

2019 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 and liquid storage on site prior to land application.
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 10 to 20 years storage.
Norwich WWTP	Lagoon System	Stored in lagoons on site until land applied usually between 10 to 20 years storage.
Plattsville WWTP	Lagoon System	Stored in lagoons on site until land applied usually between 10 to 20 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, 2019 – December 31, 2019

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 2019 by source, there was 5307 wet tonnes of dewatered biosolids land applied in total in 2019 and 1000 m³ of liquid biosolids land applied from the Ingersoll WWTP digester cleanout.

Facility	2019 Biosolids Land Applied	2019 Liquid Biosolids	2019 Total Biosolids Generated	Biosolids Type	Destination
Woodstock WWTP	2462 wet tonnes		4150 wet tonnes	Anaerobic dewatered	BCSF & Land Application
Ingersoll WWTP	1055 wet tonnes	1000 m ³ liquid from Digester cleanout	1055 wet tonnes	Anaerobic dewatered	BCSF & Land Application
Tillsonburg WWTP	793 wet tonnes		1289 wet tonnes	Aerobic dewatered	BCSF & Land Application

Thamesford WWTP		1300 m ³ generated		Aerobic Liquid	Onsite Storage & Woodstock WWTP
Norwich Lagoon	1000 wet tonnes		3000 wet tonnes	Lagoon Biosolids	BCSF & Land Application & Landfill Cover
Drumbo SBR		1067 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. 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 2019 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 and Super Saver Disposal (Ontario) Inc. working on Oxford County's behalf or by Oxford County's own forces under ECA # A900939.

This year the biosolids contractor mixed and land applied 1000 tonnes of Norwich material trucked to the BCSF for beneficial reuse on agricultural land brought in the year before. The remaining 2000 tonnes of Norwich material was deemed not to have much agricultural benefit due to the clay content, so it was reused as cover material for the Waste Management Facility.

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	2019 Annual Average	2019 Annual Average	2019 Annual Average	2019 Annual Average	Maximum
Arsenic	5.8	6.6	3.6	3.4	170
Cadmium	1.71	0.8	0.6	0.3	34
Cobalt	4.4	4.4	2.6	1.6	340
Chromium	75	36	23	10	2800
Copper	714	938	617	387	1700
Mercury	0.9	0.5	0.7	0.5	11
Molybdenum	14	18	8	4	94
Nickel	42	29	58	8	420
Lead	36	19	18	8	1100
Selenium	5	4	4	3	34
Zinc	1184	1408	712	359	4200

The Biosolids 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 2019.

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 2019 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 2019.

6. Inspection of the BCSF

The BCSF was cleaned and an in-house inspection took place on November 18, 2019.

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.

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 2019.

Appendix A

Biosolids Land Application Summary

WWTP: Ingersoll WWTP

Date : November 25, 26, 28, & 30, 2019

Primary Digester Clean Out

Land Location: Stratford Rd 25 (Downe Rd.)

911 # 4035

NASM PLAN # 23274

Load #	Time in Hours	Trailer #	Capacity m3	Driver's Name	Total m3
Nov. 25 1	1330	415	40		
2	1730	2311	44		84
Nov. 26 3	1430	1123	44		128
4	1445	AQU	44		172
5	1505	4230	44		216
6	1515	344	44		260
7	1700	0717	44		304
Nov. 28 8	0755	1542	44		348
9	0815	1123	44		392
10	1310	1123	44		436
Nov 30 11	1205	343	44		480
12	1330	344	40		520
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Biosolids Land Application Summary

WWTP: Ingersoll WWTP

Date : October 23 & 24, 2019

Primary Digester Clean Out

Land Location: Conc 1 Lot 19 Zorra 41st Line

911 # 414912

NASM PLAN # 24058

Load #	Time in Hours	Trailer #	Capacity m3	Driver's Name	Total m3
Oct. 23 1	1330		42	Johan Petter	
2	1430		42	Wayne	84
3	1530		42	Johan Petter	126
4	1630		42	Wayne	168
5	1730		42	Johan Petter	210
Oct. 24 6	0830		42	Wayne	252
7	1000		42	Wayne	294
8	1100		42	Jim Boers	336
9	1230		25	Wayne	361
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Annual Report

NASM Plan:	23764
Material Applied:	Ingersoll
Date of Application:	20-Aug-19

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.	12000	1825	13.88	10175.00	1838.88	988.75	38400.00	1400.00	18.90
Average (kg/tonne)	1.20	0.18	0.00	1.02	0.18	0.10	3.84	0.14	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	32.60	Total Volume Applied (t)	1055.45	Application Rate	32.38	tonne/Ha	Dry Tonnes /ha	6.12
Total Area: ac	80.52				14.42	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	32.94	5.95	3.20	124.32	4.53	0.06
LBS/ Acre	29.39	5.31	2.86	110.93	4.04	0.05

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	8.82
Year 2	10%	2.94
Year 3	5%	1.47

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	44.37
Year 2	40%	44.37

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.031	0.003	0.020	0.134	3.202	0.002	0.055	0.101	0.071	0.015	4.533
LBS/ Arce	0.028	0.002	0.018	0.119	2.857	0.002	0.049	0.090	0.064	0.013	4.045
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



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ENVIRONMENTAL

Annual Report

NASM Plan:	23805 Field 1
Material Applied:	Woodstock
Date of Application:	12-Aug-19

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	1237.5	1.15	9162.50	1238.65	673.75	30500.00	1162.50	28.39
Average (kg/tonne)	1.04	0.12	0.00	0.92	0.12	0.07	3.05	0.12	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	19.99	Total Volume Applied (t)	562.89	Application Rate	28.16	tonne/Ha	Dry Tonnes /ha	7.99
Total Area: ac	49.38				12.54	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	25.80	3.49	1.90	85.88	3.27	0.08
LBS/ Acre	23.02	3.11	1.69	76.63	2.92	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	6.91
Year 2	10%	2.30
Year 3	5%	1.15

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	30.65
Year 2	40%	30.65

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.017	0.005	0.011	0.201	1.897	0.002	0.032	0.112	0.099	0.013	3.274
LBS/ Arce	0.015	0.005	0.010	0.180	1.693	0.002	0.028	0.100	0.088	0.011	2.921
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



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ENVIRONMENTAL

Annual Report

NASM Plan:	23805 Field 2
Material Applied:	Woodstock
Date of Application:	12-Aug-19

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	1237.5	1.15	9162.50	1238.65	673.75	30500.00	1162.50	28.39
Average (kg/tonne)	1.04	0.12	0.00	0.92	0.12	0.07	3.05	0.12	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	3.63	Total Volume Applied (t)	102.2	Application Rate	28.16	tonne/Ha	Dry Tonnes /ha	7.99
Total Area: ac	8.97				12.54	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	25.80	3.49	1.90	85.87	3.27	0.08
LBS/ Acre	23.02	3.11	1.69	76.62	2.92	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	6.91
Year 2	10%	2.30
Year 3	5%	1.15

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	30.65
Year 2	40%	30.65

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.017	0.005	0.011	0.201	1.897	0.002	0.032	0.112	0.099	0.013	3.274
LBS/ Arce	0.015	0.005	0.010	0.180	1.693	0.002	0.028	0.100	0.088	0.011	2.921
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



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ENVIRONMENTAL

Annual Report

NASM Plan:	23805 Field 3
Material Applied:	Woodstock
Date of Application:	12-Aug-19

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	1237.5	1.15	9162.50	1238.65	673.75	30500.00	1162.50	28.39
Average (kg/tonne)	1.04	0.12	0.00	0.92	0.12	0.07	3.05	0.12	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	7.85	Total Volume Applied (t)	221.06	Application Rate	28.16	tonne/Ha	Dry Tonnes /ha	7.99
Total Area: ac	19.39				12.54	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	25.80	3.49	1.90	85.89	3.27	0.08
LBS/ Acre	23.02	3.11	1.69	76.64	2.92	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	6.91
Year 2	10%	2.30
Year 3	5%	1.15

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	30.66
Year 2	40%	30.66

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.017	0.005	0.011	0.201	1.897	0.002	0.032	0.112	0.099	0.013	3.274
LBS/ Arce	0.015	0.005	0.010	0.180	1.693	0.002	0.028	0.100	0.088	0.011	2.921
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



TERRATEC
ENVIRONMENTAL

Annual Report

NASM Plan:	23811
Material Applied:	Tillsonburg
Date of Application:	15-Aug-19

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.	7900	100	259.57	7800.00	359.57	611.43	38300.00	700.00	21.97
Average (kg/tonne)	0.79	0.01	0.03	0.78	0.04	0.06	3.83	0.07	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	26.70	Total Volume Applied (t)	793.34	Application Rate	29.70	tonne/Ha	Dry Tonnes /ha	6.53
Total Area: ac	65.95				13.23	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	23.18	1.07	1.82	113.80	2.08	0.07
LBS/ Acre	20.68	0.95	1.62	101.55	1.86	0.06

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	6.20
Year 2	10%	2.07
Year 3	5%	1.03

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	40.62
Year 2	40%	40.62

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.011	0.002	0.008	0.070	1.816	0.002	0.022	0.165	0.055	0.011	2.079
LBS/ Arce	0.009	0.002	0.007	0.063	1.620	0.002	0.020	0.148	0.049	0.010	1.855
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



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ENVIRONMENTAL

Annual Report

NASM Plan:	23812
Material Applied:	Woodstock
Date of Application:	13-Aug-19

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	1237.5	1.15	9162.50	1238.65	673.75	30500.00	1162.50	28.39
Average (kg/tonne)	1.04	0.12	0.00	0.92	0.12	0.07	3.05	0.12	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	58.48	Total Volume Applied (t)	1575.51	Application Rate	26.94	tonne/Ha	Dry Tonnes /ha	7.65
Total Area: ac	144.45				12.00	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	24.68	3.34	1.82	82.17	3.13	0.08
LBS/ Acre	22.03	2.98	1.62	73.32	2.79	0.07

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	6.61
Year 2	10%	2.20
Year 3	5%	1.10

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	29.33
Year 2	40%	29.33

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.016	0.005	0.010	0.193	1.815	0.002	0.030	0.107	0.094	0.012	3.132
LBS/ Arce	0.014	0.005	0.009	0.172	1.620	0.002	0.027	0.096	0.084	0.011	2.795
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



TERRATEC
ENVIRONMENTAL

Annual Report

NASM Plan:	23835 Field 1
Material Applied:	Oxford Blend
Date of Application:	23-Jul-19

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.	24600	5520.33	231.07	19079.67	5751.40	322.44	17000.00	518.33	41.55
Average (kg/tonne)	2.46	0.55	0.02	1.91	0.58	0.03	1.70	0.05	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	8.62	Total Volume Applied (t)	228.44	Application Rate	26.49	tonne/Ha	Dry Tonnes /ha	11.01
Total Area: ac	21.29				11.80	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	50.56	15.24	0.85	45.05	1.37	0.11
LBS/ Acre	45.12	13.60	0.76	40.20	1.23	0.10

ORGANIC N (TKN) RELEASE

YEAR	% N Release	LBs N/ Acre
Year 1	30%	13.54
Year 2	10%	4.51
Year 3	5%	2.26

PHOSPHORUS AVAILABILITY

YEAR	% P Release	LBs P/Acre
Year 1	40%	16.08
Year 2	40%	16.08

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.008	0.002	0.008	0.078	0.854	0.001	0.016	0.058	0.048	0.005	1.373
LBS/ Arce	0.007	0.001	0.007	0.070	0.762	0.001	0.014	0.052	0.043	0.005	1.225
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



TERRATEC
ENVIRONMENTAL

Annual Report

NASM Plan:	23835 Field 2
Material Applied:	Oxford Blend
Date of Application:	23-Jul-19

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.	24600	5520.33	231.07	19079.67	5751.40	322.44	17000.00	518.33	41.55
Average (kg/tonne)	2.46	0.55	0.02	1.91	0.58	0.03	1.70	0.05	0.00

** Sample results from SGS Lakefield Research Limited

Total Area: ha	29.00	Total Volume Applied (t)	768.2	Application Rate	26.49	tonne/Ha	Dry Tonnes /ha	11.01
Total Area: ac	71.63				11.80	ton/ac		

NUTRIENT VALUE

Nutrient	Organic N	Plant Aval N	Copper	Phosphorus	Zinc	Total Solids
Kg/Ha	50.54	15.24	0.85	45.03	1.37	0.11
LBS/ Acre	45.10	13.59	0.76	40.18	1.23	0.10

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%	16.07
Year 2	40%	16.07

Application Rate of Metals

	As	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Zn
Kg/ Ha	0.008	0.002	0.008	0.078	0.854	0.001	0.016	0.058	0.048	0.005	1.373
LBS/ Arce	0.007	0.001	0.007	0.070	0.762	0.001	0.014	0.052	0.043	0.005	1.225
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

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