



2023 ANNUAL BIOSOLIDS NON-AGRICULTURAL SOURCE MATERIAL (NASM) SUMMARY REPORT

Including Biosolids Land Application Program and Biosolids Centralized Storage Facility (BCSF)

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing the Biosolids Land Application Program and performance of the Biosolids Off-site Dedicated Storage. The report details the latest quality testing results, quantity statistics and any non-compliance conditions that may have occurred. It is available for review by the end of March on the County website at <http://www.oxfordcounty.ca/waterwastewater> or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

The BCSF Facility description is provided below:

Biosolids Off-site Dedicated Storage:	BCSF
Environmental Compliance Approval (ECA):	3816-76HRTS (April 3, 2020)
Reporting Period:	January 1, 2023 – December 31, 2023

BCSF Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services

P.O. Box 1614

21 Reeve Street

Woodstock, ON N4S 7Y3

Telephone: 519-539-9800

Toll Free: 866-537-7778

Email: wastewater@oxfordcounty.ca

The County owns and operates nine wastewater treatment plants (WWTP). They are listed in the table below along with their predominant treatment system and method of biosolids treatment and handling.

Plant Name	Plant Process	Biosolids Processing and Handling
Woodstock WWTP	Conventional Activated Sludge	Anaerobic digestion, centrifuge dewatering, and transported to storage at BCSF prior to land application
Ingersoll WWTP	Conventional Activated Sludge	Anaerobic digestion, centrifuge dewatering, and transported to storage at BCSF prior to land application
Tillsonburg WWTP	Conventional Activated Sludge	Aerobic digestion, centrifuge dewatering, and transported to storage at BCSF prior to land application
Thamesford WWTP	Extended aeration	Aerobic digestion, removed for further treatment at the Ingersoll WWTP
Drumbo WWTP	Sequencing Batch Reactor	No digestion, co-thickened sludge removed for further treatment at the Woodstock WWTP
Tavistock WWTP	Lagoon System	Stored in lagoons on site until land applied usually between 15 to 25 years storage
Norwich WWTP	Lagoon System	Stored in lagoons on site until land applied usually between 15 to 25 years storage
Plattsville WWTP	Lagoon System	Stored in lagoons on site until land applied usually between 15 to 25 years storage
Mount Elgin WWTP	Black/Grey Water Recirculation Sand Filter and Common Drainage field	Homeowners have septic tanks maintained by the County requiring septage removal once every 3 to 5 years and transported to the Ingersoll or Woodstock WWTP

1.1 Biosolids Land Application Program Description

The biosolids land application program for the beneficial reuse as a nutrient was developed based on the County Biosolids Management Master Plan (BMMP). The five main elements of the BMMP include: more enforcement of the County Sewer Use By-law, dewatering of stabilized biosolids at each of the major WWTPs, transporting thickened sludge from smaller plants to the nearest major WWTP for processing, land application of all biosolids on farms having a non-agricultural source material (NASM) plan, and centralized storage of biosolids when the material cannot be land applied.

The BCSF houses dewatered biosolids for periods such as winter months when the dewatered product cannot be directly land applied. The storage building is designed to provide a minimum of 240 days storage. It is also designed with segregated storage bays so that should material be determined to be non-compliant, it can be removed and taken to landfill and not mixed with compliant biosolids destined for land application.

The BCSF has sufficient room to house 7,000 m³ of material and was built in two phases. The pre-existing building (Phase 1) included 12 bays; and Phase 2 became operational in 2019, with the addition of four more bays. The BCSF has sufficient space to accommodate the 240-day storage requirements for all of the WWTPs. The individual bays are slightly inclined with cement walls to allow for easy piling of the material. The incoming material is segregated by system and month and is deposited in the appropriate bay, after which Oxford County staff push the biosolids into higher piles at the back of the bay using a loader.

The enforcement of the County Sewer Use By-law was an important step in protecting the quality of the biosolids, and to this end, maintains an active monitoring and enforcement group with the goal of improving the quality and reducing the quantity of biosolids produced.

The following table summarizes the quantity of biosolids generated in 2023 by source. In 2023, there was 7,406 wet tonnes of dewatered biosolids land applied.

Facility	2023 Biosolids Land Applied	2023 Liquid Biosolids Generated	2023 Total Biosolids Generated	Biosolids Type	Destination
Woodstock WWTP	4,187 wet tonnes	--	3,739 wet tonnes	Anaerobic dewatered	BCSF & Land Application
Ingersoll WWTP	1,438 wet tonnes	50 m ³ transferred to Woodstock WWTP	1,384 wet tonnes	Anaerobic dewatered	BCSF & Land Application
Tillsonburg WWTP	1,781 wet tonnes	640 m ³ transferred to Ingersoll WWTP 72 m ³ transferred to Woodstock WWTP	1,670 wet tonnes	Aerobic dewatered	BCSF & Land Application

Facility	2023 Biosolids Land Applied	2023 Liquid Biosolids Generated	2023 Total Biosolids Generated	Biosolids Type	Destination
Thamesford WWTP	--	2,383 m ³ transferred to Ingersoll WWTP 379 m ³ transferred to Woodstock WWTP	--	Aerobic Liquid	Ingersoll & Woodstock WWTP
Drumbo SBR	--	2,739 m ³ transferred to Woodstock WWTP	--	Co-thickened Primary Sludge	Woodstock WWTP
Mount Elgin WWTP	--	347 m ³ transferred to Ingersoll WWTP 146 m ³ transferred to Woodstock WWTP	--	Tank maintenance-septage	Ingersoll & Woodstock WWTP

2. SUMMARY AND INTERPREATION OF MONITORING DATA

2.1 Biosolids Quality Assurance and Control Measures

Sampling Procedure

Sampling is carried out as per the ECA.

Biosolids analysis is provided to the contractor and farmer for their use at the time of land application.

The biosolids are resampled at the time of land application for verification purposes.

Laboratory and Field Testing

The samples are analyzed by SGS Lakefield Research Ltd., a CAEAL certified lab. The results are entered into an Excel spreadsheet and reviewed for compliance with the regulations. The analytical results of the dewatered biosolids are also summarized and used for the calculation of monthly and yearly averages (Appendix A).

2.2 Biosolids Quality

The table below highlights the analytical results for metals versus the regulated maximum criteria. All sources of biosolids were compliant and were acceptable to be used as a nutrient for the land application program. More information can be found in Appendix A.

The results of the on-site verification sampling of biosolids prior to land application can be found in Appendix A. These samples provide a further check on the quality of the material. All 2023 samples complied with the Nutrient Management Act (NMA) criteria.

The Biosolids Contractor provides nutrient reports to individual farmers on each application to aid in the beneficial use of the product as a nutrient. The contractor's table of NASM plans indicating spreading applications is included in Appendix A.

In summary, the County's Biosolids Management program provided effective production, transport, storage, and eventual reuse as a nutrient via land application of all biosolids generated under the program. All operation and maintenance activities were performed by Oxford County staff in the WWTPs.

The transportation of the biosolids from the WWTPs to the storage building was done by the County's Wastewater Services staff under ECA # A900939.

Comparison of Generated Biosolids to NMA Criteria for Metals in mg/kg Dry Solids.

Parameter	Woodstock WWTP	Ingersoll WWTP	Tillsonburg WWTP	Regulatory Limit
Metals (mg/kg dry solids)	2023 Annual Average	2023 Annual Average	2023 Annual Average	Maximum
Arsenic	6.0	5.5	5.2	170
Cadmium	1.3	0.8	0.6	34
Cobalt	3.9	4.8	1.9	340
Chromium	75	41	16	2800
Copper	668	533	443	1700
Mercury	0.8	0.6	0.9	11
Molybdenum	13.8	33.5	8.2	94
Nickel	72.1	34.9	52.2	420
Lead	32.5	14.9	13.5	1100
Selenium	5.4	5.1	4.4	34
Zinc	1402	1072	628	4200

The Biosolids land applied from all facilities were compliant with the NMA regulations governing NASM.

3. NON-COMPLIANCE AND COMPLAINTS

There were no upsets or spills during the year of operation and no complaints were received in 2023.

3.1 Spills, Upset and Abnormal Conditions

There were no spills, upsets or abnormal events in 2023.

4. INSPECTION OF THE BCSF

The BCSF was cleaned and an in-house inspection by staff took place on October 16, 2023.

Waste Management Facility staff swept the building prior to inspection. Not all bays were completely empty.

The following is a list of items found during inspection and the actions taken:

Inspection Item	Action Taken
There are cracks in the concrete floor at the aisle end of the concrete divider wall of bays 1 through 12, all of the cracks in the floor appear to be hairline cracks	No action required at this time
All cracks and chips appear to be minor, and not increasing in size	No action required at this time
In the center aisle east of bin 5 there is a piece of concrete reinforcing steel exposed	No action required at this time
In bay 12 on the south side near the west end there are two places in the floor that are broken	No action required at this time
There are some chips in the floor of bays 2, 4, 5, 8, 10 & 12, the chips are only approximately a ½ inch deep	No action required at this time
There are minor cracks in the exterior walls on all sides of the building, some have minor staining, but none of them have opened up	No action required at this time

Inspection Item	Action Taken
In bay 11 near the east opening, on the south side there is a broken piece of concrete approximately 24" in diameter	No action required at this time
The 4 bay addition on the south end of the building is now being used	No action required at this time
The two furthest bays in the south west corner are being used for recycling	No action required at this time
Bays 13 & 15 and the common alley in front have multiple cracks and depressions	No action required at this time
There is minor rusting evident on the steel girders	No action required at this time

5. SUMMARY

The BCSF provided effective winter storage for the County biosolids land application program and was in excellent overall condition. The BCSF complied with all Conditions of the ECA as well as the inspection and reporting requirements. No complaints were received about the operation of the facility in 2023.

Appendix A



Annual Report

NASM Plan:	23766
Material Applied:	Woodstock
Date of Application:	14-Apr-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	10300	975	1	9325.00	976.00	69735.00	28800.00	1375.00	24.53
Average (kg/tonne)	1.03	0.10	0.00	0.93	0.10	6.97	2.88	0.14	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	17.48	Total Volume Applied (tonne)	722.33	Application Rate	41.32	tonne/Ha	Dry Ton /ac	4.50
Total Area: ac	43.18				16.73	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphourus	Zinc	Total Solids
Kg/Ha	38.53	4.03	288.14	119.00	5.68	0.10
LBS/ Acre	34.38	3.60	257.11	106.18	5.07	0.09

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	10.31
Year 2	10%	3.44
Year 3	5%	1.72

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	42.47
Year 2	40%	42.47

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.01	0.12	1.16	0.00	0.03	0.11	0.55	0.01	2.28
LBS/ Arce	0.05	0.02	0.04	0.65	6.31	0.01	0.14	0.59	2.99	0.06	12.44
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	24922
Material Applied:	Woodstock
Date of Application:	13-Apr-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	10300	975	1	9325.00	976.00	697.55	28800.00	1375.00	24.53
Average (kg/tonne)	1.03	0.10	0.00	0.93	0.10	0.07	2.88	0.14	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	7.03	Total Volume Applied (tonne)	290.33	Application Rate	41.31	tonne/Ha	Dry Ton /ac	4.50
Total Area: ac	17.36				16.72	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	38.52	4.03	2.88	118.97	5.68	0.10
LBS/ Acre	34.37	3.60	2.57	106.16	5.07	0.09

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	10.31
Year 2	10%	3.44
Year 3	5%	1.72

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	42.46
Year 2	40%	42.46

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.01	0.12	1.16	0.00	0.03	0.11	0.55	0.01	2.28
LBS/ Arce	0.05	0.02	0.04	0.65	6.31	0.01	0.14	0.59	2.99	0.06	12.44
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	24643
Material Applied:	Woodstock
Date of Application:	8-Aug-24

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	10600	1138	2	9462.00	1140.00	656.25	28500.00	1250.00	26.05
Average (kg/tonne)	1.06	0.11	0.00	0.95	0.11	0.07	2.85	0.13	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	20.07	Total Volume Applied (tonne)	869.37	Application Rate	43.31	tonne/Ha	Dry Ton /ac	5.00
Total Area: ac	49.58				17.53	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	40.98	4.94	2.84	123.44	5.41	0.11
LBS/ Acre	36.57	4.41	2.54	110.14	4.83	0.10

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	10.97
Year 2	10%	3.66
Year 3	5%	1.83

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	44.06
Year 2	40%	44.06

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.07	0.14	1.21	0.00	0.02	0.13	0.05	0.01	2.31
LBS/ Arce	0.06	0.01	0.37	0.74	6.61	0.01	0.14	0.70	0.30	0.05	12.59
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	25050
Material Applied:	Woodstock
Date of Application:	3-Aug-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	10600	1138	2	9462.00	1140.00	656.25	28500.00	1250.00	26.05
Average (kg/tonne)	1.06	0.11	0.00	0.95	0.11	0.07	2.85	0.13	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	22.16	Total Volume Applied (tonne)	842.44	Application Rate	38.01	tonne/Ha	Dry Ton /ac	4.40
Total Area: ac	54.74				15.39	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	35.97	4.33	2.49	108.34	4.75	0.10
LBS/ Acre	32.09	3.87	2.23	96.67	4.24	0.09

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	9.63
Year 2	10%	3.21
Year 3	5%	1.60

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	38.67
Year 2	40%	38.67

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.01	0.12	1.07	0.00	0.02	0.11	0.05	0.01	2.03
LBS/ Arce	0.06	0.01	0.03	0.65	5.80	0.01	0.12	0.61	0.26	0.05	11.05
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60601
Material Applied:	Ingersoll
Date of Application:	14-Aug-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	9500	1525	111	7975.00	1636.00	523.75	32000.00	967.50	21.98
Average (kg/tonne)	0.95	0.15	0.01	0.80	0.16	0.05	3.20	0.10	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	16.87	Total Volume Applied (tonne)	823.66	Application Rate	48.81	tonne/Ha	Dry Ton /ac	4.80
Total Area: ac	41.68				19.76	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	38.93	7.99	2.56	156.20	4.72	0.11
LBS/ Acre	34.73	7.13	2.28	139.37	4.21	0.10

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	10.42
Year 2	10%	3.47
Year 3	5%	1.74

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	55.75
Year 2	40%	55.75

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.01	0.06	0.92	0.00	0.05	0.05	0.03	0.01	1.70
LBS/ Arce	0.05	0.01	0.04	0.35	5.02	0.01	0.26	0.26	0.14	0.05	9.27
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60601
Material Applied:	Tillsonburg
Date of Application:	14-Aug-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	12600	619	9	11981.00	628.00	390.00	24500.00	575.00	24.28
Average (kg/tonne)	1.26	0.06	0.00	1.20	0.06	0.04	2.45	0.06	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	23.47	Total Volume Applied (tonne)	1355.02	Application Rate	57.74	tonne/Ha	Dry Ton /ac	6.20
Total Area: ac	57.97			23.37	tonne/ac			

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	69.17	3.63	2.25	141.45	3.32	0.14
LBS/ Acre	61.72	3.24	2.01	126.22	2.96	0.13

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	18.52
Year 2	10%	6.17
Year 3	5%	3.09

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	50.49
Year 2	40%	50.49

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.00	0.03	0.90	0.00	0.02	0.12	0.03	0.01	1.32
LBS/ Arce	0.06	0.01	0.02	0.19	4.88	0.01	0.09	0.64	0.14	0.04	7.19
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60601
Material Applied:	Woodstock
Date of Application:	14-Aug-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	10600	1138	2	9462.00	1140.00	656.25	28500.00	1250.00	26.05
Average (kg/tonne)	1.06	0.11	0.00	0.95	0.11	0.07	2.85	0.13	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	12.59	Total Volume Applied (tonne)	581.36	Application Rate	46.19	tonne/Ha	Dry Ton /ac	5.40
Total Area: ac	31.09				18.70	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	43.70	5.27	3.03	131.63	5.77	0.12
LBS/ Acre	39.00	4.70	2.70	117.46	5.15	0.11

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	11.70
Year 2	10%	3.90
Year 3	5%	1.95

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	46.98
Year 2	40%	46.98

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.01	0.15	1.30	0.00	0.03	0.14	0.06	0.01	2.47
LBS/ Arce	0.07	0.01	0.04	0.79	7.05	0.01	0.14	0.74	0.32	0.06	13.43
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60804
Material Applied:	Woodstock
Date of Application:	30-Aug-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	10400	1214	2	9186.00	1216.00	622.86	28600.00	1185.71	26.24
Average (kg/tonne)	1.04	0.12	0.00	0.92	0.12	0.06	2.86	0.12	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	9.30	Total Volume Applied (tonne)	306.96	Application Rate	33.02	tonne/Ha	Dry Ton /ac	3.90
Total Area: ac	22.96				13.37	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	30.33	4.02	2.06	94.44	3.92	0.09
LBS/ Acre	27.07	3.58	1.84	84.27	3.49	0.08

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	8.12
Year 2	10%	2.71
Year 3	5%	1.35

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	33.71
Year 2	40%	33.71

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.00	0.10	0.88	0.00	0.02	0.09	0.04	0.01	10.28
LBS/ Arce	0.05	0.01	0.03	0.55	4.82	0.01	0.10	0.49	0.23	0.04	56.00
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60804
Material Applied:	Ingersoll
Date of Application:	30-Aug-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	9300	1413	143	7887.00	1556.00	498.75	32000.00	928.75	22.08
Average (kg/tonne)	0.93	0.14	0.01	0.79	0.16	0.05	3.20	0.09	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	9.91	Total Volume Applied (tonne)	346.95	Application Rate	35.02	tonne/Ha	Dry Ton /ac	3.40
Total Area: ac	24.47				14.18	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	27.62	5.45	1.75	112.07	3.25	0.08
LBS/ Acre	24.65	4.86	1.56	100.00	2.90	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	7.39
Year 2	10%	2.46
Year 3	5%	1.23

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	40.00
Year 2	40%	40.00

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.01	0.04	0.63	0.00	0.03	0.03	0.02	0.01	1.18
LBS/ Arce	0.04	0.01	0.03	0.22	3.44	0.01	0.18	0.17	0.10	0.03	6.41
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60804
Material Applied:	Tillsonburg
Date of Application:	30-Aug-24

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	12600	507	10	12093.00	517.00	375.71	24100.00	548.57	24.59
Average (kg/tonne)	1.26	0.05	0.00	1.21	0.05	0.04	2.41	0.05	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	3.27	Total Volume Applied (tonne)	136.52	Application Rate	41.78	tonne/Ha	Dry Ton /ac	4.60
Total Area: ac	8.07				16.92	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	50.53	2.16	1.57	100.70	2.29	0.10
LBS/ Acre	45.09	1.93	1.40	89.86	2.05	0.09

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	13.53
Year 2	10%	4.51
Year 3	5%	2.25

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	35.94
Year 2	40%	35.94

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.00	0.02	0.63	0.00	0.01	0.08	0.02	0.00	0.92
LBS/ Arce	0.05	0.01	0.02	0.14	3.45	0.01	0.07	0.42	0.10	0.03	5.04
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	24335
Material Applied:	Woodstock
Date of Application:	14-Nov-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	10500	1083	3	9417.00	1086.00	630.00	29300.00	1400.00	27.03
Average (kg/tonne)	1.05	0.11	0.00	0.94	0.11	0.06	2.93	0.14	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	19.92	Total Volume Applied (tonne)	574.07	Application Rate	28.81	tonne/Ha	Dry Ton /ac	3.50
Total Area: ac	49.21				11.67	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	27.13	3.13	1.82	84.43	4.03	0.08
LBS/ Acre	24.21	2.79	1.62	75.33	3.60	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	7.26
Year 2	10%	2.42
Year 3	5%	1.21

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	30.13
Year 2	40%	30.13

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.00	0.10	0.80	0.00	0.02	0.09	0.04	0.01	1.79
LBS/ Arce	0.05	0.01	0.03	0.53	4.38	0.01	0.09	0.50	0.22	0.03	9.73
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	24335
Material Applied:	Tillsonburg
Date of Application:	14-Nov-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	11600	336	75	11264.00	411.00	464.29	30100.00	691.43	21.69
Average (kg/tonne)	1.16	0.03	0.01	1.13	0.04	0.05	3.01	0.07	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	2.37	Total Volume Applied (tonne)	82.92	Application Rate	35.01	tonne/Ha	Dry Ton /ac	3.40
Total Area: ac	5.85				14.17	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Avail N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	39.44	1.44	1.63	105.38	2.42	0.08
LBS/ Acre	35.19	1.28	1.45	94.03	2.16	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	10.56
Year 2	10%	3.52
Year 3	5%	1.76

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	37.61
Year 2	40%	37.61

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.00	0.02	0.58	0.00	0.01	0.07	0.02	0.00	0.86
LBS/ Arce	0.04	0.00	0.01	0.11	3.15	0.01	0.05	0.36	0.10	0.02	4.69
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60868
Material Applied:	Ingersoll
Date of Application:	17-Nov-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	9400	1150	73	8250.00	1223.00	521.25	34900.00	1048.75	20.75
Average (kg/tonne)	0.94	0.12	0.01	0.83	0.12	0.05	3.49	0.10	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	5.14	Total Volume Applied (tonne)	267.31	Application Rate	52.03	tonne/Ha	Dry Ton /ac	4.8.
Total Area: ac	12.69				21.06	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphourus	Zinc	Total Solids
Kg/Ha	42.92	6.36	2.71	181.58	5.46	0.11
LBS/ Acre	38.30	5.68	2.42	162.03	4.87	0.10

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	11.49
Year 2	10%	3.83
Year 3	5%	1.92

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	64.81
Year 2	40%	64.81

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.01	0.05	0.92	0.00	0.05	0.06	0.03	0.01	1.86
LBS/ Arce	0.05	0.01	0.05	0.26	5.03	0.01	0.29	0.34	0.14	0.04	10.12
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	60868
Material Applied:	Tillsonburg
Date of Application:	17-Nov-23

Nutrient Concentration (ppm - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Ammonium + Nitrate)	Copper	Phosphorus	Zinc	Solids
4 Month Avg.	11400	306	88	11094.00	394.00	477.50	30100.00	707.50	22.05
Average (kg/tonne)	1.14	0.03	0.01	1.11	0.04	0.05	3.01	0.07	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	3.63	Total Volume Applied (tonne)	206.55	Application Rate	56.94	tonne/Ha	Dry Ton /ac	5.60
Total Area: ac	8.96				23.05	tonne/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	63.17	2.24	2.72	171.39	4.03	0.13
LBS/ Acre	56.37	2.00	2.43	152.93	3.59	0.11

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	16.91
Year 2	10%	5.64
Year 3	5%	2.82

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	61.17
Year 2	40%	61.17

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.01	0.00	0.00	0.03	0.98	0.00	0.01	0.11	0.03	0.01	1.45
LBS/ Arce	0.06	0.01	0.02	0.19	5.34	0.01	0.08	0.62	0.16	0.04	7.91
Maximum allowable addition (kg/ha) per 5 years	1.1	0.27	2.7	23.30	13.6	0.09	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture