

**BEFORE INDEPENDENT HEARING COMMISSIONERS
APPOINTED BY THE WAIKATO DISTRICT COUNCIL**

IN THE MATTER of the Resource Management Act 1991
(**RMA**)

AND

IN THE MATTER of the Proposed Waikato District Plan

BETWEEN **RANGITAHİ LIMITED**

Submitter [No. 343]

AND **WAIKATO DISTRICT COUNCIL**

Local Authority

**EVIDENCE-IN-CHIEF OF
RAYMOND BRIAN O'CALLAGHAN FOR RANGITAHİ LIMITED
(CIVIL ENGINEERING)**

17 February 2021

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INTRODUCTION, QUALIFICATIONS AND EXPERIENCE

1. My name is Raymond Brian O'Callaghan.
2. I am a sole practitioner consulting infrastructure engineer based in Wellington.
3. I hold the qualifications of Bachelor Engineering (Civil), Dip Hydraulics (Delft) and I am a Chartered Professional Engineer. I am a Fellow of Engineering New Zealand (formally Institute of Professional Engineers New Zealand) and a Past President of the Association of Consulting and Engineering.
4. I have 38 years of experience as a Chartered Professional Engineer (became a Registered Engineer in 1983) and have worked in the field of civil engineering for this period. My engineering work has been mainly focussed on infrastructure including earthworks, roading, stormwater, wastewater, water supply, land development, and resource management processes associated with these projects.
5. I have led consultant services for numerous large land development projects across New Zealand with several years continued input into projects in Hamilton, Taupo, HawkesBay, Wairarapa, Kapiti, Wellington and Christchurch.

CODE OF CONDUCT

10. I have read the Environment Court Code of Conduct for expert witnesses and agree to comply with it.
11. I confirm that the topics and opinions addressed in this statement are within my area of expertise except where I state that I have relied on the evidence of other persons. I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

BACKGROUND

6. I have been retained by Rangitahi Limited (**Rangitahi**) to prepare a statement of evidence on its submission on the Proposed Waikato District Plan (**pWDP**) seeking provision for future urban growth in Raglan West.

7. I am familiar with the Raglan West area and surrounding environment and carried out a site visit of the Rangitahi development and the surrounding area as part of the preparation of this Statement.
8. In preparing this statement of evidence-in-chief (**EIC** or **evidence**) I have read the following documents:
 - (a) Rangitahi's submission and further submission on the pWDP;
 - (b) The other statements of evidence on behalf of Rangitahi;
 - (c) Waikato District Council's (**WDC**) s.42A Framework report;
 - (d) WDC's Future Urban Zone report; and
 - (e) Resource Consent Application for the Raglan Wastewater Discharge, prepared by Beca Ltd, dated 6 November 2019.
12. This EIC relates to the submission by Rangitahi to the pWDP seeking provision for medium to long term growth areas in Raglan.
13. The developed areas of Raglan are supplied with a reticulated water supply and are connected to a wastewater collection, treatment and disposal scheme. The water supply and wastewater system have capacity constraints that need to be considered as part of the planning process for future growth areas. I have carried out a broad overview of these and make comment on how these might be addressed to facilitate future growth.
14. The topography and soil conditions, with respect to appropriate earthworks, in the surrounding areas of Raglan also have an influence on the location and intensity of future urbanisation at Raglan. I have inspected the areas adjacent to the Rangitahi development and comment on likely suitability for development if development were to occur there.
15. The size and nature of the existing developed area and the location of potential future areas of development are unique to Raglan and are such that the planning approval processes for future development would benefit from a Structure Planning process. My reasons for this view are outlined in this evidence.

OVERVIEW OF EXISTING INFRASTRUCTURE AT RAGLAN

16. An understanding of engineering infrastructure capacity and any possible constraints from the infrastructure is essential when assessing potential future growth areas.
17. The urban area of Raglan is serviced by a wastewater treatment plant located on Wainui Road. The treated effluent is discharged to the Whāingaroa Harbour during an out-going tide. The existing wastewater reticulation, treatment and disposal infrastructure, is under review for a new resource consenting process. Future expansion of Raglan will place additional capacity requirements on this infrastructure.
18. Reticulated water supply to the urbanised Raglan community is sourced from the Omahina Spring in the upper reaches of the Omahina Creek, near to Te Hutewai Road. Treated potable water from the Spring is stored in a reservoir and conveyed to the urbanised area through a piped reticulation system. Future expansion of Raglan, beyond the existing capacity of the system, will require an increase in the treatment, storage, and conveyance elements of the existing system.
19. Stormwater runoff from the developed areas of Raglan is conveyed to the harbour and adjacent waterways. The developed areas are very close to the harbour and flooding from stormwater runoff is not a notable issue for Raglan. Therefore, future expansion of the Raglan area is not influenced by stormwater matters.
20. The roading network of Raglan is reasonably well established. The general roading network is appropriate for the area. However, the existing one-way bridge on Wainui Road, connecting the western part of Raglan with the township has capacity issues. The transport EIC of Mr Ian Clark addresses the issues associated with this bridge.

IMPACT OF ENGINEERING MATTERS ON FUTURE GROWTH AREAS

Wastewater

21. The wastewater treatment plant and outfall infrastructure are located in the western area adjacent to Wainui Road. The system is currently going through

a consent renewal process. I understand WDC is proposing to seek a consent renewal for a tidal discharge to the Harbour and is carrying out further investigations into other longer-term disposal options such as discharge to land.

22. WDC has indicated in its 2018 – 28 Long Term Plan an intention to spend approximately \$15.6M on upgrading the Raglan wastewater treatment system, which might include a discharge to land within this period.
23. From a broad planning perspective, there are advantages in focussing future development in west Raglan as this minimises the need for extending/upsizing reticulation and pump station capacity further to the east.
24. A resource consent application for the wastewater discharge to water, if approved, would result in an approved effluent standard, maximum discharge flow rate per day, location of the discharge and discharge regime (tidal cycle restrictions). If approved, it would likely result in a prescribed on-going investigation process for assessing other longer-term options such as land disposal.
25. I anticipate that the volume sought by the consent application incorporates a reasonable allowance for future growth in Raglan. The diagram below shows the flows into and out of the treatment plant for the 2016 – 2019 period and how these compare with the existing consent limit of 2,600m³/day. This information was sourced from the resource consent application prepared by Beca Ltd, dated 6th November 2019.

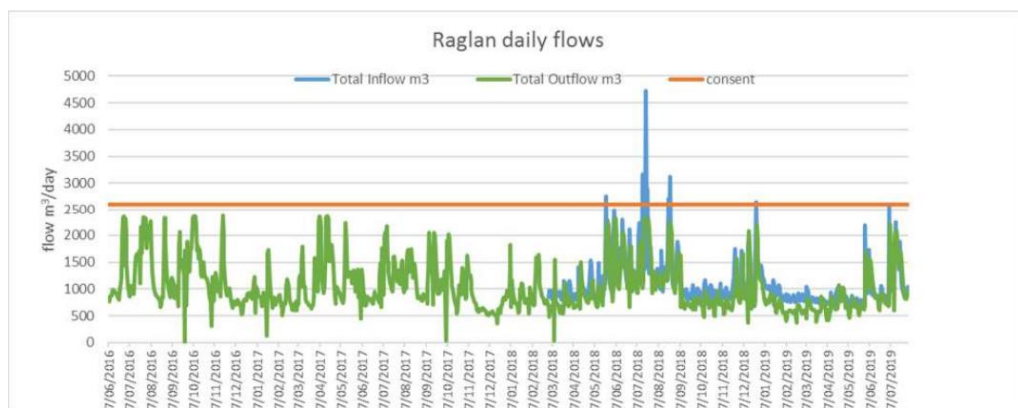


Figure 4: Raglan WWTP incoming and discharge flows 2016 - 2019

26. The blue line on the above figure is the inflow to the treatment plant. The green line is the discharge from the plant (after treatment and storage in the ponds) on an out-going tide and the red line is the consent limit for the discharge flow. The flows in the system are influenced by population and wet weather infiltration into the system. As shown by the figure above, a peak inflow of approximately 4,700m³/d was recorded in July/August 2018, which was probably triggered by significant wet weather infiltration into the system. However, this notable peak inflow was managed by the treatment plant, through pond storage, to achieve a peak outflow of less than the consent limit of 2,600m³/day.
27. System capacity is dictated by the various treatment elements (screens, treatment ponds, UV disinfection etc) and the storage pond to store treated wastewater when the tidal cycle is not suitable for discharge. The system could also incorporate inflow storage to buffer peak wet weather flows to match treatment capacity. The treatment system has to have sufficient capacity to reduce the contaminants in the wastewater to the consent limits and to control peak flows to meet the flow limits of the consent.
28. I note that the consent application prepared by Beca Ltd stated that the existing consent limit has not been exceeded in the last 5 years and the median discharge duration was 2 hours and 15 minutes, compared to a consented maximum discharge duration of 5.5 hours. Thus, there is a reasonable level of residual capacity in the system in terms of flow control.
29. Thus, in technical terms, managing the capacity of the wastewater treatment plant and disposal system to maintain compliance with resource consent conditions for maximum flow is relatively straight forward for Raglan because it can balance flows and treatment control with pond storage. The pond storage is only partially used in normal weather conditions and only begins to approach near capacity during times of extreme wet weather. Even peak holiday occupation, during dry weather does not approach maximum flow capacity. Additional pond storage is reasonably cost effective and the site has sufficient area for additional storage when required.
30. I have not attempted to estimate the expected residual capacity of the treatment plant for future growth because this will be dictated by the proposed

treatment plant upgrade works and the final disposal system adopted. However, I note from the Beca report that the average daily inflow in 2019 was estimated as 1,211m³. Beca estimated this to increase to 1,427m³/d by 2022. This increase in inflow was not expected to trigger any increase in the peak discharge flow rate because the additional flow would be managed by pond storage. Beca also noted that the increase in projected inflow of 216m³/d over the 3-year period was minor in the context of consented discharge volume and the maximum discharge rate of 2.600m³/d had sufficient capacity for future residential growth at Rangitahi Peninsula and Lorenzen Bay.

31. Further increased wastewater flows resulting from additional growth in Raglan beyond the Rangitahi Peninsula and Lorenzen Bay growth zones, including the Future Urban Zone (**FUZ**) can, in my opinion, be accommodated by ensuring:
 - (a) the reticulation system can convey the raw wastewater from the urbanised area to the treatment plant;
 - (b) wet weather flows are controlled through effective management of inflow and infiltration during wet weather;
 - (c) the treatment plant has sufficient capacity in the various treatment elements;
 - (d) there is sufficient storage for treated wastewater when discharge is not permitted (incoming tide), and
 - (e) the outfall has the appropriate capacity.
32. These are all manageable and can be achieved through appropriate engineering investigation, design, construction, and operation. The costs of any upgrades or expansion in capacity required by growth is expected to be partially funded through developer contributions with the remaining cost allocated to the existing community.
33. Therefore, I conclude that the collection, treatment, and disposal of wastewater from potential new development areas of Raglan, including the FUZ, is not a notable impediment to future growth and is not a dominant factor in identifying potential growth areas. In saying this, I am assuming that WDC

would be monitoring the performance of the treatment plant and the discharge flows and ensuring that their capacity is in keeping with the resource consent conditions for the discharge.

Water Supply

34. As described in paragraph 18, water supply for Raglan is from the Omahina Spring in the upper reaches of the Omahina Creek. The spring has a capacity of approximately 4,500m³/day. This equates to a potential population of approximately 10,000 people.
35. There is a water treatment system to ensure the water meets the Drinking Water standards and the treated water is pumped to three storage reservoirs to provide a pressurised supply to the connected community. The 3 reservoirs (Springs reservoir, Bow Street reservoir and Hills Road reservoir) have a combined capacity of 2,220m³. This reservoir storage equates to an industry service population of approximately 3,700.
36. Much like wastewater, the capacity of the system is all manageable through appropriate engineering solutions. I understand there are no constraints on the ability of the bore to supply additional water in the future. Expansion of the system to meet future demand would therefore involve appropriate treatment capacity, pumping capacity, additional reservoir storage and sufficient pipe capacity in the reticulation system to provide the required flow and pressure.
37. The existing performance of the water reticulation system is also influenced by the degree of leakage in the piped network. I have no information on the performance of the existing network however, there are standard engineering solutions involving pipe replacement and pipe upgrading to manage leakage to be within acceptable industry standards if leakage at Raglan becomes excessive.
38. As demand increases from new urban development, greater flows are required in the pipes and this leads to greater pressure losses. If the pressure losses exceed industry standards, insufficient pressure occurs at the “downstream end of the system and/or higher areas of the network”. This is managed by constructing greater sized pipes to replace/duplicate small diameter pipes in critical links in the network and/or installing an additional

reservoir in the eastern side of Raglan to reduce pressure losses in the system due to peak demand or fire flow situations.

39. Thus, it is unlikely water supply issues would be a notable constraint on future development, provided WDC maintained sufficient capacity in the system and operated the system appropriately. This should be achievable through standard engineering solutions and funded through development contributions, for the components that are triggered by growth and development.

Roading

40. New development areas would construct internal roads as part of their construction. Some connecting roads, such as sections of Wainui Road, Te Hutewai Road, and roads connecting to Lorenzen Bay and other areas in the east may require some upgrading associated with new development on these roads. However, the scale of the developments is relatively small in development terms and I would not anticipate any notable issues with being able to achieve the required standard of road upgrade.
41. There are constraint issues with the existing one-lane bridge on Wainui Road and this is addressed in more detail by Mr Ian Clark in his EIC.
42. On a more macro scale, I consider that there may be connectivity advantages in having a roading connection between the Rangitahi development and Maungatawhiri Road, particularly if/when the Rangitahi development links through to Te Hutewai Road and possibly beyond. Such a connection would alleviate some traffic through the centre of town and provide a shorter connection to west Raglan.
43. I have not carried out an assessment of the feasibility of this connection but a preliminary look at the topography in the area indicates modest grades are achievable and there are spur systems that could suit a roading alignment. The vision and future implementation of such a connection, including establishing the costs and benefits, would suit a Structure Planning approach as there would be various landowners implicated in this road.

FUTURE GROWTH AREAS

44. Waikato District Council (WDC) has identified eight areas for future growth in Raglan for the period to 2070. These are set out on page 98 of the Planning Officer's s.42A Framework Report. That Report states the existing number of households in Raglan is 2088. The Report estimates the future growth in the eight areas, and the likely timing of them will be:
- (a) Te Hutewai – 335 households in 30+ years
 - (b) Rakaunui – 100 households in 30+ years
 - (c) Afon Opototu – 331 households in 10 – 30 years
 - (d) Town Centre – 69 households in 3 – 10 years
 - (e) Flax Cove – 130 households in 3 – 10 years
 - (f) Lorenzen Bay – 184 households in 1 – 3 years
 - (g) Rangitahi Peninsula – 501 households in 1 – 3 years
 - (h) Infill – 201 households in 1 – 3 years.
45. The above suggests a potential increase in households from the existing 2,088 to 2,974 in 1 - 3 years, 3,173 in 3 – 10 years, 3,504 in 10 – 30 years and 3,939 in 30+ years (2050). This represents an approximate doubling of the number of households in the next 30 years.
46. It is common in our industry to use a household occupation of 2.8 persons per house when considering population. Using this figure, WDC's estimate of 3,939 households by 2050, equates to a population of approximately 11,000 people. However, it is to be noted that, with respect to infrastructure, the area is a holiday destination and peak population would have an influence on infrastructure performance.
47. The location of the areas referred to in para. 44 are shown in diagram below which is an extract from the Raglan Development Plan contained in Waikato 2070:



48. The Waikato 2070 document presented an estimate of 12,500 as a possible population of Raglan in 50 years' time (2070). This estimate is generally consistent with the estimate of 11,000 persons by 2050.
49. I have undertaken a site inspection of the area in the west, between the Rangitahi development and Te Hutewai Road and much of the land between Te Hutewai Road and Te Ahiawa Road within the Koning and Raglan Land Co ownership. The 2070 growth areas appear to be suitable, in many parts, for residential development from an engineering perspective. These areas are broadly reflected in the diagram shown in para. 47. Some areas are likely to be higher than the existing water supply zone and would require a new higher zone if developed.
50. Development of this area would require an appropriate balancing of various matters such as earthworks, urban design objectives, retention of landscape and natural character objectives and achievement of a suitable economic outcome. The economic performance issue will be a direct function of yield and this will have a bearing on the District Plans objective of providing housing for the region. Issues such as the need to double lane the bridge on Wainui Road would also have to be taken into account in the assessment.

51. The development of this area would require a reasonable scale of earthworks due to the topography of the land and such earthworks could, if poorly designed, conflict with retention of natural character and preservation of stream and intermittent water course objectives. However, as demonstrated by the Rangitahi development, such conflicts can be resolved and appropriate development, that meets the needs of the community, can be achieved whilst also achieving good landscape and environmental outcomes.
52. The assessment of these conflicting issues, which will also apply to the other potential development areas of Raglan, are, in my opinion, best addressed through a Structure Planning process.
53. Rangitahi has proposed the part of the Afon Opototu area to be zoned as a Future Urban Zone. I understand that the process for development within the FUZ will include a structure planning process before the area is rezoned for development. As this area is adjacent to the Rangitahi Peninsula development and has a common landowner, it could be managed by an extension/update of the existing Rangitahi Structure Plan process. However, a broader infrastructure plan for the entire Raglan area would also be beneficial to guide a co-ordinated approach to planning and development across the entire town.
54. I note that the Rangitahi development has a Structure Plan and this process has worked for this area of development. However, the Structure Plan is now some years old and development styles have advanced in recent years with a stronger desire for smaller lots and a growing demand for more development. Having inspected the land within the development and based on my extensive experience in land development, I consider there is potential for additional yield within this development assuming an assessment of landscape, natural character and urban design details are compatible with additional yield.

ISSUES RAISED IN SECTION 42A FRAMEWORK REPORT

55. Paragraph 291 of the s.42A Framework Report discusses the failure of many private developer wastewater systems designed to service a development and states "*smaller schemes place a disproportionate cost on Council and should be avoided where possible in favour of larger integrated schemes*". I agree with this view and have seen situations where wastewater systems for

discrete developments, owned and operated by a Body corporate or similar ownership structure associated with the development have not performed, have not met their resource consent requirements and have inevitably had to be taken over by the Local Authority with resulting notable costs on ratepayers.

56. For the reasons set out in paragraphs 292 – 295 in the Section 42A Framework Report, the Officer states in paragraph 296 of their report “*All new residential development that occurs at a density which necessitates reticulated water and wastewater servicing (e.g. residential development at a lot size less than 2,500m²) should be required to connect to a Council or government owned water and wastewater system*”. I agree with this statement for future residential development areas at Raglan.
57. Appendix 5 of the Section 42A Report, titled “Assessment of Growth Cell Servicing – Waters”, states that in the case of Raglan Watercare are to undertake investigations of the water supply and the wastewater system for 5 of the 7 growth cells, with only the Rangitahi Peninsula and Rakaunui growth cells having the network available. For the reasons outlined in my paragraphs 21 – 39, I consider that the investigations required for the Afon Oporu (FUZ) and Te Hutewai growth cells, can be expected to confirm that extension of the existing water supply and wastewater networks into these two cells would not create any notable difficulties and would not be out of scale with the development of these areas.
58. I have reviewed the growth chart for Raglan shown on page 98 of the Section 42A Framework Report. I consider that the chart is incorrect in the following aspects:
 - (a) Growth 2020 -2023 – the chart predicts the completion of 886 new lots in this 3-year period, of which Rangitahi makes up 501 lots. It is most unlikely that Rangitahi will complete 501 lots before the end of 2023. However, this development is expected to be completed well within a 10-year period and it is likely that it will generate more than 501 lots. I am not familiar with the rate of infill development or the Lorenzen Bay development, but I doubt they will collectively produce 385 lots before the end of 2023. However, these can be expected to be completed

within a 10-year time frame.

- (b) The chart shows the Afon Oporu cell potentially being developed in the 10 – 30-year period. I anticipate that this cell could be developed sooner if there was demand for sections and the proposed FUZ structure for this zone facilitates an earlier development program if infrastructure allows this. It is close to infrastructure and, depending on the rate of development in the other cells (eg Town Centre, Flax Cove, Lorenzen Bay and infill), existing infrastructure capacity might not be a notable restriction to earlier development. I have had a cursory look at how the FUZ could be serviced and consider it is likely that the infrastructure to be installed within the Rangitahi development as part of that development, could be extended into the FUZ land to provide connection to wastewater and water supply. If infrastructure is a restriction, then that could be overcome with an increased capital works program funded by development contributions. Therefore, this cell could be developed sooner and could coincide with the later phases of the Rangitahi development, to achieve a continuous supply of new lots in the western area.
- (c) The chart shows the Te Hutewai development cell occurring beyond 2050. I do not accept that this cell would need to be deferred for this period. If the bridge on Wainui Road is double laned (which is expected to occur this decade) and as this development cell is relatively close to the water supply (via extension through the Afon Oporu cell) and the wastewater infrastructure, I would expect the detailed investigation of infrastructure extensions to this cell would conclude it could be connected to the reticulated systems well before 2050 if it is required for growth. I anticipate that it could be serviced with water supply once the Afon Oporu cell has progressed to the extent that the water reticulation could be extended through the development to Te Hutewai Road.
59. Paragraph 189 (d) states “*Contiguous greenfield areas identified for growth (growth cells) should be viewed comprehensively to avoid piecemeal development and to enable a more comprehensive planning approach to be taken*”. I generally agree with this statement from an infrastructure

perspective but consider that the use of a Structure Planning process to cover the Afon Oporu FUZ could be managed by an update to the existing Rangitahi Development Structure Plan because infrastructure to the FUZ would largely be an extension of the Rangitahi development infrastructure. A Structure Plan process for the Te Hutewai growth cell would need to consider the Afon Oporu FUZ to achieve an efficient and effective process because these cells are interconnected in an infrastructure sense and form the bulk of future development in the west after Rangitahi.

CONCLUSION

60. In summary, I conclude that:

Infrastructure Capacity for Future Growth

- (a) I consider that the existing wastewater treatment and disposal system at Raglan can deal with future growth over the next 10 years. This infrastructure can be expanded, when required, to meet the increased flows from future growth in the Raglan area beyond this timeframe, including the proposed Future Urban Zone in the Afon Opotutu growth cell.
- (b) I consider that the water supply system at Raglan can also be expanded to meet the increased water demand from future growth when future development demand reduced flow and/or pressure to close to minimum industry standards. Existing water storage capacity is likely to approach minimum industry standards within the next 10 years. This can be addressed by the construction of an additional reservoir when required.
- (c) As the wastewater and water supply systems are located in west Raglan, there are operational and economic advantages in focussing future growth in the west.
- (d) Stormwater collection and disposal is not influenced by future growth due to the proximity of developed areas to the coastal discharges.

Structure Planning Process for Future Growth at Raglan

- (e) The planning process for the future growth areas should include Structure Planning processes due to the relatively small scale and location of the future growth areas, the integration of infrastructure solutions across different land holdings, the timing of a new bridge to facilitate further development in the west, and to achieve an efficient and effective development process.

Future Urban Zone – Rangitahi South

- (f) The proposed FUZ for the Afon Opototu growth cell, incorporating a Structure Planning process is logical from an infrastructure perspective. As this zone is adjacent to the Rangitahi Structure Plan area, and as services to the FUZ would be an extension of the Rangitahi development infrastructure, the structure planning process for the Afon Opototu growth cell could be by way of a revised/updated Rangitahi Structure Plan review that incorporated infrastructure integration.
- (g) The Rangitahi development, with its previous Structure Planning process, has demonstrated a successful process for achieving new development with appropriate engineering solutions for infrastructure.
- (h) Future growth in the FUZ can be serviced for water supply, wastewater treatment and disposal and roading connectivity with industry standard solutions that can be practical, feasible and cost effective. This will involve extension and upgrading parts of the existing infrastructure.
- (i) It is advantageous to focus future growth in the south-west and west because this will reduce the extent of infrastructure upgrade required.

Dated this 17th day of February 2021



Raymond O'Callaghan