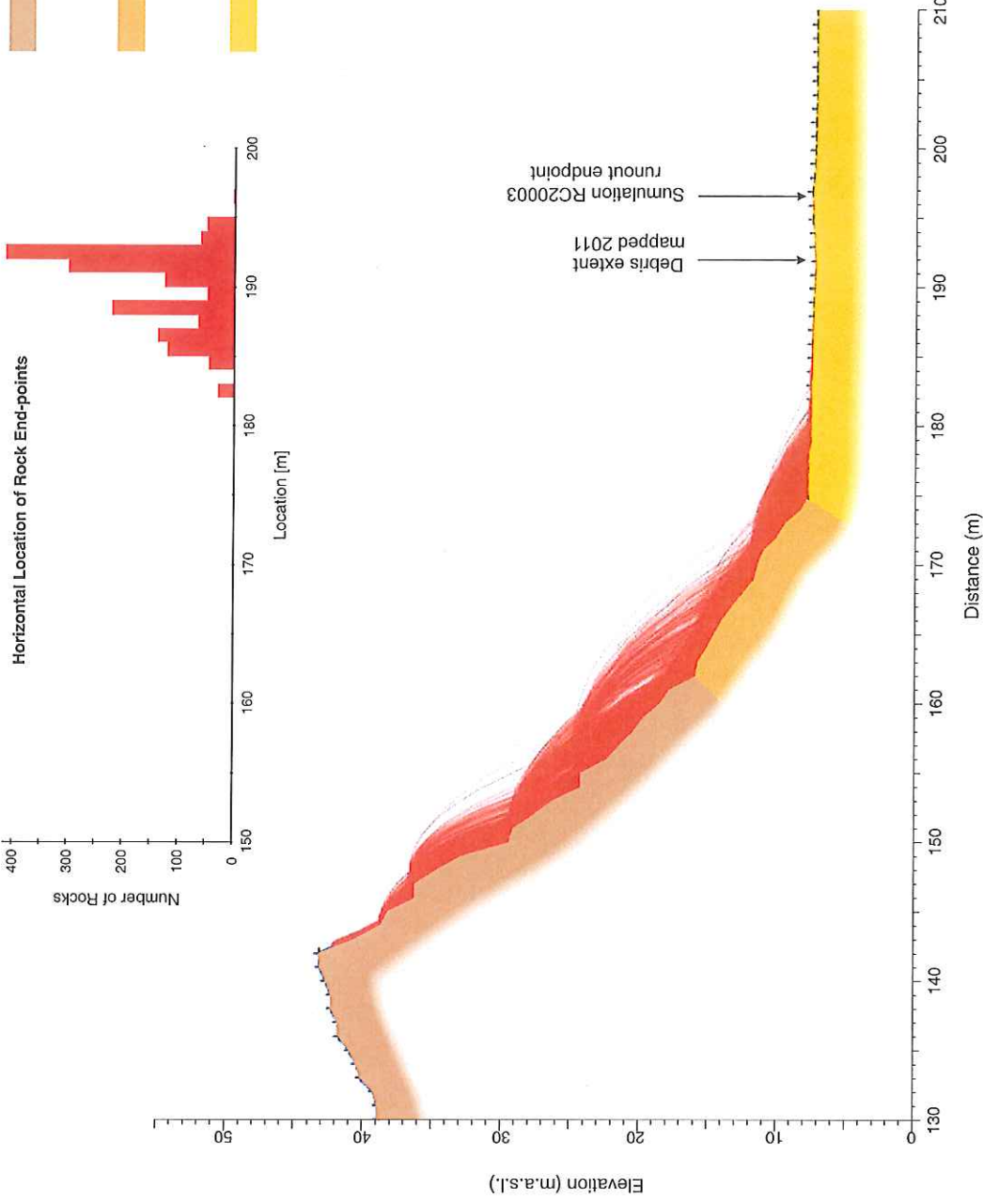


**A9 APPENDIX 9: ROCFALL MODELLING RESULTS FOR CROSS-SECTIONS 2, 4 AND 6**



**Material properties after Massey et al (2012b)**

- Material (1) Rock**  
Coefficient of Normal Restitution (RN): mean=0.53 std dev=0.04  
Coefficient of Tangential Restitution (RT): mean=0.99 std dev=0.04  
Friction Angle: mean=40 std dev=2  
Roughness: std dev=5
- Material (3) Rock near surface or partly covered**  
Coefficient of Normal Restitution (RN): mean=0.5 std dev=0.04  
Coefficient of Tangential Restitution (RT): mean=0.85 std dev=0.04  
Friction Angle: mean=20 std dev=2  
Roughness: std dev=5
- Material (5) Colluvium with vegetation smooth**  
Coefficient of Normal Restitution (RN): mean=0.3 std dev=0.03  
Coefficient of Tangential Restitution (RT): mean=0.85 std dev=0.03  
Friction Angle: mean=4 std dev=2  
Roughness: std dev=0



**SECTION 2**  
**RocFall® simulation RC20003**  
**Redcliffs**  
**Christchurch**

**APPENDIX 9**

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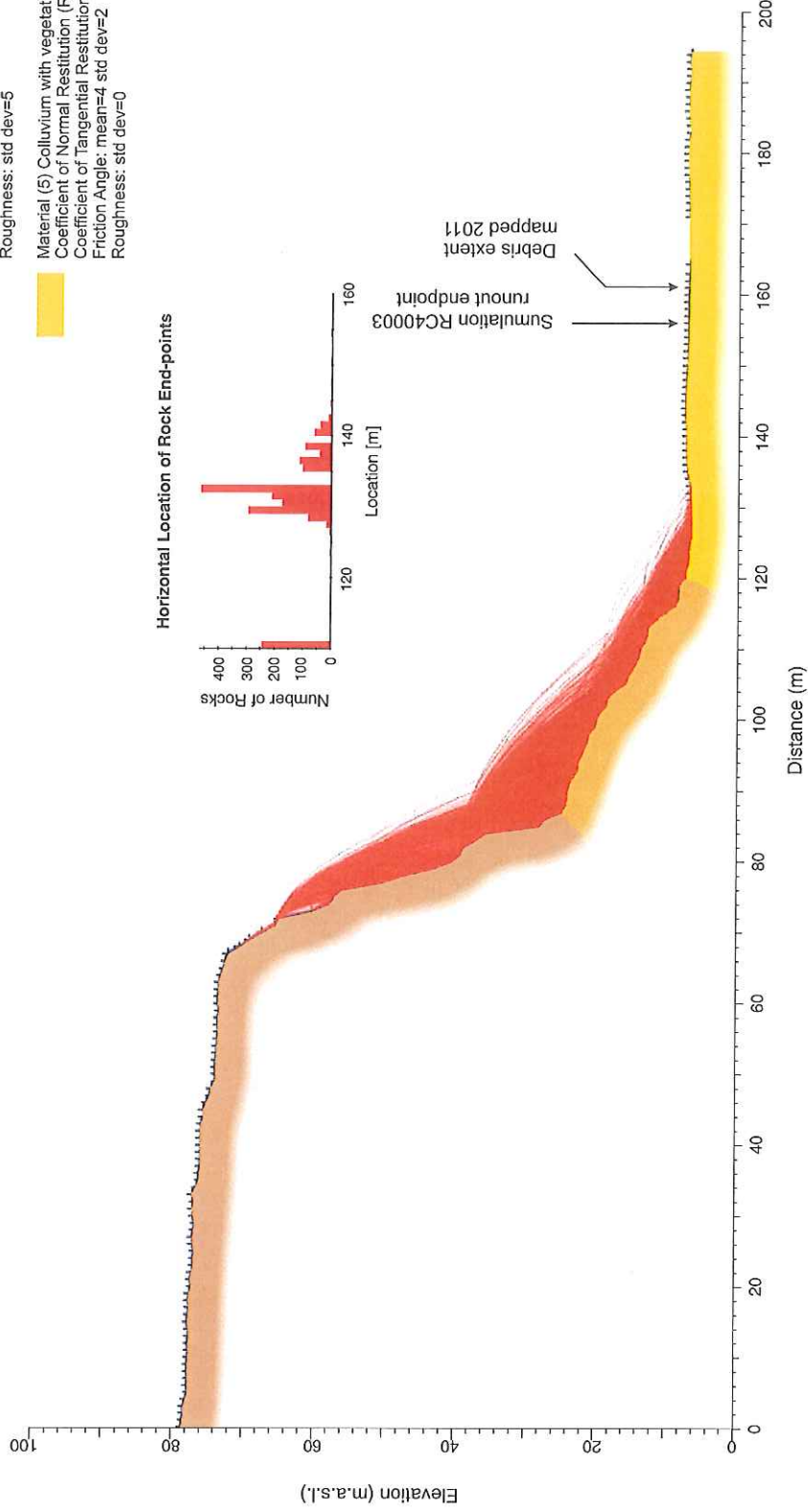
**FINAL**

Input material parameters from Massey et al 2012b  
Number of rocks = 2000  
Unit weight 27 KN/m<sup>3</sup>  
Cut of velocity 0.1m/sec  
Simulated rock mass 1,000kg (~0.3m<sup>3</sup>)

DRW: PC  
CHK: CM/FDP

Material properties after Massey et al (2012b)

- Material (1) Rock  
Coefficient of Normal Restitution (RN): mean=0.53 std dev=0.04  
Coefficient of Tangential Restitution (RT): mean=0.99 std dev=0.04  
Friction Angle: mean=40 std dev=2  
Roughness: std dev=5
- Material (3) Rock near surface or partly covered  
Coefficient of Normal Restitution (RN): mean=0.5 std dev=0.04  
Coefficient of Tangential Restitution (RT): mean=0.85 std dev=0.04  
Friction Angle: mean=20 std dev=2  
Roughness: std dev=5
- Material (5) Colluvium with vegetation smooth  
Coefficient of Normal Restitution (RN): mean=0.3 std dev=0.03  
Coefficient of Tangential Restitution (RT): mean=0.85 std dev=0.03  
Friction Angle: mean=4 std dev=2  
Roughness: std dev=0



Input material parameters from Massey et al 2012b  
 Number of rocks = 2000  
 Unit weight 27 KN/m<sup>3</sup>  
 Cut of velocity 0.1m/sec  
 Simulated rock mass 1,000kg (~0.3m<sup>3</sup>)

DRW:  
PC  
CHK:  
CM/FDP



**SECTION 4**  
**RocFall® simulation RC40003**  
**Redcliffs**  
**Christchurch**

**APPENDIX 9**

**FINAL**

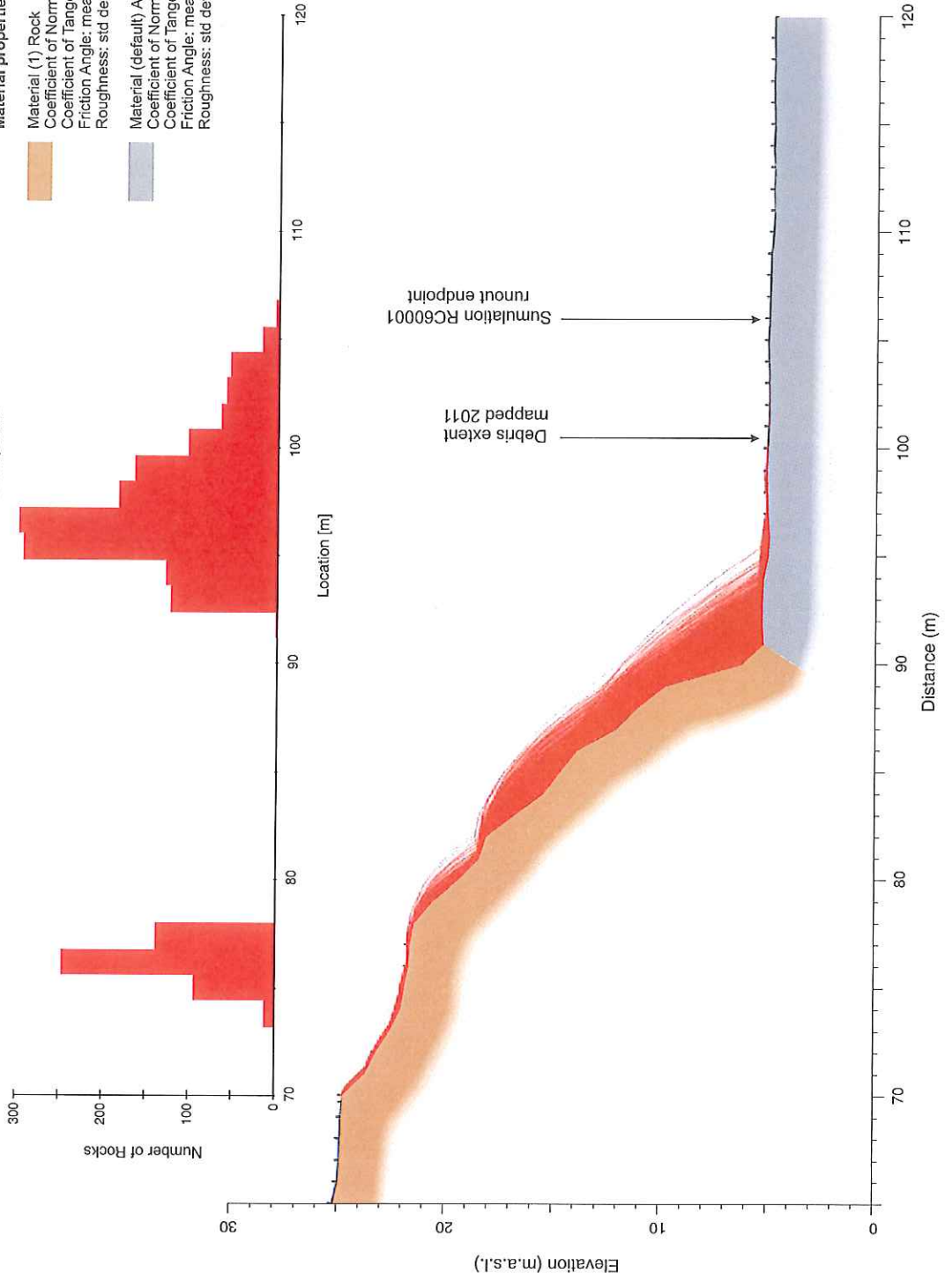
REPORT: CR2014/78  
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Horizontal Location of Rock End-points

Material properties after Massey et al (2012b)

**Material (1) Rock**  
 Coefficient of Normal Restitution (RN): mean=0.53 std dev=0.04  
 Coefficient of Tangential Restitution (RT): mean=0.99 std dev=0.04  
 Friction Angle: mean=40 std dev=2  
 Roughness: std dev=5

**Material (default) Asphalt**  
 Coefficient of Normal Restitution (RN): mean=0.5 std dev=0.04  
 Coefficient of Tangential Restitution (RT): mean=0.9 std dev=0.04  
 Friction Angle: mean=30 std dev=2  
 Roughness: std dev=0



Input material parameters from Massey et al 2012b  
 Number of rocks = 2000  
 Unit weight 27 KN/m<sup>3</sup>  
 Cut of velocity 0.1m/sec  
 Simulated rock mass 1,000kg (~0.3m<sup>3</sup>)

DRW:  
PC  
 CHK:  
CM/FDP



**SECTION 6**  
**RocFall® simulation RC60001**  
**Redcliffs**  
**Christchurch**

**APPENDIX 9**

**FINAL**

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