In the matter of the Resource Management Act 1991

And

Applications by Christchurch City Councill to Canterbury Regional Council and Christchurch City Council for resource consents to construct, operate and maintain an ocean outfall pipeline for the disposal of treated wastewater

Submission of the Avon Heathcote Estuary Ihutai Trust

1. My name is Alex Drysdale. I am the chairperson of the Avon Heathcote Estuary Ihutai Trust. I am company Director with 33 years experience in developing and building new devices and products for a variety of different fields. 1972 - 1987 sampling devices for air, soil, water, plant material, animal wastes, waste treatment ponds and laboratory processes. 1987 - 2005 garment manufacturing machinery, manufacturing processes and new products.

2. I have Diploma in Agriculture CAC 1971, New Zealand Certificate of Science in Chemistry 1975. I am a member of the New Zealand Institute of Agricultural Science and an associate member of The New Zealand Institute of Chemistry.

3. My waste disposal experience includes:
   - Consultant to Catchment Boards and Regional Water Boards on agricultural waste disposal.
   - Consultant to private companies and individuals on agricultural waste disposal.
   - Consultant to Ministry of Agriculture and Fisheries Dairy Waste Advisory committee.
   - Research on land application of beet to ethanol process wastes.
   - Research on farm dairy waste lagoon performance in Canterbury.
   - Performance testing of waste pumps and irrigation systems.
   - Agricultural waste liquid-solids separation.
   - Pond bottom sealing.
   - I have published several papers related to waste disposal, co-authored the NZAEI Agricultural Waste Manual and prepared a number of confidential reports on pump performance, odour abatement and milk disposal.

4. I have expert experience in collection of statistically valid waste samples that may be relevant to this consent.

5. I do not appear as an expert witness in this hearing and I am making this submission on behalf of the Avon Heathcote Estuary Ihutai Trust.

6. The Avon Heathcote Estuary Ihutai Trust (AHEIT, The Trust) is a charitable society registered in 2003.

7. It was formed as a result of community requests over many years for the formation of an organisation that included committed representation from statutory bodies, tāngata whenua and other agencies.

8. The vision of the Trust is

Communities working together for
Clean Water
Open Space
Safe Recreation
and
Healthy Ecosystems
that we can all enjoy and respect

Toi tū te taonga ā iwi
Toi tū te taonga ā Tāne
Toi tū te taonga ā Tangaroa
Toi tū te iwi

9. The AHEIT Trust Deed contains six objects. These objects shape and direct the activities of the Trust. They are:
   - To pursue for the Avon-Heathcote Estuary Ihutai ("the Estuary") the preservation of its natural and historic resources to maintain their intrinsic values, and to seek the protection of these resources, including restoration and enhancement, for their appreciation and recreational enjoyment by present and future generations.

   - To achieve healthy working ecosystems for the Estuary and its catchments through "Integrated Environmental Management", meaning a systematic effort to understand, through interactive interpretation and analysis, the linkages between ecosystems, resources and people.

   - To involve individuals, community groups and statutory agencies in learning and practising the principles of integrated environmental management so that all parties responsible for the management of the Estuary and its resources apply these principles.

   - To strengthen relationships between mana whenua, communities, interest groups and statutory agencies for the better management of the Estuary and its resources.

   - To acquire, publish and use information and knowledge of the Estuary through research and monitoring, public education, contributing to planning, and any other actions that are necessary for the integrated environmental management of the Estuary, its resources and its catchments.

   - To increase public recognition, understanding and appreciation of the qualities and values of the Estuary.

10. AHEIT prepared a draft Ihutai Management Plan (IMP) during 2003/2004 and following feedback and submissions from the community a final plan has been published. The plan includes Goals, Targets and Actions. Each of the commissioners has a copy of the plan and relevant Goals and Targets have been included in each section of our submission.

11. We have not been able to attend all sessions so we apologise if our information does not reflect all the evidence presented at the hearing. Our work for the Trust on this submission is in a voluntary capacity.

General

> *Referring to the Ihutai Management Plan Goals and Targets:*
>
> ***Goal 1: Communities working together for the better management of the Estuary***
>
> *Target 2: Communities are empowered, resourced and supported to participate in local decision-making (with regard to health and management of the Estuary).*
>
> *Target 5: Christchurch residents understand their impact and influence on the Estuary and environs and take positive actions.*
>
> *Target 6: The partnership with Ngāi Tahu is nurtured.*

12. The Trust generally supports the Christchurch City Council (CCC) application as the Council intends to remove wastewater discharge from the Avon Heathcote Estuary/Ihutai (The Estuary)

13. While generally supporting this consent application to remove the discharge from the estuary we see the direct discharge to the ocean as a temporary solution, and expect that the Council will be have a long-term goal not to discharge to a water body or coastal waters at all. For this reason we expect the quality of the discharge to improve over time, even with an increasing population. Identifying alternative wastewater systems and on-going investment in improved treatment will be required to achieve this.

14. We note that form the Council website that the Council is committed to improving the quality of the Avon-Heathcote Estuary environment:
"Christchurch City Council is committed to
    - *Removal of wastewater discharge from the Estuary where practicable*
    - *Ongoing trials and studies to reduce and remove sea lettuce*
    - *Improved stormwater quality discharged to rivers*
    - *Removal from the Estuary of cut-off drain discharges at the ponds*
    - *Improved discharge quality from the ponds in the interim by current pond modifications. This improvement will also be beneficial when the ocean outfall is operating."*

15. Throughout the AEE and the Technical Reports there is frequent reference to the gaps in research and knowledge about the Estuary. This was also recognised in the AEE for the continued discharge to the Estuary in 2001.

    Some examples:

    - AEE page 6-7 para 2 "However this cannot definitely be definitely predicted in the absence of actual field measurements of critical shear stress and erosion." in relation to the cofferdam effects.

    - TR 8 - Coastal Processes, Allan et al, page 79 10.0 Conclusions " the writers have identified a number of key deficiencies in our understanding of key coastal processes in Pegasus Bay that are likely to impinge on the construction, installation and operation of the outfall. Thus a number of recommendations have been made to rectify these "gaps"."

    - TR12 - Fish and Fisheries, James & Gust, page ii "In summary, fish resources in the area of the proposed outfall have not been quantified, and the possible effects of the outfall on species present are difficult to predict without better baseline information on the fish resource. Consequently our ability to determine post commissioning changes in fish diversity, size or abundance in the vicinity of the outfall is severely limited."

16. We are disappointed that more effort has not been made by CCC in the last few years to instigate research to fill some of the knowledge gaps.

17. It is important to us to note the current context we are working in with regards to the Christchurch City Council:

    - We are represented on the Discharge Audit Group set up to monitor the resource consent CRC012011 to continue to discharge to the Estuary. We were pleased to see the initial reduction in faecal coliforms and enterococci in the discharge from pond 6 following the pond remodification. More recent data shows an increasing level of indicator organisms.
    - The ammonia level in the discharge is of a real concern, and the CCC is failing to meet the current resource consent condition for ammonia. In October 2005 the condition of the consent requires levels for Ammoniacal Nitrogen to drop from 30g/m^3 to 20g/ m^3. The discharge is not meeting the current 30g/ m^3 level and will certainly not meet this new level. Because of this we understand the CCC is in the process of applying for a variation to the resource consent to keep the limit at 30g/ m^3 after October.
    - To us this is a symptom of the current environment at the CCC. In this case reliance was put on technical advice that the pond modifications would reduce the ammonia levels, and this was given as a guarantee at the 2001 resource consent hearings. This is reflected in the current process where again there is a reliance on technical advice that construction and discharge effects can be mitigated. We do not have high confidence in this advice because of our past experience. Reliance on theoretical modelling and engineering and technological solutions dominate the thinking of the applicant and their advisers.
    - In the last few months the cost estimates for the project have escalated from about $52.7m to $77.4m. To cover this increase the City Water and Waste unit suggested taking the $9m budgeted for the Green Edge project to put into the pipeline budget. The

Green Edge project was initiated to improve the ecological condition of the western edge of the Estuary from Humphreys Drive to Bexley Reserve. It also recognised that this part of the city had been disadvantaged because of being the host for many decades of waste treatment and disposal. It is for this reason we have raised issues about restoration of this Estuary edge as part of this consent. We see it as a pragmatic time to undertake some of this restoration.

- We are working with both the City Council and with Environment Canterbury to develop an integrated catchment plan for the Heathcote River. The amount of sediment entering the Estuary from the Heathcote is a concern, and it is our opinion that developments in the upper catchment do not have adequate sediment and stormwater controls.

18. It is important to record that this application is from the Christchurch City Council, not just from the City Water and Waste Unit. So the impacts of the effects from construction need to be considered along with other impacts the Council is having in the Estuary. That is, the cumulative effects of all Council activities need to be considered in relation to this application. The fact that the Estuary already has sediments present – caused by activities under the control of CCC – is not a reason to allow further sedimentation.

19. The resource consent process frustrates us when it denies the commissioners the opportunity to take an integrated approach to environmental management, especially the cumulative effects of Council actions on the ecosystems which this project impacts on.

RMA Section 5 - Purpose

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources

(2) In this Act, ``sustainable management'' means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while—

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment

20. Mr Gould argued (his paragraphs 64-70 that Sections 6, 7 and 8 are subordinate to the purpose of the RMA under Section 5. He has been selective in extracting S 5(2) (a) because the ocean outfall project will clearly meet the future needs of the Christchurch community.

21. But S 5(2)(b) and (c) require that **at the same time** the life supporting capacity of water and ecosystems are safeguarded, **and** any adverse effects are avoided, remedied or mitigated.

22. In this case protection of the estuary from serious damage in achieving the outfall construction is not about the preservation of natural character as in S6(a) ; it is about safeguarding the life supporting capacity of ecosystems as in S5(2)(b).

23. Mr Gould also states (paragraph 71) there are likely to be some unavoidable adverse effects during construction of the pipeline. While this may be true the applicant has clearly shown that a tunnelling method will avoid many adverse effects on the estuary compared with a dig and lay method. Avoiding effects should come before remedying effects which comes before mitigating effects [RMA S 5(2) (c)]. Any unavoidable effects can then be remedied or mitigated.

24. I will address the Trust's concerns about details of the application to do with:
    - Monitoring of the Estuary prior to removal of the wastewater discharge and following construction and removal of the discharge - Starting Paragraph 27
    - Effects of construction on the Estuary - Starting Paragraphs 37
    - Disposal of water containing contaminants during construction - Starting at paragraph 113

25. Chrissie Williams will present our submission on
    - Effects of construction on the Estuary edges – paragraph 123
    - Establishment and operation of construction management areas and maintaining pedestrian access – paragraph 131
    - Water quality of the discharge – paragraph 137

26. In our submission we have highlighted our concerns about some of the evidence presented in the AEE, Technical reports and at this hearing. We have also attempted to provide information on areas not emphasised or covered by the applicant.

Monitoring of the Estuary prior to removal of the wastewater discharge and following construction and removal of the discharge

Referring to Consent Applications:
CRC051701 – a coastal permit to disturb and remove material from the foreshore and seabed within the Avon-Heathcote Estuary (Ihutai) Coastal Marine Area to facilitate the erection and placement of an ocean outfall pipeline along the pipeline route extending from adjacent to the Christchurch Wastewater Plant Oxidation Pond No. 6 across the Avon-Heathcote Estuary (Ihutai) to the edge of South Brighton Park between approximate map references NZMS 260 M35:876-418 to M35:882-417. A consent with a duration of 5 years is sought.

CRC051702 – a coastal permit to deposit material on the foreshore and seabed in the Avon-Heathcote Estuary (Ihutai) Coastal Marine Area along an ocean outfall pipeline route, extending from adjacent to the Christchurch Wastewater Plant Oxidation Pond No. 6 across the Avon-Heathcote Estuary (Ihutai) to the edge of South Brighton Park between approximate map references NZMS 260 M35:876-418 to M35:882-417. A consent with a duration of 5 years is sought.

Referring to the Ihutai Management Plan Goals and Targets:

Goal 2: Healthy ecosystems are sustained in the Estuary and its surroundings
Target 1: Water quality in the Estuary and its rivers supports healthy aquatic ecosystems.
Target 2: The Estuary again supports healthy mahinga kai.
Target 3: The incidence of macro-algae as a nuisance in the Estuary is continuously reduced.
Target 4: The Estuary provides a healthy and safe ecosystem for birds.
Target 5: Estuarine fish populations are monitored and restored.
Target 6: Healthy estuarine invertebrate populations are restored and enhanced.
Target 7: Waste and contaminants entering the Estuary are continuously reduced.
Target 8: Protect, enhance and increase the natural areas of the Estuary and its catchments.

27. It is important that the effects of construction on the ecology, hydrology and physiochemical processes of the Estuary are monitored. For this to be done baseline studies should be commenced immediately, with follow-up studies post-construction

28. Also the City Council has a unique opportunity to assess the effects of removal of the wastewater discharge from the Estuary. With the appropriate studies prior to and following the removal of the discharge they have the ability to demonstrate the effects of the removal of human impacts on an urban estuary.

29. We acknowledge that the negative effects of construction will be confounded with positive effects of the discharge/nutrient removal.

30. We are also aware that there is considerable temporal and spatial variability in the Estuary. Significant differences among places within the Estuary occur because of the complex interaction of tide, wind exposure, freshwater input, aspect, and natural and unnatural disturbances.

31. **We ask that as part of the conditions of the resource consent that baseline studies be undertaken as soon as possible, and that follow up studies are undertaken at a suitable time after the pipeline to the ocean is in place. To be effective these studies would need to be very well planned, done well and over a reasonable time period. They would need to be done in such away to be comparable with historic and existing data.**

32. Minimum studies would be for nutrients, fish, birds, benthic organisms, saltmarsh, seagrass and algae.

33. Saltmarsh should be monitored as saltmarsh of this type has a reputation for being very difficult to recover following damage, unlike the herbaceous types of glasswort and similar plants. The construction and recovery processes will involve sediment movements, and this impact greatly on adjacent areas of saltmarsh.

34. Research into fish populations would require a 3-year study starting now and three years after construction a further 3-year study. The three-year length is required to average out seasonal effects.

35. Recognising the lack of good baseline information the Trust has contracted research in the last two summers. These studies are:
    - *Seagrass Zostera novazelandica in the Avon Heathcote Estuary* – Nicola Congdon and Islay Marsden, April 2004
    - *The Ecology of the Avon-Heathcote Estuary: Macrobenthic Survey, Summer 2004-2005* – Sylvia Maclaren and Islay Marden, February 2005

36. Cliff Tipler (paragraph 383) has suggested the Discharge Audit Group (DAG) is the appropriate mechanism for ensuring current and ongoing monitoring of the estuary. Unfortunately DAG has no powers and resources to do anything but talk. As we have stated monitoring is required so that the construction effects can be tracked as well as changes resulting from the removal of the discharge. This baseline research is an integral part of this consent - not an optional add-on.

Effects of construction on the Estuary

Referring to Consent Applications:

CRC051701 – a coastal permit to disturb and remove material from the foreshore and seabed within the Avon-Heathcote Estuary (Ihutai) Coastal Marine Area to facilitate the erection and placement of an ocean outfall pipeline along the pipeline route extending from adjacent to the Christchurch Wastewater Plant Oxidation Pond No. 6 across the Avon-Heathcote Estuary (Ihutai) to the edge of South Brighton Park between approximate map references NZMS 260 M35:876-418 to M35:882-417. A consent with a duration of 5 years is sought.

CRC051702 – a coastal permit to deposit material on the foreshore and seabed in the Avon-Heathcote Estuary (Ihutai) Coastal Marine Area along an ocean outfall pipeline route, extending from adjacent to the Christchurch Wastewater Plant Oxidation Pond No. 6 across the Avon-Heathcote Estuary (Ihutai) to the edge of South Brighton Park between approximate map references NZMS 260 M35:876-418 to M35:882-417. A consent with a duration of 5 years is sought.

CRC051703 – a coastal permit to take, use and divert coastal water during the installation of an ocean outfall pipeline in the Avon-Heathcote Estuary (Ihutai) Coastal Marine Area along the pipeline route extending from adjacent to the Christchurch Wastewater Plant Oxidation Pond No. 6 across the Avon-Heathcote Estuary (Ihutai) to the edge of South Brighton Park between approximate map references NZMS 260 M35:876-418 to M35:882-417. A consent with a duration of 5 years is sought.

CRC051716 – a coastal permit to emit noise within the Coastal Marine Area in excess of standard NZS 6803:1999 "Acoustic Construction Noise". The noise will be associated with construction activities on the ocean outfall pipeline and diffuser located in the following locations: a) extending from adjacent to the Christchurch Wastewater Treatment Plant

Oxidation Pond No. 6 across the Avon-Heathcote Estuary (Ihutai) to the edge of South Brighton Park between approximate map references NZMS 260 M35:876-418 to M35:882-417; and b) extending from a point at Mean High Water Springs tide level located on South New Brighton Beach, at the end of Jellicoe Street, extending east-northeast up to a maximum of 3,270 metres offshore, from approximate map reference NZMS 260 M35:891-418. A consent with a duration of 5 years is sought.

Referring to the Ihutai Management Plan Goals and Targets:

Goal 2: Healthy ecosystems are sustained in the Estuary and its surroundings
Target 1: Water quality in the Estuary and its rivers supports healthy aquatic ecosystems.
Target 2: The Estuary again supports healthy mahinga kai.
Target 3: The incidence of macro-algae as a nuisance in the Estuary is continuously reduced.
Target 4: The Estuary provides a healthy and safe ecosystem for birds.
Target 5: Estuarine fish populations are monitored and restored.
Target 6: Healthy estuarine invertebrate populations are restored and enhanced.
Target 7: Waste and contaminants entering the Estuary are continuously reduced.
Target 8: Protect, enhance and increase the natural areas of the Estuary and its catchments.

Goal 4: Safe and balanced recreation
Target 1: Water quality in the Estuary is improved so that conditions are safe for contact recreation and other water contact activities.

37. Two broad methods of construction are proposed – an underground tunnelling method or a dig and lay method.

38. We **ask that a tunnelling method of construction be a condition of the consent by declining the consents that allow for a dig and lay method.** That is, we ask the commissioners to decline **CRC51701, CRC51702 and CRC51703** (or impose such conditions that disallows a dig and lay or trenching method of construction to be used)

39. Dig and lay will cause major deleterious effects on the estuary ecosystem. In comparison tunnelling will have only minor effects.

40. Our point of view is reinforced in Technical Report 16 (page 10):

"Indeed, the method used for laying the pipeline should be selected specifically to minimise potential sediment losses, suspension, water column turbidity and sediment deposition in order to minimise possible effects on the benthic animals, algae and seagrass both near and more distant from the site."

41. The reporting officer for Environment Canterbury also endorses this view: (paragraph 140); *"I consider that in respect of the above policies, using a dig and lay method would mean disturbing the natural movement of biota, productivity and biotic patterns and the intrinsic*

values of the ecosystems in the Estuary more than is reasonably necessary given the alternative methods available. The less intrusive methods of installation would avoid nearly all of the effects anticipated with a dig and lay option, and are considered to be more consistent with the policies and objectives of the NZCPS, RPS and PRCEP.
The dig and lay option would cause adverse effects on habitat, flora and fauna along the corridor of works, and the potential exists for significant effect outside the area if sediment dispersal is not strictly controlled.
Whilst it may be considered acceptable for the limited corridor to be affected, I believe that the potential for ecosystems outside of the immediate construction area to be affected is particularly significant
Therefore, if a dig and lay method s to be used, appropriate sediment controls ad limits should be in place as conditions of consent."

42. **This statement is given to advise the panel and should not be ignored. A dig and lay method should not be allowed in this consent.**

43. Cliff Tipler (paragraphs 69, 377) explains that a number of construction options should be available to maintain a competitive tension at tendering. This is not a good enough reason to grant these consents allowing dig and lay and leave it open to the market and to financial decisions of council to decide what effects on the estuary are acceptable. It is at this resource consent stage where the effects on the environment must be weighed. Any decision must be on avoiding adverse effects rather than leaving such a decision to where political and financial influences will override ecological considerations.

44. We acknowledge the likely additional costs of tunnelling, and the limitation on available contractors because of the large pipe size. But while the dig and lay method may look more financially cost effective, it is the **unvalued environment that will be bearing the cost**.

45. There are a number of reasons for declining the three consents **CRC51701, CRC51702 and CRC51703**:
    - Effects of sediment on the Estuary ecosystem
    - Effects of light attenuation from suspended sediment in the Estuary
    - Erosion of the causeway and cofferdam
    - Effects on the hydrology in the Estuary and the lower Avon River
    - Potential scour and sediment build-up along the pipeline route
    - Effects of noise during construction
    - Timing of construction

Sediments

46. There will be negative effects on the ecology of the estuary bed at the construction site particularly on the benthos, diatoms and invertebrates

47. Sediments will be deposited during the construction of the causeway, and will be disturbed during the construction of the cofferdam and excavation of the trench.

48. Sediments in the Estuary comprise gravel, sand, silt and clay. While gravel and sand may settle quickly the silts and clay will stay in suspension for longer and will travel away from the causeway, cofferdam and trench sites. So there will be sediments deposited near the

site, and both upstream and downstream from the site, depending on the tidal and river flows.

49. Sediments are well known to affect the survival of seagrass and of some fish species, and to impact negatively on the benthic organisms.

50. We have particular concern about the disturbance of sediments containing heavy metals and harmful organic substances. Disturbing and re-suspending these contaminants would make them biologically available again. Any actions that increase the pH in the estuary will increase the bio-availability of the metal ions

51. The metal content of the sediments has been addressed by Dr Fenwick, page 3 of his evidence. But as far as we are aware there has been no reference to the effects of other chemical contaminants.

52. At the 2001 Resource Consent hearing Dr Geoff Mills in his evidence (paragraph 28, 29) noted the river deposition zones (for both the Avon and Heathcote Rivers) contained higher levels of metals and muddier textured sediments than the other parts of the estuary. Higher concentrations of heavy metals were found in the finer textured sediments.

53. Dr Mills also noted (his paragraph 66 and 67):

"*However, MFE (1998) reported that the levels of* ***dioxins*** *in sediments at Pleasant Point were close to, or exceeded, Canadian sediment quality objective guideline for the protection of aquatic life on piscivorous (fish-eating) wildlife. Cockles from the same site exceeded Canadian tissue quality objective for protection of piscivorous wildlife. MFE (1998) suggested that food web studies were required to determine the effects of dioxins on species, such as wading birds, that feed on shellfish from contaminated areas.*

Laboratory toxicity test have been carried out on sediments from three sites in the Avon Heathcote Estuary (Nipper et al 1997). Significant toxicity was found in sediments taken from near the mouths of the Avon and Heathcote Rivers. Toxicity measurements did not correlate with the concentrations of heavy metals in the sediments. The study concluded that there may be sufficient contamination present in the more polluted area of the estuary to reduce the diversity and abundance of some benthic species, and this might have adverse "flow on" effects on the wider ecosystem."

54. We are not aware of any food web studies as recommended in the MFE report. But disturbance of these muds is likely to redistribute the dioxin to other parts of the estuary.

55. The effects of sediments on the Estuary have been documented in the AEE (Section 6.3.2, Page 6-4) and by Dr Fenwick. But how the effects of re-suspended sediments will be mitigated is not developed.

(AEE, Page 6-5) "Should a dig and lay method of construction be used to cross the estuary, measures will be taken to ensure that the possible effects of sediment and metal suspension on fish, benthic invertebrates, algae and seagrass near the area of construction

and throughout the estuary are minimised by reducing the potential for sediment suspension and transport to an absolute minimum"

56. We are still not satisfied with the additional S92 information supplied by the applicant which minimises and underrates the negative effect of sediment:

"*The AEE (Technical Report 29) has not identified scour of estuary sediments a significant adverse effect. There may be some sediment mobilised by the construction activities that will be dispersed across parts of the estuary. Critical zones where sediment deposition, may be an issue are those with the seagrass beds. These have been identified at about 500m downstream. Deposition is expected to be minor therefore it is not possible to provide a limit or specific outcome to be achieved. Inspection of the seagrass beds during the critical estuary crossing can be included as a condition in the management plan, and if such an action is considered sufficiently important, then may be addressd by way of a condition. …"*

57. This contrasts with the information in Technical Report 16 and repeated by Dr Fenwick (paragraph 18)
"Three ecological implications of suspended sediment are considered <u>important</u> here:
the effects of re-deposition of the suspended material on benthic communities,
the consequences of light attenuation by high suspended loads on aquatic algae and plants, and
the availability and dispersal of previously buried toxic material.

Fine sediment entering suspension at the proposed pipeline route is likely to be carried up-stream by the setting tide and downstream into the central estuary by the ebbing tide.
Wind waves also are likely to play a role, principally in the initial suspension and repeated re-suspension of these sediment fractions. These sediments are likely to settle out and accumulate in areas of low potential wave and current energy, and may affect the composition and functioning of communities at those sites.
Sedimentation is likely to be greatest closer to the construction zone, especially on the downstream western shore and the upstream eastern shores in shallows away from the main channel.
Benthic communities at these locations, therefore, are expected to be exposed to increased sedimentation over the entire construction period, as well as for some time after completion of the pipeline, until a new dynamic sedimentation equilibrium is established."

58. Gust et al go on to say (Technical Report 16) *"For these reasons, sediment available for suspension <u>should be controlled during the construction</u>. <u>Indeed, the method used for laying the pipeline should be selected specifically to minimise potential sediment losses, suspension, water column turbidity and sediment deposition in order to minimise possible effects on the benthic animals, algae and seagrass both near and more distant from the site</u>."*

59. The applicant appears to be ignoring the advice of its own technical reports and persisting in including dig and lay as a suitable construction method for the Estuary crossing.

Erosion of the causeway and cofferdam

60. Evidence has been presented by Mr Miller and Dr Mabin to estimate the quantity of sediment that is likely to be released into the Estuary from dig and lay construction.

61. Mr. Miller (55), states numerical model RMA-2 was used to assess and predict changes in current rather than absolute predictions. We accept this limitation but point out that he has shown big changes in current will occur

	peak ebb (out)			peak flood (in)		
	without	with East	with West	without	with East	with West
Flow m/s	**0.2**	**0.27**	**0.45**	**0.15**	**0.32**	**0.38**
increase m/s		**0.07**	**0.25**		**0.17**	**0.23**
increase %		**26%**	**56%**		**53%**	**61%**
data derived by measuring the longest arrow shown at the						
location of the end of the cofferdam, Miller 2005, figures 5,6 & 7						

62. In the diagrams attached to his evidence we found it difficult to determine differences in colour rendering the detailed velocity scale unusable.

63. Mr. Miller (56), states *"that while peak and ebb tidal currents are increased, the zone of increased velocities is restricted to within 200m of the end off the cofferdam."* It seems there may be a word missing (flood?) when comparing this sentence with the titles on figures 5, 6 & 7?

64. It is of concern that the terms "peak flood" and "peak ebb" are used in the titles of figures 5, 6 & 7 but the coloured areas of these figures clearly show the water at slack high tide and slack low tide. The slack tide lasts for about an hour each side of the high or low tide. In my experience the flood and ebb periods last for about 4 hours each with the "peak flood" and "peak ebb" occurring at half tide.

65. It would seem the "Peak Flood" and "Peak Ebb" figures should have shown similar areas of water (half tide). But with the arrows showing the different directions and rates of flow.

66. As this is not the case and if we were to take figures 5, 6 & 7 at face value there are irreconcilable problems because peak flows do not occur at high tide and low tide.

67. In the AEE, (Table 6-3) a flood event was considered in the analysis and gave peak shear values of 1.68N/m^2 (western barrier) and 3.36N/m^2 (eastern barrier). But in the AEE discussion these high values have not been addressed, even though they are well above the critical shear stress for erosion for weakly consolidated (1 week) sediments. (AEE, Table 6-1), and for the eastern barrier above the critical shear stress for erosion for medium consolidated (1 month) sediments.

68. It is reported in the AEE that in flood conditions the hundred fold increase in flow volume only results in 2.5 times increases in bed shear stress from 0.62 to 1.57 N/m2. In fact the peak shear will increase from 0.54 to 3.36 N/m2 an increase of some 6.2 times.

69. It is during storm events when damaging sedimentation is likely to occur. These extreme events cannot be ignored. In fact the RMA specifically includes in its definition of effects "Any potential effect of low probability which has a high potential impact."

70. Dr Mabin attempts to develop a desktop justification but we have serious doubts about its validity. It seems to over estimate the natural sediment movement by a large margin, and underestimate the sedimentation from the construction.

71. It is proposed the causeway will be constructed of river gravels but it is not clear what will be used to consolidate the top surface of the causeway surface to make it useable by wheel and track machines. There is no mention of how the consolidated layers will be retained on the causeway top.

72. There is widely differing information presented by the applicant about the construction and size of the causeway. In his calculations Dr Mabin used widths of 9m for the causeway, 0.6m for the sheet piling, 4m for the trench giving a total width of 13.6m. Mr Tipler in his evidence has referred to a combined width of 25 metres – just under twice that of Dr Mabin. The AEE (Section 6.3.3) refers to a '50 metre wide strip of the pipeline route (comprising 25 metres of pipeline trench and cofferdam, and a further 25 metres of adjacent turbulence)'. We can not ascertain where the differences in widths will occur but it is clear that Dr Mabin's estimates of released sediment should be increased by up to a factor of 4. So the accumulation over the sedimentation zone used by Dr Mabin would be up to 10mm.

73. Whichever figures are used the assumption that the sediment will be evenly distributed is not a realistic assumption, and it is more likely that specific areas will accumulate the sediment deposits - depending on the wind, tide and currents. These areas are likely to be places where there are low velocities which include the sea grass meadow south of the pipeline route, and the extensive salt marshes around the Avon River mouth.

74. The consequence of the tidal flows constantly changing (they flow in, they stop and reverse, they flow out, and they stop and reverse and flow in again) seems not to have been considered in enough detail by Dr Mabin. He calculates sediment transport and deposition rates based on an estuary volume and tidal area based on "spring high tide"(45).

75. Spring high tide (a very high tide followed by a very low tide) occurs once every 14 days and is followed a week later by a neap tide with a low high tide and high low tide. The difference between spring and neap tides has a dramatic effect on the tidal volume and tidal currents that have not been accounted for by Mabin. So a large area has to be deducted for 12 out of 14 days when the spring high tides do not occur.

76. A further complication that has been ignored is that every three months or so a very high spring tide occurs followed by a very small neap tide six weeks later.

77. The significant effect that was not considered in the AEE is the erosive effect of winds and waves. Most **erosion in the Estuary occurs in storm events** when winds, particularly from the south, cause waves and turbulence. It is these effects that are likely to scour the causeway and cofferdam along their length, even with sheet piling, and cause sediment removal and subsequent deposition elsewhere.

78. Mabin mentions wind effects (49) but does not attempt to quantify them. He seems to assume they will happen.

79. The wind is highly variable in strength and direction as reported by Miller figure 2.2 Christchurch Wind Rose. In my experience high sediment suspension rates require high wind speeds in the order of 15 knots or about 8m/s and higher. Miller reports that wind speeds of 8m/s and greater occur only 11% of the time (sum of data in table in figure 2.2). As the tide is only in for half the time this would suggest the wave suspended sediment opportunity is about 5% of that suggested by Mabin, requiring a further reduction in the natural sediment load estimate.

80. He also ignores the combination of wind and tide. Both have to be taken into account because deep water has to be present for wind driven waves to suspend and carry the sediment loads reported (44). Sediment transporting waves are not easily sustained in shallow water. The decreasing wave size and decreasing volumes of water involved cannot move the quantities of sediment as far and as evenly as suggested by Mabin.

81. The extent of the large areas of shallow water around the estuary is evident in the long sections shown in Tipler's evidence.

82. Wind seldom moves estuary sediments at low tide as they remain damp and immovable between high tides except under extreme hot NW windstorms.

83. Fetch is an important factor that has also been left out. It is the length of wind run in contact with water that is needed to generate waves. The size and length of the wave generated is also dependent on the depth of water and the rate the depth of water changes.

84. This is significant for two reasons, for several tens of meters on the side the wind is coming from the waves are not big enough to dislodge and suspend sediment. Secondly, high-energy high volume sediment transporting waves are not sustained in water that gradually shallows over a long distance. The waves get smaller as the water shallows and the volume of water is greatly decreased so the amount of sediment that is carried falls rapidly although the concentration might stay high.

85. This is important because the depth of sediment buildup over the construction period has been seriously underestimated. To suggest that the sediment will be carried evenly to the edges of the estuary is incorrect. The area over which sediment is likely to be deposited has been seriously over estimated. The extent and rate of natural sediment transport and deposition has been seriously over estimated.

86. Mabin's estimate of the total sediment load at high tide is clearly problematic and therefore should not be used to determine the relative quantity and dispersion area of the expected sediment load from the dig and lay method.

87. The reporting officer for ECan has sought advice from Mr Justin Cope. He supports the modelling work for the erosion effects on the coffer dam. However, he does observe that if the both sides of the coffer dam were constructed at the same time (which he implies might be an option to expedite construction) the modelling would not be applicable. **A condition should be included to limit the total length of causeway so that no more than half the width of the estuary is blocked at any time**

88. Justin Cope does not address the wind and wave effects that we believe will have a greater effect than the river and tidal currents. Technical Report 16 supports our view:

    "Fine sediment entering suspension at the proposed pipeline route is likely to be carried up-stream by the setting tide and downstream into the central estuary by the ebbing tide. Wind waves also are likely to play a role, principally in the initial suspension and repeated re-suspension of these sediment fractions. These sediments are likely to settle out and accumulate in areas of low potential wave and current energy, and may affect the composition and functioning of communities at those sites."

Effects on Seagrass – Zostera

89. Zostera can be devastated by sedimentation and by reduced light from suspended sediment. The rate of recovery is also slow.

90. From the evidence presented at this hearing the effects of sedimentation on sea grass are uncertain. Dr Fenwick (paragraph 20) quotes a range of figures from 2-13cm of sediment causing effect, noting that for NZ species the ability to withstand sedimentation *"is likely to be towards the low end of the range because of lower solar radiation and seasonally lower water temperatures in the AH Estuary."*

91. Dr Bolton Ritchie (p50) notes that a 5mm depth of sediment buildup has been reported to have sub-lethal effects on estuarine biota.

92. Again there is uncertainty in the available information to assess the effects, and a precautionary approach is required. The lowest values of those provided by expert witnesses should be used

93. The effects of loss of light have been referred to by Dr Fenwick: (paragraph 20) *"The amount of light reaching benthic algae and seagrass when covered by water will be reduced by increased turbidity, adding a further stress. Seagrass tends to be particularly sensitive to reduce light availability doe to increased turbidity (Touchette and Burkholder 2000; Turner and Schwarz 203)"*

94. Dr Graeme Inglis (evidence, paragraph 36) presented information in the 2001 Resource Consent hearing which described and quantified this effect:

    "Because seagrasses must maintain a large biomass of non-photosynthetic tissues (ie roots and rhizomes) below the surface of the sediments they have a relatively high requirement for light, compared to macroalgae. The water depth at which seagrass meadows can survive is

determined by the length of time that plants receive light levels above their minimum requirement. This will vary according to species and clarity of water, but, as a general rule, corresponds to the formula:

$Z_c=1.86/k$

Where Z_c is the maximum colonisation depth and k is the average annual light attenuation coefficient in marine waters (Duart 1991). Data on light attenuation within the estuary waters are limited. A survey by Hawes (1999) at 5 sites around estuary suggests that the maximum depth distribution for Zostera in the Avon Heathcote Estuary will vary between 0.9 and 2.1m. Seagrass distribution is also determined by patterns of water flow, grazing by waterfowl and plant growth. Improvements in the quality and clarity of the estuary water through the improved CWTP discharge and future improvements to river water quality should see further expansion of the existing areas of seagrass.

Effect on saltmarsh

95. Sediments also impact considerably on saltmarsh, especially sea rush as evidenced in the lower Heathcote River. (*Partridge, T.R. 2004. Decline of Sea Rush Salt Marshes in the Lower Heathcote Estuary, Christchurch. CECS Contract Report CECS04/02)*

96. The saltmarsh area immediately north of the toe drain needs protection from not only direct impacts, but from indirect impacts of erosion that may be caused by changed river channels, and from increased sedimentation rates from increased deposition. An underground construction would minimise these.

97. This area had lost much of its saltmarsh vegetation in the last 20 years, but is showing signs of recovery in recent years. Such dynamics are often cyclic and we are probably entering an establishment phase and that process should be allowed to continue.

98. Increased sedimentation is having major impacts in the Heathcote River, and addition of sediments into the Avon could have major impacts on this less-affected system as well.

Sediment limits and controls

99. Dr Bolton-Ritchie has proposed ways of developing sediment control conditions**. If a** dig and lay **method is used for pipeline installation across the Estuary we would want very strict conditions on sediment control and monitoring. It is difficult for us to comment on Dr Bolton-Ritchie's proposals without having further information on the effectiveness of her two methods.**

100. **For this reason, and other reasons explained above, we feel that there is far too much uncertainty about setting limits and conditions for sediment control. The risks to a large part of the estuary ecosystems are too high and should be avoided by not allowing such a destructive construction method.**

101. **If the dig and lay method was to be used we would expect sheet piling to be put in on <u>both</u> sides of the causeway <u>prior</u> to causeway construction, to reduce sediment escaping to the Estuary.**

Hydrology

102. If the causeway was built as is proposed in two stages, with each stage occupying only half the estuary width, it is assumed in the AEE that the causeway and cofferdam will not affect the water flows. We disagree with this assumption and we expect that the channels within the estuary will alter as a result of the cofferdam, and that there will be impacts on the flows at the Avon River mouth.

103. Over a number of years there have been significant changes to the river and tidal flows in the lower Avon River with impacts on the salt marsh both north and south of the bridge and Pleasant Point Yacht Club facilities. CCC reports have related these changes to changes in the Avon River, such as the Withells Island cut, Kibblewhite Street stop bank realignment and the re-contouring of Naughty Boys Island.

104. Any change in the direction of the channels will have effects on the estuary and river banks. These effects will occur both downstream of the causeway and cofferdam from river flows, and upstream from tidal flows.

105. **If a dig and lay method is used we would expect some analysis of the possible changes in the estuary and river channels, the effect of these changes and mitigation measures to prevent damage around the Bridge St bridge, the Pleasant Point Yacht club and the valuable salt marsh in the lower Avon River and Raupo Bay.**

Scour and sediment buildup along pipeline route

106. It is planned that the depth of pipe will be only 1m under the estuary surface. We believe this is too shallow and will make the pipeline vulnerable to post-construction scour and possible sediment accumulation at the site. There is a history of the estuary floor having significant changes in levels. The effects of changes in tidal compartment because of the removal of the wastewater flows are unknown and future changes in the estuary floor are unpredictable.

107. **If a** dig and lay **method is used we would expect the pipe to be buried deeper than 1 metre.**

108. **If the 1m depth is retained then we recommend an additional condition that if there is any exposure of the pipe in the estuary it is immediately rectified by burying the pipe deeper, not merely covering it.** We caution against the pipe being too shallow because of cost of rectifying any such error.

Timing of construction

109. In the NIWA client report (Morrisey, 2003) *proposes "as a compromise, t is recommended that work be done in June – August, avoiding the migratory period for fish and the breeding period for those birds that breed around the estuary, but still coinciding with relatively low abundances of water birds. This would also mean that work would be complete in time for the period when the larvae and juveniles of benthic invertebrates are likely to recruit to the disturbed sediments (spring-autumn)."*

110. The applicant has disregarded this advice and stated clearly there will not be any limitations on the timing of construction.

111. The negative effects of constructing outside the June –August period can therefore not be avoided or mitigated so **t**he panel should recognise that the only way to reduce the effects on benthic organisms, fish and birds is by not allowing dig and lay construction.

112. Using other methods outside the June-August period will still have some adverse effects on birds, but other mitigation methods are available. (ECan officer's report paragraph 126).

Discharge of water and contaminants to estuary and stormwater system

Referring to Consent Applications:
CRC051698 – a discharge permit **to discharge stormwater which may contain contaminants** such as sediments and hydrocarbons **to land** from Construction Management Areas 1, 2 and 3. A consent with a duration of 5 years is sought.

CRC051699 – a coastal permit to **discharge stormwater that may contain contaminants**, such as sediments and hydrocarbons **to land and water in the Coastal Marine Area** from Construction Management Area 1 located on the former Bexley landfill at or about map reference NZMS 260 M35:876-420. A consent with a duration of 5 years is sought.

CRC051704 – a coastal permit to **discharge water containing contaminants**, being principally sediments, **to land and water in the Avon-Heathcote Estuary (Ihutai) Coastal Marine Area,** from sediment settling systems located within Construction Management Areas 1 and 2. A consent with a duration of 5 years is sought.

CRC051707 – a discharge permit to **discharge water and contaminants** such as sediments, hydrocarbons and sand-stabilising polymers **onto land and into water**, along the pipeline route where the groundwater table is intercepted during construction of the pipeline trench, surge chamber, drop structure and any associated facilities necessary for dewatering and construction activities on land along the pipeline route through South Brighton Park, along Jellicoe Street, across Marine Parade, and through the dunes to the South New Brighton foreshore. A consent with a duration of 5 years is sought.

CRC051712 – a coastal permit to **discharge water containing contaminants**, being principally sediments, **to land and water in the Coastal Marine Area,** during the installation in Pegasus Bay Coastal Marine Area of a proposed ocean outfall pipeline, that will extend from a point at Mean High Water Spring tide level located on South New Brighton Beach, at the end of Jellicoe Street, extending in an east-northeast direction up to a maximum of 3,270 metres offshore from approximate map reference NZMS 260 M35:891-418. A consent with a duration of 5 years is sought.

CRC051709 – a land use consent to store hazardous substances in the Coastal Hazard Zone 1, as defined in the Proposed Regional Coastal Environment Plan, at or about map reference NZMS 260 M35:890-418, in Construction Management Area 3. The substances will be those

necessary for the construction of an ocean outfall pipeline and outfall, being primarily diesel. A consent with a duration of 5 years is sought.

Referring to the Ihutai Management Plan Goals and Targets:

Goal 2: Healthy ecosystems are sustained in the Estuary and its surroundings
Target 1: Water quality in the Estuary and its rivers supports healthy aquatic ecosystems.
Target 2: The Estuary again supports healthy mahinga kai.
Target 4: The Estuary provides a healthy and safe ecosystem for birds.
Target 5: Estuarine fish populations are monitored and restored.
Target 6: Healthy estuarine invertebrate populations are restored and enhanced.
Target 7: Waste and contaminants entering the Estuary are continuously reduced.
Target 8: Protect, enhance and increase the natural areas of the Estuary and its catchments.

Goal 4: Safe and balanced recreation
Target 1: Water quality in the Estuary is improved so that conditions are safe for contact recreation and other water contact activities.

113. The Trust has grave concern that water bodies (the Estuary, the ocean) are assumed suitable repositories for the discharge of water and contaminants. It must be remembered that any discharge to existing stormwater systems also discharges to the Estuary or ocean.

114. If any water discharged from the construction is to be discharged to the ocean or Estuary **we ask that there is on-site treatment that removes any sediment and other contaminants before discharge**.

115. **If tunnelling is used, we support the use of a totally enclosed sedimentation settling system.**

116. If this is not possible then **we ask that no direct discharge to the stormwater system, the Estuary or ocean be allowed**, and the discharge water is pumped back to go through the Sewage Treatment Plant where contaminants and sediment can be removed.

117. A compromise would be to recycle the discharge water back to Pond 1 but we would anticipate that this would affect the functioning of that pond because of the sediment load and contaminants, including salt water.

118. Chrissie Williams will now present the Trust submissions on
- Effects of construction on the Estuary edges
- Establishment and operation of construction management areas and maintaining pedestrian access
- Water quality being discharged

119. My name is Christine Williams. I am a member of the Trust Board of the Avon Heathcote Estuary Ihutai Trust.

120. As a Community Board member I was a member of the Wastewater Treatment Plant working party from 1996 to 2000 which was set up to consider the issues and options for wastewater disposal. I was chair of the Christchurch Estuary Association for some of that time. From 2001-2004 I was a City Councillor and deputy-chair of the Sustainable Transport and utilities Committee which, among other issues, dealt with sewerage and wastewater.

121. I have a Bachelor of Technology which included engineering, applied maths and sciences. I live in South New Brighton close to the estuary and the beach.

122. I am making this submission on behalf of the Avon Heathcote Estuary Ihutai Trust.

Effects of construction and operation on Estuary edge

123. We have heard no evidence presented on the condition of the western bank of the Estuary under and adjacent to the proposed pump station site. This bank has been reclaimed in the past and is now eroding. It is very apparent that the fill used in this area comprises rubble and rubbish. Toxic materials may have been dumped in this area, and disturbance during construction could release material into the Estuary.
See photos 1 and 2

124. **We ask that this dumped material in the western bank of the Estuary be removed prior to construction in a way that prevents release of any contaminants into the Estuary.**

125. The construction work in the area provides the opportunity for removing rubble from the Estuary and for restoring a more natural edge to the western shoreline**.**
See photo 3
Removal of the rubble on the western shore of the Estuary and restoration of this shoreline should be a condition of consent.

126. Identified, mapped and photographed in Technical Report 21 of the AEE is a structure adjacent to the pump station site that could be the remains of a Maori eel trap. There are also remains of s similar structure about 100m north. **The history of the structures near the pump station site is uncertain but we feel it is important that their origin is identified and they are protected during construction.**
See Photos 4 and 5

127. The CCC Greenspace report suggests that the area near the pump station site *"is the locality for eel traps that may be over 100 years old, and thus this site is likely to be an archaeological site under the Historic Places Act 1993, in which case Section 11 of the Act will apply. ... "*

128. As identified in Technical Report 16 there is an area of salt marsh (*Juncus kraussii, Leptocarpus similis, Schoenoplectus pungens, Plagianthus divaricatus*) north of the proposed pump station site, which requires protection.
See Photo 6

129. There is also a small area of salt marsh *(Juncus kraussii)* on the eastern side of the Estuary about 300m south of the jetty, almost in line with Jellicoe St.
See Photo 7
Although small, this area should also be protected during construction. There has been much loss of salt marsh in the Estuary, and any colonies which exist should be protected and allowed to restore.

130. **We submit that the pump station site and pipeline route should be chosen to ensure protection of the identified areas of salt marsh**

Establishment and operation of construction management areas and maintaining pedestrian access

CRC051705 – a land use consent to excavate a trench for the proposed ocean outfall pipeline through South Brighton Park, along Jellicoe Street, across Marine Parade and through the dunes to the South New Brighton foreshore; excavation for the pump station adjacent to the Christchurch Wastewater Oxidation Pond No. 6; and an excavation for the pipeline drop structure and surge chamber in the sand dunes adjacent to the intersection of Marine Parade and Jellicoe Street; where the excavation may exceed eight metres below ground level. A consent with a duration of 5 years is sought.

CRC051718 – a coastal permit to erect, use and maintain an ocean outfall pipeline and any associated temporary and permanent structures necessary to construct, maintain and repair an ocean outfall pipeline across the Avon-Heathcote Estuary (Ihutai) Coastal Marine Area, extending from adjacent to the Christchurch Wastewater Plant Oxidation Pond No. 6 across the Avon-Heathcote Estuary (Ihutai) to the edge of South Brighton Park, between approximate map references NZMS 260 M35:876-418 to M35:882-417. A consent with a duration of 35 years is sought.

Referring to the Ihutai Management Plan Goals and Targets:

Goal 2: Healthy ecosystems are sustained in the Estuary and its surroundings
Target 1: Water quality in the Estuary and its rivers supports healthy aquatic ecosystems.
Target 4: The Estuary provides a healthy and safe ecosystem for birds.
Target 7: Waste and contaminants entering the Estuary are continuously reduced.
Target 8: Protect, enhance and increase the natural areas of the Estuary and its catchments.

Goal 4: Safe and balanced recreation
Target 2: Pedestrian access to and around the Estuary is protected and improved

131. The Trust expects that any permanent structures constructed to service the pipeline are of a minimum size and profile so that they do not dominate the Estuary landscape.

132. We **ask that suitable planting around any permanent structures be put in place soon after the buildings' completion** to reduce their visual effect.

133. Any temporary buildings required during construction **should be removed as soon as they are no longer required,** which may be before the entire pipeline project is completed.

134. We also **ask that the construction sites are restored and improved** on the present, and that any planting restoration uses native plants endemic to the area.

135. The Trust requires that continual access is available for people walking around the Estuary edge.

136. **A condition of consent should be added to require safe walking access to be maintained both along the western Estuary shore and on the 'Estuary Walk' through South Brighton Domain**

Water quality

Referring to Consent Application:
CRC051724 – a coastal permit to discharge up to 518,000 cubic metres per day of treated wastewater from the Christchurch Wastewater Treatment Plant at a maximum rate of 6 cubic metres per second, into the Coastal Marine Area of Pegasus Bay via a 360 metre long diffuser, located at the end of the proposed sub-marine ocean outfall pipeline. The pipeline, including the diffuser, will extend to a maximum of 3,270 metres off shore, from a point off South New Brighton Beach at or about map reference NZMS 260 M35:891-418. A consent with a duration of 35 years is sought.

Referring to the Ihutai Management Plan Goals and Targets:

Goal 2: Healthy ecosystems are sustained in the Estuary and its surroundings
Target 1: Water quality in the Estuary and its rivers supports healthy aquatic ecosystems.
Target 2: The Estuary again supports healthy mahinga kai.
Target 4: The Estuary provides a healthy and safe ecosystem for birds.
Target 5: Estuarine fish populations are monitored and restored.
Target 7: Waste and contaminants entering the Estuary are continuously reduced.

Goal 4: Safe and balanced recreation
Target 1: Water quality in the Estuary is improved so that conditions are safe for contact recreation and other water contact activities.

137. The Trust is concerned about the quality of the wastewater being disposed to the ocean. AHEIT includes Integrated Environmental Management as a primary objective, and we consider the Estuary and the ocean water quality and ecology being connected.

138. While generally approving of the consent application to remove the discharge from the estuary we see the direct discharge to the ocean as a temporary solution, and expect that the Council will be have a long-term goal not to discharge to a water body at all. For this reason we expect the quality of the discharge to improve over the time, even if there is an increasing population**. We anticipate conditions on this consent to reflect that.**

139. We are very familiar with the negative cumulative effects the discharge has had on the Avon Heathcote Estuary/Ihutai, and do not want to see the ocean ecology being compromised, while acknowledging the discharge currently flows out to the ocean.
There are various points of control on the water quality:

The quality of the sewage entering the Treatment Plant (CWTP).

140. We consider that industrial waste should not be discharged through the domestic sewerage system, and should not be treated at the CWTP.

141. The removal of industrial waste to the CWTP could be expedited by the resource consent requiring reduction in the heavy metal contaminants over time.

142. Of particular concern are mercury, cadmium, zinc, arsenic, chromium, copper, lead and nickel which have cumulative negative effects on the food chain, and **we ask that the allowed concentrations of these be reduced over the term of the consent.**

143. In the applicant's proposed conditions 6-monthly sampling for metals at the pump station is required. We are suggesting that metals should be sampled more frequently and that limits be put on the concentrations of metals. Currently sampling is proposed but no standards are given to measure these against. (see paragraphs below)

The quality of water leaving the CWTP.

144. This is dependent on the treatment process. Recent upgrading at the CWTP has reduced the concentrations of bacteriological indicators and BOD. But the recent gains made will be lost as the population grows and when Belfast industries have their waste piped to the Christchurch CWTP.

145. The Trust wants to see the current levels of contaminants in the discharge maintained or decreased even as the population increases. This can also be managed through the conditions of this resource consent.

The water quality leaving pond 6.

146. We support the use of the oxidation ponds as a natural system providing ultraviolet treatment.

147. We oppose the addition of artificial UV treatment because of the high energy requirements and because of the efficacy of the oxidation ponds.

148. Recent pond modifications have reduced the levels of faecal coliforms and enterococci leaving the ponds, but disappointingly the levels of ammonia have not been reduced by the pond modifications, and are in fact increasing.

149. We suggest that further plant or pond modifications are required to reduce the ammonia levels, and **ask that the concentrations and mass loadings of ammonia and BOD discharged be limited** by strict conditions on the consents.

150. As already mentioned by Mr. Drysdale the ammonia levels in the discharge currently are of a real concern, and the CCC is failing to meet the current resource consent condition for ammonia. In October 2005 the condition of the consent requires levels for Ammoniacal Nitrogen to drop from 30g/m^3 to 20g/ m^3. The discharge will certainly not meet this new level. Because of this we understand the CCC is in the process of applying for a variation to the resource consent to keep the limit at 30g/ m^3 after October.

151. A recent maximum ammonia concentration recording was at 37.1g/m3 on December 2004 and a mass loading maximum at the same time of 8851kg/day above the 3600kg/day standard.

152. As described by Dr Bolton-Ritchie in her report for the Environment Canterbury's Section 42a report a value of 40g/m3 with 61 times dilution the resulting concentration of ammonia would be 0.66g/m3, which exceeds the ANZEC (2000) concentration of 0.5g/m3 for 99% protection of marine species. She suggests to ensure the 99% guideline value is not exceeded a 'maximum ammonia concentration' could be set for the discharge.

153. We have suggested a standard value of 20g/m3 reflecting a median for ammonia, and a maximum value of 35g/m3. These amended and added values we have used are those in the conditions of the existing consent to discharge to the Estuary CRC012011 to be met from October this year.

154. We see no reason why there should be any variation from these values, especially for ammonia. From Dr Bolton-Ritchie:
"Ammonia is a toxic compound and even a small pulse of wastewater with a high concentration of ammonia could kill some organisms in the receiving environments."

155. We submit that the values in condition number 13 proposed by the applicant be amended to:

> "Based on the weekly sampling required by Condition 7 of this consent, and taken over each 26 week period commencing on the 1st of May, and the 1st of November of each year during the term of this consent, no more than 16 values in each 26 week period shall exceed the following standards for each of the named contaminants:-

Contaminant	Unit	Standard value	Maximum value
BOD_5 (filtered)	g/m^3	~~20~~ **10**	
Total Suspended Solids	g/m^3	~~50~~ **30**	
Ammoniacal Nitrogen	g/m^3	~~40~~ **20**	**35**

and add

Contaminant	Unit	Standard
Total nitrogen	g/m^3	**30**
Dissolved Reactive Phosphorous	g/m^3	**8**

These amended and added values are those already in the conditions of the existing consent to discharge to the Estuary CRC012011

156. We disagree that enterococci be removed from the limits (Mr Tipler, Supplementary evidence, page 54). The fc and enterococci results from the ponds have recently not correlated but this is not a good reason to stop measuring and recording enterococci which is the indicator now being used for coastal waters. It is even more important that both fc and enterococci be recorded so that more work can be carried out to identify which indicator is more suitable for this discharge.

157. We submit that the condition number 14 proposed by the applicant be amended to:

> "Based on the weekly sampling required by Condition 12 of this consent, and taken over each 8 week period commencing on the first days of January, March, May, July, September and November of each year during the term of this consent, no more than **6** values from 8 consecutive samples, shall exceed the following standard values and no more than 2 values from 8 consecutive samples, shall exceed the higher value for enterococci and faecal coliforms.

Contaminant	Unit	Standard Value	Higher Value
Enterococci	No./100ml	300	500
Faecal Coliforms	No./100ml	1,000	5,000

158. We submit that the condition number 12(f) proposed by the applicant be amended so that metal analysis is undertaken **monthly** (rather than 6 monthly) as is required under the current resource consent conditions.

159. That a new condition be added:

> "Based on daily volumes of wastewater discharged as required pursuant to condition 12(b) and the **weekly** sampling required by Condition 12(c) of this consent, and taken over each 6 month period commencing o the 1st of May, and the 1st of November of

each year during the term of this consent, no more than 16 values from 26 consecutive samples, shall exceed the following standards of the named contaminant.

Contaminant	Unit	Standard
BOD_5	kg/day	5400
Filtered BOD_5	kg/day	1800
TSS	kg/day	8100
TN	kg/day	5600
Ammoniacal Nitrogen	kg/day	3600
DRP	kg/day	1260

These standard values are based on the current consent conditions

160. There are no limits included for heavy metal mass loadings. While the applicant may assume that the discharge is meeting the current condition for heavy metals the community need to be assured that this continues to happen

161. That a new condition be added:

"Based on daily volumes of wastewater discharged as required pursuant to condition 12(b) and the **monthly** sampling required by **amended** Condition 12(f) of this consent, and taken over each 6 month period commencing o the 1st of May, and the 1st of November of each year during the term of this consent, no more than 5 values from 6 consecutive samples, shall exceed the following standards of the named contaminant.

Contaminant	Unit	Standard
Arsenic	kg/day	0.54
Cadmium	kg/day	0.032
Chromium	kg/day	9.0
Copper	kg/day	3.6
Lead	kg/day	0.99
Nickel	kg/day	4.6
Zinc	kg/day	7.0
Mercury	kg/day	

These standard values are based on the current consent conditions

162. We would also expect the accepted mass loadings of these metals to be reduced over the term of the consent. For most metals this would be achievable by more stringent trade waste bylaws, but for zinc and copper community changes would be required as domestic sewage is their predominant source. **Reduced levels of heavy metals over time should be included as a condition to this consent.**

163. The current sampling regime is not sensitive enough to understand effects of increased flows in rain events. More regular sampling at the CWTP is required to better understand the treatment process, and to able to understand the effects of changes to the operating conditions.

164. Through DAG and in other ways we have continually contested the use of grab samples as it is not able to differentiate sampling error for real differences. Mr Tipler compares grab sampling with composite sampling, but we would recommend regularly using a set of consecutive grab samples to assess the variability of the sampling method.

Water quality leaving the end of the pipeline

165. The concentration of contaminants is dependent on the water quality leaving the ponds

166. However the mass loadings of the contaminants will vary depending on the rate of flow through the pipeline. Normal flow rates will be 2cumecs, but the application asks for flood flows of 6cumecs. This will treble the mass loadings and we have concern about this.

167. In some wet weather events the STP is not able to cope with the high volume of sewage arriving at the plant, and the plant is bypassed with sewage entering the ponds directly.

168. We submit that while bypassing the STP is not a preferred option any bypass of the STP directly to the pond system must be into pond 1 so there is adequate residence time for some treatment, buffering and dilution through the pond system and before discharge to the ocean.

169. The water quality on the beaches is not only dependent on the water quality of the wastewater discharge. There are four stormwater pipes discharging directly onto beaches in North New Brighton and Waimairi.

See Photos 8-11

The removal of the stormwater discharges onto the beaches should form part of the condition of this resources consent.

170. In Section 2.6 of the AEE a risk assessment of failures in the STP and pipeline has been completed. But there is no contingency plan presented for such failures

171. The Trust's concern is the effects on the Estuary if there is a pipeline failure and the wastewater is then diverted into the Estuary from the pump station. A sudden discharge to the Estuary, even if only temporary or for a short time could quite rapidly reverse the positive effects of discharge removal.

172. We request that the preparation of contingency plans in case of pipeline failure be a condition of the consent, and that these plans be prepared prior to construction starting.

173. There is no consent application to decommission the structures to discharge from the ponds to the Estuary. (see photos 12 and 13). There is also no application to have

emergency discharge from the ponds to the Estuary. We do not support the continued existence of these discharge structures and ask that their removal be a condition of this consent.

174. If it is planned to discharge to the Estuary at any time via the existing structure then an additional Resource Consent will be required.

175. We **support the formation of a Community Liaison Group and the Trust's representation on the CLG. But we require an additional condition that this group have an independent facilitator and independent minute taker and that these roles are not taken by officers of the applicant.**

176. **The CLG also requires a disputes resolution process**, **resourcing** and **powers for it to be effective.**

177. We have separately listed our comments on the proposed conditions

Avon Heathcote Estuary Ihutai Trust

178. Submission on Conditions

178. T**hat a tunnelling method of construction be a condition of the consent by declining the consents that allow for a dig and lay method.** That is, we ask the commissioners to decline **CRC51701, CRC51702 and CRC51703** (or impose such conditions that disallows a dig and lay or trenching method of construction to be used)

179. We ask that as part of the conditions of the resource consent that baseline studies be undertaken as soon as possible, and that follow up studies are undertaken at a suitable time after the pipeline to the ocean is in place. To be effective these studies would need to be very well planned, done well and over a reasonable time period. They would need to be done in such away to be comparable with historic and existing data.

180. **Referring to the supplementary evidence of Mr Tipler**

Page 1
#10 – needs rewording so that deposition of sediment prevented – not merely observed after the fact.

#14 is vague and unenforceable. We agree with the intent but condition needs rewording.

Page 2
#15 is also unenforceable and needs strengthening

If dig and lay construction is granted consent we ask that the following conditions be added:

- A condition to limit the total length of causeway so that no more than half the width of the estuary is blocked at any time
- Very strict conditions on sediment control and monitoring
- Sheet piling to be put in on <u>both</u> sides of the causeway <u>prior</u> to causeway construction, to reduce sediment escaping to the Estuary
- Analysis of the possible changes in the estuary and river channels, the effect of these changes and mitigation measures to prevent damage around the Bridge St bridge, the Pleasant Point Yacht club and the valuable salt marsh in the lower Avon River and Raupo Bay.
- The pipe to be buried deeper than 1 metre.
- If the 1m depth is retained then we recommend an additional condition that if there is any exposure of the pipe in the estuary it is immediately rectified by burying the pipe deeper, not merely covering it.

Page 3
The term of this consent is not stated

Page 4
Additional consents required **regarding construction on the Estuary edge**

- We ask that the dumped material in the western bank of the Estuary be removed prior to construction in a way that prevents release of any contaminants into the Estuary
- Removal of the rubble on the western shore of the Estuary and restoration of this shoreline should be a condition of consent.
- That the origin of the structures near the pump station is identified and they are protected during construction
- The pump station site and pipeline route should be chosen to ensure protection of the identified areas of salt marsh
- Ask that suitable planting around any permanent structures be put in place soon after the buildings' completion to reduce their visual effect.
- Any temporary buildings required during construction should be removed as soon as they are no longer required, which may be before the entire pipeline project is completed.
- That the construction sites are restored and improved on the present, and that any planting restoration uses native plants endemic to the area.
- A condition added to require safe walking access to be maintained both along the western Estuary shore and on the 'Estuary Walk' through South Brighton Domain

Page 16
Regarding disposal of water from dewatering processes:

- We support the use of a totally enclosed sedimentation settling system.
- No direct discharge to the stormwater system, the Estuary or ocean be allowed

Wastewater quality
Page 28

- The condition number 12(f) proposed by the applicant be amended so that metal analysis is undertaken **monthly** (rather than 6 monthly) as is required under the current resource consent conditions

Page 28/29

- **The values in condition number 13 proposed by the applicant be amended to:**

  "Based on the weekly sampling required by Condition 7 of this consent, and taken over each 26 week period commencing on the 1st of May, and the 1st of November of each year during the term of this consent, no more than 16 values in each 26 week period shall exceed the following standards for each of the named contaminants:-

Contaminant	Unit	Standard value	Maximum value
BOD_5 (filtered)	g/m^3	~~20~~ **10**	
Total Suspended Solids	g/m^3	~~50~~ **30**	
Ammoniacal Nitrogen	g/m^3	~~40~~ **20**	**35**

And add

Contaminant	Unit	Standard
Total nitrogen	g/m^3	**30**
Dissolved Reactive Phosphorous	g/m^3	**8**

These amended and added values are those already in the conditions of the existing consent to discharge to the Estuary CRC012011

Page 29

- **That the condition number 14 proposed by the applicant be amended to:**

  "Based on the weekly sampling required by Condition 12 of this consent, and taken over each 8 week period commencing on the first days of January, March, May, July, September and November of each year during the term of this consent, no more than **6** values from 8 consecutive samples, shall exceed the following standard values and no more than 2 values from 8 consecutive samples, shall exceed the higher value for enterococci and faecal coliforms.

Contaminant	Unit	Standard Value	Higher Value
Enterococci	No./100ml	300	500
Faecal Coliforms	No./100ml	1,000	5,000

Page 29

- **That a new condition be added:**

  "Based on daily volumes of wastewater discharged as required pursuant to condition 12(b) and the **weekly** sampling required by Condition 12(c) of this consent, and taken over each 6 month period commencing o the 1st of May, and the 1st of November of each year during the term of this consent, no more than 16 values from 26 consecutive samples, shall exceed the following standards of the named contaminant.

Contaminant	**Unit**	**Standard**
BOD_5	kg/day	5400
Filtered BOD_5	kg/day	1800

TSS	kg/day	8100
TN	kg/day	5600
Ammoniacal Nitrogen	kg/day	3600
DRP	kg/day	1260

These standard values are based on the current consent conditions

Page 29

- **That a new condition be added:**

  "Based on daily volumes of wastewater discharged as required pursuant to condition 12(b) and the **monthly** sampling required by **amended** Condition 12(f) of this consent, and taken over each 6 month period commencing o the 1st of May, and the 1st of November of each year during the term of this consent, no more than 5 values from 6 consecutive samples, shall exceed the following standards of the named contaminant.

Contaminant	**Unit**	**Standard**
Arsenic	kg/day	0.54
Cadmium	kg/day	0.032
Chromium	kg/day	9.0
Copper	kg/day	3.6
Lead	kg/day	0.99
Nickel	kg/day	4.6
Zinc	kg/day	7.0
Mercury	kg/day	

These standard values are based on the current consent conditions

- Reduced levels of heavy metals over time should be included as a condition to this consent.

- The removal of the stormwater discharges onto the beaches should form part of the condition of this resources consent.

- We do not support the continued existence of these discharge structures and ask that their removal be a condition of this consent.

Page 34

- We support the formation of a Community Liaison Group and the Trust's representation on the CLG. But we require an additional condition that this group have an independent facilitator and independent minute taker and that these roles are not taken by officers of the applicant.
  The CLG also requires a disputes resolution process, resourcing and powers for it to be effective.