MTW assessment for Water sensitive industrial developments : a case study in Auckland

Yuliang Wang, PhD candidate & Marjorie van Roon, PhD, Senior Lecturer, School of Architecture and Planning, The University of Auckland
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Abstract

- Numerous cities around the world are increasingly applying sustainable stormwater management (SSM) to mitigate urban stormwater problems caused by rapid urban sprawl and climate change. Water Sensitive Design (WSD), as an approach to freshwater management in New Zealand, is applied to land use planning and development at complementary scales and seeks to protect and enhance the natural water cycle. Applying WSD in industrial areas is quite different to that in other land use types and special attention must be paid in industrial areas due to the complex context. So the benefits and advantages of WSD are the key points for combining it into an industrial plan which will involve various elements of environment, economy, public use and policy. More Than Water (MTW) assessment tool was used for comparing the benefits and advantages of a hypothetical Green Infrastructure version with those associated with a 'business as usual' (BAU) version of the same project from various aspects. The research aims to identify the advantages and disadvantages of water sensitive industrial development and conventional development from water / non-water aspects. The results show WSD has obvious superiority and it would be more sustainable and resilient for contemporary industrial development.

Background

- Relevant /Similar terminologies around the world
  - Low Impact Development (LID) , USA
  - Sustainable Drainage Systems (SuDS) , UK
  - Water Sensitive Urban Design (WSUD) , AU
  - Low Impact Urban Design and Development (LIUDD), NZ
- Water Sensitive Design (WSD)

  It considers stormwater management in parallel with the ecology of a site, best practice urban design, and community values. it is applied to land use planning and development at complementary scales including region, catchment, development and site. WSD seeks to protect and enhance natural freshwater systems, sustainably manage water resources, and mimic natural processes to achieve enhanced outcomes for ecosystems and our communities
- Auckland guidelines:

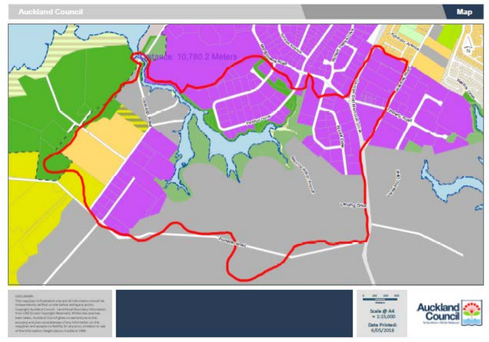
  TP10, GD01, GD04, GD05
- Sustainable stormwater management in industrial area is a research gap

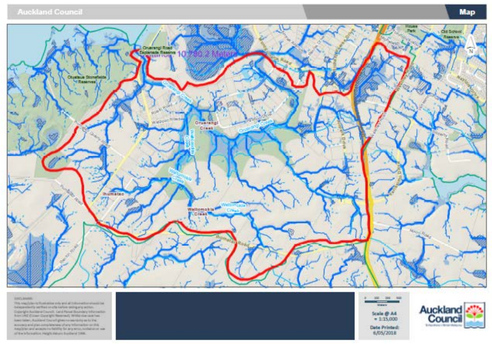
Research Questions

- What are the differences between water sensitive industrial development and conventional industrial development?
- What are the advantages and disadvantages of water sensitive industrial development
- What are the advantages and disadvantages of conventional industrial development and conventional industrial development?
- What are the advantages of water sensitive industrial development compared to conventional industrial development?

Methods

- Literature Review: document data, topographic data
- Case study: Mangere industrial area – South Auckland





- Qualitative evaluation – More Than Water Tool

  A qualitative research tool (could combine quantitative data) for evaluating the benefits and costs of WSD projects. The name of the tool reflects the notion that WSD can deliver multiple co-benefits and cost-related advantages, in addition to more familiar considerations associated with management of the hydrological and water quality effects of urban development.

Results

Benefits	Commentary		
Water- environmental benefits	WSD	BAU	Reliability
Hydrology	Medium	Medium	low
Water quality	Medium	Low	high
Aquatic habitat quality	Medium	Low	high
Drainage network and ecosystem connectivity	Low	None	low
Natural character (water bodies)	Medium	None	low
Water – Social benefits			
Supplementary water supply	None	None	High
Reduced wastewater / combined sewer system loading	None	None	High
Drainage and flood management	Medium	Low	High
Climate change adaptation	Medium	Low	Low
Recreation	Medium	Medium	high
Provisioning (e.g.: fishing)	Low	Low	high
Connectedness with nature (water bodies)	Medium	Low	Low
Non-water Environmental benefits			
Preservation of natural soils, soil hydrological function and plants	Low	Low	Low
Microclimate management	Medium	Low	Low
Carbon sequestration and mitigation	Medium	Low	Low
Terrestrial habitat quality	Medium	Low	Low
Terrestrial ecosystem connectivity	Low	None	Low
Natural character (land)	Low	Low	Low
Non-water - Social benefits			
Reduced building material consumption	Medium	None	Low
Infrastructure resilience	Medium	Low	Low
Food and fibre production	Medium	Medium	Low
Public safety	Medium	Medium	Low
Connectedness with nature (land)	Medium	Low	Low
Community health and wellbeing	Medium	Low	Low
Property values	High	Medium	Low

Results

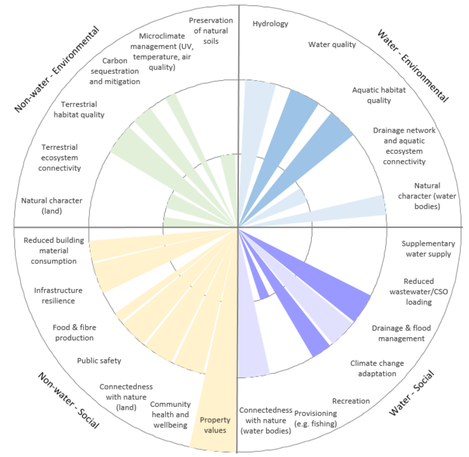


Figure 1. MTW output showing assessed benefits for hypothetical Mangere WSD development

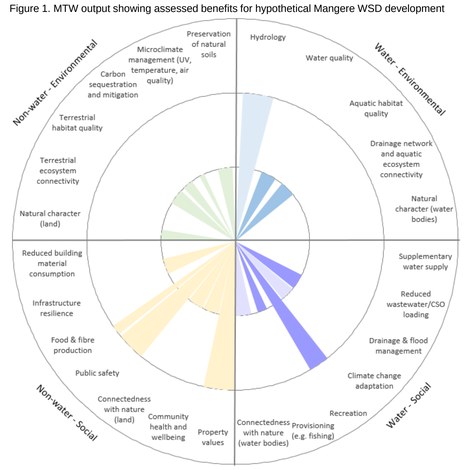


Figure 2. MTW output showing assessed benefits for BAU Mangere WSD development

Conclusions

- The assessment of water sensitive industrial development and conventional development shows that for water / non-water aspects, WSD has obvious superiority. It would be more sustainable and resilient for contemporary industrial development.
- The evaluation sets a baseline for applying a WSD framework in an industrial zone which means WSD implementation has many benefits for industrial development
- Further research will use this assessment baseline to explore and identify the application of a water sensitive design framework for industrial areas.

Reference: Moores, J., Ira, S.J.T., Batstone, C. & Simcock, R. (2019). The 'More Than Water' WSUD Assessment Tool - Activating WSUD for Healthy Resilient Communities. Building Better Homes, Towns and Cities National Science Challenge. Retrieved from https://www.landcareresearch.co.nz/__data/assets/pdf_file/0016/210715/More-than-Water-Tool-report-FINAL.pdf