5 May 2019

Waitomo District Council
PO Box 404
Te Kuiti 3941

Our ref:1250/7667//MDC Admin Building ISA Letter

Attention: Quin Powell

Dear Quin,

Initial Seismic Assessment of Waitomo District Council Administration Building

We have now completed a review and update of the Initial Seismic Assessment (ISA) of the Waitomo District Council Administration building using the Initial Evaluation Procedure (IEP). The assessment was carried out after reviewing all the provided documents noted below in the basis of assessment.

Executive Summary

The two portions of the building attained the following percentage new building standard in the two principal directions:

Timber Structure – Single Storey

Transverse: 100%NBS.

Longitudinal: 100%NBS

Hence the building is unlikely to be an earthquake risk or earthquake prone.

Blockwall Structure – Tow Storey

Transverse: 45%NBS.

Longitudinal: 92%NBS

Hence the building is classed as potentially Earthquake Risk.

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building's performance.

Introduction

This Initial Seismic Assessment has been based on the IEP as defined by the NZSEE Guidelines

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Background to the IEP and Its Limitations

The IEP procedure was developed in 2006 by the New Zealand Society for Earthquake Engineering (NZSEE) and updated in 2013 to reflect experience with its application and as a result of experience in the Canterbury earthquakes. It is a tool to assign a percentage of New Building Standard (*%NBS*) score an associated grade to a building as part of an initial seismic assessment of existing buildings.

The IEP enables territorial authorities, building owners and managers to review their building stock as part of an overall risk management process.

Characteristics and limitations of the IEP include:

- It tends to be somewhat conservative, identifying some buildings as earthquake prone, or having a lower *%NBS* score, which subsequent detailed investigation may indicate is less than actual performance. However, there will be exceptions, particularly when critical structural weaknesses (CSWs) are present that have not been recognised from the level of investigation employed.
- It can be undertaken with variable levels of available information, eg exterior only inspection, structural drawings available or not, interior inspection, etc. The more information available the more representative the IEP result is likely to be. The IEP records the information that has formed the basis of the assessment and consideration of this is important when determining the likely reliability of the result.
- It is an initial, first-stage review. Buildings or specific issues which the IEP process flags as being problematic or as potentially critical structural weaknesses, need further detailed investigation and evaluation. A Detailed Seismic Assessment is recommended if the seismic status of a building is critical to any decision making.
- The IEP assumes that the buildings have been designed and built in accordance with the building standard and good practice current at the time. In some instances, a building may include design features ahead of its time - leading to better than predicted performance. Conversely, some unidentified design or construction issues not picked up by the IEP process may result in the building performing not as well as predicted.
- It is a largely qualitative process, and should be undertaken or overseen by an experienced engineer. It involves considerable knowledge of the earthquake behaviour of buildings, and judgement as to key attributes and their effect on building performance. Consequently, it is possible that the *%NBS* derived for a building by independent experienced engineers may differ.
- An IEP may over-penalise some apparently critical features which could have been satisfactorily taken into account in the design.
- An IEP does not take into account the seismic performance of non-structural items such as ceiling, plant, services or glazing.

Experience to date is that the IEP is a useful tool to identify potential issues and expected overall performance of a building in an earthquake. However, the process and the associated *%NBS* and grade should be considered as only indicative of the building's compliance with current code requirements. A detailed investigation and analysis of the building will typically be required to provide a definitive assessment.

Basis for the Assessment

The information we have used for our IEP assessment includes:

- Previous IEP report done by DMC Ltd;
- Partial building structural drawings as made available, and;
- Geotechnical Assessment provided by Mark Mitchell, which considers the site soil to be soil class C.
- No site inspection nor destructive testing.

Waitomo District Council Administration Building

Building Description

This building is located at Queen Street, Te Kuiti. It is a mix of single storey timber structure with slab on grade and two storey reinforced retaining block wall and timber floor with slab on grade. The building was designed in 1985. The primary lateral load resisting mechanism for the single storey portion for both directions is by timber framed walls. The primary lateral load resisting mechanism for the two storey portion for both directions is by timber framed walls, upper level, and a combination of block walls and timber framed walls at lower level.

IEP Assessment Results

Our IEP assessment of the single storey part of building indicates the building can achieve 100*%NBS* in the longitudinal direction and 100*%NBS* in the transverse direction with soil class C. This is in comparison with 80*%NBS longitudinal* and 80*%NBS* transverse with soil class D, as previously assumed in DCM Ltd assessment. The initial seismic assessment of this part of building therefore indicates a seismic performance rating of 100*%NBS*, corresponding to a 'Grade A' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is above the threshold for earthquake prone buildings (34*%NBS*) and the threshold for earthquake risk buildings (67*%NBS*) as recommended by the NZSEE.

Our IEP assessment of the two storey part of building indicates the building can achieve 92*%NBS* in the longitudinal direction and 45*%NBS* in the transverse direction with soil class C. This is in comparison with 85*%NBS longitudinal* and 35*%NBS* transverse with soil class D, as previously assumed in DCM Ltd assessment. The initial seismic assessment of this part of building therefore indicates a seismic performance rating of 45*%NBS*, corresponding to a 'Grade C' building as defined by the New Zealand Society for Earthquake Engineering (NZSEE) building grading scheme. This is above the threshold for earthquake prone buildings (34*%NBS*) but is below the threshold for earthquake risk buildings (67*%NBS*) as recommended by the NZSEE.

Discussion

Our initial seismic assessment concluded that the Administration Building is 45%NBS. A DSA is recommended to investigate and accurately quantify the effects of the plan irregularities observed in the building. This seismic performance rating is considered conservative as there is evidence that the plan

irregularities were taken into account during design. A further assessment will provide a more accurate representation of the buildings performance with respect to the current standards. Prior to further assessment (DSA) intrusive investigations to determine the configuration of reinforcement at typical beam column joints should be carried out.

IEP Grades and Relative Risk

Table 1 taken from the NZSEE Guidelines provides the basis of a proposed grading system for existing buildings, as one way of interpreting the *%NBS* building score. It can be seen that occupants in Earthquake Prone buildings (less than 34*%NBS*) are exposed to more than 10 times the risk that they would be in a similar new building. For buildings that are potentially Earthquake Risk (less than 67*%NBS*), but not Earthquake Prone, the risk is at least 5 times greater than that of an equivalent new building. Broad descriptions of the life-safety risk can be assigned to the building grades as shown in Table 1.

Table 1: Relative Earthquake Risk

Building Grade	Percentage of New Building Strength (*%NBS*)	Approx. Risk Relative to a New Building	Life-safety Risk Description
A+	>100	<1	low risk
A	80 to 100	1 to 2 times	low risk
B	67 to 79	2 to 5 times	low or medium risk
C	34 to 66	5 to 10 times	medium risk
D	20 to 33	10 to 25 times	high risk
E	<20	more than 25 times	very high risk

The single storey part of building has been classified by the ISA as a Grade A building which is considered low risk, while the two storey part of building has been classified as Grade C which is considered medium risk. The New Zealand Society for Earthquake Engineering (which provides authoritative advice to the legislation makers, and should be considered to represent the consensus view of New Zealand structural engineers) classifies buildings achieving greater than 67*%NBS* as “Low or Medium Risk”, and recommends strengthening to at least 67*%NBS*.

Seismic Restraint of Non-Structural Items

During an earthquake, the safety of people can be put at risk due to non-structural items falling on them. These items should be adequately seismically restrained, where possible, to the NZS 4219:2009 “The Seismic Performance of Engineering Systems in Buildings”.

An assessment has not been made of the services and plant. We have also not checked whether tall or heavy furniture has been seismically restrained or not. These issues are outside the scope of this initial assessment however, for this predominantly empty building this is seen as low risk.

Conclusion

Our ISA assessment for this building, carried out using the IEP indicates overall scores of the buildings are as follows;

- Two Storey and overall Building – 45*%NBS* (corresponds to a Grade C building, as defined by the NZSEE building grading scheme.)
- Single Storey – 100*%NBS* (corresponds to a Grade A building, as defined by the NZSEE building grading scheme.)

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building's performance.

We trust this letter and initial seismic assessment meets your current requirements. We would be pleased to discuss further with you any issues raised in this report.

Please do not hesitate to contact me if you would like clarification of any aspect of this letter.

Yours sincerely

Hannah Blythe
Service Group Manager – Structures, Auckland
09 370 8129

Inc. IEP Assessment – Two Storey Building Portion
IEP Assessment – Single Storey Building Portion

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 1

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in the "The Seismic Assessment of Existing Buildings" Technical Guidelines for Engineering Assessments, July 2017. This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Two-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

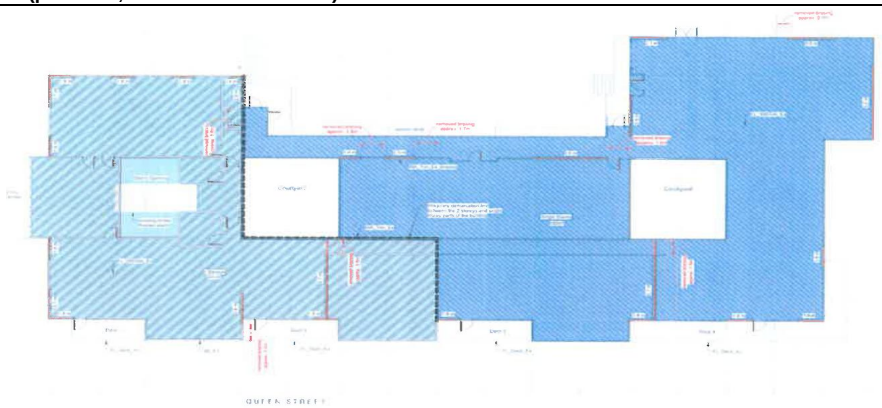
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



NOTE: THERE ARE MORE SKETCHES ON PAGE 1a ATTACHED

1.3 List relevant features (Note: only 10 lines of text will print in this box. If further text required use Page 1a)

The building was designed by Ministry of Works and Development in 1985. It consists of 2 levels of approximate 40% of total floor area at the front. The remaining area is single storey at the rear. The building is generally constructed of timber framed walls, weather board exterior, gib-board interior and timber flooring. Gib board ceilings with timber trusses supporting the iron roof over plywood sheeting.
At the 2 storey portion, soils are retained by the reinforced block work and the ground floor is a slab on grade.
The lateral stability is provided by plywood bracing panels from upper floor to the roof. A combination of plywood bracing panels and reinforced block foundation walls are provided at the perimeter and under the upper floor.
As a result of the Soil Investigation Report prepared by Mark T Mitchell Ltd on 5 October 2017, the building is found to be sitting on the subsoil class C, shallow soil.

1.4 Note information sources Tick as appropriate

Visual Inspection of Exterior	☐	**Specifications**	☐
Visual Inspection of Interior	☐	**Geotechnical Reports**	☑
Drawings (note type)	☑	**Other (list)**	☑

Reference: Seismic Assessment Report prepared by Design Management Consultants Ltd. issued on 20 July 2017

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 2

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Table IEP-2 Initial Evaluation Procedure Step 2

Step 2 - Determination of *(%NBS)*$_b$

(Baseline *(%NBS)* for particular building - refer Section B5)

2.1 Determine nominal *(%NBS)* = *(%NBS)*$_{nom}$

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	○	○
1935-1965	○	○
1965-1976	○	○
1976-1984	○	○
1984-1992	◉	◉
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	**Not applicable**	**Not applicable**
Seismic Zone:	Zone B	Zone B
c) Soil Type		
From NZS1170.5:2004, Cl 3.1.3 :	C Shallow Soil	C Shallow Soil
From NZS4203:1992, Cl 4.6.2.2 : (for 1992 to 2004 and only if known)	**Not applicable**	**Not applicable**
d) Estimate Period, *T*		
Comment: It is mixed of masonry wall and timber framed wall.	h_n = 6.1	6.1 m
	A_c = 1.00	1.00 m^2
Moment Resisting Concrete Frames: $T = \max\{0.09h_n^{0.75}, 0.4\}$	○	○
Moment Resisting Steel Frames: $T = \max\{0.14h_n^{0.75}, 0.4\}$	○	○
Eccentrically Braced Steel Frames: $T = \max\{0.08h_n^{0.75}, 0.4\}$	○	○
All Other Frame Structures: $T = \max\{0.06h_n^{0.75}, 0.4\}$	○	○
Concrete Shear Walls $T = \max\{0.09h_n^{0.75}/A_c^{0.5}, 0.4\}$	○	○
Masonry Shear Walls: $T \leq 0.4$sec	◉	◉
User Defined (input Period):	○	○
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.40	0.40
e) Factor A: Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)	**Factor A:** 1.00	1.00
f) Factor B: Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above	**Factor B:** 0.21	0.21
g) Factor C: For reinforced concrete buildings designed between 1976-84 Factor C = 1.2, otherwise take as 1.0.	**Factor C:** 1.00	1.00
h) Factor D: For buildings designed prior to 1935 Factor D = 0.8 except for Wellington and Napier (1931-1935) where Factor D may be taken as 1.0, otherwise take as 1.0.	**Factor D:** 1.00	1.00
***(%NBS)*$_{nom}$ = AxBxCxD**	***(%NBS)*$_{nom}$** 21%	21%

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Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 3

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Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

If $T \leq 1.5$sec, Factor E = 1

		Longitudinal	Transverse
a) Near Fault Factor, *N(T,D)* (from NZS1170.5:2004, Cl 3.1.6)	**N(T,D):**	1	1
b) Factor E = 1/N(T,D)	**Factor E:**	1.00	1.00

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Te Kuiti — **Refer right for user-defined locations**

Z =	0.18	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.725	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.18	(from NZS1170.5:2004, Table 3.3)

b) Factor F

For pre 1992	=	$1/Z$
For 1992-2011	=	Z_{1992}/Z
For post 2011	=	Z_{2004}/Z

	Longitudinal	Transverse
Factor F:	5.56	5.56

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o (set to 1.0 if other than 1976-2004, or not known)

	Longitudinal	Transverse
	Category 4	Category 4
R_o =	1	1

c) Return Period Factor, R (from NZS1170.0:2004 Building Importance Level)

Choose Importance Level: ○ 1 ○ 2 ○ 3 ◉ 4 (Longitudinal) ○ 1 ○ 2 ○ 3 ◉ 4 (Transverse)

	Longitudinal	Transverse
R =	1.8	1.8

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	0.56	0.56

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:
Reinforced block walls combined with ply bracing pannels. The ductility of the weaker ply bracing has been used into the assessment.

	Longitudinal	Transverse
μ =	2.00	2.00

b) Factor H

		k_μ (Longitudinal)	k_μ (Transverse)
For pre 1976 (maximum of 2)	=	1.57	1.57
For 1976 onwards	=	1	1
Factor H:		1.00	1.00

(where kμ is NZS1170.5:2004 Inelastic Spectrum Scaling Factor, from accompanying Table 3.3)

2.6 Structural Performance Scaling Factor, Factor I

a) Structural Performance Factor, S_p (from accompanying Figure 3.4)

Tick if light timber-framed construction in this direction: ☐ (Longitudinal) ☐ (Transverse)

	Longitudinal	Transverse
S_p =	0.70	0.70

b) Structural Performance Scaling Factor = $1/S_p$

	Longitudinal	Transverse
Factor I:	1.43	1.43

Note Factor B values for 1992 to 2004 have been multiplied by 0.67 to account for Sp in this period

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$

(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

	Longitudinal	Transverse
	92%	**92%**

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Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs — **Effect on Structural Performance (Choose a value - Do not interpolate)** — **Factors**

3.1 Plan Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor A** 1.0

No plan irregularity

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor B** 1.0

No vertical irregularity

3.3 Short Columns

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor C** 1.0

No short column present

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

Note:
Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Floor align each other

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	○ 0.4	○ 0.7	○ 1
Height Difference 2 to 4 Storeys	○ 0.7	○ 0.9	◉ 1
Height Difference < 2 Storeys	○ 1	○ 1	○ 1

No adjacent building and no different height

Factor D 1.0

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor E** 1.0

No significant threat

3.6 Other Factors - *for allowance of all other relevant characterstics of the building*

For ≤ 3 storeys - Maximum value 2.5
otherwise - Maximum value 1.5.
No minimum.

Factor F 1.2

Record rationale for choice of Factor F:

Building well documented with good detailing by MOW.

3.7 Performance Achievement Ratio (PAR)
(equals **A x B x C x D x E x F**)

PAR

Longitudinal **1.20**

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Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council

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Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

b) Transverse Direction

potential CSWs — **Effect on Structural Performance** (Choose a value - Do not interpolate) — **Factors**

3.1 Plan Irregularity

Effect on Structural Performance ◉ Severe ○ Significant ○ Insignificant — **Factor A** 0.4

The plan is irregular in high ratio aspect

3.2 Vertical Irregularity

Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant — **Factor B** 1.0

No significant vertical irregularity

3.3 Short Columns

Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant — **Factor C** 1.0

No short column present

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

Note:
Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Floors are aligned each other

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	○ 0.4	○ 0.7	○ 1
Height Difference 2 to 4 Storeys	○ 0.7	○ 0.9	◉ 1
Height Difference < 2 Storeys	○ 1	○ 1	○ 1

No adjacent building and no different height

Factor D 1.0

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant — **Factor E** 1.0

No significant threat

3.6 Other Factors - *for allowance of all other relevant characterstics of the building*

For ≤ 3 storeys - Maximum value 2.5
otherwise - Maximum value 1.5.
No minimum.

Factor F 1.20

Record rationale for choice of Factor F:

Building well documented with good detailing by MOW. Disparity of centre of mass and centre of rigidity along with increased shear forces in diaphragm around stair floor opening is accounted for in plan irregularity factor A above.

3.7 Performance Achievement Ratio (PAR)
(equals **A x B x C x D x E x F**)

PAR

Transverse **0.48**

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Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

Step 4 - Percentage of New Building Standard *(%NBS)*

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	**92%**	**92%**
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	**1.20**	**0.48**
4.3	**PAR x Baseline *(%NBS)*$_b$**	**>100%**	**45%**
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		**45%**

Step 5 - Is *%NBS* < 34? **NO**

Step 6 - Potentially Earthquake Risk (is *%NBS* < 67)? **YES**

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade **C**

Additional Comments (items of note affecting IEP based seismic rating)

The building is Grade C due to the irregular plan which shows the center of rigidity is away of the center of mass. That would create the torsional effects to the building.

Relationship between Grade and *%NBS*:

Grade:	A+	A	B	C	D	E
%NBS:	> 100	100 to 80	79 to 67	66 to 34	< 34 to 20	< 20

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 7

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Table IEP-5 Initial Evaluation Procedure Step 8

Step 8 - Identification of potential Severe Structural Weaknesses (SSWs) that could result in significant risk to a significant number of occupants

8.1	Number of storeys above ground level	2
8.2	Presence of heavy concrete floors and/or concrete roof? (Y/N)	N

Potential Severe Structural Weaknesses (SSWs):

Note: Options that are greyed out are not applicable and need not be considered.

Occupancy not considered to be significant - no further consideration required

Risk not considered to be significant - no further consideration required

The following potential Severe Structural Weaknesses (SSWs) have been identified in the building that could result in significant risk to a significant number of occupants:

1. None identified
2. Weak or soft storey (except top storey)
3. Brittle columns and/or beam-column joints the deformations of which are not constrained by other structural elements
4. Flat slab buildings with lateral capacity reliant on low ductility slab-to-column connections
5. No identifiable connection between primary structure and diaphragms
6. Ledge and gap stairs

IEP Assessment Confirmed by  **Signature**

Edison Luo **Name**

1017182 **CPEng. No**

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 1a

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Two-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

Table IEP-1a Additional Photos and Sketches

Add any additional photographs, notes or sketches required below:

Note: print this page separately

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 1

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Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Single-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

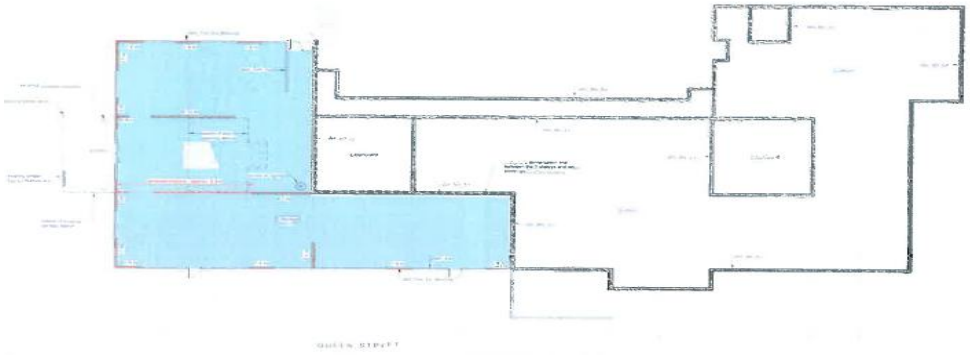
Table IEP-1 Initial Evaluation Procedure Step 1

Step 1 - General Information

1.1 Photos (attach sufficient to describe building)

NOTE: THERE ARE MORE PHOTOS ON PAGE 1a ATTACHED

1.2 Sketches (plans etc, show items of interest)



NOTE: THERE ARE MORE SKETCHES ON PAGE 1a ATTACHED

1.3 List relevant features (Note: only 10 lines of text will print in this box. If further text required use Page 1a)

The building was designed by Ministry of Works and Development in 1985. It consists of 2 levels of approximate 40% of total floor area at the front (in blue). The remaining area is single storey at the rear (in white).
The single level building is generally the timber framed walls, weather board exterior, gib-board interior and timber flooring. Gib board ceilings with timber trusses supporting the iron roof over plywood sheeting.
The lateral stability is provided by plywood bracing panels.
As a result of the Soil Investigation Report prepared by Mark T Mitchell Ltd on 5 October 2017, the building is found to be sitting on subsoil class C, shallow soil.

1.4 Note information sources Tick as appropriate

Visual Inspection of Exterior	☐	**Specifications**	☐
Visual Inspection of Interior	☐	**Geotechnical Reports**	☑
Drawings (note type)	☑	**Other (list)**	☑

Reference: Seismic Assessment Report prepared by Design Management Consultants Ltd. issued on 20 July 2017

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 2

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Single-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

Table IEP-2 Initial Evaluation Procedure Step 2

Step 2 - Determination of *(%NBS)*$_b$

(Baseline *(%NBS)* for particular building - refer Section B5)

2.1 Determine nominal *(%NBS)* = *(%NBS)*$_{nom}$

	Longitudinal	Transverse
a) Building Strengthening Data		
Tick if building is known to have been strengthened in this direction	☐	☐
If strengthened, enter percentage of code the building has been strengthened to	N/A	N/A
b) Year of Design/Strengthening, Building Type and Seismic Zone		
Pre 1935	○	○
1935-1965	○	○
1965-1976	○	○
1976-1984	○	○
1984-1992	◉	◉
1992-2004	○	○
2004-2011	○	○
Post Aug 2011	○	○
Building Type:	**Not applicable**	**Not applicable**
Seismic Zone:	Zone B	Zone B
c) Soil Type		
From NZS1170.5:2004, Cl 3.1.3 :	C Shallow Soil	C Shallow Soil
From NZS4203:1992, Cl 4.6.2.2 : (for 1992 to 2004 and only if known)	**Not applicable**	**Not applicable**
d) Estimate Period, *T*		
Comment: The ply bracing panels act in a duclitity manner and increase the building period	h_n = 2.85	2.85 m
	A_c = 1.00	1.00 m^2
Moment Resisting Concrete Frames: $T = \max\{0.09h_n^{0.75}, 0.4\}$	○	○
Moment Resisting Steel Frames: $T = \max\{0.14h_n^{0.75}, 0.4\}$	○	○
Eccentrically Braced Steel Frames: $T = \max\{0.08h_n^{0.75}, 0.4\}$	○	○
All Other Frame Structures: $T = \max\{0.06h_n^{0.75}, 0.4\}$	○	○
Concrete Shear Walls $T = \max\{0.09h_n^{0.75}/A_c^{0.5}, 0.4\}$	○	○
Masonry Shear Walls: $T \leq 0.4$sec	○	○
User Defined (input Period):	◉	◉
Where h_n = height in metres from the base of the structure to the uppermost seismic weight or mass.	**T:** 0.40	0.40
e) Factor A: Strengthening factor determined using result from (a) above (set to 1.0 if not strengthened)	**Factor A:** 1.00	1.00
f) Factor B: Determined from NZSEE Guidelines Figure 3A.1 using results (a) to (e) above	**Factor B:** 0.21	0.21
g) Factor C: For reinforced concrete buildings designed between 1976-84 Factor C = 1.2, otherwise take as 1.0.	**Factor C:** 1.00	1.00
h) Factor D: For buildings designed prior to 1935 Factor D = 0.8 except for Wellington and Napier (1931-1935) where Factor D may be taken as 1.0, otherwise take as 1.0.	**Factor D:** 1.00	1.00
***(%NBS)*$_{nom}$ = AxBxCxD**	***(%NBS)*$_{nom}$** 21%	21%

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Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 3

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Single-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

Table IEP-2 Initial Evaluation Procedure Step 2 continued

2.2 Near Fault Scaling Factor, Factor E

If $T \leq 1.5$sec, Factor E = 1

		Longitudinal	Transverse
a) Near Fault Factor, *N(T,D)* (from NZS1170.5:2004, Cl 3.1.6)	**N(T,D):**	1	1
b) Factor E = 1/N(T,D)	**Factor E:**	1.00	1.00

2.3 Hazard Scaling Factor, Factor F

a) Hazard Factor, *Z*, for site

Location: Te Kuiti **Refer right for user-defined locations**

Z =	0.18	(from NZS1170.5:2004, Table 3.3)
Z_{1992} =	0.725	(NZS4203:1992 Zone Factor from accompanying Figure 3.5(b))
Z_{2004} =	0.18	(from NZS1170.5:2004, Table 3.3)

b) Factor F

For pre 1992	=	$1/Z$
For 1992-2011	=	Z_{1992}/Z
For post 2011	=	Z_{2004}/Z

	Longitudinal	Transverse
Factor F:	5.56	5.56

2.4 Return Period Scaling Factor, Factor G

a) Design Importance Level, I

(Set to 1 if not known. For buildings designed prior to 1965 and known to be designed as a public building set to 1.25. For buildings designed 1965-1976 and known to be designed as a public building set to 1.33 for Zone A or 1.2 for Zone B. For 1976-1984 set I value.)

	Longitudinal	Transverse
I =	1	1

b) Design Risk Factor, R_o (set to 1.0 if other than 1976-2004, or not known)

	Longitudinal	Transverse
	Category 4	Category 4
R_o =	1	1

c) Return Period Factor, R (from NZS1170.0:2004 Building Importance Level)

Choose Importance Level ○ 1 ○ 2 ○ 3 ◉ 4 ○ 1 ○ 2 ○ 3 ◉ 4

	Longitudinal	Transverse
R =	1.8	1.8

d) Factor G = IR_o/R

	Longitudinal	Transverse
Factor G:	0.56	0.56

2.5 Ductility Scaling Factor, Factor H

a) Available Displacement Ductility Within Existing Structure

Comment:
Timber framed walls.

	Longitudinal	Transverse
μ =	2.00	2.00

b) Factor H

		k_μ	k_μ
For pre 1976 (maximum of 2)	=	1.57	1.57
For 1976 onwards	=	1	1
Factor H:		1.00	1.00

(where kμ is NZS1170.5:2004 Inelastic Spectrum Scaling Factor, from accompanying Table 3.3)

2.6 Structural Performance Scaling Factor, Factor I

a) Structural Performance Factor, S_p (from accompanying Figure 3.4)

Tick if light timber-framed construction in this direction ☐ ☐

	Longitudinal	Transverse
S_p =	0.70	0.70

b) Structural Performance Scaling Factor = $1/S_p$

	Longitudinal	Transverse
Factor I:	1.43	1.43

Note Factor B values for 1992 to 2004 have been multiplied by 0.67 to account for Sp in this period

2.7 Baseline *%NBS* for Building, $(\%NBS)_b$

(equals $(\%NBS)_{nom}$ x E x F x G x H x I)

	Longitudinal	Transverse
	92%	**92%**

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Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
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Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)

(Refer Appendix B - Section B3.2)

a) Longitudinal Direction

potential CSWs — **Effect on Structural Performance (Choose a value - Do not interpolate)** — **Factors**

3.1 Plan Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor A** 1.0

Uniform distributed walls and ply bracing wall panels

3.2 Vertical Irregularity

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor B** 1.0

No vertical irregularity

3.3 Short Columns

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor C** 1.0

No short column present

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

Note:
Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

Factor D1 For Longitudinal Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Floor align each other

b) Factor D2: - Height Difference Effect

Factor D2 For Longitudinal Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	○ 0.4	○ 0.7	○ 1
Height Difference 2 to 4 Storeys	○ 0.7	○ 0.9	○ 1
Height Difference < 2 Storeys	○ 1	○ 1	◉ 1

No adjacent building and no different height

Factor D 1.0

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

Effect on Structural Performance ○ *Severe* ○ *Significant* ◉ *Insignificant* **Factor E** 1.0

No significant threat

3.6 Other Factors - *for allowance of all other relevant characterstics of the building*

For ≤ 3 storeys - Maximum value 2.5
otherwise - Maximum value 1.5.
No minimum.

Factor F 1.1

Record rationale for choice of Factor F:

Building well documented with good detailling designed by MOW. Light-weight roofing and light-weight cladding have been considered.

3.7 Performance Achievement Ratio (PAR)
(equals **A x B x C x D x E x F**)

PAR

Longitudinal **1.10**

WARNING!! *This initial evaluation has been carried out solely as an initial seismic assessment of the building following the procedure set out in "The Seismic Assessment of Existing Buildings" Technical Guidelines for Engineering Assessments, July 2017. This spreadsheet must be read in conjunction with the limitations set out in the accompanying report, and should not be relied on by any party for any other purpose. Detailed inspections and engineering calculations, or engineering judgements based on them, have not been undertaken, and these may lead to a different result or seismic grade.*

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 5

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Single-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

Table IEP-3 Initial Evaluation Procedure Step 3

Step 3 - Assessment of Performance Achievement Ratio (PAR)
(Refer Appendix B - Section B3.2)

b) Transverse Direction

potential CSWs — **Effect on Structural Performance** (Choose a value - Do not interpolate) — **Factors**

3.1 Plan Irregularity

Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant — **Factor A** 1.0

No significant plan irregularity

3.2 Vertical Irregularity

Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant — **Factor B** 1.0

No significant vertical irregularity

3.3 Short Columns

Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant — **Factor C** 1.0

No short column present

3.4 Pounding Potential

(Estimate D1 and D2 and set D = the lower of the two, or 1.0 if no potential for pounding, or consequences are considered to be minimal)

a) Factor D1: - Pounding Effect

Note:
Values given assume the building has a frame structure. For stiff buildings (eg shear walls), the effect of pounding may be reduced by taking the coefficient to the right of the value applicable to frame buildings.

Factor D1 For Transverse Direction: 1.0

Table for Selection of Factor D1	Severe	Significant	Insignificant
Separation	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Alignment of Floors within 20% of Storey Height	○ 1	○ 1	◉ 1
Alignment of Floors not within 20% of Storey Height	○ 0.4	○ 0.7	○ 0.8

Floors are aligned each other

b) Factor D2: - Height Difference Effect

Factor D2 For Transverse Direction: 1.0

Table for Selection of Factor D2	Severe	Significant	Insignificant
	0<Sep<.005H	.005<Sep<.01H	Sep>.01H
Height Difference > 4 Storeys	○ 0.4	○ 0.7	○ 1
Height Difference 2 to 4 Storeys	○ 0.7	○ 0.9	○ 1
Height Difference < 2 Storeys	○ 1	○ 1	◉ 1

No adjacent building and no different height

Factor D 1.0

3.5 Site Characteristics - *Stability, landslide threat, liquefaction etc as it affects the structural performance from a life-safety perspective*

Effect on Structural Performance ○ Severe ○ Significant ◉ Insignificant — **Factor E** 1.0

No significant threat

3.6 Other Factors - *for allowance of all other relevant characterstics of the building*

For ≤ 3 storeys - Maximum value 2.5
otherwise - Maximum value 1.5.
No minimum.

Factor F 1.10

Record rationale for choice of Factor F:

Building well documented with good detailling designed by MOW. Light-weight roofing and light-weight cladding have been considered.

3.7 Performance Achievement Ratio (PAR)
(equals **A x B x C x D x E x F**)

PAR

Transverse **1.10**

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Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Single-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

Table IEP-4 Initial Evaluation Procedure Steps 4, 5, 6 and 7

Step 4 - Percentage of New Building Standard *(%NBS)*

		Longitudinal	Transverse
4.1	**Assessed Baseline *%NBS (%NBS)*$_b$** (from Table IEP - 1)	**92%**	**92%**
4.2	**Performance Achievement Ratio (PAR)** (from Table IEP - 2)	**1.10**	**1.10**
4.3	**PAR x Baseline *(%NBS)*$_b$**	**100%**	**100%**
4.4	**Percentage New Building Standard *(%NBS)* - Seismic Rating** (Use lower of two values from Step 4.3)		**100%**

Step 5 - Is *%NBS* < 34? **NO**

Step 6 - Potentially Earthquake Risk (is *%NBS* < 67)? **NO**

Step 7 - Provisional Grading for Seismic Risk based on IEP

Seismic Grade **A**

Additional Comments (items of note affecting IEP based seismic rating)

The building is adequate and statisfies the initial evaluation assessment.

Relationship between Grade and *%NBS*:

Grade:	A+	A	B	C	D	E
%NBS:	> 100	100 to 80	79 to 67	66 to 34	< 34 to 20	< 20

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 7

Street Number & Name:	Queen Streeet	Job No.:	12507667
AKA:	Single-Storey Building Portion	By:	PL
Name of building:	Waitomo District Council Administration Building	Date:	1/05/2019
City:	Te Kuiti	Revision No.:	0

Table IEP-5 Initial Evaluation Procedure Step 8

Step 8 - Identification of potential Severe Structural Weaknesses (SSWs) that could result in significant risk to a significant number of occupants

8.1	Number of storeys above ground level	1
8.2	Presence of heavy concrete floors and/or concrete roof? (Y/N)	N

Potential Severe Structural Weaknesses (SSWs):

Note: Options that are greyed out are not applicable and need not be considered.

Occupancy not considered to be significant - no further consideration required

Risk not considered to be significant - no further consideration required

The following potential Severe Structural Weaknesses (SSWs) have been identified in the building that could result in significant risk to a significant number of occupants:

1. None identified
2. Weak or soft storey (except top storey)
3. Brittle columns and/or beam-column joints the deformations of which are not constrained by other structural elements
4. Flat slab buildings with lateral capacity reliant on low ductility slab-to-column connections
5. No identifiable connection between primary structure and diaphragms
6. Ledge and gap stairs

IEP Assessment Confirmed by  **Signature**

Edison Luo **Name**

1017182 **CPEng. No**

Initial Evaluation Procedure (IEP) Assessment - Completed for Waitomo District Council Page 1a

Street Number & Name:	**Queen Streeet**	**Job No.:**	**12507667**
AKA:	**Single-Storey Building Portion**	**By:**	**PL**
Name of building:	**Waitomo District Council Administration Building**	**Date:**	**1/05/2019**
City:	**Te Kuiti**	**Revision No.:**	**0**

Table IEP-1a Additional Photos and Sketches

Add any additional photographs, notes or sketches required below:

Note: print this page separately