

APPENDIX D

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Water Balance

The water balance at the site was used to estimate a reasonable infiltration parameter.

The hydraulic gradient measured at the site is generated by infiltration over the flow line from the nearest up gradient surface water divide a distance L_u away plus the site length L_s .

The actual flow at the site is

$$Q_s = K.i.A$$

Where Q_s (m^3/d) is the flow under the site, K (m/s) is the hydraulic conductivity of the aquifer, I is the hydraulic gradient at the site (unitless) and A (m^2) is the cross sectional area of the aquifer beneath the site calculated from the aquifer depth multiplied by the site width.

Therefore recharge (m/d), at the site is likely to be

$$Recharge = \left(\frac{L_s}{L_u + L_s} \right) \times Q_s$$

and infiltration at the site, Inf (m/d) is

$$Inf = Recharge / A'$$

where A' is the site area.

This method was applied to Areas 1 and 4, the parameters used and the resulting estimates of infiltration are given in the table below. Area 6 was not included in the analysis as the position of the up-gradient surface water divide was not clear.

Parameter	Area 1	Area 4
L_u (m)	650	200
L_s (m)	130	60
Q_s (m^3/d)	22.2	20
K (m/d)	0.864	0.864
I	0.0125	0.0133
A (m^2)	2052	1736
Recharge (m^3/d)	7.2	1.8
Infiltration (m/d)	0.00029	0.00038

Based on the estimates above it was considered that a reasonable estimate for infiltration would be 0.0003m/d.

This compares favourably with an estimate of infiltration based on 10% of the total precipitation (0.0026 m/d) reported by White Young Green (2002). This is considered to be conservative, as 10% of total precipitation is considered likely to infiltrate in sandy soils. (Conner *et al*, 1996), whereas the made ground in the vicinity of Areas 1, 4 and 6 is described as silty fill.