BC120108

IPENZ ENGINEERS NEW ZEALAND | NEW ZEALAND INSTITUTE OF ARCHITECTS INCORPORATED | ACENZ

Building Code Clause(s) B1/VM4

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on the reverse side)*

ISSUED BY: Riley Consultants Ltd
(Design Firm)

TO: Kakara Estate Ltd
(Owner/Developer)

TO BE SUPPLIED TO: Marlborough District Council
(Building Consent Authority)

IN RESPECT OF: Karaka Reservoir
(Description of Building Work)

AT: 3552 SH63 Wairau Valley, Marlborough
(Address)

LOT 1 **DP** 387248 **SO**

We have been engaged by the owner/developer referred to above to provide design and construction supervision services in respect of the requirements of
(Extent of Engagement)
Clause(s) B1/VM4 of the Building Code for
○ All or ◉ Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:
☑ Compliance Documents issued by Department of Building & Housing B1/VM4 as applicable, full design drawings
(verification method / acceptable solution)
including design report 08822-E attached or
☐ Alternative solution as per the attached schedule

The proposed building work covered by this producer statement is described on the drawings titled Kakara Reservoir and numbered 08822-1 to 08822-10;
together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

(i) Site verification of the following design assumptions (as outlined in 08822-E)

(ii) All proprietary products meeting their performance specification requirements;

I **believe on reasonable grounds** the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

I, TITUS SMITH am: ☑ CPEng 239447 #
(Name of Design Professional)
☐ Reg Arch #

I am a Member of : ☑ IPENZ ☐ NZIA and hold the following qualifications: BE, MEngSci

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Design Firm is a member of ACENZ ◉ YES ○ NO

SIGNED BY TITUS SMITH ON BEHALF OF RILEY CONSULTANTS LTD
(Design Firm)

Date 14/2/12 *(signature)*

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000.*

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

Marlborough District Council
Date Received: 16/02/2012

BC120108

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003[1] or Schedules E1/E2 of NZIA's SCC 2007 [2]
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ)or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

*** Professional Indemnity Insurance**

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to $500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5)[3] (OL1-OL4) [2]. The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

1 *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*

2 *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*

3 *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

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IPENZ ENGINEERS NEW ZEALAND NEW ZEALAND INSTITUTE OF ARCHITECTS INCORPORATED ACENZ

Marlborough District Council
Date Received: 16/02/2012

020 EARTHWORKS AND HDPE LINER

020.1 SCOPE OF CONTRACT

This specification covers:

- All earthworks associated with the construction of Kakara Vineyard Dam inclusive of drainage materials brought from off site.
- Preparation of ground surfaces for filling and concrete structures.
- Temporary drainage.

020.2 Construction Staging

The dam and reservoir profile is as indicated in the drawings. It is intended that all dam earth fill materials (apart from imported drainage materials) will be obtained from the reservoir and spillway cuttings. Geotechnical investigations indicate the ground conditions within the reservoir cut area are generally alluvial gravel with silt lenses. The excavated material will be used for the earth embankment construction.

020.3 Excavation and Preparation for Fill and Structures

020.3.1 Ground Conditions

It is assumed the Contractor has visited and inspected the site and is familiar with the nature of the ground through which the works are to be constructed.

Subsoil investigations have been carried out. General information from the ground conditions is included within the appended design report for the information of the Contractor. Such information is provided by the Engineer in accordance with sound engineering practice. However, it cannot be warranted to present a complete and accurate picture of the whole of the site of the works. The results of the investigations and assessments provide an indication of the nature of materials to be encountered, but variations in the position and amounts of each type of material described will occur.

The Contractor is deemed to have taken site conditions into account when estimating his costs and deciding on his construction methods. The Contractor shall be responsible for carrying out his own assessment of excavatibility and construction methods.

Contractors are required to have allowed in their prices for handling whatever material is encountered during the Works. The fact that a tender has been submitted will be deemed as evidence that the Contractor accepts the full and sole responsibility for the method of working the expected ground conditions of the site.

020.3.2 Inspections and Approvals

The following critical points during construction must be inspected by the Engineer prior to further work being carried out in the area. No filling, concrete work, or borrow excavation for fill purposes shall commence without the Engineer's approval. The Engineer must be informed at least 48 hours prior to the following hold points being reached, to ensure construction is not delayed.

1. Inspection of the stripped, excavated and trimmed dam footprint prior to any fill or drainage material being placed.
2. Reservoir outlet and drainage outlet areas trimmed to profile prior to placement of drainage material or pipe work
3. Reservoir outlet and drainage outlet pipes after placement and welding, but prior to the start of backfilling
4. Start of the dam earthfill bulk filling operation
5. Inspection of the stripped, excavated and trimmed reservoir area prior to any drainage installation or lining activities being undertaken.
6. Inspection of reservoir and dam area prepared for HDPE liner installation

020.3.2 Stripping

All organic material shall be removed from the areas subject to excavation or filling. Turf, topsoil and any scrub shall be removed to expose soil containing insignificant amounts of organic material.

All significant volumes of topsoil shall be stockpiled for later re-use. Materials containing insufficient amounts of topsoil for practical separation shall be disposed of in dump areas to be designated by the Engineer.

020.3.4 Dam Foundations

All topsoil shall be removed from the dam footprint. The dam footprint shall then be subject to investigation by the engineer, who may direct further undercut if the foundation does not conform to the original design assumptions. No compaction of the subgrade shall be carried out.

The engineer may direct areas of exposed silt to be scarified and moistened as appropriate prior to placement of the first lift of fill to assist 'bonding' of the embankment to the foundation.

020.3.5 Cutoff Foundation

Beneath the dam embankment a cutoff trench has been specified. The cutoff has been nominally dimensioned on the drawings, and is intended to ensure that a well-compacted, low permeability barrier exists within the anticipated zone of surface/root disturbance beneath the dam. The Engineer shall inspect the cutoff foundation prior to any fill being placed, and may direct additional undercut if the foundation does not conform to the original design assumptions.

020.3.6 Reservoir and Spillway Excavations

Excavation in the reservoir/spillway areas shall be carried out to the lines and levels shown on the drawings.

020.3.7 Drainage

Due allowance for dewatering of the reservoir excavation during construction should be made, as groundwater seepage from cut faces is likely to occur.

It is anticipated that temporary drainage works within the reservoir/borrow area will be required including surface drains discharging through the drainage outlet pipe. Temporary drainage works shall be organised such that no siltation or other contamination of permanent drainage material or pipes occurs.

020.4 FILL MATERIALS

020.4.1 General

Dam fill shall be obtained on site from the reservoir area being excavated. No screening or processing of materials is anticipated beyond moisture conditioning and compaction to achieve the requirements of this specification.

Drainage material shall be obtained from off-site sources, and will likely require processing to meet the requirements of the specification.

It is anticipated that HDPE liner bedding material can be derived from materials on site, however it is likely that screening or processing will be required to meet the requirements of the specification.

020.4.2 Earth Fill

Dam fill shall be sourced on site from within the reservoir excavation. The material shall consist of silty gravel. It is intended that this material will be used "as dug" for dam earth fill. The particle size distribution after handling and placement shall conform to Table 1.

Table 1: Grading Envelope for Dam Fill

Particle Size (mm)	Percent Passing (%)
400	100
0.075	0-30

020.4.3 Drainage Material

Drainage material will require importing to site from a suitable quarry. Only hard, sound rock of uniform quality not subject to deterioration or breakdown imported off site will be acceptable as drainage material. This material is used in the perimeter drain beneath the dam and reservoir liner, in the outlet and drainage pipe trenches, and elsewhere as specified in the drawings. The particle size distribution after handling and compaction shall conform to Table 2.

Table 2: Grading Envelope for Filter/Drain

Particle Size (mm)	Percent Passing (%)
20	100
9.5	78-100
4.75	68-100
2	53-90
1.18	38-75
0.6	20-55
0.3	0-37
0.15	0-17
0.075	0-2

020.4.5 Liner Bedding Material

"Surfaces to be lined shall be smooth and free of all rocks, stones, sticks, roots, sharp objects, or debris of any kind. No stones or hard objects that will not pass through a 10 mm screen shall be present in the top 25 mm of the surfaces to be covered. The surface should provide a firm, unyielding foundation for the membrane, with no sudden, sharp or abrupt changes or break in grade." (Taken from GSE TN020 with modifications)

The recommended bedding material is a thin layer of silty sand, obtained on site where possible. A thin layer, of minimum 25 mm thickness of silty sand (or approved equivalent) shall be spread and compacted over all exposed gravel areas in the reservoir area. This shall be completed following installation of drainage materials as final preparation for liner installation.

020.4.6 Unsuitable Material

Any material that is deemed "unsuitable" by the Engineer is to be spread in the areas indicated on the drawings or as directed by the client / Engineer. This may include soil containing organic material, soil falling outside the grading limits for dam fill, or material with excessive moisture content for use as engineered fill.

020.5 PLACEMENT AND COMPACTION OF FILL MATERIALS

020.5.1 General

Fill shall be placed to the lines and levels indicated on the drawings, or otherwise instructed by the Engineer.

Any material not complying with the specified requirements shall be removed at no cost to the Principal.

All bulk earthworks shall be carried out in fully drained conditions with no free water on the working surfaces. Cut and fill areas shall be sloped and graded adequately so that they do not pond stormwater, and drains shall be installed as necessary on a regular basis to deflect run off from the areas of operation or to drain ponded water as soon as ponds are seen to develop.

No fill shall be placed during periods of wet weather. In the event of fill operations ceasing in any area on account of wet weather or for more than 1 week for any reason, the Contractor shall obtain the Engineer's approval of the conditions of the fill surface before recommencing fill operations. The engineer may direct removal, conditioning or scarifying of all or part of the exposed sections of fill prior to earthworks resuming.

No new fill shall be placed over previously placed fill that has not achieved the required standard of compaction, has become contaminated, or has deteriorated from the required fill standards. Previously placed fill which does not comply shall be reinstated or removed at no cost to the Principal. Positive and effective drainage shall be maintained during filling operations to minimise deterioration of material exposed in the upper fill layers. Special care shall be taken to avoid hollows which could pond runoff.

The combined operations of spreading and compacting shall be undertaken using very systematic and properly managed procedures to the satisfaction of the Engineer, to ensure that the entire surface of each loose layer receives the specified minimum number of passes of the roller before further loose material is spread.

It is possible that material variation will be encountered during construction, and compaction trials and further laboratory testing may be required to establish maximum densities and optimum water contents in such a case.

The specified minimum number of roller passes shall apply even if tests indicate the compaction requirements are met with fewer passes. Compaction of all material shall be carried out using specialised compacting equipment, separate from that used for transportation.

020.5.2 Placement and Compaction of Dam Fill

Notwithstanding any requirements resulting from compaction trials, the Contractor shall:

Prior to removal of material from a borrow area, wet or dry the material to a uniform moisture content close to optimum for the material. Unless the Contactor can demonstrate to the Engineer's satisfaction that conditioning of fill can be carried out on the fill surface and achieve uniform moisture content throughout the layer, this method of conditioning will not be permitted.

Spread out the fill in a layer of uniform loose thickness. Loose layer thickness shall not exceed 300 mm for dam earthfill.

Compaction of earthfill shall be carried out using a 10-tonne (static weight), smooth steel drum vibrating roller or approved equivalent.

Where dam fill abuts sloping ground steeper than 18° (1V:3H), the natural ground or fill being filled against shall be keyed in. The horizontal width of the key shall be equal to the thickness of the compacted layer.

Prior to placement of the next lift, the acceptance standards in accordance with section 5.5 shall be met, and any areas found to be deficient repaired. All areas in which remediation of deficient fill has been necessary shall be re-tested prior to additional fill being placed.

Overfilling of the dam embankments is required during construction so that compaction can be effectively carried out to the edge of the fill. During construction, the batters shall be overfilled by a minimum of 1 m (horizontal), and this overfill should be pulled up by digger and used as the final lift(s) of fill on the dam crest.

020.5.3 Placement and Compaction of Drainage Material

Drains shall be constructed to the lines and levels indicated in the drawings. The material shall be placed in a way which prevents segregation. No contamination with other material types will be permitted.

The maximum loose lift thickness for drainage material is 200 mm. Compaction of drainage materials shall comprise two passes with a vibrating plate compactor or similar. The Contractor shall ensure excessive compaction is avoided as this may reduce drain permeability. The Contractor shall avoid damage to drain pipes. If pipes are damaged they shall be removed and replaced at the Contractor's expense.

Construction of drainage works shall be staged such that sub-surface drains do not act as surface drains, or can be otherwise contaminated by siltation or vehicle trafficking prior to liner installation.

Dimensions shown on drawings are minimum dimensions. No payment will be made for drainage material used in excess of the volume corresponding to the dimensions given.

020.5.4 Placement and Compaction of Blinding Layer beneath Liner

Blinding material shall be placed and trimmed to the lines and levels indicated on the drawings as a bedding for the HDPE liner. The final surface shall be uniform and compact. Compaction shall be via a minimum of two passes with a smooth-drum roller.

020.5.5 Acceptance Standards for Dam Fill

For dam earthfill, the deflection of the compacted fill surface for all lifts during a proof roll with a 10t smooth drum roller shall be less than 7mm. Each fill layer for dam fill shall be given at least four passes, even if the acceptance standard is met with fewer passes. No pumping of weaving of fill is permitted

020.5.6 Acceptance Standards for Blinding Layer beneath Liner

Deflection of the surface during a proof roll shall be less than 5 mm, and no weaving shall be permitted.

"Surfaces shall be smooth and free of all rocks, stones, sticks, roots, sharp objects, or debris of any kind. No stones or hard objects that will not pass through a 10 mm screen shall be present in the top 25 mm of the surfaces to be covered. The surface should provide a firm, unyielding foundation for the membrane, with no sudden, sharp or abrupt changes or break in grade." (Taken from GSE TN020 with modifications)

The final prepared surface for HDPE lining may be sensitive to damage by adverse weather. The Contractor shall programme the final blinding layer installation, trimming and compacting to coincide as nearly as practicable with HDPE liner installation, so as to minimise the exposure of the prepared surface to risk of damage or deterioration.

020.5.7 Unsuitable Material

Unsuitable material shall be placed in loose layer thicknesses not exceeding 500 mm, and be trackrolled with a minimum of two passes. The finished surface shall be tight and uniform in profile and large boulders or rocks are to be buried.

020.5.8 Tolerances and Profiles

Dam Fill

The finished tolerances for the upstream and downstream batters are –100/+200mm (vertical height), and the surface shall be visually regular.

Reservoir Cut/Blinding Layer

The finished tolerances for the reservoir cut surface following placement of drainage metal and the blinding layer (where required) is –200/+100 mm (measured vertically), and the surface shall be visually regular.

Filter Drain

The specified thicknesses or dimensions are minimum values.

020.6 TOPSOIL AND GRASSING

020.6.1 Topsoil

Surfaces to be grassed shall be regular in profile with no large lumps or irregularities. A minimum depth of 100 mm of topsoil shall be applied from stockpiles of previously stripped areas. Excess topsoil is to be placed in disposal areas as directed by the Engineer.

020.6.2 Grassing

Supe phosphate fertiliser shall be uniformly applied at a rate of 250 kg/ha to topsoil areas prior to seed sowing. These areas shall be sown with a seed mixture as follows: Nui or Pacific Ryegrass 70%; White Clover 20%; and Timothy 10%. The mixture shall be sown at a rate of 26 kg/ha.

020.7 QUALITY CONTROL

The Contractor shall appoint an experienced full time earthworks supervisor, whose duties shall include the control of filling operations in accordance with this specification.

The Contractor shall undertake sufficient tests on site to become thoroughly familiar with fill types and behaviour under compaction, and satisfy themselves that the compacted fill meets the specified requirements.

All fill, blinding and drainage material control tests shall be carried out and paid for by the Contractor.

Laboratory testing shall be carried out by a Telarc registered laboratory or their representative for the tests indicated. The results shall be supplied to the Engineer demonstrating compliance with this specification, at no less than every two weeks. Any non-compliance and remedial action taken shall be reported every two weeks. Formal results shall be provided to the Engineer for each monthly progress payment. Up to 10% payment over and above retentions will be withheld if this information is not provided, or is incomplete, accompanying the progress payment application, at the Engineer's discretion. The scope and frequency of testing can only be altered at the instruction of the Engineer.

If requested by the Engineer, testing shall be carried out in the full time presence of the Engineer or his representative.

At any location the Engineer may carry out his own tests at his discretion. If there is any discrepancy the Engineer's results shall prevail.

020.8 TESTING REQUIREMENTS

020.8.1 Compaction Testing

Control tests shall be carried out by the Contractor.

The fill compaction requirements and related tests are defined in the table 5.

Table 5: Quality Assurance Tests

Test	Test Method and/or Test Description
Dam fill proof roll	To be observed by the contractor every lift
Sieve analysis	NZS 4402:1986, Test 2.8.1

The frequency of testing will depend on the consistency of the fill operations and materials. The testing rate will be generally as per table 6 at the commencement of filling.

Table 6: Testing Frequency

Test	Material	Frequency
Proof roll	Dam fill material	Every lift
Sieve Analysis	Dam fill material	1 set from the first lift, and 1 set per 5,000 m^3 thereafter.
	Drainage material	2 sets prior to construction, and 4 sets during construction as directed by the Engineer

The Engineer may reduce or increase the frequency of testing as he judges appropriate, depending on the consistency of the results.

020.9 HDPE LINER INSTALLATION

HDPE shall be minimum of 1.5 mm thickness. HDPE liner specification and installation shall be carried out by a suitably experienced sub-contractor, who will warrant the liner foundation preparation measures as fit for purpose, as well as installation including welding of joints, key trench details etc. The HDPE installation contractor shall provide a complete set of quality assurance documentation regarding final panel layout, weld testing etc.

The engineer is to approve material for use prior to construction and installation.

An indicative pipe boot penetration detail is included in the RILEY drawings, however the contractor shall provide their recommended installation detail for use with the proposed liner products and fixing systems. The pipe penetration detail and installation methodology shall be submitted for approval by the Engineer prior to commencement of lining of the reservoir.

030 PIPEWORK AND DRAINAGE

030.1 SCOPE

This section covers the installation of pipework including:

- Reservoir outlet pipe
- Drainage outlet pipe
- Drainage pipe work

030.2 Standard Specifications

The following standard specifications shall apply except where modified by this specification:

TNZ F/2 Pipe Subsoil Drain Construction,
AS/NZS2566.2 Buried Flexible Pipelines Part 2: Installation
AS/NZS4130 PE Pipes for Pressure Applications,
AS/NZS4131 PE Compounds for Pressure Pipes and Fittings.

030.3 Inspections and Approvals

The following shall be inspected and approved by the Engineer:

- bedding level for main drainage and reservoir outlet pipes
- subsurface drain pipe placement.

030.4 Materials

030.5 Subsoil and liner foundation Drain Pipes

Subsoil drain pipes shall be heavy duty perforated pipe complying with Transit Specification F/2. The perforations shall comply with the details shown on the drawings.

030.6 Drainage and Reservoir Outlet Pipes

Where shown on the drawings these pipes shall be PE100 pipe with nominal pressure ratings as indicated.

030.7 Bedding of Pipes

The bedding shall be constructed as shown on the drawings. The bedding, where the pipe joints are located, shall be recessed as necessary to ensure that the whole barrel length of the pipe makes uniform contact with the prepared bedding. No pipelaying shall be commenced until the foundation has been inspected and approved by the Engineer.

030.8 PIPE INSTALLATION

030.8.1 Outlet and Dam Toe Drainage Pipe

PE pipes shall be joined using the electro-fusion method. To ensure the full strength of the pipe is achieved and the welds are of a consistent quality and welders must be properly trained and certified. The power supply used for the fusion couplers shall be of a high quality and have the capability of readily fusing pipes of the specified diameter and wall thickness.

The Contractor shall ensure the pipe ends, particularly the internal diameters are accurately matched prior to electro-fusion welding. Pipes with internal diameters differing by more than 3.00mm shall not be joined. Any pipe revealing significant out of roundness along any of its length shall not be incorporated in the works.