



2020 ANNUAL NON-AGRICULTURAL SOURCE MATERIAL (NASM) SUMMARY REPORT Including Biosolids Land Application Program and Biosolids Centralized Storage Facility (BCSF)

1. General Information

Oxford County prepares a report summarizing the Biosolids Land Application Program and performance of the BCSF. The report details the latest quality testing results and quantity statistics and any non-compliance conditions that may have occurred. It is available for review by the end of March on the internet at www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible. If you have any questions or comments concerning the report, please contact the County of Oxford at the address and phone number listed below or by email at publicworks@oxfordcounty.ca.

Oxford County owns and operates nine wastewater treatment plants. 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 Oxford County requiring septage removal once every 3 to 5 years and transported to the Ingersoll or Woodstock WWTP.

The BCSF Facility description is provided below:

Biosolids Off-site Dedicated Storage:	BCSF
ECA Number:	3816-76HRTS
BCSF Owner & Contact Information:	Oxford County Public Works Department P.O. Box 1614 21 Reeve Street Woodstock, ON N4S 7Y3 Telephone: 519-539-9800 Toll Free: 866-537-7778
Reporting Period:	January 1, 2020 – December 31, 2020

2. Biosolids Land Application Program Description

The biosolids land application program for the beneficial reuse as a nutrient was developed based on the Oxford County Biosolids Management Master Plan (BMMP). The five main elements of the Biosolids Management Master Plan include: more enforcement of the Oxford County Sewer Use By-law, dewatering of stabilized biosolids at each of the major wastewater treatment plants, transporting thickened sludge from smaller plants to the nearest major wastewater treatment plant 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 wastewater treatment plants. 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 Oxford 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 2020 by source. For 2020, there was 7,306 wet tonnes of dewatered biosolids land applied, 2,760 m³ of liquid biosolids land applied from the Thamesford WWTP, and 2,598 m³ of biosolids land applied from the digester clean out at the Woodstock WWTP.

Facility	2020 Biosolids Land Applied	2020 Liquid Biosolids Generated	2020 Total Biosolids Generated	Biosolids Type	Destination
Woodstock WWTP	3,202 wet tonnes/ Digester Cleanout 2,598 m ³	Digester Cleanout 2,598 m ³	3,887 wet tonnes	Anaerobic dewatered	BCSF & Land Application
Ingersoll WWTP	681 wet tonnes		873 wet tonnes	Anaerobic dewatered	BCSF & Land Application
Tillsonburg WWTP	946 wet tonnes		1,562 wet tonnes	Aerobic dewatered	BCSF & Land Application

BCSF Mixed Biosolids (Norwich)	2,477 wet tonnes			Lagoon Biosolids	Land Application
Thamesford WWTP	2,760 m ³	1,807 m ³ hauled to Ingersoll WWTP, 817 m ³ hauled to Woodstock WWTP		Aerobic Liquid	Ingersoll & Woodstock WWTP/Land Application
Tavistock Lagoon			11,253 wet tonnes landfilled	Lagoon Biosolids	Landfilled
Drumbo SBR		1,416 m ³ hauled to Woodstock WWTP		Co-thickened Primary Sludge	Woodstock WWTP

3. Summary and Interpretation of Monitoring Data

3.1. 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).

3.2. Biosolids Quality

The table below highlights the analytical results for metals versus the regulated maximum criteria. Most 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. Tavistock Lagoon biosolids from the desludging of the primary cell, were found to have very high concentrations of molybdenum (>200 ppm), that exceeded the maximum allowable molybdenum concentrations (94 ppm) for land application, and thus had to be landfilled.

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 2020 samples complied with the 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, Oxford 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 wastewater treatment plants.

The transportation of the biosolids from the wastewater treatment facilities to the storage building was done by Oxford County's wastewater staff under ECA # A900939.

This year the biosolids contractor land applied 2,477 wet tonnes of mixed biosolids, made up of Norwich material which was trucked to the BCSF in a previous year, for beneficial reuse on agricultural land.

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

Parameter	Woodstock WWTP	Ingersoll WWTP	Tillsonburg WWTP	Thamesford WWTP	Regulatory Limit
Metals mg/kg dry solids	2020 Annual Average	2020 Annual Average	2020 Annual Average	2020 Annual Average	Maximum
Arsenic	5.2	4.1	3.6	4.0	170
Cadmium	1.38	0.84	0.69	0.41	34
Cobalt	3.8	2.8	2.4	1.0	340
Chromium	68	26	23	8	2800
Copper	712	654	607	386	1700
Mercury	0.7	0.4	0.8	0.5	11
Molybdenum	13	18	15	3	94
Nickel	40	22	64	6	420
Lead	30	14	17	8	1100
Selenium	4.7	3.6	4.0	4	34
Zinc	1123	1149	697	360	4200

The Biosolids land applied from all facilities were compliant with the Nutrient Management Act (NMA) regulations governing NASM.

4. Non-Compliance, Complaints

There were no upsets or spills during the year of operation and no complaints were received for the 2020.

5. Operation of the Stormwater Management Pond for the BCSF

The stormwater management pond services a total drainage area of 4.85 ha consisting of leaf and yard waste composting pad as well as the BCSF. It was designed to attenuate storm water runoff from storm events and was constructed as per the amended ECA # 4022-A8YQ6R.

5.1. Sampling Procedure

Samples are collected semi-annually during spring and fall after a significant rainfall event and analyzed for the following:

Alkalinity	Total Ammonia Nitrogen
Chloride	Iron
Nitrate Nitrogen	Nitrite Nitrogen
TKN	Total Phosphorus
Total Suspended Solids	Sulphate
CBOD	COD
Phenol	pH
Temperature	Conductivity
Dissolved Oxygen	

5.2. Stormwater Management Pond Performance & Effluent

The stormwater management facility provided effective attenuation of stormwater in 2020 with no adverse or abnormal conditions occurring.

The facility is inspected regularly and a log book of the inspections is maintained at the BCSF. The results of the sampling program are included in Appendix A in a summary Table.

5.3. Spills, Upset and Abnormal Conditions

There were no spills or abnormal discharge events in 2020.

6. Inspection of the BCSF

The BCSF was cleaned and an in-house inspection took place on November 26, 2020.

Waste Management Facility staff swept the building prior to inspection.

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, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11&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	No action required at this time.
In the centre 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.
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 north overhead door and frame above the door is damaged. The door was damaged by a recycling truck last month.	The repair will be made when all of the replacement parts arrive
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7. Summary

The BCSF provided effective winter storage for the Oxford County biosolids land application program and was in excellent overall condition. No complaints were received about the operation of either facility in 2020.

Appendix A



Annual Report

NASM Plan:	24169
Material Applied:	Oxford Blend
Date of Application:	28-Apr-20

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.	19900	5589.25	82.72	14310.75	5671.97	104.50	7200.00	128.50	40.73
Average (kg/tonne)	1.99	0.56	0.01	1.43	0.57	0.01	0.72	0.01	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	50.87	Total Volume Applied (t)	2476.81	Application Rate	48.68	tonne/ha	Dry Tonnes /ha	19.80
Total Area: ac	125.65				21.68	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	69.68	27.62	0.51	35.06	0.63	0.20
lbs/ ac	62.17	24.64	0.45	31.28	0.56	0.18

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ac
Year 1	30%	18.65
Year 2	10%	6.22
Year 3	5%	3.11

PHOSPHORUS AVAILABILITY


YEAR	% P Release	lbs P/ac
Year 1	40%	12.51
Year 2	40%	12.51

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.040	0.010	0.060	0.253	2.072	0.004	0.032	0.233	0.217	0.020	2.548
lbs/ac	0.036	0.009	0.054	0.226	1.849	0.004	0.029	0.208	0.194	0.018	2.274
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24169
	Material Applied:	Woodstock
	Date of Application:	5-May-20

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.	9900	1137.5	0.93	8762.50	1138.43	668.75	29000.00	1046.25	24.80
Average (kg/tonne)	0.99	0.11	0.00	0.88	0.11	0.07	2.90	0.10	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	15.36	Total Volume Applied (t)	529.66	Application Rate	34.48	tonne/ha	Dry Tonnes /ha	8.60
Total Area: ac	37.94				15.36	ton/ac		

NUTRIENT VALUE						
Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	30.22	3.93	2.31	100.00	3.61	0.09
lbs/ ac	26.96	3.50	2.06	89.23	3.22	0.08

ORGANIC N (TKN) RELEASE			PHOSPHORUS AVAILABILITY		
YEAR	% N Release	lbs N/ac	YEAR	% P Release	lbs P/ac
Year 1	30%	8.09	Year 1	40%	35.69
Year 2	10%	2.70	Year 2	40%	35.69
Year 3	5%	1.35			

Application Rate of Metals											
	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.043	0.010	0.034	0.552	5.722	0.006	0.110	0.179	0.239	0.036	8.952
lbs/ac	0.038	0.009	0.030	0.493	5.106	0.005	0.098	0.160	0.213	0.032	7.988
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24168
	Material Applied:	Woodstock
	Date of Application:	12-May-20

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.	9900	1128.57	0.73	8771.43	1129.30	712.86	31300.00	1128.57	24.94
Average (kg/tonne)	0.99	0.11	0.00	0.88	0.11	0.07	3.13	0.11	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	33.63	Total Volume Applied (t)	957.78	Application Rate	28.48	tonne/ha	Dry Tonnes /ha	7.10
Total Area: ac	83.07				12.68	ton/ac		

NUTRIENT VALUE						
Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	24.98	3.22	2.03	89.14	3.21	0.07
lbs/ ac	22.29	2.87	1.81	79.54	2.87	0.06

ORGANIC N (TKN) RELEASE			PHOSPHORUS AVAILABILITY		
YEAR	% N Release	lbs N/ac	YEAR	% P Release	lbs P/ac
Year 1	30%	6.69	Year 1	40%	31.82
Year 2	10%	2.23	Year 2	40%	31.82
Year 3	5%	1.11			

Application Rate of Metals											
	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.039	0.009	0.030	0.511	5.067	0.000	0.095	0.318	0.216	0.030	8.022
lbs/ac	0.035	0.008	0.027	0.456	4.521	0.000	0.085	0.284	0.193	0.027	7.158
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	11-Aug-20

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.	10100	315.71	34.63	9784.29	350.34	557.14	36100.00	594.29	24.10
Average (kg/tonne)	1.01	0.03	0.00	0.98	0.04	0.06	3.61	0.06	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	38.57	Total Volume Applied (t)	885.96	Application Rate	22.97	tonne/ha	Dry Tonnes /ha	2.50
Total Area: ac	95.27				10.23	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	22.47	0.80	1.28	82.92	1.37	0.06
lbs/ ac	20.05	0.72	1.14	73.99	1.22	0.05

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ac
Year 1	30%	6.02
Year 2	10%	2.01
Year 3	5%	1.00

PHOSPHORUS AVAILABILITY

YEAR	% P Release	lbs P/ac
Year 1	40%	29.60
Year 2	40%	29.60

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.014	0.004	0.010	0.107	2.754	0.004	0.055	0.201	0.071	0.018	2.937
lbs/ac	0.012	0.004	0.009	0.095	2.457	0.004	0.049	0.179	0.063	0.016	2.621
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24276
Material Applied:	Woodstock
Date of Application:	13-Aug-20

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.	10900	1157.14	1.4	9742.86	1158.54	731.43	30600.00	1147.14	25.33
Average (kg/tonne)	1.09	0.12	0.00	0.97	0.12	0.07	3.06	0.11	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	34.84	Total Volume Applied (t)	1097.19	Application Rate	31.49	tonne/ha	Dry Tonnes /ha	3.60
Total Area: ac	86.05				14.02	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	30.68	3.65	2.30	96.37	3.61	0.08
lbs/ ac	27.38	3.26	2.06	85.99	3.22	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ac
Year 1	30%	8.21
Year 2	10%	2.74
Year 3	5%	1.37

PHOSPHORUS AVAILABILITY

YEAR	% P Release	lbs P/ac
Year 1	40%	34.40
Year 2	40%	34.40

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.037	0.013	0.022	0.478	5.211	0.004	0.091	0.284	0.209	0.039	8.173
lbs/ac	0.033	0.012	0.020	0.427	4.650	0.004	0.081	0.253	0.186	0.035	7.293
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24278
Material Applied:	Woodstock
Date of Application:	18-Aug-20

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.	10900	1157.14	1.4	9742.86	1158.54	731.43	30600.00	1147.14	25.33
Average (kg/tonne)	1.09	0.12	0.00	0.97	0.12	0.07	3.06	0.11	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	19.59	Total Volume Applied (t)	616.89	Application Rate	31.49	tonne/ha	Dry Tonnes /ha	3.50
Total Area: ac	48.39				14.02	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	30.68	3.65	2.30	96.36	3.61	0.08
lbs/ ac	27.38	3.26	2.06	85.98	3.22	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ac
Year 1	30%	8.21
Year 2	10%	2.74
Year 3	5%	1.37

PHOSPHORUS AVAILABILITY

YEAR	% P Release	lbs P/ac
Year 1	40%	34.39
Year 2	40%	34.39

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.037	0.013	0.022	0.478	5.209	0.004	0.091	0.498	0.209	0.039	8.170
lbs/ac	0.033	0.012	0.020	0.427	4.648	0.004	0.081	0.444	0.186	0.035	7.290
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24278
Material Applied:	Ingersoll
Date of Application:	18-Aug-20

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.	9800	1000	4.94	8800.00	1004.94	678.75	3000.00	1236.25	20.80
Average (kg/tonne)	0.98	0.10	0.00	0.88	0.10	0.07	0.30	0.12	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	19.59	Total Volume Applied (t)	616.89	Application Rate	31.49	tonne/ha	Dry Tonnes /ha	3.70
Total Area: ac	48.39				14.02	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	27.71	3.16	2.14	9.45	3.89	0.07
lbs/ ac	24.73	2.82	1.91	8.43	3.47	0.06

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ac
Year 1	30%	7.42
Year 2	10%	2.47
Year 3	5%	1.24

PHOSPHORUS AVAILABILITY

YEAR	% P Release	lbs P/ac
Year 1	40%	3.37
Year 2	40%	3.37

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.028	0.006	0.019	0.192	4.979	0.004	0.114	0.164	0.101	0.028	9.069
lbs/ac	0.025	0.005	0.017	0.171	4.443	0.004	0.102	0.146	0.090	0.025	8.092
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24277
Material Applied:	Ingersoll
Date of Application:	19-Aug-20

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.	9800	1000	4.94	8800.00	1004.94	678.75	3000.00	1236.25	20.80
Average (kg/tonne)	0.98	0.10	0.00	0.88	0.10	0.07	0.30	0.12	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	1.64	Total Volume Applied (t)	64.59	Application Rate	39.50	tonne/ha	Dry Tonnes /ha	8.20
Total Area: ac	4.05				17.59	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	34.66	3.96	2.67	11.82	4.87	0.08
lbs/ ac	30.93	3.53	2.39	10.54	4.34	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ac
Year 1	30%	9.28
Year 2	10%	3.09
Year 3	5%	1.55

PHOSPHORUS AVAILABILITY

YEAR	% P Release	lbs P/ac
Year 1	40%	4.22
Year 2	40%	4.22

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.032	0.007	0.022	0.215	5.577	0.004	0.127	0.184	0.113	0.031	10.157
lbs/ac	0.029	0.006	0.020	0.192	4.976	0.004	0.113	0.164	0.101	0.028	9.063
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24277
Material Applied:	Tillsonburg
Date of Application:	19-Aug-20

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.	10000	301.43	102.7	9698.57	404.13	584.29	37700.00	634.29	24.51
Average (kg/tonne)	1.00	0.03	0.01	0.97	0.04	0.06	3.77	0.06	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	2.26	Total Volume Applied (t)	60.41	Application Rate	26.68	tonne/ha	Dry Tonnes /ha	6.50
Total Area: ac	5.58				11.88	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
kg/ha	25.92	1.08	1.56	100.77	1.70	0.07
lbs/ ac	23.13	0.96	1.39	89.92	1.51	0.06

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ac
Year 1	30%	6.94
Year 2	10%	2.31
Year 3	5%	1.16

PHOSPHORUS AVAILABILITY

YEAR	% P Release	lbs P/ac
Year 1	40%	35.97
Year 2	40%	35.97

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
kg/ha	0.022	0.005	0.014	0.144	3.824	0.005	0.069	0.266	0.103	0.026	4.151
lbs/ac	0.020	0.004	0.012	0.128	3.412	0.004	0.062	0.237	0.092	0.023	3.704
Maximum allowable addition (kg/ha) per 5 years	1.4	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:	24418
Material Applied:	Woodstock
Date of Application:	11-Nov-20

Nutrient Concentration (mg/kg- dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Nitrate + Ammonium)	Copper	Phosphorus	Zinc	Solids %
4 Month Avg.	41300	17333.33	23.33	23966.67	17356.66	430.00	3600.00	626.67	2.08
Average (Kg/m ³)	41.30	17.33	0.02	23.97	17.36	0.43	3.60	0.63	

** Sample results from SGS Lakefield Research Limited

Total Area: ha	21.65	Total Volume Applied m3	2598	Application Rate	129.50	M ³ /Ha	Dry Tonnes /ha	2.50
Total Area: ac	53.48				52.43	M ³ /Ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	2876.00	2082.80	51.60	432.00	75.20	0.00
LBS/ Acre	2566.28	1858.50	46.04	385.48	67.10	0.00

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	769.88
Year 2	10%	256.63
Year 3	5%	128.31

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	154.19
Year 2	40%	154.19

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.012	0.003	0.007	0.099	1.069	0.001	0.017	0.060	0.027	0.012	1.578
LBS/ Acre	0.011	0.003	0.006	0.088	0.954	0.001	0.015	0.054	0.024	0.011	1.408
Maximum Allowable Addition (kg/ha) per 5 years	1.4	0.27	2.7	23.30	13.6	0.090	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture



Annual Report

NASM Plan:	24414
Material Applied:	Thamesford
Date of Application:	18-Aug-20

Nutrient Concentration (mg/kg - dry basis)

Date Sampled	TKN	Ammonium	Nitrate	Organic N (TKN - Ammonium)	Plant Avail N (Nitrate + Ammonium)	Copper	Phosphorus	Zinc	Solids %
4 Month Avg.	19900	6393.5	2.1	13506.50	6395.60	291.88	1090.00	435.00	3.83
Average (Kg/m ³)	19.90	6.39	0.00	13.51	6.40	0.29	1.09	0.44	

** Sample results from SGS Lakefield Research Limited

Total Area: ha	21.23	Total Volume Applied m3	2760	Application Rate	130.00	M ³ /Ha	Dry Tonnes /ha	5.00
Total Area: ac	52.44				52.63	M ³ /Ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	1755.91	831.46	37.95	141.71	56.55	0.00
lbs/ Acre	1566.81	741.92	33.86	126.44	50.46	0.00

ORGANIC N (TKN) RELEASE

YEAR	% N Release	lbs N/ Acre
Year 1	30%	470.04
Year 2	10%	156.68
Year 3	5%	78.34

PHOSPHORUS AVAILABILITY

YEAR	% P Release	lbs P/Acre
Year 1	40%	50.58
Year 2	40%	50.58

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.003	0.007	0.006	0.146	1.453	0.001	0.030	0.074	0.072	0.003	2.166
lbs/ Acre	0.003	0.006	0.005	0.130	1.297	0.001	0.027	0.066	0.064	0.003	1.933
Maximum Allowable Addition (kg/ha) per 5 years	1.4	0.27	2.7	23.30	13.6	0.090	0.8	3.56	9	0.27	33

Metals Not Beneficial for Agriculture

Metals Beneficial for Agriculture