

Summary on the baseline Situation

We are hereby proposed to used baseline data of 3 months(1st March 2022 to 31st May 2022)Pre-Monsoon Season which was generated forMs Kaalendi LLP Mauza: - Khirodharpur, Tehsil: - Fatuha, District: -Patna, State: - Bihar gor EC vide letter no. EC23B008BR110300 on dated 13/07/2023.

Particulate Matter (PM₁₀)

The maximum and minimum concentrations for PM₁₀ were recorded as 198.74µg/m³ and 125.76µg/m³, respectively. The maximum concentration of PM₁₀ was recorded at the (AAQ1) Project Site and minimum concentration was observed at (AAQ8) Middle School, Katauna. The average concentrations range between 148.25µg/m³ to 171.82µg/m³. 98th percentile values for PM₁₀ during study period range between 172.74µg/m³ to 198.45µg/m³.

Fine Particulate Matter (PM_{2.5})

The maximum and minimum concentrations for PM_{2.5} were recorded as 127.89µg/m³ and 70.63µg/m³, respectively. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ5) Daffodils School. The average concentrations range between 79.18µg/m³ to 96.84µg/m³ was recorded. 98th percentile values for PM_{2.5} during study period range between 93.79µg/m³ to 126.25µg/m³.

Nitrogen Oxide (NO₂)

The maximum and minimum NO₂ concentrations were recorded as 45.90µg/m³ and 21.76µg/m³. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ6) Baikathpur. The average values for NO₂ were observed in the range between 24.25µg/m³ to 39.01µg/m³. 98th percentile values for NO₂ during study period range between 27.22µg/m³ to 45.39µg/m³.

Sulphur Dioxide (SO₂)

The maximum and minimum SO₂ concentrations were recorded as 18.50µg/m³ and 9.40µg/m³. The maximum concentration was recorded at (AAQ4) Middle School, Jafrabad and the minimum concentration was recorded at (AAQ3) High School, Chandpura. The average values for SO₂ were observed in the range between 11.73µg/m³ to 14.49µg/m³. 98th percentile values for SO₂ during study period range between 14.21µg/m³ to 17.78µg/m³.

Carbon Monoxide (CO)

The maximum and minimum CO concentrations were recorded as 5.12mg/m³ and 0.85mg/m³. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ7) Rasulpur, Kurtha. The average values for CO were observed in the range between 1.53mg/m³ to 2.74mg/m³. 98th percentile values for CO during study period range between 3.06mg/m³ to 4.34 mg/m³.

Observation on Ambient Noise Quality:

Day Time: The noise levels varied in the study area during day time from 44.1dB (A) Leq to 68.5dB (A) Leq. The maximum concentration was recorded at (NQ1) Project Site and the minimum concentration was recorded at (NQ3) High School, Chandpura. The day time noise level in the study area is within the noise Limit.

Night Time: The night time noise level in the study area is in the range of 36.1dB (A) Leq to 57.3dB (A) Leq. The maximum concentration was recorded at (NQ1) Project Site and the minimum concentration was recorded at (NQ7) Rasulpur, Kurtha. The night time noise was also within stipulated standards of CPCB.

Result of Ground Water Quality

- All the samples were colourless meeting desirable norms (<5 Hazen).
- All the samples meet the desirable standards (pH ranges from 7.08 to 7.81).
- TDS in samples ranges from 365.9 mg/L to 575.9 mg/L. All the samples meet the permissible limit of 2000 mg/L.
- Total Hardness in the water ranges from 230.8 mg/L to 336.6 mg/L. All the samples meet the permissible limit of 600 mg/L.
- Calcium content in the water ranges from 44.01 mg/L to 92.9 mg/L all the samples meet the permissible limit of 200 mg/L.
- Magnesium content in the water ranges from 25.1 mg/L to 42.12 mg/L.
All the samples meet the permissible limit of 100 mg/L.

- Sulphate content in the water ranges from 34.9 mg/L to 42.84 mg/L. The permissible limit of Sulphate is 400 mg/L for drinking water.
- Total alkalinity in the water samples ranges from 134.4 mg/L to 254.8 mg/L. All the samples are within the permissible limit of drinking water (600 mg/L).
- Chloride ranges from 96.4 mg/L to 135.7 mg/L. Which are below permissible limits (1000 mg/L).

Observation on Surface water Quality

- pH was observed in the range of 7.14 – 7.88 with minimum at Pond (SW8) and maximum at (SW1) Ganga River (Upstream).
- TDS was observed in the range of 218.2 -664.8 mg/L with minimum at Pond (SW8) and maximum at Pond No 7.
- COD was in the range of 15.5-32.6 mg/L with minimum at Pond (SW7) and maximum at Phalgu River (SW4).
- BOD was in the range of 3.19-5.40 mg/L with minimum at Phalgu River (SW5) and maximum at Punpun River (SW3).

Observation on Soil Quality:

Physical characters

The physical characters include Bulk density, grain size distribution (textural analysis), Porosity, Infiltration, Water holding capacity.

Grain size distribution: Texture indicates relative proportion of various sizes of primary soil particles such as sand, silt and clay present in the soil. Based on their quantities present in the soil sample and using the textural classification diagram. The textural classes of eight soil samples are sandy clay loam, i.e coarse to fine texture. Bulk density values confirm the textural class.

Bulk Density: In case of bulk density total soil space (space occupied by solid and pore spaces combined) are taken in to consideration. Thus, Bulk Density is

defined as the mass (weight) of a unit volume of a dry soil. This volume would, of course include both solids and pores. Soil texture, soil structure and organic matter content are the factors influencing the bulk density of a soil. Bulk Density, besides being an interesting and significant physical characteristic, is very important as a basis for certain computations. The Bulk density of the eight-soil sample under consideration ranges between 1.28 to 2.10 g/cm³, and confirms the texture of the soil samples of the area under study.

Chemical Characters

The parameters considered for chemical analysis are: Soil reaction (pH), Electrical conductivity (EC), Cation Exchange Capacity (CEC), Sodium Adsorption Ratio, (SAR), ESP, Macro nutrients like Available Nitrogen, Total Organic carbon, organic matter, available phosphorus, available potassium. Micro nutrients like Zinc, manganese, copper. Heavy metals like Lead (Pb), Nickel (Ni), Cadmium (Cd), Chromium (Cr), arsenic (As) and PAH.

Soil reaction (pH): The nutritional importance of pH is illustrated, thus hydrogen ion concentration has influence not only on, solubility of nutrients, but also upon facility with which these nutrients are absorbed by plants, even already in soil solution for e.g. Fe, Mn and Zn become less available as pH rises from 4.5 to 7 to 8. At pH 6.5 to 7.0 utilization of nitrate and ammonia nitrogen becomes more available. In case of phosphorus, it becomes less available to plant as pH increases above 8.5, due to its fixation in exchange complex of soil. For the eight-soil sample under consideration the pH range between 7.02 to 8.0 indicating soils are slightly alkaline and are almost normal for crop growth.

Electrical conductivity (EC): The salt content of the soils are estimated by EC measurements, and is useful to designate soils as normal or sodic (saline). Electrical conductivity is expressed as $\mu\text{mhos/cm}$ at 25°C, $\mu\text{mhos/cm}$, mmhos/cm or $\mu\text{S/cm}$. The EC of eight soil samples are between 317.4 to 407.3 $\mu\text{mhos/cm}$ and are below the limits to be called as saline and hence the soils are normal for crop growth.

Organic Carbon / Organic matter (%) Although accounting for only a small part of the total soil mass in mineral soils, organic matter influences physical, chemical, and biological activities in the soil. Organic matter in the soil is plant and animal residue which serves as a reserve for many essential nutrients, especially nitrogen. Determination of organic matter helps to estimate the nitrogen which will be released by bacterial activity for the next season depending on the conditions, soil aeration, pH, type of organic material, and

other factors. The eight soil samples under consideration contain 1.73% to 3.43% organic carbon calculated from organic carbon estimation. As per crop requirements different soils samples are more than sufficient in organic matter content.

Available Nitrogen (N): Nitrogen is a part of all living cells and is a necessary part of all proteins, enzymes and metabolic processes involved in the synthesis and transfer of energy. Nitrogen is a part of chlorophyll, the green pigment of the plant that is responsible for photosynthesis. Helps plants with rapid growth, increasing seed and fruit production and improving the quality of leaf and forage crops. The available nitrogen in the four samples in question, as per analysis, ranges between 107.3 to 213.2mg/kg showing good available nitrogen content in different samples, for crop growth.

Available Phosphorus (P): Like nitrogen, phosphorus (P) is an essential part of the process of photosynthesis involved in the formation of all oils, sugars, starches, etc. Helps with the transformation of solar energy into chemical energy; proper plant maturation; withstanding stress. Effects rapid growth, Encourages blooming and root growth. The phosphorus content of soil of four samples ranges between 38.5 to 64.6 mg/kg and falls under medium category for crop growth.

Available Potassium (K): Potassium is absorbed by plants in larger amounts than any other mineral element except nitrogen and in some cases, calcium helps in the building of protein, photosynthesis, fruit quality and reduction of diseases. The Potassium content of eight soil samples ranges between 241.5 to 362.7 mg/kg and is average for crop growth.

Available Sodium (Na): Sodium is not a plant nutrient but it does play a role in soil health. High level of sodium indicates salinity problems or sodicity problems such as poor soil structure. Excess sodium can also reduce the uptake of other by plants. For healthy and productive soil, it should aim for a sodium concentration of less 1.0 meq/100g. High sodium levels can be remediated by watering more frequently and applying gypsum. The available sodium in the eight samples in question, as per analysis, ranges between 130.6 to 181.1 mg/kg showing available sodium content in different samples are suitable for crop growth.

Available Calcium (Ca): Calcium up taken as Ca^{2+} , is essential element for the growth of the plants and fruit development, and it is important in the resistance of the plants to diseases due to with base in the protection of the cell wall. Calcium plays important biochemical functions and supports many

metabolic processes, in addition to activating several enzymatic systems, thus contributing to the proper development of plants. Calcium plays fundamental role in the stability of the membrane and cell integrity. Among all organs, the leaves contain the highest concentration. The available calcium in the eight samples in question, as per analysis, ranges between 1023.2 to 1175.4 mg/kg showing more available calcium & sufficient for crop growth content in different samples.

Comments: The interpretation of field data, physical and chemical data it can be concluded that:

As per the physical data soils are coarse to fine texture, imperatively moderate water holding capacity, and moderate to slow permeability.

As per physical characters soils are rated as moderately good for agriculture.

As per chemical characters soil reaction (pH) soils are slightly alkaline and normal for crop growth. Organic carbon is more than sufficient. Macro nutrient like nitrogen is better and phosphorus is medium to average potassium. Base saturation is very high.