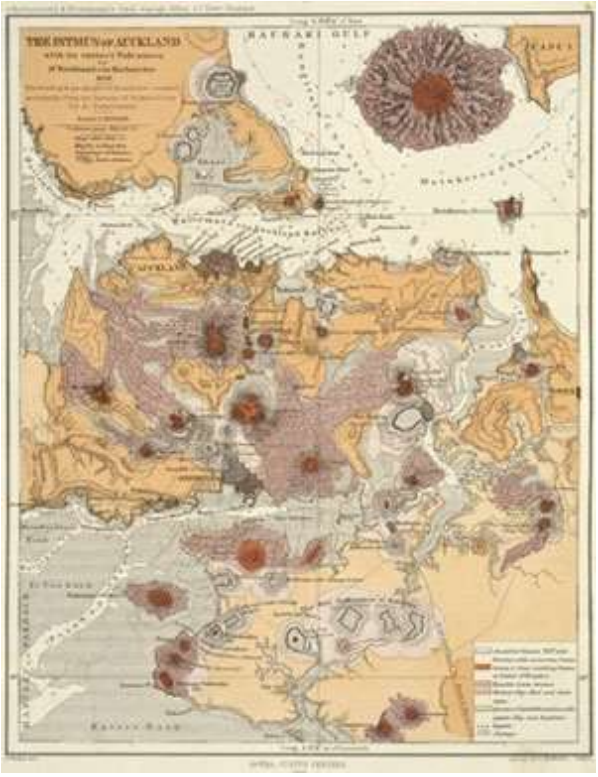
St Lukes Environmental Protection Society Inc (STEPS)

Briefing: Te Tatua-a-Riukiuta Aquifer and Waitītiko-Meola Creek

Water in Auckland's Volcanic Landscape



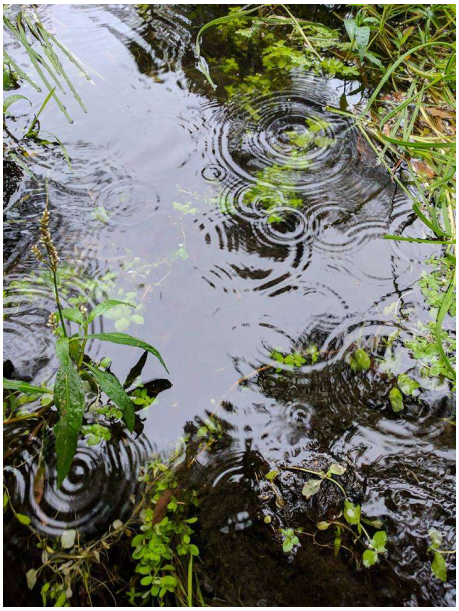
Auckland has applied for World Heritage status for its unique volcanic field and maunga including Maungawhau, The landscape in this application is depicted here by Hochstetter in 1859.

The maunga on this volcanic landscape are the sources for the creeks of the Auckland isthmus, and the aquifer (or ground-water) lying in the basaltic rocks beneath is the largest aquifer under the protection of the Auckland Council[1].

Maungawhau is one source for Waitītiko-Meola.creek. This creek alone carries half of the 2.2 million cubic meters of sewage-polluted water overflows which go into the Waitemata Harbour every year.

Local communities are calling on Auckland Council to commit to removing sewage and heavy metals from our streams and harbours by treating stormwater at source and separating it from the sewers.

The NZ Government too has a role to play in relation to water quality regulation and funding of long term infrastructure.



Above: "The isthmus of Auckland with its extinct volcanoes, by Dr. Ferdinand von Hochstetter 1859".
Auckland Libraries

Right: Meola Aquifer – clear spring water at STEPS wetland on Meola Creek, Mt Albert. May 2017

[1] Nov 2016 Auckland Unitary plan
http://unitaryplan.aucklandcouncil.govt.nz/Images/Auckland%20Unitary%20Plan%20Operative/Chapter%20M%20Appendices/Appendix%203%20Aquifer%20water%20availabilities%20and%20levels.pdf

Description - Te Tatua-a-Riukiuta Aquifer and Waitītiko-Meola Creek

- Waitītiko-Meola Creek and Waiateao-Motions Creek are inter-related stream systems, connected via Western Springs lake (where Te Tatua-a-Riukiuta aquifer surfaces). Due to Auckland's unusual geology and the presence of lava flows, Meola creek is perched above the Te Tatua-a-Riukiuta aquifer and its floor largely is impermeable. The creek is fed by springs and seepages from the surrounding aquifer, causing high water clarity especially in the middle to lower reaches.

- Waiateao-Motions Creek emerges on the East of Te Tokaroa-Meola Reef. Baseflow in the lower reaches of Motions creek comes from the Western Springs Lake, and a very rare aquatic moss (*Fissidens berteroi*) is found at several locations along the creek, including in Western Springs.

- Both creeks provide a habitat for eels, pukeko, ducks, grey warbler, tui, heron, black shag and spur wing plover. After heavy rains however, excrement, heavy metal and petro-chemical pollutants join the biodiversity.

- The catchment of Waitītiko-Meola Creek is 1558 ha (15.6 sq km) and roughly triangular with Te Tokaroa-Meola Reef estuary at the apex, and Three Kings (Te Tātua-a-Riukiuta) and Maungawhau-Mt Eden forming the other two points… the catchment is 5% pasture, 1% forest, and the stream is 5 km long above the estuary, though only the lower 3 km and the top 1 km were open in 2001. The intermediate 1 km is piped but overlain in parts by a stormflow channel. A wider catchment area which including Meola in 2001 was approximately: 45% residential; 11% open space; 53% impermeable.[2] (see Meola creek 'flyover view' at https://youtu.be/hY0RKWxO6Rw)

- As the largest catchment on the Auckland isthmus, Waitītiko-Meola Creek also suffers from being the conduit for the highest amount of combined storm water overflows and raw sewage of any creek on the isthmus into the Waitemata Harbour (Watercare estimated overflows of 1.3 million cubic meters annually). The most degraded portion in the upper catchment is near Roy Clements Treeway just behind Mt Albert Grammar School where Watercare Services overflows occur at both Lyon Ave and nearby Haverstock Rd.. This creek has very low base flows, especially in summer. However the lower part of the creek is regarded as having higher ecological value because it is spring fed. There is a large area of potential inanga spawning habitat at the stream mouth which borders the western side of protected Te Tokaroa - Meola Reef in the Waitemata Harbour. (See NZ Geographic https://www.nzgeo.com/stories/no-swimming/).

- Over the last 20 years infill in the St Lukes, Mt Albert, Sandringham area has proceeded at a very high rate resulting in large new areas of impermeable surfaces and significantly higher volumes of stormwater running through combined sewers and into Waitītiko-Meola Creek then flowing out to Waitemata Harbour along with road pollutants, rubbish and human waste. At the same time ground filtration reduced by a significant amount as the impervious surface area increased, and the level of groundwater, the aquifer and stream base flow reduced.[3]

- No new trunk sewerage infrastructure has been put in place during this time. Neither Auckland City nor Auckland Council has limited the pace of development, infill and increases in impermeable surface area, so overflows are now a routine event 100 times a year, and increasing.

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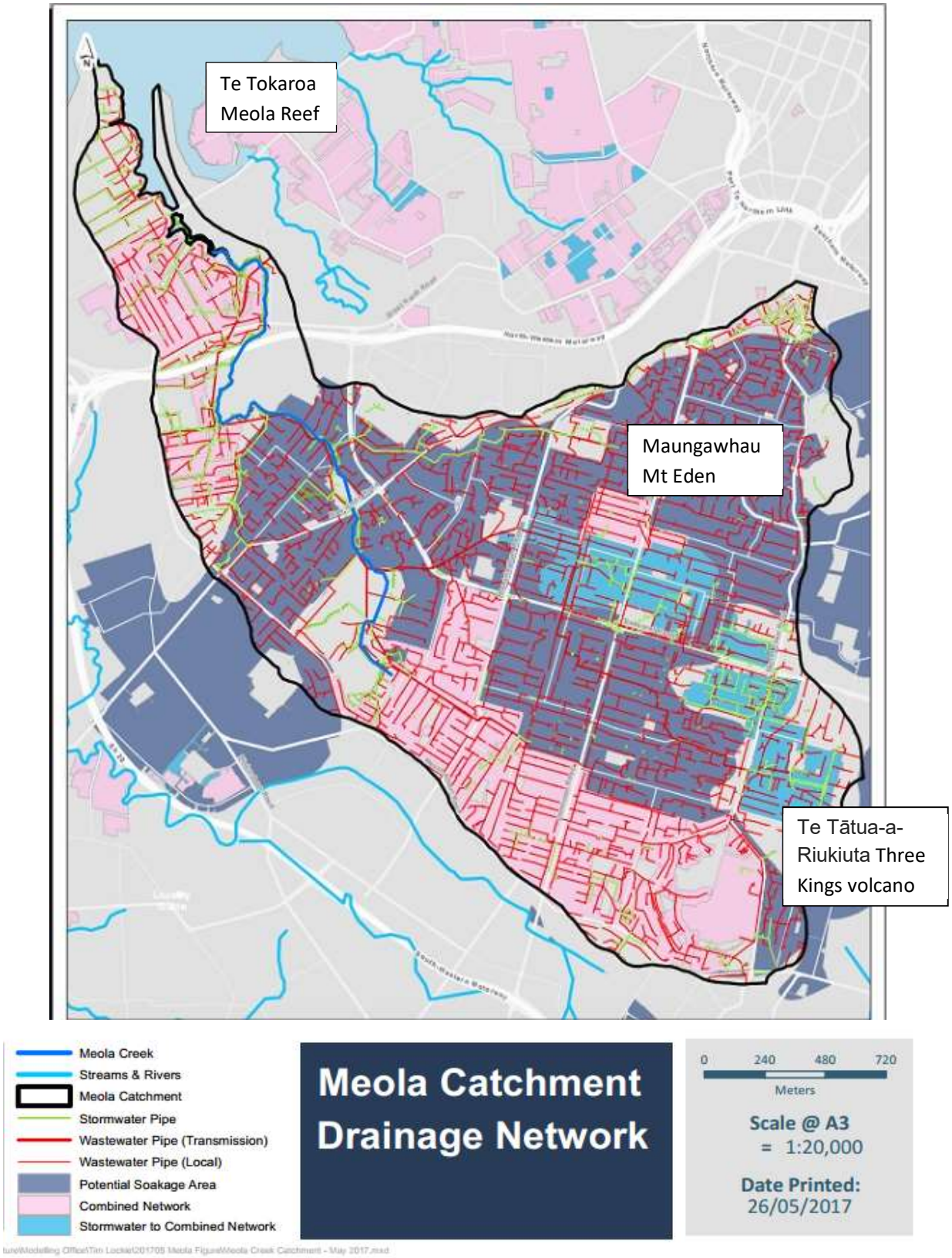
[2] Auckland City Drainage System Resource Consents Assessment of Environmental Effects (2001) [ACDSRC AEE]

[3] Auckland City Drainage System Resource Consents Assessment of Environmental Effects (2001) [ACDSRC AEE] P37" Stormwater runoff … increases significantly as the amount of impermeable surfaces increases with development. Urban development also reduces the availability of rain water soakage areas…. As urban development progresses the proportion of impermeable surface tends to increase and this generates increased volumes of runoff. In general terms every millimetre of rain falling on a square meter of impermeable surface gives rise to one litre of stormwater runoff

Meola Catchment Map



- Every new development runs a high risk of worsening an already overburdened Meola stream system; for example by removing more water from base flows through adding impermeable surfaces; or by adding pollutants to either the creek (eg from stormwater runoff from impermeable surfaces) or to the aquifer (eg from seepage from toxic materials inadvertently exposed or moved during earthworks).

- Auckland Council's Safeswim program now publishes the number of beaches where swimming is not recommended. Most creeks on the isthmus and many beaches are now recognised as unsafe for swimming and are a danger to human health and the environment.

- It is widely understood at this time that clean water will become a more and more valuable to New Zealanders and humanity as a whole. STEPS sees the need to protect the aquifer, streams, lakes and wetlands on the one hand, and on the other, the need to seek and agree options which will benefit the people of Auckland and New Zealand, as well as the existing and future environment.

- We take heart from New Zealand's progress such as :
  - Whanganui river was granted the legal rights of a person. "Ko au te awa. Ko te awa ko au."
  - Auckland's application for World Heritage status for its unique volcanic field, the source of our creek and aquifer
  - the first application for a water conservation order to protect a NZ underground water system at Te Waikoropupū Springs.

STEPS Wetland Restoration project and the Aquifer

- STEPS, Auckland Council and Watercare have jointly restored the STEPS wetland which depends on a spring from the Meola Te Tatua-a-Riukiuta aquifer, and was facilitated by the Roy Clements Treeway (RCT) Boardwalk. This project is an innovative solution which in the short term mitigated some immediate public health issues from the overflowing creek, and provides safe pedestrian access during periods of flooding for about 600 metres. A culvert was "daylighted" and a rock cascading weir provided by Metrowater to improve the function and aesthetic quality of the wetland.

- STEPS and other community groups are concerned at the potential for any contamination of Te Tatua-a-Riukiuta aquifer and STEPS believes that protection of the aquifer should be a key community objective.

- Te Tatua-a-Riukiuta (Western Springs-Meola-Three Kings) aquifer is an extensive (approx 25 sq km) volcanic aquifer, and is up to 50 meters thick.[4] According to the Auckland Unitary Plan it has water availability of 9.6 million cubic meters per year, and from 1877 to 1910 it provided Auckland city's main water supply.[5]. We are told that the existing water is of high quality and that it has also been identified as a future source of potable water.

- We believe that this generation should not do anything that has the potential to compromise this water for future generations. STEPS will work with Auckland Council and Watercare Services to ensure that the value of Waititiko Meola creek and the aquifer are enhanced and not degraded.

- STEPS trusts that Auckland Council and CCOs particularly Watercare and Healthy Waters will include preservation and protection of water quality of creeks as a high objective in all their planning and design processes.

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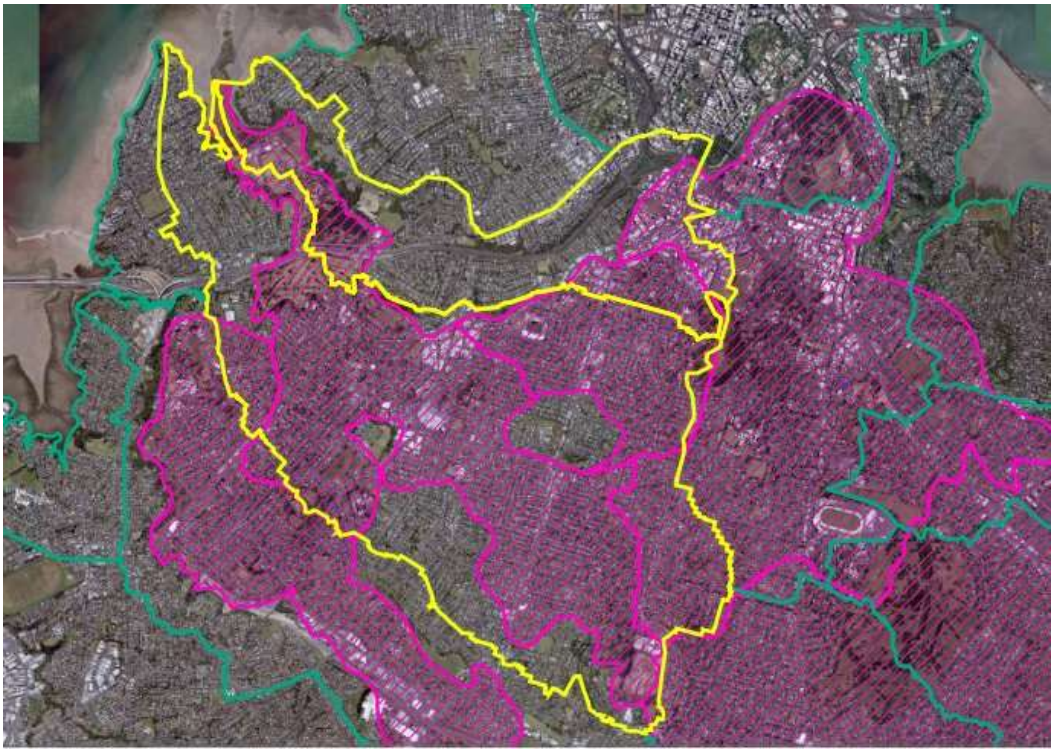
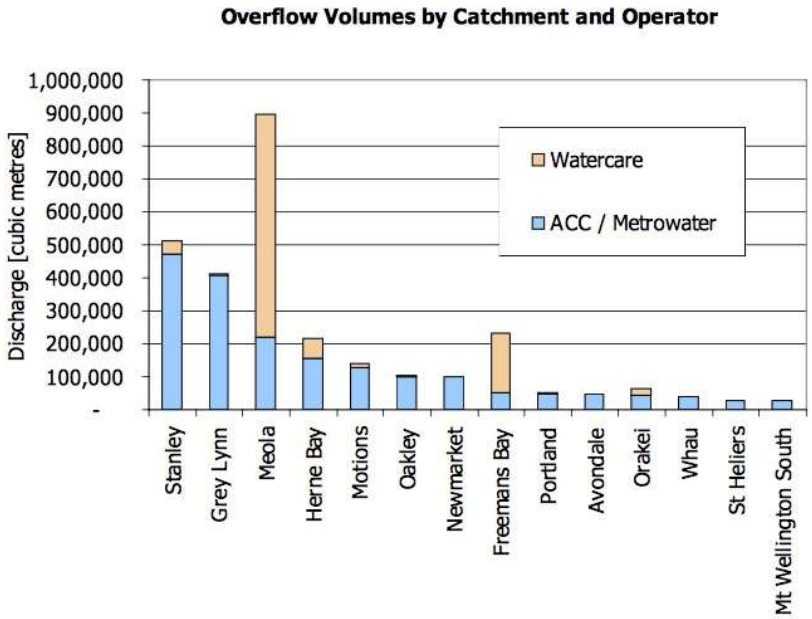
[4] TP 171 - Auckland Water Quantity Statement 2002 part 3
http://www.aucklandcity.govt.nz/council/documents/technicalpublications/TP%20171%20-%20Auckland%20Water%20Quantity%20Statement%202002%20part%203.pdf

[5] https://en.wikipedia.org/wiki/Western_Springs

- At this time Auckland Council have neither a commitment nor a plan to end sewage in streams and harbours, just to reduce it. There is still sewage in our water: we cannot assume the problem will be resolved.



Meola aquifer is shown in pink, and Meola-Motions catchment boundaries are marked in yellow.



2010, Auckland Council inauguration

Auckland Unitary Plan

- Auckland Unitary Plan (AUP) is driving an urban area increase from 42 % to 62 % imperviousness[6] city wide and we know that climate change will produce more frequent extreme events causing more flood damage. Meola Catchment has an impervious area of approximately 8 sq km or 49% and AC informed us it will increase under the AUP to 62.5%, an additional 2.2 sq km. Under AUP, there will be an additional 2.9 million cu m per year of extra storm water for Meola catchment, some portion of which would reach the creek.

- We believe that stormwater infrastructure in Meola must be put in place to support the intensification that Auckland Council desires. The project will need a specific objective to preserve the aquifer water quality for future generations, using a range of stormwater treatment approaches. Another key objective will be the reduction of stormwater transmission volumes and treatment of stormwater to ensure that only limited volumes of clean water flow to harbours.

Central Interceptor

- A widely held misconception is that Watercare's Central Interceptor (CI) project will resolve Meola catchment's overflows, and it is acknowledged that it will certainly make a difference. We believe that the 80% reduction of overflows in Waitītiko-Meola from CI is not enough. We also note that sending this additional stormwater to Mangere adds to the freshwater load in the saline environment of Manukau Harbour, while benefitting Waitemata.

- Moreover Watercare's CEO has served notice to Auckland Council in their AMP[7] that CI will only provide capacity for Meola stormwater on an interim basis making the construction of stormwater renewals in Meola catchment by Auckland Council (Healthy Waters) urgent, given the lead times involved.

- The existing Long Term Plan and the Stormwater Asset Management Plan do not show any new stormwater infrastructure for Meola. In October 2017 the Auckland Council Environment and Community Committee voted to bring forward $300 million for stormwater and $300 million for sewage transmission into the next 10 years (WIWQIP Western Interceptor Water Quality Improvement Project). We expect this to be adopted as a part of the 2018 Long Term Plan making a total of $2 billion for water projects including Central Interceptor. $2 billion is a good start but we need the **stormwater separated** from the sewer system.

- When WIWQIP work and the Central Interceptor are completed, Meola would be the only creek on the isthmus with more than 2 overflows per year, having 5 such outfalls (of a total of 9 in the western isthmus – see below). Centralising and leaving overflows flows on Meola is not good enough for our creek, our aquifer, nor for future generations.

- We ask Auckland Council for their committed plan to get the sewage and road runoff out of all our creeks and harbours, and to assure us that the stormwater soakage system is not a threat to the water quality of the aquifer.

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[6] 2015-35 Auckland long term plan

[7] "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" (Foreword by the Chief Executive of Watercare Services in the Watercare Asset Management Plan 2016 to 2036 p3.)

Above: 2017 WIWQIP proposals from Auckland Council show 10 sewerage outfalls; Five of these are on Meola Creek.

Overflows - Status Quo 2017