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Mainstreaming Low-Impact Urban Design and Development:

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In this paper…

- Background low impact urban design, development (LIUDD)
- Impediments
- LIUDD needs to be mainstream
- Benefits, Examples
- Where to from here?

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Features of conventional urban development

- Urban sprawl - proliferation of impervious surfaces
- Production of emissions, stormwater run-off
- Costly traditional infrastructure – heavy engineering, pipes etc
- Disturbance to local environments
- Pollution air, land and water
- Sedimentation of estuaries

RESULTING IN…

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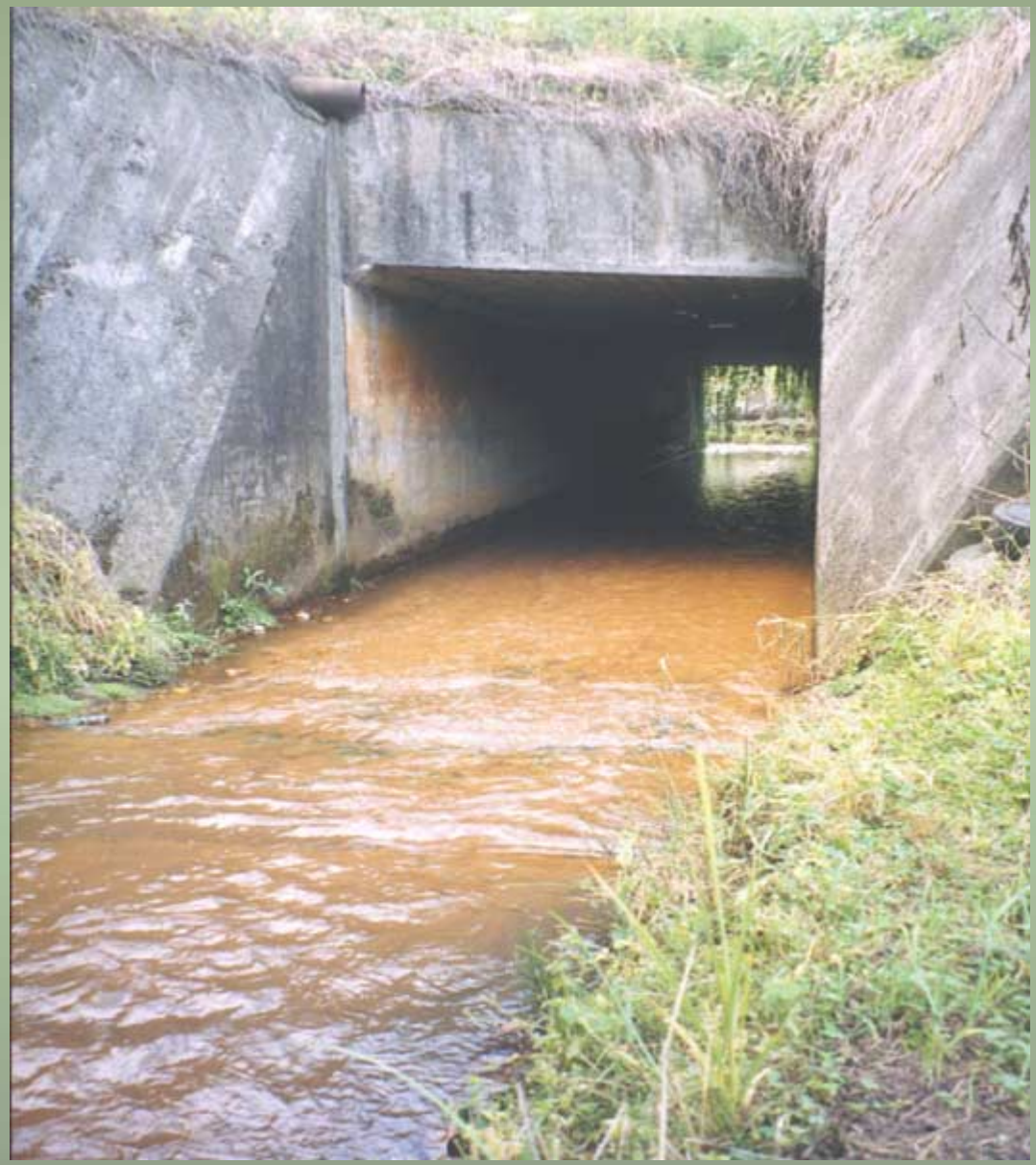

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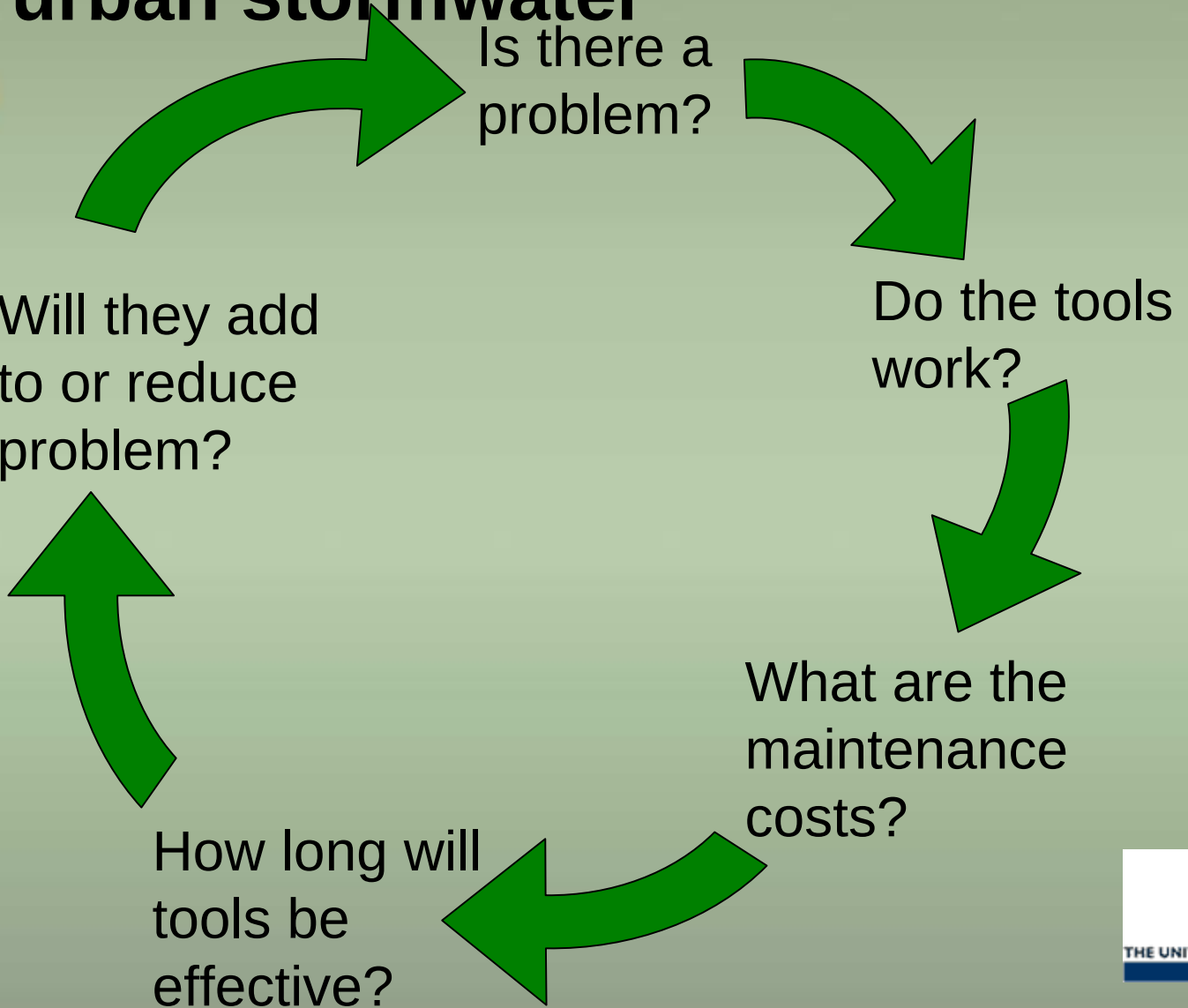
Real and perceived barriers to change

- Conflicting stakeholder needs and litigation developers/regulators
- Price concerns, planning, institutional impediments
- Lack of locally based, ecological, technical, hydrological data
- Conventional approaches to profit maximisation and lack of cost-benefit data on alternatives
- Environmental, economic, social data to influence plans, practice and policy.

Impediments to progress with urban stormwater



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Some examples of alternative approaches

Overseas	New Zealand
Elements in: Portland, Seattle, Massachusetts (USA), Bedzed (UK) Includes: - ecoroofs - rain gardens - infiltration Minimal discharges of stormwater	Tamaki, Earthsong CCC City Waterway and Wetland Natural Asset Management Strategy 1999, 2000 LIUDD and on-site stormwater strategies and guidelines - ARC 2000, 2003 - ACC 2003a,b - NSSC 2001, 2002 - CCC 1999,2000

UPTAKE OF LIUDD IS DISAPPOINTING

Earthsong website: http://www.cohousing.pl.net/

Our Solution: getting behind LIUDD

- Design and development practises
- Utilise natural systems and technological advances (erosion/sediment control). Empathy with Maori values
- Avoid, minimise and mitigate environmental damage
- Maximise on-site management
- Minimise off-site effects
- Reduce energy requirements and waste

Goal: 30% new urban developments take LIUDD approach by 2008

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The Way Forward

Four-pronged approach

Getting buy-in

Demonstrate ecological + technical efficiency

Translate into financial analysis at different scales

Rationalist plans, codes of practice

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Current Scope

Applied goal orientated research in the fields of:

- Catchment management: focus on 3 spatial scales – unit dwelling, neighbourhood and catchment.
- Environmental technologies (for reducing stormwater impacts, treatment trains).
- Assessment of development impacts and mitigation.
- Economic analysis of conventional versus sustainable development options.
- Participatory research with practitioners, engineers and construction companies in urban development.

Benefits of low-impact urban design and development

- environmental
- economic
- social

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Environmental benefits of LIUDD

- reduced sediment and pollutant loads
- reduced stormwater flows
- reduced impervious area, more vegetated areas
- offsite benefits (eg improved fish habitats)
- in estuaries (improved habitat derived from reduced contaminant and sediment accumulation)
- improved terrestrial local biodiversity (native vegetation corridors)
- improved aquatic biodiversity

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Economic benefits of LIUDD

- lower cost
- improved environmental assets
- higher returns to developers?

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Social benefits of LIUDD

- improve amenity values on- and off-site
- provide $ benefit to homeowners
- provide benefit to community from improved environment

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Current Focus

- Comparisons of LIUDD vs Conventional
- 4 Spatial scales (device, lot, neighbourhood, catchment)
- and 3 core sets TBL Indicators
- Focus on Stormwater, Energy, Waste, Social, Environmental Quality
- Leading to improved future urban design

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Pollutant Removal Effectiveness (%)

Treatment Technology	TSS	Metals	Oil & Grease	References
Infiltration Trench[1]	75–99	75–99	NA	Young et al. (1996)
Detention Ponds	46–98	24–89	NA	City of Austin (1990); City of Austin (1995); Harper & Herr (1993); Gain (1996); Martin & Smoot (1986); Young et al. (1996); Yu & Benelmouffok (1988); Yu et al. (1993 & 1994)
Underground Sand Filters	70–90	22–91	NA	Bell et al. (1995); Horner & Horner (1995); Young et al. (1996)
Organic Media Filters	90–95	48–90	90	Claytor and Schueler (1996); Stewart (1992); Stormwater Management (1994); Pandey et al. (2004)
Vegetated Swales	30–90	0–90	75	City of Austin (1995); Claytor and Schueler (1996); Kahn et al. (1992); Yousef et al. (1985); Yu & Kaighn (1995); Yu et al. (1993 & 1994)
Porous Pavements	82–95	33–99	NA	MWCOG (1983); Hogland et al. (1987); Young et al. (1996)

Landcare's Tamaki Building: Sustainable Features

- Rainwater harvesting and re-use
- Raingardens
- Tempered Air System
- Energy efficient
- Composting Toilets
- Solar hot water

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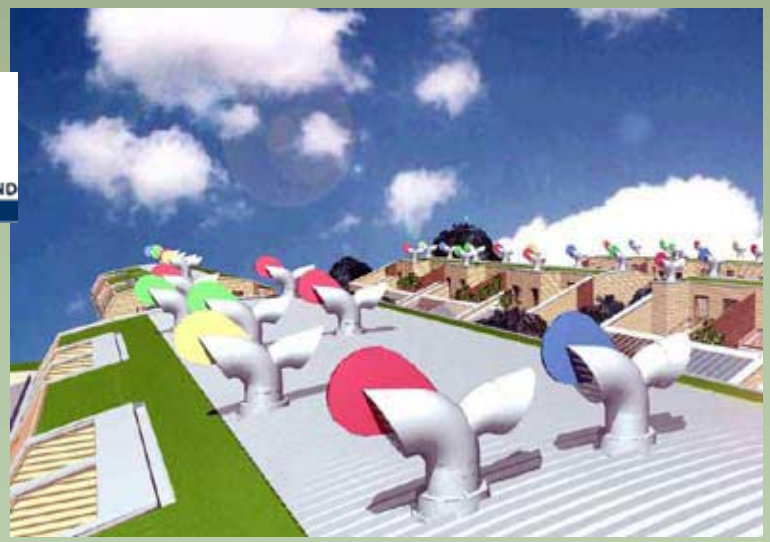
The Beddington Zero Energy Development

http://www.bedzed.org.uk



BedZED – water friendly

- sky gardens
- porous paving in car parking spaces
- runoff drains to water feature
- installing water-efficient fittings and appliances
- highly-visible water meters in the kitchen to encourage water efficiency.
- handbook for every household with tips on reducing water use.

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Catchment scale thinking: runoff resulting from increased impervious area

Title	Description	Infiltration	Evapo-transpiration	Runoff
Natural Ground Cover	Landscape of trees and shrubs with open spaces	50%	40%	10%
10-20% Impervious Surface	Landscape of trees, shrubs, open spaces and a house	45%	35%	20%
35-50% Impervious Surface	Landscape of trees, shrubs, smaller open spaces and houses	35%	35%	30%
75-100% Impervious Surface	Landscape of Office towers, large buildings, a house, and a tree	15%	30%	55%

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Target Outcomes for Urban Futures

- Transformation of urban development, construction and design.
- Measured improvement in urban freshwater, native, terrestrial environments.
- Reduced stormwater, infrastructure and energy demands and urban wastes
- Sustainable development – making an economic return.

"*Achieved by facilitating the adoption of low impact urban design and development (LIUDD)*"

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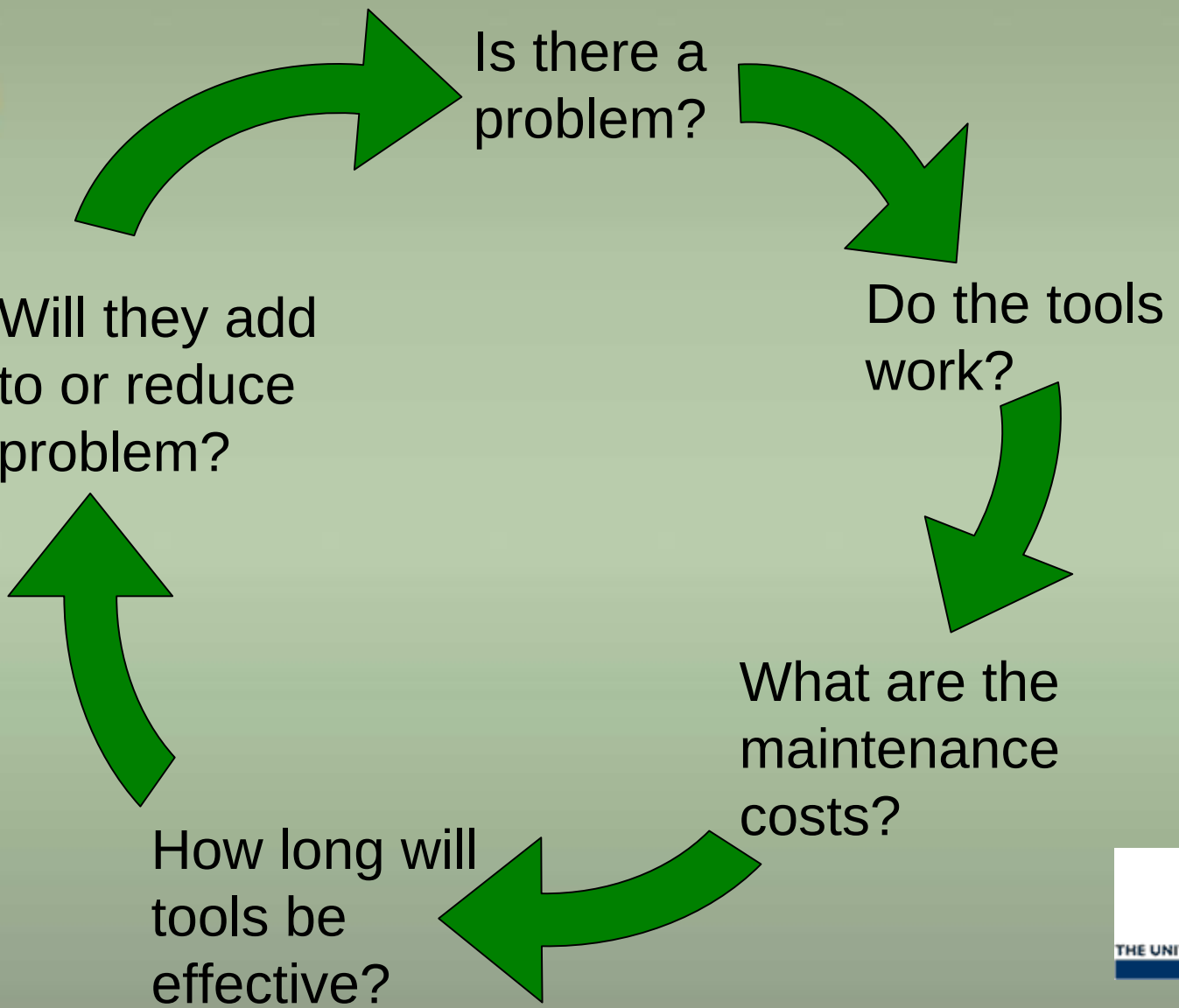
Opportunity 2050

The future …

NZ: Leaders in Sustainable Urban Development

Urban sprawl
pollution
degradation

Impediments to progress



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Breaking the cycle (LIUDD)