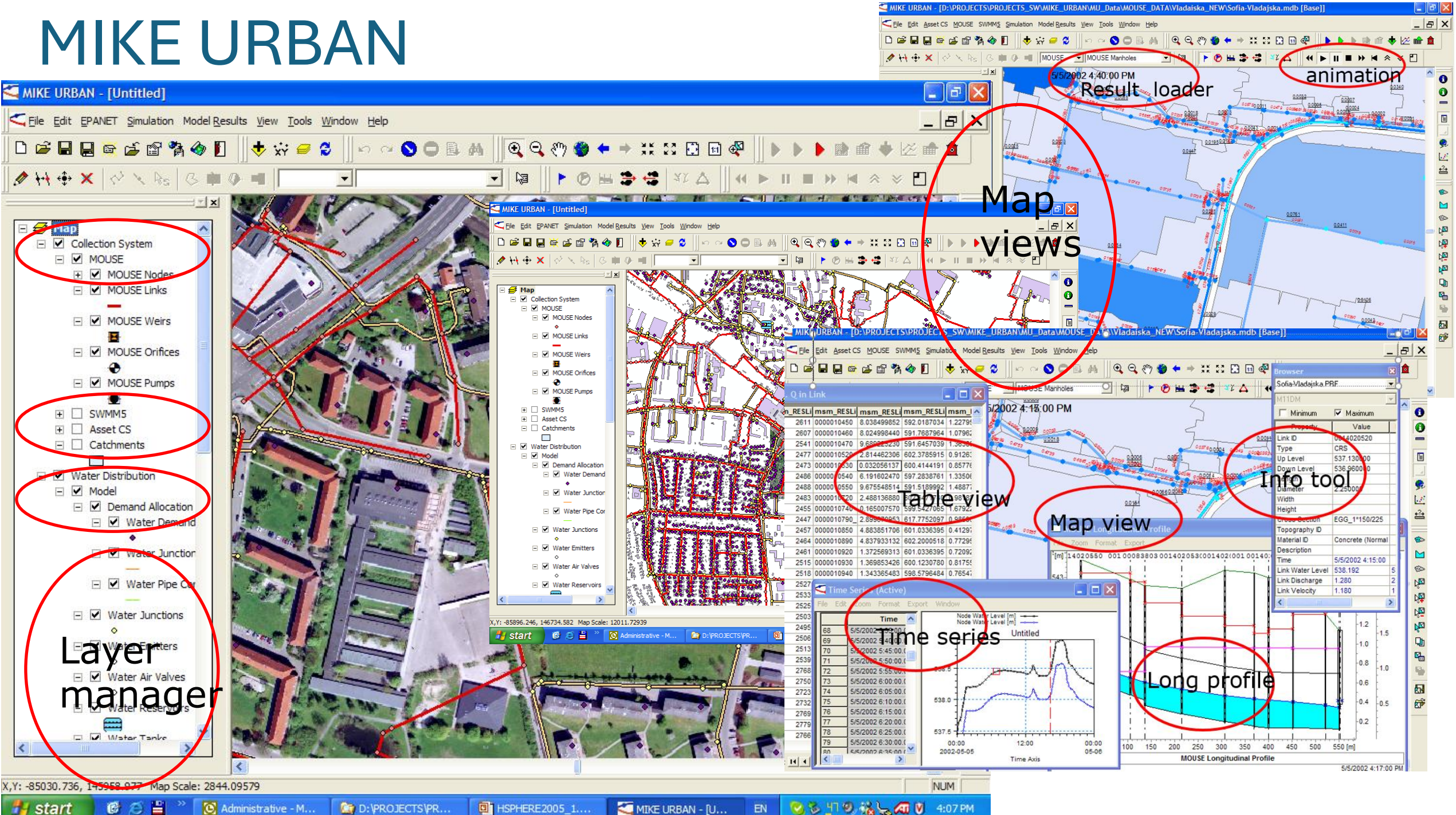




MIKE URBAN


MIKE URBAN - [Untitled]
File Edit EPANET Simulation Model Results View Tools Window Help
Map
Collection System
MOUSE
MOUSE Nodes
MOUSE Links
MOUSE Weirs
MOUSE Orifices
MOUSE Pumps
SWMM5
Asset CS
Catchments
Water Distribution
Model
Demand Allocation
Water Demand
Water Junction
Water Pipe Cor
Water Junctions
Water Emitters
Water Air Valves
Water Reservoirs
Water Tanks
Layer manager
Result loader
animation
Map views
Table view
Map view
Info tool
Time series
Long profile
Q in Link
Time Series (Active)
Browser
Sofia-Vladajska.PRF
MOUSE Longitudinal Profile
X,Y: -85030.736, 145958.877 Map Scale: 2844.09579
NUM
start
Administrative - M...
D:\PROJECTS\PR...
HSPHERE2005_1....
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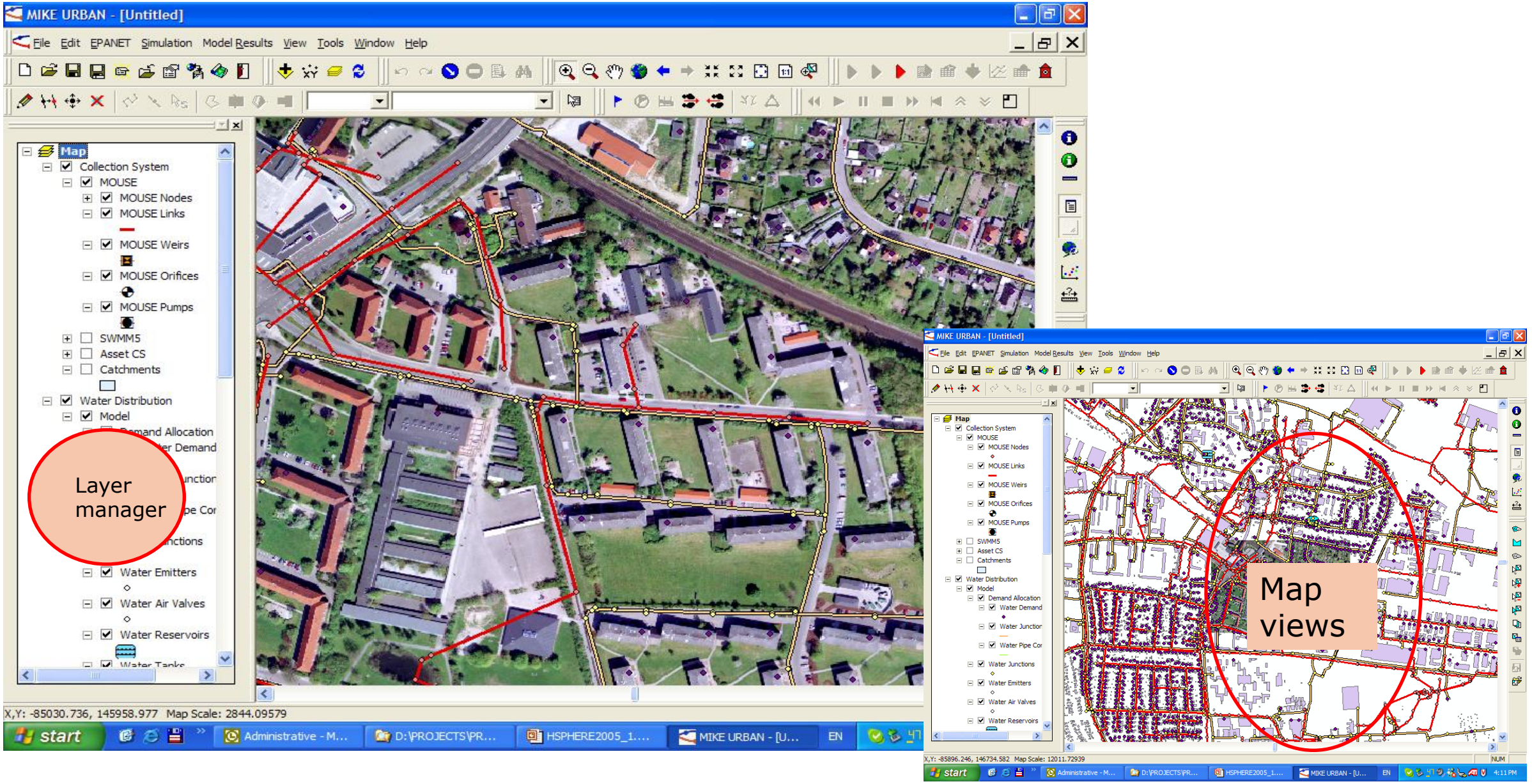
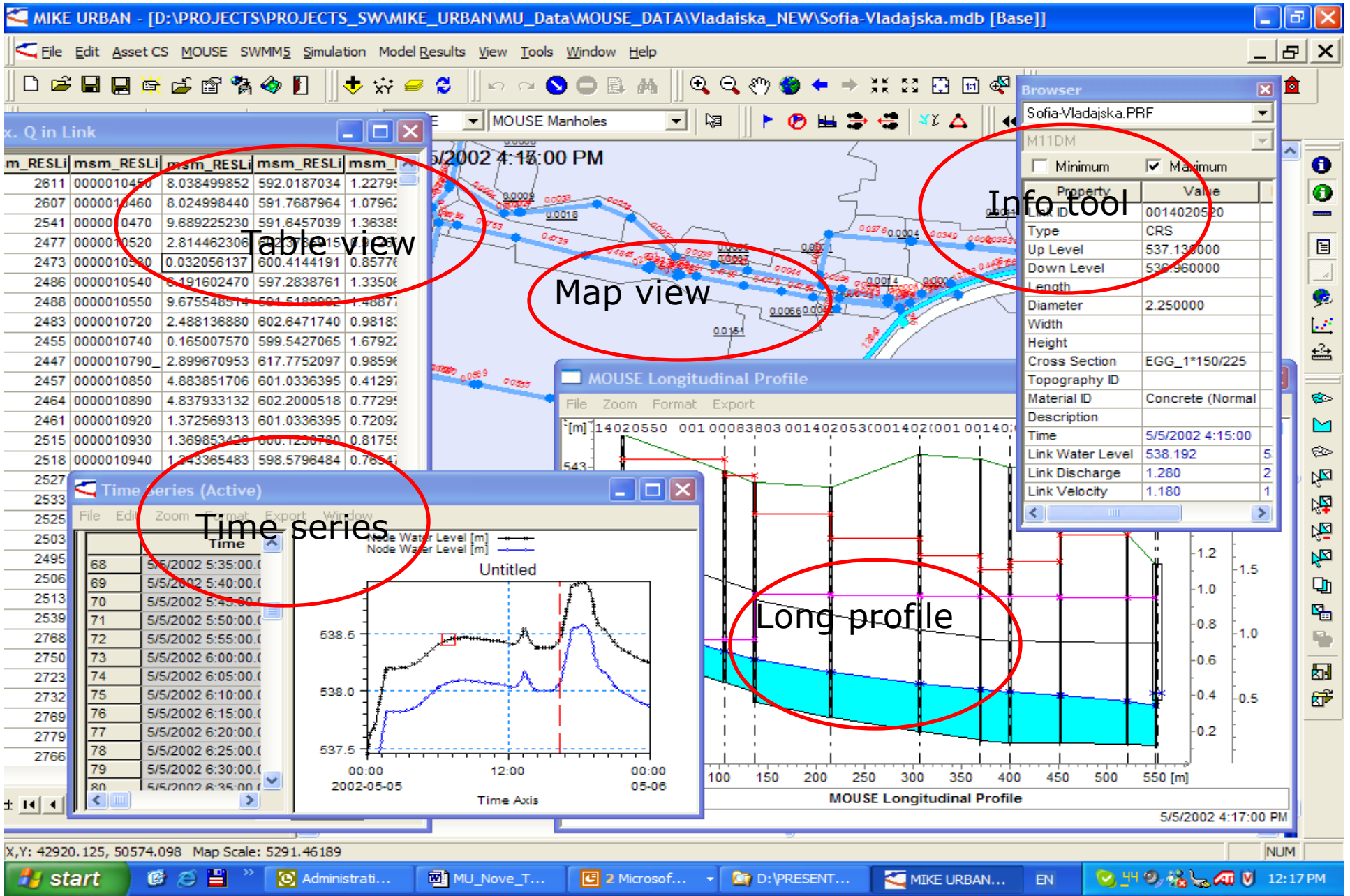
EN
4:07 PM

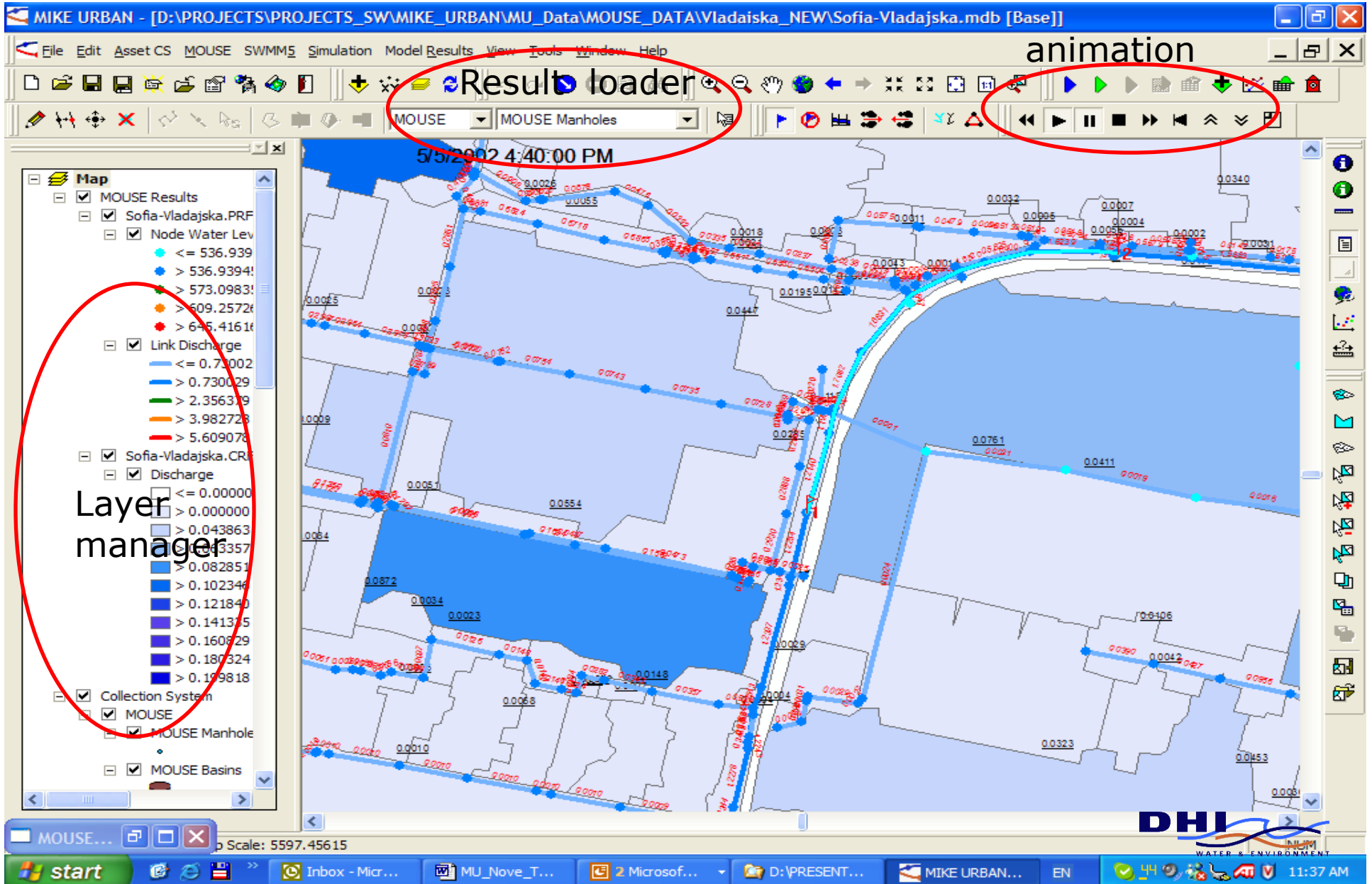
Water & Sewer model coupling



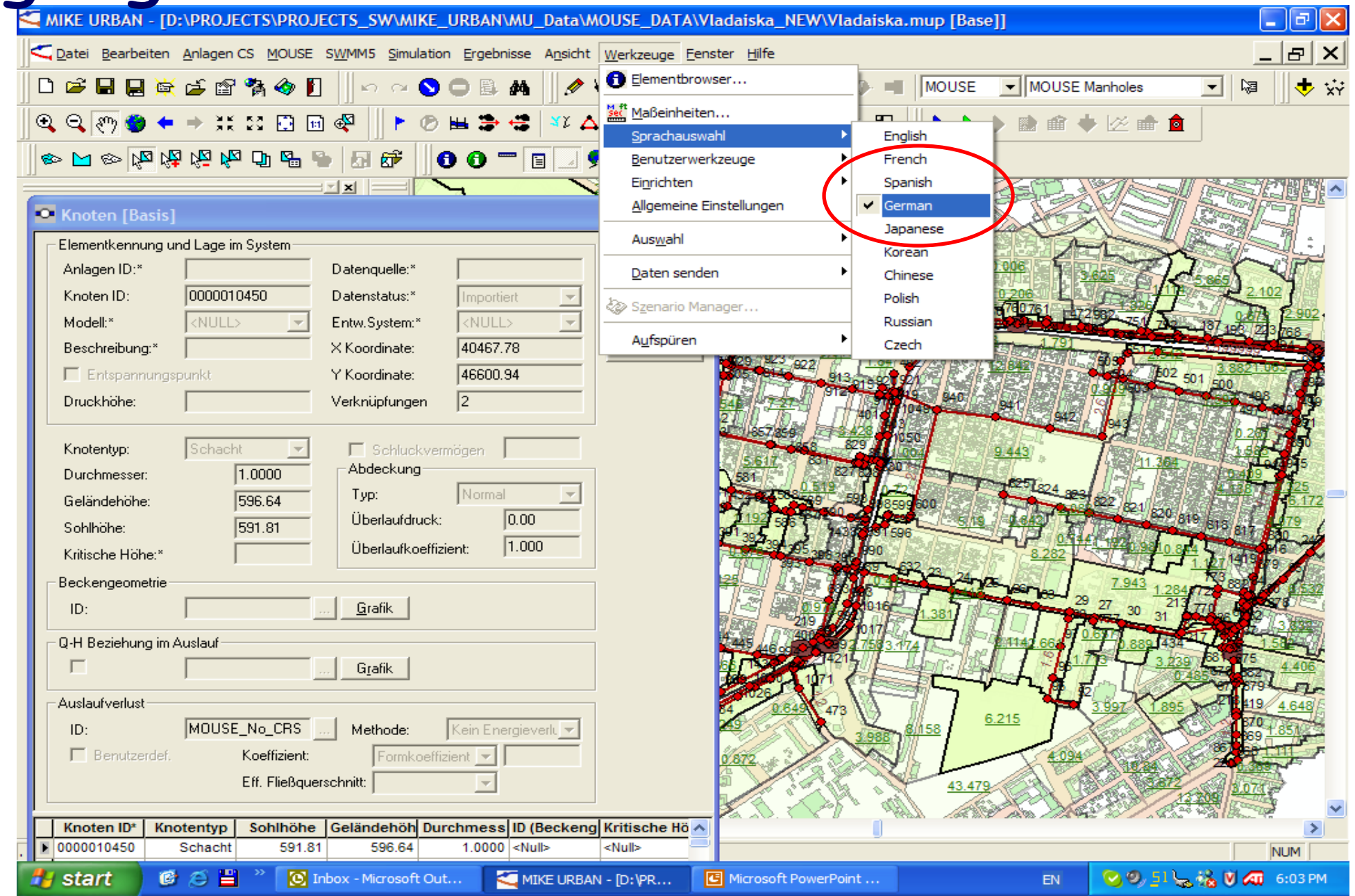
GUI and result visualisation



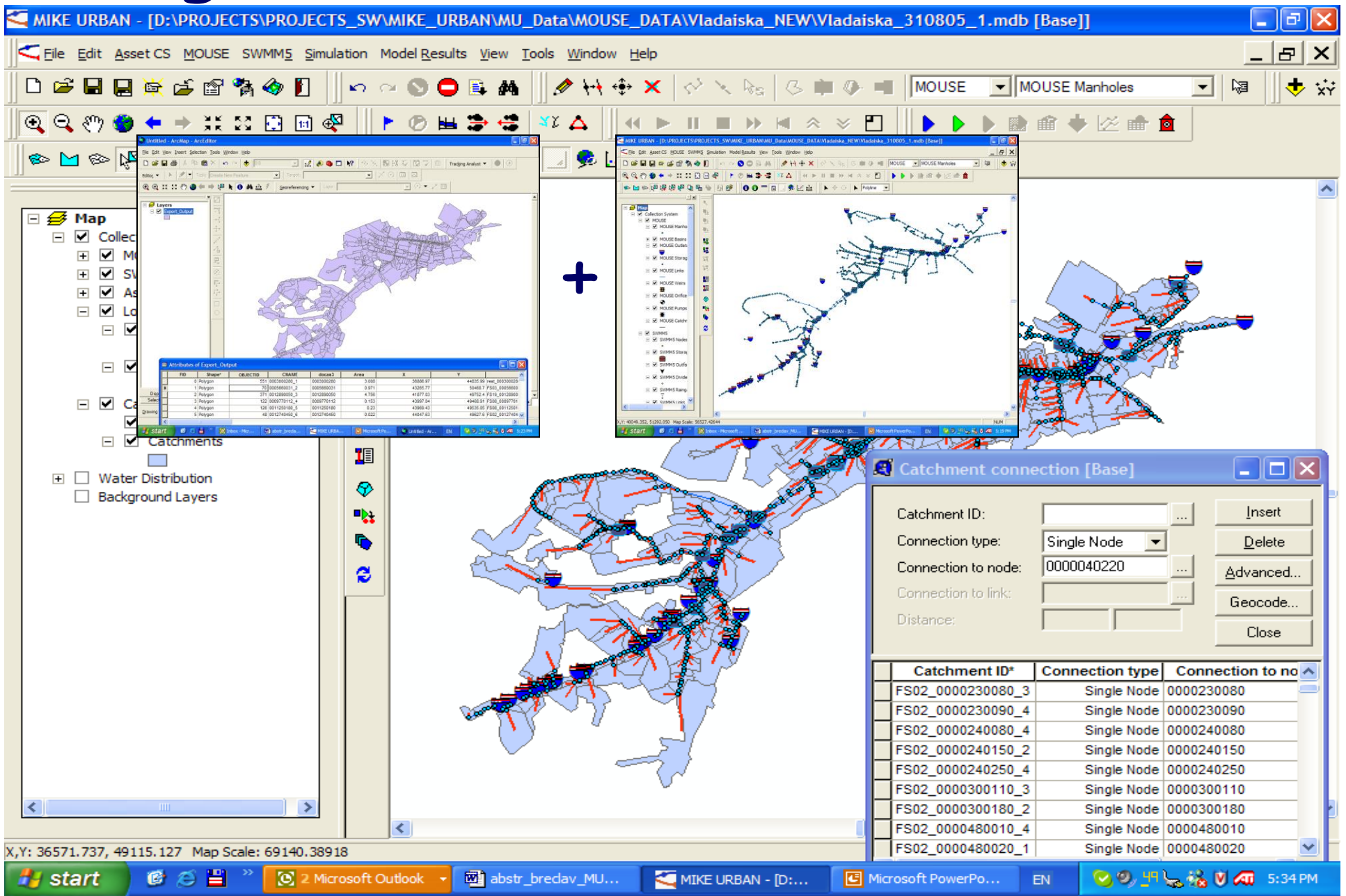
GUI and simulation results



Language localisation



Geocoding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File Edit Asset CS MOUSE SWMM5 Simulation Model Results View Tools Window Help
MOUSE
MOUSE Manholes
Map
Catchments
Water Distribution
Background Layers
Catchment connection [Base]
Catchment ID:
Connection type:
Single Node
Connection to node:
0000040220
Connection to link:
Distance:
Insert
Delete
Advanced...
Geocode...
Close
Catchment ID*
Connection type
Connection to no
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FS02_0000230090_4 Single Node 0000230090
FS02_0000240080_4 Single Node 0000240080
FS02_0000240150_2 Single Node 0000240150
FS02_0000240250_4 Single Node 0000240250
FS02_0000300110_3 Single Node 0000300110
FS02_0000300180_2 Single Node 0000300180
FS02_0000480010_4 Single Node 0000480010
FS02_0000480020_1 Single Node 0000480020
X,Y: 36571.737, 49115.127 Map Scale: 69140.38918
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2 Microsoft Outlook
abstr_breclav_MU...
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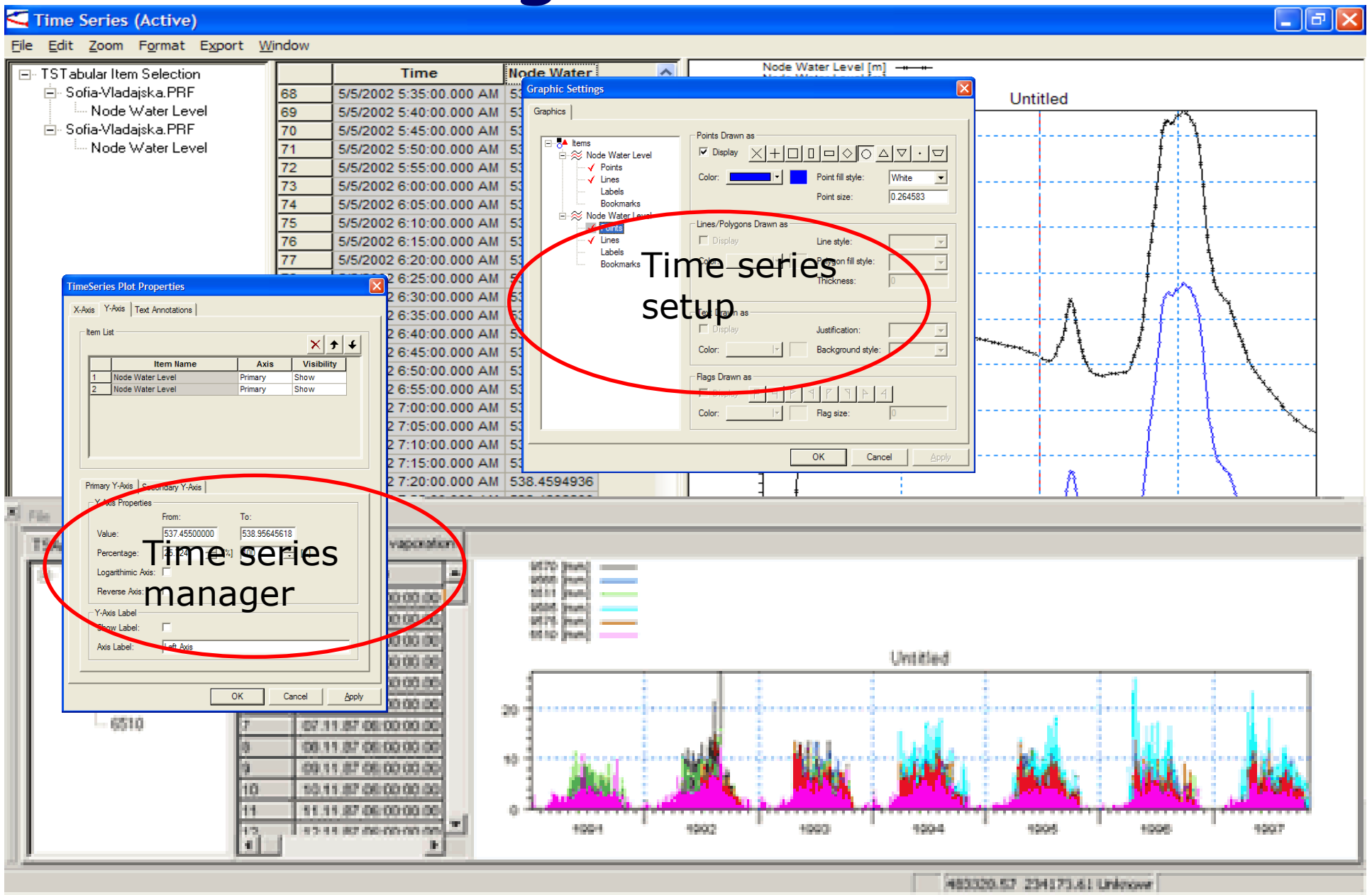
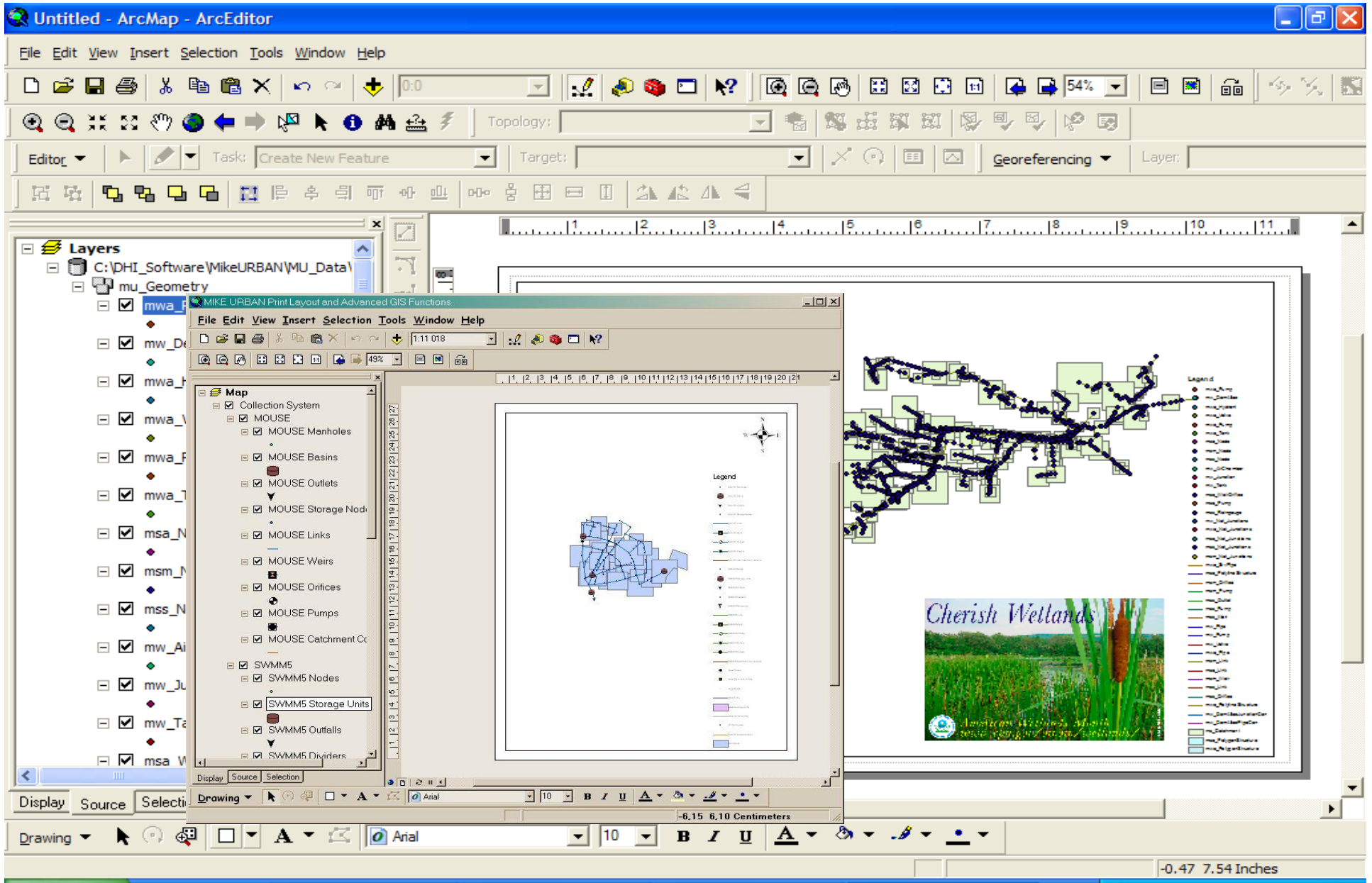
Microsoft PowerPo...
EN
5:34 PM

Time Series Management



Advanced Labelling & Layouting



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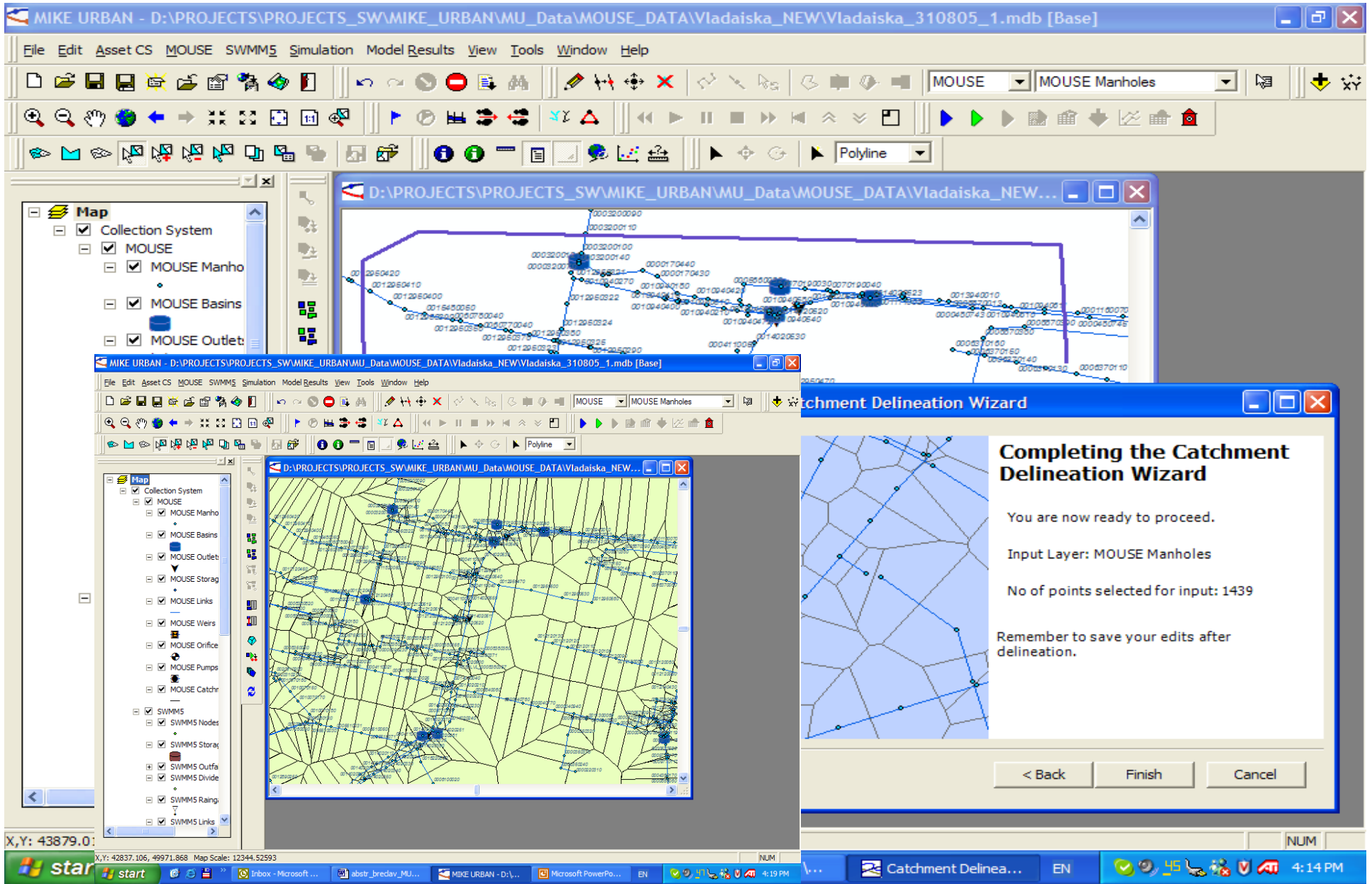

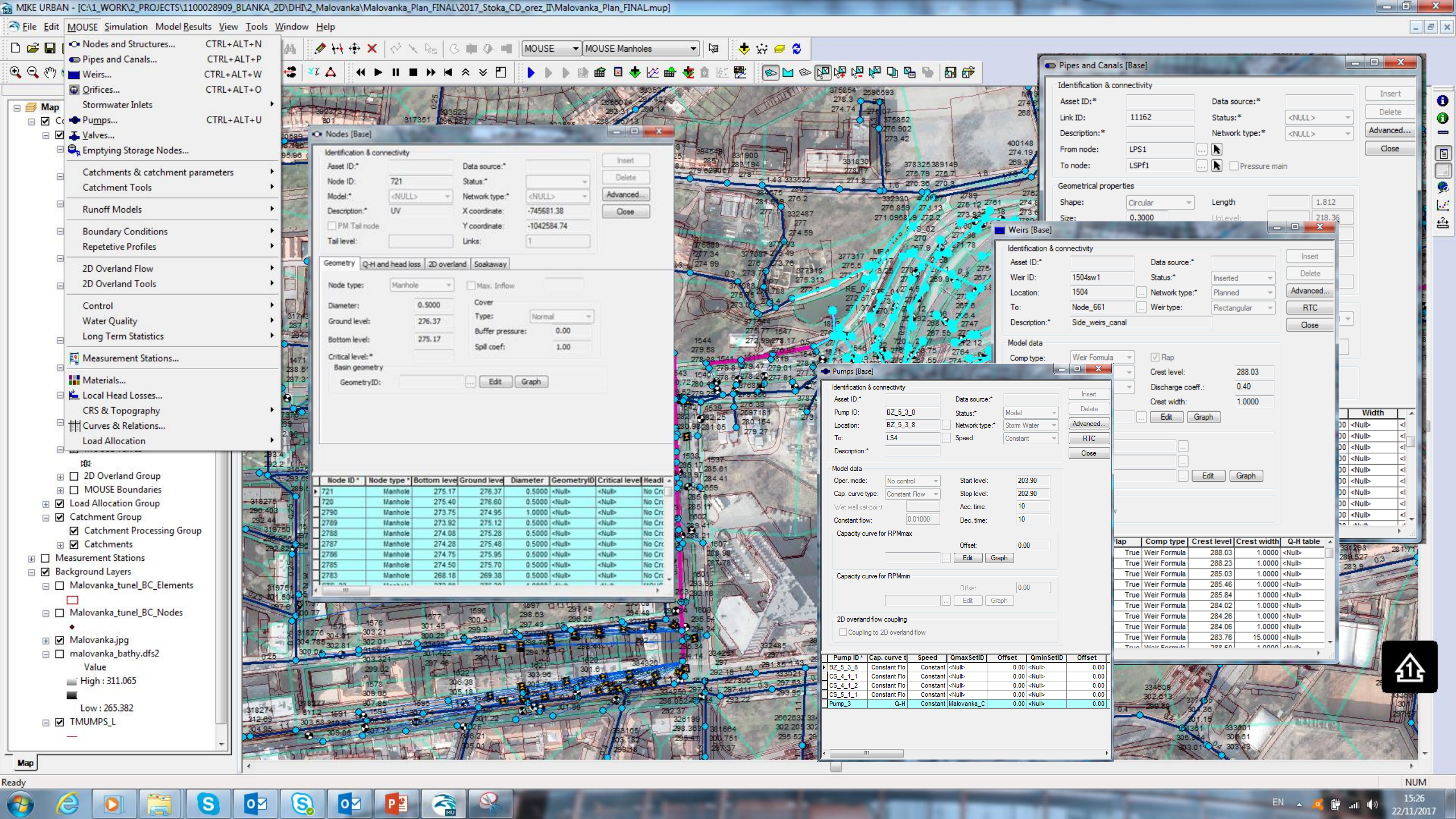
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File Edit MOUSE Simulation Model Results View Tools Window Help
Nodes and Structures... CTRL+ALT+N
Pipes and Canals... CTRL+ALT+P
Weirs... CTRL+ALT+W
Orifices... CTRL+ALT+O
Stormwater Inlets
Pumps... CTRL+ALT+U
Valves...
Emptying Storage Nodes...
Catchments & catchment parameters
Catchment Tools
Runoff Models
Boundary Conditions
Repetetive Profiles
2D Overland Flow
2D Overland Tools
Control
Water Quality
Long Term Statistics
Measurement Stations...
Materials...
Local Head Losses...
CRS & Topography
Curves & Relations...
Load Allocation
Map
2D Overland Group
MOUSE Boundaries
Load Allocation Group
Catchment Group
Catchment Processing Group
Catchments
Measurement Stations
Background Layers
Malovanka_tunel_BC_Elements
Malovanka_tunel_BC_Nodes
Malovanka.jpg
malovanka_bathy.dfs2
Value
High : 311.065
Low : 265.382
TMUMPS_L
Nodes [Base]
Identification & connectivity
Asset ID:*
Node ID: 721
Model:* <NULL>
Description:* UV
PM Tail node
Tail level:
Data source:*
Status:*
Network type:* <NULL>
X coordinate: -745681.38
Y coordinate: -1042584.74
Links: 1
Insert
Delete
Advanced...
Close
Geometry
Q-H and head loss
2D overland
Soakaway
Node type: Manhole
Max. Inflow
Diameter: 0.5000
Ground level: 276.37
Bottom level: 275.17
Critical level:*
Basin geometry
GeometryID:
Edit
Graph
Cover
Type: Normal
Buffer pressure: 0.00
Spill coef: 1.00
Node ID * | Node type * | Bottom leve | Ground leve | Diameter | GeometryID | Critical level | Headl
721 | Manhole | 275.17 | 276.37 | 0.5000 | <Null> | <Null> | No Cr
720 | Manhole | 275.40 | 276.60 | 0.5000 | <Null> | <Null> | No Cr
2790 | Manhole | 273.75 | 274.95 | 1.0000 | <Null> | <Null> | No Cr
2789 | Manhole | 273.92 | 275.12 | 0.5000 | <Null> | <Null> | No Cr
2788 | Manhole | 274.08 | 275.28 | 0.5000 | <Null> | <Null> | No Cr
2787 | Manhole | 274.28 | 275.48 | 0.5000 | <Null> | <Null> | No Cr
2786 | Manhole | 274.75 | 275.95 | 0.5000 | <Null> | <Null> | No Cr
2785 | Manhole | 274.50 | 275.70 | 0.5000 | <Null> | <Null> | No Cr
2783 | Manhole | 268.18 | 269.38 | 0.5000 | <Null> | <Null> | No Cr
Pipes and Canals [Base]
Identification & connectivity
Asset ID:*
Link ID: 11162
Description:*
From node: LPS1
To node: LSPf1
Pressure main
Data source:*
Status:* <NULL>
Network type:* <NULL>
Insert
Delete
Advanced...
Close
Geometrical properties
Shape: Circular
Size: 0.3000
Length 1.812
Weirs [Base]
Identification & connectivity
Asset ID:*
Weir ID: 1504sw1
Location: 1504
To: Node_661
Description:* Side_weirs_canal
Data source:*
Status:* Inserted
Network type:* Planned
Weir type: Rectangular
Insert
Delete
Advanced...
RTC
Close
Model data
Comp type: Weir Formula
Flap
Crest level: 288.03
Discharge coeff.: 0.40
Crest width: 1.0000
Edit
Graph
Comp type | Crest level | Crest width | Q-H table
True | Weir Formula | 288.03 | 1.0000 | <Null>
True | Weir Formula | 288.23 | 1.0000 | <Null>
True | Weir Formula | 285.03 | 1.0000 | <Null>
True | Weir Formula | 285.46 | 1.0000 | <Null>
True | Weir Formula | 285.84 | 1.0000 | <Null>
True | Weir Formula | 284.02 | 1.0000 | <Null>
True | Weir Formula | 284.26 | 1.0000 | <Null>
True | Weir Formula | 284.06 | 1.0000 | <Null>
True | Weir Formula | 283.76 | 15.0000 | <Null>
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Identification & connectivity
Asset ID:*
Pump ID: BZ_5_3_8
Location: BZ_5_3_8
To: LS4
Description:*
Data source:*
Status: Model
Network type: Storm Water
Speed: Constant
Insert
Delete
Advanced...
RTC
Close
Model data
Oper. mode: No control
Cap. curve type: Constant Flow
Wet well set-point:
Constant flow: 0.01000
Start level: 203.90
Stop level: 202.90
Acc. time: 10
Dec. time: 10
Capacity curve for RPMmax
Offset: 0.00
Edit
Graph
Capacity curve for RPMmin
Offset: 0.00
2D overland flow coupling
Coupling to 2D overland flow
Pump ID * | Cap. curve t | Speed | QmaxSetID | Offset | QminSetID | Offset
BZ_5_3_8 | Constant Flo | Constant | <Null> | 0.00 | <Null> | 0.00
CS_4_1_1 | Constant Flo | Constant | <Null> | 0.00 | <Null> | 0.00
CS_4_1_2 | Constant Flo | Constant | <Null> | 0.00 | <Null> | 0.00
CS_5_1_1 | Constant Flo | Constant | <Null> | 0.00 | <Null> | 0.00
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Ready
NUM
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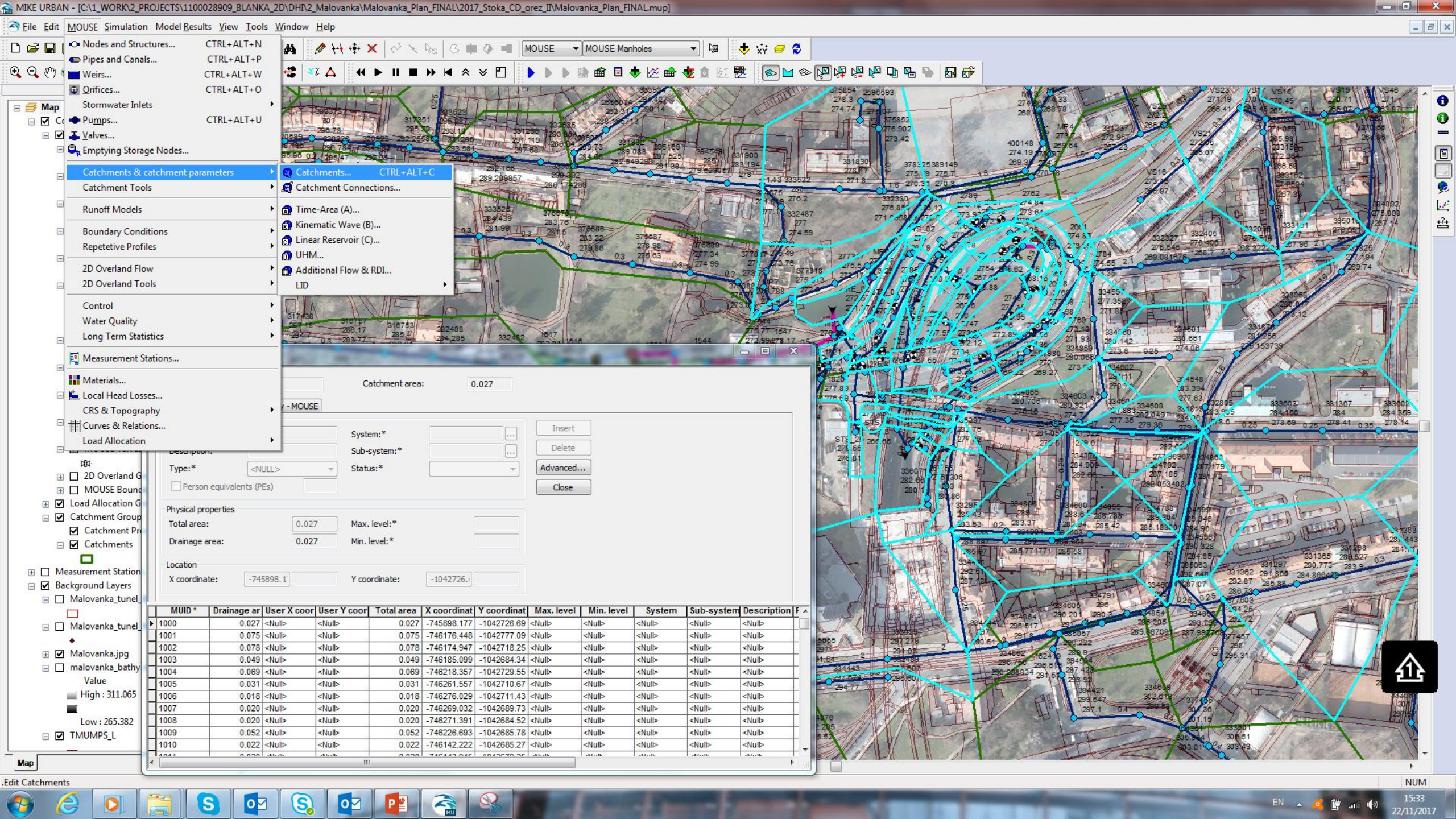
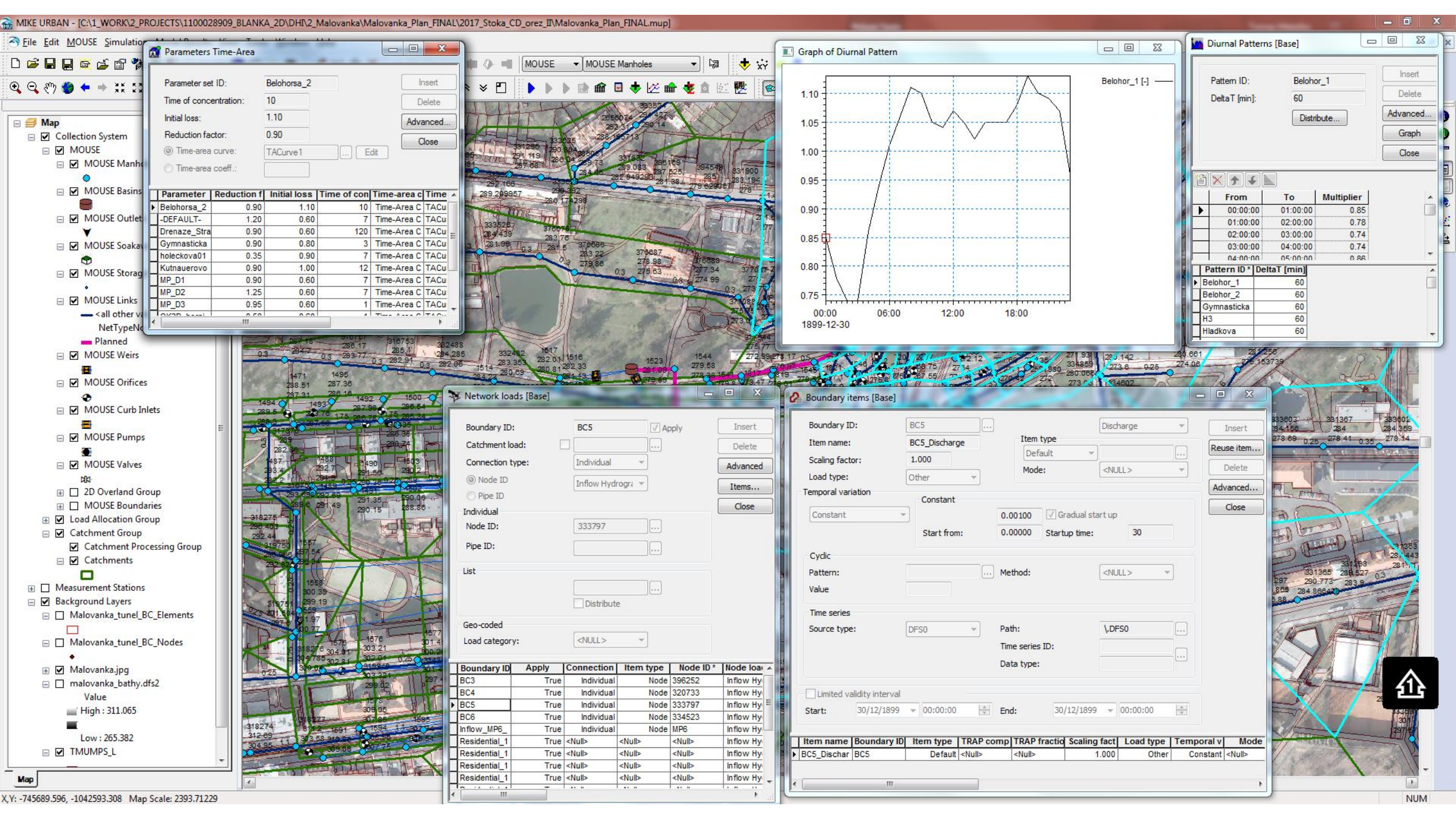
22/11/2017

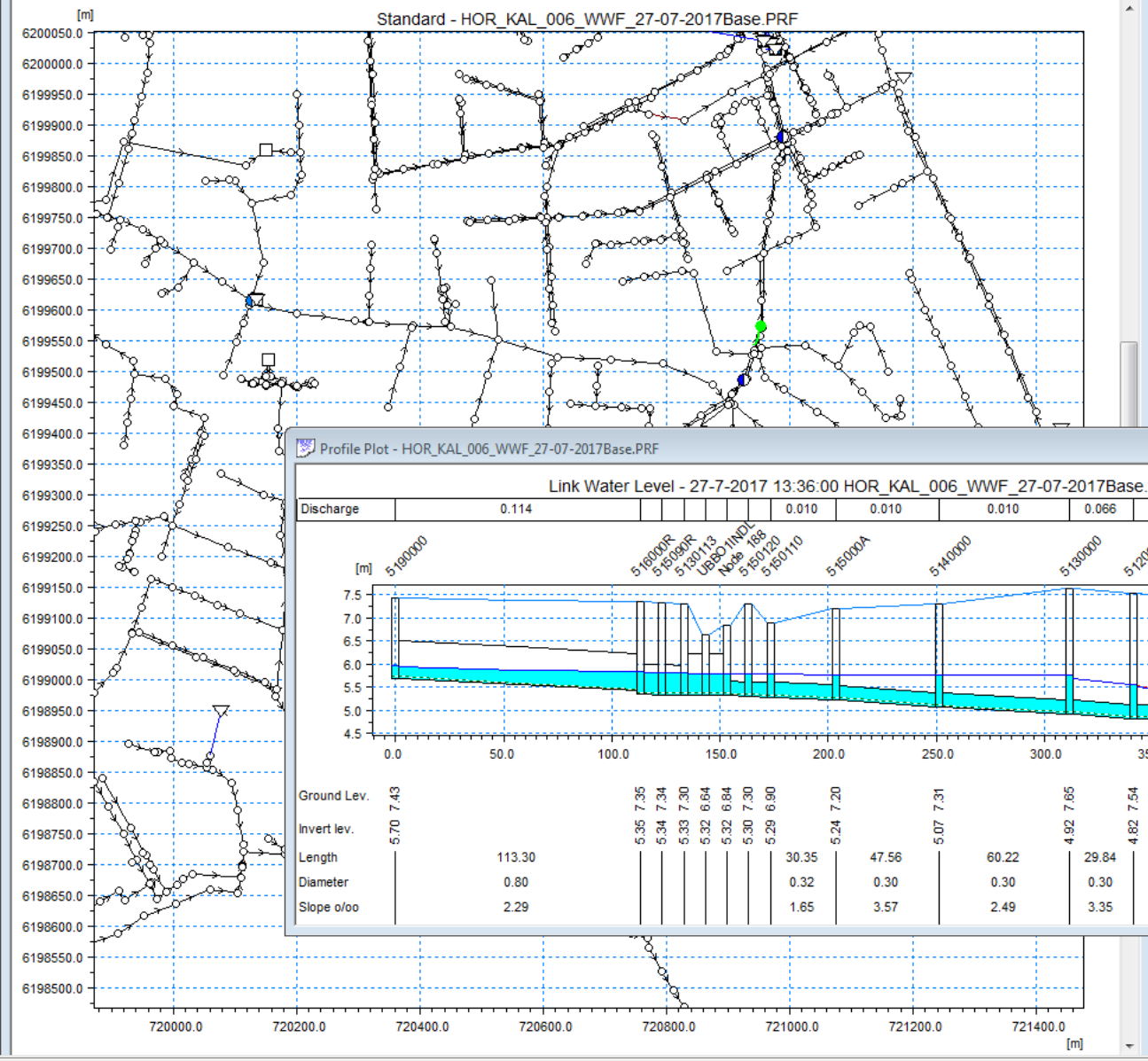

MIKE URBAN - [C:\1_WORK\2_PROJECTS\1100028909_BLANKA_2D\DHI\2_Malovanka\Malovanka_Plan_FINAL\2017_Stoka_CD_orez_II\Malovanka_Plan_FINAL.mup]
File Edit MOUSE Simulation Model Results View Tools Window Help
Nodes and Structures... CTRL+ALT+N
Pipes and Canals... CTRL+ALT+P
Weirs... CTRL+ALT+W
Orifices... CTRL+ALT+O
Stormwater Inlets
Pumps... CTRL+ALT+U
Valves...
Emptying Storage Nodes...
Catchments & catchment parameters
Catchment Tools
Runoff Models
Boundary Conditions
Repetetive Profiles
2D Overland Flow
2D Overland Tools
Control
Water Quality
Long Term Statistics
Measurement Stations...
Materials...
Local Head Losses...
CRS & Topography
Curves & Relations...
Load Allocation
Catchments... CTRL+ALT+C
Catchment Connections...
Time-Area (A)...
Kinematic Wave (B)...
Linear Reservoir (C)...
UHM...
Additional Flow & RDI...
LID
Catchment area: 0.027
System:*
Sub-system:*
Type:* <NULL>
Status:*
Person equivalents (PEs)
Insert
Delete
Advanced...
Close
Physical properties
Total area: 0.027
Drainage area: 0.027
Max. level:*
Min. level:*
Location
X coordinate: -745898.1
Y coordinate: -1042726.
MUID * | Drainage ar | User X coor | User Y coor | Total area | X coordinat | Y coordinat | Max. level | Min. level | System | Sub-system | Description
1000 | 0.027 | <Null> | <Null> | 0.027 | -745898.177 | -1042726.69 | <Null> | <Null> | <Null> | <Null> | <Null>
1001 | 0.075 | <Null> | <Null> | 0.075 | -746176.448 | -1042777.09 | <Null> | <Null> | <Null> | <Null> | <Null>
1002 | 0.078 | <Null> | <Null> | 0.078 | -746174.947 | -1042718.25 | <Null> | <Null> | <Null> | <Null> | <Null>
1003 | 0.049 | <Null> | <Null> | 0.049 | -746185.099 | -1042684.34 | <Null> | <Null> | <Null> | <Null> | <Null>
1004 | 0.069 | <Null> | <Null> | 0.069 | -746218.357 | -1042729.55 | <Null> | <Null> | <Null> | <Null> | <Null>
1005 | 0.031 | <Null> | <Null> | 0.031 | -746261.557 | -1042710.67 | <Null> | <Null> | <Null> | <Null> | <Null>
1006 | 0.018 | <Null> | <Null> | 0.018 | -746276.029 | -1042711.43 | <Null> | <Null> | <Null> | <Null> | <Null>
1007 | 0.020 | <Null> | <Null> | 0.020 | -746269.032 | -1042689.73 | <Null> | <Null> | <Null> | <Null> | <Null>
1008 | 0.020 | <Null> | <Null> | 0.020 | -746271.391 | -1042684.52 | <Null> | <Null> | <Null> | <Null> | <Null>
1009 | 0.052 | <Null> | <Null> | 0.052 | -746226.693 | -1042685.78 | <Null> | <Null> | <Null> | <Null> | <Null>
1010 | 0.022 | <Null> | <Null> | 0.022 | -746142.222 | -1042685.27 | <Null> | <Null> | <Null> | <Null> | <Null>
Map
Background Layers
Malovanka_tunel_
Malovanka_tunel_
Malovanka.jpg
malovanka_bathy
Value
High : 311.065
Low : 265.382
TMUMPS_L
Edit Catchments
NUM
EN
15:33
22/11/2017


MIKE URBAN - [C:\1_WORK\2_PROJECTS\1100028909_BLANKA_2D\DHI\2_Malovanka\Malovanka_Plan_FINAL\2017_Stoka_CD_orez_II\Malovanka_Plan_FINAL.mup]
File Edit MOUSE Simulation
Parameters Time-Area
Parameter set ID: Belohorsa_2
Time of concentration: 10
Initial loss: 1.10
Reduction factor: 0.90
Time-area curve: TACurve1
Time-area coeff.:
Insert
Delete
Advanced...
Close
Edit
Parameter | Reduction f | Initial loss | Time of con | Time-area c | Time
Belohorsa_2 | 0.90 | 1.10 | 10 | Time-Area C | TACu
-DEFAULT- | 1.20 | 0.60 | 7 | Time-Area C | TACu
Drenaze_Stra | 0.90 | 0.60 | 120 | Time-Area C | TACu
Gymnasticka | 0.90 | 0.80 | 3 | Time-Area C | TACu
holeckova01 | 0.35 | 0.90 | 7 | Time-Area C | TACu
Kutnauerovo | 0.90 | 1.00 | 12 | Time-Area C | TACu
MP_D1 | 0.90 | 0.60 | 7 | Time-Area C | TACu
MP_D2 | 1.25 | 0.60 | 7 | Time-Area C | TACu
MP_D3 | 0.95 | 0.60 | 1 | Time-Area C | TACu
Graph of Diurnal Pattern
Belohor_1 [-]
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
00:00
06:00
12:00
18:00
1899-12-30
Diurnal Patterns [Base]
Pattern ID: Belohor_1
DeltaT [min]: 60
Distribute...
Insert
Delete
Advanced...
Graph
Close
From | To | Multiplier
00:00:00 | 01:00:00 | 0.85
01:00:00 | 02:00:00 | 0.78
02:00:00 | 03:00:00 | 0.74
03:00:00 | 04:00:00 | 0.74
Pattern ID * | DeltaT [min]
Belohor_1 | 60
Belohor_2 | 60
Gymnasticka | 60
H3 | 60
Hladkova | 60
Map
Collection System
MOUSE
MOUSE Manhe
MOUSE Basins
MOUSE Outlet
MOUSE Soaka
MOUSE Storag
MOUSE Links
<all other va
NetTypeNo
Planned
MOUSE Weirs
MOUSE Orifices
MOUSE Curb Inlets
MOUSE Pumps
MOUSE Valves
2D Overland Group
MOUSE Boundaries
Load Allocation Group
Catchment Group
Catchment Processing Group
Catchments
Measurement Stations
Background Layers
Malovanka_tunel_BC_Elements
Malovanka_tunel_BC_Nodes
Malovanka.jpg
malovanka_bathy.dfs2
Value
High : 311.065
Low : 265.382
TMUMPS_L
Network loads [Base]
Boundary ID: BC5
Apply
Catchment load:
Connection type: Individual
Node ID
Pipe ID
Inflow Hydrogra
Individual
Node ID: 333797
Pipe ID:
List
Distribute
Geo-coded
Load category: <NULL>
Insert
Delete
Advanced
Items...
Close
Boundary ID | Apply | Connection | Item type | Node ID * | Node loa
BC3 | True | Individual | Node | 396252 | Inflow Hy
BC4 | True | Individual | Node | 320733 | Inflow Hy
BC5 | True | Individual | Node | 333797 | Inflow Hy
BC6 | True | Individual | Node | 334523 | Inflow Hy
Inflow_MP6_ | True | Individual | Node | MP6 | Inflow Hy
Residential_1 | True | <Null> | <Null> | <Null> | Inflow Hy
Residential_1 | True | <Null> | <Null> | <Null> | Inflow Hy
Residential_1 | True | <Null> | <Null> | <Null> | Inflow Hy
Residential_1 | True | <Null> | <Null> | <Null> | Inflow Hy
Boundary items [Base]
Boundary ID: BC5
Item name: BC5_Discharge
Scaling factor: 1.000
Load type: Other
Discharge
Item type
Default
Mode: <NULL>
Temporal variation
Constant
Constant
0.00100
Gradual start up
Start from: 0.00000
Startup time: 30
Cyclic
Pattern:
Method: <NULL>
Value
Time series
Source type: DFS0
Path: \.DFS0
Time series ID:
Data type:
Limited validity interval
Start: 30/12/1899 00:00:00
End: 30/12/1899 00:00:00
Insert
Reuse item...
Delete
Advanced...
Close
Item name | Boundary ID | Item type | TRAP comp | TRAP fractio | Scaling fact | Load type | Temporal v | Mode
BC5_Dischar | BC5 | Default | <Null> | <Null> | 1.000 | Other | Constant | <Null>
X,Y: -745689.596, -1042593.308 Map Scale: 2393.71229
NUM

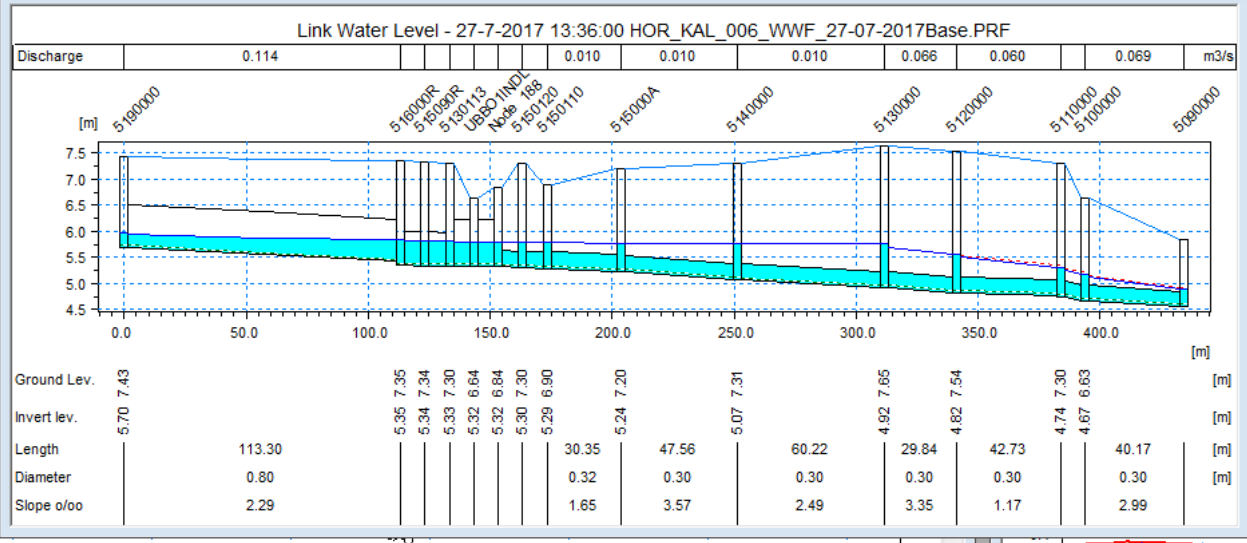
HOR_KAL_006_WWF_27-07-2017Base.PRF - MIKE View

File View Plot Animation Tools Window Help

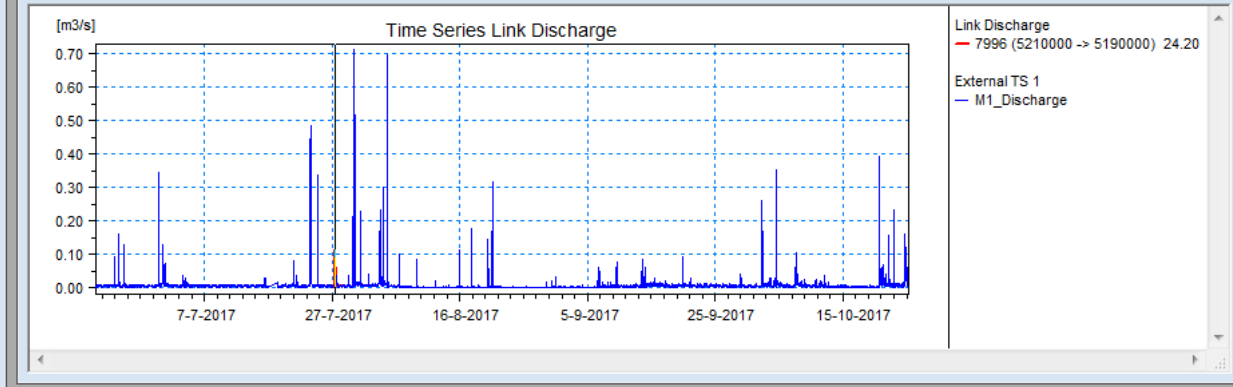
Horizontal Plan - HOR_KAL_006_WWF_27-07-2017Base.PRF



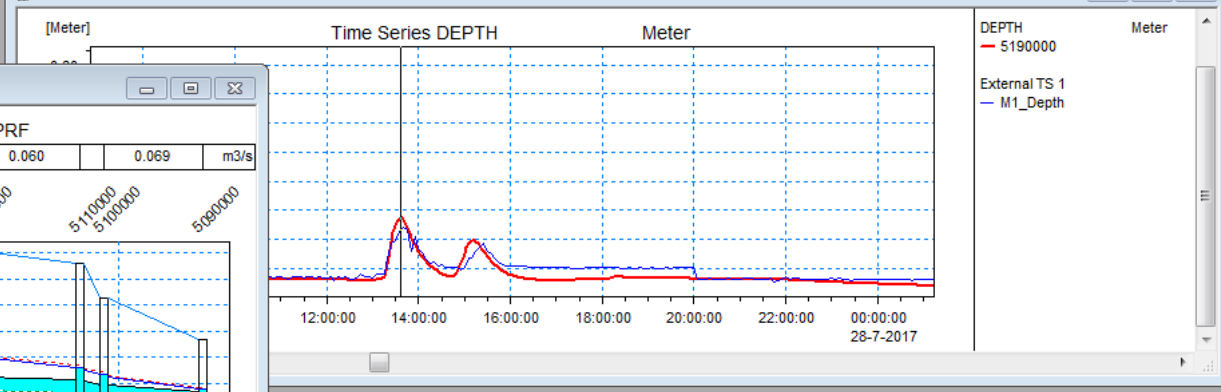
Profile Plot - HOR_KAL_006_WWF_27-07-2017Base.PRF

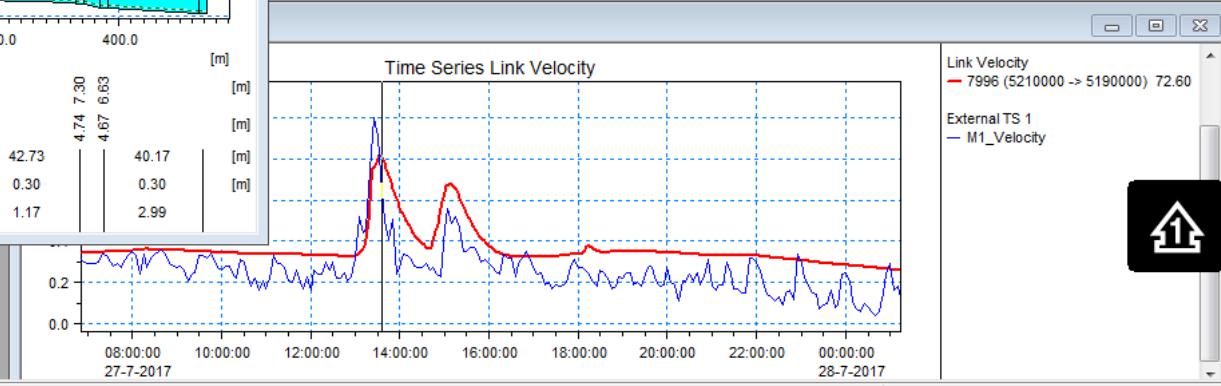


Time Series Link Discharge



Time Series DEPTH Meter



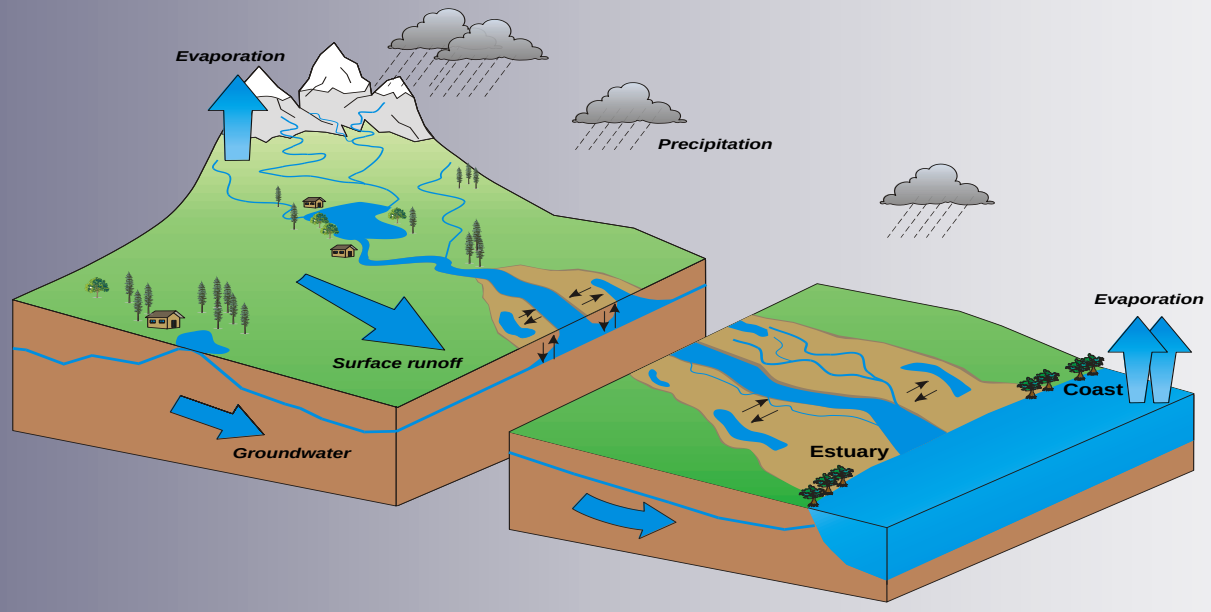


Ready

719844.12, 6199602.64

M1-5190000 | M2-5132100 | M3-5080000 | M4-2120000 | M5-1620000 | M6-3140000 | M7-1030000

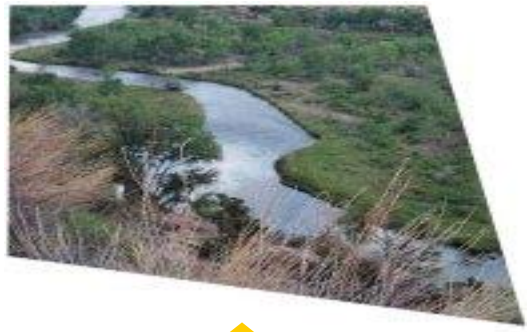
Integrated Modelling



Model Integration Needs

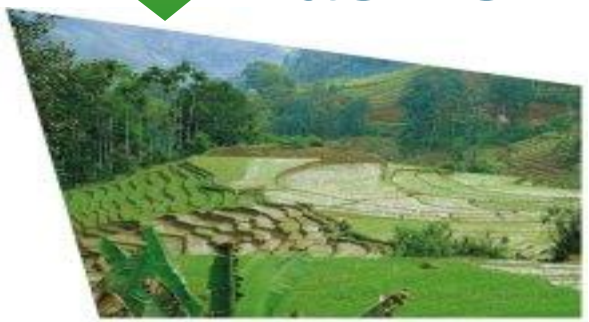
Estuaries

Rivers

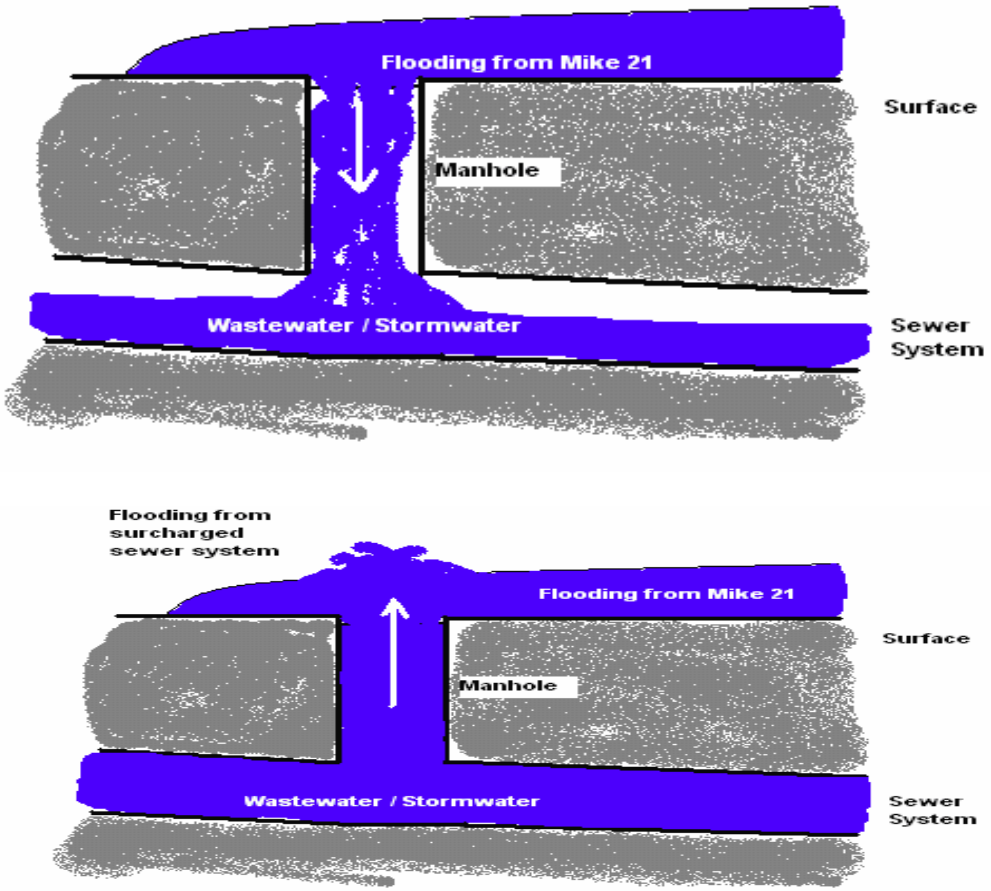


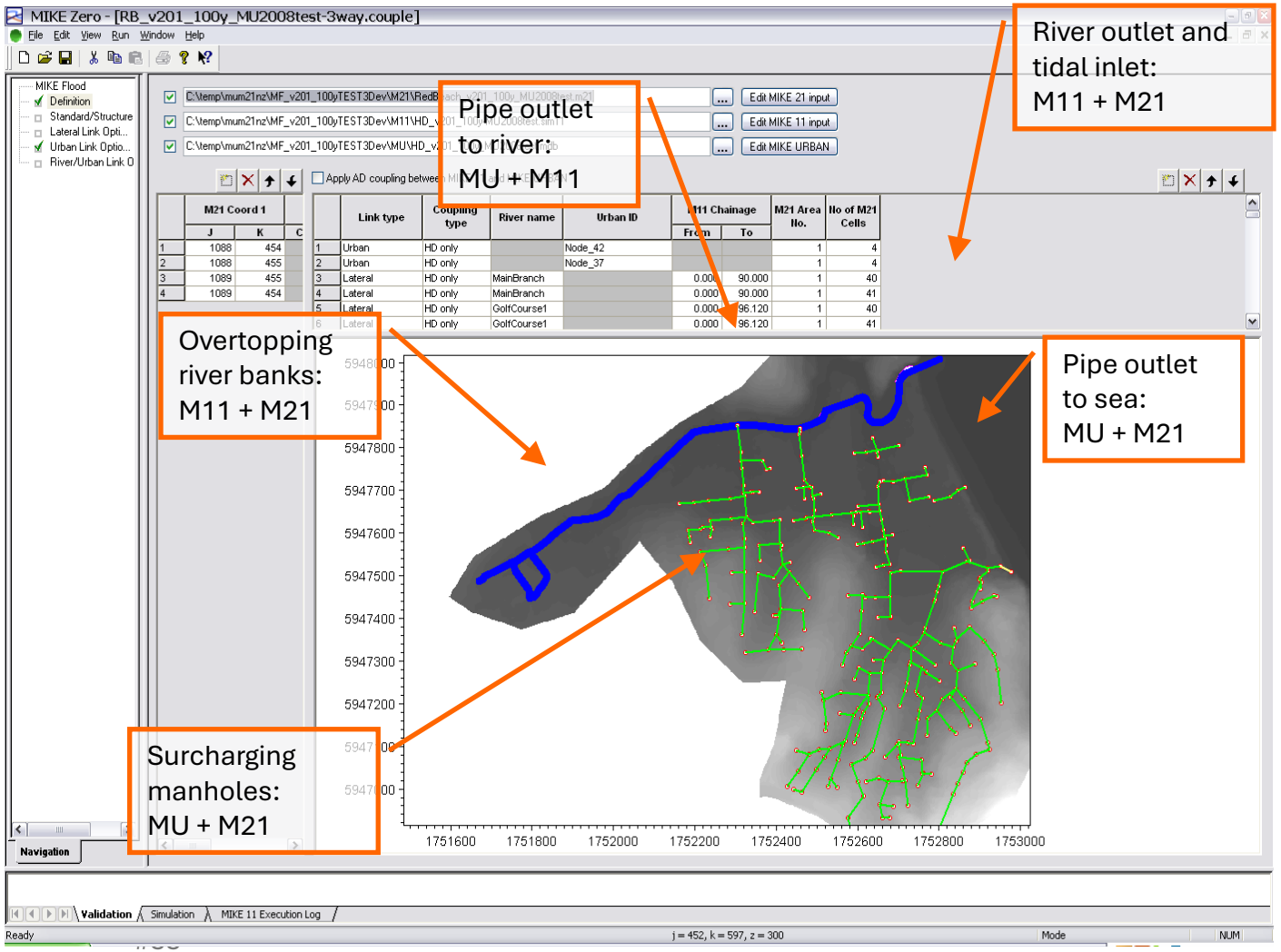
Urban

Basins

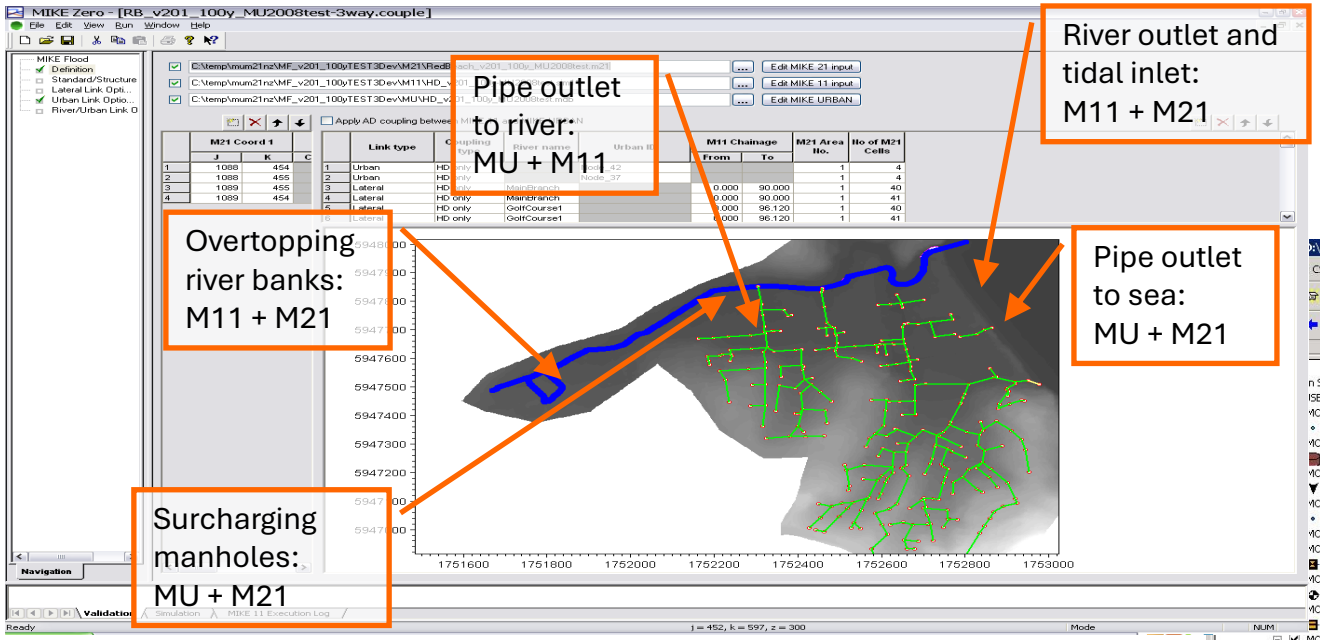


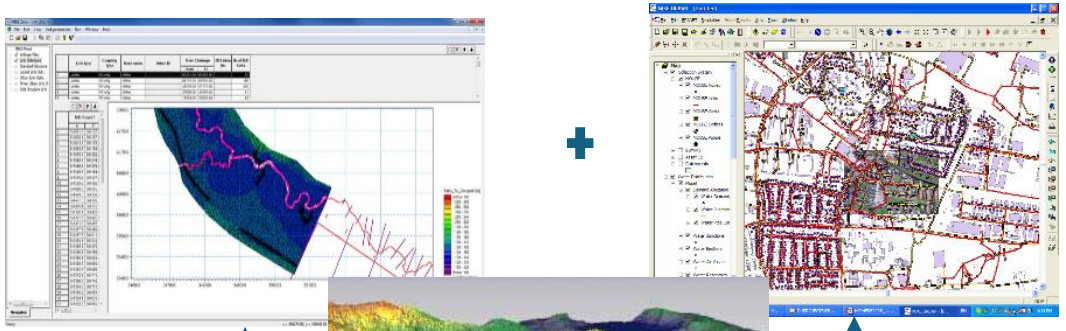
Coupled 1-2D model

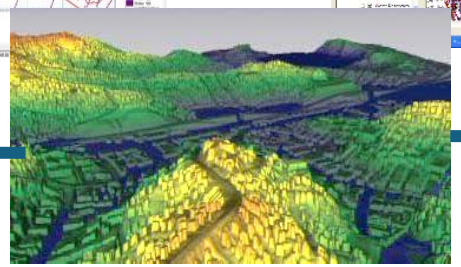


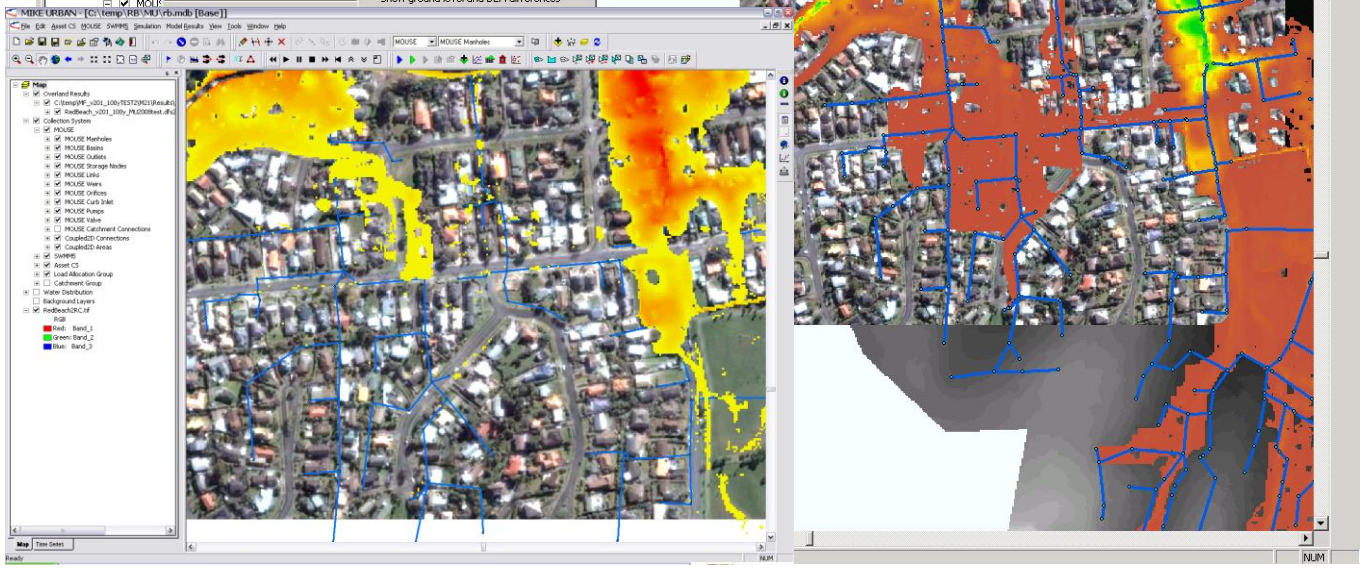


3-Way Coupling

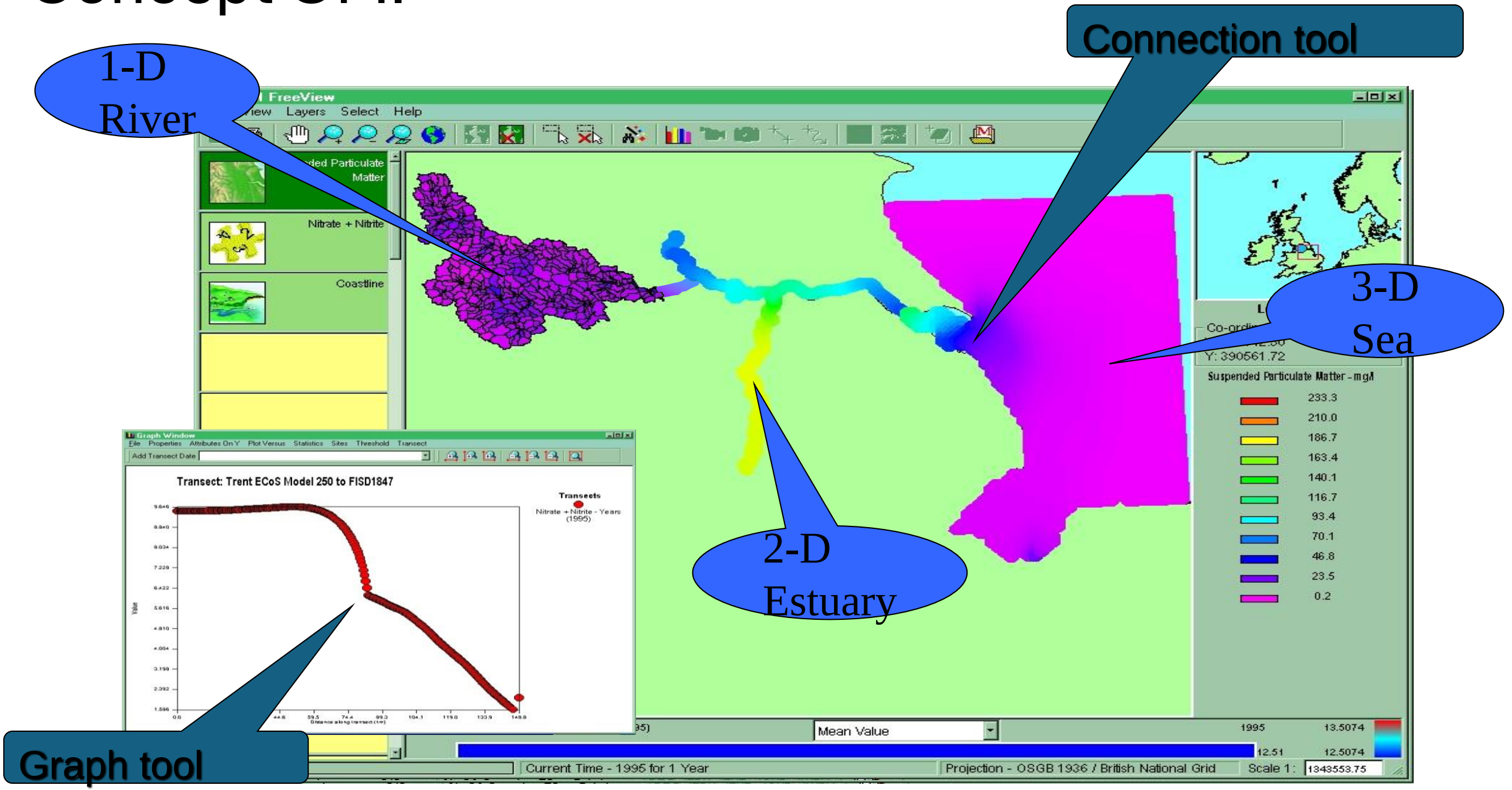








Concept OMI


1-D River
Connection tool
3-D Sea
2-D Estuary
Graph tool
FreeView
View Layers Select Help
Suspended Particulate Matter
Nitrate + Nitrite
Coastline
Graph Window
File Properties Attributes On Y Plot Versus Statistics Sites Threshold Transect
Add Transect Date
Transect: Trent ECoS Model 250 to FISD1847
Transects
Nitrate + Nitrite - Years (1995)
Distance along transect (km)
Value
Suspended Particulate Matter - mg/l
233.3
210.0
186.7
163.4
140.1
116.7
93.4
70.1
46.8
23.5
0.2
Mean Value
1995
13.5074
12.51
12.5074
Current Time - 1995 for 1 Year
Projection - OSGB 1936 / British National Grid
Scale 1 :
1343553.75