

Source - General

Matt Bower
DWQR Risk Assessment Training
2018



Overview

Source :

Anywhere the PWS
originates from



Overview

Source :

Anywhere the PWS
originates from



Overview



Biggest risk?
Lack of
knowledge

What are we risk assessing?



What are we risk assessing?



What are we risk assessing?



What sort of risks?



What sort of risks?

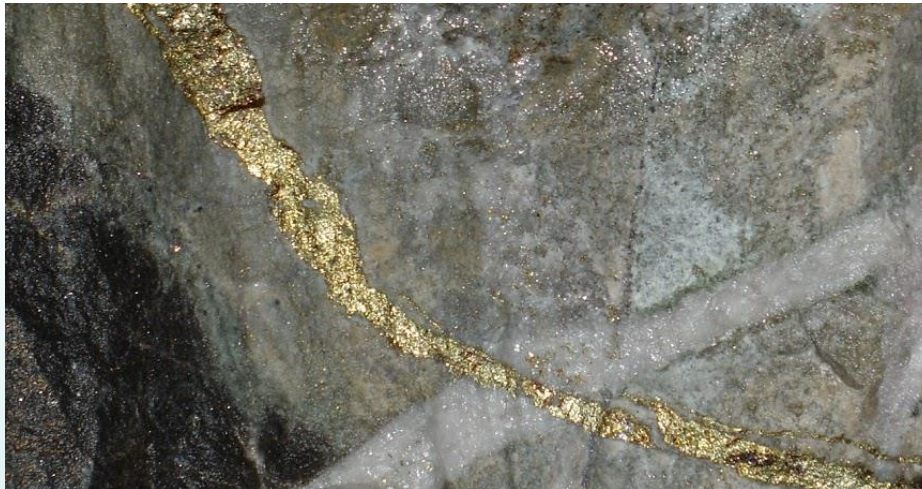
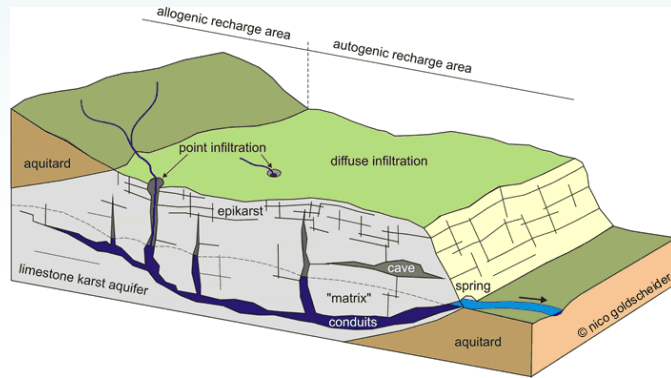
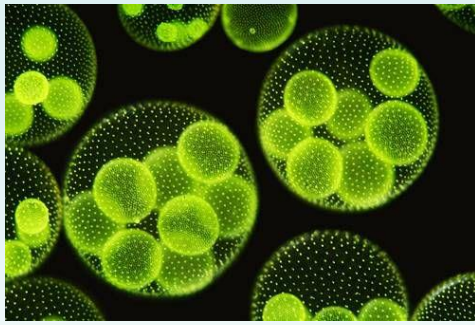


What else? Manmade Issues



What else?

Natural Issues



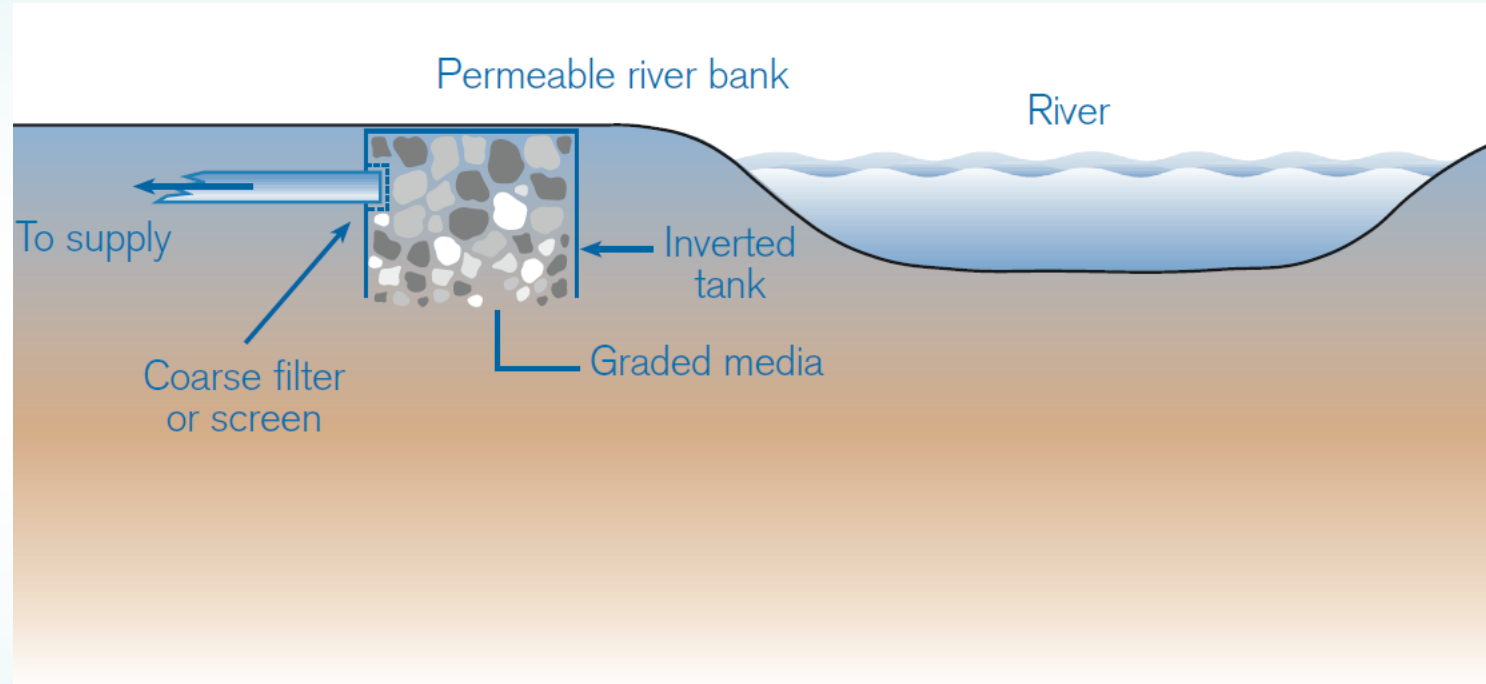
Questions

SG1	Is there a lack of knowledge and understanding about the source of the supply?	<p>The origin/location of the water source(s) should be known. A site plan or schematic should be available, this can be a simple sketch or a more complex and detailed drawing depending on the size of the supply. It need not be to scale but should represent the main source(s) of the supply. It is essential to have a knowledge of the source(s) so that any contamination risks can be identified and appropriate mitigation action taken.</p> <p>If location or understanding of the source of the supply is not present then the risk assessment of the source is difficult if not impossible to achieve. If not present, the likelihood should be scored as 5 and the person in control should be asked to make arrangements to determine the source and provide a map of the source as part of the action plan.</p>	5
SG2	Is there a risk of faecal contamination of the source from activities in the catchment?	<p>The active application of slurry/dung is a hazard in conjunction with the disruption of the soil itself, e.g. via ploughing or sub-soil injection. The likelihood value will be based on the probable duration and frequency at which such activities are undertaken.</p> <p>In some areas brownfield sites or derelict land will be remediated using sewage-derived sludge or slurry or similar materials. The rate of application will typically be higher and this should be borne in mind when assessing the risk.</p> <p>The presence of livestock close to the source has the potential to lead to microbiological contamination of the source. Consider periods for which animals are present, the time of year they are present, density of livestock, and closeness to the source.</p> <p>New sources should not be installed within 50m of unsewered human or animal waste in high vulnerability areas.</p>	5
SG3	Is there a risk of faecal contamination of the source from storage or distribution of sewage/waste?	<p>If unsewered human or animal sanitation facilities (e.g. latrines, septic tanks, cess pits or animal enclosures) are present within 50m of the source then there is considerable potential for raw sewage to contaminate the source of the drinking water supply.</p>	5
SG4	Is there risk of chemical contamination from manmade activities in catchment (use or storage of chemicals including landfill sites, mining)?	<p>If storage/disposal sites for pesticides are located close to the source, the risk characterisation should reflect this. Look for any evidence of sheep dipping activity in the area when assessing the site.</p> <p>Pesticides may also be periodically applied to the land. The timing of applications and the nature of the pesticide will depend on the crops being grown or the livestock present. Chemical fertilizers typically contain nitrates and phosphates which may enter watercourses through run-off or leaching. Levels will vary depending on the rates of application, weather conditions and the longer term history of applications at the site.</p>	4

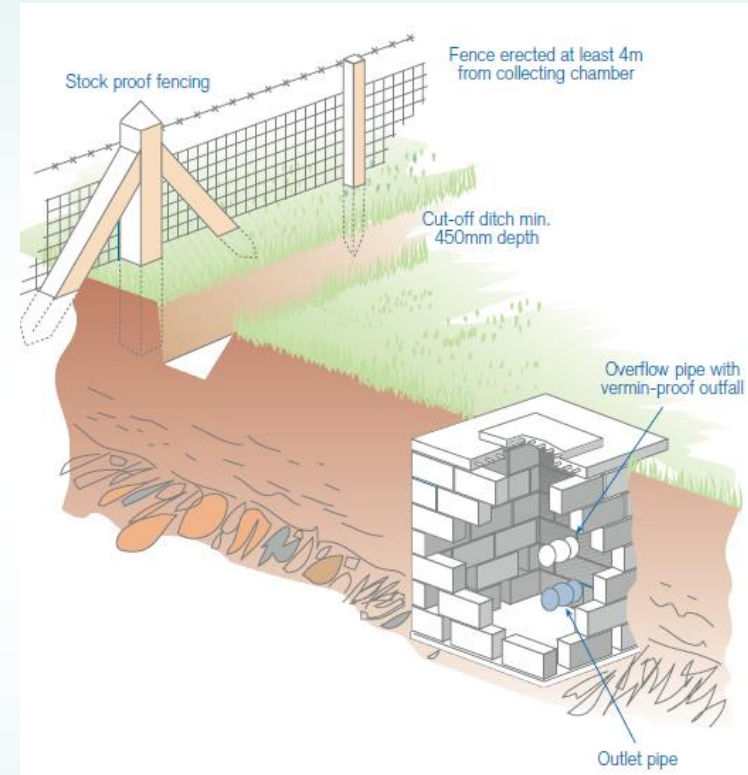
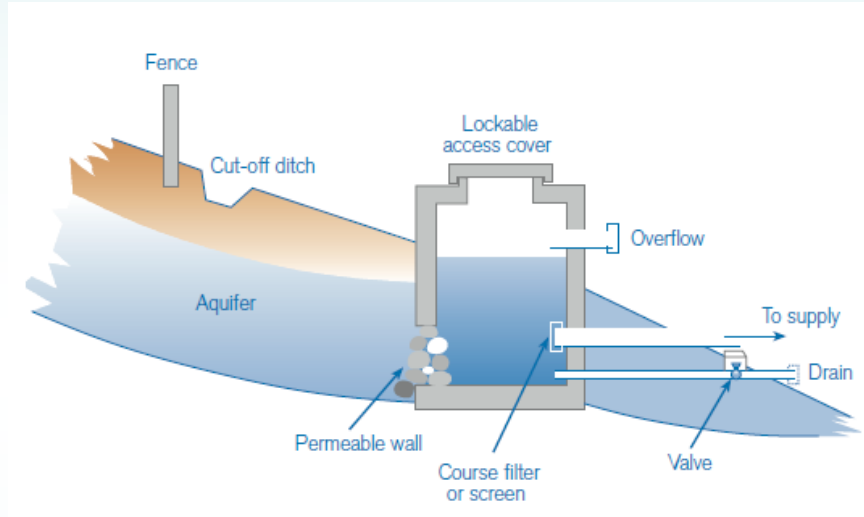
Questions

SG5	Is there a risk of chemical contamination from natural sources (local geology)?	Minerals and substances such as boron, arsenic, lead, fluoride, uranium, nickel and radon can be naturally occurring and can be determined from local geology maps or from groundwater testing under the WFD. Current or historic mining activity can be an indicator that these hazards exist. Because these are naturally occurring they have the potential to affect large areas, although they can sometimes be more localised particularly where groundwaters are concerned.	4
SG6	Is there a risk of the supply running dry or being over-abstracted?	Insufficiency caused by low levels of stored water may result in, for example, increased algal populations (due to increased temperature and sunlight), limescale deposits in ground water, sludge, increased metal concentrations and reduced oxygen levels. The insufficiency of supplies is a hazard in itself. Additionally, there are hazards associated with water levels recharging or replenishing including increased turbidity, nitrates, pesticides, or cryptosporidium from run-off.	4
SG7	Is the source at risk from vandalism (deliberate contamination of source and unauthorised access)?	Adequate protection will be site specific depending on the level of accessibility of the site to the general public. Measures may include fencing, gates and padlocks, etc.	4
SG8	Is there a risk that inappropriate materials are used in the construction of the supply?	All materials used at the source should be approved for use with drinking water and not introduce contaminants into the water unless subsequent treatment is installed and operating to remove these contaminants further along the water supply system.	4
SG9	Is the source difficult to access in order to undertake monitoring & improvements?	The source of the water supply should be accessible so as to allow it to be regularly inspected and maintained as necessary.	4
SG10	Are there any planned future activities that may affect the supply?	Consider any future activities planned in the vicinity of the source that may impact on the sufficiency or quality of the water supply.	4

Overview – Surface Water



Overview – Surface Water



Overview – Surface Water



Overview – Surface Water

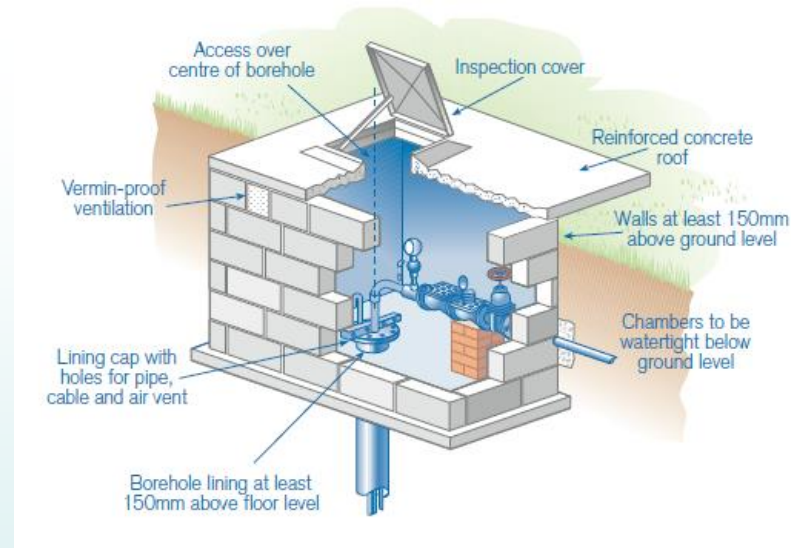
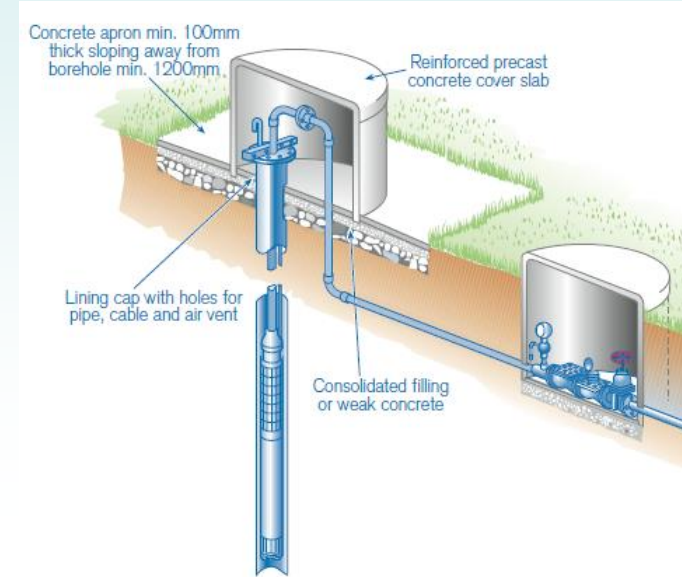
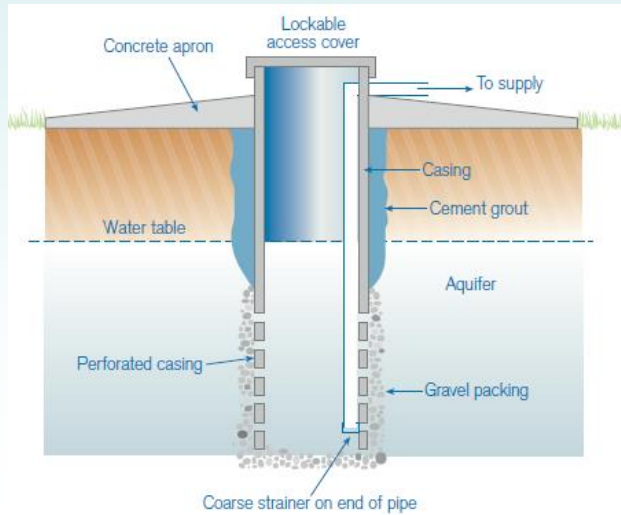


Questions

SSW1	Is there a noticeable change in the quality of the water due to meteorological conditions (colour, cloudiness/turbidity)?	Source water quality may be impacted by weather conditions such as high winds or heavy rainfall causing turbulence in the source water, disturbance of sediments and increased surface water run-off. Changes in levels and flows can result in deterioration of raw water quality with associated increases in turbidity and colour due to the suspension of sediment. This will be most prevalent during periods of heavy rainfall, when flooding and rapid runoff of surface water into the source can occur. Associated water treatment must be designed to meet the demands of these "flashy" conditions.	4
SSW2	Is freshwater aquaculture practised upstream, causing contamination (feed, pesticides etc.)?	Hazards associated with fish farms include pesticides, particulates from organics feed and waste material, including faecal matter.	4
SSW3	Is the source water used for recreational purposes?	Recreational water can become contaminated especially if there are boating activities as boats can discharge oil, lavatory waste or other chemicals into the water. The risk of contamination of a PWS by oil or fuel can be reduced by installation of a boom surrounding the intake point.	4
SSW4	Is the source water subject to seasonal algal blooms?	The main hazard associated with algae is filter blocking. However, some species of blue green algae produce toxins. This is a seasonal occurrence, therefore check with the person in control if they have experienced this at the supply. Assessment of the associated risk to public health is not straight forward. Such assessment should therefore take account of specialist advice such as "Blue -green algae (Cyanobacteria) in Inland Waters: Assessment and control of risks to public health".	3
SSW5	Could activities such as forestry, quarrying or construction create a risk to quality?	Forestry activities including fertiliser applications and felling can result in the release of nitrates and phosphates into water bodies through run-off. This can contribute to the eutrophication of surface water sources. Quarrying and construction activities have the potential to release sediment and suspended solids which can impact the quality of surface water sources by increasing turbidity levels.	3
SSW6	If the source is a spring, could surface water or spillages of contaminated material enter the supply because the headworks isn't fully sealed ?	If the chamber is not in a satisfactory state of repair, the lining is not watertight (i.e. where there is deterioration of the cement lining, brick, stone or concrete rings by roots or by other damage) or does not have a watertight cover, then there is a risk of ingress into the spring chamber causing potentially contaminated surface water to enter the supply. If there is evidence that the chamber is not watertight then the likelihood score should reflect the almost certain nature of the hazard.	5
SSW7	Is there a risk of debris or particulate matter entering the supply?	The intake from a river/lake/stream should be located away from any features that may cause turbulence and increase the disturbance of the source water. The design and construction of the spring/surface water collection chamber should be such so as to prevent vermin, debris or particulate matter entering the supply. The intake should enter through the base or side of a collection chamber through a coarse filter of natural material or purposely provided small stones/gravel/sand or the inlet pipe should be fitted with a strainer to prevent the ingress of fish, debris or vermin.	3
SSW8	Is there a risk of the intake becoming clogged?	Clogging of the intake may cause loss of supply due to blockage of strainers/ filters or pipe work. Note, frogs are often found in spring supplies and can clogg inlets/outlets and pipe work. The design and construction of the spring/surface water collection chamber should be such so as to prevent vermin, debris or particulate matter entering the supply.	3

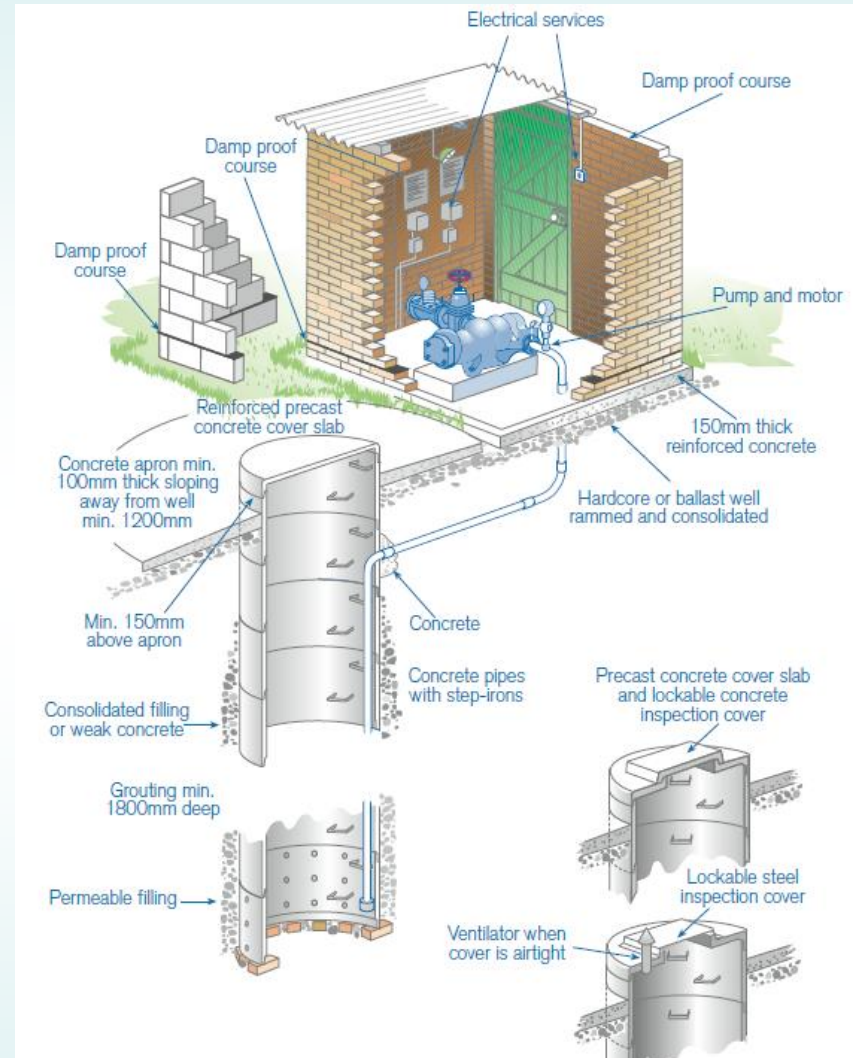
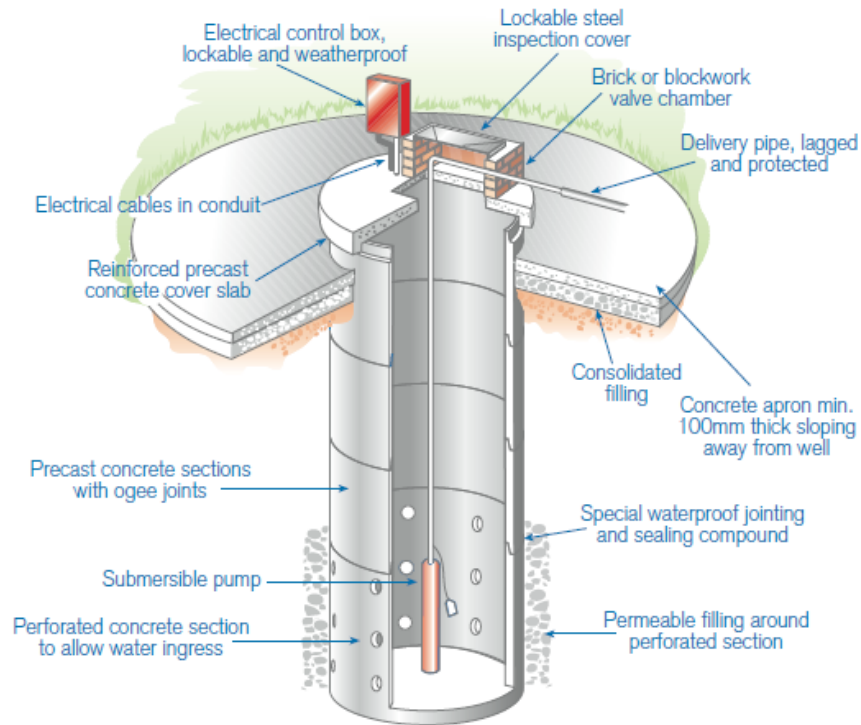
Overview - Groundwater

Boreholes

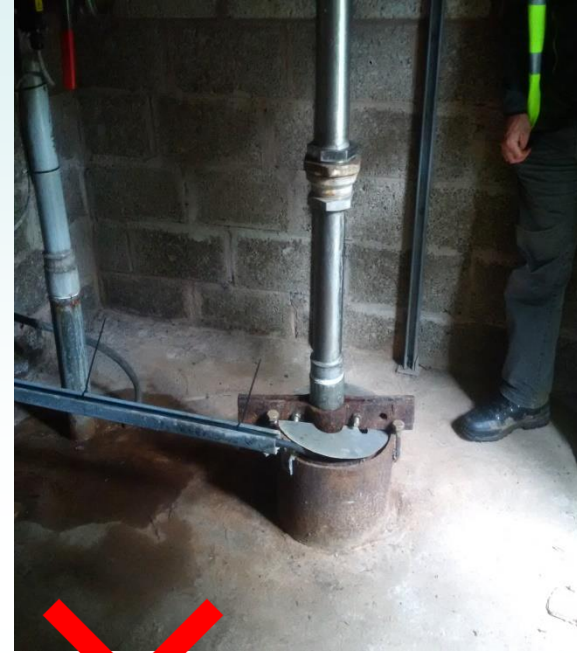


Overview - Groundwater

Wells



Overview - Groundwater



Questions

SGW1	Are there any abandoned wells or observation boreholes in the vicinity of the source that could present a risk of aquifer contamination?	If there are unused supplies or wells associated with the supply under investigation then the potential for material to be introduced directly into the source water exists. For example, if an older, out of use well is located adjacent to the currently operational well, any contamination of the out of use well or borehole can affect the water source.	4
SGW2	Could livestock have access to the well head area ?	Look for any evidence of domestic livestock production being present either directly (by the presence of animals in the vicinity of the supply) or indirectly (through presence of broken ground around the supply or the presence of animal droppings around the supply). Risks can be increased where the source is in a high vulnerability area.	5
SGW3	Is there a risk of standing water/ponding within 50m of the headworks?	Look for evidence of standing water around the source, or evidence standing water has been present (marshy ground). This indicates the soil around the source is more likely to be saturated and therefore any flow of surface water into the source will be faster. Risks can be increased where the source is in a high vulnerability area.	4
SGW4	Is there a risk of ingress due to poor headworks design, construction or condition? E.g. lack of grouting, diversion ditches, concrete aprons,.....	Surface water or subsurface flows can contaminate the borehole/well where there is inappropriate or absent grouting or lining material. This can be protected against through the use of appropriately engineered borehole arrangements. The borehole needs to be protected from the ingress of surface flows (such as flooding). This can be accomplished in a variety of ways such as having a ditch surrounding the borehole with an impermeable lining and a suitable discharge downslope from the borehole conveying surface water away from the immediate vicinity of the borehole. It should be borne in mind that evidence of surface flows may not be present at the time the supply is visited, but could still be a risk under the right circumstances. The design and construction of the headworks needs to take this into account.	5
SGW5	Is there a risk of failure of the borehole pump due to lack of regular maintenance?	Without a record of when the borehole pump was installed and regular servicing of the pump then there is a risk of the pump failing and no water being available. This is more critical at sites where there is no storage of water. A maintenance and inspection programme should be in place.	4
SGW6	Is the ability to sample the water from each specific borehole inadequate?	Where the water supply comes from more than one groundwater source, it is important to be able to sample the individual sources. If there is an issue regarding contamination of the water supply, the investigation may require sampling of the individual sources to identify the source of the contamination. This would allow decisions to be taken regarding taking certain boreholes out of service. In addition, the ability to sample specific boreholes would allow the identification of any parameters that may need to be diluted through blending with other boreholes.	3
SGW7	Is there a risk of chemical contamination (e.g. hydrocarbons, pesticides, nitrates) either directly to the headworks or to the local groundwater?	Contamination can occur from a number of sources, including accidental spillage, intentional (but inappropriate) application in the area directly around the borehole, and more widespread contamination of ground water from diffuse pollution in the groundwater catchment area. In areas where the bedrock is fractured or highly permeable (such as limestone Karst), activities some considerable way from the borehole can have an impact on quality. Specialist geological advice may be needed.	4