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Figure 1- Location map of the study area showing the sampling stations

## **Correlation Matrix**

For investigating the relationship between the physicochemical parameters to determine the relationship between taken samples from study area, the correlation Matrix was used (Figure 2). Spearman correlation test was performed by the use of R software version 4.2.2. The strong correlations observed among groundwater parameters such as electrical conductivity (EC), total dissolved solids (TDS), chloride (Cl), sulfate (SO<sub>4</sub>), and sodium (Na) underscore the interplay of natural processes and anthropogenic activities shaping groundwater chemistry. Also, these strong correlations can be attributed to the costal location of the study area and penetration of the salty water of the sea to the fresh water of the aquifer. The strong relationship between EC and TDS (r=0.96) reflects the fact that the quantity of

dissolved solids (TDS) in water directly influences its electrical conductivity. High correlations among EC, TDS, and ions like Cl, SO<sub>4</sub>, Na, and Mg (with the r value between 0.70 to 0.94) may suggest their common origin from the dissolution of salts in the aquifer or anthropogenic input. Moderate correlation of Alkalinity with total hardness (r=0.62) and its strong association with Mg (r=0.87) implies the role of carbonate rock weathering, releasing bicarbonate and Mg ions. The correlation between total hardness and cations like Ca, Mg, and K (r values from 0.71 to 0.87) further highlights the impact of mineral dissolution on water hardness. Lastly, correlations among Cl, SO<sub>4</sub>, and Na (r=0.82-0.91) might indicate shared salt sources, either from natural processes specially the penetration of the salty water of the sea or human activities. Also, it should be noted that NO<sub>3</sub>, NO<sub>2</sub> and F ions have no or very weak correlation with other parameters. These observations underscore the interconnectedness of groundwater constituents and the complex geochemical and anthropogenic influences governing groundwater quality.



Figure 2-Correlation Matrix of parameters measured in drinking water of Minab county