



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার  
পানি সম্পদ মন্ত্রণালয়  
নদী গবেষণা ইনস্টিটিউট  
<http://www.rri.gov.bd>



স্মারক নম্বর: ৪২.০৩.০০০০.১১১.১৬.০০১.১৮.৩৬

২০ কার্তিক ১৪৩০ বঙ্গাব্দ  
তারিখ: ০৫ নভেম্বর ২০২৩ খ্রিস্টাব্দ

বিষয়: বিষয়ঃ পলল পরীক্ষা সংক্রান্ত রিপোর্ট- সেড-০৫ (২০২৩-২০২৪) ও এতদসংক্রান্ত বিল প্রসঙ্গে।

সূত্র: উপবিভাগীয় প্রকৌশলী, ফরিদপুর পানি বিজ্ঞান উপবিভাগের স্মারক নং-২এস-২/৩৯৬, তারিখঃ ১৮/০৯/২০২৩ খ্রি.

উপরোক্ত বিষয়ের আলোকে আপনাকে জানানো যাচ্ছে যে, আপনার পরিমাপ বিভাগের আওতাধীন ৩৯ গঙ্গা নদীর ৯১.৯ এল বারুরিয়া স্টেশনে, ৪২ গড়াই-মধুমতি নদীর ১০১বি কামারখালী স্টেশনে, ০৩ আড়িয়ালখাঁ নদীর ৪এ অফটেক স্টেশনে ও ৬১.৫ কিতীনাশা নদীর ৩৫০ রাজগঞ্জ স্টেশনে জুলাই ২০২৩ খ্রি. হতে আগস্ট ২০২৩ খ্রি. সময়ে সংগৃহীত সর্বমোট ২৬ (ছাব্বিশ) টি পলল নমুনা নদী গবেষণা ইনস্টিটিউটের পলল গবেষণাগারে গৃহীত হয় ও বিশ্লেষণ করা হয়। উক্ত পলল পরীক্ষা সংক্রান্ত রিপোর্ট- সেড-০৫ (২০২৩-২০২৪) ও এতদসংক্রান্ত ২১৪৫০/= (একুশ হাজার চারশত পঞ্চাশ) টাকা মাত্র এর একটি বিল প্রেরণ করা হলো।

এমতাবস্থায়, বিলটি একাউন্টপেয়ী ক্রস চেকের মাধ্যমে “মহাপরিচালক, নদী গবেষণা ইনস্টিটিউট, ফরিদপুর”-এর অনুকূলে পরিশোধ করার জন্য অনুরোধ করা হলো।

সংযুক্তিঃ – ১। রিপোর্ট নং- সেড-০৫ (২০২৩-২০২৪) – ১ কপি।

২। বিল নং- সেড- ০৫ (২০২৩-২০২৪) – ২ কপি।

০৫-১১-২০২৩

উমা সাহা

পরিচালক (অতিরিক্ত দায়িত্ব)

০২৪৭৮৮০২৪৫৬ (ফোন)

০২৪৭৮৮০৩০৬৫ (ফ্যাক্স)

নির্বাহী প্রকৌশলী, দক্ষিণ-পশ্চিমাঞ্চলীয় পরিমাপ বিভাগ ডু-পাবি-১, বাংলাদেশ পানি উন্নয়ন বোর্ড গোয়ালচামট, ফরিদপুর।।

স্মারক নম্বর: ৪২.০৩.০০০০.১১১.১৬.০০১.১৮.৩৬/১ (৬)

২০ কার্তিক ১৪৩০ বঙ্গাব্দ  
তারিখ: ০৫ নভেম্বর ২০২৩ খ্রিস্টাব্দ

সদয় জ্ঞাতার্থে/জ্ঞাতার্থে (জ্যেষ্ঠতার ক্রমানুসারে নয়):

- ১। মুখ্য বৈজ্ঞানিক কর্মকর্তা, পলল, রসায়ন ও পানি দূষণ বিভাগ, নগই, ফরিদপুর, রিপোর্ট- ১ কপি;
- ২। উপবিভাগীয় প্রকৌশলী, ফরিদপুর পানি বিজ্ঞান উপবিভাগ, বাপাউবো, ফরিদপুর;
- ৩। লাইব্রেরিয়ান, নগই, ফরিদপুর, রিপোর্ট- ১ কপি;
- ৪। মহাপরিচালকের একান্ত মহাপরিচালক, নগই, ফরিদপুর;
- ৫। হিসাব রক্ষণ কর্মকর্তা, নগই, ফরিদপুর, বিল- ১ কপি এবং
- ৬। অফিস/মাস্টার কপি।।



সকল সংযুক্তিসমূহ:

(১) Report SED-05 (2023-24)

*Fatehama*

০৬-১১-২০২৩

ড. প্রকৌ. ফাতেমা রোকশানা  
মুখ্য বৈজ্ঞানিক কর্মকর্তা



## **SOIL TESTING REPORT**

**PROJECT: River Bed's Soil Sample Test of Sandwip Channel and Feni River**

**LOCATION : Sandwip Channel and Feni River**

**GEOTECHNICAL RESEARCH DIRECTORATE  
SOIL MECHANICS AND GROUND WATER DIVISION  
REPORT NUMBER: SOIL – 05 (2023–24)  
FY: 2023–2024**

**RIVER RESEARCH INSTITUTE  
FARIDPUR-7800.**

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# REPORT

## 1. INTRODUCTION

This report presents the results of soil tests carried out on the sub-surface soil samples collected from the location of Sandwip Channel and Feni River in connection with *River Bed's Soil Sample Test of Sandwip Channel and Feni River*. In this respect a total of fifteen (15) disturbed soil samples were received in the laboratory on 02/01/2024 from Managing Director, ECOSURV, Dhaka-1205 vide his office Memo No. 2023/RRI/003\_2, date. 31/12/2023.

## 2. LABORATORY TESTS AND RESULTS

### 2.1 Laser Diffraction Particle Size Analysis

Laser Diffraction Particle Size Analysis of the fifteen (15) soil samples were done using Malvern Mastersizer 3000 instrument with HydroEv dispersion unit in the laboratory. This laser diffraction particle-size analyzer uses Mie theory and is able to effectively measure particles ranging from 0.01 - 3500 $\mu$ m in diameter. Two light sources, a red light with the wavelength of 633 nm and a LED blue light of 470 nm, are used in this instrument. Water was used as a dispersant and had a refractive index 1.33. The particle refractive index and the absorption index were set according to the laboratory trial depending on the visual inspection of the sample satisfying the weighted residual. Dry samples were added slowly to the dispersion unit until obtained the required obscuration range of the individual sample. During the measurement, 3000 rpm stirring speed and 4 minutes 100% ultrasound were used for sufficient dispersion of the soil sample. Five measurements have been performed and the results were averaged for the sample.

### 2.2 Atterberg Limits Test

ASTM D 4318 method had been followed for the determination of Atterberg limits (plastic limit and liquid limit) of the samples. The detailed of the experimental procedures is described in the sections below. Out of fifteen (15) samples, thirteen (13) samples were considered for Atterberg limit tests. The other two (02) samples had been excluded for the test because of their non-cohesive nature.

#### 2.2.1 The Plastic Limit (PL)

The plastic limit was determined by alternately pressing together and rolling into a 3.2-mm (1/8-in.) diameter thread a small portion of the soil until its water content was reduced to a point at which the thread crumbles and can no longer be pressed together and re-rolled. The water content of the soil at this point was the plastic limit of the samples. The determined values of plastic limits have been shown on the Table 1.

### 2.2.2 The Liquid Limit (LL)

The Liquid Limit (LL) is the water content at which the soil changes from the liquid state to a plastic state. The Liquid limit test had been carried out on the soil samples according to multipoint liquid limit method (ASTM D4318). To perform the liquid limit test, soil samples were dried in a temperature controlled oven at 30°C until the soil clods pulverized readily. The samples were then crushed using mortar-pestle and passed through a 425- $\mu\text{m}$  (No. 40) sieve. The soils were mixed with water to form a paste. The paste is then placed in a cup and a groove was made in the center of the paste using a grooving tool of 2 mm width. The cup was lifted and dropped from a height of 10 mm at a rate of 1.9 to 2.1 drops per second until the two halves of the soil pat come in contact at the bottom of the groove along a distance of 12.7 mm (1/2 in.). The number of blows, N were recorded. Water content of the soil specimen were determined. The relationship between the water content and the corresponding number of blows, on a semi-logarithmic graph with the water content as ordinates on the arithmetical scale and the number of drops as abscissas on a logarithmic scale. A best fit straight line was drawn through the three or more plotted points. The water content corresponding to the intersection of the line with the 25-drop abscissa was taken as the liquid limit of the soil. The determined values of liquid limits have been shown on the Table 1.

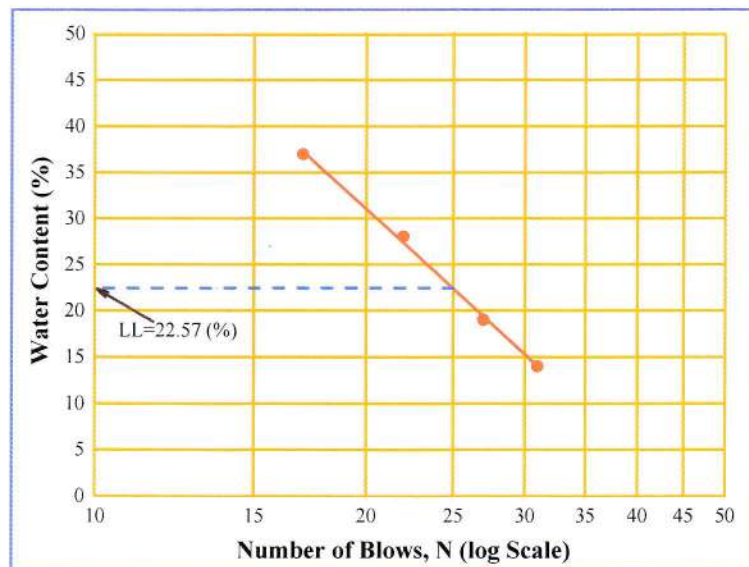


Fig. 1. Determination of liquid limit of soil specimen.

### 2.3 Computation of Plasticity Index (PI)

Computation of Plasticity Index (PI) had been accomplished by using the following equation-

$$PI = PL - LL$$

The computed values of plasticity indices have been shown on the Table 1.

### 3. Test Results

**Table 1.** Values of Atterberg Limits and Plasticity Index of the examined soil samples

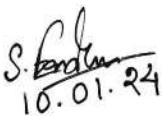
| Sample ID | Depth (m) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) |
|-----------|-----------|------------------|-------------------|----------------------|
| P01       | 3.0-3.5   | 37               | 27                | 10                   |
| P02       | 2.0-2.5   | 35               | 25                | 10                   |
| P03       | 1.5-2.0   | 28               | 22                | 6                    |
| P04       | 1.5-2.0   | 34               | 26                | 8                    |
| P05       | 1.5-2.0   | 45               | 24                | 21                   |
| P06       | 1.5-2.0   | 36               | 26                | 10                   |
| P07       | 1.5-2.0   | -                | -                 | -                    |
| P08       | 1.5-2.0   | -                | -                 | -                    |
| P09       | 1.5-2.0   | 44               | 24                | 20                   |
| P10       | 1.5-2.0   | 34               | 26                | 8                    |
| P11       | 1.5-2.0   | 50               | 25                | 25                   |
| P12       | 1.5-2.0   | 49               | 24                | 25                   |
| P13       | 1.5-2.0   | 27               | 23                | 4                    |
| P14       | 1.5-2.0   | 47               | 23                | 24                   |
| P15       | 1.5-2.0   | 42               | 23                | 19                   |

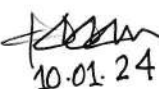
### 5. APPENDIX

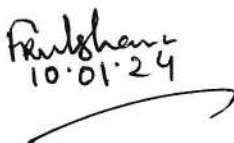
**A:** Soil Testing Bill of this report no. SOIL – 05 (2023-24).

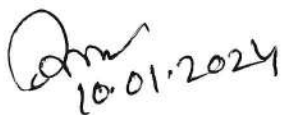
**B:** This is a list of personnel associated with testing works, preparation and publication of the report.

**C:** Requisition letter for the work.

Compiled by:   
10.01.24

Checked by:   
10.01.24

Recommended by:   
10.01.24

  
10.01.2024  
**(Uma Saha)**  
Director (In Charge)  
Geotechnical Research Directorate  
River Research Institute  
Faridpur

Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-01'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 3:17:31 PM  
**Measurement Date Time** 08-Jan-24 3:17:31 PM  
**Result Source** Averaged

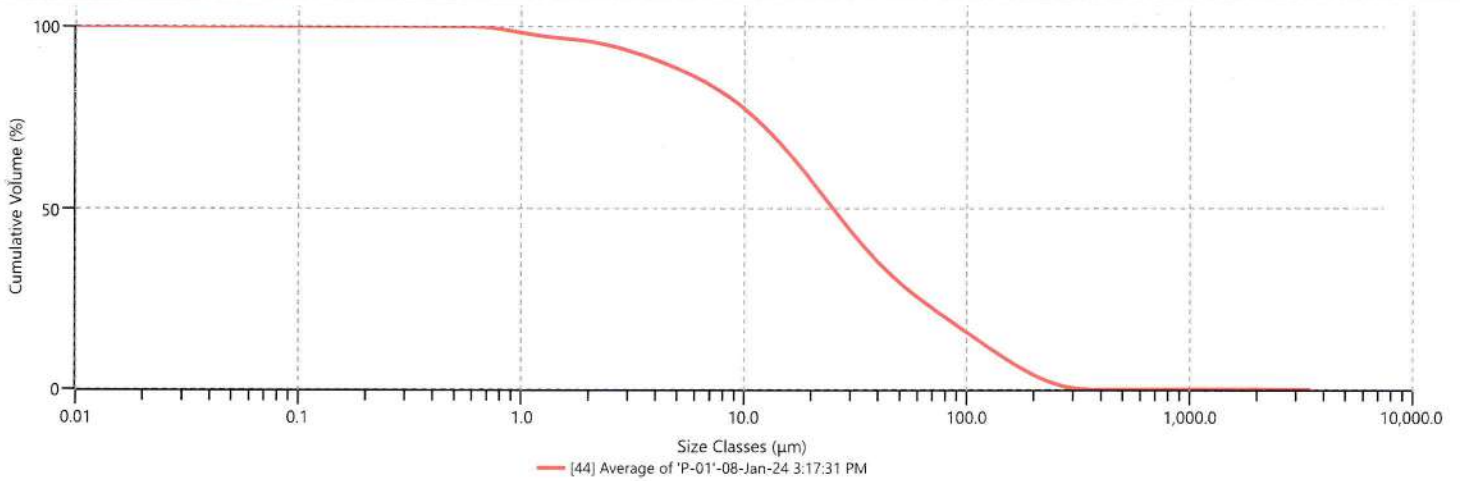
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.75 %  
**Laser Obscuration** 8.95 %

Result (D-Values)

**Dv (10)** 4.35  $\mu\text{m}$   
**Dv (50)** 25.1  $\mu\text{m}$   
**Dv (60)** 34.1  $\mu\text{m}$   
**Dv (90)** 138  $\mu\text{m}$

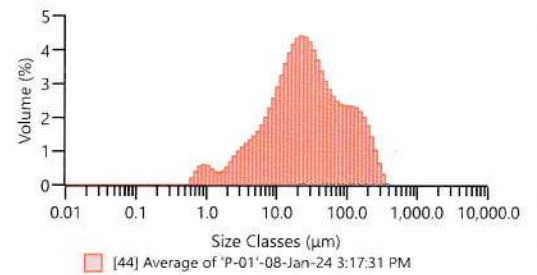
Average - Oversize



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 4.13  |
| Silt (2 - 74 $\mu\text{m}$ )           | 74.42 |
| Fine sand (74-420 $\mu\text{m}$ )      | 21.46 |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0     |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



(Scientific Officer)



(Senior Scientific Officer)



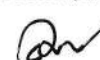
(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



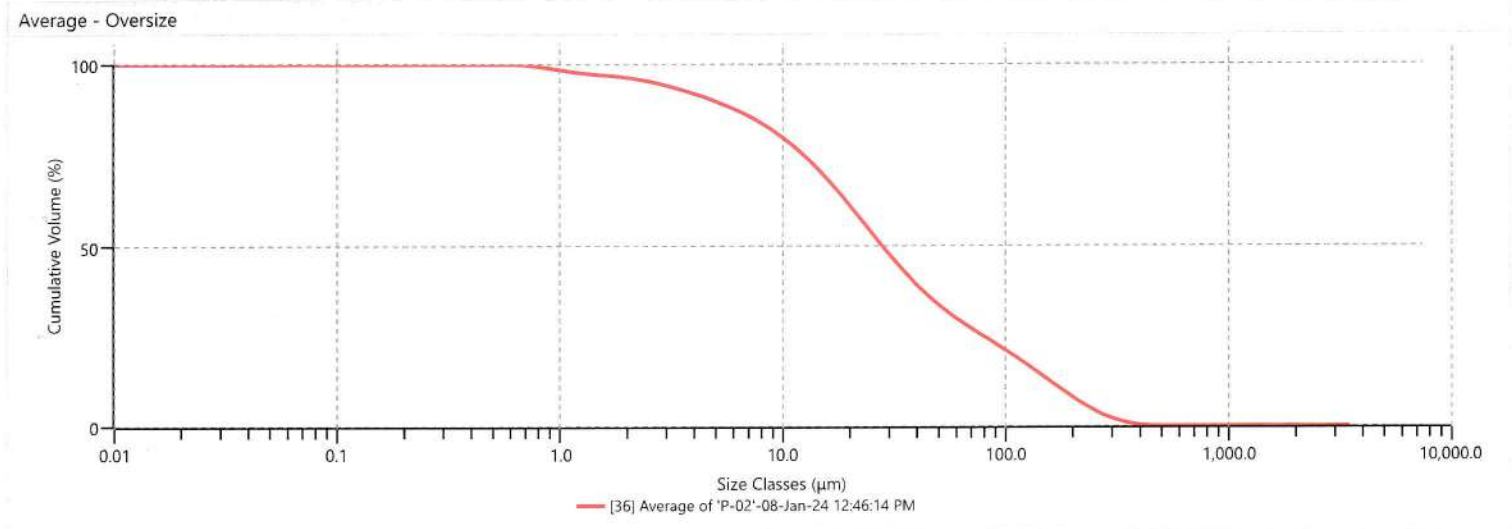


| Measurement Details  |                   |
|----------------------|-------------------|
| <b>Operator Name</b> | Nayan             |
| <b>Sample Name</b>   | Average of 'P-02' |
| <b>SOP File Name</b> | HydroEV.cfg       |

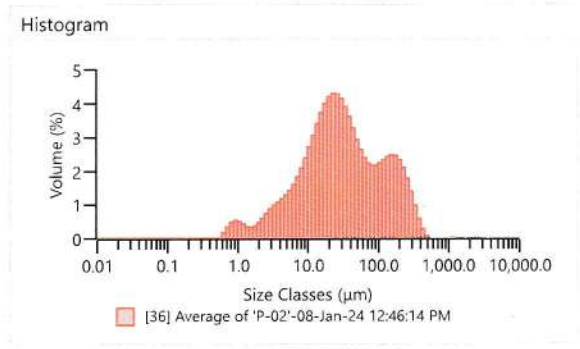
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|------------------------------|-----------------------|
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| <b>Measurement Date Time</b> | 08-Jan-24 12:46:14 PM |
| <b>Result Source</b>         | Averaged              |

| Analysis                           |                 |
|------------------------------------|-----------------|
| <b>Particle Name</b>               | Soil            |
| <b>Analysis Model</b>              | General Purpose |
| <b>Dispersant Name</b>             | Water           |
| <b>Dispersant Refractive Index</b> | 1.330           |
| <b>Weighted Residual</b>           | 0.64 %          |
| <b>Laser Obscuration</b>           | 10.07 %         |

| Result (D-Values) |                    |
|-------------------|--------------------|
| <b>Dv (10)</b>    | 4.94 $\mu\text{m}$ |
| <b>Dv (50)</b>    | 27.9 $\mu\text{m}$ |
| <b>Dv (60)</b>    | 38.8 $\mu\text{m}$ |
| <b>Dv (90)</b>    | 181 $\mu\text{m}$  |



| Unified Soil Classification System     |       |
|--|-------|
| Particle Type                          | in %  |
| Clay (<2 $\mu\text{m}$ )               | 3.62  |
| Silt (2 - 74 $\mu\text{m}$ )           | 70.27 |
| Fine sand (74-420 $\mu\text{m}$ )      | 25.89 |
| Medium sand (420-2000 $\mu\text{m}$ )  | .22   |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |



(Scientific Officer)      (Senior Scientific Officer)      (Principal Scientific Officer)      (Chief Scientific Officer)      (Director (A.C.))

*S. Kachin*      *Almy*      *Tom*      *Car*      *Car*

### Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-03'  
**SOP File Name** HydroEV.cfg

### Measurement Details

**Analysis Date Time** 08-Jan-24 11:51:16 AM  
**Measurement Date Time** 08-Jan-24 11:51:16 AM  
**Result Source** Averaged

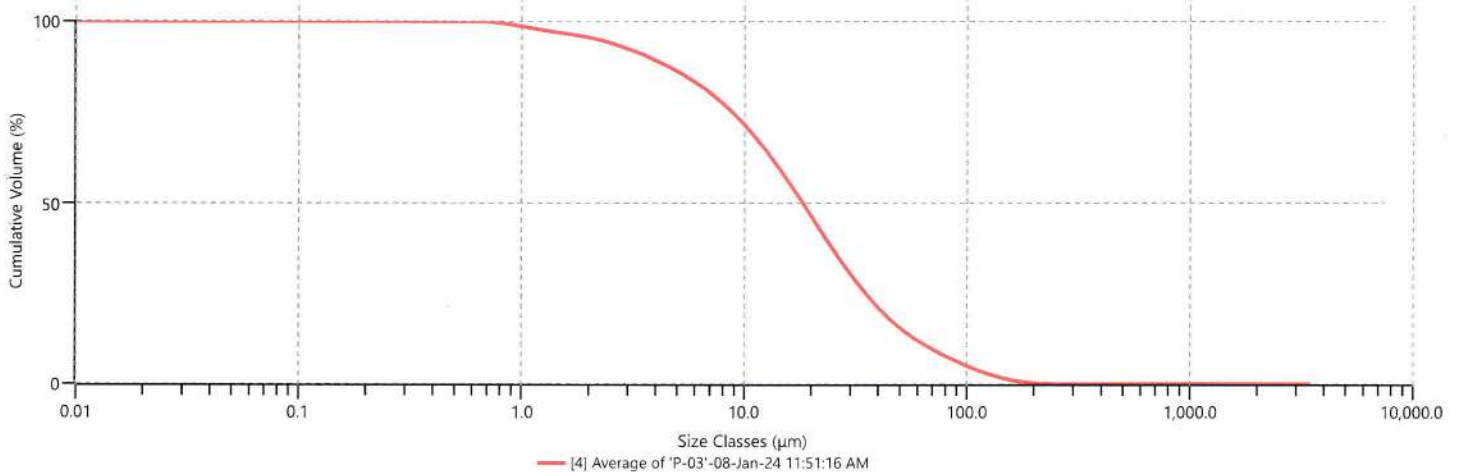
### Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 1.20 %  
**Laser Obscuration** 10.73 %

### Result (D-Values)

**Dv (10)** 3.78  $\mu\text{m}$   
**Dv (50)** 18.3  $\mu\text{m}$   
**Dv (60)** 23.4  $\mu\text{m}$   
**Dv (90)** 68.1  $\mu\text{m}$

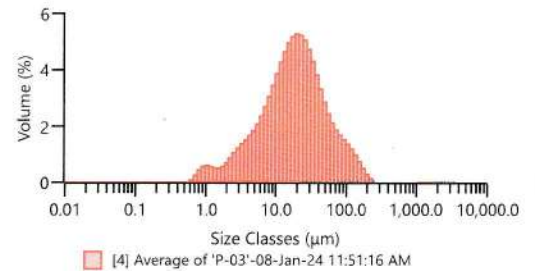
### Average - Oversize



### Unified Soil Classification System

| Particle Type                          | in % |
|--|------|
| Clay (<2 $\mu\text{m}$ )               | 4.41 |
| Silt (2 - 74 $\mu\text{m}$ )           | 86.8 |
| Fine sand (74-420 $\mu\text{m}$ )      | 8.79 |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0    |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0    |

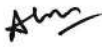
### Histogram



(Scientific Officer)



(Senior Scientific Officer)



(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-04'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:52:39 PM  
**Measurement Date Time** 08-Jan-24 12:52:39 PM  
**Result Source** Averaged

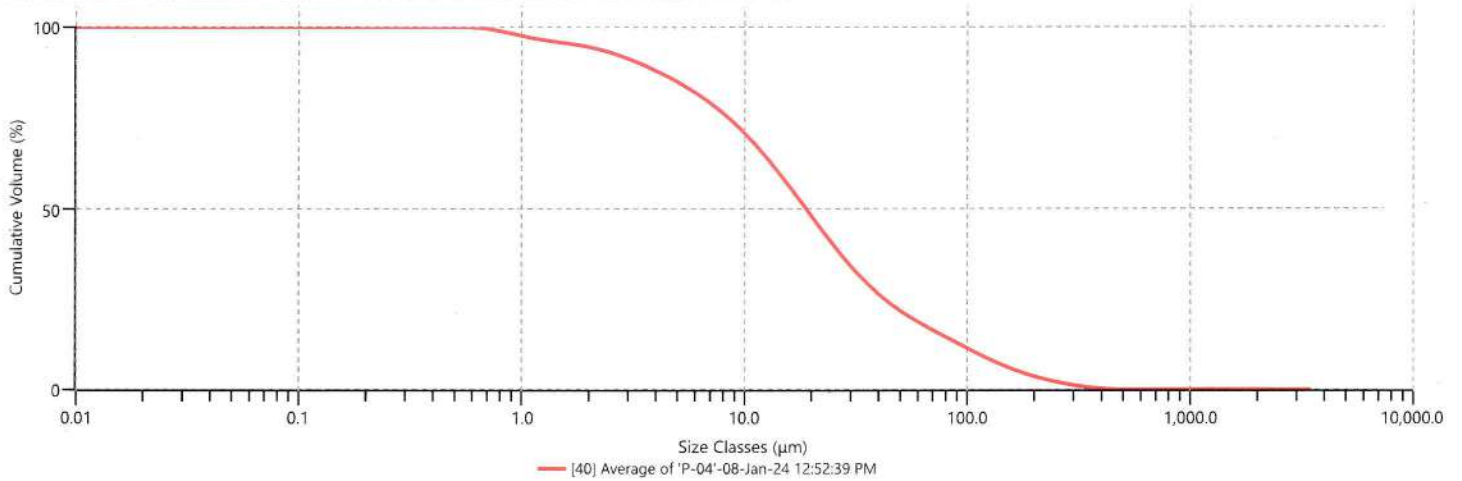
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.78 %  
**Laser Obscuration** 10.65 %

Result (D-Values)

**Dv (10)** 3.41  $\mu\text{m}$   
**Dv (50)** 18.9  $\mu\text{m}$   
**Dv (60)** 25.0  $\mu\text{m}$   
**Dv (90)** 111  $\mu\text{m}$

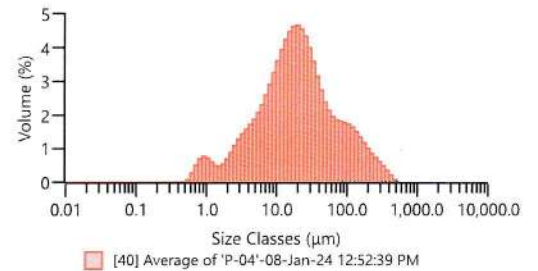
Average - Oversize



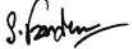
Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 5.42  |
| Silt (2 - 74 $\mu\text{m}$ )           | 78.95 |
| Fine sand (74-420 $\mu\text{m}$ )      | 15.45 |
| Medium sand (420-2000 $\mu\text{m}$ )  | .19   |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



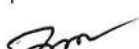
(Scientific Officer)



(Senior Scientific Officer)



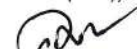
(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-05'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:20:54 PM  
**Measurement Date Time** 08-Jan-24 12:20:54 PM  
**Result Source** Averaged

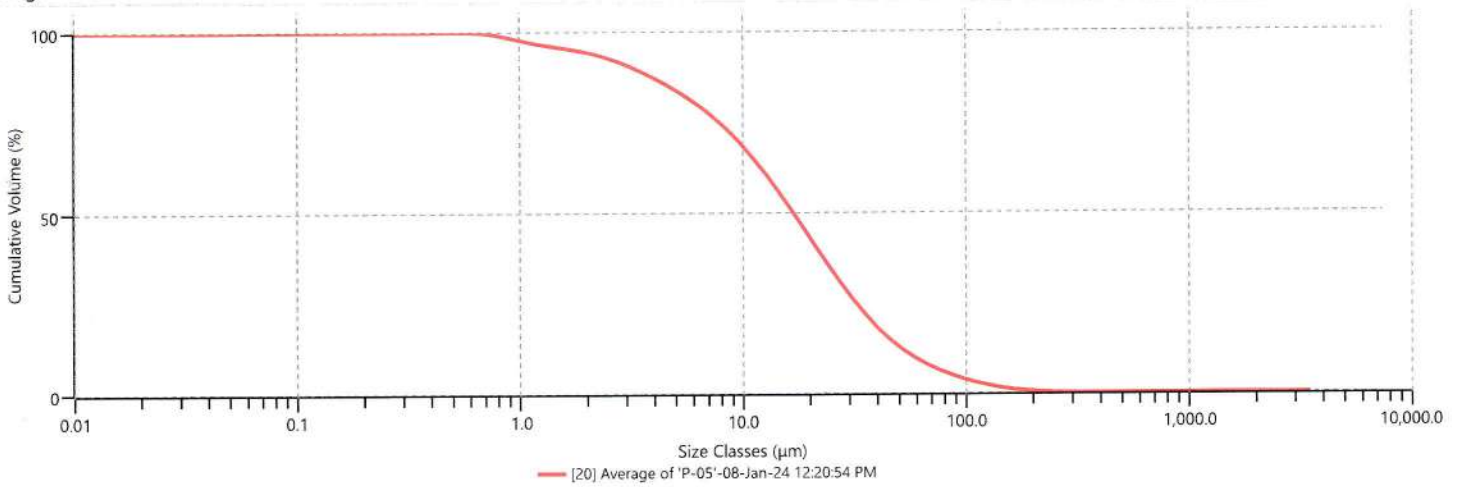
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.82 %  
**Laser Obscuration** 10.34 %

Result (D-Values)

**Dv (10)** 3.26  $\mu\text{m}$   
**Dv (50)** 16.9  $\mu\text{m}$   
**Dv (60)** 21.6  $\mu\text{m}$   
**Dv (90)** 58.4  $\mu\text{m}$

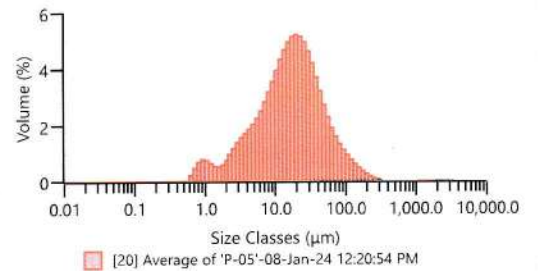
Average - Oversize



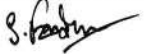
Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 5.59  |
| Silt (2 - 74 $\mu\text{m}$ )           | 87.74 |
| Fine sand (74-420 $\mu\text{m}$ )      | 6.66  |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0     |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



(Scientific Officer)



(Senior Scientific Officer)



(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-06'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 3:23:27 PM  
**Measurement Date Time** 08-Jan-24 3:23:27 PM  
**Result Source** Averaged

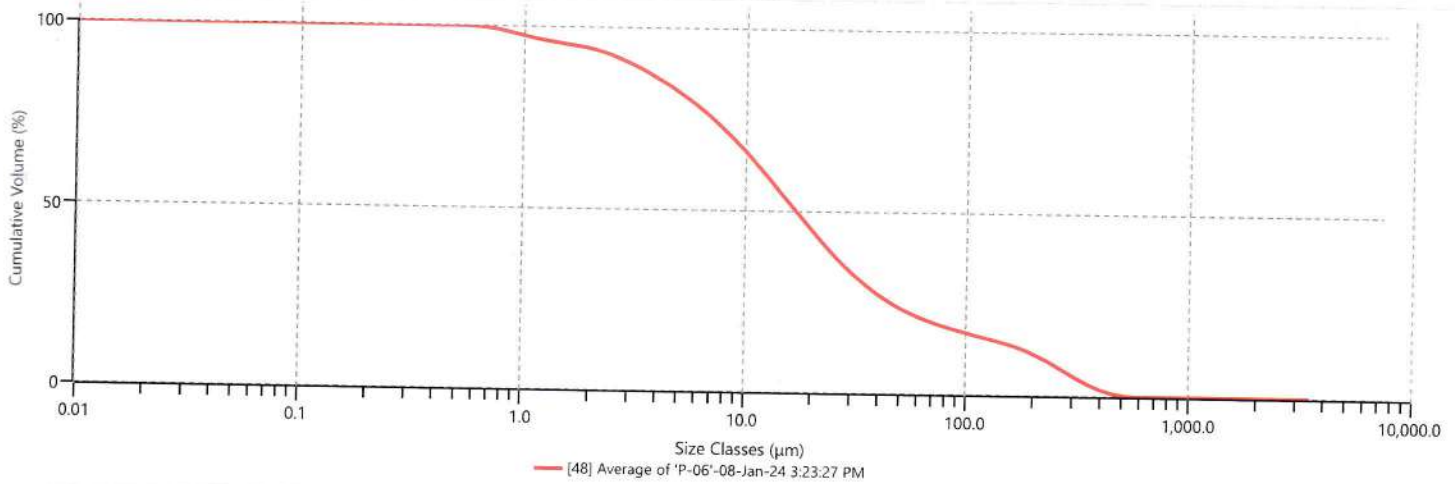
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.87 %  
**Laser Obscuration** 10.21 %

Result (D-Values)

**Dv (10)** 3.07  $\mu\text{m}$   
**Dv (50)** 17.0  $\mu\text{m}$   
**Dv (60)** 23.5  $\mu\text{m}$   
**Dv (90)** 225  $\mu\text{m}$

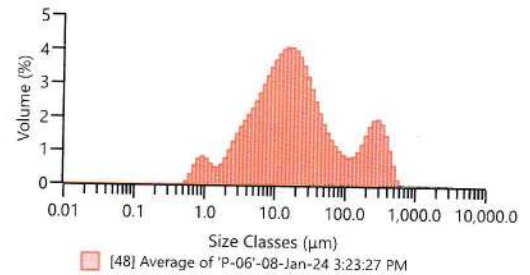
Average - Oversize



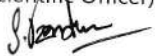
Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 5.95  |
| Silt (2 - 74 $\mu\text{m}$ )           | 74.71 |
| Fine sand (74-420 $\mu\text{m}$ )      | 17.89 |
| Medium sand (420-2000 $\mu\text{m}$ )  | 1.45  |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



(Scientific Officer)



(Senior Scientific Officer)



(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))

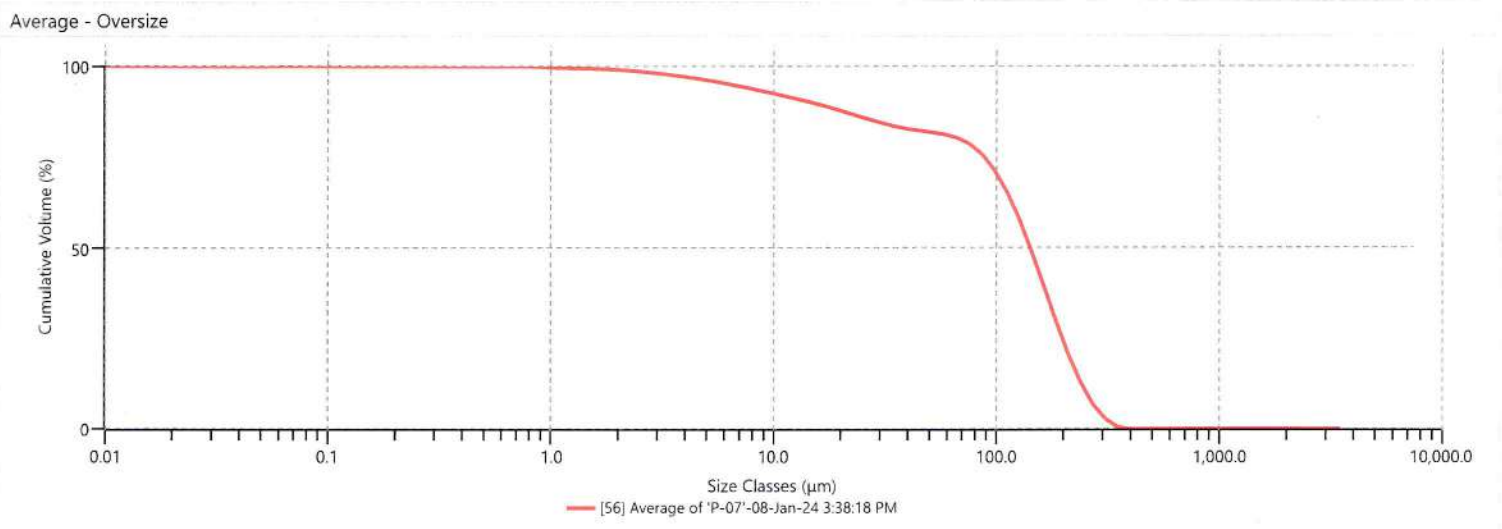


**Measurement Details**  
**Operator Name** Nayan  
**Sample Name** Average of 'P-07'  
**SOP File Name** HydroEV.cfg

**Measurement Details**  
**Analysis Date Time** 08-Jan-24 3:38:18 PM  
**Measurement Date Time** 08-Jan-24 3:38:18 PM  
**Result Source** Averaged

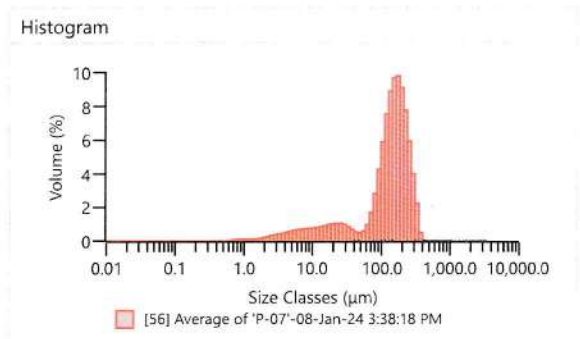
**Analysis**  
**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.38 %  
**Laser Obscuration** 10.27 %

**Result (D-Values)**  
**Dv (10)** 15.0  $\mu\text{m}$   
**Dv (50)** 142  $\mu\text{m}$   
**Dv (60)** 162  $\mu\text{m}$   
**Dv (90)** 254  $\mu\text{m}$



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | .92   |
| Silt (2 - 74 $\mu\text{m}$ )           | 20.15 |
| Fine sand (74-420 $\mu\text{m}$ )      | 78.93 |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0     |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |



(Scientific Officer) *[Signature]* (Senior Scientific Officer) *[Signature]* (Principal Scientific Officer) *[Signature]* (Chief Scientific Officer) *[Signature]* (Director (A.C.)) *[Signature]*

Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-08'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 3:46:53 PM  
**Measurement Date Time** 08-Jan-24 3:46:53 PM  
**Result Source** Averaged

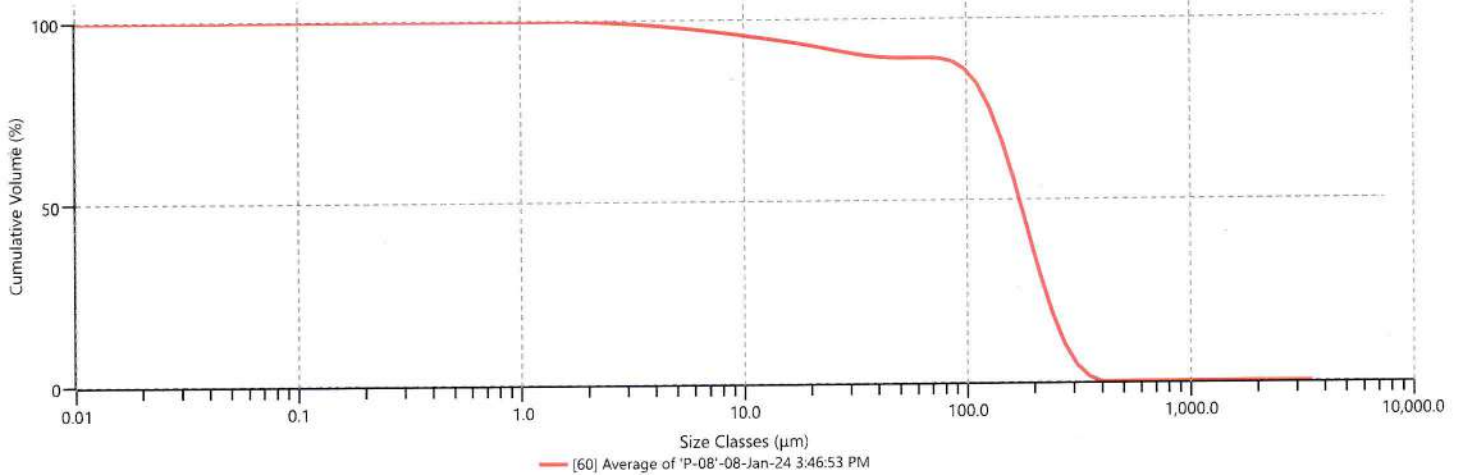
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.39 %  
**Laser Obscuration** 9.68 %

Result (D-Values)

**Dv (10)** 34.7  $\mu\text{m}$   
**Dv (50)** 172  $\mu\text{m}$   
**Dv (60)** 191  $\mu\text{m}$   
**Dv (90)** 277  $\mu\text{m}$

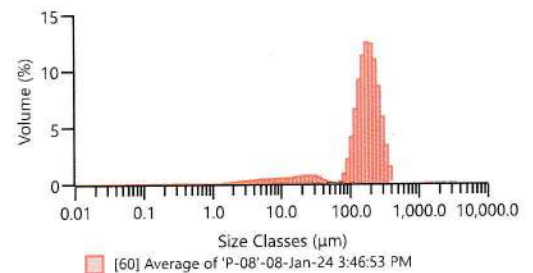
Average - Oversize



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | .21   |
| Silt (2 - 74 $\mu\text{m}$ )           | 10.77 |
| Fine sand (74-420 $\mu\text{m}$ )      | 89.02 |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0     |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



(Scientific Officer)



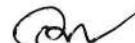
(Senior Scientific Officer)



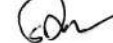
(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-09'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:08:17 PM  
**Measurement Date Time** 08-Jan-24 12:08:17 PM  
**Result Source** Averaged

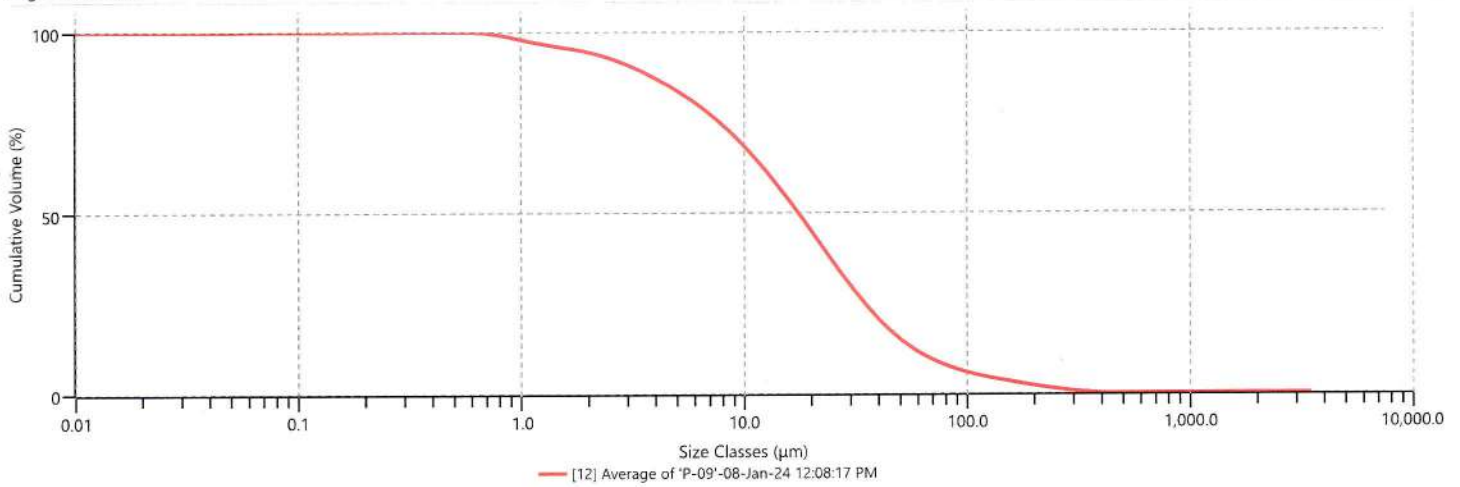
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.77 %  
**Laser Obscuration** 18.25 %

Result (D-Values)

**Dv (10)** 3.26  $\mu\text{m}$   
**Dv (50)** 17.5  $\mu\text{m}$   
**Dv (60)** 22.8  $\mu\text{m}$   
**Dv (90)** 66.6  $\mu\text{m}$

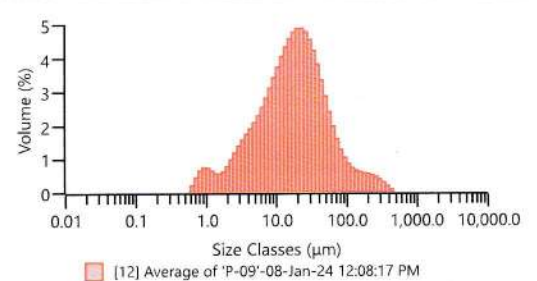
Average - Oversize



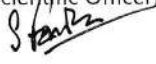
Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 5.55  |
| Silt (2 - 74 $\mu\text{m}$ )           | 85.79 |
| Fine sand (74-420 $\mu\text{m}$ )      | 8.61  |
| Medium sand (420-2000 $\mu\text{m}$ )  | .05   |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



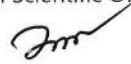
(Scientific Officer)



(Senior Scientific Officer)



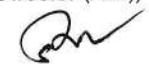
(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))





Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-10'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:39:03 PM  
**Measurement Date Time** 08-Jan-24 12:39:03 PM  
**Result Source** Averaged

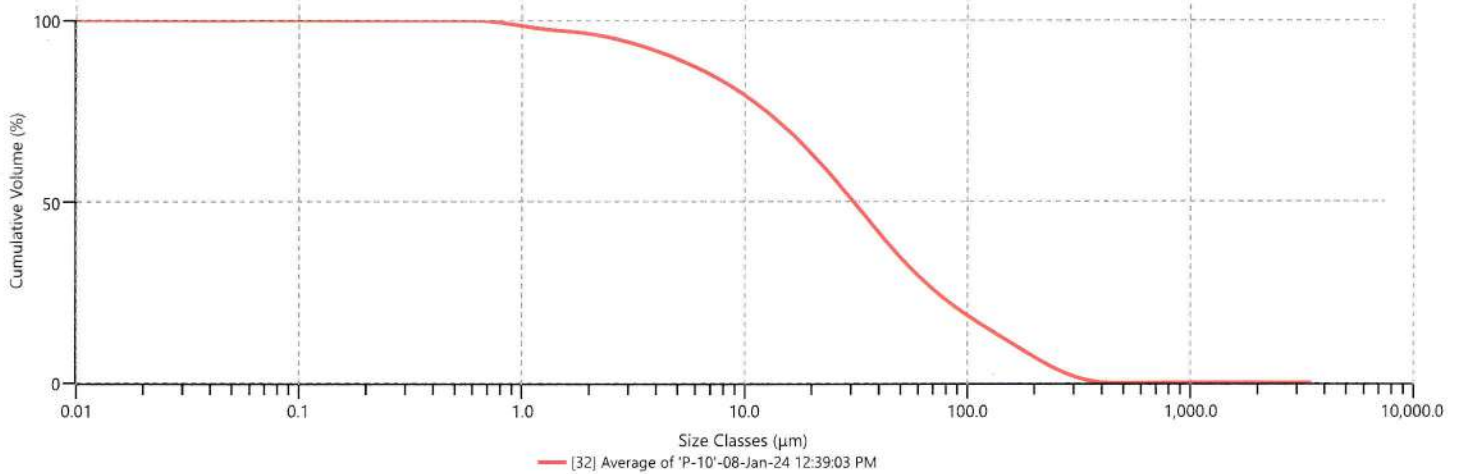
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.63 %  
**Laser Obscuration** 9.41 %

Result (D-Values)

**Dv (10)** 4.72  $\mu\text{m}$   
**Dv (50)** 30.8  $\mu\text{m}$   
**Dv (60)** 41.9  $\mu\text{m}$   
**Dv (90)** 167  $\mu\text{m}$

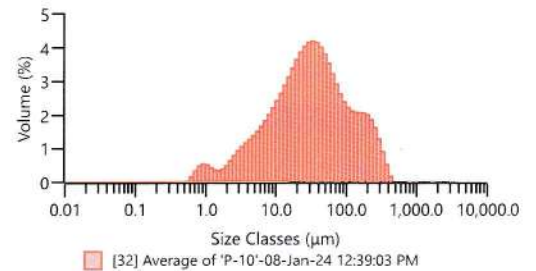
Average - Oversize



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 3.68  |
| Silt (2 - 74 $\mu\text{m}$ )           | 71.83 |
| Fine sand (74-420 $\mu\text{m}$ )      | 24.4  |
| Medium sand (420-2000 $\mu\text{m}$ )  | .1    |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram




(Scientific Officer)



(Senior Scientific Officer)



(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-11'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:33:01 PM  
**Measurement Date Time** 08-Jan-24 12:33:01 PM  
**Result Source** Averaged

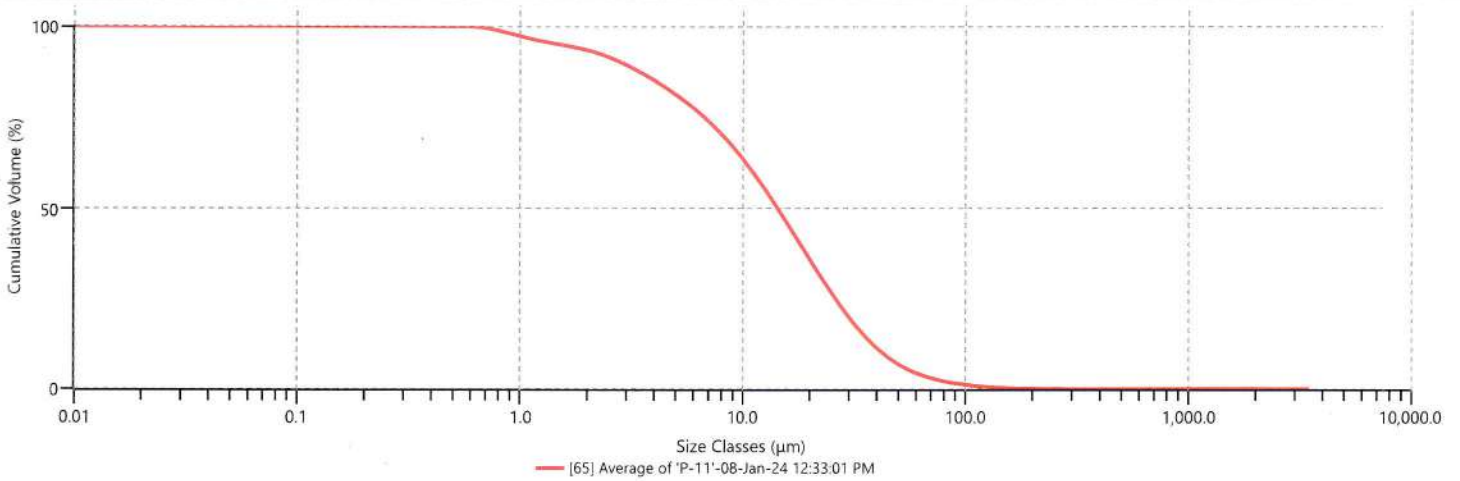
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.91 %  
**Laser Obscuration** 9.71 %

Result (D-Values)

**Dv (10)** 2.87  $\mu\text{m}$   
**Dv (50)** 14.4  $\mu\text{m}$   
**Dv (60)** 18.2  $\mu\text{m}$   
**Dv (90)** 42.6  $\mu\text{m}$

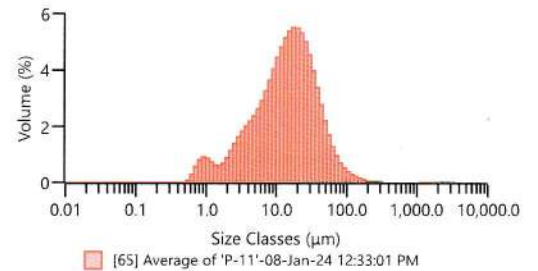
Average - Oversize



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 6.52  |
| Silt (2 - 74 $\mu\text{m}$ )           | 90.82 |
| Fine sand (74-420 $\mu\text{m}$ )      | 2.65  |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0     |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



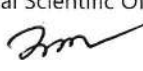
(Scientific Officer)



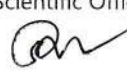
(Senior Scientific Officer)



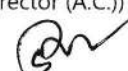
(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-12'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:26:05 PM  
**Measurement Date Time** 08-Jan-24 12:26:05 PM  
**Result Source** Averaged

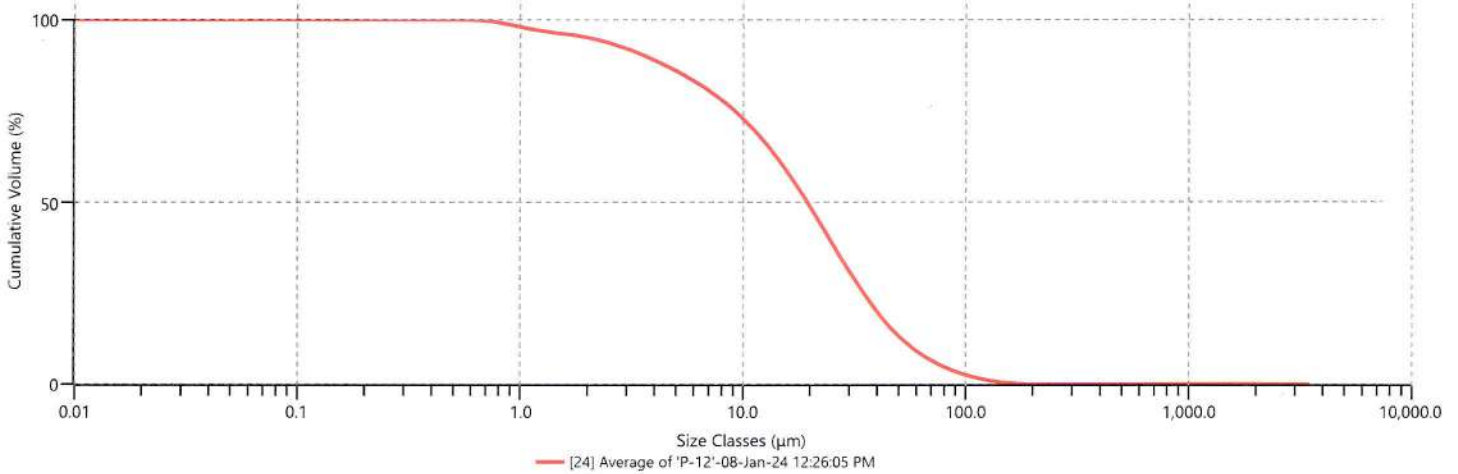
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.77 %  
**Laser Obscuration** 9.76 %

Result (D-Values)

**Dv (10)** 3.66  $\mu\text{m}$   
**Dv (50)** 19.4  $\mu\text{m}$   
**Dv (60)** 24.4  $\mu\text{m}$   
**Dv (90)** 57.8  $\mu\text{m}$

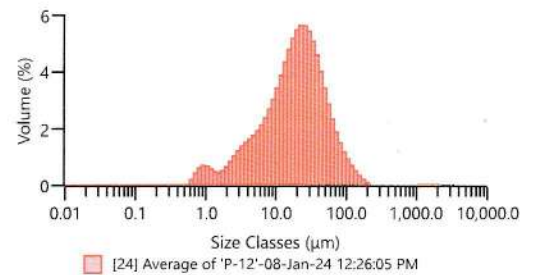
Average - Oversize



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 4.88  |
| Silt (2 - 74 $\mu\text{m}$ )           | 89.34 |
| Fine sand (74-420 $\mu\text{m}$ )      | 5.78  |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0     |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

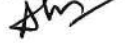
Histogram



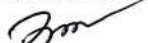
(Scientific Officer)



(Senior Scientific Officer)



(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-13'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 3:30:12 PM  
**Measurement Date Time** 08-Jan-24 3:30:12 PM  
**Result Source** Averaged

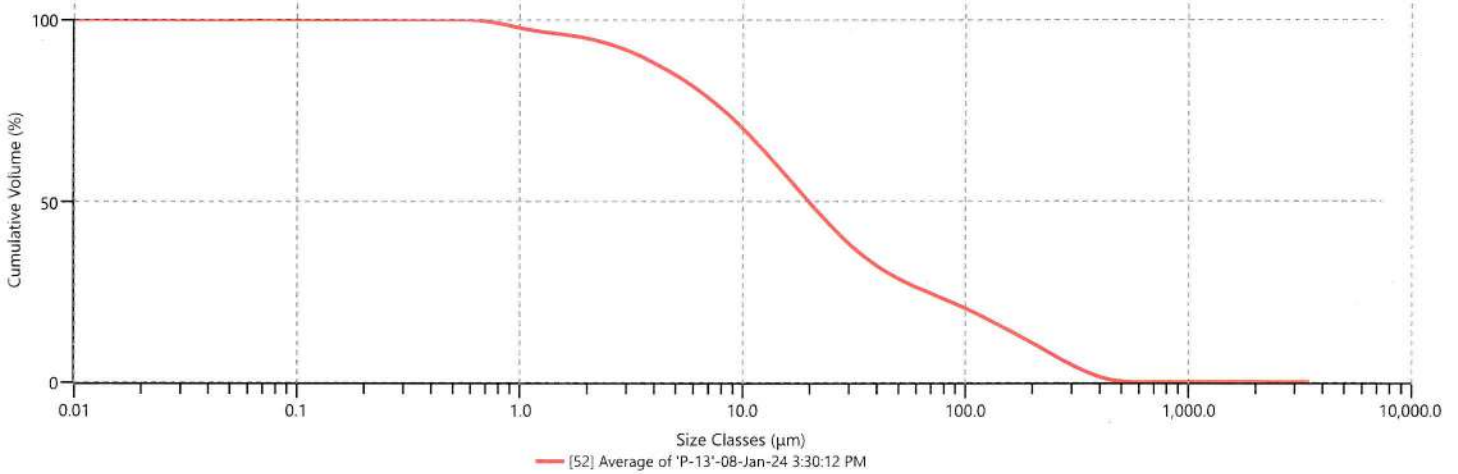
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.81 %  
**Laser Obscuration** 9.36 %

Result (D-Values)

**Dv (10)** 3.46  $\mu\text{m}$   
**Dv (50)** 19.7  $\mu\text{m}$   
**Dv (60)** 28.0  $\mu\text{m}$   
**Dv (90)** 211  $\mu\text{m}$

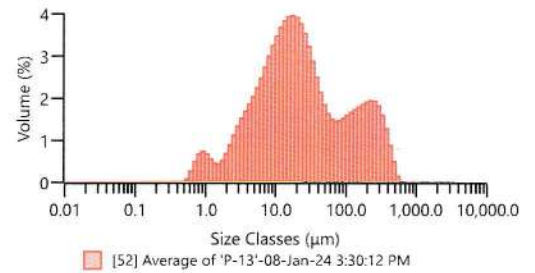
Average - Oversize



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 5.14  |
| Silt (2 - 74 $\mu\text{m}$ )           | 71.09 |
| Fine sand (74-420 $\mu\text{m}$ )      | 22.63 |
| Medium sand (420-2000 $\mu\text{m}$ )  | 1.14  |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

Histogram



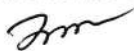
(Scientific Officer)



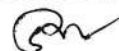
(Senior Scientific Officer)




(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-14'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:00:02 PM  
**Measurement Date Time** 08-Jan-24 12:00:02 PM  
**Result Source** Averaged

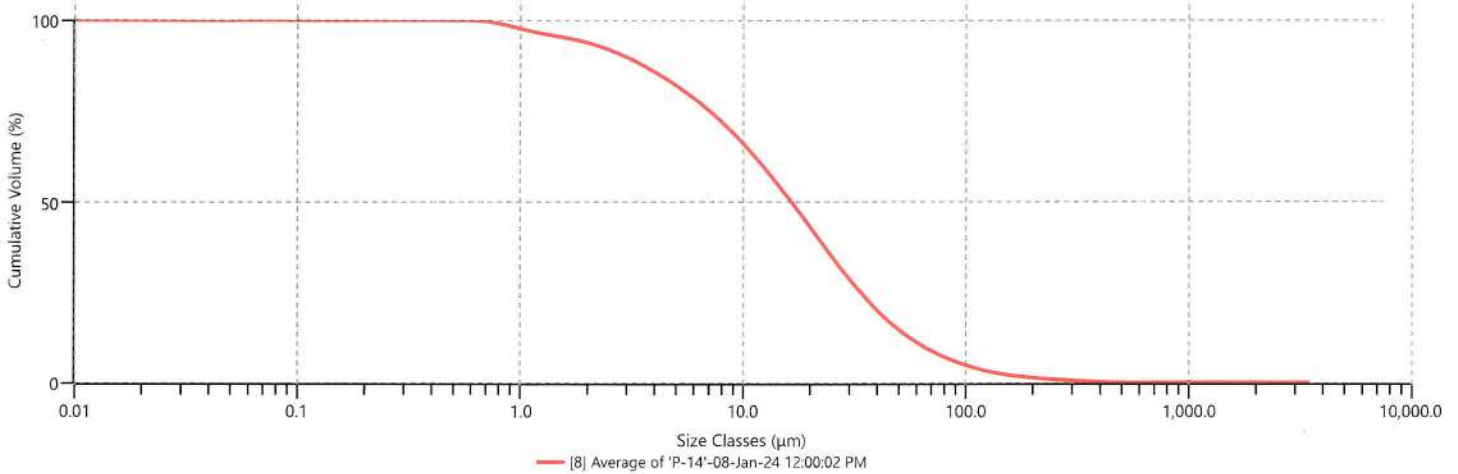
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.88 %  
**Laser Obscuration** 12.43 %

Result (D-Values)

**Dv (10)** 2.99  $\mu\text{m}$   
**Dv (50)** 16.5  $\mu\text{m}$   
**Dv (60)** 21.7  $\mu\text{m}$   
**Dv (90)** 64.6  $\mu\text{m}$

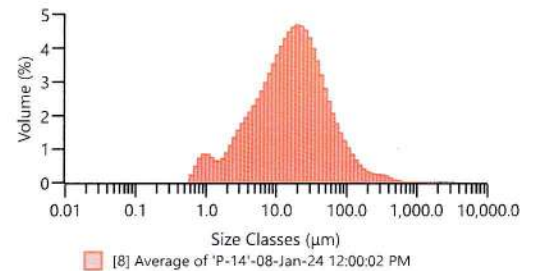
Average - Oversize



Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 6.16  |
| Silt (2 - 74 $\mu\text{m}$ )           | 85.77 |
| Fine sand (74-420 $\mu\text{m}$ )      | 7.91  |
| Medium sand (420-2000 $\mu\text{m}$ )  | .16   |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

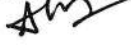
Histogram



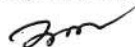
(Scientific Officer)



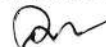
(Senior Scientific Officer)



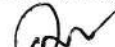
(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Measurement Details

**Operator Name** Nayan  
**Sample Name** Average of 'P-15'  
**SOP File Name** HydroEV.cfg

Measurement Details

**Analysis Date Time** 08-Jan-24 12:14:40 PM  
**Measurement Date Time** 08-Jan-24 12:14:40 PM  
**Result Source** Averaged

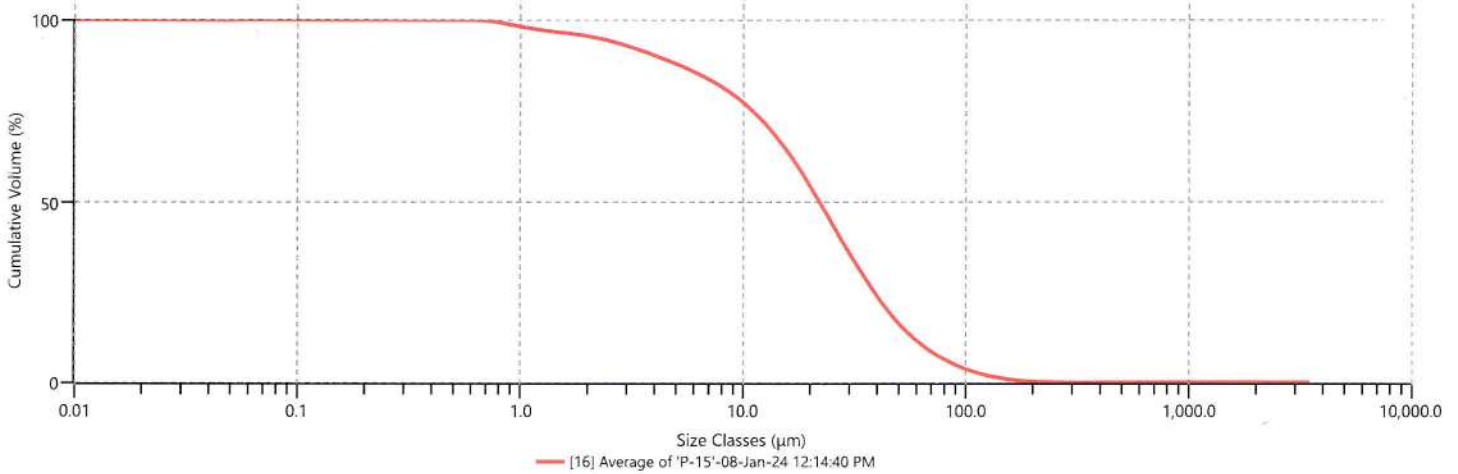
Analysis

**Particle Name** Soil  
**Analysis Model** General Purpose  
**Dispersant Name** Water  
**Dispersant Refractive Index** 1.330  
**Weighted Residual** 0.74 %  
**Laser Obscuration** 9.99 %

Result (D-Values)

**Dv (10)** 4.15  $\mu\text{m}$   
**Dv (50)** 22.1  $\mu\text{m}$   
**Dv (60)** 27.4  $\mu\text{m}$   
**Dv (90)** 65.1  $\mu\text{m}$

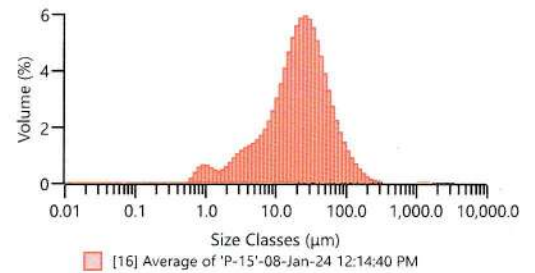
Average - Oversize



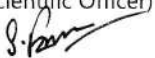
Unified Soil Classification System

| Particle Type                          | in %  |
|--|-------|
| Clay (<2 $\mu\text{m}$ )               | 4.42  |
| Silt (2 - 74 $\mu\text{m}$ )           | 87.93 |
| Fine sand (74-420 $\mu\text{m}$ )      | 7.65  |
| Medium sand (420-2000 $\mu\text{m}$ )  | 0     |
| Coarse sand (2000-4760 $\mu\text{m}$ ) | 0     |

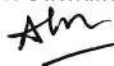
Histogram



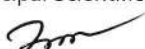
(Scientific Officer)



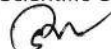
(Senior Scientific Officer)



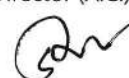
(Principal Scientific Officer)



(Chief Scientific Officer)



(Director (A.C.))



Geo-Technical Research Director  
River Research Institute

Project name: River Bed's Soil Sample Test of Sandwip Channel and Feni River

Client: Managing Director, ECOSURV, Dhaka.

Memo No-2023/RRI/003\_2

Report no: Soil- 05 (2023-24)

Date: 04/01/2024

| Sl.No.  | Name of Test   | Rate per Samples in Taka | Number of samples | Testing fee in Taka |
|---|--|--------------------------|-------------------|---------------------|
| 1.  | Specific Gravity (Gs.)   | 1725.00                  |                   |                     |
| 2.  | Natural Moisture Content   | 825.00                   |                   |                     |
| 3.  | Mechanical Analysis  |                          |                   |                     |
|   | a) Visual Inspection & Classification                                  |                          |                   |                     |
|   | (i) Disturbed Sample   | 300.00                   | 15                | 4500                |
|   | (ii) Undisturbed Sample  | 500.00                   |                   |                     |
|   | b) Sieve Analysis  | 2850.00                  |                   |                     |
|   | c) Hydrometer Analysis (Excluding Gs.)                                 | 2850.00                  |                   |                     |
|   | d) Sieve & Hydrometer Analysis   | 5250.00                  |                   |                     |
|   | e) Particle Size Analysis by Particle Size Analyzer (Mastersizer 3000) | 6000.00                  | 15                | 90000               |
| 4.  | Unit Weight  | 1650.00                  |                   |                     |
| 5.  | Loss-on-Ignition   | 3375.00                  |                   |                     |
| 6.  | Liquid Limit & Plastic Limit Combined                                  | 3750.00                  | 13                | 48750               |
| 7.  | Shrinkage Limit  | 1500.00                  |                   |                     |
| 8.  | Consolidation Test<br>(not excluding 6 loads + 2 unloads)              | 22500.00                 |                   |                     |
| 9.  | Direct Shear Test (3-point)  | 12000.00                 |                   |                     |
| 10.   | Triaxial Shear Test (for 3-specimen)                                   |                          |                   |                     |
|   | a) Unconsolidated Undrained  | 18000.00                 |                   |                     |
|   | b) Consolidated Undrained (without P.P.)                               | 31500.00                 |                   |                     |
|   | c) Consolidated Undrained (with P.P.)                                  | 39000.00                 |                   |                     |
|   | d) Consolidated Drained Test   | 39000.00                 |                   |                     |
| 11.   | Vane Shear Test  | 8500.00                  |                   |                     |
| 12.   | Unconfined Compression Test/Remolded                                   | 6000.00                  |                   |                     |
| 13.   | a) Standard AASHO (4" diamould)  | 11250.00                 |                   |                     |
|   | b) Standard AASHO (6" diamould)  | 11250.00                 |                   |                     |
|   | c) Modified AASHO (4" diamould)  | 15000.00                 |                   |                     |
|   | d) Modified AASHO (6" diamould)  | 15000.00                 |                   |                     |
|   | e) Field Density per spot  | 4950                     |                   |                     |
| 14.   | a) Permeability Test for Non-Cohesive                                  | 8850.00                  |                   |                     |
|   | b) Permeability Test for Cohesive Soils                                | 16500.00                 |                   |                     |
| 15.   | Density Index  | 6750.00                  |                   |                     |
| 16.   | C.B.R. Test  | 22500.00                 |                   |                     |
| 17.   | Laboratory Boring Log (per sheet)                                      | 225.00                   |                   |                     |
| Total Fee (Taka)  |  |                          |                   | 143250.00           |
| After 25% discount as per MoU between RRI & ECOSURV, Gross Total Fee (Taka) |  |                          |                   | 107438.00           |
| <b>In Words: Taka One Lac Seven Thousand Four Hundred and Thirty Eight</b>  |  |                          |                   |                     |

\* Charges includes 10% Printing and Binding Cost, 10% Testing and Consultancy Fee and 15% VAT

*S. Rahman*  
04.01.2024

*Arif*  
04.01.24

*Rudshana*  
04.01.2024

*Q*  
04.01.2024

## APPENDIX-B

List of personnel responsible for testing works preparation and publication of the report.

|     |                                |                      |
|-----|--------------------------------|----------------------|
| 1.  | Uma Saha                       | Director (In Charge) |
| 2.  | Engr. Md. Matiar Rahman Mondol | PSO                  |
| 3.  | Dr. Fatima Rukshana            | PSO                  |
| 4.  | Mohammad Dulal Bawali          | SSO                  |
| 5.  | Md. Moniruzzaman               | SSO                  |
| 6.  | Engr. Khondoker Rajib Ahmed    | SSO                  |
| 7.  | Engr. Sumiya Ferdhous          | SO                   |
| 8.  | Kazi Md. Shahajahan            | ST-C                 |
| 9.  | A.B.M Tazul Islam Bhuiyan      | ST-B                 |
| 10. | Md. Abu Bakker Siddique        | ST-B                 |
| 11. | Md. Nazrul Islam               | ST-B                 |
| 12. | Md. Rejaul Karim               | LT-B                 |
| 13. | Md. Mahbubul Alam              | ST-A.                |
| 14. | Sheikh Md. Rasel               | LT-A                 |
| 15. | Md. Ikramul Haque              | LT-A                 |
| 16. | Md. Jamal Uddin                | Office Assistant.    |
| 17. | Md. Mahbubur Rahman            | Office Assistant     |





Soil-05 (2023-24)

Ref.: 2023/RR1/003\_2

Date: 31.12.2023

Director General  
River Research Institute  
Faridpur, Bangladesh.

*D(GR)*  
*02/01/2024*

Subject: River Bed's Soil Sample Test of Sandwip Channel and Feni River.

Dear Sir,  
Assalamualaikum, Hope you are well in all respect.

As discussed in the meeting on 18.12.2023 we are sending the collected samples for Laboratory testing of the mentioned tests. Hopefully the samples qty will be 100 Nos. Now the samples are collecting from the rivers and will be sent sequentially.

1. Soil Particle Distribution test by
2. Atterberg Limit Test

As discussed, please fix a negotiated rate for the tests. It will be helpful to us if you kindly fix the rate 50% of the scheduled rate.

Samples ID is -

1. P01-Depth 3.0-3.5m, Sandwip Channel Coordinate E 343060m, N 2510140m
2. P02-Depth 2.0-2.5m, Sandwip Channel Coordinate E 343902m, N 2509584m
3. P03-Depth 1.5-2.0m, Sandwip Channel Coordinate E 344525m, N 2509270m
4. P04-Depth 1.5-2.0m, Sandwip Channel Coordinate E 344994m, N 2509870m
5. P05-Depth 1.5-2.0m, Sandwip Channel Coordinate E 344358m, N 2510292m
6. P06-Depth 1.5-2.0m, Sandwip Channel Coordinate E 343577m, N 2510836m
7. P07-Depth 1.5-2.0m, Feni River Coordinate E 337494m, N 2517437m
8. P08-Depth 1.5-2.0m, Feni River Coordinate E 337966m, N 2517690m
9. P09-Depth 1.5-2.0m, Feni River Coordinate E 340016m, N 2520055m
10. P10-Depth 1.5-2.0m, Feni River Coordinate E 340181m, N 2520591m
11. P11-Depth 1.5-2.0m, Sandwip Channel Coordinate E 341387m, N 2508117m
12. P12-Depth 1.5-2.0m, Sandwip Channel Coordinate E 343570m, N 2506736m
13. P13-Depth 1.5-2.0m, Sandwip Channel Coordinate E 348406m, N 2508067m
14. P14-Depth 1.5-2.0m, Sandwip Channel Coordinate E 347466m, N 2506970m
15. P15-Depth 1.5-2.0m, Sandwip Channel Coordinate E 348528m, N 2507045m

Thanks again for everything. Wishing you all the best and good health. Your kind cooperation in this regard will be highly appreciated.

Best Regards,

*[Signature]*

(Engr. Md. Shamsul Alam)  
Managing Director,  
ECOSURV  
+8801711111497

*02/01/2024*

*R.S.O (Report)*

*SSO(R)*

*Revised*  
*02.01.2024*