MINERAL RESOURCES TASMANIA

Quarry & Laboratory Report

LJN2024-068

MRT Sand Project Lot 3 Particle Size Distribution and Clay and Fine Sediment Analysis – East and Southeast Coast Sands

An unpublished Mineral Resources Report for:
Travis Holmes & Mineral Resources Tasmania

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Mineral Resources Tasmania
Department of State Growth

Tasmanian Government

CONTENTS

SUMMARY

Thirty-two siliceous sand samples were submitted for testing by T. Holmes on behalf of the Mineral Resources Tasmania Sand Sampling Program. The testing regimen was based on industry requirements and included dry sieving to assess particle size distribution with a subset of the samples also assessed for clay and fine silt proportions by settling method. There was variability in colour, with samples ranging from off-white to pale cream-yellow, chocolate brown, tan and grey. The samples were predominantly medium to fine grained sands, with a majority of samples containing at least trace organic matter and a significant minority having coarse sand to gravel/cobbles present.

Clay/silt fractions determined by dry sieving were less than 10% for the majority of samples. Eleven samples had a higher clay/silt (with only a small proportion being significantly more than 10%). Though the settling method results aren't directly comparable to the clay and fine silt fraction determined by sieving, the results were reasonably consistent with previous testing and those expected by using the standard; three samples returned a C value (ratio by volume of clay and fine silt to sand expressed as a percentage) lower than the clay silt fraction returned by sieving (mostly within ~2%). Three samples also had C values less than the <75 µm sieved fraction but had unclear gradation from sand to fine silt and clay, which would be considered technically indeterminate by the standard.

1. INTRODUCTION

Thirty-two samples of predominantly fine to medium grained, silica rich sands were submitted for analysis by Travis Holmes as part of the Mineral Resources Tasmania (MRT) Sands Resource Program. While being reasonably visually consistent, there were variations across the samples in colour (indicative of clay and/or iron oxides), grain size and angularity, and the presence of gravel/cobbles and organic content.

All samples were subject to Particle Size Distribution (PSD) testing and a subset was taken from eighteen samples to assess the clay and fine silt content of the sands by a hydraulic settling method (AS 1141.33:2015).

2. SAMPLE PREPARATION

Samples were dried to a constant mass, riffle split, photographed and broken into sub-samples for the testing. The testing regimen was determined by T. Holmes based on industry requirements and building on existing datasets. The quantity of material subsampled for sieving was based on a visual assessment of mean grain size, as per AS 1289.1.1. Due to the predominantly fine-grained nature of the sands, this required small sample sizes for sieving (~50-200g) to reduce the degree of sieve overloading. Furthermore, as per AS 1289.1.1, this also involved removing some of the largest gravel and cobble particles so as not to significantly affect the PSD results with a single particle. A ~100g riffle split subsample of fine aggregate was used for AS 1141.33 testing.

3. SAMPLE DESCRIPTIONS

The samples tested were visually predominantly fine to medium grained, silica rich sands, with some variability across the samples. The variations were predominantly in colour (off-white to pale grey, pale yellow and brown, indicating variable amounts of organic matter, clays and oxidation), grain angularity, and organic content. Some samples exhibited a gap-graded gravel and cobble component and while most were

loose and unconsolidated, some samples had a higher proportion of particle consolidation (particularly C113853). See Table 1 and Figures 1 to 32 for full sample details.

Table 1. *Sample Details for Southeast Coast MRT Sand Project Lot 3*

Sample No.	Site	Description	mE, gda94	mN, gda94	Process
E203090	Sand River, Buckland	Grey sand, loose.	557243	5287584	Dry Sieve
E203151	Sand River, Buckland	Light brown & grey sandy clay, clayey sand.	557253	5287404	Dry Sieve
E200662	Carlton Sand Deposit	Light tan sand.	553963	5253594	Dry Sieve
E200663	Carlton Sand Deposit	Dark tan sand.	553973	5253604	Dry Sieve
E200661	Carlton Sand Deposit	Light grey sand.	553973	5253604	Dry Sieve
E200680	Carlton Sand Deposit	Dark grey sand.	553508	5254184	Dry Sieve
E200678	Carlton Sand Deposit	Dark tan sand.	553413	5254284	Dry Sieve
E200677	Carlton Sand Deposit	White grey sand.	553413	5254284	Dry Sieve
E200679	Carlton Sand Deposit	Brown sand occasional grit fragments.	553508	5254184	Dry Sieve
E200676	Carlton Sand Deposit	Light tan sand.	553413	5254484	Dry Sieve
E200623	White Hill, Forcett	Fine grained variegated white to brown sand & white sand.	557611	5262099	Dry Sieve
C113827	Woodsdale Road	Unconsolidated Light brown fine-grained sand mixed with flakes of sandstone above 25cm depth and consolidated below 25cm.	546323	5286889	Dry Sieve, Clay/Silt Settling
C113828	Mosquito Valley Road	Light grey fine grained unconsolidated sand with minor bracken roots.	545695	5286879	Dry Sieve, Clay/Silt Settling
C113829	Cuttinggrass Road	Light brown fine-grained sand with abundant clay/silt fine fraction.	550296	5290685	Clay/Silt Settling
C113830	McConnons Road	light brown to light orange fine grained sand. Clean of fines and leached near surface with increasing clay content with depth.	551227	5291098	Dry Sieve, Clay/Silt Settling
C113831	Cutting Grass Road	Light grey fine-grained sand.	550235	5290513	Dry Sieve, Clay/Silt Settling

Sample No.	Site	Description	mE, gda94	mN, gda94	Process
C113832	Levendale Back Road	Light grey to light brown fine-grained sand leached with bracken roots near surface becoming clay rich and free of roots with depth.	548764	5289943	Dry Sieve, Clay/Silt Settling
C113833	Levendale Back Road	Brown sandy loam. Organic rich fine-grained sand with pebbles to cobbles of light orange fine-grained sandstone.	547089	5287245	Dry Sieve, Clay/Silt Settling
C113834	Mosquito Valley Road	Light grey fine-grained sand with high silt fraction and some bracken roots.	545926	5287033	Dry Sieve, Clay/Silt Settling
C113835	Sand River	Light grey fine-grained sand with minor bracken roots throughout.	558165	5288101	Dry Sieve, Clay/Silt Settling
C113836	Sand River	Light grey fine-grained sand. Organic contaminants near surface, cleaner with depth.	558012	5288655	Dry Sieve, Clay/Silt Settling
C113837	Carlton	Well sorted light-brown quartz rich subangular sand.	553400	5253968	Dry Sieve, Clay/Silt Settling
C113838	Carlton	Light-grey fine-grained quartz-rich sand mixed with brown clay - Lithology: sand, clayey	553706	5254154	Dry Sieve, Clay/Silt Settling
C113839	Carlton	Cream well sorted subrounded to sub angular quartz-rich fine-grained dune sand.	553236	5253551	Dry Sieve, Clay/Silt Settling
C113840	White Hill Road	Cream well sorted subrounded fine-grained quartz-rich sand.	558668	5262248	Dry Sieve
C113841	White Hill Road	Well sorted cream fine-grained quartz rich sub-rounded to sub-angular sand.	558872	5262341	Dry Sieve
C113842	White Hill Road	Well sorted cream fine-grained quartz rich sub-rounded to sub-angular sand.	559022	5262284	Dry Sieve, Clay/Silt Settling
C113844	Calverts Beach	Brown subangular to subrounded fine to medium grained "sharp" sand.	540117	5236448	Dry Sieve, Clay/Silt Settling
C113845	Calverts Beach	light grey well sorted fine grained sand with abundant bracken roots throughout.	540694	5236819	Dry Sieve, Clay/Silt Settling
C113846	Calverts beach	Light grey well sorted quartz rich fine-grained sand	539682	5236352	Dry Sieve, Clay/Silt Settling
C113853	Stonehenge	Brown fine grained sandy clay.	552972	5306591	Dry Sieve

Sample No.	Site	Description	mE, gda94	mN, gda94	Process
C113854	Stonor	Grey fine-grained sand with abundant bracken roots throughout.	531712	5305971	Dry Sieve, Clay/Silt Settling

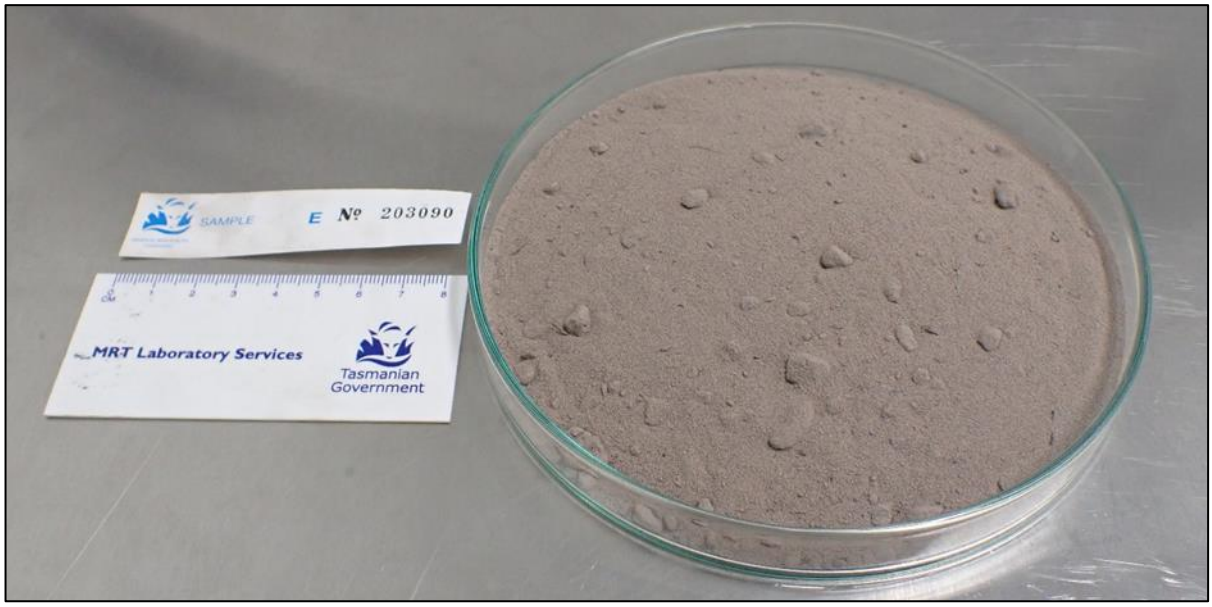

Figure 1. *E203090. Grey sand, loose.*

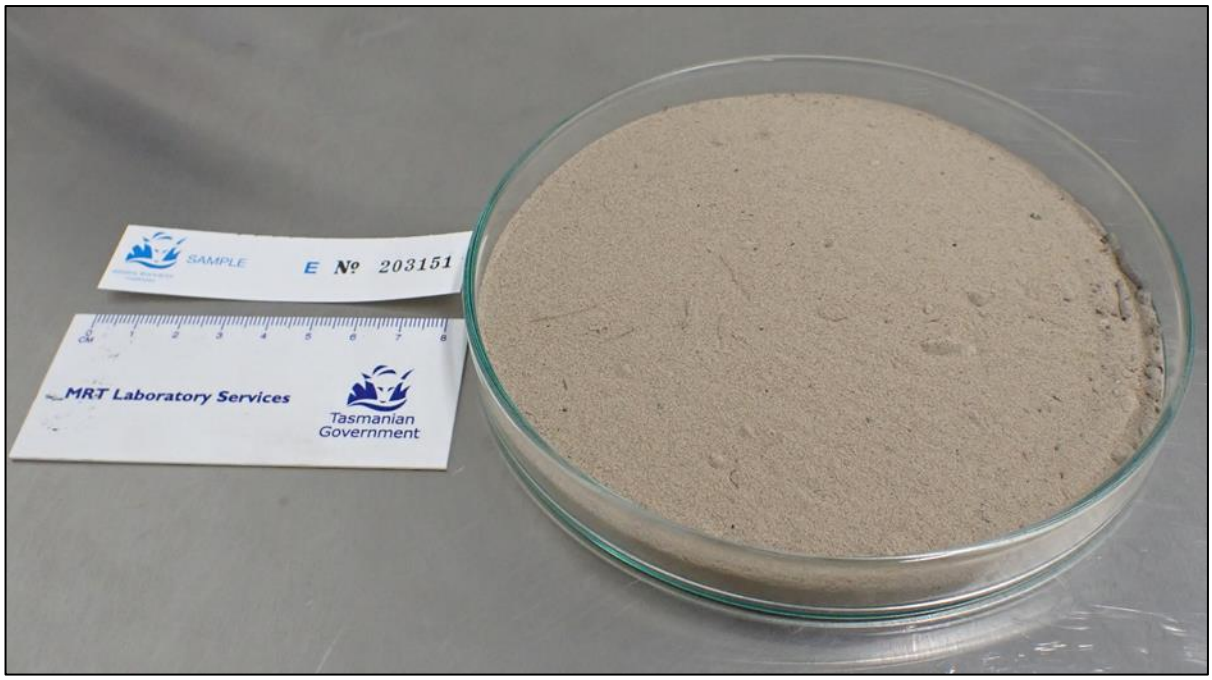

Figure 2. *E203151. Light brown & grey sandy clay, clayey sand*

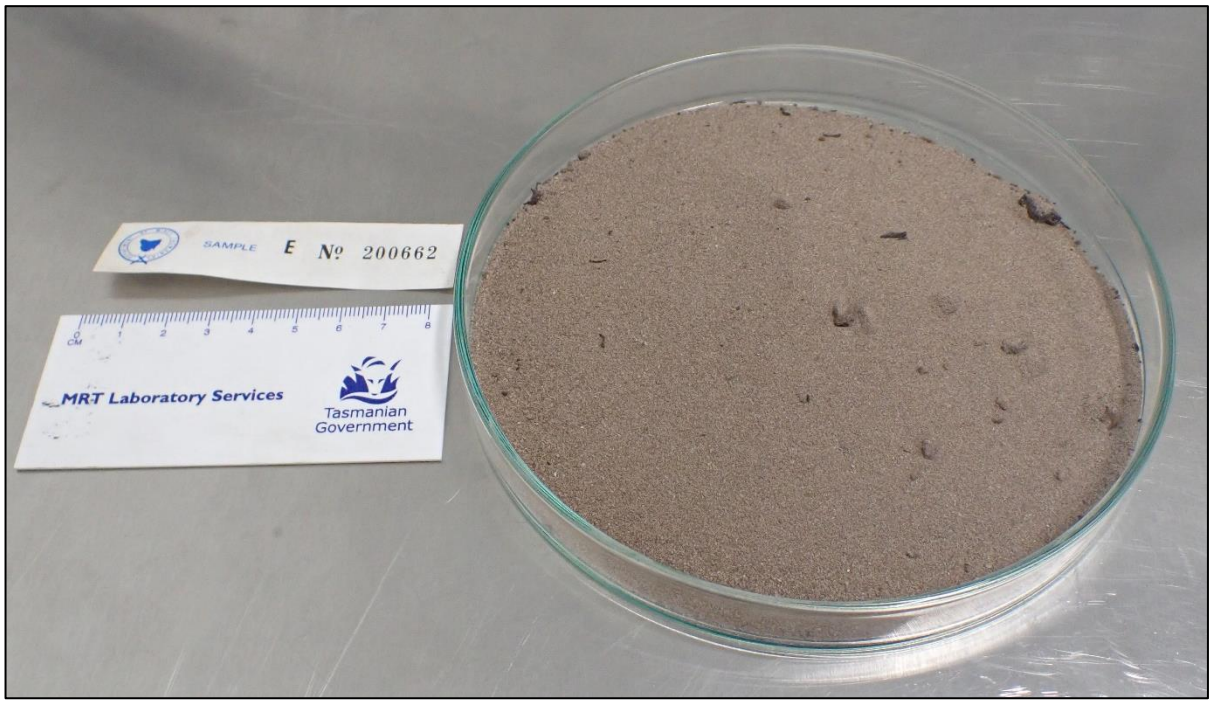

Figure 3. *E200662. Light tan sand.*

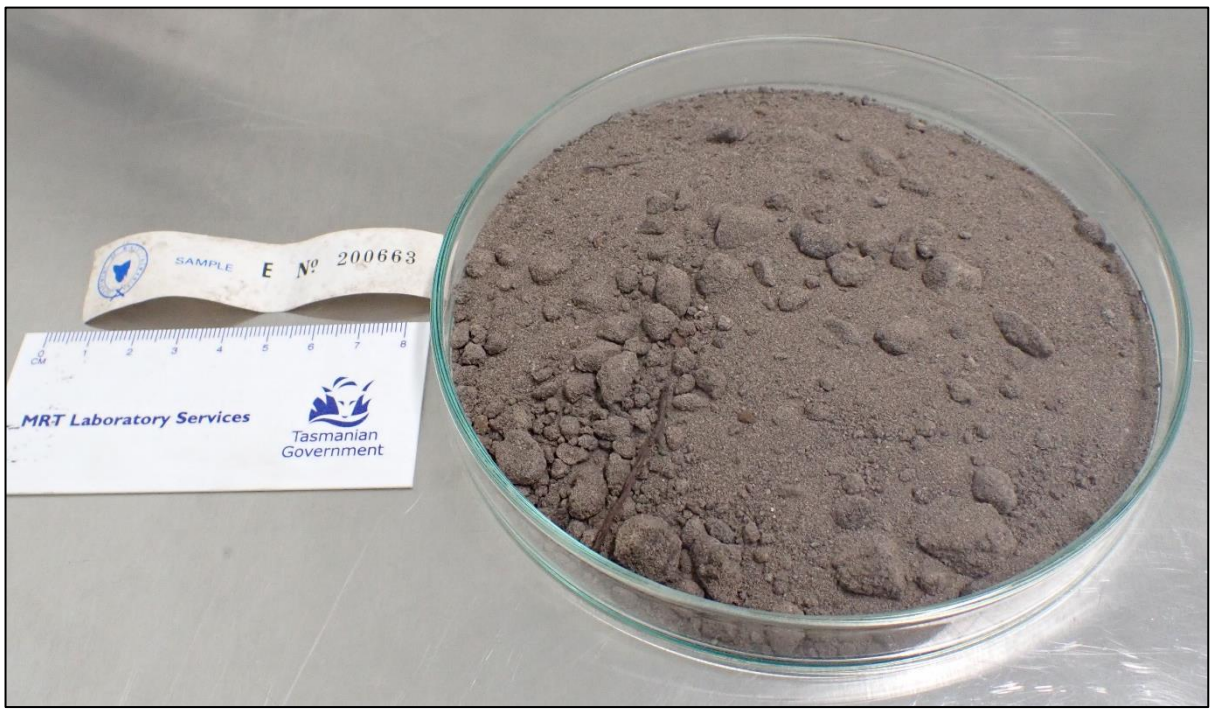

Figure 4. *E200663. Dark tan sand.*

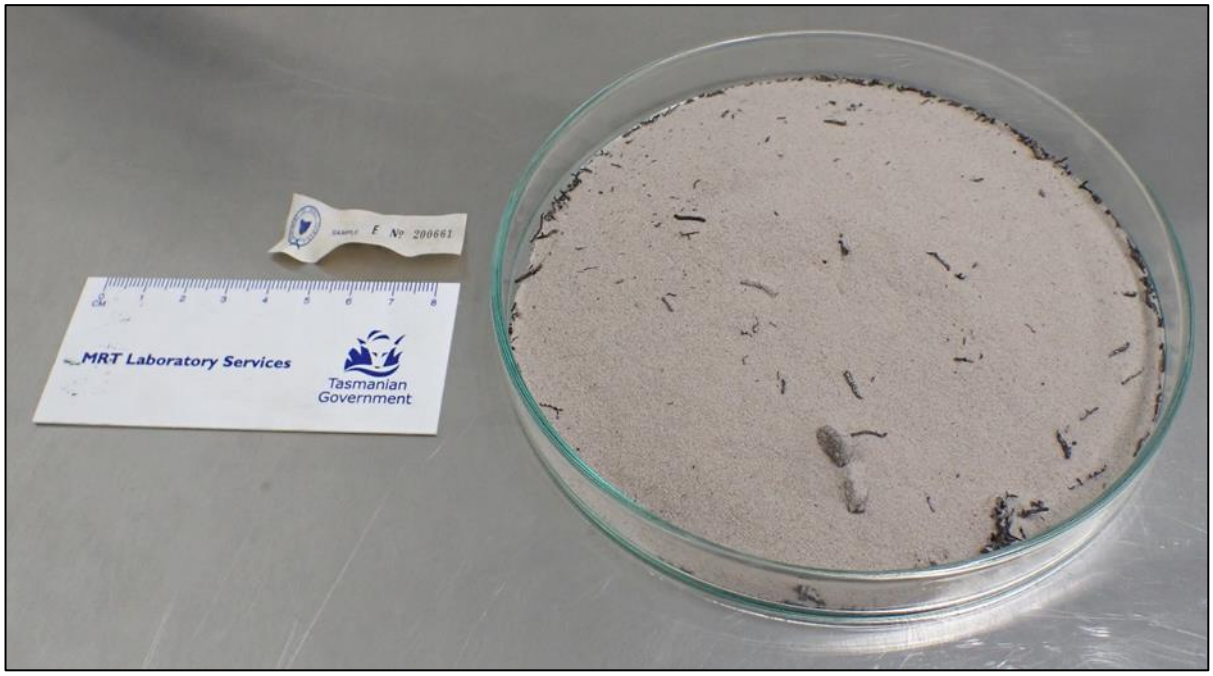

Figure 5. *E200661. Light grey sand.*

Figure 6. *E200680. Dark grey sand.*

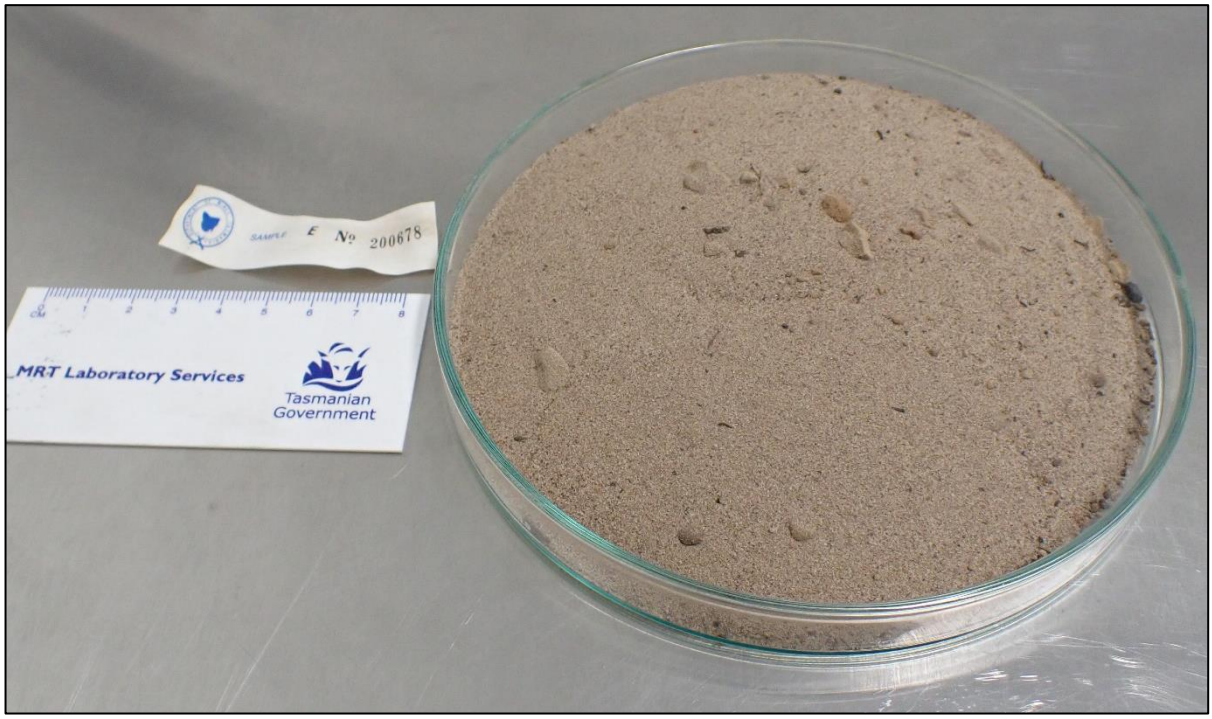

Figure 7. *E200678. Dark tan sand.*

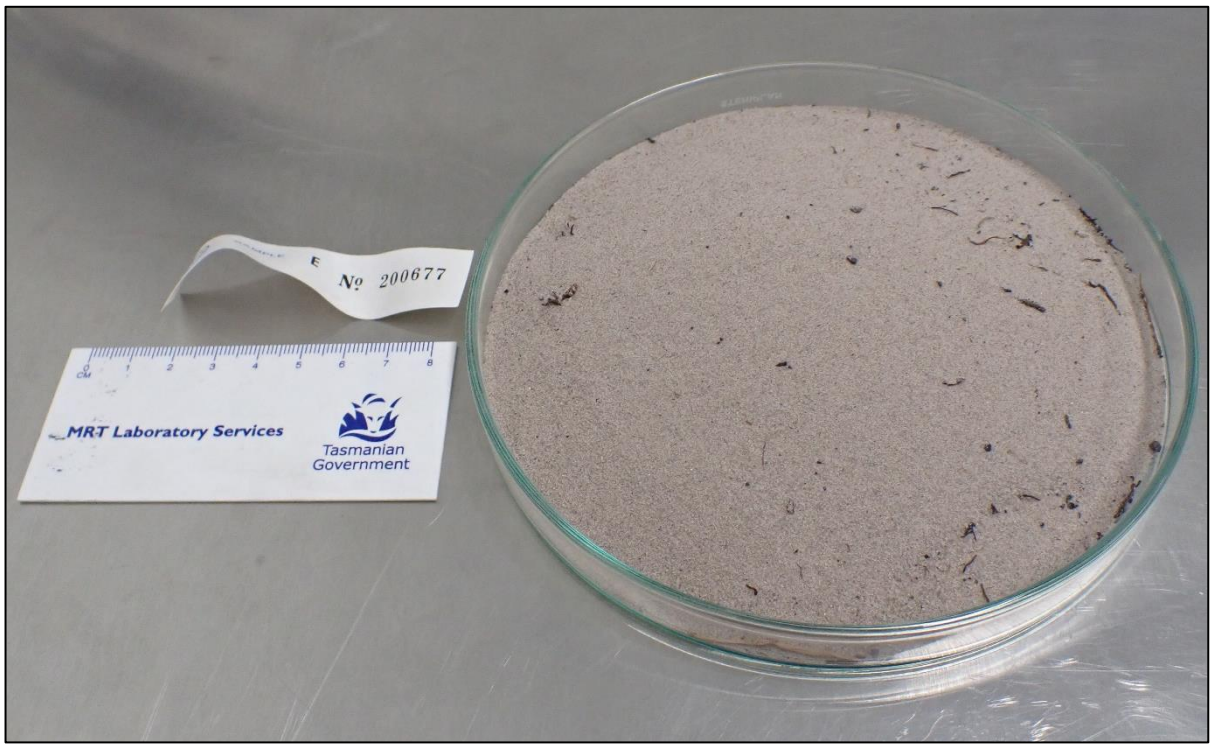

Figure 8*. E200677. White-grey sand.*

Figure 9. *E200679. Brown sand, occasional grit fragments.*

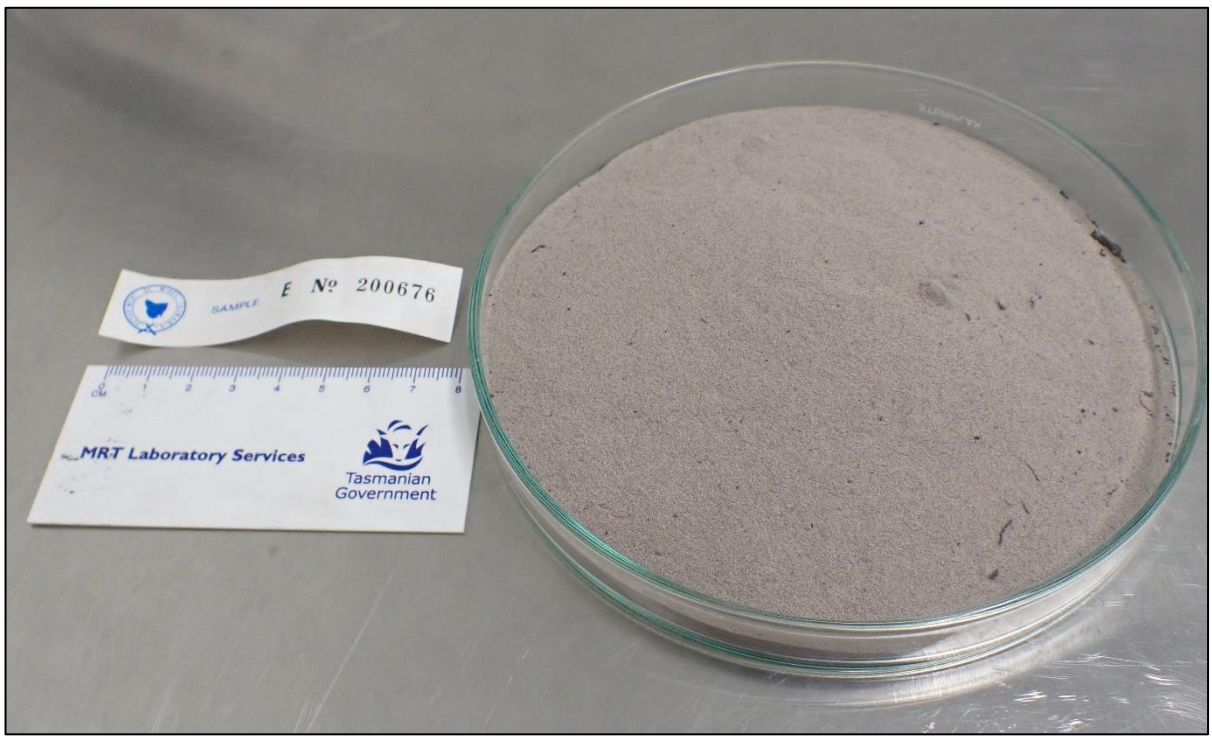

Figure 10*. E200676. Light tan sand.*

Figure 11. *E200623. Fine grained variegated white to brown sand.*

Figure 12. *C113827. Unconsolidated Light brown fine grained sand mixed with flakes of sandstone above 25cm depth and consolidated below 25cm*

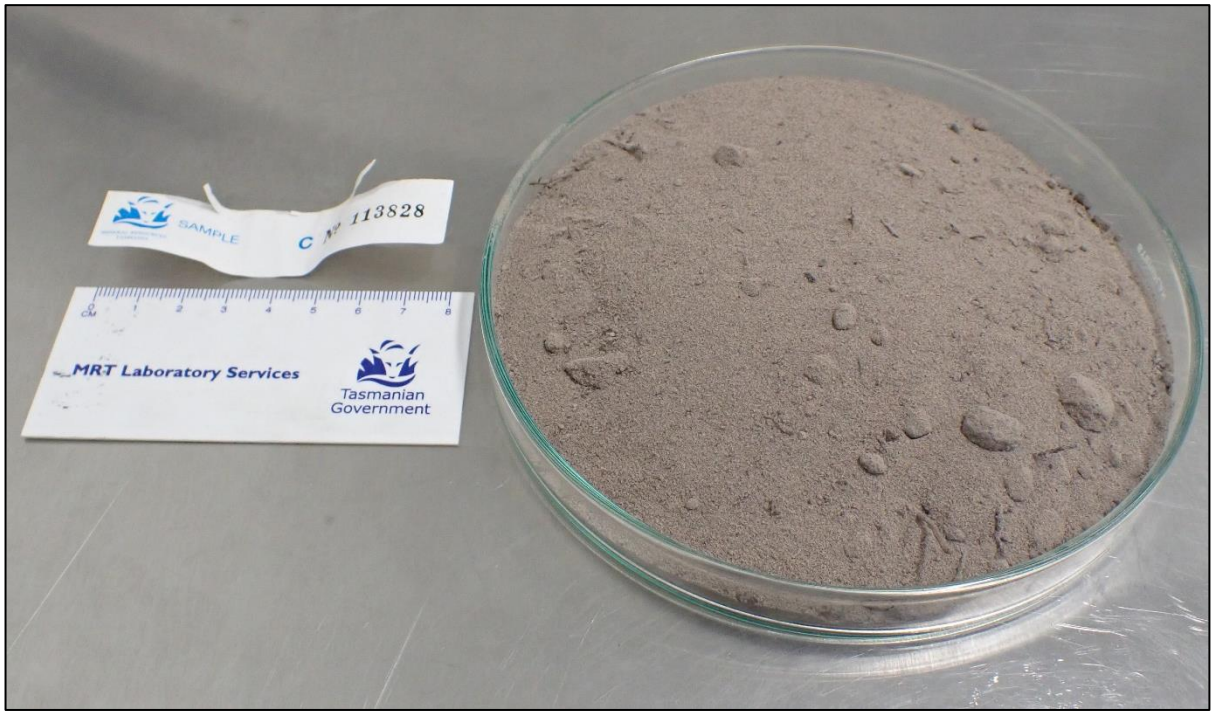

Figure 13. *C113828. Light grey fine grained unconsolidated sand with minor bracken roots*

Figure 14. *C113829.Light brown fine-grained sand with abundant clay/silt fine fraction.*

Figure 15. *C113830. Light brown to light orange fine grained sand. Clean of fines and leached near surface with increasing clay content with depth.*

Figure 16. *C113831. Light grey fine-grained sand.*

Figure 17. *C113832. Light grey fine grained unconsolidated sand with minor bracken roots.*

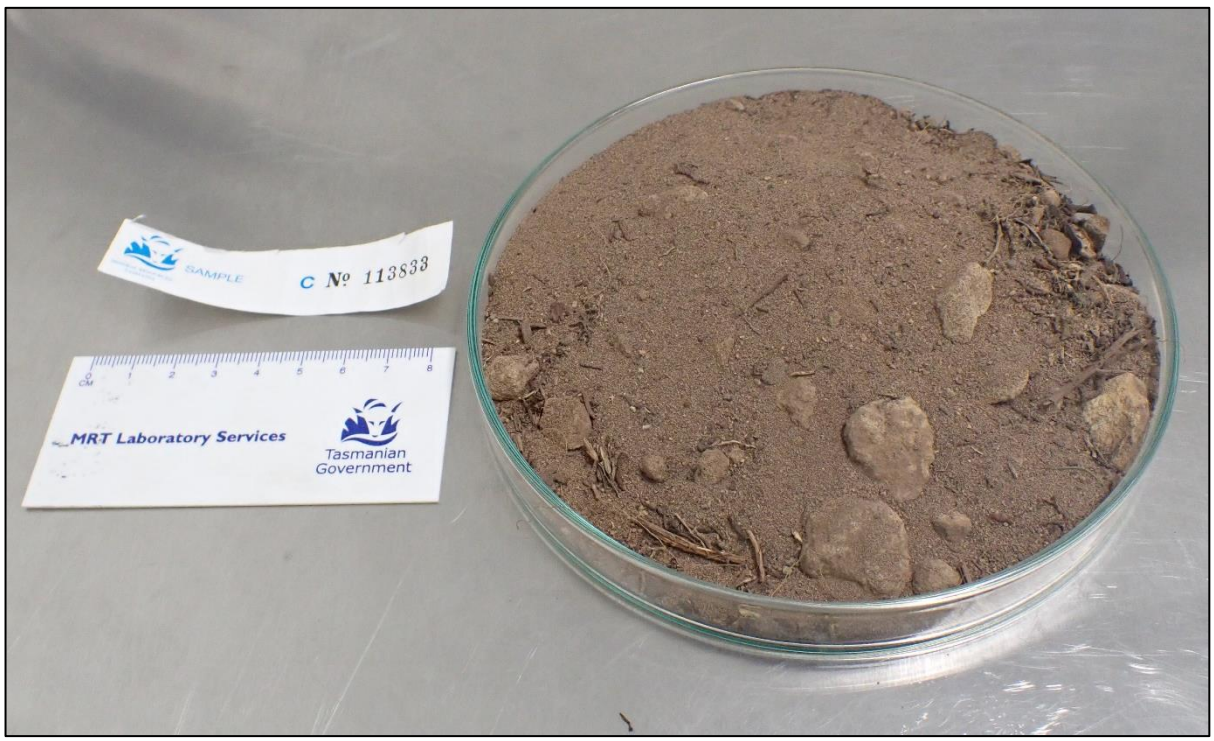

Figure 18. *C113833. Brown sandy loam. Organic rich fine-grained sand with pebbles to cobbles of light orange fine-grained sandstone.*

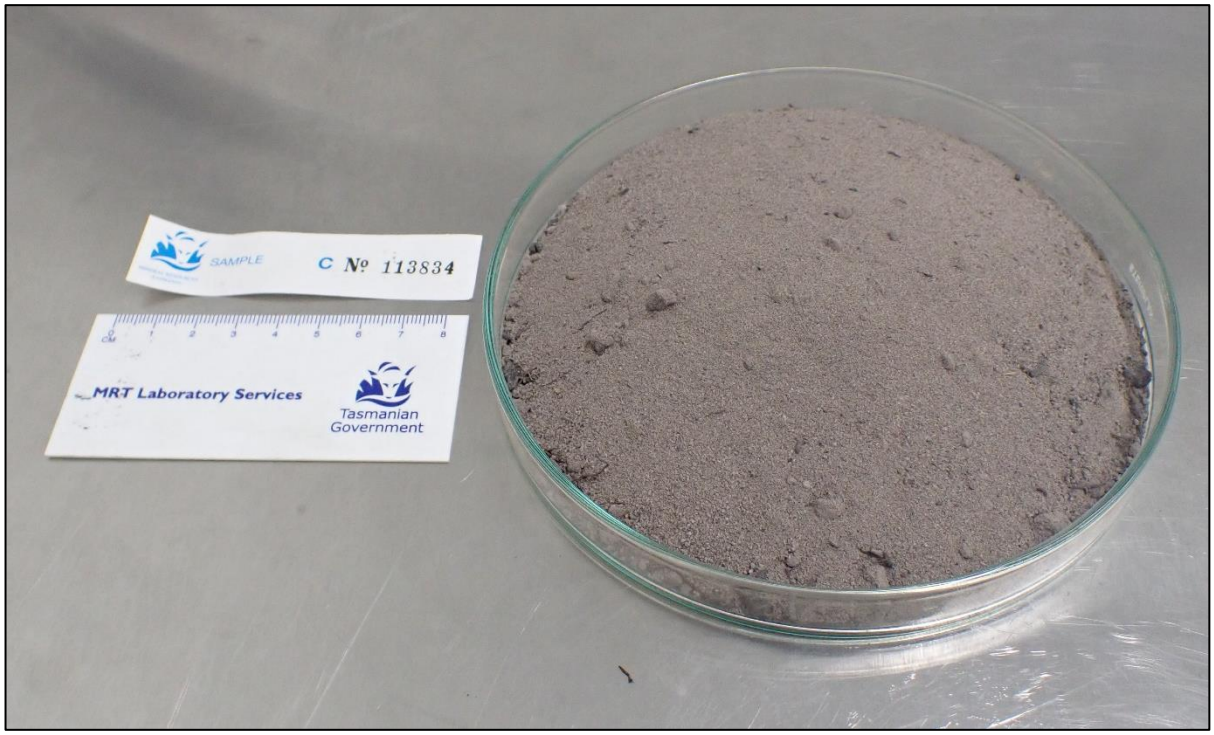

Figure 19. *C113834. Light grey fine-grained sand with high silt fraction and some bracken roots.*

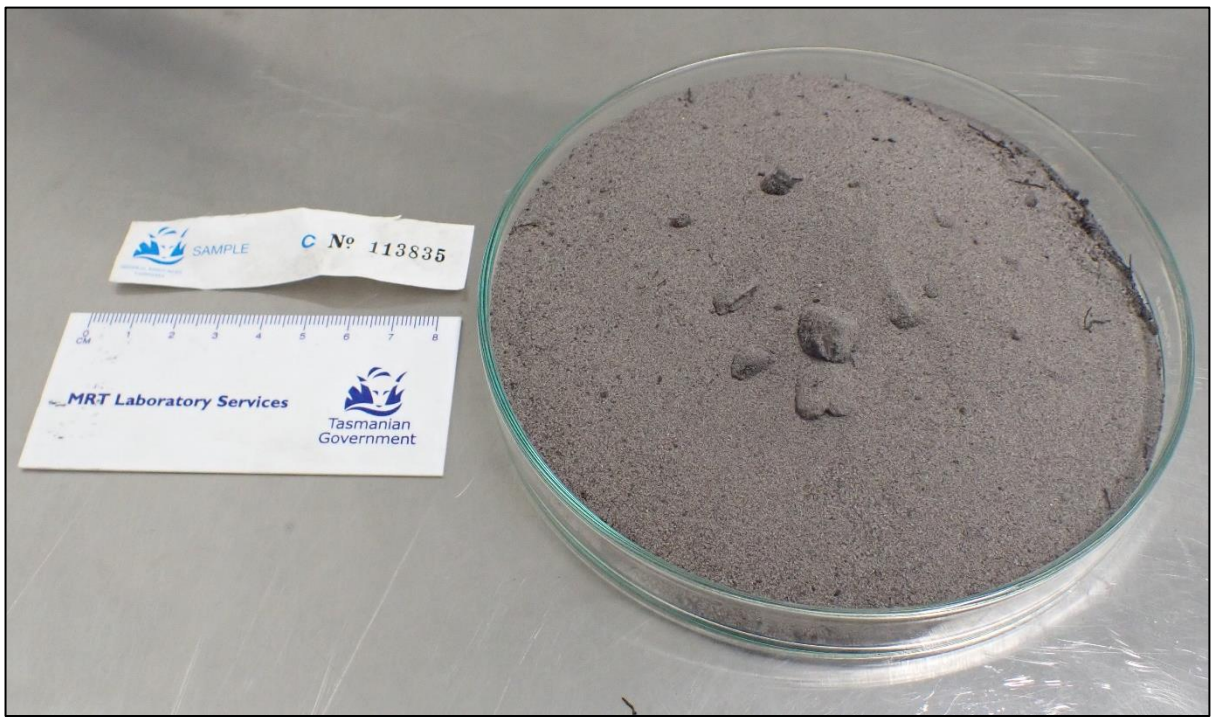

Figure 20. *C113835. Light grey fine-grained sand with minor bracken roots throughout.*

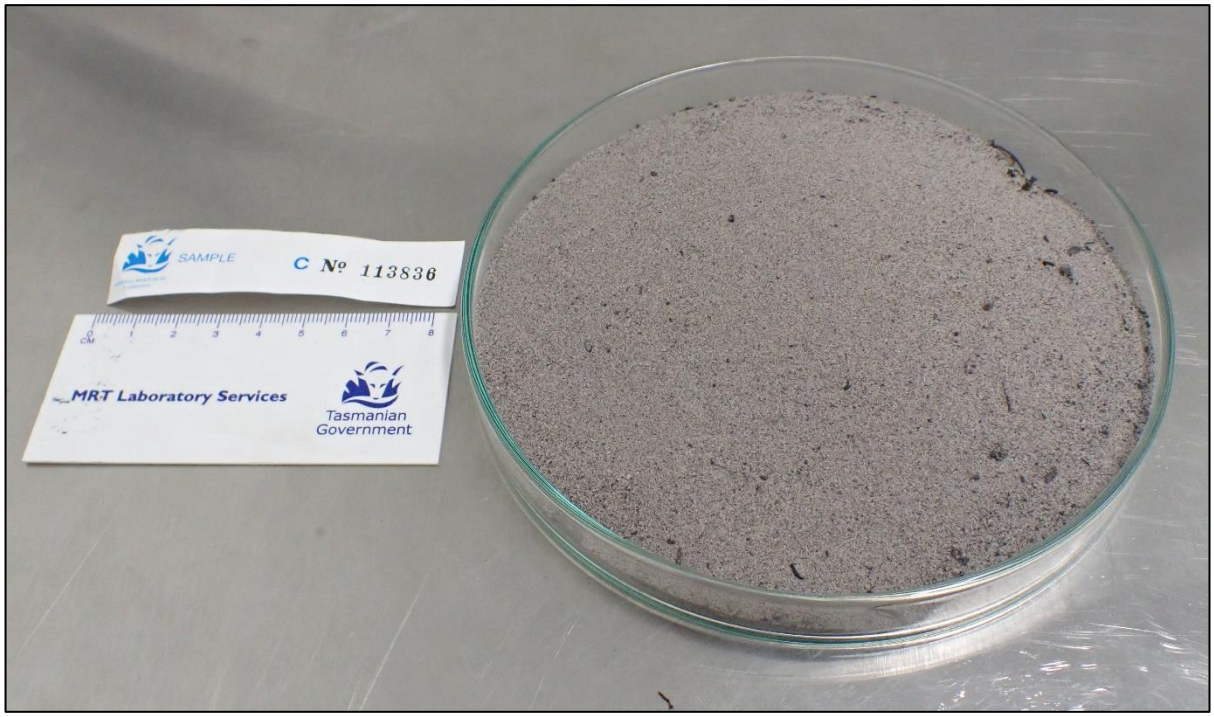

Figure 21. *C113836. Light grey fine-grained sand. Organic contaminants near surface, cleaner with depth.*

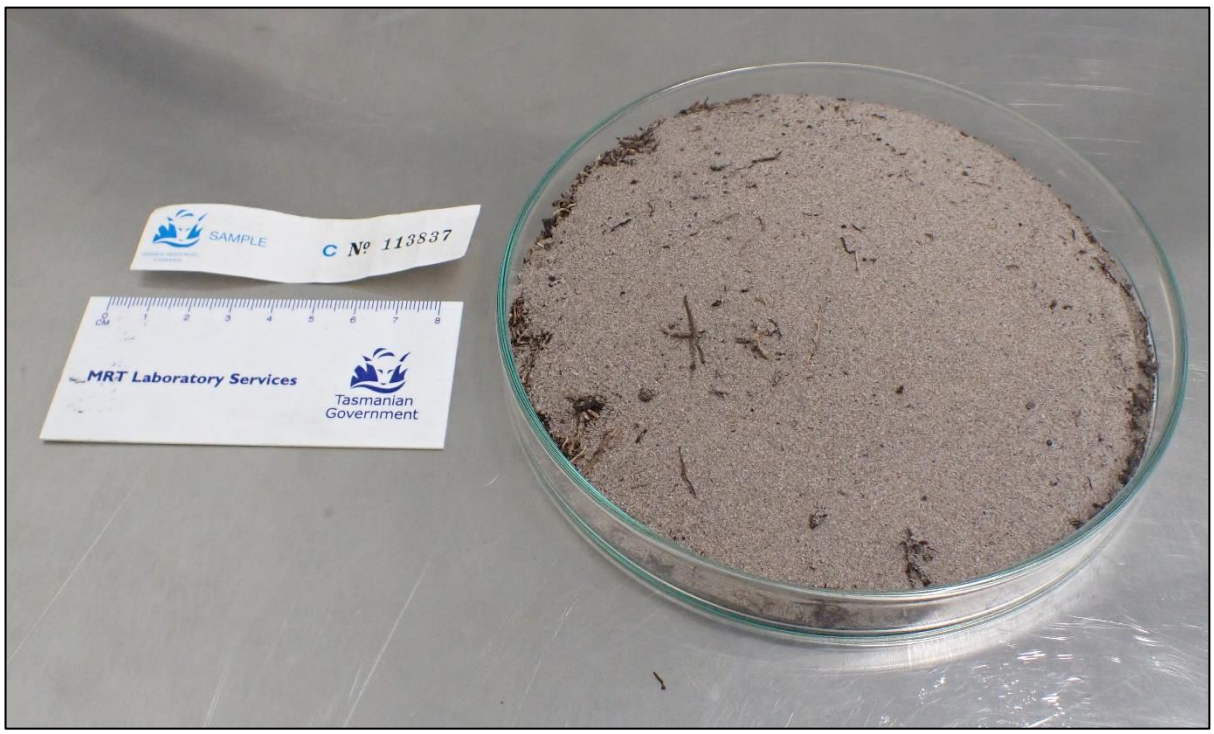

Figure 22. *C113837. Well sorted light-brown quartz rich subangular sand.*

***Figure 23**. C113838. Light-grey fine-grained quartz-rich sand mixed with brown clay.*

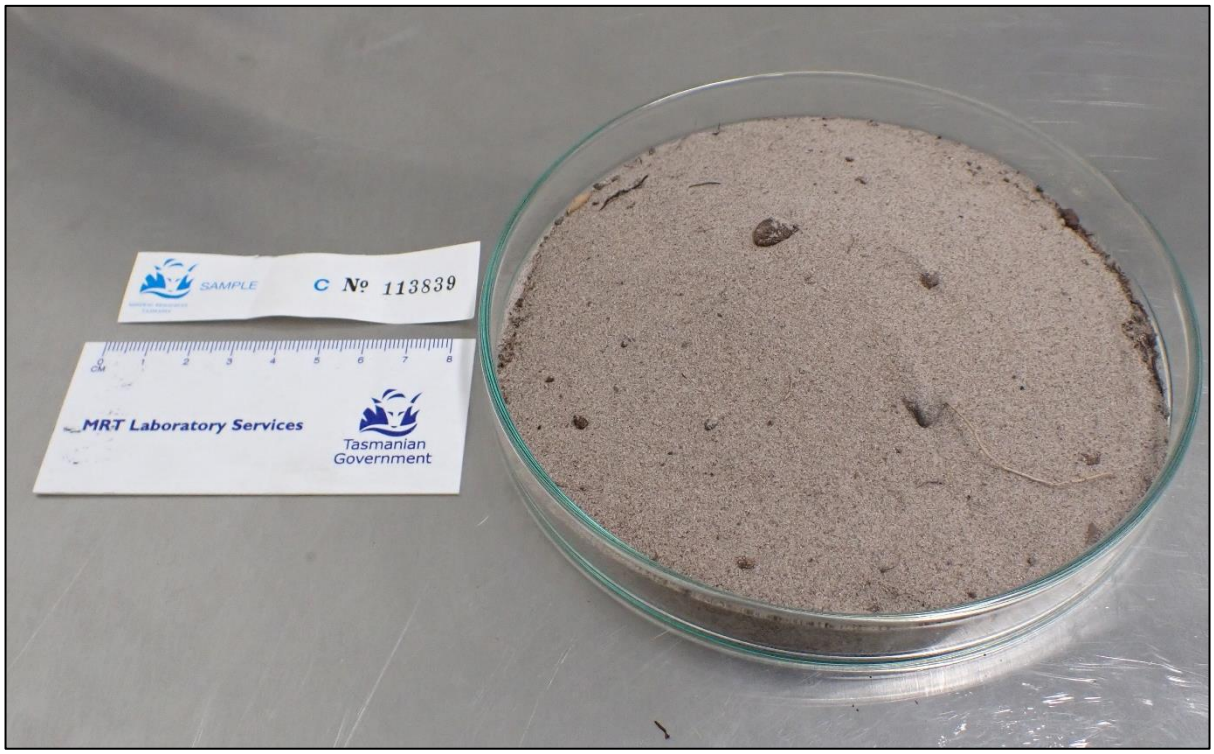

***Figure 24.** C113839. Cream well sorted subrounded to sub angular quartz-rich fine-grained dune sand.*

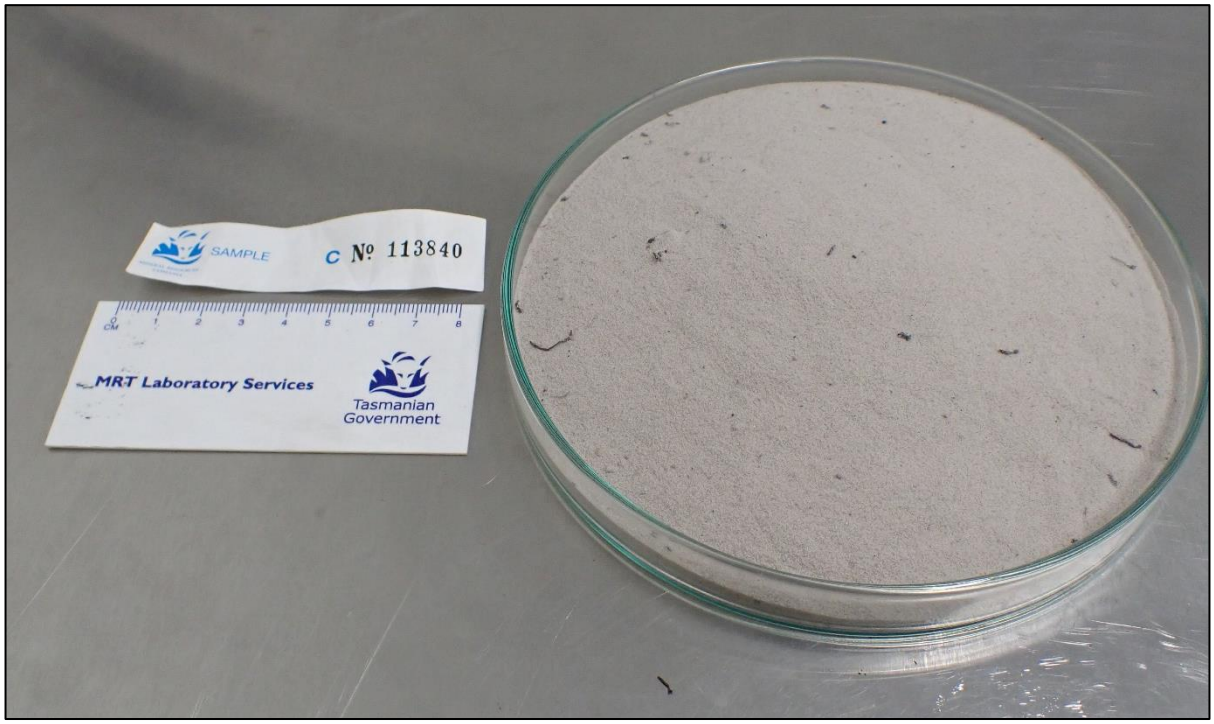

Figure 25. *C113840. Cream well sorted subrounded fine-grained quartz-rich sand.*

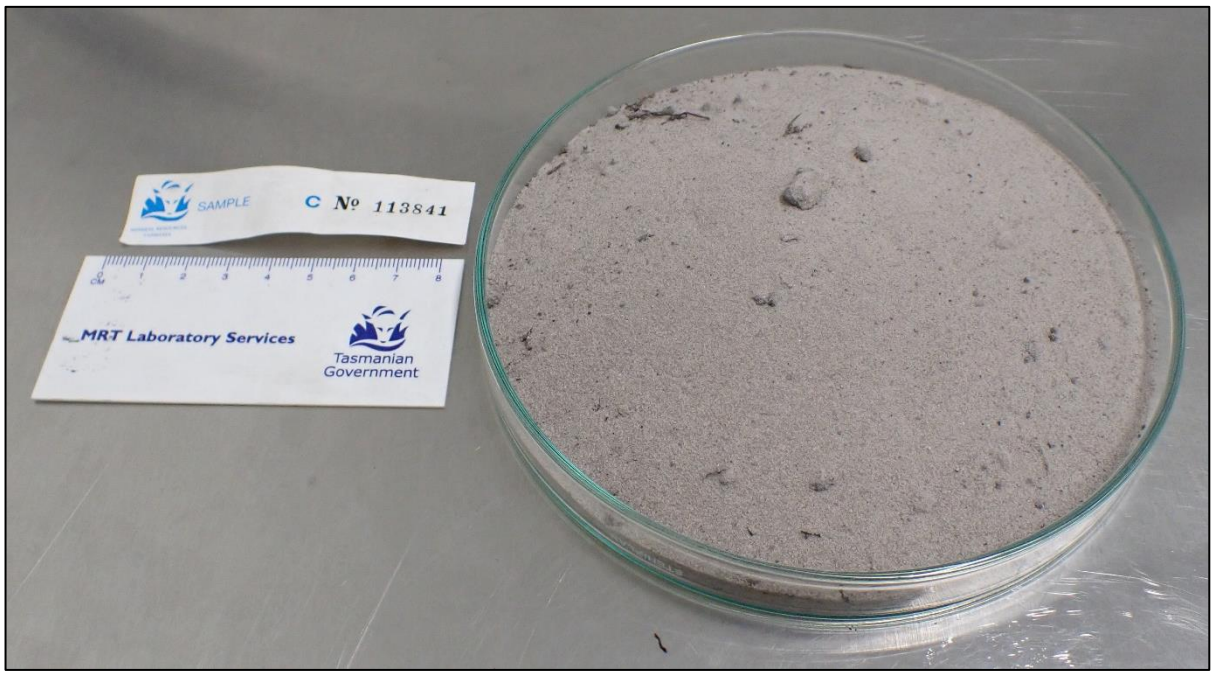

Figure 26. *C113841. Well sorted cream fine-grained quartz rich sub-rounded to sub-angular sand.*

Figure 27. *C113842. Well sorted cream fine-grained quartz rich sub-rounded to sub-angular sand.*

Figure 28. *C113844. Brown subangular to subrounded fine to medium grained "sharp" sand.*

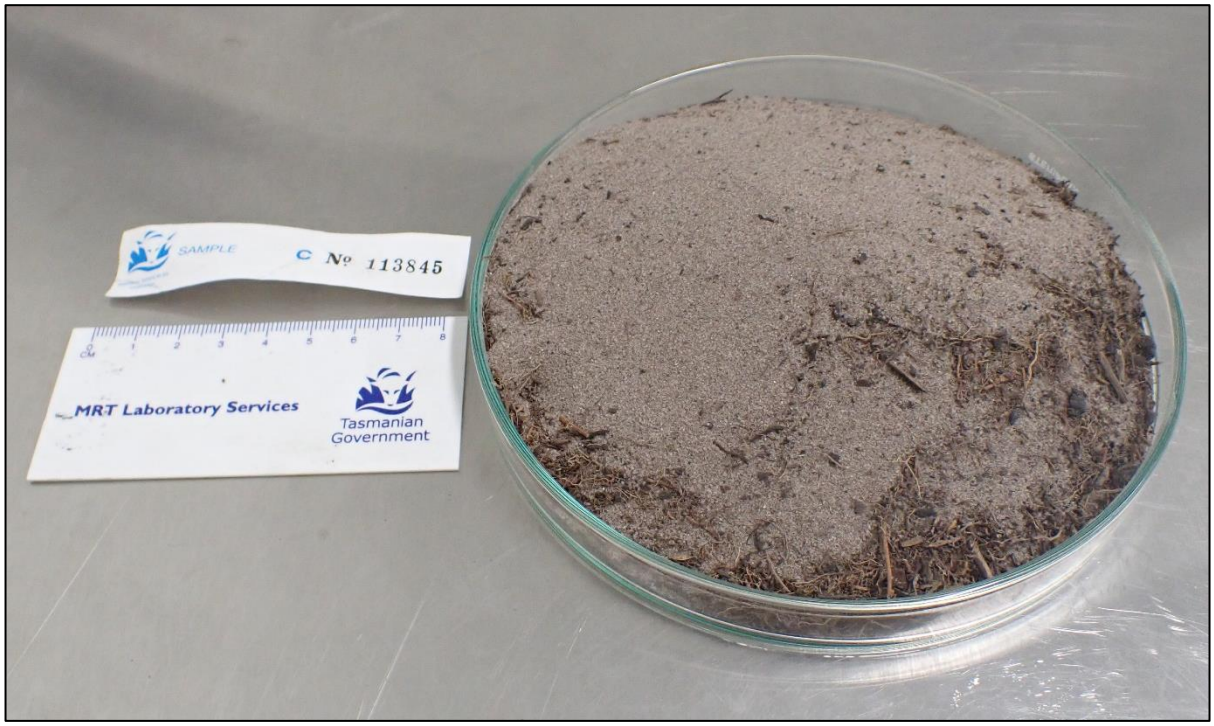

Figure 29. *C113845. light grey well sorted fine grained sand with abundant bracken roots throughout.*

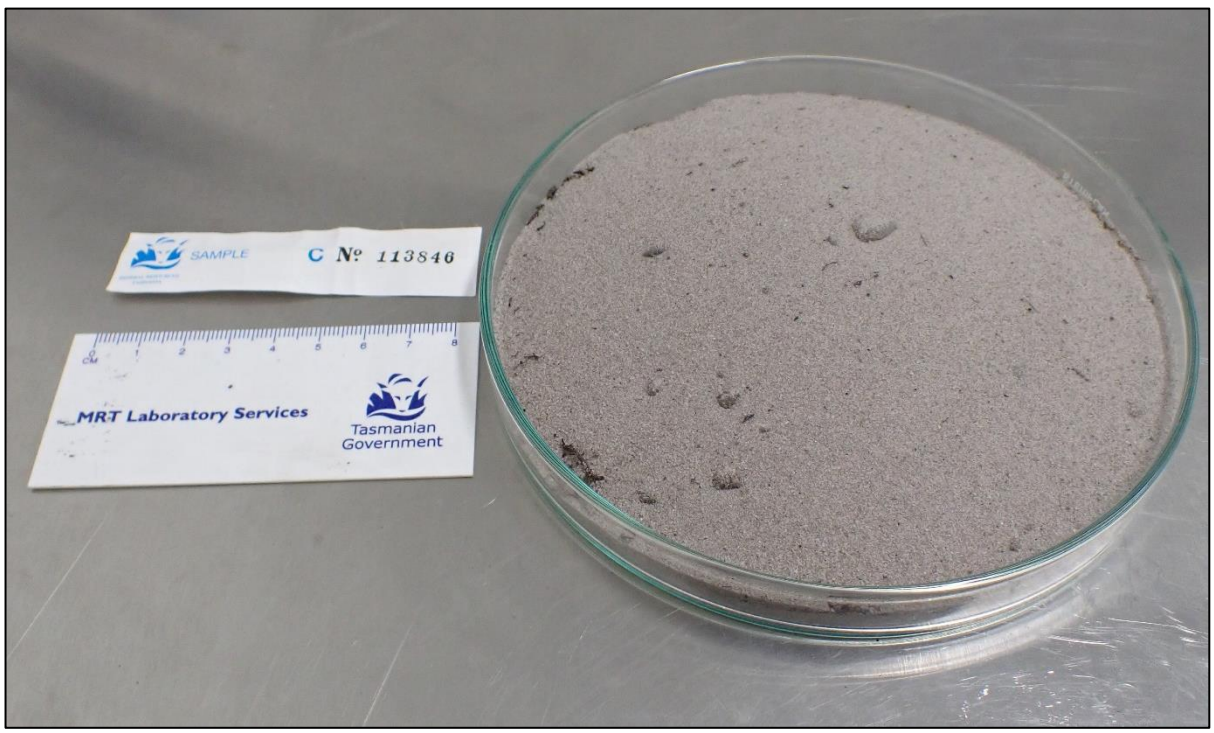

Figure 30. *C113846. Light grey well sorted quartz rich fine-grained sand.*

Figure 31. *C113853. Brown fine grained sandy clay.*

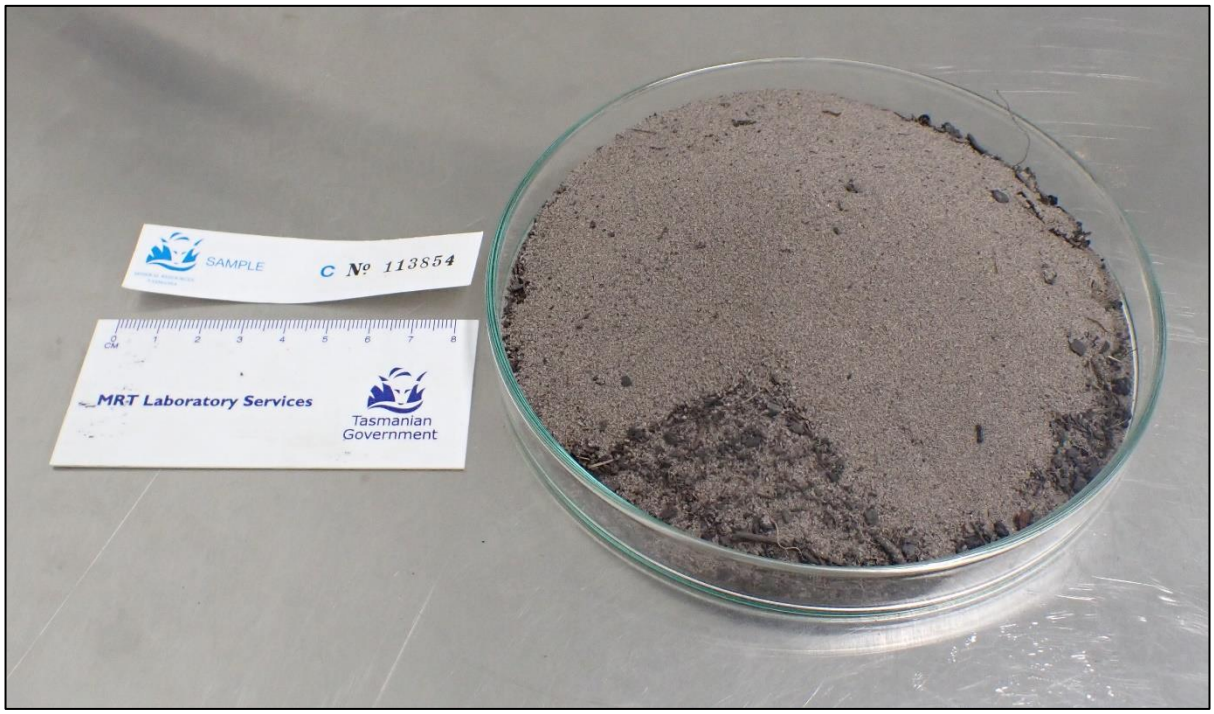

Figure 32. *C113854. Grey fine-grained sand with abundant bracken roots throughout.*

4. DRY SIEVING RESULTS

The samples were riffle-split down to manageable, representative sub-sample sizes and dry sieving was undertaken by N.L. Delany & M.R. Giddings in accordance with AS 1289.3.6.1, with any overloaded sieves re-sieved in portions. To reduce sieve overloading, weights of sample used were based on estimating average sample PSD and minimum mass of sub-sample required as per the AS 1289.1.1.

The majority of sands sampled were medium to fine-grained, silica rich sands with minimal to moderate organic content and gravel to cobble-sized clasts present in a minority of samples. Clay/silt fractions determined by PSD were less than 10% for the majority of samples. The 11 samples that had a higher clay/silt fraction were samples E203090, E203151, E200678 (borderline at 10.46%), E200676, E200623, C113827, C113828 (10.15%), C113829, C113834, C113838 and C113842. Consolidation of C113853 was reduced by mortar and pestle, with caution to not to crush individual particles. See Appendix 1 for cumulative histograms, weight % passing and weights retained on sieves.

5. CLAY & FINE SILT SETTLING ANALYSIS

Clay and fine silt settling analysis was undertaken in accordance with AS 1141.33:2015 with results summarised below (Table 2). The standard specifies where the separation of sediments is unclear, results should be specified “indeterminate”. However, in these cases, where separation of sediments is unclear, it has been indicated and an estimated C (ratio by volume of clay and fine silt to sand) calculated.

As per the Standard, there is no consistent relationship between the test result and the silt and clay fraction obtained by sieving. In general, however, the magnitude of the result of this test will be greater than the result passing the 75 µm sieve. This was verified with the majority the samples analysed for this study. Likewise, where the samples have a portion of fine aggregate >10% passing the 75 µm sieve, the Standard indicates the AS 1141.33 is unsuitable. See Appendix 2 for full discussion.

Table 2. *Sand and Fine Silt & Clay Settling Data*

Sample Registration Number	Sand Volume - S (mL)	Clay & Fine Silt Volume - F (mL)	Ratio by volume of Clay & Fine silt to Sand - C (%)	Comments
C113827	102	0	0%	** Separation of sediments unclear*
C113828	86	7	8%	
C113829	82	18	22%	
C113830	76	20	26%	** Separation of sediments unclear*
C113831	86	7	8%	
C113832	88	20	23%	
C113833	89	7	8%	
C113834	92	8	8%	
C113835	100	4	4%	
C113836	96	4	4%	
C113837	95	3	3%	
C113838	82	12	15%	** Separation of sediments unclear*
C113839	102	2	2%	
C113842	106	2	2%	** Separation of sediments unclear*
C113844	92	2	2%	
C113845	96	4	4%	
C113846	100	2	2%	
C113854	102	6	6%	

* Estimated clay and fine silt volumes, and ratios of clay and fine silt to sand

6. DISCUSSION AND CONCLUSIONS

The sands tested were found to be predominantly fine to medium grained, cream-yellow to tan and grey sands, with a significant number (18 samples) having a proportion of coarse sand to cobbles. This may not be fully reflected in the PSD results, with larger cobbles removed as per AS 1289.1.1. Almost all samples had at least a minor proportion of organic matter (predominantly fern roots) present.

Clay/silt fractions determined by Dry Sieving were less than 10% for the majority of samples. The 11 samples that had a higher clay/silt fraction were samples E203090, E203151, E200678 (borderline at 10.46%), E200676, E200623, C113827, C113828 (10.15%), C113829, C113834, C113838 and C113842.

Though the AS 1141.33 analysis is not directly comparable to the clay and fine silt fraction determined by sieving, the results were reasonably consistent with previous testing and that expected by using the Standard. Almost all the samples analysed for this study had a C value (%) similar to the weight % <75 µm determined by sieving (primarily within 1-3%).

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SENIOR LABORATORY TECHNICIAN

N. L. Delany
TECHNICAL OFFICER

DISCLAIMERS:

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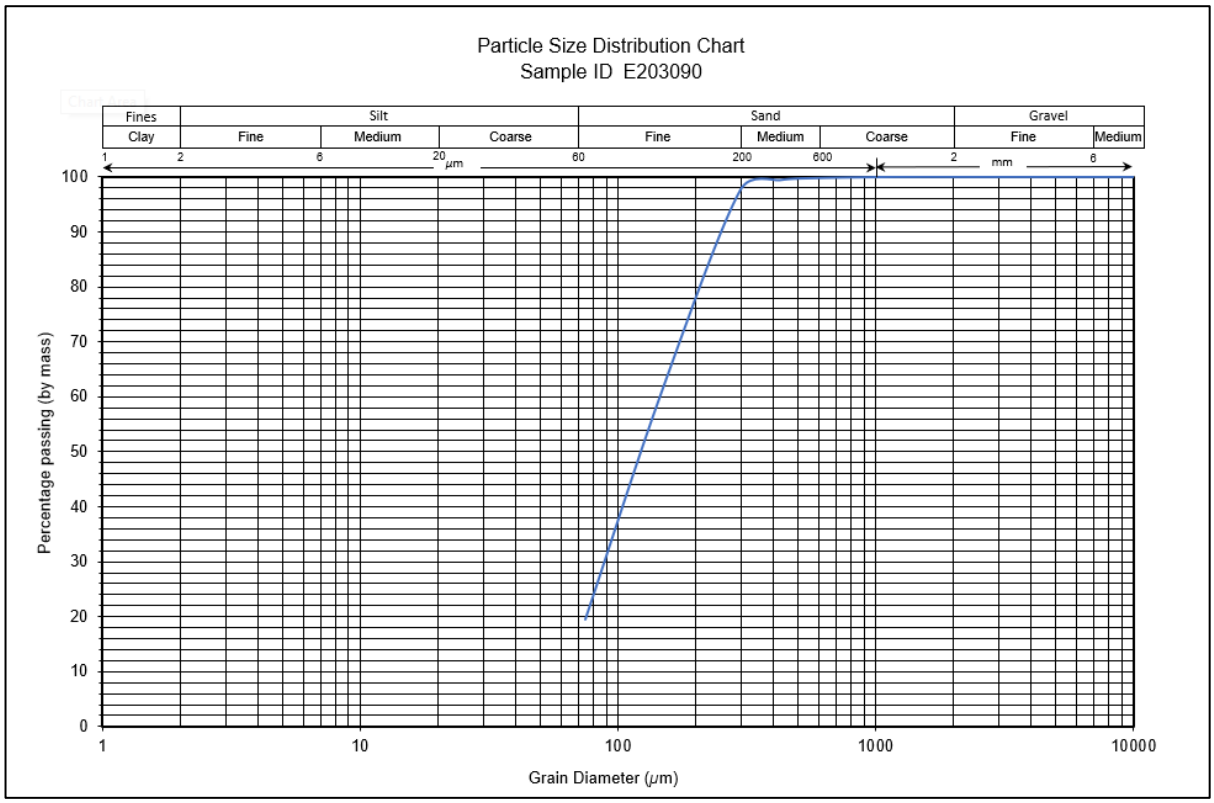
LABORATORY DETAILS

MRT operates a laboratory facility at Mornington, Tasmania. In the interests of full disclosure, these laboratories do not have NATA accreditation. However, all tests are performed according to relevant Australian Standards cited in the report and subject to internal peer review processes. The analytical facilities at MRT are periodically compared against other similar laboratories in other jurisdictions with favourable results.

APPENDIX 1: PARTICLE SIZE DISTRIBUTION DATA

E203090 Cumulative Histogram & PSD Data

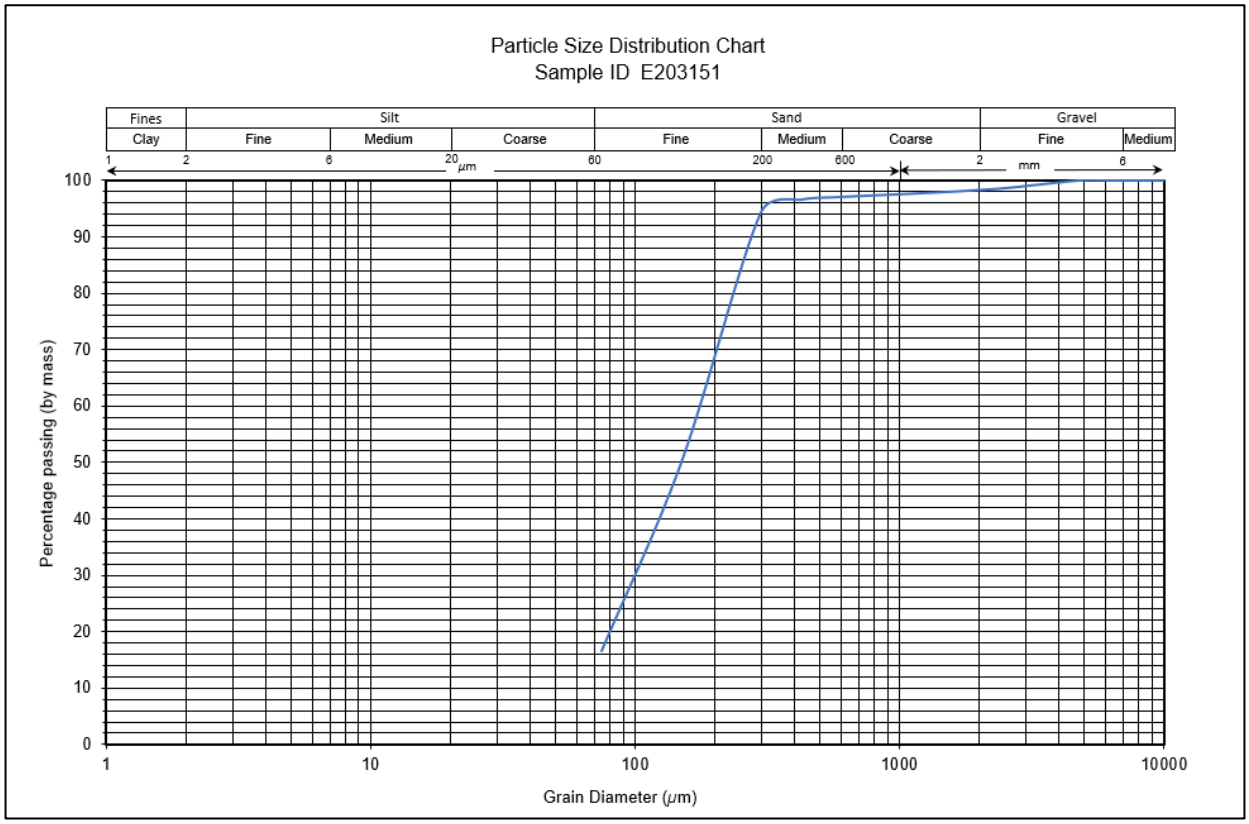


Sample ID:	E203090
Date:	6/09/2024

Weight of sample used (g)	52.7

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.10	0.19	100.00	1180
600-425	0.20	0.38	99.81	600
425-300	0.90	1.73	99.42	425
300-150	18.80	36.15	97.69	300
150-75	21.90	42.12	61.54	150
<75	10.10	19.42	19.42	75
Total	52.00	100.00		0

E203151 Cumulative Histogram & PSD Data

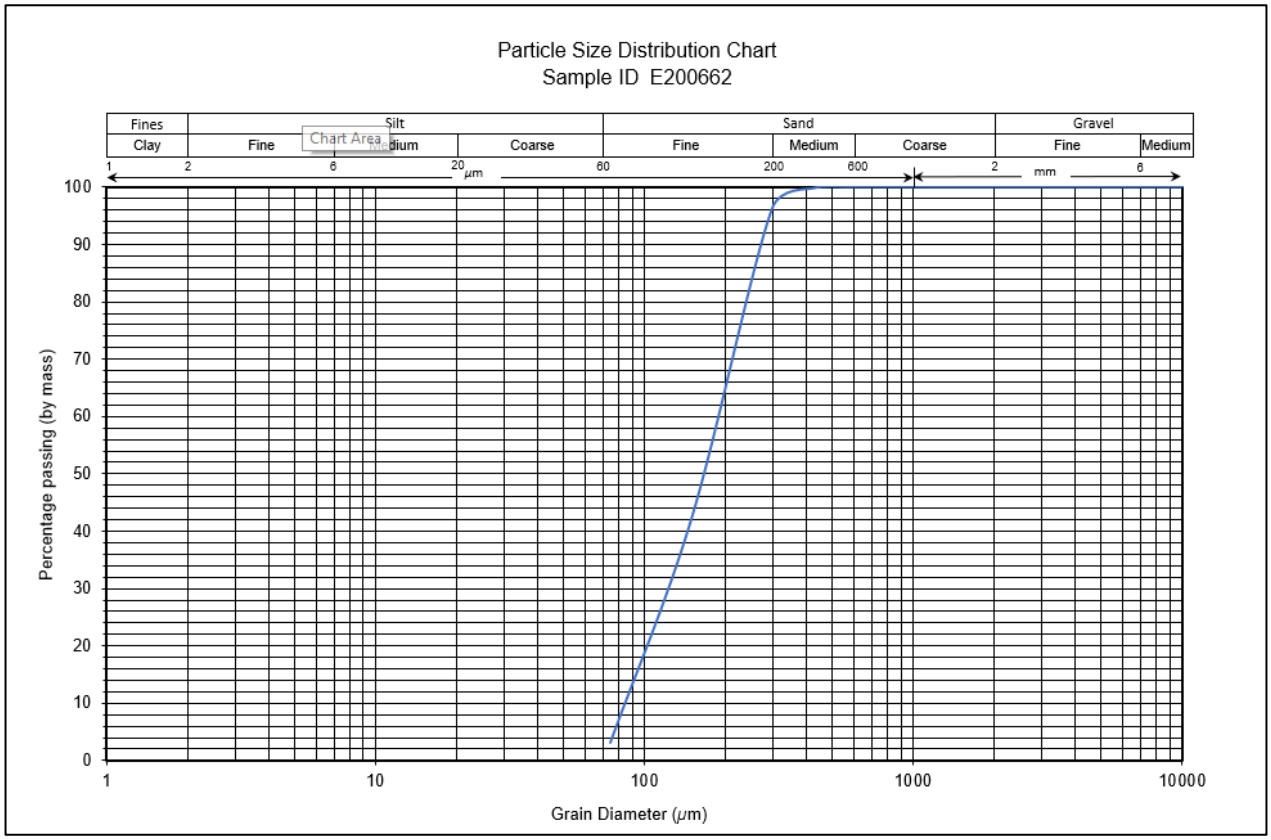


Sample ID:	E203151
Date:	6/09/2024

Weight of sample used (g)	62.2

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.90	1.45	100.00	4750
2360-1180	0.50	0.81	98.55	2360
1180-600	0.40	0.65	97.74	1180
600-425	0.30	0.48	97.09	600
425-300	1.40	2.26	96.61	425
300-150	27.50	44.43	94.35	300
150-75	20.70	33.44	49.92	150
<75	10.20	16.48	16.48	75
Total	61.90	100.00		0

E200662 Cumulative Histogram & PSD Data

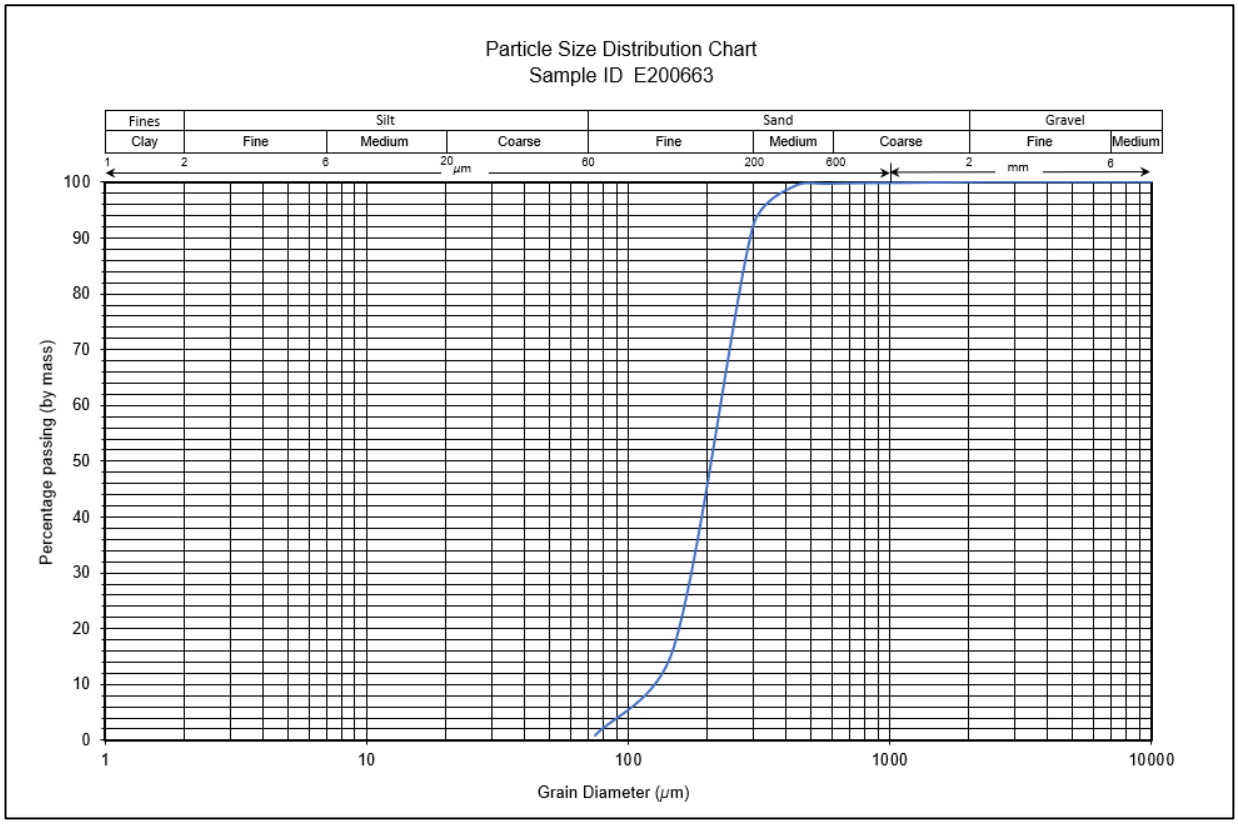


Sample ID:	E200662
Date:	6/09/2024

Weight of sample used (g)	69.4

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.00	0.00	100.00	1180
600-425	0.20	0.29	100.00	600
425-300	2.40	3.47	99.71	425
300-150	37.50	54.19	96.24	300
150-75	26.90	38.87	42.05	150
<75	2.20	3.18	3.18	75
Total	69.20	100.00		0

E200663 Cumulative Histogram & PSD Data

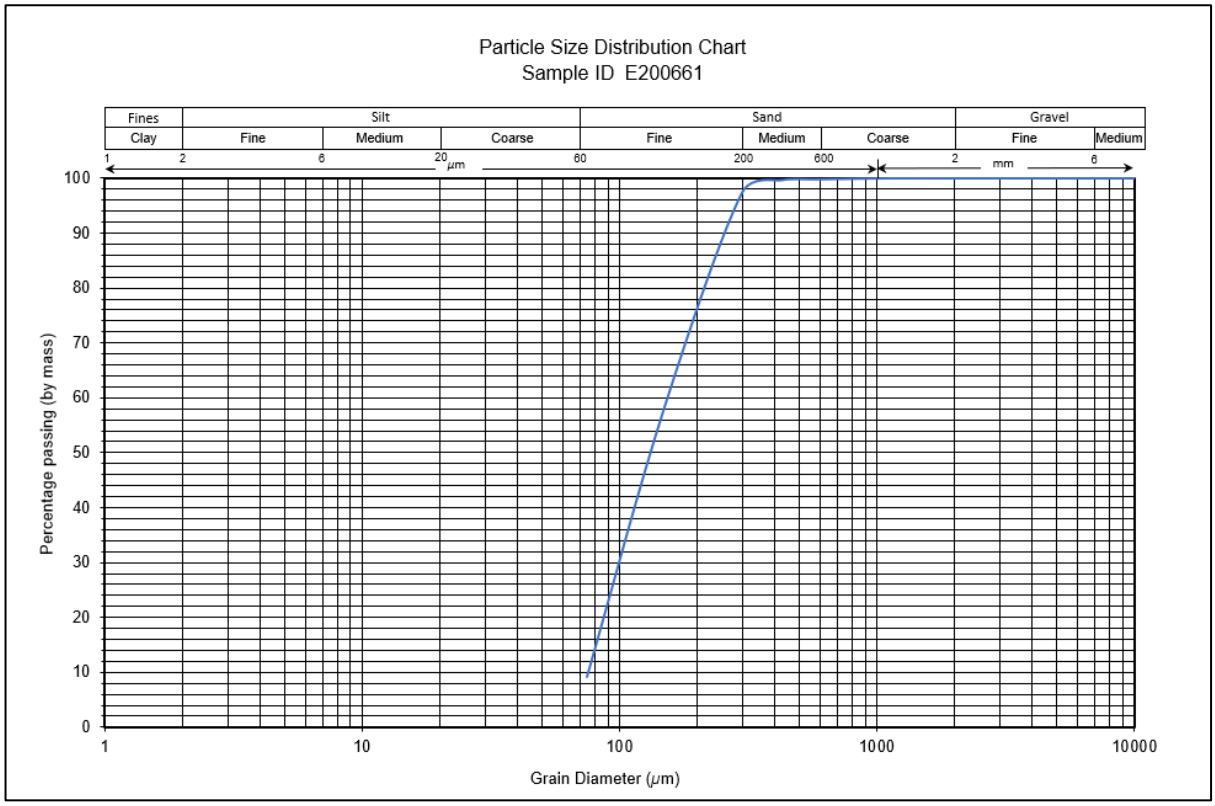


Sample ID:	E200663
Date:	6/09/2024

Weight of sample used (g)	63.1

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.10	0.16	100.00	2360
1180-600	0.10	0.16	99.84	1180
600-425	0.40	0.64	99.68	600
425-300	4.50	7.19	99.04	425
300-150	47.10	75.24	91.85	300
150-75	9.90	15.81	16.61	150
<75	0.50	0.80	0.80	75
Total	62.60	100.00		0

E200661 Cumulative Histogram & PSD Data

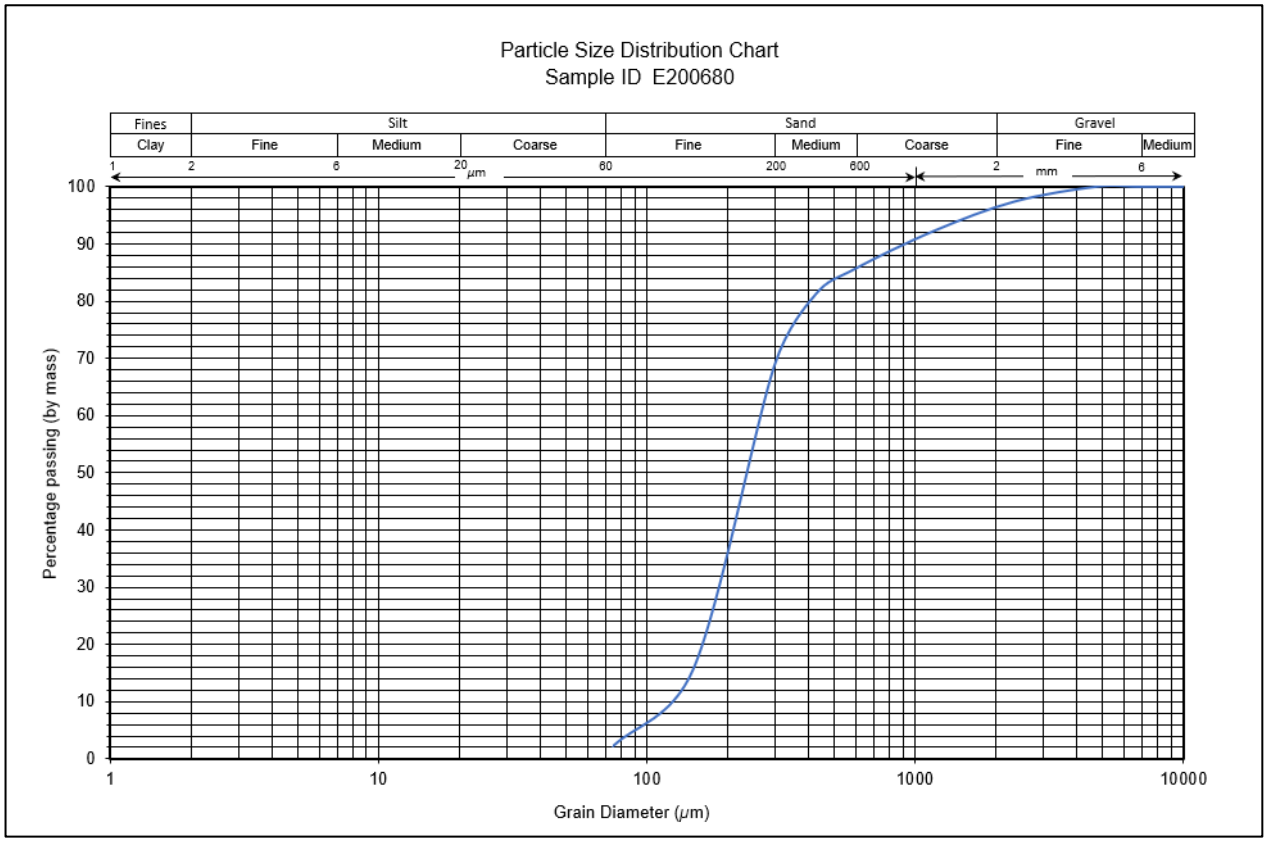


Sample ID:	E200661
Date:	6/09/2024

Weight of sample used (g)	57.6

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.10	0.18	100.00	1180
600-425	0.10	0.18	99.82	600
425-300	1.30	2.30	99.65	425
300-150	22.10	39.05	97.35	300
150-75	27.80	49.12	58.30	150
<75	5.20	9.19	9.19	75
Total	56.60	100.00		0

E200680 Cumulative Histogram & PSD Data

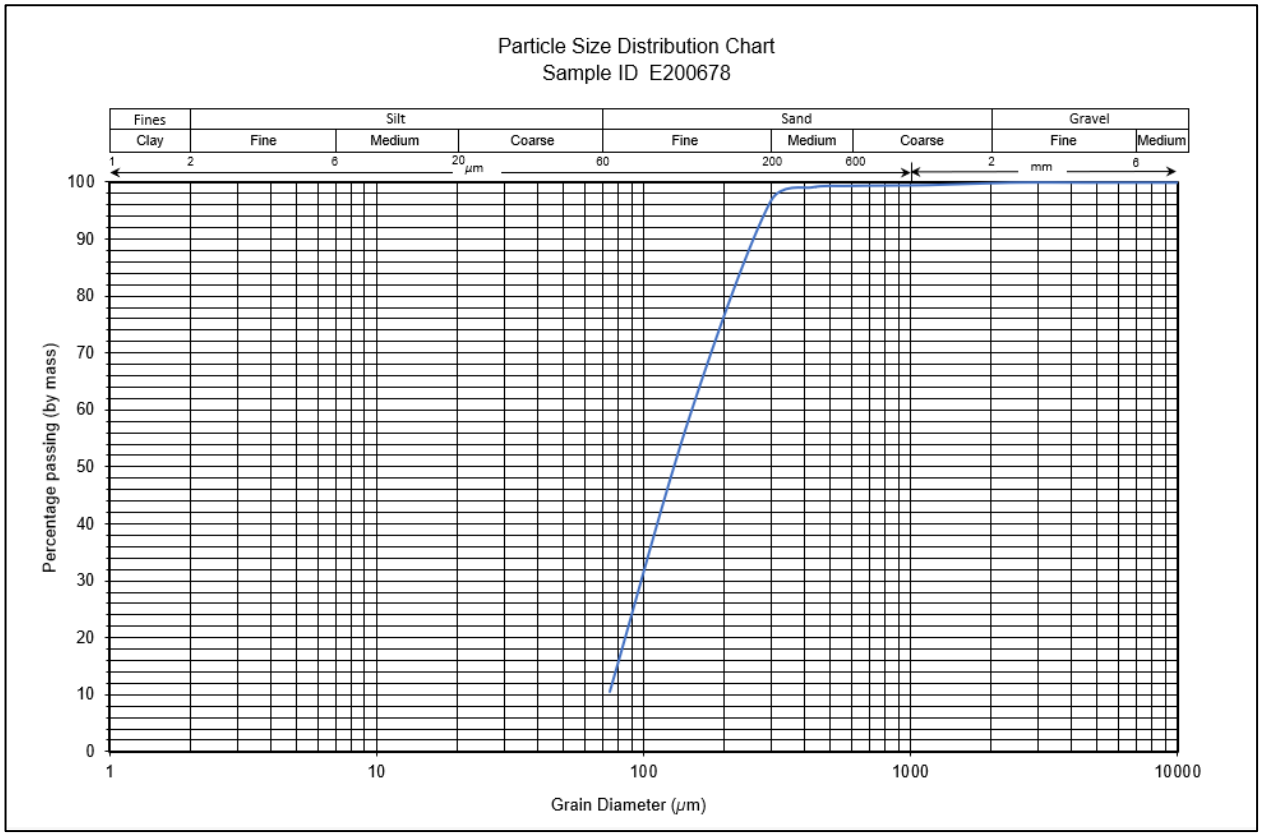


Sample ID:	E200680
Date:	6/09/2024

Weight of sample used (g)	55.1

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	1.40	2.57	100.00	4750
2360-1180	2.80	5.15	97.43	2360
1180-600	3.60	6.62	92.28	1180
600-425	2.50	4.60	85.66	600
425-300	6.70	12.32	81.07	425
300-150	28.80	52.94	68.75	300
150-75	7.40	13.60	15.81	150
<75	1.20	2.21	2.21	75
Total	54.40	100.00		0

E200678 Cumulative Histogram & PSD Data

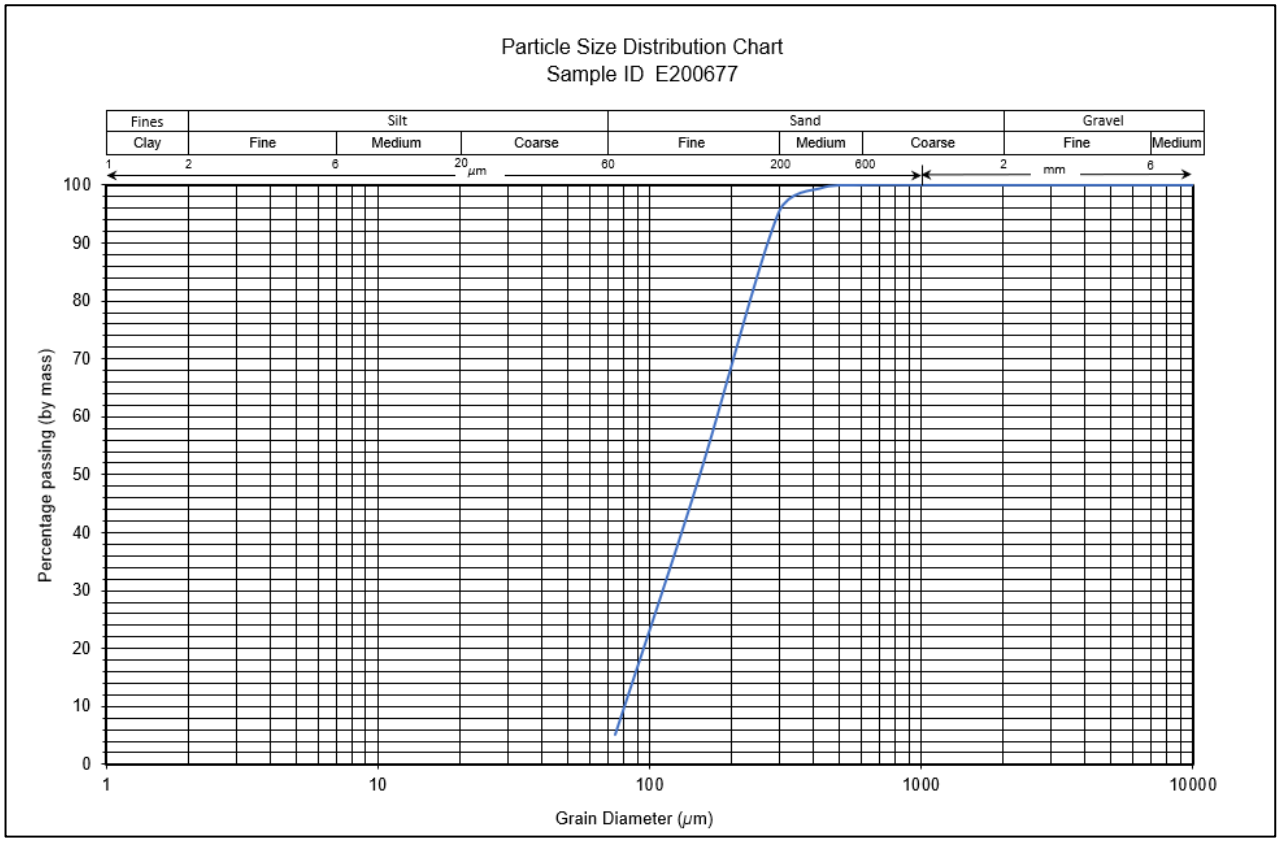


Sample ID:	E200678
Date:	6/09/2024

Weight of sample used (g)	70.3

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.30	0.43	100.00	2360
1180-600	0.10	0.14	99.57	1180
600-425	0.20	0.29	99.43	600
425-300	1.70	2.44	99.14	425
300-150	26.20	37.54	96.70	300
150-75	34.00	48.71	59.17	150
<75	7.30	10.46	10.46	75
Total	69.80	100.00		0

E200677 Cumulative Histogram & PSD Data

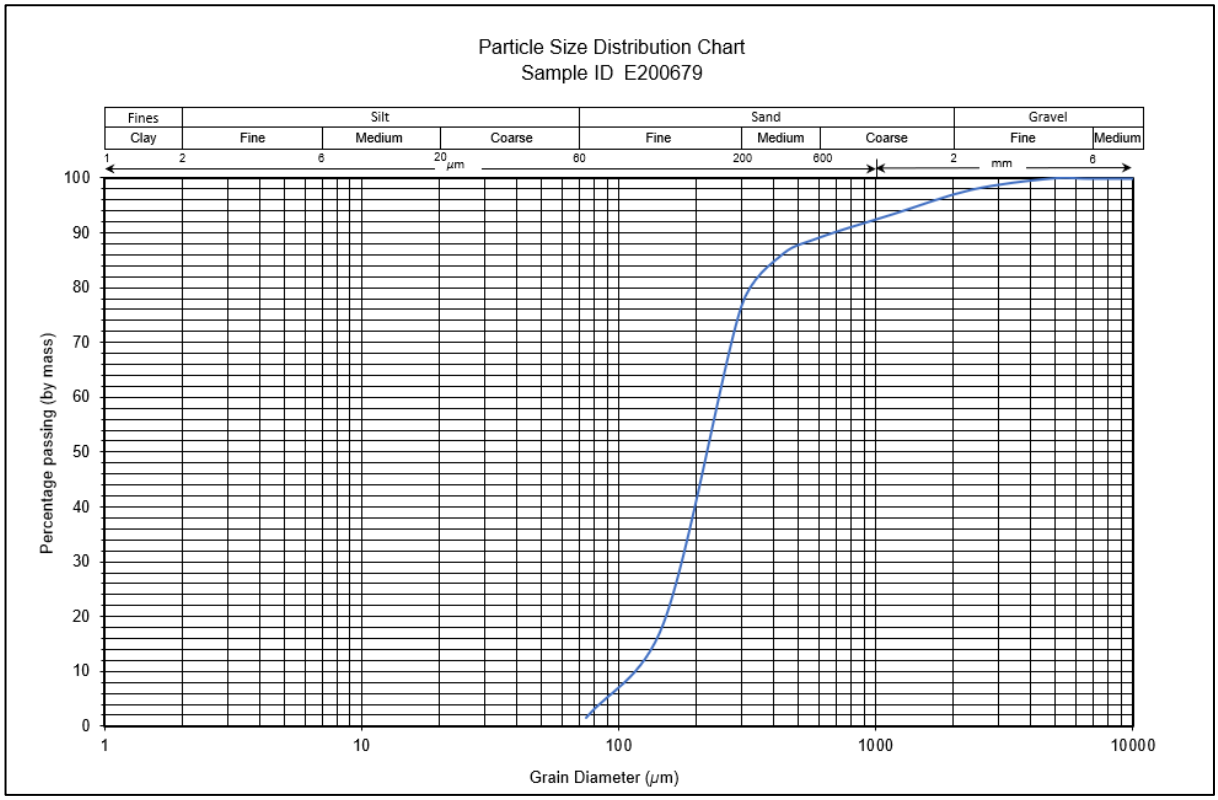


Sample ID:	E200677
Date:	6/09/2024

Weight of sample used (g)	51.2

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.00	0.00	100.00	1180
600-425	0.30	0.59	100.00	600
425-300	2.10	4.11	99.41	425
300-150	24.00	46.97	95.30	300
150-75	22.10	43.25	48.34	150
<75	2.60	5.09	5.09	75
Total	51.10	100.00		0

E200679 Cumulative Histogram & PSD Data

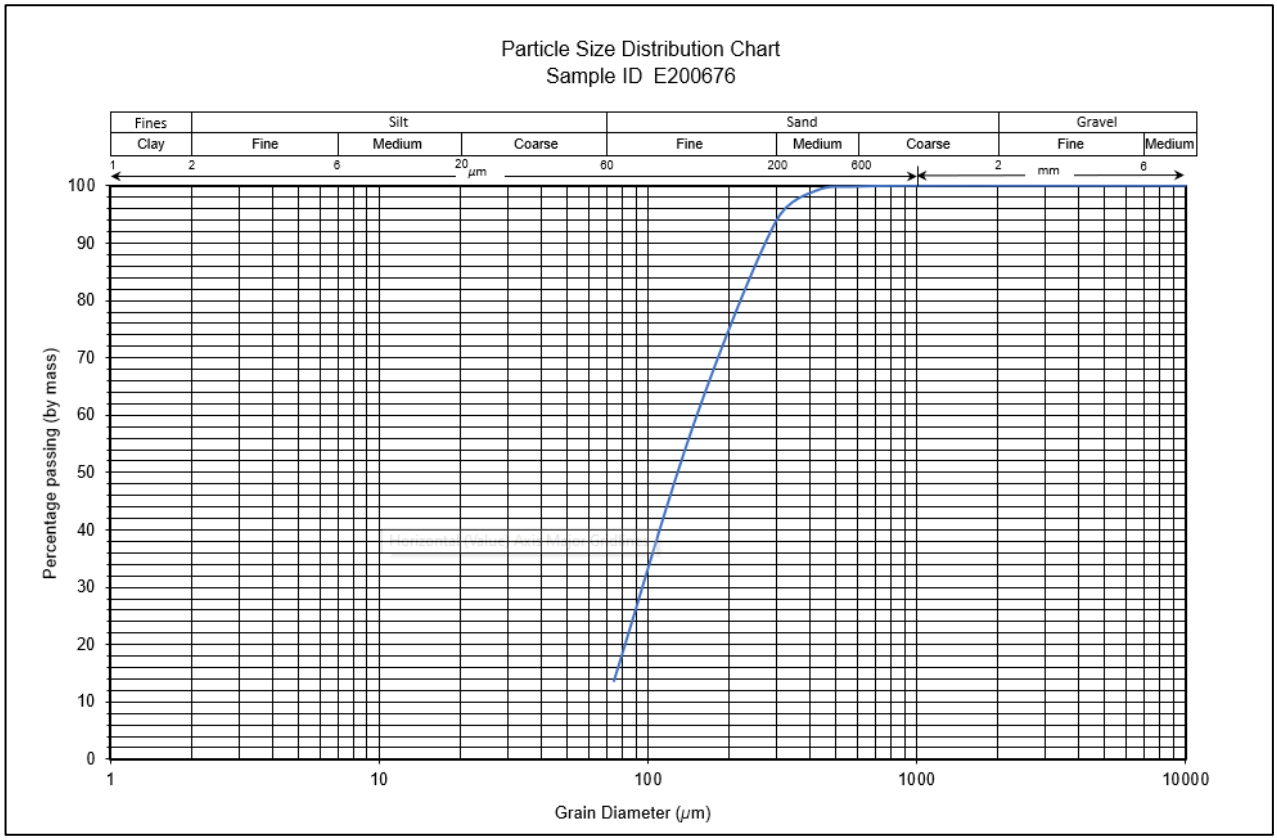


Sample ID:	E200679
Date:	6/09/2024

Weight of sample used (g)	59.6

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	1.20	2.03	100.00	4750
2360-1180	2.60	4.40	97.97	2360
1180-600	2.60	4.40	93.57	1180
600-425	2.00	3.38	89.17	600
425-300	5.50	9.31	85.79	425
300-150	34.10	57.70	76.48	300
150-75	10.20	17.26	18.78	150
<75	0.90	1.52	1.52	75
Total	59.10	100.00		0

E200676 Cumulative Histogram & PSD Data

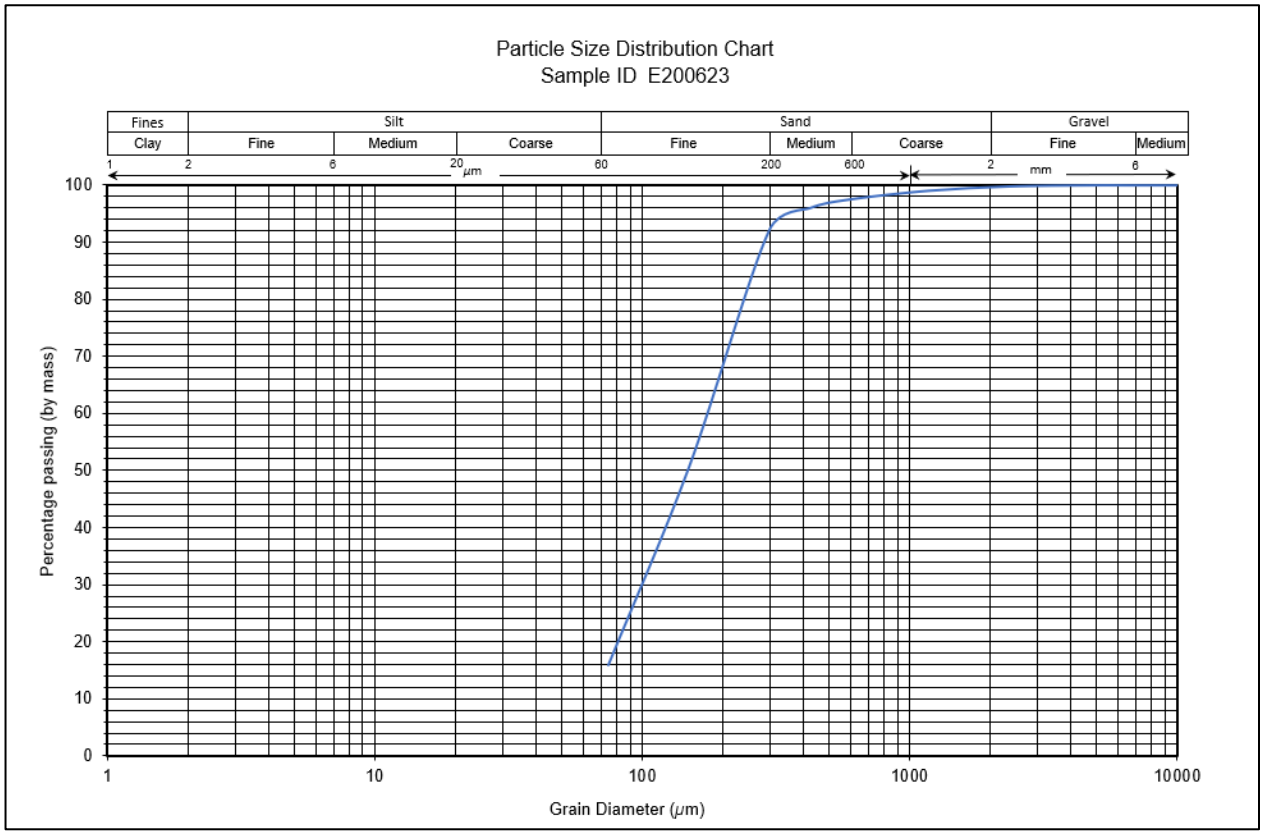


Sample ID:	E200676
Date:	6/09/2024

Weight of sample used (g)	57.8

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.10	0.17	100.00	1180
600-425	0.40	0.70	99.83	600
425-300	3.10	5.39	99.13	425
300-150	20.00	34.78	93.74	300
150-75	26.10	45.39	58.96	150
<75	7.80	13.57	13.57	75
Total	57.50	100.00		0

E200623 Cumulative Histogram & PSD Data

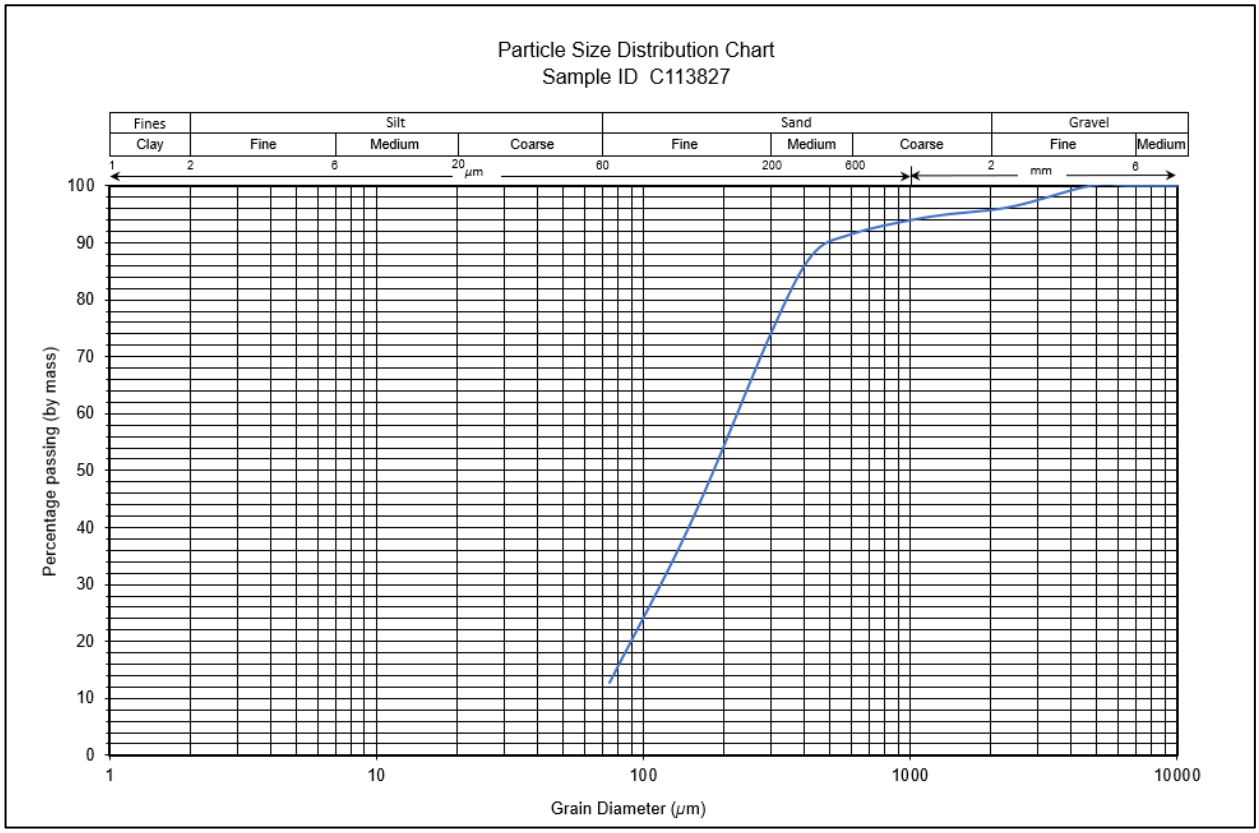


Sample ID:	E200623
Date:	6/09/2024

Weight of sample used (g)	52.9

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.10	0.19	100.00	4750
2360-1180	0.40	0.76	99.81	2360
1180-600	0.80	1.52	99.05	1180
600-425	0.80	1.52	97.53	600
425-300	2.00	3.80	96.01	425
300-150	21.90	41.63	92.21	300
150-75	18.20	34.60	50.57	150
<75	8.40	15.97	15.97	75
Total	52.60	100.00		0

C113827 Cumulative Histogram & PSD Data

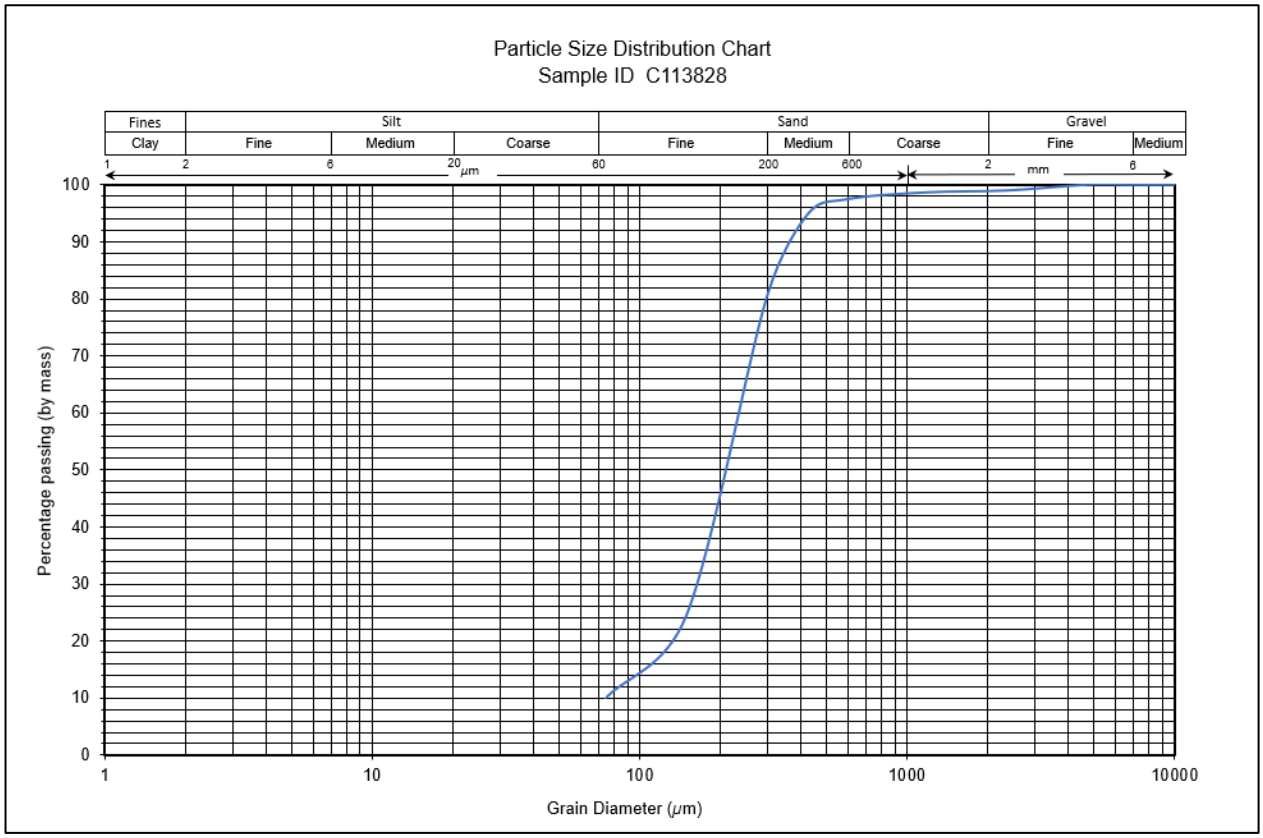


Sample ID:	C113827
Date:	6/09/2024

Weight of sample used (g)	58.8

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	2.20	3.77	100.00	4750
2360-1180	1.00	1.71	96.23	2360
1180-600	1.80	3.08	94.52	1180
600-425	2.30	3.94	91.44	600
425-300	8.00	13.70	87.50	425
300-150	19.50	33.39	73.80	300
150-75	16.20	27.74	40.41	150
<75	7.40	12.67	12.67	75
Total	58.40	100.00		0

C113828 Cumulative Histogram & PSD Data

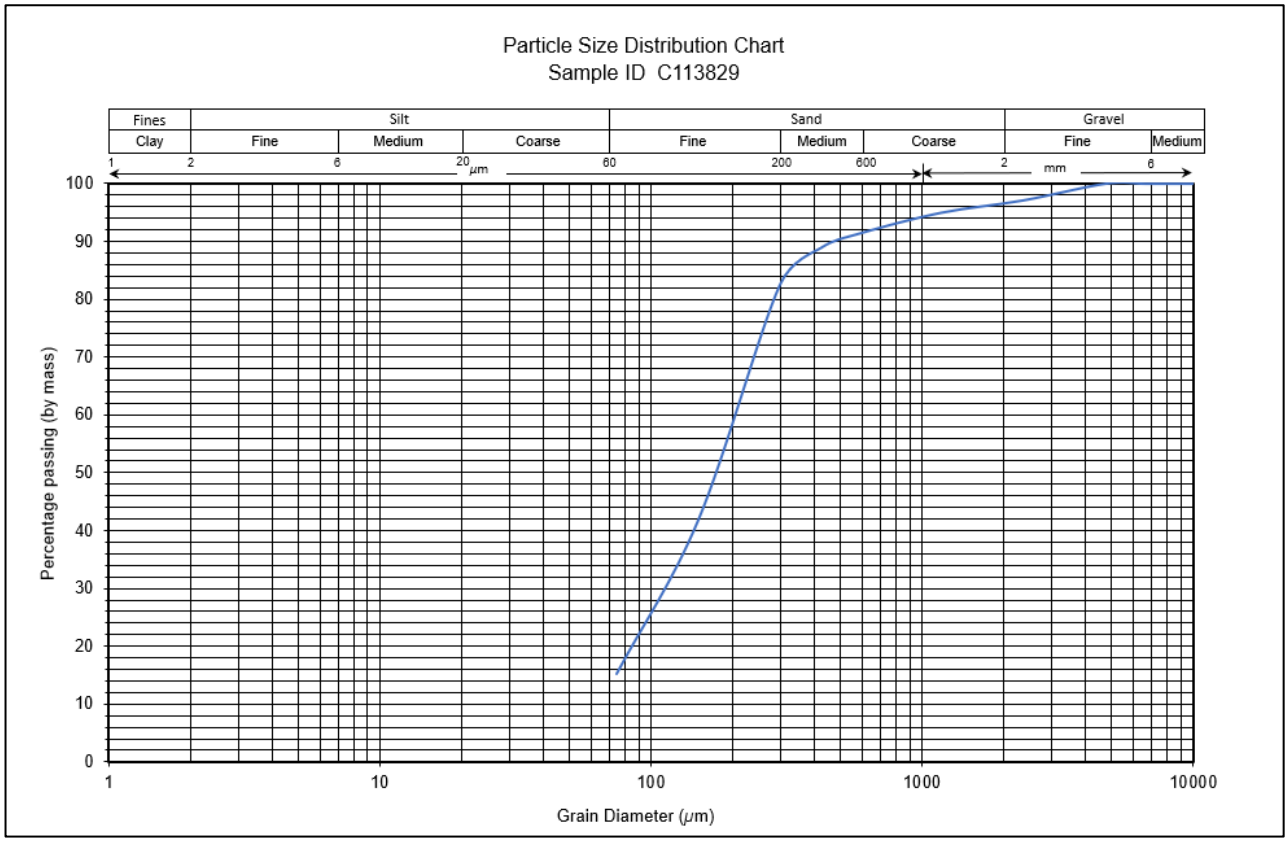


Sample ID:	C113828
Date:	6/09/2024

Weight of sample used (g)	59.3

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.60	1.02	100.00	4750
2360-1180	0.20	0.34	98.98	2360
1180-600	0.70	1.18	98.65	1180
600-425	1.60	2.71	97.46	600
425-300	8.50	14.38	94.75	425
300-150	33.00	55.84	80.37	300
150-75	8.50	14.38	24.53	150
<75	6.00	10.15	10.15	75
Total	59.10	100.00		0

C113829 Cumulative Histogram & PSD Data

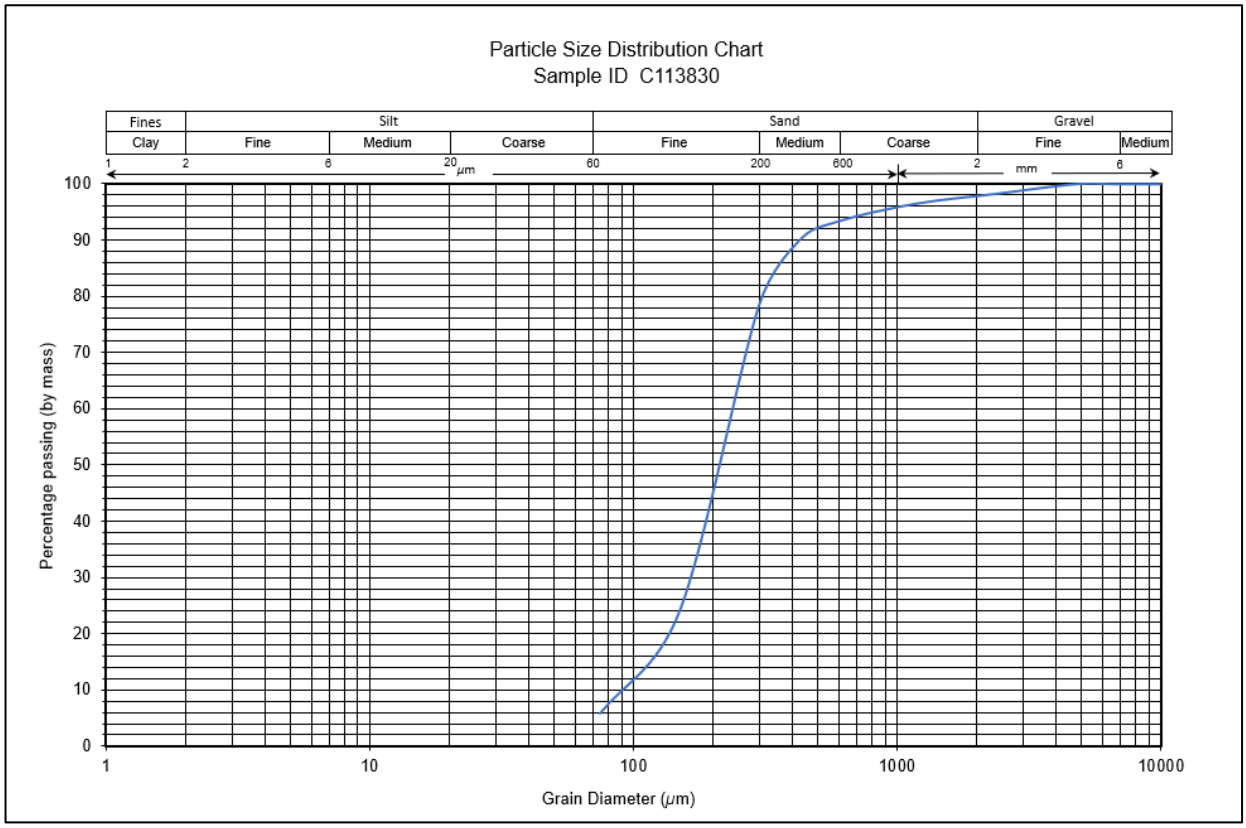


Sample ID:	C113829
Date:	6/09/2024

Weight of sample used (g)	66.2

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	1.90	2.89	100.00	4750
2360-1180	1.40	2.13	97.11	2360
1180-600	2.30	3.50	94.98	1180
600-425	1.70	2.58	91.49	600
425-300	4.20	6.38	88.91	425
300-150	26.80	40.73	82.52	300
150-75	17.50	26.60	41.79	150
<75	10.00	15.20	15.20	75
Total	65.80	100.00		0

C113830 Cumulative Histogram & PSD Data

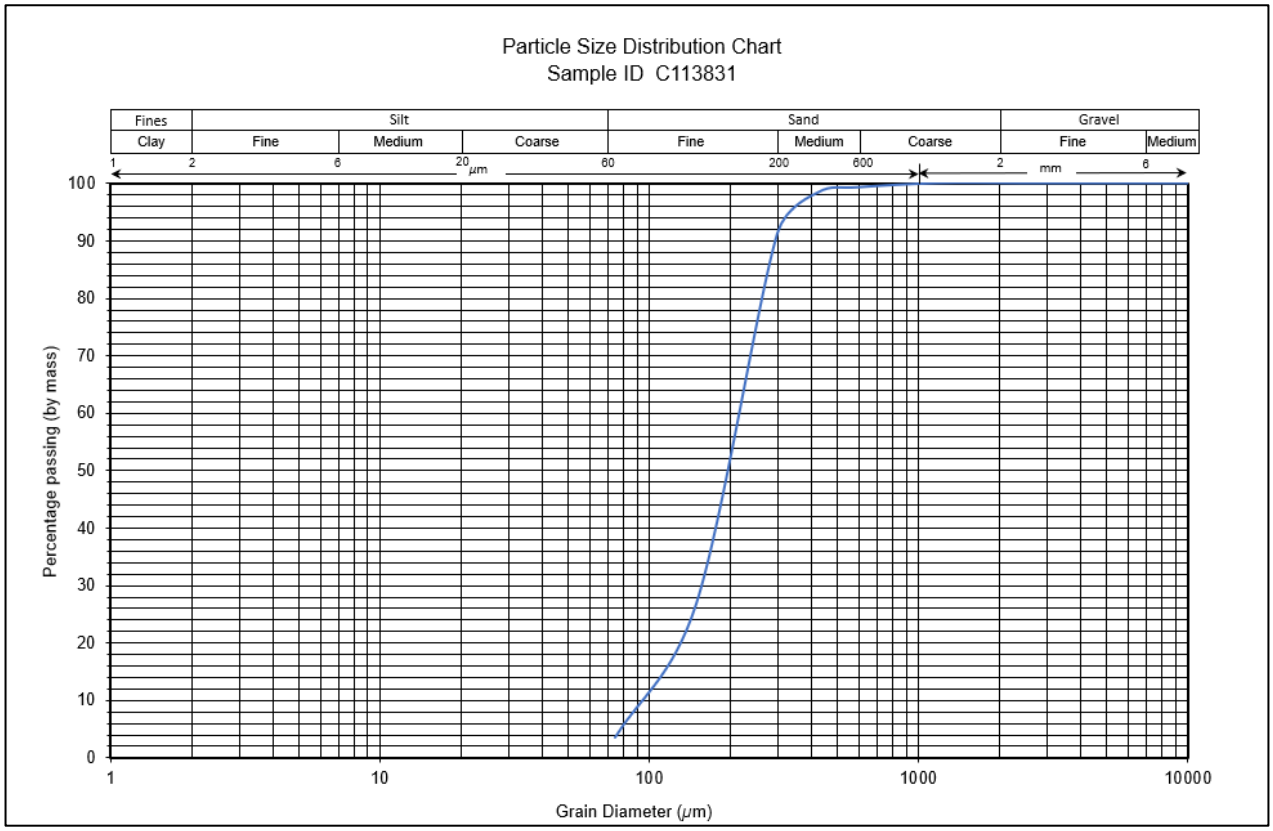


Sample ID:	C113830
Date:	6/09/2024

Weight of sample used (g)	57.6

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	1.00	1.75	100.00	4750
2360-1180	1.00	1.75	98.25	2360
1180-600	1.80	3.14	96.51	1180
600-425	2.00	3.49	93.37	600
425-300	6.60	11.52	89.88	425
300-150	31.20	54.45	78.36	300
150-75	10.40	18.15	23.91	150
<75	3.30	5.76	5.76	75
Total	57.30	100.00		0

C113831 Cumulative Histogram & PSD Data

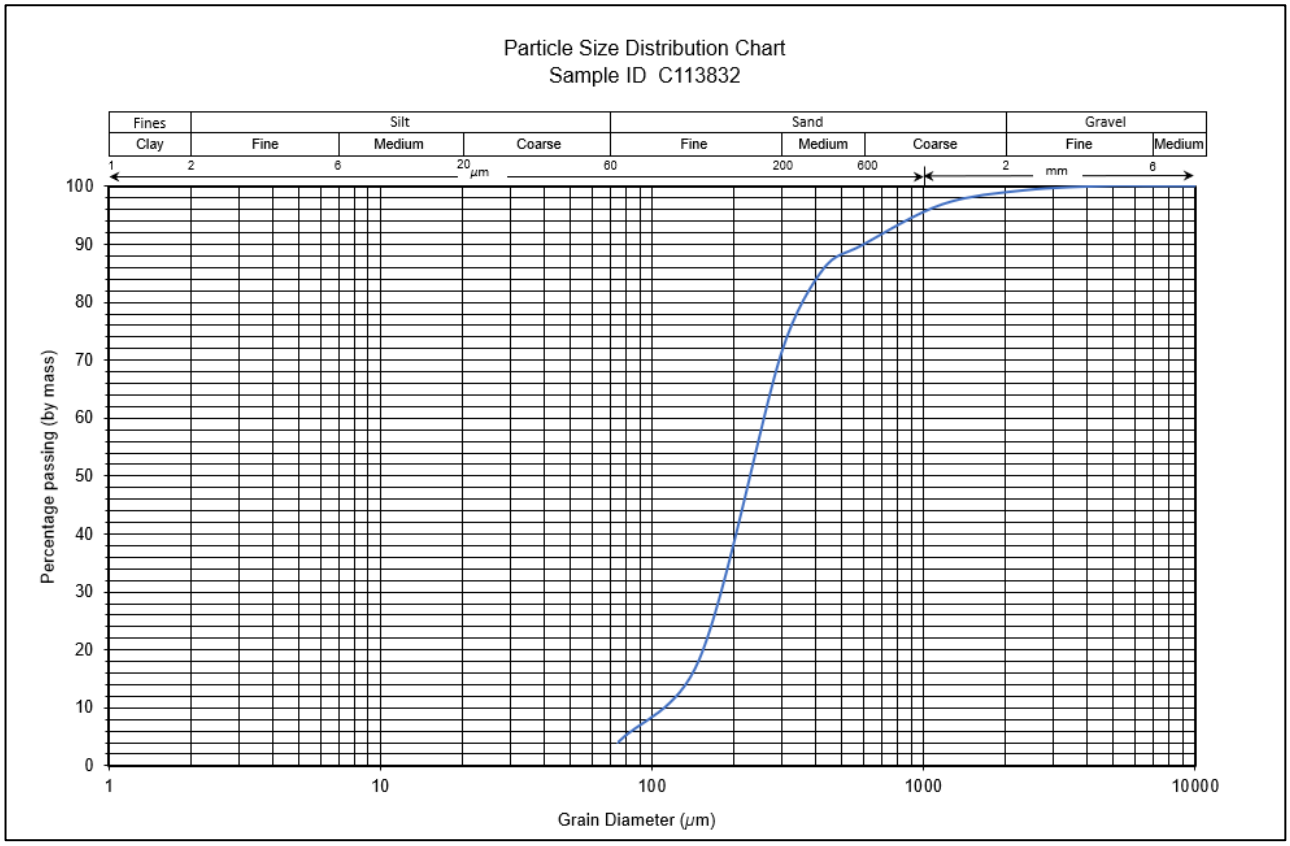


Sample ID:	C113831
Date:	6/09/2024

Weight of sample used (g)	56

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.40	0.71	100.00	1180
600-425	0.50	0.89	99.29	600
425-300	4.00	7.14	98.39	425
300-150	36.10	64.46	91.25	300
150-75	13.00	23.21	26.79	150
<75	2.00	3.57	3.57	75
Total	56.00	100.00		0

C113832 Cumulative Histogram & PSD Data

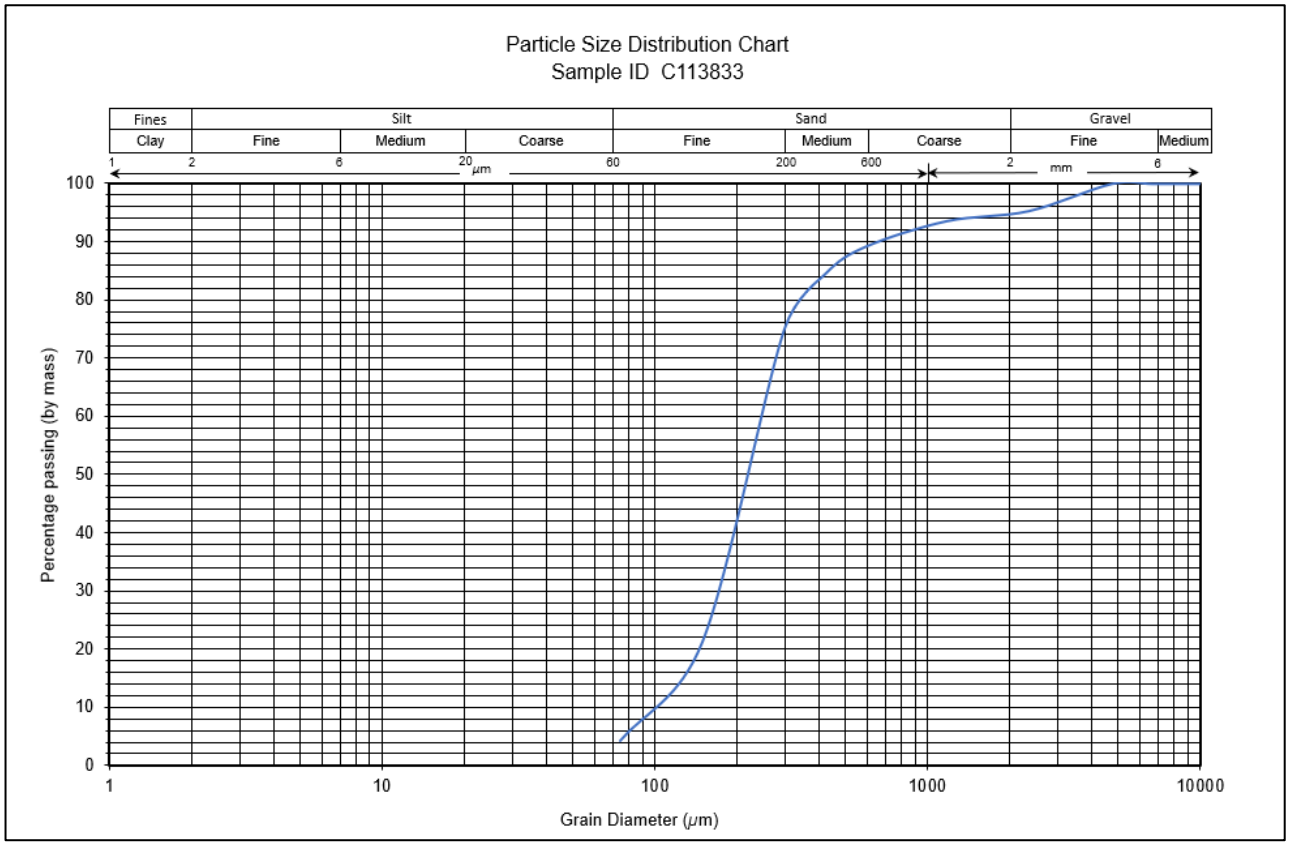


Sample ID:	C113832
Date:	6/09/2024

Weight of sample used (g)	54.6

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.40	0.74	100.00	4750
2360-1180	1.30	2.39	99.26	2360
1180-600	3.80	7.00	96.87	1180
600-425	2.40	4.42	89.87	600
425-300	7.80	14.36	85.45	425
300-150	28.60	52.67	71.09	300
150-75	7.80	14.36	18.42	150
<75	2.20	4.05	4.05	75
Total	54.30	100.00		0

C113833 Cumulative Histogram & PSD Data

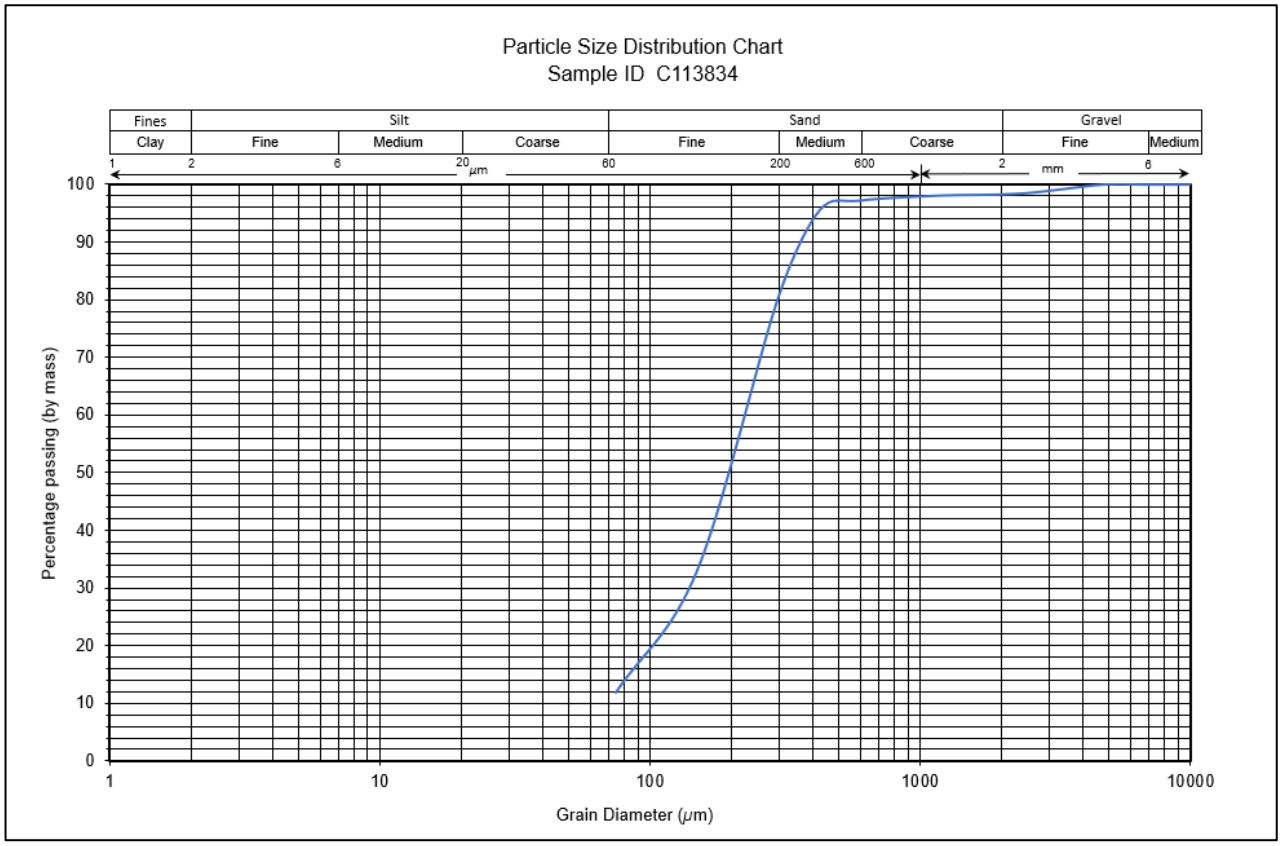


Sample ID:	C113833
Date:	6/09/2024

Weight of sample used (g)	58.2

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	2.70	4.67	100.00	4750
2360-1180	1.00	1.73	95.33	2360
1180-600	2.50	4.33	93.60	1180
600-425	2.70	4.67	89.27	600
425-300	5.50	9.52	84.60	425
300-150	31.10	53.81	75.09	300
150-75	9.80	16.96	21.28	150
<75	2.50	4.33	4.33	75
Total	57.80	100.00		0

C113834 Cumulative Histogram & PSD Data

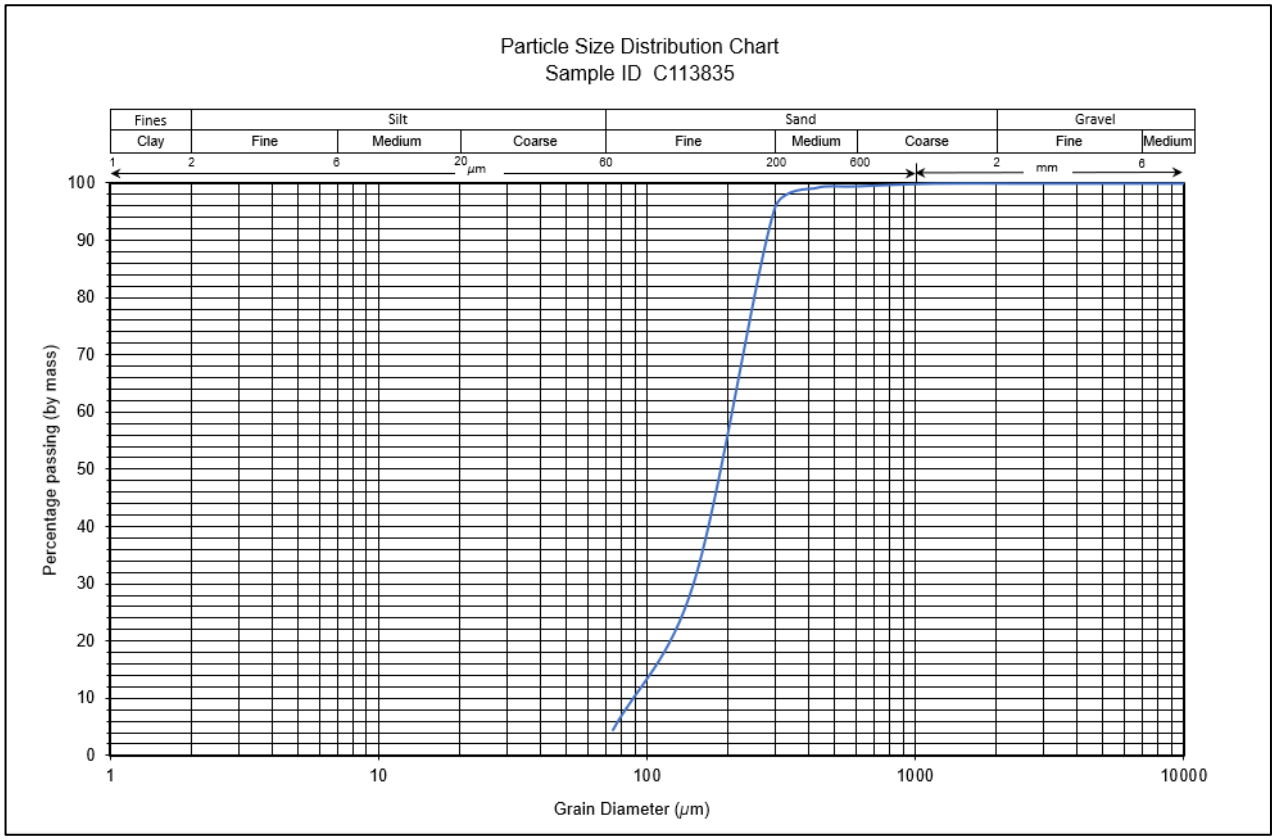


Sample ID:	C113834
Date:	6/09/2024

Weight of sample used (g)	58.2

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.90	1.56	100.00	4750
2360-1180	0.20	0.35	98.44	2360
1180-600	0.50	0.87	98.09	1180
600-425	1.00	1.73	97.23	600
425-300	8.60	14.90	95.49	425
300-150	27.40	47.49	80.59	300
150-75	12.20	21.14	33.10	150
<75	6.90	11.96	11.96	75
Total	57.70	100.00		0

C113835 Cumulative Histogram & PSD Data

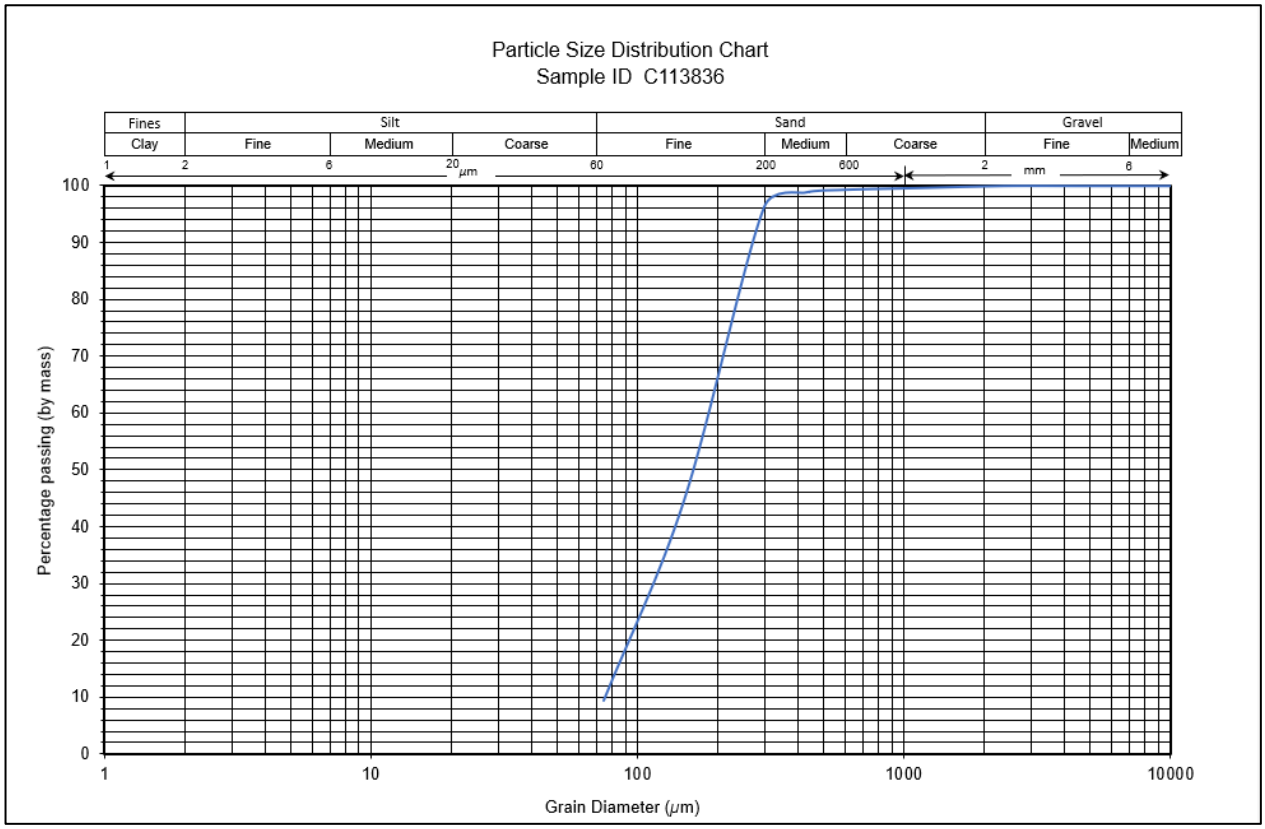


Sample ID:	C113835
Date:	6/09/2024

Weight of sample used (g)	61.8

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.30	0.49	100.00	1180
600-425	0.20	0.33	99.51	600
425-300	2.20	3.58	99.19	425
300-150	40.20	65.47	95.60	300
150-75	15.80	25.73	30.13	150
<75	2.70	4.40	4.40	75
Total	61.40	100.00		0

C113836 Cumulative Histogram & PSD Data

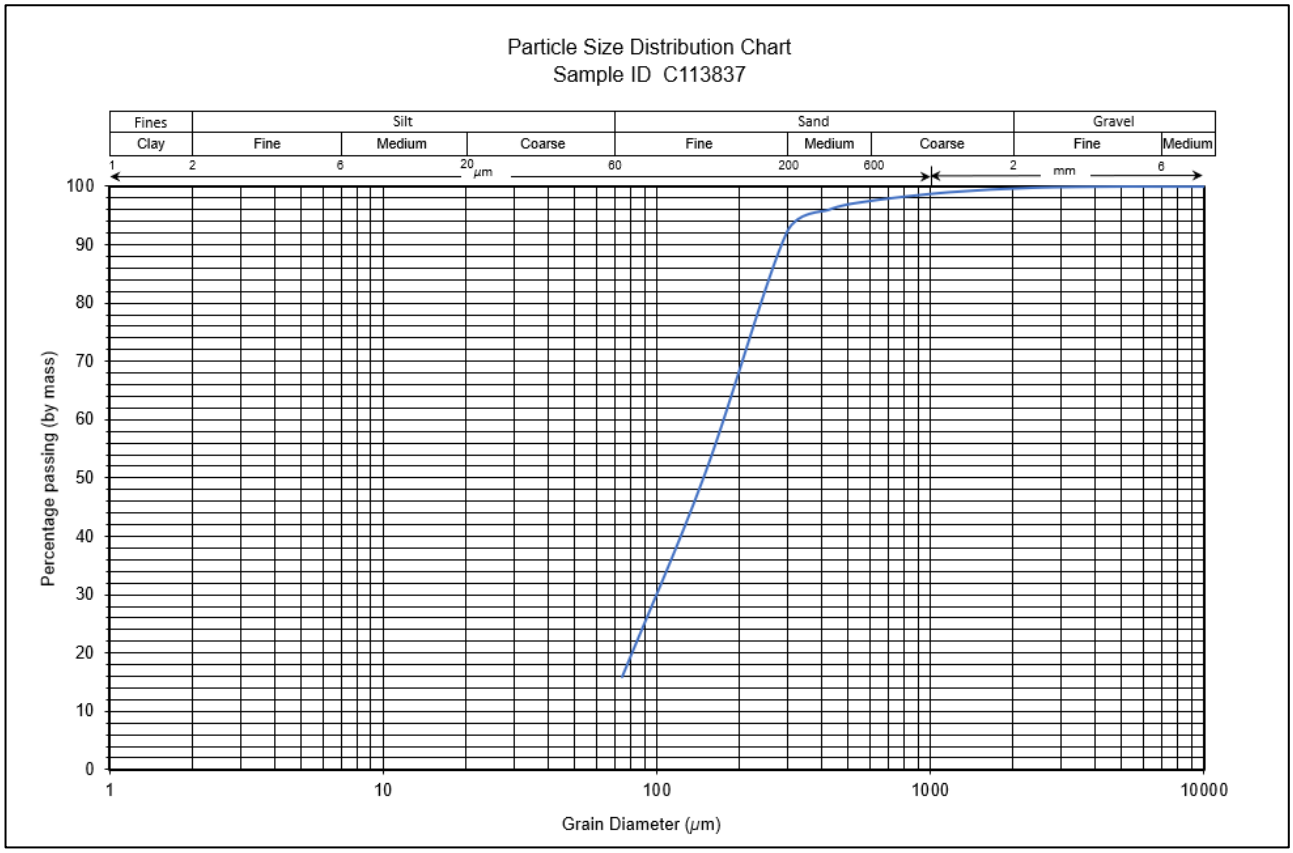


Sample ID:	C113836
Date:	6/09/2024

Weight of sample used (g)	60.3

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.20	0.34	100.00	2360
1180-600	0.20	0.34	99.66	1180
600-425	0.30	0.50	99.33	600
425-300	1.50	2.51	98.83	425
300-150	30.90	51.76	96.31	300
150-75	21.00	35.18	44.56	150
<75	5.60	9.38	9.38	75
Total	59.70	100.00		0

C113837 Cumulative Histogram & PSD Data

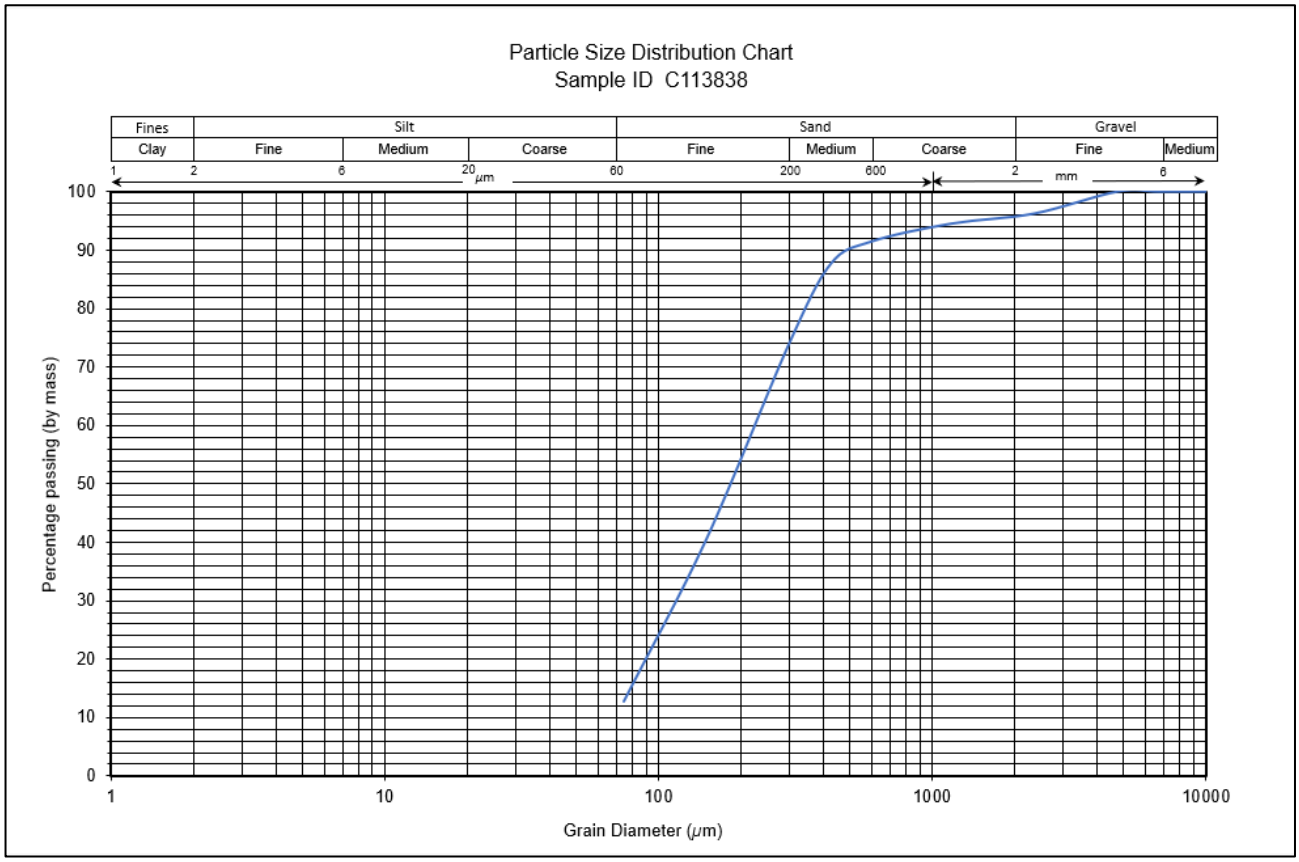


Sample ID:	C113837
Date:	19/11/2024

Weight of sample used (g)	102.1

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.20	0.20	100.00	1180
600-425	0.20	0.20	99.80	600
425-300	5.80	5.68	99.61	425
300-150	65.90	64.54	93.93	300
150-75	28.20	27.62	29.38	150
<75	1.80	1.76	1.76	75
Total	102.10	100.00		0

C113838 Cumulative Histogram & PSD Data

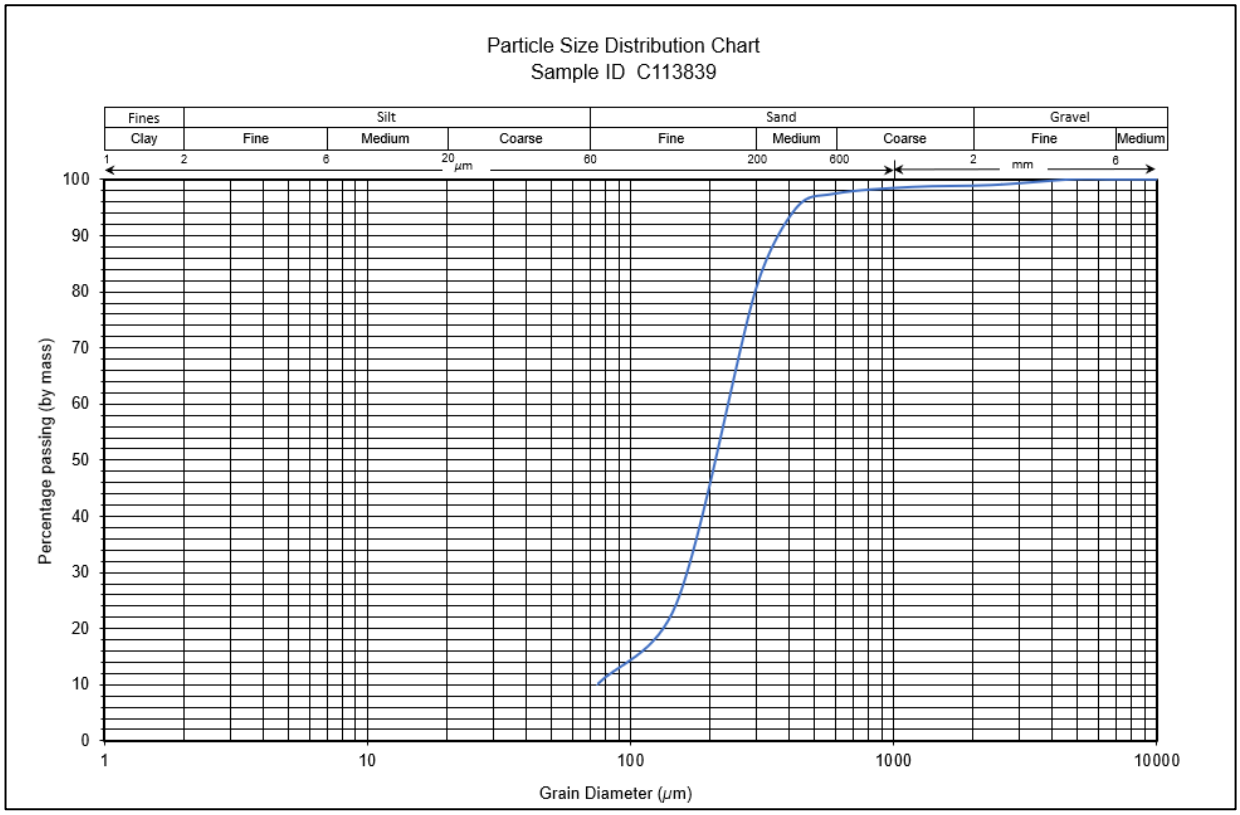


Sample ID:	C113838
Date:	19/11/2024

Weight of sample used (g)	85.4

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.30	0.35	100.00	4750
2360-1180	1.00	1.18	99.65	2360
1180-600	1.10	1.29	98.47	1180
600-425	1.90	2.24	97.18	600
425-300	8.10	9.53	94.94	425
300-150	36.70	43.18	85.41	300
150-75	26.20	30.82	42.24	150
<75	9.70	11.41	11.41	75
Total	85.00	100.00		0

C113839 Cumulative Histogram & PSD Data

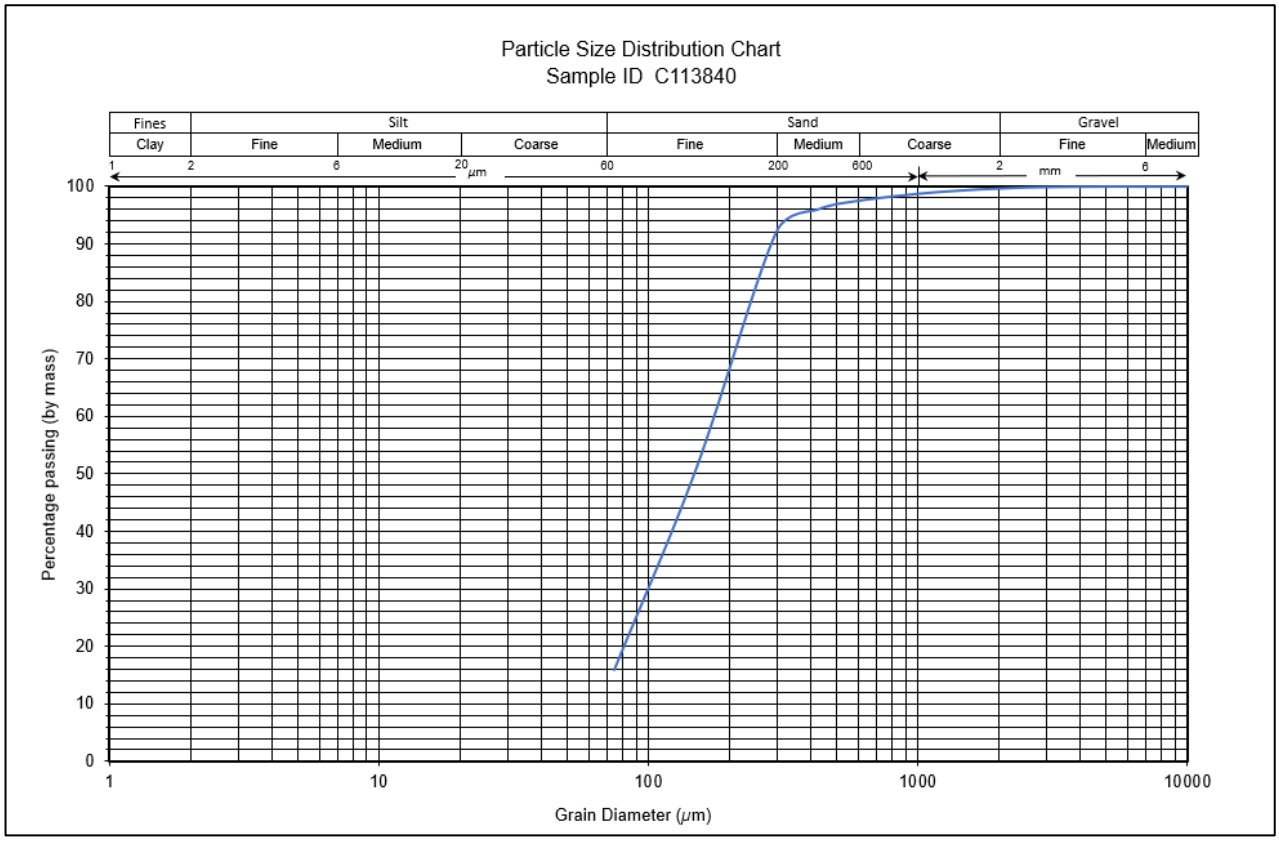


Sample ID:	C113839
Date:	19/11/2024

Weight of sample used (g)	78.4

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.10	0.13	100.00	1180
600-425	0.20	0.26	99.87	600
425-300	1.30	1.67	99.62	425
300-150	46.80	60.00	97.95	300
150-75	28.70	36.79	37.95	150
<75	0.90	1.15	1.15	75
Total	78.00	100.00		0

C113840 Cumulative Histogram & PSD Data

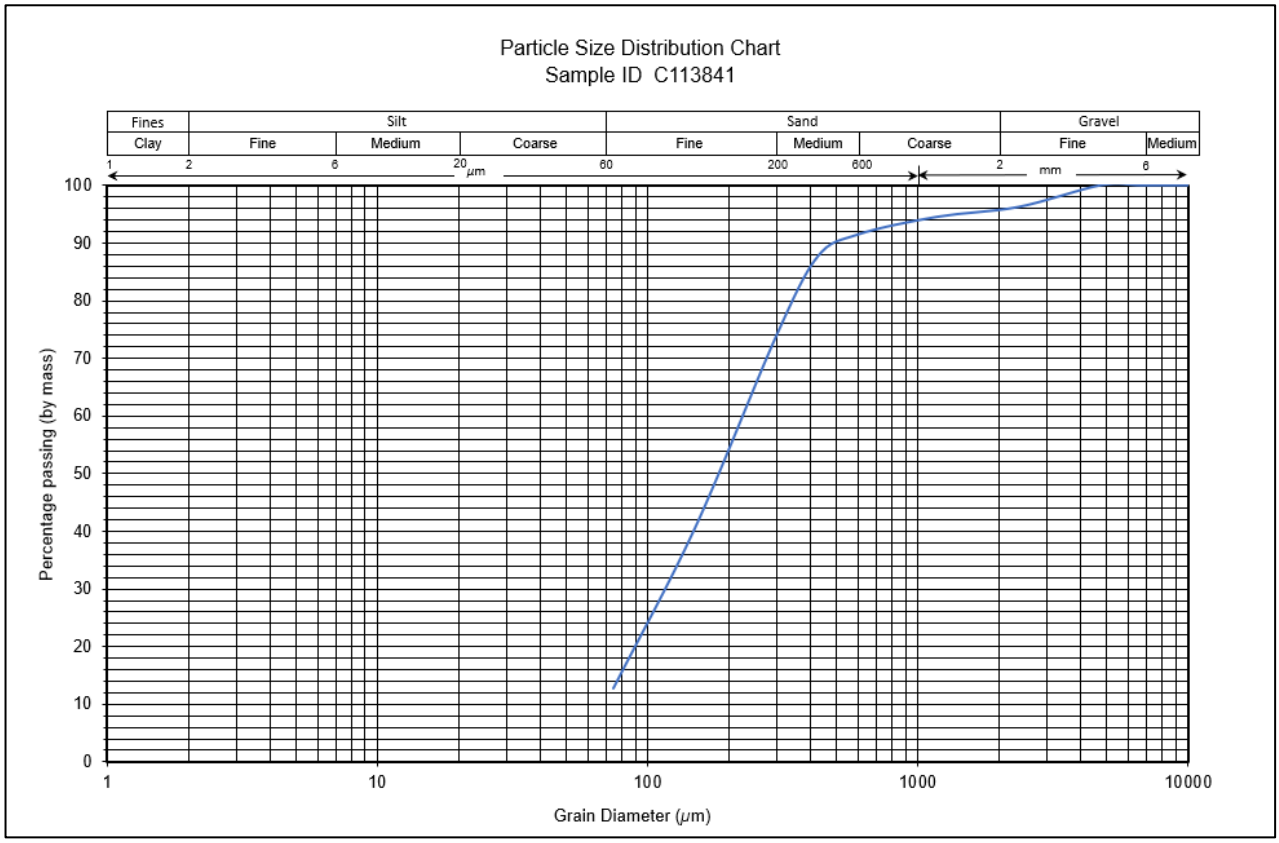


Sample ID:	C113840
Date:	19/11/2024

Weight of sample used (g)	122.40

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.00	0.00	100.00	2360
1180-600	0.10	0.08	100.00	1180
600-425	0.20	0.16	99.92	600
425-300	1.50	1.23	99.75	425
300-150	59.50	48.85	98.52	300
150-75	49.00	40.23	49.67	150
<75	11.50	9.44	9.44	75
Total	121.80	100.00		0

C113841 Cumulative Histogram & PSD Data

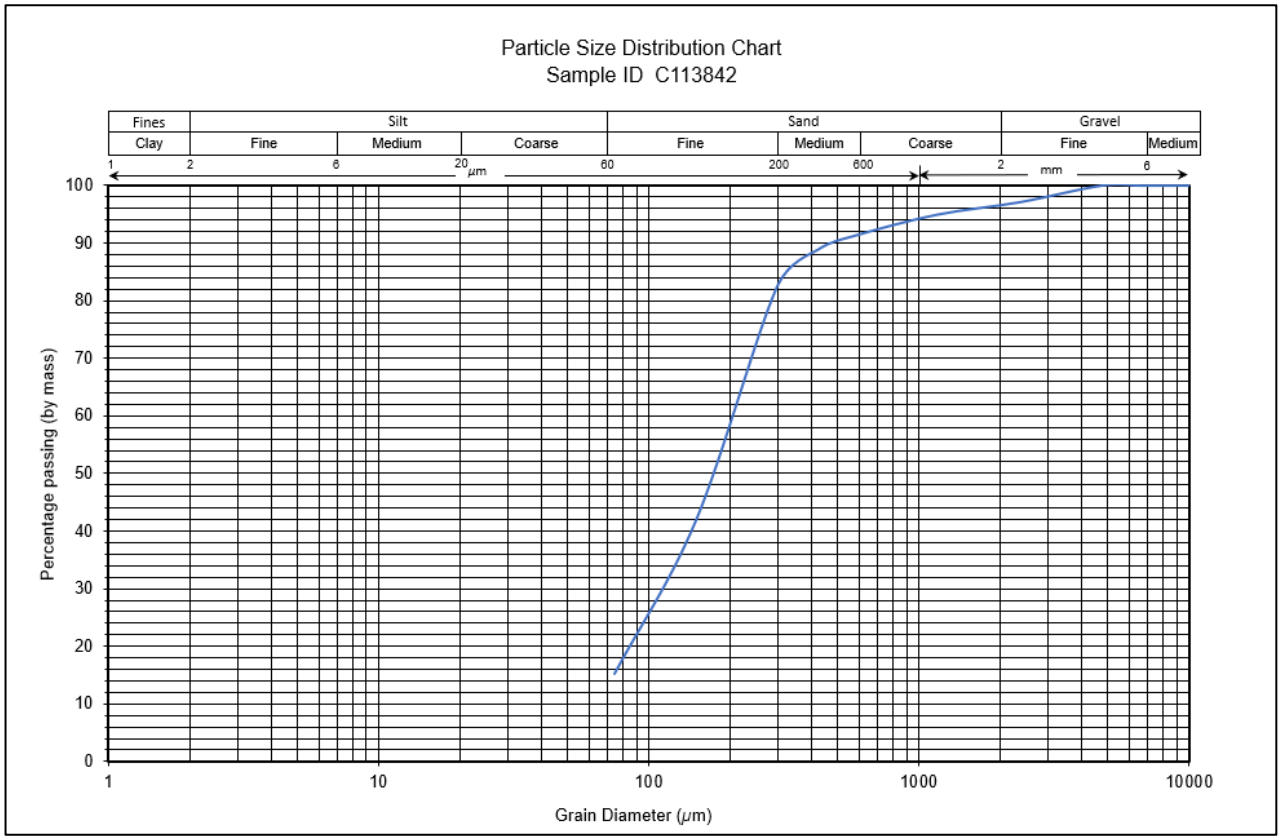


Sample ID:	C113841
Date:	19/11/2024

Weight of sample used (g)	109.60

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.20	0.18	100.00	2360
1180-600	0.60	0.55	99.82	1180
600-425	0.80	0.73	99.27	600
425-300	7.10	6.51	98.53	425
300-150	62.90	57.65	92.03	300
150-75	29.40	26.95	34.37	150
<75	8.10	7.42	7.42	75
Total	109.10	100.00		0

C113842 Cumulative Histogram & PSD Data

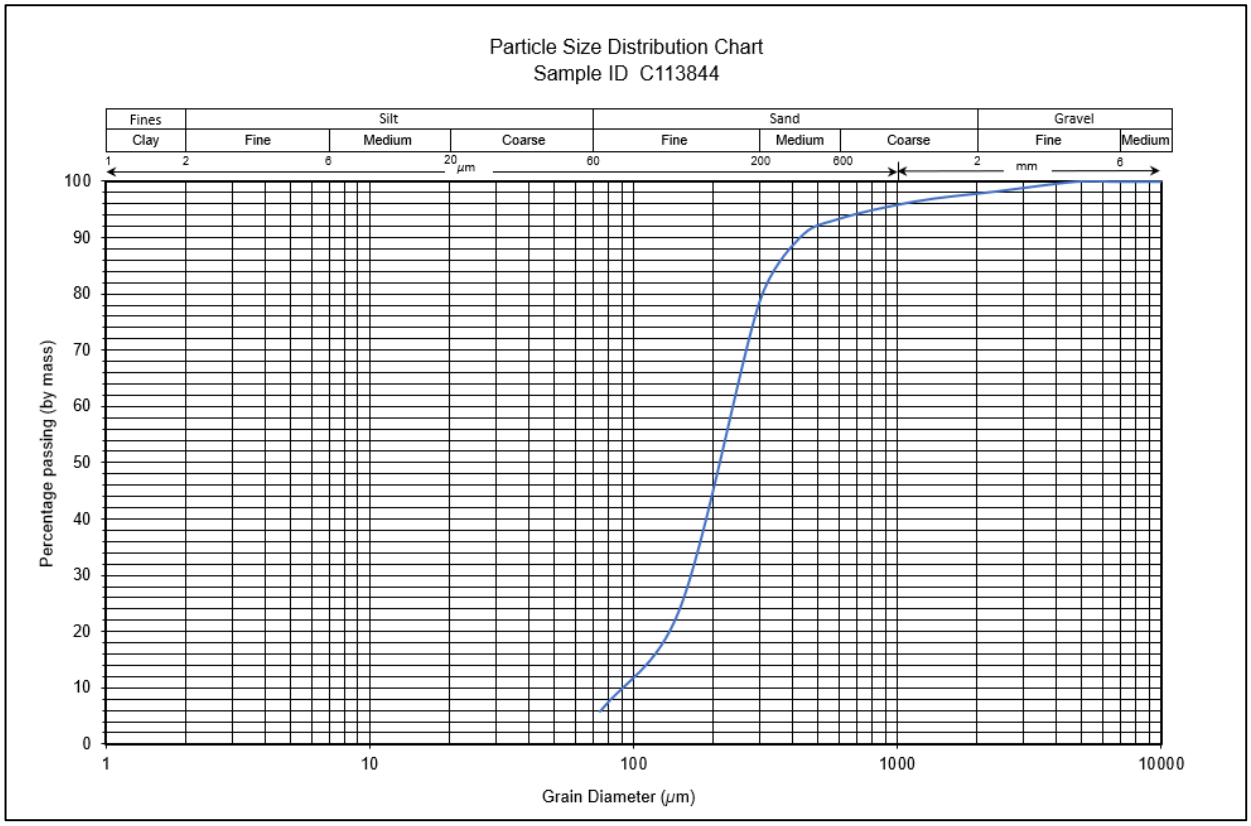


Sample ID:	C113842
Date:	19/11/2024

Weight of sample used (g)	89.1

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	0.00	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.20	0.23	100.00	2360
1180-600	0.40	0.45	99.77	1180
600-425	0.50	0.56	99.32	600
425-300	3.50	3.95	98.76	425
300-150	46.40	52.31	94.81	300
150-75	25.60	28.86	42.50	150
<75	12.10	13.64	13.64	75
Total	88.70	100.00		0

C113844 Cumulative Histogram & PSD Data



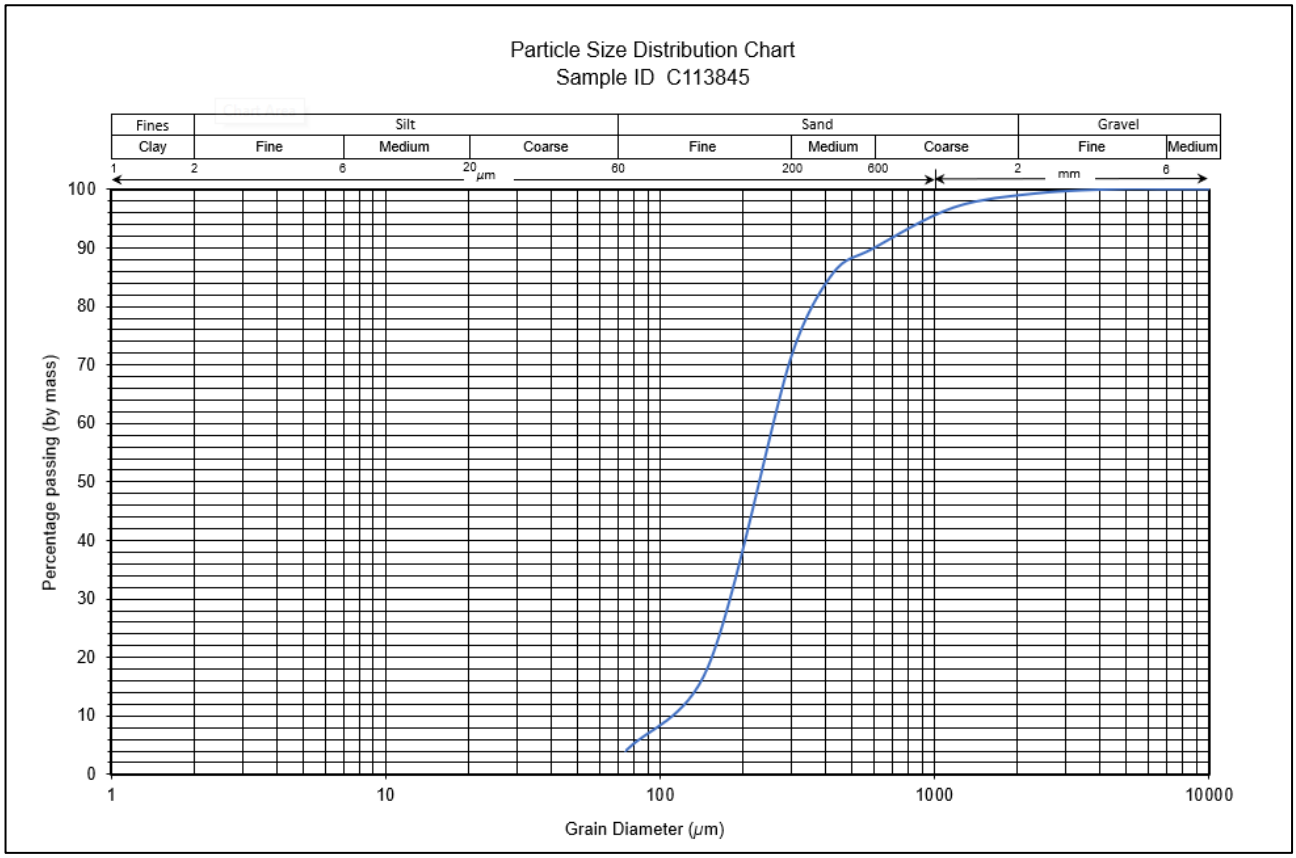
Sample ID:	C113844
Date:	19/11/2024

Weight of sample used (g)	108.6

Retained on Sieve size (microns)	wt. (g)	wt.%
>13200	0.00	0.00
13200-9500	0.00	0.00
9500-6700	0.00	0.00
6700-4750	0.00	0.00
4750-2360	0.20	0.18
2360-1180	0.30	0.28
1180-600	0.50	0.46
600-425	3.00	2.76
425-300	30.40	28.02
300-150	72.20	66.54
150-75	1.80	1.66
<75	0.10	0.09
Total	108.50	100.00

cum.% passing	Sieve size (microns)
100.00	19000
100.00	13200
100.00	9500
100.00	6700
100.00	4750
99.82	2360
99.54	1180
99.08	600
96.31	425
68.29	300
1.75	150
0.09	75
	0

C113845 Cumulative Histogram & PSD Data

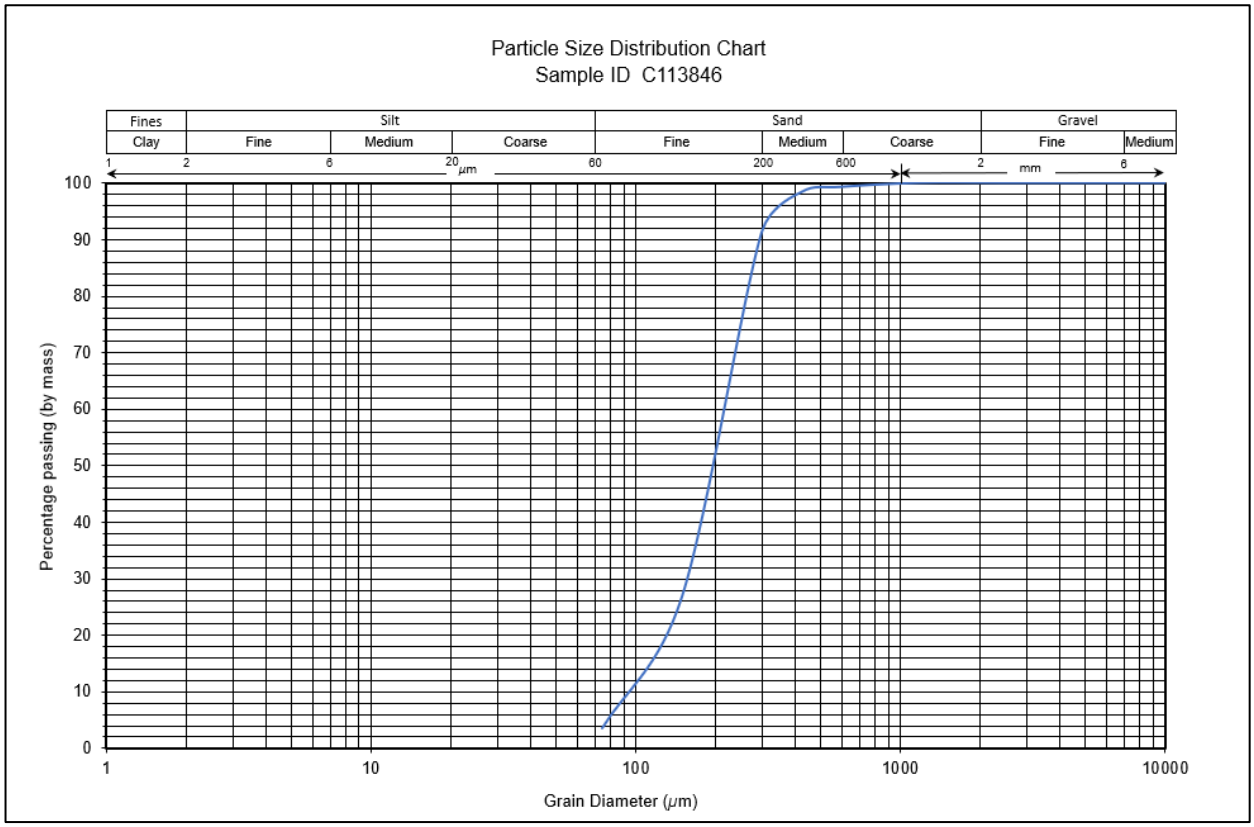


Sample ID:	C113845
Date:	19/11/2024

Weight of sample used (g)	94

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.00	0.00	100.00	4750
2360-1180	0.10	0.11	100.00	2360
1180-600	0.10	0.11	99.89	1180
600-425	0.40	0.43	99.79	600
425-300	5.60	5.96	99.36	425
300-150	78.40	83.49	93.40	300
150-75	8.00	8.52	9.90	150
<75	1.30	1.38	1.38	75
Total	93.90	100.00		0

C113846 Cumulative Histogram & PSD Data

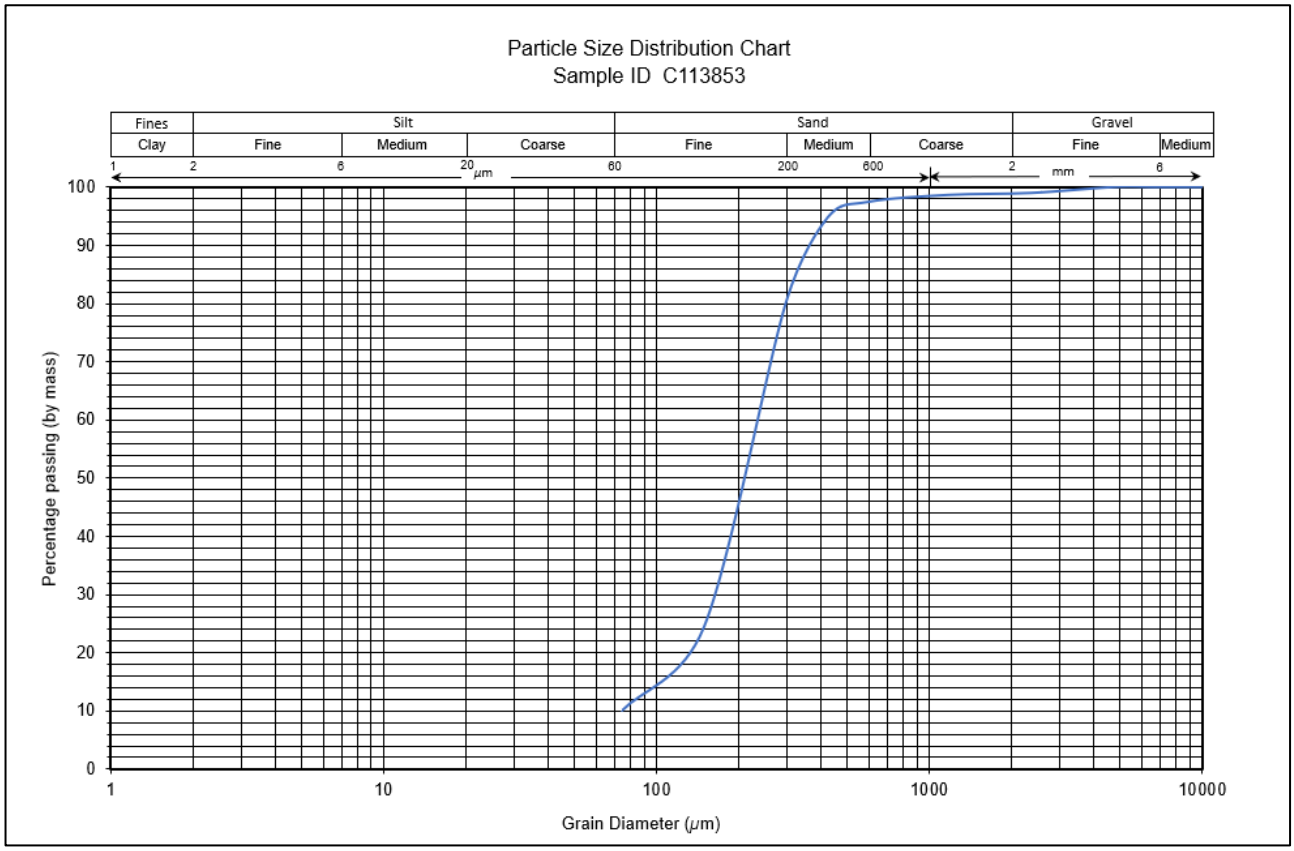


Sample ID:	C113846
Date:	19/11/2024

Weight of sample used (g)	85.4

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.10	0.12	100.00	4750
2360-1180	0.20	0.23	99.88	2360
1180-600	0.30	0.35	99.65	1180
600-425	0.80	0.94	99.30	600
425-300	7.90	9.27	98.36	425
300-150	63.40	74.41	89.08	300
150-75	10.90	12.79	14.67	150
<75	1.60	1.88	1.88	75
Total	85.20	100.00		0

C113853 Cumulative Histogram & PSD Data

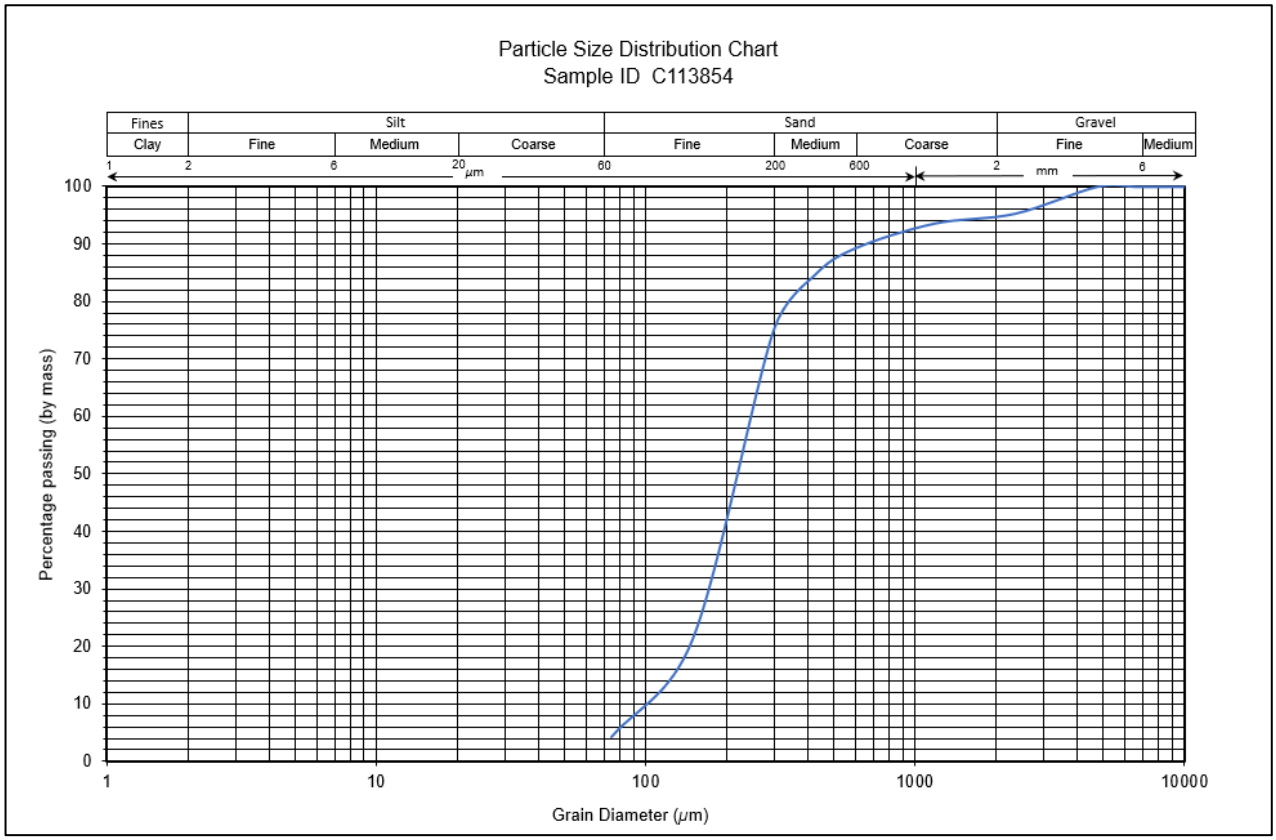


Sample ID:	C113853
Date:	19/11/2024

Weight of sample used (g)	123.1

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	32.20	26.39	100.00	4750
2360-1180	14.20	11.64	73.61	2360
1180-600	11.20	9.18	61.97	1180
600-425	5.90	4.84	52.79	600
425-300	9.90	8.11	47.95	425
300-150	24.40	20.00	39.84	300
150-75	14.60	11.97	19.84	150
<75	9.60	7.87	7.87	75
Total	122.00	100.00		0

C113854 Cumulative Histogram & PSD Data



Sample ID:	C113854
Date:	19/11/2024

Weight of sample used (g)	77.8

Retained on Sieve size (microns)	wt. (g)	wt.%	cum.% passing	Sieve size (microns)
>13200	**0.00**	0.00	100.00	**19000**
13200-9500	0.00	0.00	100.00	13200
9500-6700	0.00	0.00	100.00	9500
6700-4750	0.00	0.00	100.00	6700
4750-2360	0.20	0.26	100.00	4750
2360-1180	0.40	0.52	99.74	2360
1180-600	0.60	0.78	99.22	1180
600-425	0.90	1.16	98.45	600
425-300	6.30	8.15	97.28	425
300-150	53.50	69.21	89.13	300
150-75	12.70	16.43	19.92	150
<75	2.70	3.49	3.49	75
Total	77.30	100.00		0

APPENDIX 2: CLAY AND FINE SILT SETTLING

Clay and fine silt settling analysis was undertaken in accordance with AS 1141.33:2015 with results summarised below. The standard specifies where the separation of sediments is unclear, results should be specified “indeterminate”. However, in these cases, where separation of sediments is unclear, it has been indicated and an estimated C (Ratio by volume of Clay & Fine silt to Sand) calculated. Almost all samples had at least a minor proportion of organic matter (predominantly vegetation and fern roots) present. Samples were riffle split but otherwise tested as received, with no other treatment as per the standard.

As per the Standard, there is no consistent relationship between the test result and the silt and clay fraction obtained by sieving. In general, however, the magnitude of the result of this test will be greater than the result passing the 75 µm sieve. Samples C113828, C113834 & C113836 returned a C value lower than the clay silt fraction returned by sieving (mostly within ~2%). Samples C113827, C113830 & C113842 had C values less than the <75 µm sieved fraction and had unclear gradation from sand to fine silt and clay, which would be considered technically indeterminate by the standard.

For the latter samples (C113827 & C113842) particularly, where the clay is more active or there is a higher proportion of it, the clay and fine silt is likely to remain trapped within the sediment column, reflected in the indeterminate separation. Likewise, the standard also notes that the greater the difference between the respective tests, the more active the clay likely is. Finally, the standard recommends not using this analysis for fine aggregates with >10% passing the 75 µm sieve, so samples with a C Value >10% or where separation of sediments were unclear should be treated with extra caution.

Sample Registration Number	Sand Volume - S (mL)	Clay & Fine Silt Volume - F (mL)	Ratio by volume of Clay & Fine silt to Sand - C (%)	Comments
C113827	102	0	0%	** Separation of sediments unclear*
C113828	86	7	8%	
C113829	82	18	22%	
C113830	76	26	34%	** Separation of sediments unclear*
C113831	86	7	8%	
C113832	88	20	23%	
C113833	89	7	8%	
C113834	92	8	8%	
C113835	100	4	4%	
C113836	96	4	4%	
C113837	95	3	3%	
C113838	82	12	15%	** Separation of sediments unclear*
C113839	102	2	2%	
C113842	106	2	2%	** Separation of sediments unclear*
C113844	92	2	2%	
C113845	96	4	4%	
C113846	100	2	2%	
C113854	102	6	6%	

* Estimated clay and fine silt volumes, and ratios of clay and fine silt to sand