



Climate Change & Impact on Stormwater Systems

Can we change our future ?

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WSP Opus

Agenda

- The Deep South Challenge Research Programme
- Impact of Climate Change on Stormwater Systems
- Our Design Approaches and Limitations
- What can we do to change our future ?
- Case Studies
- Conclusions & next steps.

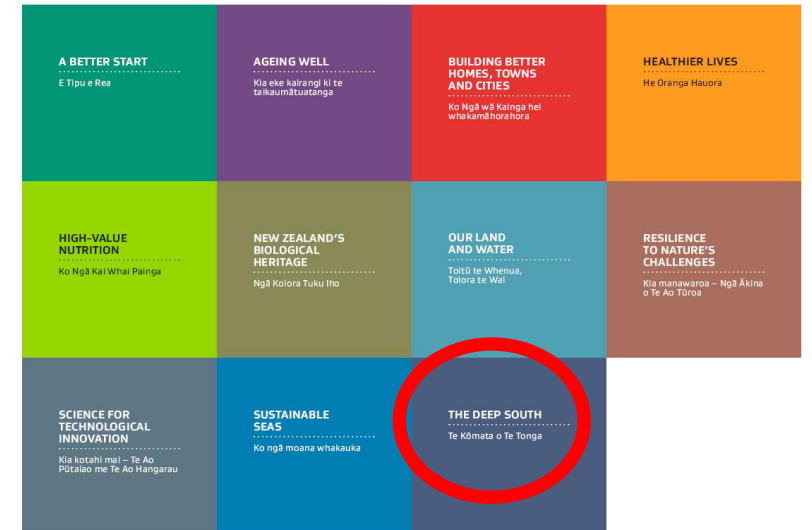


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Title page Photo Credit – Deep South Challenge Dialogue Series

National Science Challenge

- Tackling the biggest science-based issues and opportunities across NZ – over \$1.6B of funding
- One of eleven current challenges in flight.

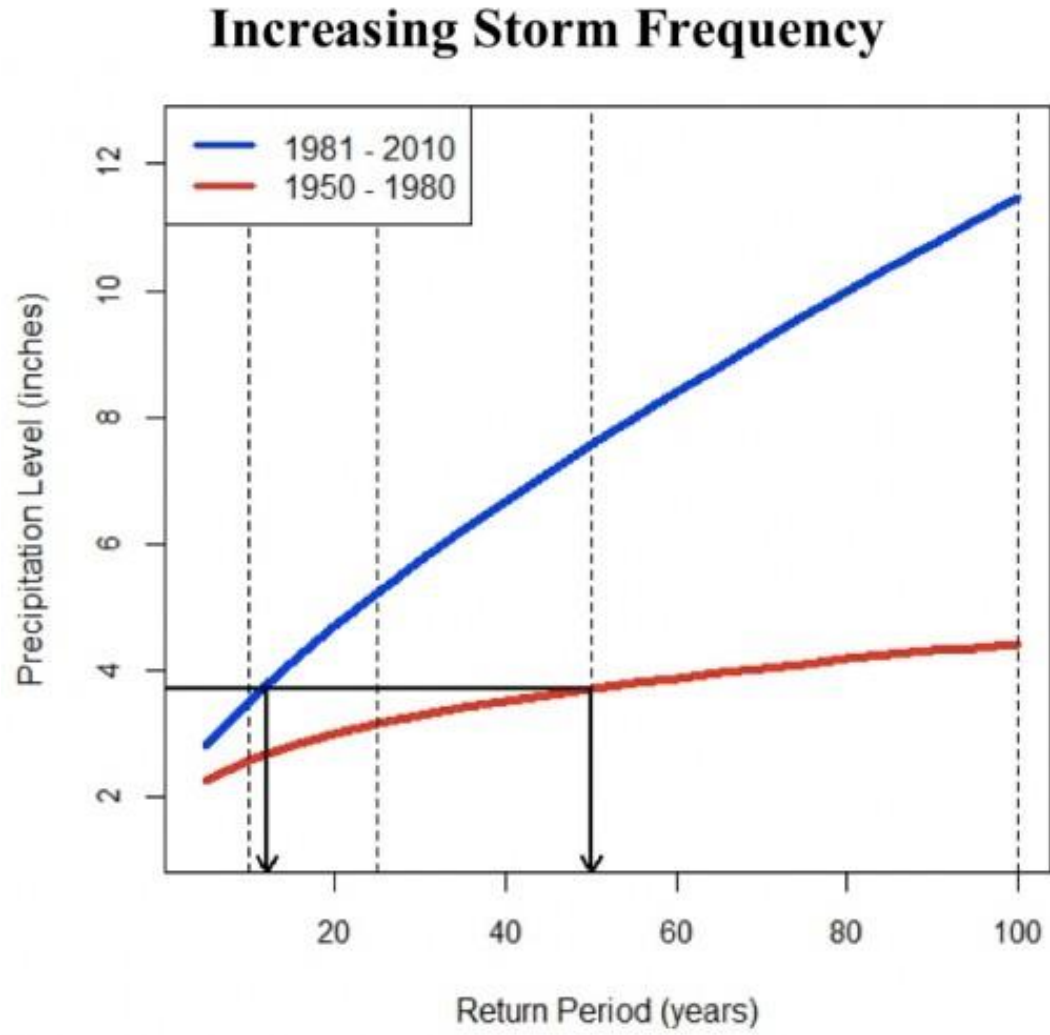


Deep South Challenge.

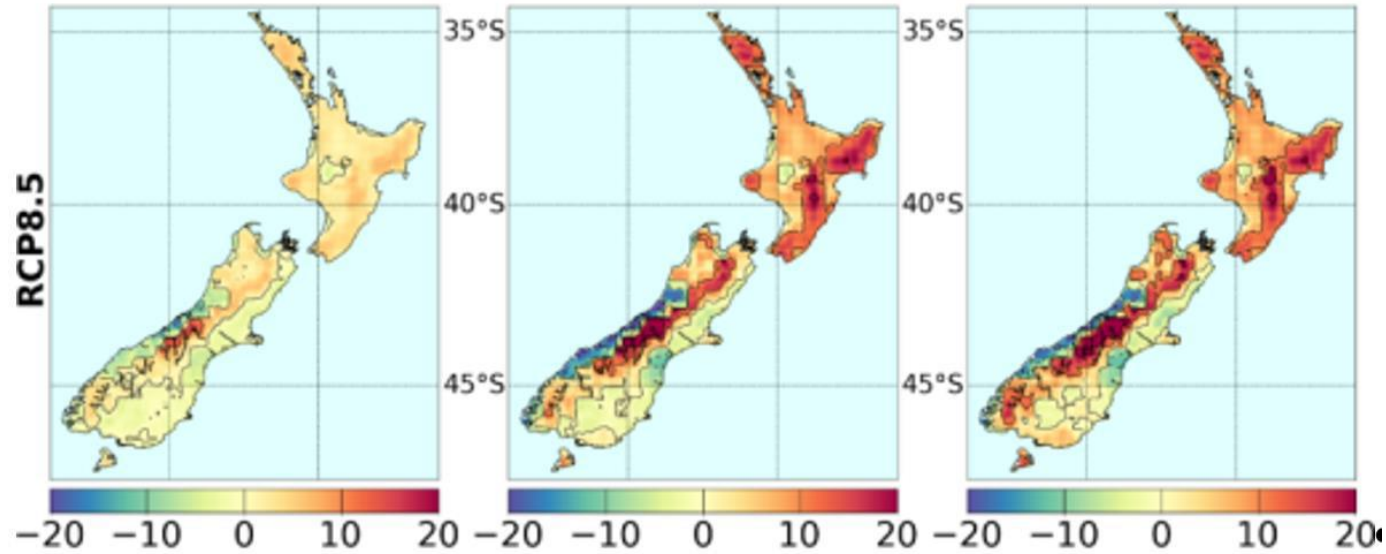
- Launched August 2014 (NIWA lead organisation)
- To understand the role of the Antarctic and the Southern Ocean in determining our climate and our future environment. Five Programmes
 - Vision Mātauranga
 - Engagement
 - Impacts & implications
 - Earth System Modelling and Prediction
 - Processes and observations



Impact of climate change on stormwater systems



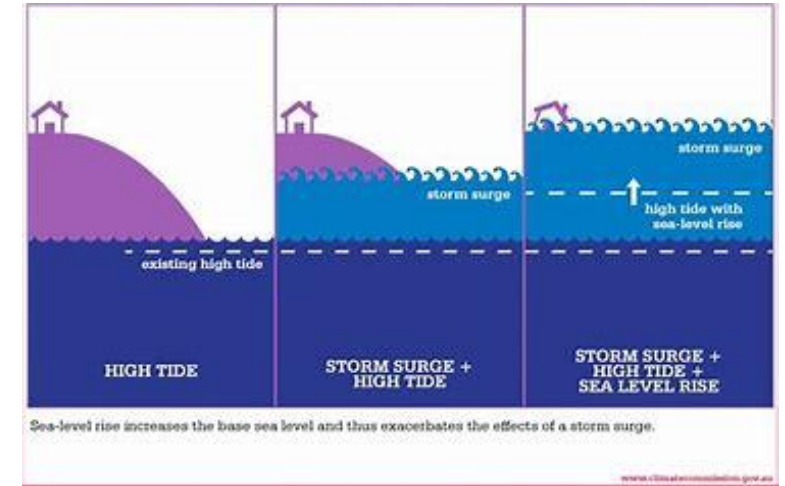
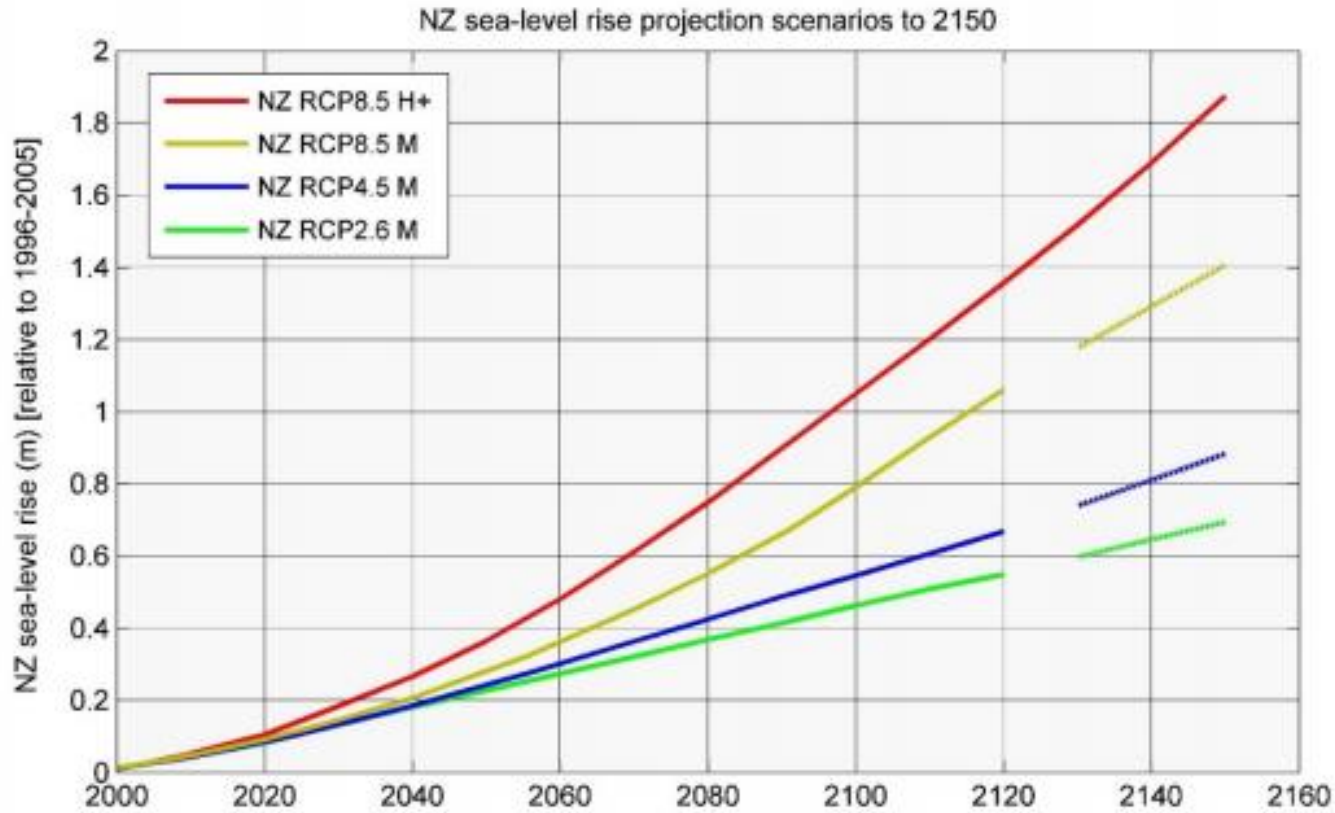
Impact of climate change on stormwater systems



Changes in "Annual Dry Days"



Impact of climate change on stormwater systems



Impact of climate change on stormwater systems



Taken from nzgeo.com – Feb 2018



Taken from King tides Auckland Facebook page – Feb 2018



Traditional Design Approaches

Closely followed traditional drainage mechanisms

- Treated as a nuisance - Out of sight out of mind
- Provision of gravity and pumped systems
 - Tend to be designed to certain state
- Quality and the receiving Water Environment a secondary concern

Twinned with:

- An ageing infrastructure
- Increasing levels of imperviousness - urbanisation
- Increasing levels of community awareness and aspiration for improved water environments
- Climatic uncertainty.

THIS IS
OUR MOMENT!

How can we change ?

1. OUR LANGUAGE

Flooding, Sea Level Rise, Climate Change and Water Quality issues - **THREAT**

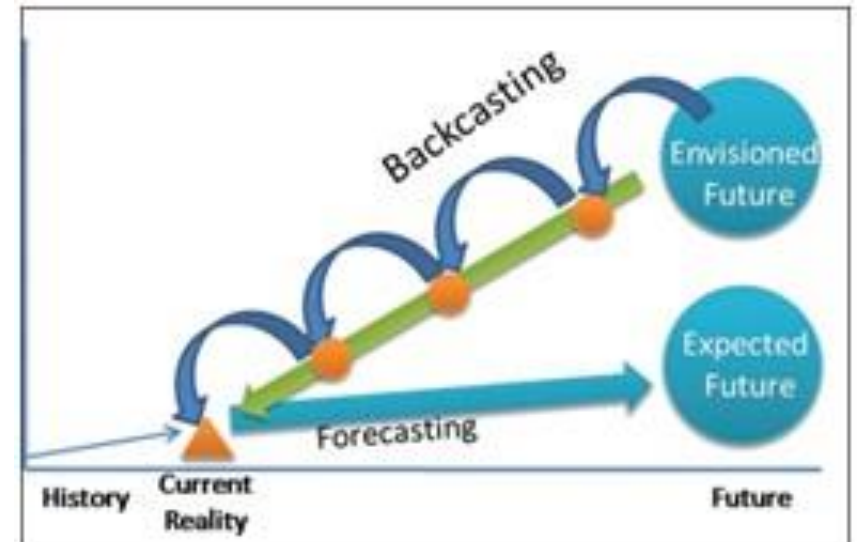
OPPORTUNITY

2. OUR APPROACH

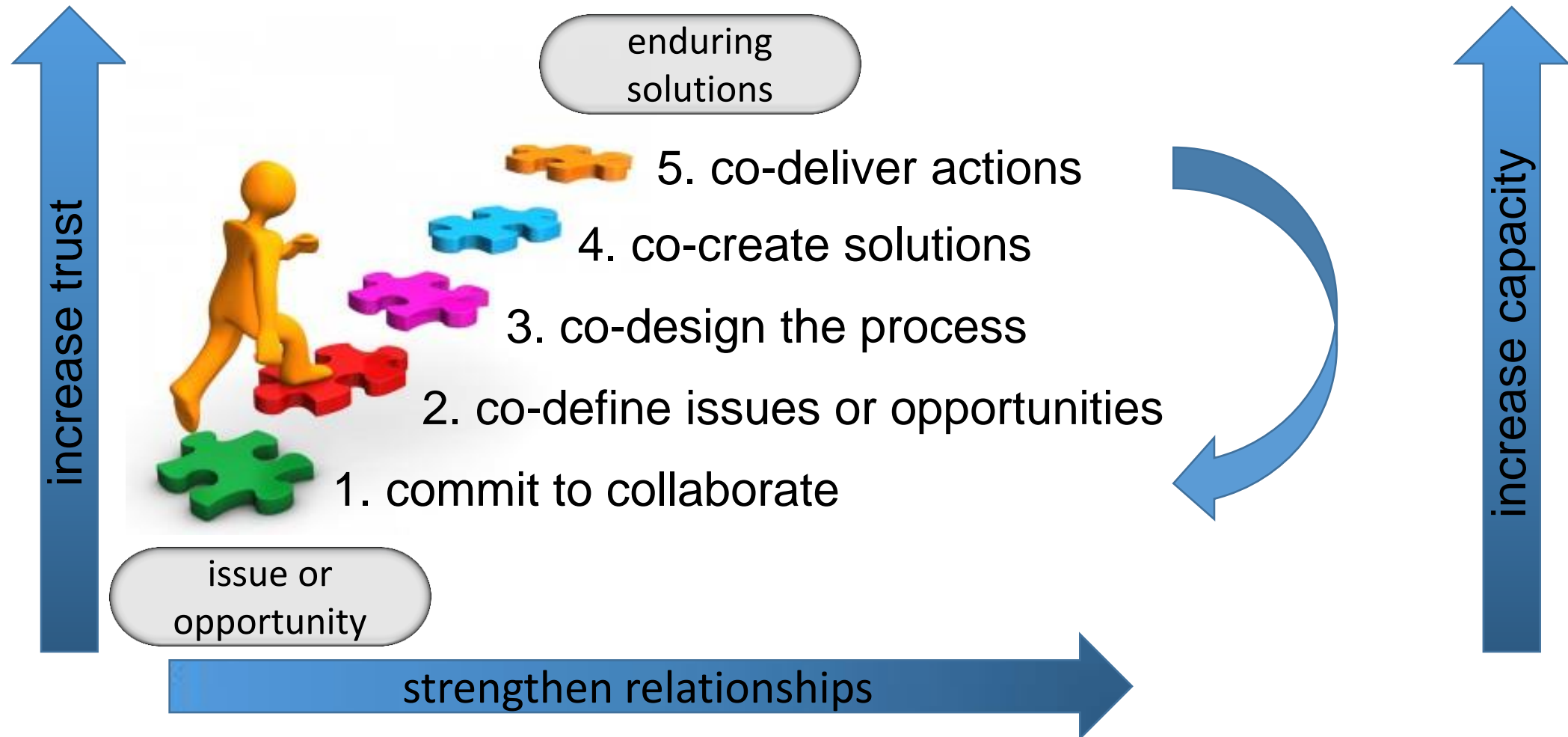
Visioning, Co-Creation and Circular Economy thinking

Aligning Private and Public investment

Move to - Water Sensitive Urban Design, Natural Ecosystems service, Designing for Exceedance



How can we change ?

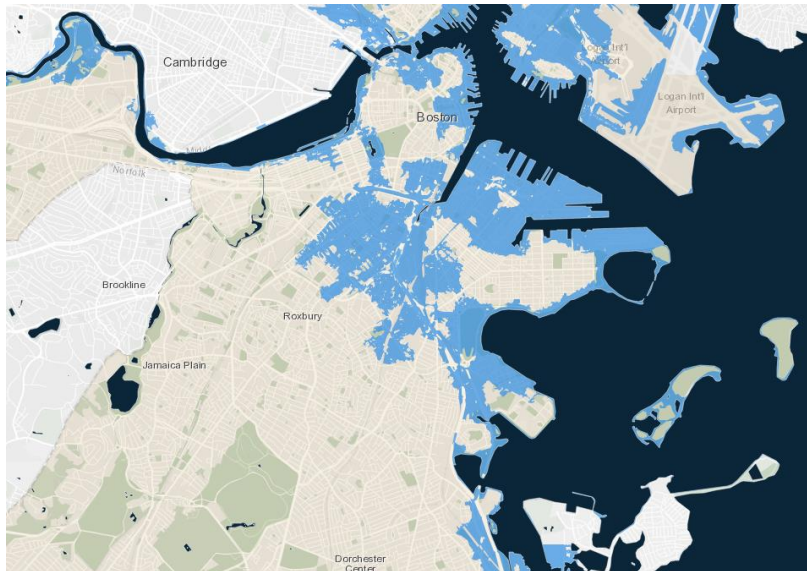


appreciative mind sets + deliberative process = enduring solutions

Case Study 1 – Climate Ready Boston.

- Updating regional and local climate projections;
- Undertaking a comprehensive evaluation of current & future risks;
- *Showcasing the impacts to examine the likely consequences of action and inaction, and;*
- Developing SMART action plans around five key initiatives to help increase Boston's resilience.

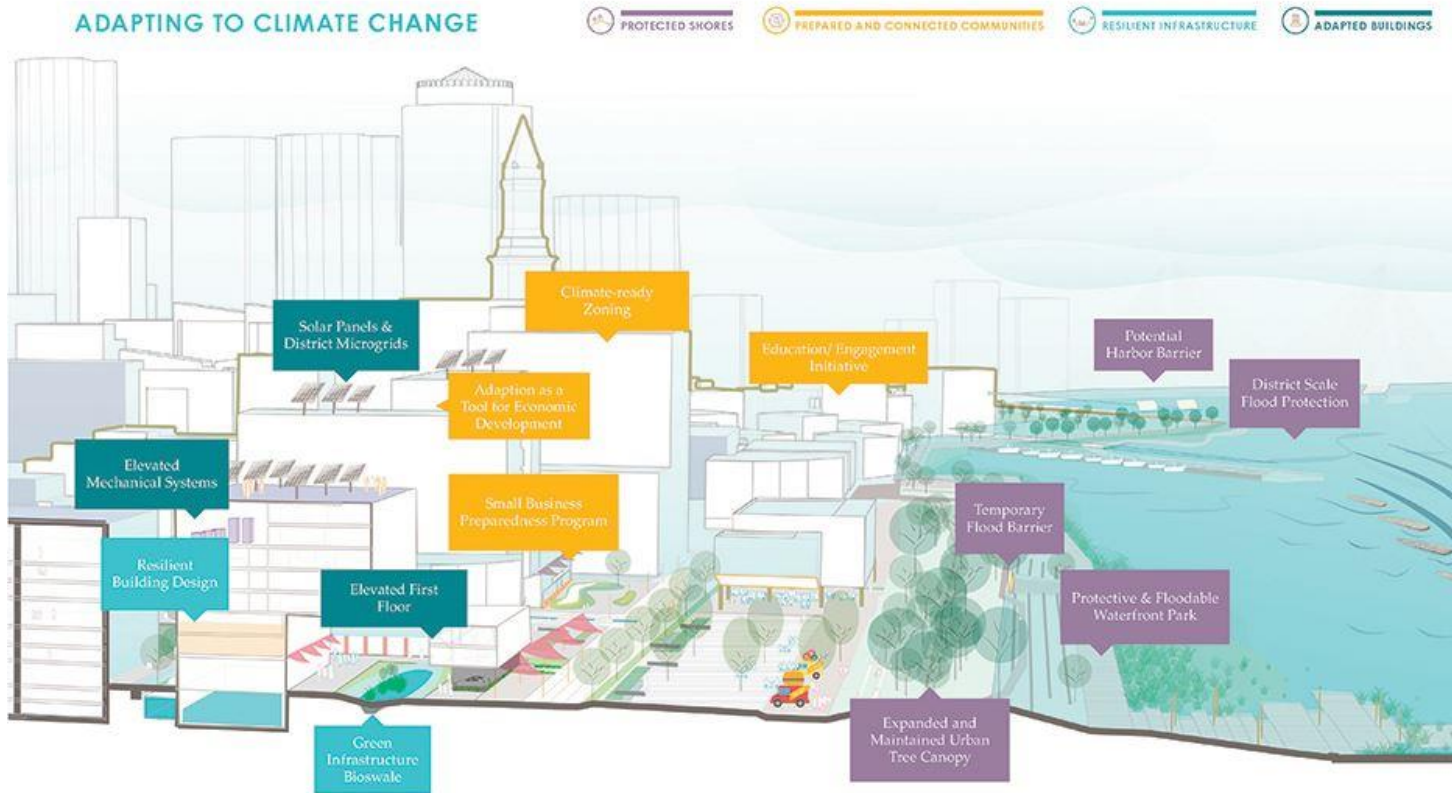
Coastal Risk



Stormwater Risk



Case Study 1 – Climate Ready Boston.



Key Takeaways:

- Generate multiple benefits
- Incorporate local involvement in design and decision-making
- Leverage Investment / building cycles
- Design in flexibility / adaptability



UPDATED CLIMATE PROJECTIONS

Ensure that decision making in Boston is informed by the latest Boston-specific climate projections.



PREPARED & CONNECTED COMMUNITIES

Support educated, connected communities in pursuing operational preparedness, adaptation planning, and emergency response.



PROTECTED SHORES

Reduce Boston's risk of coastal and riverine flooding through both nature-based and hard-engineered flood defenses.



RESILIENT INFRASTRUCTURE

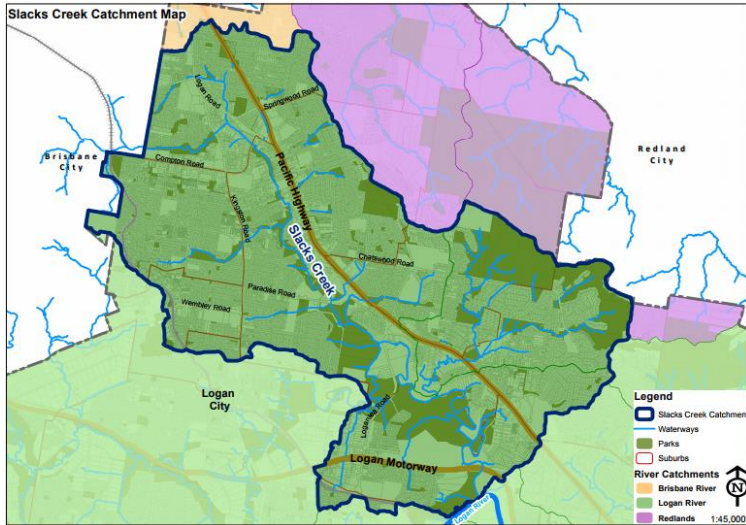
Prepare the infrastructure systems that support life in Boston for future climate conditions and create new resilient systems.



ADAPTED BUILDINGS

Create a regulatory environment and financial and other tools to promote new and existing buildings that are climate ready.

Case Study 2 – Slack's Creek, Brisbane



- Highly modified
- Ecological impediments and high sediment loading
- High pollutant loads and concentrations
- Flooding across catchment
- Few interactions and lack of awareness



Existing Condition : Concrete Channel



Existing Condition : Grassed Channel



Existing Condition : Degraded Floodplain

Case Study 2 – Slack's Creek, Brisbane



ACTIVATE

To make Slacks Creek safe and accessible to community as a place to go and enjoy.



BEAUTIFY

To enhance the activation, our Slacks Creek will require a transformation from a degraded and neglected drain to beautiful and safe open space.



CLEANSE

Removal of pollutants is key to regaining peoples trust in their waterways, protecting downstream environments and ensuring that they are safe for human contact.

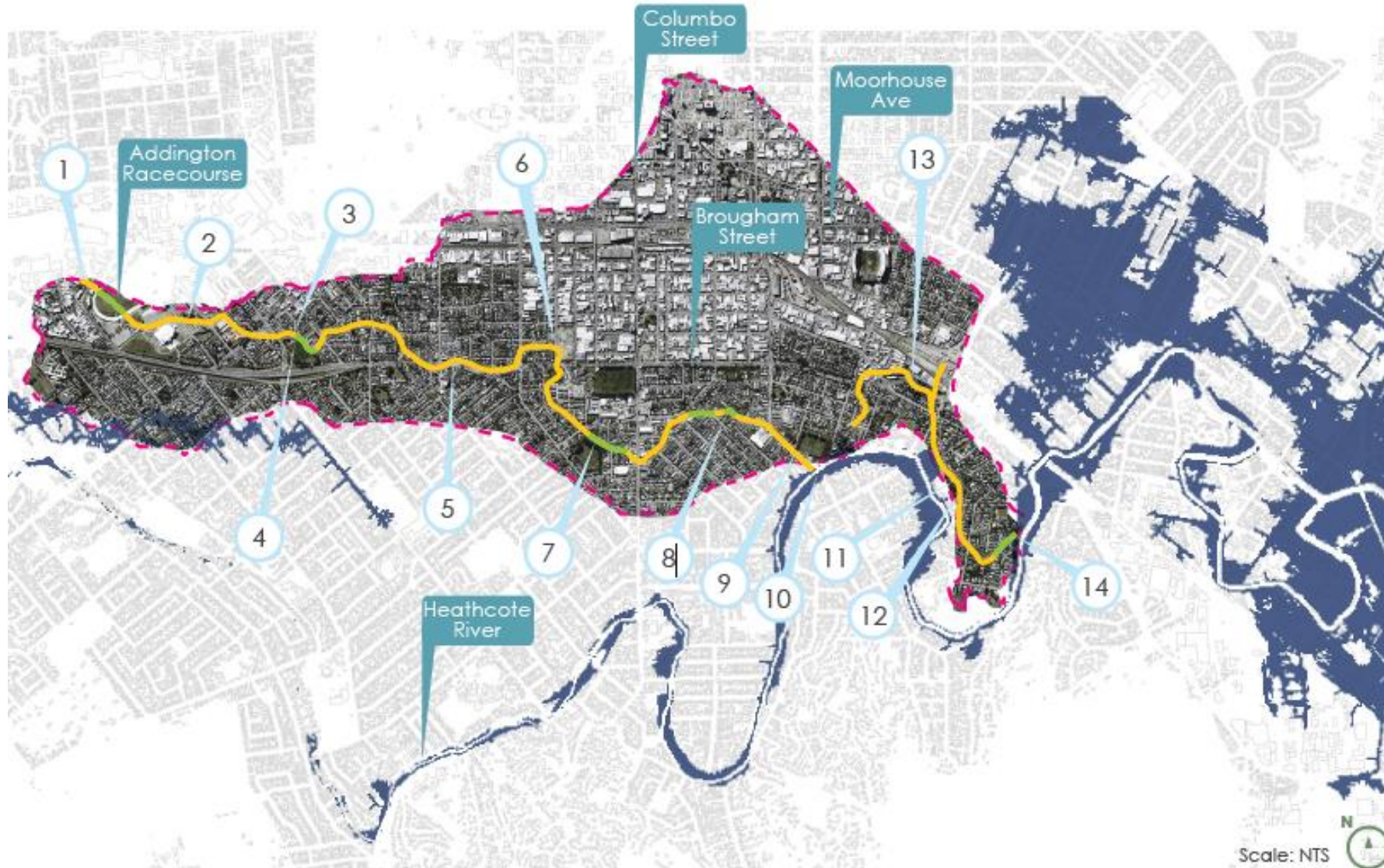


The intensification of **residential and commercial areas** within the Slacks Creek catchment is delivered using water sensitive urban design principles to create streets, plazas and buildings which promote water conservation, provide microclimate management and enhance the local community's appreciation of the urban water cycle.








Local parklands provide residents with safe access to the waterway, providing education and encouraging community stewardship of the local waterways. These open space areas can also form part of important ecological corridors, which can extend into backyards to connect habitats across the catchment.

Case Study 3 – Jackson’s Creek, Christchurch



Legend

-  Jacksons Creek catchment
-  1:200 year flood event including 1m sea level rise
-  Jacksons Creek - Timber lined and piped sections
-  Jacksons Creek - Naturalised sections
-  # See photos and description on Page 10

Case Study 3 – Jackson’s Creek, Christchurch



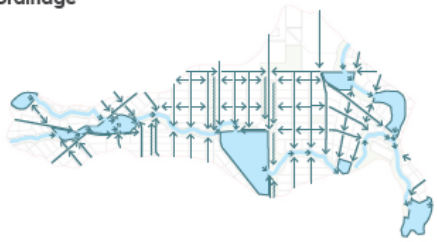
- Highly modified
- Ecological impediments and high sediment loading
- High pollutant loads and concentrations
- Flooding affects d/s catchment
- Highly trafficked with ‘islands’ of recreation
- ‘Backs turned on waterway’
- Passive surveillance opportunities limited

Case Study 3 – Jackson’s Creek, Christchurch

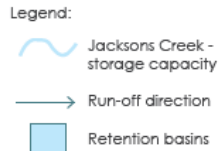
Waterway Values - Opportunities

Addressing the issues associated with all 6 waterway values across the Catchment provides opportunities to realise significant enhancements in economic, social, environmental and cultural values.

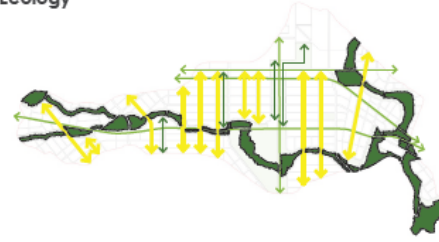
Drainage



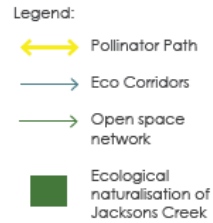
Discussion: Drainage values are enhanced through: greater permeability; stream naturalisation and connectivity; increased stormwater storage and capacity within catchment; reduced outflow into the Heathcote River; a focus on improved water quality entering and leaving Jacksons Creek; and by increasing the base flow which currently is almost non-existent.



Ecology



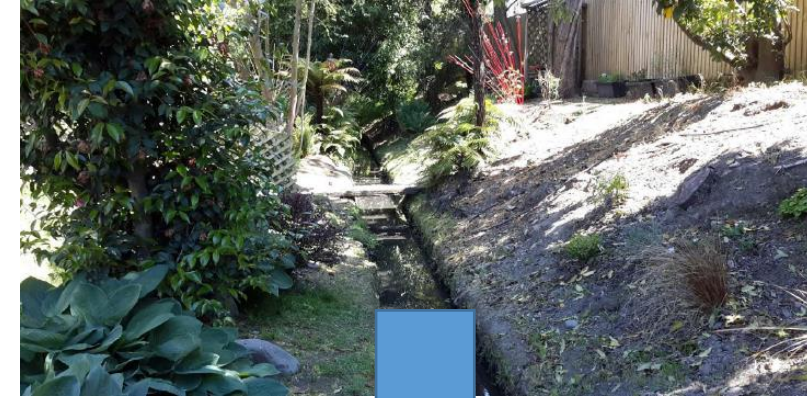
Discussion: Enhanced ecological values, improved in-stream & riparian habitat, strong connectivity, improved water quality, improved habitat, plant and animal diversity and reduced contaminant and sediment loads.



Landscape



Discussion: A multi-functional and diverse catchment dominated by a connected linear park focussed along Jacksons Creek and enhanced streetscapes with increased visibility and awareness of natural processes.



Recreation



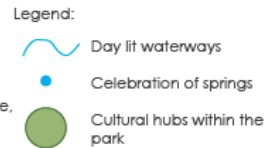
Discussion: Open space area to be increased by over 400% to provide diverse recreation opportunities within a multifunctional highly connected series of linear park spaces along a healthy and accessible waterway.



Culture



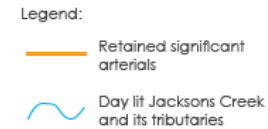
Discussion: Improved opportunities for Ngāi Tahu Rūnanga to exercise rangitiratanga and kaitiakitanga of the enhanced natural environment, recognition and protection of sites of cultural significance, enhancement of mahinga kai, natural spring and wetland sites. Accentuate stories of the land, drainage and vegetation patterns



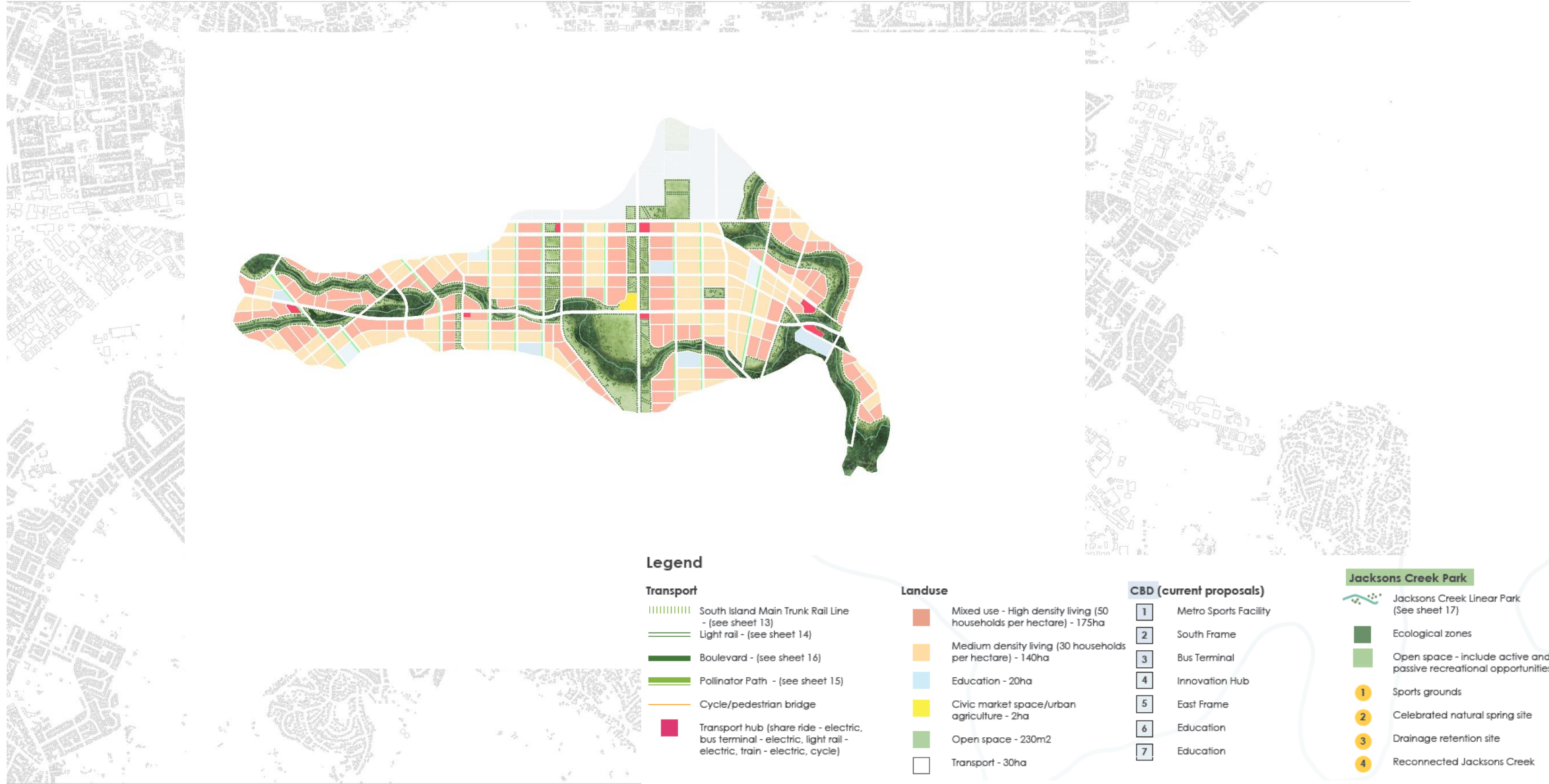
Heritage



Discussion: Recognition and enhancing of natural and cultural heritage features, patterns and values throughout the catchment.



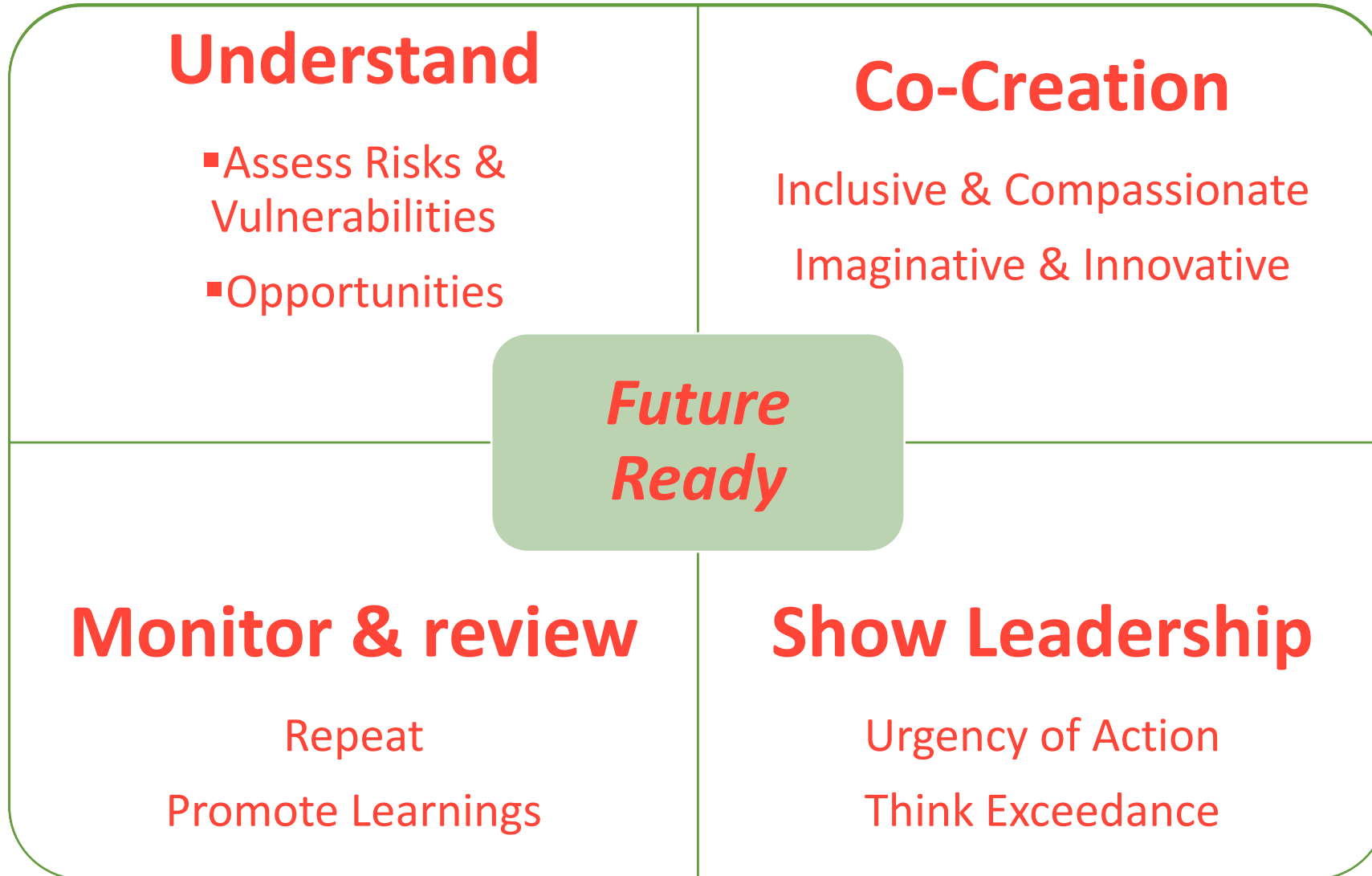
Case Study 3 – Jackson’s Creek, Christchurch



Conclusions

- We have a problem across New Zealand and it's not going away ! We are making some good strides in the right direction – but the pace needs to accelerate
- We need to make a start and plan for uncertainty – Adaptation central to our approaches.
- We are not alone and should never assume we are responsible to solve all of the issues
- Out of chaos and threat – comes opportunity !
- Start with the desired state and be BOLD and FUTURISTIC and INCLUSIVE !
 - The benefits are striking across the four wellbeing's
 - Encourage 'circular economy' outcomes

Apply Future Ready thinking



“The best way to predict the future is to create it.”

Dennis Gabor, Nobel prize-winning physicist

