Battery Calculations:

Consumption-

1. Node MCU= 80mA/h

2. Soil Moisture sensor=approx. 20mA/h

Total consumption= (80+25) mA/h=approx. 100mA/h

Total Consumption (with safety factor of 1.2x) =**120ma/h**

Average Capacity of unit AA Battery=800mA/h

Capacity of 4xAA Batteries= (800\*4) mA/h=**3200mA/h**

Estimated Runtime of sensing system= (3200/120) hrs.= Approx 26 Hours

Adapter Sizing:

Consumption-

1. Node MCU= approx. 0.6W

2.2-Channel Relay= 0.25W

3. Solenoid Valve= Approx 18W

Total Consumption= [(18+0.6+0.45) \*1.2] =22.6w

Since valve requires 12v to operate by default,

total current output required = (22.62/12) =**approx. 2A**

Hence Adapter Selected is a **12V,2A Adapter.**

**Pressure calculations-**

Inlet pipe diameter=13mm

Inlet pressure =20mPa

Outlet diameter=10mm

Outlet pressure=(20x10)/13=15.38mPa

Pressure Drop= (20-15.38) =4.62mPa=46.2 bar

**Pressure Drop, Δp = 46.2 bar**

**Flow calculations-**

1. Q = m^3/h Flow

2. Δp = bar Pressure drop (differential pressure between inlet and outlet)

3. d = Kg/dm^3 Relative density referred to water. (d=1 kg/dm3)

4. Cv = m^3/h Flow coefficient

Flow Q = Cv sqrt(Δp/d)

For 1 bar of Δp, Cv=1

For 46.2 bar of Δp, Cv=46.2 m^3/h

Flow Rate Q=(46.2) \*sqrt(46.2/1)

**Flow Rate, Q=314.024 m^3/h**