Case Study
Surface Permeability Analysis of Elster Creek Catchment

Be it the effects of climate change or La Niña, 2022 has seen many densely populated areas of Australia inundated with extreme flooding events. Spatial Vision's award winning mapping and analysis work for E2DesignLab, Melbourne Water and affected councils in the flood prone Elster Creek catchment zone charts a course for similar vulnerable areas.

High permeability reduces flood risk and increases stormwater quality, urban greening and amenity. An innovative approach was required to spatially map surface permeability on behalf of Elster Creek Catchment Flood Management Plan Working Group. The principal benefit for participating councils was a complete and detailed permeability analysis for the entire catchment to support better decision making and future modelling.

A key focus of permeability mapping is to provide local government with a tool that can support water-sensitive urban design (WSUD) planning for the public realm, and development control for the private realm, thus minimising stormwater run-off and flood risk.

Executed over 13 months, this Elster Creek Catchment Flood Management Plan Working Group funded project met three key land use planning deliverables for their flood management plan:

- A catchment-wide GIS dataset in a vector format for permeability and surface type
- Detailed attribution including confidence level, data source and other key information
- A variety of summary tables and mapping outputs for reporting and presentation

"E2Designlab were pleased to partner with leading GIS specialists Spatial Vision to deliver an innovative response to permeability mapping. Spatial Vision applied an innovative and methodical approach to map permeability across the municipality, including new permeability classifications providing a deeper understanding of different surface classifications."

Caroline Chandler,
Senior Consultant Strategy and Planning
E2DesignLab

Customer Profile
www.e2designlab.com.au

Company
E2DesignLab

Location
Victoria

Industry
Water Resources\Policy

Products
Spatial Analytics and Mapping

Solution
Spatial Vision developed an analysis of surface permeability for the Elster Creek Catchment area. Data utilized included Multispectral Imagery (at light wavelengths of Red, Green, Blue and Near Infrared), LiDAR and geospatial vector datasets.

Benefits
- Provided local governments and water authorities with the knowledge and understanding to make informed policy decisions and understand how to plan for future development and change.
- A baseline of information which can be replicated at a later date to determine change over time and track effects of policies implemented.

The Issue

The Elster Creek Catchment spans four municipal boundaries: Port Phillip, Glen Eira, Bayside and Kingston. The catchment has a known history of widespread flooding. Given the area's highly developed nature, this is expected to continue.

In addition, it is anticpated that climate change will exacerbate the challenges of flood and stormwater management, with more severe and frequent storm events causing damage and disruption.

As such, the Elster Creek Catchment Flood Management Plan 2019 – 2024 needed a baseline for permeability across the public and private realms that also showed the planning zones associated with the surface. This was required by councils within the catchment to plan for future growth, change and policy development.
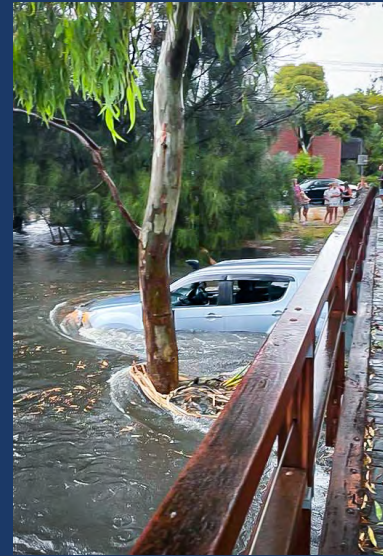
The Solution

Our approach to generate a spatial permeability dataset involved using spatial modelling to apply a set of business rules to a broad range of related datasets. The rules-based permeability analysis comprised the following stages:

- Processing of LiDAR and a multispectral desktop analysis
- GIS analysis to classify surface types (buildings, concrete, road/asphalt, soil/bare earth, healthy vegetation, dry vegetation or water body), including sub-classes
- Shadow identification and removal
- Accuracy evaluation assessment
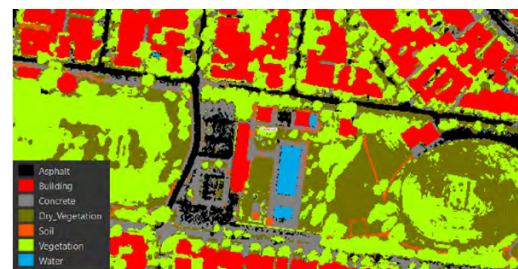- Mapping, summary tables and catchment-wide spatial datasets

Data inputs included:
- LiDAR Point Clouds
- Multispectral Banded Rasters
- Vector datasets from Melbourne Water, local councils and Vicmap

Desktop analysis outputs used permeability equivalence as a measure for achieving council stormwater management and climate resilience policy objectives. A rigorous and repeatable methodology was developed to map existing permeability across urban catchments. In addition, suitable permeability responses and approaches for the quantification of WSUD benefits were technically assessed.

GIS analysis and surface classification

Permeable v Not Permeable

The Elster Creek project assisted participating councils by establishing a suitable approach for the protection and enhancement of permeability by undertaking GIS analysis to create a fine-grained, parcel scale map. A suitable land cover and surface type layer, along with a uniform vegetation cover, was also developed for the catchment.

If you'd like to know more, **please get in touch.**

The Benefits

The scope of work undertaken assisted E2Designlab, Melbourne Water and local councils in several ways:

- Provided local governments and water authorities with the knowledge and understanding to make informed policy decisions and understand how to plan for future development and change.

- Developed a baseline of information which can be replicated at a later date to determine change over time and track implemented policies outcomes.

- In the absence of an existing tool established new methods and approaches to define, quantify and assess permability. This innovation was recognised by the 2022 Asia Pacific Spatial Excellence Awards (Victoria).

- Created a roadmap for data gathering, development scenario modelling and industry engagement actions.

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