**Project Title: Water Quality Analysis**

**Phase 1:** Problem Definition and Design Thinking

**Project Definition:**The project involves analysing water quality data to assess the suitability of water for specific purposes, such as drinking. The objective is to identify potential issues or deviations from regulatory standards and determine water potability based on various parameters. This project includes defining analysis objectives, collecting water quality data, designing relevant visualizations, and building a predictive model.

**Design Thinking:**

**2.1 Analysis Objectives:** Before embarking on data analysis, it is crucial to set clear objectives. In this phase, we meticulously define the following analysis objectives:

* **pH Value Analysis:** Assess pH levels of water bodies to ensure they fall within the WHO-recommended range of 6.5 to 8.5.
* **Hardness Assessment:** Examine water hardness, primarily influenced by calcium and magnesium salts, which can affect water quality.
* **TDS (Total Dissolved Solids) Inspection:** Evaluate TDS levels to determine mineralization, with a focus on adherence to drinking water standards.
* **Chloramine Concentration Analysis:** Investigate the presence of chloramines, a common disinfectant in drinking water, to ensure safety.
* **Sulfate Assessment:** Measure sulfate levels in the water, checking for compliance with safe drinking standards.
* **Conductivity Analysis:** Determine the electrical conductivity of water, which can impact its quality.
* **Organic Carbon Evaluation:** Assess the presence of organic carbon in water, a factor that can affect potability.
* **Trihalomethanes Examination:** Analyse trihalomethane levels to ensure water safety.
* **Turbidity Assessment:** Measure the light-emitting properties of water to determine water quality in terms of solid matter.
* **Potability Evaluation:** Determine whether the water is safe for human consumption (Potable - 1 or Not Potable - 0).

**2.2 Data Collection:** Initiating the analysis necessitates comprehensive data gathering. The dataset provided (water\_potability.csv) contains water quality metrics for 3,276 water bodies, including the parameters mentioned above. Robust data pre-processing will be essential to ensure data quality and consistency.

**2.3 Visualization Strategy:** Effective data visualization is key to conveying insights. The strategy encompasses:

* **Diverse Visuals:** Utilize appropriate chart types to represent the data effectively, enhancing interpretability.
* **Interactivity:** Develop interactive visualizations to empower users to explore data by location, time, and specific parameters.
* **Geospatial Insight:** Use geographical mapping capabilities to visualize water quality variations across the region.
* **Clarity and Context:** Enhance visualizations with labels, legends, and context information.

**2.4 Insights Generation:** The project's ultimate goal is to derive insights regarding water potability, prioritizing public health and safety:

* **Safety Assessment:** Determine regions with water bodies that consistently meet or fail to meet safety standards.
* **Impact of Factors:** Assess the influence of various parameters on water quality and potability.
* **Recommendations:** Based on analysis outcomes, provide concrete recommendations for policymakers, regulatory authorities, and the public to ensure safe drinking water.

**Next Steps:** The next phase involves data pre-processing, integration into IBM Cognos, dynamic visualization creation, and statistical analysis to fulfil the defined objectives. Collaboration among team members and regular updates are crucial for project success.

**Timeline:** The provisional timeline for the project is structured as follows:

* Data Collection and Preprocessing: 2 weeks
* IBM Cognos Setup and Visualization Design: 3 weeks
* Data Analysis and Insights Generation: 4 weeks
* Documentation and Reporting: 2 weeks
* Review and Finalization: 1 week

This meticulously planned project aims to deliver not only insights but actionable recommendations, safeguarding public health by ensuring safe drinking water.