BRIEF OF EVIDENCE for Fiona Hoang Resource Consent Hearing on SMF

https://wellington.govt.nz/-/media/have-your-say/public-input/files/public-notices/resource-consents/2022/127-and-141-stewart-duff-drive/wcc---appendix-e---sludge-minimisation-business-case-for-lodgement-august-2022.pdf?la=en&hash=91349EBE6DCB4384C2135C216ECE7CC2391A055F

https://www.stuff.co.nz/dominion-post/news/120825350/coronavirus-wellington-council-discusses-dumping-wastewater-in-cook-strait
In 2020 Moa plant operations had problems and significant costs with the distribution of the sludge to landfill. Councillor Sean Rush advised the council of an alternative, discharging effluent through the Moa Point long outfall."There are no solids (paper, sanitary pads, needles) or visible excrement. Rather it is discoloured water containing organic waste." (Dompost April 5, 2020)

In response as reported,
'Councillors Tamatha Paul, Fleur Fitzsimons, Jill Day, Rebecca Matthews, Laurie Foon, Teri O'Neill, and Sarah Free wrote to council boss Barbara McKerrow on Saturday opposing the idea. In the letter it said,
"Even a quick check in with marine scientists suggests that the advice that the treated water is not environmentally hazardous would be many years out of date and based on old science and at the very least a more up to date environmental impact report be undertaken before any more discussion is had."'

Statement of evidence of Christopher Andrew Frank French for WCC: **Appendix B: Memorandum from Wikaira Consulting** - Retrospective Options Assessment - lack of consultation in certain areas including identifying the long list of technologies.

"Overview of Mana Whenua InvolvementWe note that throughout the project lifespan there has been discrete times of input and feedback from Mana Whenua. These appear to primarily be at the development of the MCAcriteria and ranking of shortlisting sites stage (where mana whenua values were condensed into one criteria), and feedback after the ranking of short-listed options had been completed(where there appears to be support for the Moa Point site). We note that the proposed site and process appear to reflect the comments provided by mana whenua to date.In noting the above, we also note that there appears to have been several key project actions that did not directly include mana whenua, or appear to have lacked appropriate consideration of iwi and cultural values:oDevelopment of the long-list of processes and sites;oDevelopment of the fatal flaw criteria;oDetailed and clearly evidenced consideration of Sites and Areas of Significance toMāori throughout the documents;oDetailed and clearly evidenced inclusion and response to feedback from manawhenua throughout the documentsIt is difficult then to predict whether mana whenua involvement at these keys stages of the project would have influenced the outcomes differently. As Treaty partners their input is of great importance, especially in the early stages of project development. Going forward, theApplicant should seek early and effective engagement on all areas that concern ManaWhenua.Consideration of Mana WhenuaMana Whenua principles are one of the identified benefits of the SMF, according to the business case. However, Mana Whenua were not consulted on the project until the MCA –establishing the short-list."

"Mana Whenua do not appear to have been involved in identifying the long list of technologies for the establishing of the fatal flaw criteria.There does not appear to have been any Mana Whenua consultation for the sludge transfer pipeline selection. A heritage area is noted in Option 2 and 3 but there have been no considerations for Sites and Areas of Significance to Māori (SASMs).Mana Whenua do not appear to have been involved in the initial workshop held with keyConnect Water personnel in February 2020 to identify potential sites using available spatial data. However, one of the criteria contains a 'fatal flaw description" mentioning "land ownership". It is important that Mana Whenua as Treaty partners are involved in decision-making processes.In the MCA briefing paper, there is no evidence of Mana Whenua input.None of the project objectives relate to Mana Whenua or anything cultural.Mana Whenua values have not been included/reflected in the key criteria considered in identifying the long-list of potential sites for the proposed SMF. A Mana Whenua value criterion should be added. Furthermore, the table considers land use and land ownership, in which Mana Whenua will be pivotal in advising on historic land use and ownership.In the Sludge Minimisation Consenting Strategy, Mana Whenua do not appear to be included as 'affected parties' under 3.3.3.3 Scope of Notice of Requirement.There is no consideration of Mana Whenua values when assessing the site options short list,and none one of the considerations made in the technical investigation of the shortlisted options are cultural.

- **Environment Impact Statement 1988**- High rate primary and long outfall proposed in 1980. -refer attachment by the same name.
- **Environment Impact Statement Stage 2 1990** - Council adopted rate of treatment 20:30:200 when a lower level 20:30:4,400 was stated therein would meet water quality standard and save money. -refer attachment by the same name.
- **The Effect of Sewage and Natural seasonal Disturbances on Benthic and Macrofaunal Communities in Fitzroy Bay, Wellington, NZ**
  Victor C Anderlini and Robert G. Wear. Coastal Marine Research Unit, School of Biological Sciences, Victoria University 1992 refer attachment by the same name.
  -Discusses the effects of milliscreened and untreated sewage on seabed marine life on Fitzroy Bay.
  "The results of ABC, Cluster and MDS analysis presented in this paper indicated that only benthic communities within 500m radius of the present sewage outfall were affected by the discharge.
  " Benthic communities in other parts of the bay,... appear to be affected by seasonal, physical, and possibly biological disturbances. …. However such disturbances appear to be localised and of a short duration."

- **Articles by Scientists on Outfall** -refer attachment by the same name.
  - Marine Biologist, Dr Robert Weir and sewage and pollution researcher Dr Timothy Lack reported in Evening Post of their support for the use of long outfalls.

- Milliscreened Hutt effluent discharged at outfall in Fitzroy Bay since 1984.
  " ..harmed seabed life no more than a southerly storm.
  Plants and animals near the shoreline Pencarrow outfall showed no effects of pollution beyond 750 meters from the outfall" Dr Wear as reported Evening Post 15/4/93.

Summary of Results of Investigations For Moa Point Interim Consent Application 2003
https://wellington.govt.nz/-/media/rubbish-recycling-and-waste/sewerage-wastewater-and-trade-waste/sewerage-and-wastewater/files/summary-of-investigation.pdf
Discussion confirms the suitability of the long outfall location avoiding return discharge and coping with the periods of milliscreening and treated sewage when plant reaches peak during heavy rain.
Report highlights capacity of current Moa Point WWTP has limitations to cope with sewage inflows. Problem of Wellington's stormwater system:-
" there are infrequent events when the peak wet weather flows arriving at the Plant can exceed for short periods the secondary treatment capacity of 3,000 litres per second. This has been recorded on 7 occasions during the past 4 years with an average duration of 4 hours and 13 minutes (i.e. the actual duration of the events ranging from 45 seconds to 10 hours and 18 minutes). When this happens all wastewater arriving at the treatment plant is milli screened. However the volume of wastewater in excess of 3000 litres per second bypasses the disinfected secondary treatment process. Therefore the discharge from the long outfall during a bypass event is a mixture of milliscreened and disinfected secondary treated effluent.

"5.1/p6 - 5.1 The Receiving Environment The Moa Point outfall location was originally chosen as an area experiencing strong tidal and coastal currents that rapidly dilute and disperse any contaminants even during fine weather. Storm conditions further accelerate the dilution and dispersion of contaminants. At the time of the initial investigations for the long outfall a "circulation zone" was identified which conveyed water into Lyall Bay. Consequently the minimum length of the long outfall was set at 1800 metres to avoid the return of discharged effluent into Lyall Bay."

Wanganui Waste Water Treatment Plant Discharge of Milliscreened Effluent to Ocean Outfall
https://www.horizons.govt.nz/HRC/media/Media/Consent/FINAL-WDC-application-for-discharge-of-milliscreened-wastewater-to-ocean-outfall_2.pdf

Discharge of milliscreen through long outfall Wanganui 2015 of milliscreened effluent through existing outfall, and the assessment of environmental effects low environmental impacts, similarly to outfall study of marine life in Wellington's Fitzroy Bay in 1992**. (**Aderlini and Wear 1992)

"2.4 Assessment of Effects - Summary The Cawthron review states that "the results of the survey by Ellis et al (1999) suggest that the reduced level of treatment of the discharge during the upgrade is likely to have minimal effects on sediment quality around and downstream of the outfall. Concentrations of containments are extremely unlikely to exceed guidelines for the protection of marine organisms." Effects on benthic faunal communities are likely to be most severe immediately surrounding the outfall and up to 1,200m downstream. Downstream effects are predicted to be subtle. Risks to shoreline recreational users are generally low, apart from when the wastewater plume may visit the shoreline. There are potentially higher health risks for offshore surfers and divers, and consumers of raw shellfish gathered in the vicinity

WASTEWATER OUTFALLS – INTERNATIONAL PERSPECTIVES RELATIVE TO NEW ZEALAND Jim Bradley, MWH now part of Stantec 2016
https://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=1777
Excerpts discusses wastewater treatment in NZ and highlights the merits of long outfalls for NZ.

"Progress to sustainable outfalls including using natural processes and systems, creating opportunities for nature, added value for developers and stakeholders, potential for cost saving on life cycle basis and the potential for creating new habitats.

"The author estimates that over 70% of New Zealand's treated wastewater discharges directly into the marine environment. In some schemes for example Hastings and Dunedin (Tahuna) the treated wastewater contacts rocks for Maori cultural purposes before discharge into the marine environment.

"Almost without exception the degree of wastewater treatment of New Zealand's wastewater discharges are of a high to very high standard, compared to many overseas discharges. The New Zealand approach of matching treatment standard to the receiving environment's assimilative capacity is well developed. In some cases generally for political reasons, discharges have higher levels of treatment than that required from a technical environmental effects assessment viewpoint.

"• With increased pressure on fresh water and a more restrictive regulatory environment as a result of the implementation of the National Policy Statement on Fresh Water Management 2014 (NPSFM), it can be expected that more communities located within an economic conveyance (piping) distance of the coast will adopt the option of a marine discharge for the disposal of their treated wastewater. However it is expected that in the marine environment, especially estuaries and harbours greater emphasis will be placed on water quality and ecological maintenance and improvement."

Treatment Options for Marine Wastewater Discharges

http://revistadae.com.br/artigos/artigo_edicao_204_n_1649.pdf

Milli Screening and outfall example - Colombia 2016

Excerpts discusses the merits of wastewater disposal with long outfall in theory and practise.

> "1. Treatment Options for Marine Wastewater Discharges:
>
> Mathematical modeling and monitoring of operating outfalls show that their effects are generally limited to a small area, typically a few hundred meters around the discharges. This is true even for substantial discharges of essentially raw sewage, for example the Ipanema outfall in Rio de Janeiro
>
> "High near field dilution is often a specific design requirement. It can be readily achieved by a multiport diffuser that discharges the effluent as high velocity turbulent jets that rise through the water column. They entrain substantial quantities of seawater that can dilute the effluent to at least 100:1 within a few minutes after discharge and within a few hundred meters from the diffuser (Figure 1). P23
>
> "APPROPRIATE TREATMENT FOR OCEAN OUTFALL DISCHARGES Wastewater treatment for ocean discharges is a contentious issue and is often arbitrarily specified. According to the WHO, the level of treatment has little bearing on the human health risk of discharge from an effective outfall. The risk from any effluent discharged through an effective outfall is low, even if only treated to preliminary or primary levels. Conversely, if a short (ineffective) outfall is used, even secondary treatment will not reduce the health risk to acceptable levels.
>
> P. 24 " Effluents dis charged directly on the beach or from a short outfall constitute a high health risk; unfortunately, this commonly occurs in developing countries. Preliminary treatment alone will usually suffice with an effective outfall. For domestic sewage this consists of milliscreens with apertures around one mm. To understand

why advanced treatment is usually unnecessary, consider an outfall with a diffuser that effects an initial dilution of 100:1 (which can usually be easily accomplished). This corresponds to a 99% reduction in contaminant concentrations in the receiving water, which is far beyond the capabilities of even advanced conventional treatment processes. Diffuser mixing is therefore usually much more important than treatment in mitigating environmental impacts. This is why the diffuser and near field are included in the “system” in Figure 1.

“RELATIVE TREATMENT COSTS For coastal cities, especially in developing countries, the strategy of wastewater disposal through an effective outfall with preliminary treatment is an affordable, effective, and reliable solution that is simple to operate and with minimal health and environmental impacts. Mandating more advanced levels of treatment that are unaffordable often results in “no action,” with continued contamination of water bodies and their associated health risks. The lifetime cost of a typical urban wastewater scheme with advanced, for example secondary, treatment is much higher than one with primary treatment and an effective long ocean outfall. If the treatment is limited to removal of floatables and grease and oil, the economic comparison is even more favorable for the outfall. Also, increasing use of High Density Polyethylene (HDPE) makes outfalls even more attractive, especially for small to intermediate communities.

“The costs rise very rapidly as the level of treatment (and contaminant removal) increases. This is shown by the estimated annual costs to treat 100 mgd (4 m3 /s) of raw wastewater in Figure 2 where the level of treatment is expressed by the percentage BOD removed. These costs include recovery of investment plus O&M costs. Figure 2: Relative costs of wastewater treatment

(diagram missing -)

“CASE STUDY A recent case study that illustrates the relative costs and impacts of various treatment options is Cartagena, Colombia, Figure 3. The scheme consists essentially of preliminary treatment by milliscreening without chlorination followed by discharge through a long outfall. The preliminary treatment plant was designed to remove floatable material such as oils and plastic bags, as well as sand and grit particles. Figure 3: Cartagena, Colombia, outfall The outfall extends approximately four km into the Caribbean Sea and terminates in a diffuser 520 m long in water depth of 20 m. The design flow rate is about 4 m3 /s (~100 mgd). Extensive measurements of currents and density stratification were made near the diffuser and

used in mathematical modeling of the initial plume behavior and wastewater fate and transport (Roberts and Villegas, 2006). It was found that dilutions should be very high, ranging from 84 to 860 with a median value of 230. Dilutions were greater than 100:1 for 85% of the time. Because of the weak stratification, the plume almost always surfaces, but when it does surface, the dilution is always greater than 85:1."

Statutory drivers - call for " good quality local infrastructure, public services and regulatory functions at the least possible cost"
https://www.confer.co.nz/tiwf/index_htm_files/jim%20bradley%20full%20paper.pdf
2 STATUTORY DRIVERS Three key pieces of legislation that set out principles to be followed in relation to Maori-tangata whenua considerations on human waste-domestic sewage and wastewater systems.
The first is the Environment Act 1986 which sets out the principles of the management of natural and physical resources, including intrinsic ecosystem and community values, **the Treaty of Waitangi, the sustainability of natural and physical resources, and the needs to future generations.**
The second is the Resource Management Act 1991 (RMA), a statute that controls all development in New Zealand. The purpose of RMA is "…to promote the sustainable management of natural and physical resources" where sustainable management means: "…managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety…"
The third significant piece of legislation is the Local Government Act 2002 (LGA) which identifies that purposes of local government is New Zealand is: "… to promote the social, economic, environmental, and cultural well-being of communities, in the present and for the future."
These are the four well beings. In March 2012, the central government notified of their intentions to refocus the functions of Local Government and change the purpose as stated above to "cover good quality local infrastructure, public services and regulatory functions at the least possible cost". This purpose has been included in the Bill which recently had its first reading in Parliament."
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Milliscreened effluent compared to secondary with UV

Above is an image of the influent [left] (the water that enters the wastewater treatment plant) and effluent [right] (the treated water as it leaves the treatment plant). These samples were taken from Moa Point wastewater treatment plant.

This influent sample was taken once the wastewater went through the milliscreens in the treatment process.

All wastewater treated at our treatment plants is treated to a high standard so that bathing guidelines in surrounding swimming bays around the ocean outfall are met.

Wellington Water Website
https://www.wellingtonwater.co.nz/your-water/wastewater/collection-and-treatment/the-treatment-process-2/.