ho = actual TWL depth above the culvert invert or the term (dc + D)/2, whichever is greater.

Table A5-6: Manning's equation roughness coefficient (n) for culverts

Culvert Material	"n" value
Concrete pipe or box (non-lined)	0.015
Concrete pipe (PVC-lined)	0.011
Vitrified clay pipe	0.013
Corrugated metal pipe	0.022 – 0.027*
68 mm by 13 mm – annular or helical	0.025
76 mm by 25 mm – annular or helical	0.028
125 mm by 25 mm – annular or helical	0.026
152 mm by 51 mm – annular or helical	0.035
229 mm by 64 mm – annular or helical	0.035
Spiral rib metal pipe:	
19 mm (W) x 25 mm (D) @ 292 mm o/c	0.013
19 mm (W) x 19 mm (D) @ 191 mm o/c	0.013
19 mm (W) x 25 mm (D) @ 213 mm o/c	0.013
Corrugated polyethylene – smooth	0.009 – 0.015*
Corrugated polyethylene – corrugated	0.018 – 0.025*
PVC – smooth	0.009 – 0.011*
Composite steel spiral rib pipe	0.012

*Refer to pipe manufacture's data sheets

Table A5-7: Culvert entrance loss coefficients

Culvert end treatment	Ke
Pipe concrete	
Projecting from fill, socket end (groove-end)	0.2
Projecting from fill, square cut end	0.5
Headwall or headwall and wing walls	
Socket end of pipe (groove-end	0.2
Square-edge	0.5
Rounded (radius = D/12	0.2
Mitred to conform to fill slope	0.7
*End-section conforming to fill slope	0.5
Bevelled edges, 33.7°or 45° bevels	0.2
Side- or slope-tapered inlet	0.2
Pipe or pipe-arch corrugated metal	
Projecting from fill (no headwall)	0.9
Mitred to conform to fill slope, paved or unpaved slope	0.7