

Federal Democratic Republic of Ethiopia  
Sugar Corporation, Wonji-Shewa  
Addis Ababa  
Ethiopia

# **WELLENCHITI SUGAR DEVELOPMENT EXPANSION IRRIGATION PROJECT**

**Volume II - Investigation and  
Sectoral Studies**

**SOIL SURVEY and Land Suitability  
Evaluation**

**Final Report**

**October, 2014**



**Water Works Design and Supervision Enterprise**

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# **Wollenchiti Sugar Development Expansion Irrigation Project**

## **Soil Survey Final Feasibility Study**

**October, 2014**

### **Issue and Revision Record**

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Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP27

Mapping unit: V17

Status: *pit sampled*

Soil classification, FAO *Andosols*

<b>Date:</b>	<i>16/02/05</i>
<b>Coordinate Long(N)</b>	<i>0946750</i>
<b>Lat(E):</b>	<i>0541600</i>
<b>Elevation:</b>	<i>1372/1488</i>
<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Position:</b>	<i>Medium</i>
<b>Dissection:</b>	<i>Slightly dissected</i>
<b>Depth to bedrock:</b>	<i>Very deep</i>
<b>Suface cracks:</b>	<i>None</i>
<b>Drainage external:</b>	<i>Well</i>
<b>Flooding</b>	<i>Unknown</i>
<b>Fertilizers:</b>	

  

<b>Author:</b>	<i>Aman</i>
<b>Location:</b>	<i>Welenchiti</i>
<b>Land form:</b>	<i>Valley floor</i>
<b>Regional slope:</b>	<i>Gently sloping</i>
<b>Slope class:</b>	<i>Very gently slope</i>
<b>Slope form:</b>	<i>Concave</i>
<b>Micro topography:</b>	<i>Terraced</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>
<b>Effective soil depth:</b>	<i>Shallow</i>
<b>Rock out</b>	<i>None</i>
<b>Surfcoarse fragments:</b>	<i>Common fine gravel</i>
<b>Sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Well drained</i>
<b>Water table:</b>	<i>Not observed</i>
<b>Land</b>	<i>Intensively cultivated land</i>
<b>land use:</b>	<i>rainfed areable cultivation, Teff, Maize</i>
<b>erosion status:</b>	<i>Sheet &amp; splash 5-10%Active at present moderate</i>

- 0-25cm:- 10YR 5/2 brown(dry), 10YR 3/1very dark gray(moist), sandy clay texture, very few fine gravel, massive structure, loose(dry), loose(moist), non sticky non plastic(wet), very fine very few roots, few burrows (unspecified) biol, common fine pores
- 25-50cm:- 10YR 7/1 light gray(moist), pumice texture, common fine gravel, strong coarse massive structure, firm(moist), non sticky non plastic(wet), few burrows (unspecified) biol, common fine pores
- 50-90cm:- 5YR 6/2 light brownish gray(moist), pumice texture, common medium gravel, strong coarse massive structure, firm(moist), non sticky non plastic(wet), few burrows (unspecified) biol, common fine pores
- 90-150cm:- 5YR 7/1light gray(moist), pumice texture, abundant medium gravel, strong coarse massive structure, firm(moist), non sticky non plastic(wet), few burrows (unspecified) biol, common fine pores
- 150-200cm:- 10YR 5/3 brown(moist), sandy clay loam texture, weak coarse subangular structure, firm(moist), non sticky non plastic(wet), few burrows (unspecified) biol, common fine pores

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP25

Mapping unit: V35

Status: *pit sampled*

Soil classification, FAO *Andosol*

<b>Author:</b>	<i>Aman</i>	<b>Date:</b>	<i>14/02/05</i>
<b>Location:</b>	<i>Welenchiti</i>	<b>Coordinate Long(N)</b>	<i>0947350</i>
		<b>Lat(E):</b>	<i>0542800</i>
<b>Land form:</b>	<i>Plain</i>	<b>Elevation:</b>	<i>1380/1499</i>
<b>Regional slope:</b>	<i>Flat</i>	<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Slope class:</b>	<i>Nearly level/Nearly level</i>	<b>Position:</b>	<i>Low</i>
<b>Slope form:</b>	<i>Uniform</i>	<b>Dissection:</b>	<i>Normal</i>
<b>Micro topography:</b>	<i>Terraced</i>	<b>Depth to bedrock:</b>	<i>Very deep</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>	<b>Suface cracks:</b>	<i>None</i>
<b>Effective soil depth:</b>	<i>Shallow</i>	<b>Drainage external:</b>	<i>Well</i>
<b>Rock out</b>	<i>None</i>	<b>Flooding</b>	<i>Unknown</i>
<b>Surfcoarse fragments:</b>	<i>Many fine gravel</i>	<b>Fertilizers:</b>	<i>DAP 50kg/ha</i>
<b>Sealing:</b>	<i>None</i>		
<b>Drainage class:</b>	<i>Well drained</i>		
<b>Water table:</b>	<i>Not observed</i>		
<b>Land</b>	<i>state farm</i>		
<b>land use:</b>	<i>irrigated cultivation/Maize, Teff, Haricot bean, Zengada</i>		
<b>erosion status:</b>	<i>Sheet &amp; splash 5-10%Active at present moderate</i>		

- 0-30cm:- 10YR 3/3 very dark grayish brown(moist), 10YR 2/1 very dark gray(moist), coarse sandy loam texture, many fine gravel, massive structure, loose(dry), loose(moist), non sticky non plastic(wet), very fine very few roots, few burrows (unspecified) biol, few fine pores
- 30-80cm:- 2.5YR 4/2 dark grayish brown(moist), pumice texture, many medium gravel, strong medium massive structure, firm(moist), non sticky non plastic(wet), many medium pores
- 80-120cm:- 5YR 5/2 grayish brown(moist), pumice texture, many medium gravel, strong medium massive structure, firm(moist), non sticky non plastic(wet), many medium pores
- 120-190cm:- 2.5YR 6/1 gray(moist), pumice texture, many medium gravel, strong medium massive structure, firm(moist), non sticky non plastic(wet), many medium pores
- 190-200cm:- 10YR 3/3 dark brown(moist), sandy clay texture, few fine gravel, massive structure, loose(moist), non sticky non plastic(wet), very fine very few pores

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP45

Mapping unit: V16

Status: *pit sampled*

Soil classification, FAO *Cambisol*

<b>Date:</b>	<i>04/03/05</i>
<b>Coordinate Long(N)</b>	<i>0942001</i>
<b>Lat(E):</b>	<i>0541575</i>
<b>Elevation:</b>	<i>--/1494</i>
<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Position:</b>	<i>Low</i>
<b>Dissection:</b>	<i>Normal</i>
<b>Depth to bedrock:</b>	<i>None</i>
<b>Surface cracks:</b>	<i>None</i>
<b>Drainage external:</b>	<i>Moderately well</i>
<b>Flooding</b>	<i>Annually 1 to 15 days</i>
<b>Fertilizers:</b>	<i>DAP 1:1, Urea 0.5:1</i>

  

<b>Author:</b>	<i>Kinfe</i>
<b>Location:</b>	<i>Welenchiti</i>
<b>Land form:</b>	<i>Plain</i>
<b>Regional slope:</b>	<i>Flat</i>
<b>Slope class:</b>	<i>Level</i>
<b>Slope form:</b>	<i>Uniform</i>
<b>Micro topography:</b>	<i>None</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>
<b>Effective soil depth:</b>	<i>Very deep</i>
<b>Rock out</b>	<i>None</i>
<b>Surfcoarse fragments:</b>	<i>None</i>
<b>Sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Well drained</i>
<b>Water table:</b>	<i>Not observed</i>
<b>Land use:</b>	<i>Intensively cultivated land</i>
<b>erosion status:</b>	<i>rainfed areable cultivation/Teff, Boleke</i>
	<i>Water &amp; wind erosion 0-5% Active at present slight</i>

- 0-15cm:- 10YR 5/3 brown(dry), 10YR 3/3 dark brown(moist), sandy loam texture, moderate fine and medium angular blocky structure, slightly moist(dry), very firm(moist), common fine roots, common medium pores
- 15-55cm:- 10YR 4/3 brown(moist), sandy loam texture, moderate fine and medium angular blocky structure, very firm(moist), few fine roots, common fine and medium pores
- 55-110cm:- 10YR 5/3 brown(moist), fine sandy loam texture, moderate fine and medium angular blocky structure, common fine pores
- 110-150cm:- 10YR 3/4 dark yellowish brown(moist), loam texture, strong fine angular blocky structure, common fine pores
- 150-170cm:- 10YR 8/1 white(moist), sand texture, common medium gravel, crumb massive structure, common medium and coarse pores
- 170-200cm:- 10YR 4/4 dark yellowish brown(moist), loamy sand texture, strong fine angular blocky structure, common fine and medium pores

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP28

Mapping unit: A37

Status: *pit sampled*

Soil classification, FAO *Fluvisols*

Author: *Aman*  
 Location: *Welenchiti*  
 Land form: *Plain*  
 Regional slope: *Flat*  
 Slope class: *Level*  
 Slope form: *Uniform*  
 Micro topography: *Termite or ant mounds*  
 Parent material: *Alluvial deposits*  
 Effective soil depth: *Shallow*  
 Rock out: *None*  
 Surfcoarse fragments: *Very few fine gravel*  
 Sealing: *None*  
 Drainage class: *Imperfectly drained*  
 Water table: *Not observed*  
 Land use: *Intensively cultivated land*  
 erosion status: *rainfed areable cultivation*  
*Sheet & splash 0-5%Active at present slight*

Date: *16/02/05*  
 Coordinate Long(N): *0946750*  
 Lat(E): *0540000*  
 Elevation: *1348/1466*  
 Map sheet No. *0839 A4 (Nazret)*  
 Position: *Low*  
 Dissection: *Slightly dissected*  
 Depth to bedrock: *Very deep*  
 Surface cracks: *None*  
 Drainage external: *Slow*  
 Flooding: *Annually*  
 Fertilizers: *DAP+Urea 50-100kg/ha*

- 0-15cm:- 10YR 6/2 pale brown(dry), 10YR 3/2 very dark brown(moist), coarse sand texture, many fine gravel, massive structure, loose(dry), loose(moist), non sticky non plastic(wet), few fine roots, few burrows (unspecified) biol, common fine pores, slightly calcareous
- 15-40cm:- 10YR 6/3 pale brown(moist), pumice texture, many medium gravel, strong coarse massive structure, firm(moist), non sticky non plastic(wet), few burrows (unspecified) biol, common fine pores
- 40-110cm:- 10YR 6/2 light brownish gray(moist), pumice texture, many medium gravel, strong coarse massive structure, firm(moist), non sticky non plastic(wet), common fine pores
- 110-160cm:- 10YR 5/3 brown(moist), sandy clay loam texture, weak fine subangular blocky structure, firm(moist), non sticky non plastic(wet), few fine pores, slightly calcareous
- 160-200cm:- 10YR 5/3 brown(moist), sandy clay loam texture, massive structure, firm(moist), non sticky non plastic(wet), few fine pores, slightly calcareous

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP41

Mapping unit: V46

Status: *pit sampled*

Soil classification, FAO *Andosol*

<b>Date:</b>	<i>04/03/05</i>
<b>Coordinate Long(N)</b>	<i>0942026</i>
<b>Lat(E):</b>	<i>0537554</i>
<b>Elevation:</b>	<i>--/1493</i>
<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Position:</b>	<i>Medium</i>
<b>Dissection:</b>	<i>Slightly dissected</i>
<b>Depth to bedrock:</b>	<i>Unknown</i>
<b>Suface cracks:</b>	<i>None</i>
<b>Drainage external:</b>	<i>Moderatly well</i>
<b>Flooding</b>	<i>Annually 1 to 15 days</i>
<b>Fertilizers:</b>	

  

<b>Author:</b>	
<b>Location:</b>	<i>Welenchiti</i>
<b>Land form:</b>	<i>Plain</i>
<b>Regional slope:</b>	<i>Flat</i>
<b>Slope class:</b>	<i>Level</i>
<b>Slope form:</b>	<i>Uniform</i>
<b>Micro topography:</b>	<i>None</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>
<b>Effective soil depth:</b>	<i>Very deep</i>
<b>Rock out</b>	<i>None</i>
<b>Surfcoarse fragments:</b>	<i>None</i>
<b>Sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Well drained</i>
<b>Water table:</b>	<i>Not observed</i>
<b>Land use:</b>	<i>Intensively cultivated land</i>
<b>erosion status:</b>	<i>rained areable cultivation/Teff</i>
	<i>Water &amp; wind erosion5-10%Active at present slight</i>

- 0-20cm:- 10YR 5/4 (dry), 10YR 2/2 very dark brown(moist), fine sandy loam texture, moderate fine and medium platy structure, slightly moist(dry), very friable(moist), non sticky non plastic(wet), common fine and medium roots, common fine and medium pores
- 20-70cm:- 10YR 4/4 dark yellowish brown(moist), sandy loam texture, moderate fine and medium platy structure, very friable(moist), non sticky non plastic(wet), few fine roots, common fine to coarse pores
- 70-105cm:- 10YR 5/4 yellowish brown(moist), sand texture, loose structure, loose(moist), non sticky non plastic(wet), many coarse pores
- 105-135cm:- 10YR 5/4 yellowish brown(moist), fine sandy loam texture, moderate fine and medium platy structure, loose(moist), non sticky non plastic(wet), many medium and coarse pores
- 135-160cm:- 10YR 7/2 light gray(moist), sandy loam texture, moderate fine and medium platy structure, non sticky non plastic(wet), many medium and coarse pores, strongly calcareous
- 160-200cm:- 10YR 3/3 dark brown(moist), loam texture, moderate fine subangular blocky structure, non sticky non plastic(wet), few fine and medium pores

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP39

Mapping unit: V25

Status: *pit sampled*

Soil classification, FAO *Fluvisol*

<b>Date:</b>	<i>01/03/05</i>
<b>Coordinate Long(N)</b>	<i>0943070</i>
<b>Lat(E):</b>	<i>0539097</i>
<b>Elevation:</b>	<i>1361/1471</i>
<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Position:</b>	<i>Low</i>
<b>Dissection:</b>	<i>Slightly dissected</i>
<b>Depth to bedrock:</b>	<i>Very deep</i>
<b>Suface cracks:</b>	<i>None</i>
<b>Drainage external:</b>	<i>Well</i>
<b>Flooding</b>	<i>None</i>
<b>Fertilizers:</b>	<i>DAP 150kg/ha, Urea 50kg/ha</i>

  

<b>Author:</b>	<i>Aman</i>
<b>Location:</b>	<i>Welenchiti</i>
<b>Land form:</b>	<i>Plain</i>
<b>Regional slope:</b>	<i>Flat</i>
<b>Slope class:</b>	<i>Nearly level</i>
<b>Slope form:</b>	<i>Concave</i>
<b>Micro topography:</b>	<i>Termite or ant mounds</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>
<b>Effective soil depth:</b>	<i>Deep</i>
<b>Rock out</b>	<i>None</i>
<b>Surfcoarse fragments:</b>	<i>Common fine gravel</i>
<b>Sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Well drained</i>
<b>Water table:</b>	<i>Not observed</i>
<b>Land use:</b>	<i>Intensively cultivated land</i>
<b>erosion status:</b>	<i>rained areable cultivation/Maize, Teff, Haricot bean</i> <i>Water &amp; wind erosion0-5%Active at present slight</i>

- 0-35cm:- 10YR 6/2 light brownish gray(dry), 10YR 3/3 dark brown(moist), fine sandy loam texture, few fine gravel, massive structure, slightly hard(dry), loose(moist), non sticky non plastic(wet), few fine roots, few burrows (unspecified) biol, many fine pores, slightly calcareous
- 35-100cm:- 10YR 6/3 pale brown(dry), 10YR 3/3 dark brown(moist), fine sandy loam texture, massive structure, slightly hard(dry), loose(moist), non sticky non plastic(wet), very fine very few roots, few burrows (unspecified) biol, many fine pores, strongly calcareous
- 100-125cm:- 10YR 5/3 brown(dry), 10YR 3/3 dark brown(moist), coarse sandy loam texture, few fine gravel, massive structure, slightly hard(dry), loose(moist), non sticky non plastic(wet), few burrows (unspecified) biol, many fine pores, slightly calcareous
- 125-170cm:- 10YR 5/3 brown(dry), 10YR 3/3 dark brown(moist), fine sandy loam texture, massive structure, slightly hard(dry), loose(moist), non sticky non plastic(wet), few burrows (unspecified) biol, many fine pores, slightly calcareous
- 170-200cm:- 10YR 5/3 brown(dry), 10YR 3/3 dark brown(moist), coarse sandy loam texture, massive structure, slightly hard(dry), loose(moist), non sticky non plastic(wet), few burrows (unspecified) biol, many fine pores, slightly calcareous



Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP38

Mapping unit: V25

Status: *pit sampled*

Soil classification, FAO *Andosol*

<b>Date:</b>	<i>05/03/05</i>
<b>Coordinate Long(N)</b>	<i>0941627</i>
<b>Lat(E):</b>	<i>0539643</i>
<b>Author:</b>	
<b>Location:</b>	<i>Welenchiti</i>
<b>Elevation:</b>	<i>--/1504</i>
<b>Land form:</b>	<i>Plain</i>
<b>Regional slope:</b>	<i>Flat</i>
<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Slope class:</b>	<i>Level</i>
<b>Slope form:</b>	<i>Uniform</i>
<b>Position:</b>	<i>Low</i>
<b>Micro topography:</b>	<i>Termite or ant mounds</i>
<b>Dissection:</b>	<i>Normal</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>
<b>Depth to bedrock:</b>	<i>Not observed</i>
<b>Effective soil depth:</b>	<i>Very deep</i>
<b>Rock out</b>	<i>None</i>
<b>Surface cracks:</b>	<i>None</i>
<b>Surfcoarse fragments:</b>	<i>None</i>
<b>Drainage external:</b>	<i>Well</i>
<b>Sealing:</b>	<i>None</i>
<b>Flooding</b>	<i>Annually 1 to 15 days</i>
<b>Drainage class:</b>	<i>Moderately well drained</i>
<b>Fertilizers:</b>	<i>DAP 1:1, Urea 0.5:1</i>
<b>Water table:</b>	<i>Not observed</i>
<b>Land</b>	<i>Intensively cultivated land</i>
<b>land use:</b>	<i>rainfed areable cultivation/Haricot bean</i>
<b>erosion status:</b>	<i>Water &amp; wind erosion5-10%Active at present moderate</i>

- A/0-50cm:- 10YR 5/3 brown(dry), 10YR 3/3 dark brown(moist), fine sand texture, weak fine single grain structure, slightly moist(dry), very friable(moist), non sticky non plastic(wet), common few medium roots, common few medium pores
- B1/50-90cm:- 10YR 4/4 dark yellowish brown(moist), fine sandy loam texture, weak fine platy structure, very friable(moist), non sticky non plastic(wet), common few roots, common fine pores
- BT/90-130cm:- 10YR 5/4 yellowish brown(moist), fine sandy loam texture, moderate fine subangular blocky structure, firm(moist), sticky plastic (wet), common medium and coarse pores
- 130-160cm:- 10YR 5/4 yellowish brown(moist), fine sandy loam texture, weak fine platy structure, very friable(moist), non sticky non plastic(wet), few fine and medium pores
- 160-180cm:- 10YR 4/4 dark yellowish brown(moist), sand texture, weak fine and medium single grain structure, very friable(moist), non sticky non plastic(wet), many coarse pores, strongly calcareous
- 180-200cm:- 10YR 6/4 light yellowish brown(moist), coarse sand texture, common medium and coarse gravel, very friable(moist), non sticky non plastic(wet), many coarse pores, strongly calcareous

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP37

Mapping unit: V44

Status: *pit sampled*

Soil classification, FAO *Cambisol*

<b>Date:</b>	<i>04/03/05</i>
<b>Coordinate Long(N)</b>	<i>0941077</i>
<b>Lat(E):</b>	<i>0540813</i>
<b>Author:</b>	
<b>Location:</b>	<i>Welenchiti</i>
<b>Elevation:</b>	<i>--/1489</i>
<b>Land form:</b>	<i>Plain</i>
<b>Regional slope:</b>	<i>Flat</i>
<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Slope class:</b>	<i>Level</i>
<b>Slope form:</b>	<i>Uniform</i>
<b>Position:</b>	<i>Low</i>
<b>Micro topography:</b>	<i>Termite or ant mounds</i>
<b>Dissection:</b>	<i>Normal</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>
<b>Depth to bedrock:</b>	<i>Not observed</i>
<b>Effective soil depth:</b>	<i>Very deep</i>
<b>Rock out</b>	<i>None</i>
<b>Surface cracks:</b>	<i>None</i>
<b>Surfcoarse fragments:</b>	<i>None</i>
<b>Drainage external:</b>	<i>Moderately well</i>
<b>Sealing:</b>	<i>None</i>
<b>Flooding</b>	<i>Annually 1 to 15 days</i>
<b>Drainage class:</b>	<i>Well drained</i>
<b>Fertilizers:</b>	<i>DAP 1:1, Urea 0.5:1</i>
<b>Water table:</b>	<i>Not observed</i>
<b>Land use:</b>	<i>Intensively cultivated land</i>
<b>erosion status:</b>	<i>rained areable cultivation/Teff,Haricot bean, Sorghum</i> <i>Water &amp; wind erosion5-10%A/V</i>

- 0-20cm:- 10YR 5/4 yellowish brown(dry), 10YR 3/2 very dark grayish brown(moist), sandy loam texture, moderate fine and medium angular blocky structure, common few medium roots, common few medium pores
- 20-65cm:- 10YR 3/4 dark yellowish brown(moist), sandy loam texture, strong fine and medium angular blocky structure, few fine roots, common few medium pores
- 65-90cm:- 10YR 4/4 dark yellowish brown(moist), sandy loam texture, strong fine and medium subangular blocky structure, few fine and medium pores
- 90-125cm:- 10YR 6/4 light yellowish brown(moist), sandy clay loam texture, strong fine and medium subangular blocky structure, many medium and coarse pores
- 125-135cm:- 10YR 5/4 yellowish brown(moist), sand texture, weak medium single grain structure, few fine and medium pores
- 135-170cm:- 10YR 4/3 brown(moist), fine sandy loam texture, moderate fine crumb structure, few fine and medium pores
- 170-200cm:- 10YR 5/4 yellowish brown(moist), coarser sandy loam texture, moderate fine and medium crumb structure

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP35

Mapping unit: V15

Status: *pit sampled*

Soil classification, FAO *Andosol*

<b>Author:</b>	<i>Aman</i>	<b>Date:</b>	<i>01/03/05</i>
<b>Location:</b>	<i>Welenchiti</i>	<b>Coordinate Long(N)</b>	<i>0943080</i>
		<b>Lat(E):</b>	<i>0540330</i>
<b>Land form:</b>	<i>Valley floor</i>	<b>Elevation:</b>	<i>1365/1474</i>
<b>Regional slope:</b>	<i>Flat to gently sloping</i>	<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Slope class:</b>	<i>Gently slope</i>	<b>Position:</b>	<i>Medium</i>
<b>Slope form:</b>	<i>Irregular</i>	<b>Dissection:</b>	<i>Slightly dissected</i>
<b>Micro topography:</b>	<i>Termite or ant mounds</i>	<b>Depth to bedrock:</b>	<i>Very deep</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>	<b>Suface cracks:</b>	<i>None</i>
<b>Effective soil depth:</b>	<i>Shallow</i>	<b>Drainage external:</b>	<i>Well</i>
<b>Rock out</b>	<i>None</i>	<b>Flooding</b>	<i>Annually</i>
<b>Surfcoarse fragments:</b>	<i>Many fine gravel</i>	<b>Fertilizers:</b>	<i>DAP 100kg/ha, Urea 50kg/ha</i>
<b>Sealing:</b>	<i>None</i>		
<b>Drainage class:</b>	<i>Well drained</i>		
<b>Water table:</b>	<i>Not observed</i>		
<b>Land</b>	<i>Intensively cultivated land</i>		
<b>land use:</b>	<i>rained areable cultivation/Teff, Maize, Haricot bean</i>		
<b>erosion status:</b>	<i>Water &amp; wind erosion0-5%Active at present slight</i>		

- 0-25cm:- 10YR 6/2 light brownish gray(dry), 10YR 2/2 very dark brown(moist), sand texture, very few fine gravel, massive structure, soft(dry), loose(moist), non sticky non plastic(wet), few fine roots, few burrows (unspecified) biol, few fine pores, slightly calcareous
- 25-50cm:- 10YR 5/3 brown(dry), 10YR 2/2 very dark brown(moist), coares sandy loam texture,very few fine gravel, massive structure, soft(dry), loose(moist), non sticky non plastic(wet), few fine roots, few burrows (unspecified) biol, few fine pores, slightly calcareous
- 50-85cm:- 10YR 4/4 dark yellowish brown(moist), sandy clay texture, massive structure, loose(moist), non sticky non plastic(wet), few fine roots, few burrows (unspecified) biol, few fine pores, slightly calcareous
- 85-110cm:- 10YR 7/1 light gray(moist), >2mm pumice texture, weak medium single grain structure, loose(moist), non sticky non plastic(wet), few white both hard and soft carbonate, segregation nodules, few burrows (unspecified) biol, common medium pores, strongly calcareous
- 110-160cm:- 10YR 3/4 dark yellowish browm(moist), sandy clay texture, massive structure, loose(moist), non sticky non plastic(wet), very fine very few roots, few burrows (unspecified) biol, few fine pores, slightly calcareous
- 160-200cm:- 10YR 3/4 dark yellowish browm(moist), loamy sand texture, massive structure, loose(moist), non sticky non plastic(wet), very fine very few roots, few burrows (unspecified) biol, few fine pores, slightly calcareous

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP34

Mapping unit: V25

Status: *pit sampled*

Soil classification, FAO *Andosol*

<b>Author:</b>	<i>Kinfe</i>	<b>Date:</b>	<i>03/03/05</i>
<b>Location:</b>	<i>Welenchiti</i>	<b>Coordinate Long(N)</b>	<i>0943448</i>
		<b>Lat(E):</b>	<i>0542402</i>
<b>Land form:</b>	<i>Plain</i>	<b>Elevation:</b>	<i>--/1512</i>
<b>Regional slope:</b>	<i>Flat</i>	<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Slope class:</b>	<i>Level</i>	<b>Position:</b>	<i>Low</i>
<b>Slope form:</b>	<i>Uniform</i>	<b>Dissection:</b>	<i>Normal</i>
<b>Micro topography:</b>	<i>None</i>	<b>Depth to bedrock:</b>	<i>Very deep</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>	<b>Surface cracks:</b>	<i>None</i>
<b>Effective soil depth:</b>	<i>Very deep</i>	<b>Drainage external:</b>	<i>Well</i>
<b>Rock out</b>	<i>None</i>	<b>Flooding</b>	<i>Annually 1 to 15 days</i>
<b>Surfcoarse fragments:</b>	<i>None</i>	<b>Fertilizers:</b>	
<b>Sealing:</b>	<i>None</i>		
<b>Drainage class:</b>	<i>Well drained</i>		
<b>Water table:</b>	<i>Not observed</i>		
<b>Land use:</b>	<i>Intensively cultivated land</i>		
<b>erosion status:</b>	<i>rained areable cultivation/Teff, Sorghum</i>		
	<i>Water &amp; wind erosion0-5%Active at present slight</i>		

- 0-20cm:- 10YR 6/3 pale brown(dry), 10YR 4/6 dark yellowish brown(moist), sand pumice texture, massive structure, loose(dry), very friable(moist), non sticky non plastic(wet), common few medium roots, common few coarse pores
- 20-65cm:- 10YR 4/4 dark yellowish brown(moist), sand texture, massive structure, very friable(moist), non sticky non plastic(wet), few fine roots, few fine and medium pores
- 65-110cm:- 10YR 7/1light gray(moist), pumice texture, common medium and coarse gravel, massive structure, many coarse pores
- 110-135cm:- 10YR 6/4 light yellowish brown(moist), sandy loam texture, moderate fine and medium platy structure, very friable(moist), non sticky non plastic(wet), many medium and coarse pores
- 135-170cm:- 10YR 6/4 light yellowish brown(moist), fine sandy loam texture, strong fine and medium subangular blocky structure, very friable(moist), slightly sticky slightly plastic(wet), many medium and coarse pores, strongly calcareous
- 170-200cm:- 10YR 6/4 light yellowish brown(moist), sandy loam texture, strong fine and medium subangular blocky structure, firm(moist), many medium and coarse pores, strongly calcareous

Appendix D - SOIL PROFILE DESCRIPTION *profile code:* WP33

Mapping unit: V16

Status: *pit sampled*

Soil classification, FAO *Andosol*

<b>Author:</b>	<i>Kinfe</i>	<b>Date:</b>	<i>25/02/05</i>
<b>Location:</b>	<i>Welenchiti</i>	<b>Coordinate Long(N) Lat(E):</b>	<i>0944560 0540765</i>
<b>Land form:</b>	<i>Plain</i>	<b>Elevation:</b>	<i>--/1493</i>
<b>Regional slope:</b>	<i>Flat</i>	<b>Map sheet No.</b>	<i>0839 A4 (Nazret)</i>
<b>Slope class:</b>	<i>Level</i>	<b>Position:</b>	<i>Low</i>
<b>Slope form:</b>	<i>Uniform</i>	<b>Dissection:</b>	<i>Normal</i>
<b>Micro topography:</b>	<i>Termite or ant mounds</i>	<b>Depth to bedrock:</b>	<i>Very deep</i>
<b>Parent material:</b>	<i>Alluvial deposits</i>	<b>Surface cracks:</b>	<i>None</i>
<b>Effective soil depth:</b>	<i>Shallow</i>	<b>Drainage external:</b>	<i>Well</i>
<b>Rock out</b>	<i>None</i>	<b>Flooding</b>	<i>Annually 1 to 15 days</i>
<b>Surfcoarse fragments:</b>	<i>Many medium gravel</i>	<b>Fertilizers:</b>	<i>DAP 0.5:1, Urea 0.25:1</i>
<b>Sealing:</b>	<i>None</i>		
<b>Drainage class:</b>	<i>Well drained</i>		
<b>Water table:</b>	<i>Not observed</i>		
<b>Land use:</b>	<i>Intensively cultivated land</i>		
<b>erosion status:</b>	<i>rained areable cultivation/Maize, Haricot bean Water &amp; wind erosion0-5%Active at present slight</i>		

- 0-25cm:- 10YR 4/3 brown(moist), sand texture, common medium gravel, weak fine and medium crumb structure, slightly moist(dry), slightly moist(moist), common few roots, common few medium pores, strongly calcareous
- 25-105cm:- 10YR 7/1 light gray(moist), pumice texture, many coarse gravel, weak medium and coarse crumb structure, few fine roots, common medium and coarse pores, strongly calcareous
- 105-155cm:- 10YR 3/7 dark yellowish brown(moist), fine sandy loam texture, moderate fine and medium angular blocky structure, slight(moist), common few medium pores
- 155-200cm:- 10YR 5/4 yellowish brown(moist), fine sandy loam texture, moderate fine and medium angular blocky structure, slight(moist), common few medium pores
- DB1/200-300cm:-10YR 5/4 yellowish brown(moist), sandy loam texture, non sticky non plastic(wet), common medium and coarse pores, strongly calcareous
- DB2/300-400cm:- 10YR 6/3 pale brown(moist), sand texture, non sticky non plastic(wet), common, medium and coarse pores, strongly calcareous
- DB/400-500cm:- 10YR 7/6 yellow(moist), sand texture, non sticky non plastic(wet), common medium and coarse pores

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-01    **Mapping unit:**                      **Status:** Pit with sample  
**Soil classification (WRB2006):** Vitric Cambisols (Sodic),                      **Date:** 05/06/14  
**Author:** Ashenafi and Zeinu                      **Coordinate, Long (N)** 939750  
**Land form:** Level plain                      **Lat (E)** 541300  
**Regional slope:**                      **Elevation:** 1519m  
**Slope class:** Flat                      **Map sheet No:**  
**Slope form:** Straight                      **Depth to bedrock:** >200cm  
**Slope** Low                      **Rock out crops:** None  
**Micro topography:** Terraced (Soil band), 0.2-0.3m    **Surf. Coarse fragments:** Many fine to coarse gravel  
**Parent material:** Fluvial                      **Surface cracks:** None  
**Effective soil depth:** Very deep                      **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained                      **Water table:** Not observed  
**Drainage external:** Slow                      **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%) active at present slight

1A 0-40cm Dark yellowish brown (10YR 3/6, moist) sandy loam; few fine rounded fresh/slightly weathered pumice; weak medium sub-angular blocky; non sticky non plastic; very few very fine roots; very few very fine channels & very few very fine interstitial pores; non- calcareous; clear smooth boundary.

2A2 40-70cm Dark yellowish brown (10YR 3/4, moist) sandy loam; common very fine rounded fresh / slightly weathered pumice; fine single grain; non sticky non plastic; very few very fine roots; common very fine interstitial pores; non- calcareous, clear smooth boundary.

3A3 70-105cm Dark yellowish brown (10YR 5/4, moist) pumice; dominant fine sub rounded fresh/slightly weathered pumice; fine single grain; non sticky non plastic; few medium roots; slightly calcareous; clear wavy boundary.

4A4 105-200cm Dark yellowish brown (10YR 4/4, moist) silt loam; few fine and medium sub rounded fresh/slightly weathered pumice; weak medium sub-angular blocky; non sticky non plastic; very few very fine roots; few very fine pores; slightly calcareous.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-02 **Mapping unit:** **Status:** Pit with sample  
**Soil classification (WRB2006):** Vitric Andosols (Sodic) **Date:** 05/06/14  
**Author:** Ashenafi and Dawit **Coordinate, Long (N)** 939750  
**Land form:** Level plain **Lat (E)** 541600  
**Regional slope:** **Elevation:** 1519  
**Slope class:** Nearly level **Map sheet No:**  
**Slope form:** Straight **Depth to bedrock:** >500cm  
**Slope** Medium **Rock out crops:** None  
**Micro topography:** None **Sur. coa. Fragments:** Many fine gravel few  
**Parent material:** Pyroclantk to Fluvial **Surface cracks:** None  
**Effective soil depth:** Very deep **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained **Water table:** Note observed  
**Drainage external:** Slow **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%)

1A2 0-30cm Very dark gray(10YR3/1,moist) silt; common fine rounded freshly / slightly weathered & common medium sub rounded fresh / slightly weathered pumice; single grain; very friable non sticky non plastic; very few fine roots; very few & fine interstitial pores; slightly calcareous; abrupt wavy boundary.

2A2 30-110cm Light brownish gray (10YR6/2, moist) pumice ; dominant fine rounded fresh / slightly weathered & few medium sub rounded fresh/slightly weathered pumice; single grain; loose non sticky non plastic; very few fine roots; common fine interstitial & common medium interstitial pores; moderately calcareous; abrupt smooth boundary.

3A3 110-155cm Dark brown (10YR3/3, moist) silt loam; few fine rounded fresh / slightly weathered pumice; weak medium sub angular blocky; very friable non sticky non plastic; very few fine interstitial pores; non calcareous; gradual smooth boundary.

4A4 155-200cm Brown (10YR4/2, moist) loam; few very fine rounded fresh / weathered pumice; weak fine sub angular blocky; very friable non sticky non plastic; few fine interstitial pores; non calcareous.

200-300cm Dark yellowish brown (7.5YR4/3, moist) sandy clay loam; few fine sub rounded fresh / slightly weathered pumice; very friable slightly sticky slightly plastic; few fine white soft concretion carbonates; slightly calcareous.

300-400cm Dark brown (7.5YR3/2, moist) sandy clay; very few fine rounded fresh / slightly weathered pumice; friable slightly sticky slightly plastic; strongly calcareous.

400-500cm Brown (10YR4/3, moist) sandy clay; few fine sub rounded fresh / slightly weathered pumice; friable slightly sticky

## SOIL PROFILE DESCRIPTION

<b>Profile code:</b> WEP-03	<b>Mapping unit:</b>	<b>Status:</b> Pit with sample
<b>Soil classification (WRB2006):</b> Fluvisols		<b>Date:</b> 11/06/14
<b>Author:</b> Bekele & Zeinu		<b>Coordinate, Long (N)</b> 948660
<b>Land form:</b> Level plain		Lat (E) 543048
<b>Regional slope:</b>		<b>Elevation:</b> 1489m
<b>Slope class:</b> Very gently slope		<b>Map sheet No:</b>
<b>Slope form:</b> Straight		<b>Depth to bedrock:</b> >500cm
<b>Slope:</b> Medium		<b>Rock out crops:</b> None
<b>Micro topography:</b> None		<b>Surface coarse fragments:</b> Very few coarse gravel,
<b>Parent material:</b> Pyroclastic to Fluvial		<b>Surface cracks:</b> None
<b>Effective soil depth:</b> Very deep		<b>Surface sealing:</b> None
<b>Drainage class:</b> Somewhat ex. drained		<b>Water table:</b> Not observed
<b>Drainage external:</b> Well		<b>Flooding:</b> None
<b>Land cover:</b> Intensively cultivated land		
<b>Land use:</b> Rain fed arable cultivation		
<b>Fertilizer:</b> Dap100kg/ha, Urea50kg/ha		
<b>Erosion status:</b> Sheet erosion (10-25%)		

1A 0-30cm Dark brown (10YR 3/3, moist) sandy loam; very few coarse sub rounded fresh / slightly weathered common medium rounded fresh / slightly weathered & many fine rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic; very few very fine & few very fine roots; few medium channels & common fine interstitial pores; slightly calcareous; abrupt wavy boundary.

1A2 30-200cm Grayish brown (10YR 5/2, moist) pumice; few coarse angular fresh / slightly weathered many medium sub rounded fresh / slightly weathered & dominant fine sub rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic; few very fine & very few very fine roots; few medium channels & few fine interstitial pores; moderately calcareous.

200-300cm Dark brown (10YR 3/3, moist) sandy loam; very few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; loose non sticky non plastic; moderately calcareous.

300-400cm Brown (10YR 4/3, moist) sandy loam; few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; loose non sticky non plastic; moderately calcareous.

400-500cm Dark yellowish brown (10YR 4/6, moist) sandy loam; few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; loose non sticky non plastic; moderately calcareous.



## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-04    **Mapping unit:**                      **Status:** Pit with sample  
**Soil classification (WRB2006):** Haplic Fluvisols (Sodic)    **Date:** 12/06/14  
**Author:** Bekele & Zeinu                                      **Coordinate, Long (N)** 941805  
**Land form:** Level plain    **Lat (E)** 54350  
**Regional slope:**    **Elevation:** 1483m  
**Slope class:** Very gently slope                              **Map sheet No:**  
**Slope form:** Straight    **Depth to bedrock:** >200cm  
**Slope** Medium    **Rock out crops:** None  
**Micro topography:** None                                      **Surf. Coarse fragments:** Few medium gravel, many  
**Parent material:** Pyroclastic to Fluvial                      **Surface cracks:** None  
**Effective soil depth:** Very deep                              **Surface sealing:** Neon  
**Drainage class:** Somewhat exe. Drained                      **Water table:** Not observed  
**Drainage external:** Slow                                      **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%)

1A 0-30cm: Brown (10YR 4/3, moist) sandy loam; few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; weak medium sub-angular blocky; very friable non sticky non plastic; very few very fine roots; common medium channels & few fine interstitial pores; non calcareous; clear smooth boundary.

2A1 30-95cm Dark yellowish brown (10YR 4/4, moist) silt loam; very few medium rounded fresh / slightly weathered & common fine rounded fresh / slightly weathered pumice; weak medium subangular blocky; very friable non sticky non plastic; very few fine roots; very few very fine interstitial pores; non calcareous; clear smooth boundary.

3A1 95-125cm Dark yellowish brown (10YR 3/6, moist) silt loam; common fine sub rounded fresh/slightly weathered pumice; weak coarse sub-angular blocky; very friable non sticky non plastic; very few very fine roots; very few fine interstitial very few medium channels pores; non calcareous; clear smooth boundary.

4A1 125-200cm Dark yellowish brown (10YR 4/4, moist) silt loam; few fine sub rounded fresh / slightly weathered pumice; weak cores subangular blocky; very friable non sticky non plastic; very few fine roots; very few very fine pores

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-05      **Mapping unit:**      **Status:** Pit with sample  
**Soil classification (WRB2006):** Vitric Andosols (Eutric) **Date:** 12/06/14  
**Author:** Bekele & Zeinu      **Coordinate, Long (N)** 942310  
**Land form:** Level plain      **Lat (E)** 541100  
**Regional slope:**      **Elevation:** 1498m  
**Slope class:** Very gently slope      **Map sheet No:**  
**Slope form:** Straight      **Depth to bedrock:** >400cm  
**Slope:** Low      **Rock out crops:** None  
**Micro topography:** None      **Sur. co. fragments:** Common coarse gravel, many  
**Parent material:** Pyroclank to Fluvial      **Surface cracks:** None  
**Effective soil depth:** Deep      **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained      **Water table:** Not observed  
**Drainage external:** Slow      **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%)

- 1A 0-50cm Light gray (10YR7/2,dry), dark grayish brown (10YR 4/2, moist) pumice; common coarse sub rounded fresh / slightly weathered many medium angular fresh / slightly weathered & abundant fine angular fresh / slightly weathered pumice; single grin; loose non sticky non plastic; common medium channels & few fine interstitial pores; non calcareous; abrupt smooth boundary.
- 2A2 50-80cm Very dark grayish brown (10YR 3/2,moist) silt, few, very fine, prominent, clear, yellowish brown; few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; weak coarse angular blocky; very friable non sticky non plastic; very few, very fine, interstitial, pores; non calcareous; abrupt smooth boundary.
- 3A3 80-115cm Dark brown (10YR 3/3, moist) loam; common medium sub rounded fresh / slightly weathered & many fine sub rounded fresh / slightly weathered pumice; loose non sticky non plastic; very few very fine interstitial pores; non calcareous; clear smooth boundary.
- 4A4 115-200cm Dark yellowish brown (10YR3/4, moist) silt loam : very few medium sub rounded fresh / slightly weathered

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-06    **Mapping unit:**                      **Status:** Pit with sample  
**Soil classification (WRB2006):** Vitric Andosols (Eutric)                      **Date:** 13/06/14  
**Author:** Bekele & Zeinu                      **Coordinate, Long (N)** 944500  
**Land form:** Level plain                      **Lat (E)** 543200  
**Regional slope:**                      **Elevation:** 1512m  
**Slope class:** Very gently slope                      **Map sheet No:**  
**Slope form:** Straight                      **Depth to bedrock:** >200cm  
**Slope** Medium                      **Rock out crops:** None  
**Micro topography:** None                      **Su. Co. fragments:** Common medium many & fine  
**Parent material:** Pyroclank to Fluvial                      **Surface cracks:** None  
**Effective soil depth:** Very deep                      **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained                      **Water table:** Not observed  
**Drainage external:** Slow                      **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%)

- 1A 0-40cm Dark brown (10YR3/3, moist) sandy loam; common medium sub rounded fresh / slightly weathered & many fine sub rounded fresh / slightly weathered pumice; single grin; loose non sticky non plastic; very few fine roots; common medium channels & common fine interstitial pores; slightly calcareous; abrupt wavy boundary.
- 2A2 40-150cm Light brownish gray (10YR 6/2, moist);pumice; common coarse angular fresh / slightly weathered many medium sub rounded fresh / slightly weathered & abundant fine sub rounded fresh or slightly weathered pumice; single grain; loose non sticky non plastic; common medium interstitial pores; moderately calcareous; abrupt smooth boundary.
- 3A3 150-200cm Dark grayish brown (10YR 4/2,moist) Silt; very few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; moderate coarse subangular blocky; very friable non sticky non plastic; very few medium channels, very few fine channels & very few very fine interstitial slightly calcareous.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-07 **Mapping unit:** **Status:** Pit without sample  
**Soil classification (WRB2006):** Vitric Andosols (Eutric) **Date:** 13/06/14  
**Author:** Bekele & Zeinu **Coordinate, Long (N)** 945471  
**Land form:** Level plain **Lat (E)** 543093  
**Regional slope:** **Elevation:** 1527m  
**Slope class:** Nearly level **Map sheet No:**  
**Slope form:** Straight **Depth to bedrock:** >200cm  
**Slope:** Medium **Rock out crops:** None  
**Micro topography:** None **Surf. coa. Fragments:** many medium, Abundant  
**Parent material:** Pyroclank to Fluvial **Surface cracks:** None  
**Effective soil depth:** Very deep **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained **Water table:** Note observed  
**Drainage external:** Well **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%)

1A 0-25cm Dark brown (10YR 3/3,moist) sandy loam; common medium sub rounded fresh / slightly weathered & many fine sub rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic; very few fine roots; very few fine channels & few very fine interstitial pores; slightly calcareous; clear smooth boundary.

2A2 25-180cm Light gray (10YR 7/2,moist) pumice; common coarse angular fresh or slightly weathered many medium sub rounded fresh / slightly weathered & abundant fine sub rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic; common medium interstitial non calcareous; clear smooth boundary.

3A3 180-200cm Dark yellowish brown (10YR 4/4,moist) sandy loam; few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; moderate coarse subangular blocky; very friable non sticky non plastic.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-08    **Mapping unit:**                    **Status:** *Pit without sample*  
**Soil classification (WRB2006):** Fluvisols Cambisols (Eutric) **Date:** 18/06/14  
**Author:** Bekele & Zeinu    **Coordinate, Long (N)** 942250  
**Land form:** Level plain    **Lat (E)** 543000  
**Regional slope:**    **Elevation:** 1496m  
**Slope class:** Level    **Map sheet No:**  
**Slope form:** Straight    **Depth to bedrock:** >200cm  
**Slope** Low    **Rock out crops:** None  
**Micro topography:** None    **Surface coarse fragments:** Common medium  
**Parent material:** *Pyroclank to Fluvial*    **Surface cracks:** None  
**Effective soil depth:** Very deep    **Surface sealing:** None  
**Drainage class:** Somewhat ex. Drained    **Water table:** Note observed  
**Drainage external:** Slow    **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%)

1A 0-30cm Dark grayish brown (10YR 4/2, moist) sandy loam; very few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; weak coarse subangular blocky; very friable non sticky non plastic; very few fine roots; very few very fine interstitial pores; slightly calcareous; clear smooth boundary.

2A1 30-100cm Dark brown (10YR3/3, moist) sandy loam; few medium sub rounded fresh / slightly weathered & many fine sub rounded fresh / slightly weathered pumice; weak coarse subangular blocky; very friable non sticky non plastic; very few fine interstitial pores; slightly calcareous; diffuse wavy boundary.

3A2 100-140cm Gray (10YR 6/1, moist) silt loam; few fine sub rounded fresh / slightly weathered pumice; moderate coarse angular blocky; friable non sticky non plastic; very few fine interstitial pores; non calcareous; clear smooth boundary.

4A3 140-155cm Grayish brown (10YR 5/2, moist) pumice; common medium sub rounded fresh slightly weathered & dominant fine sub rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic; common medium interstitial pores; slightly calcareous; clear mouth boundary.

5A4 155-200cm Dark brown (7.5YR 3/4, moist) loamy sand; very few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; weak coarse subangular blocky; loose non sticky non plastic; common

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-09    **Mapping unit:**                      **Status:** *Pit without sample*  
**Soil classification (WRB2006):** Vitric Andosols (Eutric)                      **Date:** 18/06/14  
**Author:** Bekele & Zeinu                      **Coordinate, Long (N)** 947250  
**Land form:** Level plain                      Lat (E) 542800  
**Regional slope:**                      **Elevation:** 1510m  
**Slope class:** Nearly level                      **Map sheet No:**  
**Slope form:** Straight                      **Depth to bedrock:** >200cm  
**Slope** Low                      **Rock out crops:** None  
**Micro topography:** None                      **Sur. co. fragments:** many medium, Abundant  
**Parent material:** *Pyroclantk to Fluvial*                      **Surface cracks:** None  
**Effective soil depth:** Very deep                      **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained                      **Water table:** Note observed  
**Drainage external:** Slow                      **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion gully erosion (10-25%) active at present slight & moderate

1A1 0-45cm Dark brown(10YR3/3, moist) sandy loam; common medium sub rounded fresh / slightly weathered & many fine sub rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic very few very fine roots; few very fine interstitial pores; slightly calcareous; abrupt wavy boundary.

2A2 45-200cm Grayish brown (10YR 5/2, moist) pumice; common coarse angular fresh / slightly weathered many medium sub rounded fresh / slightly weathered & abundant fine sub rounded fresh or slightly weathered pumice; single grain; loose non sticky non plastic; common medium interstitial pores; moderately calcareous.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-10    **Mapping unit:**                      **Status:** Pit with sample  
**Soil classification (WRB2006):** Haplic Fluvisols (Sodic)    **Date:** 20/06/14  
**Author:** Zeinu and Abate                                      **Coordinate, Long (N)** 943974  
**Land form:** Level plain    Lat (E) 544300  
**Regional slope:**    **Elevation:** 1535m  
**Slope class:** Nearly level    **Map sheet No:**  
**Slope form:** Straight    **Depth to bedrock:** >125cm  
**Slope** Medium    **Rock out crops:** None  
**Micro topography:** None    **Su. Co. fragments:** very few coarse gravel, many  
**Parent material:** Pyroclank to Fluvial    **Surface cracks:** None  
**Effective soil depth:** Deep    **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained    **Water table:** Note observed  
**Drainage external:** Slow    **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%)

1A1 0-20cm Dark brown (10YR 3/3, moist) sandy loam; common medium sub rounded fresh or slightly weathered & many fine sub rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic; very few fine roots; very few fine interstitial pores; non calcareous; clear smooth boundary.

2A2 20-70/100cm Dark yellowish brown (10YR 3/4, moist) loam; few medium sub rounded fresh or slightly weathered & common fine sub rounded fresh or slightly weathered pumice; strong coarse subangular blocky; friable non sticky non plastic; common soft concretion fine medium flat soft carbonates white; very few very fine roots; few medium channels pores; strongly calcareous; abrupt wavy boundary.

3A3 70/100-150cm Very dusky red (2.5Y 5/2, moist) pumice ; few coarse angular fresh or slightly weathered many medium sub rounded fresh or slightly weathered & abundant fine sub rounded fresh or slightly weathered pumice; single grain; loose non sticky non plastic; common medium interstitial pores; slightly calcareous; abrupt smooth boundary.

4A4 150-200cm Dark brown (10YR 3/3, moist) sandy loam; very few medium sub rounded fresh or slightly weathered & many medium sub rounded fresh or slightly weathered pumice; weak coarse subangular blocky; very friable non sticky non plastic;

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-11 **Mapping unit:** **Status:** *Pit without sample*  
**Soil classification (WRB2006):** Vitric Andosols **Date:** 20/06/14  
**Author:** Zeinu and Abate **Coordinate, Long (N)** 948279  
**Land form:** Level plain **Lat (E)** 544430  
**Regional slope:** **Elevation:** 1532m  
**Slope class:** Nearly level **Map sheet No:**  
**Slope form:** Straight **Depth to bedrock:** >200cm  
**Slope:** Medium **Rock out crops:** None  
**Micro topography:** None **Sur. co. fragments:** very few coarse gravel, many  
**Parent material:** Pyroclantk to Fluvial **Surface cracks:** None  
**Effective soil depth:** Very deep **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained **Water table:** Note observed  
**Drainage external:** Slow **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion gully erosion (10-25% 1-0.5%) active at present slight

- 1A 0-45cm Dark grayish brown(10YR4/2,moist) sandy loam; common medium gravel sub rounded fresh / slightly weathered & abundant fine sub rounded fresh / slightly weathered pumice; single grain; loose non sticky non plastic; very few very fine roots; very few very fine interstitial pores; non calcareous; abrupt wavy boundary.
- 2A2 45-65cm Grayish brown(10YR5/2,moist) pumice; common coarse angular fresh / slightly weathered, many medium sub rounded fresh / slightly weathered & abundant fine sub rounded fresh or slightly weathered pumice; single grain; loose non sticky





## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-13      **Mapping unit:**      **Status:** Pit without sample  
**Soil classification (WRB2006):** Vitric Andosols      **Date:** 25/06/14  
**Author:** Bekele and Dawit      **Coordinate, Long (N)** 945000  
**Land form:** Level plain      **Lat (E)** 540200  
**Regional slope:**      **Elevation:** 1466m  
**Slope class:** Level      **Map sheet No:**  
**Slope form:** Straight      **Depth to bedrock:** >200cm  
**Slope** Low      **Rock out crops:** None  
**Micro topography:** Termite or ant mounds, 1m height, 0.5% coverage  
**Parent material:** Fluvial      **Surface coarse fragments:** Common fine  
**Effective soil depth:** Very deep      **Surface cracks:** None  
**Drainage class:** Somewhat exe. Drained      **Surface sealing:** None  
**Drainage external:** Slow      **Water table:** Note observed  
**Land cover:** Settlement & Intensively cultivated land      **Flooding:** None  
**Land use:** Residential use & Rain fed arable cultivation  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%) gully erosion (0.5%) active at present slight

- 1A 0-25cm Brown (10YR 4/3, sandy loam; common fine sub rounded fresh / slightly weathered & few medium rounded fresh / slightly weathered pumice; weak medium single grin; loose non sticky non plastic; common fine roots; very few very fine interstitial pores; non-calcareous; clear smooth boundary.
- 2A2 25-115cm Grayish brown (10YR 5/2, moist) pumice; few coarse angular fresh /slightly weathered, common medium rounded fresh / slightly weathered & many medium rounded fresh /slightly weathered pumice; moderate coarse subangular & angular blocky; non-calcareous; clear smooth boundary.
- 3A3 115-200cm Dark yellowish brown (10YR 4/4, moist) loam sandy; very few medium sub rounded fresh / slightly weathered & few fine rounded fresh / slightly weathered pumice; moderate coarse subangular & angular blocky; very friable non sticky non plastic; common termite or ant channels & nests; few medium interstitial pores; non-calcareous.



## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-15    **Mapping unit:**    **Status:** Pit with sample  
**Soil classification (WRB2006):** Vitric Fluvisols (Eutric)    **Date:** 26/06/14  
**Author:** Bekele & Zeinu    **Coordinate, Long (N)** 942500  
**Land form:** Level plain    **Lat (E)** 540216  
**Regional slope:**    **Elevation:** 1484m  
**Slope class:** Level    **Map sheet No:**  
**Slope form:** Straight    **Depth to bedrock:** >200cm  
**Slope** Low    **Rock out crops:** None  
**Micro topography:** Termite or ant mounds, 0.5-2m height, 0.1% coverage  
**Sur. coarse fragments:** Few medium gravel  
**Parent material:** Pyroclantk to Fluvial    **Surface cracks:** None  
**Effective soil depth:** Very deep    **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained    **Water table:** Note observed  
**Drainage external:** Slow    **Flooding:** None  
**Land cover:** Predominantly cultivated  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25 %,) active at present slight

- 1A1 0-50cm Dark yellowish brown (10YR 4/4, moist) sandy loam ; few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered Pumice; moderate very coarse sub angular blocky; very friable, non sticky non plastic; very few fine & very few many roots; very few fine channels & few very fine interstitial pores; non calcareous; abrupt smooth boundary.
- 2A2 50-95cm Dark grayish brown (10YR 4/2,moist) fine sand ; few medium fine sub rounded fresh / slightly weathered & common fine rounded fresh / slightly weathered pumice; single grain; loose, non sticky, non plastic; many soft concretion medium flat soft carbonates white; very few, fine, roots; few, very fine, interstitial, pores; extremely calcareous; abrupt, smooth, boundary.
- 3A3 95-135cm Brown (10YR 4/3,moist) sandy loam texture; common medium sub rounded fresh / slightly weathered & many fine sub rounded fresh / slightly weathered pumice; moderate coarse prismatic; very friable non sticky non plastic; many soft concretion medium flat soft carbonates white; very few fine & very few many roots; few very fine interstitial pores; extremely calcareous; abrupt, smooth boundary.
- 4A4 135-170cm Grayish brown (10YR 5/2, moist) pumice; very few common angular fresh / slightly weathered, many medium sub rounded fresh / slightly weathered & abundant fine sub rounded fresh/slightly weathered pumice; single grain; loose, non sticky, non plastic; few, fine, interstitial pores; moderately calcareous.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-15    **Mapping unit:**    **Status:** Pit with sample  
**Soil classification (FRB2006):** Fluvisols    **Date:** 26/06/14  
**Author:** Bekele & Zeinu    **Coordinate, Long (N)** 942500  
**Land form:** Level plain    **Lat (E)** 540216  
**Regional slope:**    **Elevation:** 1484m  
**Slope class:** Level    **Map sheet No:**  
**Slope form:** Straight    **Depth to bedrock:** >200cm  
**Slope** Low    **Rock out crops:** None  
**Micro topography:** Termite or ant mounds, 0.5-2m height, 0.1% coverage  
**Surface coarse fragments:** Few medium gravel  
**Parent material:** Pyroclank to Fluvial    **Surface cracks:** None  
**Effective soil depth:** Very deep    **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained    **Water table:** Note observed  
**Drainage external:** Slow    **Flooding:** None  
**Land cover:** Predominantly cultivated  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25 %,) active at present slight

5A5 170-200cm Dark yellowish brown (7.5YR3/4, moist) silt loam texture; few fine sub rounded fresh /slightly weathered pumice; very friable non sticky non plastic; few, soft concretion fine flat soft carbonates white; moderately calcareous.

200-300cm Dark yellowish brown (7.5YR4/4, moist) sandy clay; very few fine sub rounded fresh /slightly weathered pumice; few soft segregation (or soft accumulation very fine flat soft carbonates white; moderately calcareous.

300-400cm Dark yellowish brown(10YR4/6,moist) loamy sand; common medium sub rounded fresh or slightly weathered & common fine sub rounded fresh or slightly weathered pumice; loose, on sticky, non plastic; few soft segregation (or soft accumulation very fine flat soft carbonates white; moderately calcareous.

400-500cm Yellowish brown (10YR5/6, moist) loamy sand; loose, non sticky, non plastic; few soft segregation (or soft accumulation very fine flat soft carbonates whit; moderately calcareous.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-16    **Mapping unit:**    **Status:** Pit without sample  
**Soil classification (WRB20 06):** Fluvisols    **Date:** 27/06/14  
**Author:** Bekele & Zeinu    **Coordinate, Long (N)** 944250  
**Land form:** Level plain    **Lat (E)** 539100  
**Regional slope:**    **Elevation:** 1461m  
**Slope class:** Nearly level    **Map sheet No:**  
**Slope form:** Straight    **Depth to bedrock:** >200cm  
**Slope:** Low    **Rock out crops:** None  
**Micro topography:** Termite or ant mounds, 0.5-2m height, 0.2% coverage  
**Sur. co. Fragments:** Common medium gravel  
**Parent material:** Pyroclastic to Fluvial    **Surface cracks:** None  
**Effective soil depth:** Very deep    **Surface sealing:** None  
**Drainage class:** Somewhat ex. Drained    **Water table:** Note observed  
**Drainage external:** Slow    **Flooding:** None  
**Land cover:** Predominantly cultivated  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%), active at present moderate

1A 0-40cm Dark brown (10YR 3/3, moist) sandy loam; common medium sub rounded fresh slightly weathered & abundant fine sub rounded fresh / slightly weathered pumice; weak coarse sub angular block; very friable, non sticky, non plastic; very few, very fine & very few, many, roots; few, termite or ant channels & nests; very few, very fine, interstitial & few very fine, channels, pores; slightly- calcareous; abrupt, wavy, boundary.

2A2 40-95cm Grayish brown(10YR 5/2, moist) sandy loam texture; few coarse angular fresh /slightly weathered, many medium sub rounded fresh / slightly weathered & dominant fine sub rounded fresh or slightly weathered pumice; single grin; loose, non sticky, non plastic; few nodule medium flat hard carbonates white; few, medium, interstitial, pores; non-calcareous; abrupt, smooth, boundary.

3A3 95-130cm Dark brown (10YR3/3,moist) silt loam texture; very few medium sub rounded fresh /slightly weathered & common fine sub rounded fresh / slightly weathered pumice moderate coarse sub angular block; very friable, non sticky, non plastic; very few , many & very few, very fine, roots; few termite or ant channels & nests; very few, fine, channels & very few, very fine, interstitial, pores; non-calcareous; clear, smooth, boundary.

3A4 130-200cm Dark brown (10YR3/3, moist) sandy loam texture; very few medium sub rounded fresh /slightly weathered pumice; moderate coarse sub angular block; very friable, non sticky, non plastic; few soft concretion fine soft carbonates white; very few, fine , channels & very few, very fine, interstitial, pores;







## SOIL PROFILE DESCRIPTION

<b>Profile code:</b> WEP-20	<b>Mapping unit:</b>	<b>Status:</b> Pit without sample
<b>Soil classification (WRB2006):</b> Haplic Fluvisols	<b>Date:</b> 28/06/14	<b>Coordinate, Long (N)</b> 940500
<b>Author:</b> Dawit and Abate		<b>Lat (E)</b> 537200
<b>Land form:</b> Level plain	<b>Elevation:</b> 1513m	<b>Map sheet No:</b>
<b>Regional slope:</b>	<b>Depth to bedrock:</b> >200cm	<b>Rock out crops:</b> None
<b>Slope class:</b> Nearly level	<b>Sur. coarse fragments:</b> little medium gravel	<b>Surface cracks:</b> None
<b>Slope form:</b> Straight to convex	<b>Surface sealing:</b> None	<b>Water table:</b> Note observed
<b>Slope:</b> Medium	<b>Flooding:</b> None	
<b>Micro topography:</b> None		
<b>Parent material:</b> Alluvial		
<b>Effective soil depth:</b> Very deep		
<b>Drainage class:</b> Somewhat exe. Drained		
<b>Drainage external:</b> Slow		
<b>Land cover:</b> Intensively cultivated land		
<b>Land use:</b> Rain fed arable cultivation		
<b>Fertilizer:</b> Dap100kg/ha, Urea50kg/ha		
<b>Erosion status:</b> Water and wind erosion (5-10) active at present moderate		

1A 0-35cm Dark grayish brown (10YR 4/2, moist); loamy sand common fine sub rounded fresh / slightly weathered & very few medium rounded fresh / slightly weathered pumice; single grain; loose, non sticky, non plastic; common, fine, roots; few termite or ant channels & nests; few, fine, interstitial pores; non-calcareous; gradual, smooth, boundary.

35-130cm Dark brown (10YR 4/3, moist) coarse sandy loam; common fine rounded fresh /slightly weathered & few fine rounded fresh / slightly weathered pumice; weak medium subangular block; very friable, slightly sticky, slightly plastic; common, fine roots; few termite or ant channels & nests; very few, fine, interstitial pores; non-calcareous; diffuse, wavy, boundary.

130-200cm Dark grayish brown (10YR 4/2, moist) coarse sandy loam; very few medium rounded fresh / slightly weathered & few medium rounded fresh or slightly weathered pumice; single grain; loose, non sticky, non plastic.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-21 **Mapping unit:** **Status:** Pit without sample  
**Soil classification (WRB2006):** Haplic Cambisols **Date:** 30/06/14  
**Author:** Bekele & Zeinu **Coordinate, Long (N)** 941800  
**Land form:** Level plain **Lat (E)** 535957  
**Regional slope:** **Elevation:** 1502m  
**Slope class:** Very gently slope **Map sheet No:**  
**Slope form:** Straight **Depth to bedrock:** >200cm  
**Slope:** Medium **Rock out crops:** None  
**Micro topography:** Termite or ant mounds, 0.5-2m height, 0.2% coverage  
**Sur. coa. Fragment:** Very few medium gravel few  
**Parent material:** Pyroclank to Fluvial **Surface cracks:** None  
**Effective soil depth:** Very deep **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained **Water table:** Note observed  
**Drainage external:** Slow **Flooding:** None  
**Land cover:** Predominantly cultivated  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap125kg/ha, Urea75kg/ha  
**Erosion status:** Sheet erosion (10-25%) gully erosion (0-5%) active at present slight

1A 1 0-30cm Dark yellowish brown (10YR3/4, moist) sandy loam; very few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; moderate coarse subangular blocky; friable, non sticky, non plastic; very few, very fine, roots; few, very fine, interstitial, pores; non-calcareous; gradual, smooth, boundary.

2A1 30-100cm Dark brown (10YR 3/3, moist) sandy loam; common fine sub rounded fresh / slightly weathered & many medium sub rounded fresh / slightly weathered pumice; weak coarse subangular block; very friable, non sticky, non plastic; very few, very fine, roots; few, fine, channels & few, very fine, interstitial, pores; non-calcareous; clear, smooth, boundary.

3A2 100-160cm Dark yellowish brown (10YR3/6, moist) sandy clay loam; few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; weak coarse platy & prismatic; very friable, slightly sticky, slightly plastic; very few, very fine, roots; very few, fine, channels & very few, very fine, interstitial, pores; non-calcareous; gradual, smooth, boundary.

4A2 160-200cm Brown (10YR 4/3, moist) sandy clay loam; very few medium sub rounded fresh / slightly weathered & common fine sub rounded fresh / slightly weathered pumice; moderate fine to coarse single grain; friable, slightly sticky, slightly plastic; few soft concretion medium irregular soft carbonates white; very few, very fine, roots; few termite or ant channels & nests; very few, fine, channels & few, very fine, interstitial, pores; slightly-calcareous.



## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-23      **Mapping unit:**      **Status:** Pit with sample  
**Soil classification (WRB2006):** Haplic Fluvisols (Sodic, Eutric) **Date:** 04/04/14  
**Author:** Zeinu and Abate      **Coordinate, Long (N)** 945000  
**Land form:** Level plain      **Lat (E)** 536800  
**Regional slope:**      **Elevation:** 1462m  
**Slope class:** Nearly level      **Map sheet No:**  
**Slope form:** Straight      **Depth to bedrock:** >500cm  
**Slope** Low      **Rock out crops:** None  
**Micro topography:** Termite or ant mounds, 0.5-2m height, 0.2% coverage  
**Sur.coa. Fragments:** Very few medium gravel many  
**Parent material:** Pyroclank to Fluvial      **Surface cracks:** None  
**Effective soil depth:** Very deep      **Surface sealing:** None  
**Drainage class:** Well drained      **Water table:** Note observed  
**Drainage external:** Slow      **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation  
**Fertilizer:** Dap100kg/ha, Urea50kg/ha  
**Erosion status:** Sheet erosion (10-25%) gully erosion (0-5%) active at present moderate

- 1A 0-25cm Yellowish brown (10YR 5/4, moist) silt loam texture; very few medium rounded fresh / slightly weathered & common fine sub rounded fresh /slightly weathered pumice; single grain; loose, slightly sticky, slightly plastic; very few, fine & very few, medium, roots; few termite or ant channels & nests; common, very fine, interstitial, pores; strongly-calcareous; clear smooth boundary.
- 2A1 25-85cm Yellowish brown (10YR 5/4,moist) sandy loam texture; abundant fine rounded fresh / slightly weathered & common medium rounded fresh / slightly weathered pumice; moderate coarse subangular block; friable to firm, sticky, plastic; very few fine & very few medium roots; few termite or ant channels & nests; very few, fine, channels & very few fine interstitial, pores; strongly-calcareous; abrupt, smooth, boundary.
- 3A285-150cm Brown (10YR 3/3, moist) medium sand; very few stones rounded fresh or slightly weathered, common medium sub rounded fresh / slightly weathered & many fine rounded fresh /slightly weathered pumice; single grain; loose, non sticky, non plastic; few nodule coarse irregular hard carbonates white; very few, very fine & very few, fine, roots; common fine interstitial pores; slightly-calcareous; clear smooth boundary.
- 4A3 150-200cm Dark yellowish brown (10YR 3/4, moist) coarse sand; very few stones rounded fresh / slightly weathered, many medium rounded fresh / slightly weathered & abundant fine sub rounded fresh or slightly weathered pumice; single grain; loose, non sticky, non plastic; common nodule concretion irregular & rounded hard carbonates white; very few, very fine, roots; few, fine, interstitial l, pores; moderately-calcareous.

## SOIL PROFILE DESCRIPTION

**Profile code:** *WEP-23*      **Mapping unit:**      **Status:** *Pit with sample*

200-300cm Brown (10YR 4/3, moist) sandy clay; common fine rounded fresh/slightly weathered  
few medium rounded fresh / slightly weathered pumice; friable, sticky, plastic.

300-400cm Dark yellowish brown (10YR 4/4, moist) sandy clay loam; common fine rounded fresh /  
slightly weathered & common medium rounded fresh / slightly weathered pumice;  
friable, sticky, plastic.

400-500cm Yellowish brown (10YR 5/4, moist) silt loam; very few fine sub rounded fresh /  
slightly weathered pumice; firm sticky, slightly plastic.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-24    **Mapping unit:**    **Status:** Pit without sample  
**Soil classification (WRB2006):** Vitric Andosols    **Date:** 04/04/14  
**Author:** Dawit and Zeinu    **Coordinate, Long (N)** 944500  
**Land form:** Level plain    **Lat (E)** 536200  
**Regional slope:**    **Elevation:** 1465m  
**Slope class:** Very gently slope    **Map sheet No:**  
**Slope form:** Straight    **Depth to bedrock:** >200cm  
**Slope** Low    **Rock out crops:** None  
**Micro topography:** Termite or ant mounds, 0.5-1.5 height, 0.2%  
**Surf coa fragments:** Common medium gravel  
**Parent material:** Pyroclantk to Fluvial    **Surface cracks:** None  
**Effective soil depth:** Very deep    **Surface sealing:** None  
**Drainage class:** Well drained    **Water table:** Note observed  
**Drainage external:** Slow    **Flooding:** None  
**Land cover:** Predominantly cultivated  
**Land use:** Rain fed arable cultivation, Residential use  
**Fertilizer:** Dap125kg/ha, Urea75kg/ha  
**Erosion status:** Sheet erosion (10-25%) gully erosion (0.5%) active at present slight

- 1A 0-40cm Dark grayish brown (10YR 4/2, moist) sandy loam; many fine sub rounded fresh / slightly weathered & few medium sub rounded fresh / slightly weathered pumice; weak medium subangular blocky; very friable, non sticky, non plastic; very few, very fine & very few, fine, roots; few, very fine, interstitial & very few, very fine, channels, pores; non-calcareous; abrupt, wavy, boundary.
- 2A2 40-90cm Grayish brown (10YR 5/4, moist) pumice; dominant fine angular fresh/slightly weathered & abundant medium sub rounded fresh/ slightly weathered pumice; single grain; loose, non sticky, non plastic; very few, very fine roots, common, fine, interstitial, pores; non-calcareous; abrupt smooth boundary.
- 3A390-130cm Brown (10YR 4/3, moist) sandy clay loam; very few fine rounded fresh or slightly weathered pumice; medium coarse subangular blocky; friable, sticky, plastic; few termite or ant channels & nests; very few, fine, channels & very few, very fine, interstitial, pores; non-calcareous; clear smooth boundary.
- 4A3130-200cm Dark brown (10YR 3/3, moist) sandy clay loam; medium coarse subangular blocky; sticky, plastic; few termite or ant channels & nests; very few, very fine, channels & very few, fine, interstitial, pores; non-calcareous.

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP25      **Mapping unit:**      **Status:** Pit with sample  
**Soil classification (WRB2006):** Haplic Fluvisols      **Date:** 08/04/14  
**Author:** Dawit and Bekele      **Coordinate, Long (N)** 941000  
**Land form:** Level plain      **Lat (E)** 542900  
**Regional slope:**      **Elevation:** 1491m  
**Slope class:** Nearly level      **Map sheet No:**  
**Slope form:** Straight      **Depth to bedrock:** >200cm  
**Slope** Low      **Rock out crops:** None  
**Micro topography:** None      **Surf coarse fragments:** Common medium gravel  
**Parent material:** Pyroclank to Fluvial      **Surface cracks:** None  
**Effective soil depth:** Very deep      **Surface sealing:** None  
**Drainage class:** Well drained      **Water table:** Note observed  
**Drainage external:** Slow      **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation  
**Fertilizer:** None  
**Erosion status:** Sheet erosion (10-25 %,) active at present slight

**1A 0-45cm** Dark yellowish brown (10YR 4/4, moist) sandy loam; common medium sub rounded fresh /slightly weathered & many fine sub rounded fresh / slightly weathered pumice; weak medium subangular blocky; very friable, non sticky, non plastic; very few, many & few, very fine, roots; very few, fine, channels & few, very fine, interstitial, pores; slightly-calcareous; clear, smooth, boundary.

**2A2 45-100cm** Pale brown (10YR 6/3, moist) Loamy sand texture; few, fine, sub rounded fresh / slightly weathered pumice; weak coarse subangular block; very friable, non sticky, non plastic; very few, very fine, roots; few termite or ant channels & nests; very few, very fine, channels & very few, very fine, interstitial, pores; slightly-calcareous; abrupt, smooth, boundary.

**3A3 100-125cm** Grayish brown(10YR 5/2,moist) pumice; few medium rounded fresh/slightly weathered & dominant fine rounded fresh /slightly weathered pumice; single grain; loose, non sticky, non plastic; common soft concretion fine irregular soft carbonates white; few, fine, interstitial, pores; strongly-calcareous; abrupt, smooth, boundary.

**4A3 125-180** cm Brown (10YR 4/3, moist) silt loam texture; few fine sub rounded fresh / slightly weathered pumice; moderate coarse subangular blocky; very friable, non sticky, non plastic; common soft concretion fine irregular soft carbonates white; very few, very fine, roots; very few, very fine, channels & very few, very fine, interstitial, pores;

**180 -200 ????????**

## SOIL PROFILE DESCRIPTION

**Profile code:** WEP-26    **Mapping unit:**    **Status:** *Pit without sample*  
**Soil classification (WRB2006):** Haplic Fluvisols    **Date:** 08/04/14  
**Author:** Dawit and Abate    **Coordinate, Long (N)** 940500  
**Land form:** Level plain    Lat (E) 542500  
**Regional slope:**    **Elevation:** 1488m  
**Slope class:** Very gently slope    **Map sheet No:**  
**Slope form:** Straight to convex    **Depth to bedrock:** >200cm  
**Slope** Medium    **Rock out crops:** None  
**Micro topography:** None    **Surface coarse fragments:** Common fine  
**Parent material:** *Pyroclantk to Fluvial*    **Surface cracks:** None  
**Effective soil depth:** Very deep    **Surface sealing:** None  
**Drainage class:** Somewhat exe. Drained    **Water table:** Note observed  
**Drainage external:** Well    **Flooding:** None  
**Land cover:** Intensively cultivated land  
**Land use:** Rain fed arable cultivation  
**Fertilizer:** None  
**Erosion status:** Water and wind erosion (5-10) active at present moderate

- 0-30cm Brown (10YR 4/3, moist) sandy loam; common fine rounded fresh / slightly weathered & common medium sub rounded fresh / slightly weathered pumice; weak medium subangular blocky; loose, non sticky, non plastic; few very fine, common, fine & many, medium roots; few termite or ant channels & nests; common, fine, interstitial, pores; non-calcareous; clear, smooth, boundary.
- 30-70cm Dark grayish brown (10YR 4/2, moist) loamy sand; many fine sub rounded fresh / slightly weathered & few fine rounded fresh / slightly weathered pumice; weak medium subangular block; loose, non sticky, non plastic; many, fine & few, medium, roots; few termite or ant channels & nests; few, coarse interstitial pores; non-calcareous; clear smooth boundary.
- 70-100cm Light brownish gray (10YR 6/2, moist) silt loam; common fine rounded fresh / slightly weathered & very few medium rounded fresh / slightly weathered pumice; weak fine subangular block; loose, non sticky, non plastic; very few & very fine, roots; very few, very fine, interstitial, pores; non-calcareous; abrupt, wavy, boundary.
- 100-140cm Grayish brown (10YR 5/2, moist) pumice; very few common angular fresh /slightly weathered, dominant fine sub rounded fresh / slightly weathered & many medium rounded fresh or slightly weathered pumice; single grain; loose, non sticky, non plastic; very few, very fine, roots; strongly-calcareous; abrupt, smooth, boundary.
- 140-200cm Dark yellowish brown (10YR 4/4, moist) sandy clay loam; common fine rounded fresh /slightly weathered & very few medium rounded fresh /slightly weathered pumice; weak medium subangular block; friable, slightly sticky, slightly plastic; very few, coarse roots; moderately calcareous



Table 6. 1 Chemical characteristics of the representative pedons/auger observation points of the soils

SMU	Filed. No.	Depth	pH	pH	ECe	Na	K	Ca	Mg	CEC	SUM of Cations	OC	TN	Av .P	CaCO <sub>3</sub>	ESP
		(cm)	H <sub>2</sub> O	KCl	dS/m	Exchangeable bases (cmol(+)/kg soil)				cmol(+)/kg soil	%		mg/kg	%	%	
1aLS1	WEP-25	0-45	7.69	6.57	0.05	0.65	0.63	5.33	2.05	11.59	8.66	0.55	0.06	2.83	1.15	5.61
		45-100	7.9	7.18	0.04	1.41	0.59	6.08	2.03	13.23	10.11	0.27	0.03	1.57	0.52	10.66
		100-125	8.83	7.94	0.06	3.5	0.28	11.26	4.02	20.97	19.06	0.26	0.02	0.94	0.82	16.69
		125-180	9.04	8.27	0.18	5.68	1.13	12.97	4.6	27.29	24.38	0.29	0.02	0.60	4.05	20.81
		180-200	9.57	8.63	0.21	2.91	0.88	6.9	2.43	14.55	13.12	0.21	0.01	0.37	1.14	20.00
1aPU6	WEP-05	0-50	8	7.23	0.21	1.83	0.97	9.77	3.11	21.72	15.68	1.9	0.27	5.57	1.70	8.43
		50-80	7.12	6.4	0.14	6.33	0.85	14.98	4.58	33.01	26.73	1.8	0.21	3.65	3.82	19.18
		80-115	6.89	5.96	0.07	4.75	0.99	10.4	4.58	33.46	20.72	1.31	0.14	3.41	3.08	14.20
		115-200	7.03	6.28	0.05	7.01	3.84	12.48	4.16	35.72	27.49	0.61	0.07	1.64	2.65	19.62
	WP34	0-20	7.63	7.13	0.14	0.29	1.52	11	3.82	16.13	16.63					1.80
		20-65	7.74	6.51	0.06	0.65	0.7	14.7	2.1	16.89	18.15					3.85
		65-110	9.08	8.07	0.13	0.43	0.47	5	1.26	6.85	7.16					6.28
		110-135	8.46	7.19	0.08	0.9	1.01	9.2	2.08	11.3	13.19					7.96
		135-170	9.32	7.9	0.22	2.7	1.7	21.4	3.42	16.28	29.22					16.58

		170-200	9.5	7.92	0.25	2.87	1.74	21.4	3.3	17.02	29.31					16.86
1aSL1	AS-01	0-30	7.24	6.66	0.09	0.97	0.83	8.79	2.93	15.48	13.52	0.41	0.05	5.16	1.39	6.27
		30-75	6.83	6.05	0.05	0.91	0.8	8.99	3.27	16.89	13.97	0.38	0.04	3.72	1.88	5.39
	WEA-05	0-30	7.98	7.14	0.41	1.09	3.04	17.62	7.13	32.38	28.89	0.6	0.07	10.71	3.53	3.37
		30-70	8.38	7.38	0.25	1.94	1.66	19.08	5.94	33.18	28.61	0.76	0.08	2.69	4.54	5.85
	WP39	0-35	7.83	7.01	0.09	0.19	1.79	10.4	2.8	21.74	15.18	0.87	0.05	7.15	1.22	0.87
		35-100	8.24	7.46	0.23	0.39	1.23	14	1.8	15.65	17.42	0.75	0.06	6.53	1.18	2.49
		100-125	8.26	7.35	0.16	0.9	1.36	10.6	1.63	14.83	14.49	0.66	0.06	6.13	2.00	6.07
		125-170	8.43	7.16	0.12	13.1	1.22	0.82	1.2	16.6	16.34	0.84	0.05	7.49	3.75	78.92
		170-200	8.22	7.07	0.16						0	0.57	0.06	7.38	3.27	
	WP40	0-30	6.94	6.53	0.13	0.28	2.33	31.9	3.64	24.15	38.15					1.16
		30-75	8.21	7.48	0.12	0.32	0.92	36.5	7.14	26.02	44.88					1.23
		75-120	8.39	7.67	0.11	0.34	1.4	39.9	2.52	24.65	44.16					1.38
	120-160	9.31	7.59	0.36	6.39	3.23	27.3	7.14	31.5	44.06					20.29	
1aSL4	WEP-01	0-40	6.38	5.78	0.09	4.43	0.95	6.94	2.86	24.83	15.18	0.67	0.06	4.34	0.00	17.84
		40-70	7.29	6.49	0.04	4.83	0.93	6.06	2.02	21.96	13.84	0.47	0.05	3.27	1.03	21.99
		70-105	9.37	8.67	0.13	4.57	3.31	7.27	3.23	21.08	18.39	0.38	0.04	2.75	2.06	21.68
		105-200	9.35	8.41	0.44	6.33	3.31	9.15	3.33	26.23	22.12	0.34	0.03	2.64	2.76	24.13

1aSL5	WEP-02	0-30	7.03	6.27	0.13	5.82	0.62	9.48	3.3	26.87	19.22	1.37	0.05	3.14	3.36	21.66	
		30-110	9.36	8.39	0.07	6.21	0.35	4.49	1.63	15.08	12.67	0.32	0.03	2.50	1.46	41.18	
		110-155	9.04	8.19	0.12	6.72	3.38	7	3.3	22.39	20.4	0.38	0.04	1.67	1.79	30.01	
		155-200	9.02	8.16	0.13	6.49	2.09	6.18	2.47	21.5	17.23	0.36	0.03	1.19	1.58	30.19	
		200-300	9.68	8.78	0.46									0.00			
		300-400	9.98	8.82	0.59									0.00			
		400-500	10.19	9.56	0.8									0.00			
		WEP-06	0-40	6.04	5.37	0.12	3.29	0.57	7.68	2.83	21.96	14.37	1.47	0.16	3.50	0.00	14.98
			40-150	8.58	7.64	0.07	5.34	0.2	6.24	2.08	15.83	13.86	0.46	0.07	2.80	1.59	33.73
			150-200	8.47	7.51	0.07	1.78	0.97	9.89	3.3	20.6	15.94	0.99	0.11	1.43	3.89	8.64
		WEP-16	0-30/40	6.88	6.03	0.08	0.85	0.85	10.2	3.26	18.18	15.16	0.98	0.06	3.49	1.04	4.68
			30/40-95	8.19	7.17	0.05	1.07	0.34	5.04	1.68	12.78	8.13	0.11	0.01	2.62	1.18	8.37
			95-130	8.26	7.36	0.09	1.41	1.03	10.82	3.74	18.99	17	0.49	0.04	1.25	0.64	7.42
			130-200	8.93	8.06	0.14	3.8	1.32	8.21	3.02	18.78	16.35	0.34	0.03	1.20	2.53	20.23
		WP28	0-15	8.58	7.87	0.29	0.22	1.51	12.65	2.26	16.21	16.64	0.9	0.13	1.39	3.68	1.36
			15-40	8.4	7.5	0.1	0.18	1.33	15.4	3.33	11.8	20.24	0.36	0.04	18.08	4.10	1.53
			40-110	7.56	6.68	0.06	0.37	1.18	17.6	2.52	14.6	21.67	0.85	0.05	Trace	1.73	2.53
			110-160	7.7	6.8	0.1	0.45	0.8	15.7	0.82	10.3	17.77	0.43	0.04	2.17	2.51	

		160-200	7.98	7.04	0.07	0.49	0.7	8.7	2.08	7.23	11.97	0.41	0.05	2.65	Trace	
	WP33	0-25	6.8	5.37	0.11	0.23	0.84	10.5	1.68	20.5	13.25	1.04	0.06	5.07	2.88	1.12
		25-105	8.99	8.03	0.09	0.34	0.41	3.23	0.4	4.39	4.38	0.6	0.05	4.90	3.60	7.74
		105-155	9.22	7.86	0.12	0.41	1.16	9.48	1.65	12.09	12.7	0.6	0.06	2.45	3.57	3.39
		155-200	8.3	7.42	0.12	0.45	3.49	49.9	4.94	38.1	58.78	0.44	0.06	Trace	3.51	
		200-300	8.41	7.5	0.13	0.58	2.46	41.6	4.08	28.8	48.72					
		300-400	8.62	7.5	0.23	0.22	1.74	32.2	3.39	25.8	37.55					
		400-500	9.66	7.94	0.29	3.71	2.24	9.57	4.16	14.02	19.68					
	WP45	0-15														
		15-55	7.49	6.4	0.03	0.28	1.13	8.8	2.94	12.78	13.15	0.95	0.13	Trace	1.35	2.19
		55-110	8.58	7.59	0.16	0.79	1.29	13.9	2.1	17.35	18.08	0.51	0.06	Trace	3.98	4.55
		110-150	8.51	7.61	0.16	0.67	2.15	15.5	1.26	19.17	19.58	0.85	0.04	2.17	3.87	
		150-170	8.62	7.67	0.17	1.54	1.65	12.5	2.08	17.18	17.77	0.41	0.06	1.09	3.92	
		170-200	8.6	7.61	0.16	0.71	1.28	15	1.25	18.09	18.24	0.34	0.02	Trace	4.42	
		200-360	9.5	7.78	0.24	7.54	3.4	10.7	9.84	16.75	31.48	0	0	0.00		
		360-400	8.56	7.63	0.18	0.74	1.21	13.6	2.47	14.78	18.02	0	0	0.00		
		400-500	10.01	8.14	0.51						0	0	0	0.00		
2aLS1	WEP-15	0-50	8.17	7.59	0.08	3.06	0.87	14.28	4.49	26.61	22.7	0.55	0.04	3.72	3.75	11.50

	50-95														
	95-135	8.59	7.75	0.11	3.36	4.6	16.48	5.77	31.35	30.2	0.42	0.04	2.76	5.25	10.72
	135-170	9.06	8.37	0.11	5.5	0.67	8.98	2.86	19.51	18.01	0.23	0.03	2.17	1.04	28.19
	170-200	9.77	8.71	0.25	6.21	4.08	7.75	2.45	27.94	20.49	0.24	0.03	1.74	0.62	
	200-300	9.74	8.85	0.3									0.00		
	300-400	9.43	8.66	0.33									0.00		
	400-500	9.72	8.84	0.43									0.00		
WEP-17	0-25	6.59	5.78	0.06	0.8	0.94	11.02	4.08	19.96	16.83	0.43	0.05	6.22	0.00	4.01
	25-60	8.19	7.36	0.07	0.67	0.63	9.06	3.71	17.91	14.08	0.2	0.02	3.95	2.00	3.74
	60-120														
	120-200	8.97	7.93	0.17	4.66	1.05	12.77	4.53	25.97	23.01	0.17	0.01	1.76	4.73	
WP35	0-25	7.6	6.86	0.06	0.14	1.15	9.42	3.42	13.96	14.13					
	25-50	7.46	6.71	0.08	0.16	0.85	9.98	6.24	16.73	17.23					0.96
	50-85	8.67	7.78	0.12	0.5	1.83	13.44	5.04	15.07	20.81					3.32
	85-110	9.04	8.28	0.09	0.35	0.41	12.06	1.66	7.69	14.48					4.55
	110-160	8	7.08	0.09	0.16	1.65	19.3	1.71	22.33	22.82					
	160-200	9.19	8.48	0.14	6.42	1.08	8.99	3	20.93	19.49					
WP38	0-50	8.18	7.49	0.12	0.19	1.44	14.7	2.16	18.31	18.49					1.04

		50-90	8.1	6.82	0.07	0.49	1.59	22	3.6	19.57	27.68					2.50
		90-130	8.8	7.01	0.08	2.28	2.69	31.1	2.52	26.48	38.59					8.61
		130-160	8.87	7.71	0.29	1.83	1.79	19.2	2.4	19.13	25.22				2.70	
		160-180	8.82	7.81	0.2	1.07	1.54	15.6	2.8	20	21.01					
		180-200	8.68	7.8	0.18	0.82	1.18	17.2	2.8	20	22				3.96	
2aPU6	WEA-02	0-30	7.99	7.14	0.19	0.56	0.68	9.03	3.28	16.95	13.55	0.87	0.11	4.10	1.47	
		30-50	7.73	6.97	0.13	0.84	0.94	10.68	3.7	18.75	16.16	1.4	0.14	2.67	1.26	
		50-70	7.66	6.93	0.12	1.04	0.97	12.13	4.04	19.78	18.18	1.27	0.11	1.23	1.34	5.26
2aSL1	WEP-04	0-30	7.2	6.47	0.05	9.62	4.94	7.34	2.45	33.26	24.36	0.63	0.08	1.98	1.46	28.92
		30-95	7.42	6.5	0.03	8.91	4.24	6.53	2.04	32.82	21.72	0.41	0.05	1.84	2.60	27.15
		95-125	8	7.15	0.04	1.34	1.12	11.12	4.53	22.84	18.12	0.34	0.04	1.62	3.26	5.87
		125-200	9.1	8.22	0.12	6.89	3.53	8.4	2.94	22.83	21.76	0.22	0.02	1.21	2.57	30.18
	WEP-22	0-40	7.21	6.4	0.08	1.1	0.85	9.02	3.28	18.27	14.25	0.43	0.05	3.05	1.15	6.02
		40-100	8.2	7.26	0.06	3.93	2.02	12.06	4.31	26.69	22.32	0.37	0.04	1.94	2.86	14.72
		100-150	8.58	7.54	0.15	5.01	3.83	16.67	5.27	34.34	30.77	0.22	0.02	1.60	3.36	14.59
		150-200	8.82	7.96	0.17	6.56	3.84	18.23	6.08	37.74	34.7	0.14	0.02	1.21	4.09	
	WP-37	0-20	8.54	7.55	0.15	0.71	2.08	16.6	2.08	17.18	21.47				3.70	4.13
		20-65	8.99	7.86	0.16	1.01	2.08	17.1	1.66	11.3	21.85				4.06	8.94

		65-90	9.33	7.7	0.22	3.89	2.88	11.6	3.33	21.7	21.7				4.75	17.93
		90-125	9.5	7.78	0.24	0	0	0	0	0	0				3.16	
		125-135	9.94	7.99	0.31	0.58	0.85	5.8	1.65	8.5	8.88					
		135-170	10.01	8.14	0.51	1.28	1.56	13	1.68	17.35	17.52					
		170-200	8.69	7.63	0.27	0.52	2.85	40.4	1.65	26	45.42					
2aSL3	WEP-10	0-20	7.71	6.88	0.13	4.83	0.72	9.29	2.83	26.35	17.67	1.33	0.13	5.27	2.88	18.33
		20-70/100	9.54	8.66	0.29	5.29	2.53	12.48	4.16	25.77	24.46	0.67	0.04	4.86	2.76	20.53
		70/100-150	9.88	9.03	0.67	7.09	0.9	3.33	1.43	18.11	12.75	0.27	0.02	4.68	0.85	39.15
		150-200	9.97	9.14	0.76	5.54	0.84	6.94	2.45	20.84	15.76	0.43	0.04	2.07	2.29	26.58
	WEA-04	0-30	6.88	6.77	0.07	0.98	0.78	10.1	3.23	16.25	15.1	1.18	0.09	3.45	0.82	6.03
		30-60	7.24	6.45	0.08	0.83	0.61	8.88	2.83	14.92	13.15	0.71	0.08	1.25	2.16	5.56
		60-75	8.49	7.6	0.12	2.01	0.53	10.88	3.63	19.7	17.05	0.49	0.05	1.88	1.34	10.20
	WEA-07	0-30	8.15	7.32	0.11	0.53	0.96	8.22	3.29	15.18	12.99	0.59	0.05	4.21	1.68	3.49
		30-70	8.21	7.44	0.11	0.81	1.78	18.61	6.2	29.67	27.4	0.78	0.09	1.65	1.58	2.73
2aSL5	WEP-03	0-30	6.29	5.71	0.07	5.32	7.58	9.79	3.26	36.81	25.96	2.29	0.25	5.02	0.00	14.45
		30-200	9.01	8.36	0.15	5.93	0.29	9.24	3.36	22.37	18.82	0.33	0.04	1.03	5.57	26.51
		200-300	9.36	8.47	0.19									0.00		#DIV/0!
		300-400	9.61	8.6	0.35									0.00		#DIV/0!

		400-500	9.58	8.61	0.49								0.00			
	WEP-23	0-25	8.39	7.51	0.16	4.83	1.94	16.62	5.4	31.62	28.81	0.65	0.08	3.98	2.65	15.28
		25-85	9.13	8.18	0.18	6.7	1.68	10.97	3.38	27.52	22.72	0.56	0.07	0.99	4.73	24.35
		85-200														
		200-300	8.76	7.79	0.31									0.00		
		300-400	8.54	7.4	0.2									0.00		0.00
		400-500	8.55	7.46	0.14									0.00		
	WP25	0-30	7.04	6.43	0.13	0.26	0.74	11.9	1.24	14.13	14.14	1.31	0.07	7.45	2.97	1.84
		30-80	8.84	7.49	0.11	0.26	0.39	3.01	0.86	4.2	4.52	0.39	0.05	Trace	4.34	6.19
		80-120	8.3	8.03	0.18	0.68	0.62	6.3	1.26	7.7	8.86	0.25	0.03	Trace	0.75	8.83
		120-190	9.35	8.34	0.13	0.92	3.12	6.2	1.24	6.72	11.48	0.26	0.03	Trace	5.57	13.69
		190-200	8.9	7.53	0.12	2.12	1.3	11	1.69	15.65	16.11	1.99	0.1	Trace	3.24	
	WP27	0-25	6.57	5.91	0.14	0.42	3.81	15.7	3.82	13.8	23.75					3.04
		25-50	8.16	6.98	0.07	0.39	2.19	12	3.43	10.7	18.01					3.64
		50-90	9.04	8.07	0.14	0.31	0.52	6.8	2.14	7.91	9.77					3.92
		90-150	9.42	8.32	0.15	0.24	0.24	5.4	2.06	5.28	7.94	0.42	0.04			4.55
		150-200	8.23	7.53	0.19	1.05	0.67	20.4	5.2	21.7	27.32	0.59	0.05			
3aSL1	WP41	0-20	8.48	7.64	0.09	0.13	1.48	21.4	3.3	13.43	26.31					0.97



		20-70	8.2	7.34	0.07	0.17	0.9	15.4	1.32	17.22	17.79					0.99
		70-105	8.27	7.12	0.05	0.2	0.74	10.3	0.82	11.64	12.06					1.72
		105-135	8.27	7.43	0.07	0.31	0.81	12.2	1.26	13.7	14.58					2.26
		135-160	8.68	7.72	0.1	0.48	0.75	10.4	3.74	13.11	15.37					3.66
		160-200	8.94	7.66	0.12	1.33	1.47	13.1	5.94	19.82	21.84					6.71
3aSL5	WEA-03	0-30	6.74	5.78	0.09	0.7	0.55	11.92	3.84	19.22	17.01	2.11	0.24	5.42	Trace	3.64
		30-75	8.26	7.49	0.09	0.91	0.38	9.28	2.83	14.48	13.4	0.3	0.04	1.78	2.06	6.28
4aSL1	WEA-06	0-30	8.27	7.38	0.1	0.78	1.37	17.61	5.73	27.16	25.5	0.55	0.06	3.70	3.34	2.87
		30-70	8.29	7.37	0.13	0.63	1.24	17.11	5.84	26.3	24.81	0.72	0.09	2.79	3.30	2.40

Table 6. 1 Physical characteristics of the representative pedons of the soils

SMU	Filed.No.	Depth (cm)	Clay %	Silt %	Sand %	Gravel %	Textural Class	BD g/cm <sup>3</sup>	FC wt%	PWP wt%	AWC % v/v	IF cm/hr	HC m/day
1aLS1	WEP-25	0-45	0	0	100	-							
		45-100	1.6	52.16	46.24	-	SIL						
		100-125	0	6.18	93.82	6.44	S						
		125-180	2.16	51.46	46.38	-	SIL						
		180-200	1.23	12.42	86.35	16.88	S						
1aPU6	WEP-05	0-50	6.87	55.05	38.08	92.28	SIL						
		50-80	0	97.3	2.7	0	SI						
		80-115	8.91	48.09	43	0	L						
		115-200	0	52.78	47.22	-	SIL						
	WP34	0-20	13.87	24.97	61.16		SL						
		20-65	13.31	28.52	58.17		SL						
		65-110	6.42	15.58	78		LS						
		110-135	8.34	30.59	61.07		SL						
		135-170	8.78	20.94	70.28		SL						
	170-200	9.24	24.36	66.4		SL							
1aSL1	AS-01	0-30	3.24	39.22	57.54	-	SL						
		30-75	3.32	41.01	55.67	-	SL						
	WEA-05	0-30	8.38	88.1	3.52	-	SI						
		30-70	9.5	87.99	2.51	-	SI						
	WP39	0-35	10.01	23.35	66.64		SL						
		35-100	12.69	25.37	61.94		SL						
		100-125	14.93	29.84	55.23		SL						
		125-170	10.08	24.74	65.18		SL						
	170-200	11.04	31.1	57.86		SL							

	WP40	0-30	18.66	36.33	45.01		L						
		30-75	8.08	29.62	62.3		SL						
		75-120	8.19	22.74	69.07		SL						
		120-160	17.91	48.76	33.33		L						
1aSL4	WEP-01	0-40	2.21	46.15	51.64	0	SL						
		40-70	1.07	39.29	59.64	0	SL						
		70-105	0	17.28	82.72	85	LS						
		105-200	0	54.92	45.08	-	SIL						
1aSL5	WEP-02	0-30	4.0	91.69	4.29	2.45	SI	1.06	19.9	7.12	13.55		
		30-110	0	51.16	48.84	0	SL						
		110-155	4.24	48.28	47.48	0	SIL	1.35	23.83	9.2	19.75		
		155-200	8.41	47.33	44.26	-	L						
		200-300											
		300-400											
		400-500											
	WEP-06	0-40	0	40.2	59.8	0	SL						
		40-150	0	7.63	92.37	49.78	S						
		150-200	0	54.47	45.53	-	SI						
	WEP-16	0-30/40	0	34.82	65.18	0	SL						
		30/40-95	0	42.81	57.19	37.79	SL						
		95-130	0	55.86	44.14	0	SIL						
		130-200	4.4	42.21	53.39	-	SL						
	WP28	0-15	14.75	17.7	67.55		SL						
		15-40	7.86	30.14	62		SL						
		40-110	14.18	30.87	54.95		SL						
	110-160	9.48	25.27	65.25		SL							
	160-200	7.37	20.64	71.99		SL							
WP33	0-25	18.03	29.42	52.55		SL							

		25-105	4.9	18.6	76.5		LS						
		105-155	9.03	29.11	61.86		SL						
		155-200	10.04	24.65	65.31		SL						
		200-300	8.32	30.51	61.17		SL						
		300-400	8.04	33.07	58.89		SL						
		400-500	8.75	32.1	59.15		SL						
	WP45	0-15	0	0	100								
		15-55	9.09	31.83	59.08		SL						
		55-110	9.89	31.47	58.64		SL						
		110-150	9.33	27.06	63.61		SL						
		150-170	11.49	26.11	62.4		SL						
		170-200	8.18	26.04	65.78		SL						
		200-360	7.66	33.53	58.81		SL						
		360-400	9.86	31.47	58.67		SL						
		400-500	13.11	32.78	54.11		SL						
	WEP-15	0-50	2.06	34.48	63.46	-	SL	1.34	18.66	9.49	12.29		
		50-95	0	0	100								
		95-135	2.87	54.35	42.78	-	SL	1.08	33.67	10.88	24.61		
		135-170	1.31	6.96	91.73	39.76	S						
		170-200	5.79	50.84	43.37	-	SIL						
		200-300											
		300-400											
		400-500											
	WEP-17	0-25	0	32.2	67.8		SL	1.46	16.7	8.42	12.09		
		25-60	1.55	23.33	75.12		LS	1.21	21.96	8.36	16.46		
		60-120	0	0	100								
		120-200	0	34.86	65.14		SL						
	WP35	0-25	8.17	13.62	78.21		LS						
2aLS1		25-50	5.88	14.1	80.02		LS						

		50-85	7.9	28.96	63.14		SL						
		85-110	6.66	21.89	71.45		SL						
		110-160	12.08	27.61	60.31		SL						
		160-200	11.84	23.68	64.48		SL						
	WP38	0-50	8.92	16.06	75.02		SL						
		50-90	10.33	27.56	62.11		SL						
		90-130	12.81	40.26	46.93		L						
		130-160	8.19	14.74	77.07		SL						
		160-180	5.14	5.14	89.72		S						
		180-200	6.09	7.61	86.3		LS						
	WEA-02	0-30	6.19	50.6	43.21	-	SIL						
		30-50	0	54.62	45.38	-	SIL						
2aPU6		50-70	4.21	46.68	49.11	-	SL						
	WEP-04	0-30	2.19	44.02	53.79	-	SL						
		30-95	0	55.3	44.7	-	SIL						
		95-125	5.79	45.11	49.1	-	SIL						
		125-200	0	62.12	37.88	-	SIL						
	WEP-22	0-40	0	83.7	16.3	-	SI						
		40-100	0	48.6	51.4	-	SL						
		100-150	5.91	48.78	45.31	-	SL						
		150-200	6.27	51.53	42.2	-	SIL						
	WP-37	0-20	7.98	36.58	55.44		SL						
		20-65	13.99	31.97	54.04		SL						
		65-90	9.35	33.67	56.98		SL						
		90-125	10.2	32.63	57.17		SL						
		125-135	10.38	20.76	68.86		SL						
		135-170	9.5	26.59	63.91		SL						
2aSL1		170-200	11.13	25.04	63.83		SL						

2aSL3	WEP-10	0-20	0	39.24	60.76	0	SL						
		20-70/100	8.99	43.65	47.36	0	L						
		70/100-150	0	98.13	1.87	6.76	SI						
		150-200	5.32	42.45	52.23	-	SL						
	WEA-04	0-30	0	31.55	68.45	-	SL						
		30-60	0	19.77	80.23	-	LS						
		60-75	1.48	12.42	86.1	16.88	LS						
	WEA-07	0-30	4.33	33.42	62.25	-	SL						
2aSL5		30-70	0	41.59	58.41	-	SL						
	WEP-03	0-30	0	48.8	51.2	-	SL	1.03	22.62	7.19	15.86		
		30-200	3.36	60.26	36.38	-	SIL						
		200-300											
		300-400											
		400-500											
	WEP-23	0-25	0	52.81	47.19	-	SIL	1.19	28.04	11.24	19.99		
		25-85	6.28	42.87	50.85	-	SL	1.35	24.46	13.80	14.39		
		85-200	0	0	100								
		200-300											
		300-400											
		400-500											
	WP25	0-30	12.22	19.55	68.23		SL						
		30-80	4.09	12.28	83.63		LS						
		80-120	6.33	45.21	48.46		SL						
		120-190	9.96	41.81	48.23		L						
		190-200	12.3	32.17	55.53		SL						
	WP27	0-25	11.4	11.4	77.2		SL						
		25-50	5.37	23.25	71.38		SL						
		50-90	6.92	27.7	65.38		SL						
	90-150	7.56	36.24	56.2		SL							

		150-200	9.42	25.11	65.47		SL						
3aSL1	WP41	0-20	6.41	18.31	75.28		SL						
		20-70	9.92	23.45	66.63		SL						
		70-105	6.91	24.66	68.43		SL						
		105-135	11.84	30.27	57.89		SL						
		135-160	7.43	37.17	55.4		SL						
		160-200	8.81	34.25	56.94		SL						
3aSL5	WEA-03	0-30	0	34.38	65.62	-	SL						
		30-75	1.04	54.8	44.16		SIL						
4aSL1	WEA-06	0-30	7.46	44.78	47.76	-	L						
		30-70	7.59	60.64	31.77	-	SIL						

**SOIL AUGER DESCRIPTION**

<b>Auger</b>	<i>WEA-01</i>	<b>Mapping</b>	<b>Status:</b>	<i>As</i>
<b>Soil class.(FAO 06):</b>	<i>Fluvisols</i>		<b>Date:</b>	<i>170614</i>
<b>Author:</b>	<i>Zeinu and Bekele</i>			<i>Long(N 0941000</i>
<b>Land form:</b>	<i>Level plain</i>		<b>Coordinate: Lat(E):</b>	<i>0540600</i>
<b>Regional</b>	<i>Straight</i>		<b>Elevation:</b>	<i>1502</i>
<b>Slope class:</b>	<i>Very gently</i>		<b>Map sheet No:</b>	
<b>Slope form:</b>	<i>Straight</i>		<b>Depth to</b>	<i>&gt;125cm</i>
<b>Slope Position:</b>	<i>Medium</i>		<b>Rock out</b>	<i>None</i>
<b>Micro topo. :</b>	<i>None</i>		<b>S. coarse</b>	<i>Few medium /very few boulders</i>
<b>Parent material:</b>	<i>Volcanic ash / Sand and gravel</i>		<b>Surface cracks:</b>	<i>None</i>
<b>Eff. soil depth:</b>	<i>Deep</i>		<b>Surface sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Some what excessively drained</i>		<b>Water table :</b>	<i>Unknown</i>
<b>Drainage</b>	<i>Slow</i>		<b>Flooding</b>	<i>None</i>
<b>Land cover:</b>	<i>Intensively cultivated</i>			
<b>Land use:</b>	<i>Rain fed agriculture/ Maize, Sorghum/</i>			
<b>Fertilizer:</b>	<i>Dap:100Kg/ha, Urea:50Kg/ha</i>			
<b>Erosion status:</b>	<i>Sheet erosion with slight degree (10-25% coverage)</i>			

- 0-30cm:Dark Yellowish Brown (10YR4/4) (moist), Sandy loam; few medium to fine sub rounded with freshly weathered pumice ; loose moist, none sticky & none plastic wet consistency, slightly calcareous.
- 30-125cm:Dark yellowish brown (10YR 3/4)(moist), Sandy loam; few medium to fine sub rounded with freshly weathered pumice ; loose moist, none sticky & none plastic wet consistency, slightly calcareous.



**SOIL AUGER DESCRIPTION**

<b>Auger</b>	<i>WEA-02</i>	<b>Mapping</b>	<b>Status:</b>	<i>As</i>
<b>Soil class.(FAO 06):</b>	<i>Fluvisols</i>		<b>Date:</b>	<i>060614</i>
<b>Author:</b>	<i>Ashenafi,zeinu &amp;</i>			<i>Long(N 0942800</i>
<b>Land form:</b>	<i>Level plain</i>		<b>Coordinate: Lat(E):</b>	<i>0541800</i>
<b>Regional</b>	<i>Flat</i>		<b>Elevation:</b>	<i>1480</i>
<b>Slope class:</b>	<i>Nearly level</i>		<b>Map sheet No:</b>	
<b>Slope form:</b>	<i>Straight</i>		<b>Depth to</b>	<i>&gt;125cm</i>
<b>Slope Position:</b>	<i>Medium</i>		<b>Rock out</b>	<i>None</i>
<b>Micro topo. :</b>	<i>None</i>		<b>S. coarse</b>	<i>many fine, many coarse.</i>
<b>Parent material:</b>	<i>Volcanic ash</i>		<b>Surface cracks:</b>	<i>None</i>
<b>Eff. soil depth:</b>	<i>Deep</i>		<b>Surface sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Some what excessively drained</i>		<b>Water table :</b>	<i>Unknown</i>
<b>Drainage</b>	<i>slow</i>		<b>Flooding</b>	<i>None</i>
<b>Land cover:</b>	<i>Intensively cultivated</i>			
<b>Land use:</b>	<i>Settlement, Rain fed agriculture/ Maize, Sorghum/</i>			
<b>Fertilizer:</b>	<i>Dap:100Kg/ha, Urea:50Kg/ha</i>			
<b>Erosion status:</b>	<i>Sheet erosion with slight degree (10-25% coverage)</i>			

0-30cm:Brown(10YR4/3)(moist), Silt loam; few medium sub rounded, common fine rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency, slightly calcareous.

30-80cm:Very dark greyish brown(10YR3/2)(moist), Silt loam; common medium sub rounded, common fine rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency, slightly calcareous.

80-100cm:Dark greyish brown(10YR4/2)(moist), Pumice; abundant coarse, few medium sub rounded weathered pumice; loose moist; none sticky & none plastic wet consistency, slightly calcareous.

100-125cm:Dark Yellowish Brown (10YR4/4)(moist), Sand loam; few fine rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency; none calcareous.

Remark: Pumice layer at 80cm -100cm observed

**SOIL AUGER DESCRIPTION**

<b>Auger</b>	<i>WEA-03</i>	<b>Mapping</b>	<b>Status:</b>	<i>As</i>
<b>Soil class.(FAO 06):</b>	<i>Fluvisols</i>		<b>Date:</b>	<i>110614</i>
<b>Author:</b>	<i>Bekele &amp; Zeinu</i>		<b>Coordinate:</b>	<i>Long(N 0948000 Lat(E): 0544100</i>
<b>Land form:</b>	<i>Level plain</i>		<b>Elevation:</b>	<i>1522</i>
<b>Regional</b>	<i>Flat</i>		<b>Map sheet No:</b>	
<b>Slope class:</b>	<i>Gently slope</i>		<b>Depth to</b>	<i>&gt;125cm</i>
<b>Slope form:</b>	<i>Straight</i>		<b>Rock out</b>	<i>None</i>
<b>Slope Position:</b>	<i>high</i>		<b>S. coarse</b>	<i>Very few coarse, many medium / abundant fine</i>
<b>Micro topo. :</b>	<i>None</i>		<b>Surface cracks:</b>	<i>None</i>
<b>Parent material:</b>	<i>Volcanic ash / Sand and gravel</i>		<b>Surface sealing:</b>	<i>None</i>
<b>Eff. soil depth:</b>	<i>Deep</i>		<b>Water table :</b>	<i>Unknown</i>
<b>Drainage class:</b>	<i>Some what excessively drained</i>		<b>Flooding</b>	<i>None</i>
<b>Drainage</b>	<i>Well</i>			
<b>Land cover:</b>	<i>Intensively cultivated</i>			
<b>Land use:</b>	<i>Settlement, Rain fed agriculture/ Maize, Sorghum/</i>			
<b>Fertilizer:</b>	<i>Dap:100Kg/ha, Urea:50Kg/ha</i>			
<b>Erosion status:</b>	<i>Sheet erosion with moderate degree (10-25% coverage)</i>			

0-30cm:Dark brown(10YR3/3)(moist), Sandy loam; few medium, many few sub rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency; slightly calcareous.

30-125cm:Very dark greyish brown(10YR4/2)(moist), Pumice; many medium angular, dominant fine sub rounded; with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency, slightly calcareous.

**SOIL AUGER DESCRIPTION**

<b>Auger</b>	<i>WEA-04</i>	<b>Mapping</b>	<b>Status:</b>	<i>As</i>
<b>Soil class.(FAO 06):</b>	<i>Fluvisols</i>		<b>Date:</b>	<i>170614</i>
<b>Author:</b>	<i>Bekele &amp; Zeinu</i>		<b>Coordinate:</b>	Long(N) <i>0943753</i> Lat(E): <i>0542342</i>
<b>Land form:</b>	<i>Level plain</i>		<b>Elevation:</b>	<i>1508</i>
<b>Regional</b>	<i>Flat</i>		<b>Map sheet No:</b>	
<b>Slope class:</b>	<i>Gently slope</i>		<b>Depth to</b>	<i>&gt;125cm</i>
<b>Slope form:</b>	<i>Straight</i>		<b>Rock out</b>	<i>None</i>
<b>Slope Position:</b>	<i>Medium</i>		<b>S. coarse</b>	<i>Many medium / abundant</i>
<b>Micro topo. :</b>	<i>Termites/0.2-0.5m/ 0.5% coverage</i>			<i>fine</i>
<b>Parent material:</b>	<i>Volcanic ash / Sand and gravel</i>		<b>Surface cracks:</b>	<i>None</i>
<b>Eff. soil depth:</b>	<i>Deep</i>		<b>Surface sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Some what excessively drained</i>		<b>Water table :</b>	<i>Unknown</i>
<b>Drainage</b>	<i>Well</i>		<b>Flooding</b>	<i>None</i>
<b>Land cover:</b>	<i>Intenssively cultivated</i>			
<b>Land use:</b>	<i>Rain fed agriculture/ Maize, Sorghum/</i>			
<b>Fertilizer:</b>	<i>Dap:100Kg/ha, Urea:50Kg/ha</i>			
<b>Erosion status:</b>	<i>Sheet erosion with moderate degree (10-25% coverage)</i>			

0-30cm:Very dark greyish brown(10YR4/2)(dry), Brown(10YR 4/3)(moist); Sand loam; common medium, many fine sub rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency; slightly calcareous.

30-60cm:Brown(10YR4/3)(moist), Loamy sandy; many fine, few medium sub rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency, moderately calcareous.

60-125cm:Grayish brown(10YR5/2)(moist),Pumice; many medium sub rounded, abundant fine rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency, moderately calcareous.

**SOIL AUGER DESCRIPTION**

<b>Auger</b>	<i>WEA-05</i>	<b>Mapping</b>	<b>Status:</b>	<i>As</i>
<b>Soil class.(FAO 06):</b>	<i>Fluvisols</i>		<b>Date:</b>	<i>300614</i>
<b>Author:</b>	<i>Dawite &amp; Abate</i>			<i>Long(N 0944000</i>
<b>Land form:</b>	<i>Level plain</i>		<b>Coordinate: Lat(E):</b>	<i>0540000</i>
<b>Regional</b>	<i>Flat</i>		<b>Elevation:</b>	<i>1467</i>
<b>Slope class:</b>	<i>Nearly level</i>		<b>Map sheet No:</b>	
<b>Slope form:</b>	<i>Straight</i>		<b>Depth to</b>	<i>&gt;125cm</i>
<b>Slope Position:</b>	<i>Low</i>		<b>Rock out</b>	<i>None</i>
<b>Micro topo. :</b>	<i>None</i>		<b>S. coarse</b>	<i>Few fine /very few medium</i>
<b>Parent material:</b>	<i>Volcanic ash / Sand and gravel</i>		<b>Surface cracks:</b>	<i>None</i>
<b>Eff. soil depth:</b>	<i>Deep</i>		<b>Surface sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Some what excessively drained</i>		<b>Water table :</b>	<i>Unknown</i>
<b>Drainage</b>	<i>Slow</i>		<b>Flooding</b>	<i>None</i>
<b>Land cover:</b>	<i>Intensively cultivated</i>			
<b>Land use:</b>	<i>Rain fed agriculture/ Maize, Sorghum/</i>			
<b>Fertilizer:</b>	<i>Dap:100Kg/ha, Urea:50Kg/ha</i>			
<b>Erosion status:</b>	<i>Sheet &amp; wind erosion with slight degree (0-5% coverage)</i>			

0-30cm:Brown(10YR4/3)(moist), Silt; very few medium rounded, few fine sub rounded with freshly weathered pumice; loose moist; slightly sticky & slightly plastic wet consistency, slightly calcareous.

30-70cm:Dark Yellowish Brown(10YR4/4)(moist), Silt; few fine sub rounded, few medium rounded with freshly weathered pumice; very friable moist; slightly sticky & slightly plastic wet consistency; moderately calcareous.

70-125cm:Dark brown(10YR3/3)(moist), Silt loam; very few medium sub rounded, few fine sub rounded with freshly weathered pumice; very friable moist; slightly sticky & slightly plastic wet consistency; very few nodules and concretion fine to medium soft and hard calcium carbonates with white colour; moderately calcareous.

**SOIL AUGER DESCRIPTION**

<b>Auger</b>	<i>WEA-06</i>	<b>Mapping</b>	<b>Status:</b>	<i>As</i>
<b>Soil class.(FAO 06):</b>	<i>Fluvisols</i>		<b>Date:</b>	<i>050714</i>
<b>Author:</b>	<i>Bekele &amp; Zeinu</i>			<i>Long(N 0945500</i>
<b>Land form:</b>	<i>Level plain</i>		<b>Coordinate: Lat(E):</b>	<i>0536300</i>
<b>Regional</b>	<i>Flat</i>		<b>Elevation:</b>	<i>1477</i>
<b>Slope class:</b>	<i>Nearly level</i>		<b>Map sheet No:</b>	
<b>Slope form:</b>	<i>Straight</i>		<b>Depth to</b>	<i>&gt;125cm</i>
<b>Slope Position:</b>	<i>Low</i>		<b>Rock out</b>	<i>None</i>
<b>Micro topo. :</b>	<i>Termites/0.5-1.5m/ 0.2% coverage</i>		<b>S. coarse</b>	<i>Many medium / abundant fine/ few stone</i>
<b>Parent material:</b>	<i>Volcanic ash / Sand and gravel</i>		<b>Surface cracks:</b>	<i>None</i>
<b>Eff. soil depth:</b>	<i>Deep</i>		<b>Surface sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Some what excessively drained</i>		<b>Water table :</b>	<i>Unknown</i>
<b>Drainage</b>	<i>Slow</i>		<b>Flooding</b>	<i>Annually 1-15 day</i>
<b>Land cover:</b>	<i>Moderately cultivated</i>			
<b>Land use:</b>	<i>Rain fed agriculture/ Maize, Sorghum/</i>			
<b>Fertilizer:</b>	<i>Dap:125Kg/ha, Urea:75Kg/ha</i>			
<b>Erosion status:</b>	<i>Sheet erosion10-25% coverage), Gully 0-5% coverage with slight degree active at</i>			

0-30cm: Yellowish brown (10YR5/4)(moist), Loam; many fine, common medium sub rounded with freshly weathered pumice; loose moist; sticky & plastic wet consistency; strongly calcareous.

30-90cm:Brown(10YR5/3)(moist), Silt loam; many fine, common medium sub rounded with freshly weathered pumice; very friable moist; slightly sticky & slightly plastic wet consistency; few segregation and concretion fine irregular soft calcium carbonate with white colour; moderately calcareous.

90-125cm:Grayish brown(10YR5/2)(moist), Pumice; many medium, dominant fine sub rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency; moderately calcareous.

**SOIL AUGER DESCRIPTION**

<b>Auger</b>	<i>WEA-07</i>	<b>Mapping</b>	<b>Status:</b>	<i>As</i>
<b>Soil class.(FAO 06):</b>	<i>Fluvisols</i>		<b>Date:</b>	<i>050714</i>
<b>Author:</b>	<i>Bekele &amp; Zeinu</i>			<i>Long(N 0944000</i>
<b>Land form:</b>	<i>Level plain</i>		<b>Coordinate: Lat(E):</b>	<i>0536200</i>
<b>Regional</b>	<i>Flat</i>		<b>Elevation:</b>	<i>1480</i>
<b>Slope class:</b>	<i>Very gently slope</i>		<b>Map sheet No:</b>	
<b>Slope form:</b>	<i>Straight</i>		<b>Depth to</b>	<i>&gt;125cm</i>
<b>Slope Position:</b>	<i>Medium</i>		<b>Rock out</b>	<i>None</i>
<b>Micro topo. :</b>	<i>Termites/0.5-1.5m/ 0.2% coverage</i>		<b>S. coarse</b>	<i>few medium / common</i>
<b>Parent material:</b>	<i>Volcanic ash / Sand and gravel</i>		<b>Surface cracks:</b>	<i>None</i>
<b>Eff. soil depth:</b>	<i>Deep</i>		<b>Surface sealing:</b>	<i>None</i>
<b>Drainage class:</b>	<i>Some what excessively drained</i>		<b>Water table :</b>	<i>Unknown</i>
<b>Drainage</b>	<i>Slow</i>		<b>Flooding</b>	<i>None</i>
<b>Land cover:</b>	<i>Moderately cultivated</i>			
<b>Land use:</b>	<i>Rain fed agriculture/ Maize, Sorghum/</i>			
<b>Fertilizer:</b>	<i>Dap:125Kg/ha, Urea:75Kg/ha</i>			
<b>Erosion status:</b>	<i>Sheet erosion 10-25% coverage), Gully 0-5% coverage with slight degree active at</i>			

0-30cm: Yellowish brown (10YR5/4)(moist), Sandy loam; common fine, few medium sub rounded with freshly weathered pumice; loose moist; slightly sticky & slightly plastic wet consistency; slightly calcareous.

30-95cm: Brown (10YR4/3)(moist), Sandy loam; many fine, few medium sub rounded with freshly weathered pumice; very friable moist; slightly sticky & slightly plastic wet consistency; slightly calcareous.

95-125cm: Grayish brown(10YR5/2)(moist), Pumice; many medium, few fine sub rounded with freshly weathered pumice; loose moist; none sticky & none plastic wet consistency; moderately calcareous.