
Regional District of Nanaimo

2021 Biosolids Management Summary and Compliance Report

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TABLE OF CONTENTS

1	PROGRAM OVERVIEW	1
2	REGULATORY AUTHORIZATION.....	1
3	REPORT OBJECTIVES	2
4	2021 BIOSOLIDS MANAGEMENT	2
4.1	BIOSOLIDS MANAGEMENT SUMMARY	2
4.2	BIOSOLIDS PROGRAM TRANSPORTATION SUMMARY	3
4.3	BIOSOLIDS STORAGE	3
4.4	2021 PRE-APPLICATION MEASURES	3
4.5	BIOSOLIDS LAND APPLICATION	4
4.6	BIOSOLIDS QUALITY.....	4
4.7	SOIL MONITORING	5
4.8	REGULATORY COMPLIANCE.....	5
5	SUMMARY AND INTERPRETATION OF THE EFFECTS OF BIOSOLIDS DISCHARGES ON THE RECEIVING ENVIRONMENT.....	5
6	CONCLUSION.....	6
	APPENDIX ONE – TABLES	7
	APPENDIX TWO – FIGURES.....	13
	APPENDIX THREE – PHOTOGRAPHS.....	17
	APPENDIX FOUR – DECLARATION OF LAND APPLICATION COMPLIANCE	18

APPENDIX ONE – TABLES

Table 1: Summary of SYLVIS 2021 deliverables as outlined in the RDN-SYLVIS 2017-2021 and 2021-2022 extension contracts for biosolids management at the TimberWest Properties.	7
Table 2: Summary of SYLVIS 2021 deliverables as outlined in the Mosaic-SYLVIS 2021-2026 Agreement for biosolids management at Blackjack.	9
Table 3: Regional District of Nanaimo biosolids management summary - 2021.	10
Table 4: Regional District of Nanaimo biosolids quality summary - 2021.	11
Table 5: Historical management of Regional District of Nanaimo biosolids at the TimberWest Properties, Harmac Landfill, and Blackjack from 2007 to 2021.	12

APPENDIX TWO – FIGURES

Figure 1: Tonnage of Regional District of Nanaimo – Greater Nanaimo Pollution Control Centre (GNPCC) dewatered biosolids delivered and applied at the TimberWest Properties by month in 2021.	13
Figure 2: Tonnage of Regional District of Nanaimo – Greater Nanaimo Pollution Control Centre (GNPCC) dewatered biosolids delivered to Blackjack by month in 2021.	14
Figure 3: Tonnage of Regional District of Nanaimo – Greater Nanaimo Pollution Control Centre (GNPCC) and French Creek Pollution Control Centre (FCPCC) dewatered biosolids delivered to Harmac by month in 2021.	15
Figure 4: TimberWest Properties application areas fertilized with Regional District of Nanaimo biosolids in 2021.	16

APPENDIX THREE – PHOTOGRAPHS

Photograph 1: RDN biosolids are stockpiled in storage areas at the TimberWest Properties. ...	17
Photograph 2: Trail reclamation using biosolids at the TimberWest Properties.	17
Photograph 3: Stockpile at Blackjack constructed using concrete lock blocks.	17

1 PROGRAM OVERVIEW

The Regional District of Nanaimo (RDN) operates two wastewater treatment plants that produce municipal biosolids:

1. French Creek Pollution Control Centre (FCPCC) - Class A biosolids
2. Greater Nanaimo Pollution Control Centre (GNPCC) - Class B biosolids

In 2021, RDN biosolids were managed at three sites in the Nanaimo area: private forest lands on Weigles Road ("TimberWest Properties") and off Nanaimo River Road ("Blackjack") both managed by Mosaic Forest Management, and at the Nanaimo Forest Products Harmac Mill (Harmac).

At the TimberWest Properties biosolids were used in a forest fertilization and reclamation program. RDN biosolids have been managed at this site since 2003. The objectives of biosolids forest fertilization were to increase soil quality and tree growth; and for reclamation to return application trails to productive forest and habitat.

In 2021, management of RDN biosolids by SYLVIS began at the new Blackjack site, which will be used for a long-term forest fertilization program. The new site, Blackjack, is on private forest lands managed by Mosaic Forest Management on Nanaimo River Road in Nanaimo, BC. Delivery of RDN biosolids began to Blackjack in December 2021. The objectives of biosolids forest fertilization at Blackjack are to increase soil quality and tree growth and in reclamation to return cut trails to productive forest.

RDN biosolids were also managed in soil fabrication projects at Harmac. Biosolids managed at Harmac were used to fabricate reclamation growing medium (RGM) for use in landfill closure and biosolids growing medium (BGM) for distribution. The Harmac site can also serve as a contingency site for management of RDN biosolids during periods of inclement weather when management at the TimberWest Properties or Blackjack sites is not possible.

A total of 7,571 wet tonnes (wt) of RDN biosolids were produced in 2021: 6,272 wt from the GNPCC and 1,299 wt from the FCPCC. Of the 7,571 wt produced, 5,060 wt (67% of annual production in 2021) were delivered to the TimberWest Properties, 317 wt (4%) were delivered to Blackjack, and 2,194 wt (29%) were delivered to Harmac (Table 3).

2 REGULATORY AUTHORIZATION

RDN biosolids were managed at the TimberWest Properties under the *2021 TimberWest Properties (Weigles Road) Forest Fertilization Land Application Plan* (SYLVIS Documents # 1339-20), Authorization #110596, valid February 7, 2021 to August 4, 2021) and *2021 TimberWest Properties (Weigles Road) Reclamation & Forest Fertilization Land Application Plan* (SYLVIS Document #1439-21, Authorization #110825, valid August 5, 2021 to August 4, 2022).

RDN biosolids were delivered to Blackjack starting in mid-December 2021, under site Authorization #110732, valid May 16, 2021 to May 15, 2022). A Land Application Plan will be finalized prior to commencement of applications at Blackjack.

Biosolids used to fabricate RGM at Harmac were managed under the *Nanaimo Forest Products – Harmac Mill Reclamation Growing Medium Land Application Plan* (SYLVIS Document # 1341-20, Authorization #110574). Class A biosolids used in production of BGM were managed according to regulatory requirements in the *Organic Matter Recycling Regulation* (OMRR) and do not require a land application plan (LAP).

3 REPORT OBJECTIVES

This report summarizes the RDN's biosolids management program. It also contains a Qualified Professional Certification of Compliance for the two 2021 biosolids LAPs for the TimberWest Properties as required under *Organic Matter Recycling Regulation* (OMRR) section 5 (3). A Qualified Professional Certification of Compliance will be issued after the term of the LAP for Blackjack for 2021 as applications have not begun as of the date of writing.

While a terse summary of management of RDN biosolids at Harmac is provided in this report, a detailed discussion of the regulatory details of the RGM LAP is not included here. A separate compliance report for this project (*Nanaimo Forest Products – Harmac Mill Residuals Growing Medium Land Application Plan 2021 (Authorization #110574) Qualified Professional Certification of Compliance*, SYLVIS Document #1483-22) has been provided to Harmac.

No certification of compliance is required for BGM production.

4 2021 BIOSOLIDS MANAGEMENT

This document contains information on the management of 2021 RDN biosolids including a summary of contractual requirements for the forest fertilization and reclamation programs (Table 1 and Table 2), a biosolids program management summary (Table 3, Figure 1, Figure 2, and Figure 3), a biosolids quality summary (Table 4), a summary of historical management (Table 5), a map of areas applied in 2021 at the TimberWest Properties (Figure 4), and photographs from the biosolids management projects (Photographs 1 to 3).

4.1 BIOSOLIDS MANAGEMENT SUMMARY

In 2021, the majority of RDN biosolids were managed at the TimberWest Properties on Weigles Road in Nanaimo, BC. All contractual tasks relating to biosolids quality monitoring, biosolids delivery coordination, biosolids beneficial use, site safety, environmental monitoring, public engagement, reporting, coordination with the Nanaimo Mountain Bike Club, and adherence to the conditions of site use under the RDN land-use agreement with TimberWest were completed for 2021 (Table 1).

RDN biosolids were first delivered to the new site, Blackjack, on Nanaimo River Road in mid-December 2021. Contractual tasks relating to biosolids quality monitoring, biosolids delivery coordination, site safety, environmental monitoring, and reporting were completed for 2021 (Table 2).

RDN biosolids delivered to Harmac were managed under contract by Harmac, with SYLVIS providing qualified professional oversight for production of reclamation growing medium (RGM) for use in landfill reclamation and biosolids growing medium (BGM) for distribution.

4.2 BIOSOLIDS PROGRAM TRANSPORTATION SUMMARY

In 2021, 5,060 wt of RDN biosolids (0 wt from FCPCC; 5,060 wt from GNPCC) were transported by DBL Disposal to the TimberWest Properties (Table 3). Monthly tonnage delivered to this site in 2021 is shown in Figure 1.

In 2021, 317 wt of RDN biosolids (0 wt from FCPCC; 317 wt from GNPCC) were transported by DBL Disposal to Blackjack (Table 3). Monthly tonnage delivered to this site in 2021 is shown in Figure 2.

In 2021, 2,194 wt of RDN biosolids (1,299 wt from FCPCC; 895 wt from GNPCC) were transported by DBL Disposal to Harmac (Table 3). Monthly tonnage delivered to this site in 2021 is shown in Figure 3.

Total RDN biosolids production in 2021 (7,571 wt) was above the five-year average annual production of 5,668 wt due to implementation of secondary treatment at the GNPCC (Table 5).

4.3 BIOSOLIDS STORAGE

Four storage areas exist at the TimberWest Properties and one large storage area exists at Blackjack, each consisting of an asphalt base with lock blocks delineating three sides of the stockpiles (Photograph 1 and 3). All five storage areas were utilized for biosolids stockpiling in 2021. Biosolids storage conformed to OMRR requirements for Vancouver Island where biosolids are required to be covered from October 1 to March 31 of every year.

Harmac does not cover the stored biosolids as biosolids are typically quickly incorporated into a fabricated soil medium (BGM or RGM). Details of RGM storage are discussed in the Harmac Compliance Report. BGM is not subject to regulatory storage requirements in the OMRR.

4.4 2021 PRE-APPLICATION MEASURES

At the TimberWest Properties, site inspections were carried out by a SYLVIS Qualified Professional or designate prior to biosolids fertilization. During site inspections, water features and other sensitive site features were identified, mapped, and appropriate setback distances were determined. Pre-application soil samples were collected in order to determine an appropriate agronomic rate of biosolids application. Groundwater depth was assessed using a soil auger or visually in road cuts and was confirmed to be in excess of 1 metre (m) prior to commencing biosolids applications.

No applications occurred at Blackjack in 2021; site inspections will be carried out by a SYLVIS Qualified Professional or designate prior to biosolids fertilization and reclamation in 2022.

At Harmac, a site inspection was carried out prior to initiating soil fabrication operations to confirm the suitability of the storage facility, mixing methodology, and soil storage area. Landfill areas to

be reclaimed using RGM were assessed prior to applications to ensure suitability for applications. Details of site inspections for the RGM project are detailed in the Harmac Compliance Report.

At Harmac, currently stockpiled BGM is primarily the product of Class A biosolids deliveries starting in October 2021, with a small amount of previously mixed and certified BGM remaining to be distributed.

4.5 BIOSOLIDS LAND APPLICATION

In 2021, 4,426 wt of RDN biosolids (0 wt from FCPCC; 4,426 wt from GNPCC) were applied as a fertilizer and soil amendment to the TimberWest Properties (Table 3, Figure 1). Biosolids were land-applied to 74 hectares (ha) of forested lands for forest fertilization and reclamation at the TimberWest Properties at application rates specific to the individual fertilization units based on their history of previous biosolids land applications. Across the site, the biosolids application rate was an average of 12.3 dt/ha which does not exceed the application rate specified in the LAP (20 dry tonnes per ha). At the end of 2021, 800 wt (0 wt from FCPCC; 800 wt from GNPCC) remained in storage facilities at the TimberWest Properties in preparation for fertilization in 2022 (Table 3).

Biosolids were land-applied using a side-discharge spreader equipped with a hydraulic fan which propels the biosolids up to 30 m into forest stands. All biosolids applications adhered to a 30-m setback distance from permanent water features and identified ephemeral water features. Biosolids land applications were completed every 2-4 weeks throughout 2021 except during periods of extreme weather (i.e., snowfall, heavy rainfall) or when the ground was snow-covered; land application operations were suspended during these times. For example, biosolids land applications did not occur in January and February of 2021 when periods of snowfall or snow cover occurred.

No applications occurred at Blackjack in 2021.

Biosolids incorporated into RGM were land-applied at the Harmac landfill as a topsoil cover during landfill closure operations. In 2021, 4,200 m³ RGM containing approximately 1,140 wt of biosolids were used in landfill closure (Table 3, Figure 3). Volumes of RGM produced and land-applied at Harmac are detailed in the Harmac Compliance Report.

BGM containing RDN Class A biosolids was distributed offsite.

4.6 BIOSOLIDS QUALITY

Biosolids quality was characterized throughout 2021 to ensure that it met quality requirements for trace element concentrations, foreign matter, and pathogen reduction set forth in the OMRR. A total of six composite samples, each composed of eight equal-volume subsamples, were collected by SYLVIS from the FCPCC and the GNPCC. The biosolids were analyzed for physical parameters, nutrients, and trace elements (Table 4). All RDN biosolids samples collected in 2021 met the respective OMRR Class A and B criteria for trace elements.

The OMRR requires that a set of seven discrete samples be collected for fecal coliform analysis for every 1,000 dry tonnes of biosolids or annually, whichever comes first.

In 2021, 427 dry tonnes (dt) of biosolids were produced by the FCPCC. For Class A biosolids each individual sample must meet the Class A criterion of 1,000 most probable number per gram (MPN/g). There was no scope for biosolids sampling at the FCPCC in the latter third of the year and therefore five fecal samples were collected in 2021. The fecal coliform density of the last seven samples collected by SYLVIS in 2020 and 2021 was <10 MPN/g in all samples (Table 4).

In 2021, 1,286 dt of biosolids were produced by the GNPCC, requiring two sets of fecal coliforms samples. For Class B biosolids the geometric mean of each set must meet the Class B criterion of 2,000,000 MPN/g. SYLVIS collected 14 samples, the geometric mean of the sampling sets was 33,600 MPN/g (Table 4).

Though it did not occur in 2021, deliveries of FCPCC and GNPCC biosolids could co-occur into the same storage areas at the TimberWest Properties and/or Blackjack sites in cases when Class A deliveries cannot occur to Harmac. Biosolids would be mixed prior to land application, and both would be managed as a Class B product.

4.7 SOIL MONITORING

Ongoing soil monitoring was carried out at the TimberWest Properties throughout 2021. Soil samples, each composed of 10 sub-samples from the top 0-15 cm at random varying distances from the roadside, were collected by SYLVIS. On average, soil trace element concentrations remain below 75% of applicable OMRR soil criteria for this site. Further details on soil sampling and nutrient concentrations can be found in the LAP.

RGM quality at Harmac is discussed in the Harmac Compliance Report.

4.8 REGULATORY COMPLIANCE

Biosolids management activities at the TimberWest Properties were carried out under Authorizations #110596 and #110825, and in accordance with the LAP applicable at the time of applications (SYLVIS Document #1339-20 and #1439-21). All regulatory requirements of the OMRR and specifications of the LAP were met including the requirements for rainy season storage, agronomic application rate, groundwater level during application, water feature buffers, biosolids quality, pre-application and predicted post-application soil concentration limits, and signage. A Declaration of Land Application Compliance of biosolids applications at the TimberWest Properties along Weigles Road is provided in Appendix Four.

Details of regulatory compliance of biosolids land applications as part of RGM at Harmac are detailed in the Harmac Compliance Report.

5 SUMMARY AND INTERPRETATION OF THE EFFECTS OF BIOSOLIDS DISCHARGES ON THE RECEIVING ENVIRONMENT

The objectives of biosolids forest fertilization at the TimberWest Properties are to increase soil quality and tree growth while remaining compliant with the OMRR. Biosolids fertilization has generally increased surface horizon organic matter content and available nutrients (e.g., phosphorus). These enriched soils store more carbon and enable accelerated tree growth, which has been documented at this site and other biosolids forest fertilization sites. Trace element

concentrations in the soil have increased as a result of additions from biosolids. It has been observed¹ at this site that deer browse of trees is increased in biosolids-fertilized areas, underlining a finding from many biosolids sites that increases in vegetation biomass can lead to increases in animal populations that consume or inhabit the vegetation. The objectives of reclamation activities at the TimberWest Properties were to return application trails to productive vegetation and establish wildlife habitat.

Biosolids forest fertilization at Blackjack has the same objectives as those at the TimberWest Properties. The Blackjack site will benefit from the addition of organic matter and available nutrients resulting in increased carbon storage and accelerated tree growth.

The fabrication of growing media (BGM and RGM) at Harmac produces a material that can be used for landfill closure (RGM) or in projects on and off site that require topsoil (BGM). These growing media provide a fertile substrate upon which vegetation can grow to achieve site objectives such as protection of underlying landfill layers or site restoration. Like other organic amendments, their use sequesters carbon in the soil and eliminates the need to import soil from other sites.

6 CONCLUSION

RDN biosolids were managed at the Weigles Road TimberWest Properties, Blackjack, and at Harmac in 2021. 5,060 wt (67% of annual production in 2021) were delivered to the TimberWest Properties, 317 wt (4%) were delivered to Blackjack, and 2,194 wt (29%) were delivered to Harmac.

All biosolids land application activities at the TimberWest Properties occurred as specified in the current LAP and according to management requirements under the OMRR. Soil quality data remain below 75% of applicable OMRR soil criteria for this site.

The TimberWest Properties have accepted over 51,000 wt of biosolids since 2007 (Table 5). SYLVIS looks forward to continuing this productive relationship and providing biosolids management services and support to the RDN throughout 2022 and beyond at the new site, Blackjack.

¹ Danjou, B. 2014. Effect of Biosolid on Vegetation Development Within Two Douglas-fir Plantations: Third Year Progress Report - DRAFT. Vancouver Island University, Nanaimo, B.C.

APPENDIX ONE – TABLES

Table 1: Summary of SYLVIS 2021 deliverables as outlined in the RDN-SYLVIS 2017-2021 and 2021-2022 extension contracts for biosolids management at the TimberWest Properties.

Task or Activity	Description
Biosolids Quality	RDN biosolids quality was monitored throughout 2021 through the collection of six full suite samples and 14 fecal coliform samples. Increased sampling occurred in 2021 compared to previous years at GNPCC due to implementation of secondary treatment leading to increased production.
Biosolids Quantity	5,060 tonnes of RDN biosolids were transported to the TimberWest Properties by DBL Disposal in 2021. 4,426 tonnes of biosolids were land-applied in 2021. 800 tonnes remained stored at the TimberWest Properties at the end of 2021.
Biosolids Transportation and Delivery Coordination	SYLVIS coordinated biosolids deliveries to the TimberWest Properties with DBL Disposal throughout 2021.
Access Maintenance	SYLVIS conducted road maintenance and snow removal on internal roads at the TimberWest Properties in 2021.
Contingency	2,194 tonnes of RDN biosolids were sent to the Harmac contingency site in 2021, in part for contingency during snowy road conditions and in part to fulfill RDN's contract with Harmac.
Storage of Biosolids	Biosolids were stored in four storage facilities at the TimberWest Properties and covered with tarps from October 1 to March 31 as per OMRR requirements.
Invoicing	Biosolids were invoiced on a monthly basis.
Environmental Incidents	No environmental incidents occurred in 2021.
Site Safety	No safety incidents occurred at the TimberWest Properties in 2021. SYLVIS maintained COR and BC Forest SAFE safety accreditations in 2021.
Public and Media Relations	No open houses were held in 2021 due to COVID-19.
Complaints Management	There were no complaints received about the biosolids forest fertilization program at the TimberWest Properties in 2021.
Annual Reporting	This summary report fulfills the regulatory requirement for written certification under OMRR Section 5(3).
Storage Facility Management	SYLVIS managed storage facilities throughout 2021. Containment walls at the storage facilities were enhanced in 2021.
Application Planning	SYLVIS mapped, planned, and notified all fertilized areas in 2021.
Nanaimo Mountain Bike Club Land Use Coordination	An application map for use by site recreational users was produced in 2021.

Table 1 (continued): Summary of SYLVIS 2021 deliverables as outlined in the RDN-SYLVIS 2017-2021 and 2021-2022 extension contracts for biosolids management at the TimberWest Properties.

Task or Activity	Description
Biosolids Beneficial Use	Biosolids were managed under the 2021 Land Application Plans applicable at the time of applications (SYLVIS Document #1339-20 and #1439-21) and ENV Authorizations #110596 and #110825. 4,426 tonnes of biosolids were land-applied to 74 ha of forest under this authorization in 2021.
Record-Keeping	SYLVIS kept detailed records of all fertilization activities and environmental monitoring in 2021.
Environmental Monitoring	Soil sampling to measure pre- and post- application nutrient and trace elements concentrations was completed in 2021. Scope for water sampling was removed in consultation with the RDN due to the transition to a new long-term management site (Blackjack).
TimberWest Rules	SYLVIS maintained its BC Forest SAFE accreditation in 2021.
Construction	No works were constructed by SYLVIS at the TimberWest Properties in 2021.
Fires	SYLVIS followed a fire prevention protocol throughout 2021.
Hazardous Substance	No hazardous substances were introduced by SYLVIS to the TimberWest Properties in 2021.
Condition of TimberWest Lands	SYLVIS maintained the condition of the TimberWest Properties in 2021.
Equipment Storage	Except for temporary storage of heavy equipment during fertilization activities, SYLVIS did not store any equipment at the TimberWest Properties in 2021.

Table 2: Summary of SYLVIS 2021 deliverables as outlined in the Mosaic-SYLVIS 2021-2026 Agreement for biosolids management at Blackjack.

Task or Activity	Description
Biosolids Quality	RDN biosolids quality was monitored throughout 2021 through the collection of six full suite samples and 14 fecal coliform samples. Increased sampling occurred at GNPCC due to increased production.
Biosolids Quantity	317 tonnes of RDN biosolids were transported to the Blackjack site by DBL Disposal in 2021. 0 tonnes of biosolids were land-applied in 2021. 317 tonnes remained stored at the Blackjack site at the end of 2021.
Biosolids Transportation and Delivery Coordination	SYLVIS provided biosolids deliveries to the Blackjack site through DBL Disposal in December 2021.
Contingency	A Contingency Plan was written for the 2021-2026 biosolids management contract and the following contingency sites were developed for use in 2021: TimberWest Properties, Harmac, Hamm Road, 155-A Pit, Haslam Pit and Old Nanaimo River Camp. No deliveries were required to contingency sites in 2021.
Invoicing	Biosolids deliveries were invoiced on a monthly basis.
Environmental Incidents	No environmental incidents occurred in 2021.
Site Safety	No safety incidents occurred at the Blackjack site in 2021. SYLVIS maintained COR and BC Forest SAFE safety accreditations in 2021.
Odour Management Plan	An Odour Management Plan was written and followed in 2021.
Communications Plan	A Communications Plan was written and followed in 2021.
Public and Media Relations	No open houses were held in 2021 as the site was not active.
Complaints Management	There were no complaints received about the biosolids forest fertilization program at the Blackjack site in 2021.
Annual Reporting	This summary report fulfills the regulatory requirement for written certification under OMRR Section 5(3).
Biosolids Beneficial Use	No applications occurred at the Blackjack site in 2021.
Record-Keeping	SYLVIS kept detailed records of all stockpile related activities and environmental monitoring in 2021.
Environmental Monitoring	Soil sampling to measure pre-application nutrient and trace elements concentrations was completed in 2021.

Table 3: Regional District of Nanaimo biosolids management summary - 2021.

Site	TimberWest Properties			Blackjack			Harmac BGM ^a		Harmac RGM ^b			Total
WWTP	GNPCC	FCPCC	Subtotal	GNPCC	FCPCC	Subtotal	FCPCC	Subtotal	GNPCC	FCPCC	Subtotal	
Class	B	A		B	A		A		B	A		
Carry-over from 2020	166	0	166	0	0	0	1,007	1,007	1,189	369	1,558	
Delivered	5,060	0	5,060	317	0	317	1,299	1,299	895	0	895	7,571
Applied or removed from site	4,426	0	4,426	0	0	0	998	998	771	369	1,140	6,564
Carry-over to 2022	800	0	800	317	0	317	1,308	1,308 ^c	1,312	0	1,313 ^d	3,421

Note: All values in units of wet tonnes.

a FCPCC biosolids are used at the Nanaimo Forest Products Harmac Mill as a feedstock in the production of a biosolids growing medium (BGM). No GNPCC biosolids were used to produce BGM.

b GNPCC biosolids are used at the Nanaimo Forest Products Harmac Mill as a feedstock in the production of a reclamation growing medium (RGM) used for landfill closure.

c FCPCC Class A biosolids as a component of BGM remained stored at the Harmac site at the end of 2021.

d GNPCC Class B biosolids as a component of RGM remained stored at the Harmac site at the end of 2021. This value represents biosolids which have been incorporated into the RGM but which have not yet been land-applied.

Table 4: Regional District of Nanaimo biosolids quality summary - 2021.

Parameter	FCPCC	GNPCC	Regulatory Criteria		Units
	Class A	Class B	Class A ^b	Class B ^c	
# of samples	2	4	-	-	
Available Nutrients, Physical Properties, Acidity					
Total Nitrogen - TKN	49,700	54,675	-	-	µg/g
Ammonia + Ammonium- N (available)	3,020	5,998	-	-	µg/g
Nitrate - N	2	2	-	-	µg/g
Phosphorus (available)	230	1,425	-	-	µg/g
Potassium (available)	689	872	-	-	µg/g
Organic Matter	65.1	65.6	-	-	%
Total Solids	32.9	20.5	-	-	%
pH	7.1	7.0	-	-	pH
Electrical Conductivity	6.9	4.6	-	-	dS/m
Trace Elements					
Arsenic	2.6	2.8	75	75	µg/g
Cadmium	1.3	1.3	20	20	µg/g
Chromium	35	31	-	1,060	µg/g
Cobalt	2.0	3.2	150	150	µg/g
Copper	565	518	-	2,200	µg/g
Lead	12	21	500	500	µg/g
Mercury	0.64	0.60	5	15	µg/g
Molybdenum	5.0	8.0	20	20	µg/g
Nickel	11	13	180	180	µg/g
Selenium	3.3	5.0	14	14	µg/g
Zinc	985	928	1,850	1,850	µg/g
Microbiological Analysis - Fecal Coliforms					
Fecal Coliforms	10 ^d	33,600 ^e	1,000	2,000,000	MPN/g

Note: All analyses based on dry weight.

- a Weighted average is based on GNPCC production of 83% and FCPCC production of 17% of total 2021 biosolids production.
- b Class A trace element criteria specified in Trade Memorandum T-4-93, Standards for Metals in Fertilizers and Supplements as of August 2017, and microbiological criteria specified in Schedule 3 of the BC *Organic Matter Recycling Regulation*.
- c Class B trace element criteria specified in Schedule 4 and microbiological criteria in Schedule 3 of the BC *Organic Matter Recycling Regulation*.
- d Value is the maximum of seven samples collected by SYLVIS.
- e Value is the geometric mean of 14 samples collected by SYLVIS.

Table 5: Historical management of Regional District of Nanaimo biosolids at the TimberWest Properties, Harmac Landfill, and Blackjack from 2007 to 2021.

Year	TimberWest Properties	Harmac	Blackjack	Total Production
2007	1,150 wt	-	-	1,150 wt
2008	3,350 wt	-	-	3,350 wt
2009	3,000 wt	-	-	3,000 wt
2010	1,560 wt	-	-	1,560 wt
2011	1,350 wt	-	-	1,350 wt
2012	1,280 wt	-	-	1,280 wt
2013	3,930 wt	-	-	3,930 wt
2014	4,812 wt	-	-	4,812 wt
2015	4,383 wt	-	-	4,383 wt
2016	4,263 wt	-	-	4,263 wt
2017	3,662 wt	797 wt	-	4,459 wt
2018	4,802 wt	164 wt	-	4,966 wt
2019	4,871 wt	719 wt	-	5,590 wt
2020	3,773 wt	1,850 wt	-	5,623 wt
2021	5,060 wt	2,194 wt	317 wt	7,571 wt
Total	51,246 wt	5,724 wt	317 wt	57,287 wt

APPENDIX TWO – FIGURES

Figure 1: Tonnage of Regional District of Nanaimo – Greater Nanaimo Pollution Control Centre (GNPCC) dewatered biosolids delivered and applied at the TimberWest Properties by month in 2021.

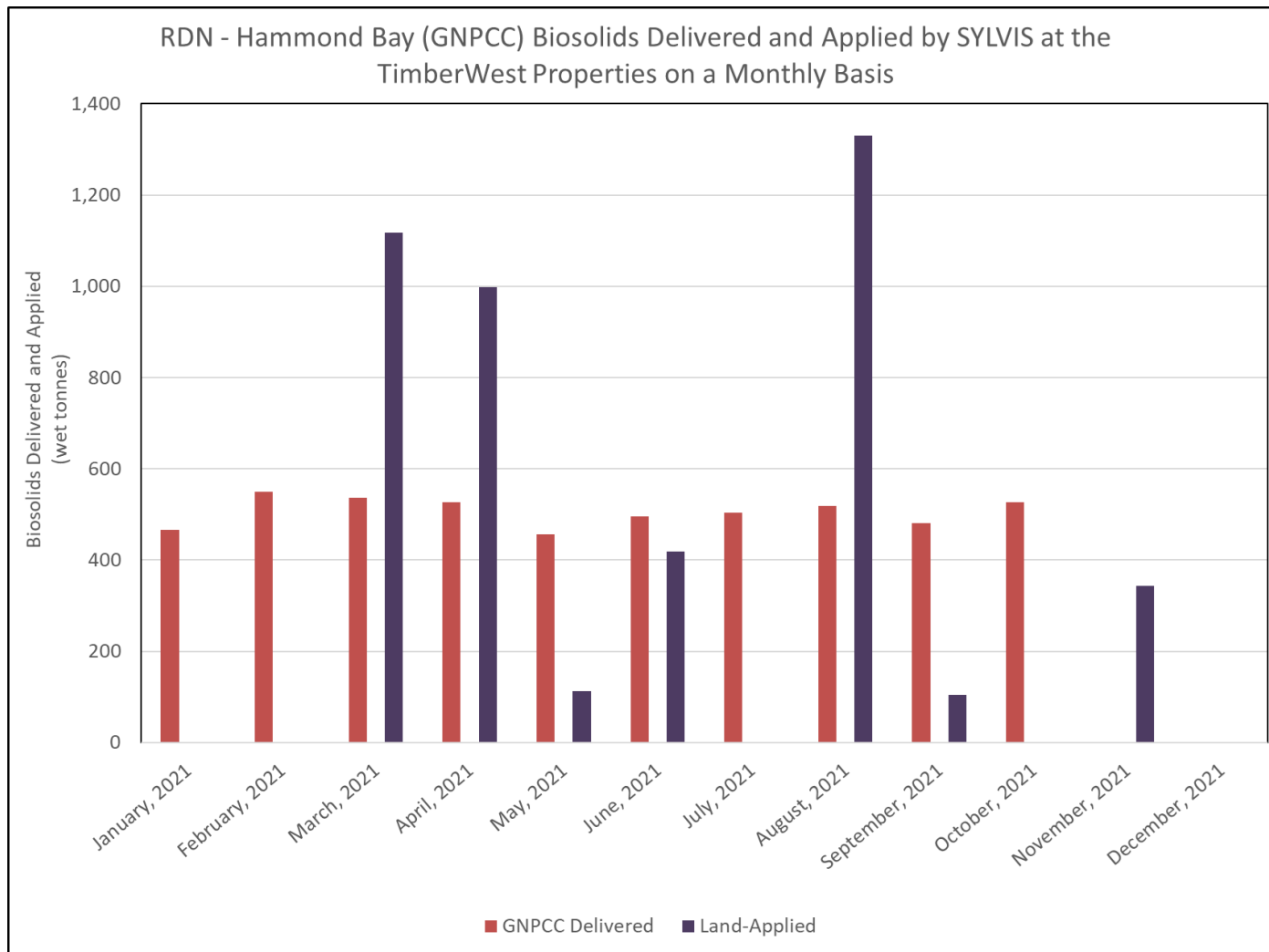


Figure 2: Tonnage of Regional District of Nanaimo – Greater Nanaimo Pollution Control Centre (GNPCC) dewatered biosolids delivered to Blackjack by month in 2021.

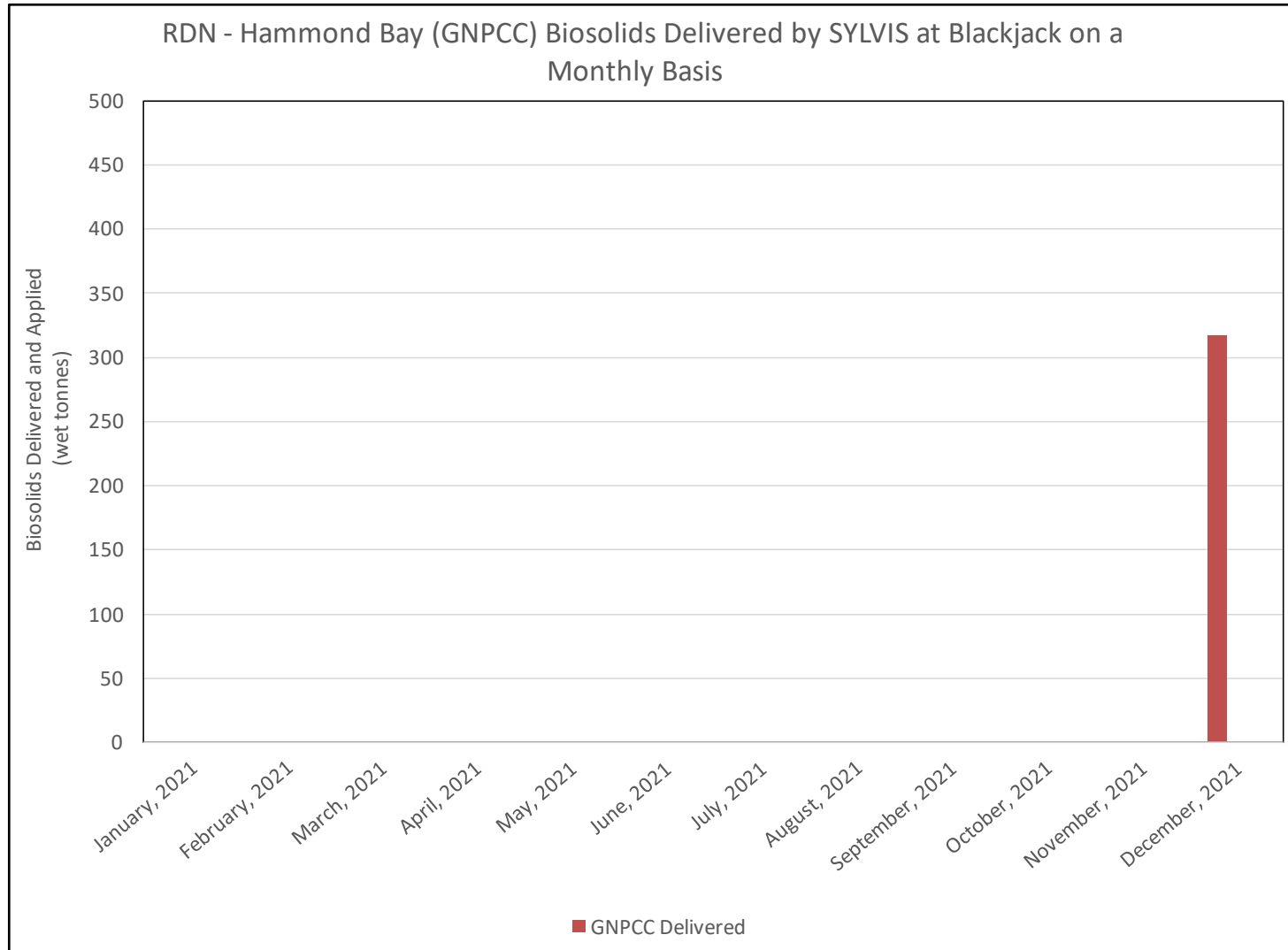


Figure 3: Tonnage of Regional District of Nanaimo – Greater Nanaimo Pollution Control Centre (GNPCC) and French Creek Pollution Control Centre (FCPCC) dewatered biosolids delivered to Harmac by month in 2021.

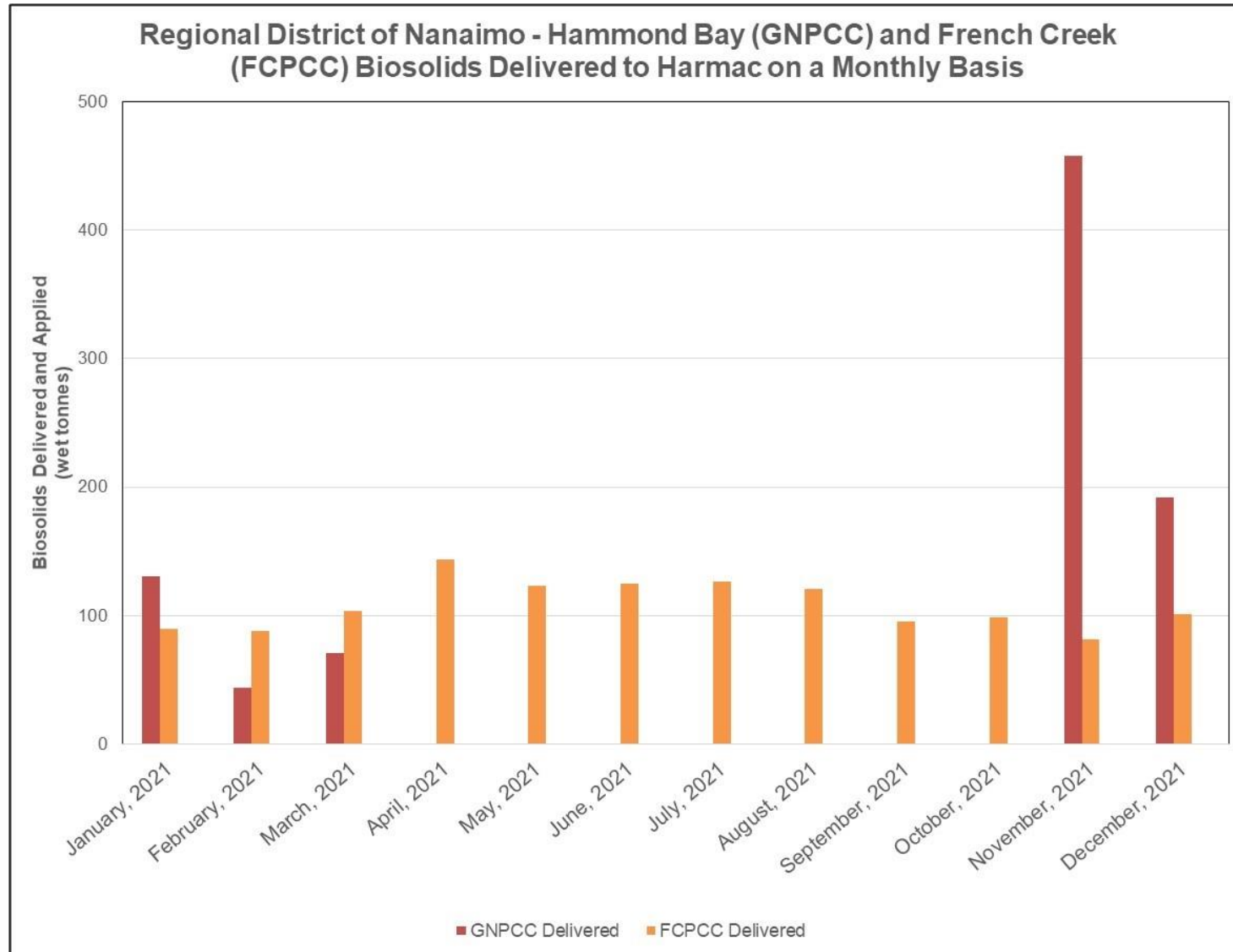
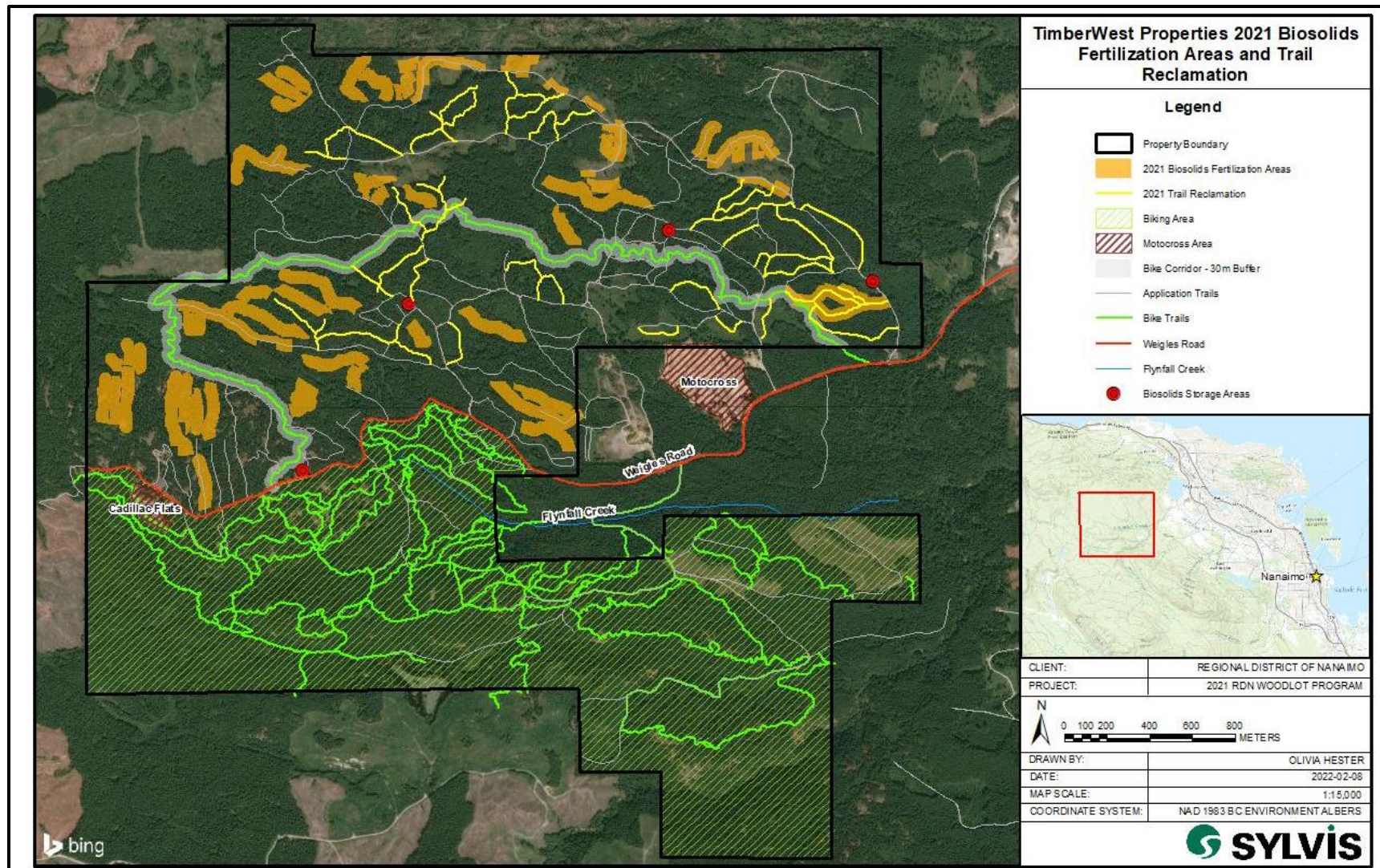


Figure 4: TimberWest Properties application areas fertilized with Regional District of Nanaimo biosolids in 2021.



APPENDIX THREE – PHOTOGRAPHS



Photograph 1: RDN biosolids are stockpiled in storage areas at the TimberWest Properties.
(September 2021)



Photograph 2: Trail reclamation using biosolids at the TimberWest Properties.
(November 2021)



Photograph 3: Stockpile at Blackjack constructed using concrete lock blocks.
(November 2021)

APPENDIX FOUR – DECLARATION OF LAND APPLICATION COMPLIANCE

DECLARATION OF LAND APPLICATION COMPLIANCE AT THE TIMBERWEST PROPERTIES

I, Christian Evans, PAg, confirm by signature and seal below that, to the best of my knowledge, biosolids were land applied at the TimberWest properties according to the information contained in the *2021 TimberWest Properties Forest Fertilization Land Application Plan*, (SYLVIS Documents #1339-20, Authorization #110596) and *2021 TimberWest Properties Reclamation and Forest Fertilization Land Application Plan*, (SYLVIS Document #1439-21, Authorization #110825). These applications are considered a beneficial use of the resource and to the best of my knowledge were completed in accordance with the *Organic Matter Recycling Regulation*.

This certification is valid only if it bears the original signature and seal of the author.

Signature:



Date:

February 16th, 2022

Professional Seal

