

**BEFORE ENVIRONMENT SOUTHLAND
AND SOUTHLAND DISTRICT COUNCIL**

UNDER the Resource Management Act
1991

IN THE MATTER of a Resource Consent
Application and Designation by
Southland District Council to
discharge treated wastewater to
land and odour to air from the Te
Anau Wastewater Treatment
Plant

**STATEMENT OF EVIDENCE OF IAN DAVID EVANS FOR
SOUTHLAND DISTRICT COUNCIL**

**ANDERSON LLOYD
LAWYERS
DUNEDIN**

Solicitor: M R Garbett

Level 10, Otago House
Cnr Moray & Princes Street,
Private Bag 1959,
DUNEDIN 9054
Tel 03 477 3973
Fax 03 477 3184

QUALIFICATIONS AND EXPERIENCE

1. My name is Ian David Evans.
2. I am currently employed by the Southland District Council as its Strategic Water and Waste Manager. I am responsible for developing this proposal and working on these applications.
3. I hold a Bachelor of Science Degree in Environmental Management from the University of Ulster and a Masters Degree in Water Resource Management from the Napier University of Edinburgh. I also hold post graduate qualifications from the Chartered Institution of Water and Environmental Management and the Waste Management Industry Training Advisory Board both in the United Kingdom.
4. I have 22 years' experience in the Utilities Industry predominantly based around design, build and operation of water and wastewater treatment assets. The past four years have been based in New Zealand.

SCOPE OF EVIDENCE

5. I have been asked to prepare evidence in relation to the current operation of the Te Anau Wastewater Treatment Scheme and the proposal as outlined in the consent application. This includes:
 - a. An overview of the existing scheme, including how it performs in relation to its current consent;
 - b. An overview of how the current proposal has been developed including options considered and key decisions taken; and
 - c. An overview of Council's proposal as outlined within the application document.

EXECUTIVE SUMMARY

6. In 2004 Council was granted by Environment Southland a short term (ten year) discharge consent for discharge of treated wastewater from the Te Anau wastewater treatment plant to the Upukerora River.

7. A condition of the consent required Council to develop a long term strategy around wastewater treatment and disposal for Te Anau and that this was to be lodged with Environment Southland by October 2009.
8. A working party comprising of a number of key stakeholders was formed to investigate long term options. One key message from the working group was that the status quo was not an option and if possible irrigation to land was the preferred means of disposal.
9. A range of options were considered and developed prior to the preferred option of local treatment at the existing site with disposal to land at Kepler Block.
10. Paralleling the strategy being submitted the Council finalised purchase arrangements with Landcorp Farming Limited which concluded with formal purchase of 375ha adjacent to the Te Anau Airport Manapouri.
11. The current application is for resource consent approval to irrigate treated wastewater to approximately 70ha of land to the north of the runway via two centre pivot irrigators.
12. The current application is to discharge treated wastewater to land to the north of the airport only.
13. The application also includes an Assessment of Environmental Effects (AEE) which my colleagues, through their various areas of expertise will present evidence on.

CURRENT TREATMENT PLANT

14. The Te Anau wastewater treatment plant is located on the north eastern outskirts of the Te Anau township. The Upukerora River lies immediately to the east of the site and Lake Te Anau lies approximately one kilometre to the north. State Highway 94 from Te Anau to Milford Sound runs to the south and southeast of the site. Access to the site is via the Upukerora road running north off State Highway 94.
15. Initially built in 1967 to service the commercial area of the town the scheme was further extended in the 1970's to service the north

western residential area and continued to expand as further development occurred over time.

16. The treatment plant consists of three oxidation ponds covering a total area of 4.81ha. Pond one covers 3.33ha. Ponds two and three each cover 0.74ha (and are the original ponds dating back to 1967).
17. In addition to the oxidation ponds the wastewater treatment plant also includes a manually cleaned coarse screen, two aerators in pond one and a six cell wetland. These additional units were constructed after the granting of the previous resource consent in October 2004.
18. Wastewater arrives at the south west corner of the site via a 475mm gravity main, first passing through a coarse manually cleaned bar screen before flowing into the large 3.3ha facultative pond where the majority of treatment is undertaken. The main treatment undertaken is the settlement of solid material as sludge, and the oxidation of organic material and ammonia nitrogen. The pond also contains two horizontal mixing aerators which provide additional air for treatment.
19. Leaving pond one, flows pass through the first of the two smaller maturation ponds where additional treatment, mainly via natural ultra violet disinfection is received. On leaving these ponds the flows pass through an open surface wetland which provides additional polishing and provides earth contact prior to discharge via pipeline to the Upukerora River.
20. Typical daily flows are between 750m³ during low flow periods and 1750m³ at peak periods, giving an average retention time within the system of between 35 – 60 days.
21. Day to day operation and maintenance of the plant is undertaken by Downer New Zealand, with additional support and advice from Council's Water and Waste Department.
22. The plant is designed and operated in accordance with the '*Guidelines for the Design, Construction and Operation of Oxidation Ponds*' (Ministry of Works 1974) and the '*Oxidation Pond Guidelines 2005*' prepared jointly by New Zealand Environmental Technologies, Ministry for the Environment and New Zealand Water and Waste Association.
23. The current plant has two current discharge permits. Discharge Permit 202636 controls the discharge of wastewater from the

treatment plant to land and water, the land portion being via the base of the wetland. Air Discharge Permit 202637 controls the discharge of contaminants including odour to air. There is no means of measuring the volume of treated effluent discharging through the bottom of the ponds however it is believed that the majority discharges via pipeline direct to the Upukerora River.

24. Discharge Permit 202636 permits the discharge of an average dry weather flow of up to 2500m³/day and higher flows in wet weather. The consent requires samples to be taken four times a year (December, January March and June) from 5m upstream of the discharge and up to 100m downstream of the discharge and that they comply with the standard for Hill Country Waterbodies in accordance with Environment Southlands Regional Freshwater Plan for Southland outside of this mixing zone. Although the consent required samples of the discharge to be taken there are no limits applied to the actual discharge itself. Sample results are included within **Appendix A** of this evidence.
25. An overview of the results would indicate that occasionally while the discharge does appear to be having an impact on the receiving water, low upstream water quality can also make it difficult for Council to achieve compliance with the standards for hill country waterbodies. As an example the water quality standards for Hill Country Waterbodies states that '*Oxygen in solution in waters shall not be reduced below 9.5mg/l*'. I draw attention to the sample of 30 January 2013 where the upstream dissolved oxygen was measured at 9.6mg/l leaving little room for the discharge to be assimilated thus resulting in a non-compliance of 9.2mg/l measured downstream. The upstream sample taken on 14 March 2013 is in breach of the water quality standard for dissolved oxygen (9.2mg/l) indicating that upstream activity is also likely to be having an impact.
26. A further condition of the discharge permit requires Council to monitor along the lake front approximately 350m west of the mouth of the Upukerora. Council is further required to undertake investigation when soluble inorganic nitrogen concentrations (Ammonia nitrogen and nitrate plus nitrite nitrogen) exceed 0.05g/m³ (or mg/l) and dissolved reactive phosphorus (DRP) concentrations exceed 0.006g/m³. Again by way of example on 18 June 2012 the lake

sample of 0.007g/m^3 exceeded the threshold concentration for DRP within the consent. Results from the upstream and downstream sample were 0.02g/m^3 and 0.022g/m^3 indicating that a significant contribution came from upstream of the discharge. This could lead to the conclusion that the discharge from the ponds was not the sole contributor to the slightly elevated level.

27. Whilst the monitoring results suggest that the discharge of treated wastewater to the Upukerora River does have a detectable impact on the water quality in the lake it also indicates that other activities further upstream can also have a similar or greater impact.

THE CURRENT APPLICATION

28. As a background to how the long term strategy and current consent application were developed it is necessary to understand some of the background around the investigations undertaken for the 2004 consent application.
29. In December 1997 a resource consent application was lodged with Environment Southland which proposed to discontinue the discharge to the flood channel and initially discharge the oxidation pond effluent via a perforated pipeline laid within the alluvial gravels of the river margin. It also proposed that within 12 to 24 months of granting of the consent a land disposal system would be constructed on land adjacent to the oxidation ponds. The resource consent application concluded, after a preliminary desktop investigation, that rapid infiltration appeared the most suitable option. However, it stated that this conclusion was based on inferred geological and hydrogeological information and that a more detailed site investigations and field trials would need to be conducted prior to final selection of rapid infiltration as the preferred land disposal option.
30. Submitter concerns centred on the risk that the infiltration area could block and effluent would be diverted to the river bed gravels on a frequent basis. In order to respond to these concerns further investigation work was undertaken in February 2001.
31. In April 2001, Council's consultants MWH compiled a report entitled *'Te Anau Sewage Treatment Plant Site Investigation Report and*

- Recommendations'*. This preliminary desktop investigation involved determining the feasibility for the Council of adopting a rapid infiltration system for discharge of effluent to land at the sewage treatment site. The investigation looked at two areas adjacent to the ponds, and concluded that both areas were unsuitable due to unsuitable topography, ground conditions and insufficient depth to groundwater.
32. In December 2001, MWH completed a follow up investigation to the earlier work in a report entitled '*Te Anau Sewage Treatment and Disposal System – Design Concept and Site Investigation Recommendations'*. This resulted in recommendations that a detailed site Hydrogeological investigation be undertaken to help determine capacity of the land to accept treated effluent.
 33. In July 2002, Council's consultants MWH completed field investigations and compiled a report entitled '*Te Anau Sewage Treatment Plant Hydrogeological Investigations'*. The conclusions reached in this report were that rapid infiltration was not a suitable method of disposal at the oxidation pond site.
 34. In October 2003 after a period of sustained population growth – and projections for this to continue, Council's consultants MWH compiled a report entitled '*Te Anau Sewage Treatment Scheme Capacity Assessment'*. The key recommendation of this report was to enhance the treatment capacity of the oxidation ponds. One appropriate method considered to achieve this is the installation of aerators in the oxidation ponds to provide additional oxygen.
 35. All of these reports were included as background documents in the short term resource consent application that was granted by Environment Southland in October 2004. As well as requiring Council to install a screen, aeration and a wetland another significant component of the consent was for Council to develop a long term strategy for the treatment and disposal of wastewater for Te Anau, with consideration given to moving away from a direct discharge to water if possible. This was lodged with Environment Southland by the mid-point of the current ten year consent.
 36. Following completion of the various improvements in 2005 Council commenced the Strategy Review with the formation of an Infrastructure Working Group. This group comprised representatives

of the key interested stakeholders, and set the objective of assisting Council with the development of the long term strategy. Representatives from the following organisations were part of this group:

- a. Te Anau Community Board;
 - b. Southland District Councillor;
 - c. Guardians of the Lakes Manapouri, Monowai and Te Anau;
 - d. Iwi;
 - e. Department of Conservation;
 - f. Fish and Game;
 - g. Environment Southland Staff; and
 - h. Southland District Council Staff.
37. Through regular meetings the group formulated a strategy that they believed to be acceptable and which was adopted by the Te Anau Community Board and endorsed by the Council prior to being lodged with Environment Southland.
38. Key elements of the strategy included:
- a. If possible a disposal route to land was seen as the preferred long term goal, as this was consistent not only with Environment Southland's policy guidelines but equally as important, iwi considerations. This expectation was set at the initial Working Group meeting in September 2005 and again raised a meeting on 20 June 2007. While this was seen as a preferred goal, the group still continued to consider local options for treatment and disposal.
 - b. When considering local based treatment and disposal options a number of options were considered from basic enhancement of the current ponds to a full multi-stage mechanical type plant capable of treating to a very high standard, prior to discharge (reuse quality). Given the Natural State classification of Lake Te Anau in the Regional Water Plan for Southland it was considered that any local treatment solution would require to be treated to a standard fit for re-use.

- c. When considering land disposal options there was a need to secure sufficient land of suitable use for year round irrigation of treated wastewater to allow for long term future growth of Te Anau. If possible a discharge site could also accommodate the Manapouri wastewater scheme when its resource consent expires in 2024.

Site Selection

39. As the largest landowner in the Te Anau basin Council approached Landcorp Farming Limited regarding potential purchase of sufficient suitable land. Reports within the strategy document outline the areas considered for land disposal and reasons for them being discounted. Through these discussions and investigations two sites were identified as being potentially suitable, the site at Kepler farm and a site at Freestone. Further evidence will be presented by Tony Davoren of Hydro Services Ltd to highlight why the Kepler block was identified as the preferred site.
40. Consideration was to be given to staging the development to match growth and help minimise potential financial burdens. This meant that a further short term consent could be required for the existing discharge.
41. At a workshop with the Te Anau Community Board on 18 October 2006 treatment and disposal options were outlined and discussed. The accompanying report entitled *'Te Anau Sewerage Scheme Development, Initial Consideration of Future Treatment & Disposal Options'* considered technical, environmental and financial considerations of local treatment and disposal versus treatment at the existing site and irrigation to land at a disposal area remote from the site. The report was also considered by the Infrastructure Working Group at their meeting on 2 November 2006. The outcome from both meetings was a preference for development of the existing oxidation pond site to cater for future development and disposal at a remote site subject to the purchase of suitable and sufficient land. The working group concluded at their meeting on 2 November 2006 that even treatment to the highest quality may not completely resolve concerns

about disposal to the river or lake from a cultural or perception perspective.

42. As a consequence of these meetings Council continued to develop the concept further and also continue negotiations with Landcorp Farming Limited over land purchase matters. This work continued throughout the remainder of 2006 and into 2007. The overall strategy report was presented to the Te Anau Community Board at their meeting of 21 November 2007. At which time approval was also given to complete the purchase of 375 acres of land at the Kepler Farm adjacent to the Te Anau Airport Manapouri. This recommendation was ratified by Council at their meeting on 12 December 2007, with the purchase of land completed on 30 June 2008. The strategy as a whole was then lodged with Environment Southland.
43. Following the 2010 Local Government elections the newly elected Te Anau Community Board requested that Council revisit the proposal to determine if any new alternative options had become available in the intervening period. Two workshops were held in 2011 and following a report presented to the Community Board on 4 July 2012. This included an updated local treatment and disposal option. The Board endorsed the strategy as developed and recommended that work continue to develop the resource consent application based on the strategy recommended by the Infrastructure Working Group, with the application officially lodged with Environment Southland on 13 September 2013.

Proposal

44. The current application as it stands is an application for 35 years to irrigate treated wastewater onto land to the north of the Te Anau Airport. The application and proposal represents a significant investment in community infrastructure and as such I believe warrants the maximum discharge consent period allowed under the Act. In addition given that the proposal satisfies both iwi cultural values and Regional Discharge Plan policies it is unlikely during the course of the consent period that a more culturally acceptable solution would become available.

45. At this stage it is also worth re-iterating that the discharge consent application only relates to the land to the north of the airport runway. The land use designation application in the Draft District Plan covers the whole 375ha block, and which I will refer to again later in my evidence.
46. In relation to the current discharge consent application I will provide evidence in relation to the following:
 - a. Proposed upgrades at the existing site;
 - b. Pipeline route and construction;
 - c. Proposed work at the land; and
 - d. Intention for how the land will be managed.
47. It is my intention that this is provided as an overview, with some information not likely to be available until we advance to the detailed design stage.
48. While the initial concept of upgraded treatment and irrigation to land at Kepler Farm is still relevant there have been a number of changes to what was being proposed in the strategy document. The main reason for these amendments is in response to revised growth projections and to keep costs down. In the original strategy document it was intended to construct maturation ponds at the site and irrigate onto the southern block. Under the current application it is proposed to irrigate onto the northern block only without the intention to construct maturation ponds at the site, which is possible due to revised growth projections.

Upgrade of Existing Site

49. As alluded to earlier the site has undergone several previous upgrades to match growth of the township and also to comply with Resource Consent Conditions under Discharge Permit 202636 which was issued in 2004.
50. The next proposed upgrade will install a fine screen at the inlet to the ponds to remove gross solids. As with other wastewater treatment plants the collected solids will be compacted to remove excess water,

deposited to a wheelie bin or similar type of container and disposed of to landfill.

51. It is also proposed to purchase and install new aeration equipment on the large maturation pond. There are currently two aerators in the existing pond. Under the current proposal it is proposed to install six new aerators with the existing two being used as back up within the district.
52. A new pumping station will also be constructed at the site to enable pumping of the treated wastewater to the disposal site. Although no detailed design has been finalised the pump station will be designed with full redundancy in mind to minimise the risk of mechanical breakdown. This is standard engineering practice in the construction of major infrastructure projects. The station will also be highly automated and capable of being operated remotely via a dial in SCADA arrangement.
53. It is also intended to undertake a sludge survey to determine the levels of sludge in the large primary oxidation pond and desludge the pond if required. It is fair to say that the majority of settlement and treatment is carried out in this pond so it is at least prudent to survey this one. Should desludging be required this will be carried out on site with the sludge pumped into geotextile bags and allowed to dewater over time, with the liquid material being returned to the process stream. Desludging will also increase the retention time in the ponds which will in turn result in improved treatment capacity within the ponds.
54. By carrying out these upgrades it is anticipated that the quality of the treated effluent being pumped to the irrigation site will be of a higher quality than is currently being discharged to the Upukerora River. The upgrades alone however would not provide a sufficient level of treatment to allow long term continued discharge to the river, principally because it does not address nutrient removal requirements, and for the cultural and community acceptance reasons previously mentioned.

Proposed Transfer Pipeline

55. Following treatment at the upgraded oxidation pond site the treated wastewater will be pumped to the disposal field via a new pipeline to be constructed in road reserve. The pipeline is expected to be between 200-300mm diameter and either High Density Polyethylene (HDPE) or PVC. An easement will also be sought to bring the pipeline, power and an access route across the Landcorp property immediately to the west of the Northern Block.
56. Selecting the correct diameter pipeline is critical not only for operational efficiency and catering for future growth, but also controlling retention time, a key factor in managing risk of septicity and odour generation. It is estimated that a 200mm diameter pipe would have a retention time of between 8 and 18 hours based on a daily flow of between 750m³/day and 1750m³/day. At similar flow rates a 300mm diameter pipe would provide a retention time of between 17 and 41 hours. From an odour management perspective therefore a smaller pipeline would be more preferable although would incur greater friction losses at higher flows.
57. In engineering terms it is fair to say that a lot of lessons have been learnt around pipeline designs and appropriate materials following the Christchurch earthquakes. Overall it is therefore fair to say that the infrastructure associated with this proposal is likely to be more resilient than some of the existing wastewater infrastructure.
58. Likely material for pipeline construction are jointed PVC or continuously welded polyethylene which evidence suggests suffered lesser damage during the Christchurch earthquakes than materials such as asbestos cement. This resilience is one of the main reasons why these materials are preferred to more traditional pipework such as asbestos cement.

Site Development Including Shelter Belts and Centre Pivots

Odour control at disposal site

59. Centre pivots are seen as a highly efficient method of irrigating large areas of land without having to install and maintain significant amount of pipework and solid set type irrigators, which Council operate on the

Otautau wastewater treatment scheme, albeit on a much smaller scale that is currently proposed. The centre pivots are a prefabricated galvanised structure with associated pipework and controls through which the treated wastewater is irrigated. They are made up of a number of modules which are connected to make up the required radius. The current plan proposes to two centre pivot irrigators each with a diameter of 700m.

60. The irrigator sprinklers are designed to generate large droplets as close to the ground as possible to minimise interference by wind thus further reducing the risk of spray drift and any odour migrating off site. At this stage it is not anticipated that the effluent will be irrigated from a height greater than 1.5m. In terms of droplet size the median droplet size will be 1700 microns, with around 1% less than 150 microns. Finally to further control odour/spray drift the irrigators will not be fitted with the high volume discharge end gun devices that are often seen on agricultural irrigators and are designed to irrigate as much pasture as possible.
61. The total area under both the irrigators is 75ha, with a further 50 available on the block for future development as growth arises. It is proposed to retain the peat bog in the eastern pivot irrigated area and to establish plantings around the perimeter to enhance habitat value. Although it is not planned to routinely irrigate this area it may be necessary to have periodic irrigation (especially during summer months) in order to maintain its health.
62. While the centre pivots can efficiently irrigate an area of 75ha the application covers the total 125ha area of the northern block to safeguard future demand. This provides for an additional 50ha capable of being irrigated before Council would consider having to move onto the Southern Block.
63. Options for irrigation would need to be compatible with the proposed cut and carry operation for the site and would be likely to be fixed sprinklers which irrigate close to ground level with relatively large droplet size.
64. Within the proposed irrigation block two rows of shelter belts traverse the site in an east west direction. The proposal requires the removal of these shelter belts. It is proposed to establish a new three tier

shelter belt of radiata pine along the northern boundary. The existing eastern and western belts on the site boundary will remain and will be augmented by further radiata pine plantings. The shelter belts will serve the dual purpose of reducing wind within the irrigation area, and as a secondary control for spray drift migration. The primary control being pivot design as previously mentioned.

65. While design, operation of the irrigators and, provision of shelter belts will help provide a degree of control against odour migration and have a role to play in an odour management toolbox they do not address the issue of odours being generated in the first place. Through some of our detailed investigations which Mr Lockyer will speak to later in the hearing it became apparent that the risk of septicity and odour generation was sufficiently high to warrant a multi stage approach to odour management covering the existing oxidation ponds, the transfer pipeline and the disposal site itself.
66. The concept is fleshed out in an Odour Management Plan (OMP) which forms part of the Environmental Management Plan (EMP) which I will touch on again later.

Oxidation Ponds

67. The oxidation ponds currently have two aerators with sufficient capacity for a further four. There have been no recorded complaints of issues of odour from the site. It is the intention that six aerators will be installed prior to the pipeline being commissioned. Not only will this provide an additional level of treatment but it will also add more dissolved oxygen to the effluent prior to it entering the pipeline, with a view to keeping the treated wastewater in the pipeline in an aerobic state for as long as possible.

Pipeline

68. While there is a desire to keep dissolved oxygen in the wastewater for as long as possible detailed modelling has identified that there is a significant risk that this will become depleted within the pipeline giving rise to anaerobic conditions taking over which increases the risk of odour generation. The rate of dissolved oxygen depletion is dependent on a number of factors the main ones being residence time in the pipeline, temperature of the wastewater, and the surface area of

the pipeline. Therefore odour management at Kepler will be required, prior to irrigation.

69. The main tool available to manage this risk is appropriate sizing of the pipeline, which will be a balance between minimising the retention time in the pipe and allowing for future increased flows.

Irrigation Site

70. A trickling filter will be provided at the irrigation site prior to the centre pivot irrigators with the primary purpose of managing odour, although there may be other beneficial outcomes as well. Air extracted from the biological filter will then receive a further level of treatment as it passes through a soil biofilter. In broad terms the biological filter treats odour released from the liquid while the soil biofilter strips odorous compounds from the air extracted from the trickling filter. As a back-up and further control measure it is proposed to install a chemical dosing system to mop up any residual odorous compounds.
71. The operation of the system as a whole is explained in more detail in the OMP which has been circulated to submitters, and which Mr Lockyer will go into in much more detail during his evidence.

Operational and Pasture Management

72. Irrigation of treated wastewater by centre pivot will occur throughout the year with the maximum peak discharge varying seasonally. The effect of the proposed irrigation on soils, pasture production and groundwater quality will be covered by detailed expert evidence from Dr Tony Davoren and Mr Simon East.
73. The consent application is structured in a way to reflect the seasonal fluctuations in population and hence flow, with a maximum rate of 4500m³ per day during the summer period and 2000m³ per day over the winter period. These figures are based on the long term population projections and are in excess of what is currently treated, with current maximum summer and winter flows being closer to 1600m³ per day and 600m³ per day.
74. As previously indicated the disposal field will be managed through a cut and carry operation with four to five cuts per season anticipated to yield between 13,500 and 15,000kg of dry matter per year. Non irrigated areas are expected to yield between two and three cuts per

year dependant on growing conditions. It is also intended that the sward be maintained at a minimum height of 50-70mm during the growing season and no less than 150-200mm in winter to help minimise feeding birds. Harvesting will occur prior to seed head development.

75. Ultimate responsibility for the management of the site will lie with Council as the consent holder. However this will be done in close conjunction with Downer New Zealand as our operations and maintenance contractor who will continue to be responsible for the day to day operation of the township reticulation and oxidation ponds, and Landcorp Farming Limited with whom Council have recently agreed to enter into a partnership approach as documented in a recently signed Memorandum of Understanding.

Environmental Management Plan

76. As stated within the discharge consent application an EMP has been developed, the purpose of which is to:
- a. Identify and manage adverse effects of the activity on surrounding environs, particularly in respect of odour and groundwater quality;
 - b. Ensure all resource consent conditions are met;
 - c. Document type and frequency of monitoring; and
 - d. Identify and document management actions that will be taken in response to these monitoring results and to changes in the environmental conditions such as rainfall events (adaptive management approach).
77. The draft that has been developed has a strong focus on odour and groundwater discharge, largely because these were two of the biggest concerns voiced by submitters during the consultation process. However it also includes actions available in relation to operational and emergency management. The EMP document itself is intended as a high level overarching document. Further operational details can be set out in management plans that can form appendices to it. Examples include:

- a. Pasture Management Plan
 - b. Bird Strike Risk Assessment and Management
 - c. Emergency Management Plan
78. These documents will enable the Council as consent holder to further expand on the adaptive management approach required of staff and contractors and provide in greater detail steps to be taken in the event of a range of issues arising. I would point out at this stage that the document is still draft and may be subject to change depending on specific consent conditions that may be imposed. Furthermore it is intended that these documents will be reviewed on a regular basis or when any significant change to the operation of the site occurs. The OMP has already been fully developed in response to concerns from submitters and has been circulated.
79. The Bird Strike Risk Assessment has also been submitted to the Airport Manager and to the Civil Aviation Authority, neither of whom have raised any specific concerns, as evidenced by the letter from the airport manager included in **Appendix B**.
80. The EMP also mentions the formation of a Technical Working Group, which will primarily be responsible for evaluation of results and amendments to the operation of the site in response to trigger levels being met, as well as longer term decisions around the site and operation.
81. Although not finalised yet membership of this working group will include representatives from Council, our Operations and Maintenance Contractor, groundwater specialists, odour specialists and pasture management specialists.

Alternatives Considered

82. The original Strategy document developed from 2006 indicated that a range of treatment and disposal options were discussed with the Working Party. Dr Davoren was involved with investigations around alternative sites and will provide additional evidence on what sites were investigated and reasons for their unsuitability. I will now provide

some further information on local treatment options that were discussed.

83. Returning to the matter of local treatment alternatives, a number of submitters have raised what alternatives have been considered and what other technologies are available. While it is fair to say that technologies are moving on all the time the key factor in determining suitability of treatment options must be the expected discharge quality of the treated wastewater. Given that Lake Te Anau is classified as Natural State under the Environment Southland Regional Water Quality Plan any discharge entering the Upukerora and ultimately the lake itself would have to be of the highest quality. Unfortunately none of the technologies suggested by submitters could achieve that level of treatment on their own.
84. In terms of identifying key contaminants to be treated, the four most significant within domestic wastewater would have to be Biochemical Oxygen Demand (BOD, which is an indicator of organic contamination), Nitrogen (both in the form of ammonia and nitrate), Phosphorous (both dissolved and particulate) and E. Coli (indicator of microbiological treatment).
85. In terms of treatment both BOD and ammonia are relatively easy to deal with, for example by a biological trickling filter where the BOD is converted to biomass and carbon dioxide and the ammonia is oxidised to nitrate nitrogen. To achieve true nitrogen removal a further stage of treatment is required, which involves conversion of the nitrate nitrogen to nitrogen gas under anaerobic conditions. Unfortunately both of these processes cannot effectively treat the other main contaminants, and as such further treatment stages are required, though luckily both are relatively straightforward. E. Coli levels can be addressed by exposure to either natural (sunlight) or mechanical ultra-violet radiation. Treatment for phosphorous removal is usually by chemical dosing which settles the phosphorous out as a sludge.
86. In order to achieve true reuse quality it may also be necessary to remove further contaminants such as trace heavy metals. In order to do this it is most likely that a membrane type system would also be necessary. Whilst all stages are relatively common within the wastewater treatment process having a multi stage plant will add

additional levels of complexity as well as cost. In addition there is also the requirement to deal with the sludge by product, typically this would require a level of dewatering to thicken it prior to final disposal.

87. The 'option D' solution as raised by submitters could be achieved by the above process or alternatively by a process called submerged membrane bioreactor technology which encompasses some of the above stages. While this technology is reasonably understood it is still quite new to New Zealand with only a small number of applications currently in operation. Again additional treatment and disposal of the sludge by product would need to be considered.
88. All of the above options were considered during the development of the original strategy document. In addition an alternative local treatment and disposal process based around worm farm technology and membrane treatment was presented to the Te Anau Community Board in 2012 when it was reaffirmed that the current proposal represented the most favourable environmental, cultural and economic outcome.

Notice of Requirement

89. Running parallel to the development of the discharge consent application Council applied for a Notice of Requirement for the designation of the purchased land at Kepler Farm to be included within the Proposed District Plan.
90. The designation advises of Council's intent to utilise the land for the purposes it was purchased, that being the irrigation of treated wastewater to land from the Te Anau oxidation pond, and potentially the Manapouri oxidation ponds at a later date. It also sets a record within the District Plan for people to understand the purpose and nature of the site, and results in rules in the District Plan for future development of land surrounding the designated area, principally in relation to setback from the site boundary.
91. Section one of the Notice of Requirement identifies the objectives of the application, these being;
 - To enable the ongoing administration of the wastewater facility.

- To enable the discharge of treated wastewater from Te Anau and Manapouri (at a future date) to land.
 - To enable operation of all associated infrastructure including pumps, irrigators and access.
92. A requirement under section 168A(b) of the Resource Management Act requires that consideration has been given to alternative sites, routes or methods of undertaking the work.
93. These are addressed within the discharge consent application document but for the purposes of the Notice of Requirement application I will briefly reiterate as follows.
94. In respect of alternative sites Dr Davoren's evidence will give further explanation as to what alternative sites were considered and reasons why they were discounted. This is also detailed more fully in Dr Davoren's report which forms part of the overall Long Term Disposal Strategy report.
95. In summary up to six alternative sites were considered with detailed investigations carried out on two. The current site was identified as the preferred site taking into consideration a number of factors including, suitability of soils for irrigation, distance, topography and availability of sufficient land to provide long term security.
96. In terms of alternative routes for the pipeline considered the preferred option for Council is where possible to plan the route along road reserve. In this instance the only practical route is along the legal road reserve owned by New Zealand Transport Agency (NZTA) but which Council has legal access to for infrastructure purposes. Any alternative would involve negotiations with multiple land owners requiring easements over private land which was ruled out very early as it added an extra layer of complexity and cost.
97. In terms of consideration of alternative methods for treatment and disposal Appendix C of the current consent application provides further information on options for local treatment and disposal which were considered at the time the long term strategy was being developed. The alternative methods were ultimately discounted on the basis of cost and that even treating to the highest standard would still

be unacceptable from an iwi perspective, with other stakeholders supporting this.

98. In terms of considering alternative methods of disposal via irrigation I refer to Dr Davoren's evidence. He states that irrigation by centre pivot irrigation is the most efficient means of irrigating large areas of land at a relatively low cost in comparison to other methods considered such as solid set irrigation, sub soil irrigation or pop up sprinklers all of which require installation of significant lengths of pipework on the irrigation field at considerable extra cost. Centre pivot irrigation is also the most appropriate for a cut and carry operation as there is less risk of damage to equipment during harvesting.
99. Given the extensive investigations undertaken prior to the purchase of the site I believe that Council can fully demonstrate that it has met the requirements of section 168A(b) of the Act.
100. Although the current discharge consent application only relates to the northern block, the Notice of Requirement covers both the northern and southern block. The main reason for this is that although the northern block should provide sufficient land for the 35 years applied for in the current discharge consent application, the long term purpose of the land remains unchanged, i.e. the disposal of treated wastewater and the activities related to the operation of this activity and the maintenance of the irrigators and ancillary infrastructure. Designation of the whole site will provide that level of long term surety that the land can be used for the reason it was purchased and that Council can continue to carry out one of its core activities i.e. provision of wastewater services. Any proposal to extend discharge to the southern block would require an additional discharge consent from Environment Southland.
101. Rule PWN.6 in the current operative District Plan and INF.3 in the Proposed District Plan provide for separation distances from oxidation ponds, sewerage and wastewater treatment facilities. In broad terms this means that no new dwellings should be constructed closer than 150m from the boundary of such facilities, thus providing a degree of protection to both parties. In respect of the properties to the south

west boundary of the site¹, if the 150m setback criteria were applied this would encroach onto part of these properties. In respect of this therefore Council is proposing to move the designation boundary 150m inside its own property boundary thereby providing a similar level of protection that these rules intended to achieve. This means use of adjacent private property in this area is not restricted by the current plan rules.

102. The designation is required to enable Council, through its Water and Waste Services department to fulfil its duty to administer this land for the purposes of proposed treated wastewater disposal.
103. Overall I consider that the proposal best achieves Council's objectives, compared to all the other options that have been looked at over many years.
104. The notice was advertised in November 2012 and following a consultation period that ran until February 2013, and which received 33 submissions. A review of the submissions demonstrated that the majority of areas of concern were more relevant to the discharge consent application than to the Notice of Requirement, hence the decision to hold a joint hearing to cover the two applications as allowed for under section 102 of the Resource Management Act.

Community and Stakeholder consultation

105. Throughout the development of the long term strategy and leading up to the lodgement of the consent application Council has undertaken extensive consultation by various means, not only with key stakeholders but also the wider community.
106. One of the first steps in this process was to establish a working party made up of key stakeholders to work together to find the best solution. The working party was formed in 2005 and included representatives from the Te Anau Community Board, Council and Council staff, the Guardians of the Lakes, Iwi, Department of Conservation and Fish and Game Southland.

¹ Those having Legal Descriptions Lot 1 2 DP 434263, Lot 2 DP 434263 and Lot 3 DP 434263 and physical addresses 1725 A, B and C Manapouri Te Anau Highway.

107. The working party met frequently during the next few years to look at the various options and once it was identified that land disposal was the best option, the group was part of the process to decide on the best land for disposal.
108. In 2008 Council resolved to buy land in the Kepler block. Public meetings were held in Manapouri and Te Anau to inform the residents about what work had been done and why the land was bought. Advertising, posters and fliers were used to inform people about the meetings. Notes were taken from the meeting.
109. Stories about the meetings were in the local newspapers and Council had included information in its quarterly newsletter in April 2008 and June 2008, after the meetings.
110. Between 2008 and 2013 further articles appeared in the local and regional press and further meetings and workshops were held with the Community Board, Guardians of the lakes and representatives of the original Working group.
111. Southland District Council ran two open days at the Te Anau Airport Manapouri at the beginning of this year on the proposed scheme. A flier was sent out to all ratepayers and residents to invite them to the open day and explain the process. Radio and newspaper advertising was also used.
112. Council has and continues to answer questions on the proposed scheme through the Letters to the Editor in the Southland Times.

DRAFT CONDITIONS FROM MR HAMMOND'S REPORT

113. Having read the planning report I would make the following comments in respect of the proposed draft consent conditions.

Condition 1 Consent Period (both drafts)

114. I refer to my previous evidence where I believe there is justification for the maximum consent period of 35 years to be granted. The principal reasons for seeking the maximum period are that at an estimated construction cost of close to \$12 million represents a significant

investment in community infrastructure within the Te Anau basin. This infrastructure is designed to serve Te Anau for at least 35 years.

115. It would also provide greater security as a viable long term option to dispose of the treated wastewater from the Manapouri scheme when its' resource consent is due for renewal in 2024. If a 25 year term is imposed on this proposal this would potentially mean any that consent to dispose of Manapouri treated wastewater could only be granted for 15 years, which I believe may be too short to justify the potential investment required to connect that scheme in.
116. The proposal to dispose of treated wastewater to land is the preferred option of both Environment Southland and Iwi, and is unlikely to change over the requested duration for the discharge consents.
117. The planning report cites the reasons for granting a lesser period as uncertainties around scale, duration and frequency of effects and the potential for wastewater disposal technology to change over the 35 year life of the consent. I consider that these reasons are satisfactorily managed by a review condition in the draft conditions. Both draft consents contain a clause allowing Environment Southland to review the conditions of the consent on an annual basis in response to various triggers and which I believe would adequately address any changes to technology justifying amended conditions. Limiting the term is not necessary to trigger assessment of new technology as part of this consent.
118. Requiring the Council to apply for a new consent in 25 years' time will require re-justification of the whole scheme, including the site. Given the extensive work undertaken to date to identify the Kepler block as the most suitable site, and that land disposal is the preferred option of both Environment Southland and Iwi it is difficult to see how a more suitable alternative can be found.

Condition 3 Discharge to Land

119. The draft condition as written within the report potentially prevents Council from disposing of any other treated wastewater from any other scheme at the site. One key consideration during the development of the proposal, and advantage of the Kepler site was that it allowed the

Manapouri township to connect into the scheme when its consent expires in 2024. As this is still a viable option in the future I would request that the condition is redrafted to allow this.

Condition 13 (a) (ii) Discharge to Land and Condition 9 (b) Discharge to Air

120. With regard to these I would raise some concern over Environment Southland representation on the proposed Technical Working Group. The purpose of the group is to ensure that the overall scheme is being run in accordance with the Environment Management Plan (EMP) and to agree what operational changes can be made to improve overall scheme performance without compromising environmental performance. This is the reason for including the various areas of expertise I have alluded to previously in my evidence. I find it difficult to see how Environment Southland could balance the role as a regulator with being involved in an operational decision making role. This may create the perception of a conflict of interest for Environment Southland.
121. As an alternative I would propose that these conditions require the TWG to meet regularly with key Environment Southland staff where the group can discuss overall performance as well as any significant changes undertaken to the operation of the scheme and any proposed changes in response to monitoring results, complaints received etc. I believe that this proposal still transparently demonstrates that both parties can work closely together to address and resolve any issues and concerns, but keeps the two Councils' roles clear and separate.

Condition 4 Discharge to Air

122. This condition requires Council to install a fine screen (condition 4 (a)) and a minimum of six 'Tornado' floating mechanical aerators (condition 4 (b)). As Council is proposing to undertake these works as part of an upgrade project at the existing site approval for this work is not specifically being sought as part of this application. An appropriate budget has been identified in our Long Term Plan for this work. I do not believe that this condition is required as the work will proceed

ahead of the pipeline construction. Should the condition remain I would request that reference to 'Tornado floating aerators' be removed as this is overly restrictive and potentially ties the Council down to one manufacturer when there may be a number of more suitable aerators on the market.

CONCLUSION

123. In conclusion to summarise the journey so far I would reiterate the following points:
- a. Through the development of the working group an expectation was made that long term a discharge away from the river was the preferred option.
 - b. Notwithstanding this expectation Council continued to consider options for local treatment and disposal up to as recent as 2012 at the request of the Community Board.
124. In concluding my evidence I would reiterate that I have provided a high level introduction and overview of how the application has been developed as well as introducing the proposal and highlighting areas of risk, which will be expanded on further by my colleagues in what is more their areas of expertise.

DATED this 27th day of June 2014

Ian Evans

APPENDIX A

Te Anau Sample Results

Discharge	20/01/2011	11/03/2011	15/06/2011	18/01/2012	23/03/2012	18/06/2012	17/12/2012	30/01/2013	14/03/2013	18/06/2013	18/12/2013	29/01/2014	12/03/2014	Mean
BOD (mg/L)	17	21	20	7.5	15	28	18	17	11	23	49	32	13	21
Electrical Conductivity (uS/cm)	541	592	616	726	714	592	518	443	573	573	413	443	448	553
Escherichia coli concentration (MPN/100 mL)	340	738	437	969	235	5291	202	425	49	3100	330	520	810	1034
Nitrate Nitrite (as N mg/L)	0.047	0.61	1.3	8.94	0.042	0.566	0.007	0.01	0.01	0.56	0.13	0.44	0.56	1.02
Temperature (°C)	0	17.8	7.9	17.1	15.2	3.9	15.4	18.9	19	8	18.9	17.5	20.1	15.0
Total Ammonia Nitrogen Concentration (as N mg/L)	11.9	16	19	23.2	32.1	20.7	19.5	7.1	17.2	24	5.5	2.9	2.3	15.5
Total Nitrogen Concentration (as N mg/L)	18	31	31	36.1	37.3	29.4	24	14.1	28.2	33	21	13	8.7	25.0
Total Phosphorus Concentration (as P mg/L)	7.3	6.5	5.5	7.55	7.29	5.14	5.19	5.59	7.72	5.8	6.2	6.2	5.7	6.28
Total Suspended Solids Concentration (mg/L)	27	73	50	41	19	77	24	30	30	50	71	63	46	46
Upstream														
Clarity (Black Disc) cm	0	0	0	0	100	100	95	92	88	86	91	87	90	92
Dissolved Oxygen Concentration (mg/L)	10.6	10	12.8	9.9	10.2	13.9	10.4	9.6	9.2	11.6	9.7	9.9	10	10.6
DRP (as P mg/L)	0.12	0	0.009	0.009	0.005	0.008	0.005	0.005	0.005	0.019	0.005	0.005	0.005	0.016
Electrical Conductivity (uS/cm)	0.098	0.099	0.096	0.101	0.95	92.3	97	98	110	83	93	92	104	59
Escherichia coli concentration (MPN/100 mL)	52	14.8	21.1	41	10	44.1	41	24.9	10	97	61	86	10	39.5
Nitrate Nitrite (as N mg/L)	0.2	0.098	0.24	0.143	0.113	0.207	0.076	0.105	0.2	0.17	0.1	0.12	0.18	0.150
pH	7.9	8.4	7.8	7.97	8.35	7.86	8.06	7.93	8.29	7.6	8.03	7.91	8.25	8.027
Temperature (°C)	0	15	8.4	13.7	14	4.6	13.9	16.2	19.1	6.9	16	15.1	15.9	13.2
Total Ammonia Nitrogen Concentration (as N mg/L)	0.25	0.04	0.023	0.045	0.01	0.137	0.01	0.01	0.15	0.05	0.02	0.01	0.03	0.060
Total Phosphorus Concentration (as P mg/L)	0	0.018	0.016	0.01	0.005	0.01	0.008	0.01	0.012	0.02	0.01	0.01	0.01	0.012
Downstream														
Clarity (Black Disc) cm	0	0	0	0	100	100	95	92	88	86	92	88	100	93
Dissolved Oxygen Concentration (mg/L)	10.5	10.4	13.8	9.8	10.8	13.3	11	9.2	9.3	10.8	10.2	8.5	10.4	10.6
DRP (as P mg/L)	0.042	0.029	0.02	0.028	0.021	0.014	0.007	0.017	0.04	0.018	0.005	0.005	0.005	0.019
Electrical Conductivity (uS/cm)	0.099	0.102	0.097	0.101	0.97	93.1	98.9	99	114	85	94	110	104	61.5
Escherichia coli concentration (MPN/100 mL)	31	10	12.2	86	51	28.5	74	18.5	41	31	50	52	10	38.1
Nitrate Nitrite (as N mg/L)	0.18	0.092	0.25	0.145	0.1	0.206	0.074	0.104	0.21	0.16	0.12	0.1	0.2	0.149
pH	7.9	8.4	7.8	7.97	8.26	7.85	7.98	7.92	8.24	7.59	7.87	7.96	8.23	8.00
Temperature (°C)	0	15	7.9	13.9	13.8	5.3	14	15.9	18.6	7.6	15.8	15.3	15.7	13.2
Total Ammonia Nitrogen Concentration (as N mg/L)	0.18	0.089	0.07	0.131	0.119	0.083	0.061	0.064	0.15	0.21	0.01	0.01	0.02	0.092
Total Phosphorus Concentration (as P mg/L)	0	0.042	0.033	0.037	0.025	0.022	0.014	0.024	0.053	0.06	0.01	0.1	0.01	0.036
Lake														
DRP (as P mg/L)	0.014	0	0.006	0.016	0.005	0.007	0.005	0.005	0.007	0.005	0.005	0.005	0.005	0.007
Escherichia coli concentration (MPN/100 mL)	75	5.2	3.1	26	10	4.1	3	3.1	37.9	1	7.4	63	11	19.2
Nitrate Nitrite (as N mg/L)	0.055	0.052	0.09	0.05	0.092	0.278	0.035	0.036	0.01	0.09	0.07	0.05	0.1	0.078
Temperature (°C)	0	5.8	10.6	15.4	15	9.2	13.5	19.1	18.2	10.7	15.3	15.6	16.9	13.8
Total Ammonia Nitrogen Concentration (as N mg/L)	0.044	0.021	0.014	0.106	0.01	0.01	0.1	0.01	0.02	0.04	0.02	0.01	0.02	0.033

0 = Sample not taken

APPENDIX B



When replying please quote: S3452/1627/0 E Pearce

11 February 2014

Ian Evans
Waste and Water Manager
Southland District Council
PO Box 903
Invercargill 9840

Dear Ian

Effects on Airport with Proposed Effluent Disposal

With regard to the proposed effluent disposal solution for the Te Anau township being transported and irrigated adjacent to the airport runway on the northern aspect of the airfield the following considerations have been made from an airport perspective.

Currently the land surrounding the airport is rural and intensively farmed. The airport has little control over the land use adjacent to the active runways which makes it difficult to monitor, manage and control bird activities that result from various methods of land use. Over certain periods of the year land that has been detailed as land designated for irrigation by centre pivot gets cultivated for various crop planting. During this period it has been noted that there is a significant increase in large bird activity associated with this farming activity. For this reason the Airport Landing Chart has been annotated warning of increased bird activity during these periods. The risk of potential bird strike over this period is dramatically increased.

The airport has little control over this activity apart from implementing risk management strategies. With the establishment of a controlled environment and undisturbed ground structure it is suggested that less large bird activities will result from the introduction of the proposed effluent disposal.

Although not identified as a major risk associated with aircraft operating parameters, the removal of the northern boundary tree line will reduce the occurrence of mechanical turbulence associated with the location of this tree line. It is considered that cross wind conditions will ultimately improve.

The Airport requested a report from a qualified group of experts to provide evidence that can be submitted to the Civil Authority as an independent authority for the safety management of aviation activities at airports and the Airport User Group.

r/14/2/2350



Te Anau Airport
Aviation Drive
Manapouri

Tel (03) 249 6608
Fax (03) 313 2969
Postal: 116 Town Centre, Te Anau 9600
Email manager@teanauairport.co.nz
Internet www.teanauairport.co.nz

A written report furnished by MWH was received and evaluated by both the Airport User Group and the Civil Aviation Authority for comment. One submission was received by a member of the User Group on 11 February detailing concerns over the increase of invertebrates and associated risk with that increase. The Civil Aviation Authority replied after the Wildlife Committee meeting with no concerns raised apart from a comment on adjusting the airport's wildlife programme to incorporate comments in Chapter 8 of the MWH report.

Airports by nature are located in rural environments due to the large amount of land used to incorporate the required activities, noise issues and obstacle boundaries. Risk measures are required to be implemented as direct control over external land use is not always possible. For this parcel of land in close proximity to the airport more control and better understanding of potential risks associated with the land use will enable further risk measures to be put in place.

Yours faithfully

A handwritten signature in black ink, appearing to read 'E Pearce', written in a cursive style.

Evan Pearce
MANAGER TE ANAU AIRPORT