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Job No: 19-021

25 February 2019

Silverfin
Level 12, AIG Building
41 Shortland St
Auckland 1010

Attention: Miles Brown

Dear Miles,

Re: Initial Seismic Assessment Report – Inghams Enterprises (NZ) Pty Ltd: Te Aroha Processing Plant.

We have now completed an Initial Seismic Assessment (ISA) of buildings at Inghams Processing Plant near Te Aroha using the Initial Evaluation Procedure (IEP) and in accordance with the latest NZSEE Guidelines for Seismic Assessment of Buildings published in July 2017. The assessment was carried out by doing a full review of the previous ISA undertaken in 2014, and then verified by using the information obtained from completing a site visit and visual inspection of the buildings in 2014 as well as a recent inspection by the client confirming no major changes or alterations have been made since 2014. Note that the buildings have largely been constructed during two major site redevelopments, both of which have been relatively recent and fall within one age grouping within the IEP system. For this reason it was decided to complete the IEP assessment on the basis of building system rather than repeat the process for each individual structure. Two main systems are present, steel portal frames and concrete shear wall.

1 Executive Summary

Our ISA assessment for the buildings, carried out using the IEP for Importance Level 2 (IL2), indicates an overall potential seismic rating of 95%NBS for the steel portal framed buildings and 100%NBS for the precast concrete shear wall buildings (percentage of new building standard) and are therefore considered Grade A buildings, as defined by the NZSEE building grading scheme. None of the buildings are considered as earthquake prone.

Table 1: IEP Assessment Results

Building	%NBS	Grade	Potentially Earthquake Prone?
Portal Framed Buildings	95	A	No
Shear Wall Buildings	110	A+	No

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building's performance. Where continued use of the building is required, a more reliable result will be obtained from a Detailed Seismic Assessment (DSA). A DSA could find critical structural weaknesses (CSWs) not identified from the IEP, or that identified CSWs have been addressed in the design of the building.

2 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 2017 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 and 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:

- An IEP assessment is primarily concerned with life safety. It does not consider the susceptibility of the building to damage, and therefore to economic losses.
- It tends to be somewhat conservative, identifying some buildings as earthquake prone, or having a lower grading, 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, e.g. 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 grade 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 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.

The IEP has been based on a review of drawings and an inspection of both the interior and exterior of the building and can be considered to be a comprehensive assessment at the ISA level.

The rating determined is greater than 35%NBS and therefore, if ratified by the TA, the building should not be considered as earthquake prone.

3 Basis for the Assessment

The information we have used for our IEP assessment includes:

Full review of previous ISA and IEP carried out by Stiles and Hooker in 2014. Previous site visit, including an interior and exterior inspection, was carried out by a Stiles & Hooker Ltd Structural Engineer on 7 May 2014.

No geotechnical investigations have been carried out.

As-built drawings of the existing buildings and the extensions which have been done during the period 1993 to 2003 and also more recent.

4 Building Description

The buildings are located at the Inghams Processing Plant, 624 Waihekau Road, Ngarua RD, near Te Aroha.

Table 2: Building Descriptions

Building	Construction	Lateral Load Resisting Systems	Relationship to Neighbouring Buildings
Portal Framed Buildings	Rectangular, single storey, structural steel portal frame structures of varying plan dimensions. Typically with pitched roofs to a central ridge line. Metal roof and wall cladding. Foundations of shallow strip and pad type. Design being predominantly in two phases, 1997 and 2003. No significant structures of earlier construction remain.	Portalised structural steel frames, with some trussed and some universal beam rafters, in the transverse direction and cross bracing in the longitudinal direction.	Some free standing, some linked to adjacent structures of similar construction. Ice tower free standing within the processing building, having been built around as the plant has expanded.
Shear Walled buildings.	Rectangular, single and two storey structures of varying plan dimensions, with internal steel frames. Roofs of lightweight construction and cladding. Intermediate floors of concrete and of steel construction are present in part or all of some buildings. Concrete floor slab on grade. Foundations of shallow strip and pad type. Construction at 2003.	Structural steel frames with lateral load resistance via diagonal bracing at roof level and in plane action of the concrete walls.	Free standing structures, with adjacent but structurally independent framed structures.

5 IEP Assessment Results

Each of the buildings were assessed using the IEP as described in Part B of the guideline document, The Seismic Assessment of Existing Buildings, dated July 2017.

For each building the IEP assessment determines the seismic strength (%NBS) in the longitudinal and transverse directions. The minimum %NBS of each direction determines the overall earthquake rating for each building, corresponding to the building grading scheme as defined by the NZSEE.

Buildings with a final %NBS of 33% or less are classified as earthquake prone and the threshold for earthquake risk buildings is less than 67%NBS as recommended by the NZSEE. Table 3 summarises the IEP assessment results.

Table 3: IEP Assessment Results

Building	%NBS	Grade	Potentially Earthquake Prone?
Portal Framed Buildings	95	A	No
Shear Wall Buildings	110	A+	No

The key assumptions made during our assessment of each building are shown in Appendix B. Refer also to the attached IEP assessments.

Note also that the IEP requires consideration of the general site characteristics at the building site. These include stability, landslide threat and liquefaction. In this case the building site is generally flat and level and slope stability is not an issue. Determination of the potential for liquefaction at a site however requires a detailed geotechnical investigation which is considered to be beyond the scope of this assessment.

6 IEP Grades and Relative Risk

Table 4 taken from the NZSEE Guidelines provides the basis of a proposed grading system for existing buildings, as one way of interpreting the %NBS 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 3.

Table 4: 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 to 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

These buildings have been classified by the IEP as a grade A building and are therefore considered to be a low 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 a buildings achieving greater than 67%NBS as “Low Risk”, and having “Acceptable (improvement may be desirable)” building structural performance.

7 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 bracing of the ceilings, in-ceiling ducting, services and plant or contents. We have also not checked whether tall or heavy furniture or equipment has been seismically restrained or not. These issues are outside the scope of this initial assessment but could be the subject of another investigation.

8 Limitations

This Report has been prepared for the sole use of Silverfin. This Report is not intended for use by other parties and no other party should rely on this Report without the prior written consent of Stiles and Hooker Ltd. The opinions expressed by Stiles and Hooker Ltd in this Report are based on the sources of information noted above.

The following limitations apply to this report:

- Stiles and Hooker and its employees and agents are not able to give any warranty or guarantee that all defects, damage, conditions or qualities have been identified.
- Inspections are primarily limited to visible structural components. As such, there will be concealed structural elements that will not be directly inspected.
- The inspections are limited to building structural components only.
- Inspection of building services, pipework, pavement, and fire safety systems is excluded from the scope of this report.
- Inspection of the glazing system, linings, carpets, claddings, finishes, suspended ceilings, partitions, tenant fit-out, or the general water tightness envelope is excluded from the scope of this report.
- Assessment of the lateral load capacity of the building/s is limited to a visual inspection only.
- Assumptions have been made in respect of the geotechnical conditions at the site, including the possibility of liquefaction.
- We have not undertaken any detailed checks of the gravity system, wind load capacity, or foundations.
- Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practising in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report.

9 Conclusion

Our ISA assessment for these buildings, carried out using the IEP indicates indicate that all significant buildings rate at 95% or 110% NBS, which corresponds to a Grade A buildings, as defined by the NZSEE building grading scheme. This is above the threshold for Earthquake Prone Buildings (34%NBS) and above the threshold for Earthquake Risk Buildings (67%NBS) as defined by the NZSEE.

The ISA is considered to provide a relatively quick, high-level and qualitative measure of the building’s performance. In order to confirm the seismic performance of this building with more

reliability you may wish to request a DSA. A DSA would also investigate other potential weaknesses that may not have been considered in the initial seismic assessment.

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
Stiles and Hooker Ltd

Ian Kearney
CPEng Reg No. 1151481 CMEngNZ
Principal Structural Engineer

Appendix A

Site Map

Appendix B

Building Descriptions & IEP Assessments

- Portal Framed Buildings
- Shear Wall Buildings

Portal Framed Buildings		
IEP Item	**Assumption**	**Justification**
Date of Building Design	1997 & 2003	Record drawings.
Soil Type	D	Estimated.
Building Importance Level	IL2	Normal structure.
Ductility of Structure	1.25 Long 1.25 Transv.	Tension only cross bracing. Steel portal frame.
Plan Irregularity Factor, A	1.0 Long 1.0 Transverse	Single storey braced portal frame structure.
Vertical Irregularity Factor, B	1.0 Long 1.0 Transverse	Single storey braced portal frame structure.
Short Columns Factor, C	1.0 Long 1.0 Transverse	N/A N/A
Pounding Factor, D	1.0 Long 1.0 Transverse	N/A N/A
Site Characteristics	1.0 Long 1.0 Transverse	The building site is flat and level and slope stability is not an issue. If the soils underlying the building did liquefy during an earthquake, then we would expect some settlement of the building foundations to occur but it is considered unlikely that liquefaction settlements alone would cause the building to collapse. Cold rooms located adjacent retaining walls or battered fill. Both designed in conjunction with the buildings inclusive of seismic considerations.
Critical structural Weaknesses Identified	Longitudinal Transverse	Nil. Nil.
F Factor	1.0 Long 1.0 Transverse	N/A N/A

Shear Wall Buildings		
IEP Item	**Assumption**	**Justification**
Date of Building Design	2003	Record Drawings.
Soil Type	D	Estimated.
Building Importance Level	IL2	Normal structure.
Ductility of Structure	1.25 Long 1.25 Transv.	Cantilever Wall action. Cantilever Wall action.
Plan Irregularity Factor, A	1.0 Long 1.0 Transverse	Rectangular, walls to 4 sides.
Vertical Irregularity Factor, B	1.0 Long 1.0 Transverse	
Short Columns Factor, C	1.0 Long 1.0 Transverse	N/A N/A
Pounding Factor, D	1.0 Long 1.0 Transverse	N/A N/A
Site Characteristics	1.0 Long 1.0 Transverse	The building site is flat and level and slope stability is not an issue. If the soils underlying the building did liquefy during an earthquake, then we would expect some settlement of the building foundations to occur but it is considered unlikely that liquefaction settlements alone would cause the building to collapse. Refrig plant room located near to a retaining wall, footings were designed not to surcharge the wall which predates the room.
Critical structural Weaknesses Identified	Longitudinal Transverse	Nil. Nil.
F Factor	1.0 Long 1.0 Transverse	N/A N/A