

Water & Sanitation for Development and Emergencies

Lesson Plan & Curriculum

Note: exact order of sessions is subject to change depending on field trips.

Day	No.	Main subjects	Details
1	1	Environmental Health & Technical back up	Overview of disease causing organisms, infective doses, F-diagram. Book review & technical response services - where to look for information.
	2	Field hydrogeology & surveying 1	How groundwater works – overview of aquifer types, springs, etc. Porosity, permeability. Geology.
	3	Field hydrogeology & surveying 2	Watsan survey formats & practice: general watsan surveys, sanitary surveys, village mapping, overview of different methods to find groundwater.
	4	Field hydrogeology & surveying 3	Practical: how to use an Abney level. Field data collection and plotting elevation data.
2	5	Water flow in pipes & system curves	Hydraulic theory, pipe friction tables & system curves. Use of data from practical to create system curves for 2 pipe sizes. Practical calculations.
	6	Motor pumps & pump choice 1	Different pump options. Practical calculation: Choose a pump based on pump efficiency and power requirements that fits system curve from practical.
	7	Handpump operation & maintenance	Practical: handpump demonstration of Canzee, IMK2, rope and treadle pumps. Theory: Handpumps or bucket system? VLOM introduced. Handpump sustainability explored. Review of types and operation: e.g. IMK2 & 3, Afridev, Canzee, rower, treadle, rope & washer. Advantages & disadvantages of types. Spare parts issues.
3	8	Shallow water sources	Shallow water sources: hand-dug wells, riverbed wells, infiltration wells, infiltration galleries, sub-surface dams. Hand dug well rehabilitation.
	9	Hand dug wells 1	Step by step overview of hand dug well construction – trimming walls, rebar bending, in-situ lining, cutting ring, making curved blocks. Discussion of Bill of Quantities, concreting guidelines, slab, rebars arrangement & apron.
	10	Hand dug wells 2	Practical: rebar measuring and bending, making curved blocks, principals of making cutting ring
	11	Rainwater Collection & Tanks 1	Catchments – domestic and village level. Collection system, guttering & storage tank options. How to improve village water ponds. How to calculate if climate is viable for rainwater collection scheme.
	12	Rainwater Collection & Tanks 2	Practical: calculating tank size needed for training centre.
4	13	Coagulation, flocculation & sedimentation 1;	Product types & effectiveness. Calculating 1% alum solution. Practical: jar test. Watermaker demonstration. Natural coagulants - <i>Moringa</i> demonstration. Treatment methods for removal of taste, colour, iron, manganese, fluoride & arsenic.
	14	Treatment methods for specific chemicals	
5	15	Sand filtration 1	What are the differences between rapid & slow sand filters. Roughing filters. Theory behind filtration – mechanical & biological processes. Field SSF water test data. Practical: sieve analysis to choose sand type according to uniformity coefficient & effective size.
	16	Sand filtration 2	Practical: casting household slow sand filter.
	17	Gravity flow water systems 1	How to design a simple gravity flow system.
	18	Spring protection	Spring protection techniques – various options. Construction guidelines.
	19	Chlorination 1	Product types & effectiveness. Calculating 1% chlorine solution. Practical: making 1% solution & doing jar test - how to do in emergencies.

	20	Sand filtration 3	Opening slow sand filter mould, finishing filter, filling with water & testing for leaks.
6	21	Gravity flow water systems 2; Motor pumps & pump choices 2	Practical: measuring real flow in pipes & comparing to theoretical calculations (gravity flow & system curves), jointing PVC & PE pipes.
	22		
	23		Time to complete any unfinished practicals, reviewing items if / as requested by participants.
	24		
7	25	Household Water Treatment	Options - slow sand filtration, ceramic filters, sedimentation, household RO systems, coagulation/flocculation. Container contamination studies. Practical: ceramic filter, SODIS demonstration, household chlorination.
	26	Water testing 1	Water quality standards & Sphere. When to test water, what is most important to test for – core and secondary tests.
	27	Hygiene promotion	How to do it: village method, Tot workshop method. Teaching methods & materials. Monitoring. Hygiene baseline data & T-shirts. Importance of handwashing. Group work: sample situations. Practical: different handwashing options.
	28		
8	29	Water testing 2	Practical: collecting a sample and testing bacteriological & chemical parameters, including testing bacteria from SODIS demonstration.
	30	Sanitation options 1	Types – e.g. family, communal, school latrines. General slab construction guidelines, sludge accumulation rates for latrines (and schools), general principle of traditional latrine vs. VIP. Sanplat design. Rebar spacing. Dome slabs. Participation: footrest spacing.
	31	Sanitation options 2	Practical: latrine slab construction of standard and dome slabs.
	32	Emergency water & sanitation overview; Emergency sanitation 1; Water testing 3	Overview of emergency watsan: what to do first & how to make a work plan. Sanitation options & scenarios including IDP/refugee scenarios. Defecation fields & trench latrines, communal latrines, family latrines, bathing facilities. Cleaning issues. Drainage issues. Practical calculation: how to build 700 latrines in 7 weeks – materials, staffing, budget. Practical: reading water test results.
9	33		
	34	Emergency sanitation 2	Practical: making an emergency latrine shelter from available materials
	35	Emergency water supply	Water supply & treatment options & scenarios including IDP/refugee scenarios. Group work: to identify a solution for a given situation based on what was taught during the previous days. Supply, treatment, distribution. Kit list for Emergency Water Treatment & Supply kit for 10,000 people.
	36		
10	37	Solid Waste Management & vector control	SWM in refugee settings. Health Care Waste Management guidelines – standards necessary. Designs. Vector control overview. Practical: using sprayer.
	38	Drilling 1: options	Drilling options – hand drilling, machine drilling, jetting, sludging.
	39	Drilling 2: well jetting	Practical: jetting
	40	Drilling 4: BushProof drilling	Practical: BushProof manual drilling.
11	41	Drilling 3: gravel pack & pumping test	What to supervise in contracted boreholes. Overview of technical drilling methods using rotary mud flush drilling as example: Screen/ casing options, screen slot size, drillers' log. Practical calculation: how to determine what kind of gravel pack needed from previous sieve analysis. Theory: Borehole development. Pumping tests – how to do & what information they give. Aquifer pumping test data sheet.
	42		

	43	Coagulation, flocculation & sedimentation 2	Practical: visit to water treatment works.
	44		
12	45	Sand filtration 4	Practical: Washing sand & gravel, filling slow sand filter with sand and gravel, maintenance instructions.
	46	Course evaluation	Feedback from participants.
	47	Examination (optional)	Assessment for those who require it.
	48	End of course.	