HydroLOGICA

Global Water CENTER

Borehole Drilling Supervision Guide

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Adapted from *Supervising Water Well Drilling: A Guide for Supervisors* (RWSN, 2014).
www.rural-water-supply.net

1. Site Verification Checklist

Activity	Checklist	Yes	No	
Water User priorities – based on Community engagement	**Proximity to point of use:**			
	Equitable access for all water users, especially women and most disadvantaged in the Community	◯	◯	
	Land ownership and access rights for users and maintenance teams established and confirmed in writing	◯	◯	
Geological favourability - based on hydrogeological assessment	Sufficient yield for the intended purpose	◯	◯	
	Appropriate water quality for the intended purpose	◯	◯	
	Interference (commingling) with other groundwater sources and uses avoided	◯	◯	
	Desk study was completed, accurate and recommend drilling	◯	◯	
	Geophysics study was completed, accurate and recommend drilling	◯	◯	
		High	**Medium**	**Low**
	Chance of success	◯	◯	◯
Permits	Permits acquired	◯	◯	
Contamination risk	Is the aquifer confined?	◯	◯	
	No potential pollution sources within minimum distances	◯	◯	
Drilling logistics	Sufficient access for heavy equipment and vehicles including road surface, width and turning radii	◯	◯	

Activity	Checklist	Yes	No	
Community liaison	Explain details of drilling process	◯	◯	
	Community member roles, contributions and responsibilities	◯	◯	
	Exchange details of main contact persons or community representatives	◯	◯	
	Driller's representative introduced to the Community	◯	◯	

2. Premobilization Checklist

Item	Checklist	✓	Notes
Premobilization Meeting			
	Clarify roles and responsibilities for all parties, including who is responsible for what once on-site.	☐	
	Review the contract, permits, borehole design, required materials, and procedures with all parties.	☐	
	Review and approve the program of works, including the schedule for mobilization, drilling, testing, and completion.	☐	
	Review and approve target depths, drilling diameter, and casing and screen diameter.	☐	
	Discuss technical specifications and drilling procedures.	☐	
	Confirm expected equipment to be brought to site, and review crew qualifications and certifications.	☐	
	Share project objectives and community context information.	☐	
	Establish the communication plan, including protocols, contact information, and reporting formats.	☐	

Item	Checklist	✓	Notes
Establish data collection and monitoring procedures.		☐	
Confirm site access routes and equipment transportation plans.		☐	
Identify potential risks and agree on mitigation strategies.		☐	
Establish procedures for handling contract changes or problems on-site.		☐	
Equipment is Fit for Service, Fit for Purpose and Sufficient Quantity			
Drilling rig	Year of Manufacture:		
	Manufacturer:		
	Holdback capacity:		
	Hydraulic system operational	☐	
	Engine and hydraulic system starts and runs for 15 min	☐	
	Check for leaks, damage, non working accessories, or missing parts	☐	

Item	Checklist	✓	Notes
Compressor	Year of Manufacture:		
	Manufacturer:		
	Start and run for 15 minutes without problem	☐	
	Confirm compressor volume and pressure is sufficient for diameter of well to be drilled	☐	
	Check for leaks, damage, non working accessories, or missing parts	☐	
Mud pump	Year of Manufacture:		
	Manufacturer:		
	Start and run for 15 minutes without problem	☐	
	Confirm mud pump volume and pressure is sufficient for diameter of well to be drilled	☐	
	Check for leaks, damage, non working accessories, or missing parts	☐	

Item	Checklist	✓	Notes
Equipment is Fit for Service, Fit for Purpose and Sufficient Quantity			
Generator (if applicable)	Check rating against estimated borehole depths	☐	
	Test pumps	☐	
Water tanker	Check for leaks	☐	
	Note volume	☐	
Support trucks	Check that the Driller has the necessary working support vehicles	☐	
Materials is Fit for Service and in Sufficient Quantity			
Drill pipes/rods	Check that there are adequate lengths of drill pipes/rods to drill the deepest hole	☐	
	Note drill rod length and diameter	☐	

Item	Checklist	✓	Notes
Drill bits (and hammer depending on the type of drill rig)	Hammers and bits are of the right diameter (measure)	☐	
	Right drill bits available for likely ground conditions	☐	
	Check fit for service condition	☐	
Samples of materials meet technical specifications	Temporary casing diameter and total length is correct	☐	
	Drilling fluid additives	☐	
	Sample box or sample bags	☐	
	Casing and screen (measure length and diameter)	☐	
	Note wall thickness and confirm casing collapse pressure is adequate for borehole depth	☐	
	Screen	☐	
	Filter pack and gravel materials	☐	

Item	Checklist	✓	Notes
Personnel			
Drilling manager	Years of experience:		
	Experience with similar assignments:		
Rig operator	Years of experience:		
Driver	Years of experience:		
Mechanic	Years of experience:		
Rig assistants	Number of assistants:		
	Years of experience:		
Record Taker	Years of experience:		

3. Mobilization Checklist

Activity	Checklist	✓	Notes
Programme of work	Programme of work submitted and approved	☐	
Data collection forms	Format of data entry forms agreed	☐	
Project filing system	Daily drilling logs	☐	
Drill site layout	Location of vehicle and rig parking	☐	
	Maintenance garage	☐	
	Site office and living accommodation	☐	
	Fuel storage and spillage control measures	☐	
	Water supply source	☐	
	Sanitation facilities	☐	
	PVC casing and screens protected from direct sunlight	☐	

Activity	Checklist	✓	Notes
Site setup and safety	Rig set up away from traffic hazards and power transmission lines	☐	
	Rig and support vehicle not positioned on a steep slope	☐	
	Drilling team wearing personal protective clothing: boiler suits, hard hats, boots, eye protection and gloves	☐	
	Flammable items such as fuels or chlorine etc kept in approved containers, properly marked and stored away from sources of heat	☐	
	First Aid kit checked	☐	
	Emergency procedure in case of major injury and need for hospitalisation	☐	
Rig position	Rig positioned over pegged site	☐	
	Level and plumb	☐	
	Check that rig outriggers have blocking, are stable and on native soil	☐	

4. Active Drilling Checklist

Activity	Checklist	✓	Notes
Health and safety	Mast not raised during thunderstorm (lightning strike risk)	☐	
	Lifting of very heavy or bulky loads which could lead to back strain should be avoided. Lifting should be done using the legs and not with the back	☐	
	Trips, slips and spills	☐	
	Drill crew should drink plenty of fluids regularly to prevent dehydration, which can lead to poor judgement	☐	
	Fire extinguishers on site and accessible	☐	
During Drilling Operations			
Drilling Depth	Depth measurements being conducted and logged properly	☐	
Penetration Rate	Penetration rates being measured properly	☐	

Activity	Checklist	✓	Notes
Drilling Fluid	Type of drilling fluid being used:	☐	
	Driller using Marsh funnel to measure drilling fluid viscosity	☐	
	And a mud balance to measure mud weight	☐	
Maintaining Proper Circulation (Mud or Air)	For Rotary mud drilling, check that the circulation mud pits (or portable tanks) have a volume that is at least three times the volume of the borehole.	☐	
	Ensure that the Driller prevents sample contamination due to poor circulation, borehole erosion or caving.	☐	
	Ensure that mud pits are kept clean to prevent re-circulation of cuttings.	☐	
Strata Log	Samples taken at regular intervals and properly washed, bagged, labelled, logged and stored in sample box	☐	
	Photograph samples	☐	
	Use samples to prepare a Strata Log	☐	
Drill Report	Daily drilling log signed by rig operator and Supervisor (Download report here)	☐	
	Daily Strata Log signed by contractor and Supervisor	☐	

5. Borehole Design Checklist

Design Criteria	Value	✓	Notes
Borehole Depth (metres)			
Aquifer/Rock Type	◯ Basement ◯ Consolidated ◯ Unconsolidated		
Expected or forecasted yield (litres per second)			
Drilled borehole diameter (mm)			
Type of borehole casing and screens:	◯ PVC ◯ Steel ◯ Other: _____		
Wall diameter and thickness (mm) check diameter and wall thickness with callipers			
Quantity of borehole casing & screens (m)			
Screening length (m)			

Design Criteria	Value	✓	Notes
Installation of casing and screens	Produce sketch of proposed assemblage of casing and screen	☐	
	Layout casing and screening on the ground, check against sketch and photograph	☐	
	Check joints between casing pipes	☐	
Gravel pack	Ensure that gravel pack design is adhered to (formation stabiliser or filter pack)	☐	
	Check that formation stabiliser does not contain mica, clay or laterite. Should be a 2-4mm silica based rounded material	☐	
Sanitary seal	Check sanitary protection design, proper depth and material composition. Should extend at least 5 meters below the ground level and be of an impermeable material preferably bentonite chips or a neat concrete grout	☐	

6. Borehole Development and Site Completion

Activity	Checklist	Yes	No
Borehole development success	Duration of development meets contract specifications	◯	◯
	Borehole development successful (Water is turbid and fine free):	◯	◯
	If NO then should the Driller continue development?	◯	◯
	If YES a re-drill is needed, should it be at the Driller's cost?	◯	◯
Borehole disnfection	Was borehole disinfected?	◯	◯
Platform casting	Correct sand : cement : aggregate ratios (1:2:4)	◯	◯
	Correct drainage slope (1:50)	◯	◯
	Surface trowelled smooth	◯	◯
	Borehole number, date of completion, yield and water levels embedded in the wet concrete or noted in other location	◯	◯
	Concrete kept moist for 72 hours to allow proper curing	◯	◯
	Is the finished platform acceptable?	◯	◯

Activity	Checklist	Yes	No
Final borehole review	Depth to static water level acceptable	◯	◯
	Adequate yield	◯	◯
	Acceptable sand content of pumped water	◯	◯
	Acceptable turbidity of pumped water	◯	◯
	Borehole straight and vertical	◯	◯
	Acceptable chemical quality of pumped water	◯	◯
	Acceptable bacteriological quailty of pumped water	◯	◯
Water quality testing results	Turbidity acceptable	◯	◯
	Chemical parameters acceptable	◯	◯
	Bacteriological quality acceptable	◯	◯

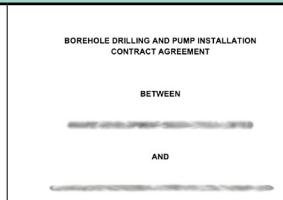
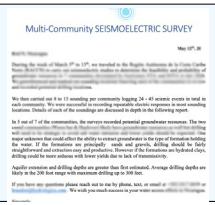
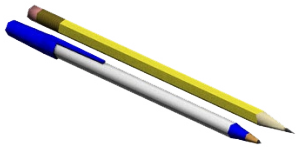
7. Demobilization Checklist

Activity	Checklist	✓	Notes
Work complete	Borehole should be securely capped on completion to prevent tools and other debris falling into the hole and children throwing stones and corn stalks into it which could render it useless.	☐	
	All installation work complete and approved by Supervisor	☐	
	All testing completed and documentation and data handed over to Supervisor	☐	
Drilling site cleared	On completion, the site should be restored as far as possible to what it was before the drilling, mud pits filled in and compacted.	☐	
	All litter, liquid and solid waste disposed of responsibly so as not to cause nuisance	☐	
	Circulation pits filled in	☐	
	Equipment cleaned and packed away	☐	
	Unused materials taken away (check with contract who owns or pays for unused materials, such as casing, filter packs etc.)	☐	
	No environmental contamination including oil our fuel spills	☐	
	Public barrier taken down.	☐	

8. Completion Checklist

Activity	Checklist	✓	Notes
Reporting	Drilling report completed and copies given to Client, the Community and the Regulator/ Government water or geology ministry	☐	
Handover	Agree handover date with Driller, Community and Client.	☐	
	Organise signed handover of borehole to the Community or Client.	☐	
Defect Liability Period	Agree on monitoring schedule.	☐	
	Report any problems found, or reported by the Community to the Client. If necessary, mobilize the Driller to undertake repair work.	☐	
Invoicing and payment	At end of defects liability period, submit supervision invoice to Client and give approval for final payment to Driller (depending on contract).	☐	

9. Drilling Supervisor Toolkit Checklist

Item		Purpose	✓	Notes
Documentation				
Copy of the Drilling Contract	 BOREHOLE DRILLING AND PUMP INSTALLATION CONTRACT AGREEMENT BETWEEN [redacted] AND [redacted]	Includes the BoQ and technical specifications, preliminary borehole designs, and authorities and escalation measures	☐	
Hydrogeological and siting reports	 Multi-Community SEISMOELECTRIC SURVEY	To verify the site location	☐	
Daily drilling log	 Location Equipment Fit for Purpose Pre Drilling Review	To record drilling activities—depth, geology, water strike, equipment status, personnel, PPE, etc.	☐	
Notebook or paper		For taking notes during drilling	☐	
Pen / pencil		To enter information into the log, take notes, etc.	☐	

Item		Purpose	✓	Notes
Clipboard or folder		For keeping documentation safe from damage or wind	☐	
PPE				
Hard hat		For protection from falling objects or bumps to the head	☐	
Work boots		To keep feet from being injured and to prevent slipping	☐	
High visibility vest		So to be visible to everyone on site	☐	
Gloves		For protection from damage from equipment, chemicals and falling objects	☐	

Item		Purpose	✓	Notes
Eye protection		For protection from splatters, dust, falling objects, etc.	☐	
Mask		For protection in high dust/ fume situations	☐	
Hearing protection		To protect against dangerous noise levels coming from the rig and drilling equipment	☐	
Equipment and supplies				
Calipers		To measure casing and screen thickness	☐	
Camera		To document all aspects during all drilling phases	☐	

Item		Purpose	✓	Notes
GPS device		To verify the siting location coordinates	☐	
Spirit level		(Ideally magnetic) to ensure the rig is level and drill rods straight	☐	
Tape measure		To measure casings, screens and rods–diameters and lengths	☐	
Strainer & bucket		To wash the cuttings to identify changes in geology and confirm water strike	☐	
Baggies		To collect and sort cuttings	☐	
Marker		To label the cuttings bags	☐	

Item		Purpose	✓	Notes
Long tape measure		To measure the borehole depth	☐	
String and weight		To measure the borehole depth	☐	
Electric water level meter		To measure the water depth	☐	
Stopwatch		For timing tests	☐	
Downhole camera		To examine the borehole, casings and screens for issues	☐	
Conductivity/pH meter		Quick test for salinity (not for water quality testing for suitability)	☐	