KEEPING BRITAIN TRADING

IMMINGHAM EASTERN RO-RO TERMINAL

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Associated British Ports

Immingham Eastern RoRo Terminal

Environmental Statement:
Appendix 9.1: Benthic Ecology Survey

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Immingham Eastern RoRo Terminal

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1 Introduction

1.1.1 This report has been prepared by ABPmer for Associated British Ports (ABP) and provides a summary of the results of intertidal and subtidal benthic sampling undertaken in September 2021 as part of the Immingham Eastern RoRo Terminal Project (also referred to as the proposed development).

1.1.2 The survey methodologies are detailed in Section 2 and the results of the intertidal and subtidal surveys are presented in Sections 3. Overall summary conclusions are then provided in Section 4.

2 Methodology

2.1 Intertidal benthic sampling

2.1.1 The intertidal sampling survey was undertaken on the 7 September 2021 using a dedicated two-person hovercraft to access the shoreline safely.

2.1.2 Ten stations were successfully sampled (Figure 1). At each of these stations, a sample was collected using a 0.01 m² hand-held corer (to a depth of approximately 15 cm) and analysed for macrofaunal analysis (faunal composition, abundance and biomass). An additional core sample was also be collected at each station for Particle Size Analysis (PSA) and Total Organic Carbon (TOC).

2.1.3 Field notes were also made about the nature of the habitats at each of the sampling points. Information recorded included details on the sediment type, evidence of bird feeding (e.g. footprints), the specific characteristics of the habitat at the precise point where the samples were retrieved and general characteristics of the wider habitat. A photographic record of the sediment type and the broader habitat appearance was also taken.

2.1.4 All infaunal samples were immediately delivered to the laboratory once the survey was complete, where samples were sieved (using a 0.5 mm sieve) and fixed ahead of analysis.

2.1.5 Anecdotal ornithology observations were also recorded during the survey.

2.2 Subtidal benthic sampling

2.2.1 The subtidal grab sampling survey was undertaken on the 10-11 September 2021. The sampling methods followed the established and recognised procedures outlined in the Recommended Operational Guidelines (ROG) for Grab Sampling and Sorting and Treatment of Samples (Guerra and Freitas, 2013) and the Marine Monitoring Handbook, Procedural Guideline No 3-9 (Thomas, 2000).

2.2.2 The survey was undertaken to characterise the benthic fauna within the following areas:

- Immingham Eastern RoRo Terminal: Ten stations were sampled with the location of these stations shown in Figure 1.
- Disposal sites (HU060/HU056): In total, twelve stations were sampled (four within each of the proposed disposal sites and two nearby to each of the disposal sites) as shown in Figure 1.

2.2.3 At each station, a benthic sample was collected using a 0.1 m² Day Grab for macrofauna analysis (faunal composition, abundance and biomass). An additional sample was also taken at each station for determination of PSA and TOC.

2.2.4 At each site, up to three attempts were made to retrieve a suitable sample (i.e. a grab containing sufficient volume of sediment for analysis). The sediment depths within the grab which were used for sample acceptance were a minimum of 7 cm for muddy or soft sediments and 5 cm for hard packed or coarse sediments. Anything less than these values was only retained if no other viable sample was collected.

2.2.5 Each grab sample was photographed upon successful retrieval and transferred into a labelled plastic bucket. All infaunal samples were immediately delivered to the laboratory once the survey was complete, where samples were sieved (using a 0.5 mm sieve) and fixed ahead of analysis.

2.2.6 Anecdotal ornithology and marine mammal observations were also recorded during the survey.

2.3 Laboratory analysis

2.3.1 The benthic macrofaunal analysis was undertaken by Hull Marine Laboratory. The laboratory is Marine Biological Analytical Quality Control Scheme (NMBAQC) accredited. The PSA and TOC elements of the benthic ecology analysis were conducted by the ABPmer in-house NMBAQC accredited laboratory.

2.3.2 Faunal samples were sorted from the sieve residue using low power binocular microscopes. All of the macroinfaunal specimens were identified to species level (where practicable) and enumerated. This work was undertaken in adherence with ISO 16665 standards and the NMBAQC Scheme Guidelines.

2.3.3 The PSA sample analysis was undertaken by ABPmer using the NMBAQC standardised methodology. The analysis was carried out using a Mastersizer laser diffractor which produces detailed sedimentary profiles for fine sediments (clay, sand and silts). The TOC analysis was carried out using an elemental analyser.

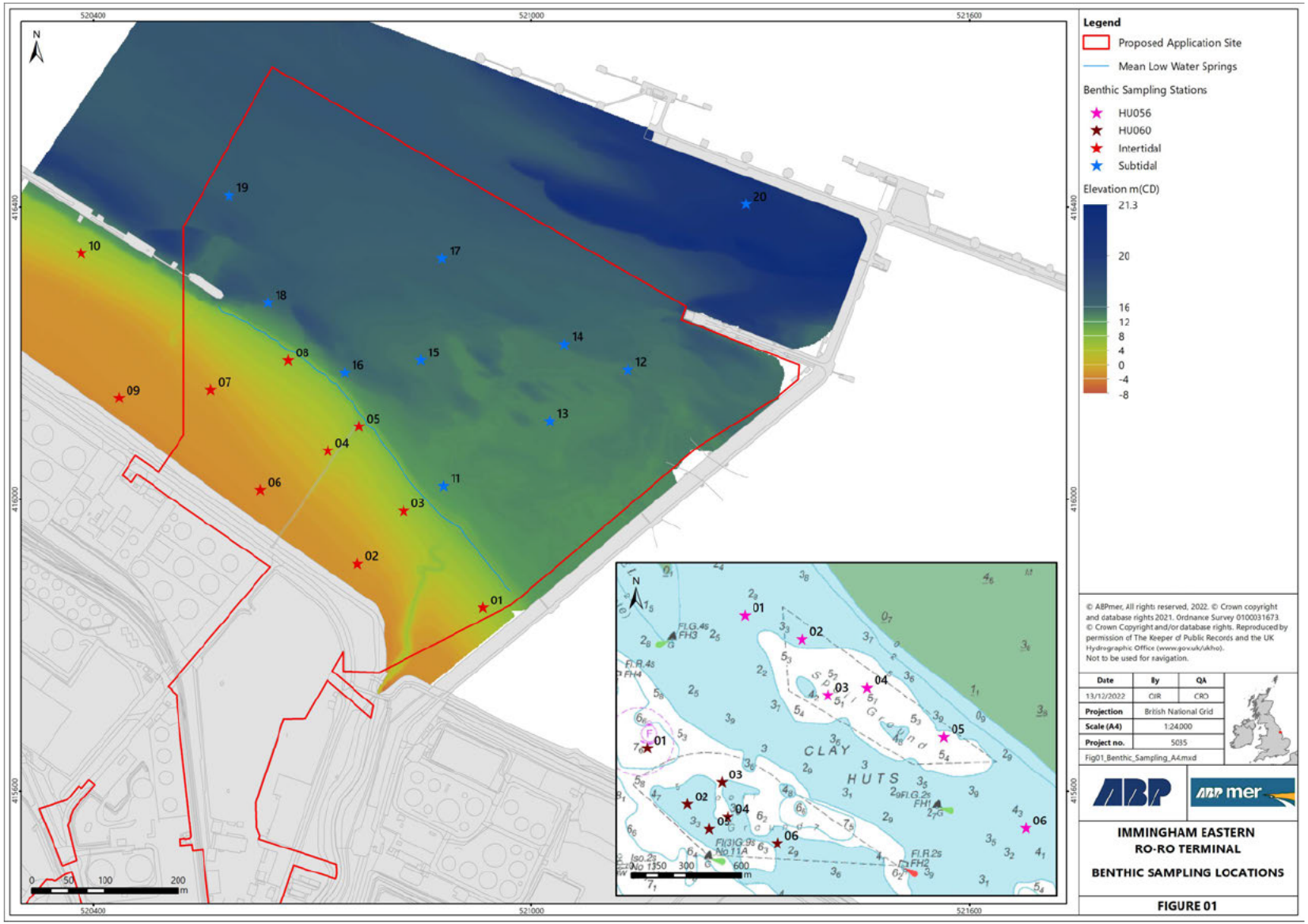

Figure 1. The location of intertidal core and subtidal grab sample stations

3 Results

3.1 Introduction

3.1.1 The results of the intertidal and subtidal sampling are described in the following sections, including key characterising species and any species of particular note (such as protected species or non-native species)[1].

3.1.2 The laboratory results are presented in Annex 1 (faunal analysis) and Annex 2 (PSA and TOC). Summary information on the sedimentary and ecological conditions at the sites based on these results is presented in Table 1.

3.2 Intertidal ecology survey results

3.2.1 The sediment in samples collected in this area consisted predominantly of sandy mud (Table 1 and Image 1). The TOC in the samples ranged between approximately 1 % and 3 % (Table 1). Overall, the number of taxa found in the samples was variable and ranged from four (Station IMM 1 and IMM 3) to 15 (Station IMM 7). The number of individuals was also highly variable and ranged from 1,100 organisms per m² (Station IMM 1) to 40,600 organisms per m² (Station IMM 7). The range in total species biomass in the samples was between 1 gram per m² at Station IMM 3 and 190 grams per m² at Station IMM 7 (which was primarily attributed to the ragworm *Hediste diversicolor* and the peppery furrow shell *Scrobicularia plana*).

3.2.2 The infaunal samples were predominantly characterised by nematodes, the oligochaetes *Tubificoides benedii* and *Enchytraeida*e spp., the mud shrimp *Corophium volutator*, the mudsnail *Peringia ulvae*, Baltic tellin *Limecola balthica* as well as the polychaetes *Hediste diversicolor* and *Pygospio elegans*. These characterising species dominated the assemblage and contributed almost entirely to the total abundances of organisms recorded at most of the sites. All the species recorded from the samples in this area were considered commonly occurring in the region and not protected.

3.2.3 During the surveys, the non-native Pacific oyster *Crassostrea gigas* and barnacles were recorded attached to piles on jetties in the area (Image 2).

3.2.4 The assemblage recorded is considered typical of the community recorded on mudflats in the nearby area (ABPmer, 2009; IECS, 2010 Able UK Limited, 2021). For example, intertidal surveys at North Killingholme (located approximately 3 km from the proposed development) in 2015 and 2016 also recorded a benthic assemblage characterised by species such as *Corophium volutator, Tubificoides benedii, Pygospio elegans, Hediste diversicolor, Limicola balthica* and nematodes with a broadly similar total number of individuals in the samples (up to around 50,000 organisms per m²) (Able UK Limited, 2021).

[1] As is standard practice for benthic analysis, the data in the report is presented as m² rather than per 0.1m² grab.

Table 1. Intertidal benthic survey results

Station	Sediment Type	TOC (%)	No. of Taxa (per m²)	No. of Individuals (per m²)	Total Biomass (g per m²)	Key Characterising Species (Number per m² Shown in Brackets)
IMM 1	Mud	3.65	4	1,100	6.29	*Nematoda* (400) *Limecola balthica* (300) *Tubificoides benedii* (300) *Nephtys* (100)
IMM 2	Sandy Mud	3.32	14	15,400	105.76	*Peringia ulvae* (4,600) *Nematoda* (2,400) *Enchytraeidae* (2,100) *Hediste diversicolor* (1,500) *Tubificoides benedii* (1,400) *Pygospio elegans* (1,100) *Abra tenuis* (500)
IMM 3	Sandy Mud	2.99	4	1,300	1.13	*Nematoda* (500) *Limecola balthica* (500) *Tubificoides benedii* (200) *Tharyx* (100)
IMM 4	Sandy Mud	2.92	9	20,700	31.14	*Tubificoides benedii* (14,400) *Corophium volutator* (3,600) *Nematoda* (800) *Limecola balthica* (700) *Tellinoidea* (600) *Pygospio elegans* (300)
IMM 5	Sandy Mud	3.05	6	1,600	6.16	*Tubificoides benedii* (900) *Limecola balthica* (300) *Nematoda* (100) *Enchytraeidae* (100) *Corophium volutator* (100) *Tellinoidea* (100)

Station	Sediment Type	TOC (%)	No. of Taxa (per m²)	No. of Individuals (per m²)	Total Biomass (g per m²)	Key Characterising Species (Number per m² Shown in Brackets)
IMM 6	Sandy Mud	2.90	11	30,300	58.07	*Enchytraeidae* (5,400) *Peringia ulvae* (5,400) *Tubificoides benedii* (5,000) *Nematoda* (4,900) *Hediste diversicolor* (2,700) *Limecola balthica* (2,500) *Abra tenuis* (2,000)
IMM 7	Sandy Mud	3.36	15	40,600	189.77	*Tubificoides benedii* (13,800) *Enchytraeidae* (5,700) *Nematoda* (5,100) *Limecola balthica* (3,500) *Pygospio elegans* (3,400) *Hediste diversicolor* (3,300) *Peringia ulvae* (1,800)
IMM 8	Sandy Mud	3.05	14	4,100	15.87	*Nematoda* (800) *Limecola balthica* (700) *Tubificoides benedii* (600) *Peringia ulvae* (400) *Hediste diversicolor* (300)
IMM 9	Sandy Mud	3.73	14	21,600	47.98	*Hediste diversicolor* (6,800) *Nematoda* (3,200) *Abra tenuis* (2,000) *Enchytraeidae* (1,600) *Peringia ulvae* (1,500) *Tubificoides benedii* (1,400) *Limecola balthica* (1,200)

Station	Sediment Type	TOC (%)	No. of Taxa (per m²)	No. of Individuals (per m²)	Total Biomass (g per m²)	Key Characterising Species (Number per m² Shown in Brackets)
IMM 10	Sandy Mud	2.71	8	26,800	57.37	*Corophium volutator* (16,400) *Tubificoides benedii* (4,800) *Nematoda* (2,100) *Limecola balthica* (1,800) *Tellinoidea* (1,100) *Eteone longa* (400)

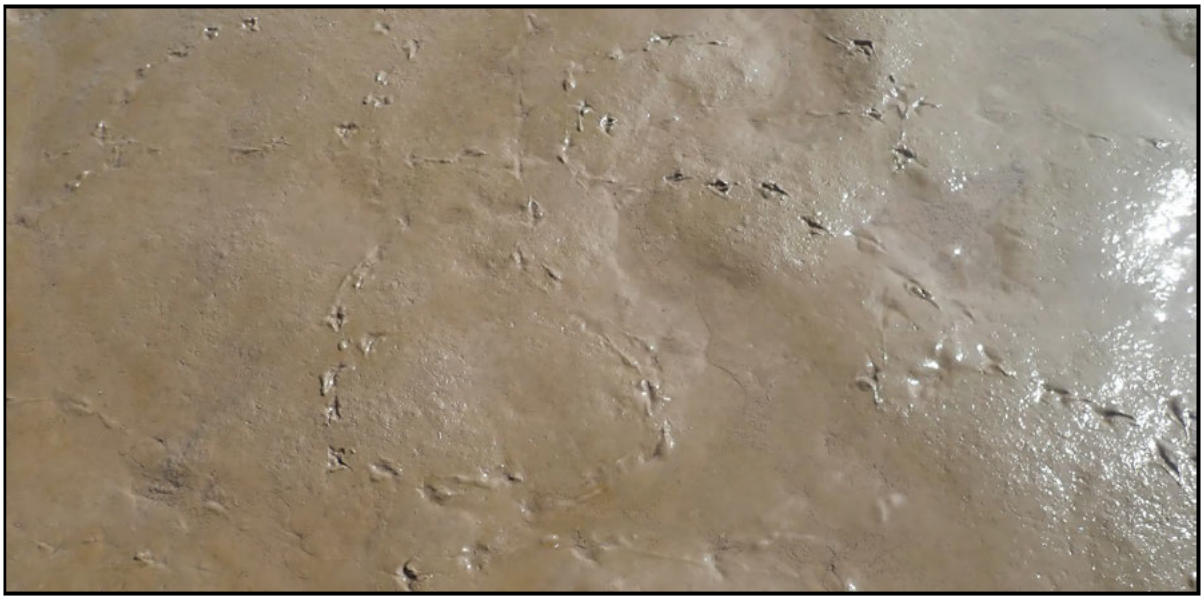

Image 1. Station IMM 04 (sandy mud with bird footprints)

Image 2. Pacific oysters *Crassostrea gigas* and barnacles colonising piles

3.2.5 Many of the species recorded in the samples are considered prey species for coastal waterbirds such as polychaetes, Baltic tellin *Limecola balthica*, mudsnail *Peringia* spp. and mudshrimp *Corophium* spp. (Stillman *et al.,* 2005; Woodward *et al*., 2014). The species and size of the prey taken varies between different coastal waterbirds. Larger waders are typically capable of consuming larger invertebrate prey items than smaller species. In order to better understand prey size in the samples collected, prey species were assigned to different size classes based on a size class classification supplied by the laboratory which has been used by Natural England and the Environment Agency in previous studies. The results are summarised in Table 2. The benthic prey recorded in the surveys were typically small size classes that are consumed by both smaller and larger wading bird species.

Table 2. Size classes of key bird prey species

Species Group	Species	Size Class	Abundance (per sample)	% (per sample)
Polychaetes	*Eteone longa*	<25mm	14	100
		>25mm	0	0
	Hediste diversicolor	<25mm	113	77
		25-50mm	34	23
	Nephtys spp	<25mm	3	100
		>25mm	0	0
	Pygospio elegans	<25mm	68	100
		>25mm	0	0
	Streblospio shrubsolii	<25mm	12	100
		>25mm	0	0
	Tharyx	<25mm	3	100
		>25mm	0	0
	Manayunkia aestuarina	<25mm	22	100
		>25mm	0	0
Crustacean	*Corophium volutator*	<3mm	142	65
		>3mm	75	35
Gastropod	*Peringia ulvae*	<3mm	136	99
		3-5mm	1	1
Bivalves	*Limecola balthica*	<9mm	117	98
		9-15mm	2	2
	Abra tenuis	<5mm	51	100
		>5mm	0	0
	Scrobicularia plana	20-25mm	2	100

Size classes used:

Hediste diversicolor + other polychaetes:	<25 mm, 25-50 mm, 50-75 mm, 75-100 mm, >100 mm
Corophium volutator + other corophiid species:	<3 mm, >3 mm
Peringia ulvae:	<3 mm, 3-5 mm, >5 mm
Macoma balthica:	<9 mm, 9-15 mm, 15-20 mm, >20 mm
Other bivalve species:	< 5 mm, 5-10 mm, 10-15 mm, 15-20 mm

Ornithology observations

3.2.6 Species such as Curlew, Black-tailed Godwit, Redshank and Dunlin were recorded foraging within the Proposed Development area approximately 150 waders using this area in total. Approximately 30 Turnstone and 50 Herring Gull were present roosting on the outfall and the concrete structures.

3.3 Subtidal benthic survey results

3.3.1 To summarise the key findings from the subtidal sampling, the survey area has been divided into three broad areas with the results for each area summarised.

3.3.2 These areas are as follows:

- **Immingham Eastern RoRo Terminal (Stations IMM 11 to IMM 20);**
- **Disposal site HU060 (Stations HU060 1 to HU060 6); and**
- **Disposal site HU056 (Stations HU056 1 to HU056 6).**

Immingham Eastern RoRo Terminal

3.3.3 The sediment from samples collected from the area of the Immingham Eastern RoRo Terminal consisted of mud and sandy mud (Image 3). The TOC in the samples ranged between approximately 3 % and 13 % (Table 3). Overall, the number of taxa found in the samples ranged from two (Station IMM 15) to 17 (Station IMM 14), and the number of individuals from 20 organisms per m² (Station IMM 15) to 37,540 organisms per m² (Station IMM 13). However, most stations were relatively impoverished (<10 taxa and <10,000 organisms per m²). The range in total species biomass in the samples was between >1 and 14 grams per m².

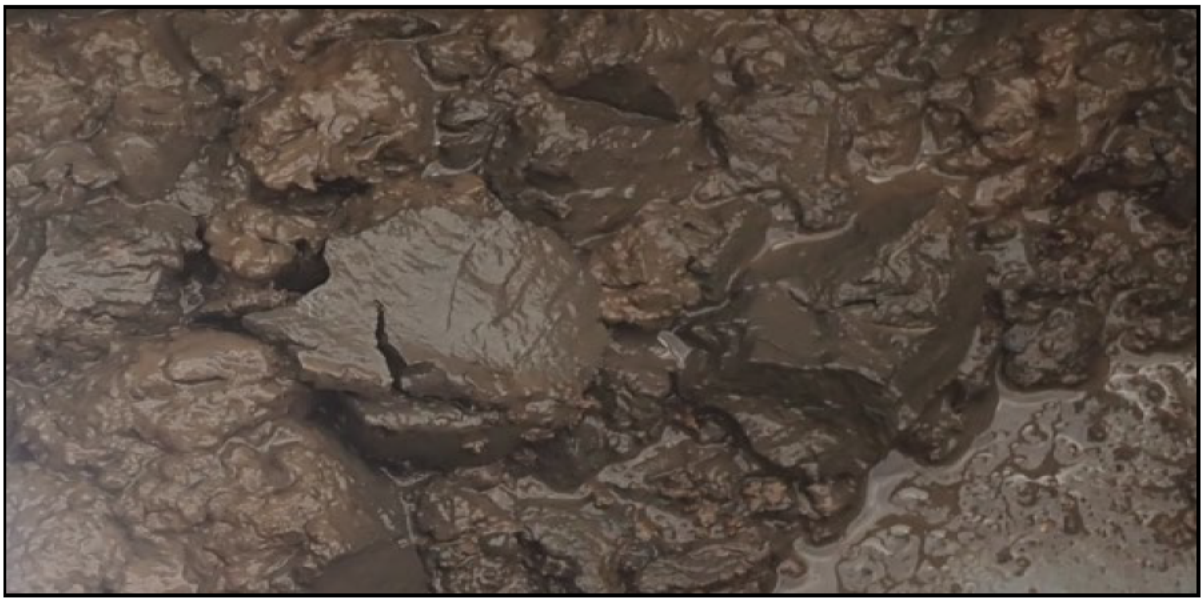

Image 3. Station IMM 14 sample (sandy mud)

3.3.4 The faunal samples were predominantly characterised by nemotodes, the mudsnail *Corophium volutator*, polychaetes (such as *Streblospio shrubsolii Polydora cornuta Tharyx* spp. and *Nephtys* spp.), oligochaetes *Tubificoides* spp. and barnacle *Amphibalanus improvises*. All the species recorded from the samples in this area were considered commonly occurring in the region and not protected.

3.3.5 The faunal assemblage recorded is considered characteristic of subtidal habitats in this section of the Humber Estuary. For example, subtidal benthic surveys undertaken in the Immingham area in 2009, 2010 and 2016 predominantly recorded mud or muddy sand habitat which was generally impoverished (with a low number of taxa occurring at the majority of sites). The most commonly recorded infaunal species (generally recorded in low

abundances) were the polychaetes *Capitella capitata*, *Streblospio shrubsolii, ,Pygospio elegans, Polydora cornuta*, oligochaetes *Tubificoides* spp., mud shrimp *Corophium volutator*, and nematodes (ABPmer, 2009; IECS, 2010; Able UK Limited, 2021).

Disposal site HU060

3.3.6 The sediment in samples collected in this area consisted predominately of sand (Image 4) with TOC between approximately<1 and 3 % at all stations (Table 3).

3.3.7 Most stations were considered impoverished (<7 taxa and <121 organisms per m²). However, 16 taxa were recorded at both Station HU060 4 and HU060 6 with 1,880 and 4,030 organisms per m² respectively at each of these stations. Biomass ranged from 0 to 3.37 grams per m².

3.3.8 The samples were characterised by a wide range of species but typically in low abundances including nematodes, barnacle *Amphibalanus improvises*, polychaetes (such as *Pygospio elegans* and *Arenicola* spp.) and the amphipod *Corophium volutator*. All the species recorded from the samples in this area were considered commonly occurring in the region and not protected.

3.3.9 Benthic surveys undertaken in 2008 within and near to Clay Huts disposal sites also recorded a community characterised by the polychaetes *Arenicola marina* and *Pygospio elegans* as well as nematodes and amphipods (ABPmer, 2009).

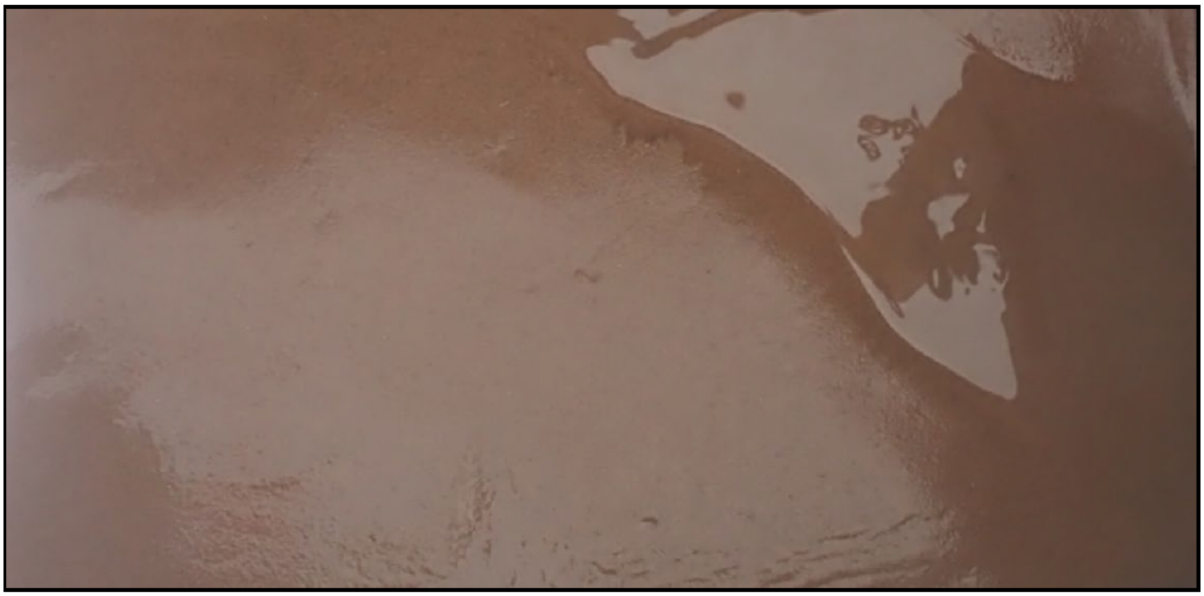

Image 4. Station HU060 06 (sand)

Disposal site HU056

3.3.10 The sediment in samples collected in this area consisted of sand, gravelly sand and sandy gravel (Image 5) with TOC ranging from between

approximately 1 % and 3 % (Table 3). The stations were considered highly impoverished (with 0 to 2 taxa and 0 to 30 organisms per m² recorded). The samples were characterised by low abundances of a few species (the amphipod *Corophium volutator*, mysid shrimp *Gastrosaccus spinifer*, bryozoan *Electra monostachys* and springtails *Collembola* spp.).

3.3.11 Benthic monitoring in 2017 at disposal site HU056 recorded commonly occurring estuarine species generally in low abundances such as the polychaetes *Polydora cornuta, Pygospio elegans Arenicola marina* and *Capitella* spp., bivalve *Limecola balthica*, mysid shrimps and amphipods (ABPmer, 2017).

3.3.12 The impoverished assemblage recorded is considered typical of scoured subtidal habitats in the Humber Estuary (which are subject to very strong tidal currents). No protected species were recorded.

Image 5. HU056 05 (Gravelly sand)

Marine mammal and ornithology observations

3.3.13 Approximately 10 to 15 grey seals were recorded hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary), approximately 4 km from the proposed development. In addition, a harbour porpoise was recorded foraging in the channel (approximately 2 km from the proposed development).

3.3.14 A juvenile auk species (a Razorbill or Guillemot) was recorded foraging mid channel between Grimsby and Immingham.

Table 3. Subtidal benthic survey results

Area	Station	Sediment Type	TOC (%)	No. of Taxa (per m²)	No. of Individuals (per m²)	Total Biomass (g per m²)	Key Characterising Species (Number per m² Shown in Brackets)
Immingham Eastern RoRo Terminal	IMM 11	Mud	3.83	12	11,740	8.32	*Corophium volutator* (8, 910) *Tubificoides benedii* (1,570) *Streblospio shrubsolii* (420) *Nematoda* (250) *Tharyx* (240) *Limecola balthica* (130) *Tubificoides swirencoides* (100)
	IMM 12	Sandy Mud	4.63	16	12,270	1.44	*Nematoda* (9,830) *Streblospio shrubsolii* (1,210) *Amphibalanus improvises* (450) *Polydora cornuta* (440) *Corophium volutator* (110) *Mytilus edulis* (90) *Tharyx* (60)
	IMM 13	Sandy Mud	13.01	4	37,540	14.13	*Corophium volutator* (33,130) *Polydora cornuta* (4,170) *Nematoda* (230) *Tubificoides benedii* (10)
	IMM 14	Sandy Mud	4.03	17	22,480	3.34	*Streblospio shrubsolii* (13,790) *Nematoda* (7,150) *Amphibalanus improvisus* (520) *Polydora cornuta* (340) *Tharyx* (210) *Tubificoides benedii* (210) *Corophium volutator* (70)
	IMM 15	Sandy Mud	13.01	2	20	0.10	*Nephtys hombergii* (10) *Amphibalanus improvisus* (10)

Area	Station	Sediment Type	TOC (%)	No. of Taxa (per m²)	No. of Individuals (per m²)	Total Biomass (g per m²)	Key Characterising Species (Number per m² Shown in Brackets)
	IMM 16	Sandy Mud	4.03	5	250	1.19	*Tubificoides benedii* (120) *Nephtys* (50) *Nematoda* (40) *Limecola balthica* (40)
	IMM 17	Sandy Mud	3.98	4	80	0.09	*Nephtys* (30) *Nematoda* (20) *Diastylis rathkei* (20) *Corophium volutator* (10)
	IMM 18	Sandy Mud	3.69	5	9,580	6.30	*Corophium volutator* (9,550) *Tubificoides benedii* (10) *Enchytraeidae* (10) *Limecola balthica* (10)
	IMM 19	Mud	4.23	8	300	0.57	*Streblospio shrubsolii* (110) *Nematoda* (50) *Nephtys hombergii* (50) *Tubificoides benedii* (30) *Tharyx* (20) *Limecola balthica* (20) *Diastylis rathkei* (10)
	IMM 20	Sand	4.22	9	5,130	4.91	*Corophium volutator* (4,950) *Streblospio shrubsolii* (70) *Nematoda* (30) *Nephtys* (30) *Limecola balthica* (20) *Diastylis rathkei* (10) *Austrominius modestus* (10) *Tubificoides benedii* (10)

Area	Station	Sediment Type	TOC (%)	No. of Taxa (per m²)	No. of Individuals (per m²)	Total Biomass (g per m²)	Key Characterising Species (Number per m² Shown in Brackets)
Disposal site HU060	HU060 1	Sand	4.04	6	40	0.004	*Nematoda* (10) *Pygospio elegans* (10) *Arenicola* (10) *Bathyporeia elegans* (10)
	HU060 2	Sand	0.38	0	0	0.00	
	HU060 3	Slightly Gravelly Muddy Sand	0.92	6	60	0.01	*Scoloplos armiger* (20) *Eteone longa* (10) *Tharyx* (10) *Corophium volutator* (10) *Tellinoidea* (10)
	HU060 4	Sand	1.69	16	1,880	3.37	*Amphibalanus improvisus* (1,800) *Nototropis guttatus* (20) *Jaera (Jaera) albifrons* (20) *Scoloplos armiger* (10) *Tubificoides benedii* (10) *Corophium volutator* (10) *Limecola balthica* (10)
	HU060 5	Sand	2.51	3	120	0.01	*Protodriloides chaetifer* (90) *Mytilus edulis* (20) *Tubificoides benedii* (10)
	HU060 6	Sand	3.04	16	4,030	0.56	*Nematoda* (2,170) *Pygospio elegans* (900) *Arenicola* (590) *Polydora cornuta* (80) *Ampharete cf. acutifrons* (80) *Austrominius modestus* (50) *Corophium volutator* (50)
	HU056 1	Sand	2.01	1	30	0.001	*Corophium volutator* (30)

Area	Station	Sediment Type	TOC (%)	No. of Taxa (per m²)	No. of Individuals (per m²)	Total Biomass (g per m²)	Key Characterising Species (Number per m² Shown in Brackets)
Disposal site HU056	HU056 2	Slightly Gravelly Muddy Sand	2.84	2	0	0.001	*Corophium volutator* (P) *Electra monostachys* (P)
	HU056 3	Muddy Gravel	1.05	1	10	0.002	*Corophium volutator* (10)
	HU056 4	Gravelly Mud	1.01	0	0	0.00	
	HU056 5	Gravelly Sand	1.40	0	0	0.00	
	HU056 6	Muddy Gravel	1.03	2	20	0.12	*Gastrosaccus spinifer* (10) *Collembola* (10)

4 Summary

4.1.1 The intertidal benthic samples consisted predominantly of sandy mud and were characterised by a range of commonly occurring species of oligochaetes, polychaetes, amphipods, molluscs and nematodes which are considered characteristic of intertidal mudflat in this area of the Humber Estuary. Many of the dominant species recorded are also considered important prey items for overwintering birds. Intertidal mudflat is a qualifying interest features of the Humber Estuary Special Area of Conservation (SAC) and Ramsar site. This feature is also supporting habitat of the Humber Estuary Special Protection Area (SPA). In addition, intertidal mudflat is a Habitat of Principal Importance in England under the Natural Environment and Rural Communities (NERC) Act 2006 Section 41. No intertidal species which are considered nationally rare or protected were recorded in the surveys.

4.1.2 The subtidal benthic samples consisted predominantly of mud or sandy mud, with gravelly sediment and sand mainly recorded at the disposal sites. Samples were typically impoverished and characterised by commonly occurring polychaetes, oligochaetes, nematodes, crustaceans and bivalves. No subtidal species considered nationally rare or protected were recorded, with the assemblages observed considered characteristic of estuarine communities found more widely in the Humber Estuary.

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6 Abbreviations/Acronyms

ABP	Associated British Ports
BAP	Biodiversity Action Plan
CCW	Countryside Council for Wales
GIS	Geographical Information System
GPS	Global Positioning System
ISO	International Organization for Standardization
JNCC	Joint Nature Conservation Committee
MHCBI	Marine Habitat Classification for Britain & Ireland
NERC	Natural Environment and Rural Communities
NMBAQC	National Marine Biological Analytical Quality Control Scheme
PSA	Particle Size Analysis
ROG	Recommended Operational Guidelines
TOC	Total Organic Carbon
UK	United Kingdom

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Annexes





Innovative Thinking - Sustainable Solutions

ABP mer

A Laboratory Macrofauna Results

Species	Qualifier	IMM_1	IMM_2	IMM_3	IMM_4	IMM_5	IMM_6	IMM_7	IMM_8	IMM_9	IMM_10	IMM_11	IMM_12	IMM_13	IMM_14	IMM_15	IMM_16	IMM_17	IMM_18	IMM_19	IMM_20	HU56-1	HU56-2	HU56-3	HU56-4	HU56-5	HU56-6	HU60-1	HU60-2	HU60-3	HU60-4	HU60-5	HU60-6
Sertularia																						P			P							
Campanulariidae													P																			
Nematoda		4	24	5	8	1	49	51	8	32	21	25	983	23	715		4	2		5	3	1					217						
Harmothoe impar	sp. agg.																										1						
Pholoe inornata																											1						
Eteone longa	sp. agg.		3					5	2		4		1		4									1			2						
Phyllodoce mucosa																											1						
Sphaerodoropsis balticum															1																		
Hediste diversicolor			15		1		27	33	3	68																							
Nephtys	juv.	1							1			4	1		3		5	3		1	3												
Nephtys hombergii									1			2	2		1	1				5													
Scoloplos armiger																								2	1		2						
Polydora cornuta												3	44	417	34												8						
Pygospio elegans			11		3		8	34		11	1	2			4							1					90						
Streblospio shrubsolii			1		1			6	2	1	1	42	121		1379					11	7											
Tharyx	Type A			1	1				1			24	6		21					2				1			1						
Arenicola	juv.																					1					59						
Protodriloides chaetifer																										9							
Ampharete cf. acutifrons																											8						
Manayunkia aestuarina							3	13		6																							
Baltidrilus costatus								1		8																							
Tubificoides benedii		3	14	2	144	9	50	138	6	14	48	157	1	1	21		12		1	3	1				1	1							
Tubificoides pseudagaster	sp. agg.											1																					
Tubificoides swirencoides									1			10															1						
Enchytraeidae			21			1	54	57	1	16									1														
Austrominius modestus																					1						5						
Amphibalanus improvisus													45		52	1								180		2						
Gastrosaccus spinifer																																	1
Nototropis guttatus																								2									
Bathyporeia elegans																					1												
Corophium volutator			7		36	1	2	5	2		164	891	11	3313	7			1	955		495			1	1		5	3		1			
Corophium volutator	parts																												P				
Cyathura carinata										2					3																		
Jaera (Jaera) albifrons	sp. agg.																								2								
Diastylis rathkei													2					2		1	1												
Peringia ulvae			46				54	18	4	15																							
Mytilus edulis	juv.												9		3										2								
Tellinoidea	juv.		1		6	1	11	5		6	11													1									
Limecola balthica		3	4	5	7	3	25	35	7	12	18	13	1				4		1	2	2				1								
Abra tenuis			5				20	4	2	20																							
Scrobicularia plana			1					1																									
Alcyonidium diaphanum																								P								
Farrella repens													P		P									P								
Amathia lendigera																								P								
Electra monostachys													P		P				P		P	P		P	P		P		P				
Bicellariella ciliata																									P								
Plocamium cartilagineum	sp. agg.														P		P								P								
Vertebrata byssoides																									P								
Polysiphonia																									P								
Collembola																																	1
Dolichopodidae	larva		1							5																							
Total number of taxa		4	14	4	9	6	11	15	14	14	8	12	16	4	17	2	5	4	5	8	9	6	0	6	16	3	16	1	2	1	0	0	2
Total abundance		11	154	13	207	16	303	406	41	216	268	1174	1227	3754	2248	2	25	8	958	30	513	4	0	6	188	12	403	3	0	1	0	0	2
Total abundance (m2)		1100	15400	1300	20700	1600	30300	40600	4100	21600	26800	11740	12270	37540	22480	20	250	80	9580	300	5130	40	0	60	1880	120	4030	30	0	10	0	0	20

Species	Qualifier	IMM_1	IMM_2	IMM_3	IMM_4	IMM_5	IMM_6	IMM_7	IMM_8	IMM_9	IMM_10	IMM_11	IMM_12	IMM_13	IMM_14	IMM_15	IMM_16	IMM_17	IMM_18	IMM_19	IMM_20	HU56-1	HU56-2	HU56-3	HU56-4	HU56-5	HU56-6	HU60-1	HU60-2	HU60-3	HU60-4	HU60-5	HU60-6
Sertularia													-									-											
Campanulariidae													-																				
Nematoda		0.0001	0.0001	0.0001	0.0001	0.0001	0.0007	0.0003	0.0001	0.0001	0.0001	0.0001	0.0584	0.0001	0.03		0.0001	0.0001		0.0001	0.0001	0.0001					0.0064						
Harmothoe impar	sp. agg.																										0.0246						
Pholoe inornata																											0.0001						
Eteone longa	sp. agg.		0.0015					0.0027	0.0006		0.0002		0.0002		0.0002									0.0001			0.0001						
Phyllodoce mucosa																											0.0001						
Sphaerodoropsis balticum															0.0001																		
Hediste diversicolor			0.1826		0.0628		0.235	0.7403	0.0015	0.3314																							
Nephtys	juv.	0.0003							0.0016			0.0019	0.0001		0.0039		0.0005	0.0023		0.0001	0.0012												
Nephtys hombergii									0.0049			0.0011	0.0027		0.0449	0.0099				0.0075													
Scoloplos armiger																								0.0001	0.0012		0.0001						
Polydora cornuta												0.0001	0.0023	0.0267	0.0016												0.0001						
Pygospio elegans			0.0023		0.0001		0.0038	0.0054		0.0025	0.0001	0.0001			0.0001						0.0001						0.0066						
Streblospio shrubsolii			0.0001		0.0001			0.0004	0.0007	0.0001	0.0001	0.0023	0.0206		0.2154					0.0002	0.0001												
Tharyx	Type A			0.0001	0.0001				0.0001			0.0018	0.0001		0.0002					0.0001				0.0001			0.0001						
Arenicola	juv.																				0.0001						0.0024						
Protodriloides chaetifer																									0.0001								
Ampharete cf. acutifrons																											0.013						
Manayunkia aestuarina							0.0001	0.0001		0.0001																							
Baltidrilus costatus								0.0001		0.0002																							
Tubificoides benedii		0.0005	0.0057	0.0001	0.0521	0.0013	0.0306	0.0383	0.0011	0.0028	0.0127	0.0251	0.0001	0.0001	0.0054		0.0008		0.0001	0.0018	0.0001				0.0004	0.0007							
Tubificoides pseudagaster	sp. agg.											0.0001																					
Tubificoides swirencoides									0.0001			0.0002															0.0001						
Enchytraeidae			0.0002			0.0001	0.0009	0.002	0.0001	0.0001									0.0001														
Austrominius modestus																					-						-						
Amphibalanus improvisus													-		-	-								-			-						
Gastrosaccus spinifer																																	0.0116
Nototropis guttatus																								0.0001									
Bathyporeia elegans																					0.0001												
Corophium volutator			0.0012		0.0185	0.0001	0.0001	0.0022	0.0001		0.0578	0.3637	0.0078	1.3863	0.0013			0.0004	0.6286		0.2249			0.0001	0.0001		0.0023	0.0001		0.0002			
Corophium volutator	parts																												0.0001				
Cyathura carinata										0.0011					0.0008																		
Jaera (Jaera) albifrons	sp. agg.																								0.0004								
Diastylis rathkei													0.0048					0.0066		0.0134	0.003												
Peringia ulvae			0.0344				0.0397	0.012	0.0038	0.012																							
Mytilus edulis	juv.												0.0459		0.0304											0.0001							
Tellinoidea	juv.		0.0001		0.0002	0.0001	0.0002	0.0001		0.0009	0.0001													0.0001									
Limecola balthica		0.062	0.07	0.011	0.1774	0.0599	0.1683	0.1507	0.1392	0.0118	0.5026	0.4357	0.0014				0.1176		0.0011	0.0337	0.2612				0.3345								
Abra tenuis			0.0124				0.1013	0.0292	0.0048	0.104																							
Scrobicularia plana			0.745					0.9139																									
Alcyonidium diaphanum																								-									
Farrella repens													-		-									-									
Amathia lendigera																								-									
Electra monostachys													-		-				-		-	-		-	-		-		-				
Bicellariella ciliata																								-									
Plocamium cartilagineum	sp. agg.														-		-							-									
Vertebrata byssoides																								-									
Polysiphonia																								-									
Collembola																																	0.0001
Dolichopodidae	larva		0.002							0.0127																							
Total Biomass		0.0629	1.0576	0.0113	0.3114	0.0616	0.5807	1.8977	0.1587	0.4798	0.5737	0.8322	0.1444	1.4132	0.3343	0.0099	0.119	0.0094	0.6299	0.0569	0.4906	0.0004	0	0.0005	0.3367	0.0009	0.056	0.0001	0.0001	0.0002	0	0	0.0117
Total Biomass (m2)		6.29	105.76	1.13	31.14	6.16	58.07	189.77	15.87	47.98	57.37	8.322	1.444	14.132	3.343	0.099	1.19	0.094	6.299	0.569	4.906	0.004	0	0.005	3.367	0.009	0.56	0.001	0.001	0.002	0	0	0.117

B Laboratory Sediment Results

B.1 Particle Size Analysis

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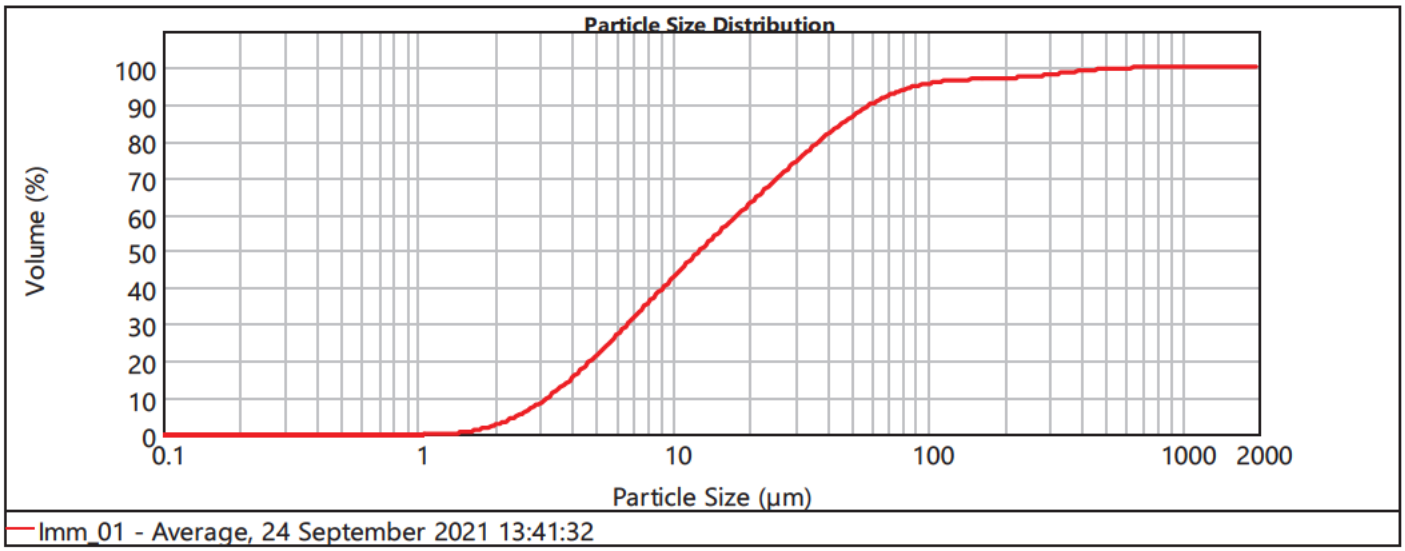
Particle Size Analysis Report

Sample Name:	Imm_01 - Average	Measured by:	IDavidson on 24 September 2021
Sample Source:	Sugar	Obscuration:	21.08 %
Sample Collected:		Weighted Residual:	0.728 %

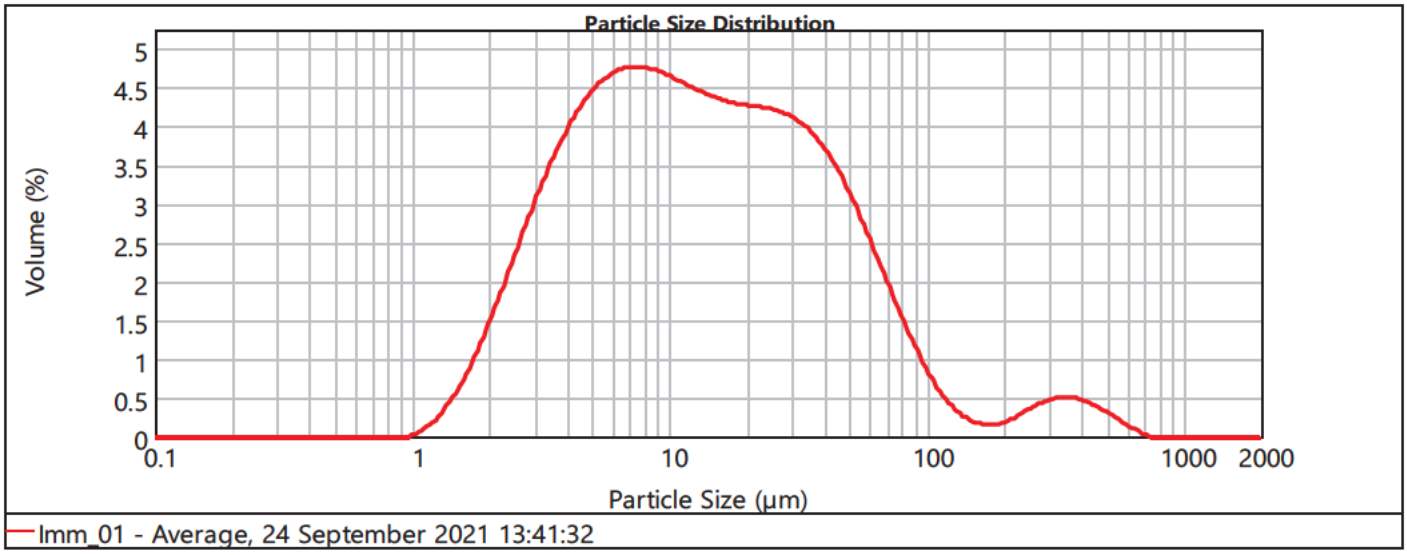
d(0.1):	3.212 µm	d(0.5):	12.745 µm	d(0.9):	60.020 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
3 %	24 %	36 %	27 %	7 %	3 %	0 %

Frequency Curve



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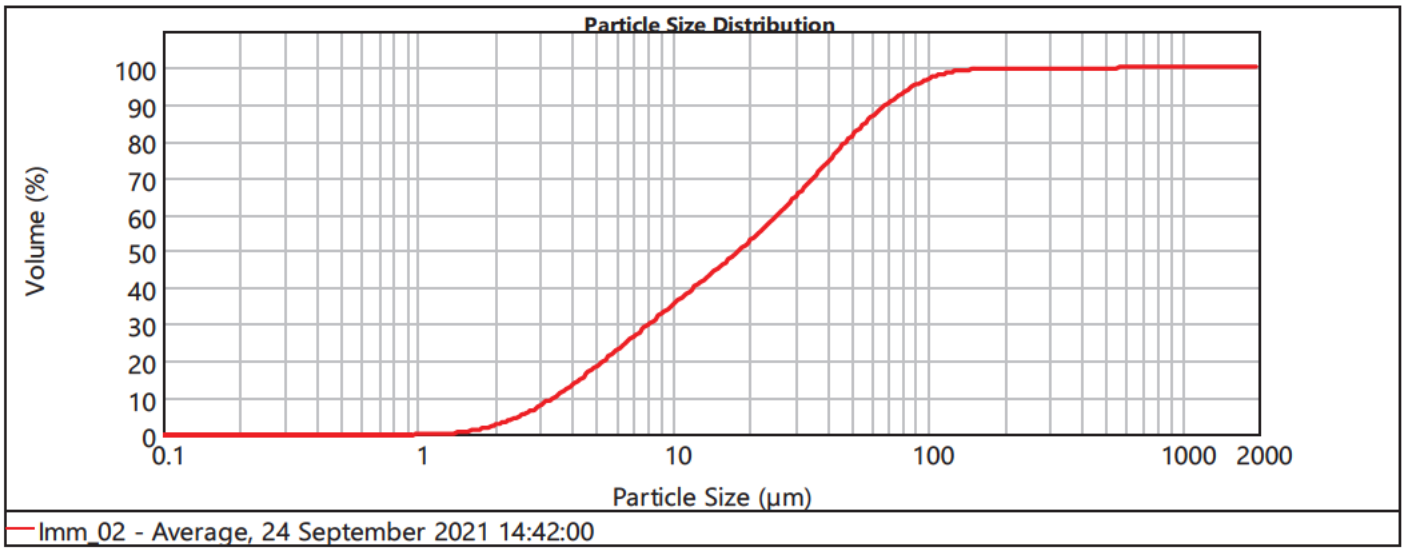
Particle Size Analysis Report

Sample Name:	Imm_02 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		13.23 %
Sample Collected:			Weighted Residual:		0.685 %

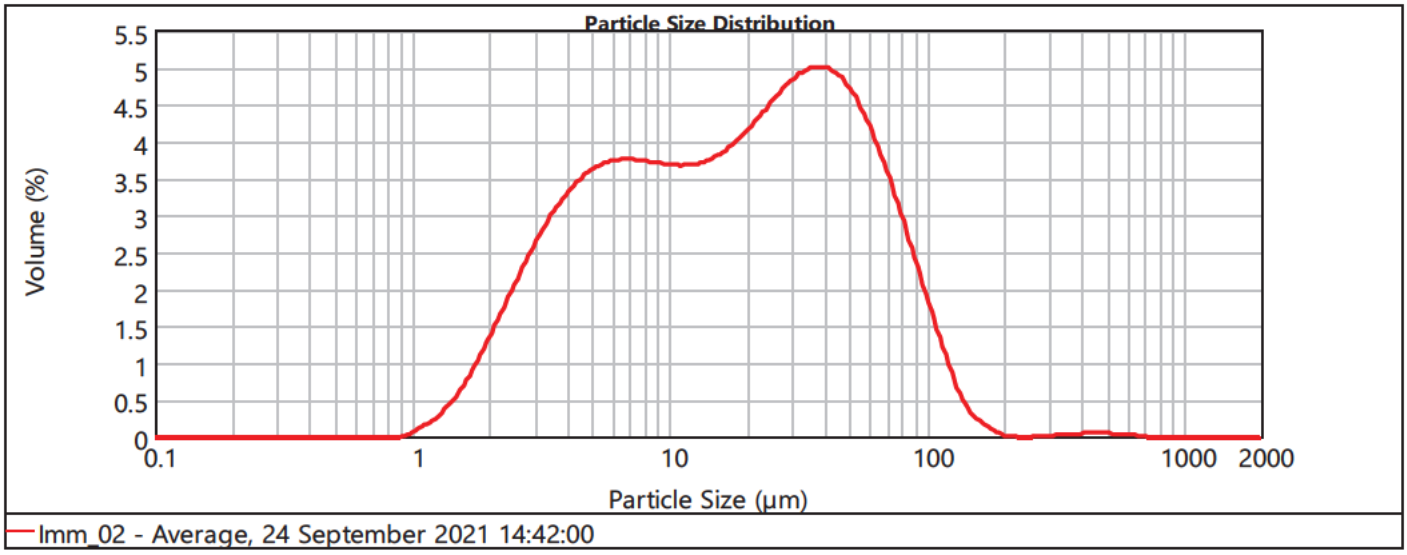
d(0.1):	3.383	µm	d(0.5):	18.132	µm	d(0.9):	68.935	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
3 %	20 %	30 %	34 %	13 %	0 %	0 %

Frequency Curve



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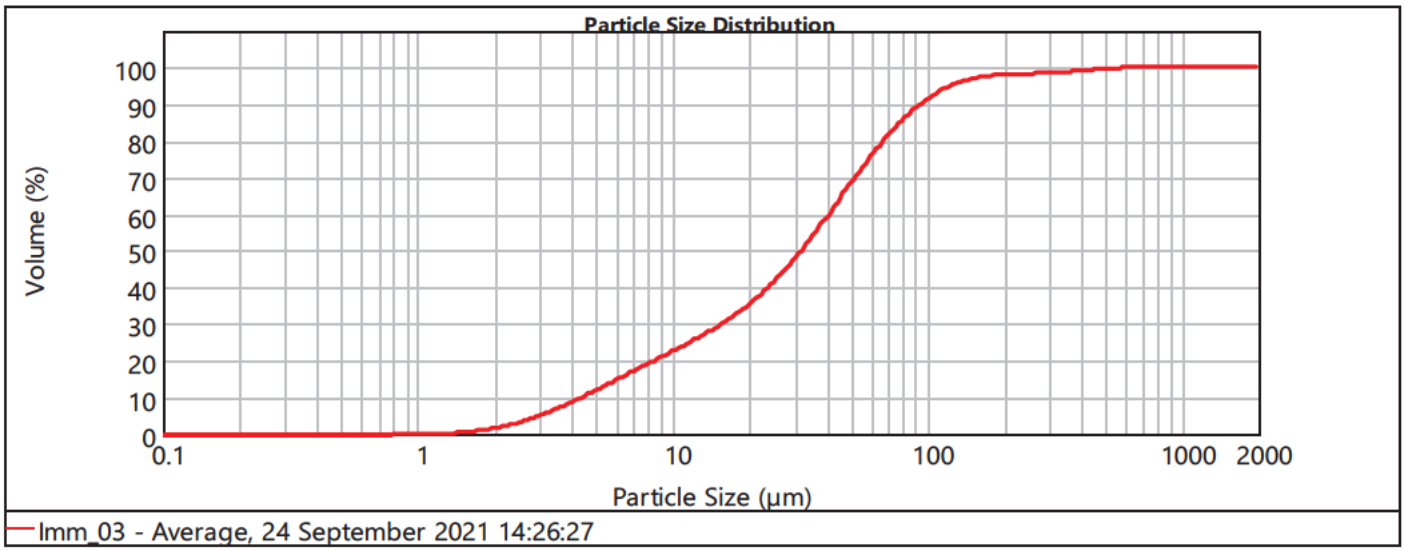
Particle Size Analysis Report

Sample Name:	Imm_03 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		11.64 %
Sample Collected:			Weighted Residual:		0.825 %

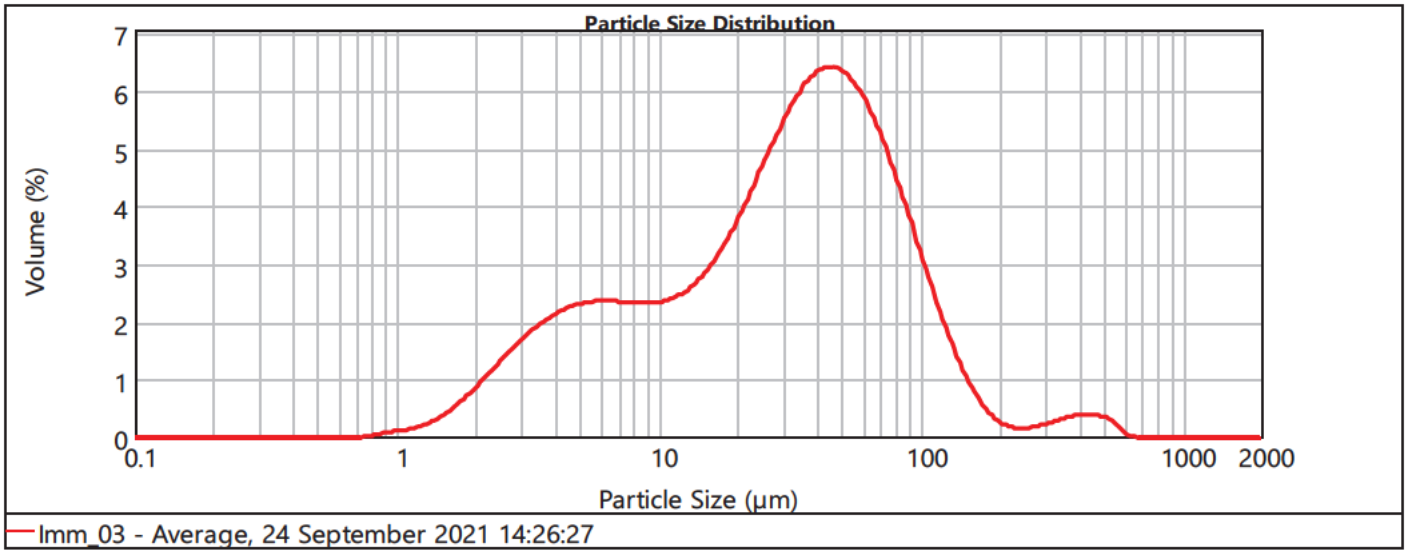
d(0.1):	4.335	µm	d(0.5):	31.757	µm	d(0.9):	93.194	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	13 %	21 %	40 %	22 %	2 %	0 %

Frequency Curve



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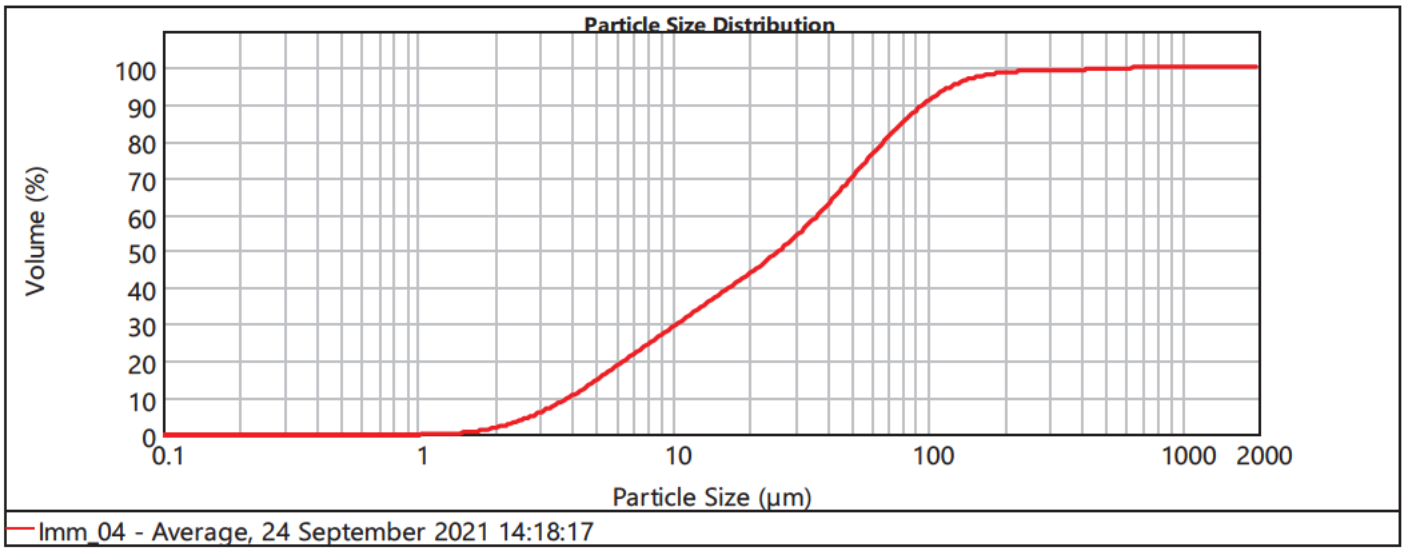
Particle Size Analysis Report

Sample Name:	Imm_04 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		13.26 %
Sample Collected:			Weighted Residual:		0.883 %

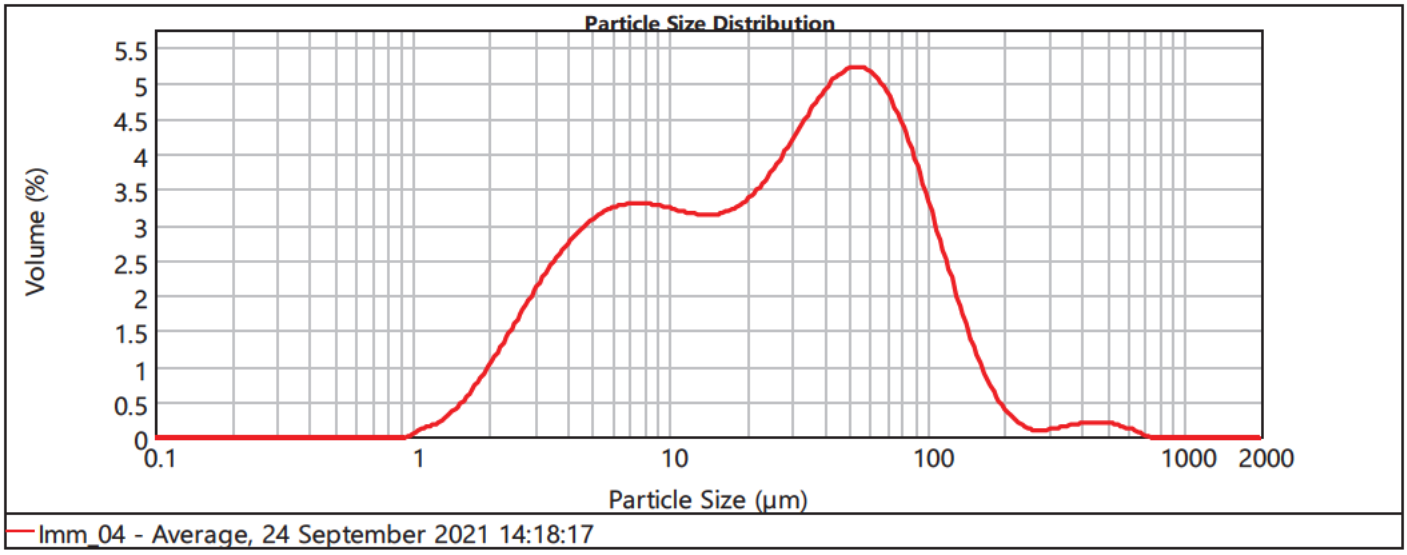
d(0.1):	3.886	µm	d(0.5):	25.980	µm	d(0.9):	96.161	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	17 %	25 %	32 %	23 %	1 %	0 %

Frequency Curve



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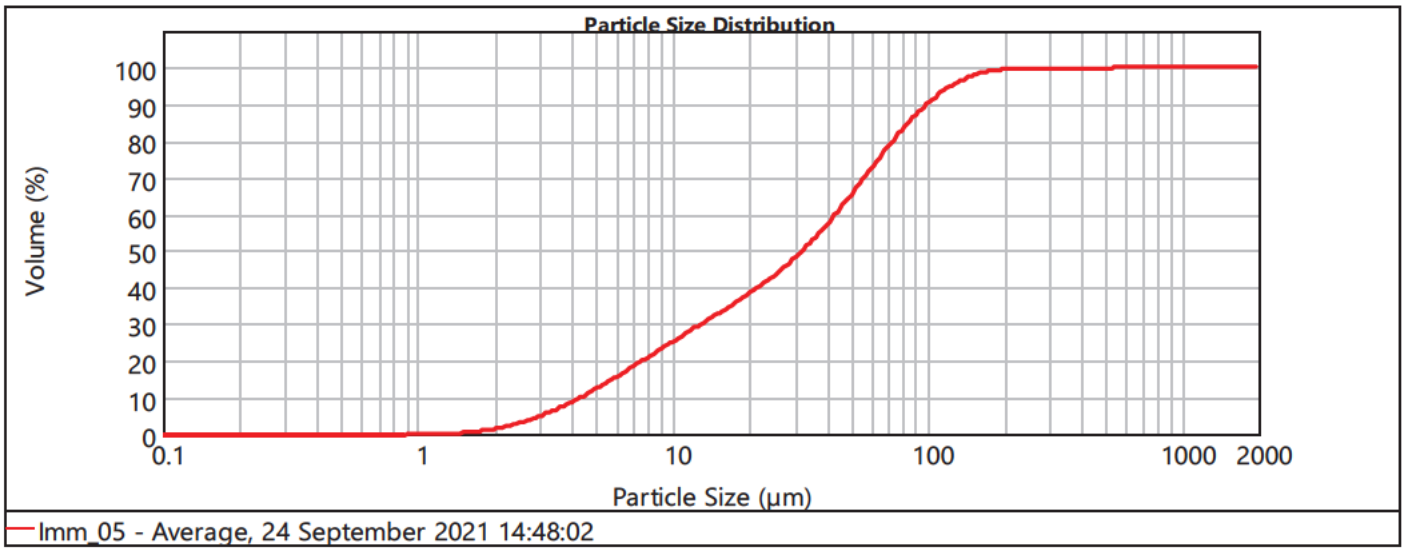
Particle Size Analysis Report

Sample Name:	Imm_05 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		12.03 %
Sample Collected:			Weighted Residual:		0.914 %

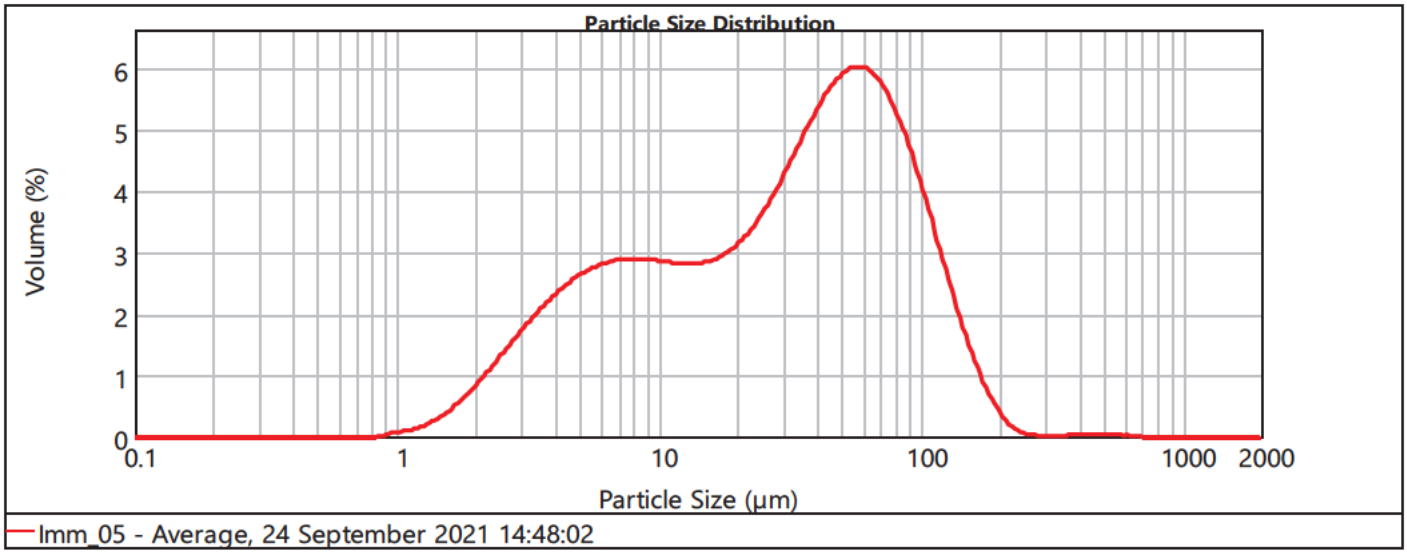
d(0.1):	4.304	µm	d(0.5):	32.134	µm	d(0.9):	99.160	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	14 %	23 %	34 %	27 %	0 %	0 %

Frequency Curve



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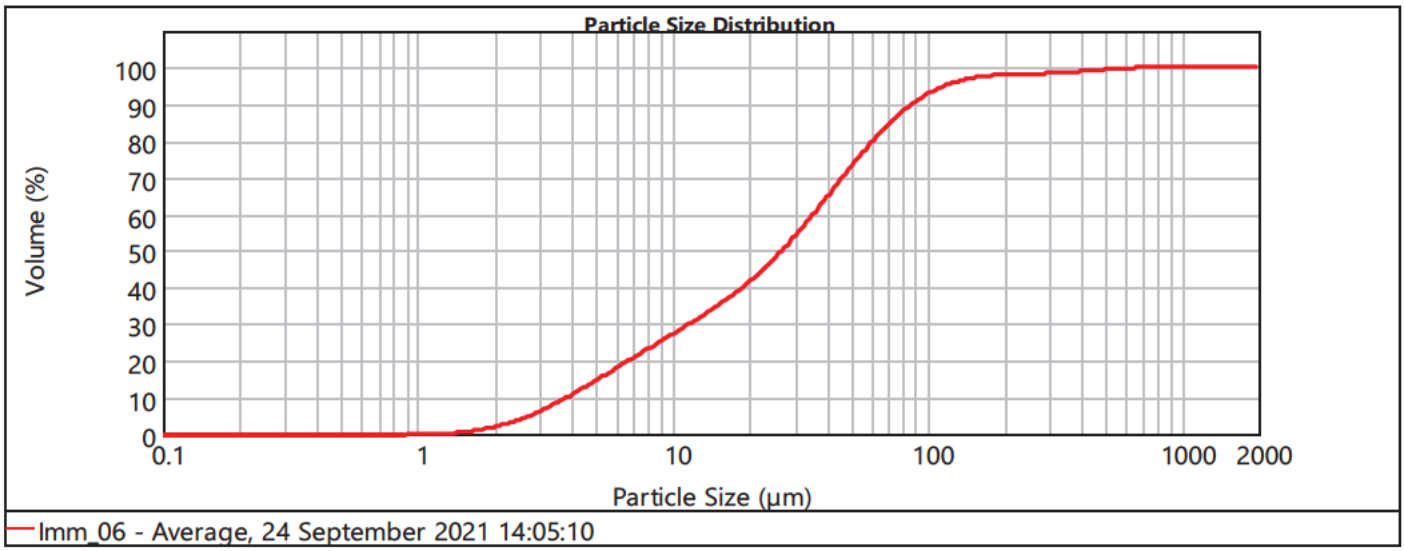
Particle Size Analysis Report

Sample Name:	Imm_06 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		13.25 %
Sample Collected:			Weighted Residual:		0.861 %

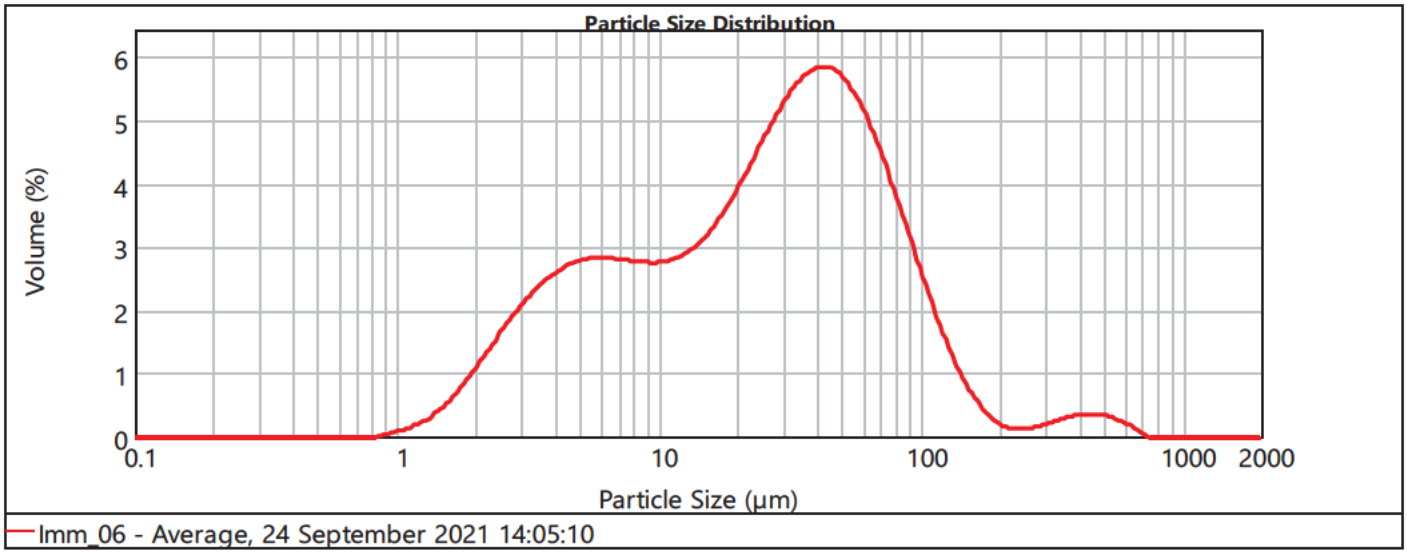
d(0.1):	3.809	µm	d(0.5):	26.688	µm	d(0.9):	86.764	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	16 %	24 %	38 %	19 %	2 %	0 %

Frequency Curve



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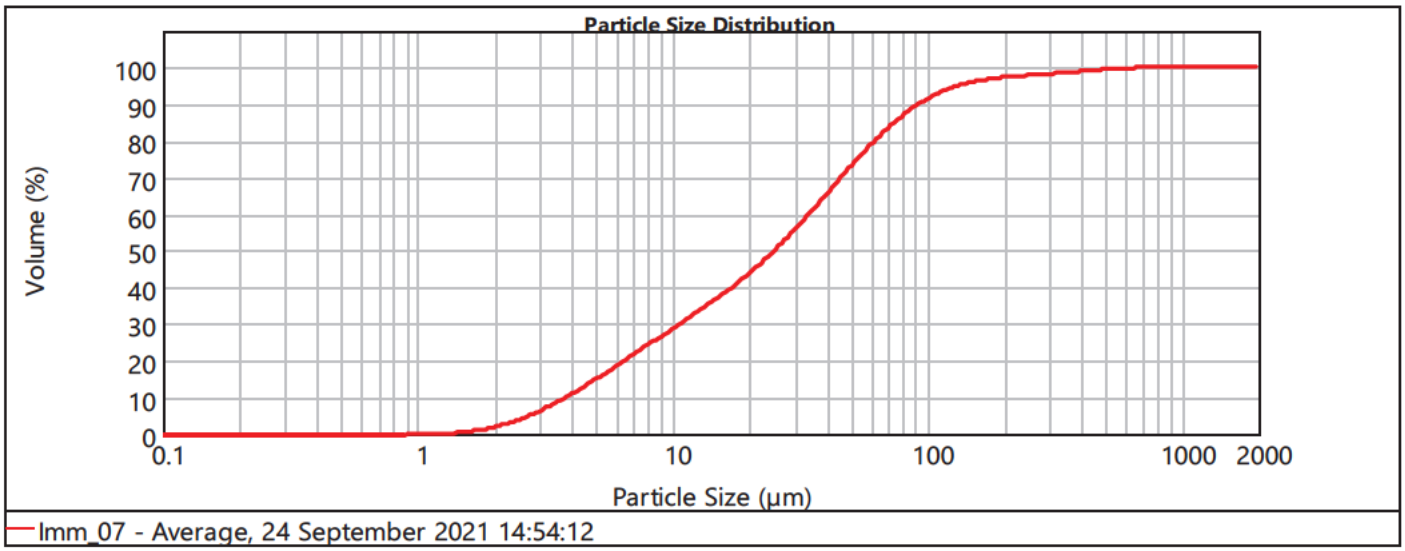
Particle Size Analysis Report

Sample Name:	Imm_07 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		14.72 %
Sample Collected:			Weighted Residual:		0.883 %

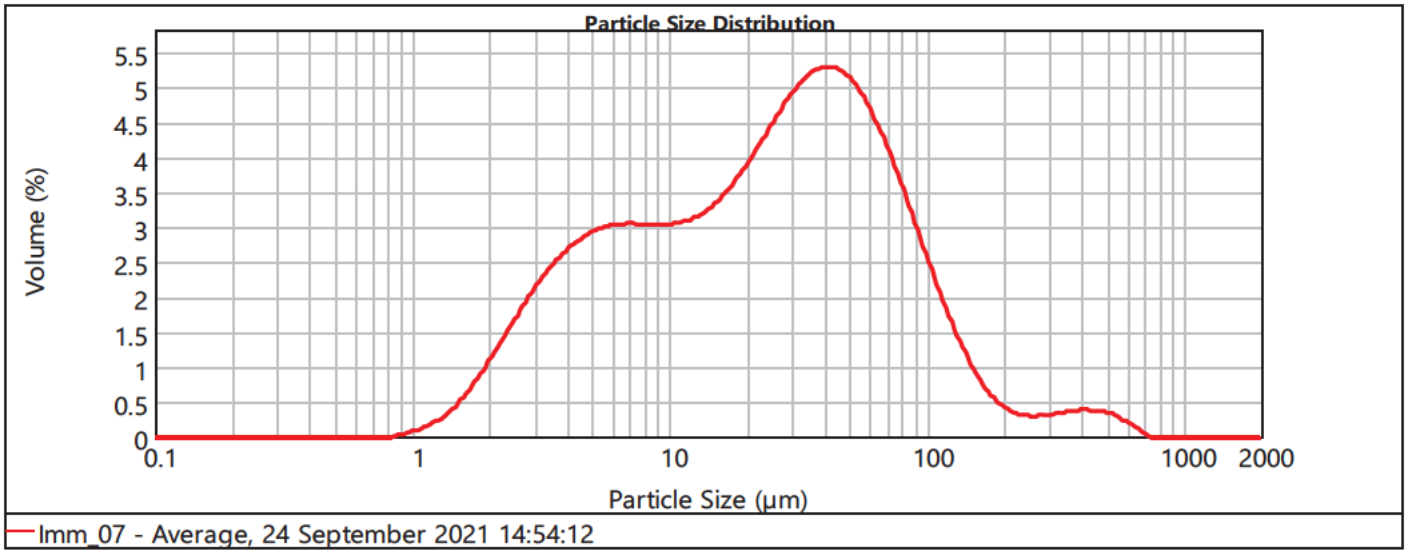
d(0.1):	3.772	µm	d(0.5):	24.883	µm	d(0.9):	92.111	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	17 %	25 %	35 %	18 %	2 %	0 %

Frequency Curve



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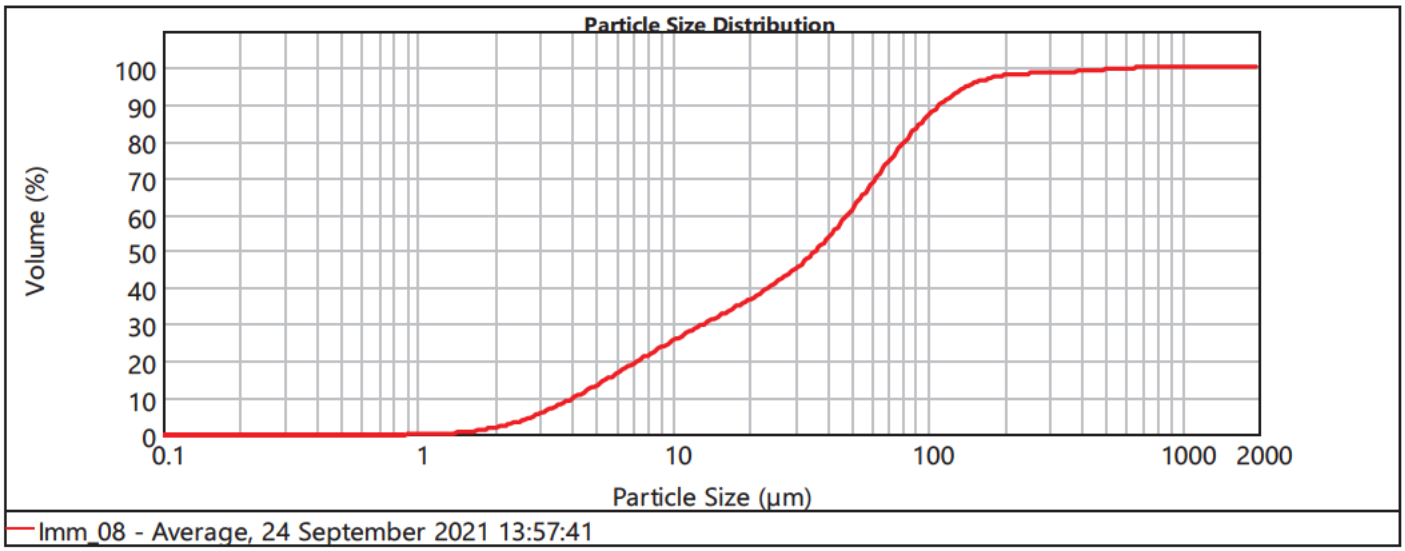
Particle Size Analysis Report

Sample Name:	Imm_08 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		12.57 %
Sample Collected:			Weighted Residual:		1.038 %

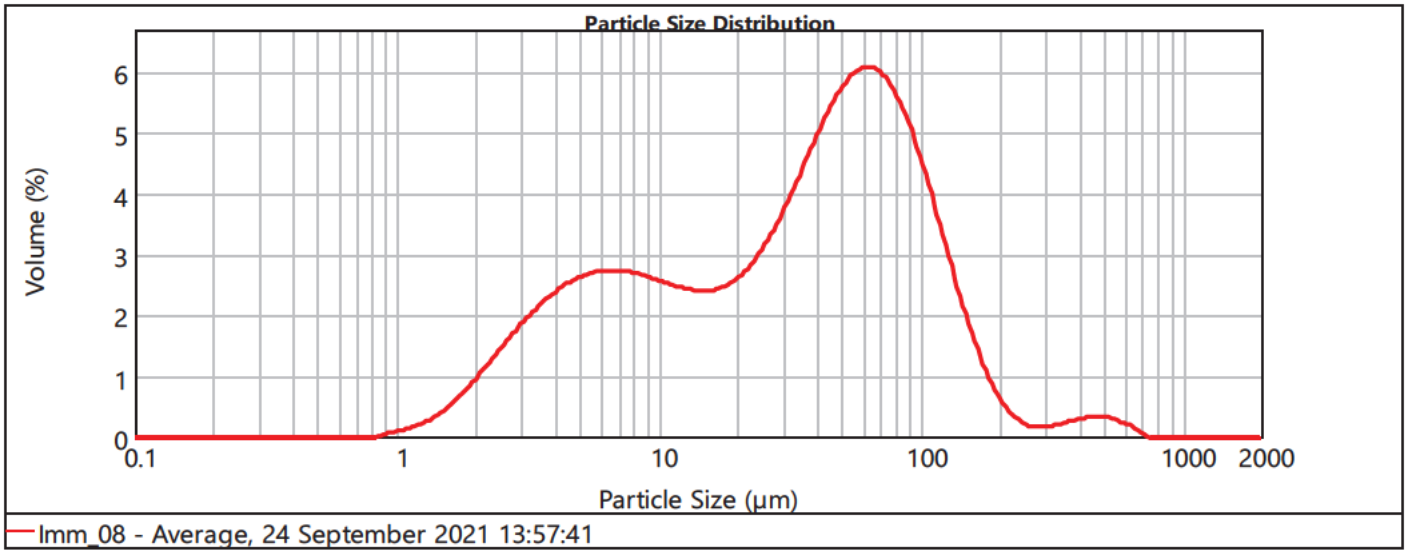
d(0.1):	4.074	µm	d(0.5):	36.169	µm	d(0.9):	112.040 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	15 %	20 %	31 %	30 %	2 %	0 %

Frequency Curve



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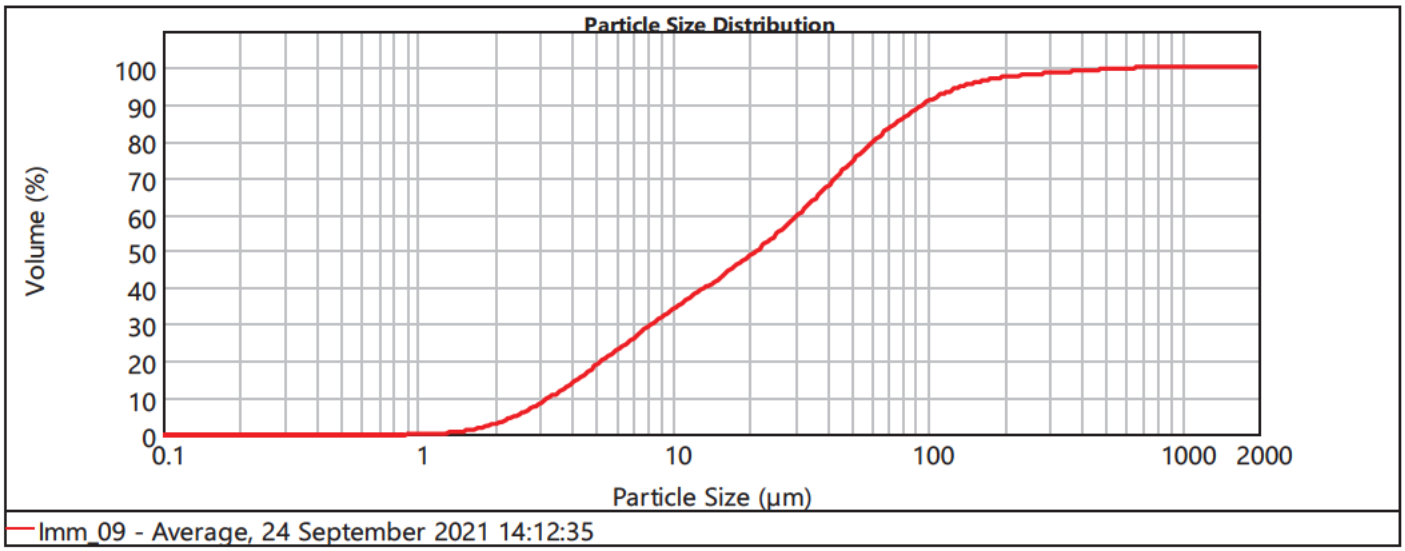
Particle Size Analysis Report

Sample Name:	Imm_09 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		10.54 %
Sample Collected:			Weighted Residual:		0.860 %

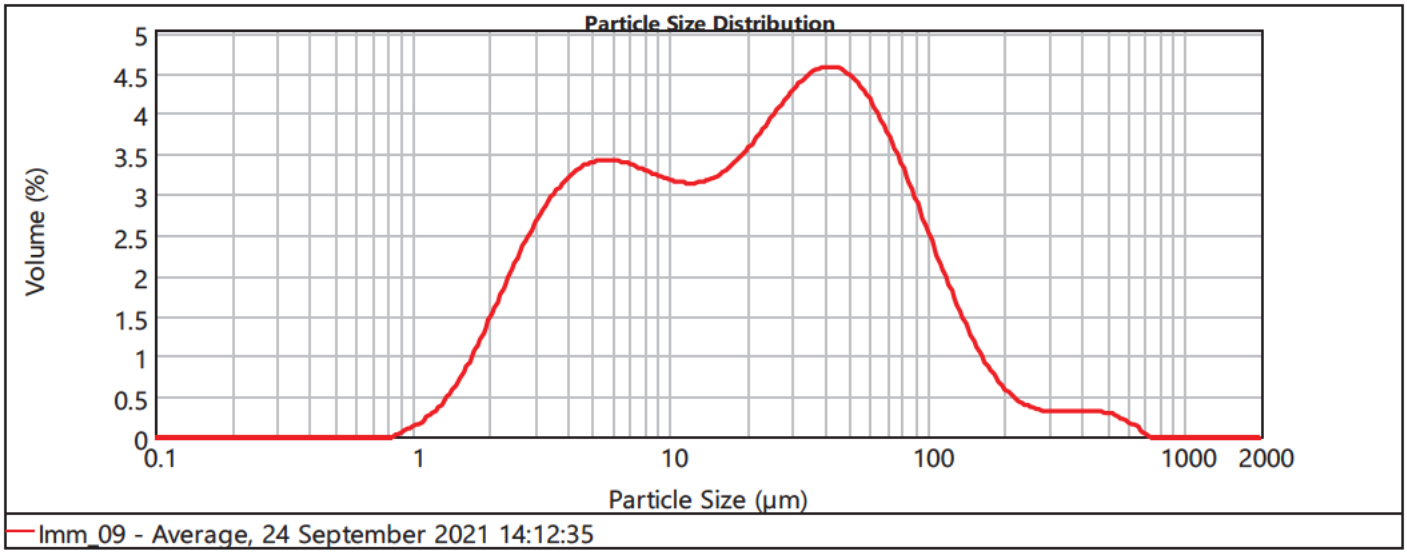
d(0.1):	3.272	µm	d(0.5):	21.181	µm	d(0.9):	95.817	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
3 %	20 %	26 %	31 %	18 %	2 %	0 %

Frequency Curve



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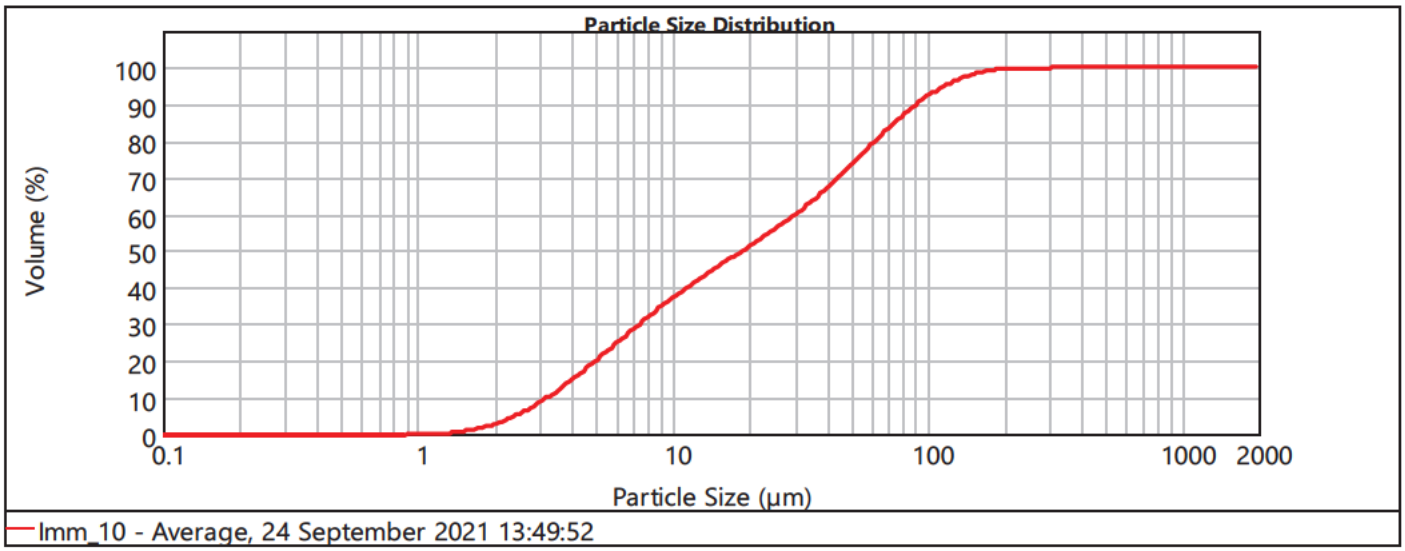
Particle Size Analysis Report

Sample Name:	Imm_10 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		12.45 %
Sample Collected:			Weighted Residual:		0.775 %

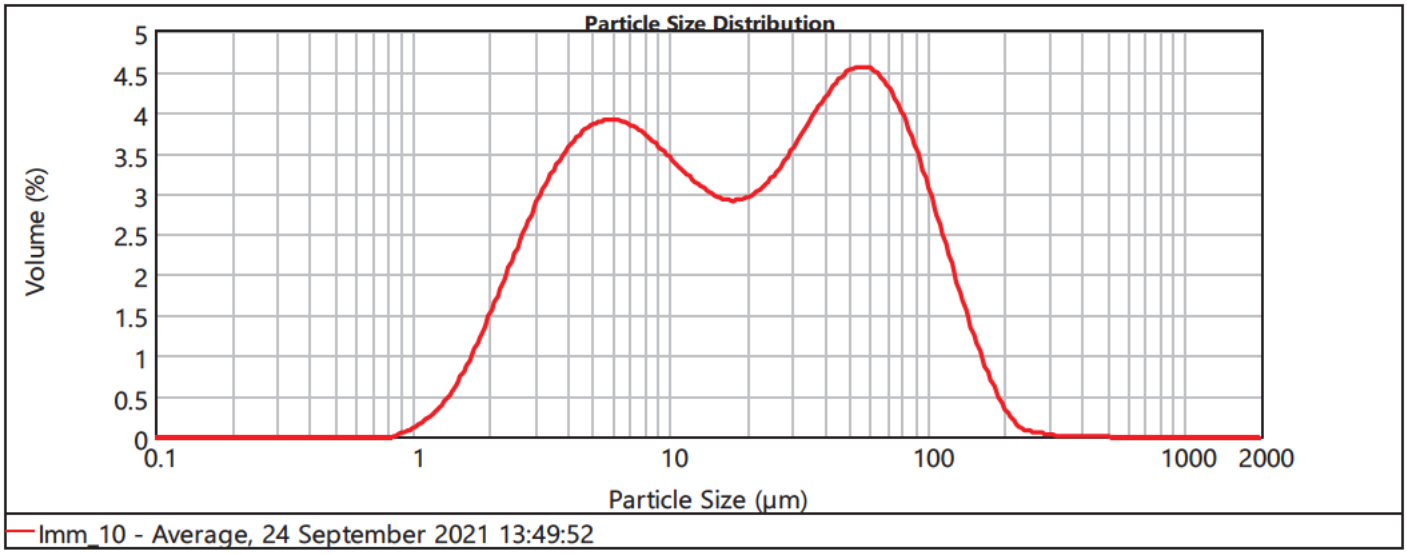
d(0.1):	3.205	µm	d(0.5):	18.700	µm	d(0.9):	90.354	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
3 %	22 %	26 %	28 %	21 %	0 %	0 %

Frequency Curve



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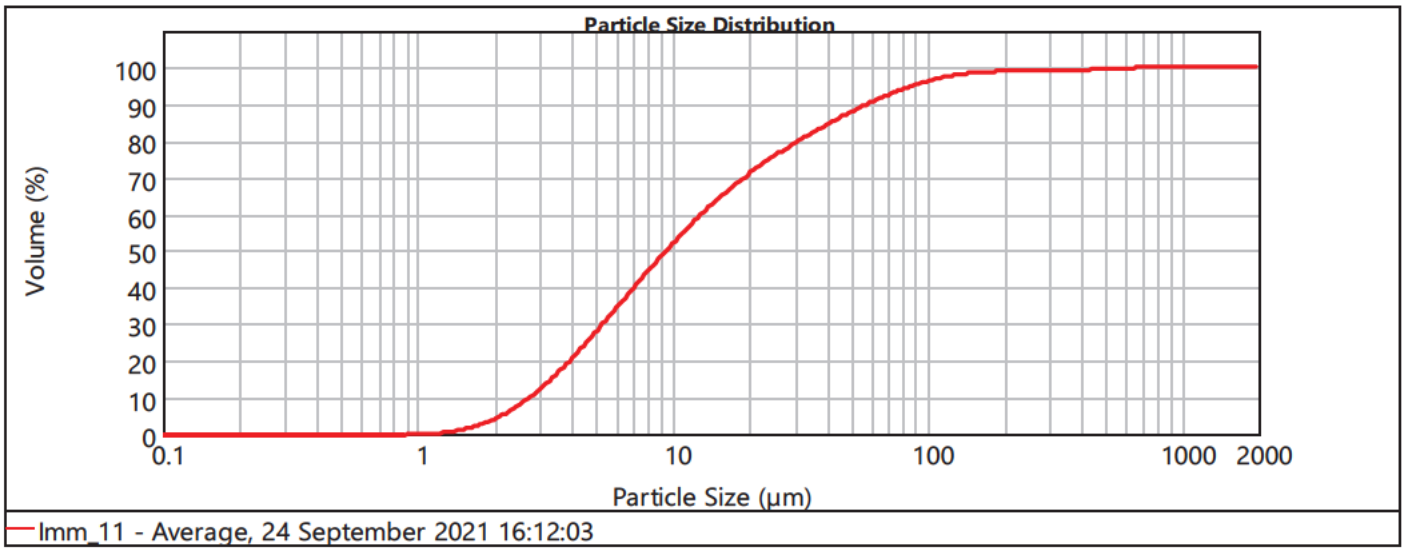
Particle Size Analysis Report

Sample Name:	Imm_11 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		13.90 %
Sample Collected:			Weighted Residual:		0.599 %

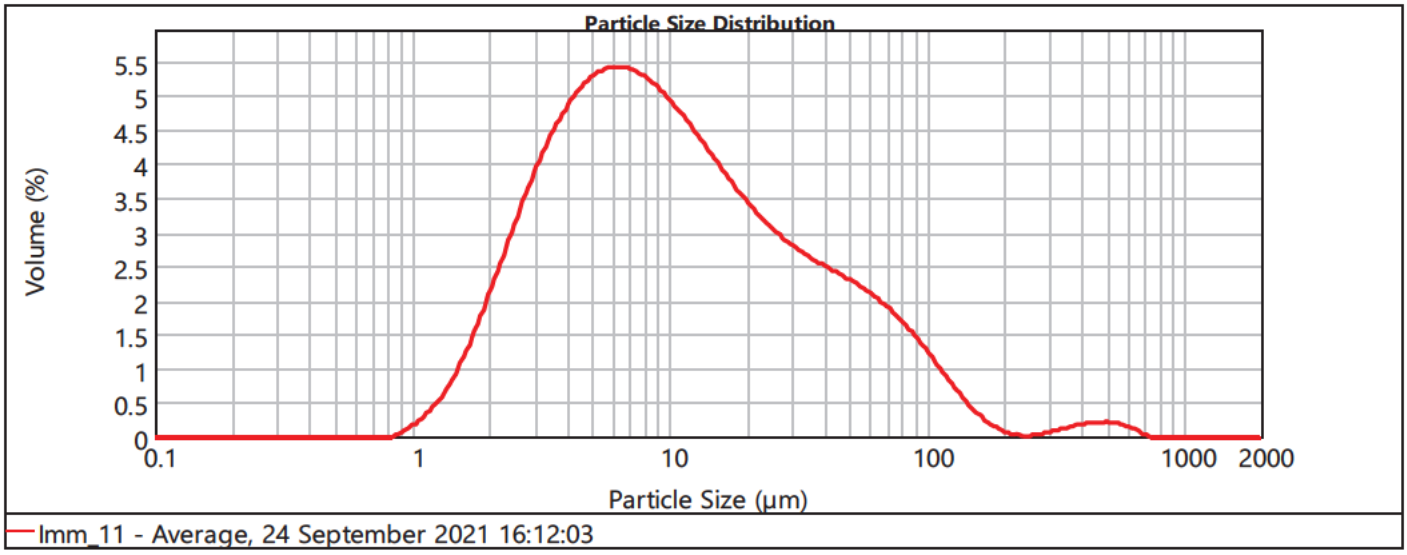
d(0.1):	2.728	µm	d(0.5):	9.389	µm	d(0.9):	57.901	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
4 %	30 %	37 %	19 %	8 %	1 %	0 %

Frequency Curve



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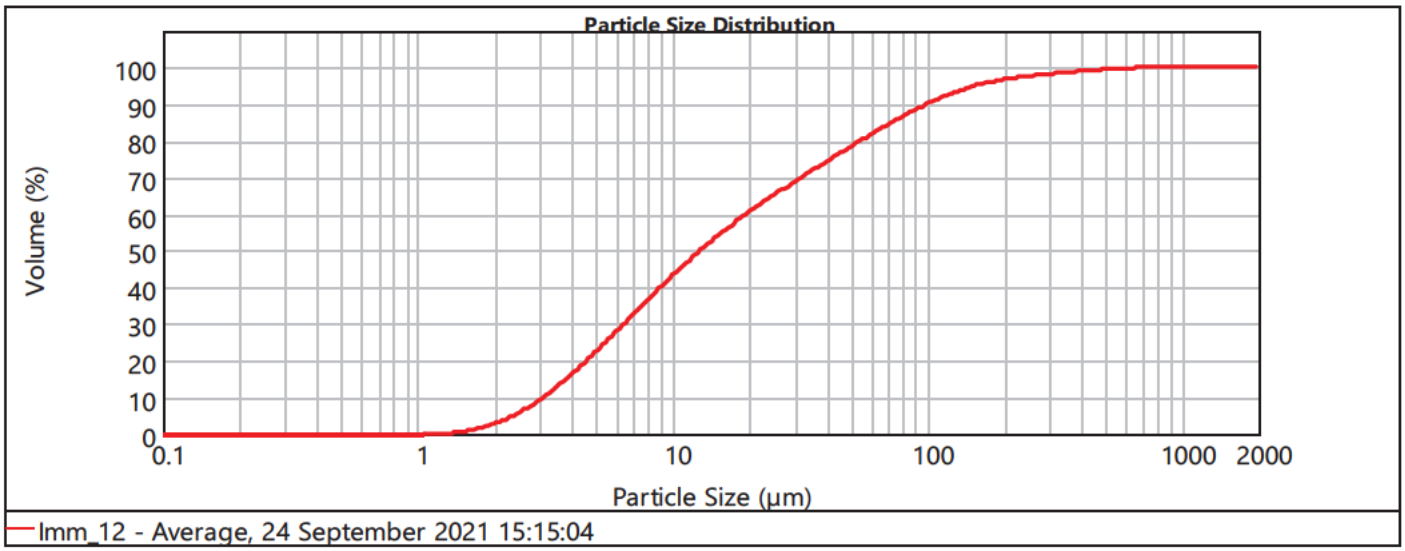
Particle Size Analysis Report

Sample Name:	Imm_12 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		13.83 %
Sample Collected:			Weighted Residual:		0.796 %

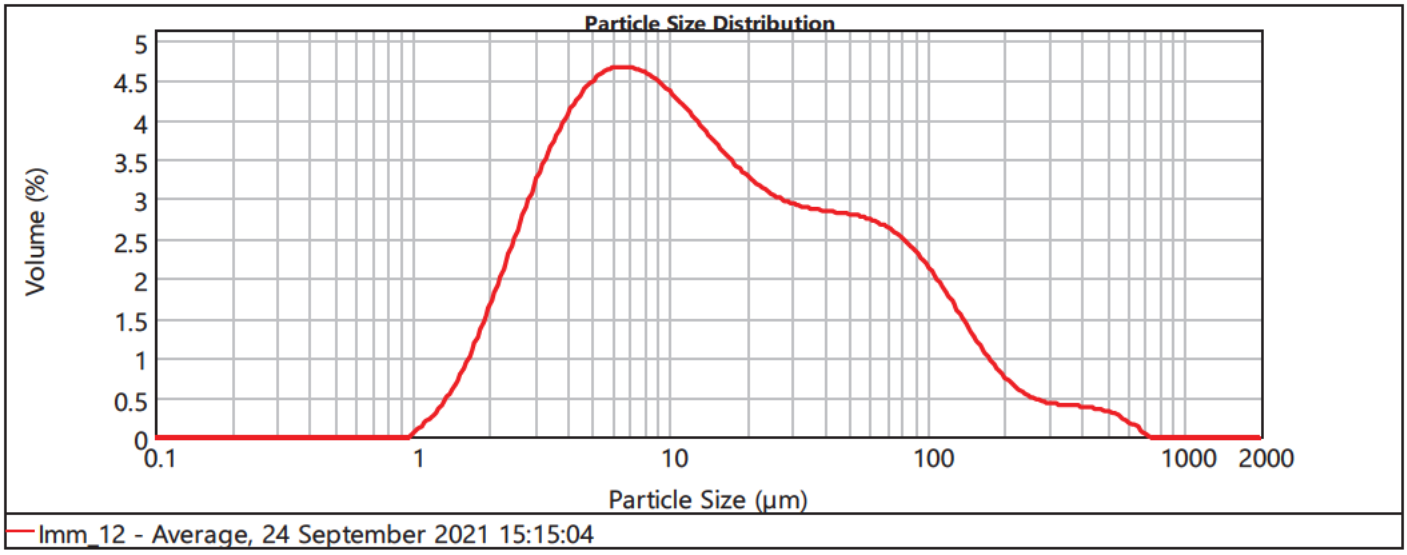
d(0.1):	3.076	µm	d(0.5):	12.737	µm	d(0.9):	98.640	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
3 %	25 %	33 %	21 %	15 %	3 %	0 %

Frequency Curve



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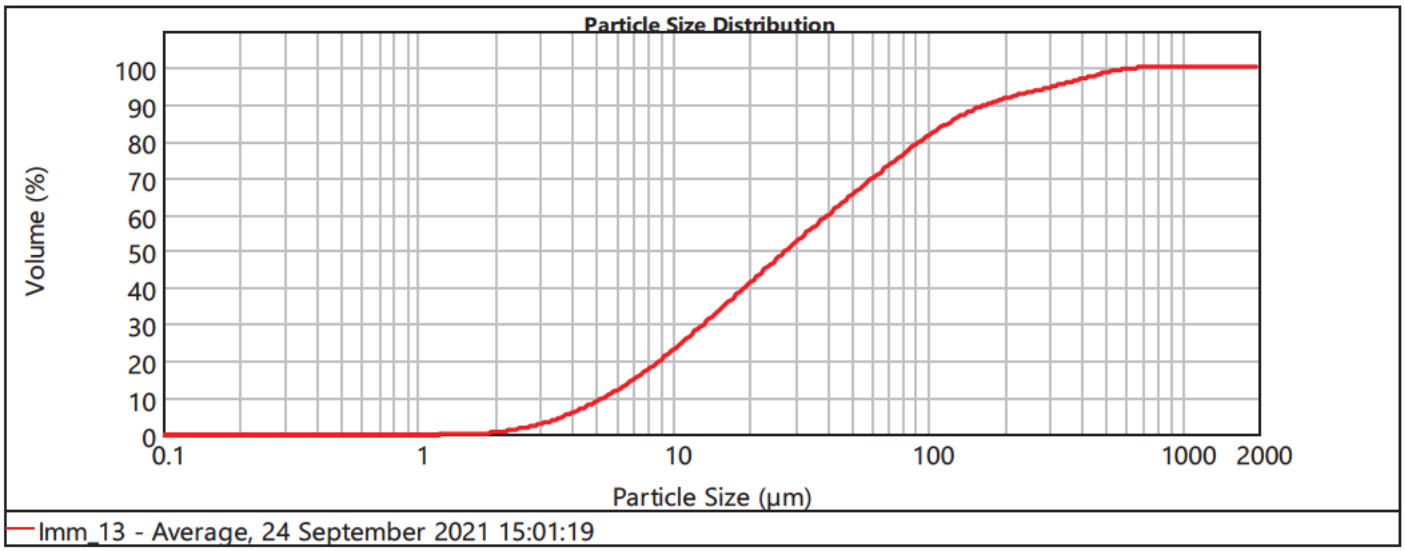
Particle Size Analysis Report

Sample Name:	Imm_13 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		15.93 %
Sample Collected:	Rhizomes >1mm present in sample		Weighted Residual:		0.926 %

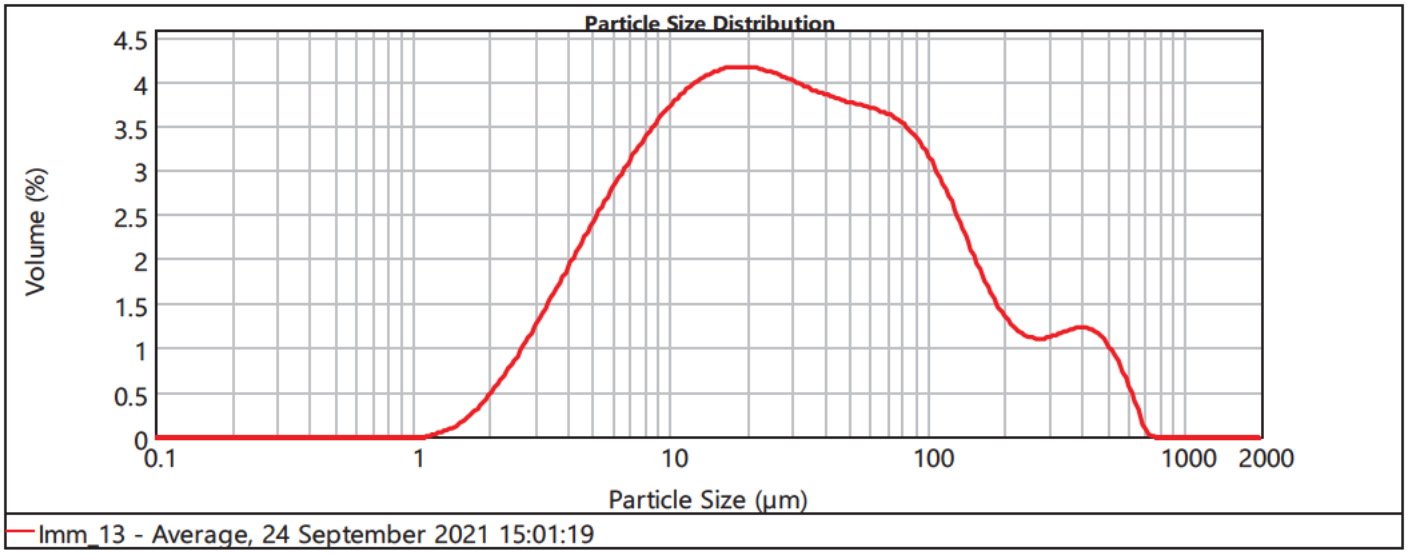
d(0.1):	5.339	µm	d(0.5):	27.691	µm	d(0.9):	171.668	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
1 %	11 %	29 %	28 %	22 %	8 %	0 %

Frequency Curve



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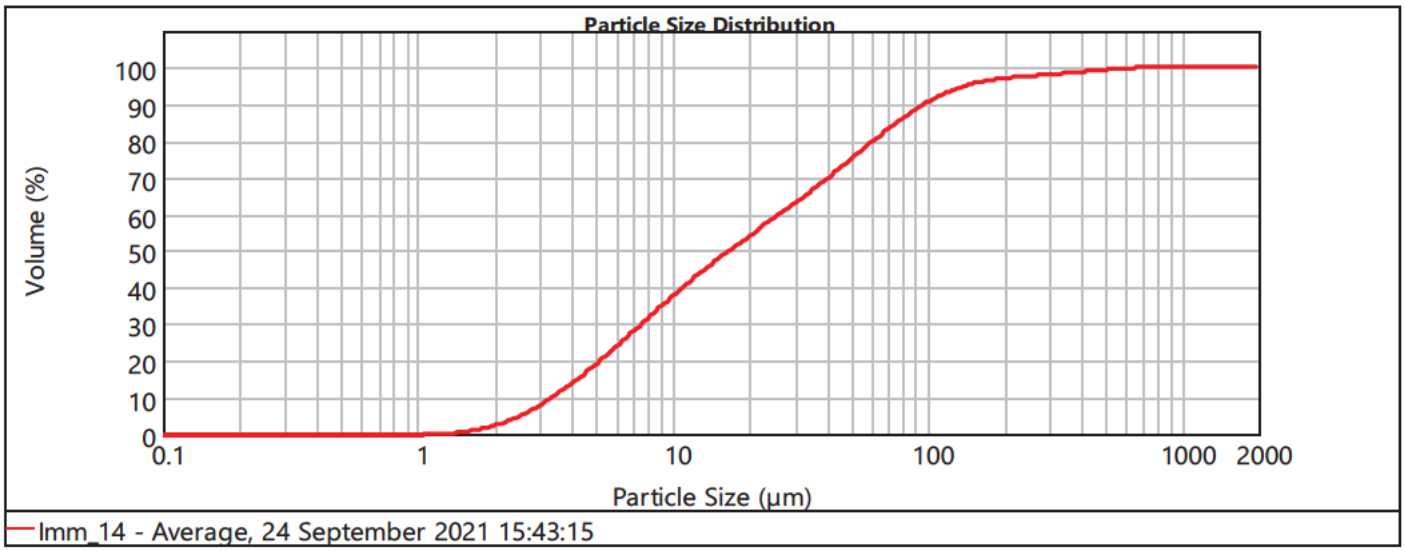
Particle Size Analysis Report

Sample Name:	Imm_14 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		14.61 %
Sample Collected:			Weighted Residual:		0.842 %

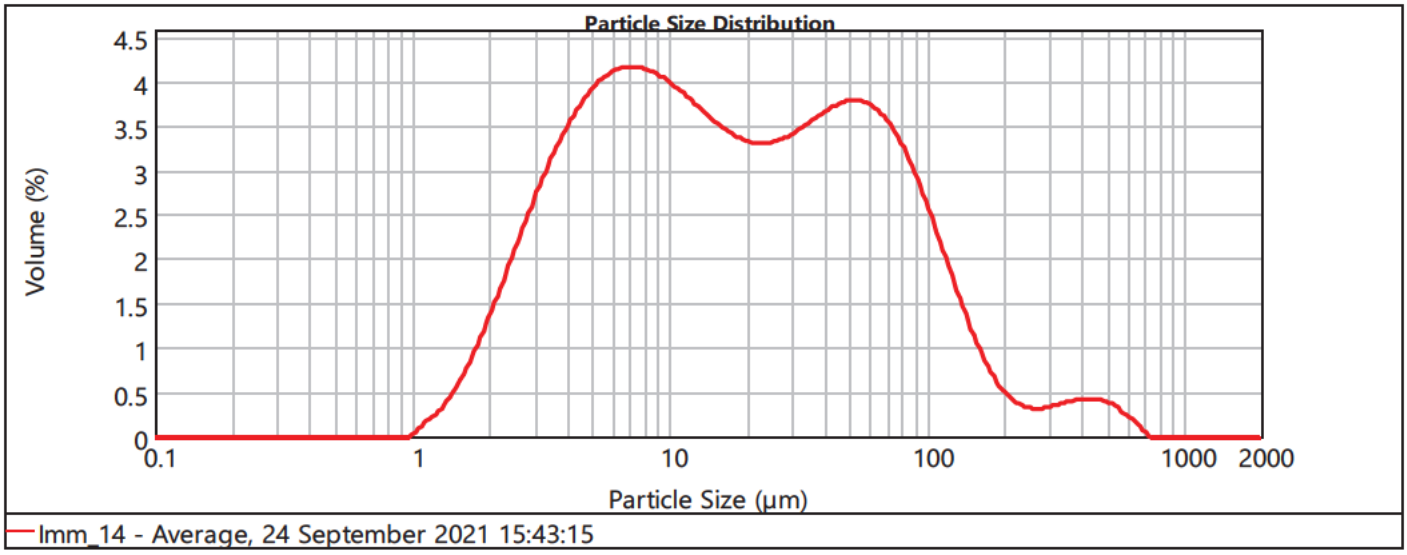
d(0.1):	3.359	µm	d(0.5):	16.579	µm	d(0.9):	96.798	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	21 %	30 %	25 %	18 %	3 %	0 %

Frequency Curve



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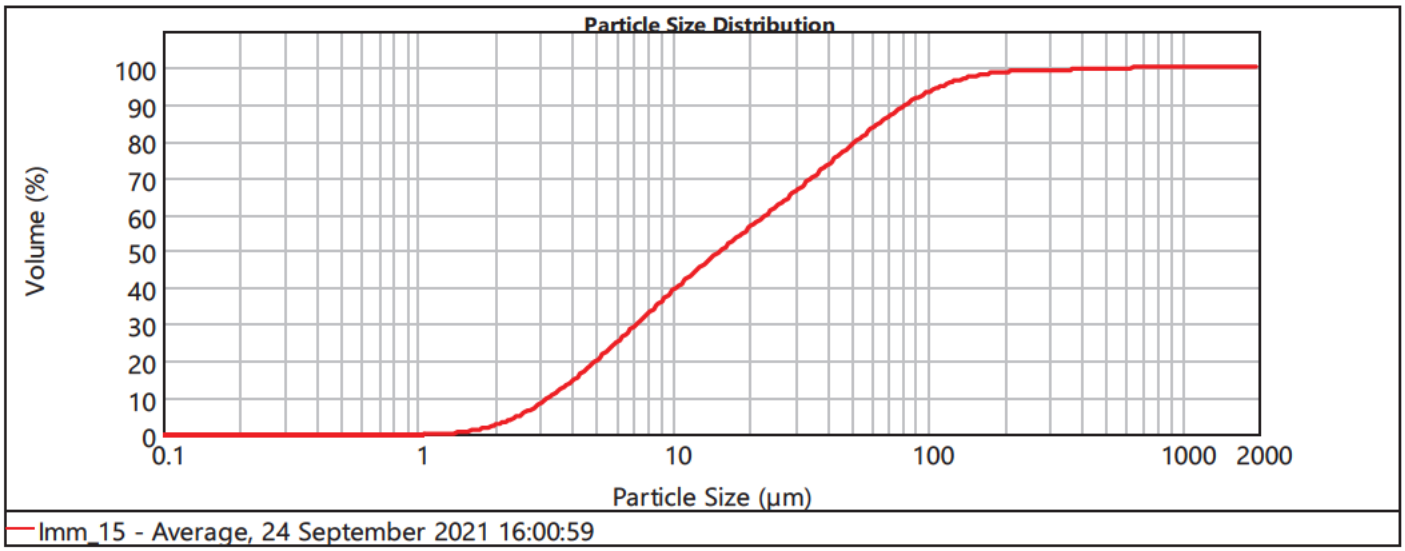
Particle Size Analysis Report

Sample Name:	Imm_15 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		15.70 %
Sample Collected:			Weighted Residual:		0.721 %

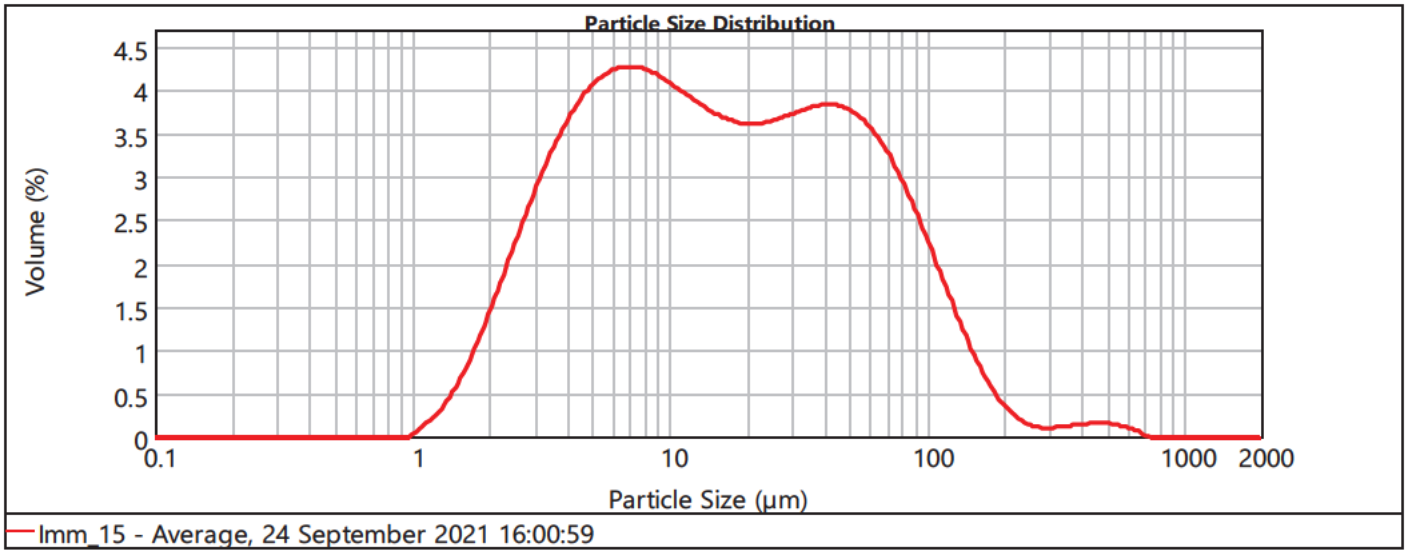
d(0.1):	3.278	µm	d(0.5):	15.313	µm	d(0.9):	82.670	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
3 %	22 %	31 %	27 %	16 %	1 %	0 %

Frequency Curve



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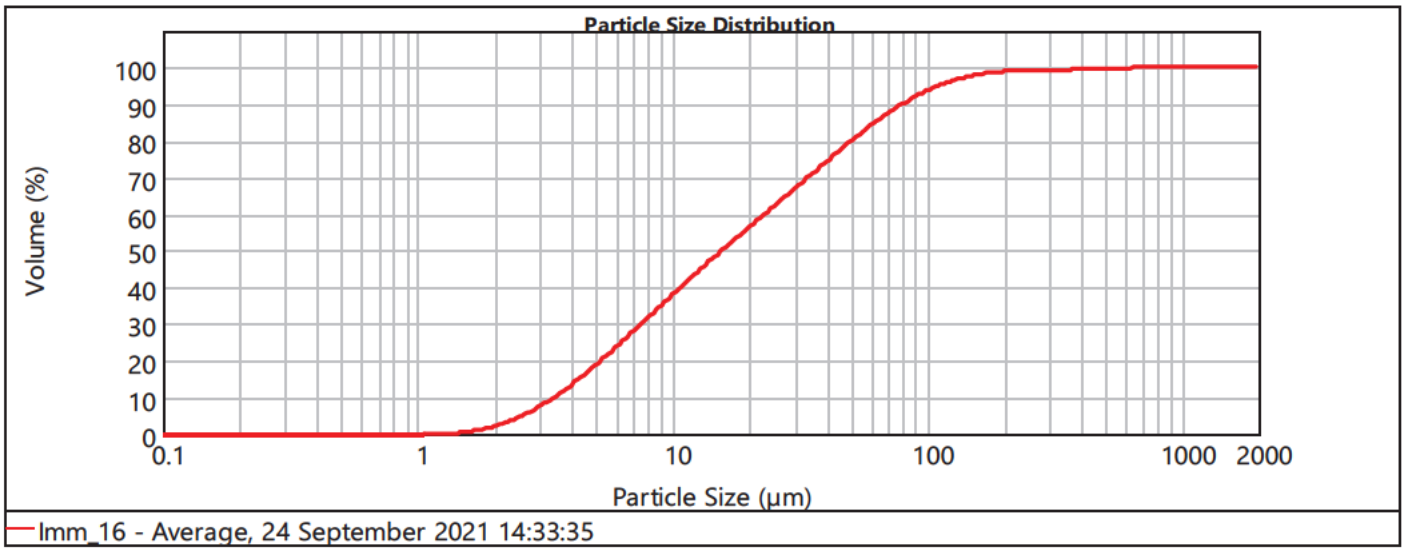
Particle Size Analysis Report

Sample Name:	Imm_16 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		14.33 %
Sample Collected:			Weighted Residual:		0.738 %

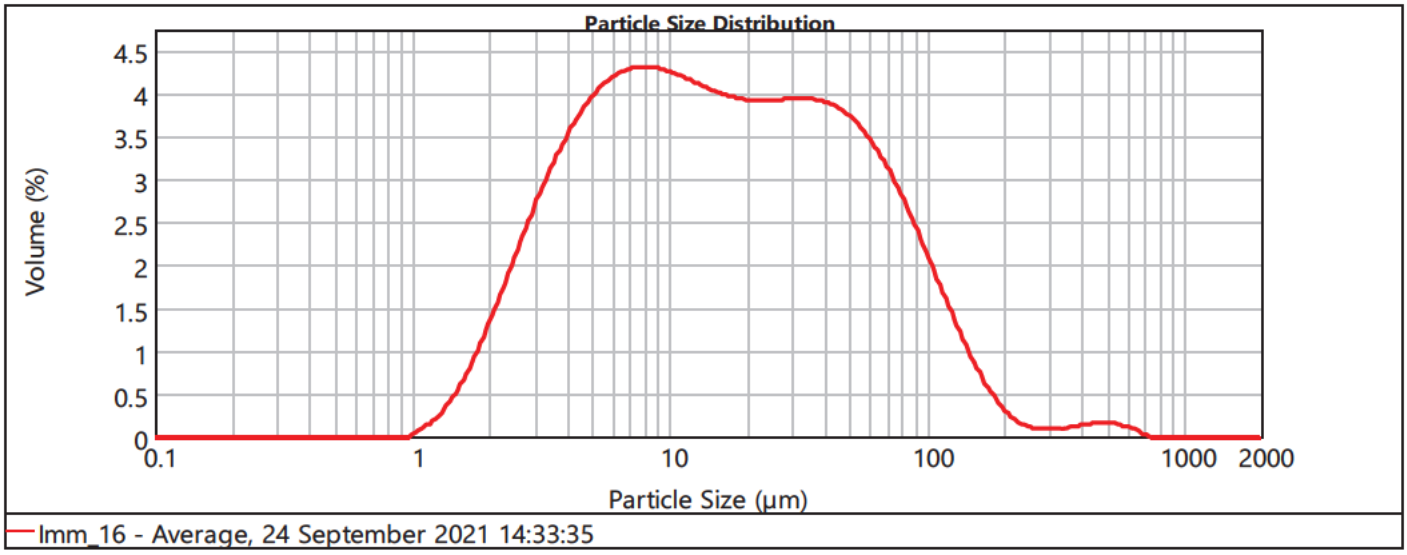
d(0.1):	3.391	µm	d(0.5):	15.508	µm	d(0.9):	79.285	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
2 %	22 %	33 %	28 %	15 %	1 %	0 %

Frequency Curve



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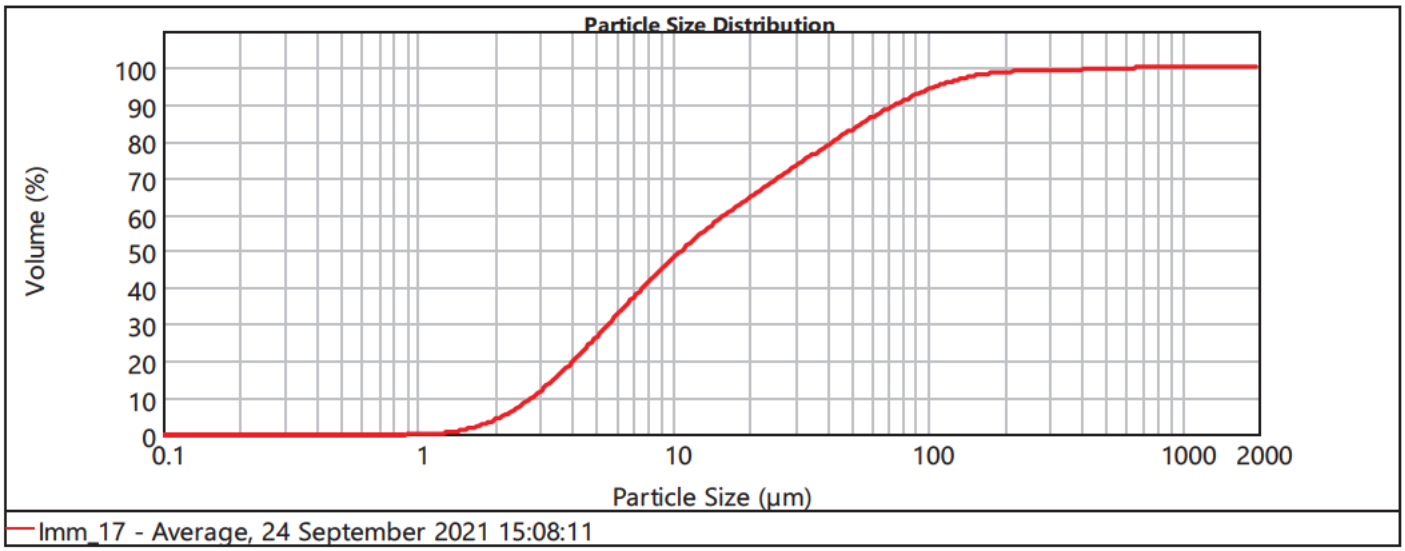
Particle Size Analysis Report

Sample Name:	Imm_17 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		14.16 %
Sample Collected:			Weighted Residual:		0.664 %

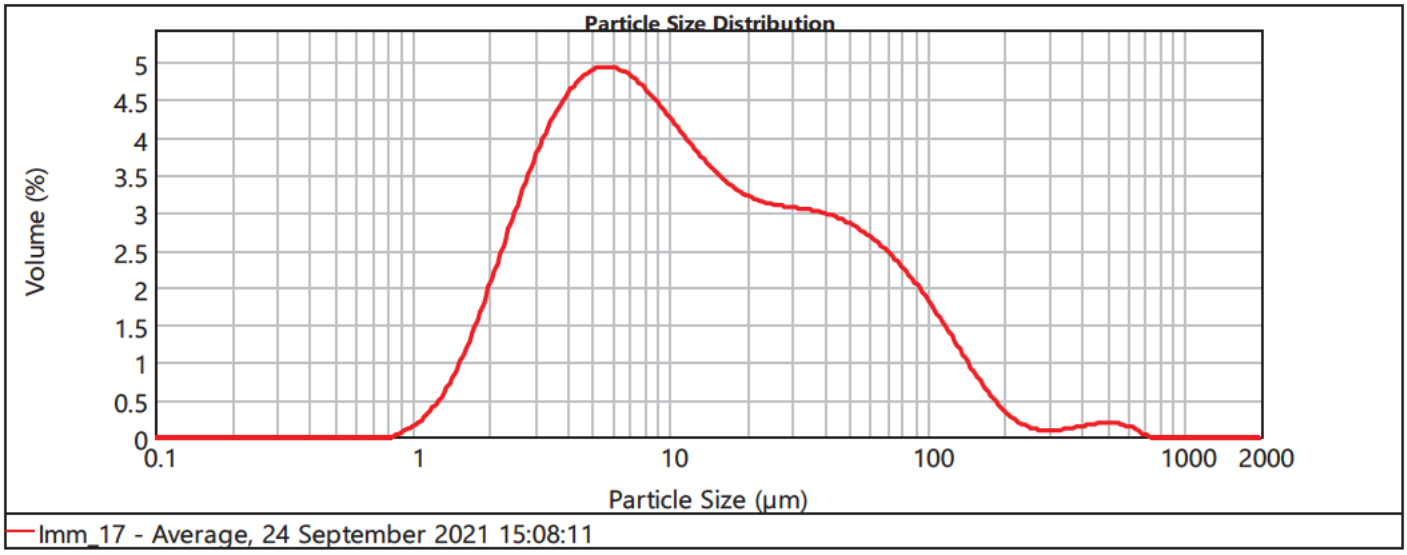
d(0.1):	2.795	µm	d(0.5):	10.761	µm	d(0.9):	75.386	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
4 %	28 %	32 %	22 %	13 %	1 %	0 %

Frequency Curve



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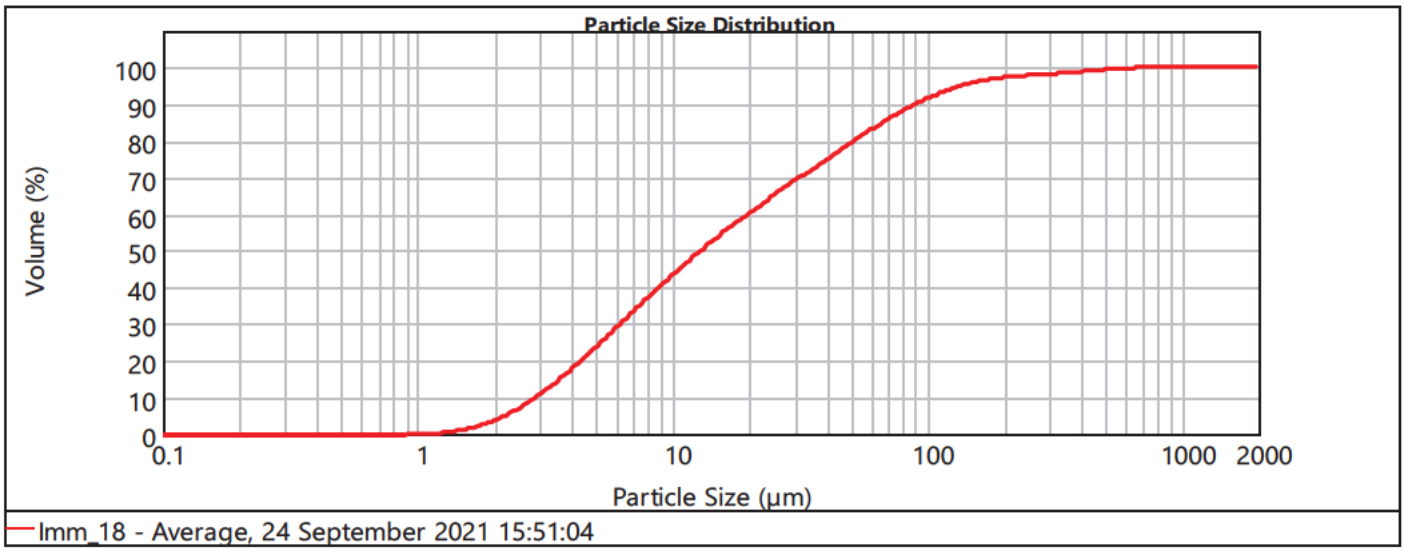
Particle Size Analysis Report

Sample Name:	Imm_18 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		21.83 %
Sample Collected:			Weighted Residual:		0.700 %

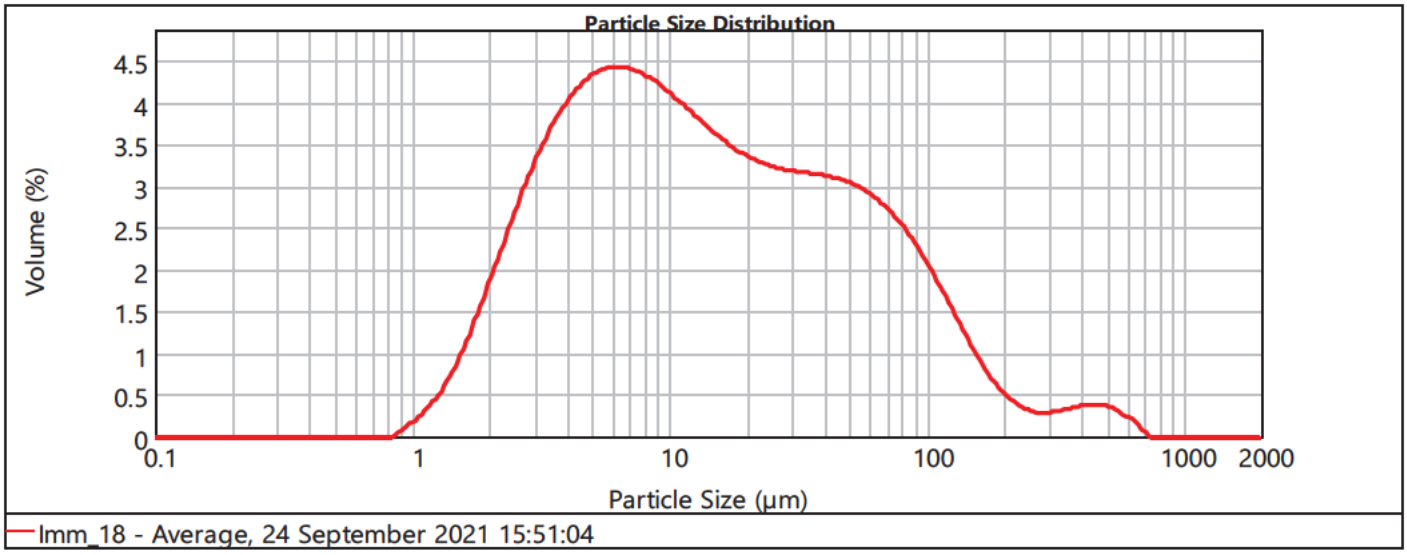
d(0.1):	2.884	µm	d(0.5):	12.797	µm	d(0.9):	89.358	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
4 %	25 %	31 %	23 %	14 %	3 %	0 %

Frequency Curve



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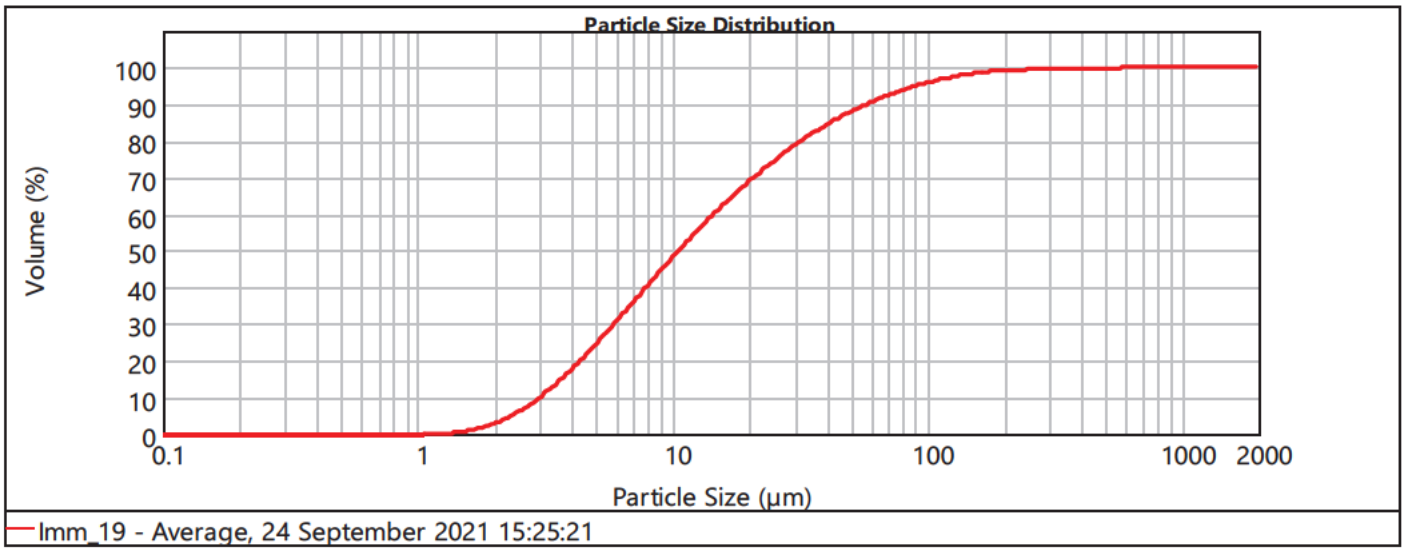
Particle Size Analysis Report

Sample Name:	Imm_19 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		13.92 %
Sample Collected:			Weighted Residual:		0.642 %

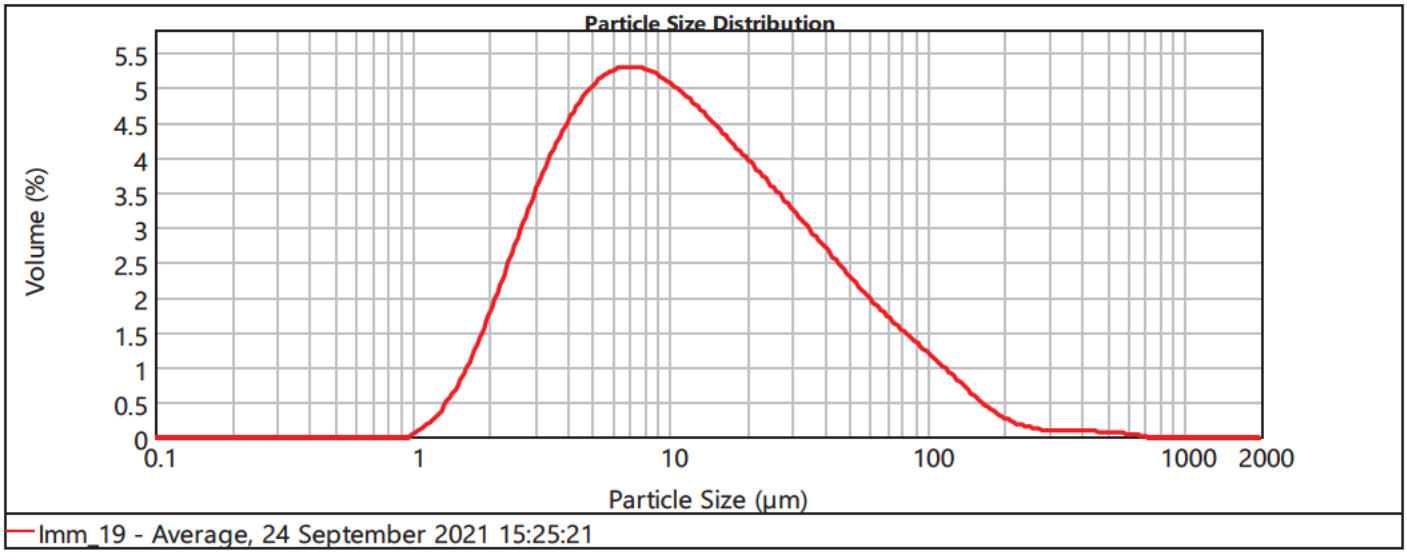
d(0.1):	2.984	µm	d(0.5):	10.503	µm	d(0.9):	57.480	µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
3 %	28 %	38 %	22 %	9 %	1 %	0 %

Frequency Curve



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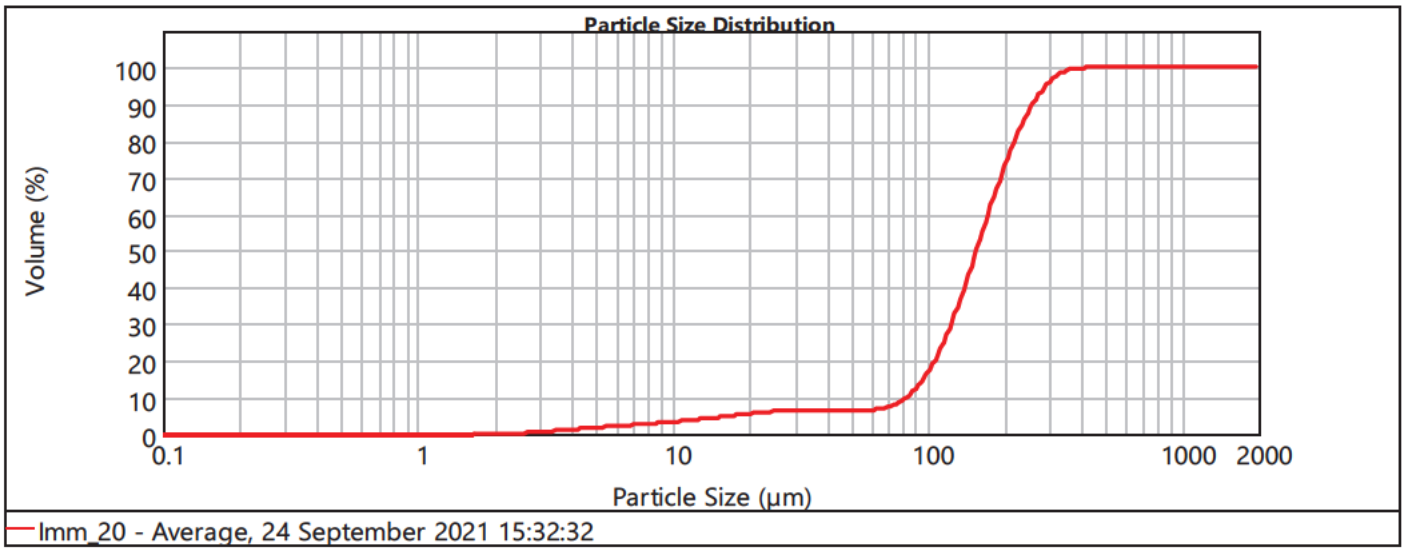
Particle Size Analysis Report

Sample Name:	Imm_20 - Average		Measured by:	IDavidson	on 24 September 2021
Sample Source:	Sugar		Obscuration:		12.27 %
Sample Collected:			Weighted Residual:		0.435 %

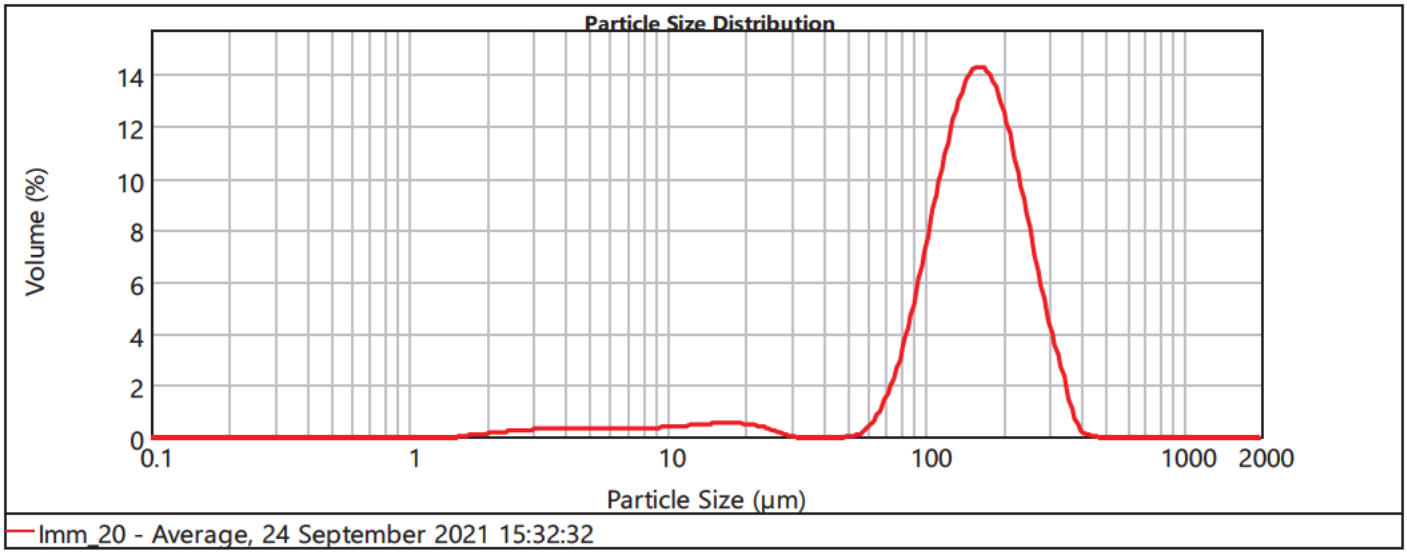
d(0.1):	81.836 µm	d(0.5):	155.361 µm	d(0.9):	257.761 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
0 %	2 %	3 %	1 %	66 %	27 %	0 %

Frequency Curve



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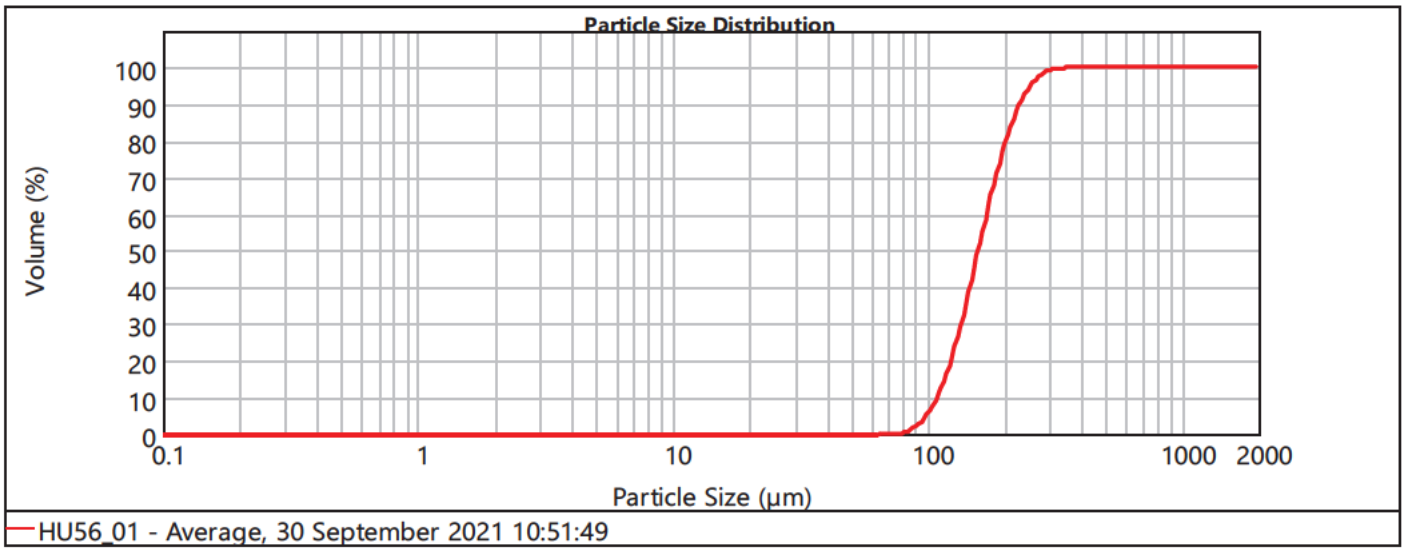
Particle Size Analysis Report

Sample Name:	HU56_01 - Average		Measured by:	IDavidson	on 30 September 2021
Sample Source:	Sugar		Obscuration:		12.86 %
Sample Collected:			Weighted Residual:		0.773 %

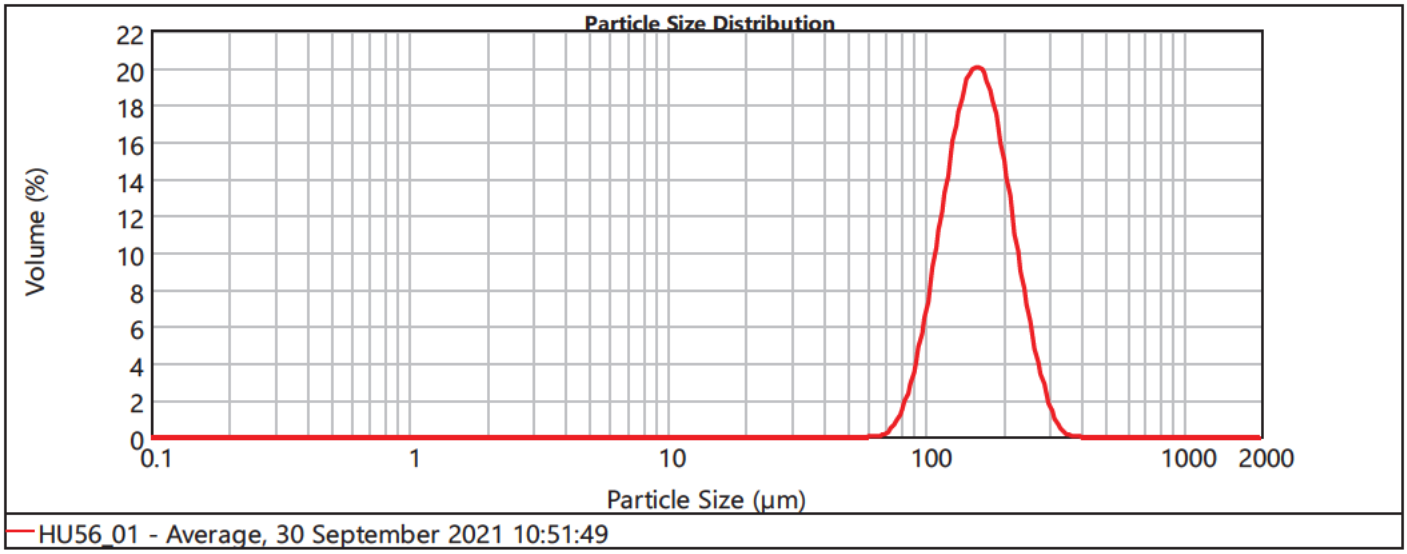
d(0.1):	108.455 µm	d(0.5):	158.002 µm	d(0.9):	229.834 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
0 %	0 %	0 %	0 %	79 %	21 %	0 %

Frequency Curve



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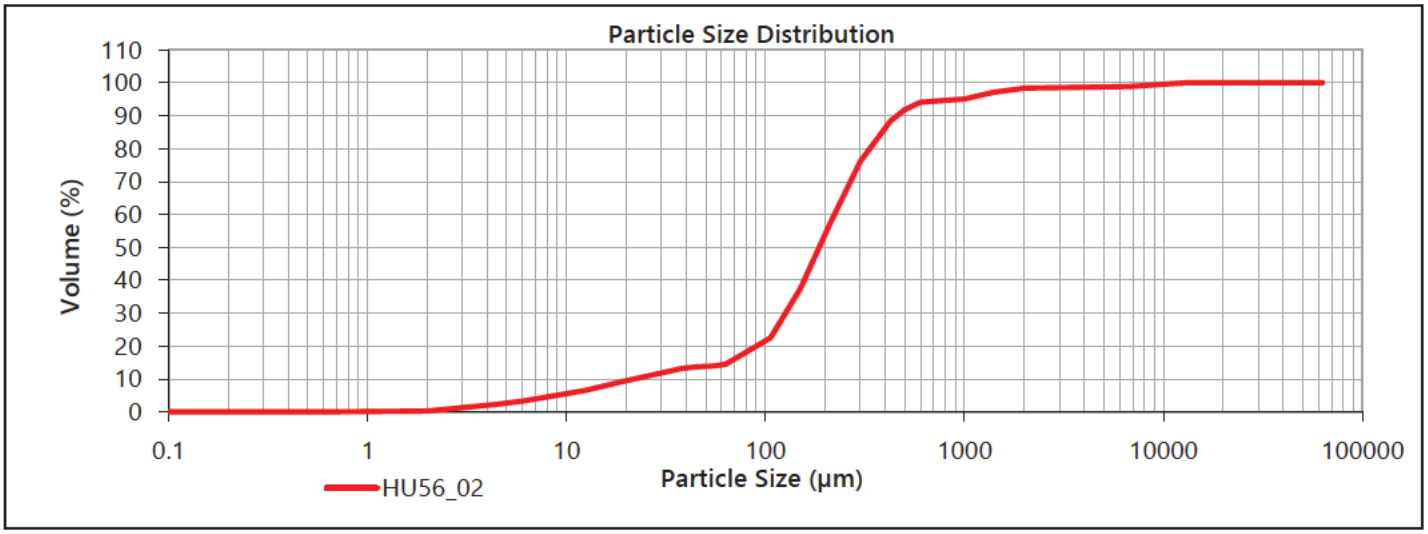
Particle Size Analysis Report

Sample Name:	HU56_02	Measured by:	IDavidson
Sample Source:	Sugar		
Sample Collected:	11/09/2021		

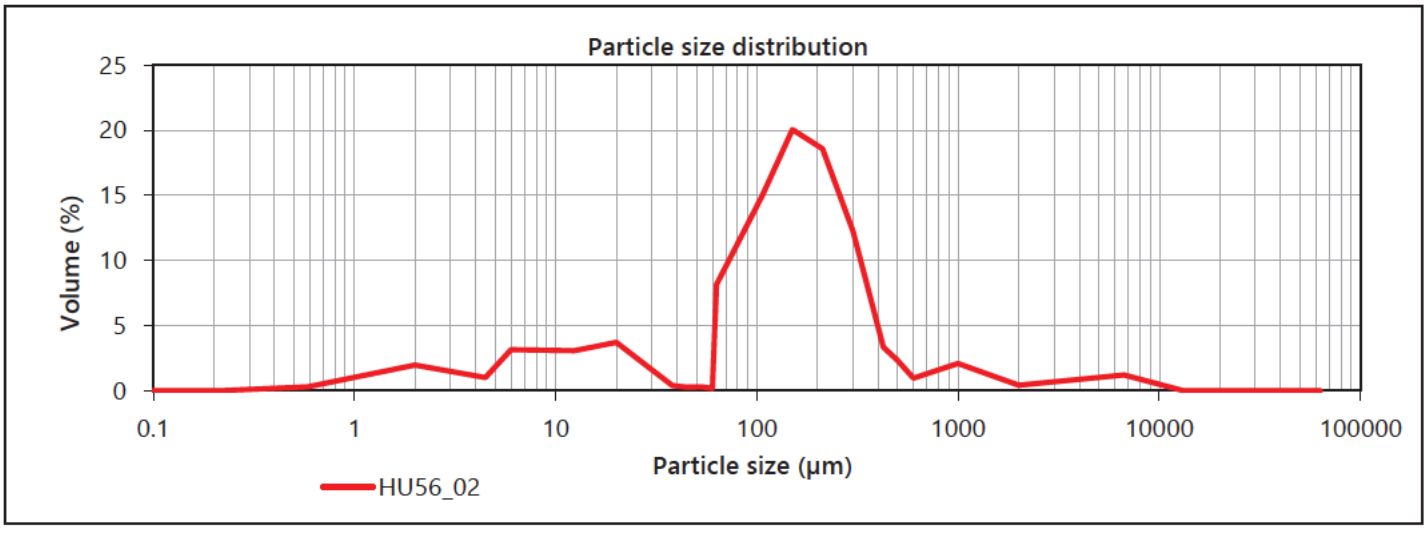
d(0.1):	22.3	µm	**d(0.5):**	**188.7**	**µm**	d(0.9):	461.9	µm

Cumulative Frequency Plot



Clay (%)	Silt (%)			Sand (%)			Gravel (%)			Cobble (%)
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
0.3	3.0	6.2	4.7	43.3	36.5	4.3	0.4	1.2	0.0	0.0

Frequency Curve



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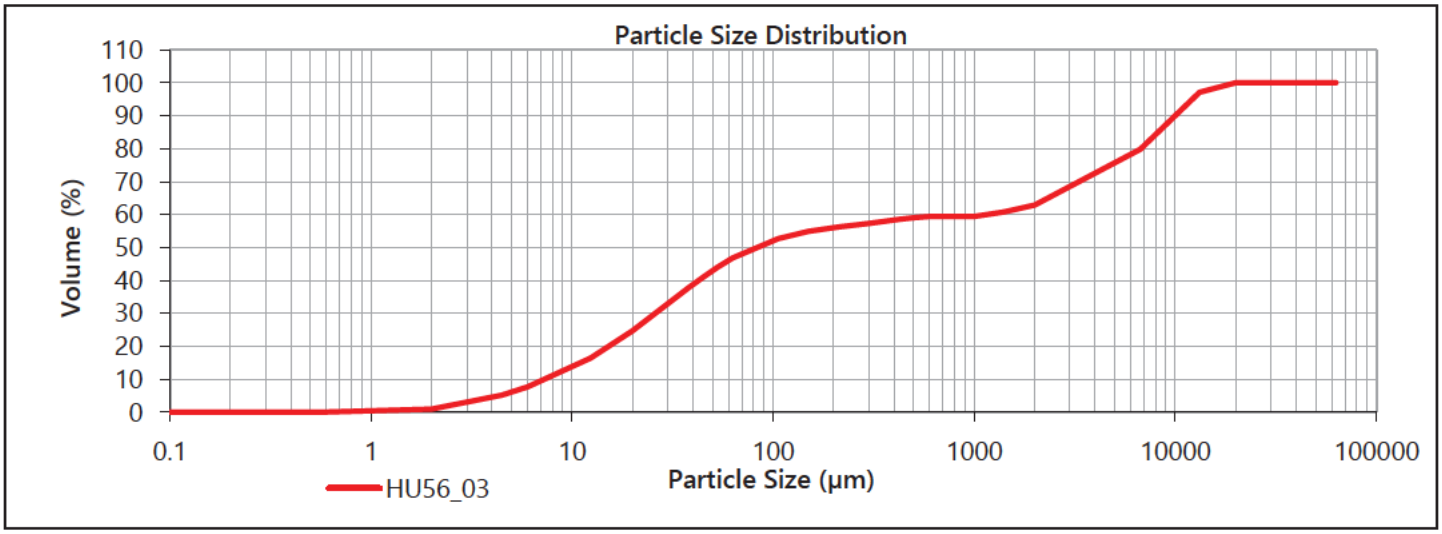
Particle Size Analysis Report

Sample Name:	HU56_03	Measured by:	IDavidson
Sample Source:	Sugar		
Sample Collected:	11/09/2021		

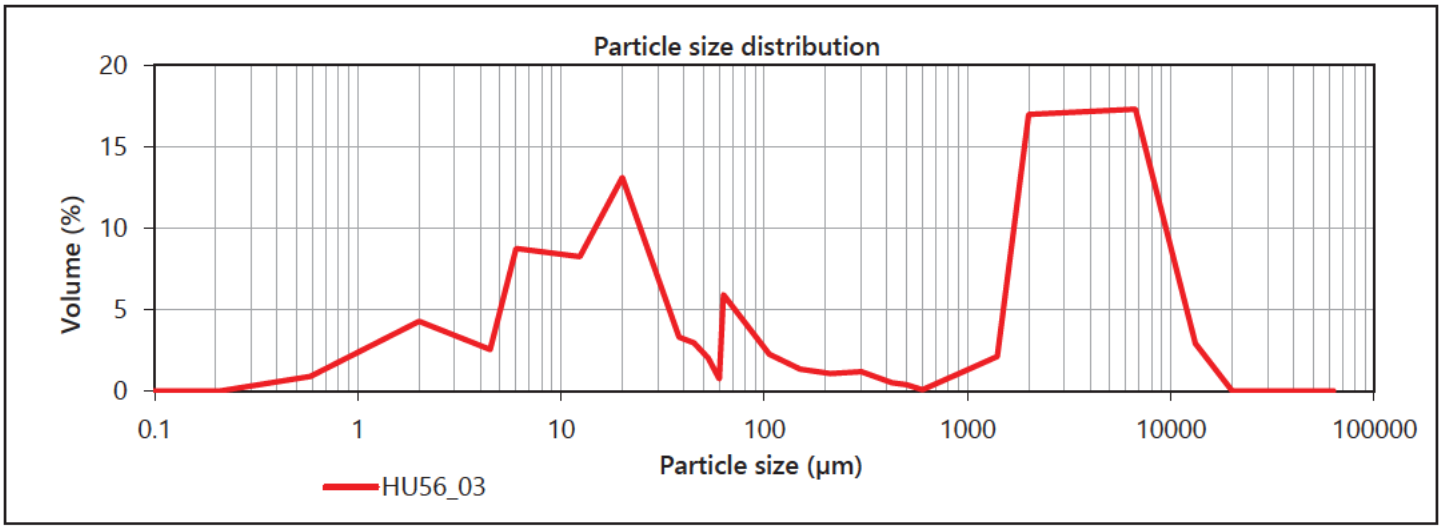
d(0.1):	7.7	µm	**d(0.5):**	**86.6**	**µm**	d(0.9):	10531.9	µm

Cumulative Frequency Plot



Clay (%)	Silt (%)			Sand (%)			Gravel (%)			Cobble (%)
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
0.9	6.8	17.0	21.4	10.2	3.1	3.5	17.0	20.2	0.0	0.0

Frequency Curve



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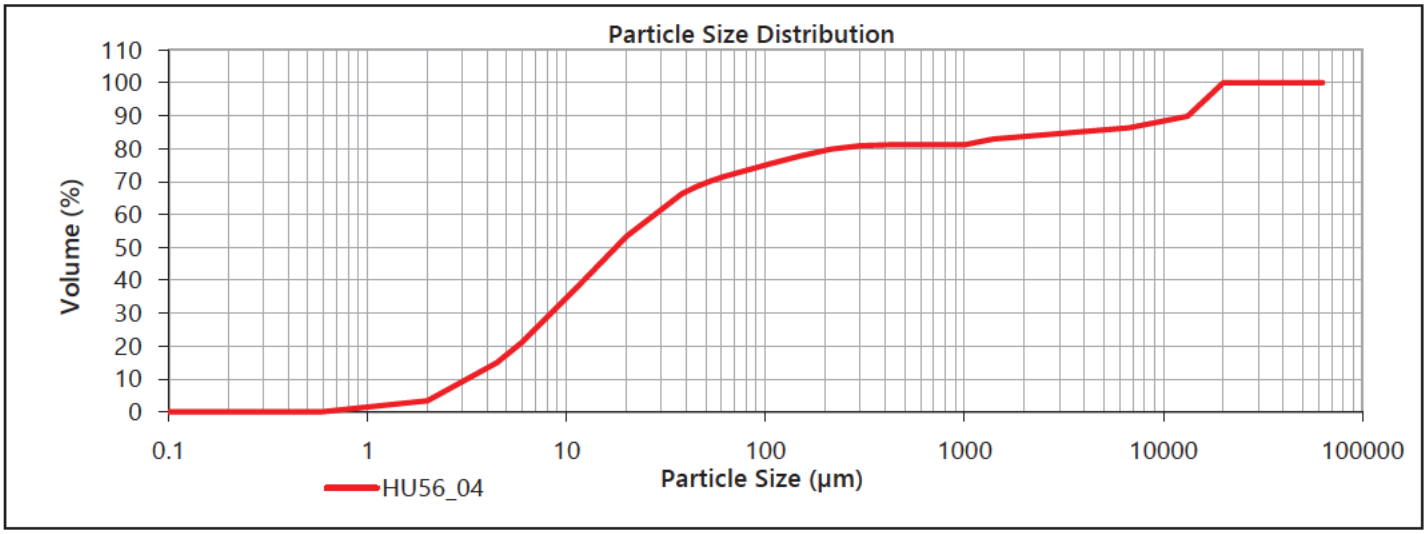
Particle Size Analysis Report

Sample Name:	HU56_04	Measured by:	IDavidson
Sample Source:	Sugar		
Sample Collected:	11/09/2021		

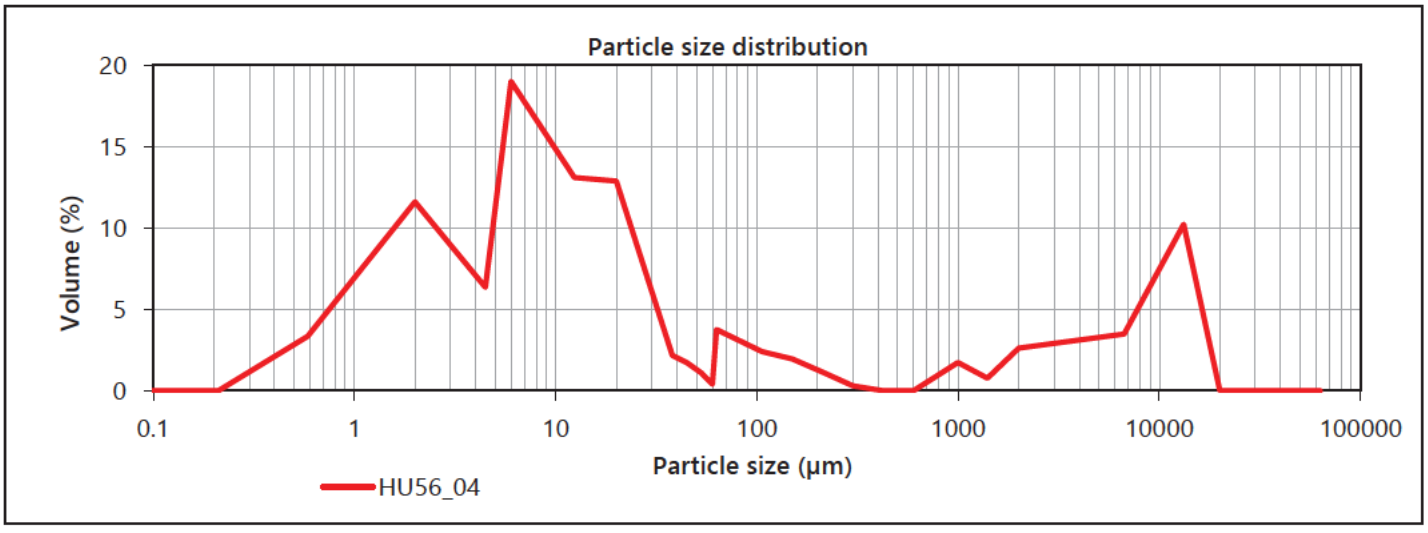
d(0.1):	3.4	µm	**d(0.5):**	**18.0**	**µm**	d(0.9):	13348.1	µm

Cumulative Frequency Plot



Clay (%)	Silt (%)			Sand (%)			Gravel (%)			Cobble (%)
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
3.3	17.9	32.1	17.9	8.5	1.4	2.5	2.6	13.7	0.0	0.0

Frequency Curve



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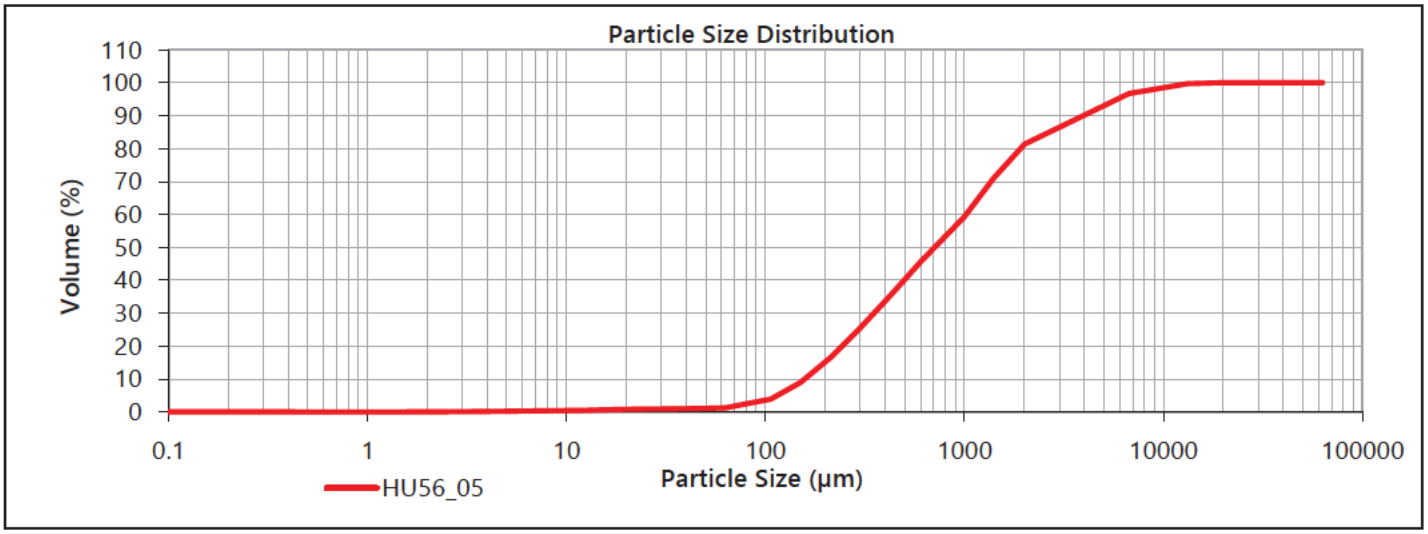
Particle Size Analysis Report

Sample Name:	HU56_05	Measured by:	IDavidson
Sample Source:	Sugar		
Sample Collected:	11/09/2021		

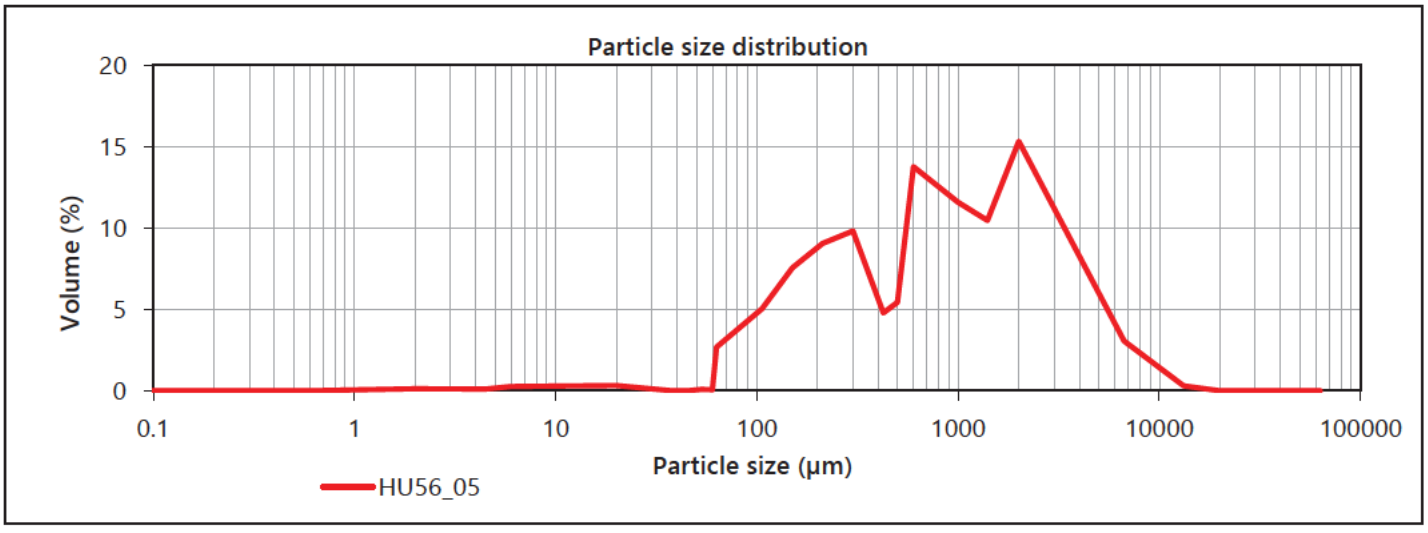
d(0.1):	158.8	µm	**d(0.5):**	**729.4**	**µm**	d(0.9):	4659.8	µm

Cumulative Frequency Plot



Clay (%)	Silt (%)			Sand (%)			Gravel (%)			Cobble (%)
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
0.0	0.2	0.6	0.4	15.3	29.1	35.8	15.3	3.4	0.0	0.0

Frequency Curve



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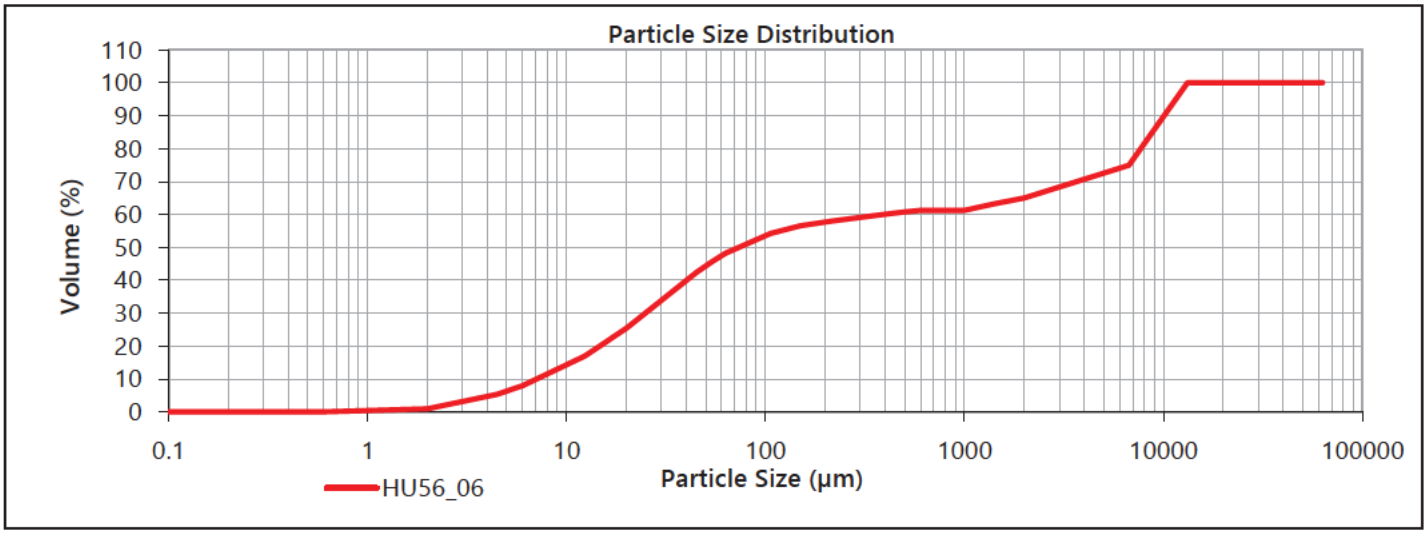
Particle Size Analysis Report

Sample Name:	HU56_06	Measured by:	IDavidson
Sample Source:	Sugar		
Sample Collected:	11/09/2021		

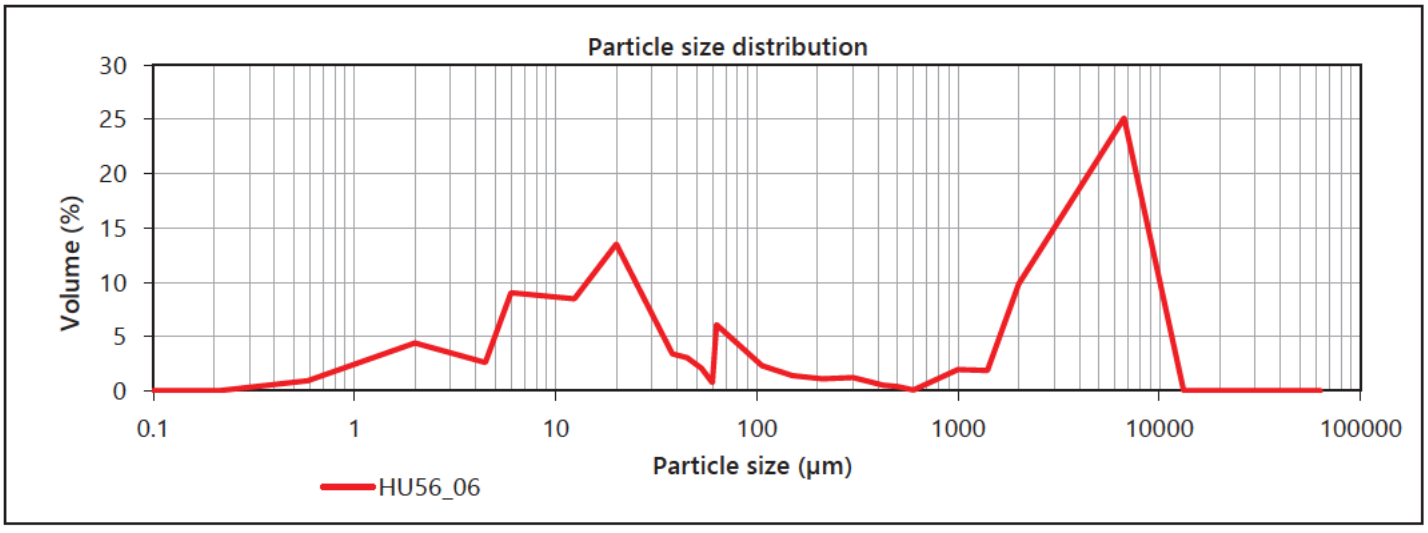
d(0.1):	7.5	µm	**d(0.5):**	**75.9**	**µm**	d(0.9):	10610.9	µm

Cumulative Frequency Plot



Clay (%)	Silt (%)			Sand (%)			Gravel (%)			Cobble (%)
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
0.9	7.0	17.5	22.0	10.5	3.2	3.9	9.9	25.1	0.0	0.0

Frequency Curve



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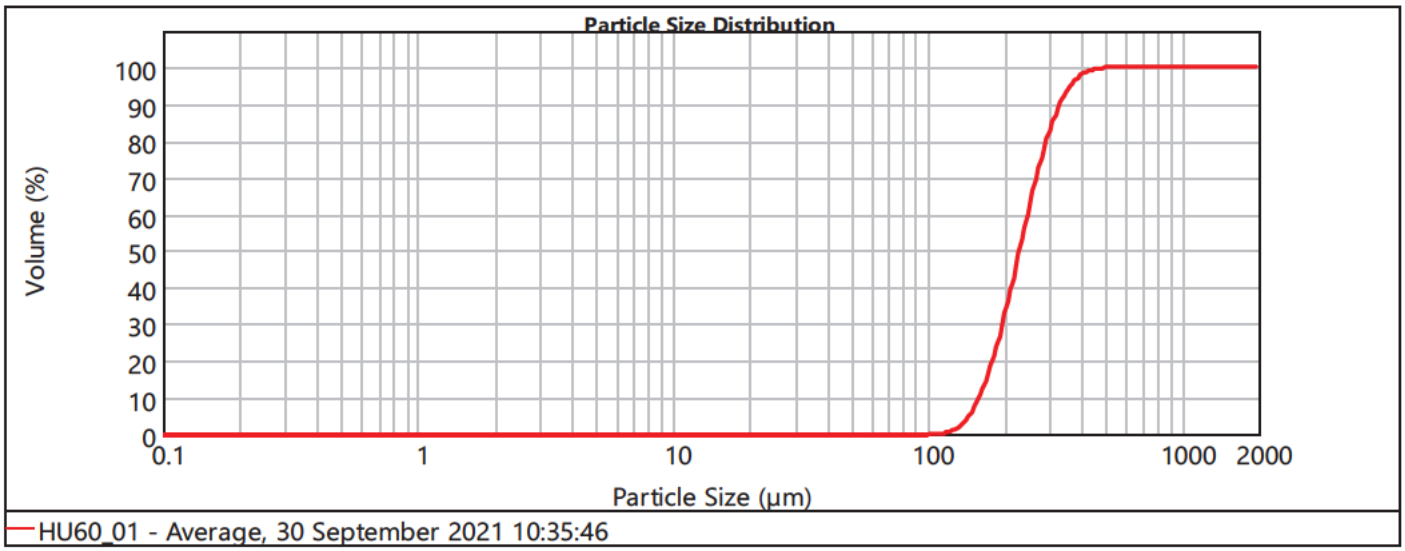
Particle Size Analysis Report

Sample Name:	HU60_01 - Average	Measured by:	IDavidson on 30 September 2021
Sample Source:	Sugar	Obscuration:	10.66 %
Sample Collected:		Weighted Residual:	0.787 %

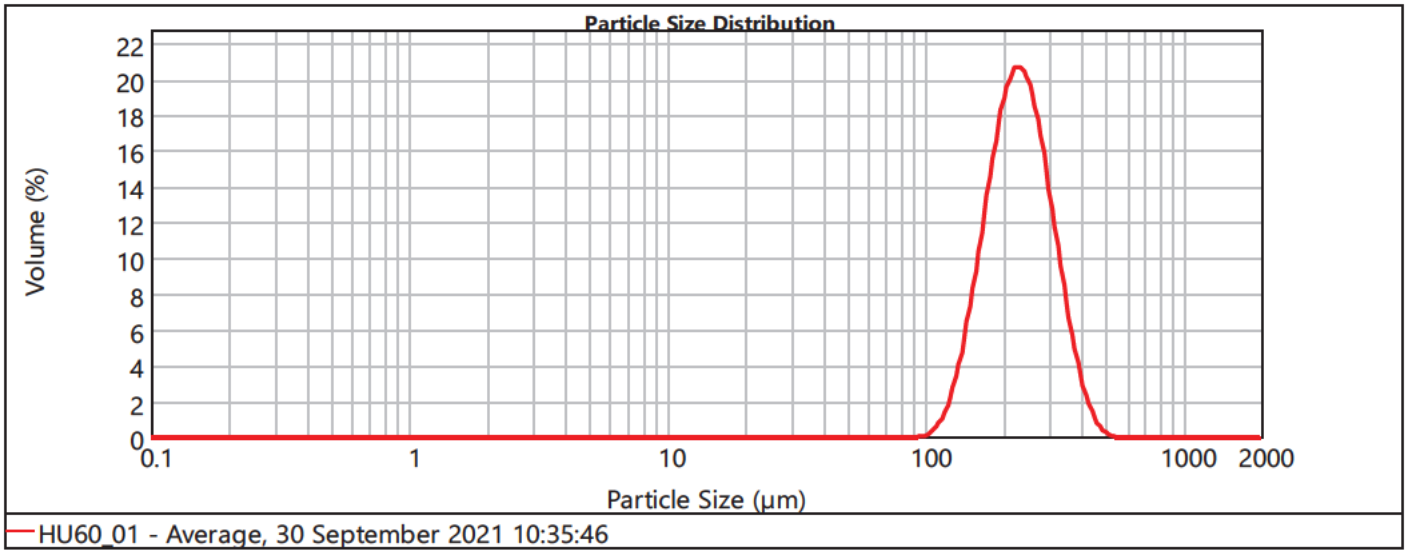
d(0.1): 158.985 µm	d(0.5): 229.115 µm	d(0.9): 329.772 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
0 %	0 %	0 %	0 %	32 %	68 %	0 %

Frequency Curve



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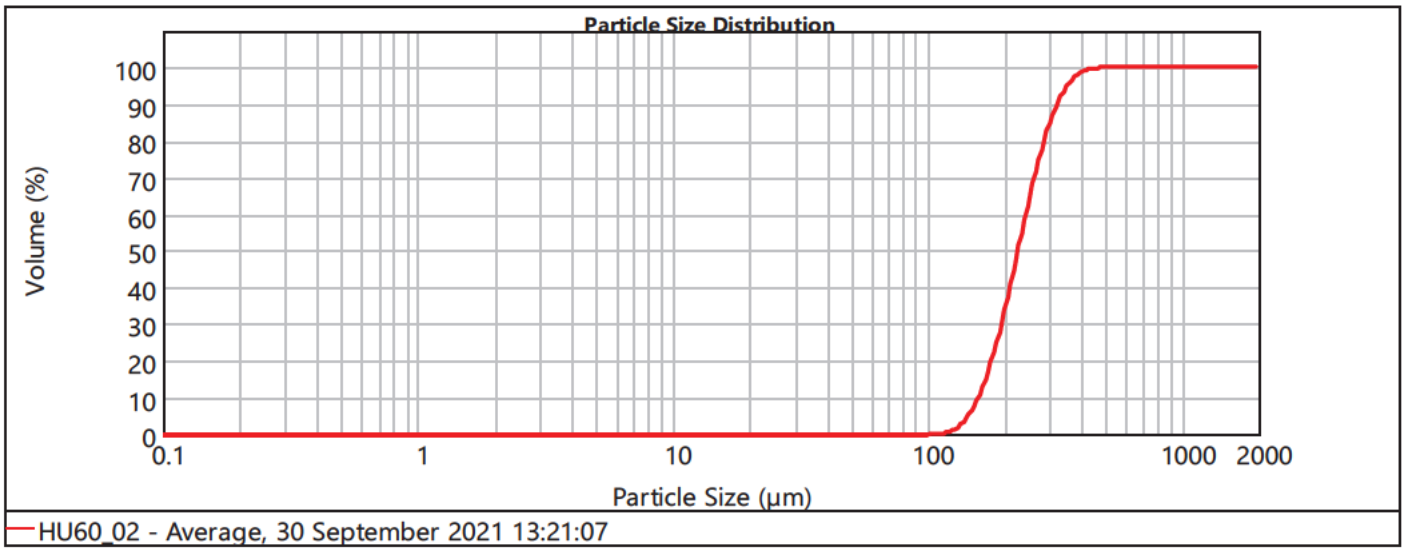
Particle Size Analysis Report

Sample Name:	HU60_02 - Average	Measured by:	IDavidson on 30 September 2021
Sample Source:	Sugar	Obscuration:	12.29 %
Sample Collected:		Weighted Residual:	0.635 %

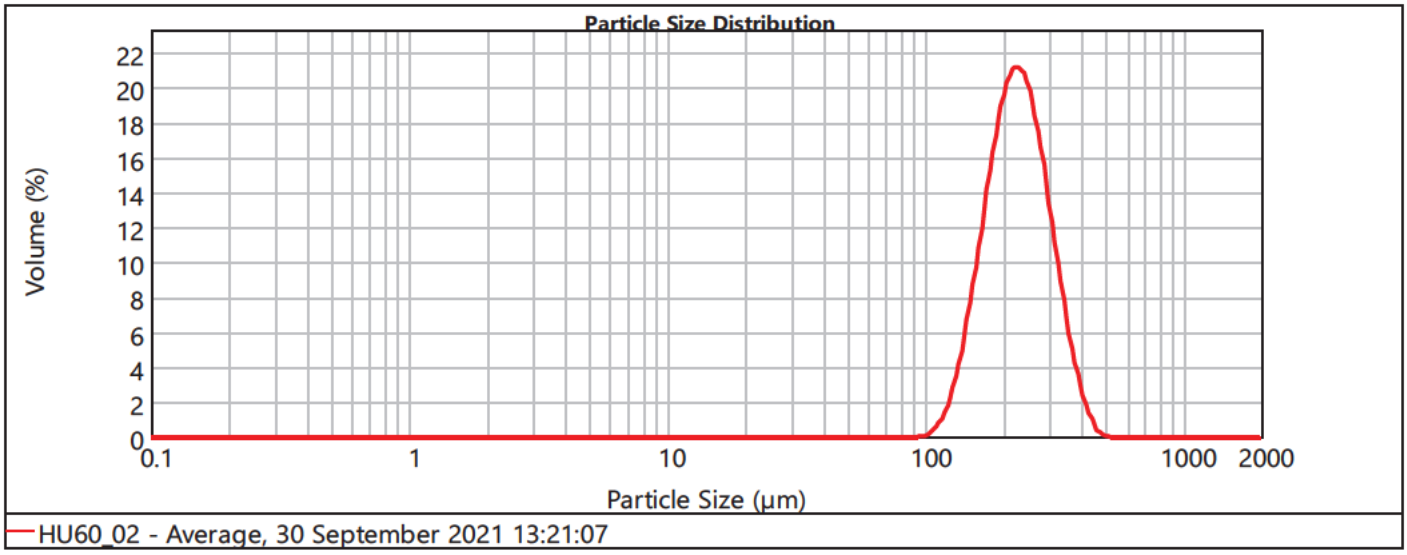
d(0.1):	158.062 µm	d(0.5):	226.015 µm	d(0.9):	322.084 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
0 %	0 %	0 %	0 %	33 %	67 %	0 %

Frequency Curve



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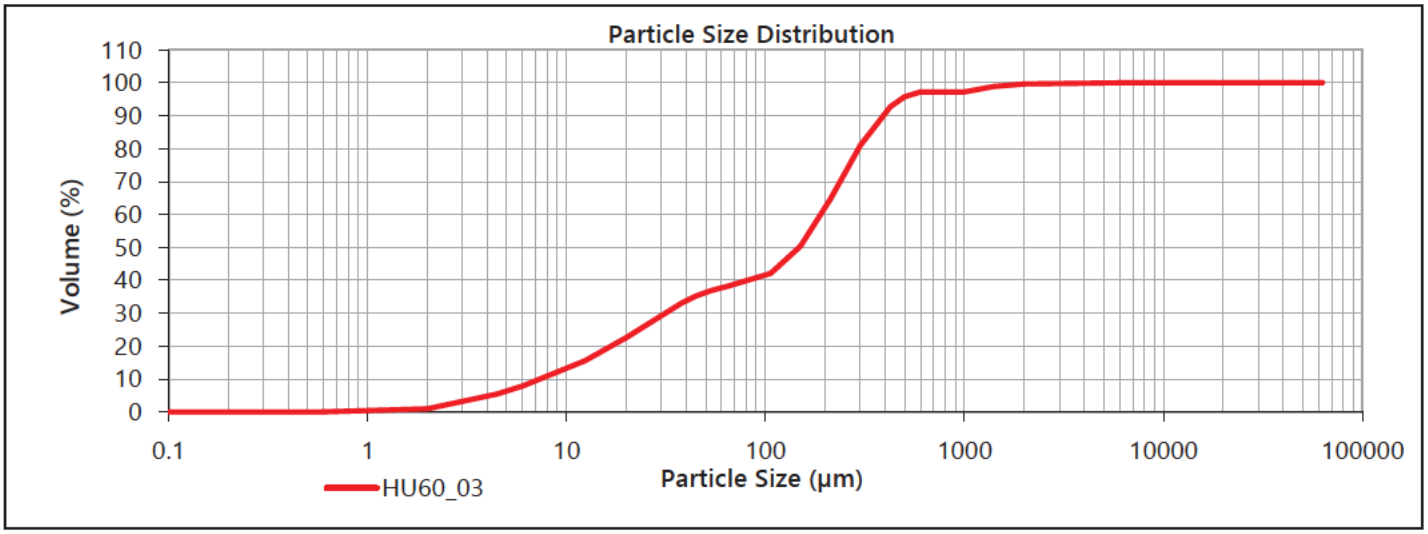
Particle Size Analysis Report

Sample Name:	HU60_03	Measured by:	IDavidson
Sample Source:	Sugar		
Sample Collected:	11/09/2021		

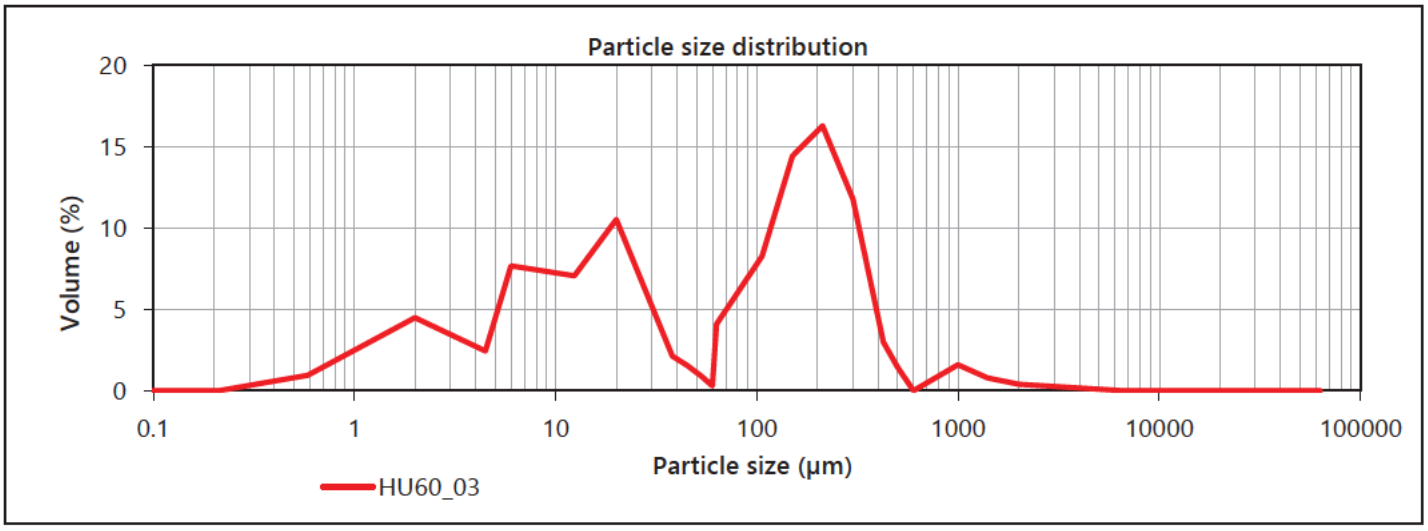
d(0.1):	7.8	µm	**d(0.5):**	**148.4**	**µm**	d(0.9):	395.9	µm

Cumulative Frequency Plot



Clay (%)	Silt (%)			Sand (%)			Gravel (%)			Cobble (%)
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
0.9	6.9	14.7	15.1	27.1	32.5	2.4	0.4	0.0	0.0	0.0

Frequency Curve



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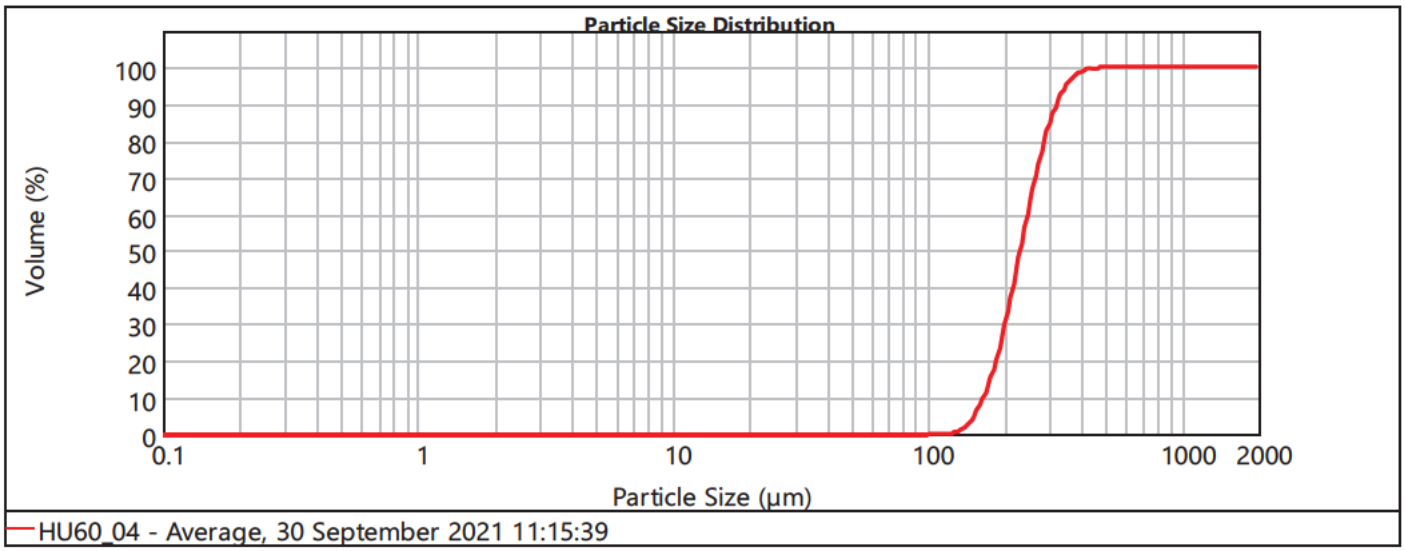
Particle Size Analysis Report

Sample Name:	HU60_04 - Average		Measured by:	IDavidson	on 30 September 2021
Sample Source:	Sugar		Obscuration:		11.45 %
Sample Collected:			Weighted Residual:		0.729 %

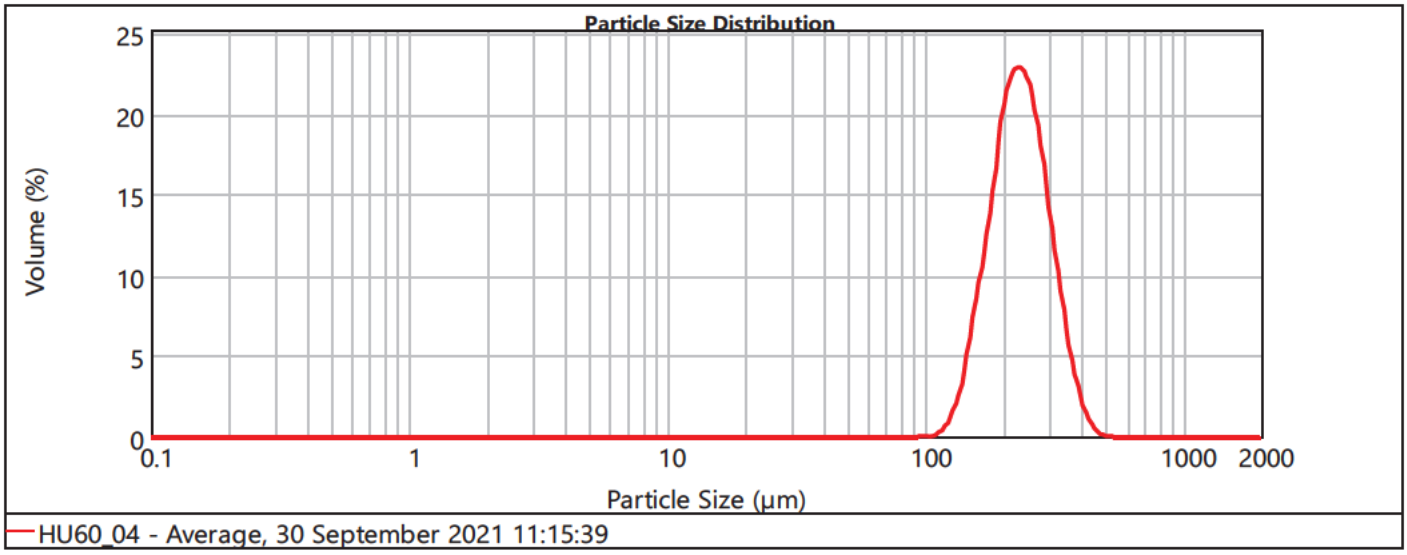
d(0.1):	165.268 µm	d(0.5):	230.698 µm	d(0.9):	319.948 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
0 %	0 %	0 %	0 %	29 %	71 %	0 %

Frequency Curve



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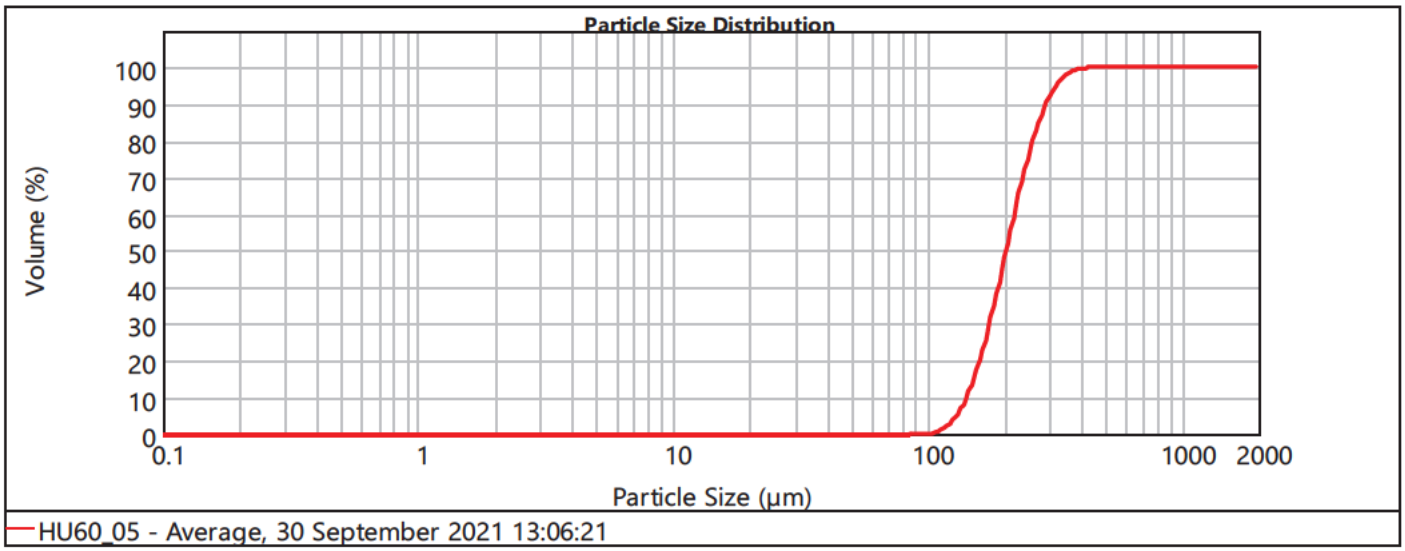
Particle Size Analysis Report

Sample Name:	HU60_05 - Average	Measured by:	IDavidson on 30 September 2021
Sample Source:	Sugar	Obscuration:	12.32 %
Sample Collected:		Weighted Residual:	0.592 %

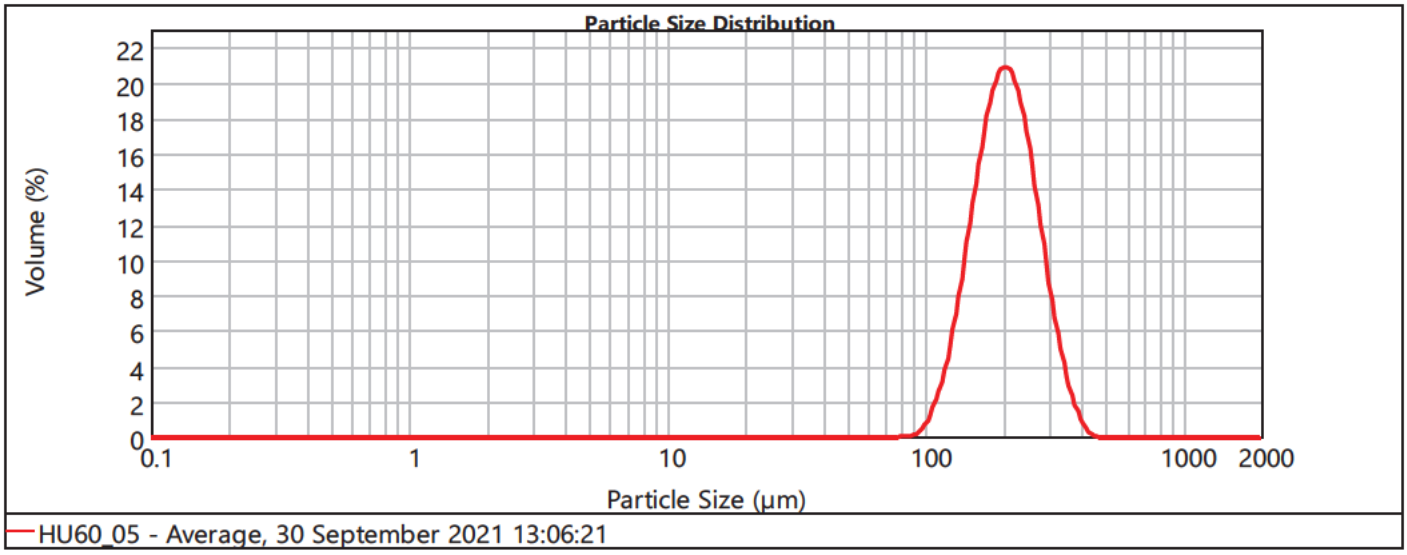
d(0.1):	141.521 µm	d(0.5):	203.339 µm	d(0.9):	290.934 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
0 %	0 %	0 %	0 %	48 %	52 %	0 %

Frequency Curve



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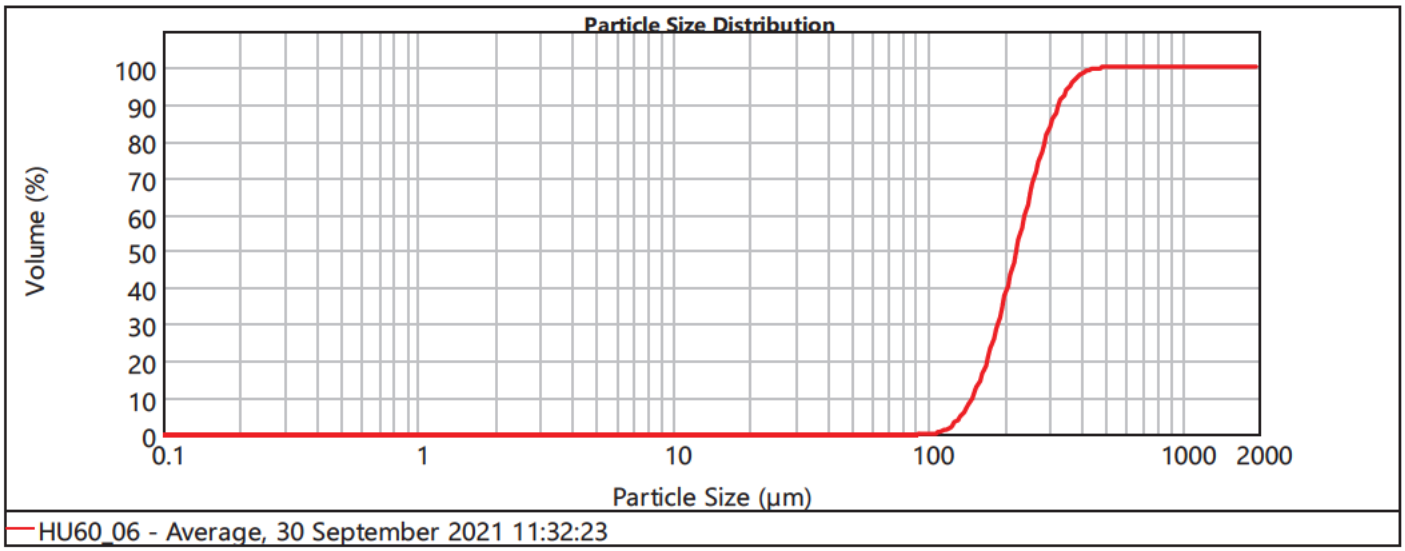
Particle Size Analysis Report

Sample Name:	HU60_06 - Average	Measured by:	IDavidson on 30 September 2021
Sample Source:	Sugar	Obscuration:	11.71 %
Sample Collected:		Weighted Residual:	0.780 %

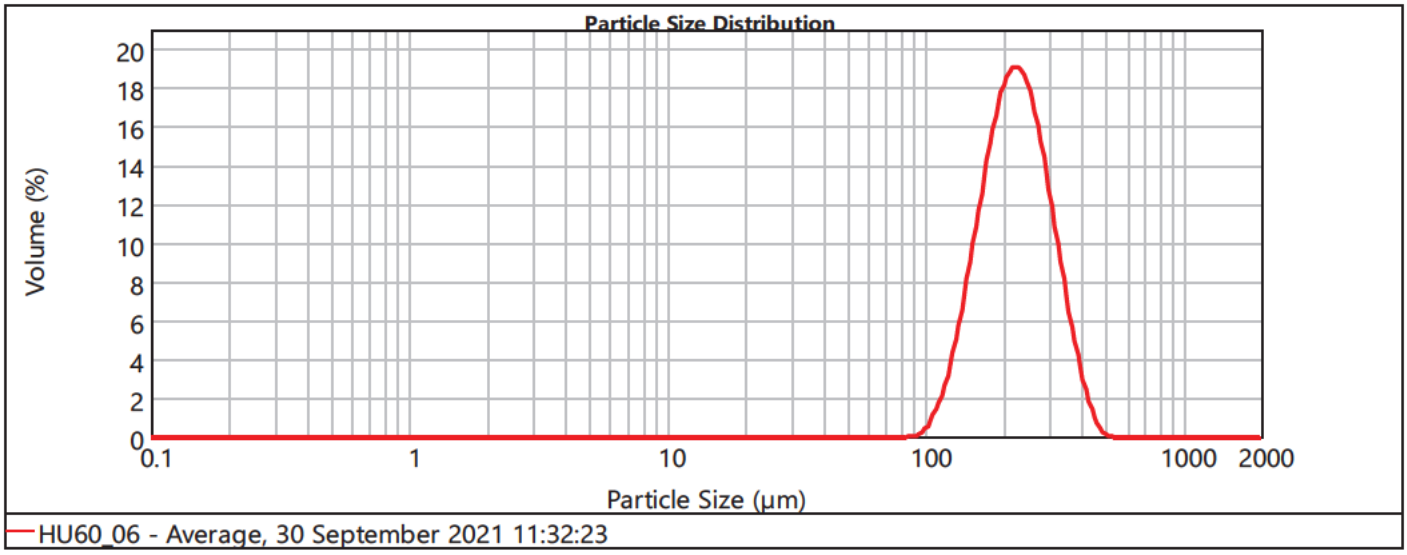
d(0.1): 149.550 µm	d(0.5): 222.455 µm	d(0.9): 328.328 µm

Cumulative Frequency Plot



Clay	Silt			Sand		
	Fine	Medium	Coarse	Fine	Medium	Coarse
0 %	0 %	0 %	0 %	37 %	63 %	0 %

Frequency Curve



B.2 Total Organic Carbon

Crucible ID	Sample	Weight of crucible (g)	Weight of crucible + wet sample (g)	Weight of crucible + dry sample @105 (g)	Weight of crucible + dry sample @475 (g)	Weight of dry material @105 (g)	Weight of dry material @475 (g)	LOI475
1	lmm_01	36.18	101.73	76.19	74.73	40.01	38.55	3.65
2	lmm_02	36.61	90.18	71.59	70.43	34.98	33.82	3.32
3	lmm_03	37.08	83.12	63.46	62.67	26.38	25.59	2.99
4	lmm_04	36.40	91.10	60.74	60.03	24.34	23.63	2.92
5	lmm_05	36.60	81.62	63.51	62.69	26.91	26.09	3.05
6	lmm_06	34.93	102.73	78.79	77.52	43.86	42.59	2.90
7	lmm_07	36.62	88.33	69.70	68.59	33.08	31.97	3.36
8	lmm_08	36.14	69.83	52.53	52.03	16.39	15.89	3.05
9	lmm_09	35.23	76.73	70.04	68.74	34.81	33.51	3.73
10	lmm_10	36.12	91.78	68.59	67.71	32.47	31.59	2.71
11	lmm_11	35.74	71.89	54.03	53.33	18.29	17.59	3.83
12	lmm_12	35.07	87.43	63.15	61.85	28.08	26.78	4.63
13	lmm_13	36.21	67.98	48.66	47.04	12.45	10.83	13.01
14	lmm_14	36.64	78.16	57.24	56.41	20.60	19.77	4.03
15	lmm_15	36.27	75.53	56.11	55.32	19.84	19.05	3.98
16	lmm_16	36.29	83.26	62.02	61.07	25.73	24.78	3.69
17	lmm_17	36.78	84.01	62.79	61.69	26.01	24.91	4.23
18	lmm_18	36.54	91.83	67.32	66.02	30.78	29.48	4.22
19	lmm_19	35.60	82.17	60.37	59.37	24.77	23.77	4.04
20	lmm_20	36.30	94.61	81.04	80.87	44.74	44.57	0.38
01	HU56_01	36.62	65.71	59.41	59.20	22.79	22.58	0.92
05	HU56_02	36.21	66.62	59.89	59.49	23.68	23.28	1.69
04	HU56_03	36.16	68.58	61.30	60.67	25.14	24.51	2.51
06	HU56_04	36.62	71.16	64.21	63.37	27.59	26.75	3.04
02	HU56_05	36.59	70.99	64.02	63.47	27.43	26.88	2.01
10	HU56_06	36.13	67.43	59.01	58.36	22.88	22.23	2.84
12	HU60_01	37.08	67.98	61.80	61.54	24.72	24.46	1.05
08	HU60_02	36.40	71.09	63.29	63.02	26.89	26.62	1.00
03	HU60_03	35.23	65.65	58.42	58.06	23.19	22.83	1.55
11	HU60_04	36.53	61.16	55.42	55.23	18.89	18.70	1.01
07	HU60_05	34.93	67.02	60.57	60.21	25.64	25.28	1.40
09	HU60_06	36.28	67.01	60.51	60.26	24.23	23.98	1.03

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