

RESOURCE MANAGEMENT ACT 1991**Decision of Marlborough District Council**

RESOURCE CONSENT: U140294 and U140296

APPLICANT: New Zealand King Salmon Company Limited

LOCATION: Site 8632, Waitata Reach, Pelorus Sound/Te Hoiere
(U140294)

Site 8634, Ngamahau Bay, Tory Channel/Kura Te Au
(U140296)

**THIS IS THE DECISION ON THE SECTION 127 APPLICATIONS TO CHANGE
THE FOLLOWING RESOURCE CONSENT CONDITIONS:**

To change Condition 36 of Coastal Permit U140294, in order to increase the Maximum Initial Feed Discharge at the Waitata salmon farm from 3,000 tonnes per annum to 4,000 tonnes per annum.

To change Condition 40 of Coastal Permit U140294, in order to alter the Environmental Quality Standards and the definition of Enrichment Stages for seabed deposition at the existing Waitata salmon farm.

To change Condition 40 of Coastal Permit U140296, in order to alter the Environmental Quality Standards and the definition of Enrichment Stages for seabed deposition at the existing Ngamahau salmon farm.

DECISION:

Refused

Pursuant to section 127, and having regard to Part 2 matters, the Marlborough District Council **REFUSES** all three applications by New Zealand King Salmon Company Limited to change Conditions 36 and 40 of Coastal Permit U140294 ('the Waitata application') and Condition 40 of Coastal Permit U140296 ('the Ngamahau application').

BACKGROUND AND PROCEDURAL MATTERS

1. This is the combined report and decision of independent Hearings Commissioner Sharon McGarry. I was appointed by the Marlborough District Council (**MDC** or 'the Council) and delegated powers and functions under section 34A(1) of the Resource Management Act 1991 (**RMA** or 'the Act') to hear and decide applications by New Zealand King Salmon Company Limited (**NZKS** or 'the Applicant') to change the conditions of Coastal Permit U140294 ('the Waitata application') and Coastal Permit U140296 ('the Ngamahau application') pursuant to section 127 of the RMA.
2. The resource consents authorising operation of the salmon farms were granted on 17 April 2014 by a Board of Inquiry (**BOI**) appointed by the Environmental Protection Authority. The Waitata farm was established by January 2016. The Ngamahau farm was established by November 2015.
3. The Waitata section 127 application was lodged with the MDC on 23 April 2020 and was amended by the Applicant on 2 July 2020¹.
4. The Ngamahau section 127 application was lodged on 13 May 2020 and was also amended by the Applicant on 2 July 2020¹.
5. The applications were publicly notified on 26 August 2020. Seven submissions opposing the applications were received, with six indicating they wished to be heard.
6. The Applicant made further amendments to the applications on 14 October 2020². Some of these amendments were subsequently withdrawn on 27 April 2021³.
7. The hearing was initially scheduled to commence on 10 November 2020. However, following a pre-hearing meeting on 5 November 2020, the Applicant requested that the applications be placed on hold under section 91 and the hearing postponed to enable the provision of further information.
8. Prior to the hearing, two bundles of hearing reports were produced pursuant to section 42A of the Act by the Council's Reporting Officer, Mr Peter Johnson (Senior Resource Management Officer, MDC) and technical reviewer Dr Hilke Giles (Coastal and Systems Scientist, Pisces Consulting Limited); one dated 16 October 2020 and the second dated 3 June 2021.
9. The s42A Report dated 16 November 2020 included a report by Dr Giles on the proposed changes to Condition 40 for both applications, a report by Dr Giles on the proposed changes to Condition 36 for the Waitata application, and a report by Mr Johnson addressing both applications. Appended to the report bundle were copies of the following documents:
 - (a) Waitata Condition 40 application as notified (Appendix 1);
 - (b) Ngamahau Condition 40 application as notified (Appendix 2);
 - (c) Further amendment to Condition 40 both applications (Appendix 3);
 - (d) Waitata Condition 36 application as notified (Appendix 4);

¹ Gascoigne Wicks letter dated 2 July 2020

² Gascoigne Wicks letter dated 14 October 2020

³ Gascoigne Wicks letter dated 27 April 2021

- (e) Waitata compliance reports (Appendix 5);
 - (f) Ngamahau compliance reports (Appendix 6);
 - (g) Submissions received on Waitata application Condition 40 (Appendix 7);
 - (h) Submissions received on Ngamahau application Condition 40 (Appendix 8);
 - (i) Submissions received on Waitata application Condition 36 (Appendix 9); and
 - (j) Legal Memorandum – Barbara Mead, MDC (dated 12 October 2020).
10. The s42A Report dated 3 June 2021 addressed amendments to the applications and included an additional report by Dr Giles on the proposed changes to Condition 40 for both applications, an additional report by Dr Giles on the proposed changes to Condition 36 for the Waitata application, and an additional report by Mr Johnson addressing both applications. Appended to the report bundle were copies of the following documents:
- (a) Amendment to proposed changes to Condition 40 (Appendix AA);
 - (b) Clarification of amendment to Conditions 36 (Appendix BB);
 - (c) Issues for further attention (Appendix CC);
 - (d) Breach response protocol (Appendix DD);
 - (e) 2020-2021 Annual Monitoring Summary for the Waitata Reach Salmon Farm. Cawthron Report No. 3632 (Appendix EE); and
 - (f) 2020-2021 Annual Monitoring Summary for the Ngamahau Bay Salmon Farm. Cawthron Report No. 3636 (Appendix FF).
11. The s42A Report, Applicant's evidence and submitter expert evidence were pre-circulated to the parties prior to the hearing in accordance with section 103B of the RMA. This evidence was pre-read and taken 'as read' at the hearing.
12. The rescheduled hearing commenced at 9:00 am on Tuesday 29 June 2021 and evidence was heard over the course of two days. I adjourned the hearing at 2:00 pm on 30 June 2021, having heard from all the parties in attendance.
13. The hearing was adjourned to enable:
- (a) The Reporting Officer to consider the need for any further changes to implement the changes recommended by Dr Giles or any other consequential changes to the conditions;
 - (b) Submitters to comment on any further recommended changes to conditions;
 - (c) The Reporting Officer to consider submitter comments on further changes to conditions; and
 - (d) The Applicant to provide a written right of reply and final set of proposed conditions.
14. On 15 July 2021, the Reporting Officer provided a Memorandum setting out any further recommended consequential changes to conditions to reflect their recommended changes; and a set of conditions showing the proposed tracked changes to the existing conditions of consent.
15. Further comments on the Reporting Officer's proposed changes to conditions were received from three submitters by the 28 July 2021 timeframe set.
16. The Reporting Officer provided a response to the further comments from submitters on 5 August 2021.

17. The Applicant provided a written right of reply on 12 August 2021.
18. I closed the hearing on 23 August 2021.
19. I did not undertake a site visit given the nature of the applications.

Applications

20. The proposed changes are found in several separate applications which have been amended after discussion with the Council and submitters.
21. In summary, the applications seek the following three changes to the existing conditions of consent:
 - (a) A change to Condition 40 for the Waitata and Ngamahau farms to clarify the definition of Enrichment Stage (**ES**) – ‘**Change 1**’;
 - (b) A change to Condition 40 (Table 3) for the Waitata and Ngamahau farms to clarify the Environmental Quality Standards (**EQS**) at Zone 4 – ‘**Change 2**’; and
 - (c) A change to Condition 36 for the Waitata farm to increase the Maximum Initial Feed Discharge from 3,000 to 4,000 tonnes per annum – ‘**Change 3**’
22. The proposed wording changes to conditions are shown as tracked changes in the s42A Report (3 June 2021).

Notification and Submissions

23. Seven submissions in opposition to the application were received within the submission period. All of the submissions opposed the changes sought to Condition 36; four opposed changes to Condition 40 for the Waitata farm and five opposed changes to Condition 40 for the Ngamahau farm.
24. The s42A Report (16 October 2020) accurately summarised the key points of relevance raised in submissions for each condition change (pages 63-64) and should be read in conjunction with this decision.

The Hearing and Appearances

25. A public hearing was held on Tuesday 29 and 30 June 2021 in the Marlborough District Council Chambers. The following parties appeared at the hearing:

For the Applicant:

- Mr Quentin Davies/Mr Joshua Marshall (Counsel, Gascoigne Wicks)
- Mr Mark Preece (Seafarms Operation Manager, NZKS)
- Dr Lincoln MacKenzie (Senior Research Scientist, Cawthron Institute) – via Zoom
- Dr Emma Newcombe (Coastal Ecologist, Cawthron Institute)

For the Submitters:

- McGuinness Institute - Ms Lucy Witkowski
- Friends of Nelson Haven and Tasman Bay Incorporated - Mr Rob Schuckard
- Guardians of the Sounds - Ms Clare Pinder

Kenepuru and Central Sounds Residents Association

- Mr Andrew Caddie
- Ms Hanneke Kroon

For Marlborough District Council:

- Mr Peter Johnson (Lead Senior Environmental Planner)
- Dr Hilke Giles (Coast and Systems Scientist, Pisces Consulting Limited – via Zoom)

26. An audio recording of proceedings and copies of the hearing evidence are held by the Council. I also took notes throughout the hearing of responses to my questions.

SUMMARY OF EVIDENCE

Applicant's Case

27. **Mr Quentin Davies**, Counsel, conducted the Applicant's case and was assisted by Mr Joshua Marshall. Mr Davies presented legal submissions and called three witnesses. He outlined the background to the applications, the s127 statutory test, reasons for the changes, effects of the changes sought, retrospective condition changes, past compliance, and matters raised in submissions. He submitted that it is the Applicant's position that neither change of conditions (Condition 36 and 40) applied for is required but had been applied for out of an abundance of caution. In response to questions, he stated that the Applicant was not abandoning its interpretation of the conditions, but that it would be useful to have clarity of interpretation and consent conditions that better reflect current understanding. He emphasised that assessment of the application must be about the effects of the change and not broader matters relating to salmon farming. Appended to his submissions was a copy of an application for a declaration to the Environment Court as to the scope of the conditions of the coastal permits held for salmon farms in Waitata Reach, Ngamahau Bay and Richmond Bay (Kopāua) (dated 22 June 2021). He also tabled a copy of an email from Bailey Lovett (Ministry for Primary Industries) dated 28 June 2021 on whether there would be an out-of-cycle review of the benthic best management practice guidelines; and the statement of evidence of Dr Nigel Keeley in relation to benthic effects for NZKS and supplementary document of tables (dated June 2012).
28. At my request, after the adjournment Mr Davies helpfully provided a copy of the conditions of consent with all previous amendments to conditions shown.
29. At my request, Mr Davies also provided copies of 'Best Management Practice guidelines for salmon farms in the Marlborough Sounds. Part 1: Benthic environmental quality standards and monitoring protocol' (Version 1.1) dated June 2019 ('BMP guidelines'); 'Best Management Practice guidelines for salmon farms in the Marlborough Sounds. Part 2: Water quality standards and monitoring protocol' (Version 1.0) dated October 2019; 'Draft example of the Marine Environmental Monitoring and Adaptive Management Plan' by Keeley *et. al.* 2012; and '2018-2019 Annual Environmental Monitoring Summary for the Waitata Reach Salmon Farm' Cawthron Report No. 3323.
30. **Mr Mark Preece**, Seafarms Operations Manager for NZKS, provided a written statement of evidence and presented a written summary of evidence at the hearing. Mr Preece gave an overview of NZKS's high flow salmon farms, the context of the changes sought to the Environmental Quality Standards (**EQS**), changes to minimum feed levels, and the social and economic effects of the application. He noted that the annual monitoring reports demonstrate that the farms are currently operating at enrichment levels close to those which occur in the Marlborough Sounds and provided a summary of the 2019/2020 monitoring results. He outlined the change in operation of the salmon farms since the consents were granted from farming multiple ages of fish on one site to only farming a single age of fish. He noted that this had resulted in feed levels changing from being relatively constant over a period of a year to feed levels

ramping up over an 18-month period. He provided Figure 2 showing that in an 18 month grow out cycle 65% of the feed is consumed in the first year and 45% in the last six months. He stated the proposed changes addressed the farms' short term needs but that a thorough review of the consent conditions is underway with more substantial change to be made by a future review of conditions. He noted that NZKS is required to conduct three yearly surveys of the king shag/kawau and have contributed funding to annual surveys in collaboration with others. Appended to his statement were photographs and figures of feed levels.

31. At my request, Mr Preece provided me with copies of 'Pilot study on the use of mussel farms in Pelorus Sound/Te Hoiere by King Shag' (Contract Report No. 5074) by Wildland Consultants; 'King Shag research project: Year One update report' (dated November 2019) by Wildlife Management International Limited; 'King Shag research project: Year Two update report' (dated December 2020) by Wildlife Management International Limited; and 'Marine Environmental Monitoring – Adaptive Management Plan for salmon farms Ngamahau, Kopāua and Waitata (2020-2021)' Cawthron Report No. 3538.
32. **Dr Lincoln MacKenzie**, a Senior Research Scientist with the Cawthron Institute, provided a written statement of evidence and presented a written summary of evidence via Zoom addressing potential effects of salmon farm emissions on the generation of harmful algal blooms. He considered there was no evidence of the unusual occurrence of algal blooms associated with the salmon farms in nearby bays and inlets, although there had been some notable bloom activity in distant parts of Pelorus Sound/Te Hoiere in recent years. He noted that there have been a number of dinoflagellate 'red tide' blooms in several inlets in Pelorus Sound/Te Hoiere during 2018-2019 caused by previously unrecorded species which had caused problems for the mussel industry. However, there is evidence to suggest that these invasive species were introduced from offshore waters associated with the 2017-18 Tasman Sea 'heat wave'. He noted that the effects of salmon farm emissions on nutrient concentrations and phytoplankton blooms in the Pelorus Sound/Te Hoiere were simulated using a biophysical model⁴ under a variety of seasonal and feed loading scenarios. He stated that under the highest loading scenarios (well in excess of current consented loads) the model predicted slight increases in concentrations of nutrients (nitrate) and phytoplankton biomass (chlorophyll) in inner Tennyson Inlet. He stated that increases of this scale in reality would not be detectable against the background variability; and that recent multi-decadal phytoplankton data from Pelorus Sound/Te Hoiere showed concentrations of chlorophyll at various locations have remained stable or have shown a small decline since the 1980s (as had much of New Zealand's coastline). He concluded there was no empirical evidence that nutrient emissions from salmon farms play a pivotal role in driving ecosystem changes; but acknowledged that there was inadequate understanding of how nutrient discharges from sea cages affect the structure and function of the wider pelagic ecosystem.
33. **Dr Emma Newcombe**, a Coastal Ecologist with the Cawthron Institute, provided a written statement of evidence and presented a written summary of evidence at the hearing addressing potential seabed effects from the proposed changes. She also showed video footage of typical seabed imagery monitoring. Her evidence focused on the effects of organic enrichment and the measurement of observed effects and background variability. She noted that changes in populations of organisms can be difficult to detect before they become unacceptably large given natural variability, which is why descriptors of physical and chemical changes in the sediment are useful early indicators of change. She stated that a combination of physical, chemical and biological variables provides a weight of evidence approach to the detection of effects

⁴ Broekhuizen, N., Hadfield, M., Plew, D. 2015. A biophysical model for the Marlborough Sounds Part 2; Pelorus Sound. A report for the Marlborough District Council. NIWA report No. CHC2-14-130.

from the salmon farms on the seabed. She outlined the use of the Enrichment Stage (**ES**) approach as a means to incorporate a range of biological and chemical indicators of seabed enrichment into a single metric and the relative weighting of the three components. She stated that seabed conditions at the Waitata farm had not exceeded EQS when assessed as an overall ES. She demonstrated (with her Figure 1) why it is not ideal to measure seabed effects with a single variable. She concluded that if the component variables of the ES metric are used for assessing compliance there is a high probability that random variation will lead to the exceedances of consented environmental limits. She considered the proposed change would not change the intention of the conditions and would not permit greater change than was originally intended. She concluded that the increase in feed levels sought was unlikely to exceed the EQS beneath the cages or at the 150 metre stations; but that it is difficult to predict with certainty whether EQS could be exceeded at the 600 metre stations (Zone 3/4 boundary).

Submitters

34. **The McGuinness Institute** was represented at the hearing by Ms Lucy Witkowski. Ms Witkowski stated that the submitter remained in opposition to the changes to conditions sought and approach taken to achieve compliance with the conditions. She noted the Institute's support of the other submitters in opposition to the applications.
35. **Friends of Nelson Haven and Tasman Bay Incorporated** was represented at the hearing by Mr Rob Schuckard. Mr Schuckard provided a written statement outlining the background to the consents and the key concerns in relation to uncertainty in the modelling, the adaptive management approach, and the requirements of the conditions to achieve sustainability of the activity. He noted that based on the annual monitoring reports for the five production years, two years (2016-2017 and 2017-2018) had been within the consented Recommended Initial Feed Levels (**RIFL**) ($\pm 15\%$), two years had been below the RIFL (2018-2019 and 2019-2020) and one year had been above the RIFL. He highlighted this in his Figure 1 and stated this did not meet the requirement of Condition 37 to be within RIFL for three years before any feed increase is allowed. He noted that this 'erratic application of feed levels' had complicated the interpretation of the annual monitoring data and prevented any environmental equilibrium being reached. He acknowledged there was general compliance with the ES at the OLE boundary over the 2016-2021 period but noted that ES 3.0 is a state that is unlikely to be found naturally and is a point where enrichment becomes discernible. He highlighted changes at the Outer Limits of Effects (**OLE**) boundary (Zone 3/4 boundary) that were not comparable to reference sites and noted concerns regarding the locations of some of the reference sites. He concluded that no increases in feed levels should be allowed until the objectives of the adaptive management regime had been fulfilled; and that changes to Condition 40, to narrow the scope for change, were 'premature' and do not reflect the uncertainty in analysing benthic health. He requested that condition changes sought be declined.
36. Following the hearing adjournment, Mr Schuckard provided an addendum clarifying the figures in his evidence (Appendix 1), data used from annual environmental monitoring for Waitata (Appendix 2), and data used from baseline monitoring 2015 (Appendix 3).
37. As requested, Mr Schuckard also provided copies of the five technical reports⁵ he referenced in evidence.

⁵ The New Zealand King Salmon Company Limited: Assessment of Environmental Effects – Benthic' Cawthron Report No. 1983 dated August 2011;

'Assessment of Effects of Farming Salmon at Waitata Bay, Pelorus Sound: Deposition and Benthic Effects' Cawthron Report No. 1986 dated August 2011;

'State of the Environment Report 2015. Our Land, Our Water and Our Place' Marlborough District Council';

38. **Guardians of the Sounds** was represented at the hearing by Ms Clare Pinder. Ms Pinder presented a written statement outlining background to the organisation and its role as an environmental 'watchdog'. She noted the BOI had purposely used the words 'and conditions' rather than a composite index to ensure conditions were comparable to the reference sites (background conditions). She considered a better solution would be to clarify 'conditions' by inserting 'organic loading, sediment chemistry and macrofauna values' in brackets, which would retain the intention of the BOI decision. She expressed real reservations with rewarding NZKS for their bad behaviour and breaching the maximum consented feed levels. She requested that if the changes sought were granted that the changes recommended by Dr Giles to improve the monitoring regime and reflect the single year class farming be included. She highlighted Dr Giles' evidence that there is a lack of assessment of the enrichment effects on epifauna at both sites and a lack of baseline data on significant marine site 5.8. She stated that the applications should be declined on the basis of measured effects outside the OLE and failure to meet the adaptive management conditions. She noted that there was still significant uncertainty regarding environmental effects and that a precautionary approach was warranted.
39. **Kenepuru and Central Sounds Residents Association (KCSRA)** was represented at the hearing by Mr Andrew Caddie and Ms Hanneke Kroon. Ms Kroon presented two written statements addressing each of the conditions changes and a PowerPoint presentation; and provided copies of a graph showing temperature records for 2013 – 2020 for the Pelorus entrance and Tory Channel/Kura Te Au and three other documents.⁶ She highlighted concern regarding significant adverse impacts on public space and considered this vastly outweighed the benefits to NZKS. She noted the variations were aimed at addressing non-compliance with conditions which were carefully drafted through the BOI process to address uncertainties and ensure a precautionary approach was taken. She considered the Waitata site had not performed to expectations because it is not a 'cool' water site and that temperature spikes above 17 degrees Celsius had led to significant mortality spikes. She noted that even when feed discharges were low from high fish mortality, monitoring records show non-compliance with Condition 40. She suggested that NZKS had been carefully dismantling the BOI conditions through a series of non-notified applications, which she considered was a cynical approach to adaptive management (change the consent conditions and not the farm) rather than complying with the limits. She noted concern that issues relating to the size of the depositional footprint had not been addressed. She emphasised the need for a precautionary approach (NZCPS Policy 3) and not a less restrictive approach to address non-compliance, particularly in relation to effects on king shag.
40. Mr Caddie stated that adaptive management should not be about adapting the conditions of consent to suit the operation. He considered the BOI did not get it wrong with the words 'and conditions' given the process and scientific expertise available. He noted concern that some of the reference sites were too close to other marine farm sites. He considered the level of uncertainty, as evidenced by Dr Giles review, warranted a precautionary approach and a need to retain the status quo.
41. A written statement on behalf of the **Director General of Conservation** (dated 24 June 2021) was tabled at the hearing in relation to the proposed changes to

Morrisey, D., Anderson, T., Broekhuizen, N., Stenton-Dozey, J., Brown, S., Plew, D. 2015. Baseline monitoring report for new salmon farms, Marlborough Sounds. NIWA Client Report No: NEL1014-020. Prepared for New Zealand King Salmon; and 'A review of total free sulfide concentrations in relation to salmon farm monitoring in the Marlborough Sounds' Cawthron Report No. 2742.

⁶ 'Intelligence Report NZ-RLO & *T. maritimum* 2015 response' Ministry for Primary Industries. May 2017; 'Salmon Farming: It's all about Location, Location Location' by the Marine Sub-Committee of KCSRA (dated 16 May 2016); and 'Investigation of atypical mortality patterns associated with skin lesions in farmed New Zealand king salmon (*Onchorhynchus tshawytscha*) by Gates, C. et. al. (undated).

Condition 36. It stated the main concern was the degree of uncertainty about the potential effects resulting from the proposed feed level increases given this would be a significant increase when compared to the discharge levels over the previous two years. It noted that there had been no assessment of the risk and insufficient details regarding the ability to detect and respond to significant adverse effects early. It noted agreement with the assessment of Dr Giles and the uncertainties outlined. It highlighted that feed loadings had not been consistent over the last three years and it is therefore unclear whether measured effects had reached an 'equilibrium' state. It also highlighted Dr Newcombe's evidence that annual monitoring had tended to take place within a number of months of a short fallow period, which may have allowed for a period of recovery of the seabed; and commented that the predictive ability of the model is somewhat confounded by the change in feed regime at the same time as the proposed feed increase. It noted that a revised monitoring plan (MEM-AMP) had not been provided with the application, which results in considerable uncertainty as to how it will address the feed increase and the transition to a single year-class salmon farm. It stated that if any feed increase was allowed it must be conditional on the preparation and certification of a revised MEM-AMP, with additional monitoring to give confidence about the magnitude of adverse effects at the OLE and monitoring undertaken when ES levels are at their predicted maximum following maximum feed discharges.

Section 42A Reports

42. **Dr Hilke Giles** spoke to her technical review and reports and provided a written statement addressing the key points and evidence presented. She acknowledged that the multiple versions of her evidence had created complexity but had been necessary given the additional information, amendments to the applications and the postponement of the initial hearing date. She remained of the view that the requirements of Condition 37 had not been met, including breaches of sub-clauses 37(a) and (b). On the basis of the 2020/2021 annual monitoring results, she concluded the receiving environment was likely to have the capacity to assimilate the proposed feed increase to 4,000 tonnes per year and would not breach the EQS at the current monitoring sites. She acknowledged that there would likely be a small increase in the spatial extent of benthic effects, but that this was ecologically acceptable. However, she noted this one year of data at higher feed discharges did not address potential cumulative effects. She highlighted a number of uncertainties regarding the effectiveness of the current benthic monitoring regime for detecting effects under the single year class farming regime and recommended further changes to the monitoring regime.
43. **Mr Peter Johnson** spoke to his s42A Report and addressed the matters raised during the hearing. He stated the identification of values should not be undertaken in a vacuum and should be viewed in the context of the statutory plans. He considered that 'narrowly speaking' the changes sought would not have significant adverse effects. He said that in terms of effects one king shag, he had taken the lead of the BOI. He considered there was good information available to assess the application and that the concerns were 'more around the margins'. He remained uncomfortable with applying the changes retrospectively and considered past compliance history should not be rewritten. He recommended that changes to conditions be granted from the date of the decision.
44. As requested by me at the hearing, Mr Johnson provided a Memorandum (dated 14 July 2021) outlining changes to conditions to implement the changes recommended by Dr Giles. As a minimum, he recommended:
 - (i) Clarification for determining the timing of benthic monitoring to ensure it follows maximum feed discharges for the year;
 - (ii) The addition of a 150 metre south monitoring site;

- (iii) A review of the suitability and consistency of the reference sites for future monitoring;
 - (iv) A review of the response to potential breaches of EQS to ensure they are clear and effective under the single year class farming model to avoid the need for enforcement action by the Council; and
 - (v) A requirement to monitor recovery from a potential breach of EQS before restocking can occur.
45. Mr Johnson and Dr Giles helpfully provided a tracked change version to the Applicant's consolidated version of conditions to address the further recommended changes. Mr Johnson noted concern that changes suggested to defining 'a year' may have other unforeseen consequences for other consent conditions.
46. As requested, Mr Johnson confirmed his recommendation to grant the changes to conditions sought but reiterated that he remained uncomfortable with retrospectively applying the changes and any re-writing the compliance history on this basis. He noted:
- 'I anticipate that these amended conditions would be an interim measure, better than the status quo yet probably not suitable for use over the long term and/or across all existing salmon (or other finfish) farms in the Marlborough Sounds. While it remains to be seen, there appears to be a strong prospect that the applicant will seek a wider review of its consent conditions in the near future in its pursuit of best management practice'*
47. As requested, Mr Johnson provided a further Memorandum (dated 4 August 2021) commenting on the responses from submitters to the further recommended changes to conditions.
48. Ms Barbara Mead, Advocacy and Practice Integration Manager with MDC, provided a Memorandum (dated 12 October 2020), providing legal opinion as to whether a change of conditions can be granted retrospectively (i.e. the effect of the changes applying prior to the date of grant of the application).
49. Ms Mead provided a supplementary Memorandum (dated 29 June 2021) responding to the Applicant's legal submissions relating to applying the proposed conditions changes retrospectively.

Applicant's Right of Reply

50. Mr Davies provided a written right of reply on behalf of the Applicant addressing ES versus EQS, further recommended changes by the Reporting Officer, the deposition footprint, the potential 'yo-yo' scenario, effects on king shag, adaptive management, the BMP guidelines, the scope of the applications, implications for the company, the relevance of mortality and operational factors, the example MEM-AMP for the BOI, and the ability to apply the changes retrospectively. He concluded that granting the applications would resolve existing uncertainty relating to interpretation of the conditions, implement some of the BMP guidelines and enable NZKS to increase feed levels while maintaining a healthy environment.

ASSESSMENT

51. In assessing the applications, I have considered the application documentation and AEE, the s42A Reports and appended information, the submissions, pre-circulated evidence, and all the evidence provided during and after the hearing adjournment. This has required a substantial amount of time reviewing all background information and the technical documents referenced. I have summarised this evidence above. I record I have considered all the issues raised in making my determination.

Activity Status

52. Pursuant to section 127 the applications must be considered as a discretionary activity.

Sections 104 and 104B

53. Under section 127, in considering the effects of the changes to conditions proposed, I am required to have regard to the matters listed in section 104 of the Act.

54. In terms of section 104(1), and subject to Part 2 of the Act, which contains the Act's purpose and principles, I must have regard to-

- (a) *Any actual and potential effects on the environment of allowing the activity;*
- (ab) *Any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity;*
- (b) *Any relevant provisions of a national environmental standard, other regulations, a national policy statement, a New Zealand coastal policy statement, a regional policy statement or a proposed regional policy statement, a plan or proposed plan; and*
- (c) *Any other matters the consent authority considers relevant and reasonably necessary to determine the application.*

55. Section 104B states that after consideration of an application for a discretionary activity, I may grant or refuse the applications. If I grant the applications, I may change any conditions or impose new conditions under section 108, so long as they relate to the effects of the proposed changes to conditions.

56. I consider the principal issues of contention and each of these statutory considerations below in relation to each application.

Principal Issues of Contention

57. There were a number of issues raised by submitters that are not relevant to my assessment of the effects of the applications, including the suitability of the sites for salmon farming, mortality rates, and operational and management issues. I have not had regard to these matters.

58. The subject of whether the changes sought can be applied retrospectively was the subject of disagreement between Mr Davies and Ms Mead. Mr Davies submitted that the ability to grant retrospective consents is well established and logically applies to variations too. He stated that the definition of 'effect' includes past effects which could be from the start of the effect and not merely from the date of the application.

59. Ms Mead agreed that retrospective consents can be granted to enable an activity to be lawfully carried out from a certain date. However, she considered that the Council's ability to grant a retrospective variation was limited to an activity that had occurred, which had readily identifiable effects; and that the variation could only apply from the date it was granted. She further cautioned that the effects of the variation must be within scope of the original consent and do not result in 'environmental creep'.

60. In reply to Ms Mead's memorandum, Mr Davies submitted that the proposed changes are within the scope of the original application; issues of environmental creep are not relevant; and the application is not a renewal of a consent which is about to expire. He disagreed with Ms Mead's assertion that the adverse effects identified at the time of granting must be compared with the adverse effects of the variation, as the existing environment includes the effects of the currently consented activities. He considered Change 1 and 2 should be granted retrospectively because they reflect the intent of the originally granted consent. He considered Change 3 should be granted retrospectively

to avoid 'legacy issues' and noted that this would have been authorised after the 2018/2019 annual monitoring if Changes 1 and 2 are made retrospectively.

61. I agree with Ms Mead that the key question is whether environmental effects of the changes sought are within the scope of the assessment of effects of the consent granted and do not authorise greater (both in magnitude and extent) environmental effects than consented. I do not agree with Mr Davies that Change 2, enabling overall ES enrichment to be the sole EQS for the benthic environment outside of the OLE, was the intent of the granted consent. I consider it would be inappropriate to apply Change 3 retrospectively given I have insufficient evidence to demonstrate that the effect of increased feed discharges (discharged in breach of the conditions of consent) is within the scope of the effects anticipated by the consent granted.
62. I consider compliance history is based on the conditions that applied at the time it was assessed and it cannot be rewritten with the overlay of conditions changed at a later date. The 'legacy issue' the Applicant wishes to avoid is the fact it has breached the maximum allowed feed discharge under the conditions of consent. In my view, this cannot be expunged by retrospective changes to conditions.

Section 104(1)(a) Environmental Effects

63. The resource consents to operate the two salmon farms form part of the existing environmental context from which the effects of the proposed changes must be assessed. This includes the consented limits and standards which define the authorised scale of effects, in both magnitude and extent.
64. I agree with Mr Davies that this includes allowance for a certain level of benthic deposition and consequential effects on king shag feeding habitat within the consented area and the predicted (consented) deposition footprint. It does not include effects outside the OLE, where environmental effects from salmon farming were predicted to be indiscernible from natural conditions and variation. Arguments as to whether a measurable effect outside the OLE are 'acceptable' or 'material', or negative or positive was a matter for the BOI when assessing the consents granted. The fact remains that consents were granted on the basis that benthic effects outside of the OLE would be similar to natural background conditions and that this could be managed through changes to feed inputs. I have assessed the effects of the changes on this basis and consider the limits and standards of the consents define what is 'acceptable'.
65. On the basis of the evidence of Dr MacKenzie, I accept that the changes sought are unlikely to increase the risk of harmful algae blooms occurring from the effects of salmon farming.
66. I accept that the evidence of Dr Newcombe and Dr Giles that increased water quality effects are unlikely. I note Dr Giles recommendation to required water quality monitoring in Tennyson Inlet.
67. I have focused my assessment on the environmental effects on the benthic environment. I accept that benthic effects are important to the protection of the feeding habitat of king shag and the requirement to avoid adverse effects, not just significant adverse effects.

Change 1

68. Mr Davies submitted that the reference to Figure 4 and Table 5 in Condition 40 of both consents is inherently ambiguous and does not provide an appropriate level of certainty to determine compliance. He considered the BMP guidelines contained a clear

definition for ES, including polynomials by which the ES equivalents for each variable should be calculated (BMP guidelines Table 8).

69. Dr Giles considered the change to the definition of ES (Change 1) did not have any direct consequences for environmental effects at either farm site.

Findings

70. I have considered this proposed change in conjunction with Change 2. While I accept the change will not have any direct environmental effects, the zone concept and ES approach and how the overall ES is calculated is fundamental to managing adverse benthic effects. I consider it is important that the conditions of consent define how this is to be calculated, without reference to other documents which may be superseded or changed. I consider BMP guidelines should give technical guidance to the implementation of the conditions of consent, not the other way around.
71. If reference to Figure 4 and Table 5 of the current conditions does not clearly define how the ES is calculated, this should be addressed through the changes to the conditions themselves, as suggested by Ms Pinder. However, this is not what is proposed. I find Change 1 should not be granted in isolation to a wider review of conditions to ensure they are fit for purpose.

Change 2

72. Mr Davies submitted that it is unclear whether use of 'conditions' in Table 3 of Condition 40 refers to ES as an overall aggregate of the ES variables or to the individual variables weighted to make up ES. He stated that NZKS consider 'conditions' should be interpreted as the aggregate variable ES, whereas the Council had recently taken the alternate view that it means the individual variables to calculate ES. He noted the Council's interpretation had led to past non-compliance assessments at Waitata.
73. Mr Davies submitted that assessment of the change must be on the effects of the difference between the approaches. While he conceded NZKS approach may permit greater variability in individual variables, he noted that an increase in one variable may be a poor indicator or no indicator of an environmentally material change. He submitted that what is relevant is whether the increase is 'ecologically significant' and that the original intention of the BOI was that the aggregate to ES approach be taken. He noted that if natural variability in the benthos results in a breach of consent conditions, regardless of the salmon farms, the condition is unlawful.
74. Mr Davies submitted sulphur is an imprecise environmental indicator and redox is a poor indicator based on the evidence of Dr Newcombe. He stated that BMP Benthic triggers for Type 1, 2 or 3 monitoring should not be confused with an environmental effect, as the action for exceeding Type 1 triggers is to undertake Type 2 monitoring. He noted the Applicant undertakes routine Type 2 monitoring and the present conditions do not allow for Type 1 monitoring.
75. Mr Preece provided an example for the 2019/2020 monitoring year where the Council considered the Waitata farm was non-compliant because the total abundance at the Zone 4 boundary (monitoring station 600 metre south) was higher than at the relevant reference sites. He considered this was inconsistent with the intended operation of ES and doesn't acknowledge the fact that individual variables can be poor indicators of environmental conditions. He considered the BOI intended a weight of evidence approach to be taken towards compliance.

76. Dr Newcombe referred to the evidence of Dr Keeley to the BOI and his confirmation of the intention to use an overall ES to assess compliance. She considered that using an overall ES to test compliance would not permit any greater effects than were originally intended to be permitted. She noted that when using the overall ES, a number of measurable changes could occur at or beyond the OLE (Zone 3/4 boundary) without causing non-compliance. She gave the example where sediment chemistry could be affected by fish farming activity, but that non-compliance would not result until multiple lines of evidence (or component variables that comprises ES) show an effect on the seabed. She stated that in adopting the overall ES 'as per the consent conditions' greater effects of farming could occur at the OLE monitoring sites than would be allowed if component variables are used to assess compliance. However, she noted that the permissible changes would not necessarily be negative in terms of ecological functioning.
77. Dr Newcombe outlined that the relative weighting (ratios) of the three groups of ES variables (organic loading = 0.1, sediment chemistry = 0.2 and macrofaunal composition = 0.7) derives partly from their reliability to predict ES and partly from their ecological significance. She considered the main concern of maintaining the ecological integrity of the benthic environment was represented by the macrofaunal variables; and that organic and sediment chemistry are mainly predictors of this integrity. She noted that the percentage of organic matter around farm sites is highly variable and is distributed more widely at higher flow sites.
78. Dr Newcombe concluded that if component variables of the ES metric are used to assess compliance there is a high probability that random variation will lead to exceedance of the consented environmental limits.
79. The background to the consent condition ES limits and EQS is outlined in Dr Keeley' evidence to the BOI⁷. In his statement of evidence, he described the enrichment gradient of ES 1-7 as ranging from 'natural to azoic'. He noted that numerous variables are used to indicate enrichment and that some variables are more reliable than others, with accuracy in an assessment of effects improving with the benefit of multiple variables/indicators. He noted that the established worldwide understanding of enrichment patterns and an ES classification system for salmon farms in Tasmania had been adapted specifically to suit the Marlborough Sounds environment. He explained-
- 'The ES gradient is important because it provides a framework for categorising effects, and a common scale against which a range of common environmental indicators/variables can be quantified. The resulting empirical relationships between the environmental variables and ES can be used to reliably evaluate seabed conditions by placing them on a continuous scale from 1 (good) to 7 (bad) (i.e. using a bounded continuous variable).*
- Importantly, the general ES criteria can be incorporated into Environmental Quality Standards (EQS) as each stage implies measurable criteria for a range of variables.'* (Paragraph 36 and 37, page 14)
80. Dr Keeley's evidence to the BOI stated that the level of seabed impact is directly related to the farming intensity (i.e. the amount of feed or the number of fish farmed); and that seabed effects can be controlled by feed usage. He stated that the size and intensity of the depositional footprint is also strongly influenced by site depth and current speeds, which together constituent the 'dispersive qualities' of a site. He noted that deep, high flow sites are likely to have larger but more diffuse depositional footprints than low flow sites when farmed at comparable intensity due to resuspension.

⁷ Statement of Evidence Nigel Brian Keeley dated June 2012 and Supplementary Document of Tables dated June 2012.

81. Dr Keeley's evidence stated that a recommended initial feed level (**RIFL**), the predicted sustainable feed level (**PSFL**) and the maximum conceivable feed level (**MCFL**) had been estimated for each site. He noted the PSFL represented the '*best estimate (based on modelling and experience) of the amount of feed the site can tolerate without seabed effects becoming unacceptable (according to predefined environmental criteria)*'. He noted it was anticipated that this would be re-evaluated after a few years at which point a maximum sustainable feed level would be able to be determined for each site. He stated–

'The RIFL is approximately 75% of PSFL and provides a conservative estimate of an approximate initial feed level from which stepwise increases at set maximum tonnages and frequencies may occur (dependent upon the results of annual environmental monitoring surveys).

The MCFL represents the suggested upper limit for a site that could conceivably be achieved without excessively impacting the seabed and is mainly to assess the worst-case scenarios. However, this level may never actually be reached in practice at many of the farms.' (Paragraph 50 and 51, page 18).

82. Dr Keeley's evidence noted the four steps used to determine the RIFL, the PSFL and the MCFL –
- (i) Using DEPOMOD v2.2 model to predict the depositional footprints at each site for a range of scenarios (cage configurations and feed levels) based on measured site-specific physical properties;
 - (ii) Relating (predicted) depositional flux (measured in kilograms solids per square metre per year [**kg/m²/yr**]) to observed ecological effects by modelling multiple historical scenarios for existing farms and comparing the predicted fluxes to the corresponding environmental monitoring results, which had resulted in empirical relationships between predicted depositional flux and (likely) ES;
 - (iii) Defining 'acceptable' levels of effects based on predefined criteria regarding the maximum size and magnitude of the predicted footprints; and
 - (iv) Predicting the sustainable, site-specific feed capabilities based on how much area was likely to be affected by a standardized range of depositional flux levels and therefore levels of effects; and using the results to identify the highest feed levels at which the seabed effects directly beneath the cages is likely to be no greater than ES 5.0.

83. Dr Keeley stated that at ES 5.0 the infauna population starts to collapse and organic material is likely to accumulate; but that the recommended maximum ES 5.0 beneath the cages takes into account other factors such as the optimum utilisation of the space and farming economics. He acknowledged that at high flow sites the spatial extent thresholds may be reached before the beneath cage ES 5.0 threshold and that in this case ES 5.0 would never be reached. He stated –

'...highly dispersive sites have the potential to affect relatively large areas before the maximum ES thresholds are triggered. So, although spatial limitations and the associated acceptable zone of effect (AZE) boundaries need to be tailored to suit the sites it was also considered appropriate to set a realistic footprint size constraint to use as a second factor in the capacity determining process.'
(Paragraph 55, page 20)

84. Table 10 of Dr Keeley's evidence showed the total predicted deposition area for the Waitata site was 21 ha with RIFL, 24 ha with PSFL and 28 ha with MCFL. He noted that the outer extent of the footprint was defined by the area predicted to be affected by farm sourced deposition >0.5 kg/m²/yr or correspondingly ES ≥3.0. He stated that '*...this threshold was selected because it is the point at which effects can be clearly attributed to the farms, and because it can be predicted from the depositional modelling*

using the *no-resuspension scenarios*'. He noted this was considered to be a conservative measure and a precautionary approach given it is slightly lower than other published estimates of minimum levels of deposition required to induce measurable changes in the benthos.

85. Dr Keeley emphasised that model validation (equating predicted outputs to actual effects) and the experience of those that are implementing and interpreting the outputs were the key elements in obtaining meaningful outcomes throughout the staged development. He stated that progression to the next stage or feed level would be conditional on meeting the pre-specified EQS.
86. Dr Keeley stated that the Waitata footprint is predicted to extend up to 800-900 m away but that there remains some uncertainty over whether detectable levels of effects will actually manifest greater than 400-500 m. He noted that the farm-specific footprint dimensions incorporated into the consent conditions (representing the area permitted to be affected) was based on the PSFL rather than the MCFL. He acknowledged that there was potential for '*...low-level cumulative seabed enrichment in far-field locations through the process of resuspension, horizontal transport, and subsequent sedimentation in other locations.*' He stated he had constructed a simple model to depict the potential for far-field benthic effects, but that these potential effects are 'difficult to reliably assess' and are associated with a high degree of uncertainty. For this reason, he noted that a long term, far field monitoring programme was recommended as a precautionary measure.
87. Dr Keeley outlined that the three adaptive management approaches to be employed to ensure environmental effects remain within acceptable limits were:
 - (i) staged development - with expansion contingent on compliance with EQS;
 - (ii) tiered monitoring – with increased monitoring effort when sites approach or exceed EQS or in response to identified environmental issues; and
 - (iii) ongoing adaptive management – with any exceedances of the EQS addressed and management responses implemented to ensure the farm becomes compliant with the EQS within the required timeframe by adapting management approaches.
88. Dr Keeley stated that under the monitoring zones concept seabed conditions are compared against pre-specified EQS that relate to both the magnitude (or 'severity') and spatial extent of effects. He noted that in Zone 4 (anywhere outside of Zones 1-3) the benthic conditions are required to be comparable to natural background conditions. He stated that the Zone 3/4 boundary (equivalent to the maximum acceptable zone of effect) was determined from the site-specific depositional model; and that this should be re-evaluated after three years of operation at the RIFL. He noted that this is provided for in the consent conditions and would involve a repeat baseline survey to evaluate the positioning of monitoring sites to ensure that they are appropriately located for long-term compliance monitoring. He stated that seabed monitoring results would be compared against some of the core EQS and that details pertaining to how the overall ES is calculated are provided in the example MEM-AMP provided.
89. Dr Keeley recommended that at least three years elapse at the specified feed levels ($\pm 15\%$ over three years) to ensure the full effects of the activity had been expressed and evaluated before progressing. He noted feed increases would be considered appropriate if at least two years of annual monitoring results are considered to be comparable (i.e. no statistically significant degradation) and compliance with all the specified EQS. He stated that under the three-tiered monitoring approach, increased feed levels and/or managing at the upper limits of environmental thresholds would require higher intensity of monitoring. He noted that Type 3 monitoring constitutes a footprint mapping exercise to assess the spatial extent of effects after three years of

operation and would be repeated as required. He stated that this was akin to the baseline survey and would be used to determine the actual shape of the footprint (i.e. to validate the model predictions) and to ensure the appropriate positioning of monitoring stations for ongoing, long term monitoring.

90. Mr Schuckard noted that Dr Keeley had used model v2.2 which was not able to deal with organic deposition. He said that there are only two options in the model – with resuspension or no resuspension. He noted that only the modelling assuming no resuspension had resulted in the OLE footprint. He stated the modelling showed close to natural deposition beyond 600 metres, but now the Applicant is trying to justify higher deposition levels by saying deposition is good for the environment. He considered certainty of effects of organic deposition from resuspension was far from established and had largely been overlooked when the consent was granted. He considered this was why the modelling had under-predicted the spatial extent of deposition and the actual footprint is significantly larger than consented.
91. Mr Schuckard considered the monitoring data should encapsulate trigger levels of individual environmental parameters that are, at high levels, toxic or highly undesirable and should be avoided on their own merit. He strongly advised that sulphide trigger levels be maintained as a separate metric in line with the BMP guidelines given sulphide levels and low oxygen levels are prime drivers of changes in benthic conditions from oxidic to hypoxic. He considered that maintaining biodiversity indexes and multidimensional analyses in combination with separate chemical triggers are an expression of the precautionary principle. He stated that use of a singular ES did not reflect the uncertainty about analysing benthic health in the Waitata Reach at this stage. He considered the use of 'conditions' should be clarified to refer to the BMP trigger levels for sulphide (Table 5). He questioned the status of the 2015 baseline monitoring report⁸ and why changes measured were not compared to conditions before the farms were developed. He also highlighted the baseline monitoring report (section 8.2.2, page 118) recommended the establishment of permanent quadrats on shallow reefs at Waitata and Ngamahau farm sites and associated reference locations to identify changes in the abundance and size of colonies of organisms, changes in the compositions of encrusting assemblage and evidence of the accumulation of organic waste. He questioned why this had not been undertaken.
92. In relation to the Ngamahau application, Mr Schuckard noted significant declines in benthic conditions (sulphides, redox and macrofaunal abundance) under the cages as a result of relatively small increases of feed levels. He highlighted the importance of the location of the reference (control) sites and the recommendation in 2016 to add an additional far-field control site, which had not been implemented. He noted that TC-Ctl-1 and TC-Ctl-3 are located closer to operational marine farms than would be expected for appropriate far-field control sites; and noted that these had shown significant increases since the Ngamahau farm was developed. He highlighted the need for a statistical analysis comparing the OLE monitoring stations and the reference sites; and questioned why the Applicant had not done this given it was critical to assess effects and compliance with the current conditions.
93. Ms Kroon noted KCSRA supported the Council interpretation that compliance is required with the individual EQS conditions (components) as well as the overall ES. She noted that the deposition footprint clearly exceeded the consented 24 ha footprint and therefore did not meet the EQS for seabed deposition.
94. Dr Giles considered that changing 'conditions' to an overall ES may result in more adverse effects being permitted at the Zone 3/4 boundary compared to the Council's

⁸ Morrissey, D., Anderson, T., Broekhuizen, N., Stenton-Dozey, J., Brown, S., Plew, D. 2015. Baseline monitoring report for new salmon farms, Marlborough Sounds. NIWA Client Report No: NEL1014-020. Prepared for New Zealand King Salmon

current interpretation. However, she considered the potential increase in adverse effects were likely to be *'acceptable for benthic soft-sediment environments, including infauna'*. She stated that the change sought would *'improve the effectiveness and ecological value of response to potential future non-compliances with the EQS because it reduces uncertainty in interpretation.'* However, she noted that she had been unable to assess the broader implications of permitting greater adverse effects at the Zone 3/4 boundary on epifauna, including sponges in nearby reef monitoring.

95. In response to questions regarding her stated 'inability to assess the broader effects', Dr Giles stated that this was because some of these effects were outside her specific expertise; and the current disconnect between the broader consent monitoring conditions on epifauna and reef habitat and benthic soft sediments. She noted her assessment in this regard had been 'narrow' and relied on the findings of the BOI. She acknowledged that there had been no holistic view of the assessment of environmental effects of the farms to support the applications, except for year by year reviews of the annual monitoring reports. She considered there was a need for a wider review of the consent conditions and an assessment of effects based on the five years of available monitoring information and deposition footprint mapping.
96. Dr Giles outline the following factors that are creating uncertainty:
- (a) The change from continuous feed discharge to a single year class farming model;
 - (b) Unstable feed input over the initial years of farming;
 - (c) Problems with the reference sites, including uncertainty regarding the appropriateness of some sites, uncertainty around the influence of seasonality, and changes to reference sites used in the 2020/2021 annual monitoring; and
 - (d) Inconsistent responses in ES component indicators (e.g. sulphides) compared to the work of Dr Keeley which questions the ES approach (e.g., the appropriateness of the chosen ratio of the three component ES scores).
97. Dr Giles stated that the full context of the current situation was not anticipated by the BOI and that the conditions imposed only prescribed a process for addressing uncertainty relating to feed inputs and stability in the receiving environment. She considered the current conditions did not address the other areas of uncertainty. She noted that Mr Preece agreed the consent conditions are not fit for purpose with the current farming model and she agreed. She noted that changing the farming model and changes in the feed discharge had resulted in a range of 'in scope effects' that were challenging to address through the applications to change specific conditions.
98. Dr Giles considered the introduction of the BMP guidelines had created additional uncertainty and had delayed addressing risks to the benthic environment. She noted that annual monitoring reports (and various parties) referred to the BMP and consent conditions but that in her view only the consent conditions are relevant to assessment of the applications. She noted the BMP provides technical guidance but should not lead changes to consent conditions.

Findings

99. I have detailed the evidence of Dr Keeley to understand the background to the assessment of benthic effects for the grant of consent and the zone concept approach for ES and EQS. Much of this detail is also relevant to Change 3 below.
100. I assure the Applicant that I am not confused about the difference between ES and EQS, as suggested in reply. My questions throughout the hearing were focused on what existing consent limits or standards would be removed by changing the word 'conditions' in the EQS column of Table 3 to 'ES'.

101. Dr Keeley's evidence clearly states EQS relate to both the magnitude (or 'severity') and spatial extent of effects. Table 8 of Dr Keeley's evidence shows two bullet points under the EQS for Zone 4 with 'ES <3.0 **and** Conditions must remain statistically comparable with the relevant/appropriate reference Station(s)'. It limits the maximum permitted magnitude of enrichment effect at the Zone 3/4 boundary and requires benthic 'conditions' in Zone 4 to be similar to comparable to benthic conditions not impacted by marine farming activities (i.e. at control sites). While I accept it was clear that Dr Keeley intended use of an integrated multi-metric derived ES value, it is also clear that he acknowledged the potential for far-field cumulative effects and the difficulty in assessing these. He clearly stated that ES can be incorporated into the EQS, not that it should function as the EQS in Zone 4. He clearly considered the limits on the size of the deposition footprint was a 'second factor' in determining maximum sustainable feed levels.
102. I note Table 3 referred to in Condition 40 does not include the 'and' from Dr Keeley's Table 8, but I consider each EQS listed in Table 3 applies conjunctively. The change of 'conditions' to 'ES' removes the second EQS requirement in Zone 4 to have statistically comparable benthic conditions to natural conditions and leaves compliance to be based solely on the derived overall ES. In my view, this does not address the potential for cumulative effects outside of Zone 3 and the requirement for deposition rates to be near background levels.
103. I consider the intention was for benthic organic loadings, sediment chemistry and macrofauna 'conditions' outside of Zone 3 to remain comparable to appropriate control sites. I acknowledge epifauna changes are not included in Condition 40 and agree with Dr Giles that there is a disconnect between this condition and reef monitoring required by other conditions. I also agree that this a significant gap in the EQS, as any epifauna changes over time (in abundance and state) should be monitored, reported and compared over time to the conditions of the consent.
104. I agree with Dr Giles that there is considerable uncertainty regarding the effectiveness of the current monitoring to measure benthic effects given the change to the single year class farming regime. I agree that there should be an analysis of all the existing monitoring data to review the effectiveness of the monitoring approach and in particular the overall ES component and how this is derived in light of actual data collected. I agree that collating the data in the same way as Dr Keeley (in his 2012 paper), which underpins the ES approach would address some of the uncertainty identified. I consider the ES approach, and in particular the assumed ratio of the three components should be reviewed in light of the five years of data and the implications of changing to a single year class farming regime. I am mindful that the empirical relationships relied on in 2012 may have been pushed beyond their limits under the current farming regime given that these were based on monitoring data from 2005-2009 under historical salmon farming operations. This is critical given the significant reliance on the ES approach to limit benthic effects and consequently effects on the feeding habitat of king shag.
105. Of further concern is that it is clear that the annual benthic monitoring undertaken has not been well timed to coincided with peak feed discharges and has not measured the benthic response to maximum feed discharges reflecting Dr Keeley's adaptive management approach. In my view, this is a serious limitation of the monitoring data available and its usefulness in determining maximum sustainable feed levels.
106. I agree with Mr Schuckard that the monitoring data should be compared to the 2015 baseline report and that this is critical to the assessment of the benthic effects.

107. The evidence shows that exceedances in individual ES variables measured at the monitoring stations are not from 'random variation' in the natural environment, as suggested by Dr Newcombe. Rather, the changes in sediment chemistry (particularly sulphides) and increases in macrofaunal abundance measured in Zone 4 are likely to be early indications of measurable changes in the receiving environment up to 800 metres away from the salmon cages at Waitata.
108. For these reasons, I find that the word 'conditions' should not be replaced with 'ES', as proposed.

Change 3

109. Mr Davies submitted '*The environmental effects of salmon farming in the Marlborough Sounds is the most well understood aspect of the benthic environment in the Marlborough Sounds. The intensity of research coupled with the multiple factors which are analysed gives us a clear picture of what is occurring and why.*' (Paragraph 64, pg. 13).
110. Mr Davies submitted that it is NZKS's view that it was entitled to a feed increase after the 2019 monitoring year under the existing consent conditions but that the interpretation of the conditions by the Council did not allow this to happen. He submitted the evidence of Dr Newcombe supported the proposed feed increase, irrespective of the requirements of Condition 37. He suggested that the existing consent contemplated the feed increase sought by Change 3 and that the existing criteria would allow a feed increase.
111. Mr Davies submitted that feed discharge stability is not achievable with an 18-20 month salmon farming cycle used since 2018, as more feed is discharged in one year when compared to the next. He noted that Dr Newcombe's evidence is that the observed data has broadly validated the model used to consent the farm. He considered this gave confidence that the farms are being appropriately managed.
112. Mr Preece stated NZKS would be eligible for an increase in feed but for the inability to operate within 15% of the current maximum, as this will likely never be achieved under the farming model of growing a single age of fish for up to 18 months. For this reason, he considered the consent conditions are not fit for this model of farming.
113. Dr Newcombe stated that seabed conditions at Waitata had not exceeded EQS (when assessed as an overall ES) which shows that feed inputs can be increased from current actual feed inputs (which have been lower than the consented maxima) without breaching the EQS. Her Table 1 showed the predicted flux, and modelled and measured (2017-2018, 2020 and 2021) overall ES for monitoring stations around Waitata. She acknowledged that until 2021 the previous annual monitoring had tended to be undertaken within a number of months of a short fallow period, whereas the model used assumed annual feed input spread over a year. She noted that without data on recovery during fallowing periods and data on re-impact trajectories at high flow sites it is not possible to assess the predictive ability of the model under the new feed regimes. She highlighted that the feed inputs in 2020 and those projected for Waitata differ from the historical feed inputs because they are higher than in the past and are sustained over a longer period of time. She considered this could result in enrichment increasing in the future and affects the predictability of the model.
114. In response to questions, Dr Newcombe agreed that annual monitoring under the MEM-AMP for the first four years had not been well-timed to coincide with peak feed input given it was based on constant feed inputs. However, she noted that efforts had been made in the year five monitoring under the variable feed regime to coordinate it with when the environmental effects would be the greatest. She noted that the timing

of the annual survey was not set by the current consent conditions and is undertaken in accordance with the MEM-AMP in consultation with NZKS.

115. Dr Newcombe stated that an 'informal validation of the model' was conducted in 2020 with the data from the annual monitoring surveys in an attempt to predict whether the feed inputs of up to 4,600 tonnes (4,000 tonnes $\pm 15\%$) would result in compliant seabed conditions. She noted the results suggested the modelled flux and the ability to predict maximum ES values were reasonably accurate. She acknowledged the predictions were subject to several sources of uncertainty and approximation but indicate that under 4,000 tonnes of feed input the EQS would be met, with little margin for error at the OLE. She noted the latest monitoring data were consistent with this, with higher feed levels resulting in '*...a slightly higher value at a 600 m station than previously recorded*'. She stated that –

'At the OLE, where environmental standards can be breached by the relatively low value of ES 3.0, a one-off breach is unlikely to cause environmental effects to an extent that would cause a substantial negative change. Breaches at the pens (where the environmental standard is higher) are probably less likely, and very high enrichment would be unlikely to occur over a large area.

*My expectation is that changes that caused a breach of environmental standards at the OLE (600 m) stations would be readily reversible.'*⁹

116. Dr Newcombe noted the 2020/2021 annual monitoring data somewhat mitigated concerns about the predictability of the model, as the change in the feed regime combined with higher than historical feed inputs had (at least in the first year of monitoring) not caused a large increase in ES values compared to the historical range.
117. Dr Newcombe stated that the Waitata reef monitoring surveys and imagery from soft sediment qualitative assessments showed no changes in community abundance or community structure that can be attributed to the presence of the farm; and that a summary of the qualitative information on epifauna present at the Zone 3/4 boundary (monitoring sites 600 south and 600 north) show 'little difference' between the two groups, including taxa diversity and abundance.
118. Dr Newcombe confirmed that the 'flux' footprint predicted by the 2011 modelling did not consider resuspension and subsequent redeposition, and the report recognised that the resuspension would distribute farm derived material further afield. She considered this was the likely cause of both the lower enrichment values immediately beneath the farms and the measurable levels of some parameters at the 600 m monitoring stations.
119. Dr Newcombe addressed concerns about the location of the monitoring reference (control) site near the Waitata farm by stating that the key point is that there was no consistent evidence of increasing enrichment at the Waitata control station when looking at the averages and not individual data points.
120. Dr Newcombe considered the monitoring data did not support claims that there are increasing trends in sediment chemistry at or near the Waitata farm. She noted submitters had focused on increases in species abundance at the OLE/600 m monitoring stations, which neglects a range of important aspects of macrofaunal community structure that are captured in the overall ES, such as species diversity and evenness.
121. Dr Newcombe noted that the Waitata annual report for 2018 indicated that total free sulphide concentrations at 800 metres north of the farm were at least two-fold higher than the reference stations. While she acknowledged this was a 'measurable effect'

⁹ Evidence Summary of Dr Emma Newcombe (dated 29 June 2021, paragraphs 17 and 18, page 3))

she considered there was insufficient evidence to suggest this is an 'undesirable effect' as it may be neutral or even positive in terms of ecosystem functioning. She considered that concerns raised regarding increasing sulphides having a negative effect would be reflected in the biological community information. She noted that in the early stages of enrichment the abundance of some species increases which is a positive effect in terms of the ability to process farm derived material but acknowledged this is a change from the surrounding area.

122. Dr Newcombe considered the annual reef monitoring undertaken at Ngamahau indicated ecologically significant marine site 5.8 is not being adversely affected by the salmon farm.
123. Dr Newcombe stated that the recommendation in the 2016 annual monitoring report to add an additional control station in Tory Channel/Kura Te Au had not been enacted but appeared to be precautionary. She said she did not see any 'pressing need' at this point. In response to the recommended addition of a 150 metre station to the south of the Waitata farm, she noted that this is not required under the BMP guidelines and could potentially capture some patchiness in effects. While she acknowledged that this may be informative, she considered the main focus should be on the OLE boundary.
124. Dr Newcombe highlighted other human activities that are changing the seabed such as the extraction of target and non-target species, and the deposition of terrestrial sediments. She noted the importance of replication at different scales to allow separation of different kinds of variability and to make more robust assessment of whether averages in abundance inside the footprint are different to those outside.
125. In response to questions, Dr Newcombe did not consider there was any need to undertake a review of the five years of annual survey data for statistical analysis of trends because her Figure 4 showed there are no cumulative effects that would warrant further statistical analysis.
126. Mr Schuckard noted that in the first two years (when feed levels were compliant with Condition 37) monitoring data for macrofauna, total organic matter and redox from the zone of maximum effect (ZME) and the OLE showed an increase in enriched state around the Waitata farm. He considered no benthic equilibrium (steady state) was reached in response to the RIFL after two years of operation. He stated that under the two years of nearly 3,000 tonnes of feed an area of 38 ha was affected, which is 58% more than the 24 ha consented and 200 metres further than the OLE boundary. He noted that total free sulphide levels under the cages had quickly deteriorated with the higher feed levels in 2020/2021, which indicated levels would be unlikely to be within the recommended BMP guideline condition of 2400 μM (micromoles) under the cages or 390 μM at the OLE (Table 5).
127. Mr Schuckard noted that the adaptive management approach of the conditions was to address uncertainty and that it relied on consistent feed levels over three years and demonstration of stability in the receiving environment. He emphasised that a number of variables showed no stability had been reached (his Figures 2 and 3). He also noted that total organic matter at the OLE was higher than the baseline survey but were similar to the control sites, which may indicate a general deterioration of environmental conditions. He noted increases in macrofaunal abundance recorded at the OLE were not recorded at the reference sites indicating conditions at the OLE were not statistically comparable with the reference sites. He considered higher feed levels would not improve the current non-compliant situation at the OLE and would create an even larger footprint than consented.
128. Mr Schuckard noted that over the 2018/2019 monitoring year sediment chemistry at the control sites had deteriorated significantly from about ES 2.5 to ES 3.5. He considered

this raised further uncertainty regarding the reference sites or indicated a general deterioration in the wider environment of Waitata Reach. He stated that reference sites PS-Ctl-6 and PS-Ctl-7 are located beside existing marine farms and that it is unclear whether the flow regimes at the control sites are comparable to the Waitata farm site.

129. Mr Schuckard concluded the benthic effects of the feed levels used up to 2021 were 'unknown'. He highlighted that this uncertainty related to the prime feeding habitat of the king shag and does not reflect the precaution that is required to mitigate anthropogenic activities on this vulnerable species. He estimated approximately 700 ha (12%) of king shag habitat is currently covered by marine farm deposits (mussel and salmon) and that the impact on the quality of king shag feeding area has only indirectly and marginally been studied. He highlighted the importance of denitrification and nitrification processes in maintaining ecosystem functionality and health, and the uncertainty relating to these rates beyond the consented boundaries.
130. Ms Kroon highlighted Dr Keeley's evidence that MCFL was the maximum 'conceivable' but that it may not be realistic. She noted that none of the requirements of Condition 37 had been met to allow a feed increase; and that even with low feed levels EQS conditions and the consented deposition footprint were exceeded. She noted exceedance of the consented deposition footprint was the main reason NZKS's application (U190357) to increase the number of cages was declined, despite the 2018/2019 annual monitoring report not being available at the time. She considered the Waitata farm should have to reduce its feed rate in order to shrink the benthic footprint and that operational requirements should not override complying with the consent conditions. She stated that it is certain that increase feed levels will result in additional adverse environmental effects and a significantly larger deposition footprint. She considered concerns relating to natural character (particularly of the seabed) and sea birds (particularly king shag) had been dismissed, but that an enlarged deposition footprint would have adverse effects on these values.
131. Dr Giles noted that the 2020 feed discharge was 94 percent of the feed increase sought and that the 2020/2021 annual monitoring results provide useful information on benthic conditions following a year of feed discharges in the order of the maximum sought. On this basis, she considered it likely the proposed increase to 4,000 tonnes per year will not breach the EQS at the current monitoring sites but may increase the spatial extent of benthic effects beyond the existing footprint. In response to questions, she stated that one year of monitoring data did not provide information on any potential cumulative effects and that at least three years would be needed to address this uncertainty. She also considered there was potential for the spatial extent to increase slightly given the maximum feed levels could be up to 4,600 tonnes ($\pm 15\%$).
132. Dr Giles cautioned that the 2020/2021 annual monitoring report had not yet been reviewed by MDC and it is therefore not yet known whether it meets compliance requirements. However, she considered the findings were not critical given the changes to the reference sites and implications for meaningful interpretation of the results and comparisons of changes over time.
133. Dr Giles noted that there are 'considerable uncertainties' about the effectiveness of the current benthic monitoring regime for detecting effects under a single year class farming regime. She considered this is problematic because a continuation of the current programme may miss peak benthic enrichment and productivity, and result in inaccurate assessments of benthic effects by describing effects as less intense than they are. She recommended that, regardless of the medium to long term changes proposed by the Applicant, immediate changes should be made to the monitoring regime to reflect the change to a single year class farming system, including timing monitoring to coincide with peak productivity and introducing monitoring after fallowing

and before restocking to assess recovery following periods of high enrichment. She confirmed that without these additional changes to conditions there should be no increase in feed levels allowed.

134. Dr Giles strongly recommended adding a second monitoring site in Zone 3 to the south (at the Zone 2/3 boundary) to compliment the 150 metres north monitoring site, which would address uncertainty. She had no specific concerns regarding the effects on water quality but recommended requiring water quality monitoring in Tennyson Inlet, in line with the Applicant's intention to do so in the future.

135. Dr Giles concluded –

'Notwithstanding my conclusions on the likely ecological effects of the proposal, I have concerns about our ability to assess and manage future compliance with consent conditions robustly.

In my opinion, there is a real risk that the level of information we will obtain from benthic monitoring of the effects of salmon farms operated under the single year class farming model will become less robust over time (potentially starting in 2022). I also see a risk that responses to potential exceedances of EQS may be ineffective or that effectiveness of responses may not be measurable.

This is problematic because the predicted benthic impacts at 4,000 t feed input may reach EQS at the Zone 2/3 boundaries.¹⁰

136. Dr Giles highlighted that this was confirmed in evidence by Dr Newcombe where she stated there was little margin for error at the OLE and ES 4.0 is predicted to be reached at the 150 m north monitoring station (Zone 2/3 boundary). On this basis, she concluded that it is 'critical that future monitoring is robust'. In response to questions, she considered the monitoring undertaken to date had been useful but not robust, and had 'allowed for information to be qualified and rescribed'. She noted concern that previous monitoring had not been timed well to coincide with peak feed discharge or to address seasonality effects on benthic productivity and no information had been presented to address this. She considered the timing of monitoring was critical and should be set in the conditions and controlled by the Council, not through the MEM-AMP by NZKS.

Findings

137. The intention of the adaptive management approach in the conditions (based on Dr Keeley's zones of effect concept using ES and EQS limits) was to start at a conservative feed discharge level (RIFL) and monitor the benthic response during peak discharge levels at the zone boundaries for at least three year to allow for the benthic conditions to reach a new equilibrium or steady state. Once this is achieved, the consent conditions provide a pathway for staged feed increases based on the results of robust monitoring of the benthic response to peak discharges and the ability to demonstrate consistent compliance with the EQS and the predicted magnitude and scale of effects. The monitoring data collected is to ensure the measured actual benthic effects are within the scope of the predicted effects (i.e. validation of the modelling) and benthic EQS (consent limits) are complied with.

138. In exercising the consent, under a single year class farm regime, the Applicant has been unable to consistently operate within the RIFL ($\pm 15\%$) for three consecutive years and has had varying annual volumes (due to the 18-month cycle) and rates of discharge. The evidence suggests it will be unlikely to ever meet this requirement based on a calendar year, or even under the Applicant's recently devised 'alternative year period'.

¹⁰ Key points and response to evidence present by Dr Hilke Giles (dated 30 June 2021), paragraphs 8-10, pages 4-5.

139. In addition, the monitoring data collection has not been undertaken at times of peak feed discharges and has occurred in different seasons. There are also instances where data from the monitoring sites has been collected at different times to data from reference sites. This affects the results and the ability to compare annual data over time. I share Dr Giles' concerns that the annual monitoring report confirms that monitoring approaches have changed over the five years, including changes to reference sites, the definition of a 'year' and reference to the BMP instead of conditions. There are many examples where results have been qualified or dismissed as not important and the Council interpretation of consent conditions has been ignored. Dr Newcombe's evidence clearly illustrates this approach to minimising measured effects and dismissing compliance matters.
140. Of even more concern, is that despite poorly timed monitoring and generally low or compliant feed discharge levels (RIFL), the monitoring reports indicate that the deposition footprint (OLE) is significantly larger than predicted and measurable changes in the benthic environment compared to background levels are occurring in Zone 4. The actual deposition footprint is significantly larger than what Dr Keeley predicted for MCFL as the worst-case scenario. This raises the question as to what management response will be required to reduce the benthic effects to within the maximum consented limits.
141. The annual monitoring data collected over five years shows benthic conditions in compliance Zones 1, 2 and 3 for the Waitata farm have not been stable. The information collected over five years does not provide any certainty as to what the maximum sustainable feed levels are for the site, as anticipated by Dr Keeley. However, the results suggest that the RIFL of 3,000 tonnes may not be 'conservative' and confirms that highly dispersive sites such as Waitata will be constrained by far-field limits and not ES limits beneath the cages, as noted by Dr Keeley. I do not agree that the modelling results have been 'broadly validated'. I do not share Mr Davies confidence that the results give assurance that the farm is being appropriately managed.
142. It is clear from Dr Keeley's evidence that there was significant uncertainty regarding the potential extent of effects (given the limitations of the modelling) and that this would be addressed by the three adaptive management approaches outlined in his evidence (see paragraph 83 above). However, all three approaches have not been implemented as anticipated in terms of consistent staged development, robust meaningful monitoring or implementation of management responses to address non-compliance. In my view, the adaptive management approach to address uncertainty and define maximum sustainable feed levels has failed.
143. Dr Giles' evidence outlines a significant number of problems with the consent conditions and a number of critical questions that need to be addressed in relation to monitoring and the adaptive management approach that in my view must be addressed before any increase in feed levels can be considered.
144. I conclude that the benthic effects of the feed levels used up to 2021 remain uncertain and that this uncertainty relates to the prime feeding habitat of the king shag where adverse effects must be avoided.
145. For these reasons, I find that the feed increase sought should not be granted.

Section 104(1)(ab) Offsets or Compensation

146. I am required to consider any measure proposed or agreed to by the Applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will arise from allowing the activity.

147. No offsets or compensation were proposed by the Applicant.

Section 104(1)(b) Relevant Statutory and Plan Provisions

148. An assessment of the application against the relevant planning provisions of the New Zealand Coastal Policy Statement (**NZCPS**), Marlborough Regional Policy Statement (**RPS**), the Marlborough Sounds Resource Management Plan (**MSRMP**), proposed Marlborough Environment Plan (**PMEP**) and Variation 1A to the PMEP was provided in the s42A Reports by Mr Johnson.
149. I agree with Mr Johnson that little weight should be given to the RPS and MSRMP given they pre-date the NZCPS.
150. I have had regard to the relevant objectives and policies of the NZCPS and Policies 3, 11 and 23. I find that given the uncertainty relating to the effectiveness of the current monitoring regime to measure the benthic effects of maximum discharge levels and the potential for significant adverse effects, a precautionary approach is warranted (Policy 3).
151. The adaptive management framework for graduated increases in feed discharges based on achieving consistent feed discharges over at least three years and robust monitoring of the environmental effects to demonstrate stability in the benthic receiving environment was imposed by the BOI to address uncertainty. However, despite five years of operation, significant uncertainty remains regarding sustainable feed levels due to changes in the farm operation and ineffective monitoring. I agree with Dr Giles that the changes sought will increase uncertainty in this regard. This is inconsistent with the NZCPS Policy 3.
152. NZCPS Policy 11 requires the avoidance of adverse effects on the habitat of the king shag. The existing conditions limit the magnitude and extent of benthic effects to ensure this requirement is met. Mr Johnson acknowledged it is uncertain whether the increase in feed levels would result in cumulative adverse effects on king shag feeding habitat. I find that there is insufficient evidence to demonstrate that the changes sought (Change 2 and 3) will sufficiently avoid adverse effects on the feeding habitat of king shag.
153. I agree with Mr Johnson that significant weight should be given to the PMEP. I consider the wording changes sought (Changes 1 and 2) to address interpretation, in the absence of a robust review of the effectiveness of the current monitoring regime for managing adverse effects outside the OLE from operating a single year class farm regime, will not improve the management of adverse effects. This is inconsistent with PMEP Objective 13.22 and Policy 13.22.10.
154. Change 2 would allow for an increase in the magnitude and extent of adverse effects from the existing consent by removing the EQS of requiring benthic conditions to be comparable to natural benthic conditions outside of the OLE. Change 3 would also result in an increase in the magnitude and extent of adverse benthic effects. I find these changes would be inconsistent with PMEP Objective 8.1 and Policies 8.2.10, 8.3.1 and 8.3.5.
155. I agree with Mr Davies and Mr Johnson that little weight should be given to Variation 1 and 1A to the PMEP (notified 26 May 2021) which propose the creation of ten aquaculture management areas for finfish farming (AMA) given the early stages of their development.

Section 104(1)(c) Other Matters

156. The s42A Report (16 October 2020) outlined the previous changes to conditions for the Waitata and Ngamahau farm sites that have been granted by the Council. I have had regard to these changes in making this determination.
157. Mr Davies submitted that any issues of non-compliance are not relevant to the applications. He noted it is NZKS's view that both farms have been compliant with the conditions of the existing consents. I consider issues of non-compliance are relevant matters and I have had regard to compliance with the existing conditions.

Part 2 of the RMA

158. All my considerations of the application are subject to Part 2 of the Act, which contains the purpose and principles of sustainable management. I accept that the provisions of the NZCPS and PMEP give effect to the purpose and principles of the RMA within the context of the coastal environment.
159. Overall, I find that the applications are inconsistent with Part 2 of the Act and the promotion of sustainable management, as defined in section 5, for the reasons outlined above.

Conclusion

160. The change to single year class farming (since the consents were granted) has caused interpretation issues because it has changed the rate of feed discharge over a year. There is no 'ambiguity' in the definition of what constitutes 'a year' as claimed in the 2020-2021 annual monitoring, it is simply that it is now the rate of feed over an 18-20 month period that is important. The modelling undertaken by Dr Keeley used historical monitoring data (2005-2009) from salmon farms operating under relatively constant annual feed levels. The conditions imposed were designed for relatively constant feed discharges year after year and repeated annually monitoring. Monitoring annually at a similar time each year and at peak feed levels is not possible with a single year class 18-20 month cycle. It is highly unlikely the Applicant can meet the requirement to have consistent annual feed levels for three years or three years of stability in the receiving environment.
161. The reference site benthic 'conditions' are critical for assessing compliance at the Zone 3/4 boundary (OLE). The selection and timing of monitoring of reference sites is uncertain. The reference sites must be appropriately located to represent background environmental conditions in sites with comparable flow regime and should not be located in sites where they may be affected by other marine farm sites. It appears that some of the reference sites are located in close proximity to other marine farm sites and it is questionable whether these are appropriate. Furthermore, it is critical that reference sites are sampled at the same time as the other monitoring sites. In my view, such critical matters should be set by the conditions of consent and not left to the MEM-AMP, which may be subject to change.
162. It is extremely concerning that the 2020/2021 annual monitoring report changed the reference sites used to assess compliance with the EQS and that data collection from the reference sites was not at the same time as the other monitoring stations. This significantly undermines the effectiveness of the latest monitoring results and the ability to compare the results over time with previous monitoring years. It also prevents any assessment of compliance with the EQS at the Zone 3/4 boundary. This illustrates to me the importance of setting these critical factors in the conditions of consent and not allowing changes to the monitoring through the MEM-AMP process without the certification of the Council. This is a significant gap in the current conditions and warrants the Council's urgent attention.

163. The focus of attention needs to be on reviewing the conditions to ensure effective, robust and consistent monitoring of environmental effects is occurring (for the term of the consent) and not on arguments of interpretation to enable compliance with EQS to enable feed increases. I consider the existing conditions are not fit for purpose given the change to single class farming and the failure of the conditions to require effective monitoring of environmental effects.
164. I agree with Dr Giles that there is a very real risk of ongoing non-compliances with the current conditions and potential for alternating between compliance and non-compliance (the 'yo-yo scenario') under the single class farming model. In my view, the effects of such variability in feed inputs must be assessed and addressed through specifically designed monitoring and not by trying to change conditions drafted for historical operations.
165. I find the significant uncertainties and shortcomings of the conditions and monitoring programme for the current farming operation will not be addressed by changing the conditions as proposed. There is no certainty of a future consent holder initiated wider review of conditions to address these concerns and I consider this to be irrelevant to my decision here.
166. Dr Giles' assessment of the benthic effects was limited to reviewing the information contained in the annual monitoring reports, which does not include information held by the Applicant on exact feed discharges in relation the timing of monitoring. She was therefore unable to carry out any statistical analyses of trends or a robust assessment of the likely effects of the proposed feed increase. I agree that there is a critical need to better understand the relationship between short-term feed discharges and ES responses to determine appropriate monitoring timing in order to assess maximum benthic effects. There is also a need for better understanding of the benthic response to the practice of fallowing and recovery of benthic conditions.
167. I consider that there is a high risk that granting the condition changes sought will further decrease the effectiveness of the current monitoring conditions and allow for greater adverse benthic effects both in magnitude and extent. It is also likely that the changes sought will have other unforeseen consequences for other conditions. While I tried to address this risk during the hearing, it is clear that the focus of the applications and the assessment of effects are too narrow to address the fact that the conditions were simply not drafted for operating single year class farming and are therefore not fit for purpose.
168. I do not share Mr Johnson's confidence that these concerns will be addressed by a future consent wide review initiated by the consent holder and disagree that granting these applications would be an interim measure. I consider the development of the BMP guidelines is useful for providing guidance for monitoring effects, but it is a tool for assessing compliance with the conditions of consent. The consent conditions must set the appropriate limits and standards to be met. I consider the BMP guidelines are a distraction from ensuring the consent conditions are appropriate, effective, complied with and enforced by the Council.
169. I agree with Dr Giles and the submitters that there is an urgent need for the Council to undertake a review of all of the conditions to ensure they are fit for purpose and that the actual effects are within the scope of the activity, as consented. The Applicant has ignored the fact that the depositional footprint is greater than predicted and subsequently consented, and that any increase in feed inputs is dependent on demonstrating stability in the receiving environment and compliance with the limits and standards of the consent. There is a concerning attitude that feed increases were

anticipated when this is clearly dependent on the ability to determine maximum sustainable feed levels and demonstrate compliance with the consent limits.

170. In my view, there is clear evidence of non-compliance with the conditions that should not be addressed by changing the conditions. The deposition footprint significantly exceeds the consented deposition footprint at RIFL and is resulting in measurable changes in the benthic environment beyond the Zone 3/4 boundary (OLE). The intention of the BOI was clearly that outside of Zone 3, deposition levels would be close to background levels and that benthic conditions would be comparable to appropriate control sites. This is clearly not the case and measurable changes have occurred up to 800 m from the cages.
171. The Applicant has exceeded Waitata feed discharge levels allowed under the consent in 2020/2021 without complying with the conditions of consent that would enable an increase. This has further increased the extent and magnitude of effects beyond the consented deposition footprint. In addition, the Applicant has changed the monitoring programme in this period which has undermined the Council's ability to consistently and robustly determine compliance with EQS. In my view, these are serious breaches of the conditions of consent which should not and cannot be remedied by granting the changes sought.
172. It is up to the Council, as the Consent Authority, to determine whether a consent holder is compliant with the conditions of consent. It is not for the consent holder to determine this or to decide it has met the conditions to allow any feed increases.
173. I agree with submitters that adaptive management is about changing the scale of the activity to meet the limits and standards of the consent, not changing the conditions of consent to meet the desired scale of activity.

Determination

174. For the reasons outlined in this decision, the Marlborough District Council **REFUSES** all three section 127 applications by New Zealand King Salmon Company Limited to changes Conditions 36 and 40 of Coastal Permit U140294 ('the Waitata application') and Condition 40 of Coastal Permit U140296 ('the Ngamahau application').



Sharon McGarry
Independent Hearings Commissioner
Date this 7 September 2021

ANNOTATION HISTORY

Date	Reason for Amendment/Alteration