

BushProof

with



Training in Water & Sanitation for Development & Emergencies



Singapore

Overview

The BushProof *Water & Sanitation for Development & Emergencies* training is a broad, intense 12-day course with a heavy practical bias, providing a rare opportunity to learn through both theoretical and hands-on practical sessions. The training is invaluable to both those who need more technical input for their work, as well as for those in management who find they have become more and more involved in water and/or sanitation programmes, but lack the basic technical and theoretical background.

The training in Singapore is hosted and co-facilitated by the World Toilet College.

The curriculum has a sanitation focus during the first week, and a water focus during the second week. Applicants have the option to attend either or both parts of the training.



Practical sessions

The training is intense and is given through a range of practical and theoretical sessions. While several theoretical courses are available, practical hands-on field experience is difficult to obtain. The BushProof training therefore focuses heavily on practical sessions, which include the following:

- Manual drilling
- Jetting
- Sieve analysis
- Measuring elevation
- Measuring water flow in pipes due to gravity and from pump
- Handpump operation
- Chlorine and alum jar tests
- Biosand filter construction
- Water testing (chemical, physical, bacteriological)
- Latrine slab construction (normal, dome)
- Making an emergency latrine shelter

Participants are expected to get involved with all practical sessions and should expect to get dirty!

Theoretical sessions

In addition to the practical sessions, the course will provide a broad overview of the theoretical aspects of water and sanitation projects. Theoretical issues are linked to real life field experiences of the facilitators throughout the course.

Teacher-student ratio

We will never have more than 15 participants per course, and therefore have a high teacher-student ratio, which we find is essential to allow individual feedback and tuition.



Venue

Training will be conducted at the World Toilet College (WTC) at 19 Toa Payoh West. It is conveniently located: within easy distance of the airport as well as most of the tourist attractions in Singapore, and close to several budget hotels.



The training centre has a wireless internet connection.

Language

The course will be conducted in English.

Dates

See website www.bushproof.com or www.worldtoilet.org for details.

How to book

Go to www.bushproof.com and click on Products > Training > Booking a Training. Here you will find booking procedures and application forms. Alternatively contact us at www.worldtoilet.org if you experience any difficulties.

Resources

Course handouts will accompany the course, as well as several resource CDs with a wealth of expertise in the form of documents and articles. A certificate will be presented to participants on completion of the training.

Course fees & duration

The duration of the course is 13 days (with 12 days taught). The first week has a sanitation focus, while the second week concentrates on water. Applicants can therefore attend for the whole training or part of it, according to their areas of interest. Course fees are shown below:

Attendance up to 6 taught days	1,300 Euro
Attendance up to 12 days	2,400 Euro

Important notes:

- **Any organization booking 5 places can get a 6th place for free.**
- **We have to get a minimum attendance of 5 full-paying applicants to make the course viable, otherwise we will have to cancel the course. Our cut-off date will be 1 month prior to the course start date – so please confirm with us prior to paying for international flights.**

The course fee includes:

- Tuition, handouts, resource CDs, coffee breaks, lunch on training days and field visits.

The course fee does not include the following:

- Airfares, travel or medical insurance, visa, accommodation, breakfast / evening meal and transport costs to and from the training centre every.

An arrival guide will be sent to all applicants together with the invoice. This allows participants to choose and organise their own accommodation and includes telephone and email contacts. If participants are having real difficulties arranging accommodation or anything else, please contact us at WTC.

Expenses including hotels and transport are – depending on hotel choice – likely to be from 40 Euro/day upwards. Further details will be in the arrival guide.

Contact details

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Web: www.bushproof.com and/or www.worldtoilet.org



Health advice

Singapore is a safe city with good public health standards and exceptionally good health care.

Please take health advice prior to travel as inoculation regulations can change at short notice. No vaccinations are required at this time but vaccinations against tuberculosis, hepatitis A and hepatitis B are sometimes recommended. Although not a requirement for travel to Singapore, you are advised to be up to date with tetanus and typhoid inoculations.

There is a risk from Dengue fever in Singapore. You should take all normal precautions against being bitten by mosquitoes; see website reference below.

Special notes:

- There is a mandatory death penalty for certain offences including drug trafficking. Trafficking is defined by possession of drugs above a certain amount (e.g. 500g of cannabis). There are severe penalties for all drug offences in Singapore.
- There is no malaria in Singapore, but there is a risk from dengue fever. For advice on how to prevent insect bites visit: <http://www.nathnac.org/pro/factsheets/iba.htm>.
- Tap water is safe to drink, and all local food is generally considered safe to eat.

Charges are made for all healthcare visits; insurance is strongly recommended.

Visas

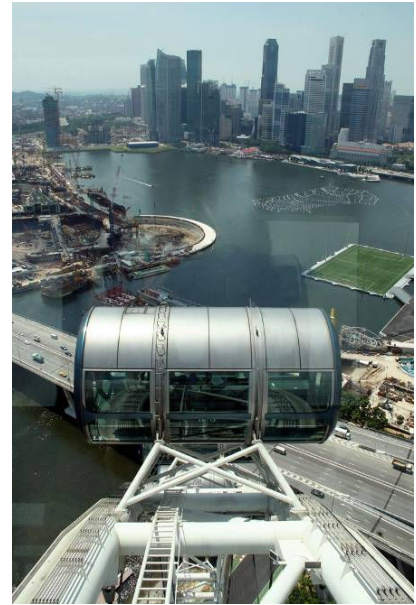
Singapore has a fairly liberal policy on visas for visitors: people from the majority of countries can visit visa-free for limited periods of time. However, there are countries for which all visitors require visas. For a list of these countries, visit: http://www.ica.gov.sg/services_centre_overview.aspx?pageid=252&secid=165

All visitors to Singapore must have:

- Valid travel document with at least 6 months' validity
- Onward or Return ticket
- Entry facilities to their next destination
- Sufficient funds to stay in Singapore

International travel

Most major airlines and few budget airlines travel to Singapore. Your routing may have a significant impact on flight costs. Please contact us if you encounter any difficulties.



Training schedule

Note: subject to change depending on field trips.

Day	No.	Time	Main subjects	Details
Monday		08.30 - 09.00	Introduction & welcome	Introduction to the course
	1	09.00 – 10.30	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	11.00 – 12.30	Survey methods & data collection	Watsan survey formats & practice: needs assessment, checklists, sanitary surveys, village mapping.
	3	14.00 – 15.30	Hygiene promotion	How to do it: village method, ToT workshop method. Teaching methods & materials. Monitoring. Hygiene baseline data & T-shirts.
	4	16.00 – 17.30	Handwashing	Importance of handwashing. Practical: different handwashing options.
Tuesday	5	09.00 – 10.30	Sanitation options 1	Types – e.g. emergency, family, communal, school latrines. Sludge accumulation rates, and disposal, treatment, and reuse options. Principle of traditional latrine vs VIP, ecological options. Sanplat & dome slab design, rebar spacing. Practical: footrest spacing.
	6	11.00 – 12.30		
	7	14.00 – 15.30	Sanitation options 2	Practical: latrine slab construction of standard and dome slabs. Concreting guidelines & rebar arrangements.
	8	16.00 – 17.30	Emergency sanitation 1	Practical: making a latrine in emergencies from available materials.
Wednesday	9	09.00 – 10.30	Solid Waste Management & vector control	SWM in refugee settings. Health Care Waste Management guidelines – standards necessary. Designs. Vector control overview. Practical: using sprayer.

	10	11.00 – 12.30	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.
	11	14.00 – 15.30	Sand filtration 2	Practical: casting household slow sand filter.
	12	16.00 – 17.30	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.
Thursday	13	09.00 – 10.30	Coagulation, flocculation & sedimentation 1	Product types & effectiveness. Calculating 1% alum solution. Practicals: Jar test, Watermaker demonstration, <i>Moringa</i> (natural coagulant) demonstration.
	14	11.00 – 12.30	Treatment methods for specific chemicals	Overview of treatment methods for removal of taste, colour, iron, manganese, fluoride & arsenic.
	15	14.00 – 15.30	Chlorination	Product types & effectiveness. Calculating 1% chlorine solution. Practical: making 1% solution & doing jar test - how to do in emergencies.
	16	16.00 – 17.30	Sand filtration 3	Practical: opening slow sand filter mould, finishing filter, filling with water & testing for leaks.
Friday	17	09.00 – 10.30	Water testing 1	Water quality standards & Sphere. When to test water, what is most important to test for – core and secondary tests.
	18	11.00 – 12.30	Water testing 2	Practical: collecting a sample and testing bacteriological & chemical parameters, including testing bacteria from SODIS demonstration.

	19	14.00 – 15.30	Coagulation, flocculation & sedimentation 2	Practical: visit to water treatment works
	20	16.00 – 17.30		
Saturday	21	09.00 – 10.30	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.
	22	11.00 – 12.30	Rainwater collection & tanks 2; Water testing 3	Practical: calculating tank size needed for training centre. Practical: reading water test results.
Monday	23	09.00 – 10.30	Field hydrogeology	How groundwater works – overview of aquifer types, springs, etc. Porosity, permeability. Geology.
	24	11.00 – 12.30	Shallow water sources	Shallow water sources: hand-dug wells, riverbed wells, infiltration wells, infiltration galleries, sub-surface dams. Hand dug well rehabilitation.
	25	14.00 – 15.30	Field surveying	Practical: how to use an Abney level. Field data collection and plotting elevation data.
	26	16.00 – 17.30	Spring protection	Springs & spring protection techniques – various options. Construction guidelines.
Tuesday	27	09.00 – 10.30	System curves: water flow in pumped pipe systems	Hydraulic theory, pipe friction tables & system curves. Practical calc: how much water flow to expect in a pumped system with various elevations and for various pipe types, sizes & lengths.
	28	11.00 – 12.30	Motor pump types & pump choice 1	Different pump options. Practical calc: choose a pump based on pump efficiency and power requirements that fits system curve from practical.

	29	14.00 – 15.30	Handpump operation & maintenance 1	Practical: handpump demonstrations of Canzee, IMK2, rope and treadle pumps. Handpumps or bucket system? VLOM introduced. Handpump sustainability explored. Review of types and operation: e.g. IMK2, Afridev, Canzee, rower, treadle, rope & washer. Advantages & disadvantages of types. Spare parts issues.
	30	16.00 – 17.30	Gravity flow water systems 1	How to design a simple gravity flow system.
Wednesday	31	09.00 – 10.30	Gravity flow water systems 2 ; Motor pump types & pump choice 2	Practical: measuring real flow in pipes & comparing to theoretical calculations (gravity flow & system curves), pipes & fittings, jointing PVC & PE pipes.
	32	11.00 – 12.30	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, rebar arrangement & apron.
	33	14.00 – 15.30	Hand dug wells 2	Practical: rebar bending, curved block and cutting ring mould construction (NB. we do not construct a well during the Singapore training).
		16.00 – 17.30		
Thursday	34	09.00 – 10.30	Sand filtration 4	Practical: Washing sand & gravel, filling slow sand filter with sand and gravel, maintenance instructions.
	35	11.00 – 12.30	Drilling 1: options	Drilling options – hand drilling, machine drilling, jetting, sludging.
	36	14.00 – 15.30	Drilling 2: well jetting	Practical: jetting

	37	16.00 – 17.30	Drilling 3: BushProof drilling	Practical: BushProof manual drilling.
Friday	38	09.00 – 10.30	Drilling 4: gravel pack & pumping test	Overview of technical drilling methods using rotary mud flush drilling as example: screen & casing options, screen slot size, drillers log. Borehole development. Pumping tests – how to do & what information they give. Aquifer pumping test data sheet. What to supervise in contracted boreholes. Practical calc: how to determine what kind of gravel pack needed from previous sieve analysis.
	39	11.00 – 12.30		
	40	14.00 – 15.30	Emergency water & sanitation overview; Emergency sanitation 2	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 calc: how to build 700 latrines in 7 weeks – materials, staffing, budget.
	41	16.00 – 17.30		
Saturday	42	09.00 – 10.30	Emergency water supply	Water supply & treatment options & scenarios including IDP/refugee scenarios. Kit list for Emergency Water Treatment & Supply kit for 10,000 people. Group work: to identify a solution for a given situation based on what was taught during the previous days. Supply, treatment, distribution.
	43	11.00 – 12.30		
	44	14.00 – 15.00	Course evaluation	