IN THE HIGH COURT OF NEW ZEALAND
AUCKLAND REGISTRY

CIV 2003-488-000135

	BETWEEN	J L TINDALL & OTHERS Plaintiff
	AND	FAR NORTH DISTRICT COUNCIL Defendant

Hearing: 7-9, 13-17, 20-21, 23, 27-28, 30-31 March 2006

Appearances: C R Pidgeon QC & R S Pidgeon for plaintiffs
D J Heaney, D J Neutze & S H Macky for defendants

Judgment: 20 October 2006 at 4.00 pm

JUDGMENT OF WINKELMANN J

This judgment was delivered by me on 20 October 2006 at, 4.00 pm pursuant to Rule540(4) of the High Court Rules.

Registrar/ Deputy Registrar

Solicitors
Urlich McNab Kilpatrick, Whangarei
Heaney & Co, Auckland

Counsel
C R Pidgeon QC, Auckland

[1] The plaintiffs are oyster farmers in the Waikare Inlet in the Bay of Islands, New Zealand. They lease their farms from the Crown. The defendant, the Far North District Council (FNDC) is the local authority for the region, and operates the Kawakawa sewerage reticulation and treatment plant (the Kawakawa Scheme). Three outbreaks of gastro-enteritis have been linked epidemiologically to the consumption of oysters harvested from oyster farms in the Waikare Inlet; in 1994, 1999 and 2001. The oysters are believed to have been contaminated at the relevant times with norovirus, a virus which causes gastro-enteritis in humans.

[2] After the 2001 outbreak of gastro-enteritis, the farms were subject to an emergency closure by Northland Health, the regional health authority. Thereafter the farms were reclassified as restricted which means that harvesting of oysters is only allowed on a limited basis. That classification continues until the present day. The plaintiffs say that the effect of the reclassification is that the farms have not been economically viable to operate since October 2001.

[3] The plaintiffs allege that in times of heavy or even moderate rainfall, raw sewage is discharged from the Kawakawa sewerage reticulation before it reaches the treatment plant. They allege further that when there is moderate or heavy rainfall the treatment ponds at the plant overflow or are stretched beyond operational capacity so that partially treated sewage is discharged from the ponds. The plaintiffs say that when such discharges occur the sewage enters the Kawakawa River and makes its way down the river to the oyster farms. Although conceding the possibility of multiple sources of pollution of the Waikare Inlet, the plaintiffs say that discharges and spills from the Kawakawa Scheme are the most likely source of the contamination of the oysters. Alternatively, the plaintiffs say that the discharges and spills materially increased the risk of that contamination.

[4] The plaintiffs have brought action against FNDC seeking to recover their losses, including loss of profits and loss of the capital value of farms. The plaintiffs also seek general damages in respect of distress, and inconvenience caused by the severe downturn in their financial position consequent upon the reclassification of

the farms. The plaintiffs initially sought an award of exemplary damages but that claim was abandoned during the course of the hearing.

[5] FNDC says that the treatment plant functioned well and did not discharge partially treated sewage other than on one occasion in mid-2004, when there was a planned discharge. Although acknowledging defects in the Kawakawa sewerage reticulation that from time to time allowed discharge of raw sewage into the river, FNDC denies that any such discharge had occurred at the relevant times and says that even if it did, viruses contained within that discharge would almost certainly not reach the farms or cause their contamination. In any event FNDC says that it inherited a defective sewerage system in 1989 and thereafter did all it reasonably could to address the defects in the reticulation and to upgrade the plant.

[6] The plaintiffs plead four causes of action in nuisance and negligence. In the first nuisance cause of action the plaintiffs say that by its use, operation and management of the Kawakawa Scheme, FNDC allowed the discharge of raw or partially treated sewage that polluted the Waikare Inlet, and that pollution caused or contributed to the classification of the plaintiffs' farms as 'restricted'. FNDC thereby interfered with the plaintiffs' use and enjoyment of their farms, causing material damage and loss. The plaintiffs say that FNDC knew, or ought to have known, that the sewage was likely to cause damage to the plaintiffs and did not act reasonably in its use, operation and management of the Kawakawa Scheme. This cause of action is referred to in this judgment as the "nuisance/contamination cause of action".

[7] In the further or alternative cause of action in nuisance, the plaintiffs say that even if they are unable to prove that noroviruses were discharged by FNDC into the Kawakawa River and then onto the plaintiffs' oyster beds causing the reclassification, the nuisance created by FNDC has prevented Northland Health from removing the restricted classification and re-opening the oyster farms. This cause of action is referred to in this judgment as the "nuisance/classification cause of action".

[8] In the first negligence cause of action, the plaintiffs allege that FNDC owed them a duty of care in relation to the use, operation and management of the Kawakawa Scheme, and FNDC knew that the plaintiffs could suffer damage if it

failed to exercise reasonable care in the performance of those functions. The plaintiffs say that FNDC's breach of duty in respect of the use, operation and management of the Kawakawa Scheme, caused the discharge of the noroviruses into the Kawakawa River that contaminated the plaintiffs' oyster beds causing the reclassification. This cause of action is referred to in this judgment as the "negligence/contamination cause of action".

[9] In the further or alternative cause of action in negligence, the plaintiffs say that even if the plaintiffs cannot prove that noroviruses were discharged by FNDC into the Kawakawa River and then onto the plaintiffs' oyster beds, it was the negligence of FNDC in operating the Kawakawa Scheme that has prevented Northland Health from removing the restricted classification and re-opening the oyster farms. This cause of action is referred to in this judgment as the "negligence/classification cause of action".

[10] In relation to all causes of action the damage relied upon by the plaintiffs as causing their loss is the reclassification of the farms.

[11] The plaintiffs gave evidence as to the financial and human cost of this closure. For most the effective closure of their farms has torn away the economic foundations of their lives. They and their families have been subject to terrible stress. This has been caused not only by the loss of the farms but also by this litigation. The judgment that follows does not address the human issues raised by this litigation. The issues to be determined by this judgment focus simply upon whether the plaintiffs have satisfied the onus upon them to prove to the requisite standard, the essential elements of the causes of action they have pleaded against FNDC.

A. Factual background

Physical location

[12] A map of the general location of the farms is attached to this judgment. The plaintiffs' oyster farms are all situated in the middle or lower Waikare Inlet, a tidal

body of water at the inner most reaches of the Bay of Islands. Just inside the mouth of the inlet is Tiger Bay. There are oyster farms inside the Waikare Inlet whose owners are not involved in bringing this claim, and in particular those in the upper Waikare Inlet, whose farms are not now affected by the reclassification.

[13] On an outgoing tide, the Waikare Inlet drains out through the Veronica Channel. On the southern shores of the Veronica Channel sits the township of Opua and on the northern shores, a settlement at Okiato Point. Across the headland on which Okiato Point is situated is a bay called Orongo Bay. Oyster farming also takes place in Orongo Bay.

[14] To the south-west of the entry to the Waikere Inlet lies the Kawakawa River Estuary, and further south, the Kawakawa River. On an outgoing tide the Kawakawa River also drains out through the Veronica Channel. One of the issues in this proceeding is whether, on an ingoing tide, water from the Kawakawa River enters the Inlet.

[15] Kawakawa township is located close to the Kawakawa River. The Kawakawa Scheme services Kawakawa's population of around 1,400, although the treatment plant was designed with a capacity sufficient for a population of 2,400. The treatment plant is located on the northern side of and adjacent to the Kawakawa River. During the course of trial, evidence was produced as to the distance the treatment plant is from the oyster farms. The plaintiffs accept that the distance is at least 13.5 kilometres, while the evidence of one of FNDC's witnesses was that the plant was 15.93 kilometres from the farms. I do not consider the difference in estimate to be material for the purposes of this judgment, and I proceed on the basis of the plaintiffs' concession that the distance is 13.5 kilometres.

Oyster farming in the Waikare Inlet

[16] The plaintiffs hold their farms under individual leases from the Crown, some dating back to the 1960s. Oyster farming has taken place in the Waikare Inlet since 1971. Oysters grown and harvested in the area are Pacific Oysters. Prior to the

emergency closure of the oyster farms in August 2001, oysters from the Waikare Inlet made up approximately 30% of New Zealand's commercial harvest of oysters.

[17] The New Zealand Food Safety Authority (NZFSA) is the regulatory authority which enforces food safety standards in relation to commercially harvested oysters in New Zealand. It does this in accordance with Industry Agreed Implementation Standard 005.1: Shellfish Quality Assurance Circular (the Standard). The Standard stipulates the minimum standards that must be adhered to by all export commercial shellfish operations. It provides that shellfish growing areas must be the subject of sanitary surveys by an authorised Health Officer to identify potential sources of pollution. Based on that survey the Health Officer must recommend the appropriate classification and harvesting criteria for that growing area. Those recommendations must be approved by the regional shellfish specialist appointed by the Ministry of Agriculture and Fisheries. The growing area is then given a classification which regulates, in accordance with public health principles, when harvesting of shellfish is allowed. The regional shellfish specialist in the case of the Waikare Inlet has at all material times been Ms Dorothy McCoubrey of NZFSA. There have been several health officers responsible for recommendations regarding harvesting since 1994, but at the time of trial the authorised Health Officer was Mr Neil Silver, of Northland Health.

[18] Prior to August 2001, the entire Waikare Inlet was classified as conditionally approved. The Standard provides that a conditionally approved area must meet certain stringent water quality criteria for a reasonable period of time but may be subject to intermittent microbiological contamination. To maintain this classification regular water sampling must be undertaken. If at any time, the water quality does not meet the strict requirements, the area is closed to shellfish harvesting. Intermittent microbiological contamination is therefore dealt with by temporary closure of the growing area.

Re-classification of area

[19] On 24 August 2001, Northland Health invoked an emergency closure of the Waikare Inlet oyster growing area. The reason for the emergency closure was

epidemiological evidence that oysters harvested from the Inlet were the cause of three separate food poisoning outbreaks within the Auckland area during that month. The causative organism for the illnesses was found to have been norovirus (also called "Norwalk-like virus"). Norovirus can only be caught from exposure to human faeces or vomit, or from ingesting food or water contaminated by such matter.

[20] The Waikare Inlet had previously been implicated in two other significant norovirus outbreaks; in November 1994 and November/December 1999. After those events, the growing area was subject to an emergency closure of 21 days but was then reopened as conditionally approved. One of the plaintiffs, Mr Tindall, confirmed that no losses flowed from the 1994 and 1999 emergency closures because all oysters were ultimately harvested and sold; the emergency closures simply delayed the harvest and sale of the oysters.

[21] However, following the 2001 contamination, and because of this history and the concern that the Waikare Inlet oysters were again the vector for transmission of the virus, Northland Health closed the area until such time as the source of the virus was found and appropriate management and mitigation strategies were fully implemented.

[22] On 8 October 2001 the Health Officer at Northland Health changed the classification for the middle and lower Waikare Inlet (referred to as Growing Area 206) to "restricted" but recommended that the upper Waikare Inlet growing area was suitable to remain as "conditionally approved". The Health Officer at that time was Mr Brian Denison, of Northland Health.

[23] Oysters from areas classified as restricted may be harvested but must be treated in an approved manner before consumption. Although the Standard provides that the Health Officer must approve the method of treatment for oysters harvested, it appears that in this case the Health Officer acted on the recommendation of Ms McCoubrey as to what treatment processes should be approved.

[24] The potential treatments for oysters harvested from restricted growing areas are depuration or relaying. Depuration is the process by which oysters are placed for

a short period of time in a depuration plant, a clean water environment, which enables contaminants to be ejected by the oysters. The only treatment approved for oysters harvested from Growing Area 206 was and is to relay the oysters to clean waters for a minimum period of eight weeks. During that cleansing period the shellfish must remain at least 300 metres away from any other shellfish that are to be harvested. Ms McCoubrey's evidence was that while she did consider depuration as a potential treatment for the oysters, she concluded that short term depuration in an artificial environment was not suitable as an approved treatment process for oysters potentially contaminated with viruses.

[25] Following the emergency closure, the oyster farmers in Growing Area 206 engaged AquaBio Consultants Limited to assess the risk of viral contamination of oysters in their area and to suggest how the risk might be managed. Northland Regional Council (NRC), FNDC and Far North Holdings Limited agreed to contribute to the costs of that report. As a result of the analysis undertaken, AquaBio identified a number of potential sources of faecal contamination, including the Kawakawa Scheme, but was unable to conclude from which source the August 2001 contamination had originated. AquaBio concluded that the risks of pollution/contamination from all sources was sufficiently predictable so that the areas could safely be reclassified as 'conditionally approved' with some conditions attaching. The risk was said to be capable of management if levels of illness in the community were monitored, as risk of contamination though human waste was most acute when there was background illness in the community.

[26] Northland Health was not satisfied that by monitoring levels of illness in the community the risk of contamination was sufficiently predictable. It declined to reclassify the growing area. Growing Area 206 has remained subject to a restricted classification since the end of 2001, apart from a short period of time when it was subject to a prohibited classification imposed when water testing of the area was not carried out as required by the industry standards.

[27] None of the plaintiffs' oyster farms are currently operating. Although some farms initially relayed their stock (the estimate is that approximately 30% of existing stock at the time of the farm closures was relayed to other farms) the evidence of the

plaintiff farmers was that it was not economically viable to operate their businesses on this basis because of the extent of restrictions upon relaying. In large part therefore the businesses have simply not operated since the emergency closure in August 2001.

[28] The damage the plaintiffs complain of is the reclassification of Growing Area 206 to restricted, and the refusal of Northland Health to reclassify that Area to 'conditionally approved'. No losses flowing directly from physical damage caused by the contamination in August 2001 are claimed.

Prospects for re-classification to conditionally approved

[29] On the weekend before the commencement of this hearing, Northland Health issued the 12-year sanitary survey for Growing Area 206 in draft. That survey is a requirement of the Standard. Although still in draft, both parties were agreed this report should be produced into evidence because of its significance to the facts at issue, particularly the classification causes of action. The report writer, Mr Silver, gave evidence. He is the current Health Protection Officer with Northland Health, with responsibility for the assessment of suitability for human consumption of mollusca shellfish. As mentioned he is the Health Officer who, in terms of the Standard, is responsible for recommending the appropriate classification for growing areas.

[30] In the summary to the draft report he states that the quality of the growing water in the Waikare Inlet is predominantly influenced by the inflow of the Kawakawa River and to a lesser extent the Waikare River. He says:

> Sewage treatment systems, onsite disposal systems and the presence of a large marina and international yacht quarantine area … have the ability to influence water quality.

[31] He notes that while considerable work had been done following the 2001 incident to prevent or reduce the ingress of human faecal waste into the marine environment, foodborne illnesses still continue to occur. He identifies as evidence of this an outbreak of shigellosis in August 2005 linked to the consumption of oysters harvested from marine structures at the Opua Marina. Shigella is a bacteria only

present in human faecal waste. Samples collected from persons infected with the shigella bacteria also showed the presence of norovirus. Mr Silver concludes:

> This event shows that the marine environment continues to be the recipient of human faecal pollution notwithstanding the efforts to prevent human faecal pollution. This is a public health concern as the predictability of when impacts are likely to occur is not known.
>
> The conclusion that can be drawn is that an undiscovered pollution source still exists or that the measures taken by the District and Regional Council to mitigate the influence of human faecal matter on the marine environment have not been successful.

His draft recommendation is that the farms remain classified as "restricted".

[32] In evidence before me Mr Silver confirmed that Northland Health would recommend a classification of "conditionally approved" for Growing Area 206 if there was no faecal pollution entering the Waikare Inlet. The effect of his evidence and report is that before reclassification could occur Northland Health would require to be satisfied:

(i) That on-site sewage disposal units (such as septic tanks and long drop toilets) at Okiato Point and Opua are no longer a potential source of human faecal material.

(ii) That the Kawakawa treatment plant is operating to inactivate the viral load in the discharge from the treatment ponds. He said that testing would be required as to what is a satisfactory viral load in the discharge.

(iii) That the issue of possible discharges from boats (particularly those berthed in the Customs quarantine area at Opua and permanent "live aboards" anchored to swing berths) have been adequately addressed.

(iv) That the various responsible authorities have sufficient plans for on-going hazard identification and mitigation.

[33] Ms McCoubrey, who would decide upon reclassification after receiving Mr Silver's recommendations, said that before there could be a reclassification the NZFSA would need to know where the pollution comes from in the area and be satisfied that it could predict how those sources of pollution would perform.

[34] In the light of Northland Health's latest proposal regarding classification of the farms, it is most likely that the leases will be terminated. When and if the leases are terminated, the plaintiffs are obliged by the terms of their leases to clear away all structures and items associated with the farms, and to restore the sea bed to its original condition.

Characteristics of norovirus

[35] Viruses are smaller than bacteria and are generally species specific. Norovirus is specific to humans. It is an enteric virus, which means that it affects the gastro-intestinal tract of its human host. It causes gastro-enteritis. Norovirus was first detected in 1972; outbreaks have since been recorded in Australia and New Zealand, the first outbreak occurring in Australia in 1978. Norovirus has a very low infectious dose; it is estimated to be potentially infectious with the presence of as few as 5 viruses, possibly even less.

[36] Because norovirus cannot replicate itself outside of its species host it cannot be cultured using cell culture techniques. It can be detected by the use of nucleic acid detection techniques such as Polymerase Chain Reaction (PCR). But PCR techniques cannot determine if the virus detected is active or inactive (which very roughly equates to infectious or non-infectious). Because of these difficulties in culturing and detecting norovirus, little is known about the characteristics of the virus such as its survivability in the environment. It is however believed to be capable of survival in the environment for weeks, and in some cases months.

[37] I heard a considerable volume of expert evidence as to the characteristics and detectability of norovirus. There was a difference between the plaintiffs and FNDC's experts as to survivability of the virus. However it was common ground that although the science in relation to norovirus is rapidly developing, it is still the

case that little is known in relation to the virus. This flows largely from difficulties in culturing and detecting the virus. It was also common ground that in circumstances where there is more than one potential source of norovirus which has contaminated shellfish it is impossible to say with any degree of scientific certainty, which one of those sources the norovirus came from.

[38] Bivalve shellfish such as Pacific Oysters are filter feeders, and therefore tend to accumulate material contained in their feeding waters. Because of this, viruses may be found at higher concentrations in oysters than they exist in the growing waters. The accumulation of viruses by shellfish can vary depending upon virus type, water temperature, turbidity and any factor affecting the feeding activity of oysters. For instance oysters' feeding activity is reduced at times of low salinity, commonly associated with rainfall events.

[39] The primary source of human enteric viruses in the environment is human excreta, particularly faecal material. Human enteric viruses may enter the environment from sewage treatment plants, septic tanks, marine craft or recreational users excreting matter directly into the environment. The main mode of transmission of enteric viruses is the faecal oral route, and person to person contact is the most common means of infection. However, if waterways become polluted by human sewage, enteric viruses may also be transmitted via drinking water, bathing water, or the consumption of shellfish.

[40] The types of viruses present in effluent depends upon the season of the year and the viruses affecting the community at the time. When there is background illness in the community the level of viruses in the sewage increases significantly. However humans can carry and excrete enteric viruses without exhibiting illness. Fifteen percent of any population is likely to be excreting an enteric virus at any one time, and this means that there is a constant low level of enteric viruses in sewage effluent. In New Zealand and Australia, norovirus and Hepatitis A virus are the most common agents associated with disease outbreaks from oysters.

[41] Ms Hay, a marine biologist with AquaBio Consultants Ltd, estimated that the 12 million oysters harvested from the Waikare Inlet each year are likely to represent

between 1 and 2 million oyster meals. A total of 24 people were reported ill in the August 2001 outbreak, 77 in the November/December 1999 outbreak, and 80 in the 1994 outbreak. Ms McCoubrey accepted that these figures suggested that out of approximately 10 million oyster meals over seven years, 150 people had been reported as being ill. By my calculation, 0.0015 per cent of the people who ate one of the 10 million oyster meals became ill with norovirus.

History and nature of Kawakawa Scheme

[42] The Kawakawa sewage treatment plant began operation in 1969. Prior to a series of upgrades commencing in 2001, the plant was a typical two-stage "facultative" oxidation pond system, comprising a 2-hectare primary pond followed by a 0.56 hectare secondary or maturation pond.

[43] The Kawakawa township lies some distance from the treatment plant, and to the South. The main pipeline from the township is connected to the North Road pumping station, which pumps the effluent under the Kawakawa River, to the treatment plant, approximately 1 kilometre away. The reticulation system connecting the various households and business sites in the township to the treatment plant was created predominantly from the 1960s through to the early 1980s.

[44] Mr John Harding is an expert witness called for FNDC. Mr Harding is a public health engineer with particular expertise in wastewater treatment and disposal. He is currently the technical advisor to the Sanitary Works Technical Advisory Committee, the Committee responsible for managing the New Zealand Government's $150 million Sanitary Works Subsidy Scheme. The Sanitary Works Subsidy Scheme commenced operating in 2003 and is funded by the Ministry of Health. It is designed to assist small communities implement sewerage schemes.

[45] Mr Harding described the functioning of oxidation pond systems. He said that the design of the Kawakawa treatment plant is typical of numerous oxidation pond systems constructed in the 1960s and 1970s to service small communities in New Zealand. He explained that in a two-stage facultative pond system, the first stage primary pond carries out the majority of the treatment. Settleable solids sink to

the bottom of the pond to form a sludge which is anaerobically digested. On the surface of the pond, bacteria use oxygen to further break down the effluent. The second stage maturation pond has the function of removing excreted pathogens (including bacteria and viruses). The principal mechanisms for faecal bacteria removals in facultative and maturation ponds are time, high pH and high light intensity, together with high dissolved oxygen concentration. Because much less is known about viruses than about bacteria, less is known as to the mechanisms for their removal. However, Mr Harding gave evidence that while the mechanism for virus removal is less certain, it is generally recognised that removal occurs by absorption into settleable solids (including the pond algae) and consequent sedimentation.

Far North District Council

[46] Up until 1989 the treatment plant and reticulation system were operated under the control and ownership of the Bay of Islands County Council. On 1 November 1989, the Local Government (Northland Region) Reorganisation Order 1989 (the Reorganisation Order) came into effect. This was part of a reorganisation effecting amalgamations and regroupings of local authorities throughout New Zealand with the overall effect of a reduction in the number of Councils, and an overall increase in the amount of land area that local authorities were responsible for. As a consequence of that reorganisation, FNDC came into being on 1 November 1989 and assumed responsibility for the ownership and operation of the Kawakawa Scheme.

[47] FNDC has the second largest land area and longest coastline in its jurisdiction in New Zealand. It also is distinguished by the fact that it has, in terms of socio-economics, a population with one of the lowest income levels in New Zealand. Mr Clive Manley, Chief Executive of FNDC since 1999 gave evidence that Kawakawa has a deprivation rating of between 9 and 10 which means it is amongst the most deprived areas of New Zealand with discretionary income levels in the bottom 5 percent of New Zealand income levels.

[48] In 1997 FNDC contracted out the Kawakawa sewerage and water supply and reticulation and treatment for a 10-year period to Impact Services Limited. FNDC's contract with Impact Services Limited requires that Impact Services Limited operate and maintain the treatment plant in accordance with the relevant consents issued to FNDC and directly notify the authorities in relation to sewage spills. Impact Services Limited are also required to carry out monitoring requirements pursuant to any consents.

Condition of Sewerage Reticulation and Plant as at 1990

[49] On assuming control of the Kawakawa Scheme FNDC commissioned a report by Infiltrol engineers on the condition of the sewerage reticulation. That report, issued in 1990, revealed that the reticulation was in a very bad state of repair requiring extensive work to rectify structural defects and stormwater infiltration issues. Problems identified included rat holes around a number of manholes that allowed surface water infiltration, rat holes around sewer lines and damaged or abandoned private laterals (connections to the reticulation). A Council document following on from that report (generated around September of 1990) commented:

> The Kawakawa Sewerage Scheme is in a bad state of repair which is causing some thirty discharges per year of untreated effluent from two manholes and the pumping station (to the oxidation ponds). Also, during major floods with a return period of more than three years the pumping station becomes submerged, i.e. Cyclone Bola.

Conditions attaching to discharges from treatment ponds

[50] The treatment plant has operated since 1969 under successive water rights and resource consents for discharge. NRC Water Right 1168 dated 25 November 1988 expired on 31 August 1998. The conditions attaching to that water right required that the works relating to the right were to be operated and maintained in a workmanlike manner; that the discharge would conform with water quality standards relating to oxygen and coliform content; that all stormwater run off should be diverted from the pond; and finally that the depth of the second pond should be reduced to 1.2 metres to facilitate its conversion to a wetland.

[51] In 1998 FNDC applied for a new discharge permit but continued exercising the 1988 permit while that application was being processed. FNDC's application was publicly notified, and a number of submissions were received. As part of the process a number of pre-hearing meetings between submitters, NRC and FNDC were held where treatment and disposal options were explained along with likely costs.

[52] Mr Riann Elliott, Water Quality Monitoring Team Leader at NRC gave evidence that it was as a result of these pre-hearing meetings it was agreed that a significantly improved level of treatment would be provided, including ultraviolet disinfection, and that FNDC would apply for a further consent to discharge the treated wastewater to land when conditions allowed. A fresh application for a discharge permit was made and again publicly notified. This application proceeded through to a hearing. Submissions presented on behalf of some oyster farmers from the Waikare Inlet requested that the discharge from the treatment ponds be disposed to land on a permanent basis and not only when conditions allowed.

[53] On 7 February 2001, NRC granted a fresh resource consent continuing to permit discharge of treated sewage into the Kawakawa River on conditions stipulated within the resource consent. In relation to the discharges to water, the consent required that the treatment system be upgraded in accordance with the details supplied in the application which included the addition of an ultraviolet disinfection system, mechanical aerators in the first pond, and filtration components to filter effluent from the pond. It also required that the capacity of pond 1 be increased to no less than 1600 cubic metres per day. The consent stipulated certain standards the discharge from the upgraded treatment system was required to meet. However, that condition was not to take effect until such time as the upgrade which encompassed the addition of an ultraviolet treatment system, was complete.

[54] Monitoring was also to be undertaken of the water quality of the receiving waters 20 metres downstream of the discharge point. It was stipulated that the discharge should not cause:

a) The natural temperature of the water to be altered by more than 3 degrees Celsius;

b) The levels of natural pH and concentration of dissolved oxygen in the receiving waters to go outside stated parameters;

c) The natural colour and clarity of the waters to be changed to a conspicuous extent;

d) The four day average concentration of ammonium remaining in the water to exceed certain limits; and

e) The median of samples to exceed 126 E.coli per 100 mls and any one sample to exceed 410 E.coli per 100 mls.

[55] Because of the variable quality of the upstream water, the condition qualified these requirements as follows:

> When the upstream water quality level does not meet the above standards, then the discharge shall not cause the water quality in the river 20 metres downstream of the discharge to be worse than the upstream water quality.

[56] The consent reserved to the NRC the right to review the conditions of the consent on notice.

[57] Mr Elliot gave evidence that by mid-2002 it became evident that FNDC was unlikely to be able to comply with the completion date for the upgrade to the treatment plant. As a consequence NRC applied to the Environment Court for an enforcement order requiring the upgrade to be completed. This led to an Environment Court mediation session whereby an abatement notice was issued instead requiring the completion of various components of the upgrade of the treatment system by agreed dates as outlined below:

a) Raise the pond embankment level so as to provide more storage in the pond and adequate free board for flooding from the Kawakawa River;

b) Complete the installation of, and have operational the mechanical aerators in the first oxidation pond;

c) Complete the installation of, and have operational, the filtration system to filter the effluent from the pond;

d) Complete the installation of, and have operational, the ultra-violet disinfection system to treat the effluent from the filtration system' and

e) Convert the second pond to a constructed sub-service flow wetland using coarse gravel media, capable of providing a detention time of at least one day for a flow of 360 metres per day.

Conditions (a) to (d) were to be completed by 20 December 2002 and (e) was to be completed by 31 May 2003.

[58] After the abatement notice was served FNDC applied to NRC for a change to the conditions of its consent. The change sought was a downsizing of capacity of the filtration and disinfection components of the treatment system from 1600 metres per day to 800 cubic metres per day. After further consent processes, involving appeals and mediation, NRC issued a fresh resource consent on 17 September 2004, expiring on 30 April 2010. That consent required FNDC to upgrade its treatment system to the full 1600 cubic metre per day capacity for pond 1, with stage 3 of the upgrade to be completed and operational by 31 May 2005. That consent remains in force. The standards regulating the quality and impact of effluent discharge remain unchanged from the 2001 consent.

[59] Although FNDC did not complete the upgrade within the time required by the consent issued in 2001, it did comply with the requirements of the abatement notice issued against it, and also complied with the 31 May 2005 completion date for stage 3.

B. Nuisance/Contamination Claim: General principles

[60] A private nuisance is an activity or state of affairs that causes a substantial and unreasonable interference with the claimant's use or enjoyment of land.

Although the conduct of the wrongdoer may not itself be unlawful, it may amount to a nuisance if its impact is to:

(a) Cause damage to the claimant's land; or

(b) Interfere with the claimant's use or enjoyment of the land.

It is conceded by FNDC that the oyster farmers' leasehold interest in the farms constitutes a sufficient interest in the "land" for the purposes of a claim in nuisance.

[61] As pleaded, the nuisance/contamination claim is in the nature of a claim for consequential loss (the contamination and reclassification) arising from physical damage to the plaintiffs' oyster farms (the pollution). The nuisance/classification cause of action is a claim for loss of use of the plaintiffs' land, the pollution allegedly having caused the adverse reclassification to be maintained.

Test for liability: created or adopted nuisance?

[62] Liability for a nuisance created by the defendant is strict in the sense that the defendant cannot avoid liability by proving that it took all possible care to prevent the nuisance. In this sense liability is not "fault" based. However, the plaintiff must still show that the interference was unreasonable and not in the ordinary use of the land. In determining unreasonableness the Court balances the right of the plaintiff to use and enjoy their land as against the extent of any interference that a reasonable land user in the plaintiff's position should be expected to tolerate. The social utility of the activity that is alleged to have caused the nuisance will be relevant to the assessment of what is reasonable but if the defendant's activities, despite their significant social utility to the public, cause substantial physical damage to the plaintiff's land, the plaintiff will not be obliged to disproportionately bear the cost of those activities: *Royal Anne Hotel Co Ltd v Ashcroft* [1979] 2 WWR 462.

[63] Also relevant in assessing the "unreasonableness" of the interference will be any particular sensitivities of the plaintiffs. A person who carries on an exceptionally delicate trade cannot complain because the trade is injured by his

neighbour doing something lawful on his property, if the neighbour's activity would not injure a claimant with ordinary sensitivities. However there may be liability if the defendant fails to take reasonable and practicable precautions that would avoid the nuisance, yet not prejudice its own interests: *Gandel v Mason* [1953] 3 DLR 65.

[64] To establish an actionable nuisance it is also necessary that the plaintiff show that the damage complained of was a reasonably foreseeable consequence of the state of affairs or activity conducted on the defendant's land: *Hamilton v Papakura District Council* [2000] 1 NZLR 265 (CA).

[65] In relation to a nuisance not created by the defendant but rather by a trespasser to the land, an Act of God, or a predecessor in title, a different test for liability applies. An occupier will not be held liable for the nuisance unless the occupier "adopts" or "continues" the nuisance. What constitutes an adoption or continuation of a nuisance was considered in *Sedleigh-Denfield v O'Callagan* [1940] AC 880. In that case the plaintiff and defendant shared adjoining premises. On the defendant's side of the divide was a ditch. When a block of flats was due to be constructed in the area, the County Council laid pipelines through the defendant's ditch, without the defendant's permission. However, the defendant soon became aware that the pipe had been laid. The defendant did not put any proper guard on the entrance to the pipe to prevent it becoming blocked. It became blocked and flooded the plaintiff's property.

[66] The House of Lords held that the defendant was liable as it had adopted the nuisance by continuing to use the pipe for its own benefit (to remove water) without taking the proper means to render it safe. Viscount Maugham stated at 358:

> In my opinion, an occupier of land "continues" a nuisance if, with knowledge or presumed knowledge of its existence, he fails to take any reasonable means to bring it to an end, though with ample time to do so. He "adopts" it if he makes any use of the erection, building, bank or artificial contrivance which constitutes the nuisance.

[67] Viscount Maugham and Lord Wright both adopted the statement of the law found in Salmond's Law of Torts (5ed 1920) at that time:

> When a nuisance has been created by the act of a trespasser or otherwise without the act, authority, or permission of the occupier, the occupier is not responsible for that nuisance unless, with knowledge or means of knowledge of its existence he suffers it to continue without taking reasonably prompt and efficient means for its abatement.

[68] The rule in *Sedleigh-Denfield* was applied by the Privy Council (on appeal from Australia) in *Goldman v Hargrave and Others* [1967] 1 AC 645. In *Goldman* the defendant was the occupier of land adjacent to that of the plaintiffs. A tree on the defendant's land was struck by lightening and the defendant, when he could have put the resultant fire out with water, decided to let the tree burn down. The fire spread onto the adjacent land. The Privy Council found the defendant liable, finding that the principle in *Sedleigh-Denfield* was equally as applicable in instances involving natural or man-made hazards. It was open to the defendant, in light of his means and resources, to take steps to put out the fire but he had failed to take such steps.

[69] The Privy Council considered the appropriate standard that the defendant must discharge to show it has taken reasonable steps to abate a hazard on its land that it did not create (at 663):

> So far it has been possible to consider the existence of a duty, in general terms. But the matter cannot be left there without some definition of the scope of his duty. How far does it go? What is the standard of the effort required? What is the position as regards expenditure? It is not enough to say merely that these must be "reasonable", since what is reasonable to one man may be very unreasonable, and indeed ruinous, to another: the law must take account of the fact that the occupier on whom the duty is cast has, ex hypothesisi, had this hazard thrust on him through no seeking or fault of his own. His interest, and his resources, whether physical or material, may be of a very modest character either in relation to the magnitude of the hazard, or as compared with those of his threatened neighbour. A rule which required of him in such unsought circumstances in his neighbour's interest a physical effort of which he is not capable, or an excessive expenditure of money, would be unenforceable or unjust. One may say in general terms that the existence of a duty must be based on knowledge of the hazard, ability to foresee the consequences of not checking or removing it, and the ability to abate it. And in many cases, as, for example in Scrutton L.J.'s hypothetical case of stamping out a fire, or the present case, where the hazard could have been removed with little effort and no expenditure, no problem arises. But other cases may not be so simple. In such situations the standard ought to be to require of the occupier what it is reasonable to expect of him in his individual circumstances. Thus, less must be expected of the infirm than of the able bodied: the owner of small property where a hazard arises which threatens a neighbour with substantial interests should not have to do so much as one with larger interests of his own at stake and greater resources to protect them: if the small owner does what he can and promptly calls on his

> neighbour to provide additional resources, he may be held to have done his duty: he should not be liable unless it is clearly proved that he could, and reasonably in his individual circumstance should, have done more.

[70] In this case FNDC inherited a Sewerage Scheme with significant defects pursuant to the Reorganisation Order. The issue arises as to which test is to be applied; that for a nuisance created by the defendant, or the test for a nuisance continued or adopted.

[71] The plaintiffs contend that any nuisance is to be treated as a created nuisance, because of the provisions of the Local Government Act 1974, which provides the default position in relation to transfer of liabilities in respect of any reorganisation scheme affecting local authorities promulgated by Order in Council. FNDC argues that it is the provisions of the Reorganisation Order that apply.

[72] The default provisions of the Local Government Act 1974 are subject to any express provisions contained in a particular reorganisation order. Because the Reorganisation Order contains express provision in relation to the transfer of liabilities, these must apply. It is not in any case material which provision applies, since the relevant provision from Schedule 3(b) of the Local Government Act is adopted without modification in the Reorganisation Order. Clause 115 of that Order provides in material part that a local authority constituted by the Order would, in respect of the district of that local authority:

> have and may exercise and be responsible for all liabilities, obligations and engagements and contracts which previously were, or which would have been, the responsibility of the former authorities had they not been dissolved.

The plaintiffs submit that by reason of that provision, FNDC is to be treated as if it created the state of affairs that led to the alleged discharges.

[73] In *Crimmins v Stevedoring Industry Finance Committee* [1999] HCA 59 10 November 1999, the High Court of Australia considered similar legislative provisions governing the transfer of liabilities from one statutory authority to another. That case involved an action in negligence against the statutory authority for the stevedoring industry. The plaintiff suffered from mesothelioma lung disease, which is caused by the inhalation of asbestos fibres. It was alleged that the plaintiff

had been exposed to asbestos due to the negligence of his employer. The plaintiffs' condition was diagnosed in 1997, therefore the cause of action in negligence arose at that point. However, the initial exposure likely occurred in the early 1960s. At that time, the stevedoring industry was regulated by a central Authority under the Stevedoring Industry Act 1956 (Cth). The federal legislation regulating the industry was again later changed by the Stevedoring Industry Finance Committee Act 1977 (Cth) which established the Committee (the present respondent). The Stevedoring Industry Acts (Termination) Act 1977 (Cth) provided that the Authority would continue to carry out certain functions until February 1978. Section 14 of the Termination Act provided as follows:

> The Committee is, by force of this section, liable to perform all the duties and to discharge all the liabilities and obligations of the Authority that existed immediately before the expiration of [the transitional] period.

[74] The question therefore arose as to whether, if the Authority had breached its duty of care, the Authority thereby had a "liability" which transmitted to the respondent Committee.

[75] The Court unanimously held that s 14 was broad enough in its terms to pass on the "potential liability" from the Authority in respect of the breach of duty of care, to the present defendant. Gleeson CJ stated at [8]:

> Depending upon the context, the meaning of "liability" can include a contingent or potential liability. When the legislature, in providing for replacement of the Authority by the respondent, stipulated that the respondent was to perform all the duties, and discharge all the liabilities, of the Authority, which was abolished and which had no further capacity itself to meet any claims upon it, there was no good reason to distinguish between complete and inchoate causes of action in cases where the Authority had committed a breach of a legal duty. Such a distinction is not required by the use of the word "liability", and to give it a narrow construction would defeat the evident purpose of the legislation, which was to preserve the just entitlements of those who had dealings with the Authority before its abolition.

[76] McHugh J accepted that the term "liability" was wide enough to encompass what could be called a contingent liability in tort, which would become a complete cause of action when the damage accrued. Kirby J considered that the juxtaposition of the terms "liabilities" and "obligations" meant that these words must fulfil different functions. While "obligations" must be taken to mean liabilities that had

been conclusively and authoritatively determined to be owed at law, "liabilities" meant a lesser degree of responsibility that had not yet conclusively been determined to be an obligation. This would include what the plaintiff had dubbed as contingent or inchoate liabilities, which were "awaiting future events". Furthermore, the underlying purpose of the provisions were relevant and evident in the history of the legislation:

> [194] This history also suggests a purpose of the successive transmission provisions that was designed to avoid the injustice which could arise, either to the new agency or to persons with claims against it, if it were held that their entitlements or responsibilities fell into a gap in the legislation. Of course, gaps sometimes occur in legislation. But it seems a proper approach to such provisions (of which s 14(b) of the Termination Act is an example) to assume that no gap was intended. The language of the section must still be given meaning. It must ultimately govern the ascertainment of the legislative purpose. But the legislative history encourages the approach to s 14(b) which McGarvie J expressed, obiter, in *Wintle's* case
>
> > [I]t is hardly to be expected that parliament intended that if a liability which was in the process of crystallising but had not crystallised before the relevant date, crystallised after the relevant date, the party to whom the liability would have been owed if it had crystallised before the relevant date, be left without remedy.

[77] The wording of the relevant clause in *Crimmins* is clearly comparable to that in the Reorganisation Order and I consider the comprehensive reasoning of the High Court in *Crimmins* to be compelling. In line with *Crimmins*, I consider that Clause 115 in the Reorganisation Order has the effect in the present case of displacing the *Goldman* rule. In considering the plaintiffs' claims FNDC is to be treated as if it were the creator of the state of affairs.

[78] In reaching this decision, I take into account the statutory and regulatory scheme. If it were to be accepted that the term "liabilities" in this context only extended to causes of action that had already accrued and/or proceedings that had been initiated before the transfer of responsibilities, then this would operate in an arbitrary and unprincipled way to deny some claims, but to allow others. I consider this would be particularly unjust in circumstances involving a body which has essentially changed its name and some of its organisational infrastructure, but for all intents and purposes remains the relevant statutory authority, albeit under a new title.

This is not comparable to a case where a defendant has moved into a new building or facility in respect of which it previously had no control.

[79] Counsel for FNDC presented submissions that the nuisance could be categorised as either a continued/adopted nuisance or a created nuisance. Were it not for the provisions of Clause 115, I view it as an adopted nuisance. This is because, on the plaintiffs' case, FNDC inherited a dilapidated system but failed to adequately address or rectify the on-going problems. However, as the terms of the Reorganisation Order make FNDC responsible for its predecessors' liabilities, the nuisance alleged is to be treated as a created nuisance.

[80] In respect of the nuisance/contamination cause of action the issues arising are therefore as follows:

(i) Did the discharges from the Kawakawa Scheme cause the contamination of the plaintiffs' oyster farms? If so;

(ii) Was the damage suffered a reasonably foreseeable consequence of the state of affairs complained of as against FNDC? If so;

(iii) Was the level of interference with the plaintiffs' use and enjoyment of their oyster farms occasioned by the discharges, unreasonable?

C. Nuisance/contamination claim: causation

Test for causation

[81] Mr Pidgeon for the plaintiffs accepts that the usual rules of causation require proof that it is more likely than not that the Kawakawa Scheme caused the contamination events. However, he submits that even if I conclude that the plaintiffs have not established, on the balance of probabilities, that discharge from the Kawakawa Scheme caused the contamination, then it is sufficient for the purposes of establishing causation, that the plaintiffs prove that such discharges materially

contributed to causing the plaintiffs' damage by materially increasing the risk of damage being caused.

[82] The plaintiffs rely upon the decision of the House of Lords in *Fairchild v Glenhaven Funeral Services* [2003] 1 AC 32 in which the House of Lords held that in the special circumstances of that case the Court would depart from the usual "but for" test of causal connection. In *Fairchild* the plaintiffs had been exposed to asbestos during their employment with two employers. The employers were found to have been in breach of their duty to take reasonable care or to take all practical measures to prevent the employee from inhaling asbestos dust because of the known risk that such dust, if inhaled, might cause mesothelioma. Both employers breached that duty. The plaintiffs contracted mesothelioma and sued the employers for compensation. The medical evidence was that the risk of developing mesothelioma increased with the amount of asbestos inhaled. However, because of the limits of scientific knowledge, the plaintiff could not prove, on the balance of probabilities, that the mesothelioma was the result of having inhaled asbestos dust during employment with employer A or employer B or during employment by employer A and B taken together.

[83] The House of Lords nevertheless found in favour of the employees. Lord Nicholls said:

> So long as it was not insignificant, each employer's wrongful exposure of its employee to asbestos dust and, hence, to the risk of contracting mesothelioma, should be regarded by the law as a sufficient degree of causal connection. This is sufficient to justify requiring the employer to assume responsibility for causing or materially contributing to the onset of the mesothelioma when, in the present state of medical knowledge, no more exact causal connection is ever capable of being established. Given the present state of medical science, this outcome may cast responsibility on a defendant whose exposure of a claimant to the risk of contracting the disease had in fact no causative effect. But the unattractiveness of casting the net of responsibility as widely as this is far outweighed by the unattractiveness of the alternative outcome.

[84] Although Lord Bingham emphasised that the relaxation of the usual requirements of proof of causation was directed to the particular facts of the case he said:

> It would be unrealistic to suppose that the principle here affirmed will not over time be the subject of incremental and analogical development. Cases seeking to develop the principle must be decided when and as they arise. For the present, I think it unwise to decide more than is necessary to resolve these three appeals.

[85] Mr Pidgeon submits that *Fairchild* establishes that where a cause is incapable of scientific proof on the orthodox "but for" test of tortious liability, then a proven breach of duty of care that can be shown to materially increase a risk of the type of injury, is sufficient proof that the breach actually caused or contributed to that injury. The plaintiffs therefore say that if they have not proved "on the balance of probabilities" that "but for" discharges of sewage from the scheme the contamination events would not have occurred, they can nevertheless succeed on the basis of the *Fairchild* principle.

[86] *Fairchild* has not created a new general rule of causation although it may have created a principle that in exceptional circumstances, rules as to causation may be modified on policy grounds. The Courts in England have been reluctant to extend the application of the principle beyond the particular facts of that case: (see *White v Paul Davidson Taylor* [2004] EWCA Civ 1511; *Beary v Paul Mall Investments* (a firm) [2005] EWCA Civ 415) and it is yet to be applied in New Zealand. I am not prepared to set aside the considerable weight of authority that proof of factual causation is required. These authorities clearly continue to bind the Courts, at least in cases outside the field of personal injury.

[87] As Lord Hoffman said in *Gregg v Scott* [2005] 2 AL 176 when reviewing cases concerned with the issue of causation:

> What these cases show is that, as Helen Reece points out in an illuminating article ("Losses of Chances in the Law" (1996) 59 MLR 188) the law regards the world as in principle bound by laws of causality. Everything has a determinate cause, even if we do not know what it is. The blood-starved hip joint in *Hotson*, the blindness in *Wilsher*, the mesothelioma in *Fairchild*; each had its cause and it was for the plaintiff to prove that it was an act or omission for which the defendant was responsible. The narrow terms of the exception made to this principle in *Fairchild* only serves to emphasise the strength of the rule. The fact that proof is rendered difficult or impossible because no examination was made at the time, as in *Hotson*, or because medical science cannot provide the answer, as in *Wilsher*, makes no difference. There is no inherent uncertainty about what caused something to happen in the past or about whether something which happened in the past

> will cause something to happen in the future. Everything is determined by causality. What we lack is knowledge and the law deals with lack of knowledge by the concept of the burden of proof.

[88] It may well be the case that the *Fairchild* principle will be applied in New Zealand in an appropriate case. However this is not that case. While science may not be able to exclude any one potential source of the contamination as its cause, there is ample evidence that has been produced that enables me to evaluate the likelihood that the Kawakawa Scheme is that source.

Plaintiffs' case

[89] The plaintiffs allege that the Kawakawa Scheme discharged norovirus into the Kawakawa River and on to the Plaintiffs' oyster beds on many occasions but in particular in November 1994, November/December 1999 and August 2001. The plaintiffs say that these discharges caused or materially increased the risk of the contamination events and that the contamination events caused Northland Health to reclassify Growing Area 206 as restricted. Particulars provided in the statement of claim of the allegation that the pollution which caused or contributed to the contamination events came from the Kawakawa Scheme were:

> (a) Effluent was discharged from the Kawakawa sewage treatment plant and/or the Kawakawa Township sewerage and stormwater system particularly when the two oxidation ponds overflowed after heavy rainfall.
>
> (b) This occurred in November 1994, September and October 1996 and on three occasions in 1998, and in August 1999.
>
> (c) From 30 June 2004 to 3 July 2004 the defendant, primarily from stormwater entering the reticulation system in Kawakawa, allowed Pond 1 of the Kawakawa treatment plant which was full to overflow to discharge from that Pond, bypassing the filtration and disinfection components of the treatment system, into Pond 2 and from there to the Kawakawa River, with the result that all oyster farmers in the Waikare River (and not just the farms of the plaintiffs) were closed by Northland Health for 56 days from 5 July 2004.
>
> (d) Further improper discharge from the Kawakawa sewage pump stations occurred in June and July 2004 and in particular on 15 July 2004.

[90] Although not explicitly pleaded the plaintiffs also rely upon overflows from the North Road Pumping Station and upon discharges from broken pipes in the period of time preceding the 2001 contamination events. Mr Pidgeon submitted that overall throughout the 1990s and up until at least 2004, the situation was deteriorating with more frequent occurrences of discharges of raw or partially treated sewage.

[91] It emerged in evidence that there is no certainty that even a perfectly functioning sewage treatment plant of the type in use in Kawakawa prior to the upgrades will remove all viruses from sewage before discharge of the treated effluent. Viruses survive these systems but some 90% plus are removed. No sewage treatment plant will remove viruses completely 100% of the time. During the course of his closing submissions, Mr Pidgeon confirmed that the plaintiffs do not allege that the discharge from the plant when it operated in dry conditions prior to upgrade, or when it now operates within the parameters of its resource consent, constitutes a nuisance, or involves any breach of a duty of care owed by FNDC to the plaintiffs. This is an appropriate concession. A claim that relied upon norovirus contained within discharge from a fully functional sewage scheme would likely fail on the basis that the interference with the plaintiffs' use and enjoyment of their land was reasonable. Material considerations would be that the activity has great social utility, and that the plaintiffs have a peculiar sensitivity to viruses contained within the discharge because of the particular nature of their trade.

[92] Mr Pidgeon clarified that the plaintiffs allege that the nuisance/breach of duty arises from the discharge of raw sewage from the sewerage reticulation and from the discharge or overflow of partially treated sewage from the treatment plant during and following periods of significant rainfall. The plaintiffs produced salinity data which I accept establishes that there were rainfall events at around the time of at least the 1999 and 2001 contamination events.

[93] The factual issues necessarily involved in a determination of whether norovirus contained within discharges of raw or partially treated sewage from the Kawakawa Scheme are:

(i) Did raw or partially treated sewage discharge from the Kawakawa Scheme at relevant times?

(ii) Assuming discharge of raw or partially treated sewage at relevant times, could norovirus have reached Growing Area 206 in infective doses?

(iii) Are there other more likely sources of faecal contamination in the Waikare Inlet?

(i) Did raw or partially treated sewage discharge from the Kawakawa Scheme at relevant times?

[94] To prove that the contamination came from the Kawakawa Scheme the plaintiffs need to prove that there were discharges of raw or partially treated sewage from the Scheme at a time proximate but prior to the contamination events.

[95] Surprisingly there was little focus in the plaintiffs' evidence on discharges or spills proximate to the time of the outbreaks. The plaintiffs' written submissions also did not directly address the issue. Accordingly, during presentation of his closing submissions I requested Mr Pidgeon to particularise the evidence relied upon by the plaintiffs as proving such spills or discharges. Mr Pidgeon said the plaintiffs relied upon:

a) The Chief Executive of FNDC's (Mr Manley's) acceptance that remedial work was urgently required from the date FNDC assumed ownership and control of the Kawakawa Scheme;

b) Internal FNDC documents, engineering reports and the NRC spill register;

c) The evidence of the plaintiffs' expert Mr William Fullerton, that there were deficiencies in the maintenance and operation of the Kawakawa Scheme; and

d) The evidence of FNDC's witness Mr William Down as to discharge incidents. From 1990 to 1997 Mr Down was employed in the engineering department of FNDC and was involved in budgeting, forecasting, stock control and purchasing in the utilities and facilities asset management. From 1997 to 2001 he was employed by Impact Services Ltd and held the position of project management in utilities, facilities, maintenance and design and maintaining construction contracts. Between February 2001 and June 2005 he was in the position of technical support, project management for FNDC. He managed FNDC's 10 water and 18 sewage schemes, including monitoring compliance with consents. Mr Down' evidence was that he was involved between 1990 and 2006 with the Kawakawa Scheme.

[96] In his written submissions, Mr Pidgeon also relied upon what he characterised as FNDC's failure to produce important witnesses and information to the Court which he said leaves FNDC open to the "inevitable inference being drawn that massive problems were taking place in respect of the plant, pump station and reticulation system."

[97] I have considered Mr Pidgeon's submissions carefully. Given the lack of particularity in his identification of the evidence the plaintiffs rely upon, I have also spent some time reviewing this material to attempt to isolate the evidence he refers to.

Extent of spills: Raw sewage from the Sewerage Reticulation

(a) Raw sewage spills from pumping station

[98] It cannot seriously be disputed that throughout the 1990s and up at least until 2004, significant spills of sewage were occurring from the North Road Pumping Station, and from various parts of the sewerage reticulation.

[99] The FNDC report in 1990 identified a problem with discharges of untreated sewage from the Pumping Station. Mr Down confirmed that in some conditions the

Pumping Station would overload, allowing sewage to escape, travel across the paddock on which the Station was situated and enter the River. He also accepted that in flood conditions the Pumping Station could become submerged leading to the discharge of raw sewage. However, he was not asked to, and did not identify, such an overflow occurring around the time of a contamination event.

[100] The plaintiffs relied upon the NRC spill register as its principal proof of such events occurring. Mr Elliott, Water Quality Team Leader with NRC produced that document into evidence. He described it as a "warts and all document" of all notifications the NRC received of breakages and discharges from the Kawakawa Scheme from any source whatsoever, including FNDC and the public.

[101] The spill register does record an incident where the North Road Pumping Station overflowed which appears to have occurred prior to 2003, but the date is deleted in the copy produced into evidence by consent. There are a number of deletions in this document. These deletions were agreed between counsel for the plaintiffs and defendants apparently because of admissibility issues in relation to the document. The plaintiff did not produce evidence as to when that incident occurred. Other overflow incidents related to the North Road Pumping Station are recorded in the NRC spill register, but occurred in 2003 or later so could not be responsible for the contamination events. Mr Elliott also gave evidence that NRC issued an abatement notice in late July 2004, in relation to "frequent unauthorised discharges from the Pumping Station to land in a position where it enters water". However, Mr Elliott's evidence was that the abatement notice related to some of the incidents recorded in the spill register. That evidence therefore takes the plaintiffs' case no further than the NRC spill register.

[102] Mr Fullerton was an expert witness for the plaintiffs. He is a water and waste water process scientist with Beca Carter Holdings and Ferner Limited. His evidence was that sewage spill and overflow records of FNDC and NRC indicate overflows from the Pumping Station into the Kawakawa River occurred frequently during high rainfall as sewage flows exceeded the pumping capacity. The FNDC spill and overflow records were not produced into evidence. However, the NRC spill register of 31 May, 21 June, 28 June, 30 June, 20 July, 23 July and 29 July 2004 recorded

overflow from the station and those are the dates of overflow identified by Mr Fullerton in his evidence. The NRC spill register also records overflows in March 2003 not referred to by Mr Fullerton in his evidence. These dates are of course all after the contamination events.

[103] There is, therefore, no evidence of an overload of the North Road Pumping Station at a time prior but proximate to the contamination events. I do not draw any inference adverse to FNDC from its failure to produce its spill and overflow records into evidence. Since Mr Fullerton refers to them I have inferred that they were disclosed to the plaintiffs, and certainly Mr Pidgeon took no issue in relation to their non-discovery. If they were of assistance to the plaintiffs' case Mr Pidgeon was able to cross-examine FNDC witnesses in relation to them and/or to produce them into evidence. He did not do so.

(b) Raw sewage spills from pipeline breakage

[104] Mr Fullerton said that there were also on-going problems with leaking and burst pipes. Breaks in the pipeline from the Pumping Station to the treatment pond occurred in April 1994. He said:

> There was evidence of a failure of the pipeline believed to have occurred near the south bank of the Kawakawa River sometime possibly in November 1994. It is believed to have resulted in an unknown quantity of raw sewage to discharge to river. FNDC repaired the line by the end of November.

[105] Mr Fullerton does not identify the evidence he relies upon as establishing this discharge and nor was I referred to any documentary evidence that records the event he describes. Mr Fullerton was called as an expert witness, and not as a witness of primary fact. Even were I to accept his evidence of the discharge, it is so vague as to be insufficient to prove that a discharge occurred at a time proximate but prior to the 1994 contamination event. He can be no more precise than "sometime possibly in November 1994".

[106] Mr Fullerton's evidence was also that the failure in the pipeline could have been occurring as early as September 1994 at the time of the first contamination event. He based this on the elevated faecal coliform readings upstream from the

treatment plant in NRC testing results for September 2004. However, I regard Mr Fullerton's evidence on this point as speculative. There was ample evidence before the Court of other sources of faecal contamination upstream from the plant, including the settlement of Moerewa, which is not reticulated for sewage treatment. Further, although elevated in comparison to some other readings around that time, the level of faecal coliforms as measured by the NRC in September 1994 was well within the levels stipulated in the water right applicable at that time.

[107] Further breakages of the pipe occurred in September and October 1996, February, March and April 1998. None of these breakages were at times proximate to a contamination event. By June of 1998, the pipeline from the pumping station to the treatment ponds had been replaced.

(c) Partially treated sewage: Overflows and discharges from treatment plant

[108] It was argued for the plaintiffs that following heavy rainfall the treatment ponds overflowed, discharging raw or partially treated sewage into the River. The plaintiffs' pleading was not clear as to when the overflows were said to have occurred. Mr Davenport, one of the plaintiffs, gave evidence that he saw the Kawakawa River breach the treatment pond banks, but again did not say when.

[109] Mr Down' evidence was that embankments of the treatment ponds were increased in height between 1993 and 1996. He said that there was no breach of the pond embankments and that if there had been he would have known of it, because such a breach would have left a large hole in the embankment which would have been visible. He said that although the area around the ponds flooded in the past, the ponds had remained entirely intact. There is no entry in the NRC spill register of any overflow of the ponds or breach of the pond banks by flood or river water.

[110] I accept Mr Down' evidence that if there was an overflow or breach of the walls of the pond, the evidence of that spill or breach would have been clearly visible even after it had occurred. Given Mr Down' evidence that he saw no sign of any such spill or breach of the pond banks, and the absence of any reference to such an event in the NRC spill register, I am not satisfied that it occurred. Further, even if

such an event had occurred, the plaintiffs failed to produce any evidence to suggest that it was close in time to the contamination events.

(d) Partially treated sewage: improperly placed discharge pipe

[111] Mr Fullerton said that failure to install and maintain flap valves on the discharge pipes from treatment pond 2 may have resulted in the backflow from the River into the reticulation pond during flood conditions. He said that the original design of the discharge of effluent from the treatment plant is by way of a pipe extending from the secondary pond, through the embankment, to the Kawakawa River. The level of the pipe was set so that the secondary pond would maintain a fixed water level, believed to be some 300 mm below the level of pond 1. It would be normal engineering practice to provide for a flap valve on the discharge pipe if there was a possibility that flood river levels could submerge the pipe and lead to backflow into the pond. From photographs taken in 1997, it did not appear that a flap valve was fitted to the original pipe. He also said that he believed that the conversion of the secondary pond to a wetland was achieved by restoring the second pipe at a lower level. This pipe was constructed in July 1993 and according to the FNDC records, a flap valve was installed. However Mr Fullerton said that the NRC monitoring log notes that two 50 mm alkaline pipes were inserted into the original discharge pipe to siphon water from the pond; thus if a flap valve were attached to this pipe, it would be ineffective.

[112] Mr Down' evidence in relation to this issue was that there was a back flow preventor fitted to the original pipe. In the late 1980s and early 1990s, there was a second pipe at a lower level from pond 2 to the River. When FNDC attempted to convert the second pond to a marsh wetland, he says that he personally concreted up that pipe in the summer of 1990/1991. Since then that pipe has been re-checked in 1996 and in 2003. Mr Fullerton agreed that he had not personally inspected the pipes and was not in a position to contradict Mr Down' evidence.

[113] Mr Down was cross-examined in relation to this issue. Two photographs of pipes were produced into evidence by consent, it seemed for the purpose of contradicting his evidence. Mr Down was questioned in relation to those

photographs. Unfortunately there was no proper foundation laid as to when those photographs were taken, who they were taken by, or what they were of. Mr Down could not identify them, and their production failed to shed any light on the issue.

[114] The evidence that emerges on this issue from Mr Down and Mr Fullerton is confusing as to what pipe had been concreted up and as to what pipe had alkathene pipes through it, and the significance of any of this. Based on this evidence I am unable to conclude that there was an issue with back flow of Kawakawa River water into the pond when the River was at flood levels.

[115] In any case there is no evidence to show that such an event occurred at any time proximate to the contamination events.

(e) Partially treated sewage: ponds operating beyond capacity

[116] The plaintiffs did not assist with evidence or submissions defining or differentiating partially treated sewage from treated sewage. Mr Fullerton's evidence did not touch upon this issue. For want of a better definition I have assumed that discharges that comply with water right/resource consents are discharges of properly (or fully) treated sewage. That would accord with Mr Pidgeon's concession that the plaintiffs do not rely upon discharges from the treatment ponds when they are operating within normal parameters.

[117] To prove the discharge of partially treated sewage from the treatment plant, the plaintiffs again rely upon the NRC spill register, the evidence of Mr Fullerton, and also upon a series of engineering reports commissioned at various stages by FNDC. The latter include a report prepared by Fraser Thomas Engineers in 1998, and a series of engineering reports prepared by MWH Consultants (June 2003, March 2004 and February 2006) in support of funding applications made by FNDC for Government grants for the upgrade of the Kawakawa Scheme.

[118] The NRC spill register records that in May 2003, to prevent overflow of pond 1 into pond 2, the sand filtration system was bypassed. The NRC spill register notes that discharge during that incident would probably not have met discharge standards.

The register also records a controlled spill in June and July 2004. The evidence before me was that on that occasion partially treated sewage was discharged during a controlled spill, agreed to by NRC and Northland Health. The controlled spill was undertaken to reduce the level of the ponds to allow them to cope with expected inflows. These discharges occurred after the contamination events. There are no other records of non-complying discharges in the NRC spill register.

[119] Mr Fullerton's evidence was that stormwater infiltration meant that very large volumes of water were pumped to the treatment plant. He said that based on the original design plan, the two pond system would have adequate capacity to treat the population of Kawakawa's sewage if maintained appropriately. He said it remained adequate in normal weather conditions but, when high flows containing stormwater were pumped to the treatment ponds, the treatment system would most likely fail, resulting in the discharge of partially treated sewage into the waterways.

[120] However, Mr Fullerton did not identify or refer to any primary evidence to support his assertion that discharges of partially treated sewage had taken place, other than the entries in the NRC spill register. Mr Fullerton also criticised a failure by FNDC to desludge, and to keep stock, vegetation and stormwater from the surrounding areas, from entering the ponds. However, his evidence was that the latter alleged failures by FNDC simply exacerbated the problem caused by the stormwater inflows from the reticulation following rain events.

[121] The plaintiffs also rely upon the MWH Consultants reports to prove that the treatment plant discharged partially treated effluent at times of significant rainfall. Mr Pidgeon submitted that the reports showed that FNDC's own consultants acknowledge "that these events had occurred and that they had polluted the oyster farms at Waikare".

[122] The MWH reports were not discovered by FNDC, and only came to light during the course of the evidence of FNDC's own expert witness, Mr John Harding. Mr Harding said that in reaching his opinions in relation to the functioning of the Kawakawa treatment plant he had considered three reports prepared by MWH, engineering consultants. Accordingly, Mr Harding was stood down to allow the

plaintiffs time to consider these reports before cross-examination of Mr Harding. In closing, FNDC's counsel submitted that I should put the reports to one side because any factual matters alluded to in them amounted to evidence from a witness not before the Court and any opinions expressed had not been properly put in evidence by a properly qualified expert.

[123] I am not persuaded that I should put the MWH reports to one side. The reports were produced on behalf of FNDC by its own consultants and there can be no doubt as to their authenticity. The reports were relied upon by FNDC to support an application for the grant of public money. FNDC cannot now disavow the reports because it assesses it tactically better to do so. However, when weighing the material contained in these reports it is appropriate to take into account that the reports are in large part a recital of others research and work.

[124] One of the MWH reports refers to a report prepared by the Environment Business Group. I assume that this is part of the FNDC. The Environment Business Group report is said by MWH to conclude that the upgrade for which funding was sought for the Kawakawa Scheme would reduce the risk of viral contamination of shellfish harvested from the Waikere Inlet. Although Mr Pidgeon seemed to make a faint submission that it was an admission, he did not press the submission. I do not in any case regard that reference in the report as evidence of an admission by FNDC or as tending to prove that discharges from the Kawakawa Scheme caused the contamination events or increased the risk of viral contamination of the shellfish. Such references simply reflect the identification by AquaBio of the Kawakawa Scheme as one of the potential sources of contamination.

[125] The MWH reports contain literally hundreds of pages of scientific material which I have taken some time over. Very little of the material in those reports was identified by the plaintiffs in closing as relevant for me, or referred to by Mr Pidgeon when cross-examining Mr Harding. However, I was directed to the following relevant statement in the June 2003 MWH report:

> The treatment process at the plant, before the works outlined in this application were undertaken, was discharging partially treated sewage into the river, contributing to its contamination and making it unfit for the uses of the people in the area.

[126] When read in context it is plain that the authors of the report are characterising all discharge from the plant, even in normal weather patterns, as being partially treated. This is because of the absence of tertiary treatment process at the plant such as filtration and ultra violet light disinfection prior to upgrade. Such a reading is consistent with later material in the report where adverse comment is made as to the fact that because of the absence of tertiary treatment there was a possibility of microbiological contamination.

[127] The plaintiffs also submit that it is significant that the resource consent for the plant upgrades in 2001 stipulated for an increased capacity. Mr Pidgeon invited me to infer from this condition, that the increased capacity was needed to ensure that the plant could cope with the volumes of stormwater but still ensure that effluent was properly treated.

[128] The expert called for the defence, Mr Harding, accepted that the upgrade in capacity for the tertiary plant from 800 cubic metres to 1600 cubic metres per day was stipulated for by NRC because modelling of the inflow had been carried out by a consultant and based on that report a capacity of 800 cubic metres was thought to be insufficient. That issue was not pursued further in cross-examination. It was therefore not clarified in what sense 800 cubic metres was thought to be insufficient. The obvious question, not addressed in evidence was, insufficient in achieving what performance criteria?

[129] Mr Harding for FNDC expressed the opinion that because of the long retention period that oxidation ponds have, they do not discharge partially treated effluent. Although they might have a natural variation in their treatment standards due to issues such as peak water flows, the Kawakawa treatment ponds were sized for 2,400 people so had a significant reserve capacity. He did not accept that the treatment plant was discharging partially treated sewage prior to upgrade. He said that:

> The treatment plant for the upgrade was a two-stage pond system, as used in 50, 60, 70 other communities around New Zealand. … I believe it was working very well because these plants are robust and reliable and resistant to peak flows from communities with poor reticulation, which is not unusual.

[130] Mr Harding's evidence as to the efficacy of the ponds is supported by the water testing data produced to the Court by the plaintiffs' witness Mr Elliot, Water Quality Team Leader with NRC. His evidence was that since 1985, NRC officers have undertaken regular monitoring of water quality 20 metres downstream from the discharge, and 25 metres upstream of the discharge. He produced into evidence the data collected from sampling since 1993, and said:

> An examination of this data to determine Compliance with Consents requirements particularly in relation to bacterial indicators shows that over the period of 1 January 1993 until March 2001 it was very likely that the discharge complied with the consent requirements for faecal coliforms …. The average for the data set from 1 January 1993 until March 2001 is approximately 6,600/100ml, suggesting that the average limit of 30,000/100ml. The average number of faecal coliforms per 100ml for the data set from 1985 until the issue of the new consent in 2001, is approximately 12,100/100ml, and again indicates the discharge was within the average limit.

[131] With the frequency of testing over this period of time (in excess of 130 samples) it is highly likely that at least some of these tests were conducted during or following significant rainfall events.

[132] When the new discharge permit came into effect on 7 February 2001 a different set of water quality criteria were required to be met. Mr Elliot said that while determining compliance with the receiving water standard –

> is somewhat problematic due to its structure … it is considered that the sampling data indicates a potential non-compliance period during the early stages of the consent prior to the construction of UV disinfection unit. It is evident that once the disinfection unit was installed that the quality of the discharge was generally better than the upstream water quality in terms of the bacterial indicator escherichia col (e.coli) as such non-compliance was very unlikely.

[133] Having considered the testing results since 1993, it is apparent that prior to February 2001, the discharge was not tested for e.coli and that when, under the new testing regime it was, the effluent discharge was initially found to be non-complying with the new standards. However, consideration of the faecal coliform test results

after February 2001 does not reveal a deteriorating picture. The results remain within the same range as they had through the 1990s. These results do not therefore suggest that the water quality of the discharge suddenly deteriorated in early 2001, but rather, that for a period of time through 2001, there was likely non-compliance with the new stricter criteria for discharge, based on levels of e.coli in the discharging waters. Mr Elliot's evidence does not link this non-compliance to rainfall events. I do not therefore see this evidence as supporting the plaintiffs' allegation that, following heavy rainfall, partially treated sewage was discharged.

[134] The plaintiffs' expert, Mr Fullerton conceded that:

> The samples taken during times when the plant was operating, presumably no storm flows coming in, the plant was operating within the expected performance of an oxidation pond.

[135] This statement by Mr Fullerton exposes the difficulty with the way in which the plaintiffs have attempted to prove the discharge of partially treated sewage from the plant. Notwithstanding the testing data which shows a picture of consistency in treatment and compliance with consent standards, the plaintiffs say that because of stormwater inflows the plant must have been discharging partially treated sewage, given its capacity. However if the plaintiffs' case rested upon such an analysis, then one would expect the plaintiffs to have produced evidence as to the minimum retention periods for treatment, the volume of inflow due to rainfall (or at least an estimation) and the consequent likely retention periods at times of rainfall events. Without that, the plaintiffs' case rests on no more than mere assertion.

[136] In contrast, Mr Harding's evidence that the plant would have sufficient capacity to deal with the stormwater infiltration (although similarly general in its treatment of the subject), was supported by the results of water monitoring, which showed compliance with water quality criteria, other than for a short period in 2001. The latter period of non-compliance is explained by the adoption of a different set of criteria for water quality and is not explained by stormwater infiltration or a deterioration in treatment. In short the plaintiffs have failed to prove that following significant rainfalls, the treatment plant was regularly discharging partially treated sewage.

[137] Although the NRC spill register records two isolated incidents of discharge of partially treated sewage from the treatment ponds, there is insufficient evidence to establish that the problem was any more widespread than that, and in particular that partially treated sewage was discharged every time there was a rainfall event.

[138] Before leaving this issue, it is necessary to deal with the submission made by Mr Pidgeon as to the approach to be taken to evidence in relation to the functioning of the Kawakawa Scheme. He referred to the well known statement of Lord Mansfield in *Blatch v Archer* (1774) 1 Cowp 63, 65 that all evidence is to be weighed according to the proof which it was in the power of one side to produce, and in the power of the other to have contradicted. *Cross on Evidence* expresses the principle as being that a party's knowledge of essential facts may lessen the amount of evidence required to discharge an evidential burden borne by that party's adversary. Mr Pidgeon submitted that FNDC kept important witnesses and information from the Court leaving itself open to the inevitable inference being drawn that massive problems were taking place in respect of the plant, pump station and reticulation. In particular Mr Pidgeon said that FNDC should have called some of its consultants who had actual experience of the problems. As to documents kept from Court, I have assumed Mr Pidgeon refers to the MWH engineering reports.

[139] The MWH reports were ultimately produced into evidence and the plaintiffs given an opportunity to cross-examine in relation to them. They should undoubtedly have been discovered, but I am not prepared to infer from that non-disclosure that FNDC was covering up evidence of 'massive' problems. In relation to witnesses, FNDC did call as a witness Mr Down, who was involved in one capacity or another with the functioning of the Scheme from 1990 to the present day and was available for cross-examination as a witness of fact as to the issue. FNDC also called its own expert witness who was able to be cross-examined in relation to the Scheme. It is also relevant that the plaintiffs had disclosure through the discovery process of FNDC documents. Given this and the availability of FNDC witnesses for cross-examination, I do not accept that any lightening of the plaintiffs' burden of proof in relation to the issue of discharges from the Kawakawa Scheme is appropriate, nor am I prepared to draw an inference that discharges did occur at the relevant times,

particularly in the light of material already referred to which undermines the validity of that inference.

Did the situation deteriorate through the 1990's?

[140] The plaintiffs submitted in closing that the evidence established that the problems with the Kawakawa Scheme became more and more serious. However, the plaintiffs could not refer me to any evidence to support their contention that the situation was deteriorating. Although Mr Manley accepted that there was an urgent situation in relation to the reticulation that required remedying, the situation had been identified as urgent since the Infiltrol Report in 1990. There was no evidence of an increase in the number of spillages. On the contrary, the record of incidents kept by NRC in the late 1990s shows a far lesser level of incident than that described in the 1990 FNDC memoranda.

Conclusion: Discharges at time proximate to contamination events

[141] To summarise the position as established by the evidence, discharges of raw or partially treated sewage did occur on occasion when there were pipeline breakages, or the North Road Pumping Station overflowed or became submerged in flood waters. There were also two incidents, well after 2001, when the treatment ponds discharged partially treated sewage. However, there is no evidence of such an incident proximate to the contamination events, and insufficient evidence to support the plaintiffs' allegation that such events occurred whenever there was moderate or heavy rainfall.

(ii) Assuming discharges of raw or partially treated sewage at relevant times, could norovirus have reached Growing Area 206 in infective doses?

[142] The above factual findings effectively dispose of the plaintiffs' nuisance/contamination claim. However, as I heard and have analysed a considerable volume of evidence in relation to hydrology and virology, and because of the relevance of this issue to the classification causes of action, I also consider whether the plaintiffs have proved that norovirus in discharges of raw or partially

treated sewage could have reached Growing Area 206 in sufficient quantity to cause contamination of the oysters.

[143] To prove that infective doses of norovirus contained within such discharges reached the oyster farms prior to the contamination events and caused (or increased) the risk of those events the plaintiffs rely upon:

a) The evidence of NRC employee, Mr Glenn Mortimer, that as Estuarine Water Quality Officer he undertook studies to measure water quality and water measurement studies, and that one of the findings of these studies was that in certain conditions water from the Kawakawa River travelled up into the Waikare Inlet;

b) The evidence of Mr Tony Robinson, hydrometric researcher, that immediately preceding the contamination events in 1999 and 2001 the salinity levels in Waikare Inlet dropped significantly and that his opinion was that this was due to fresh water inflows from the Kawakawa River that had flowed past "viral reservoirs" created by the Kawakawa Scheme;

c) The evidence of Dr Gail Greening, virologist, that following the controlled sewage spill in 2004, there were high levels of the bacteria F-RNA phage, and that norovirus was detected in shellfish collected at various sites. The plaintiffs also rely upon Dr Greening's evidence in relation to studies of viral uptake in shellfish in other locations in New Zealand;

d) The evidence of Ms Brenda Hay, marine biologist, that the contamination events were associated with recorded sewage spills and with relatively rapid changes in salinity in the Waikare Inlet, and that the Kawakawa Scheme cannot be eliminated as a potential source of the contamination; and

e) The evidence of Ms Kelly Roberts, microbiologist, that there is a constant low level source of enteric viruses entering the Kawakawa River Estuary and the Waikare Inlet, and that the Kawakawa sewage treatment plant was identified as a source of human enteric virus entering the river and potentially entering the Waikare Inlet.

[144] FNDC says that water from the Kawakawa River does not enter the Inlet, beyond Tiger Bay, and in any case even if it does, FNDC argues that viruses could not survive the 13.5 kilometre journey through the shallow and winding waters of the Kawakawa River to reach the oyster farms in infectious doses. It relies upon:

a) The evidence of Mr Gary Venus that water from the Kawakawa River does not travel into the Waikare Inlet, beyond Tiger Bay (an area just inside the Inlet); and

b) The evidence of Dr Gary Grohmann, virologist, as to studies undertaken in relation to the distance viruses have been found to travel from a source of pollution.

Did water from the Kawakawa River enter the Waikare Inlet and reach the oyster farms?

[145] The plaintiffs allege that in certain conditions and at certain times water from the Kawakawa River enters the Waikare Inlet. In particular the plaintiffs say that this can occur at slack water (the period of time between the tide going out and coming in) on a flood tide. The plaintiffs rely upon the evidence given by several witnesses who say that they have on occasion seen a plume of muddy water visibly entering the Waikare Inlet from the mouth of the Kawakawa River.

[146] The plaintiffs also rely upon the evidence of Mr Glenn Mortimer to prove the entry of Kawakawa River water into the Inlet. Mr Mortimer is a marine ecologist and has experience in the investigation of water movement patterns in estuarine and coastal areas, focusing upon the impact of discharges on water quality. He described a study he undertook in 1991 in performance of his duties as Estuarine Water Quality

Officer for NRC. The study was focused upon establishing existing marine quality and assessing water quality impacts of any of known pollutant sources. Drogues were used by Mr Mortimer for this purpose. Drogues are commonly used to test water movements. Part of the drogue sits under the surface of the water, thus preventing the effect of wind producing a distorted picture of the water movement.

[147] An ancillary finding made during these investigations was that hydrodynamics at the Kawakawa Estuary mouth (near Opua Wharf) were complex and directly influenced by that of the Waikare Outflow. Mr Mortimer observed that the tidal outflow from the Waikare Inlet appeared to restrict and consequently delay that from the Kawakawa Estuary. Because of the delay, tidal waters were still flowing out from the Kawakawa Estuary when the waters began flowing back into the Waikare Inlet. On this basis he concluded that some of the tidal water from the Kawakawa River estuary is probably introduced into the Waikare Inlet during the early stages of the incoming tide. He said that this effect could be greater in flood conditions because the River outflow would be higher and stronger, and therefore the freshwater from the River would travel further down the River Estuary. However, he said:

> In my experience, given the relatively small nature of Northland Rivers, that outflow tends to be confined to the mid to upper reaches of estuaries.

[148] He described the freshwater outflow as being in a wedge like shape. At the end of the Kawakawa River Estuary closest to the Veronica Channel, was what he described as the longest narrowest part of the wedge, with some freshwater on top. Back towards the River there would be a deeper layer of freshwater. Mr Mortimer also confirmed that his testing suggested that it was extremely unlikely that any water from the Kawakawa River would be carried directly across to the North Eastern side of the Waikare Inlet where Lease 64 is situated.

[149] FNDC contend that the hydrology of the area, around the Waikare Inlet, the mouth of the Kawakawa River and the Veronica Channel, make it highly unlikely that water from the Kawakawa River (and hence any discharge from the Scheme) reaches the plaintiffs' oyster farms. The expert witness who gave evidence on hydrology matters for FNDC was Mr Gary Venus. Mr Venus is a marine biologist,

and has experience in undertaking coastal and near shore circulation studies in relation to a number of marina and port developments in Northland. Mr Venus used oranges as an inexpensive way of testing water movements. He referred to some literature supporting the use of oranges as an inexpensive and accessible substitute for drogues. He performed a series of tests using oranges released into the water off Kawakawa River. Based on these tests he expressed the opinion that water from the River does not make its way into the middle and lower Waikare Inlet proper. On the latter part of the outgoing tide, he said that his tests and a review of available information as to hydrological movements in the area, had led him to conclude that there is a current deflection whereby a small portion of the outflow from Kawakawa River is redirected into the bay at the Southern Entrance to the Waikare Inlet, Tiger Bay.

[150] Mr Venus' evidence was that tidal exchange in the Waikare Inlet equates to around 40,000,000 cubic metres per day, whereas the mean daily flow of the Kawakawa River and Waikare River is less than 1% of the tidal exchange volumes. Therefore, even in flood situations the tidal exchange remains the dominant force. He also gave evidence that the design flow for the treatment plant is 350 cubic metres per day.

[151] On cross-examination Mr Venus said that when briefed as an expert witness he had not been asked to determine whether water from the Kawakawa River entered the Waikare Inlet. His study was only designed to collect information on tidal circulation in the entrance to the Waikare Inlet. He accepted that on the turn of the tide, water from the Kawakawa River could be picked up and carried into the Waikare Inlet.

[152] On the basis of the expert evidence and eye witness accounts of muddied river waters entering the Inlet, I am satisfied that for a small period of time shortly after slack water, the incoming tide will pick up waters from the Kawakawa River Estuary and carry them into the Waikare Inlet. These waters will include Kawakawa River waters. It is however extremely unlikely that any water from the River would be carried directly across to the North Eastern side of the Waikare Inlet where lease

64 is situated. The latter point is significant because lease 64 is one of the leases involved in the 1999 contamination event.

[153] I am also satisfied that the amount of Kawakawa River water picked up by the incoming tide will be greater in storm or flood conditions but that even in flood conditions this inflow occurs for a short period of time only. It is not possible on the basis of this evidence to conclude with precision what volume of water from the River enters the Inlet, but it is possible to estimate that it is an extremely small amount of water considered as a proportion of the overall tidal interchange. The conclusion that follows from this and from the information as to the volumes of the tidal exchange, the Kawakawa River flow and the daily discharge from the treatment plant is that any discharge from the Kawakawa Scheme that reaches the Inlet will be massively diluted by River and then tidal waters, even in flood conditions.

[154] The plaintiffs rely upon the evidence of Mr Robinson as to salinity levels in the Waikare Inlet following rainfall events in the Kawakawa catchment to establish firstly that rainfall events preceded the 1999 and 2001 contamination events and secondly, to prove that water from the River not only entered the Waikare Inlet, but also that it reached the oyster farms in significant volumes. Mr Robinson described a research project commissioned by the Waikare Inlet and Orongo Bay farmers to investigate the advantages of basing the harvesting criteria on salinity measurements rather than rainfall measures at Orongo Bay. I infer that the latter is the current measure used to determine when harvesting is permissible in the Inlet. His evidence was based on the research undertaken for that study.

[155] The plaintiffs submit that his evidence "showed a very noticeable increase in fresh water when established discharges or spillages or significant increase in flood conditions occurred in respect of the Kawakawa River which caused pollution in the Waikare Inlet." The plaintiffs say that this evidence establishes that viruses from raw sewage spills and partially treated sewage from the Kawakawa Scheme were in the Inlet prior to outbreak events.

[156] In summarising his evidence Mr Robinson said that in all contamination events in 1999 and 2001 in the upper and middle Waikare Inlet:

> The data presented clearly shows that in all … incidences [of viral outbreaks], flood water from the Kawakawa River system flowing past the viral "reservoirs", associated with the Kawakawa sewage outflow, had the opportunity of impacting on the oyster growing areas.

[157] Mr Robinson's evidence was that:

a) Salinity levels drop when there is an inflow of fresh water. Salinity levels in the Waikare Inlet fall at the time of significant rainfall events in the Kawakawa catchment and persist for 2 to 3 days after the rainfall event;

b) Salinity data collected suggested that contamination events in Growing Area 206 and other viral incidences in Orongo Bay were preceded by periods of low salinity levels in the affected area. The 1999 and 2001 contamination events were preceded by drops in salinity levels; and

c) The Kawakawa River was the most likely source of fresh water causing this drop in salinity.

[158] In relation to the latter key point, while acknowledging that the Waikare River also flows into the Waikare Inlet Mr Robinson said that the Kawakawa River has a bigger catchment so would be in flood for a longer period than the Waikare River. From this he concluded that the drop in salinity in the Inlet which occurred for a period over two or three days after the cessation of rainfall, was more consistent with having been caused by water inflows from the Kawakawa River than from the Waikare River and runoff from the surrounding lands.

[159] Mr Venus' opinion was that the more likely source of fresh water in the Inlet would be direct runoff from the hills surrounding the Inlet, and also from the Waikare River, the latter flowing directly into the Inlet. Mr Robinson's reason for rejecting this more obvious explanation was the length of time that the drop in salinity persisted, which he said could only be explained by a river with a catchment as large as the Kawakawa River. However, Mr Venus described the catchment area of the Inlet itself as approximately 150 square kilometres, encompassing a large

amount of undeveloped and swampy land. He said that rainfall inland in the Waikare catchment could take some time to move down into the Waikare Inlet, and this would be the more likely explanation for the persistence of the drop in salinity after rainfall events.

[160] Although I accept Mr Robinson's evidence that the salinity measurements evidence rainfall events in the region prior to the 1999 and 2001 contamination events, I do not find his evidence linking the contamination events to the Kawakawa Scheme persuasive. Such an explanation is inconsistent with the evidence of the plaintiffs' witness Mr Mortimer, as to the relatively small amounts of water from the Kawakawa River that enter the Inlet for a short period of time at the turn of the tide, even in flood conditions. Mr Venus's explanation for the drop in salinity seems the more likely. Moreover I found Mr Robinson an unimpressive witness. He tended to stray beyond his level of expertise into the area of virology and his evidence in chief was disjointed, difficult to understand, and presented in an unnecessarily argumentative style.

Virus survivability

[161] Dr Gail Greening is a virologist who was called as an expert witness by the plaintiffs. She is a Science Leader at the Institute of Environmental Science and Research and is Project Leader of the ESR Enteric, Environmental, Zoonotic and Selected Imported Infectious Diseases Service Description, which includes laboratory surveillance of norovirus disease for the Ministry of Health. In relation to Dr Greening's evidence, reliance was placed by the plaintiffs primarily on her evidence as to high levels of F-RNA phage bacteria and the presence of norovirus in shellfish following the 2004 controlled spill.

[162] Dr Greening is undertaking a research programme "Safeguarding Environmental Health and Market Access for New Zealand Foods", a component of which is the study of F-RNA bacteriophage as a viral indicator of shellfish quality. F-RNA phage is a non-pathogenic bacterial virus of similar size and with similar properties to enteric viruses. F-RNA is proposed by the European Union as an indicator organism as a means of detecting problematic levels of enteric viruses in a

waterway. As part of the study, samples were collected from Lease 64 and Lease 160 and from other sites around the Bay of Islands following the 2004 controlled spill. Dr Greening described the results as showing elevated levels of F-RNA phage at various testing sites, and the presence of norovirus and adenovirus (another enteric virus) at various sites.

[163] Having considered Dr Greening's evidence I conclude that the data presented by her does not support the plaintiffs' case, but rather supports a source of contamination other than the Kawakawa Scheme for the following reasons:

(a) Dr Greening confirmed that testing detected lower levels of F-RNA phage at the treatment plant outlet and in the Kawakawa River, than at sites more distant from the spill site such as Okiato Point, Opua, Lease 64 and Lease 160;

(b) On cross-examination Dr Greening confirmed in relation to the norovirus detected on testing, that the levels of norovirus detected dropped as the testing sites progressed up the Kawakawa Inlet, and that the only norovirus detected in the Waikare Inlet was at Lease 64; and

(c) According to the evidence of the plaintiffs' witness Mr Mortimer, Lease 64 is unlikely to be affected by water from the Kawakawa River.

[164] I also record that Dr Greening said that the testing from which her evidence was drawn had yet to be verified and that she did not want conclusions to be drawn from data prematurely before testing had been completed and the data had been analysed in a full scientific manner.

[165] Dr Greening also gave evidence that her study included testing of sites near an outfall from a sewage treatment plant in Dunedin, which showed high levels of F-RNA phage and contamination with enteric viruses at sites along the coast from the plant. However Dr Greening did not know what other potential sources of

contamination existed close to the testing sites as she had not personally visited the sites. I attach no significance to this evidence.

[166] Ms Hay's evidence seemed to be the primary plank of the plaintiffs' case that the contamination events were causally linked to spills or leaks of raw or partially treated sewage. She described the risk analysis she undertook in September 2001. She said that the following conclusions can be drawn from the risk analysis:

(a) There are a number of potential sources of human sewage in the marine environment. It is not possible to say which source was the cause of the contamination, but the Kawakawa Scheme cannot be excluded;

(b) Based on epidemiological data and data from norovirus testing in shellfish, there is a decreasing gradient of risk of viral contamination in oysters from the lower to the upper Waikare Inlet;

(c) Most but not all norovirus contamination incidents were associated with recorded sewage spills or relatively rapid changes in salinity; and

(d) The long persistence times of some enteric viruses in the marine environment, the hydrology of the Waikare Inlet/Kawakawa River region, the ability of Pacific Oysters to concentrate viruses out of their growing waters, and the longer persistence of norovirus in Pacific Oysters suggests that under some conditions (ie: when there is a significant rainfall in the Kawakawa catchment) viruses entering the Kawakawa River at Kawakawa could potentially be accumulated in significant numbers by oysters in Waikare Inlet.

[167] Although in her evidence in chief Ms Hay said that the incident not associated with rapid changes in salinity or a documented sewage spill was associated with a time when boat numbers in the Opua region were likely to have been significantly increased due to the Coastal Classic Yacht Race, on cross-

examination her evidence was that all three contamination events at issue in these proceedings were linked to high rainfall events and sewage spills.

[168] In relation to the 1994 event Ms Hay relied upon what she said were elevated faecal coliform readings downstream from the treatment plant in September and October of 1994, which she believed were consistent with a spill event. On cross-examination Ms Hay accepted that the 1994 reading she was referring to was upstream of the plant and even then that that reading was well within the levels permitted under Water Right 1168.

[169] Ms Hay's evidence does not assist the plaintiffs in establishing the Kawakawa Scheme as a likely source of the contamination. Put at its highest, her evidence goes no further than saying that the Kawakawa Scheme is a possible source; one that cannot be scientifically excluded as the cause of contamination. Further, even this view is based on factual assumptions not made out in the evidence. Although it was not clearly articulated by her, her evidence in relation to the contamination events proceeded upon two assumptions. Firstly, that when there are significant rainfall events it can be assumed that there will have been a discharge of raw or partially treated sewage from the sewerage reticulation and treatment plant. Second, she assumes, relying upon Mr Robinson's salinity results, the presence of large volumes of fresh water from the Kawakawa River in Growing Area 206 prior to the contamination events. Finally, although pre 2001 data may suggest higher rates of norovirus contamination in the lower than the upper Waikare Inlet, that is also consistent with the source of the contamination being boats, or on-site disposal units.

[170] In closing, Mr Pidgeon submitted that Ms Hay had given detailed evidence on virus survival in water and had concluded that it is "perfectly feasible for viruses to survive in the Waikare Inlet". Ms Hay did give general evidence about virus survival, the mechanics of de-activation, survival of viruses in oysters and difficulties in detecting viruses. She did not however address the ability of viruses to survive a trip of over 13 kilometres, and in the relevant conditions.

[171] The plaintiffs also relied upon the evidence of Ms Kelly Roberts who gave evidence in relation to a study she had undertaken into human enteric virus occurrence and transport in the Waikare Inlet from 2001 to 2002. She said that she took oyster and water samples at various sites, twice in October 2001 and December 2001, twice in January 2002 and once in March 2002. She collected sediment samples in July 2002. Her evidence was confusingly presented and difficult to follow, but counsel must bear at least part of the responsibility for that. Her evidence was that:

a) Norovirus was not detected in any oysters from the Waikare Inlet farming area. Norovirus was detected on two occasions from an oyster sample at the Kawakawa River mouth and from a water sample taken at the raw sewage *inlet* pipe of the Kawakawa sewage treatment plant;

b) The only samples where all three enteroviruses tested for (adenovirus, enterovirus and norovirus) were found, was in the raw sewage inlet pipe of the Kawakawa sewage treatment plant and from an oyster sample at the Kawakawa River mouth;

c) Faecal coliform levels could be predictive for adenovirus but not for other viruses tested. F-RNA bacteriophage showed no predictive value for any of the three enteroviruses; and

d) Norovirus was only detected after increased rainfall and river flow on 25 November 2001.

[172] She concludes that there is a constant low level source of enteric viruses into the Kawakawa River Estuary and Waikare Inlet, and that the treatment plant is a potential source of these. She says that the role of boat waste has not been clarified by her research.

[173] Mr Pidgeon submitted in closing that Ms Roberts had concluded on the basis of her research that the Kawakawa sewage treatment plant was polluting the oysters.

That is not a conclusion Ms Roberts draws, nor one that was available to her, based upon her limited research. Given that she could not exclude other potential sources of the norovirus she identified, such as on-site disposal units, or boating activity, her evidence does not greatly assist the plaintiffs.

[174] Dr Grohmann also identified that Ms Roberts had found zero F-RNA bacteriophage at the various testing sites on 18 and 25 October 2001, 28 December 2001, 9 & 29 January 2002 and 21 March 2002. He described that reading as very unusual because F-RNA bacteriophage would normally be found in inland waterways, estuaries or inlets such as the Kawakawa River and Estuary and the Waikare Inlet. He commented that this research, if accepted as correct, shows either that:

a) The treatment plant was working effectively and efficiently to the extent that it eliminated all viruses and associated bacteriophage; or

b) Viruses contained in any effluent from the treatment plant were not transported to the sampling sites.

[175] Dr Grohmann said that if either conclusion is correct, even if norovirus was discharged from the treatment plant, it was unlikely to be transported as far as Tiger Bay or Opua, let alone the Waikare Inlet. However, Dr Grohmann concluded the more likely explanation was that Ms Roberts had erred in her analysis of her samples, which he said would cast doubt about the validity of the remainder of her results.

[176] I prefer the latter explanation. Given the multiple sources of human faecal waste identified in evidence that potentially enter the waterways, a negative reading for F-RNA phage over such an extended area is simply unlikely.

[177] Therefore, to summarise, Ms Roberts' put the matter no higher than that the treatment plant is a likely source of enteric viruses. Her evidence does not link discharges from the treatment plant to contamination events in the Inlet. Although she comments that it is a potential source of the contamination she detected, she

could not clarify the role of other potential sources. My overall impression was that her research was limited in its extent, and was not directed to testing the possibility of a link between discharges from the Kawakawa Scheme, and contamination events in the Inlet. I also have concerns as to the reliability of the results given the unusual results in respect of the presence of F-RNA phage.

[178] Finally the plaintiffs relied upon the evidence of Mr Silver that on a visit to Ireland he had been told about an incident of contamination of oysters, where the oyster farm was 11 kilometres from a discharge of raw sewage. I attach no weight to this evidence. Mr Silver had not made a study of the incident. He was simply relaying information provided to him by others, and in those circumstances it was not possible to assess the validity of any comparison between that incident, and the issues in this proceeding. It was not suggested that the incident had been the subject of a properly conducted study, or was the subject of any published scientific report.

[179] In support of its defence that the Kawakawa Scheme was an unlikely source of the norovirus responsible for the contamination events FNDC called Dr Grohmann, virologist. Dr Grohmann has been involved in the investigation of outbreaks of enteric viruses linked to the consumption of shellfish. His evidence was that while the possibility of viruses contained within any discharge of sewage, treated or untreated, reaching the oyster farms in an active state, could not be excluded, this was very unlikely. His opinion was expressed to be given on three principal grounds:

a) Based on his knowledge of viruses, and in particular norovirus, such survival was unlikely;

b) His review of scientific literature which revealed no study in which viruses were recorded as surviving a trip of the distance, and in the exposed environment, that the plaintiffs argue is possible; and

c) The pattern of contamination events is inconsistent with the Kawakawa Scheme being its source.

[180] Dr Grohmann said that there is no accurate scientific data available on the survival of norovirus in the environment because the virus cannot be assayed by cell culture. Any PCR assay cannot show organism viability in the sense of whether it remains infective.

[181] Viruses rarely free float in the environment because of their highly charged protein shell which will naturally attach to debris. Therefore viruses naturally tend to settle in the receiving stream, although from time to time they can become re-suspended in the water column and move again only to resettle with particulates. Because a virus will not free float, it will not move downstream or with tides at the same rate as the water flow. As the virus moves in this fashion, attaching, detaching and re-attaching to particulates, it will be exposed to natural UV light.

[182] Dr Grohmann's evidence was that he had inspected the Kawakawa River, and River Estuary. He described the River as long, shallow in parts and meandering. He had flown its length to view the nature of the River and its course. His opinion was that because of the effect of ultraviolet light and proteolysis (the degradation of the protein shield surrounding the viruses genome) there is very little prospect that a virus could survive a trip of that nature and distance. He also said that the dilution effect of the tidal interchange, and rainfall, assuming a discharge occurred as a consequence of a rainfall event, made it even more unlikely that noroviruses would arrive in the Waikare Inlet in infective doses.

[183] Dr Grohmann said that there was no scientific study or literature that he was aware of that suggested that viruses could survive a trip through so many kilometres of a waterway, but he was able to refer to:

a) A study undertaken while he was working at Sydney Water where untreated sewage was discharged at sea, but viruses could not be found in swimming water some 3-5 kilometres away; and

b) Studies at Noosa in Australia, where treated effluent was discharged into a shallow creek leading onto a beach which showed that viruses

could be detected 0.5 kilometres after discharge, but not at 1-3 kilometres.

[184] Mr Pidgeon put to Dr Grohmann that he had previously given evidence in litigation arising from a contamination event in New South Wales, Australia which was inconsistent with the opinion he now expressed in relation to the distances that viruses can travel. The following passage from the judgment in *Environment Protection Authority v Gardner* [1997] NSWLEC 212 was put to Dr Grohmann which summarises the evidence he gave in that case:

> Dr Grohmann also gave evidence of a general nature as to the serious public health risk posed by the emission of viruses in human effluent into waters within the environment. Viruses such as adenoviruses, Hepatitis A, rotaviruses and enteroviruses all carry the potential to cause eye disease, respiratory disease, gastroenteritis, meningitis, temporary partial paralysis, fever or sore throat in humans. Once they have entered the water column, viruses can travel many kilometres and, if they lodge within sediment, can exist for several years. Viruses can travel through soil and rock down into groundwater. This means that illness caused by viruses within human effluent can occur at the time and point of the discharge of that effluent, or a long time and distance away from the point of discharge.

[185] It was put to him that he had said that when viruses enter the water column they can travel many kilometres. Dr Grohmann's response was that his evidence was specific to that case, where he was talking about an enclosed and protected waterway and where large volumes of untreated sewage were continually discharged. He said that even in that case, no viruses were found in sediment or oysters 3 to 5 kilometres away from the outfall.

[186] The plaintiff submitted that Dr Grohmann's evidence as to the survivability of viruses over long distances should be discounted in the light of his earlier inconsistent evidence in the *Gardner* case. It was submitted that this entirely discredited his evidence. However, I am inclined to accept Dr Grohmann's answer in cross-examination on this point that the facts of each case must be considered, and that his evidence there was given in relation to the particular facts of that case. I am also influenced in this view by the fact that Dr Grohmann was able to support his opinion by reference to a review of scientific literature he had undertaken in relation to norovirus survivability. No conflicting studies were put to him and no deficiency

was identified in his research methodology in identifying relevant studies. I therefore accept his evidence on this point.

[187] The plaintiffs also say that Dr Grohmann accepted in cross-examination that his evidence was given on the basis of properly treated effluent being discharged from Kawakawa. However, Dr Grohmann did not so limit his evidence. He accepted that viruses contained in treated effluent had a much lesser rate of survival, but he also addressed in his evidence the survival of viruses discharged from the sewerage reticulation.

[188] The final matter that Dr Grohmann refers to as supporting his conclusion that the Kawakawa Scheme is an unlikely cause of the contamination events is the absence of more regular contamination. He said that if the Kawakawa Scheme was responsible for the reported outbreaks then he would have expected to see many more incidents over the lifetime of the oyster farms. He referred to the evidence of a number of sewage spills which entered the waterways and the Kawakawa River and in particular the significant spill in 1996 where for two days raw sewage from Kawakawa entered the waterways at a time when the Kawakawa River was in flood. Dr Grohmann comments that that type of concentrated discharge is the type of discharge that he would expect to give rise to contamination to oysters within an acceptable proximity range. The discharge was of untreated effluent so that there would have been no virus removal whatsoever. He said that the fact that this discharge did not give rise to a contamination event supports his conclusion that the distance between Kawakawa and the oyster farms is too great to present a real risk.

[189] This latter point has a compelling logic to it, and I found Dr Grohmann's evidence overall persuasive. I am satisfied that while the possibility of viruses surviving the distance and dilution effect to reach Growing Area 206 in an infective dose cannot be eliminated, it is very unlikely.

(iii) Are there other more likely sources of faecal contamination in the Waikare Inlet?

[190] The other principal point raised by FNDC by way of defence on the issue of causation was the existence of other more likely sources of contamination. It was common ground between the parties that as at 2001 there were the following potential sources of faecal contamination of the Waikare Inlet, as described by the plaintiffs' expert Ms Brenda Hay, a Marine Biologist with Aqua Bio Consultants:

a) The onsite sewage disposal systems at Okiato Point and Opua;

b) Onsite sewage disposal units around the shores of the Waikare Inlet;

c) The onsite sewage disposal system at the Opua industrial estate; and

d) Sewage discharges from boats, including commercial boat operators, and those at the Opua Marina, the Customs Quarantine Area at that Marina and permanent moorings at Opua.

Onsite disposal systems around the shores of the Inlet and Okiato Point

[191] In 2001, there were approximately 360 septic tanks, longdrops and onsite disposal systems around the Waikare Inlet, Opua and Okiato Point.

[192] Mr Donald McInnes, an oyster farmer in Growing Area 206 was subpoenaed to give evidence by FNDC. He is not one of the plaintiffs in this action. His farm is located in Tiger Bay, which is at the very western most end of the Inlet, just around the point from the Kawakawa River Estuary. Okiato Point is across the estuary from Opua. Although none of the oysters linked to the August 2001 outbreak of norovirus were traced back to his farm, his farm is classified as restricted along with the rest of Growing Area 206. He gave evidence that his farm had earlier been linked to an outbreak of gastro-enteritis in September 2000. The outbreak was investigated by Northland Health and traced to a septic tank at a property directly behind his farm.

[193] In September 2001 the Environmental Health Officer for FNDC undertook a survey of the settlement at Okiato Point to assess onsite disposal. His opinion was that Okiato Point was an unsuitable area for the use of septic tanks in conjunction with soakholes or disposal fields, because of the clay ground conditions. His survey

revealed that 28% of the waste water systems were faulty and a further 7% doubtful. His opinion was that they were part of the contributing factors to intermittent faecal contamination of the lower Waikare Inlet.

[194] As a consequence of this report FNDC officers undertook a more detailed inspection of onsite disposal systems at the Point. Dye testing from the faulty tanks confirmed that run-off from the tanks entered the stormwater system and from there went into the Veronica Channel. Seven systems were identified as requiring full replacement. In respect of 80 sites, significant remedial work was identified and subsequently undertaken. The nearest oyster farm to Okiato Point is one of the Plaintiffs' farms, Lease 64, held by Mr Davenport. It is only 300 metres away from Okiato Point.

[195] Mr Harding gave evidence that because of the type of soils common in the area onsite disposal is problematic. He said:

> There is generally insufficient soakage to provide satisfactory 365 day/year disposal of the effluent. There is significant risk that rain will result in polluted runoff, which will make its way to the sea. It is possible that the worst of the effluent disposal systems are causing almost continuous runoff.

[196] The Northland Health's draft sanitary survey report continues to identify Okiato Point as a potential source of contamination.

[197] I find that the onsite disposal units at Okiato Point were, and continue to be, significant sources of faecal contamination of the Waikare Inlet. In relation to the on site disposal units around the shores of the Inlet, I am satisfied that on one occasion at least one of those units has caused faecal contamination of waters of the Inlet, and more particularly, the oyster farm of Mr Donald McInnes, in Growing Area 206.

Opua onsite disposal

[198] Part of Opua is not reticulated for sewage. In 2003 FNDC identified that there were properties in English Bay Road, Opua, with defective on site disposal systems allowing mingling with stormwater and effluent, which could find its way into the waters of Veronica Channel.

[199] In late 2005, the Council monitoring team was again involved in investigating the Opua/English Bay area for possible sources of sewage discharge into the sea. Four properties in Franklin Street were identified as problematic. Two were discharging effluent down the hill to Beach Road, which leads to the harbour. One property had a pipe from its septic tank which allowed effluent to travel down a bank and directly toward the sea. These four systems have since been the subject of remedial work.

[200] The waters which pass into and out of the Waikare Inlet travel past Opua and therefore pick up any faecal contamination in the area which result from onsite disposal systems. Mr Silver has confirmed that the problems with onsite disposal systems at Opua is a continuing concern for Northland Health and impacting upon the classification of the oyster farms. On site disposal units at Opua were, and continue to be, a source of faecal contamination.

Effluent discharge from boats

[201] A large number of recreational craft use the Veronica Channel and immediate surrounds for temporary or permanent mooring. There are boats on permanent moorings alongside the Opua Marina. The Opua Marina has approximately 250 boats and is only about half a kilometre from the western most part of Growing Area 206. Visiting boats regularly moor in Veronica Channel. At Opua there is a Customs Clearance Area where overseas boats are required to moor pending inspection by Customs Officers. In all of these situations there is the potential for boats to discharge toilet waste overboard. That waste is untreated and a likely source of faecal contamination into the Veronica Channel and from there into the Waikare Inlet. Dr Greening confirmed that discharge of vomit or faecal waste from boats has the potential to contaminate a large area.

[202] Following on from the Aqua Bio survey NRC has taken steps to address the risk of discharge from boats. Mr Elliott's evidence was that NRC has introduced a regular survey of moored boats aimed at locating persons living aboard and advising them of restrictions relating to discharges from boats. NRC also actively works with Opua Marina to minimise the risk of illegal discharges from boats in the marina.

NRC is also now attempting to address the issue of potential discharges from overseas boats while waiting at the Opua Customs Quarantine area for clearance.

[203] Nevertheless, Mr Silver was of the opinion that the 2004 shigella outbreak was more likely to have come from a discharge from a boat tank than from the sewage treatment plant. This is because shigella is a bacterial organism and bacteria survive for only a short time when exposed to the environment. He identifies discharge from boats as being of continuing concern.

[204] Mr Robinson confirmed that if there were contaminants in the water in the vicinity of Okiato Point and the boats on anchor and moored thereabouts, there is a high probability that that contamination would be carried down through to the leases. It is significant that of all the other potential sources of contamination, the Kawakawa Scheme is by far the most geographically distant from the Inlet.

Conclusion, Causation

[205] The plaintiffs have failed to prove that, on the balance of probabilities, discharges of raw sewage from the sewerage reticulation or partially treated sewage from the treatment plant were the cause of any of the contamination events, and in particular the 2001 contamination event that led to the reclassification. The plaintiffs have not proved that it is more likely than not that:

a) Any discharge of raw sewage occurred at a time prior but proximate to the three contamination events relied upon;

b) The treatment plant regularly discharged partially treated sewage at times of moderate or heavy rainfall; and

c) At a time prior but proximate to the contamination events, the oyster farms were exposed to norovirus originating from the Kawakawa Scheme.

[206] I accept the evidence of Ms Hay and Dr Greening that it is impossible to exclude the Kawakawa Scheme as a potential source of contamination, however I am persuaded that it is a most unlikely source of that contamination because:

a) Of the distance the treatment plant is from the farms, which makes it very unlikely that viruses would survive the journey from the point of discharge to the farms;

b) Any discharge from the Kawakawa Scheme would be massively diluted by river and tidal waters;

c) The pattern of contamination events is not what would be expected were the Kawakawa Scheme the source of the viruses; and

d) There are other more likely sources of contamination.

[207] Even were I to apply the causation test formulated in *Fairchild*, that would not assist the plaintiffs. In *Fairchild* there was no doubt that each employer had exposed the employee to asbestos, the only issue was which breach had caused the damage. There is no proof in this case that active norovirus from the Kawakawa Scheme reached the oyster farms in sufficient numbers to be infective, and I have held that it is unlikely that they did.

[208] The decision in *Pride of Derby v British Celanese* [1952] 1 All ER 1326, relied upon by the plaintiffs, also does not bridge the gap for the plaintiffs on causation. In that case it was held that multiple defendants could be liable for a nuisance in respect of concurrent pollution, each defendant having been proven to have contributed to the damage. The plaintiff's waters were found to have been polluted by the combined effects of the defendants' activities. Harman J held that once an actionable wrong is established against one party, it is no defence for the other parties to argue that their own acts must thereafter be harmless and not actionable. That approach was confirmed on appeal. In that case there was proof that the defendants were discharging the pollutant into the waterway. The issue was

not, as it is here, whether the discharge complained of occurred, and if it did, whether the contamination reached the plaintiffs' waters.

D. Nuisance/Contamination Claim: Reasonable foreseeability

[209] Assuming that the plaintiffs could prove discharges of raw and partially treated sewage at times proximate to the contamination events and that the discharges caused the damage, the plaintiffs also have to prove that it was foreseeable that the discharges were likely to cause the lengthy reclassification of Growing Area 206. It is not enough for the plaintiffs to show that it was reasonably foreseeable that the alleged spills or discharges would occur or even that they would cause or contribute to contamination of Growing Area 206 because the contamination is not the damage which gives rise to the losses claimed. The plaintiffs must show that it was reasonably foreseeable that the contamination would lead to the reclassifications.

[210] The requirement for foreseeability of damage in an action for nuisance has been confirmed in *Cambridge Water Co Ltd v Eastern Counties Leather Plc* [1994] 2 AC 264. Damage is foreseeable only where there is a real risk of damage; a risk that would occur to the mind of a reasonable person in the position of the defendant, and one which he would not brush aside as far fetched: *Hamilton v Papakura District Council*.

[211] Although the plaintiffs did not articulate in any detailed way the basis on which they contend that the damage was reasonably foreseeable, I have inferred, after consideration of the evidence, that they rely upon the following:

(a) Raw or partially treated sewage spilled into a river that led down to a channel through which, in turn, the tidal waters of the Waikare Inlet pass;

(b) FNDC knew the extent and frequency of such spillages as evidenced by various engineering reports, the internal Council memo of September 1990 and the NRC spill register;

(c) Prior to the contamination event in 2001, there had been other contamination events; and

(d) The oyster farmers participated in the consent hearings in relation to the review of the discharge caused from the treatment plant, and submitted and produced evidence of a risk of viral contamination of Growing Area 206 if the treatment plant was not sufficiently upgraded.

[212] By the time of the consent hearings in December 2000 at the latest it is apparent that oyster farmers in the region and Northland Health were identifying a risk to human health in recreational shellfish gathering from the discharge from the treatment plant. The document entitled Report and Decision of the Hearings Committee in respect of the 15 December 2000 hearing relating to FNDC's application to discharge treated waste water into the river, records that evidence had been presented which indicated that any discharge to the River posed a contamination risk to the shellfish downstream through viruses in the discharge.

[213] However, it is material, when weighing this evidence, that while there had been previous contamination events prior to those hearings, there is no evidence to suggest that those outbreaks were thought to have been linked to the Kawakawa Scheme. Mr Silver and Mr Denison confirmed that at the times of the 1994 and 1999 contamination events Northland Health thought that the contamination was linked to boats discharging in the area, and the 2000 event at Donald McInnes' farm in Tiger Bay was clearly linked to a septic tank near his farm.

[214] There had also been occasions on which serious discharges of raw sewage from the Pumping Station and sewerage reticulation had occurred, but in respect of which there had been no reported contamination event. Further, previous contamination events had resulted in temporary closures only. Notwithstanding the low number of contaminated oysters identified to have come from Growing Area 206, when the 2001 contamination event occurred, the NZFSA decided not to reopen the area as conditionally approved until the source of the contamination had been

identified and eliminated. Counsel for FNDC correctly characterised this as a zero tolerance policy, and Ms McCoubrey accepted that it was imposing rigid standards.

[215] On the basis of this evidence I conclude that prior to August 2001 FNDC had the risk of viral contamination from discharges brought to its attention. However, it would, in all the circumstances, have regarded the risk of lengthy reclassification of the Waikare Inlet as remote. The Scheme had been operating for many years; for as long or longer than the oyster farms had been in operation. Discharges of raw or partially treated sewage were known to have occurred in the past, but were not thought to be linked to contamination events. FNDC were aware that previous contamination events had led to temporary closure only, not a protracted reclassification. Having weighed these matters, I conclude that the plaintiffs have failed to prove that the risk of lengthy reclassification was a reasonably foreseeable consequence of the discharge of raw or partially treated sewage from the Kawakawa Scheme.

[216] Given my findings that the discharges from the Kawakawa Scheme did not cause the contamination of the plaintiffs' oyster farms, and my findings in relation to reasonable foreseeability, I do not need to address the third issue in relation to this cause of action, as to whether the level of interference occasioned by the discharge was unreasonable.

E. Negligence/Contamination Cause of Action

[217] The plaintiffs allege that FNDC owed them a duty of care in relation to the use, operation and management of the Kawakawa Scheme, and that they failed to exercise reasonable care, skill and diligence.

[218] I have already held that the plaintiffs have failed to prove that any discharge from the Kawakawa Scheme caused the contamination, and that the damage was not reasonably foreseeable. These findings are fatal to the plaintiffs' negligence/contamination cause of action.

[219] Given those findings in relation to causation and foreseeability, it is not appropriate that I embark upon a consideration of whether a duty of care should be imposed in this situation. I note that the plaintiffs did not properly articulate the content of the alleged duty, but I infer it is a duty to take reasonable care to prevent the discharge of raw or partially treated sewage from the Kawakawa Scheme. The imposition of such a duty upon a local authority operating within financial constraints to provide a service of considerable social utility raises policy issues, and it is not appropriate to embark upon a discussion of those issues when the existence and content of such a duty does not on the facts, fall to be decided in light of my findings as to causation.

[220] However, I do propose to consider the allegations as to the use, operation and management of the Scheme, having heard and considered extensive evidence on this issue, and for these purposes assume the existence of such a duty of care.

[221] It is alleged in the statement of claim that FNDC's use, operation and management of the sewage scheme caused the discharges. The following particulars were provided of the allegation:

(a) FNDC breached the conditions of the Resource Consent granted by the NRC.

(b) FNDC did not regularly remove and dispose of sludge from the treatment system's oxidation ponds.

(c) The capacity of FNDC's sewage ponds was inadequate to meet the demands of its users.

(d) The design of the ponds was not appropriate to secure the satisfactory operation of the ponds to prevent discharge of untreated sewage into the Kawakawa River.

(e) The failure to properly manage the ponds to ensure the untreated sewage would not discharge into the Kawakawa River.

(f) The failure to upgrade the treatment system to prevent such discharge.

(g) Breaching the conditions of resource consents that impose standards on the quality of effluent discharged into the Kawakawa River, and the quality of the water in the River.

(h) Failing to warn the plaintiffs or any of them when there has been discharges of sewage effluent into the river, so that they could delay harvesting the oysters until they were clear of contamination.

(i) Failing to prevent the discharge of sewage effluent into the Kawakawa River.

(j) Failing to prevent raw sewage inflow into the Kawakawa River from rising main bursts and/or leaking or failing manholes.

(k) Failing to properly design, maintain and inspect the Kawakawa Township sewerage and stormwater system to the extent that there are illegal connections, pumping station breakdown, faulty installations and damaged pipeworks, so that during periods of heavy rain the sewerage system can be overloaded by sudden increases of water, which then overflow, polluting nearby areas.

(l) Placing the discharge pipe from the Kawakawa Sewerage treatment plant at such a height that it is prevented from being submerged by floodwater.

[222] The plaintiffs principally rely upon the evidence of Mr Fullerton to prove that FNDC:

a) Failed to take steps to address the deficiencies in the reticulation that existed when it inherited the system, and even allowed them to worsen;

b) Exacerbated the situation by:

- Failing to maintain adequate depth in the treatment ponds.

- Failing to install and maintain flap valves on the discharge pipes from pond 2 so that the backflow from the river into the pond could occur in flood conditions.

- Failing to monitor the quality of the discharge.

[223] There is an allegation also that FNDC failed to warn the oyster growers when discharges occurred so that they could delay harvesting oysters until they were clear of contamination.

[224] The plaintiffs' case as it emerged after evidence was not, as pleaded, that the design and capacity of the ponds was inadequate to meet the demands of its users and prevent the discharge of untreated sewage into the Kawakawa River. Mr Fullerton confirmed in his evidence that the plant was adequately sized for the population. The problem he identified was inadequate capacity to cope with volumes in wet weather because of stormwater infiltration. Mr Pidgeon clarified during submissions that the plaintiffs' complaint was not with the design of the treatment plant, but rather with deficiencies in the sewerage reticulation (including the Pumping Station) and with the plant's operation during rain events because of these problems. Further, the focus of the evidence of Mr Fullerton was not upon the cause of the deficiencies in the reticulation, but rather upon the adequacy of FNDC's response in the period of time after 1989, and the coming into effect of the Reorganisation Order. Accordingly notwithstanding the provisions of clause 115 of the Reorganisation Order, the plaintiffs' claim focused upon alleged breaches of duty occurring after 1989.

Breach of duty: relevant principles

[225] In determining whether there has been a breach of the duty to take reasonable care, it is necessary to weigh up:

- the nature and foreseeability of the potential risk, danger or harm in question.

- the probability of that harm eventuating; and

- the expense and difficulty for a defendant in alleviating that harm.

(*Wagon Mound Overseas Tankship (UK) Ltd v The Miller Steamship Co Pty Ltd* (No 2) [1967] 1AC 617.

[226] When the defendant is a local authority the last enumerated point comes particularly into focus, given the practical reality for such bodies of limited funding and often competing priorities for those funds. In *Crimmins v Stevedoring Industry*

Finance Committee Gaudron J considered the special considerations that applied when considering the nature of any duty on a public body:

> A public body or statutory authority only has those powers that are conferred upon it. And it only has the resources with which it is provided. If the common law imposes a duty of care on a statutory authority in relation to the exercise or non-exercise of its powers or functions, it only imposes a duty to take those steps that a reasonable authority with the same powers and resources would have taken in the circumstances in question.

[227] The issue of limitation of resources effecting local authorities, and competing priorities are often taken into account when determining the existence and scope of the duty, as opposed to whether a duty held to exist has been breached. The authors of Todd *The Law of Torts in New Zealand* at 6.6.02(5) and 7.3 argue that pragmatic considerations such as the burden of taking precautions against harm, the availability of resources and the economic feasibility of preventative steps are better taken into account when determining whether a breach of duty has occurred.

Breach of duty: evidence

(a) Reticulation system

[228] The Infiltrol report obtained by FNDC on assuming control of the Kawakawa Scheme in 1989 identified that a proportion of the reticulation was in a bad state of repair requiring extensive work to rectify both structural defects and stormwater infiltration sources. The report writers said that there was a need for a comprehensive programme of rehabilitation due to the problems directly resulting from excessive infiltration of stormwater into the system.

[229] The report described three options. The first was to leave the public sewer system as it was. The report writers said:

> The result of this can already be seen during heavy rainfall i.e. raw sewage discharging from flooded manholes onto lawns, streets, paddocks, and into rivers.

[230] The second option identified was to increase the capacity of the sewerage system to cope with the infiltration. However, the report writers concluded that due

to the bad state of repair of a number of the drains, that would involve draining much of the ground water in Kawakawa after heavy rain, pumping it and treating it.

[231] The third option identified was to embark on a programme of rehabilitation of the whole sewerage system, in order to reduce infiltration to an acceptable level. The engineers recommended either that the work be carried out under one contract after a major investigation or that there be money set aside each year for immediate repair work and continual investigations.

[232] Following on from the receipt of the Infiltrol report, an internal FNDC report was generated regarding the Kawakawa Scheme. That report has already been referred to. The report writer identified the need to obtain good information to enable a focused repair programme. The assessment of the situation was that $1.3 to $1.6 million was needed to be spent to eliminate discharges of untreated effluent from manholes and the North Road Pumping Station. It was recommended that the work be staged over 2-3 years.

Plaintiffs' criticism

[233] In relation to the issues concerning the reticulation system, Mr Fullerton said that he had not discovered documents to show FNDC let contracts for major repairs of the sewers or manholes in the period 1992-1997. He said that he located in the FNDC records a survey in 1997 that found 186 of 229 manholes needed repair and also identified serious silting of flat grade sewers. Contracts for repairs and manholes and pipeline problems of "large to medium severity" were carried out during 1999 to 2001 but some manhole repairs remained outstanding.

[234] In relation to the pumping station, Mr Fullerton observed that excessive inflows of stormwater meant that there were significant overflow events at the pumping station. His opinion was that the North Road Pumping Station was very old and in an apparently dilapidated condition and that the installed pump capacity was inadequate and larger pumps were required. He said that an emergency storage volume of 73 square metres should have been provided, whereas available storage

was only about 26 metres. Although the Pumping Station was upgraded in 2001, further emergency overflow storage was not provided until 2004.

Extent of works undertaken since 1990

[235] It appears that at least to some extent, it was the third option identified by Infiltrol in its 1990 report that FNDC adopted; embarking on a programme of rehabilitation of the Kawakawa Scheme.

[236] Mr Manley and Mr Down, FNDC's Asset Management Co-ordinator, both gave evidence as to the works undertaken by FNDC to address the problems with the sewerage reticulation, including the North Road Pumping Station. Mr Manley said that FNDC did not have the funds estimated in 1990 as required to rehabilitate the Scheme, in line with the third option in the Infiltrol Report. Because of the funding shortfall on 23 October 1990 FNDC applied to Northland Health for funding. The funding sought was $1.6 million on the basis of the Infiltrol report. Northland Health declined FNDC's funding application.

[237] In the 1990/1991 financial year FNDC was able to generate only $125,000 for repair work. At that time FNDC engaged a company called Jetco Group Limited to undertake grouting repairs on the sewers and manholes. It was understood that this work would significantly reduce stormwater infiltration. Mr Manley's evidence was that the work was less expensive than other options such as replacing infrastructure, but was understood to be likely to significantly reduce stormwater infiltration, and was affordable to the Council. The work commenced on 5 March 1991.

[238] Mr Down's evidence was that in the early 1990s the investigative techniques available to identify the nature and extent of defects in reticulation were limited, and the causes of infiltration were many. Remedial works were therefore difficult to complete and expensive. In May 1991 a further report was obtained from Infiltrol making recommendations for remedial work, timing of work, and budgeting for the 1991/1992 to 1993 financial years. Mr Down said that FNDC used that report to allocate priority.

[239] In 1993 the Council engaged a contractor, Paihia Contractors, to undertake remedial work to the manholes which were identified in the report as having the most serious stormwater infiltration problem.

[240] Thereafter Mr Manley said remedial work was undertaken annually where possible, but always subject to funds being available. The approach adopted from FNDC's point of view was to incur the costs of doing the remedial work which had the most dramatic impact upon improving the system. Consultants were therefore engaged on an on-going basis to identify priorities for FNDC.

[241] In 1991 the rising main river crossing between the pump station and the ponds was highly visible in the Kawakawa River and was considered to be at risk of damage by rocks and logs floating down the river. In 1993 FNDC replaced that pipeline with a new polyethylene pipeline directionally drilled under the river.

[242] Through a series of pipeline failures between 1995 and October 1996, FNDC identified that the rising main between the Kawakawa River crossing and the Kawakawa sewage treatment plant was in need of replacement. That then became a priority for FNDC and in 1997 the pipeline was programmed for replacement. That replacement was completed in June 1998.

[243] In the 1996/1997 year, $110,000 was budgeted for a further Infiltrol survey and repairs. In 1997 Fraser Thomas Consulting Engineers were engaged to investigate the reticulation and provide advice. That relationship continued until 1999. Fraser Thomas' investigations involved house to house checks for illegal connections, smoke testing and video surveillance of in pipes in Kawakawa.

[244] By 1999, Mr Down's evidence was that virtually all of the remedial work identified had been completed but for around what he characterised as 45 minor or patchy repairs to areas within the reticulation system. Notwithstanding that, stormwater infiltration continued to cause on-going problems, with the North Road Pumping Station overflowing on occasion, which was not fully addressed until 2004 when additional storage capacity was added to receive overflows at the pumping station.

[245] In 2003 the Sanitary Works Subsidy Scheme referred to earlier was introduced by the Government to improve health and environmental protection available to poorer communities. Under this scheme, 50% of capital costs can be met by the Ministry of Health if the proposed works are accepted for funding. The Scheme targets capital works and does not therefore assist with the funding of repairs to reticulation. Details of expenditure on the Sewerage Scheme since 1999 were produced by Mr Manley.

[246] From 1999 to 2006, $6.7 million has been spent on carrying out further upgrades to the Kawakawa sewage treatment plant and associated reticulation. Works undertaken have included:

a) A significant de-sludging of the ponds completed in 2001;

b) An ongoing upgrading of the reticulation system to address infiltration issues;

c) Replacement and then further upgrading of the North Road pumping station; and

d) A substantial upgrading of the treatment plant to include filtration and UV disinfection after the primary pond, and the conversion of the secondary (maturation) pond into a subsurface gravel wetland.

[247] It appears to be the plaintiffs' argument that FNDC was in breach of duty because following the release of the Infiltrol report it failed to immediately address all reticulation issues. However, the evidence establishes that FNDC had limited funding. It applied all available resources to rectify the defects in the reticulation system. FNDC used consultants to identify priorities and address those priorities as funds became available. As soon as Government subsidies became available it accessed those funds to undertake a substantial upgrade. The plaintiffs could not point to any way in which FNDC could have addressed the funding shortfall other than to borrow, but Mr Manley's evidence was that FNDC was at or close to its borrowing limits at relevant times. FNDC also had competing priorities. It had

other communities with no sewerage reticulation such as Moerewa, which, in Mr Harding's evidence, presented greater public health issues than the Kawakawa Scheme, even in a dilapidated state.

Failure to maintain adequate depth in treatment ponds

[248] Mr Fullerton criticised FNDC for failing to maintain adequate pond depth. In particular his evidence was that FNDC exacerbated the problems of stormwater infiltration during rain events, by failing to desludge, keep stock and vegetation clear of the ponds, and prevent stormwater from surrounding lands entering the ponds. The earlier finding that the plaintiffs have not established discharge of partially treated sewage from the ponds disposes of this allegation. In any case, Mr Fullerton's evidence was not that the failure to desludge caused the alleged discharges, but rather that it exacerbated the extent of those discharges. Even on the plaintiffs' case therefore, these alleged failures by FNDC could not be said to be causally connected to the contamination events.

Monitoring microbiological levels

[249] Mr Fullerton also criticised FNDC for failing to monitor the microbiological quality of the effluent in accordance with the sampling conditions stipulated in the Water Right, pursuant to which the pond was operated between 1988 to 1998. He conceded, however, that the extent of sampling required by that Water Right was uncertain and that water sampling was undertaken by NRC. NRC were undertaking regular testing of discharge from 1988 and by 1998 the evidence is clear that Impact Services was undertaking regular monitoring. In these circumstances Mr Fullerton's criticisms do not have any merit.

Failure to warn the plaintiffs of discharge so plaintiffs could delay harvest

[250] The evidence of Mr Down was that if there was a spill FNDC would promptly advise NRC and/or Northland Health. Mr Elliot, NRC, said that the NRC would ensure that Northland Health had been notified as it is Northland Health that

makes the necessary decisions regarding public health and what to do with the oyster farms.

[251] I am satisfied that that was adequate notification by FNDC as it was Northland Health that was charged with making determinations regarding suppression of harvesting, those decisions informed by public health considerations.

Summary conclusions

In summary, FNDC has taken steps over a period of time from 1990 to the present day, to remedy defects in the sewage reticulation. The repairs were not undertaken immediately but in stages. I am satisfied that, having regard to the limited resources available to FNDC it proceeded properly to allocate those resources to the most pressing priorities as identified by consultants engaged for this purpose.

Nuisance/Classification Cause of Action

[252] The classification causes of action received scant attention in the plaintiffs' closing but Mr Pidgeon did address these causes of action briefly during his opening. The plaintiffs' claim appears to be that even if the Kawakawa Scheme cannot be proved to have caused the contamination event or events that triggered the reclassification, then FNDC should still be liable in nuisance (and negligence) for interfering with the plaintiffs' use of their farms. This is put on the basis that the on-going discharge of raw and partially treated sewage by FNDC from the Kawakawa Scheme has prevented the reclassification of Growing Area 206 since 2001.

[253] Although the plaintiffs rely upon the evidence contained in the NRC spill register of discharges, the 2004 controlled spill, and the continuing problems with overflows from the North Road Pumping Stations (the subject of an abatement notice from NRC), the claim proceeds on the assumption that it is not proven that the spills caused contamination of the oysters, but simply that the spills and discharges have prevented the reclassification of the farms.

[254] It is an essential element of any nuisance claim that the damage be caused by an activity or state of affairs on the defendant's land. I have held that it is most unlikely that infective doses of norovirus from the Kawakawa Scheme reached Growing Area 206. Accordingly no discharge from the Kawakawa Scheme is proven to have affected the growing waters. It would be extending the neighbourhood principle too far to hold a defendant liable for a third party's perception that the defendant's use of land is detrimentally affecting the plaintiffs' land.

[255] In any case, the plaintiffs have failed to establish a link between any spills and discharges from the Kawakawa Scheme and the regulatory authorities refusal (Northland Health and NZFSA) to again reclassify Growing Area 206 as conditionally approved. It is plain from the draft 12 year Sanitary Survey, the evidence of Mr Silver and that of Ms McCoubrey, that Growing Area 206 has not been reclassified because of a concern regarding continued presence of faecal pollution. However, Mr Silver said that there are several concerns that need to be addressed before reclassification will occur including concerns regarding the on site disposal systems at Okiato Point and Opua as well as discharges from boats. In relation to the Kawakawa treatment plant, he said that if it was performing well and in compliance with the resource consent, he would still need to determine the capacity of the plant to inactivate the viral load, determine the likely viable fraction in the outflow and model a boundary line that would meet a particular standard of 0.04 viral particles.

[256] Ms McCoubrey agreed that predictability was the key issue in terms of reclassification. She said:

> We first of all need to know where pollution comes from in the area and we need to be able to predict how those sources will perform, so that when we do allow harvesting of the shellfish, we are comfortable that they are unlikely to cause human illness.

In relation to spills from the Kawakawa Scheme, Ms McCoubrey confirmed that if there was an adequate notification system, spills would not prevent reclassification. She accepted that achieving predictability in connection with a sewage treatment plant would be easier than achieving predictability from discharges from boats.

[257] There is now a fully functioning upgraded treatment plant. The principal component of that upgrade, the ultra violet light disinfection unit was in place in December 2002. Mr Elliott's evidence was that the level of performance of the upgraded plant is such that the quality of the discharge is generally better than the upstream water quality in terms of the presence of ecoli, and that there is compliance with resource consents. Concerns regarding the North Road Pumping Station have been addressed. Yet still there has been no reclassification. Having considered this evidence I have concluded that the restricted classification remains in place because of:

(i) Northland Health's concerns regarding oyster farms operating within approximately 13 kilometres of the upgraded treatment plant. This is unrelated to concerns regarding spills and discharges the plaintiffs rely upon, but relates to the possibility of virus being present even in fully treated effluent.

(ii) The continuing lack of certainty about where pollution is sourced from, and the consequent lack of predictability as to when contamination will occur.

[258] I am satisfied that accidental spills and discharges from the Kawakawa Scheme are predictable and could be managed by the NZFSA so as to allow a reclassification to conditionally approved if that were the only issue facing the oyster farmers.

[259] Accordingly this cause of action must fail. I do not separately address the negligence/classification cause of action as it has the same insurmountable causation difficulties. I would not in any event be prepared to impose a duty on FNDC to operate and maintain the Kawakawa Scheme so as to avoid reclassification of the oyster farms by a third party statutory body. There are many reasons why such a duty of care would not be imposed but perhaps the greatest difficulty would be that the duty imposed would be a shifting one, depending upon the mind of the regulatory authority at the time. It would also likely impose a disproportionate economic burden upon the community for the benefit of a few.

Other matters

[260] Given my findings in relation to causation and foreseeability, I do not need to address the statutory authority defence raised by FNDC or FNDC's pleas of contributory negligence, voluntary assumption of risk and failure to mitigate. I also do not address the issue of quantum.

[261] The plaintiffs' claims therefore fail and FNDC is entitled to judgment.

[262] If counsel are unable to agree on the issue of costs I propose to hear them at 9.00 am on Monday 4 December 2006 at which time one hour will be set aside for argument. FNDC should file and serve an outline of its arguments on costs (no longer than five pages) by Monday 20 November 2006. The plaintiffs' reply, again limited to five pages, is to be filed and served by Monday 27 November 2006.

Winkelmann J

APPENDIX

Purerua
Cape Wiwiki
Tikitiki I
Harakeke I
Mataka
258
Howe Pt
Whale Bay
Rangihoua Bay
Wairoa Bay
Te Pahi I
Poraenui Pt
Tareha Pt
Black Rocks
Kent Passage
Moturoa I
Inlet
86
87
56
85
Te Kume
Onewhero Bay
Brampton Shoal
Bay of Islands
Motutara Rk
Te Nunuhe Rk
Kariparipa Pt
Okahu I
Urupukapuka I
Waewaetorea I
Motukiekie I
Moturua I
Otehei Bay
99
Motuarohia I
Tapeka Pt
Te Rawhiti Inlet
Paramena Reef
Rawhiti
345
Pukehuia
Wairoa Bay
Waihihi Bay
Maiki Hill
98
Oneroa Bay
Manawaora Bay
Paroa Bay
Parekura Bay
Parekura Bay
153
Russell
Waitangi
Motumaire I
138
Te Puke
Haruru
Paihia
Pomare Bay
179
Paroa Bay
Manawaora
Frenchmans Swamp
152
216
227
347
Orongo Bay
Okiato
Veronica Chan
Waikare Inlet
427
Ngaiotonga
98
Otao
Opua
Whangae Bridge
215
Waihaha
Te Ranga
Tutaematai
314
Waikare
Kawakawa
229
306
232
166
Taumarere
Karetu
Pukeatua
224
Otamamua
311
217
1
Kawakawa
Moerewa
360
Monoa
427
168
Te Rangi
407
Pukemoremore
399
195
182
Waiomio
195
Tirohanga Stm
Mokotuna Stm
353
433
212
Ruapekapeka
253
Tapuhi