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Detailed Pre-Project Study Report (DPA) - Middle Guinea Region _ Center of Ley_hollol September _2020

Provision of services and advice

Study by Mr. Ousmane Conté, Expert in Mobile AEP: '224 622 27 01 04' Email: bestconsultgn95@yahoo.fr

Center name	**Ley Hollo**	
Region	Lab	
Prefecture	Lelouma	
Location	Latitude: 11,462867 Dd; Longitude: -12,665362 Dd; Medium altitude. In: 911 m	
Infrastructure	1 primary school and community health centre	
Existing water works	Functional traditional well-operated wells well exploited in wadi bypassing the lift and 2 non-functional PMH,	
Other	Ley hollo has a health centre; the sick are also taken to the chief place 4 km from the village	
Water resource		
Drilling No.		FO (to be realized)
Estimated operating flow		5 m3/h
Estimated NS		45 m
Coast installation pump estimated		65 m / TN
Water quality		Water quality will be defined after drilling and will focus on bacteriological and physical-chemical analyses carried out by a certified laboratory.
Production equipment		
Photovoltaic Generator	3629 Wc; Supplied by a solar station; Dose pump: 12 w	

Hydraulic production	Submerged pump: flow: 5 m3/h - HMT: 80 m (calculated: 79 .90 m)

Energy needs	
Pump	P- 2.27 Kva (to be confirmed depending on the characteristics of the drilling to be carried out)
Operating buildings	Supplied by 1 panel of 350 Wc.

Characteristics Water Castle (EC)	Metal water tower, with internal walls coated with E-type food paint and exterior with a rust-proof coating
Location	Latitude: **11,462867** Dd; Longitude: **-12,665362 Dd;** Coast TN: 911 m
Volume of profit	40m3
Elevation	6 m

Pipe	Linear Refoulement	Linear Distribution	Total Linear
PVC PN 10, 40 (estimate)		100	100
PVC PN 10, 63		750	750
PVC PN 10, 90		1690	1690
PVC PN 10, 110		460	460
PVC PN 16, 63	Estimated at 500		500
Overall total	500m (estimated)	**3000**	**3500**

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1.1. Geographical location

1.1.1. The Middle Guinea region (Labé)

The Middle Guinea region (called Fouta djallon) is Guinea's third administrative region. The Middle Guinea region is bounded to the north by Senegal and Guinea Bissau, to the west by the Lower Guinea region, to the south by Sierra Leone and to the east by the Upper Guinea region. The region is mainly made up of **The Peuhl and Djallonké** ethnic groups

The region's economic resources come largely from **livestock, agriculture and trade**

The climate is generally, Foutanien type; annual precipitation is between 500 and 1200 mm and vegetation is sub-tropical.

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1.1.2. The locality of Ley_Hollol and its surroundings

The center of Ley_hollol is part of the sub-prefecture, Korbé and Lelouma prefecture. Its geographical coordinates (WGS84) are:

Latitude Dd	Longitude Dd	Medium altitude (m)
11,462867	**-12,665362**	**911**

Table 1: Irang Localities Coordinates

Based on the self-census carried out by the social intermediation team as part of the project, the population of **Ley hollo** is estimated at **1241** inhabitants by **2020**. The department growth rate defined by RGPH in 2014 is **3.2%.**

The town is located on a hilly site, accessed by the road leading to the capital of the region of Labé and also of Lelouma.

The town of **Ley hollo** does not have a health centre and a national EDG power grid. This community has a primary school and a community health centre. The subdivision plan is not yet defined.

Local administrative map

1.2. The socio-economic context of the centre

Number of neighbourhoods: not divided into neighbourhood Total number of concessions: 250

Number of men: 609

Number of women: 632

Total population : 1241

Number of people per concession (moy): 5

Schooling: 1 primary school

Habitat type: grouped, on mountain cliff in precarious material (95% in banco).

The main crops of the locality are: fonio, rice, and vegetable crops.

It practices the handicrafts and the sale of grain products and small businesses. The weekly market takes place on Saturdays, they buy from Lelouma (capital) or in the surrounding areas, it welcomes grain traders from the various surrounding communities and those from other parts of the province.

The locality has two groups and mixed associations that work in the field of rural development by organizing farmers in their activities, storage, management and sale of their production.

1.3. The current supply of water to the centre

The town of **Ley hollo** has about 20 traditional wells that are functional, usually during the rainy season. These wells are their current source of supply for the village. The population sources mainly from these traditional wells.

The location of the favourable areas as a potential water resource would be dotted within a radius of 2 km and beyond and in the talweg not far from the village.

Socio-economic surveys have estimated the following parameters for the locality of **Ley hollo**

Coverage rate	45% (population served/total population)	This is the water collected at traditional wells as well as at the source level.
Specific consumption	15 l/d/p	This is water collected from unprotected wells
Water chore carried out	95% by women	
Average draw distance	1200 metres	
Average draw time	120 minutes	

Table 2: Basic Socio-Economic Data for Water Supply

The investigation noted that the water service is currently non-paying. However, the public says they are willing to pay for this service.

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1.4. The current health, hygiene and sanitation situation of the centre

Frequency of waterborne diseases by type:

Diarrhea and stomach aches: July to December; medium impact.

Cholera: July to November; medium impact

Typhoid fever: March to August; strong impact.

Malaria: all year round; strong impact.

Poliomyelitis: February to October; medium impact.

Worms (tapeworms and amoebae): June to October; medium impact.

Latrine existence: Yes, defecation is usually done in the open.

Type of latrine: Traditional latrines (which collapse in rainy season):

2.1. Estimates of the population to be served

Based on the parameters contained in the feasibility report, beneficiaries to be served at different horizons are provided in the following table.

Villages or City Grouping Hollol Law	Population 2020 (auto-recensem however)	Rates of Growth	Population2025	Population 2035	Population2040 2 330
	1 241	3,2	1 453	1 991	

$$P_n = P_0(1+\tau)^n$$

Existing infrastructureEcole	Nbr in 2020	Rates of Growth	Nbr 2025	Nbr 2035	Number 2040 2
High school	1	3,2	1	2	
CS			-	-	- 1
	1		1	1	

Horizon	2020	2025	2035	2040
Population	1 241	1 453	1 991	2 330
Primary school	1	1	2	2
Health Centre	1	1	1	1
Rate of increase		3,2%		

Table 1: Estimate of the number of beneficiaries by typology

2.2. Estimated water demand

Based on the sizing criteria established in the feasibility report, daily demand per horizon is given in the following table. Details of the estimate are provided as an appendix.

	2025	2035	2040
Need in m3/d	21,79	29,86	34,95
Loss (3% of demand) in$^{m^3}$/d	0,65	0,90	1,05
Production request m^3/d	22,44	30,75	36,00
Production in m3/d	30,00	30,00	30,00
Deficit	7,56	-0,75	-6,00
Solar energy	A daily pumping of 6 hours with a flow of 5 m3 will not satisfy the water demand of the population of Leyhollol, this deficit will be compensated by the use of traditional wells or night pumping by generator.		

Table 2: Water demand by horizon

Livestock in the village will drink from existing unprotected water points.

2.3. The characteristics of the water resource, production rate

2.3.1. The characteristics of the resource

The drinking water system will be powered by FO drilling to achieve an estimated flow of 5 $m^{3/h}$which will be confirmed as part of the project. The intended main features are defined in the table below.

Drilling No.		
Code	FO	
Contact information (WGS84)	Latitude	To be defined
	Longitude	To be defined
TN Coast (next to the castle)	911 m	
Diameter casing	DN 140 (7'')	
Forecast operating flow	5 $m^{3/h}$(to be confirmed after pumping test)	
Total forecast depth	100 m	
Forecast water level (NS)	55 m (to be confirmed after pumping test)	
Forecast installation coast	65 m (to be confirmed after pumping test)	
Creeping Length	To be determined when drilling equipment	
Physical and chemical characteristics of water	PH (between 5.5 and 9)	Settings to be determined during in-situ water analysis and at least Laboratory
	Conductivity (25 degrees) (max 1500 euros/cm	
	Iron (max 0.3 mg/l)	
	Turbidity (less than 10 NTU)	
	Color (less than 25 UCV)	
Observations	Notice after drilling and water testing	

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Table 3: Operating Drilling Characteristics

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2.4. Analysis of the resource/demand balance sheet

The proposed pumping rate being 5 m^3, It is found that a supplement of drilling water will have to be provided by 2035, unless the flow obtained is significantly higher than expected flow.

	2025	2035	2040

Need in m3/d	21,79	29,86	34,95
Loss (3% of demand) in$^{m^3}$/d	0,65	0,90	1,05
Production request m^3/d	22,44	30,75	36,00
Production in m3/d	30,00	30,00	30,00
Deficit	7,56	-0,75	-6,00
Solar energy	A daily pumping of 6 hours with a flow of 5 m3 will be able to meet the water demand of the population of Leyhollol, this deficit will be compensated by the use of existing traditional wells.		

Table 4: Production Volume/Demand Balance Sheet

3.1. Production

The FO drilling that will supply the drinking water system (AEP) will be carried out as part of the Project and equipped with a submerged pump. The pump is sized for 2035.

It will have to provide sufficient pressure to obtain a minimum pressure of 0.2 bars (2mCE) at tank entrance.

The characteristics of the pump are provided in the following table:

Code	
Sizing horizon	2035 (10 years)

Expected flow	$5m^{3/h}$
HMT (forecast)	80 mCE (calculated value: 79.90 mCE) Coast pump installation: 65 m / TN (846 m) Tank entry rating: 917 m (911 (TN) - 4 m (height written off) - 2.10 m (height vat)) Maximum dynamic level: - 60 m Geometric height: 61.10 m Linear load loss - 4.13Mce Residual pressure - 2 m CE
Power	4.08 va
Installation coast / TN (Forecast)	- 65 m (i.e. at a hill of 846 m)
TN Coast	753 m

Table 5: Underwater Pump Characteristics

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3.2. Energy supply

3.2.1. The solar power system

The drinking water system will be powered by a solar station

The calculated characteristics of the solar system are given in the following table:

Type of pumping	Over the sun
Average sun value (southern Chad)	4.5 KWh/m2/d
HMT	80 m
Q (m3/day) (needed in 2025)	30 m^3/day (Production volume 30 m^3/day sufficient until 2035, but insufficient by the end of 2035 for a demand of 53.41 m3/day)
Power the calculated pump	**2,27 Kva**
Power needed to start the pump	**3,629 Toilets**

Table 6: Features of the Solar System

The solar panels will be installed near the borehole.

3.3. Water treatment

The water quality of the borehole does not require special treatment, only chlorination disinfection will be carried out.

It will be done via a 12W electric dose pump, as described in the report.

3.4. The capacity of the tank

The capacity of the catch tank is 40 m3 useful consisting of 4 tanks of 5 m3 in HDEP. They will be placed on the roof of the Operating Building

Code	RE	
Type	Cylindrical	
Tank material	PEHD	
Useful storage volume	40 m^3(5 m^3 x4)	
Free height	0,10 m	
Useful height	2 m	
Total height of the tank	2.10 m	
Diameter of the tank	1.80	
Elevation / TN (m)	917 m	
Installation coast (SRTM30)	……. m	
Location (WGS84)	Latitude (decimal degrees)	**11462867 Dd**
	Longitude (decimal degrees)	**-12,665362 Dd**

Table 8: Tank Characteristics

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3.5. The water system

The network is sized for 2035, 10 years. The modeling was done with the Epanet software. A minimum pressure of 0.50 bars at the service points was provided, with the following flows: o Borne Fountain: 2$m^{3/h;}$

o Special connection: 1$m^{3/h;}$

o Administrative connection: 1$m^{3/h}$

The back-up line will therefore be made of stainless steel for the exposed part and PVC 110 PN 16 for the buried part from the borehole to the tank with a drill head equipment include: - an elbow at 90 degrees large radius of the same diameter as the back-up pipe;

A sucker and a discharge valve;

A low-load anti-return valve;

An oblique sieve filter;

Runoff stabilization cuffs or honeycomb flow stabilizers; A DN 110 volumetric counter;

If necessary, an anti-ram system (a hydropneumatic balloon with a butyl membrane to counteract the effects);

A flexible connection to the line from the back-up to the downstream tarpaulin; A purge valve.

The dimensions of the distribution network obtained from hydraulic modeling under EPANET are summarized in the table below. The details of the results are presented in an appendix.

PN10, 40 (connection)		100	**100**
PN10, OUT OF 63		750	**750**
PN10, OUT OF 90		1690	**1 690**
PN 10, OUT OF 110		460	**460**
PN 16, DE63 (ESTIMATED)	500		**500**
Overall total	**500**	**3000**	**3500**

Table 11: Summary of Linear by DE and PN

The figure below illustrates the results of the modelling

Network scheme

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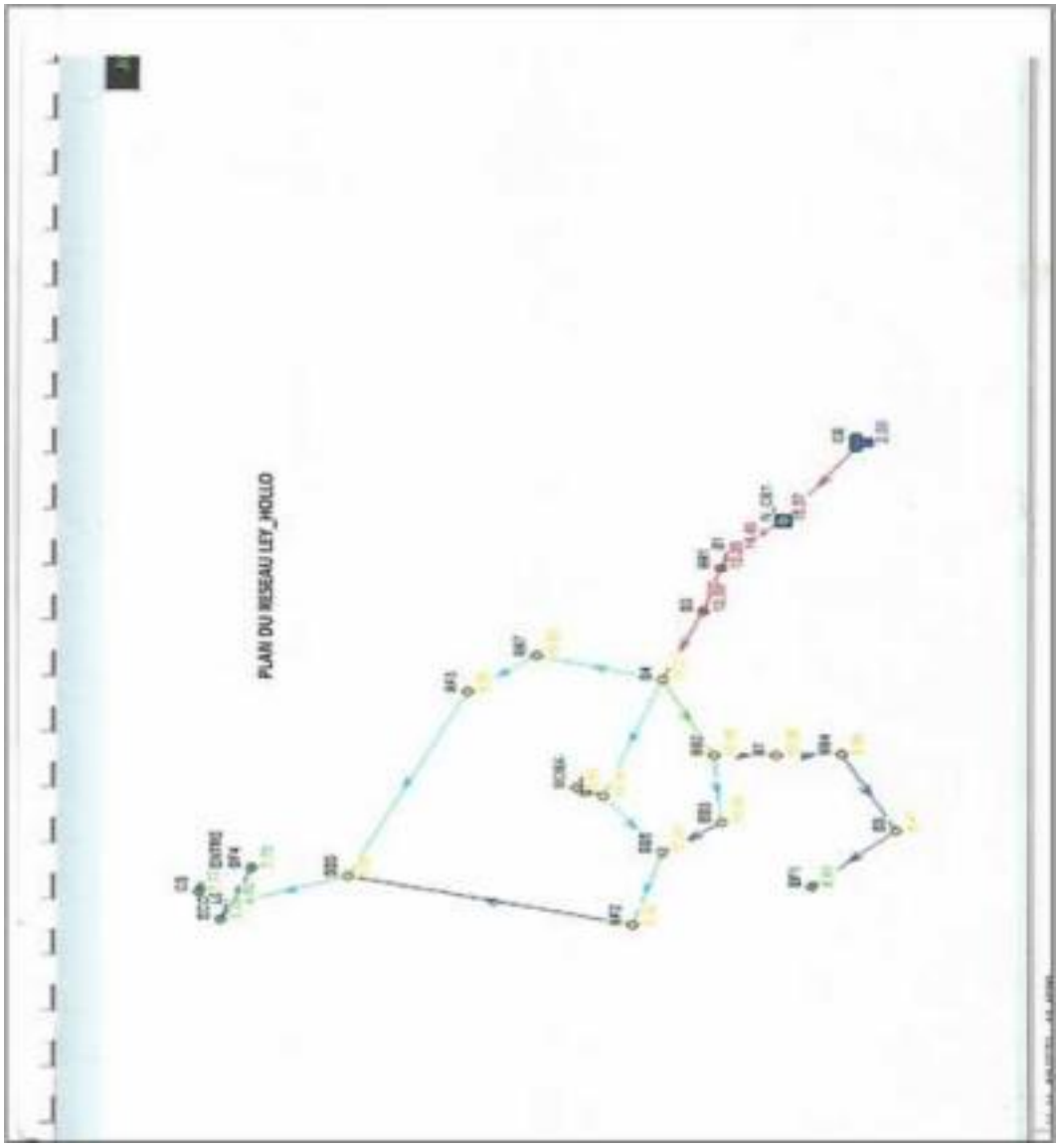

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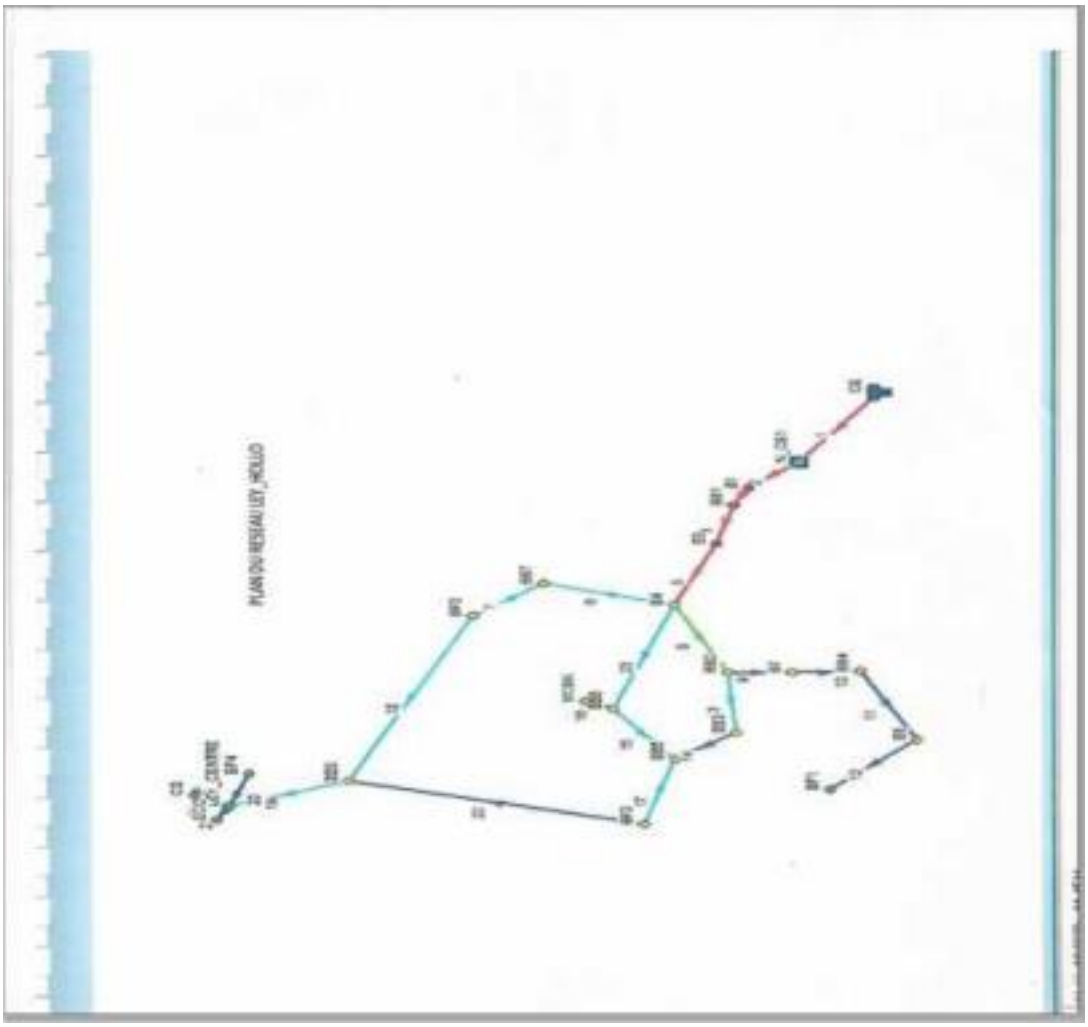

Distribution points

3.5.1. Private connections (BP)

Based on socio-economic surveys, a total of 40% private connections are considered for the investment estimate by 2035.

The school and health centre will be connected to the network through a social connection.

3.5.2. Fire hydrants (BF)

A total **of 10 fire hydrants** will be built in the centre of Ley hollo

They have been positioned in the centre and on the outskirts of the centre. Their location has been validated with the population that will be the subject of a report.

Their location is shown on the network diagram.

3.6. Hydraulic control and protection works 3.6.1. High-point works: suction cups

They will also be carried out in accordance with the description given in the feasibility study. The number of drain works is estimated in the forecast estimate.

NB: The calculation of the transitory regime of the back-up line will be made after the location of the drilling is frozen, based on the topography to determine the appropriate equipment to protect the pipe from battering (overpressure or depression of the pipe) caused by sudden events.

3.6.2. Low-point works: draining

They will also be carried out in accordance with the description given in the feasibility study. The number of drain works is estimated in the forecast estimate.

3.6.3. Sectioning work

The number of sectioning works and their location will be precisely specified when the project is carried out. However, a forecast quantitative is indicated in the estimate.

3.6.4. Counting work

A Woltmann-type water meter will be installed at the exit of the tank to account for the volume going to the distribution. This equipment is counted in the accessories and equipment of the tank (Water Castle) Each fire hydrant and private connection will also be equipped with a count to measure the volume sold.

The out-of-drilling flow will be measured with a DN 50 volumetric meter installed on the drill head.

CO-01	DN 50	To be defined	To be defined

Table 3: Counting Book Features

3.7. The operating building

It includes a 24^{sqm} caretaker's lodge including the chlorination room and a 4 sqm outdoor toilet with a ventilated latrine and a tin bathing area and roof.

On the roof slab of the operating building, the tanks will be placed. The building's two solar-powered panels will be installed on the roof of the building.

The solar panel system that provides energy to the solar pump and the dose pump will be placed near the drill to be operated and secured.

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Annexes

Calculating needs

Basic data: (feasibility study documents)

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1.Consommation

Type of connection	Specific consumption	
UPH	**15**	**l/J/hbt**

2. Calculating needs

Villages or Grouping Cities	**Population2020**	**Need how to production Daily**	**Loss (3%)**	**Net need**	**Need for the day pointe (Cpj=1,2) m3/d**
	hbt.	**m3/d**	**m3/d**	**m3/d**	23,01
Hollol Law	1 241	18,62	0,56	19,17	

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Villages or Grouping Cities	**Population2025**	**Need means of production Daily**	**Loss (3%)**	**Net need**	**Need for the day pointe (Cpj=1,2) m3/d**
	hbt.	**m3/d**	**m3/d**	**m3/d**	26,93
Hollol Law	1 453	21,79	0,65	22,44	

1

Villages or Grouping Cities	Population2035	Need how to production Daily	Loss (3%)	Net need	Need for the day pointe (Cpj=1,2) m3/d
	hbt.	m3/d	m3/d	m3/d	36,90
Hollol Law	1 991	29,86	0,90	30,75	

1

Villages or Grouping Cities	Population2040	Need how to production Daily	Loss (3%)	Net need	Need the day depointe (Cpj-1.2) m3/d 13
	hbt.	m3/d	m3/d	m3/d	140,00
Hollol Law	2 330	34,95	1,05	10 950,00	

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Implementation sheet

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