IN THE MATTER	of the Resource Management Act 1991 **(the Act)**
AND	
IN THE MATTER	of an appeal under clause 14 of the First Schedule to the Act
BETWEEN	CARRUS CORPORATION LIMITED, TE TUMU LANDOWNERS GROUP, TE TUMU KAITUNA 14 TRUST, TE TUMU KAITUNA 11B2 TRUST, FORD LAND HOLDINGS PTY LIMITED (ENV-2015-AKL-000151) Appellant
AND	BAY OF PLENTY REGIONAL COUNCIL Respondent

BEFORE THE ENVIRONMENT COURT
Environment Judge J A Smith sitting alone under s 279 of the Act
IN CHAMBERS at Auckland

CONSENT ORDER

A. Under s 279(1)(b) of the Act, the Environment Court by consent, orders that:

(a) The appeal is allowed in part subject to Annexure A and Annexure B to this order.

(b) The appeal is otherwise dismissed.

B. Under s 285 of the Act, there is no order as to costs in relation to this order.

Introduction

1. This appeal relates to proposed Change 2 (Natural Hazards) to the Bay of Plenty Regional Policy Statement. The Change inserts natural hazards provisions into the policy statement. The Change guides those preparing regional, city and district plans and considering resource consent applications in managing land use and associated activities according to the level of natural hazard risk they are subject to.

2. The appeal is the only one filed on the Change and relates to Appendix K which contains the methodology for risk management. The appeal raised concerns that there were provisions within Appendix K relating to the expression of return intervals and the formula or Annual Individual Fatality Risk.

3. The parties have reached an agreement that will resolve this appeal in its entirety. The changes agreed include the following:

   (a) Updates to flowchart to clarify the methodology.

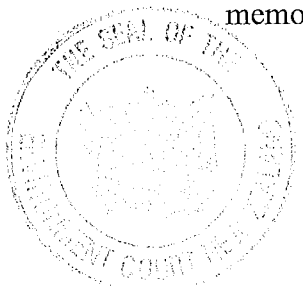
   (b) Amendment to Appendix A Definitions to clarify that the "population in care" is intended to include the population in (a) to (d) of that definition by deleting the linkage "or" and replacing it with "and".

   (c) Amendments to Appendix K Step 4 to amend use of (ARI) to (AEP) (cl 16 correction).

   (d) Amendments to the Risk Screening Matrix Likelihood column.

   (e) Amendments to Appendix K Step 5.

4. In making this order the Court has read and considered the appeal and the memorandum of the parties dated 18 April 2016.



5. Tauranga City Council gave notice of an intention to become a party to this appeal under s 274 of the Act, and has signed the memorandum of the parties setting out the relief sought.

6. The Court is making this order under s 279(1)(b) of the Act, such order being by consent, rather than representing a decision or determination on the merits pursuant to s 297. The Court understands for present purposes that:

   (a) All parties to the proceedings have executed the Memorandum requesting this order; and

   (b) All parties are satisfied that all matters proposed for the Court's endorsement fall within the Court's jurisdiction, and conform to relevant requirements and objectives of the Act, and in particular Part 2.

Order

7. Therefore the Court orders, by consent, that the proposed Change 2 (Natural Hazards) to the Bay of Plenty Regional Policy Statement is amended as shown in **Annexure A** underline (for additions) and ~~strike through~~ for deletions and the clean provisions are shown in **Annexure B**.

8. The appeal is resolved in its entirety.

9. There is no order as to costs.

DATED at Auckland this 5th day of May 2016.

J A Smith
Environment Judge

Annexure A

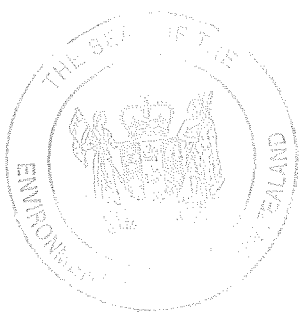
Amend Appendix A as shown:

Appendix A – Definitions

...

Population in care means the population within the hazard assessment area that is in:

(a) Hospital; ~~or~~ and
(b) Aged care facilities; ~~or~~ and
(c) Schools; ~~or~~ and
(d) Early education and infant day care facilities.



(Amend Appendix K as shown)

Appendix K – Methodology for risk assessment

...

Primary Analysis (Steps 1 – 4)

Step 1 – Selecting starting likelihood for risk assessment

...

Table 6[1] Likelihoods for initial risk assessment

Hazard	Column A: Likelihood for initial analysis[+] AEP (%)[#]	Column B: Likelihood for secondary analysis[+] AEP (%)[#]
Volcanic hazards (including geothermal)	0.1	0.2 0.005
Earthquake (Liquefaction)	0.1	0.2 0.033
Earthquakes (Fault rupture)	0.017	0.2 0.005
Tsunami	0.1	0.2 0.04
Coastal erosion	1	2 0.2
Landslip (Rainfall related)	1	2 0.2
Landslip (Seismic related)	0.1	0.2 0.033
Flooding (including coastal inundation)	1	2 0.2

[+]The term "initial analysis" refers to the starting point for risk analysis as described in Step 1 of this methodology. It is the first scenario to be assessed for risk. The term "secondary analysis" refers to any subsequent scenario that is assessed for risk in accordance with Step 5 of this methodology.

[#]AEP (Annual Exceedance Probability) is the probability that a natural hazard event of a certain size will occur, or will be exceeded, in a time period of one year. For example, an inundation level with a 2% AEP means that there is a 2% chance in any one year of that level being equalled or exceeded.

[4] Table 6 likelihoods, presented to guide the identification of the event with the highest risk, are derived from ranges suggested by relevant hazard specialists.

...

Step 4 – Determine the risk level

Based on the likelihood (AEP from Table 6) and the consequence level derived from Table 7, the level of risk is to be determined using the Risk Screening Matrix below.

Risk Screening Matrix

Likelihood[2] (AEP %)	Consequences: Insignificant	Minor	Moderate	Major	Catastrophic
≥2	Low risk	Medium risk	Medium risk	High risk	High risk
≤2–1	Low risk	Low risk	Medium risk	Medium risk	High risk
≤1–0.1	Low risk	Low risk	Medium risk	Medium risk	High risk
≤0.1–0.04	Low risk	Low risk	Low risk	Low risk	Medium risk
<0.04	Low risk	Low risk	Low risk	Low risk	Medium risk

Key

Low risk

Medium risk

High risk

Secondary Analysis

Step 5 – Iterate risk assessment and calculate annual individual fatality risk (AIFR) if necessary

...

(a) Where the initial assessment results in a risk level categorisation of *High*:

(i) No further assessment is required (but see (ii) below). The ~~maximum~~ risk for the purpose of Policy NH 6B is High. (While there might be a greater risk associated with a less

[5] The likelihood ranges allow for the evaluation of multiple hazards, e.g. flooding, landslip, tsunami, fault rupture. (Saunders, W.S.A.; Beban, J.G.; Kilvington, M. 2013. Risk-based approach to land use planning, *GNS Science Miscellaneous Series 67*)

likely event the management approach associated with that hazard will not change.)

(ii)…

(b) Where the initial assessment results in a risk level categorisation of *Medium*:

(i) Calculate the annual individual fatality risk (AIFR) using the following formula:

AIFR = (D x P)/N

Where:

D = number of anticipated (modelled) deaths from the event

N = population (maximum number of people present within the hazard assessment area at any point in time over a 24 hour period)[3]

P = the computed annual exceedance probability. Note that values of AEP expressed as a percentage (as in Table 6) must first be divided by 100.
E.g., from Column A of Table 6, using Flooding AEP(%) of 1:
P = 1/100 = 0.01

(ii) If the AIFR is greater than 1 x 10^{-4} ~~(re-)~~ categorise the risk as High.

(iii) …

(iv) If the risk screening matrix categorises risk from any secondary assessment as High, the ~~maximum~~ risk for the purpose of Policy NH 6B is High.

(v) If the risk screening matrix does not categorise risk from any secondary assessment as High the ~~maximum~~ risk for the purpose of Policy NH 6B is Medium.

(c) Where the initial assessment results in a risk level categorisation of *Low*:

(i) …

(ii) If the risk screening matrix categorises the risk from any secondary assessment as Medium, calculate the ~~average~~ annual individual fatality risk (AIFR) using the formula described in Step 5 (b) above. If the AIFR is greater than 1 x 10^{-4} ~~(re-)~~ categorise the risk as High. ~~Clauses (iii) and (iv) apply if the AIFR is less than 1 x 10^{-4}.~~

(iii) If the risk screening matrix categorises the risk from ~~all~~ any secondary assessments as Low, ~~and the AIFR is less than or equal to 1 x 10-5 the maximum risk is Low unless (iv) applies~~ calculate the annual individual fatality risk (AIFR) using the formula described in Step 5 (b) above.

- If the AIFR is 1 x 10^{-4} or less and greater than 1 x 10^{-5} re-categorise the risk as Medium.
- If the AIFR is 1 x 10^{-5} or less the risk is Low.

(d)~~(iv)~~ Despite ~~(iii)~~ (b) and (c) above, ~~if the risk screening matrix~~ re-categorises the risk ~~from all secondary assessments as Low, the level of risk is:~~

- Medium if the $AIFR^{pic}$ is ~~in the range between~~ 1 x 10^{-4} or less and greater than 1 x 10^{-6} ~~when the population used for the calculation of the AIFR is limited to the population in care.~~; or
- High if the $AIFR^{pic}$ is greater than 1 x 10^{-4}.

where the $AIFR^{pic}$ is calculated using the following formula:

$AIFR^{pic} = (D^{pic} \times P)/N^{pic}$

where:

D^{pic} = number of anticipated (modelled) deaths in the population in care from the event

N^{pic} = population (maximum number of people in care present within the hazard assessment area at any point in time over a 24 hour period)

P = the computed annual exceedance probability (as defined in (b) above).

[6] ~~Except that the population for the purpose of Step 5 (c) (iv) is the population in care.~~

If ~~secondary or subsequent~~ an assessment indicates High or Medium risk, further iterative assessment may be undertaken to test the effect of alternative or additional mitigation options in an effort to reduce the risk level.

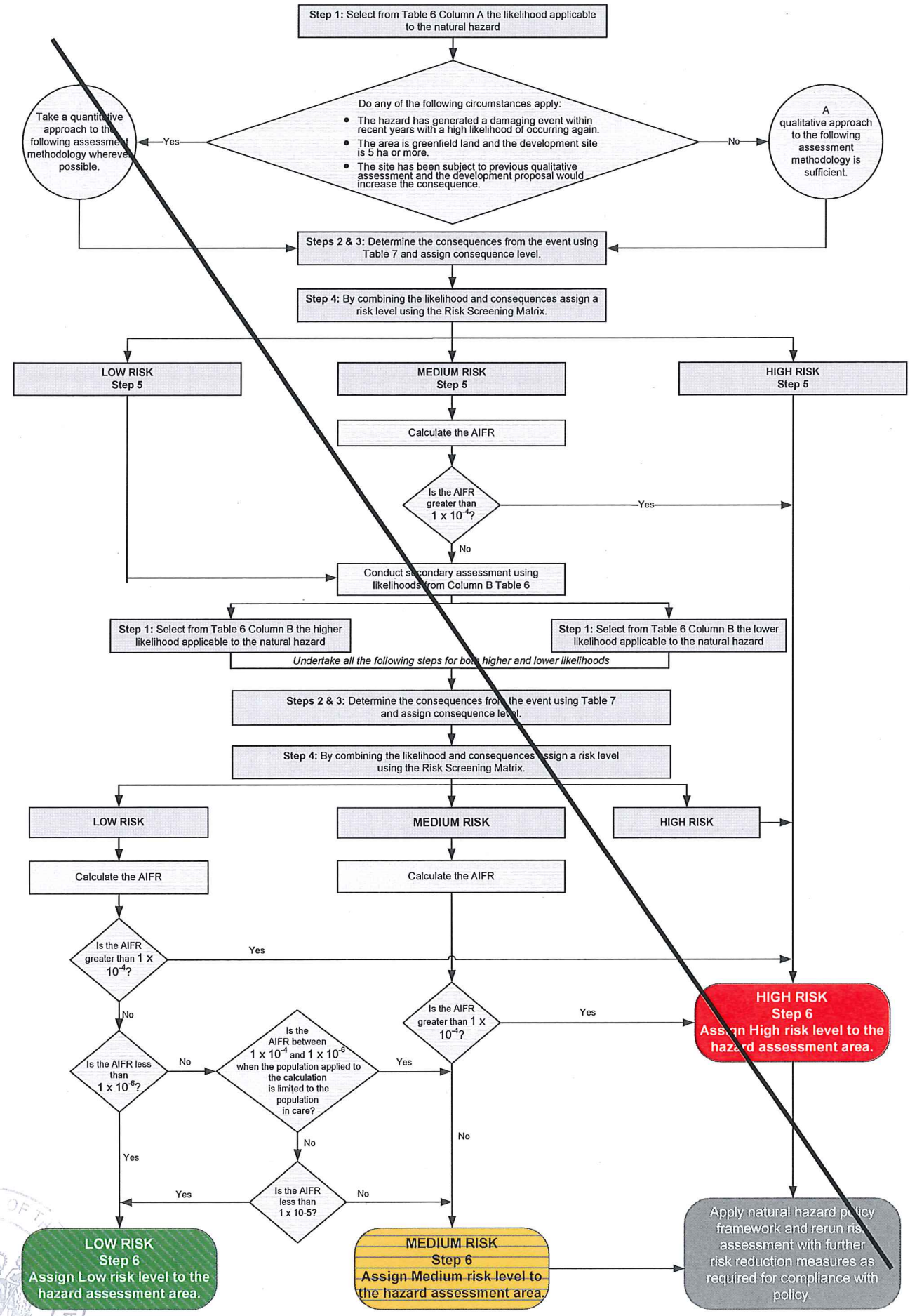
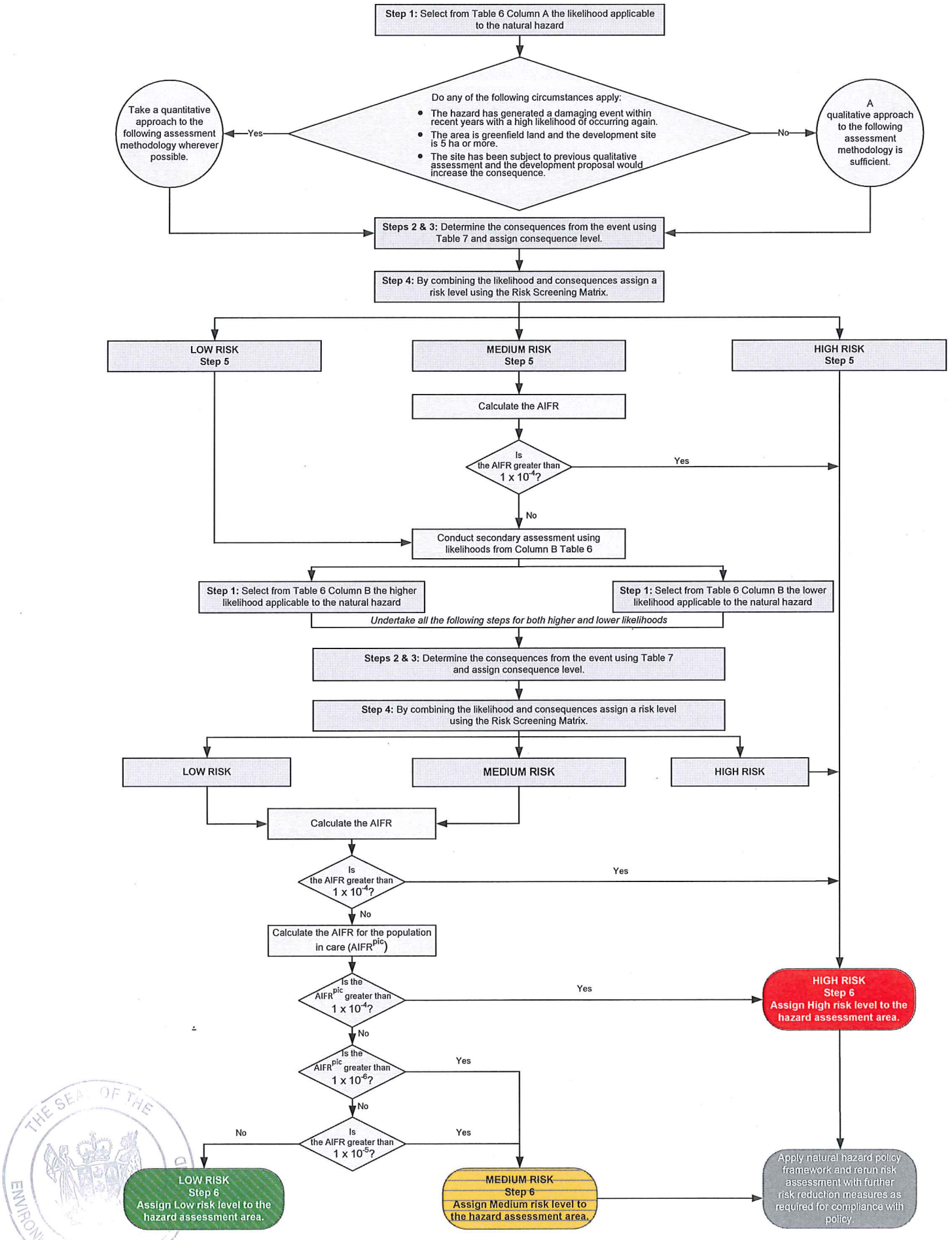


Figure 3 Appendix K Methodology for Risk Assessment Flow Chart.

Figure 3 Appendix K Methodology for Risk Assessment Flow Chart



Appendix A – Definitions

...

Population in care means the population within the hazard assessment area that is in:

(e) Hospital; and
(f) Aged care facilities; and
(g) Schools; and
(h) Early education and infant day care facilities.

Appendix K – Methodology for risk assessment

...

Primary Analysis (Steps 1 – 4)

Step 1 – Selecting starting likelihood for risk assessment

...

Table 6[4] Likelihoods for initial risk assessment

Hazard	Column A: Likelihood for initial analysis[+] AEP (%)[#]	Column B: Likelihood for secondary analysis[+] AEP (%)[#]
Volcanic hazards (including geothermal)	0.1	0.2 0.005
Earthquake (Liquefaction)	0.1	0.2 0.033
Earthquakes (Fault rupture)	0.017	0.2 0.005
Tsunami	0.1	0.2 0.04
Coastal erosion	1	2 0.2
Landslip (Rainfall related)	1	2 0.2
Landslip (Seismic related)	0.1	0.2 0.033
Flooding (including coastal inundation)	1	2 0.2

[+]The term "initial analysis" refers to the starting point for risk analysis as described in Step 1 of this methodology. It is the first scenario to be assessed for risk. The term "secondary analysis" refers to any subsequent scenario that is assessed for risk in accordance with Step 5 of this methodology.

[#]AEP (Annual Exceedance Probability) is the probability that a natural hazard event of a certain size will occur, or will be exceeded, in a time period of one year. For example, an inundation level with a 2% AEP means that there is a 2% chance in any one year of that level being equalled or exceeded.

...

Step 4 – Determine the risk level

Based on the likelihood (AEP from Table 6) and the consequence level derived from Table 7, the level of risk is to be determined using the Risk Screening Matrix below.

Risk Screening Matrix

Likelihood[5] (AEP %)	Consequences: Insignificant	Minor	Moderate	Major	Catastrophic
≥2					
<2–1					
<1–0.1					
<0.1–0.04					
<0.04					

Key

[4] Table 6 likelihoods, presented to guide the identification of the event with the highest risk, are derived from ranges suggested by relevant hazard specialists.

[5] The likelihood ranges allow for the evaluation of multiple hazards, e.g. flooding, landslip, tsunami, fault rupture. (Saunders, W.S.A.; Beban, J.G.; Kilvington, M. 2013. Risk-based approach to land use planning, *GNS Science Miscellaneous Series 67*)

Low risk

Medium risk

High risk

Secondary Analysis

Step 5 – Iterate risk assessment and calculate annual individual fatality risk (AIFR) if necessary

...

(a) Where the initial assessment results in a risk level categorisation of *High*:

(i) No further assessment is required (but see (ii) below). The risk for the purpose of Policy NH 6B is High. (While there might be a greater risk associated with a less likely event the management approach associated with that hazard will not change.)

(ii)...

(b) Where the initial assessment results in a risk level categorisation of *Medium*:

(i) Calculate the annual individual fatality risk (AIFR) using the following formula:

AIFR = (D x P)/N

Where:

D = number of anticipated (modelled) deaths from the event

N = population (maximum number of people present within the hazard assessment area at any point in time over a 24 hour period)

P = the computed annual exceedance probability. Note that values of AEP expressed as a percentage (as in Table 6) must first be divided by 100.
E.g., from Column A of Table 6, using Flooding AEP(%) of 1:
P = 1/100 = 0.01

((ii) If the AIFR is greater than 1×10^{-4} re-categorise the risk as High.

(iii)...

(iv) If the risk screening matrix categorises risk from any secondary assessment as High, the risk for the purpose of Policy NH 6B is High.

(v) If the risk screening matrix does not categorise risk from any secondary assessment as High the risk for the purpose of Policy NH 6B is Medium.

(c) Where the initial assessment results in a risk level categorisation of *Low*:

(i)...

(ii) If the risk screening matrix categorises the risk from any secondary assessment as Medium, calculate the annual individual fatality risk (AIFR) using the formula described in Step 5 (b) above. If the AIFR is greater than 1×10^{-4} re-categorise the risk as High.

(iii) If the risk screening matrix categorises the risk from any secondary assessment as Low, calculate the annual individual fatality risk (AIFR) using the formula described in Step 5 (b) above.

- If the AIFR is 1×10^{-4} or less and greater than 1×10^{-5} re-categorise the risk as Medium.
- If the AIFR is 1×10^{-5} or less the risk is Low.

(d) Despite (b) and (c) above, recategorise the risk as:

- Medium if the $AIFR^{pic}$ is 1×10^{-4} or less and greater than 1×10^{-6}; or
- High if the $AIFR^{pic}$ is greater than 1×10^{-4}

where the $AIFR^{pic}$ is calculated using the following formula:

$AIFR^{pic} = (D^{pic} \times P)/N^{pic}$

where:

D^{pic} = number of anticipated (modelled) deaths in the population in care from the event

N^{pic} = population (maximum number of people in care present within the hazard assessment area at any point in time over a 24 hour period)

P = the computed annual exceedance probability (as defined in (b) above).

If an assessment indicates High or Medium risk, further iterative assessment may be undertaken to test the effect of alternative or additional mitigation options in an effort to reduce the risk level.

Figure 3 Appendix K Methodology for Risk Assessment Flow Chart