UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Reforesting the Built Environment: a Practical Feasibility Case Study in Christchurch

Dr. Kerry Mulligan
Dr. Shannon Page

Department of Mechanical Engineering
University of Canterbury

Green roofs

- Relatively thin substrate cover
- Hardy plant species
- Most commonly retrofitted to commercial buildings

Environment Canterbury green roof
(Landcare Research, 2008)

Waitakere Central Civic Centre
(Waitakere City Council, 2007)

University of Auckland green roof
(Fassman, E., et al, 2008)

Why a green roof?

- Main benefit - Storm water retention
- Existing storm water runoff issues
  - Stream bank erosion (receiving waters)
  - Infiltration of sewage system
- Problems exacerbated by infill housing
- Other benefits of a green roof
  - Improved thermal performance of building
  - Habitat – (insects and birds)
  - Improved aesthetic appeal

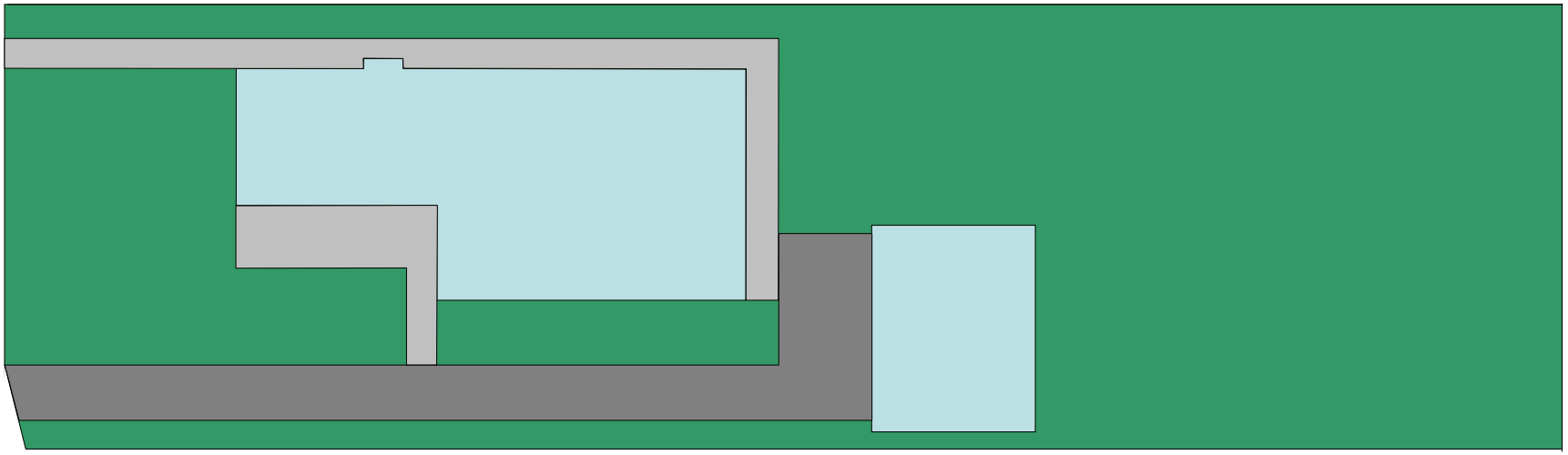
Case Study

Objective : develop a simple green roof system for an existing dwelling (infill housing example)

Outline

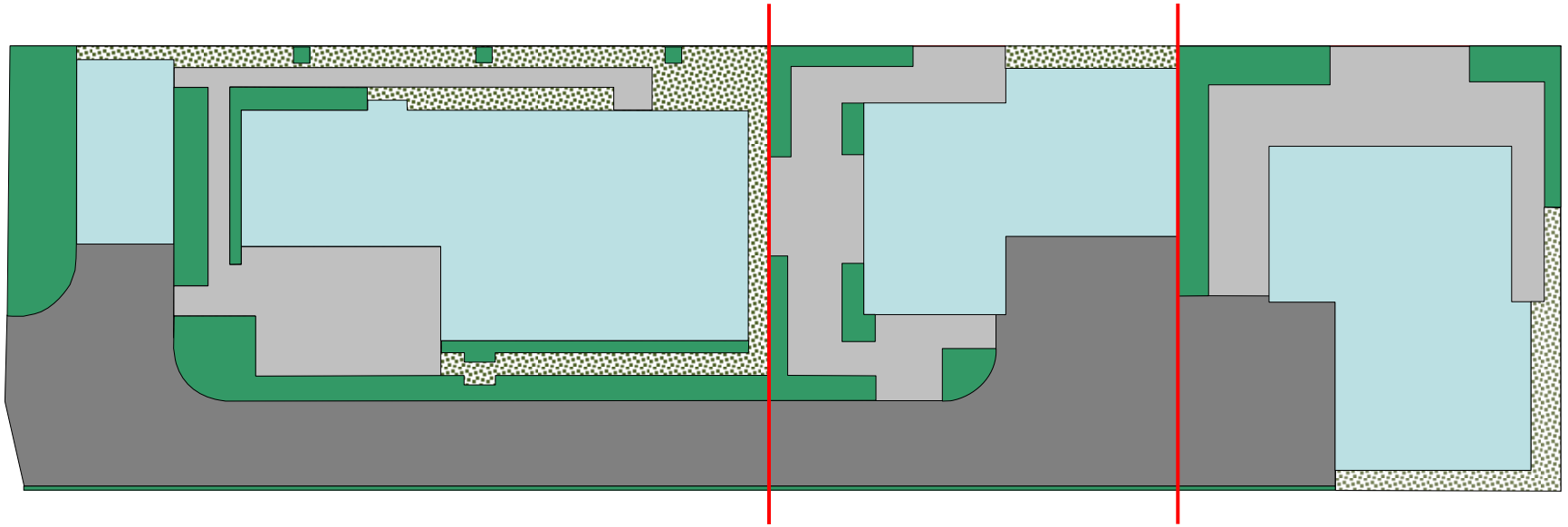
- The dwelling
- Green roof considerations
- Design and results: Mark I & II
- Summary

The dwelling



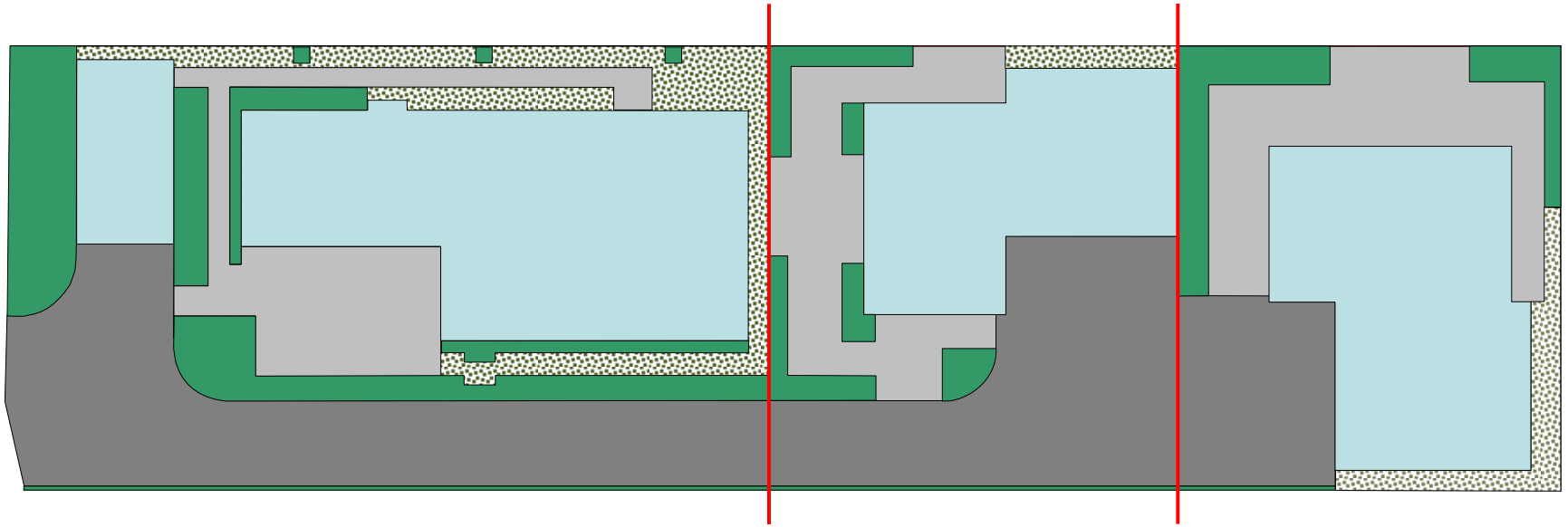
Surface cover		Original Section	
		m^3	%
Impervious surfaces	Building	153	19
	Path/patio	53	7
	Access way	71	9
Pervious surfaces	Garden/grass	515	65
	Stones	0	0
	Total	792	100

The dwelling



Surface cover		Original Section		After subdivision		Change in surface cover
		m³	%	m³	%	%
Impervious surfaces	Building	153	19	284	36	+17
	Path/patio	53	7	136	17	+10
	Access way	71	9	210	27	+18
Pervious surfaces	Garden/grass	515	65	104	13	-52
	Stones	0	0	58	7	+7
	Total	792	100	792	100	

The dwelling



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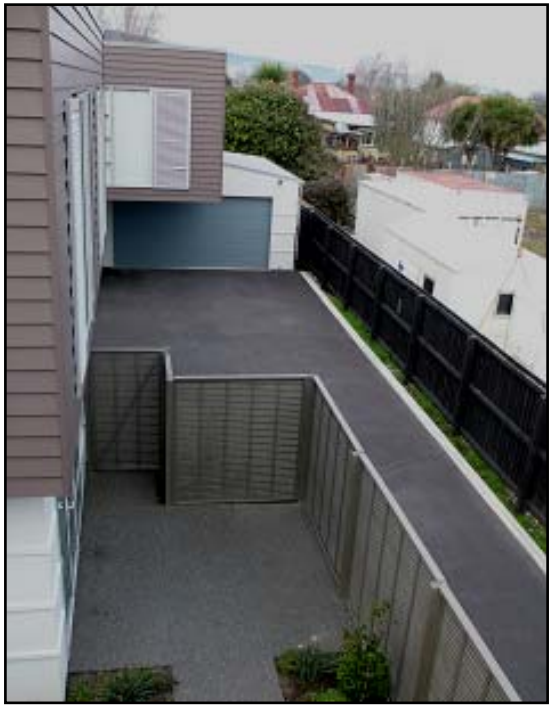


Original house – 1920's Rimu frame with concrete block and plaster

Flat roof – 3.1^{o} slope, garage 4.5^{o}

Load bearing – 50kg/m^{2}

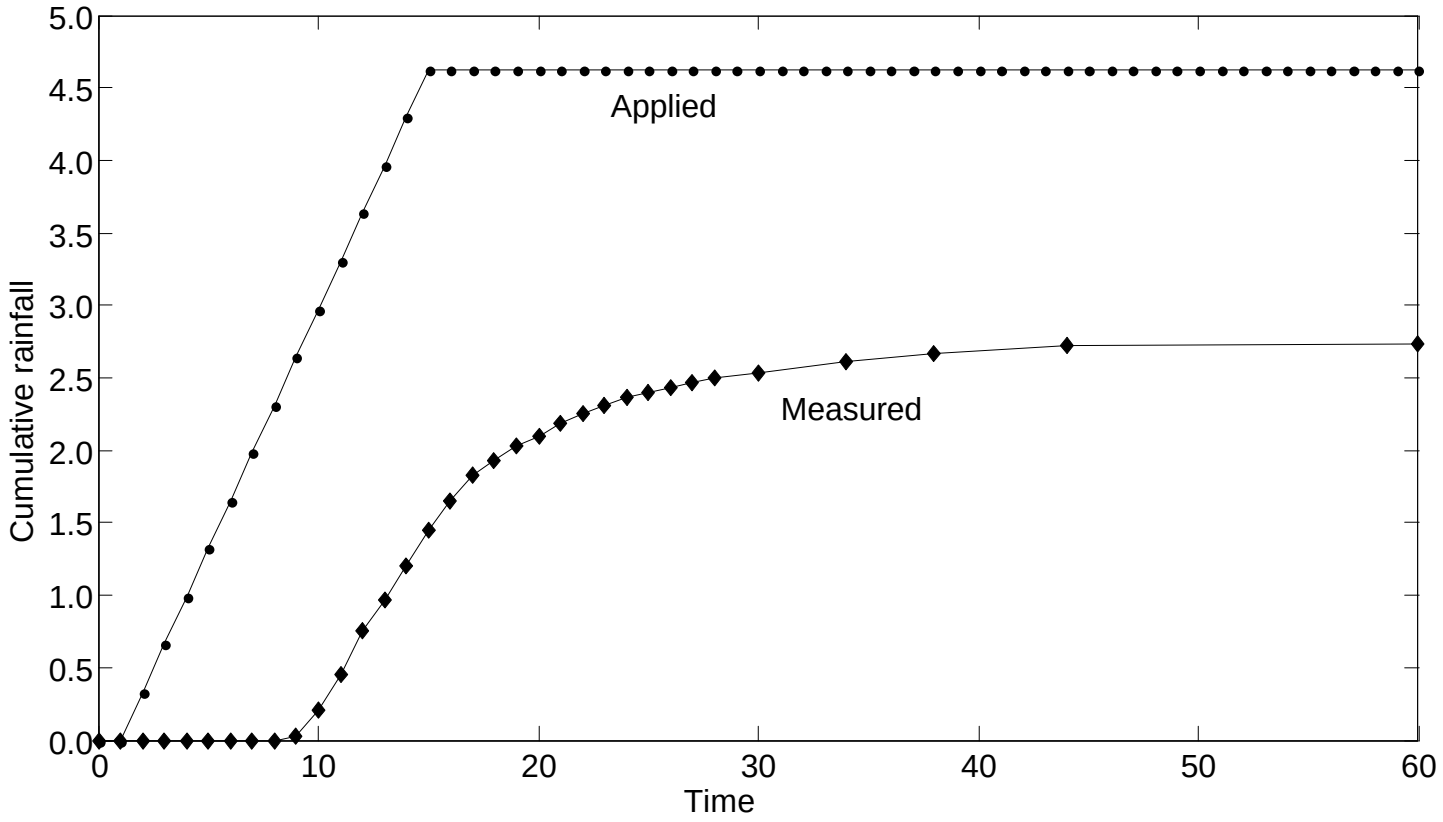
Requirements of Green roof

- Light weight (< 50kg m^2)
- Prevent moisture from reaching existing roof
- Easy to install AND remove

Design - Mark I

- Substrate: sphagnum moss, palm peat, potting mix
- Plants: mix of ground covers and grasses

Performance of substrate module



- Delay – 8 minutes
- Retained 1.9mm of 4.6mm applied

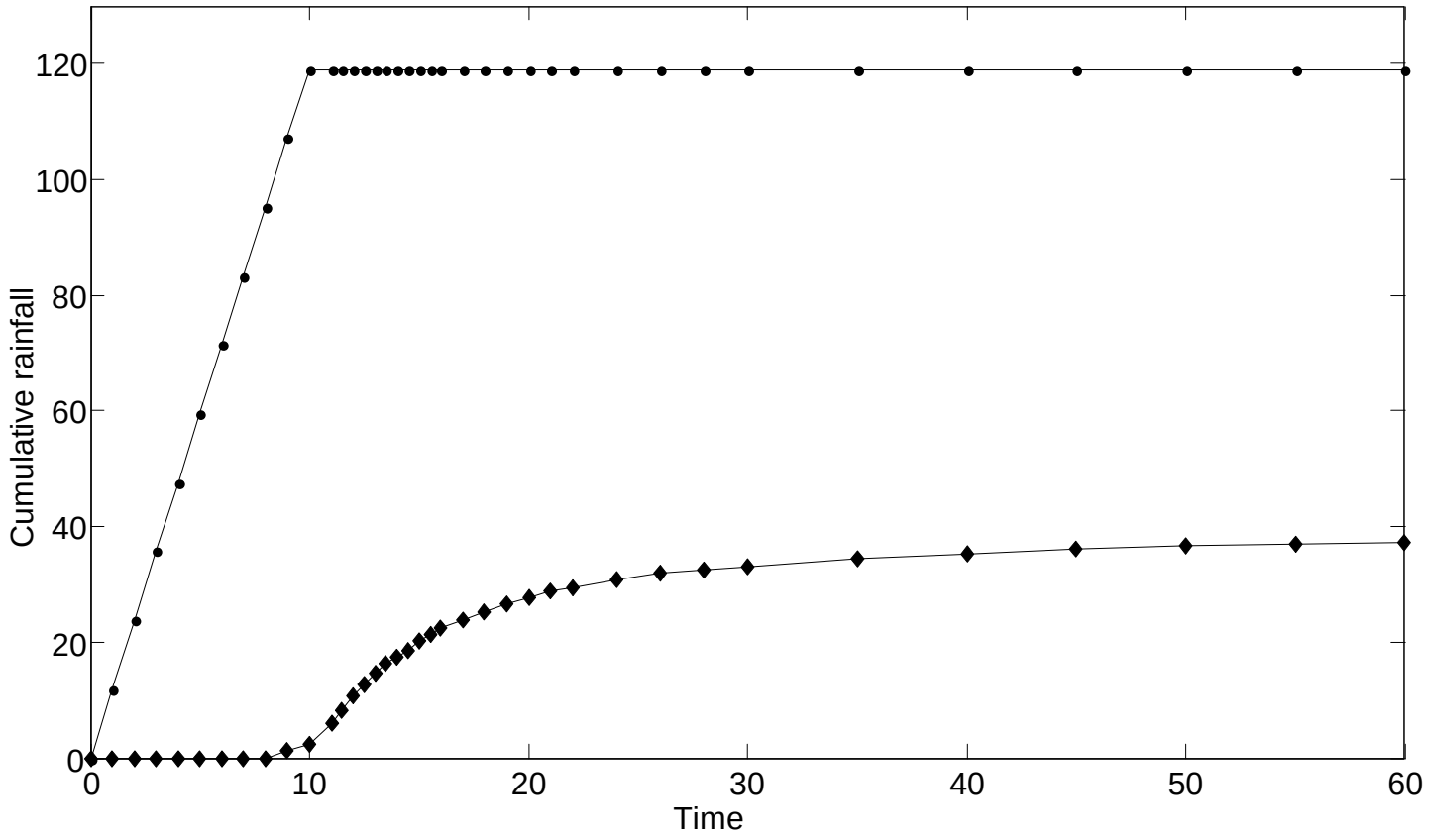
Durability

- Survived the winter
- Loss of moss and soil in dry windy conditions
- Inadequate water retention in the summer

Design - Mark II

- Less exposed area for the same volume
- Enclosed in Bidim®

Performance of substrate module



- Delay – 7 minutes
- Retained 8.2mm of 11.9mm applied

Summary

- Green roof system designed for an existing (infill) housing environment
- Modular design chosen
  - Catering for various weight restrictions
  - Allowing easy installation and removal
- Designs show good delay and retention of rain water
- Ongoing trials of plant species