

Appendix 5

Calculations supporting the selection of 5 x 150mm diameter novacoil pipe that Releases clearwater from the coffer dam at the bottom of the link access track into the Papawai Stream

Catchment Area: 3000m²

HIRDs V4 Output:

Rainfall depths (mm) :: Historical Data

| ARI | AEP | 10m | 20m | 30m | 1h | 2h | 6h | 12h | 24h | 48h | 72h | 96h | 120h |
|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.58 | 0.633 | 6.94 | 9.85 | 12.0 | 16.8 | 23.0 | 36.8 | 48.2 | 61.7 | 76.9 | 86.4 | 93.3 | 98.6 |
| 2 | 0.500 | 7.63 | 10.8 | 13.2 | 18.4 | 25.2 | 40.2 | 52.6 | 67.3 | 83.9 | 94.2 | 102 | 107 |
| 5 | 0.200 | 10.0 | 14.1 | 17.2 | 23.9 | 32.8 | 52.1 | 68.0 | 86.6 | 108 | 121 | 130 | 137 |
| 10 | 0.100 | 11.8 | 16.7 | 20.3 | 28.2 | 38.5 | 61.0 | 79.4 | 101 | 125 | 140 | 151 | 160 |
| 20 | 0.050 | 13.7 | 19.3 | 23.5 | 32.5 | 44.4 | 70.2 | 91.2 | 116 | 144 | 161 | 173 | 182 |
| 30 | 0.033 | 14.9 | 20.9 | 25.5 | 35.2 | 48.0 | 75.7 | 98.4 | 125 | 155 | 173 | 186 | 196 |
| 40 | 0.025 | 15.7 | 22.1 | 26.9 | 37.2 | 50.6 | 79.8 | 104 | 131 | 162 | 182 | 195 | 206 |
| 50 | 0.020 | 16.4 | 23.1 | 28.0 | 38.7 | 52.7 | 82.9 | 108 | 136 | 169 | 188 | 203 | 214 |
| 60 | 0.017 | 17.0 | 23.8 | 28.9 | 40.0 | 54.4 | 85.6 | 111 | 141 | 174 | 194 | 209 | 220 |
| 80 | 0.012 | 17.8 | 25.1 | 30.4 | 42.0 | 57.1 | 89.7 | 116 | 147 | 182 | 203 | 218 | 230 |
| 100 | 0.010 | 18.5 | 26.0 | 31.6 | 43.6 | 59.2 | 93.0 | 120 | 152 | 188 | 210 | 226 | 238 |
| 250 | 0.004 | 21.5 | 30.1 | 36.5 | 50.2 | 68.1 | 107 | 138 | 174 | 214 | 239 | 257 | 270 |

The 100yr ARI (AEP 0.01) for 10mins is 18.5mm. 3000m² x 0.018m = 54m³

54m³/10 minutes is the same as 90 Litres per second assuming all rainfall immediately runs off and is distributed over the 10-minute period evenly.

The capacity of a 150mm diameter pipe has been calculated as 21 L/s using Manning's equation, an assuming the slope is 1% on the pipe and Manning's "n" is 0.013

$$Q = A * V$$

$$V = \frac{1}{n} * A * R^{2/3} * \sqrt{S}$$

$$R = A/p$$

Conclusion: The combined flow capacity of the proposed 5 x 150mm diameter novacoil pipes (105L/s) will accommodate 100% of the flow generated by the 100yr ARI for the 10minute event (90L/s). The assumptions made regarding how the flow is generated (namely zero infiltration and making no allowances for water travelling from distance) are unrealistic and conservative in nature and actual flows are likely to be considerably less.