BEFORE GREATER WELLINGTON REGIONAL COUNCIL

UNDER	the Resource Management Act 1991
IN THE MATTER OF	the Proposed Natural Resources Plan for the Wellington Region
AND	
IN THE MATTER OF	Submissions by the **Kapiti Coast District Council**

STATEMENT OF EVIDENCE OF RITA O'BRIEN
ON BEHALF OF THE KAPITI COAST DISTRICT COUNCIL

Technical - dewatering

Hearing Group 3

DATE: 21 August 2017

INTRODUCTION

1.1 My full name is Rita Louise O'Brien. I am a Stormwater and Coastal Engineer at the Kāpiti Coast District Council (**District Council**). I have held this position since October 2016. My qualifications are a Bachelor of Engineering (Industrial Geology) from Exeter University and a Master of Applied Sciences [Resource Management] from Lincoln University.

1.2 I have been employed in local and regional government in a variety of roles since October 2000. I have been employed by Kāpiti Coast District Council, including as the Council's Subdivision Engineer, since January 2005.

1.3 As part of my current role in the Infrastructure team, and previous role in the Resource Consent team, I provide engineering advice to the Planning team(s) on resource consent and plan change applications. This includes general advice about interpretation of the District's flood hazard maps and specific advice on the provision of infrastructure. In some cases this has led to me presenting evidence at consent and environment court hearings. I have recently been involved in making applications for a suite of Council's activities under the PNRP, principally relating to the maintenance of our open channel storm water network.

1.4 I have read and am familiar with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014. I agree to comply with that Code. Other than where I state that I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

2. OUTLINE OF EVIDENCE

2.1 My evidence is organised under the following headings:

(a) Introduction and code of conduct
(b) Background/ context
(c) Response to Statement of primary evidence of Dr Douglas Mzila on behalf of Wellington Regional Council
(d) Conclusion

3. BACKGROUND/ CONTEXT

3.1 Kāpiti Coast District Council (the District Council) has been involved in the Proposed Natural Resources Plan (PNRP) since its inception, prepared submissions on the draft

Plan and met with GWRC staff on multiple occasions throughout the process. The District Council's final submission is focused on specific provisions and I want to take this opportunity to tell a story about our experiences to date with respect to the reasonableness of its requirements in the PNRP in relation to gaining consents for the District Council's infrastructure activities.

3.2 The purpose of this statement is an attempt to clarify the engineering aspects of our submission and should be read in conjunction with Emily Thomson's Planning evidence.

3.3 The Kāpiti Coast District is located on a narrow coastal plain that extends along the western margin to the Tararua Range. The major landform is a series of fixed and mobile sand dunes, interspersed with wetlands. The soil composition along the coastal plain is a mix of sand and peat, with varying degrees of drainage capacity. Urban settlement has occurred close to rivers and in areas that will always be vulnerable [and increasingly so under the influence of climate change] to the effects of flooding and stormwater run-off.

3.4 The water table throughout the Kāpiti Coast District, and other parts of the Wellington Region, is generally high (and/or in some areas tidally influenced) and the soils are very porous (sands, river gravels,). Depending on the actual location it is not uncommon to find the water table 800-1000mm below the ground level in the summer months and at the surface during winter.

3.5 The health and sustainability of Kāpiti Coast District's waterways and natural environment are of vital importance to the community. Our connection to the District's natural environment is what makes the Kapiti Coast a great place to live, work and play; and the District Council recognises the Proposed Natural Resources Plan is a key document is realising its aspirations for the natural environment.

3.6 A core function of local authorities, required under the LGA 2002, is the provision of good-quality infrastructure and local public services in a cost-effective manner. The District Council's piped and open channel networks [three waters – storm water, water and wastewater], and transport networks form part of the existing environment; and are essential services which the District Council is obliged to provide within its urban areas. The District Council needs to plan infrastructure development, upgrades and maintenance with a 30-year timeframe under the LGA 2002. This is not compatible with short duration consents. It is also nonsense to have rules that could theoretically be declined or publically notified which relate to the provision and maintenance of essential regionally significant infrastructure because it is impossible to prevent

discharges from the networks or choose not to undertake critical work on the District Council's infrastructure. The efficient development of infrastructure relies on the permitted / controlled activities and their specified conditions [or matters in which Greater Wellington Regional Council reserves control] being linked to the practicality of the functional requirements for the long-term management of the regionally significant infrastructure involved.

3.7 With a high water table and the ground conditions in the Kapiti Coast District, the soils are very mobile, which means the soils will flow into any excavation created (the same as digging in the sand in the tidal area). This makes some operations impossible (i.e. pipe / manhole installation, replacement, maintenance or repair) without the use of trench support [i.e. some form of shoring] and ground water control (i.e. dewatering). Dewatering involves controlling groundwater by pumping, to locally lower groundwater levels in the vicinity of the excavation.

3.8 Council's reticulated network for wastewater and stormwater varies in depth from 1m to 5m and in pipe sizes from 150mm to 750mm for wastewater and larger for storm water (up to 2.5m). All the District Council's assets (pipelines and wet wells) are designed and built to be water tight (generally not permitting ground water into the pipe systems). To have any surety that this can be maintained during construction or repairs the trench needs to be kept as dry and clean as possible through dewatering.

3.9 For mobile operations, such as the lying or repairing of pipelines, spear pump systems (spears) are the most effective means of controlling groundwater on the Kapiti Coast. If the ground water is not controlled the soil continually flows into the excavation, creating a genuine health and safety issue.

3.10 Spears or well pointing (multiple shallow bores connected to a main pump) is suitable for porous soils, and both stationary and mobile projects. The use of this type of dewatering plant is more common because of the versatility (small items of plant joined together to form an effective unit). The smaller units provide for a more precisely targeted dewatering with the smallest possible cone of influence. The cone of influence or bell effect relates to the porosity of the ground, i.e. the more water flowing through the ground the flatter the cone and the larger the zone of influence.

3.11 The static groundwater level adjacent to the well falls as water begins to flow to the well and the depression cone begins to form. The cone expands upwards from the bottom of the well to the static groundwater. In the case of spear systems, the drawdown cone is a composite of multiple cones from adjacent shallow bores.

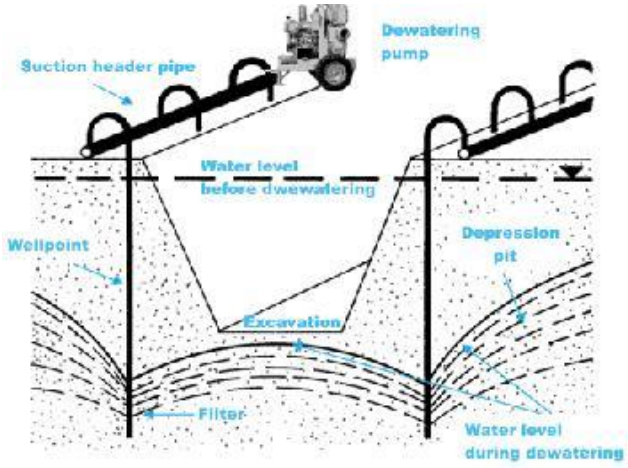


Figure 1: Typical configuration of spear pump system and visual presentation of depression cone

3.12 The dewatering for the laying of pipes or installing manholes is considered to be mobile as a length of pipe will be laid each working day with the ground opened and closed daily or over 2-3 days. The majority of the District Council's works are pipe renewal and repairs. However, a pipe laying project can occur over a 6-8 week period or longer within the same neighbourhood or catchment. Depending on available budgets, there could be 3 to 6 such projects each year. Unless the work is of an urgent nature, work does not occur at night, on public holidays or over the weekend.

3.13 For static operations, such as construction of wet-wells, deep well pointing or spears dewatering is the most effective means of controlling groundwater on the Kapiti Coast.

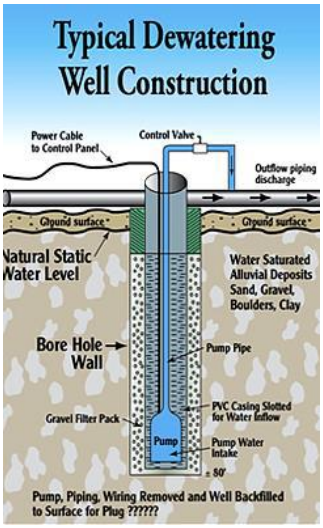
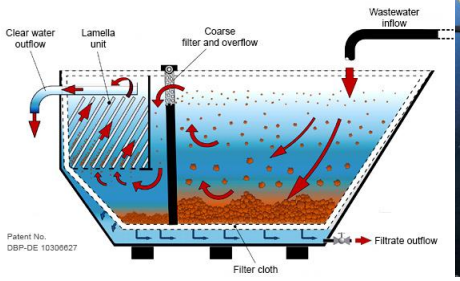


Figure 2: typical dewatering well construction showing deep well with submersible pump in base

3.14 Although the first flush upon commencement of a dewatering activity can be cloudy, the discharge water from well pointing or spear pumps are clear of silts. Even so, traditional silt control methods are still employed [such as settling tanks or filtration] before final discharge. The use of a settling tank allows the nature of the discharge water to be observed and if required, sampled. Any water from a known or potentially contaminated site can be isolated and disposed of, after appropriate treatment, to sewer or stormwater. The illustration below shows the general set up for a settling tank.



Figures 3 &4: the general set up for a settling tank????

3.15 The traditional method in more solid (less porous) ground is to use a shallow point pump in the bottom of a trench or excavation. This method is totally ineffective given the soil type and ground water flows experienced on the Kapiti Coast.

Figure 5: Shallow point pump in the bottom of a trench

3.16 The majority of construction work undertaking by the District Council is undertaken within urban areas where the existing ground water environment has been heavily modified. Most bores within the urban area are shallow (3m deep) ‘sand’ bores used for domestic garden irrigation.

3.17 There are several examples of longer duration projects requiring dewatering undertaken on the Kapiti Coast. The water table is very high (0.8m in summer and / or tidally influenced) in these areas and groundwater was controlled using spear pump systems. There have been no detrimental effects to the surrounding ground observed [including to adjacent infrastructure – pipes, roads] and no private bores reported to have been affected. These projects include:

a) Wastewater Pump Station on Rauparaha Road in Waikanae with its 7.3m deep wet well and a 200m^3 storage tank took 10 months and 14 months respectively. The dual tanks are 3.2m below ground level and consist of 2 x 2.55m diameter pipes, 22 meters long, plus all the connecting pipe work. Dewatering occurred intermittently, as required, for approximately 18 weeks of the construction period. The photographs below show the dual tanks being installed with the spear dewatering system evident adjacent to the top of the trench.

Figures 6 & 7: the dual tanks being installed with the spear dewatering system evident adjacent to trench top

The water was returned to the Ngarara Stream via the existing stormwater network.

b) stormwater pump station on Raumati Road in Raumati with its deep wet well and extensive large diameter pipe network took 18 months. The dewatering associated with the project took about 6 months (the associated pipework taking a further 6 months) and involved deploying around 60 spears with an estimated discharge rate of 13-20 l/s.

3.18 Effective dewatering makes the adjacent ground more stable, thus reducing the risk of subsidence. Dewatering is continuous for the duration of these projects as, once controlled, the time and money involved in re-establishing a dry work site is not an efficient use of resources. Where groundwater volumes are underestimated and inappropriate control methods employed, it has resulted in the work being repeated or the subsidence of adjacent infrastructure [e.g. Manawa Road, Raumati where the road collapsed adjacent to the excavation and the pipes 'floated' – the collapse and pipe floatation was a function of inappropriate control method being employed rather than any ground subsidence due to dewatering].

3.19 An example of a significant stormwater upgrade project requiring consent under the Proposed Natural Resources Plan is the stormwater pump station in Moana Street, Otaki. This pump station, with its deep wet well and extensive large diameter pipe network, took 18 months to complete with continuous dewatering being required over a period of approximately 6 months for the wet well [the associated pipe work required a further 6 months]. Dewatering was undertaken using a spear pump system discharging at between 8-20 l/s.

3.20 At the concept / feasibility stage of such a project it is impossible to confirm with any accuracy either the duration or quantity of water involved until you actually excavate. Resource consent WGN160044[33656] was granted for this activity on 10 September 2015 but following excavation of the areas to be dewatered, it was evident that significantly increased rates of dewatering would be required.

3.21 The new consent WGN160066 [33703] allowed for dewatering to occur for the new pump station site and stormwater main at a significantly increased rate of 100l/s [8,640m^3/day] and 30l/s [2,595m^3/day] respectively [increased from a total of 2.5l/s [216m^3/day]]. Consent was required under Rule 140 as dewatering would continue for more than a month. The water was discharged via the reticulated stormwater network to the Waitohu Stream. The decision included conditions requiring monitoring the

discharge at the Waitohu Stream in conjunction with Iwi. Prior to a decision being issued, the situation was modelled by Greater Wellington Regional Council. Dr Mzila (as GWRC technical expert) assessed the impact to be less than minor due to the tidal nature of the Waitohu Stream at this location and most of the groundwater abstracted was being returned to the Waitohu Stream.

3.22 No detrimental effects to the surrounding ground were observed, no private bores were reported to have been affected and no issues were identified through monitoring of the Waitohu Stream in accordance with consent conditions. The dewatering occurred within close proximately to residential properties (within 4 m). Properties were surveyed prior to dewatering commencing and at the conclusion of the project without this being required by the consent conditions.

3.23 In practice, groundwater extracted during a dewatering process is often returned to the same groundwater system either to land or an open channel [via the piped network or directly] resulting in a non-consumptive take. During initial start up the discharge water can have a cloudy appearance, but once established runs clear. For a belts and braches approach, the discharge water is passed through a sedimentation tank.

4. RESPONSE TO STATEMENT OF PRIMARY EVIDENCE OF DR DOUGLAS MZILA ON BEHALF OF WELLINGTON REGIONAL COUNCIL

4.1 Dr Mzila discusses [page14 of his Statement of Primary Evidence] the potential impact on the groundwater environment and states that, in general, long duration dewatering has a greater potential to cause significant impact, compared to short term dewatering. The majority of these impacts are captured in the specified conditions under R140.

4.2 While I acknowledge that dewatering and groundwater control has the potential to impact on the groundwater environment [geotechnical, contamination, recharge and water resource], these impacts are broadly a function of the method of control, the specific depth and location of controls, hydrogeological conditions, the scale and duration of dewatering, and the sensitivity of the 'receptor'.

4.3 I am concerned that the one size fits all approach of requiring anything in excess of 1 month duration to default to a discretionary activity is unnecessarily onerous. As the examples show (as presented in Section 3 of my evidence) there have been no detrimental effects to the surrounding ground observed [including to adjacent infrastructure which are sensitive to subsidence i.e. pipes and roads] and no private

bores are reported to have been affected. All of these examples of recent infrastructure projects required dewatering over durations well beyond the 1 month timeframe proposed for a permitted activity under rule R140.

5. CONCLUSIONS

5.1 The discretionary activity status (under rule 142) does not fairly or appropriately recognise regionally significant infrastructure and local authority activities which are critical to the functioning and wellbeing of communities. The District Council cannot separate the infrastructure required to support urban settlements and the sustainable use and development of natural resources. The PNRP currently has little recognition of regionally significant infrastructure (in terms of its rules in supporting urban development – people and communities) which makes consenting more onerous (and thus unreasonable) particularly for smaller territorial authorities with limited funds and large infrastructure networks to construct, upgrade and maintain.

Rita O'Brien
Stormwater and Coastal Engineer
Kapiti Coast District Council
21 August 2017