Using catchment scale field data to validate *MicroDrainage®*

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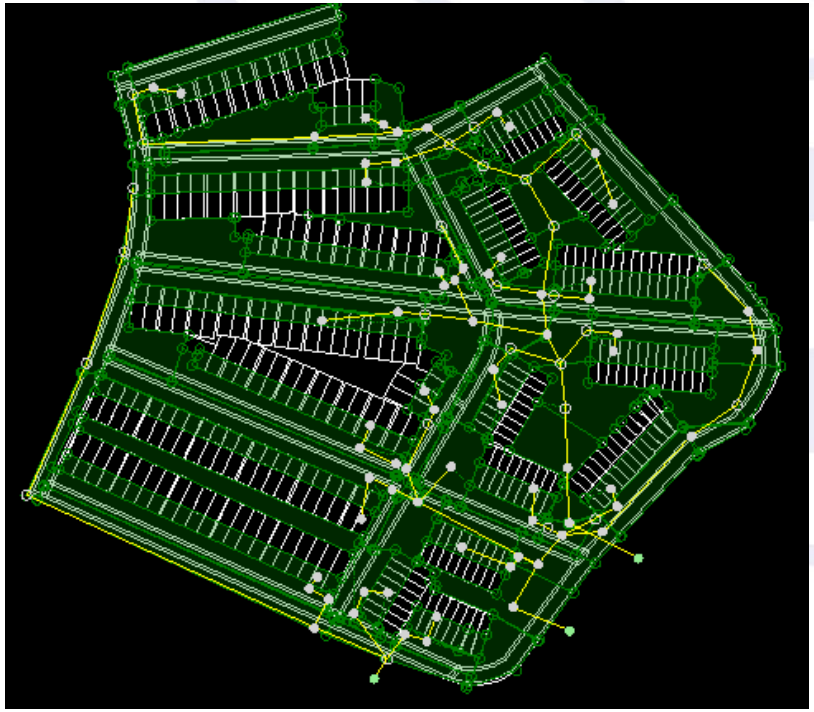
What is *MicroDrainage®*?

- UK industry standard drainage modelling tool with integrated SuDS.
- Lack of validation at the management train scale

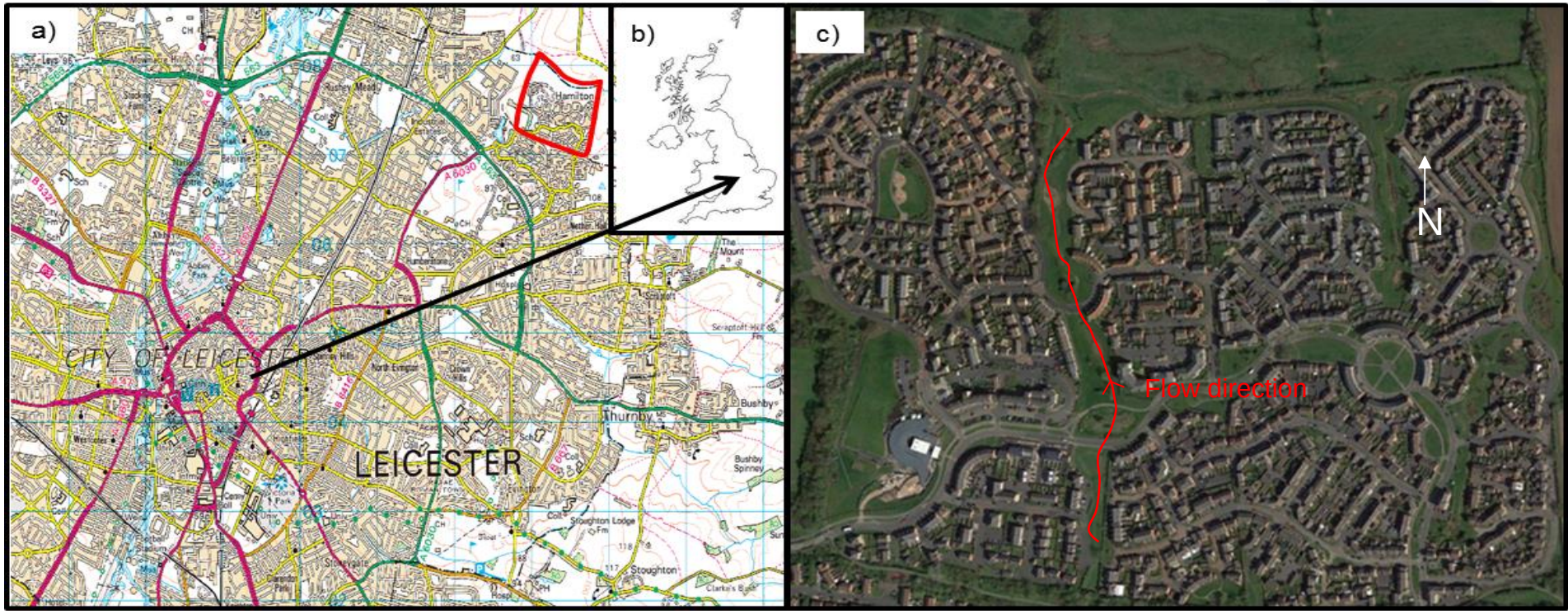


Purpose of the research

- Determine the accuracy of *MicroDrainage*® at predicting runoff

- Enhance user confidence in the ability of the software to further engage practitioners with SuDS

Study Site: Hamilton, Leicester



- Previously farmland, construction began on SuDS management train 2001; housing 2002.
- 4 SuDS management trains: swales and detention ponds.
- Flow controlled to greenfield runoff via weirs at the junction of devices
- Main focus for SuDS was flooding problems in the nearby Melton Brook.

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Study Site: Hamilton, Leicester

- 16ha SuDS management train: swales, vegetated wet ponds and dry detention ponds
- No source controls
- Steep topography
- Flow measured at 8 sites

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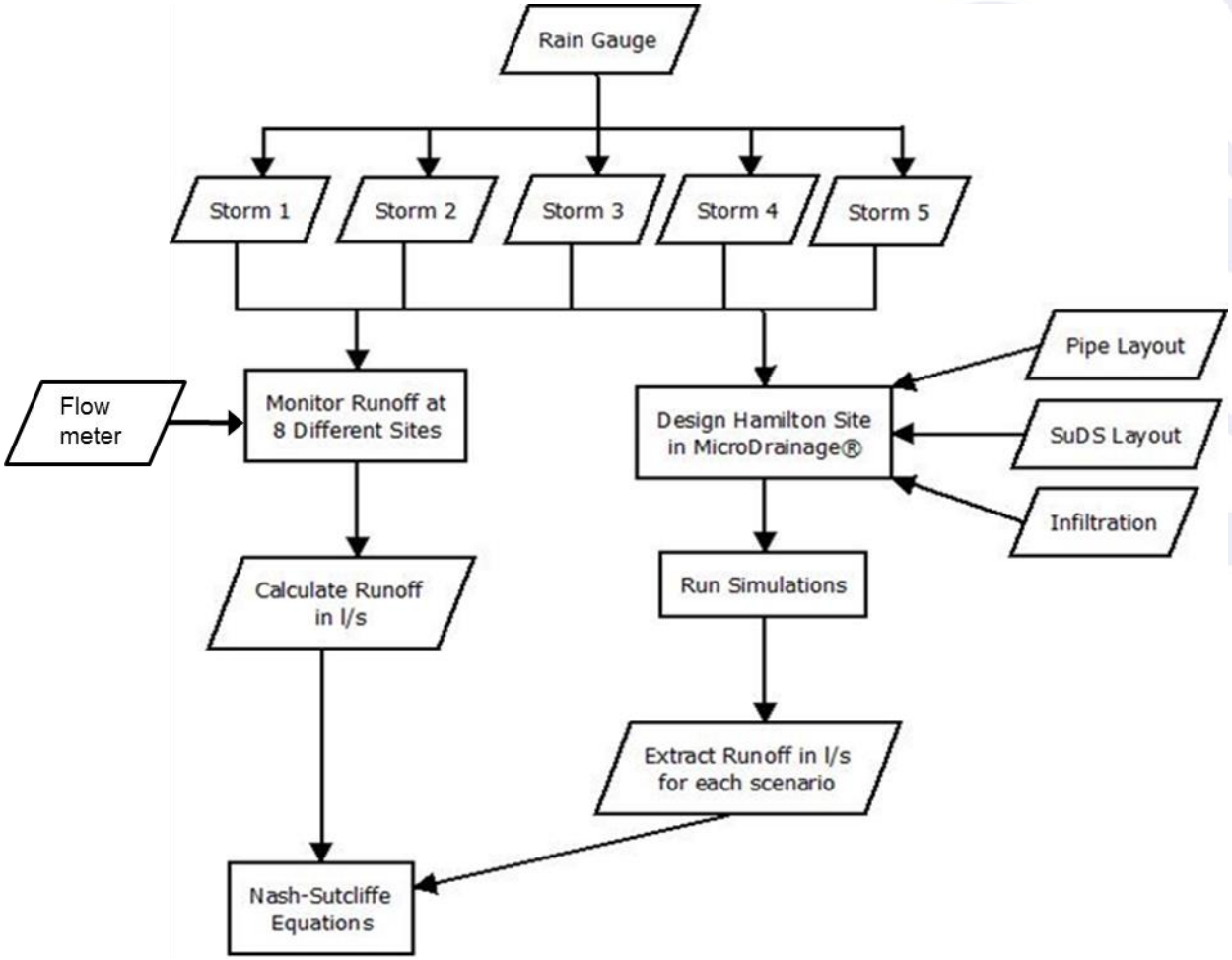
Methodology

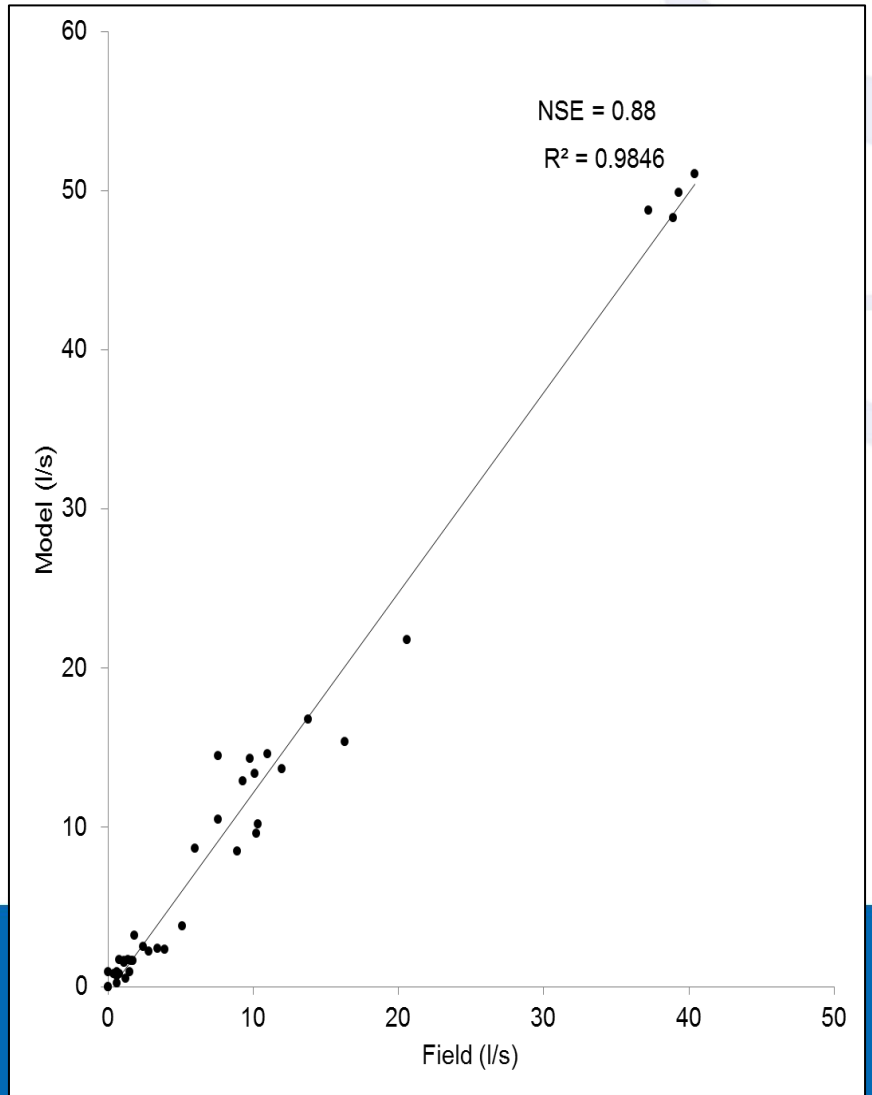


Designing the site in *MicroDrainage®*

- Designed the existing storm sewer network
- 1m LiDAR to define flood flow routes

Validate the accuracy of *MicroDrainage®*

Comparison between field and modelled data for Hamilton, using MicroDrainage®



Uncertainties

1. Values of Manning's attributed to the density and types of vegetation simplified the model, when in reality vegetation changed markedly for each device, influencing flow characteristics.
2. Previous model validation focussed at the small scale (typically one unit), as increasing the size of the simulation had the potential to introduce inaccuracies
3. At 16ha, infiltration rates may not have been consistent across the site; however MicroDrainage® required a constant infiltration value.
4. Field-walking found that the location of some of the pipes were not consistent with the mapped layout; in some cases outflow pipes were slightly offset.
5. To overcome these uncertainties, state tests were undertaken to determine whether the model accurately replicated the site. Once a state was achieved, the only variable to change was the Manning's value to replicate vegetation growth or removal.

Summary

- Five flow generating events monitored at Hamilton and accurately re-modelled in MicroDrainage®.
- NSE of 0.88 for Hamilton is extremely positive due to size of site.
  - No previous research undertaken in model analysis at this scale.
  - Increased level of uncertainty for modelling over 16 ha

- Provided industry confidence for *MicroDrainage*®

Acknowledgements

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