

'Model' water safety plan for dug wells

Hazard event	Cause	Risk	Control measure	Critical limits		Monitoring			Corrective action	Verification
				Target	Action	What	When	Who		
Ingress of contaminated surface water directly into well	Well does not have a cover; lining stops at ground level; faulty or absent apron; drainage ditches faulty or absent	Moderate/ Major	Proper wellhead completion with raised wellhead, cover and apron. Good drainage	Well covered Lining extends 30cm above the apron. Apron with radius of 1.5m around well. Drainage ditches in good condition	Lack of cover on well; lining stops at ground level; apron damaged or cracked; ditches full, faulty or absent	Sanitary inspection	During construction Monthly	Water development agency Community operator	Provide cover on well Extend lining. Repair apron. Clean and repair drainage ditches.	Sanitary inspection <i>E.coli</i> Faecal streptococci
Ingress of contaminants due to poor construction or damage to the lining	Entry of contamination in top few metres of dug well because of cracks in lining or poor sealing of lining	Moderate/ Minor	Proper construction and use of a mortar seal on lining	Lining in good condition; no signs of weep holes in lining during rainfall	Well lining is pitted, evidence of seepage into well during rainfall	Sanitary inspection	Seasonal	Community operator	Improve well lining	Sanitary inspection <i>E.coli</i> Faecal streptococci
Animal damage allows contamination routes to develop	Animals not excluded from immediate wellhead	Likely/ Moderate	Fencing	Fence in good condition	Lack of fence or faults in fence	Sanitary inspection	Monthly	Community operator	Repair or install fence	Sanitary inspection
Contamination introduced by buckets	Handpump or other sanitary means of abstraction not installed or non-functioning	Almost certain/ Major	Install and maintain handpump or other sanitary means of abstraction	Abstraction by handpump or other sanitary method in good working order	Lack of handpump or other sanitary means of withdrawal	Sanitary inspection	Monthly	Community operator	Install or repair handpump or other sanitary means of withdrawal	Sanitary inspection
Wellhead area is inundated with contaminated surface water	Lack of diversion ditches mean that source is not protected against flood events	Unlikely/ Major	Diversion ditches surround the dug well, designed	Diversion ditch clear of rubbish and in good condition	Ditch has rubbish or shows signs of wear	Sanitary inspection	Monthly	Community operator	Repair and clear ditches	Sanitary inspection
Leaching of microbial contaminants into aquifer	Leaching of faecal material from sanitation, solid waste, drains	Moderate/ Moderate	Provide adequate set-back distances defined on travel time	No sources of faecal material within set-back distance	Latrines/sewers built or solid waste dumps within separation distance	Inspection by community	Monthly	Community operator	Move pollutant sources, improve sanitation design, reduce sewer leakage	Inspection <i>E.coli</i> Faecal streptococci Bacteriophages Nitrate Chloride Tracer studies

Groundwater contains naturally occurring chemicals	Geological setting means chemicals present at toxic levels	Moderate/ Moderate	Select groundwater with acceptable levels of natural chemicals	Water quality assessments indicate water quality is acceptable	Evidence of natural contaminants	Risk assessment of geological setting Water quality assessment	Before construction Periodic evaluation	Water development agency	Use alternative source Treatment of water	Risk assessment Water quality assessment Monitoring of chemicals of concern
Leaching of chemicals into groundwater	Leaching of chemicals from landfills, waste dumps, discharges to ground	Moderate/ Minor	Provide adequate set-back distances defined on travel time	No sources of chemicals within set-back distance	Pollutant discharges within set-back distance	Inspection by community	Monthly	Community operator	Move pollutant sources, improve pollution containment	Inspection Analysis of chemical composition of pollution Analysis of water quality