REWORKING THE WATERSHED

USING DECENTRALISED FLOOD MANAGEMENT TO RETROFIT THE URBAN ENVIRONMENT

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INTRODUCTION

Case Study of Retrofit Integrated Water Management Measures for City of Bayside:

- Flooding Issues and Causes
- Flood Modelling Investigations
- Mitigation Option Selection
- Option Staging
- Decentralised Storages
- Opportunities and Barriers
- Application across Victoria and Australia

FLOODING ISSUES

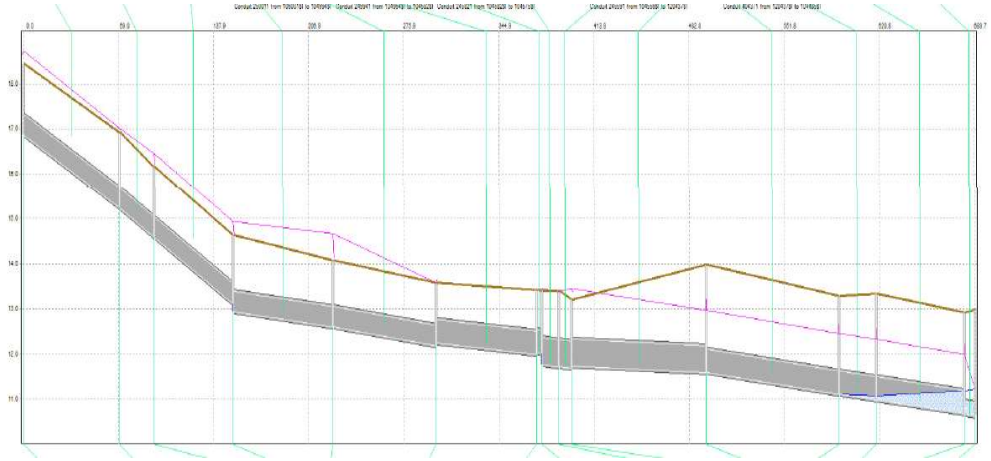
- Small catchment serviced by pit and pipe constructed in the 1970s
- Chronic multi-annual nuisance flood events, with periodic flooding of local properties
- Characterised by trapped depressions and minimal existing storage
- Infill development has increased runoff from 1970s levels
- Flood frequency patterns have changed due to a changing climate
- Council presides over an enormous amount of infrastructure

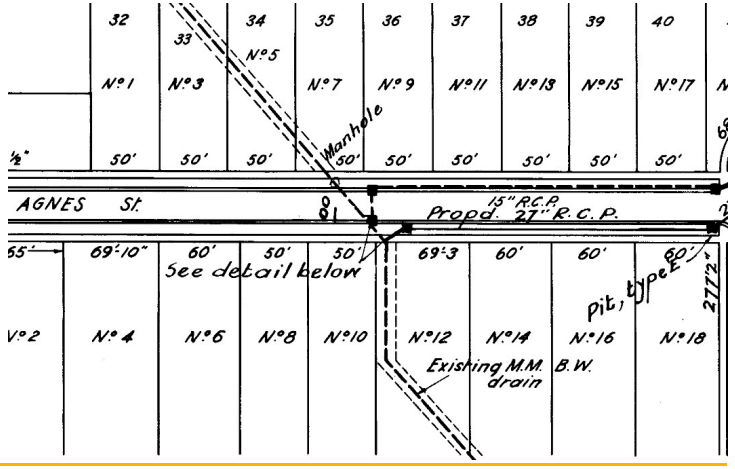
POTENTIAL CAUSES

Cause of drainage failure not immediately evident.

Possible Causes Identified:

- Aging Infrastructure & Climate Change
- Poor Drainage Hydraulics
- Incorrect Maintenance Regime
- Tailwater Constraints





FLOOD MODELLING INVESTIGATION

Existing Conditions Model

- Built for calibration
- Built using Council spatial data
- Modelled for each potential cause of drainage failure
- Outputs matched to anecdotal reports and photography from residents

- Results indicated that the flooding was caused by reduced conveyance and tailwater conditions.

MITIGATION OPTIONS SELECTION

Options Evaluation

- Potential options added to calibrated existing conditions model
- Options bound by a cost-benefit analysis
- Flood reduction by cost and constructability

Solution

- No silver bullet solution available
- Complex situation with both budgetary and timeline constraints
- Pipe storage most ideal for immediate benefit

STAGED APPROACH

Staged approach adopted

- One solution cannot restore the drainage.

Stage 1 = no nuisance flooding

Stage 2 = 5 year off the roads and 100 year only in the road

DECENTRALISED STORAGES

OPPORTUNITY/BARRIERS

- Effectiveness and capacity
- Local interest
- Community expectations
- Community acceptance
- Integrated water management approach
- A changing climate
- Policy and planning
- Economic feasibility and funding

EFFECTIVENESS AND CAPACITY

- Many houses have rainwater tanks
- Not designed for flood management
- Airspace can be achieved through design, with high flow and low flow outlets
- Configured to capture a large portion of the roof area, and plumbed into water using appliances

LOCAL INTEREST, COMMUNITY EXPECTATIONS AND ACCEPTANCE

- Community expects a level of service with respect to flood management
- For this case study, this level of service is not provided
- Community acceptance of rainwater tanks
- Importance of non-structural measures
  - Community education on flood management
  - Regular requests for maintenance and street cleaning to ensure the serviceability of the pit and pipe network
  - Flooding opposite the local primary school, consider supporting the school in flood management education

INTEGRATED WATER MANAGEMENT APPROACH

- Focus on both the potable and non-potable sources of water
  - water quantity
  - promote water reuse
  - minimise flood impacts
- Decentralised technologies can turn stormwater into a water resource by and assist with improved management of stormwater flows

A CHANGING CLIMATE

- Coastal and low elevation nature exposes it to a range of potential climate change related impacts
- Very real potential to increase flood risk due
- Increases in the probability of extreme events
- Sea level rise, storm surge etc.

POLICY AND PLANNING

- Council policy and planning is not seen as a barrier for decentralised flood management
- Water tanks are deemed to be un-classifiable structures pursuant to the Building Code of Australia
- Do not require a building permit, provided conditions are met
- Maintenance and functionality of rainwater tanks will fall on the community

ECONOMIC FEASIBILITY AND FUNDING

- Funding scheme includes various problems, challenges and barriers in the implementation of decentralised options
- Cost sharing, full supply of the tanks, and community grants can increase the uptake
- Approximately 1000 rainwater tanks would be required within the community to effectively mitigate the flooding
- Water pricing would need to be increased to achieve a positive benefit-cost ratio

IS THIS A FLOOD MITIGATION TOOL?

Does it work?

- Under the right scenario, Yes

But there are things to consider…

- Economic feasibility of rainwater tanks will likely mean that their implementation from a flood management perspective may not be economically viable on a larger scale implementation
- Consider stakeholder preferences and future challenges within the municipality, such as climate change, population growth, landuse change and urban development

CONCLUSIONS

- Council provide a level of service for flood management of the protection against the 18% and 1% AEP floods
- This is not feasible at this location
- Alternative options considered, including decentralised flood management
- Rainwater tanks and other decentralised storages provide an alternative option
- However there are other barriers that will have to be overcome, such as funding and community acceptance

QUESTIONS?