

BEFORE THE ENVIRONMENT COURT
I MUA I TE KOOTI TAIAO O AOTEAROA

Decision No. [2019] NZEnvC 71

IN THE MATTER of the Resource Management Act 1991
AND of an appeal pursuant to s 120 of the Act
BETWEEN EYRE COMMUNITY ENVIRONMENTAL
SAFETY SOCIETY INCORPORATED
(ENV-2014-CHC-000057)
Appellant
AND CHRISTCHURCH REGIONAL COUNCIL
and WAIMAKARIRI DISTRICT COUNCIL
Respondents
AND WAIMAKARIRI IRRIGATION LIMITED
Applicant

Court: Principal Environment Judge L J Newhook
Environment Commissioner I M Buchanan

Special Advisor under s 259 RMA: A J Sutherland

Hearing: 18, 19 and 20 June 2018, closing submissions received 4, 11 and
18 July 2018

Appearances: E Chapman for the Appellant
B G Williams for the Applicant
M C Dysart for the Regional Council
A J Schulte for the District Council

Date of Decision: 10 April 2019

Date of Issue: 10 April 2019

SECOND INTERIM DECISION OF THE ENVIRONMENT COURT



- A. **Grant of consent foreshadowed, subject to our being satisfied as to the further matters called for;**
- B. **A final set of conditions including additional conditions proposed by WIL, and directed by the Court, and any upgrades to the Emergency and other Plan drafts, to be lodged within 30 working days of the issue of this decision;**
- C: **Further 30 working days for consultation among parties leading to agreement or further timetable;**
- C: **Costs reserved.**

REASONS

Background

[1] Waimakariri Irrigation Limited (WIL) applied for consent to authorise the construction and operation of an off-stream storage dam at the corner of Wrights Road and Dickson Road, Burnt Hill, North Canterbury. The purpose of the dam is to store water authorised by existing consents, abstracted from the Waimakariri River, to supplement supply of water to shareholding farmers during periods when water availability from the river is subject to restrictions.

[2] The Court issued an Interim Decision¹ on this application on 7 September 2016, concluding that it was not at that stage able to indicate whether consent would be forthcoming or not. The Court directed further evidence on a number of specific issues before a final decision could be made. The purpose of the latest hearing was to receive and examine considerable further evidence and make a final decision on the application.

[3] An essential component of this further information was the preparation of a detailed Emergency Evacuation Plan (EEP) as part of the broader requirement of an Emergency Action Plan (EAP). This EEP was to be developed in consultation with the local community and Emergency Management Response agencies, a process that took

¹ *Eyre Community Environmental Safety Society v Canterbury Regional Council and Waimakariri District Council* [2016] NZEnvC 178.



a long time to complete. During this period, the upper South Island experienced a 7.8 magnitude earthquake, generally referred to as the Kaikoura earthquake.

[4] Additional time was taken by the parties and the Court to resolve a matter related to access to details of an unpublished engineering paper authored by Dr J P Giroud and relied on by the Applicant.² This matter was the subject of Memoranda from WIL, dated 18 August 2017 and 7 September 2017, seeking confidentiality orders under ss 42 and 279(3)(c) RMA, restricting access to it. The Court issued a Minute (Judge D A Kirkpatrick) on 26 October 2017, which recorded directions, following which agreement was reached among the parties for the sharing of the Giroud paper and the maintenance of confidentiality of the information in it.

[5] The Applicant WIL is a co-operative company with approximately 200 shareholders established to supply irrigation water from a run-of-river scheme authorised to take 10.7 cumecs of water from the Waimakariri River.

[6] The Appellant, Eyre Community Environmental Safety Society Incorporated (ECESS), represents people who live or have business interests in or near the area projected by WIL to be inundated by water in the event of any catastrophic failure of the proposed storage dam.

[7] Consents are required for the project from the Canterbury Regional Council (CRC) and the Waimakariri District Council (WDC) as set out in the Interim Decision.³ Details of the proposal are also set out in the Interim Decision⁴ and are not repeated here.

[8] The primary issue identified in the Interim Decision was the safety of those who might be in the flow path of any water released from the ponds by a catastrophic breach of the embankments. Underlying this primary concern were issues about the seismic data on which the design of the facility was based; engineering aspects of the design; methods of monitoring pond integrity and performance; embankment failure detection and warning systems; and the choice of instrumentation. Findings identifying the need for considerable further evidence and information were made throughout the Interim Decision.

² See paragraphs [145] and [128] of our Interim Decision.

³ Interim Decision at para [2].

⁴ At paras [7] to [12].



[9] Legal issues raised by the parties around the assessment of risk, proof and alternatives were the subject of findings in the Interim Decision⁵ and are not now in contention. A legal issue related to scope was raised by the Appellant during the later hearing and addressed in closing submissions from the parties. We consider this issue following examination of the proposals for dewatering the ponds later in this decision.

[10] A matter resolved in the first hearing was that the applications to both WDC and CRC were to be considered as discretionary activities.⁶ Statutory planning provisions are set out in the Interim Decision⁷ as were details of the NZSOLD 2015 Dam Safety Guidelines that have provided underlying direction and standards for the development of the design of the proposed pond systems.⁸

[11] WDC has advised that no changes had been made to the Waimakariri District Plan since the conclusion of the first resumed hearing, that would materially impact on the proposal.

[12] CRC also advised that recent changes to the Canterbury Regional Policy Statement, Canterbury Land and Water Regional Plan and Canterbury Air Regional Plan, would have no material impact on the proposal. Some changes to the rules in the Regional Air Plan concerning dust, hazardous substance storage and stormwater discharge may create permitted activity status in relation to them. The Applicant is to confer with the Regional Council as to whether it can operate in accordance with those rules or alternatively still needs relevant consents with conditions to form part of the suite envisaged.

Live issues

[13] The principal issues of:

- seismic assessment (post-Kaikoura earthquake);
- engineering design of the dam;
- quality control for the HDPE liner;
- embankment monitoring and failure detection systems;
- practicality and effectiveness of the EAP and EEP;

⁵ At paras [23] to [38].

⁶ At paras [46] to [49].

⁷ At paras [56] to [60].

⁸ At paras [72] to [79].



- hydraulic modeling; and
- scope related to dewatering

were not capable of final determination in the Interim Decision, and aspects of these issues were in contention for this hearing.

The further hearing

[14] Expert evidence on seismic assessment was presented by Dr R Van Dissen, an Earthquake Geologist from GNS called by the Applicant and by Ms J Campbell, a retired Senior University Lecturer with expertise in structural geology and related disciplines, retained by ECESS. Rebuttal evidence was also received from Dr G McVerry (called by the Applicant), an Expert Engineering Seismologist, but he was unavailable to attend the hearing. Mr Van Dissen adopted Dr McVerry's evidence in total and was available for questioning on matters within his own scope of expertise.

[15] Mr N Connell, Senior Engineer with Dam Watch Engineering, called by the applicant, provided the Court with detailed responses to the many questions raised in the Interim Decision on matters related to the design and operation of the ponds. He also provided a revised technical specification, Dam Safety Management Plan and Emergency Action Plan.

[16] Ms J Stanway, a Structural Engineer called by ECESS, addressed construction design issues and aspects of the EAP and EEP. Mr K Dodds, an Instrumentation Specialist and member of ECESS, raised concerns over the proposed monitoring and embankment failure detection and warning systems.

[17] Mr R Woods, a Natural Hazards Risk Management Specialist at GNS Science, was engaged by WIL to consult on and prepare the EEC. Mr Woods had not provided evidence at the previous hearings ECESS called. Mr I Shields and Ms C Ballinger presented lay evidence on the practicalities of the EEC, while Mr M Gardner, a Consultant Water Resources Engineer also called by ECESS provided expert assessment of the hydraulic modelling on which the EEC flood hazard mapping relied.

[18] Mr T Smith, a Consultant Geotechnical Engineer called by the Councils, provided us with expert comment on the EAP, implications of the recent Kaikoura earthquake, hydraulic modelling, and structural design matters. Mr B Wiremu, Emergency Management Advisor at WDC, provided comment on aspects of the EEP.



[19] Given the complexity of all matters canvassed in this hearing, we invited closing submissions from all parties, and received same from the councils, followed by ECESS, and finally the Applicant in reply.

Seismic Assessment

[20] The Interim Decision examined in detail the evidence of Dr McVerry and Mr Van Dissen covering the "Quantitative Modelling and Seismic Risk Assessment" report prepared by GNS for the Applicant, together with a challenge to this assessment presented by Ms Campbell for ECESS. The Court there found that the GNS investigation of Ms Campbell's concerns was thorough and reinforced the original peak ground acceleration (PGA) estimates of GNS as being appropriate. We accepted the Applicant's evidence that the PGAs "are conservative and form a good basis for the dam design".⁹

[21] Two months after the Interim Decision was issued, a magnitude 7.8 earthquake occurred near Kaikoura. In consequence, the Appellant identified review of the seismic hazard models relied on by the Applicant as being an issue for the resumed hearing, in addition to the range of matters identified by the Court in the Interim Decision.¹⁰ The Appellant requested that the failure by the Applicant to consider vertical acceleration in the design of the dam be revisited by the Court.

[22] Ms Campbell described in some detail the characteristics of the Kaikoura earthquake, none of which was in dispute. She considered that information from this event supported and strengthened aspects of her earlier evidence and that the seismicity issue should be considered again by the Court. Ms Campbell then recorded that information gained from Kaikoura "will not immediately add quantifiable data to the existing assessment on which the Interim Decision was made, so may not influence the present conclusion".¹¹ Ms Campbell's evidence then provided a high-level assessment of the implications of multi-fault rupture for a probabilistic seismic hazard assessment, ground deformation consequences of fault interactions, and the implications of localized high vertical accelerations.

⁹ Interim Decision, para [114].

¹⁰ Statement of Issues on behalf of *Eyre Community Environmental Safety Society Incorporated*, dated 11 August 2017.

¹¹ Campbell, Supplementary evidence at page 10.



[23] Mr Van Dissen described the Kaikoura region as being underlain by the subduction interface between the Australian Plate to the west and the Pacific Plate to the east. He considered this interface may have linked at depth the faults that ruptured during the Kaikoura event. He said that this subduction interface does not underlie the region where the Wrights Road ponds are proposed.

[24] Mr Van Dissen referred to the sensitivity studies reported by Dr McVerry for the original hearing¹² as encapsulating the potential impact of multi-fault rupture on ground motion estimates for the site. These studies showed that even by doubling the energy release from the modelled design event, it would still be within the recommended maximum design earthquake for the dam. Mr Van Dissen did not consider that a causative relation had been established from information on the Kaikoura earthquake between high and vertical accelerations in areas that have been uplifted and located near a fault junction where reverse slip components are present. He did not consider that the WIL site, which is in such an area, would preferentially be expected to produce high vertical accelerations during a significant earthquake event as suggested by Ms Campbell.

[25] Dr McVerry examined in some detail the recorded ground motions from the Kaikoura earthquake and compared these with the recommended design of PGAs for the WIL ponds. He noted that even with one extreme vertical acceleration record (3.0 g) close to the epicentre of the earthquake, the range of other records at short distances from the fault surface rupture are within those recommended for design of the ponds. This despite the much larger (magnitude 7.8) Kaikoura earthquake, than the 7.2 magnitude potential earthquake assessed for faults closest to the WIL ponds. Dr McVerry's evaluation of the Kaikoura records did not lead him to resile from his earlier evidence that the earthquake ground motions recommended for the storage ponds are appropriate.¹³

[26] Part way through the hearing, after we had heard from Mr Van Dissen and Ms Campbell, the Court introduced a photograph of an example of the extreme surface rupture resulting from the Kaikoura earthquake, together with journalist comment on the views of a number of experts purporting to bring into contention the current approach to seismic risk assessment. Mr Van Dissen and Ms Campbell were asked to comment on whether the same scenario could occur at the proposed pond site and whether the

¹² McVerry, EIC, May 2015.

¹³ McVerry, Evidence in Reply, February 2019, paras [17] to [19].



information from the Kaikoura event could or should be directly applied in reassessment of the Applicant's PGA risk assessment.

[27] The responses of the two experts were somewhat discursive. Ms Campbell largely focused on the wider Canterbury region and possible extrapolations and inferences for the WIL site. She considered that potential for surface rupture of the type shown in Exhibit 7 produced by the Court exists, as indicated from geological formations adjacent to the Waimakariri River.

[28] Mr Van Dissen restated his conclusions from earlier evidence,¹⁴ that there is no evidence that a failure such as that shown in Exhibit 7 has passed through the WIL pond site in the past 18 to 20,000 years.¹⁵ He considered that the gentle folding of the ground surface observed in the subject area was from movement in the Hororata fault and was an expression of 18,000 years of displacement. It was Mr Van Dissen's opinion that it was highly unlikely that faults such as those causing surface rupture at Kaikoura would express themselves as metre scale ruptures at the WIL site as they have not done so in the past.¹⁶

[29] Ms Campbell acknowledged that the Hororata fault, known south of the Waimakariri River and presumed to continue north past the pond site, has been "sitting doing nothing for 18,000 years."¹⁷ She then provided a theoretical examination of what could be happening at the site, based on her interpretation of the ancient drainage geology.¹⁸

[30] Ms Campbell considered that it was not impossible (metre scale surface displacement), but it did not look very likely from the history of what is seen at the site.¹⁹ It was put to both witnesses that the scenario that best suited the evidence available was that provided by Mr Van Dissen in his conclusion.²⁰ This conclusion was restated

¹⁴ Van Dissen Supplementary Evidence, February 2016, at paras 43 and 44 and Van Dissen Statement of Evidence in Reply, 21 December 2017.

¹⁵ Transcript, page 273, line 5.

¹⁶ Transcript, page 240, line 30.

¹⁷ Transcript, page 242, line 14.

¹⁸ Transcript, page 246, line 17 to page 247, line 14.

¹⁹ Transcript, page 252, line 19.

²⁰ Supplementary Evidence, 2016.



for this hearing.²¹

The Hororata fault does extend beneath, or near to, the WIL storage pond site and movement on the fault at depth has deformed the ground surface at the WIL storage pond site within the last approximately 18,000 years, but these ground deformations have been of such low intensity as to not be detectable. Modelling of co-seismic ground surface deformations (both tilts and strains) resulting from a wide range of scenario Hororata fault ruptures indicate that the ground tilts and strains at the WIL storage pond site produced by those ruptures are likely to be well below the tolerable limits for the proposed dam embankment and liners.

[31] This was carefully acknowledged by Ms Campbell as a conclusion that was closest to her thinking.²²

[32] We accept the scenario described in Mr Van Dissen's conclusion set out above as best reflecting the evidence available to us. We accordingly see no reason to revisit our finding on seismic issues in the Interim Decision.²³

Engineering

[33] Details of design criteria and development, including the peer review process and response, were set out in the Interim Decision. The Court considered a range of specific matters raised by the Review Panel as requiring further attention by WIL, along with technical engineering issues identified by the Appellant's expert witnesses. After completing this examination of the evidence, the Court remained to be satisfied on several engineering matters recorded in the Interim Decision. That decision also identified aspects of the quality control of the HDPE geomembrane liner, and ongoing monitoring of the embankments and ponds that needed to be addressed by the Applicant. We now turn our attention to the Applicant's responses in some detail.

Peer Review Comments

[34] First, dealing with matters raised by the Peer Review Panel.

²¹ Vandissen, Statement of Evidence in Reply, 21 December 2017 at para 19.3b.3.

²² Transcript, page 269, line 20.

²³ Interim Decision at para [114].



Fuse Plug²⁴

[35] WIL proposes a 500 mm thick layer of silt be placed on the upstream face of the fuse plug to reduce any risk of seepage during commissioning. This is now shown in construction drawing WIL 1125/30/147 and included in proposed conditions.

Access to Embankment Crest²⁵

[36] Mr Connell noted that the design crest of 4 metres is in accord with the NZSOLD Guidelines 2015 as adequate for maintenance access and that the embankments are not designed as access roadways. He described how access to the dam crest would be achieved for construction plant if required in the event of an emergency. Restrictions and operational risks relating to the embankment access have been added to s 3.4 of the Dam Safety Management Plan. We will require a clear link to an enforceable condition of consent.

Peer Review of Niwa System²⁶

[37] Damwatch is to review the Niwa system and define the dam safety requirements for the control system. An independent review of the control system will then be carried out. A consent condition to this effect is proposed.

Health and Safety Issues During Pipe Trench Construction²⁷

[38] Section 3.0 of the Technical Specifications now requires all work to be carried out in accordance with WorkSafe New Zealand Approved Guidelines.²⁸

Third Party Quality Assurance on Site²⁹

[39] We note the advice of Mr Connell that the peer review issue of third party requirement on site during construction referred to the installation of the liner only, not to the wider Construction Quality Assurance (CQA) provided by the designer for construction works in general. Mr Connell explained why the designer's QA

²⁴ At Para [122].

²⁵ Paragraph [123].

²⁶ Paragraph [125].

²⁷ Paragraph [126].

²⁸ Excavation Safety – Good Practice Guidelines Worksafe New Zealand, July 2016.

²⁹ Paragraphs [127], [128] and [131].



requirements are appropriately recorded in the Technical Specifications, rather than the Construction Management Plan as suggested by the Court.³⁰ The requirements for a contractor's QA plan to be reviewed by a third party is now in the Technical Specifications, Issue 5, s 6.6.2. A condition directing third party review of the geomembrane quality assurance/quality control plans and method statements is included in the proposed conditions.

[40] A closely related issue concerns the relevant standards for HDPE liner testing and selection³¹ raised by Ms Stanway and considered by us in the Interim Decision.³² The Court sought (paragraph [165]) clarification of the testing of the liner and the selection of enhanced specification roles for use in the pond corners; testing of each roll of geomembrane; and advice on the appropriate standard for the selection of samples for the geomembrane for testing.

[41] Mr Connell advised that the manufacturer of the liner carries out testing in accordance with internationally accepted ASTM Standards. The appropriate Standard is ASTM D4354 Sampling of Geosynthetics for testing, not ISO 28591 referred to in the Interim Decision.

[42] Mr Connell drew our attention to the relevant sections of the Technical Specifications, (Issue 5), covering testing of the material at the manufacturing site, an independent verification (s 6.6) weld testing during installation (s 6.11) and testing of samples during operation of the pond for deterioration over time (s 6.18). The Applicant proposes carrying out tensile strength testing to select rolls that meet the requirements of advanced tensile and extension properties detailed in Technical Specification (Issue 5) (s 6.9.5) for use in the corners of the ponds. For the rest of the material, every second roll would be tensile tested.

[43] Ms Stanway, after further investigation of geomembrane liner testing, appeared to accept the Applicant's proposed testing of all liner rolls for "advanced" properties to be used on pond corners as set out in the Technical Specifications, (Issue 5).³³

[44] In response to an inquiry from the Court on the cost of independent tensile testing of all HDPE rolls, Mr Connell advised that this would be in the order of half to

³⁰ Paragraph [129].

³¹ Paragraphs [160] to [163].

³² Paragraphs [154] to [165].

³³ Stanway Supplementary Evidence, 24 November 2017, at para 34.



one million dollars.³⁴

[45] We are satisfied with the proposed testing regime set out in s 6 of the Technical Specifications, (Issue 5), the concerns of the Court having been thoroughly investigated and answered to our satisfaction. While the concern of the Court has primarily been with safety of persons located downstream of the facility in the event of catastrophic failure, not only have we been provided with robust answers concerning the liner, but the liner is but one of many parts to the safety equation. We will require a clear link to an enforceable condition.

Testing Regime for Layer Thickness³⁵

[46] The Court required layer thickness measurements to be included in the Construction Management Plan. Mr Connell advised that this is more appropriately placed in the Technical Specification, as this holds more weight than the CMP. We accept his advice, and the Court's requirement is now included in s 4.1.3 of the Technical Specification (Issue 5). A consent condition is proposed directing the CMP to also reflect this requirement. We require that there be transparent and enforceable links through all relevant documentation up to condition of consent level.

Compaction of Surfaces for Liner³⁶

[47] Mr Connell noted that s 4.4 Technical Specification (Issue 5) has been modified to include the removal of all angular protruding rock that had the potential to puncture the liner. Links must be ensured for enforceability purposes, as above.

Estimation of Crack Widths and Liner Behaviour

[48] The Interim Decision raised concerns reflecting the evidence of Ms Stanway, noting the unavailability of calculations underpinning the methodology described in the Conference paper by Dr J P Giroud and others.³⁷ These detailed calculations are included in an earlier unpublished report by Dr Giroud. As noted earlier, following a somewhat protracted process over confidentiality, this report was made available to the Court, technical experts for the parties and the Peer Review Panel.

³⁴ Transcript, page 274, line 3.

³⁵ Paragraph [129].

³⁶ Paragraph [130].

³⁷ Giroud, J P; Jacka, N; Dann, C and Eldridge, J (2013). *Hydropower Canal Geomembrane Liner Analytical Techniques*. Proceedings NZSOLD/ANCOLD Conference, Rotorua, New Zealand.



[49] Counsel for the Applicant in opening submitted that this report does not relate to crack width assessment, but to the assessment of the ability of a geomembrane to span a crack. Mr Connell reminded us³⁸ that "the methods used for deformation and crack estimates have been based on the behaviour of embankment dams and landfill sites, including embankment materials that develop cracks which remain open". He considered this to be a conservative design methodology.

[50] The NZSOLD Guidelines 2015 refer to the ability of a liner to span a crack in an embankment wall and reference is made to the Giroud 2013 approach to determine the behaviour of a liner if a crack develops.

[51] Counsel for the Applicant advised that after receiving the Giroud 2012 report referred to above, the Peer Review Panel requested testing of the HDPE liner to ensure it can meet the design criteria. Following review of the relevant parts of the Design Report (Issue 4), Technical Specification (Issue 5) and an independent test report³⁹, the Peer Review Panel concluded:⁴⁰

- the methodology utilised by Damwatch Engineering to estimate crack widths reflects current practice and the estimated crack widths are appropriately conservative;
- the methodology developed by Dr J P Giroud in 2012 for analysing the performance of a geomembrane liner over a crack in a canal has been appropriately modified and verified by Damwatch Engineering for the Waimakariri embankment;
- recent laboratory testing of the proposed HDPE liner and underlying geotextile at Waimakariri has confirmed that Damwatch's design assumptions for the performance of the HDPE liner are appropriate;
- the proposed HDPE liner is capable of safely spanning the conservative crack widths estimated for the Waimakariri embankment.

[52] The Peer Reviewers go on to state:

We are satisfied that the estimated crack widths and geomembrane design are appropriate for the project and that Damwatch Engineering has completed

³⁸ Statement of Evidence of Nigel McConnell in Reply, 21 December 2017, paragraph 21.

³⁹ Completed by TRI Australia, dated 24/4/2018 to 1/5/2018

⁴⁰ Correspondence to Mr Brent Walton, Waimakariri Irrigation Limited, dated 10 May 2018 attached to Opening Submissions for WIL, dated 18 June 2018.



appropriate in-house reviews to check and verify their crack width calculations and geomembrane design. In addition, the inclusion of a geotextile beneath the HDPE geomembrane on all embankment slopes, the adoption of an enhanced HDPE geomembrane at all embankment corners, and the detailing at the upstream ends of all conduits that pass through the embankments are resilient features that will improve the post-earthquake performance of the embankments. We believe that the design of the geomembrane has been completed in accordance with good dam engineering practice and the recommendations included in the NZ Dam Safety Guidelines, published by the New Zealand Society on large dams in 2015.

[53] We are satisfied that the HDPE geomembrane liner design as now developed, is appropriate for the project, and that our concerns have been thoroughly investigated and covered or answered to our satisfaction. Although "second hand", the advice of the peer reviewers (people eminently qualified in their fields) was not the subject of any call by the appellant to cross examine them. We have no basis on the evidence before us, to disregard or question their advice. Once again, a clear link to an enforceable condition must be ensured.

Review of PIC⁴¹

[54] In the initial study to determine the Potential Impact Classifications (PIC) of the proposed pond, the average number of persons per dwelling for the community downstream of the dam was taken as 2.5. Mr Shields, a Member of ECESS, having presented evidence that the actual figure from later census data was 2.9, the Interim Decision requested a reassessment of the PIC rating for each of the pond embankments.

[55] Mr Connell⁴² set out in detail the revised calculations confirming the original PIC ratings as being appropriate, no change therefore being proposed. This evidence was not challenged and can be accepted by the Court.

[56] The Court requested (paragraph [139]) of the Interim Decision, that the Dam Safety Management Plan be amended to be explicit about the operation of all embankments to high PIC standards. Mr Connell advised that this is now included in s 1.0 of the Dam Safety Management Plan (Issue 5) and repeated in s 4.1 of that

⁴¹ Paragraphs [137] to [138].

⁴² Connell, Supplementary Evidence, 3.1.9, Annexure 1.



document, directing the dam manager accordingly. Demonstrable and enforceable links into conditions of consent are required.

[57] Subject to that, responses and action taken to matters raised by the Court, together with the peer review conclusion, give us confidence in accepting the peer review statement “the design for the project is suitably conservative and incorporates a number of resilient features to safely accommodate all loading conditions”.⁴³

Ongoing Monitoring of Embankments and Ponds

Dam Safety Management Plan

[58] The Interim Decision⁴⁴ raised several matters related to the Dam Safety Management Plan (DSMP). Mr Connell in response, advised that the DSMP had been prepared in accordance with the NZSOLD Guidelines 2015 and that peer review of the plan will be carried out three months prior to the initial filling by one of the Review Panel members. A consent condition is proposed to this effect, which we require be clearly enforceable. Mr Connell also noted that the DSMP reflects the requirements for both a Dam Safety Management System (NZSOLD Guidelines) and a Dam Safety Assurance Programme (Building Act).

Auto Sensory System

[59] At the time of the May 2016 hearing, WIL had not chosen an auto sensory system to detect a developing breach of an embankment, the need for which was signalled in proposed consent conditions and recommended by the engineering experts in their conferencing. Since that time surveillance and monitoring requirements have been reviewed concerning likely failure modes of the ponds, together with methods for auto sensory systems. Mr Connell presented the review findings and recommendations.⁴⁵

[60] The recommended auto sensory instrumentation system from this review is Time Domain Reflectometry (TDR). The Technical Specification (Issue 5) s 9.3 has been updated to specify the installation of this system in the dam crest. The DSMP section 8.11 has also been reworded to clarify the modes of failure and indicators of

⁴³ From Interim Decision at para [153].

⁴⁴ At paragraphs [166] to [168].

⁴⁵ Appendix C, Supplementary Evidence, Annexure 2.



these, together with backup surveillance methods for the key failure mode indicators.⁴⁶

[61] In response to questions under cross-examination regarding Mr Dodds' recommended approach, Mr Connell considered Mr Dodds' methodology to be "misdirected" in that he considered Mr Dodds did not understand the failures mode mechanism, the time it takes for failure modes to develop in large embankments of the type proposed here and the very favourable embankment fill material.⁴⁷ In response to questions from the Court, Mr Connell agreed that the TDR system has not been used in New Zealand, but was used for railway embankments in the United States. It was a "tried and true" system that had been around for more than ten years, albeit not over long distances.⁴⁸

[62] In response to further questions from the Court, when recalled at the end of the hearing, Mr Connell noted that the TDR system proposed was the simplest available and was essentially a "tripwire" in that it raises an alarm when no reflection of a signal is sensed.⁴⁹

[63] Mr Dodds considered the proposed TDR system to be a "retrograde step",⁵⁰ and that essentially no liner integrity monitoring is proposed. He described in some detail the shortcomings of the proposed instrumentation systems, including TDR, and suggested that an embedded copper or fibre tripwire system would be a far better option. He also discussed a number of instrumentation technologies related to sensor redundancy, power supply continuity and communications.

[64] Mr Dodds elaborated at length during questioning on the reasons why he considered the proposed TDR system would not work. Regrettably, none of this evidence had been prepared in written form and had not been available to WIL expert advisors to comment on, despite Mr Dodds having access to WIL expert rebuttal evidence since December 2017.

[65] That rebuttal evidence⁵¹ from Mr Connell set out in some detail why he considered the TDR system proposed as being appropriate, particularly given the

⁴⁶ Table 5, DSMP, Issue 5.

⁴⁷ Transcript, page 40, line 14.

⁴⁸ Transcript, page 43, lines 21 to 26.

⁴⁹ Transcript, page 275, line 13.

⁵⁰ Supplementary Evidence, 23 November 2017 at para 4.1.1.

⁵¹ Statement of Evidence of Nigel Connell in Reply, 21 December 2017.



nature of embankment construction, the purpose of the liner, the material, and construction methodology for the embankments. Mr Connell explained how the embankments would perform if there was any seepage or liner leakage. In his opinion, the nature of the embankment material would prevent seepage flows from causing rapid embankment failure. Visual detection processes will ensure that any potential dam failure from seepage would be recorded and remedied before embankment failure could occur. He did not consider that sophisticated liner leakage detection instrumentation of the type suggested by Mr Dodds was necessary for this project.

[66] Under cross-examination Mr Dodds acknowledged that the method by which the proposed TDR system worked was using a coaxial cable as a sensor, coupled with a break detection signal similar to radar. It would function the same as severance of a copper wire or fibre in detecting a rapid dam failure.

[67] It should be noted that the Court in its Interim Decision⁵² considered the many issues raised by Mr Dodds and provided an opportunity for him to be "more helpful if he can be" in preparing evidence for the resumed hearing. We infer that he was unable to take matters further to establish any real strength for his criticisms.

[68] After careful examination of the proposed TDR system, together with a challenge to the efficacy of this system by Mr Dodds, we are satisfied that the system as now described in the Technical Specification (Issue 5) and DSMP is in accord with the NZSOLD Guidelines. We consider the Applicant's proposals for auto sensory instrumentation to be installed at the ponds as fully meeting the issue identified by the parties' experts in conferencing.

[69] In doing so we note the provision for an alternative dam breach detection option to the proposed TDR in the revised conditions. The Appellant submitted that it was not appropriate to take the assessment of the merits of any alternative from the Court by allowing approval by a third party (WDC) through a "certification" decision.

[70] The Court is asked to approve a set of consent conditions that direct the performance required of the overall dam safety management system. A suite of management plans, some of which have already been developed to a considerable extent, give effect to these conditions. Final plans, and any changes made to these over time, are required to be certified through Council processes that they meet the **objectives and standards** set out in the conditions. If, during the detail design stage,

⁵² Paragraphs [181] to [184].



an alternative to the TDR system proposed is judged by WIL experts to be superior and better meet the consent conditions, this is required to be confirmed by the Council. This then enables the alternative to be utilised without reference back to the Court. There is no delegation of approval as no approval is required, simply **certification** that the alternative meets the consent requirements. In the final stage we will want to be satisfied about these things in the conditions.

Route March Forms⁵³

[71] The Interim Decision noted deficiencies in the proposed Route March forms to be used as a guide to and record of routine inspections of the ponds and their embankments. The forms have now been modified to our satisfaction.

HDPE Coupons⁵⁴

[72] Future testing requirements for the coupons have been included in the DSMP (Issue 5) at s 8.9 as the appropriate live document for the operational life of the pond (as opposed to the Technical Specification). A draft consent condition has been included to this effect, which we must be satisfied is enforceable. *Instrumentation*

[73] Mr Connell provided responses to many of the instrumentation issues raised by Mr Dodds.⁵⁵ We are satisfied with these responses, covering instrumentation design redundancy, piezometer numbers and monitoring, communication systems, the controlling server in Wellington, battery backup, breach detection and leak detection. Apart from the introduction of the TDR system, no modifications are suggested to the technical specification or any plans as a consequence of these issues being raised with the Court, nor do we consider any are necessary.

Emergency Action Plan (EAP) and Emergency Evacuation Plan (EEP)

EAP

[74] The Interim Decision identified inadequacies in the auto sensory and warning systems proposed for the operation of the dam (paragraph [186]). Mr Connell directed us to the diagram in the executive summary of both the DSMP (Issue 5) and EAP (Issue 5), illustrating the connections between the various parts of the monitoring

⁵³ Paragraph [175].

⁵⁴ Paragraphs [176] to [177].

⁵⁵ Interim Decision, recorded at paragraph [182].



system and the actions to be taken in an emergency. Details of each component are in the DSMP and construction specifications.

[75] The EAP has been taken out of the DSMP and issued as a separate document, revised to update it to the latest NZSOLD Guidelines 2015 as directed by the Court. The EAP is to be peer reviewed prior to implementation and updated before the ponds are commissioned.

[76] One of the main concerns for the EAP expressed by ECESS witnesses and pursued at length during the hearing was the issue of dam water level drawdown. Appendix D1 of the EAP (Issue 5) describes the lowering of pond water level as the primary mitigation option. In non-urgent circumstances, this is achieved by stopping inflows and releasing controlled outflows to the irrigation canals. These canals have limited storage capacity, so drawdown rates are determined by the pumping of water from the races by the WIL farmers. Dewatering of the ponds under these circumstances could take up to two weeks.

[77] Under emergency circumstances, such as following a significant seismic event, where visual inspections of the embankments indicate a breach of an embankment could develop, controlled drawdown of levels would have to occur at a rate beyond the ability of the canals to contain the water. It is likely under these circumstances that power supply for pumping to land would be cut off. Water discharged from the ponds would overtop canals at various chokepoints such as culverts, and result in local flooding and possible damage to the irrigation network. This is acknowledged in the EAP.

[78] WIL prepared for the Court⁵⁶ a map showing the flooding impact of drawdown using canals R2 and R3 and a further overlay⁵⁷ showing the boundaries of Ngāi Tahu Farming Ltd and Ngāi Tahu Forests Ltd. These maps indicate that the bulk of surface flooding from these canals during an emergency event would occur on Ngāi Tahu land. We were told that this would be covered by an affected party approval from the landowners.

[79] Emergency dewatering was explained by Mr Connell in evidence and during cross-examination. The amount and rate at which water is released from the ponds would depend on the nature of the emergency which in turn determines the amount of

⁵⁶ Exhibit 6.

⁵⁷ Exhibit 9.



overtopping of the canal systems as they reach capacity. Mr Connell went on to explain that water flow exceeding canal capacity would flow out of the canals at culvert chokepoints and cause local flooding and road access issues during the period that it takes the excess water to flow down the natural gradient of the land to the Waimakariri and Eyre rivers.

[80] In closing submissions counsel for the Applicant noted international recommendations for emergency drawdown indicate a discharge capacity of 5% of available water per day as being appropriate. This translates to approximately half a metre drop per day for the WIL ponds. WIL have proposed a further consent condition requiring canals MR4 and R3 that discharge to the Eyre River to be upgraded and maintained to accommodate a discharge from the ponds to the river of 7.3 cubic metres per second without overtopping the network. This volume would meet the international 5% recommendations referred to above.

[81] Even with this capacity available, WIL propose to retain the reference to higher dewater volumes set out in Appendix D to the EAP to provide flexibility for decisions in emergency circumstances that could lead to some localised flooding. The final EAP is to include an indicative procedure for dewatering and show likely inundation areas. We agree that this would be a useful addition in meeting the objectives set for the EAP. Although it will not be our task to approve the EAP, we would like to see the further development of the document in this regard before these proceedings are finalised.

[82] Cross examination questions were put to Mr Connell as to why the storage ponds could not be left empty during winter when irrigation was not occurring, thus removing the downstream risk to the community for at least part of the year. Mr Connell responded that the ponds should not be left empty as this would have implications for the integrity of the liner. Further consideration has been given to this since the hearing and WIL have proposed a condition to limit the level of the ponds over the winter period when water storage is not required. The proposed levels, around half full for Pond 1 and approximately 2 metres drawdown for Pond 2, are set to ensure the integrity of the liner while further reducing risk for the community.

[83] During the hearing there was repeated reference by counsel and witnesses for the appellants to the potential restraints on evacuation by roads that could already be impassable due to flooding from the dewatering process. The Appellant relied on this when questioning the efficacy of the Emergency Evacuation Plan.



[84] In examining the plausibility of such a scenario, we note that emergency dewatering capability is a critical safety element following a significant earthquake event. If a potential dam break situation is observed developing (Alert Level 3) the ponds can be dewatered in a controlled manner to avoid a catastrophic release from the ponds.⁵⁸ The capacity to achieve this without canal overtopping is enhanced by the requirement to maintain a discharge capability to the Eyre River of 7-3 Cumecs as noted earlier.

[85] If the situation is of high urgency (Alert Level 4) evacuation procedures under the EEP can be initiated immediately with sufficient time for evacuation to occur prior to the controlled release. Any subsequent full breach of an embankment, if it developed, would therefore be under circumstances where evacuation had already occurred. The presence of localised floodwater from the emergency dewater would be of little relevance. We can envisage no scenario, nor were we directed to any, where a catastrophic release of water could occur at a time when evacuation roads were impassable due to emergency dewatering and evacuation had not already occurred.

The issue of scope related to dewatering provisions

[86] ECESS in closing submissions (and as signalled during the hearing), raised an issue of legal scope concerning dewatering. This related to information from the draft EAP that revealed the intention to use the irrigation canals to dewater the ponds under emergency conditions in a manner that would result in overtopping of some canals, with resultant localised flooding. Counsel for the Appellant submitted that this "planned activity" had not been included in the original application or the s 42A RMA notification report; the application did not include, as he said it should have, application for consent to discharge water to land required under the Land and Water Regional Plan.

[87] Counsel for the Appellant relied on *Auckland City Council v Minister for the Environment*⁵⁹ as authority that s 330 RMA (concerning emergency works) cannot be relied on as an "ultimate resort to every contingency". His submission was that the supercharging of the canals as identified in the draft EAP was within the control of the dam operator and part of the engineering design and therefore required consent. Activity that resulted in localised flooding from dewatering the ponds would alter the character and impact if the application from a resident's perspective. This aspect of the

⁵⁸ We deal subsequently with uncontrolled release in the context of the EEP.

⁵⁹ (1999) 5 ELRNZ 1.



application should have been available to be examined by submitters, but this had not occurred.

[88] Counsel submitted that as no application had been made for such dewatering activity, it was outside the scope of the application and not within the Court's jurisdiction to consider. A key element of the dewatering strategy relied on by the applicant and required for any large dam was therefore not available to the Court to consider.

[89] We have examined the dewatering strategy proposed by WIL, including maintaining the capacity to discharge from the ponds to the Eyre River at a rate that meets international recommendations for dewatering capability. We also note the reduced storage volumes now proposed during winter months, with corresponding lower risk and less water required to be discharged to the canals if a breach of an embankment was imminent.

[90] We find on evidence previously considered that rapid dewatering of the ponds giving rise to the concern of the Appellant, would only occur after a highly unlikely seismic event, and only if the first levels of drawdown and pumping to land and direct discharge to the Eyre River proved inadequate under the emergency event. It seems relatively uncontentious on the evidence that the bulk of any localised flooding would be confined to sparsely populated areas on Ngā Tahu-owned land. Any discharge to MR 4 and R 2 would be controlled within the capacity of the canals to discharge to the river without causing flooding in the areas of concern to the appellant.

[91] On the geological and seismic scientific information before us, it seems to us that s330 RMA could apply to emergency actions associated with an imminent or actual catastrophic breach of embankments at the proposed WIL pond site. Any need for drawdown of water exceeding the capacity of any of the canals to cope with, could be part of such emergency action, depending on circumstances at the time.

[92] We set out s 330(1) and (1A):⁶⁰

330 Emergency works and power to take preventive or remedial action

- (1) Where—
 - (a) any public work for which any person has financial responsibility; or
 - (b) any natural and physical resource or area for which a local authority or consent authority has jurisdiction under this Act; or

⁶⁰ Subsection (1A) was inserted as from 10 August 2005 by the Resource Management Amendment Act of that year (s 120(1)).



- (c) any project or work or network utility operation for which any network utility operator is approved as a requiring authority under section 167; or
- (ca) any service or system that any lifeline utility operates or provides—is, in the opinion of the person, authority, network utility operator, or lifeline utility, affected by or likely to be affected by—
- (d) an adverse effect on the environment which requires immediate preventive measures; or
- (e) an adverse effect on the environment which requires immediate remedial measures; or
- (f) any sudden event causing or likely to cause loss of life, injury, or serious damage to property—

the provisions of sections 9, 12, 13, 14, and 15 shall not apply to any activity undertaken by or on behalf of that person, authority, network utility operator, or lifeline utility to remove the cause of, or mitigate any actual or likely adverse effect of, the emergency.

- (1A) Subsection (1) applies whether or not the adverse effect or sudden event was foreseeable.

[93] WIL is a network utility operator and a gazetted requiring authority so most parts of subsection (1) could be engaged.

[94] The *Auckland City* case is not particularly helpful. It concerned septage generated on Waiheke Island, and the declarations sought were of a general nature focussing on the then provisions of the s 330, not a particular factual situation. The decision is interesting for the general guidance it offered about the operation of s330 as it was then framed (1998) but does not help concerning the making of declarations on particular factual circumstances.

[95] We understood the Appellant was submitting that a resource consent could be required for emergency dewatering purposes capable of being anticipated, but we cannot read such an approach into the decision. Indeed, having regard to the last sentences of the decision, the guidance offered by the Court even before the insertion of subsection (1A) was:⁶¹

... [t]hat even where conditions which give rise to the elements that form the emergency for the purposes of s 330 (1) or (2) could have been foreseen, or indeed were foreseen, the person or body may still rely upon the provisions of the particular subsection sought to be invoked, provided that the relevant qualifying aspects ... are met.

⁶¹ At p. 18, lines 8-13.



[96] We accept the submission of counsel for the Applicant⁶² that there are no reasonable grounds upon which the criteria in the wider s 330 would not be met. It is trite that the statutory grounds in s 330 would need to be made out at the time, and we accept the submission that councils cannot simply rely on this section as being always available if things go wrong.

[97] We consequently hold that it is not appropriate for the Appellant to raise speculative combinations and permutations, particularly running ahead of the scientific information before us, and assert that such events are not then to be regarded as emergencies.

[98] We accept the submissions on behalf of the Applicant that no issue of scope arises. Although we cannot bind future decision-makers, s 330 could operate in the sorts of highly unlikely circumstances we have discussed from the evidence, or from other extreme events not presently anticipated or thought about.

Hydraulic Modelling

[99] Maps produced from hydraulic modelling of various dam break scenarios, identify emergency evacuation zones. Mr M J Gardner, in new supplementary evidence called by ECESS⁶³, raised questions around the level of detail in the modelling; the absence of assessment of a rainy-day failure when flooding was already occurring from the nearby rivers; the desirability of incorporating a higher resolution of rain into the model; and changes in the landscape, particularly small irrigation dams that could affect water flow paths. He also identified a transformational error that had been overlooked when creating the roughness definition file.

[100] Mr Connell addressed each of these issues.⁶⁴ He noted that the maps had been updated to take account of the error identified by Mr Gardner and a revised inundation assessment prepared for incorporation into the EAP. Mr Connell noted that rainy day failure scenarios had not been considered, as pond design prevented embankments from overtopping during heavy rainfall and dam break flood waves would have minimal impact on natural flood event levels. Mr Connell considered that the grid size of the model and new landscape features would have little influence on the extent of inundation from a dam break. We are satisfied that the inundation maps are now

⁶² At para 19.4(c).

⁶³ Supplementary Evidence of M J Gardner, 24 November 2017.

⁶⁴ Statement of Evidence of Nigel Connell in Reply, 21 December 2017, Annexure 1.



fully adequate for emergency planning purposes.

EEP

[101] The Interim Decision⁶⁵ identified the need for further work on the EAP and its associated EEP, taking the somewhat unusual step of requesting that the draft plans be developed possibly to the extent virtually of detailed and peer reviewed documents.

[102] WIL engaged Mr R J Woods⁶⁶ to develop the EEP for the ponds. The resultant plan, developed in consultation with the local community and emergency management responders and agencies, detailed the roles and responsibilities of stakeholders and described the operational basis for conducting an evacuation. In line with national CDEM guidance, it recommended that residents should develop household emergency plans for both existing and new hazards. Mr Woods described in some detail how the plan was developed, and the consultation undertaken. He concluded "the methodology employed, and level of public consultation undertaken for the development of the WIL EEP is both defensible and robust and is in accordance with Ministry of Civil Defence and Emergency Management Guidelines for evacuation planning".⁶⁷

[103] The EEP establishes three warning and evacuation areas based on the different arrival times of flooding from a catastrophic breach and the various potential failure locations.

[104] A *self-evacuation* area would be inundated first, generally less than one hour after a catastrophic breach, not allowing time for authorities to co-ordinate evacuation. A multiple alert system, including automated sirens at the ponds, would be put in place to alert residents and others in this zone immediately that a breach has been detected and self-evacuation should be initiated.

[105] Further away, the *assisted evacuation* area would not be flooded before a co-ordinated effort could be mounted by authorities to assist residents with evacuation. Again, multiple alert systems would be provided.

[106] The *targeted warning* area is the broader area where some inundation may occur, but not to the extent that would be a threat to life or property. Residents in this

⁶⁵ At paragraph [201].

⁶⁶ Natural hazards risk management specialist, EIC called by applicant, 18 August 2017

⁶⁷ Evidence of Mr Woods re EEP, at paragraph 72.



area would be encouraged to opt in to a proposed automated SMS, an email message facility advising them of any storage pond failure.

[107] The Court identified at the beginning of the hearing concerns over the scattered evidence on the geography of the area and the detailed criticism of the availability of identified evacuation routes. The Court indicated that it would be assisted if a plan could be agreed among the parties showing the evacuation area and the identified roads readily accessible by residents and others in the event of an emergency evacuation. This map⁶⁸ was produced following consultation among the parties. An overlay map⁶⁹ was also produced to the Court showing localised areas that would be expected to have some flooding following emergency drawdown of water from the ponds at rates beyond the ability of the water races to cope.

[108] In response to questions from the Court on the practicality of visitors to the area or seasonal workers being familiar with potential evacuation routes in the event of an emergency, Mr Woods acknowledged that this was a challenge for all Civil Defence Management groups developing evacuation plans. He advised that it generally comes down to the ability to give people a warning that they may or may not act on. Mr Woods considered that land owners had a responsibility to inform staff of significant risks at a site and that evacuation route signage could be of assistance.

[109] Mr Woods referred to the identification in the EEP of limiting factors for an effective evacuation and methods for mitigating these.⁷⁰ He acknowledged that the presence of transient people in the evacuation area had not been considered and this was an area where improvement was desirable. Counsel for WIL in closing provided additional wording recommended by Mr Woods to be added as 4.1.3.5 to the EEP.⁷¹ The new information has not been tested in Court. It must be developed somewhat beyond its rather generalised current form into cogent enforceable obligations on WIL. We reserve leave to the parties to have us consider in a further brief hearing if necessary, this and any other desirable tightening of the document.

[110] Mr Woods responded to a wide range of questions in cross-examination and from members of the Court on the EEP development process and details of how the

⁶⁸ Exhibit 5, Evacuation Route.

⁶⁹ Exhibit 6, Water Races Spill.

⁷⁰ Wrights Road Storage Ponds, Emergency Evacuation Plan, at para 4.1.6, Table 4.3.

⁷¹ Annexure 1. Submissions for Waimakariri Irrigation Limited in reply.



plan would operate. Apart from the issue of transient visitors or workers, Mr Woods did not believe any significant changes were required to the draft EEP before the Court. ECESS's counsel Mr Chapman challenged Mr Woods on a range of detail in the EEP without significant gain.

[111] The EEP details provisions for exercising the plan, monitoring requirements and review. Provision is to be made for new versions of the Plan to be prepared addressing any deficiencies identified in the monitoring and evaluation phases.

Evaluation

[112] We found in the Interim Decision and confirm here that the seismic design standard of annual exceedance of one in 10,000 is appropriate for the Wrights Road ponds based on the seismic evaluation evidence presented by Mr Van Dissen and Dr McVerry from GNS. We have confirmed that the engineering design of the ponds meets this standard and is consistent with the requirements of the NZSOLD Guidelines. It follows that an event exceeding the design standard would have to occur to create the potential for failure of one or more of the embankments. This could be either as a catastrophic failure or by unravelling of the embankment structure over time from significant cracking and associated rupture of the protected liner allowing quantities of water through the structure sufficient to develop as a breach.

[113] From the evidence of Mr Van Dissen such an event has not occurred in the subject area for at least 18,000 years. Moreover, the design and proposed construction details now before the Court have been developed to a highly conservative degree. In the highly unlikely event that an overdesign seismic event produced cracking of an embankment that had the potential to develop as a significant leak that needed attention, the dam operator can de-water the ponds through irrigation canals under normal operating procedures. This would not be a disaster scenario and allows pumping of water to land through the WIL shareholders irrigation systems and direct discharge of up to 7.3 cumecs to the Eyre River. In the highly unlikely, but not impossible, scenario of an overdesign seismic event that resulted in damage to an embankment and a catastrophic breach, WIL have proposed consent conditions setting out the objectives and performance standards for evacuation of the potentially affected community downstream of the dam, and we have considered the draft Plans. The next stage will be for WIL to submit a further iteration of conditions and the two Plans for our consideration, and a further hearing if disputes remain on the details of them to the extent not fully ruled on in this decision.



[114] Emergency preparedness requirements for the dams of this type are outlined in the NZSOLD Guidelines, including documentation in an EAP. Section 3.3.1 of the Guidelines state that “the EAP should limit the effects of a dam failure on people, property and the environment and define and prioritise the implementation of those actions that realistically may be achieved to minimise the potential for loss of life and damage to property and the environment”.

[115] WIL have prepared an EEP as a component of the EAP provisions in the NZSOLD Guidelines in meeting the reference under s 3.3.6 to Preventative and Emergency Actions that include establishing co-ordinated plans and procedures with police and CDEM authorities.

[116] Notwithstanding the misgivings related to some of the detail of the EEP by many people in the potentially affected community as expressed in the evidence from ECESS, the Court may be able to accept (with any necessary tightening) the version of the draft EEP prepared through an inclusive process by a recognised expert in the field as describing a plausible coordinated evacuation procedure in the highly unlikely event of failure or imminent failure of the dam embankments. Provision is to be made for the ongoing monitoring and review of the EAP and its associated EEP, so these plans retain their relevance over time.

[117] The Court is not required to formally approve the EEP, or any of the other plans, but the EEP must deliver on how the standards set in the conditions of consent are to be met. Certification of the plan through Council processes is appropriate to ensure that these conditions are met, both for the initial plan prior to commissioning of the dam and for any changes that may result from ongoing monitoring and review.

[118] Subject to the above, we are likely to be satisfied that the draft EAP and EEP meet the standards set out in the proposed conditions directing these plans and that these conditions are consistent with the NZSOLD Guidelines for emergency preparedness.

[119] Planning provisions for Hazard Management were outlined in the Interim Decision at (paragraph [207] to [211]). The Court identified the need for comprehensive EAP and EEPs to be in place so the proposal be consistent with the Canterbury Regional Policy Statement, Policy 11.3.5 Land and Water Regional Plan, Policy 4.4.8 and Waimakariri District Plan, Policy 8.1.1.2. Subject to the above, we are likely to be satisfied that the current versions of these plans as presented to the Court, together



with requirements for monitoring and updating, are consistent with the relevant provisions of the planning documents described above.

Conditions

[120] Draft conditions of consent were prepared by the Applicant for the first hearings. Following observations of the Court in the Interim Decision, WDC and CRC assumed the task of revising the conditions. Feedback from the parties has been incorporated in a second revised draft provided for the Court and further comment has been provided by the parties.

[121] The Court has given careful consideration to the draft conditions and further submissions on these. Changes to the WIL proposed draft conditions have been directed towards giving confidence that the processes of management planning, review and certification are sufficiently robust for the circumstances. We appreciate the effort applied by the Councils towards achieving this end, and subject to the above are likely to accept the conditions more or less as drafted.

[122] A consent condition to reduce localized flooding during emergency dewatering of the ponds is to be added as proposed by WIL to read:

Following commissioning, the Consent Holder shall ensure that the Waimakariri irrigation race network has sufficient capacity to accommodate a discharge of 7-3 cubic metres per second from the Waimakariri Storage Ponds to the Eyre River without overtopping the irrigation race network.

[123] A further condition to reduce community risk during winter when storage water is not required is to be added as proposed by WIL to read:

Between 20 April and 1 August in any year the storage of water for irrigation, domestic supply and stockwater purposes shall be limited to an operating level of 223.0 m RL in Pond 1 and 221 m RL in Pond 2.

[124] The Appellant proposed conditions on dewatering, modelling, dewatering trials, provision of an overflow system back to the Waimakariri River and a seismic line survey underneath the ponds.

[125] We have addressed the issue of dewatering earlier. We are satisfied that for other than emergency purposes to prevent an embankment breaching, dewatering of the ponds can be effectively achieved through the irrigation canals and on farm irrigation pumping. In the highly unlikely, but not impossible event of more rapid



dewatering being required, risk to life and serious property damage can be avoided by the controlled release of water from the ponds at volumes that may cause spill from the canals resulting in some localised flooding. This would be under circumstances where managed evacuation, if required, can be effected prior to any flooding affecting road egress from potentially flooded areas.

[126] The current application does not include an emergency⁷² overflow to the Waimakariri River. We accept that this would be too speculative and subject to unreasonable numbers of permutations and combinations.

[127] In relation to the seismic survey request, we accept the evidence of Mr Van Dissen that the available evidence from ground surface topography showing displacement over an 18,000-year period allowed for a safety design level to be established that he was comfortable with.⁷³ Further seismic survey of the type suggested was not necessary in his opinion, given the topographic evidence. We see no advantage in further seismic survey below the dam site for the reasons outlined in Mr Van Dissen's evidence, which we have preferred, on the seismic information on which the Design Safety Standard of 1: 10,000 is based.

[128] Revised conditions establishing a community liaison group (CLG), to be in place for the duration of the consents, provide opportunities for concerns of affected residents to be identified and acted on. Some of the matters already identified, such as alarm systems at a household level and assistance with household evacuation plans have been incorporated into the objectives for the CLG and its continued involvement with development and review of the EAP/EEP alongside the emergency management agencies.

[129] Matters raised in the Interim Decision related to the consent to dam water requiring attention, have been addressed in evidence and specifically addressed in revised draft conditions for CRC 12610. It appears that these revised conditions have generally been accepted by both the Applicant and Appellant and we record our acceptance of these conditions here.

[130] There is considerable cross-over of consent conditions between CRC 12610 and RC 135478. We note the consistency in wording for the duplicate conditions for each consent and that non-duplicated conditions reflect the different responsibilities of

⁷² In the sense of highly unlikely, extreme event-related.

⁷³ Transcript, page 259 to 260.



the two Councils and the details of the consents applied for.

[131] Detailed cross-checking of conditions for the two primary consents needs to be carried out to ensure accuracy and consistency for the final conditions to be issued. For instance, we note that CRC 12610 Condition 19 is not the same as Condition 30 RC135478 in that 30 (a) (i) and (ii) in the latter are incorrectly 19(a)(a) and (b) in the former and the reference in 19(b) should refer to 19(a) (i) and (ii). There may be other inconsistencies such as these that we have not yet found.

Insurance

[132] WIL have proffered a set of consent conditions covering public liability insurance. The councils raised issues concerning separate insurance for public infrastructure, indicating that there may be better options available involving separate insurance and compensation packages. This raised issues around jurisdiction to impose such conditions, which we have not resolved at this stage. We note for present purposes WIL has proffered draft conditions about insurance after seeking expert insurance advice. The Court did not hear evidence on this, and directs the parties either to come to an agreement about it, or propose steps for us to resolve it.

The Council decision

[133] Section 290A of the Act requires the Court to have regard to the first instance decision under appeal. That does not create a presumption that the decision is correct, or impose on an Appellant an onus of demonstrating that it is incorrect. It does require that genuine and open-minded attention be paid to it. In this instance the Councils, following a joint hearing by independent commissioners, granted consent with conditions, including a requirement for peer review of the pond embankment design and for recommendations from this review to be incorporated into final design for approval. This review has been completed and the advice from the panel has informed our determination of the design conditions to be included. The evidence before us has been considerably more detailed, based on significantly upgraded Dam Safety Guidelines (2015), and tested much more rigorously than before the hearing commissioners. We are likely to confirm the grant of consent by the Councils for substantially the same reasons, but with a far more rigorously designed proposal and much more comprehensive set of conditions to manage the risks.



Outcome

- A. Grant of consent likely to be confirmed, subject to our being satisfied as to the further matters called for in this decision.
- B. A further set of conditions including additional conditions proposed by WIL or directed in this decision, and upgrades to the various Plan drafts directed here, to be lodged within 30 working days of the issue of this decision.
- C: The parties are to consult on those drafts, and endeavour to reach agreement if possible. Should that not be possible, the parties are to approach the Court within a further 30 working days with proposals for steps towards resolution of remaining disputes about them, inclusive of any timetable thought necessary.
- D: Costs reserved at this stage.

For the court:



L J Newhook

Principal Environment Judge

