

Waitematā  
Local Board  
Te Wai Orēa,  
Western  
Springs  
Development  
plan



**STEPS August 2018**

*We protect and enhance Waititiko Meola Creek, Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs*

Volcanoes of Auckland: Hayward,

Thanks to Waitematā Local Board

*Thank you WLB for funding  
Waititiko, Waiateao Catchment Initiative  
with Albert Eden and Puketapapa Local Boards*



Weir where  
Te Wai Orēa  
feeds Waiateao



reeway, Te

## STEPS Context

- Te Wai Orēa is a Taonga:
  - Strong intention to protect Te Wai Orēa, Waititiko, Waiateao and Te Tatua-a-Riukiuta Aquifer for future generations
- Reverence for Papatuanuku, Whenua, Wai; indigenous flora, fauna and people
- Respect for Te Mana o te Wai, Manaakitanga, Auckland Unitary Plan (AUP) and Resource Management Act (RMA)
  - frameworks to help us take care of the land and our environment in Aotearoa
- Recognition of Ngā Mātāpono Hoahoa Māori a Te Aranga, particularly **Taiao, Natural Environment**
- Respect for Fukuoka, Japanese sister city
- Recognition of the Environment as Humanity's first right

STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Agenda

- Introduction and Context
- Auckland's Volcanoes, Volcanic Aquifer and Springs
- Water Quality in Te Tatua-a-Riukiuta Aquifer, Waititiko and Waiateao creeks, Te Wai Orēa
- Te Wai Orēa SEA in 2018 Auckland Unitary Plan
- Principles and Recommendations for Te Wai Orēa Plan



Pukeko Te Wai Orea 2018

STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Purpose and scope of Te Wai Orēa Western Springs Development plan

- ▶ This development plan has been commissioned by the Waitematā Local Board for the purpose of providing a vision and action plan to guide improvements to Western Springs Lakeside Te Wai Ōrea Park (Western Springs) and its interfaces with neighbouring reserves and facilities over the short, medium, and long-term (p7)
- ▶ Under the Auckland Unitary Plan (AUP), Western Springs Te Wai Ōrea is considered a site of regional ecological significance, for **both its flora and fauna**. (p10)
- ▶ Aspiration of this plan is to not propose wholesale changes to the park in either its appearance or its use. The park has a **distinct character and visitor satisfaction is high**. The purpose of this plan is identify character areas, to ensure that all proposed park improvements do not adversely impact on key characteristics or values. (P72)
- ▶ Appear to relate to whenua, wai and ngahere

STEPS protects and enhances Waifitiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Waitematā Ecological Enhancement Priorities

Reserve	Ecological Value - Flora (15)	Ecological Value - Fauna (15)	Restoration outcomes and sustainability of work (15)	Position of reserve (9)	Previous management (9)	Size of reserve (6)	Shape of reserve (6)	Part of important ecological corridor/group (10)	Score	Restoration efforts needed (6)	Overall score
Western Springs	15	10	10	9	9	5	4	10	72	4	76
Meola Reef Reserve	10	10	10	6	9	5	6	10	66	4	70
Auckland Zoo Forest	8	10	10	9	9	6	4	10	66	2	68
Hukanui Reserve	10	10	10	9	6	3	3	8	59	3	62
Motions Rd Reserve	10	10	12	9	3	3	2	10	59	3	62

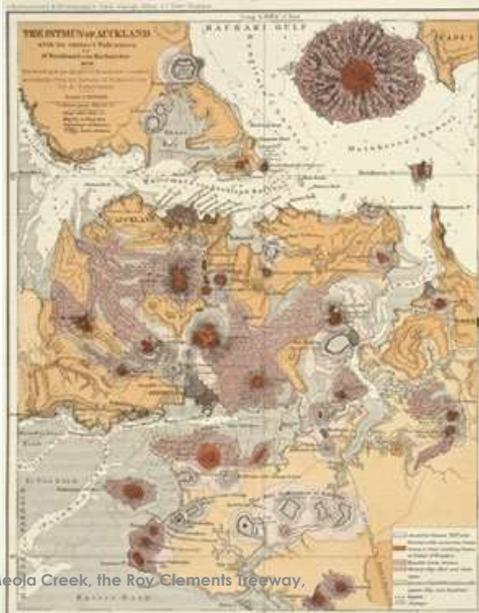
- ▶ In 2013, AC biodiversity team reviewed local reserves to prioritise where ecological restoration works could take place within the **Waitematā Local Board area**. Out of 150 local reserves, Western Springs Te Wai Ōrea ranked **first in priority** for management, scoring highly for **ecological values and potential of both its flora and fauna** (P11)
- ▶ "Urban Wild link: for example, a possible **corridor could link Meola Reef to Jagers Bush/Motions Road Reserve and Western Springs**, through to Arch Hill Reserve and along the North- Western motorway revegetation corridors to Symonds St Cemetery,"
- ▶ Appears to relate to whenua, wai, ngahere and ecology

STEPS protects and enhances Waifitiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Te Tatua-a-Riukiuta, Waititiko, Waiateao, Te Wai Orēa volcanic aquifer rivers and springs

NZ has applied for World Heritage status for its unique Auckland volcanic field and maunga including Maungawhau, a source for Waititiko

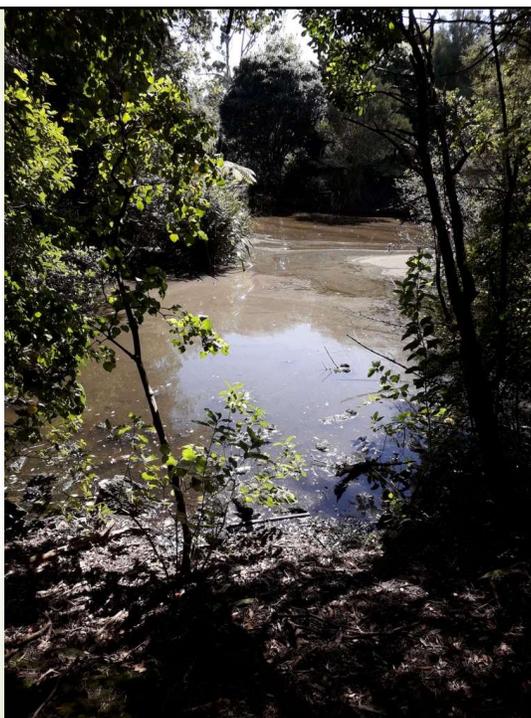
Landscape depicted by Hochstetter in 1859.



STEPS protects and enhances Waititiko Media Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

### Te Wai Orēa and volcanic aquifer

*How well do we protect our aquifer and springs?*

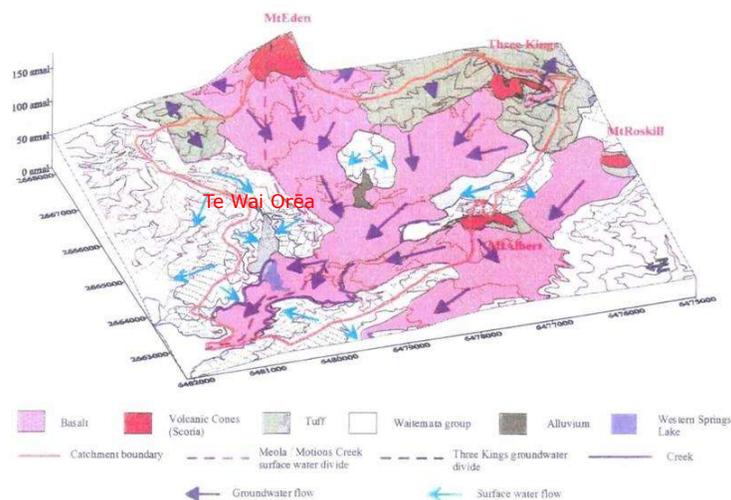


## Aquifer and Lava Flows at Western Springs

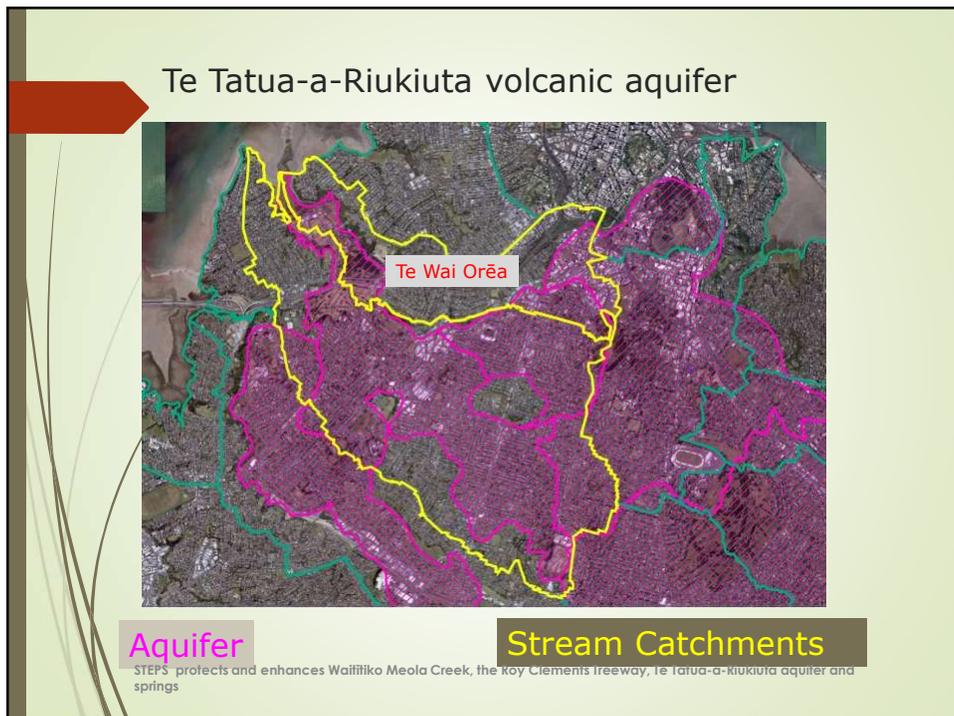
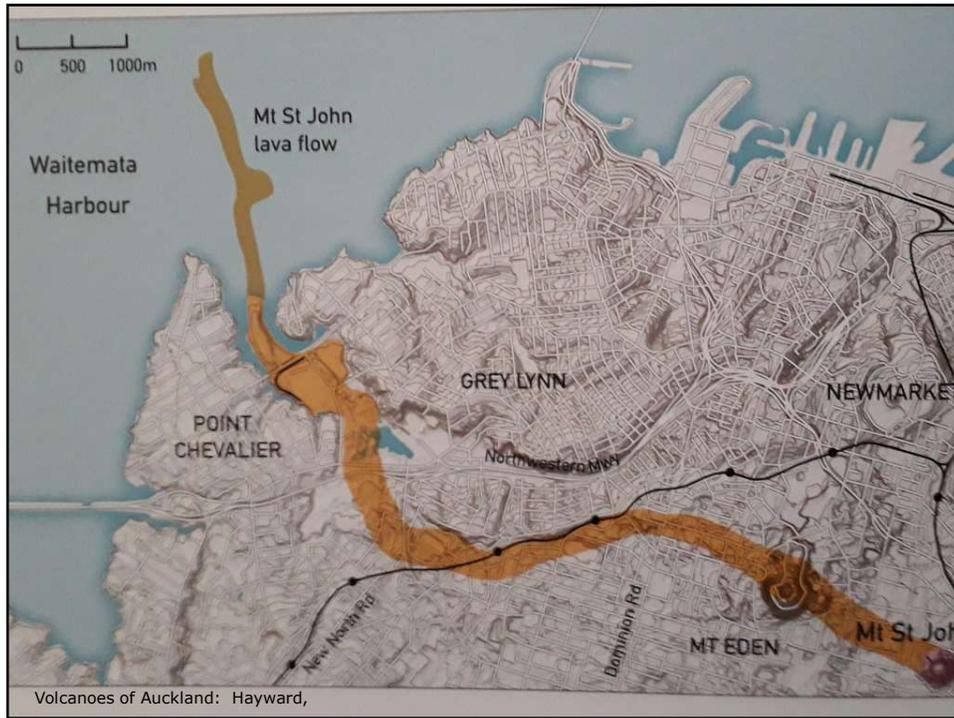
- **Western Springs**... are fed by water that flows through the highly jointed basalt of Mt St John, Mt Eden, and Three Kings lava flows, down the paths of the old buried valley systems to bubble to the surface again at Western Springs. (p66 )
- [Te Tatua a Riukiuta/Three Kings lava]... after breaching the tuff ring [near] Duke St, lava poured into a stream valley flowing downstream for 3 km before coming to a stop at Western Springs. ...**Water still flows down this valley** but now it travels underground through the cooling cracks in the lava flows before welling up at Western Springs... (P142 )
- [Te Kopuke/ Mt St John] .. erupted before Mt Eden... a large lava flow poured ...like a river down a valley... to join Waitemata River valley near Birkenhead. (P135)  
**(Volcanoes of Auckland: The Essential Guide  
 Bruce W. Hayward, Graeme Murdoch & Gordon Maitland)**

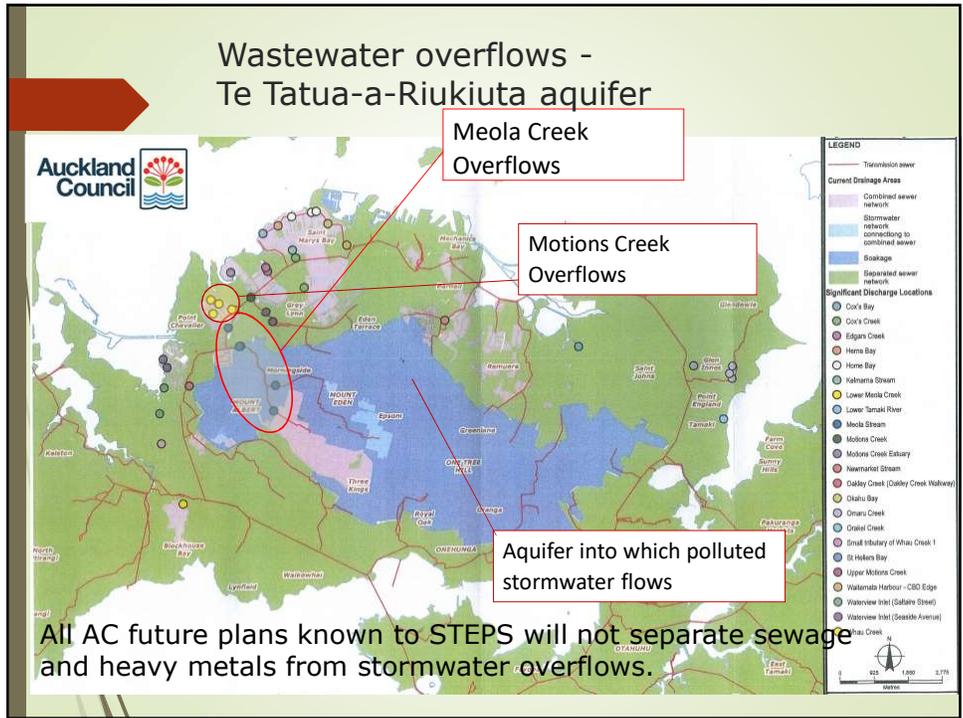
STEPS protects and enhances Waititiko Meola Creek, Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

Western Springs/ Three Kings/ Meola Aquifer



3d Hydrogeological Model of the Western Springs Aquifer (Viljevac 1998 Figure 2.12).  
 References: Clarke, C, Roy Clements Treeway Boardwalk – Urban stream management  
<http://www.nzsses.auckland.ac.nz/Conference/2008/papers/Clarke.pdf> p6  
 Viljevac, Zeljko, 1998. Western Springs Aquifer – Hydrogeological Characteristics and Computer Model. The University of Auckland.





## Te Wai Orēa in Auckland Unitary Plan 2018

*How do we protect  
restore and enhance  
SEAs?*

Rock Forest – Te Wai Orēa 2018

## Rock Forest in the Unitary Plan

- ▶ The ecosystem classification '**WF7.2 Puriri Forest**' is a **Critically Endangered ecosystem** within the Auckland Region
  - Of more than **5000 hectares** of rock forest that once shrouded lava boulderfields of Auckland isthmus, only tiny remnants survive, totalling 29 Ha [NZ Geographic 2016] (STEPS knows of only 5 Ha rock forest isthmus vegetation plus Rangitoto)
  - Puriri forest species include puka, mangeao, titoki, puriri.
- ▶ Auckland Unitary Plan 2018 E15.2 **SEA Vegetation management and biodiversity Objectives**
  - Ecosystem services and indigenous biological diversity particularly in sensitive environments, and areas of **indigenous vegetation cover**, are **maintained and enhanced** while providing for appropriate ... use development.
  - **Indigenous biodiversity is restored and enhanced in areas where ecological values are degraded**, where development is occurring.

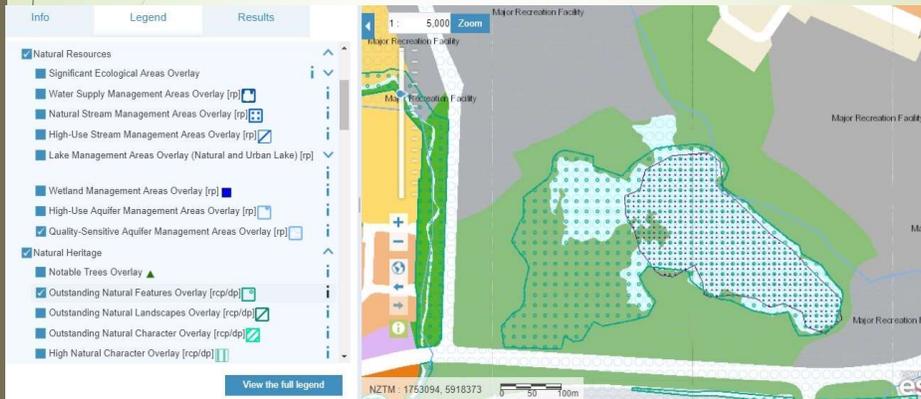


STEPS protects and enhances Waifitiko Meola Creek, the Roy Clements Puriri Te Wai Orēa Te Tatua-a-Riukiuta aquifer and springs

## Te Wai Orēa - Sites of Significance to Mana Whenua - Auckland Unitary Plan

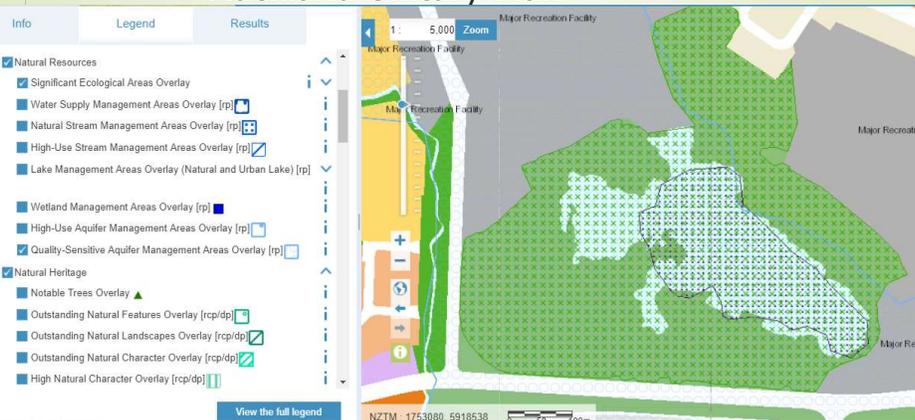
STEPS protects and enhances Waifitiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Te Wai Orēa - Outstanding Natural Feature - Auckland Unitary Plan



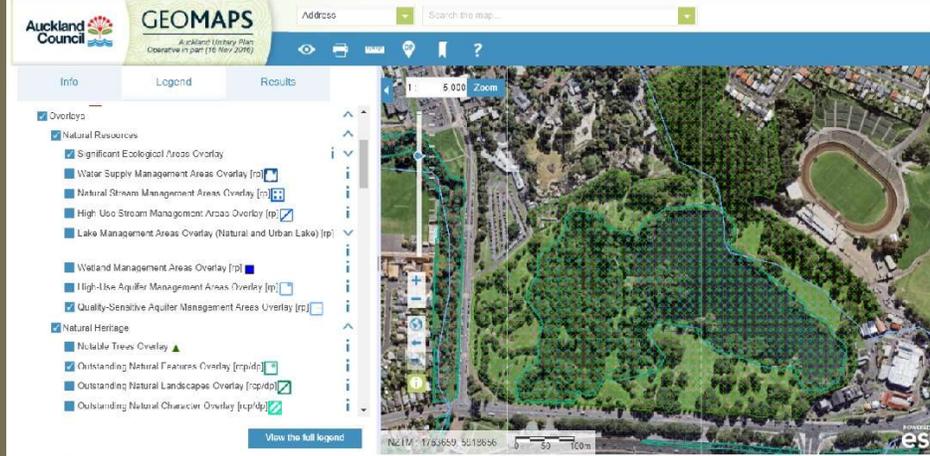
STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Te Wai Orēa - Significant Ecological Area - Auckland Unitary Plan



STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Auckland Unitary Plan



STEPS protects and enhances Waikīkī Meola Creek, the Roy Clements Treeway, Te Tātua-a-Riukiuta aquifer and springs

## Significant Ecological Areas

- *SEAs are areas of significant indigenous vegetation or a significant habitat of indigenous fauna.*
- A sites SEA status provides a **heightened level of protection**
- More stringent provisions may also apply for earthworks and other activities
- In the Auckland Region, natural habitats for native plants and animals have been greatly reduced or damaged
- The importance of protecting and restoring our remaining **biodiversity is being increasingly recognised** by local, regional and national government.

*Presentation: Sites of Ecological Significance June 2016*



## Statement from the Auckland Plan

- *The physical attributes and quality of living associated with our environment are a large part of Auckland's appeal to residents, visitors and migrants.*
- *The environment is an essential part of our identity, our economy, and the way we live. We will safeguard what we have, and strive to radically improve our environment where it has become degraded.*
- *We will become a 'green Auckland', through the directions and actions in the Plan, and live up to that name. Our own well-being depends on this, and as guardians of the environment, we have a responsibility to leave it in a better state for future generations.*

*Presentation: Sites of Ecological Significance June 2016*



## Threats to SEAs

- The presence of **weeds**
- **Pests**  
*Weed and pest control therefore very important*
- **Indifference** from owners, users, adjoining properties etc



Privet, Te Wai Orea

*Presentation: Sites of Ecological Significance June 2016*



## Te Wai Orēa Western Springs Development plan



Rock Forest – Te Wai Orea 2018

*What makes Western Springs unique  
in the world?*

## STEPS Supports

- Intent to improve health of Te Wai Orēa
  - water quality including the springs and aquifer
- Reinstate natural wetlands
- Refuge concept
- Pests: Control/ remove exotic fish & fauna; exotic trees
- Educate public regarding bird feeding
- Waiatea Motions Creek rehabilitation (and Waitītiko)
- Boardwalk by Waiatea



Naturalised titoki, Te Wai Orēa

STEPS protects and enhances Waitītiko Meola Creek, the Roy Clements Treeway, the Tatua-a-Riukiuta aquifer and springs

## STEPS Questions

- ▶ Is this plan in accord **with its Auckland Unitary Plan SEA status?**
- ▶ Does approach support the Taiao principle?
  - Overlook volcanic landforms and maturing rock forest flora that make Western Springs unique globally; basis for ONF, SEA
  - Overlook the relationship between wai ora, and whenua ora (Health of water depends on health of land)
  - Account for pollution of Meola and Motions creeks connected through the aquifer, contributing to ongoing pollution of Te Wai Orēa?
- ▶ **Where is the limited budget for Waitematā Local Board's TOP ecological restoration site best spent?**

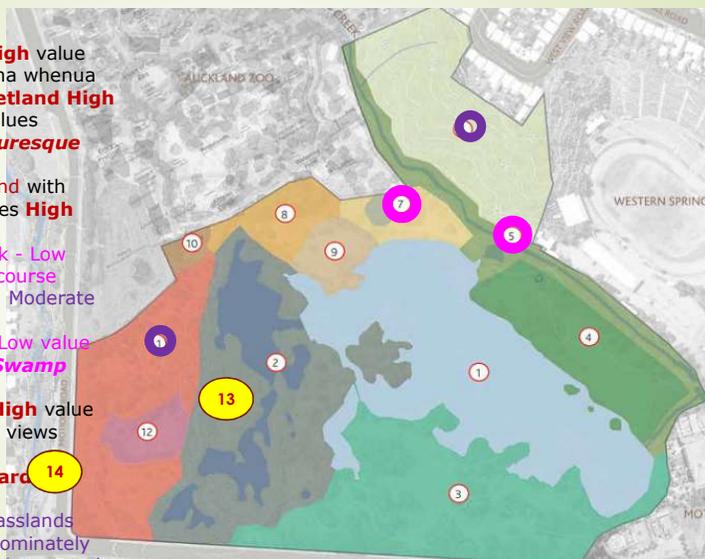


Puriri Te Wai Orēa

STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Ecological value or Development values?

- Area 1 - The **lake** - **High** value for significance to mana whenua
- Area 2 - Vegetated **wetland** **High** value for ecological values
- Area 3 - **English picturesque** **High** value
- Area 4 - Open **grassland** with mature **specimen** trees **High** value
- Area 5 - **Motions Creek** - **Low** value degraded watercourse
- Area 6 - Native forest **Moderate** value
- Area 7 - **Filter pond** - **Low** value stagnant pond. **Nice Swamp Cypress specimens**
- Area 8 - **Playground** **High** value
- Area 9 - **Elevated lake views** **High** value
- Area 10 - **Fukuoka Gardens** **High** value
- Area 11 - **Enclosed grasslands** **Moderate** value ...predominately native vegetation. not integrated.
- Area 12 - **Former quarry** **High** value for **events**.



- 13 **Rare Lava rock forest** – not identified
- 14 **Waititiko Meola Creek** – under restoration

## Ecological and Sustainability Principles

- Wai and fauna health depend on **whenua/ land and flora / rakau**
  - Grass is very suitable for foreign fowl
  - Wetlands are one of the world's most productive landscapes
  - Native plants/ trees more suited to **local and rare bird and freshwater** species, helping to filter pollutants (reconsider foreign trees)
  - What is the weed and pest management strategy?
  - Can Western Springs exemplify future pest- free Auckland?
- Zero carbon foot print**
  - How much lawn mowing is built into this plan?
  - How much oil and sand required to build paths through the top ecological area in Waitemata?
- Water sensitive design**
  - Paved surfaces generate stormwater, reduce permeability
  - Stormwater transports oil and heavy metals into wai

STEPS protects and enhances Waititiko Meola Creek, Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Te Wai Orēa Proposal

- WLB and Biodiversity team assess current and potential
  - Ecological value of rare lava rock forest
  - Connections between Te Wai Orēa wai/ springs water quality and wider volcanic landscape, aquifer and Waititiko and Waiateao awa
- With **Mana Whenua and community**
- Enhance existing rock forest refuge –west of the lake**
- Rock forest theme playground
- Native bird corridors along our awa/ creeks

**Let's enhance our wai and our whenua!**



Pahoehoe lava flow Te Wai Orēa

STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Proposed Western Springs Action Plan

- **WLB commit to enhancing Significant Ecological Area**, including rock forest, stream and wetland
  - Involve professional biodiversity and water sensitive design experts
  - Map park – identify volcanic outcrops, soils of sedimentary
  
- Produce park values plan based on:
  - **Ecological value and rarity – a sense of place**
  - Mana whenua focus, aligned with AUP
  - Amenity for playground and events
  - ... explain how the values were derived
  
- Produce **ecological** restoration plan
  - Enhance rare lava rock forest
  - Waiateao riparian and Wai Orēa lake side planting
  - Pest management and **weed management**
  - Investigate rare long fin of short fin tuna/ eel
  
- Signs to include information about local lava, aquifer and rare rock forest



Pelargonium inodorum, Te Wai Ore



STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Other STEPS Input

- Apparent lack of ecological maintenance of existing site - eg local infestations of wattles, moth plant, madeira vine
  - **Upgrade to Ecological Contract**
  
- Commit to spending on nutrient removal only with scientific validation that the approach is sustainable and will make a difference in the long term (while nutrients are poured in upstream)
  
- Consider sustainability
  - no new concrete /paved paths on volcanic outcrops
  - no paths, buildings, blasting, rockbreaking on ONF lava flow
  - **use boardwalks instead** of AT paths
  - map existing natural tracks through rock forest
  
- Given focus on wai, **annual nutrient overload from deciduous** trees (including cherry) is not in accord with 80 million years of evolution in Aotearoa
  - Cherries are exotic, and Landcare Research identifies several cherry species as known invasive weeds.
  
- **Reconsider excluding further use of exotics, deciduous trees in Western Springs SEA**

STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## STEPS Offers

- ▶ Collaborate on planting bird corridors – from Maungawhau via **Te Wai Orēa Western Springs to Te Tokaroa/ Meola Reef**
- ▶ Walks available:
  - Rock forest walk for AELB and AC Officers, other stakeholders
  - Walk to STEPS spring fed wetland in Waititiko-restoration
- ▶ Assist with plant lists – rock forest, wetland, riparian planting
- ▶ Assist with text for signs on ecology, plants, aquifer and lava rock



STEPS Wetland, Waititiko

STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Wai - Spring fed water

- ▶ STEPS, Auckland Council and Watercare have jointly restored the STEPS wetland fed by a spring from the Te Tatua-a-Riukiuta aquifer, in the Roy Clements Treeway
- ▶ High visual clarity
- ▶ Welcome WLB support on WIWQIP project – especially soakage improvement on the Aquifer which will benefit Waititiko, Waiateao and Te Wai Orēa



STEPS Wetland, Waititiko

## Appendix

### Some References

- [Auckland Unitary Plan 2018](#)
- Waitematā Ecological Enhancement Priorities Abigail Forbes Ecologist, Auckland Council February 2012
- [Indigenous terrestrial and wetland ecosystems of Auckland. Auckland Council.](#) Singers, N.; Osborne, B.; Lovegrove, T.; Jamieson, A.; Boow, J.; Sawyer, J.; Hill, K.; Andrews, J.; Hill, S.; Webb, C. 2017
- [Volcanoes of Auckland: The Essential Guide](#) - Bruce W. Hayward, Graeme Murdoch & Gordon Maitland (Auckland University Press)
- [Eden in Auckland](#) NZ Geographic Wilkins 2016 issue 140
- [New Zealand coldwater springs and their biodiversity \(DOC\)](#)
- [Restoring Auckland's puriri lava flow forest](#)
- [Water quality in New Zealand: Land use and nutrient pollution](#) Parliamentary Commissioner for the Environment: 2013 & 2015
- [Lakes and residential sources of urban water pollutants](#)
- [Waters of the western springs catchment, Auckland](#) W. J. Russell & K. A. Rodgers (1977), New Zealand Journal of Marine and Freshwater Research, 11:4, 713-728,

STEPS protects and enhances Waifitiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## STEPS questions plan statements

- ▶ *The current vegetation ...is mostly **riparian planting** around the water bodies and grassed areas with specimen trees (native and exotic) (p57)*
  - ONF lava flows and their unique vegetation not recognised or labelled (p72)
- ▶ ecological improvement relates only to *water quality and excessive bird life* (p15)
- ▶ Concept plan focuses on *wai only* (p22)
- ▶ *The ecosystems of particular interest at Western Springs Lakeside Te Wai Orēa are the wetlands* (p46)

STEPS protects and enhances Waifitiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## STEPS questions plan statements

- ▶ P105 5 "Rehabilitate Motions Creek" – needs further discussion – this is a long term commitment
- ▶ P87 "specimen tree" – is this exotic? We request a specific plant list please and would expect it to be naturally occurring local plants.
- ▶ P 7 *The water quality issues are complex and will involve ongoing collaboration between mana whenua, Auckland Council, and the community to address the causes. This plan considers the catchment wide issues and what can be done within the park to improve the water quality of the lake and Motions Creek – We support the aspiration but the plan does not cover it.*
- ▶ **The source of the contamination in the Greater Western Springs aquifer is unknown** and very difficult to identify and fix with the scale of the aquifer. Possible contamination sources could be leakages from ageing wastewater assets... (p47)

STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, the Tatua-a-Riukiuta aquifer and springs

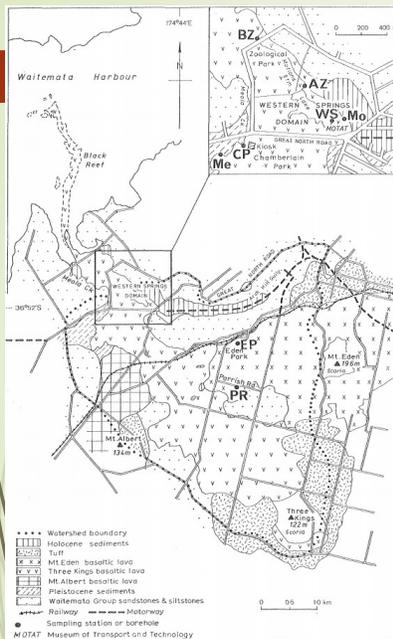
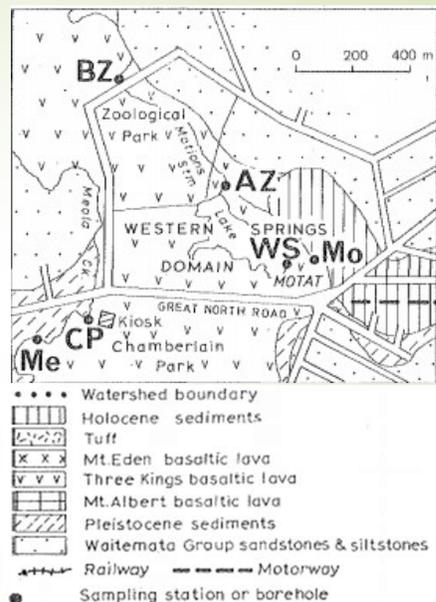
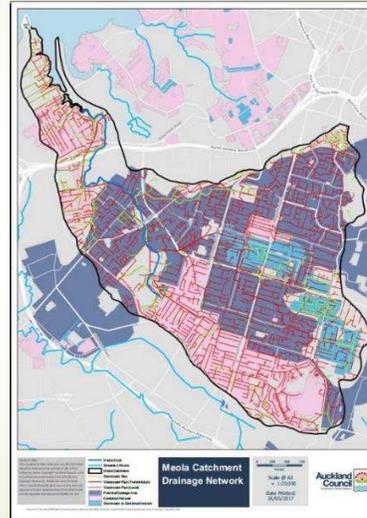


FIG. 1.—Geological sketch map of the catchment area of Western Springs.



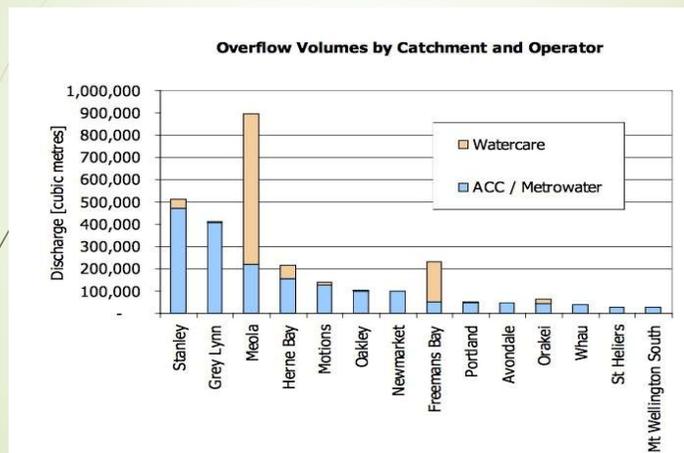
Waters of the western springs catchment, Auckland W. J. Russell & K. A. Rodgers

## Waititiko Meola is the largest catchment on Auckland isthmus



STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, the Tatua-a-Riukiuta aquifer and springs

## Catchment Overflows in 2010 (Auckland Council inauguration)



STEPS protects and enhances Waititiko Meola Creek, the Roy Clements Treeway, the Tatua-a-Riukiuta aquifer and springs

## Why do we have overflows?

this is the sewer from  
Balmoral and Mt  
Eden at Lyon Ave

And this is the sewer  
pipe that continues on  
(eventually to Mangere)



What can't fit in the little pipe, overflows into our creek...

## Te Tatua-a-Riukiuta volcanic aquifer links Te Wai Orēa with Waitītiko & Waiateao streams



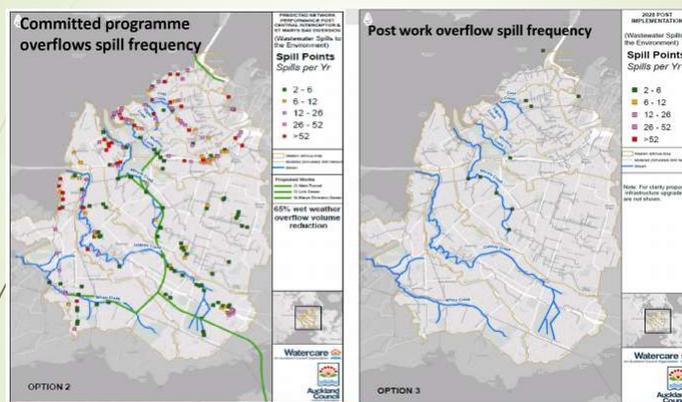
CHIRAG JINDAL/SUPPLIED A cave stretching off a house basement, scanned by Chirag Jindal.

## STEPS is working to get waste water out of our stream

- Meola still has the biggest wastewater and stormwater overflows in Auckland (approximately 1 – 1.3 million cubic meters per year or 500+ Olympic Swimming Pools).
- High peak runoff damages creek banks, resulting in sedimentation of the creek and Waitematā Harbour.
- Auckland Council acknowledges the soakage system into our aquifers is not working well
- (There are no plans to separate and remove sewage from Meola creek, though a reduction is planned via Central Interceptor).
- "Watercare's proposed Central Interceptor is being provided to enable growth in the central and southern areas of Auckland and also provides an **interim** solution to stormwater issues, providing time for **Auckland Council to construct adequate stormwater infrastructure to service the area**. Continued reliance on the wastewater system for the collection and treatment of stormwater is not sustainable for a growing and liveable city." Watercare CEO 2016

STEPS protects and enhances Waifitiko Meola Creek, the Roy Clements Treeway, Te Tatua-a-Riukiuta aquifer and springs

## Western Interceptor Water Quality Improvement Plan (WIWQIP) 2025?



Meola overflows are 40% of remaining overflows  
 Plan is to continue combined sewer and overflows  
 in Meola catchment, while reducing frequency