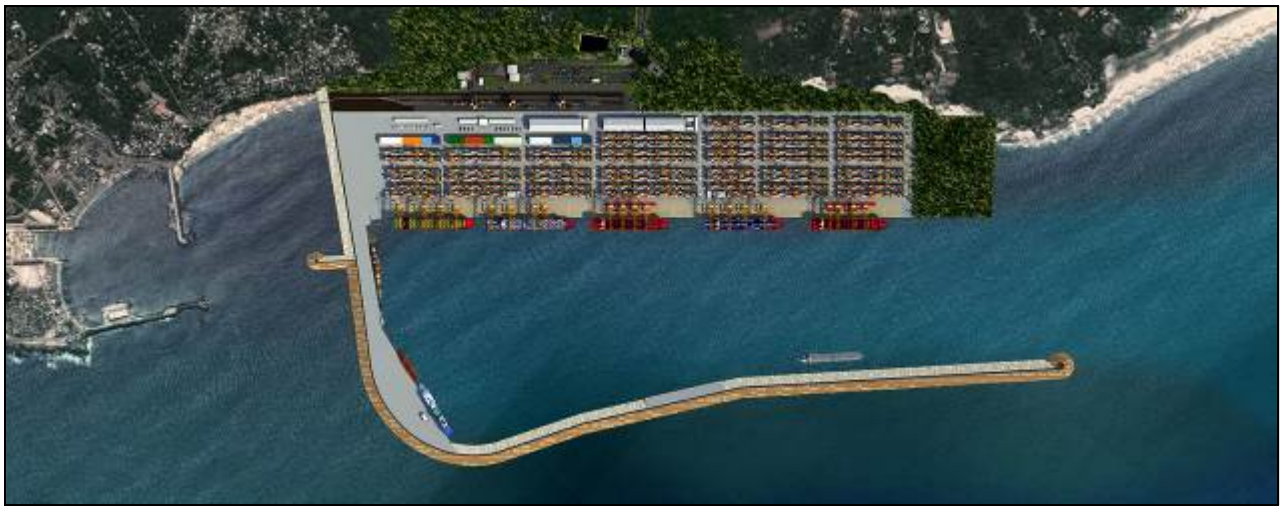
Environment Monitoring Report



Adani Vizhinjam Port Pvt. Ltd.

Vizhinjam, Kerala

January 2022

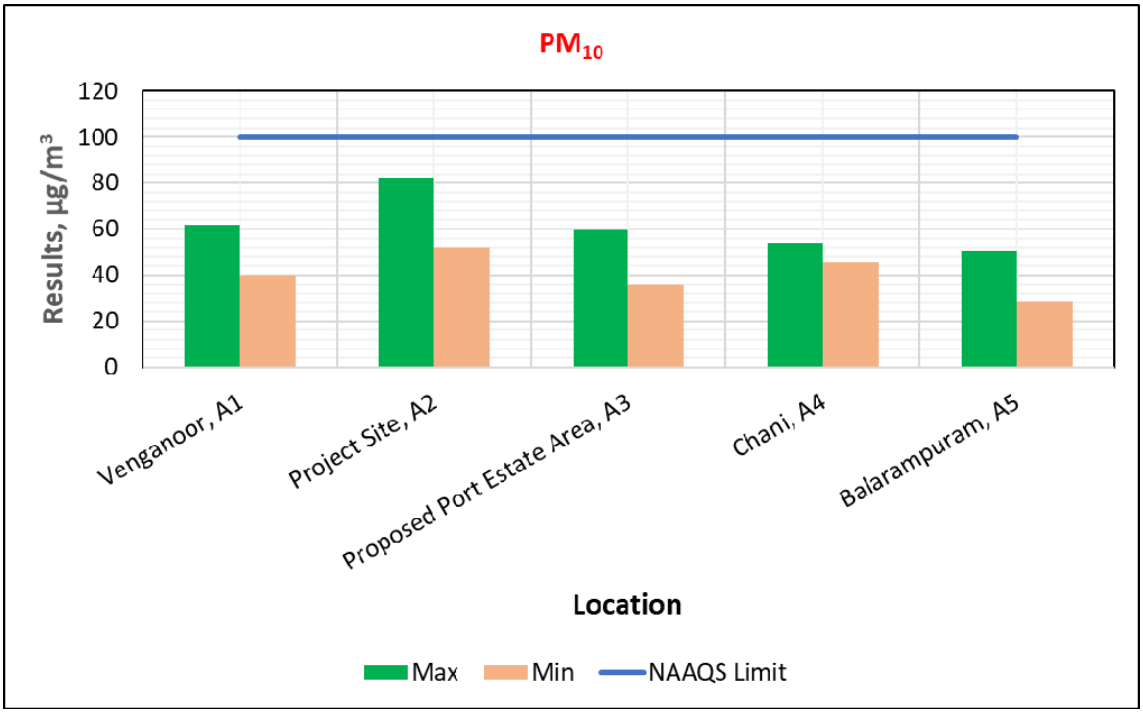
Environment Monitoring Locations:

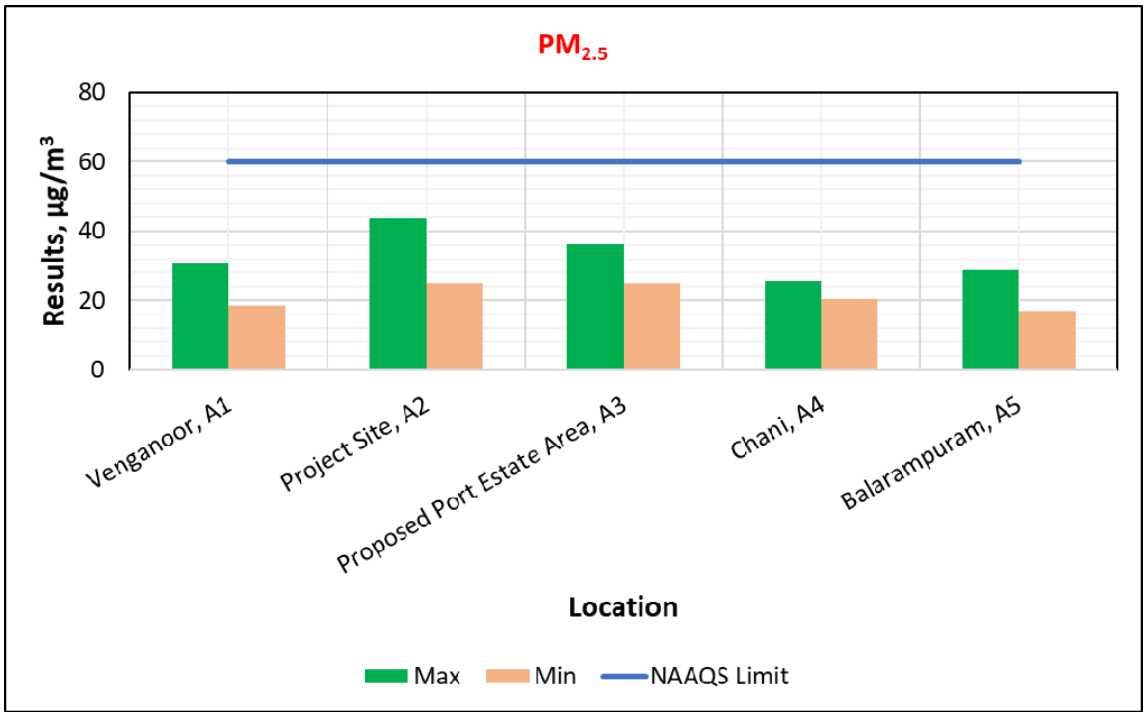
Sl. No.	Environmental Attribute	Location
1.	Ambient Air Quality Monitoring	Port Site (A1)
		Proposed Port Estate Area (A2)
		Chani (A3)
		Venganoor (A4)
		Balarampuram (A5)
2.	Ambient Noise	Port Site (Industrial) (N1)
		Proposed Port Estate Area (Commercial) (N2)
		Chani (Residential) (N3)
		Venganoor (Residential) (N4)
		Balarampuram (Residential) (N5)
3.	Marine Water	Near Kovalam Beach (M1)
		Proposed Dredging Site (M2)
		South of Break Water (M3)
		Port Basin (M4)
		Inner Approach Channel (M5)
		Kovalam Beach (M6)
4.	Groundwater	Port Site (G1)
		PAF Area (G2)
		Proposed Port Estate Area (G3)
5.	Surface Water	Poovar West Canal (S1)
		Vizhinjam Branch Canal (S2)
		Vellayani Lake (S3)
6.	Soil	Port Site
		Proposed Port Estate Area
		Mullor (Along the road network)
		Balarampuram (Along the rail network)

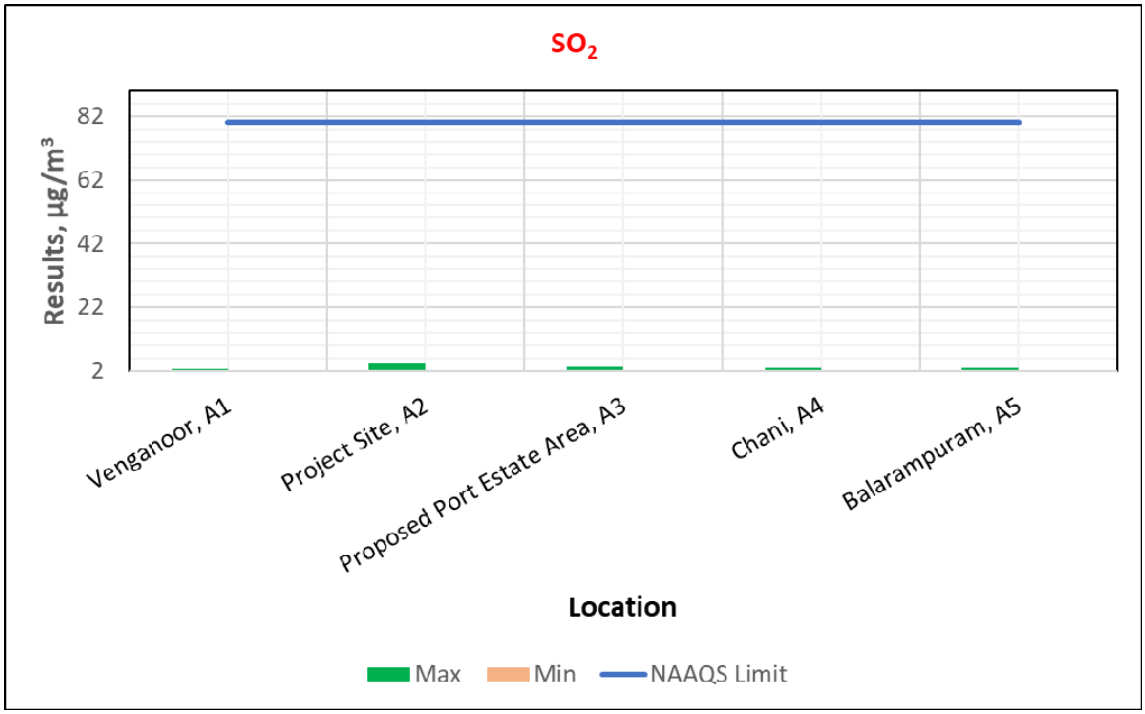
1. Summary of Environmental Monitoring Results for the Month of January 2022:

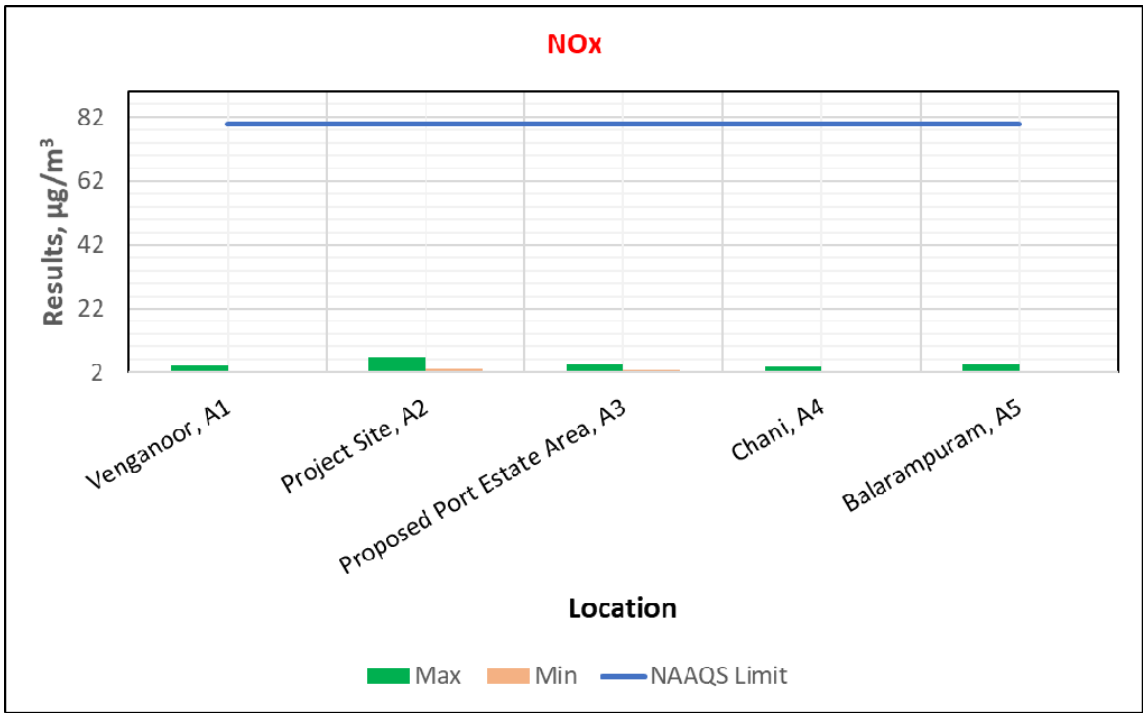
- The ambient air quality monitoring results were observed to be within National Ambient Air Quality Standards (NAAQS), 2009 at all the five locations.
- Noise readings were within limits at all the monitoring locations.
- Marine water and sediment samples results were observed to be comparable with the baseline.
- Ground water samples were collected from 3 locations (open wells) - Port Site, Proposed Port Estate Area and Port Annex Facility area. All the parameters at all locations excluding the parameter Turbidity at Proposed Port Estate Area were within the acceptable limits as per IS 10500:2012. The water from these locations are not used for drinking purposes.
- Surface water sample results were observed to be comparable with the baseline.

2. Ambient Air Quality

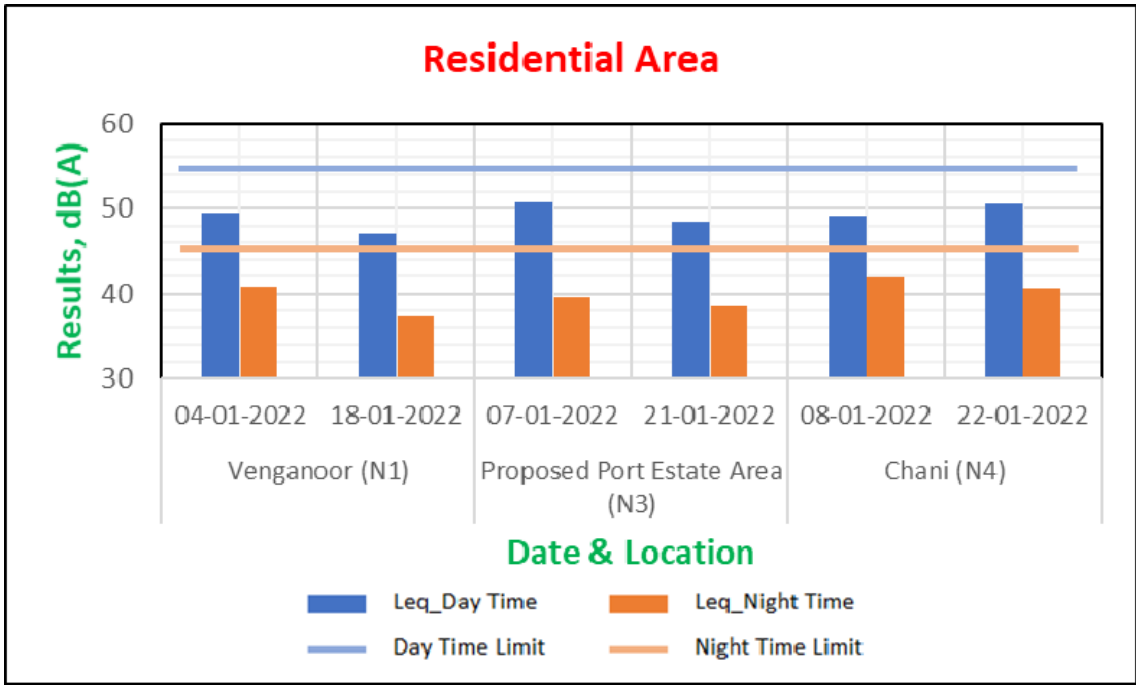


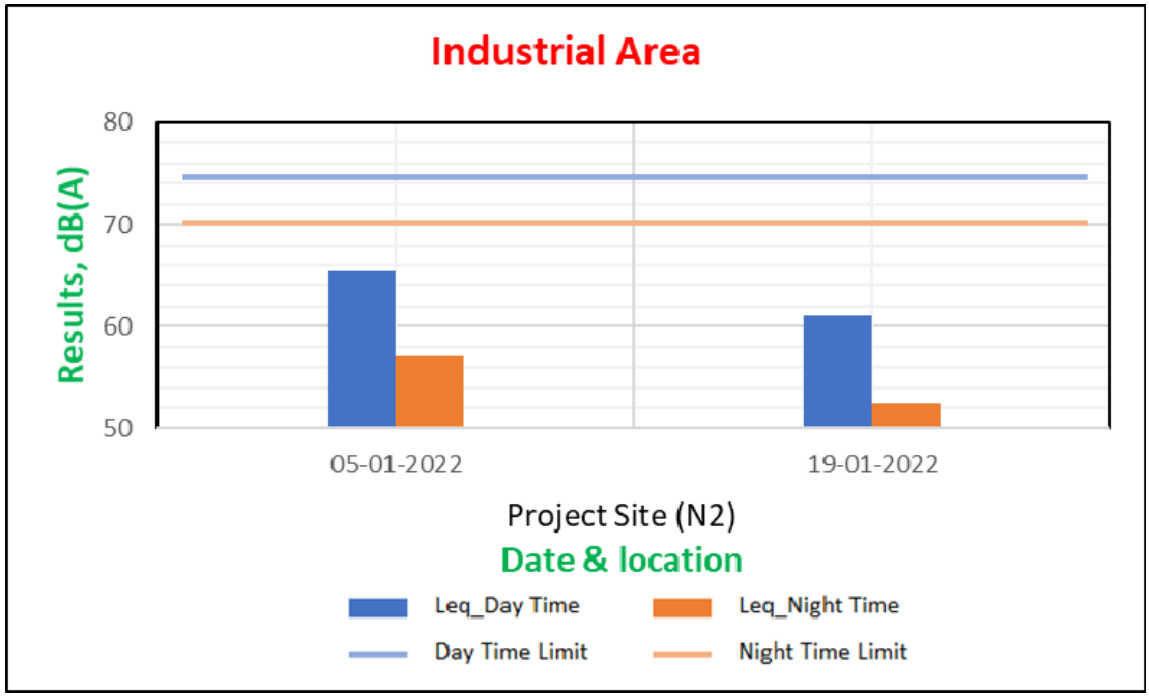


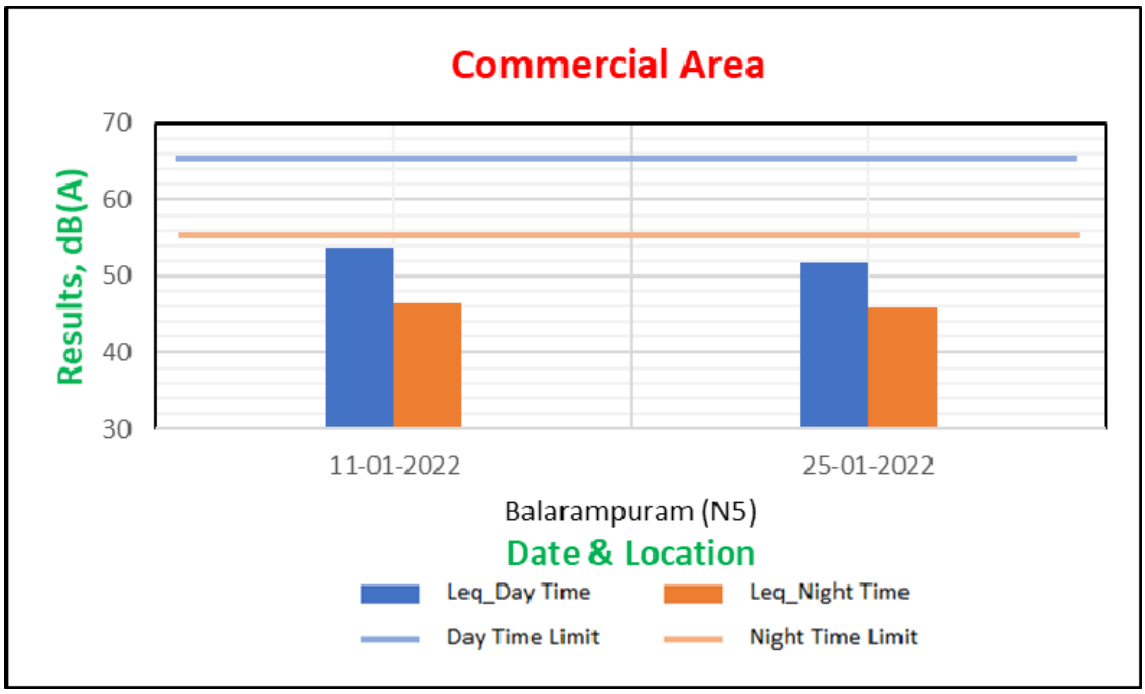

SO2
Results, µg/m³
82
62
42
22
2
Venganoor, A1
Project Site, A2
Proposed Port Estate Area, A3
Chani, A4
Balarampuram, A5
Location
Max
Min
NAAQS Limit


NOx
Results, µg/m³
82
62
42
22
2
Venganoor, A1
Project Site, A2
Proposed Port Estate Area, A3
Chani, A4
Balarampuram, A5
Location
Max
Min
NAAQS Limit

3. Ambient Noise

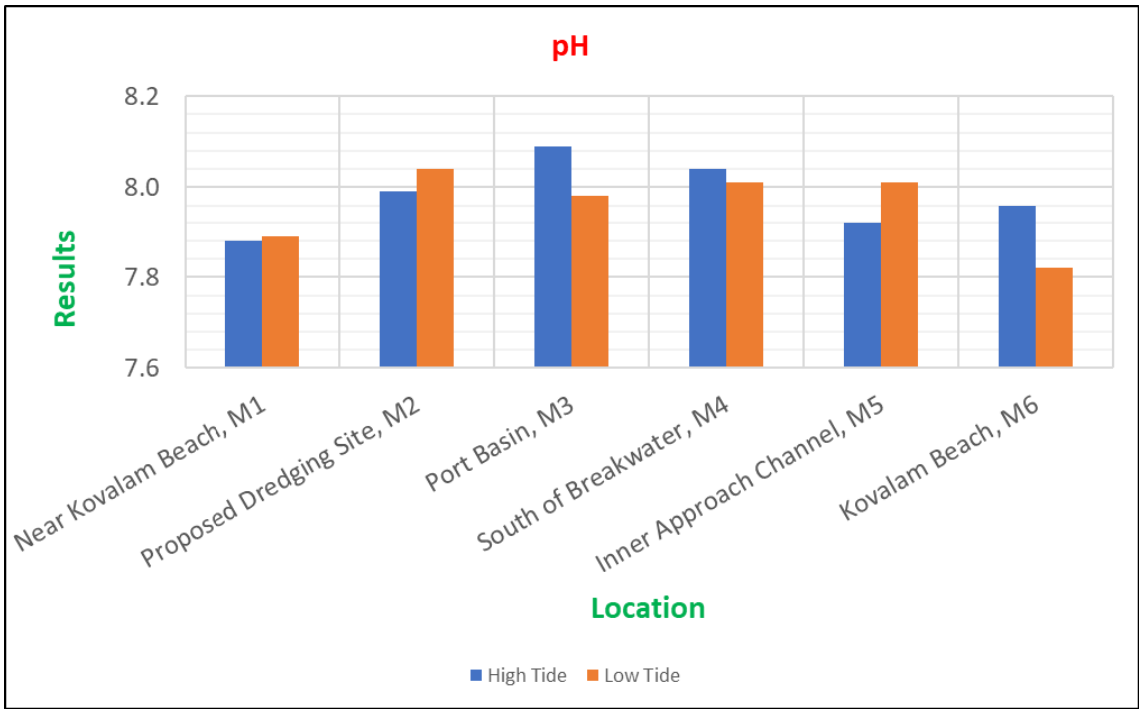


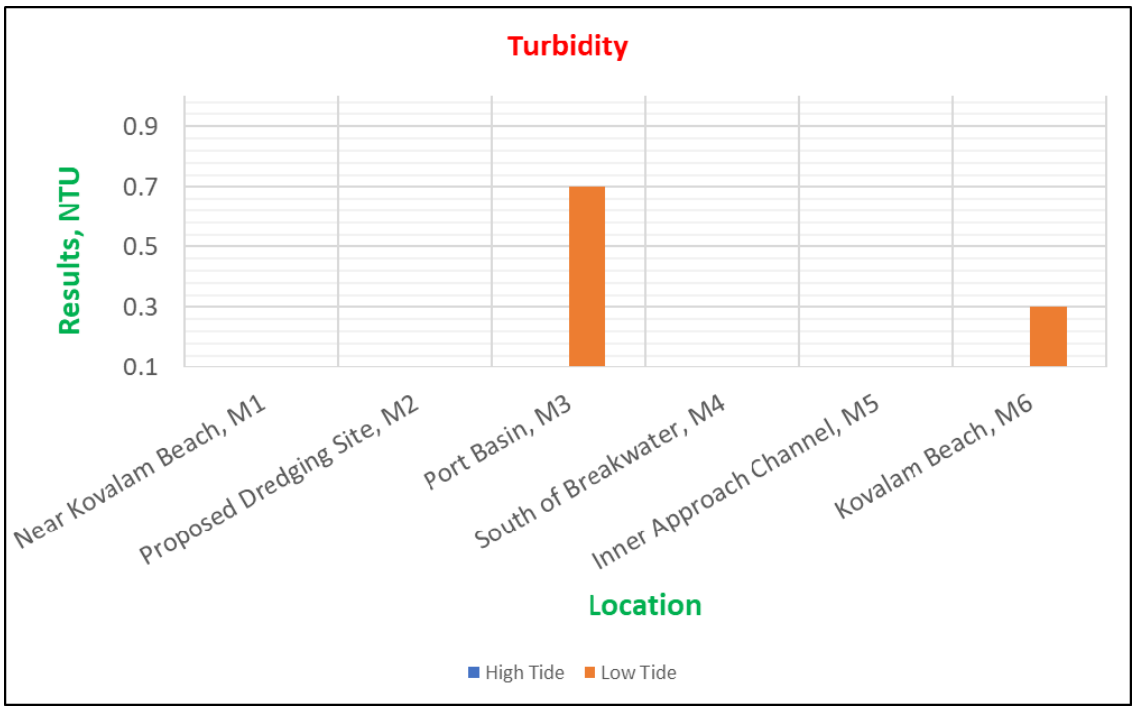


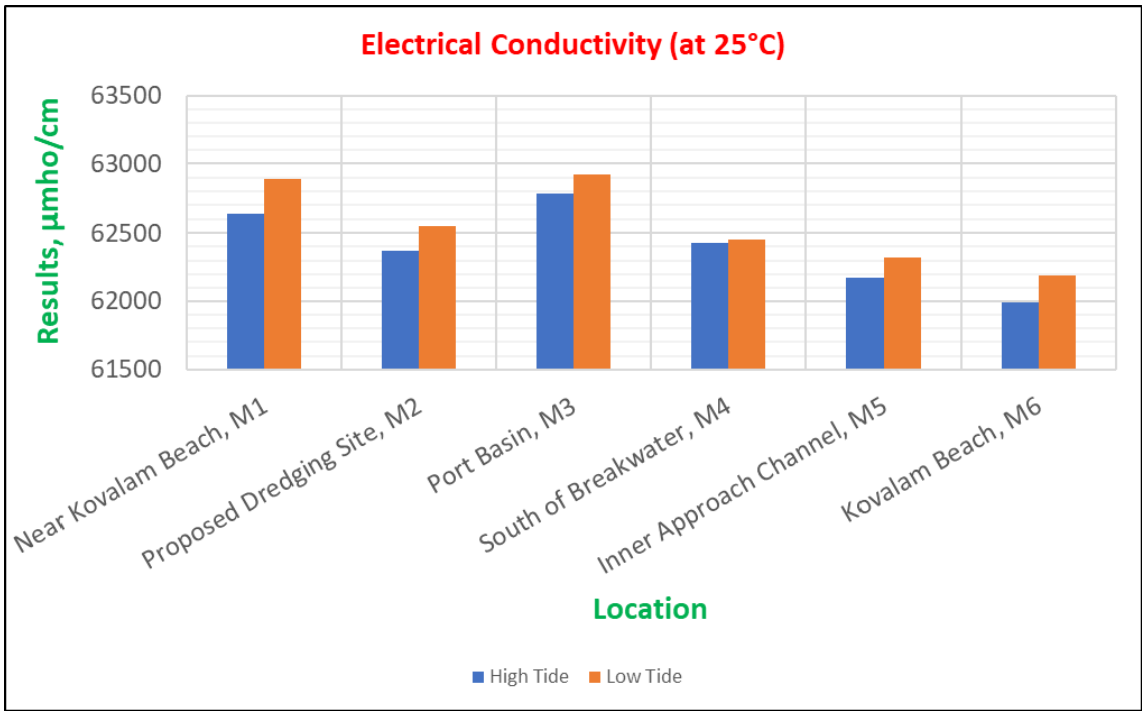

Commercial Area
70
60
50
40
30
Results, dB(A)
11-01-2022
25-01-2022
Balarampuram (N5)
Date & Location
Leq_Day Time
Leq_Night Time
Day Time Limit
Night Time Limit

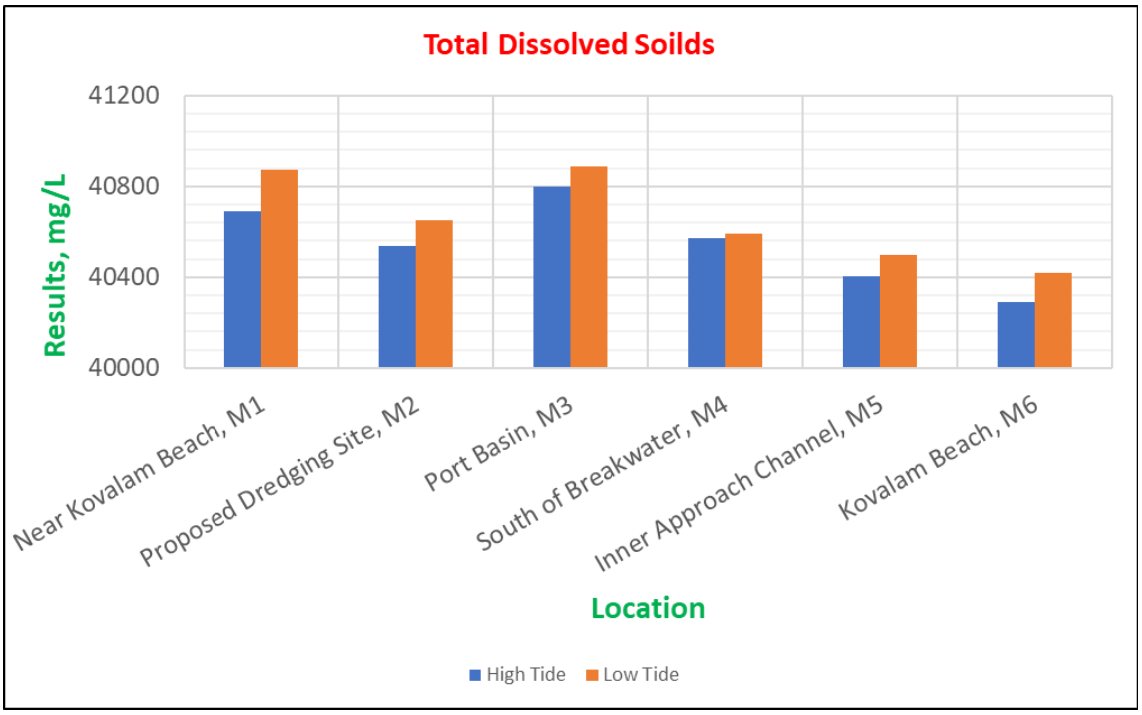
4. Marine Survey

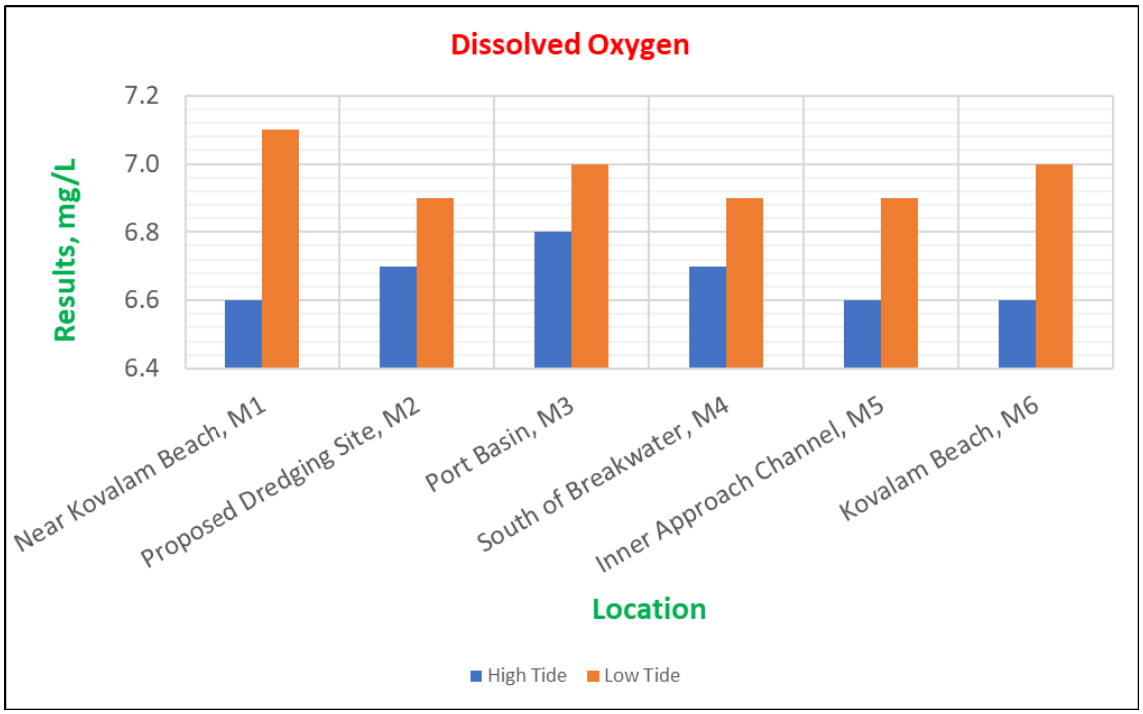
4 a. Marine Water Analysis



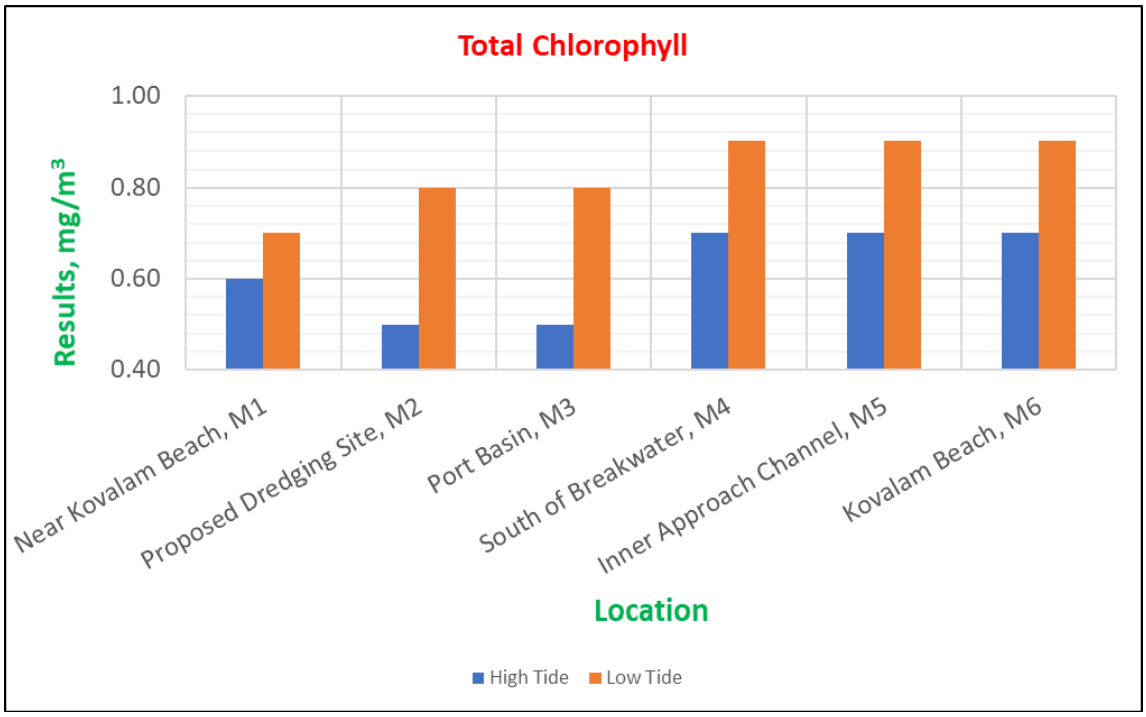


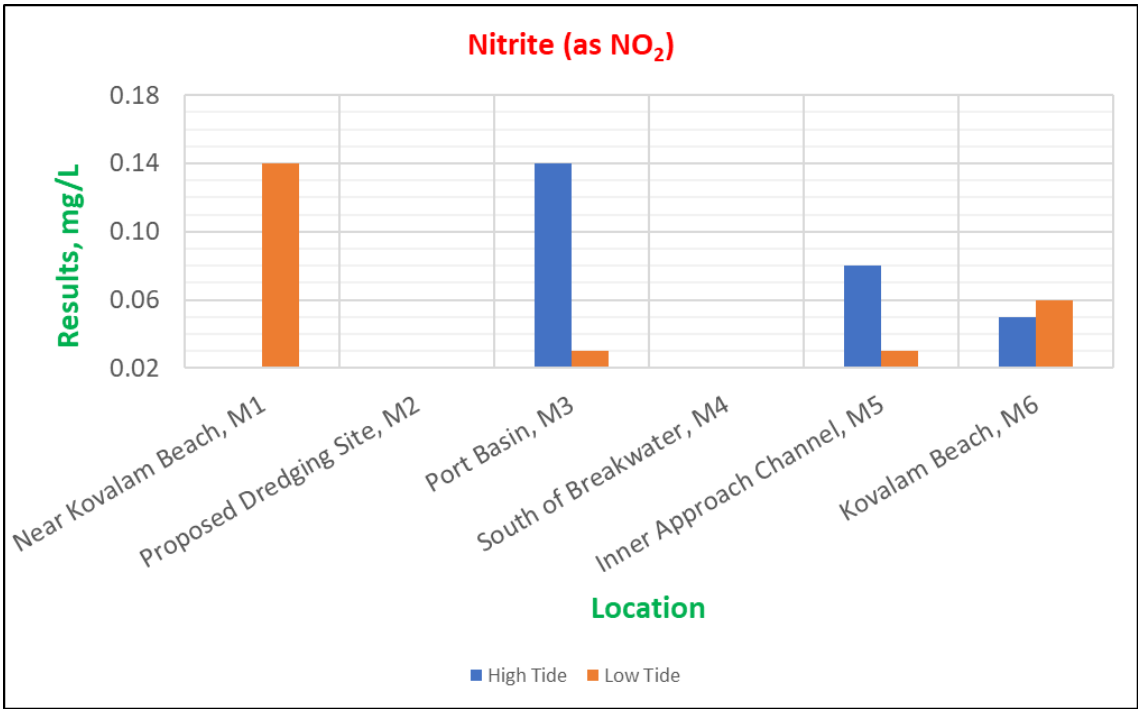

Electrical Conductivity (at 25°C)
Results, µmho/cm
63500
63000
62500
62000
61500
Near Kovalam Beach, M1
Proposed Dredging Site, M2
Port Basin, M3
South of Breakwater, M4
Inner Approach Channel, M5
Kovalam Beach, M6
Location
High Tide
Low Tide

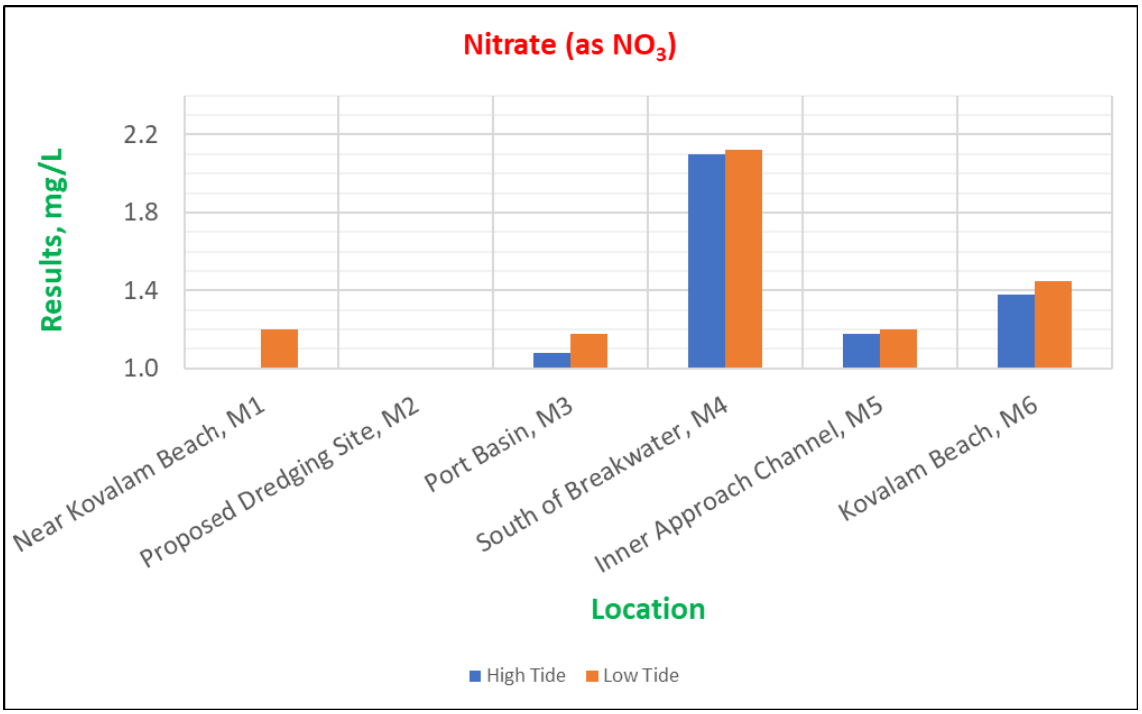

Total Dissolved Soilds
Results, mg/L
41200
40800
40400
40000
Near Kovalam Beach, M1
Proposed Dredging Site, M2
Port Basin, M3
South of Breakwater, M4
Inner Approach Channel, M5
Kovalam Beach, M6
Location
High Tide
Low Tide


Dissolved Oxygen
Results, mg/L
7.2
7.0
6.8
6.6
6.4
Near Kovalam Beach, M1
Proposed Dredging Site, M2
Port Basin, M3
South of Breakwater, M4
Inner Approach Channel, M5
Kovalam Beach, M6
Location
High Tide
Low Tide

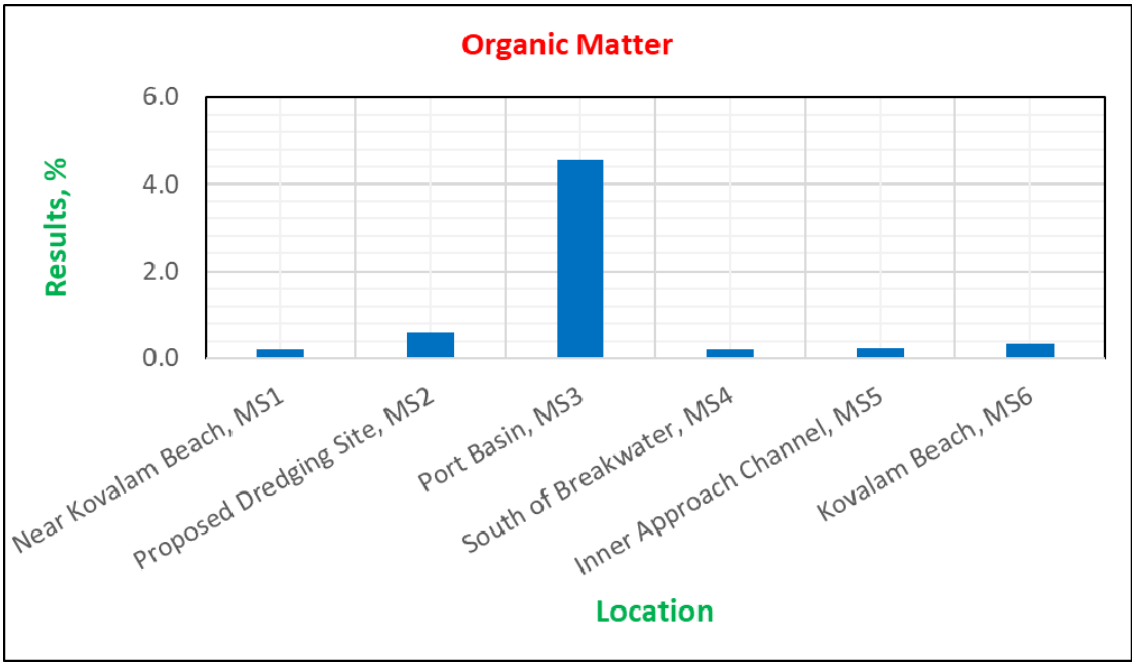

Salinity
Results, ppt
34.80
34.60
34.40
34.20
34.00
Near Kovalam Beach, M1
Proposed Dredging Site, M2
Port Basin, M3
South of Breakwater, M4
Inner Approach Channel, M5
Kovalam Beach, M6
Location
High Tide
Low Tide

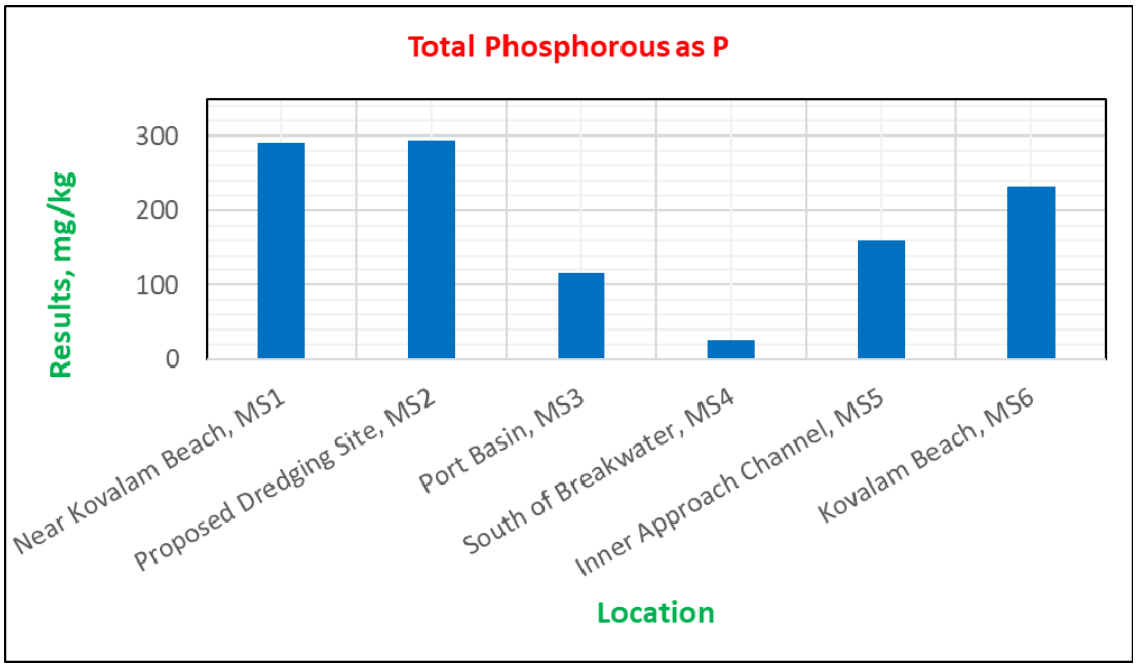

Total Chlorophyll
1.00
0.80
0.60
0.40
Results, mg/m3
Near Kovalam Beach, M1
Proposed Dredging Site, M2
Port Basin, M3
South of Breakwater, M4
Inner Approach Channel, M5
Kovalam Beach, M6
Location
High Tide
Low Tide

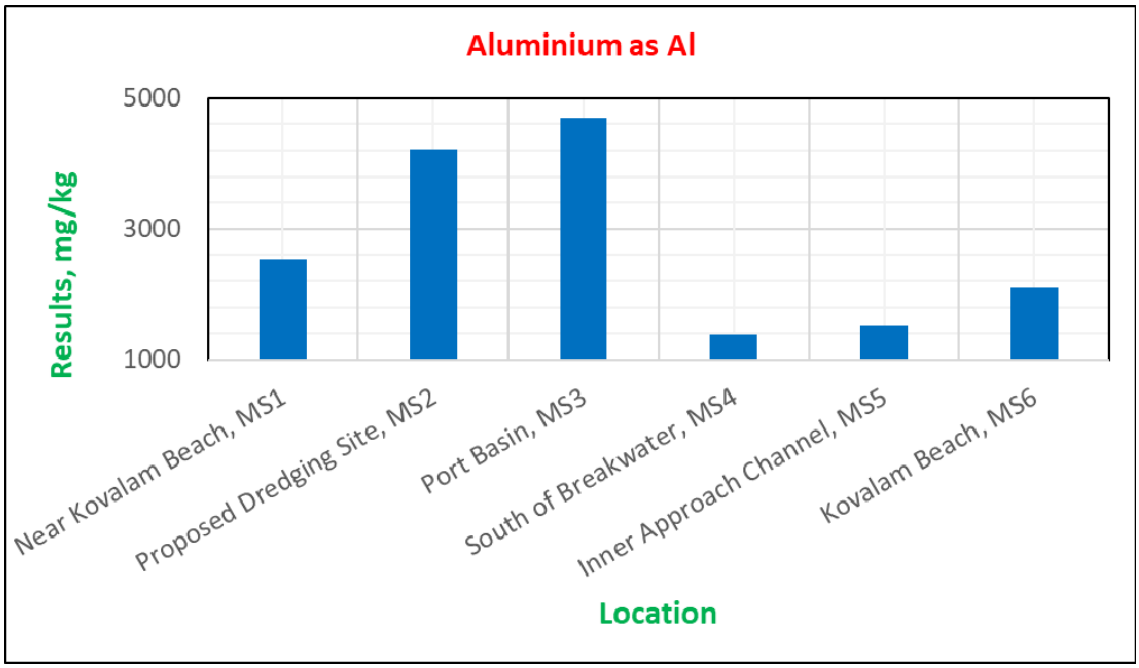

Nitrite (as NO2)
0.18
0.14
0.10
0.06
0.02
Results, mg/L
Near Kovalam Beach, M1
Proposed Dredging Site, M2
Port Basin, M3
South of Breakwater, M4
Inner Approach Channel, M5
Kovalam Beach, M6
Location
High Tide
Low Tide

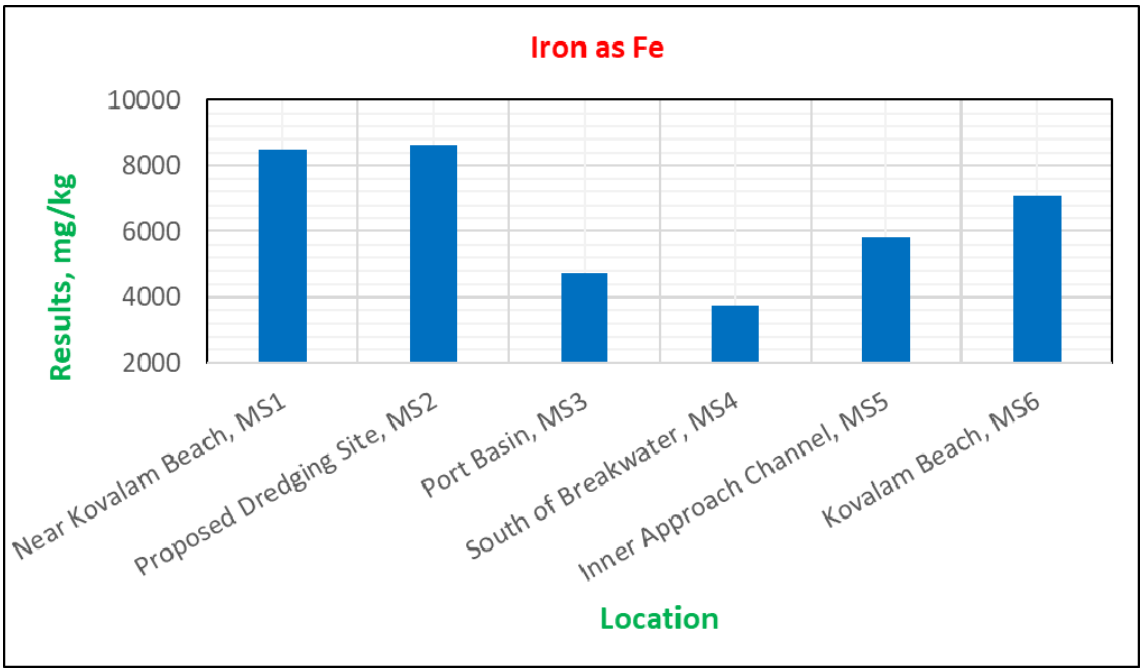


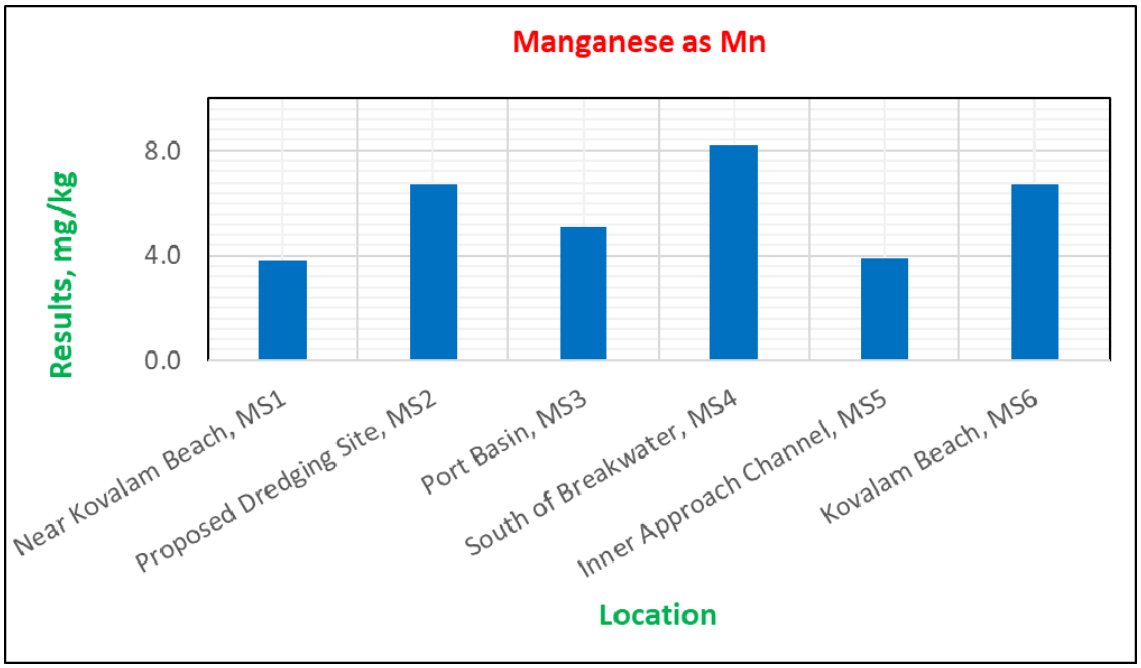
4 b. Sediment Analysis

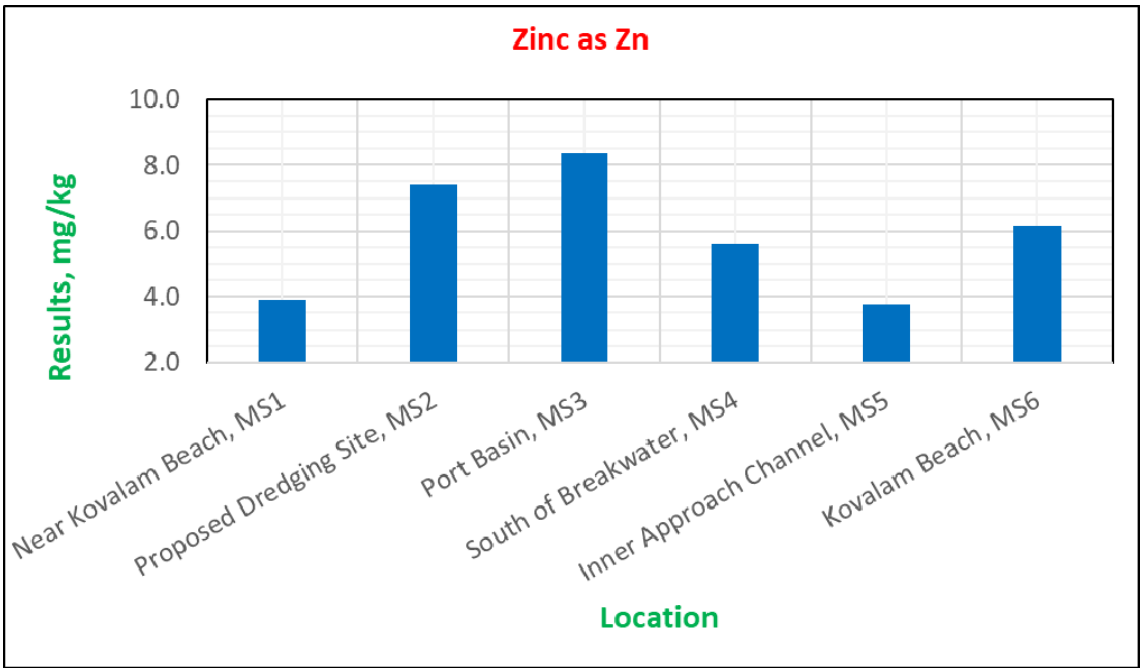


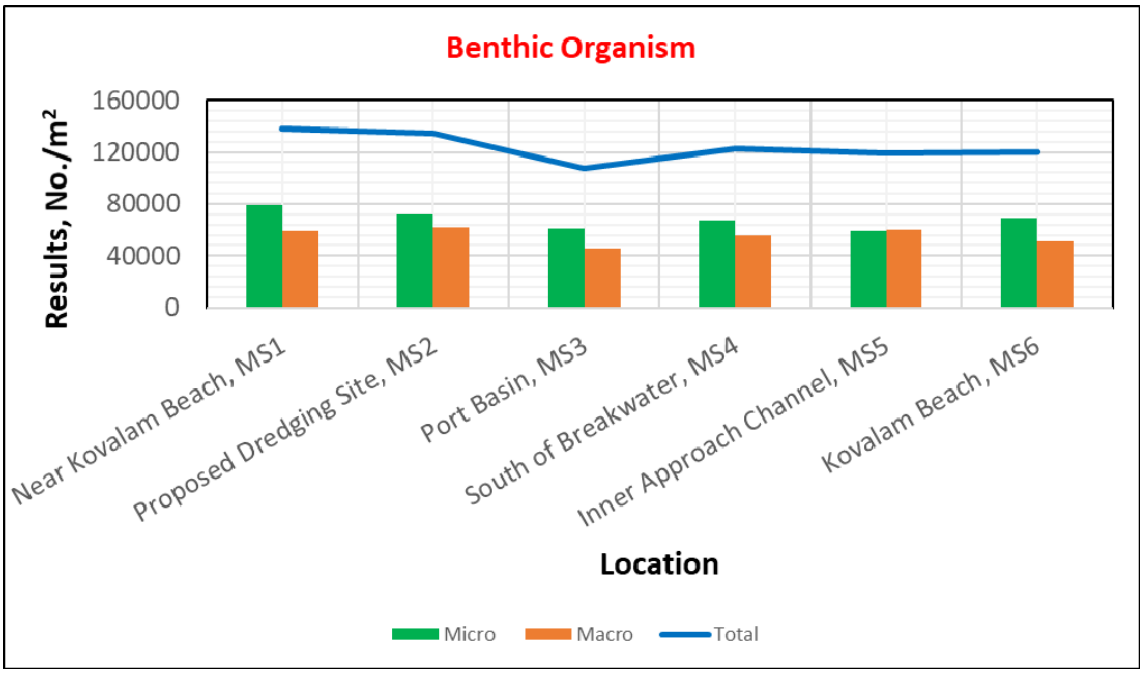

Total Phosphorous as P
Results, mg/kg
300
200
100
0
Near Kovalam Beach, MS1
Proposed Dredging Site, MS2
Port Basin, MS3
South of Breakwater, MS4
Inner Approach Channel, MS5
Kovalam Beach, MS6
Location


Aluminium as Al
Results, mg/kg
5000
3000
1000
Near Kovalam Beach, MS1
Proposed Dredging Site, MS2
Port Basin, MS3
South of Breakwater, MS4
Inner Approach Channel, MS5
Kovalam Beach, MS6
Location

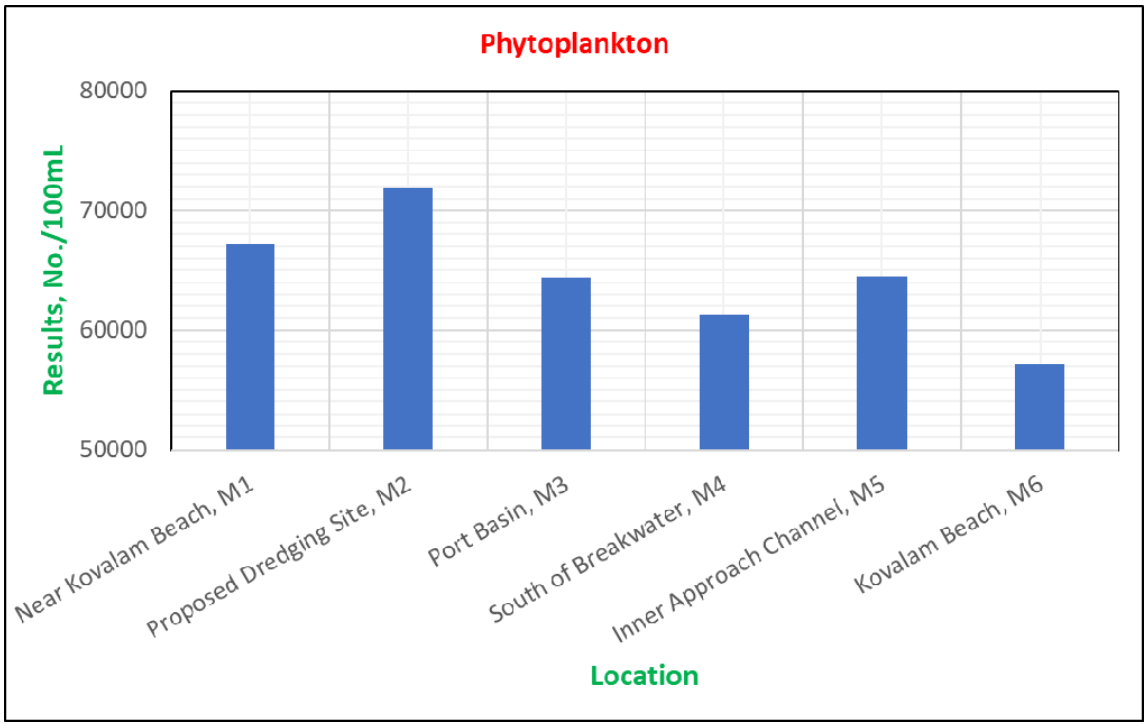

Iron as Fe
Results, mg/kg
10000
8000
6000
4000
2000
Near Kovalam Beach, MS1
Proposed Dredging Site, MS2
Port Basin, MS3
South of Breakwater, MS4
Inner Approach Channel, MS5
Kovalam Beach, MS6
Location


Manganese as Mn
Results, mg/kg
8.0
4.0
0.0
Near Kovalam Beach, MS1
Proposed Dredging Site, MS2
Port Basin, MS3
South of Breakwater, MS4
Inner Approach Channel, MS5
Kovalam Beach, MS6
Location

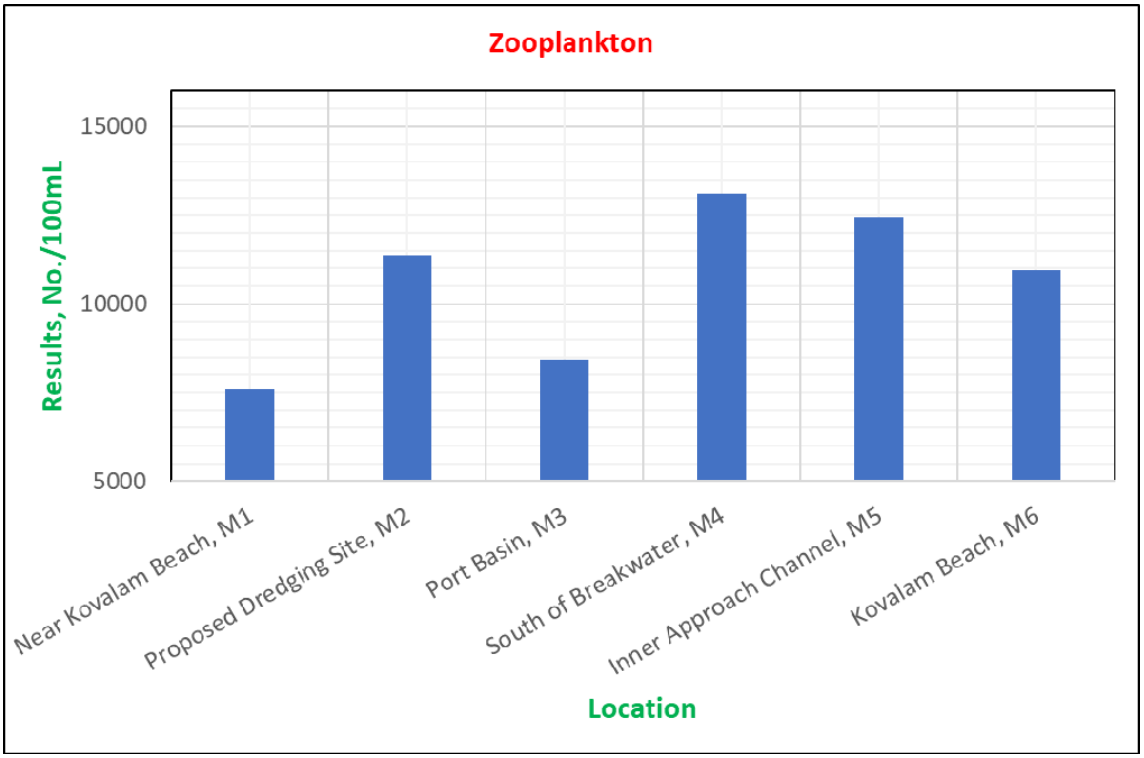

Zinc as Zn
Results, mg/kg
10.0
8.0
6.0
4.0
2.0
Near Kovalam Beach, MS1
Proposed Dredging Site, MS2
Port Basin, MS3
South of Breakwater, MS4
Inner Approach Channel, MS5
Kovalam Beach, MS6
Location


Benthic Organism
Results, No./m²
160000
120000
80000
40000
0
Near Kovalam Beach, MS1
Proposed Dredging Site, MS2
Port Basin, MS3
South of Breakwater, MS4
Inner Approach Channel, MS5
Kovalam Beach, MS6
Location
Micro
Macro
Total

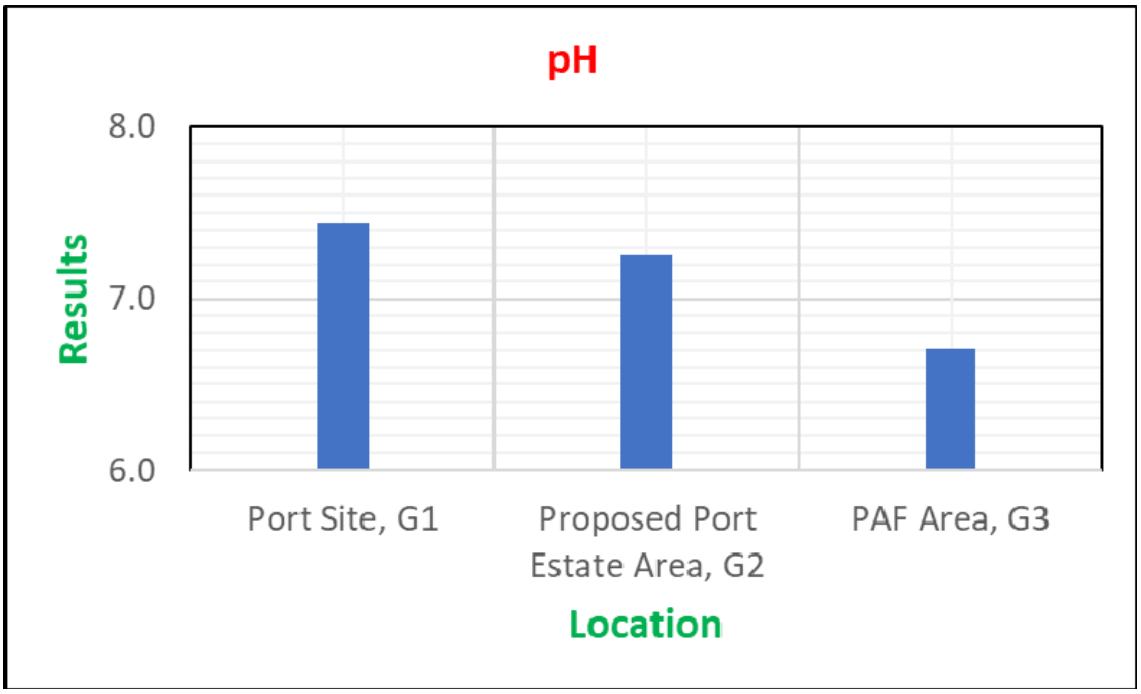
4 c. Phytoplankton Analysis from Marine Samples

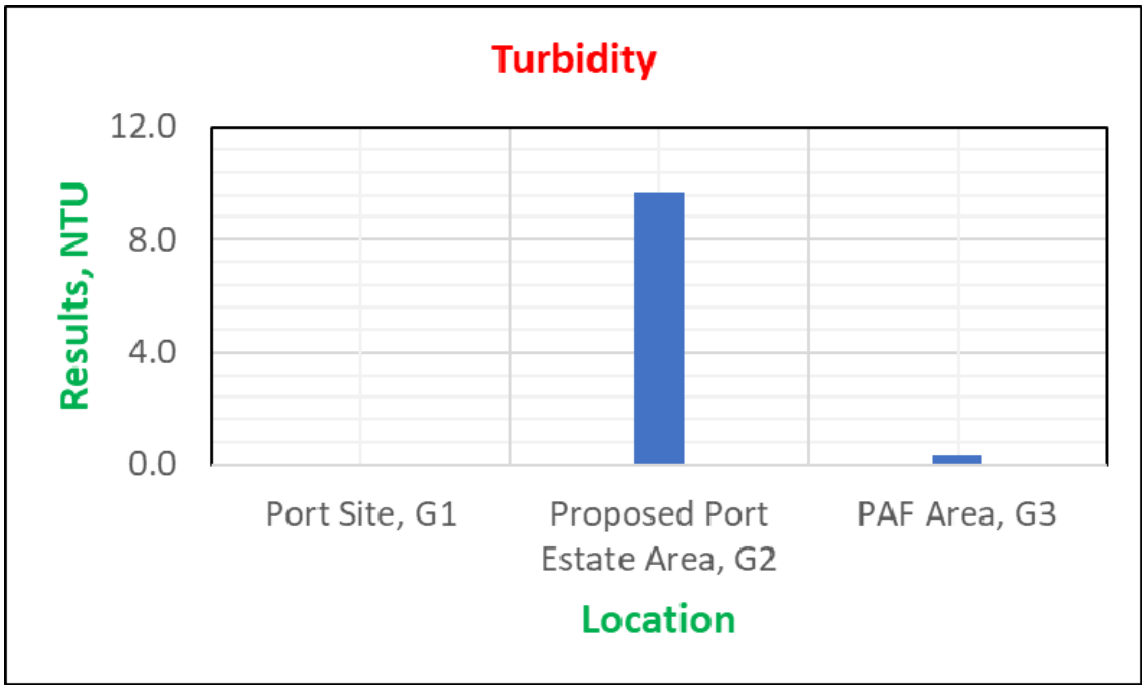


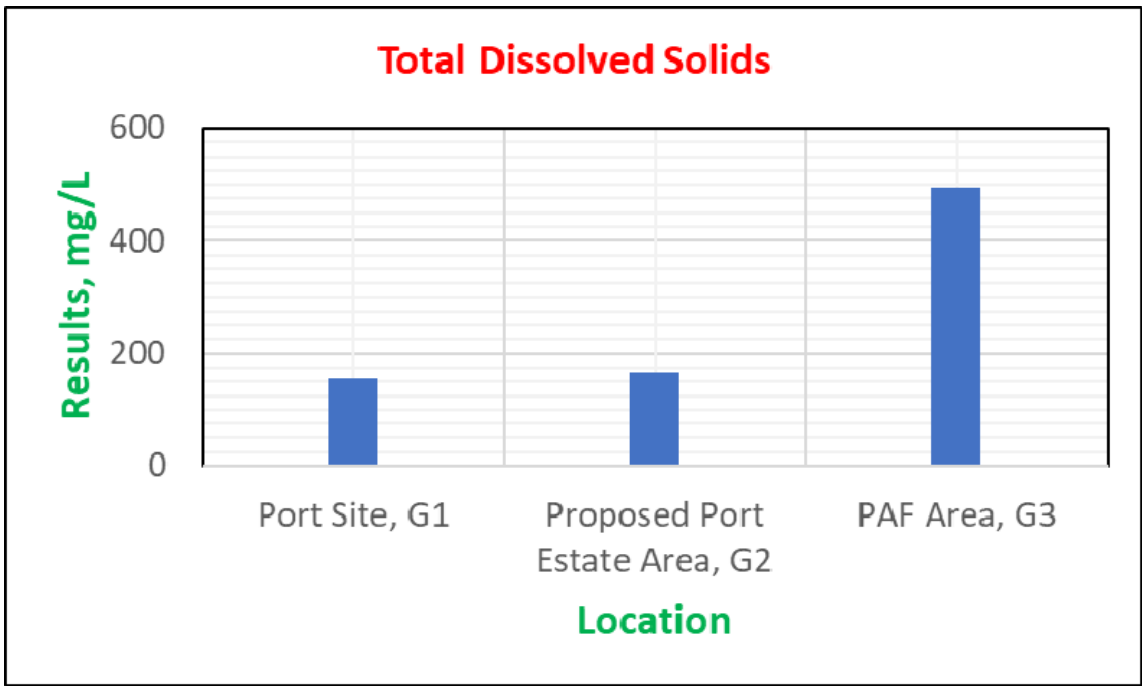
4 d. Zooplankton Analysis from Marine Sample

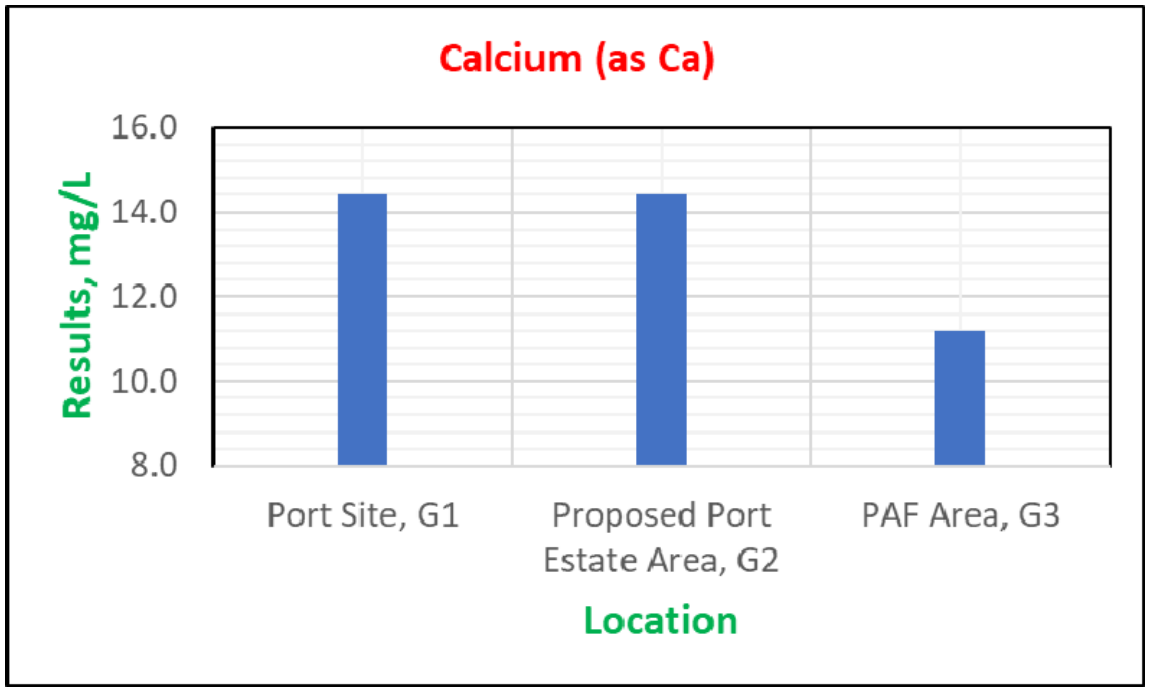


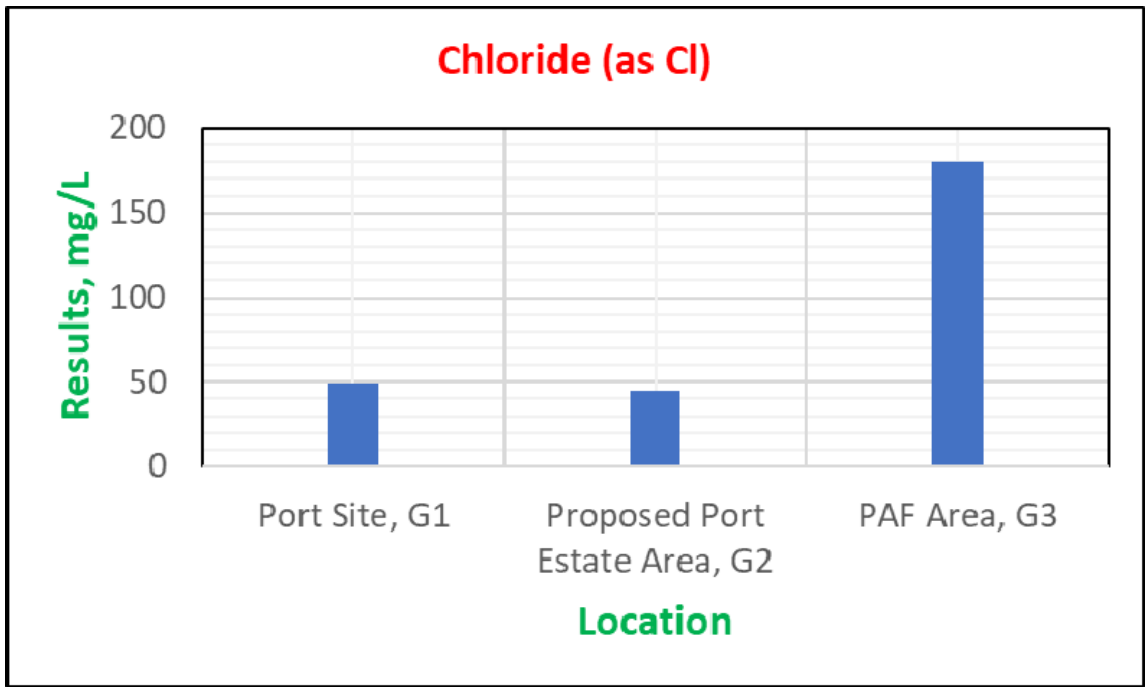
5. Groundwater Analysis

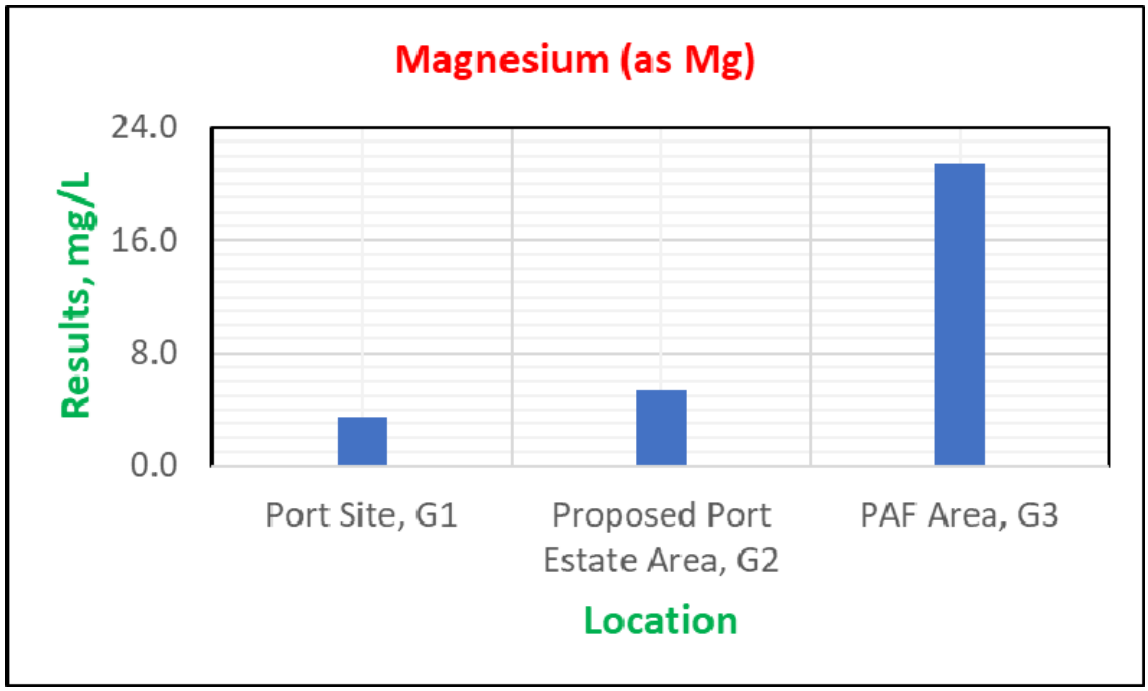


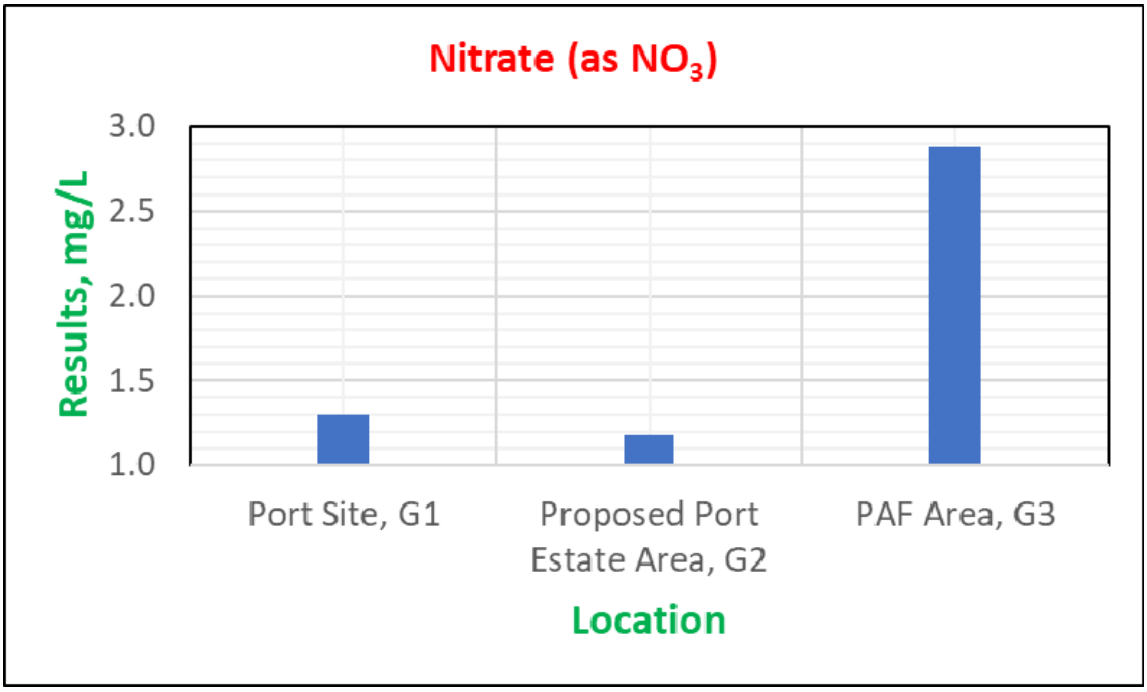


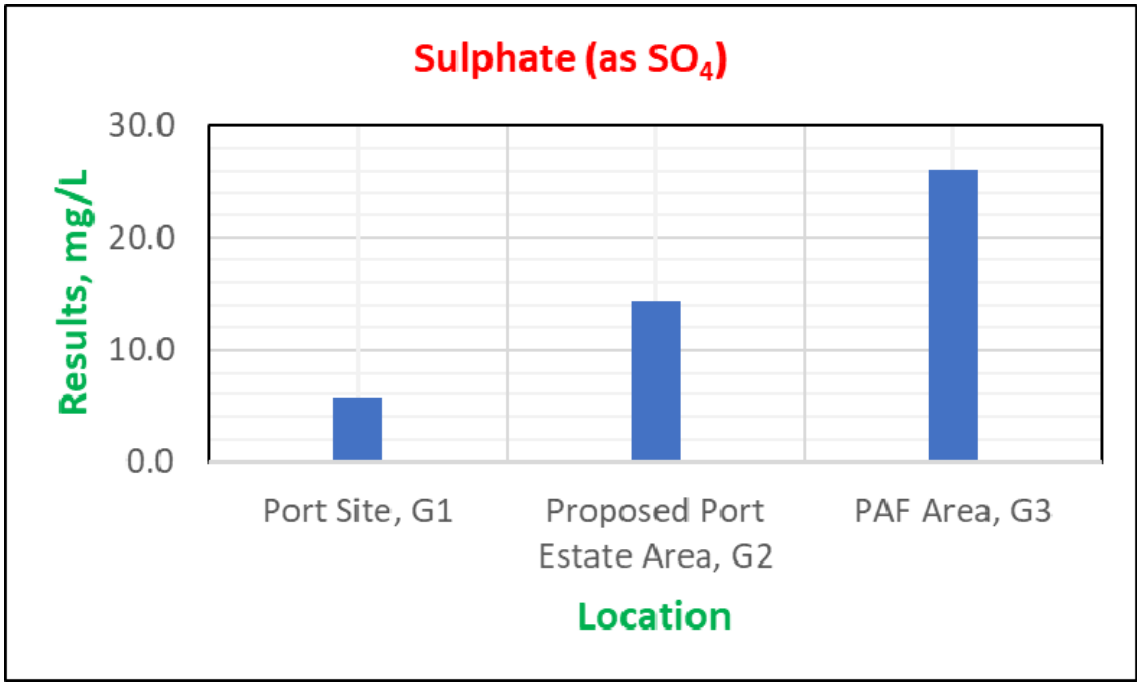

Total Dissolved Solids
Results, mg/L
600
400
200
0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

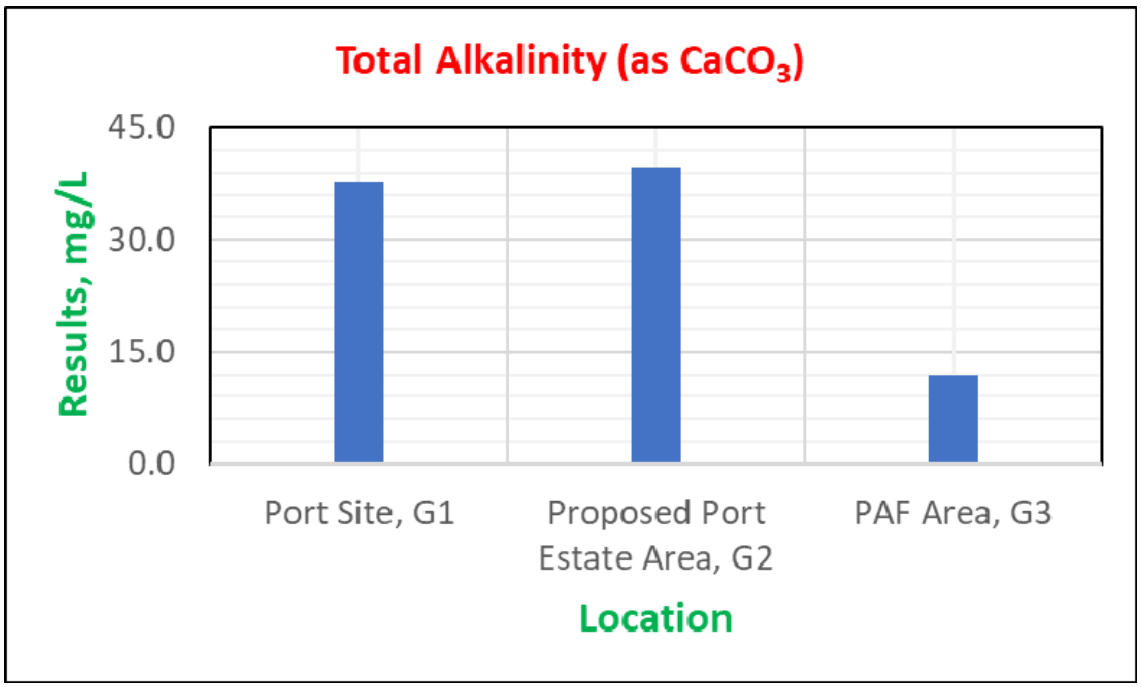

Calcium (as Ca)
Results, mg/L
16.0
14.0
12.0
10.0
8.0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

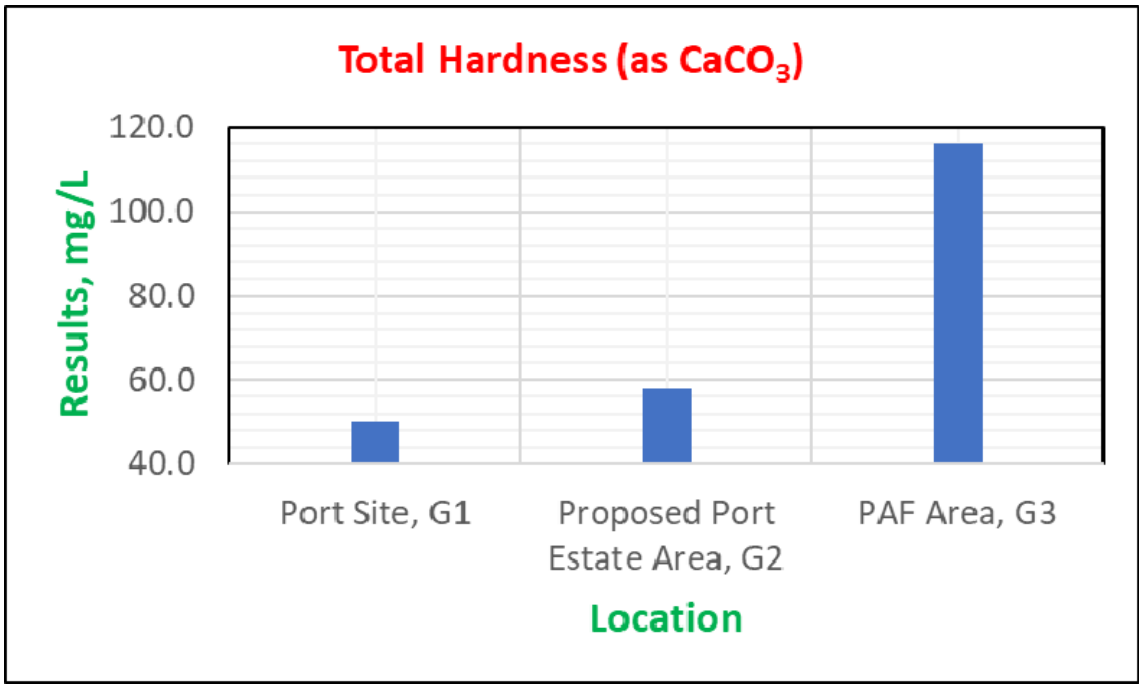

Chloride (as Cl)
Results, mg/L
200
150
100
50
0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

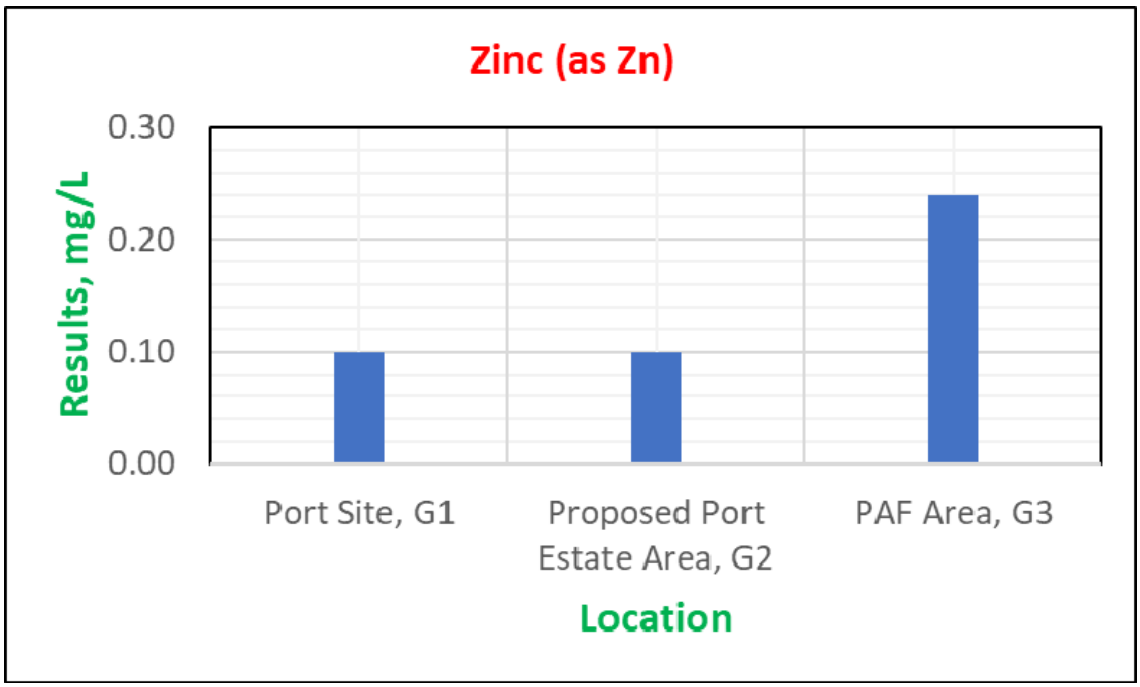

Magnesium (as Mg)
Results, mg/L
24.0
16.0
8.0
0.0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location


Nitrate (as NO_3)
Results, mg/L
3.0
2.5
2.0
1.5
1.0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

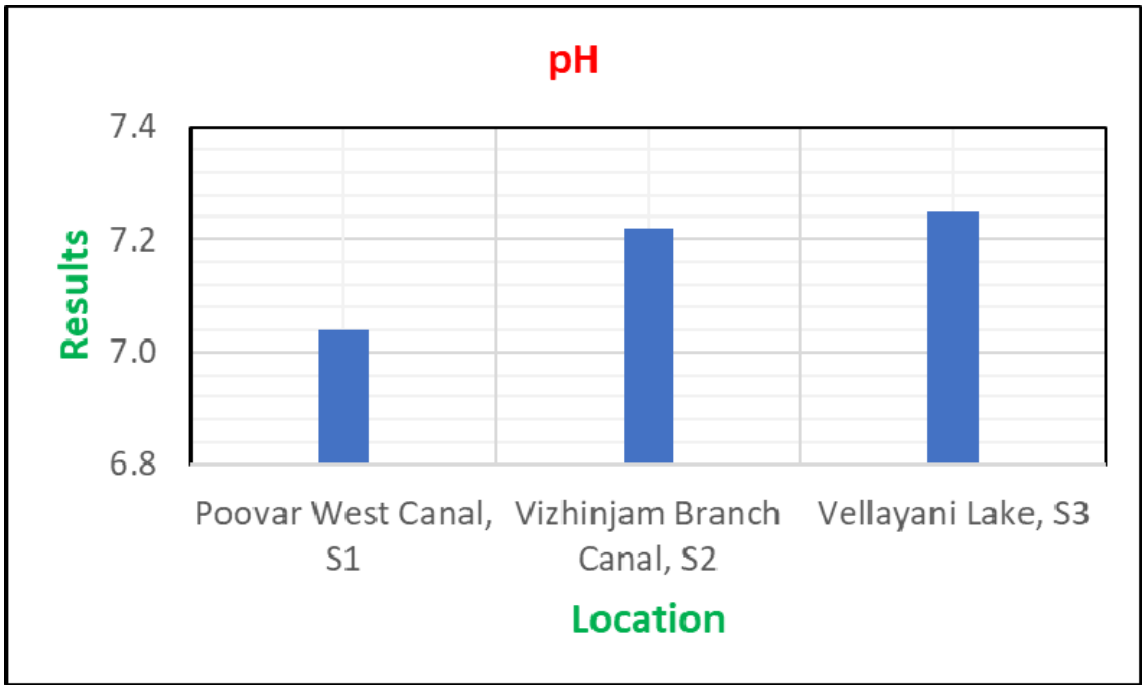

Sulphate (as SO_4)
Results, mg/L
30.0
20.0
10.0
0.0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

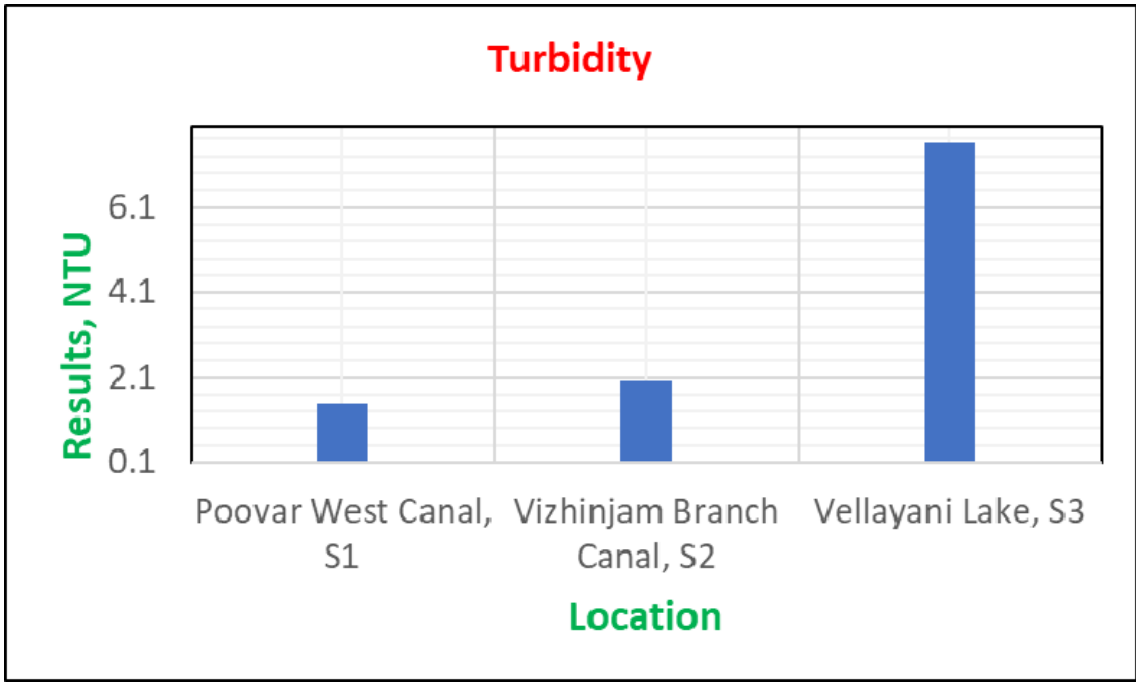

Total Alkalinity (as $CaCO_3$)
Results, mg/L
45.0
30.0
15.0
0.0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

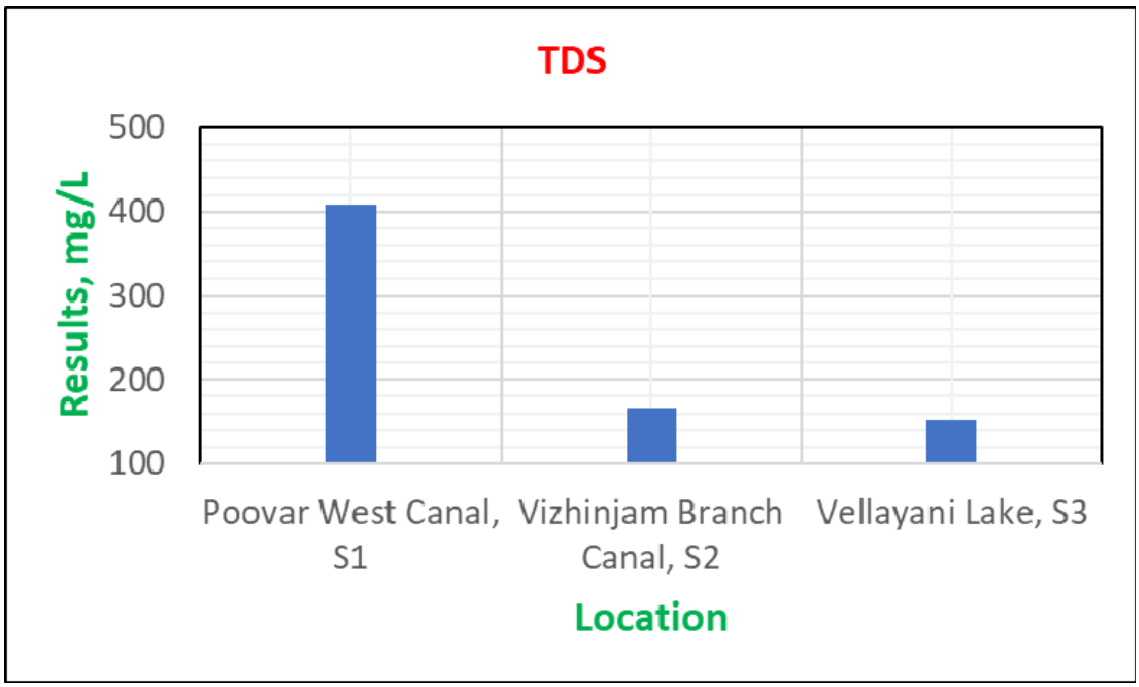

Total Hardness (as $CaCO_3$)
Results, mg/L
120.0
100.0
80.0
60.0
40.0
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

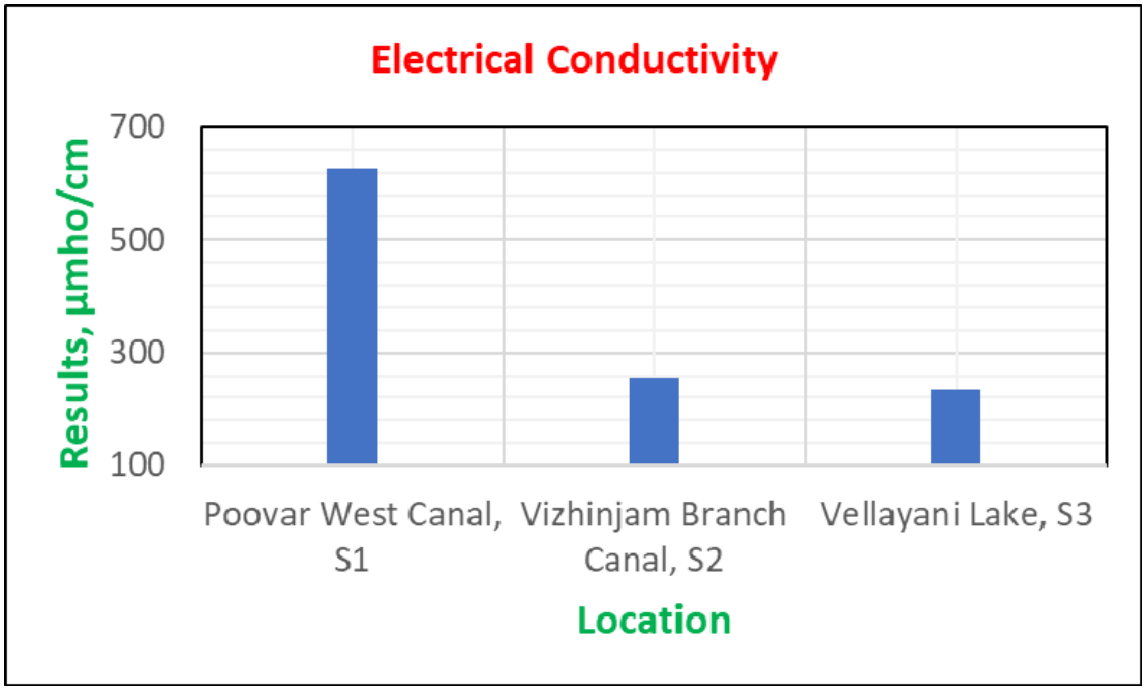

Zinc (as Zn)
Results, mg/L
0.30
0.20
0.10
0.00
Port Site, G1
Proposed Port Estate Area, G2
PAF Area, G3
Location

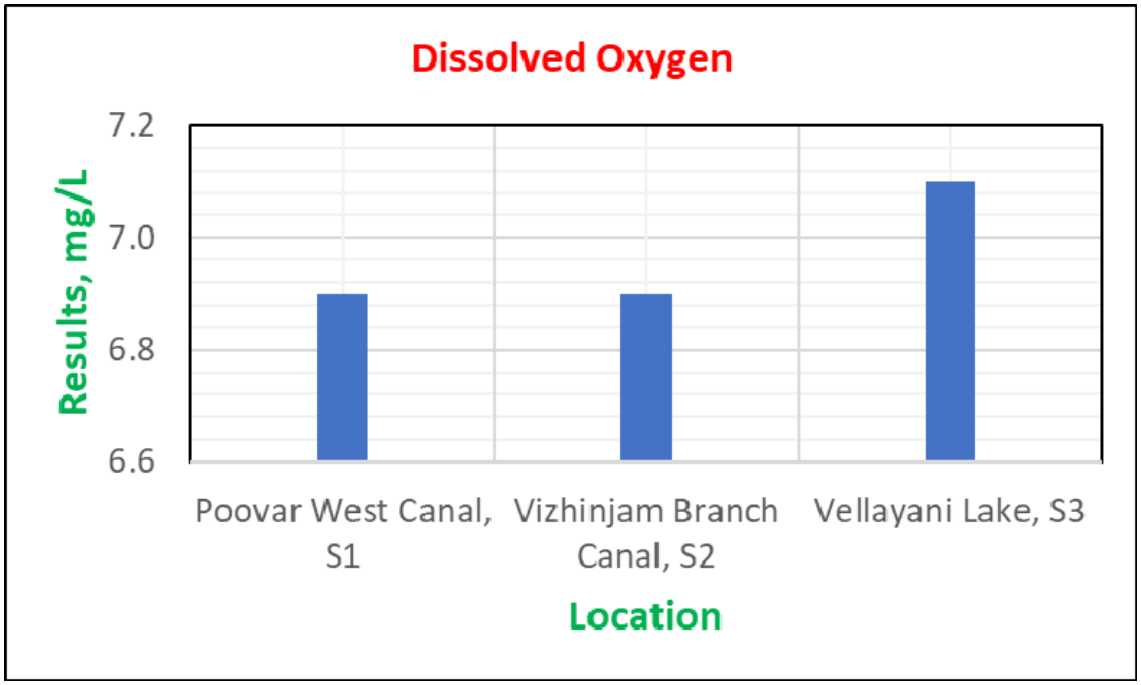
6. Surface Water Analysis

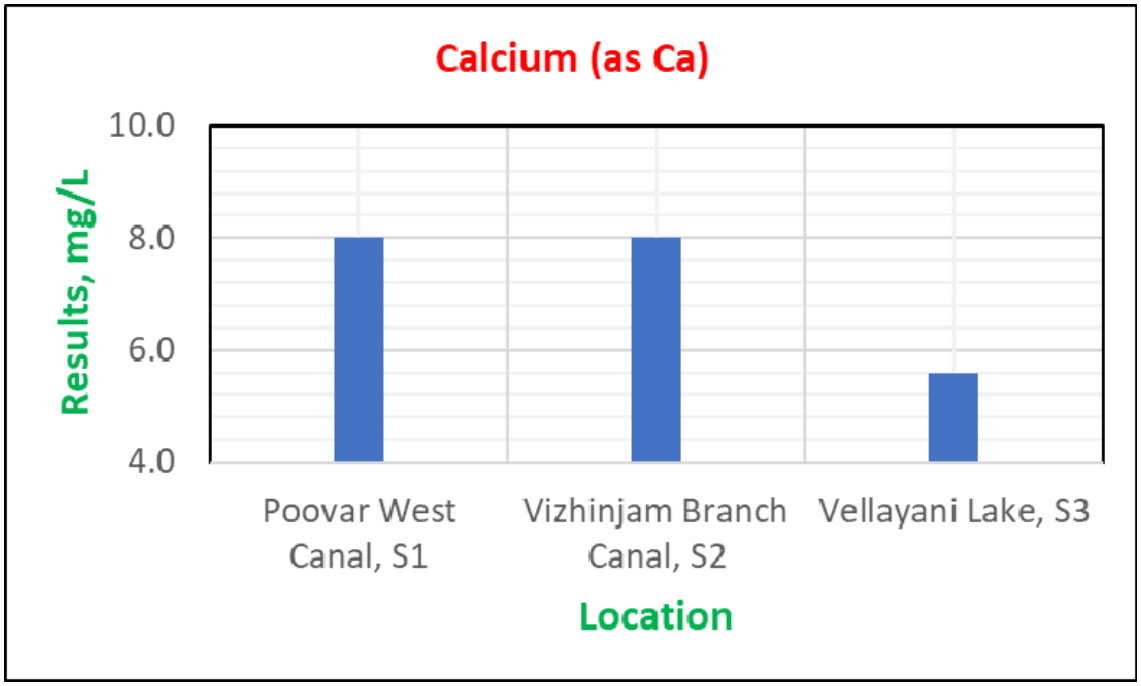


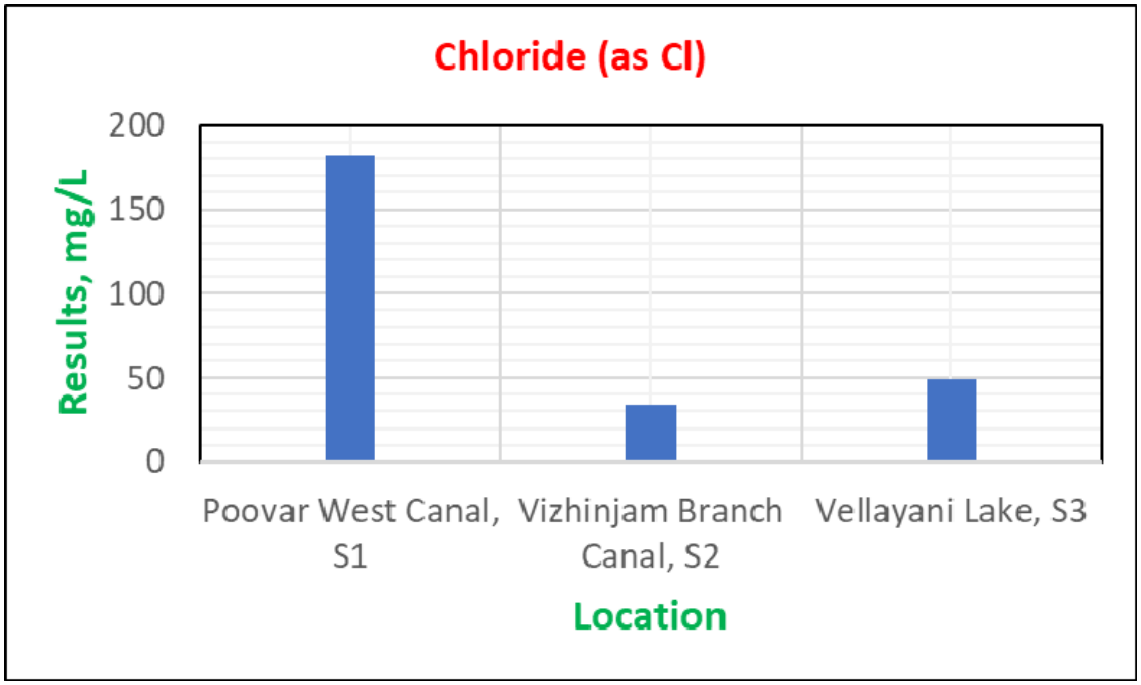


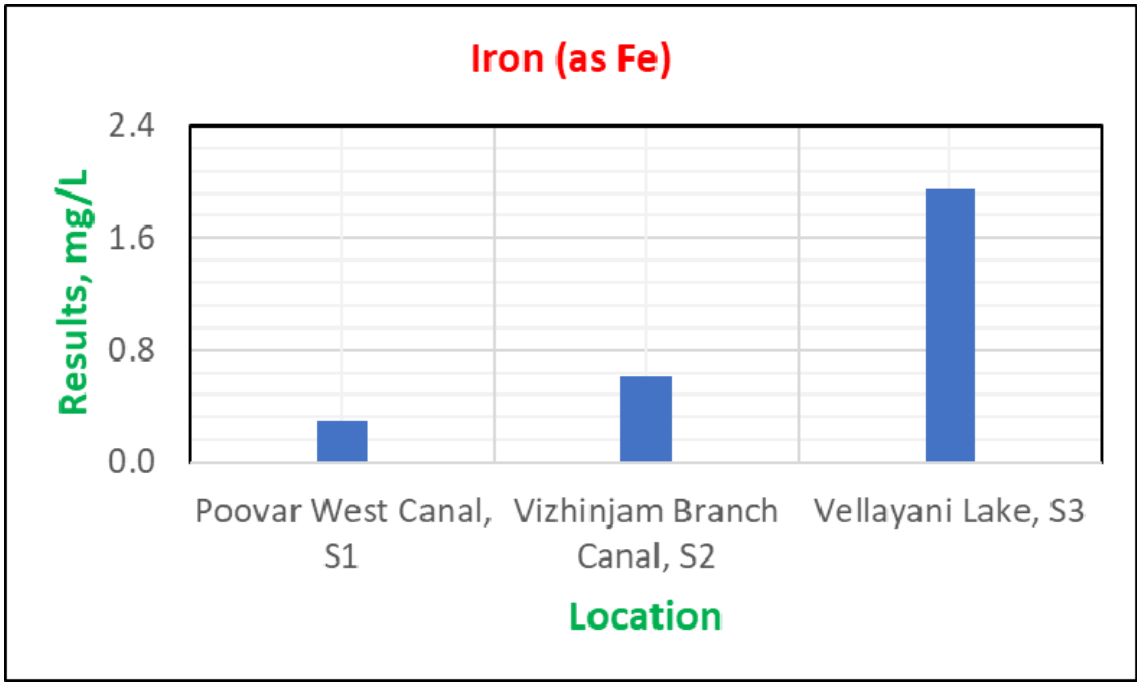

TDS
Results, mg/L
500
400
300
200
100
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

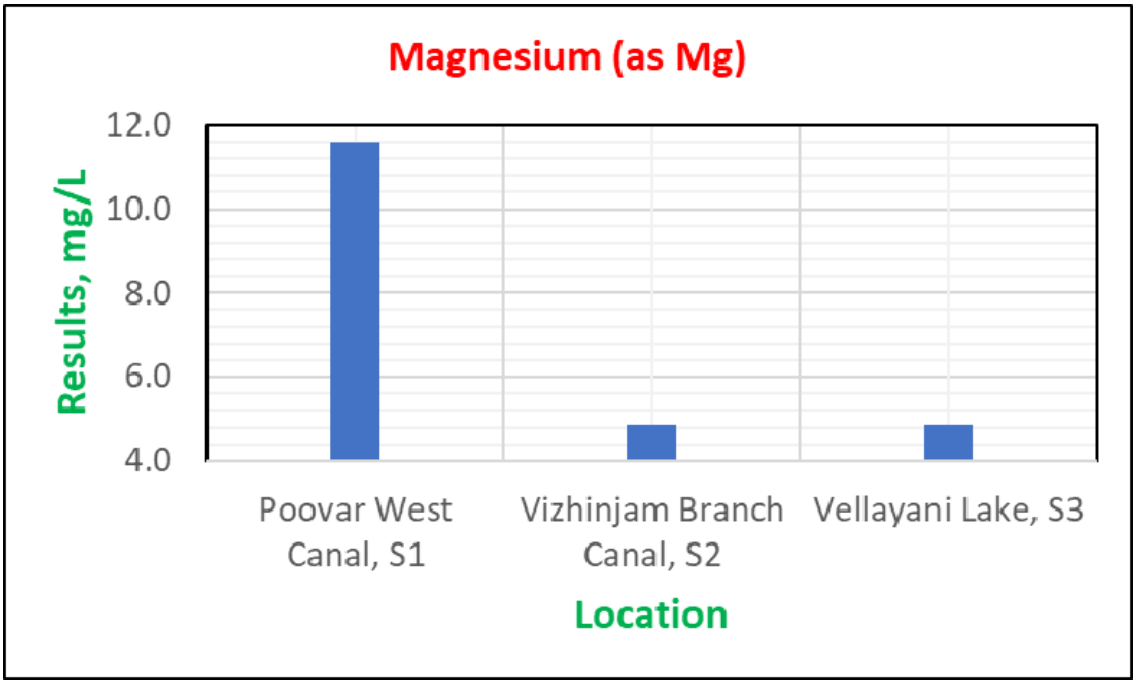

Electrical Conductivity
Results, µmho/cm
700
500
300
100
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

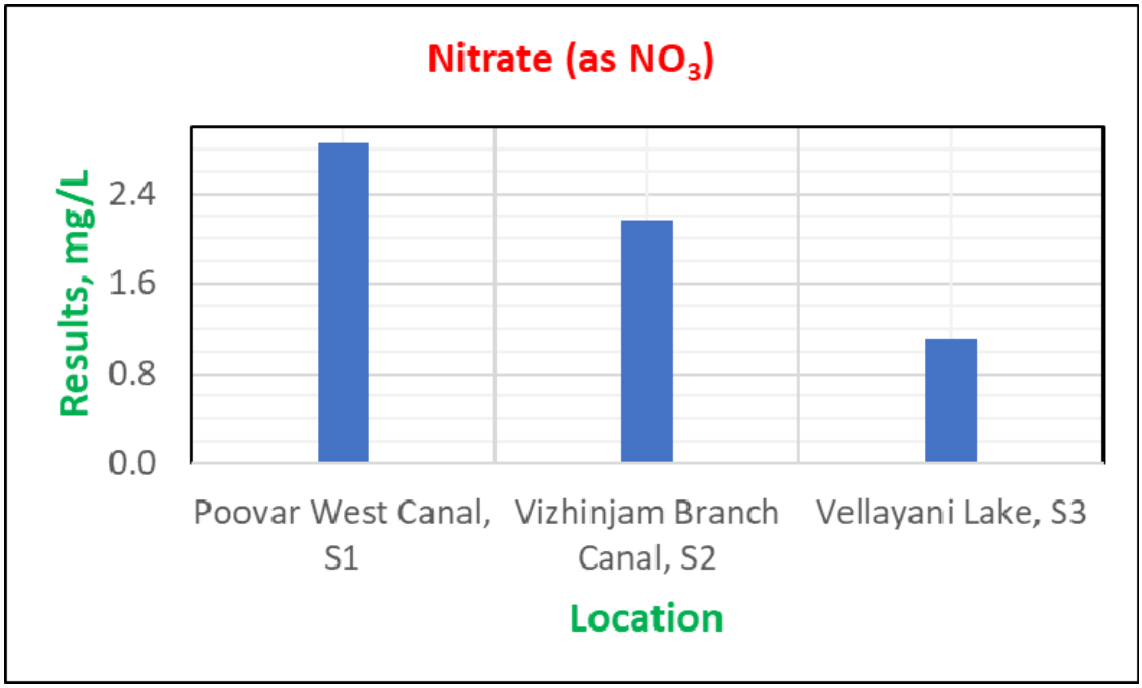

Dissolved Oxygen
Results, mg/L
7.2
7.0
6.8
6.6
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

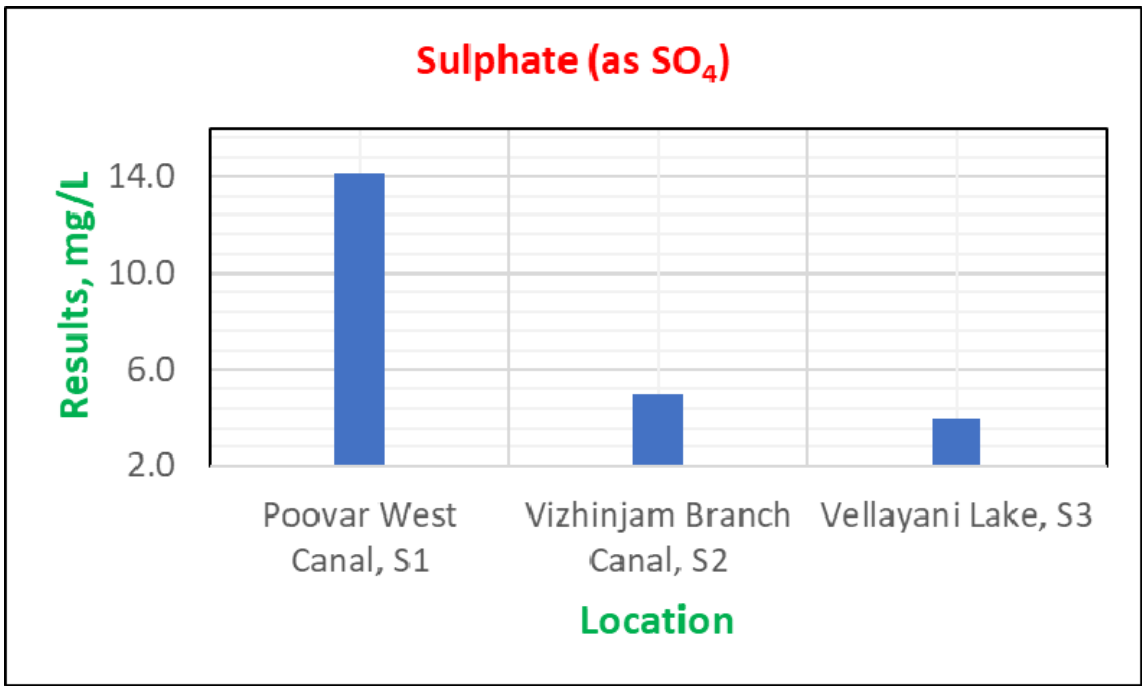

Calcium (as Ca)
Results, mg/L
10.0
8.0
6.0
4.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

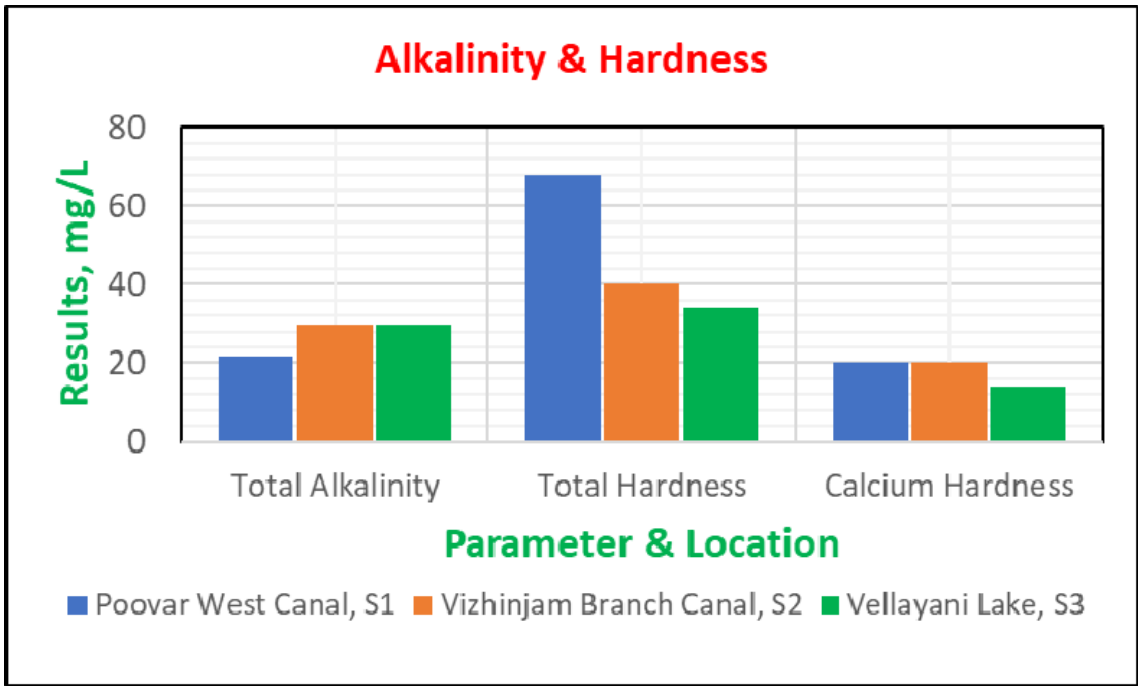

Chloride (as Cl)
Results, mg/L
200
150
100
50
0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

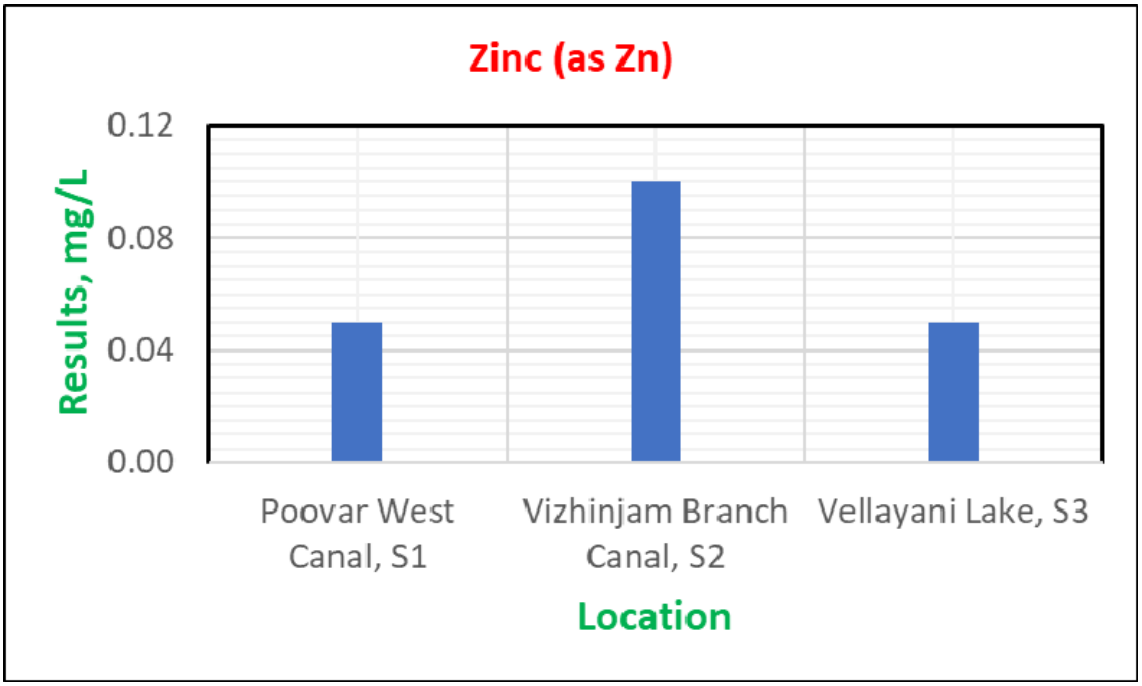

Iron (as Fe)
Results, mg/L
2.4
1.6
0.8
0.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

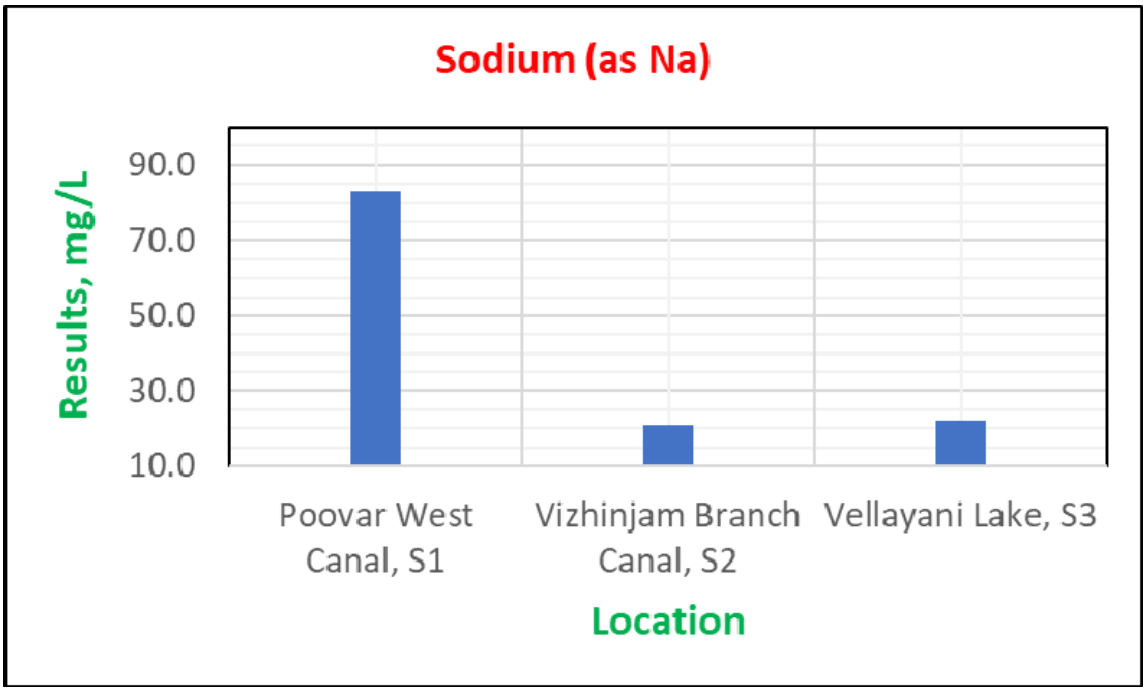

Magnesium (as Mg)
Results, mg/L
12.0
10.0
8.0
6.0
4.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

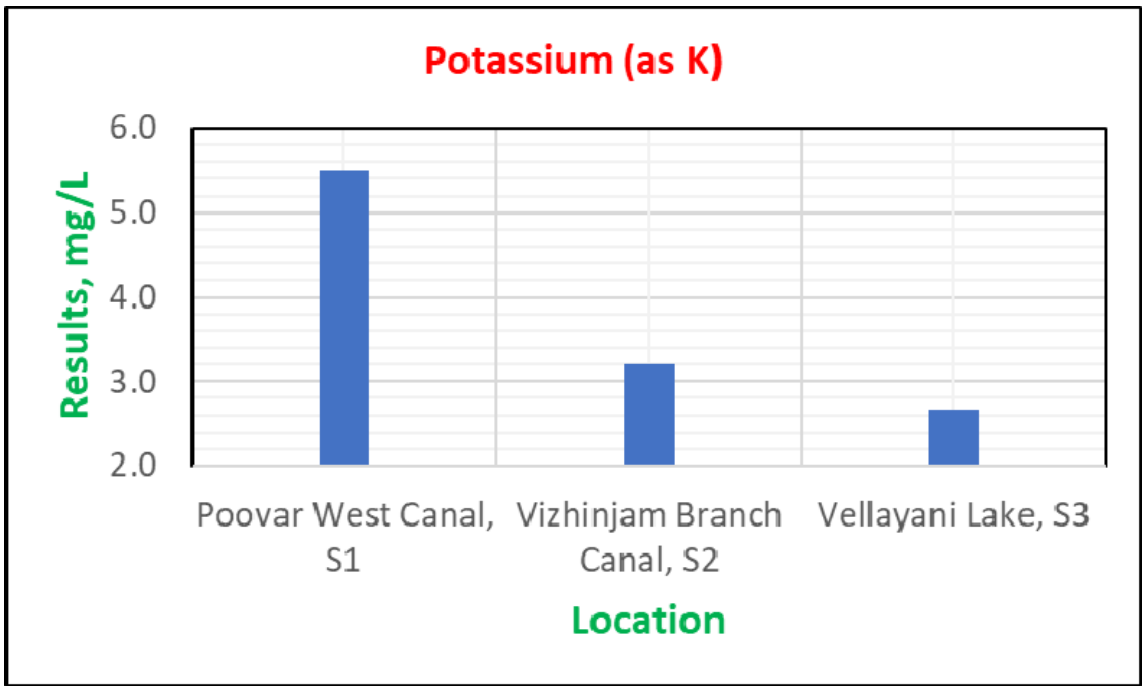

Nitrate (as NO_3)
Results, mg/L
2.4
1.6
0.8
0.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

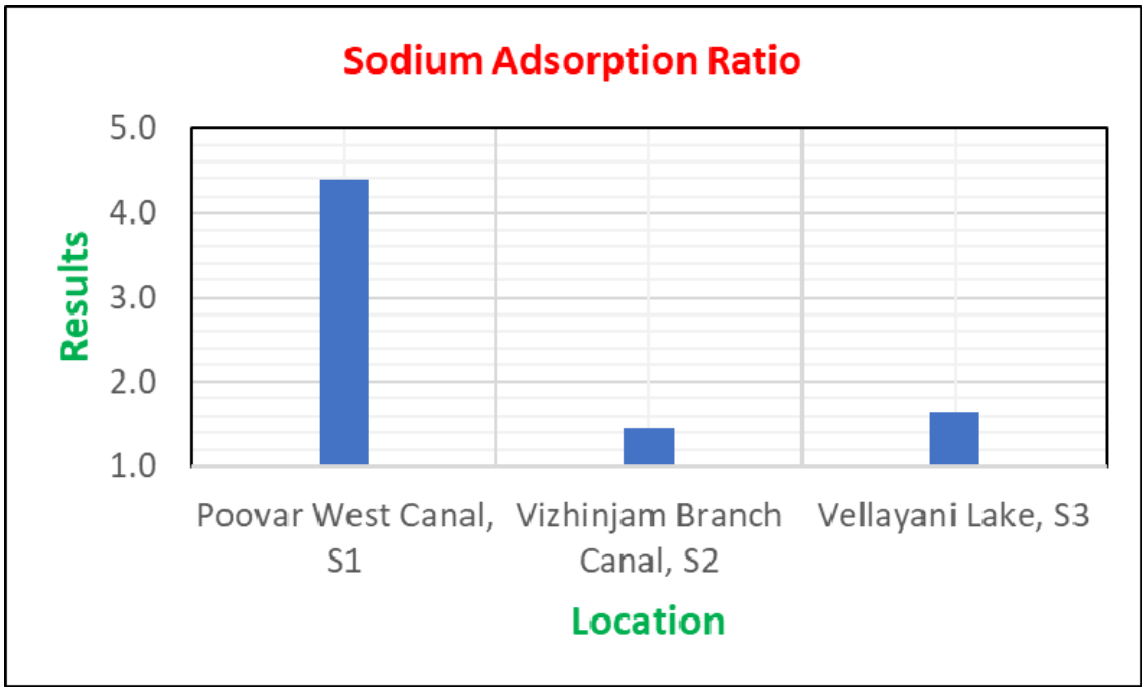

Sulphate (as SO_4)
Results, mg/L
14.0
10.0
6.0
2.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location


Alkalinity & Hardness
Results, mg/L
80
60
40
20
0
Total Alkalinity
Total Hardness
Calcium Hardness
Parameter & Location
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3

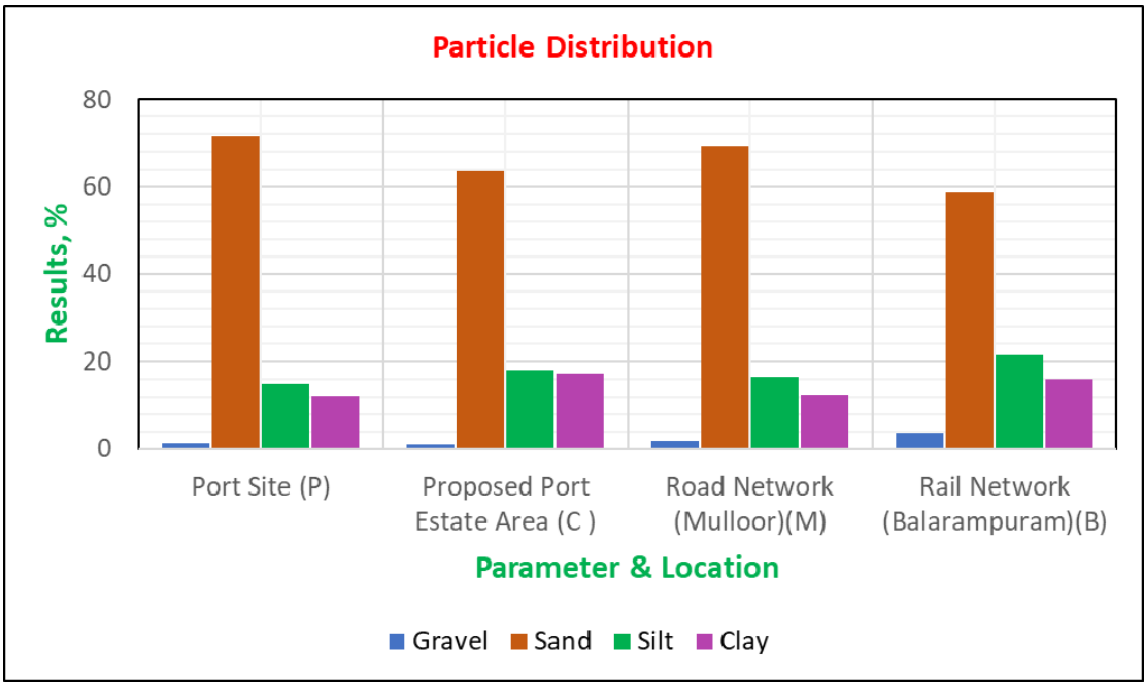

Zinc (as Zn)
Results, mg/L
0.12
0.08
0.04
0.00
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

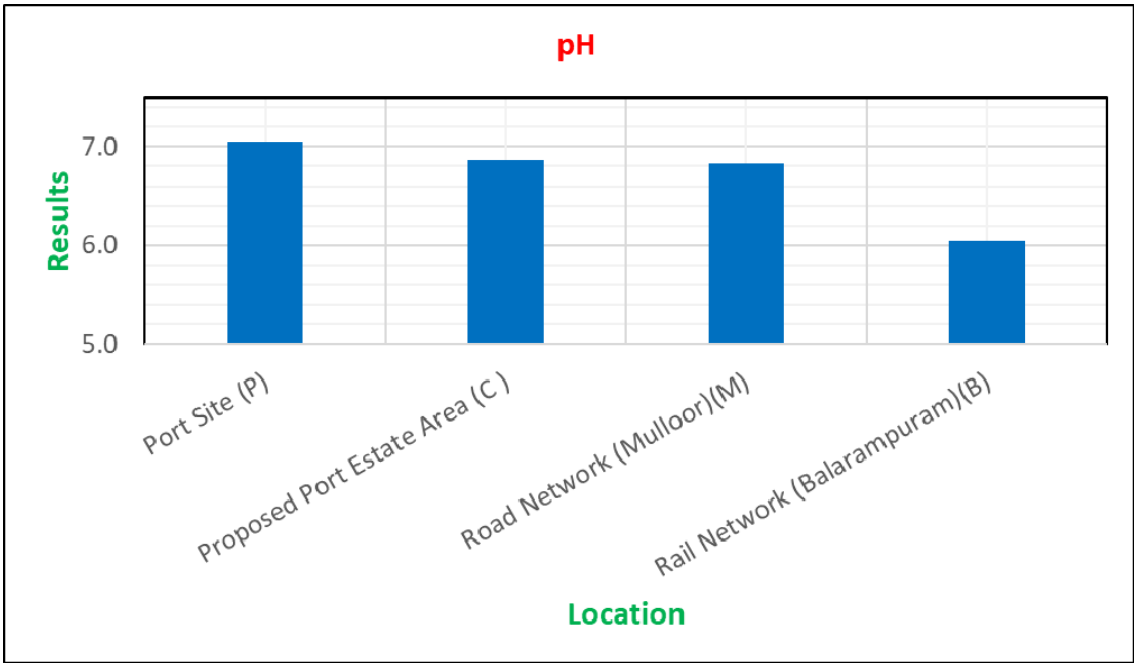

Sodium (as Na)
Results, mg/L
90.0
70.0
50.0
30.0
10.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

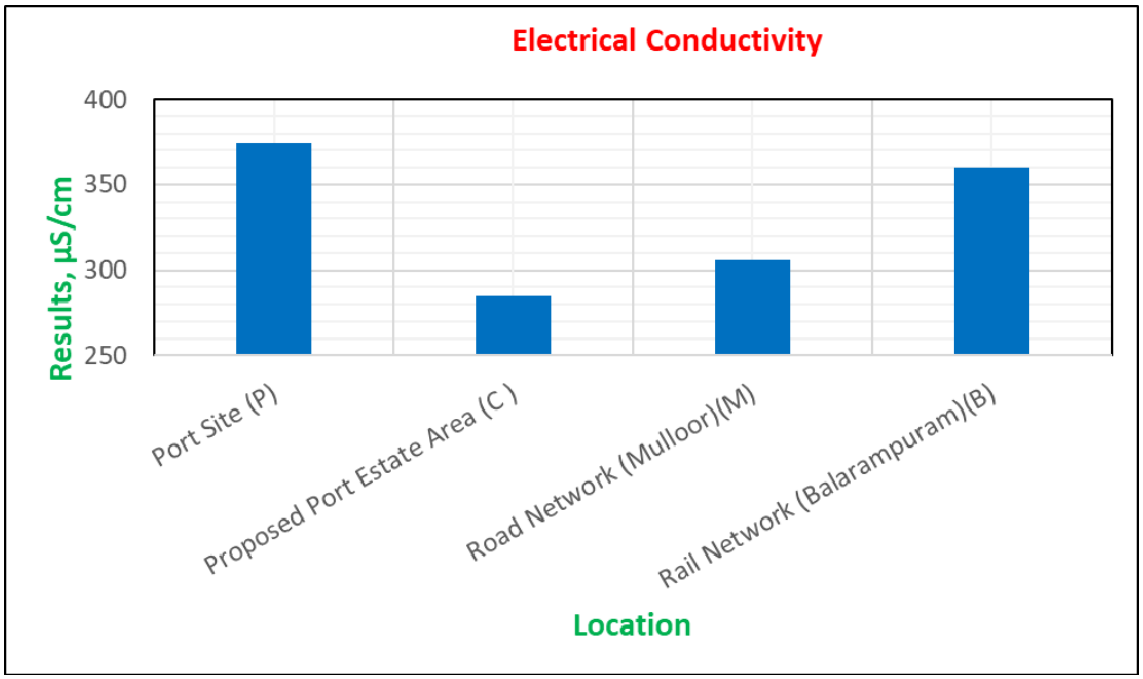

Potassium (as K)
Results, mg/L
6.0
5.0
4.0
3.0
2.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

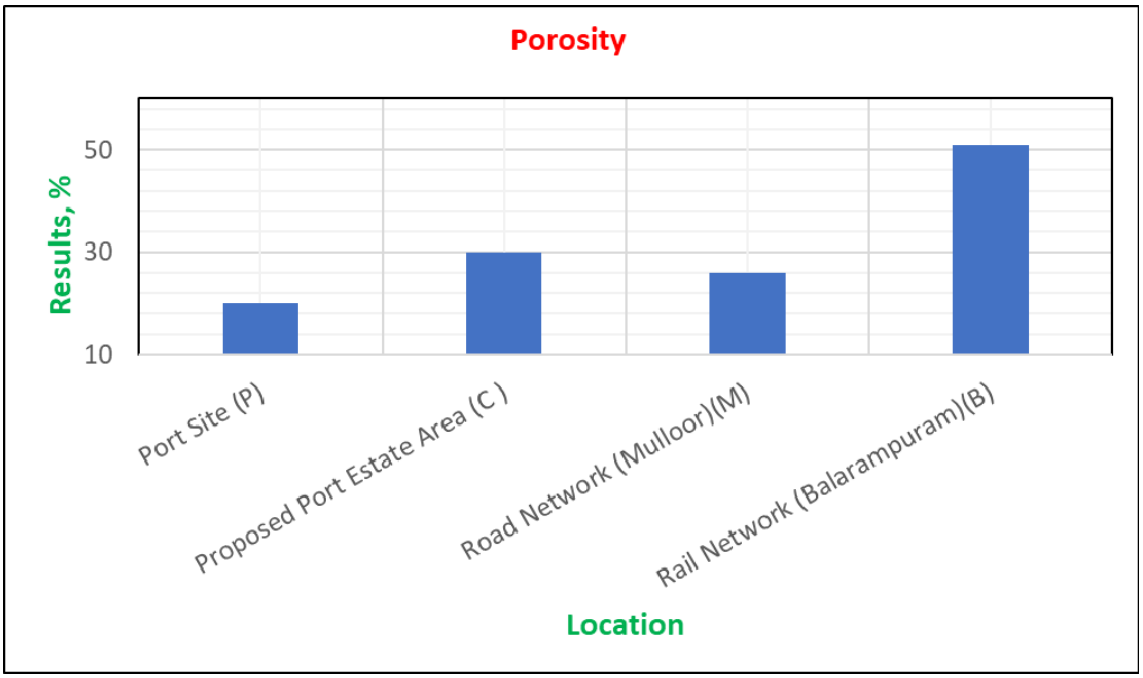

Sodium Adsorption Ratio
Results
5.0
4.0
3.0
2.0
1.0
Poovar West Canal, S1
Vizhinjam Branch Canal, S2
Vellayani Lake, S3
Location

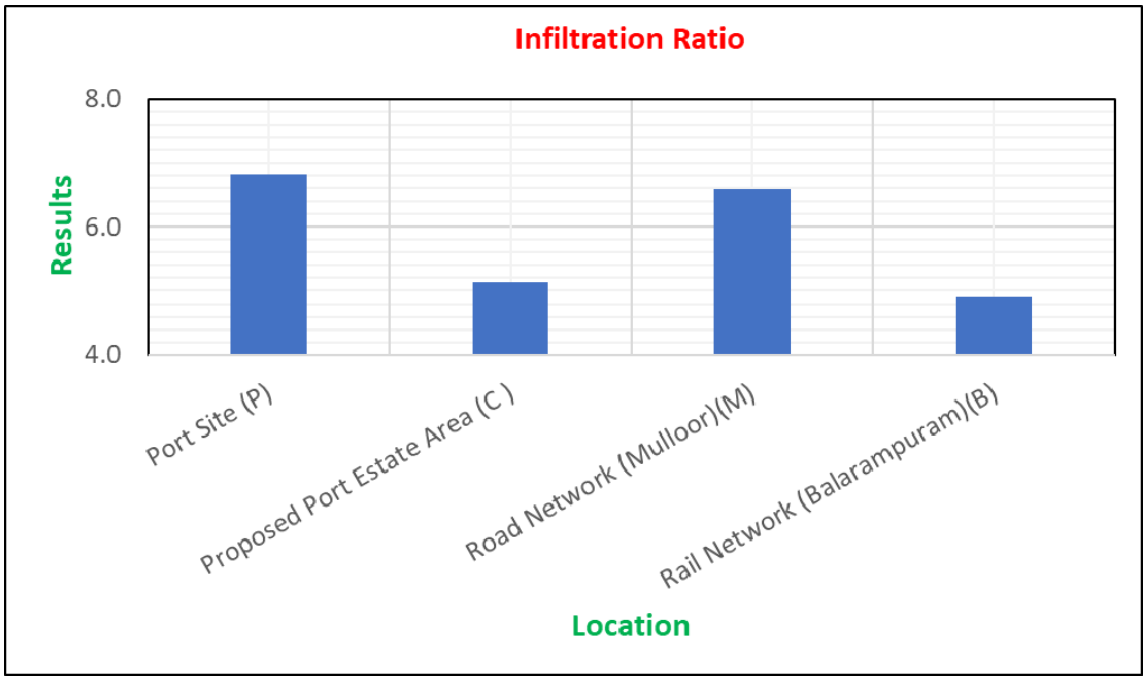
7. Soil Analysis

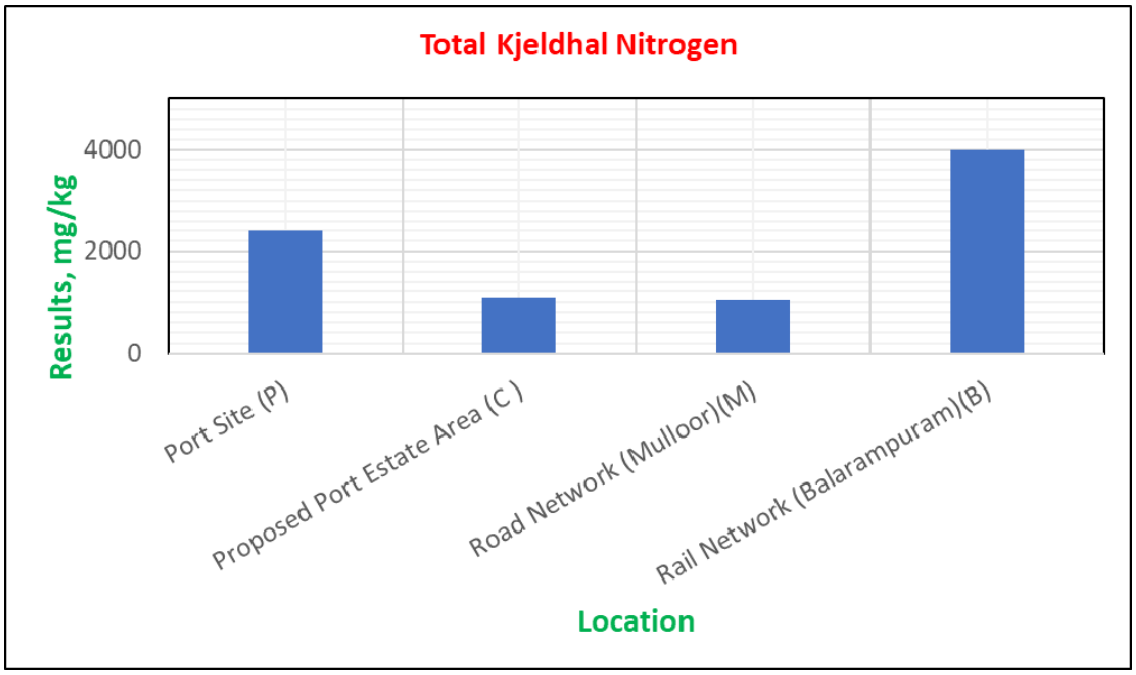


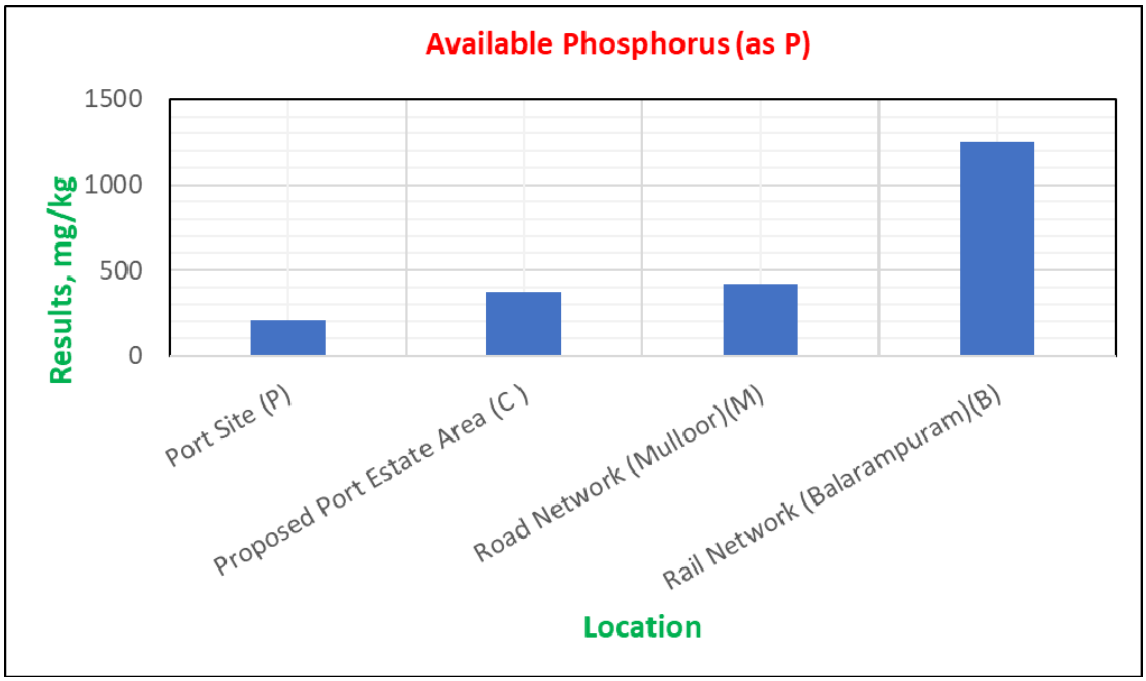


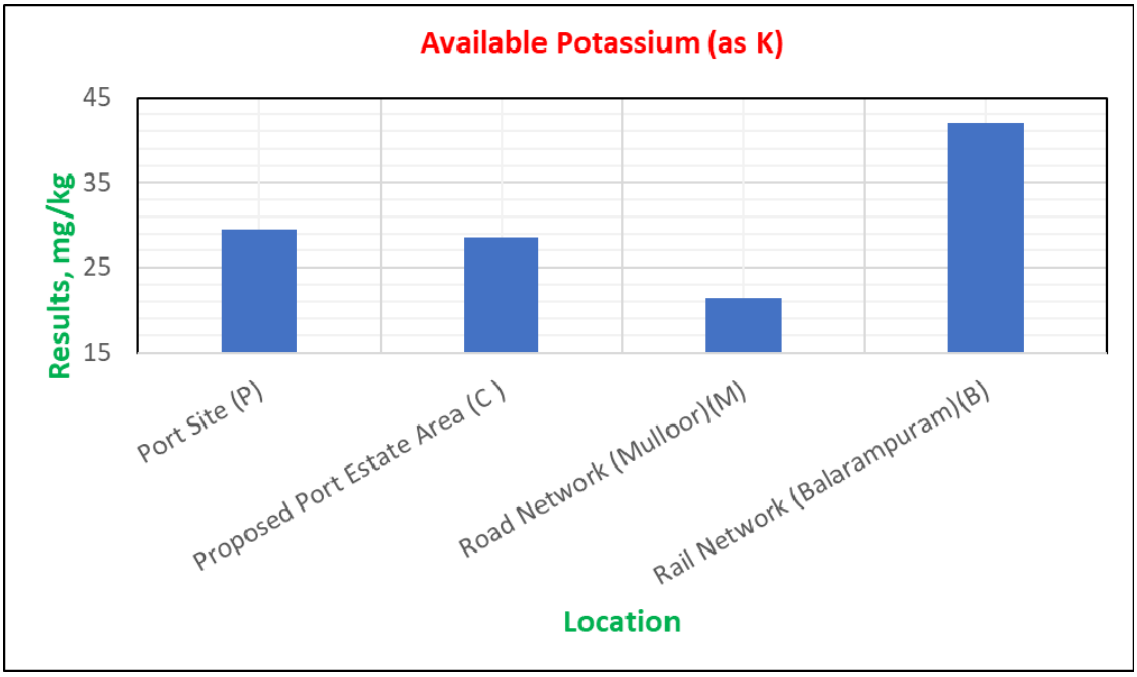

Electrical Conductivity
400
350
300
250
Results, µS/cm
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location

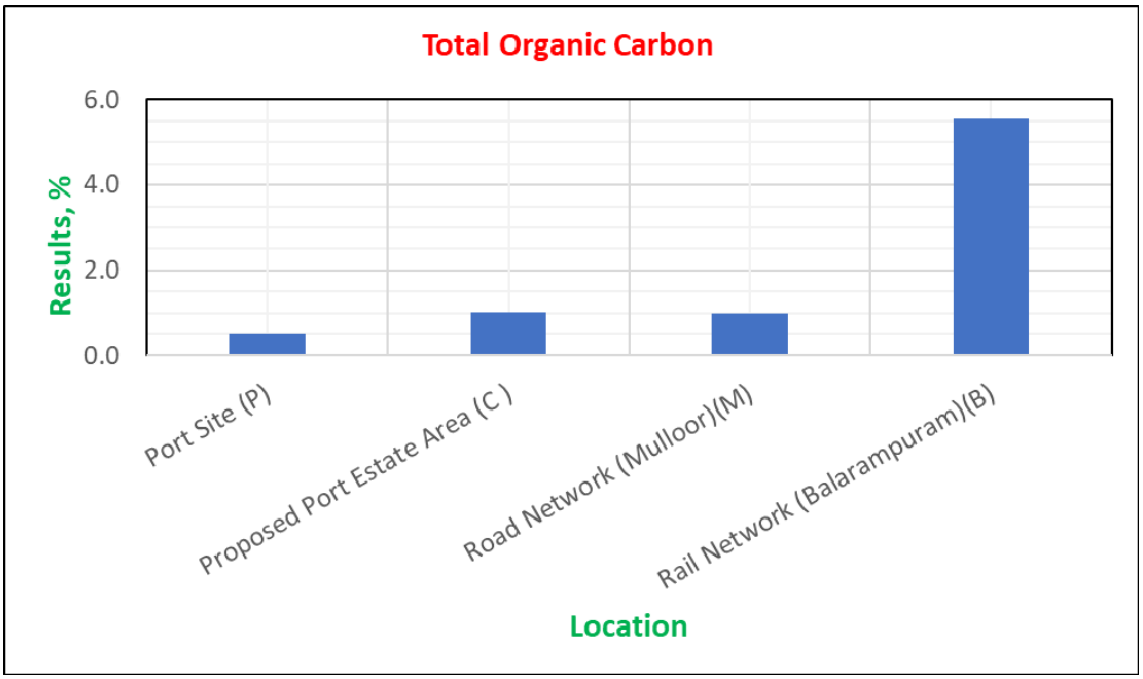

Porosity
50
30
10
Results, %
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location

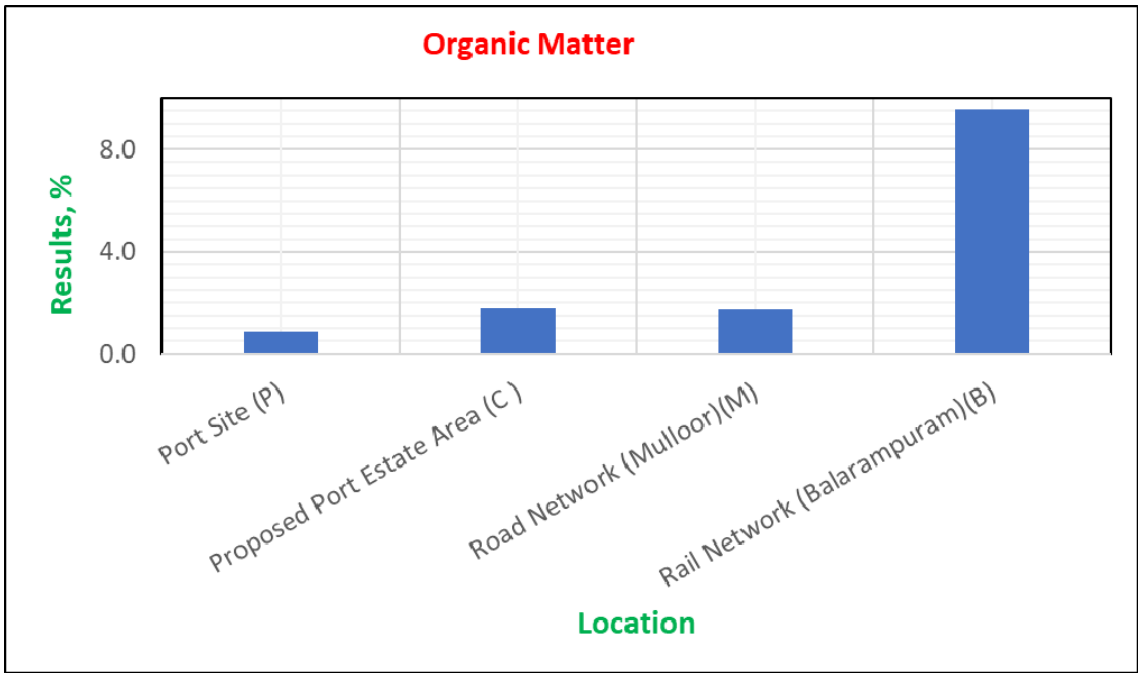

Infiltration Ratio
8.0
6.0
4.0
Results
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location

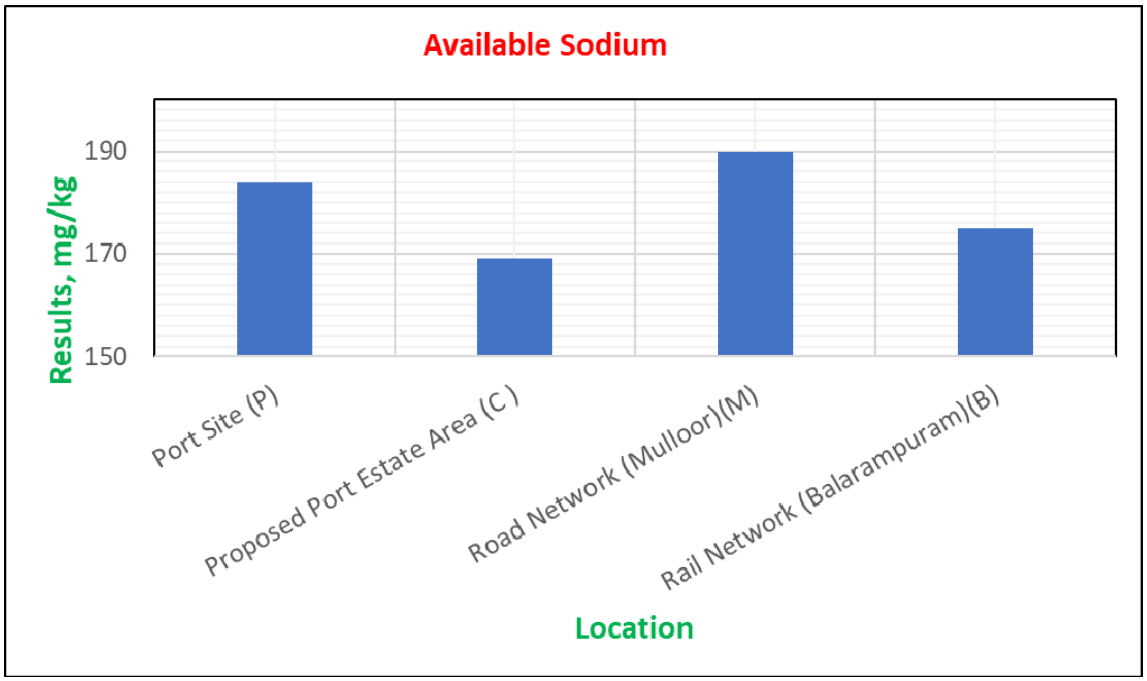

Total Kjeldhal Nitrogen
4000
2000
0
Results, mg/kg
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location

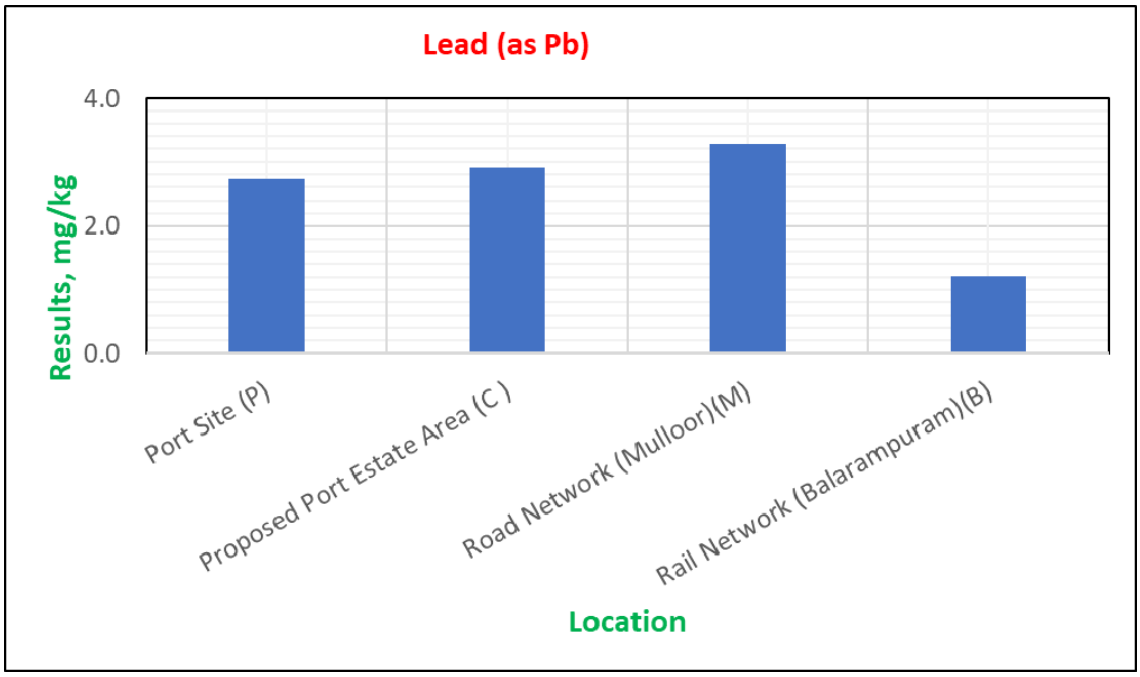

Available Phosphorus (as P)
Results, mg/kg
1500
1000
500
0
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location


Available Potassium (as K)
Results, mg/kg
45
35
25
15
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location


Total Organic Carbon
6.0
4.0
2.0
0.0
Results, %
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location


Organic Matter
8.0
4.0
0.0
Results, %
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location


Available Sodium
Results, mg/kg
190
170
150
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location


Lead (as Pb)
Results, mg/kg
4.0
2.0
0.0
Port Site (P)
Proposed Port Estate Area (C)
Road Network (Mulloor)(M)
Rail Network (Balarampuram)(B)
Location