

Geological environment - field appraisal

A – Basic information about the catchment

Name of Water Expert:

Woreda:

Kebele:

Got:

Name of Catchment / Water Point:

Type of water point (tick as appropriate): ☐ HDW
☐ Protected Spring
☐ Drilled Well
☐ Other (specify).....

Altitude (m above sea level): Highest point of catchment:
 Lowest point of catchment:

Agro-climatic Zone
 (See Annex xx):

		High Wurch	Altitude >3700m
		<input type="checkbox"/>	
	Moist Wurch	Wet Wurch	3200 – 3700m
	<input type="checkbox"/>	<input type="checkbox"/>	
	Moist Dega	Wet Dega	2300 – 3200m
	<input type="checkbox"/>	<input type="checkbox"/>	
Dry Weyna Dega	Moist Weyna Dega	Wet Weyna Dega	1500 – 2300m
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Dry Kolla	Moist Kolla		500 – 1500m
<input type="checkbox"/>	<input type="checkbox"/>		
Berha			< 500m
<input type="checkbox"/>			
Rainfall	Less than 900 mm	900 – 1400 mm	More than 1400 mm

Population planned for waterpoint: Households: People:

B – Identifying geological environment

1. Farta Woreda is dominated by rocks typical of shield volcanoes, with contain four main rock types: basalts, volcanic ashes, trachytes and alluvial sediments in local depressions.

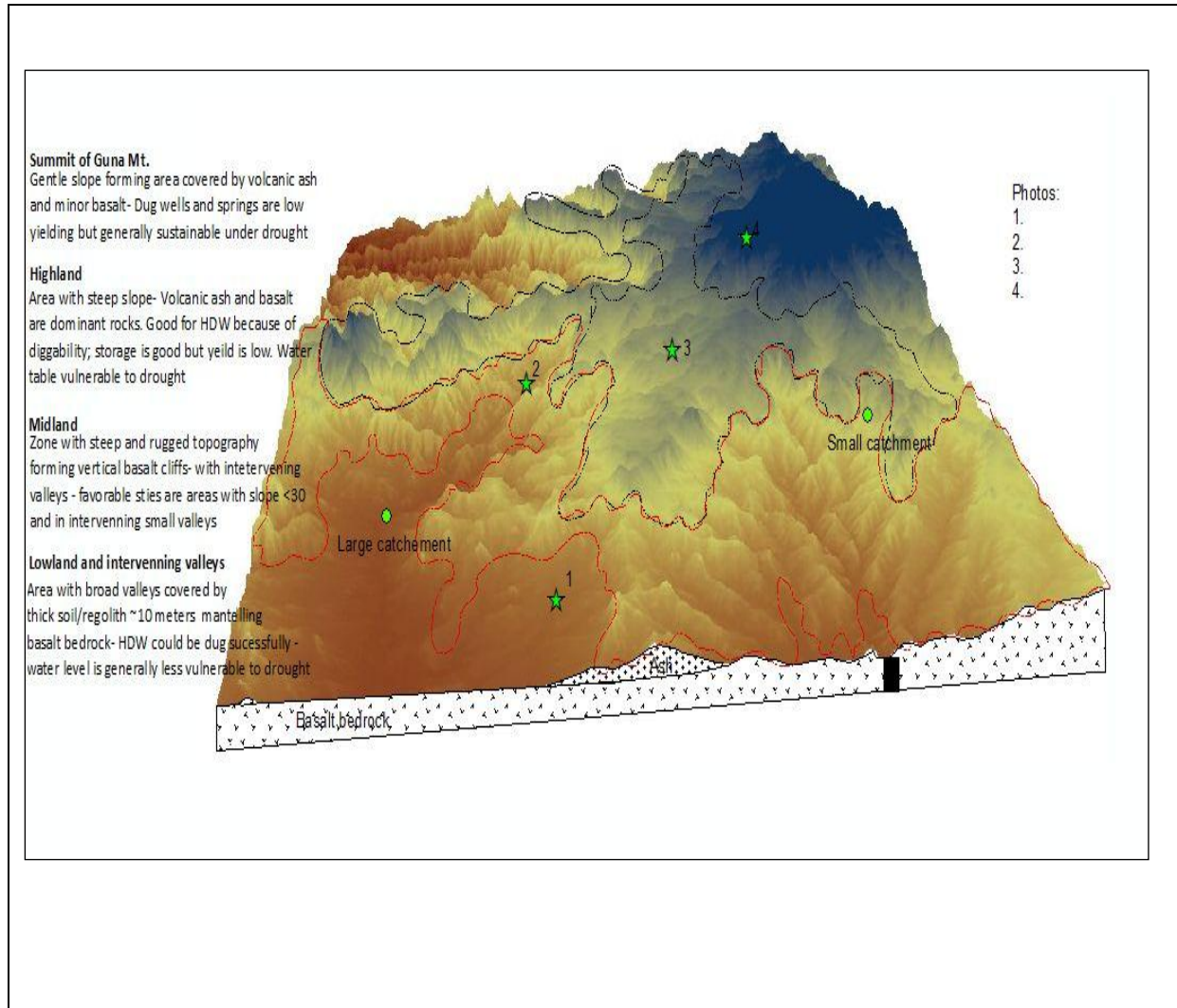


Figure XX Basic geological structure of Farta Woreda

2. Identifying the geological environment is done through visual inspection of the area where the water point is to be sited.
3. Walk from highland to low land, collect rocks , mark the positions and convert this to simple map. Creeks and gullies often expose rocks that would otherwise be covered by soil, and allows an estimate to be made of the thickness of alluvial deposits. Unweathered rock is often used to construct walls and buildings.
4. Different rocks have characteristic landforms
5. The annexed sheets can be used as an aid to identifying the different rock types and geological environments.

Sketch geological map

Basalt– Identification in shield volcanoes



Morphology: Cliff forming, flat topped, sharp edges



Outcrop: Variegated when weathered & dark when fresh



Hand-specimen: Minerals rarely visible, dark colored

Water schemes implication

- Zoned groundwater occurrence
- Groundwater occurs in joints, between flow contacts and in weathered top;
- Fractured zone is Low storage, high permeability ;
- Scorea zone is high storage high permeability; Weathered zone is high storage low permeability;
- Springs generally contact and focused type;
- Water quality is generally good ;
- Seasonal water level fluctuation is generally small
- Wells fill rapidly once pumped;
- Lining required near top (0-6 meters) and can be open in lower part
- Target weathered tops for successful water point
- Weathered zone is diagable, fresh zone is not

Trachyte– Identification in shield volcanoes



Morphology: dome forming



Outcrop: rounded cliff; low weathering degree



Hand-specimen: visible crystals/minerals; grey color, heavy

Water schemes implication

- Low storage, low yield, low permeability;
- Groundwater occurs in joints, between flow contacts and in weathered top (weathering is low in trachytes);
- Fractured zone is Low storage but high permeability ;
- Springs generally contact and focused type;
- Water quality is generally good ;
- Seasonal water level fluctuation is generally large;
- Wells fill rapidly up on drainage
- Low diggability

Volcanic ash– Identification in shield volcanoes



Morphology: gentle slope undulating; slope break when hard



Outcrop: Light colored, friable, sugary texture



Hand-specimen: light weight, porous

Water schemes implication

- Low yield but sustainable;
- Diffuse springs;
- Low water level fluctuation between wet and dry periods;
- High storage but low permeability (release to well);
- Springs generally diffuse discharge type;
- When deeply weathered is poor water bearing formation;
- Water quality is generally good may contain high F;
- Water level least vulnerable to rainfall variation
- Dispersion of ashes lead to sedimentation in well bottom – periodic dredging of sediment needed,
- Optional lining required in the top part

Alluvial sediments (Regolith)– Identification in shield volcanoes



Morphology: flat plain bounded by higher grounds



Outcrop: Occurs in foot hills of mountains, adjacent to rivers



Hand-specimen: Mix of clay, silt, sand, gravel, pebble, cobble

Water schemes implication

- High storage, high yield;
- Low to medium water level fluctuation between wet and dry periods;
- High storage and medium to high permeability;
- Springs generally diffuse discharge type;
- Water level least vulnerable to rainfall variation (decrease in recharge);
- Groundwater occurs in coarser part of the formation;
- Groundwater occurs also at the contact between the soft rocks and underlying bed rock;
- Underlying weathered and decomposed bed rock is good water bearing zone;
- High digability, but vulnerable to collapse, need lining all the time