



TIAKI WAI | CARING FOR LAND & WATER

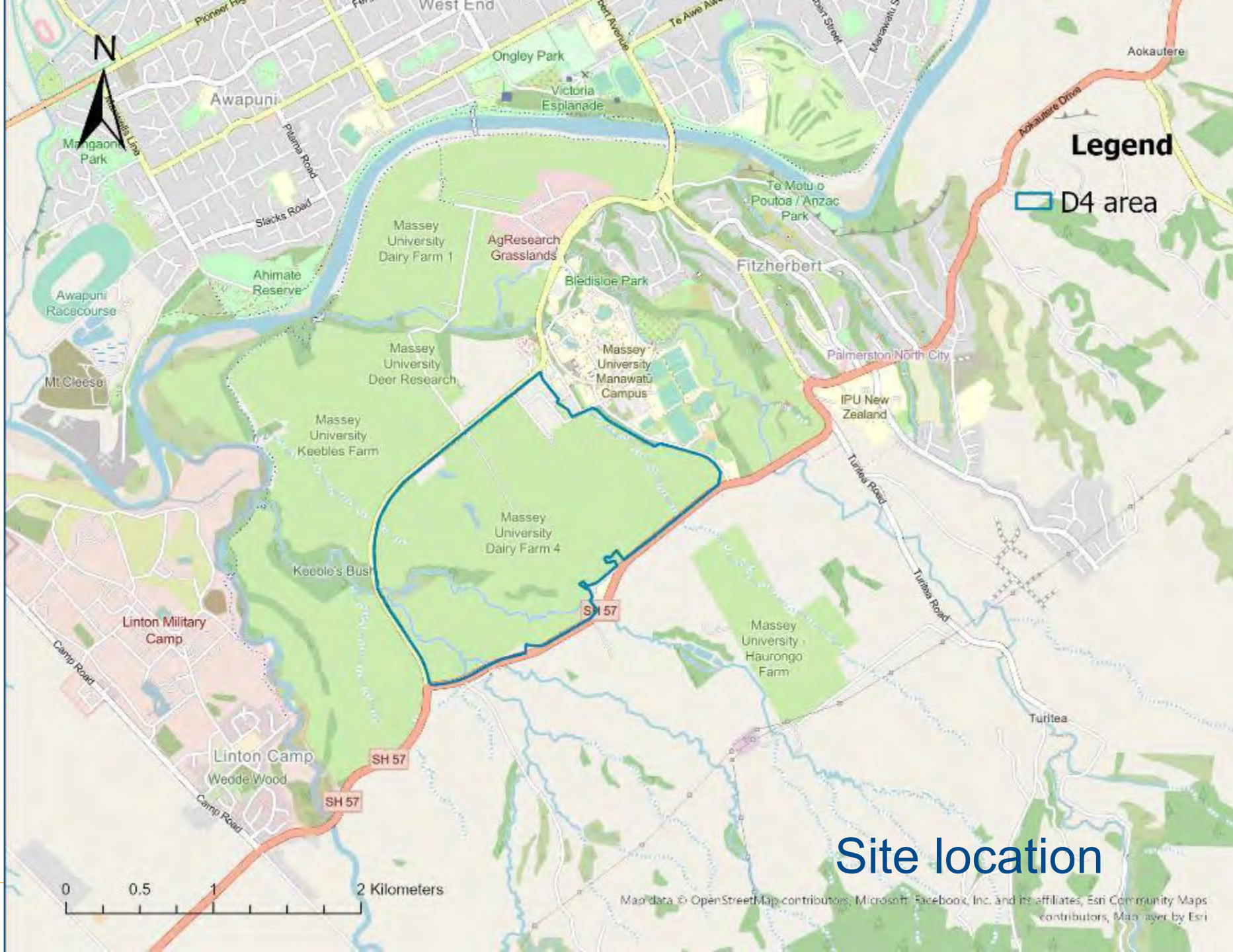
Tools and techniques for mapping of catchment flow pathways and identification of potential mitigation sites

Fernando Avendaño Veas

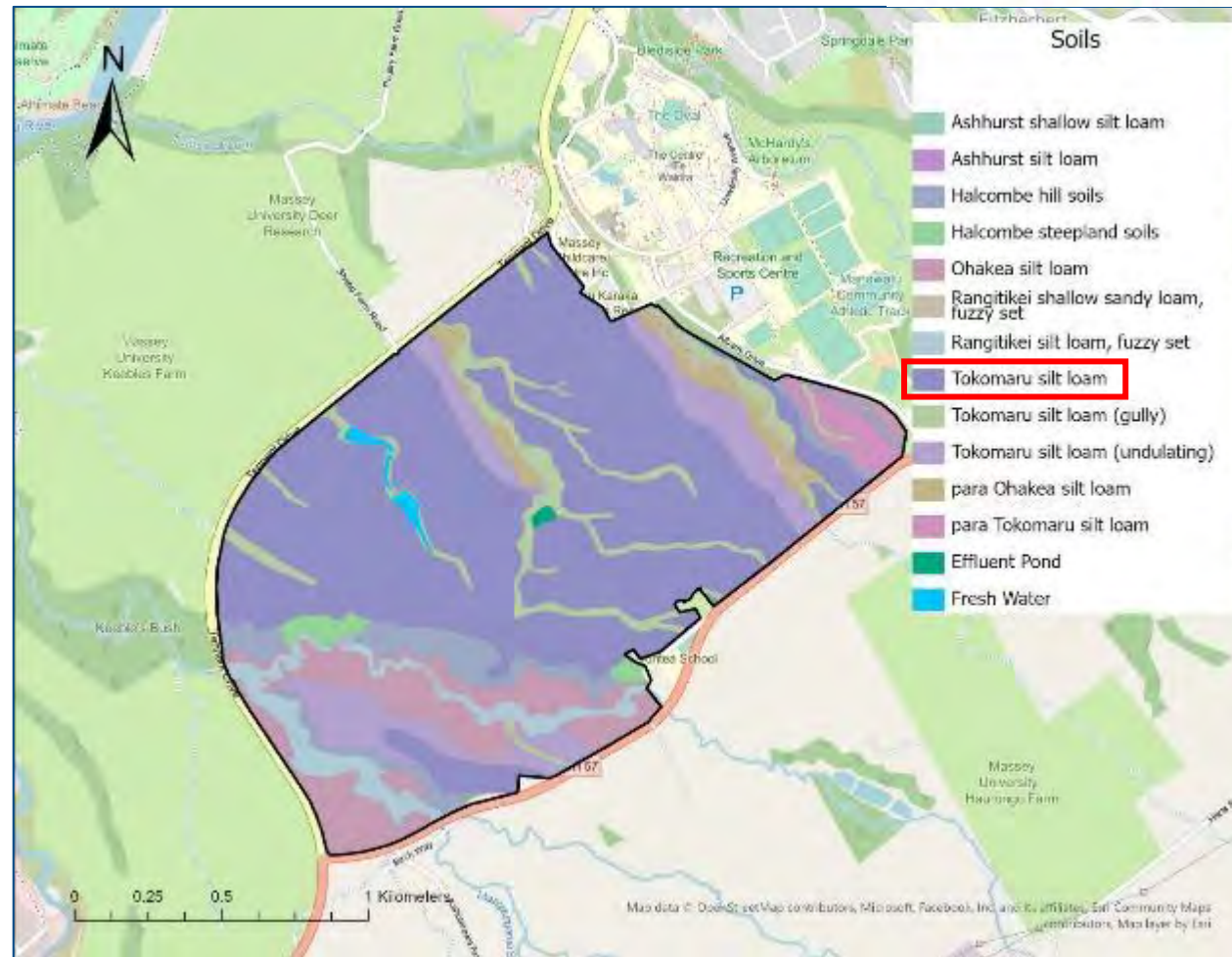
Methodology – Data, tools and analyses required

- Analysis of GIS layers & hydrologic modelling
- Collection and collation of previous data of the area
- Water quality sampling and stream flow estimations
- Flow and nutrient modelling

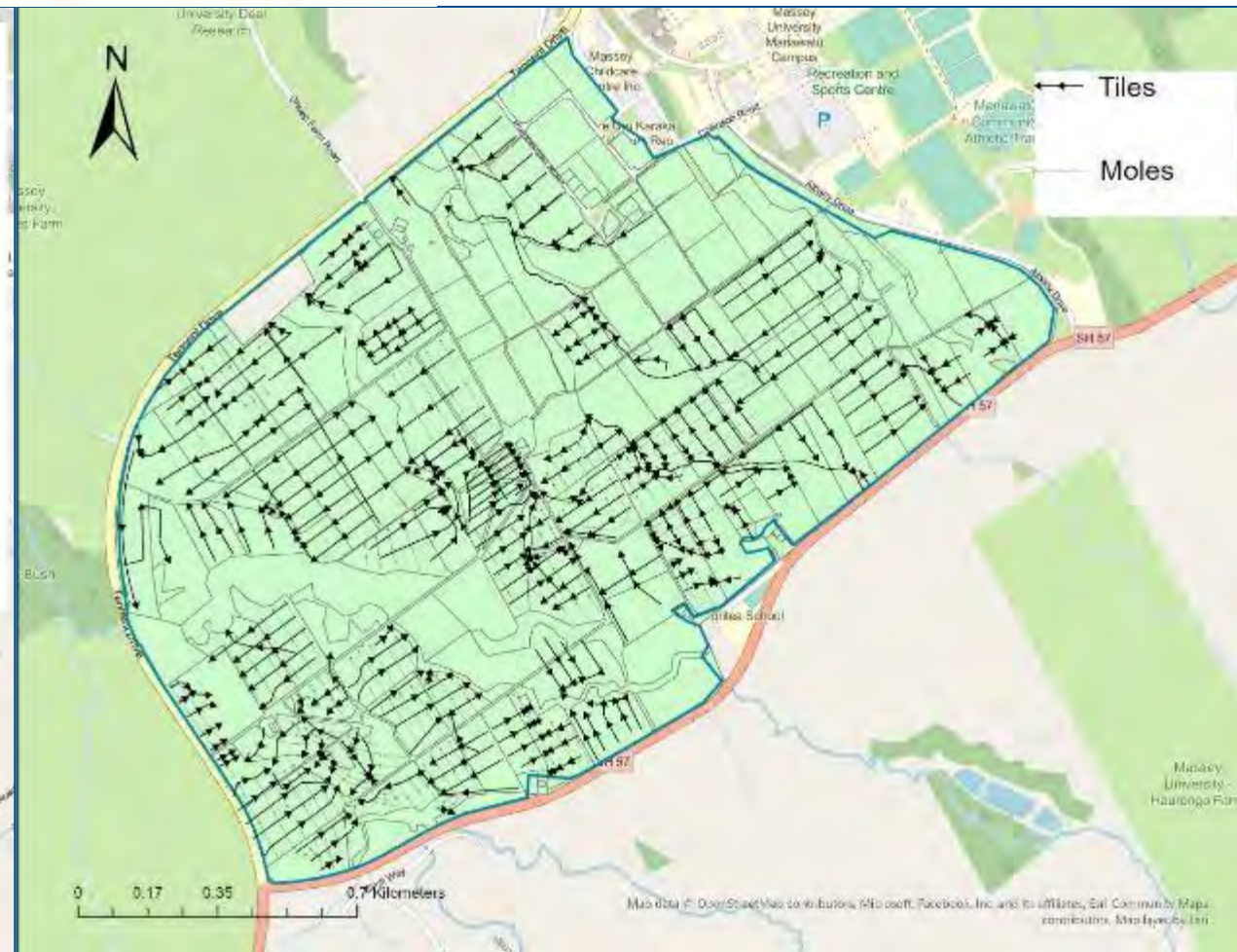
Analysis of
potential e-o-f
practices



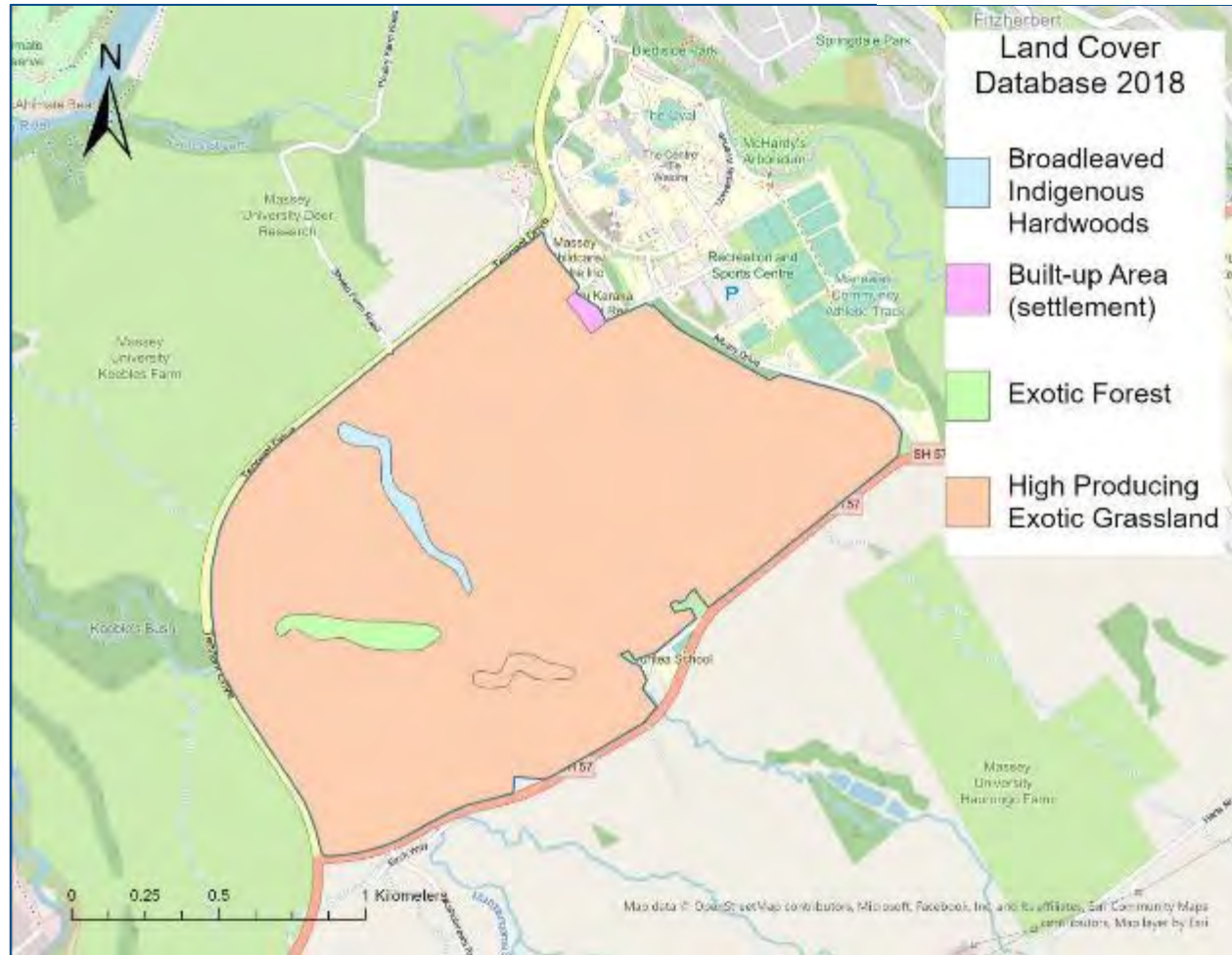
Site location



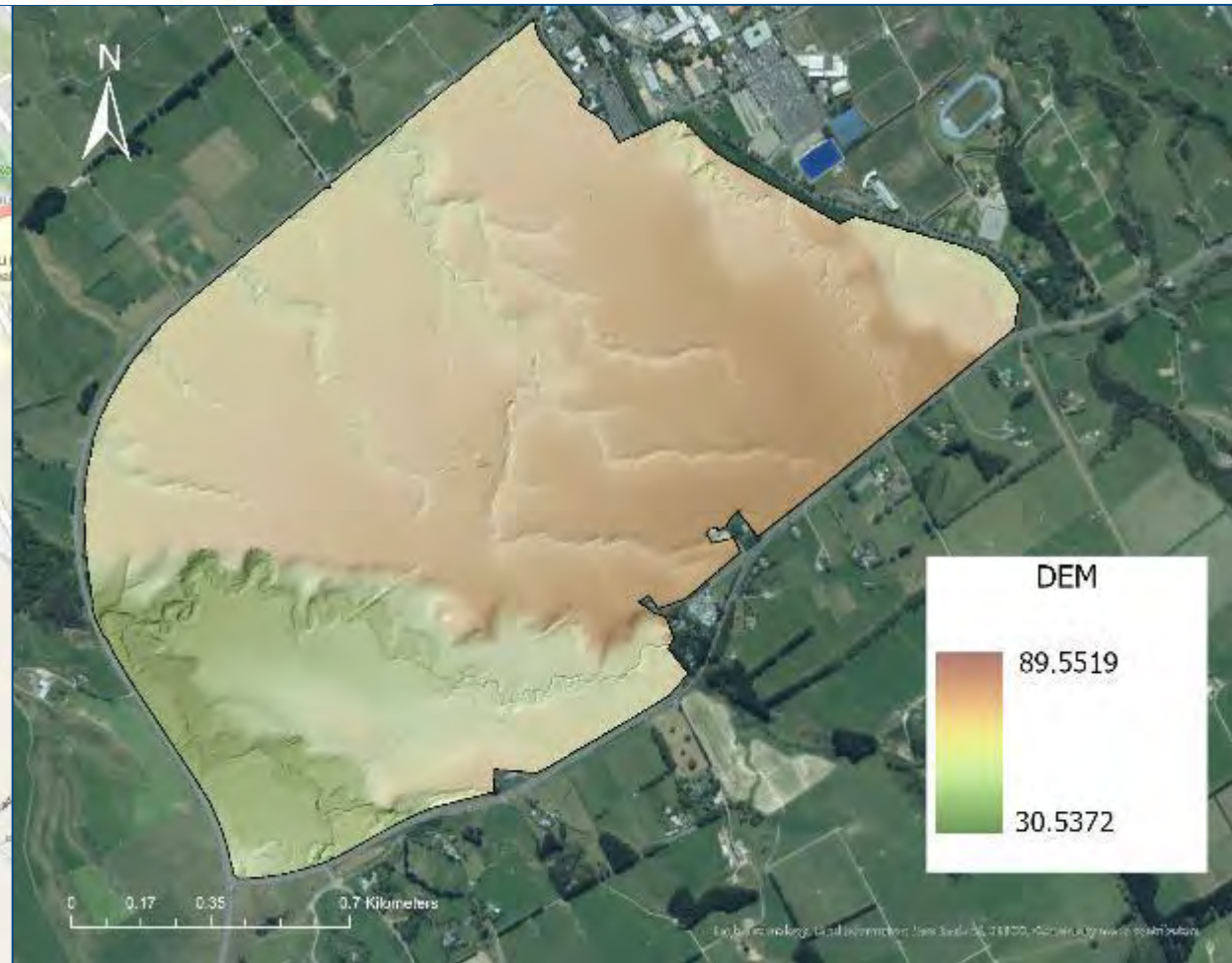
Soils



Drainage



Land use



Elevation



- Sampling (February-March 2023)

Sample ID	Nitrate-N (mg L ⁻¹)	DRP (mg L ⁻¹)	Total P (mg L ⁻¹)	E. coli (MPN 100mL ⁻¹)
1	0.98	0.31	2.20	20453
2	1.14	0.16	1.58	10793
5	0.43	0.23	0.33	2498
6	0.01	0.05	0.17	218
7	0.01	0.02	0.08	42

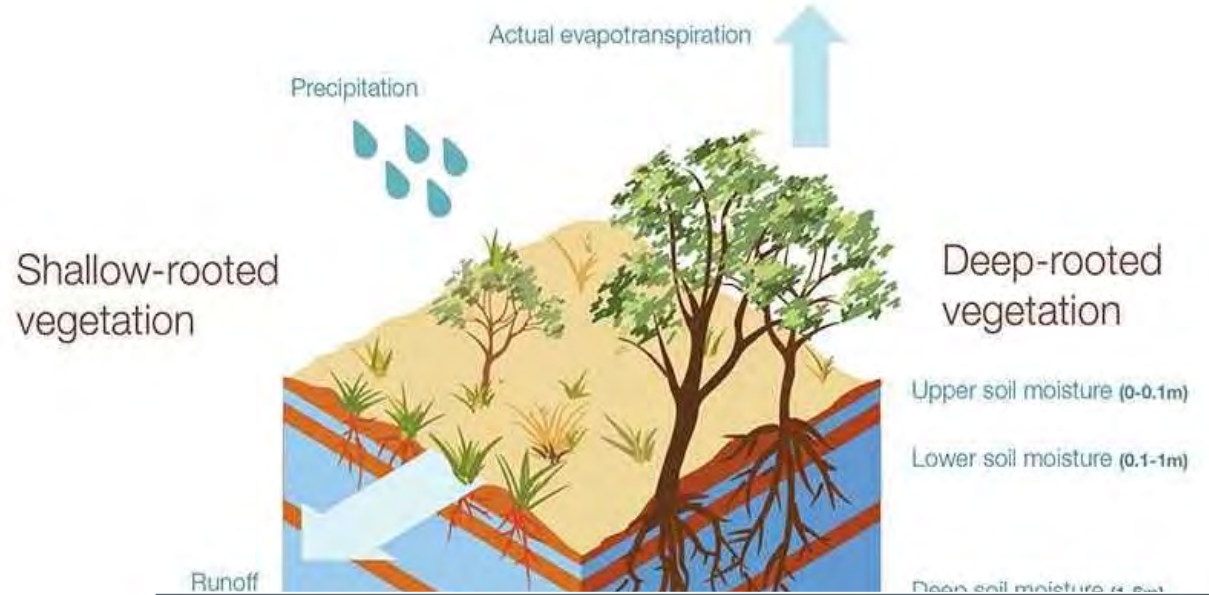
- Sampling (February-June 2023)

Sample ID	Count	Nitrate-N (mg L ⁻¹)	DRP (mg L ⁻¹)	Total P (mg L ⁻¹)	E. coli (MPN 100mL ⁻¹)
1	12	3.72	0.43	1.92	13343
2	10	1.21	0.26	0.92	4486
3	5	12.89	0.07	0.72	8963
4	4	11.79	0.95	2.02	13120
5	7	7.33	0.52	0.79	9525
6	9	0.68	0.13	0.34	4056
7	11	0.37	0.03	0.13	2507



Potential edge-of-field mitigation practices

- Based on a water balance:
 - Bioreactor:
 - Size: 300 m³
 - Drainage treated: 27% (approx. 7,900 m³)
 - Catchment area: 12.9 ha
 - Residence time: 16 hrs
 - Wetland:
 - Under further analysis





Photos courtesy of Brian Levine and John Paterson

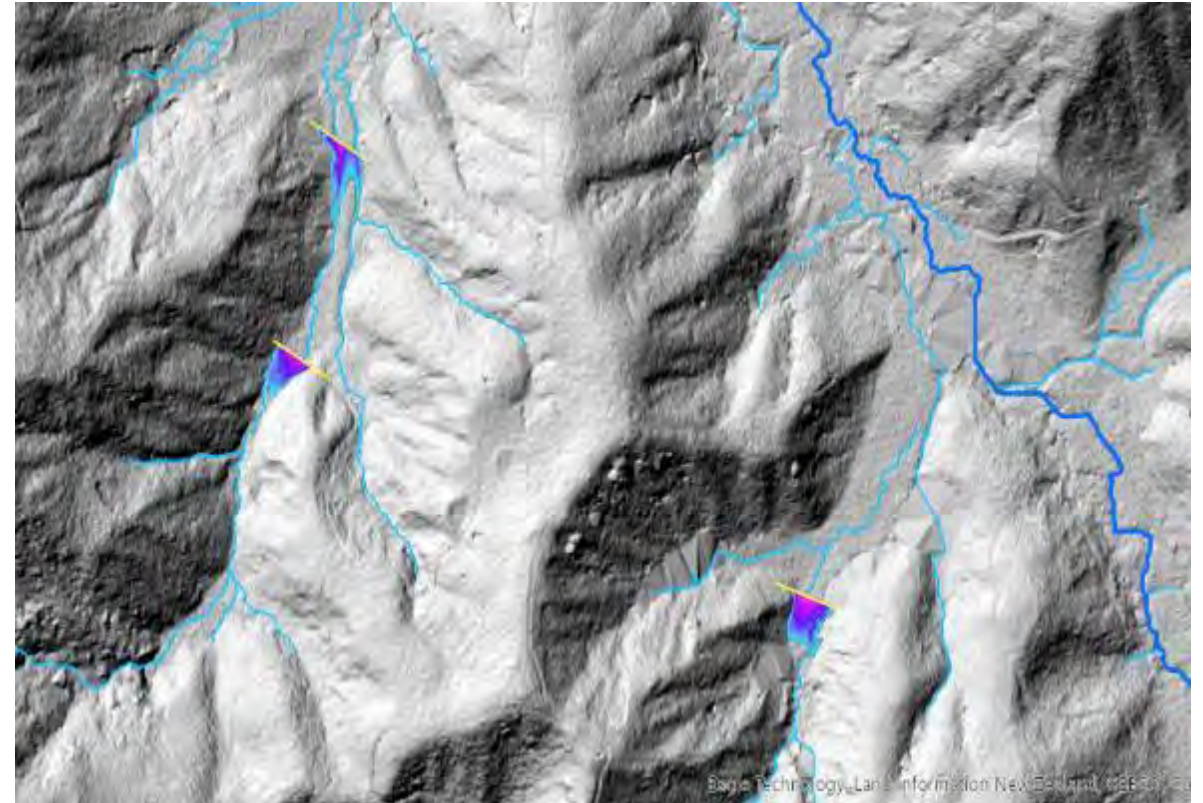
ACPF tool

Input data

- DEM
- Catchment boundary
- Land use
- Design parameters (i.e., height, width)



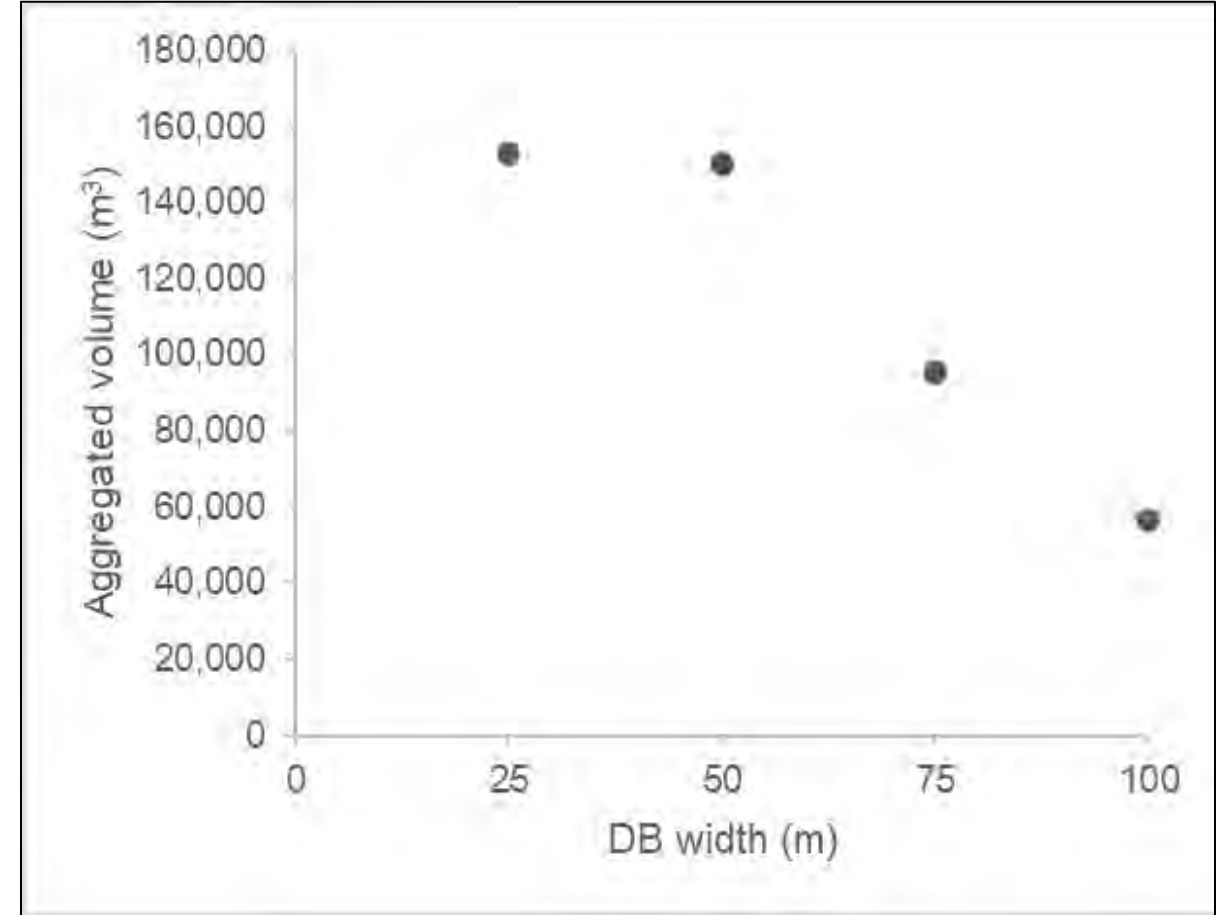
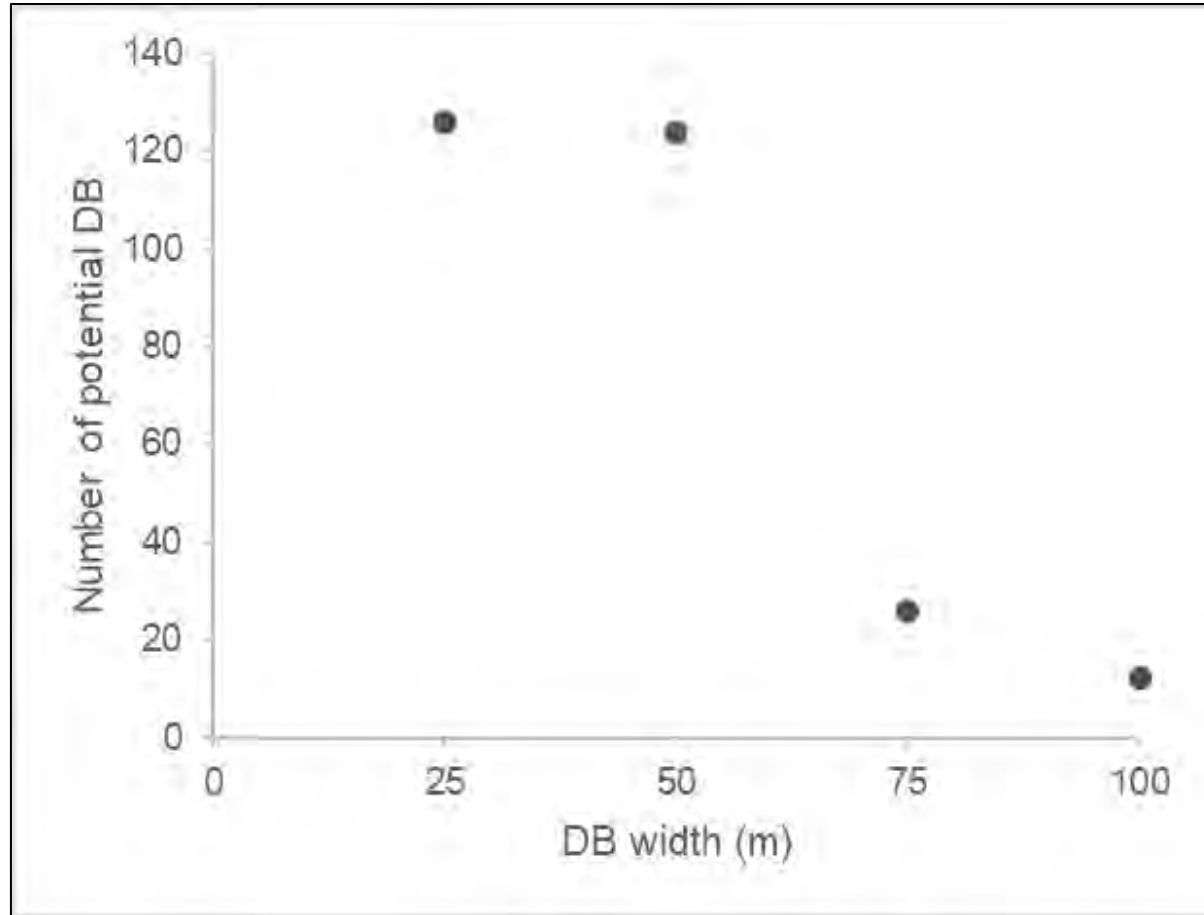
ACPF tool
in GIS
software



- Potential places for DB
- Pond storage (m³)
- Contributing area (ha)
- Contributing area/storage ratio

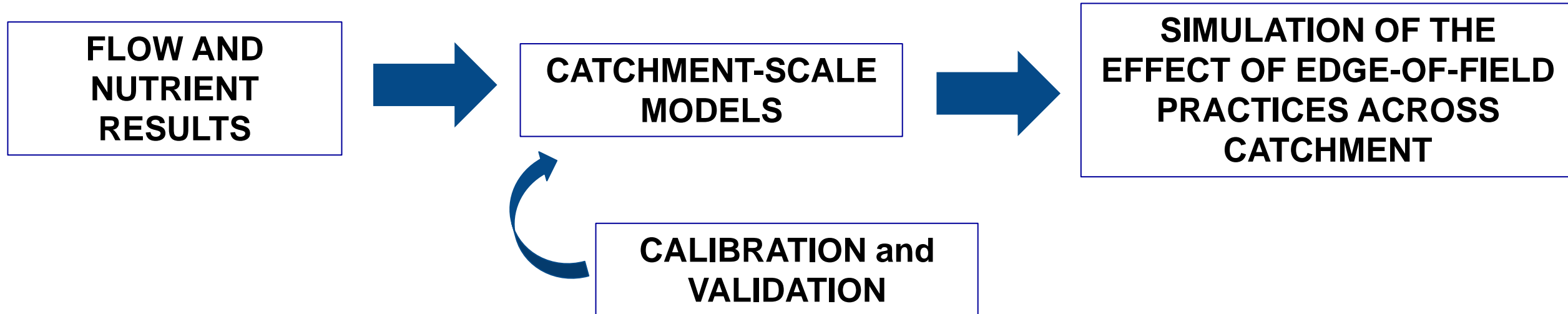






- Smaller and more DB will deliver more effective storage

Future plans



Concluding remarks

These tools will help us:

- Identify key contaminants and model and map critical flow pathways
- Assess potential mitigation sites and water quality mitigation strategies from farm to catchment scale



Further development for sharing in master classes