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Okanagan Biomass Inventory

Regional District of Central Okanagan and
Okanagan Sustainability Leadership Council

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Project Purpose

Develop a Biomass Waste Inventory

What do we have?



Options to:

- Avoid land-intensive approach
- Reduce GHGs
- Create carbon-neutral energy



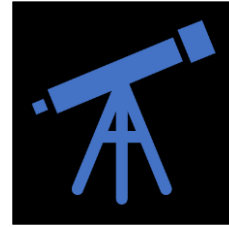
Our Team



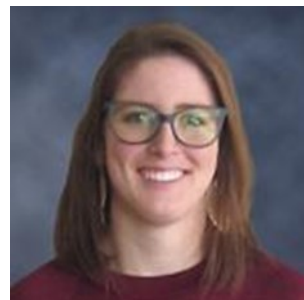
Melanie – Project
Manager / Lead



Ruben – Low Carbon
Energy Specialist



Megan – Lead Research
/ Project Support



Trent – Data Collection /
Management



Methods Overview

Biomass Categories

Estimate Volumes

- Literature
- Available data
- Conversations with producers



Animal
Waste



Wastewater
Residuals



Plant
Residuals



Food
Waste



Paper



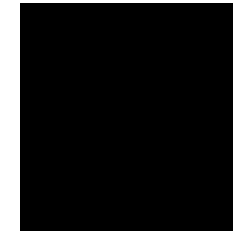
White
Wood



Leaf & Yard
Waste



Clean Wood-
Roadside



Clean Wood-
Mill

Information Requested

- Volume
- Weight
- Seasonality
- Wet/Dry
- Disposal Market
- Method of Transportation



- Current Production of Biogas
- Biomass Available for Capture
- Contamination Level
- Confidence in Data
- Source of Information
- Additional Notes

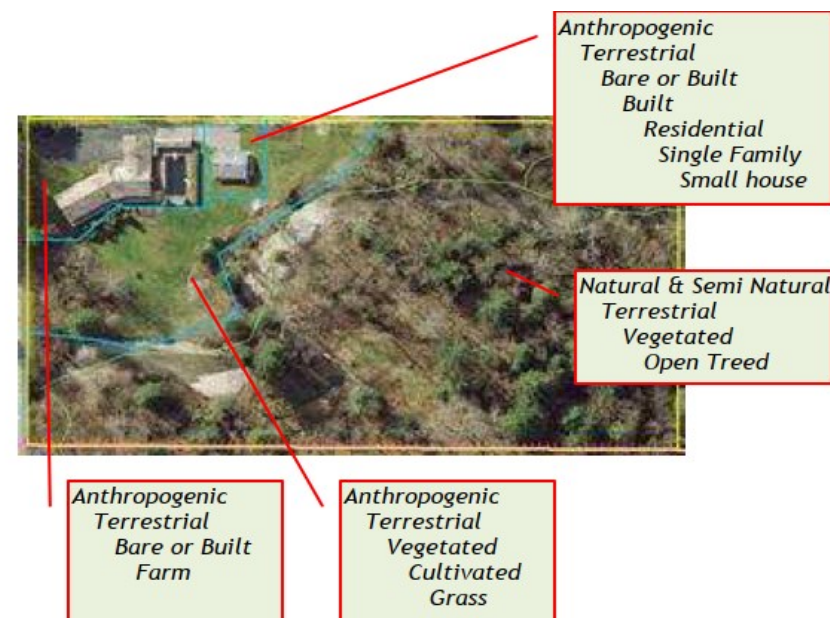
Methods: Animal Waste

Livestock Counts (2016 Census of Agriculture)

X

Volumes of manure produced by livestock type

Cross-referenced with
Agricultural Land Use Inventory
For livestock



Methods: Biosolids, Leaf and Yard Waste, Paper, White Wood

Compost Facilities

Landfills



Methods: Plant Residuals

Total hectares in ALUI of orchards and vineyards

X

Typical planting densities

+

Discussions with Producers



Methods: Food

Tonnes BC commercial and institutional food waste annually
(Federal dataset) /

number of establishments in BC =

tonnes / BC establishment

Tonnes/BC establishment x number of licenced
establishments in the Okanagan (BC Liquor and Licensing
database) =

tonnes commercial/industrial food waste in the Okanagan



Methods: Clean Wood, Mills

Mills - Biomass Inventory Mapping and Analysis Tool (BIMAT)

Dataset + graphical interface

Screened against

- Major Timber Processing Facilities dataset
- Information obtained from the lumber industry
- The Canadian Biomass 2021 Pellet Mill Mapping



Methods: Clean Wood, Roadside

BIMAT and Natural Resources Canada dataset (NRCAN)

- vector data (shapefile)
- post-harvest forest residues in Canada
- oven-dry tonnes per year over the next 20 years
- limitation - Based on remote sensing
- Soon to come: FP Innovations completing a detailed biomass inventory for roadside wood – 2022



Biomass Inventory Results

Deliverables: Excel Dataset and Report

- Contact
- Region ~ North, Central, South
- Category of Biomass
- Production Season
- Wet/dry
- Disposal Market
- Management
- Volume

Region	Category of Biomass	Source
North Okanagan	Animal Waste	BC Chicken Growers Association
North, Central and South Okanagan	Animal Waste	2016 Census of Agriculture
North and Central Okanagan	Wastewater Residuals	City of Kelowna
Central Okanagan	Wastewater Residuals	Regional District of Central Okanagan Westside Wastewater Treatment Plant
Central Okanagan	Wastewater Residuals	Lake Country Wastewater Operations
South Okanagan	Wastewater Residuals	Regional District of Okanagan-Similkameen
South Okanagan	Wastewater Residuals	Penticton Wastewater Treatment Plant, CH2M/Hill 2010 Regional Organic Waste Management Strategy
All Okanagan	Plant Residuals	BC Grape Growers Association
All Okanagan	Plant Residuals	Okanagan Vineyards
North, Central, and South Okanagan	Plant Residuals	2006-2014 Agricultural Land Use Inventories, Okanagan
North, Central, and South Okanagan	Plant Residuals	Agriculture and Agri-Food Canada
North Okanagan	Plant Residuals	Vert Nature
Central Okanagan	Plant Residuals	The Valens Company
Central Okanagan	Plant Residuals	Summerhill Wineries
Central Okanagan	Plant Residuals	Stewart Family Estate Vineyard
North Okanagan	Food Waste	Spa Hills Compost
North Okanagan	Food Waste	Tetra Tech Canada Inc. 2018 RDNO Solid Waste Management Plan
Central Okanagan	Food Waste	Tetra Tech Canada Inc. 2021 RDCO Solid Waste Management Plan
Central Okanagan	Food Waste	City of Kelowna
Central Okanagan	Food Waste	UBCO Sustainability Society
Central Okanagan	Food Waste	Original Joes - West Kelowna
South Okanagan	Food Waste	Regional District of Okanagan-Similkameen, CH2M/Hill 2010 Regional Organic Waste Management Strategy

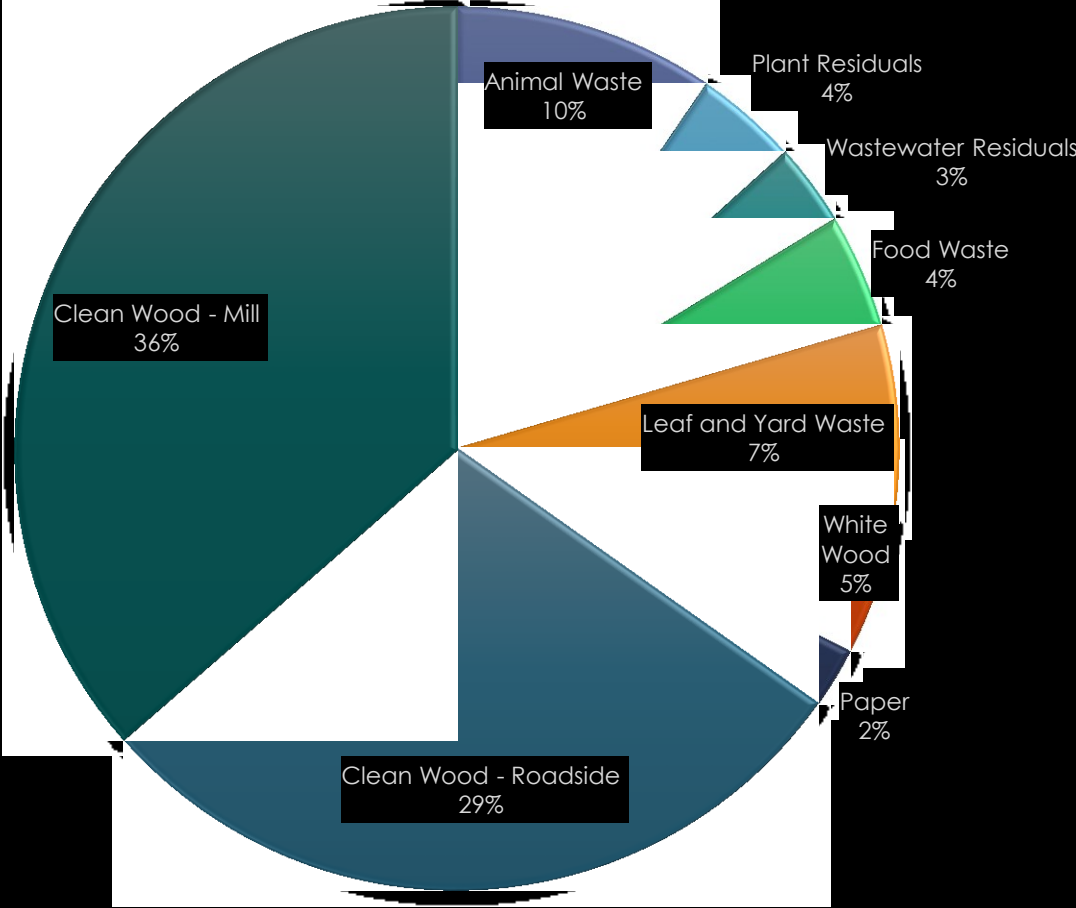


Current Estimates

Category	Estimated Volume (wet tonnes/year)	Current Management
Animal waste	145,900	Composted and used on farm
Wastewater residuals	45,891	Composted and marketed to private users and the public
Plant residuals	57,664	Composted and used on farm
Food waste	63,533	Landfilled or composted at private facility
Paper	33,832	Recycled
White wood	74,445	Landfilled
Leaf and yard waste	110,048	Composted and supplied to the public
Clean wood - mill	556,526	Managed onsite, supplied to other facilities, used in cogeneration or made into pellets
Clean wood – roadside	439,171	Left/managed onsite
Total	1,527,010	

Current Estimates

Biomass Generators



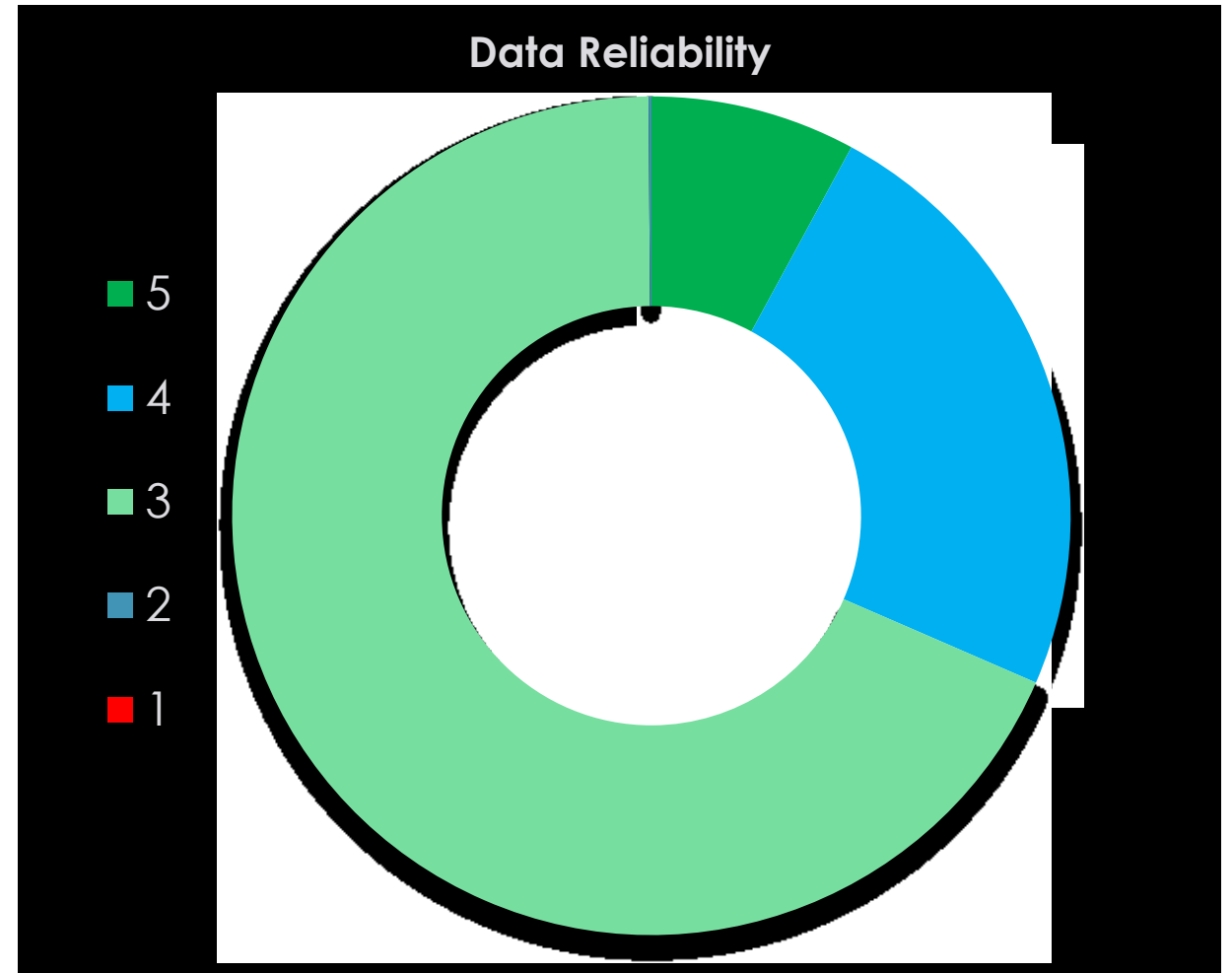
Data Assumptions

Biomass Stream	Assumption(s)
Animal Waste	<ul style="list-style-type: none">• No seasonal variation in volume
Wastewater Residuals	<ul style="list-style-type: none">• No seasonal variation in volume• Minimal contamination• No major sludge sources in the Okanagan
Plant Residuals	<ul style="list-style-type: none">• Low production in winter• No contamination• Composted is considered “wet” material
Paper	<ul style="list-style-type: none">• No seasonal variations• Limited Contamination
Leaf & Yard Waste	<ul style="list-style-type: none">• Low production in winter• Contamination from misplaced items• Considered “dry” material
White Wood	<ul style="list-style-type: none">• No seasonal variation in volume• Some contamination always present
Clean Wood	<ul style="list-style-type: none">• No seasonal variation in volume for Mill waste• Roadside waste declines in winter• Some contamination always present



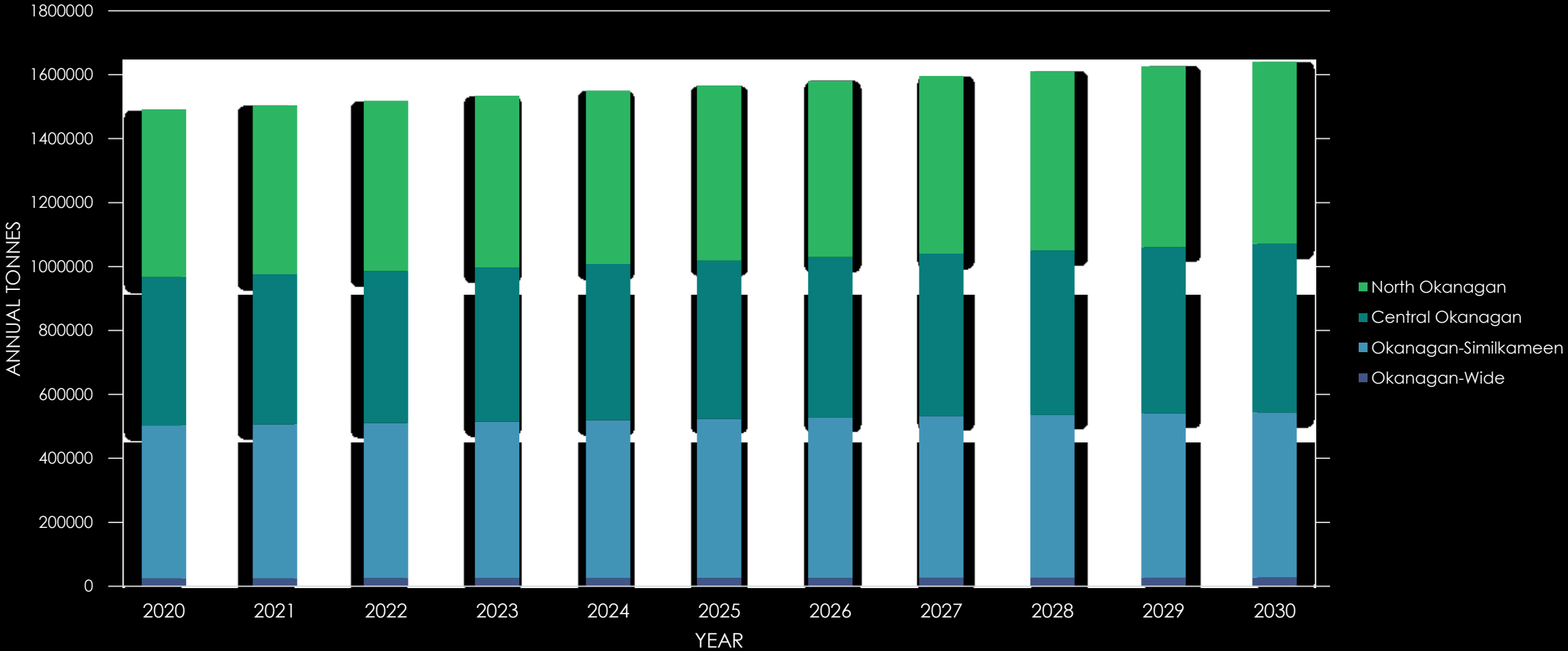
Data Reliability

- Limited by reliability of sources
- Ranked Poor (1) to Reliable (5)
- Based on specific questions to the information provider or reflective of dataset limitations

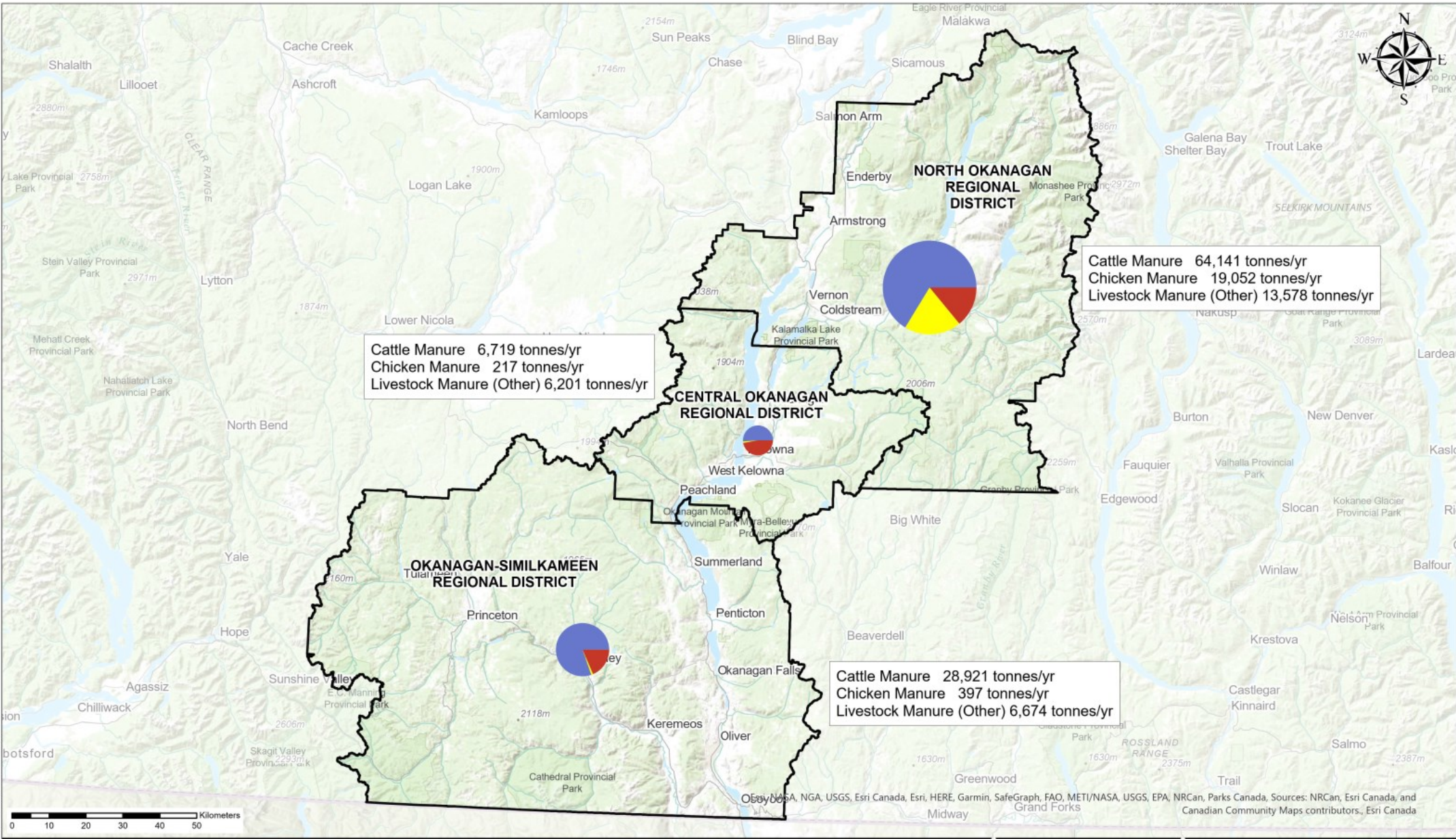


Future Projections

Future Biomass Projection*



Visualizations



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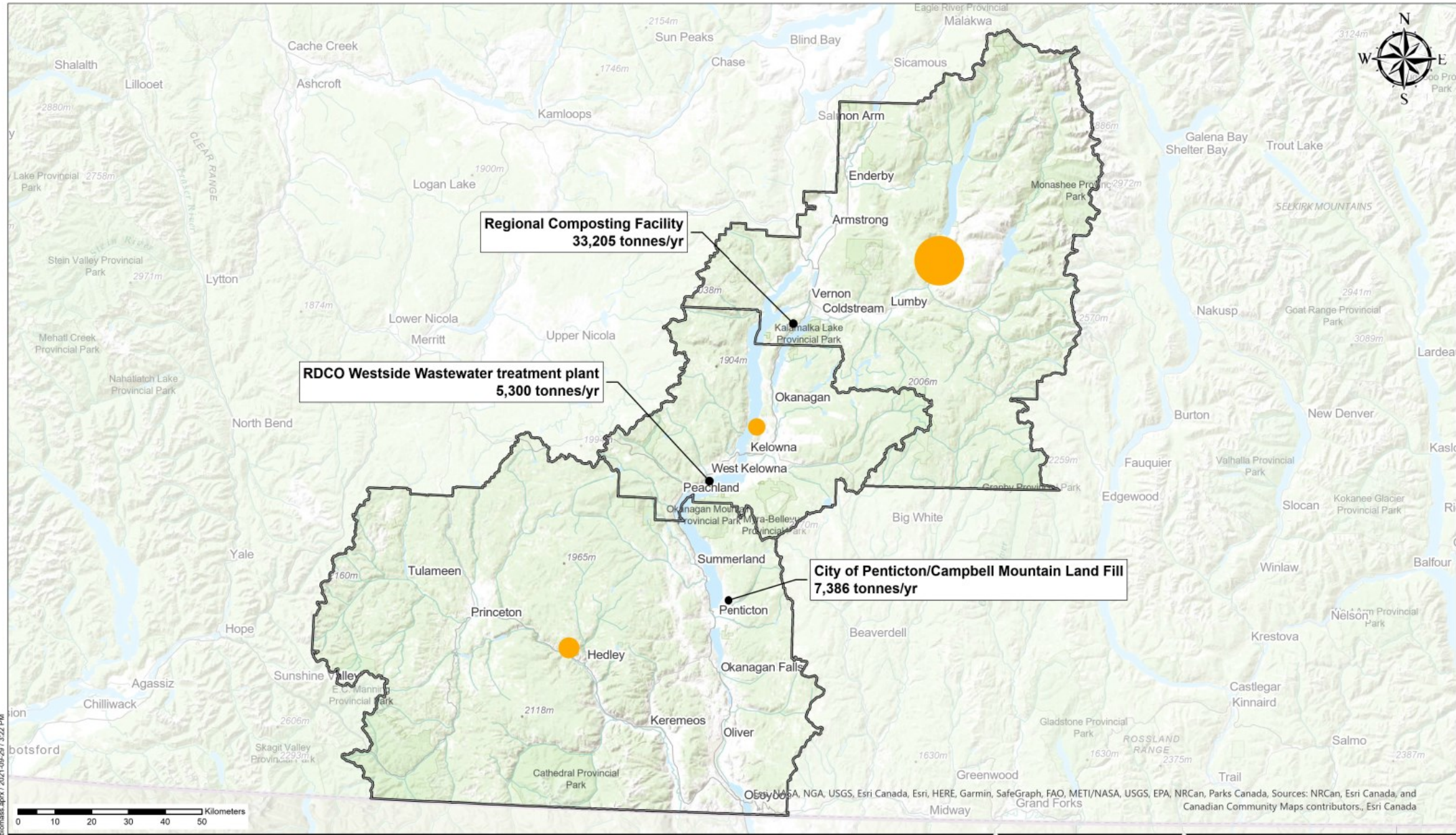


Regional District Boundary
■ Cattle Manure
■ Chicken Manure
■ Livestock Manure (Other)

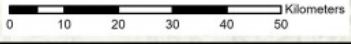
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FIGURE 1: ANIMAL WASTE

Regional District Central Okanagan and Okanagan Sustainability Leadership Council
Okanagan Biomass Inventory



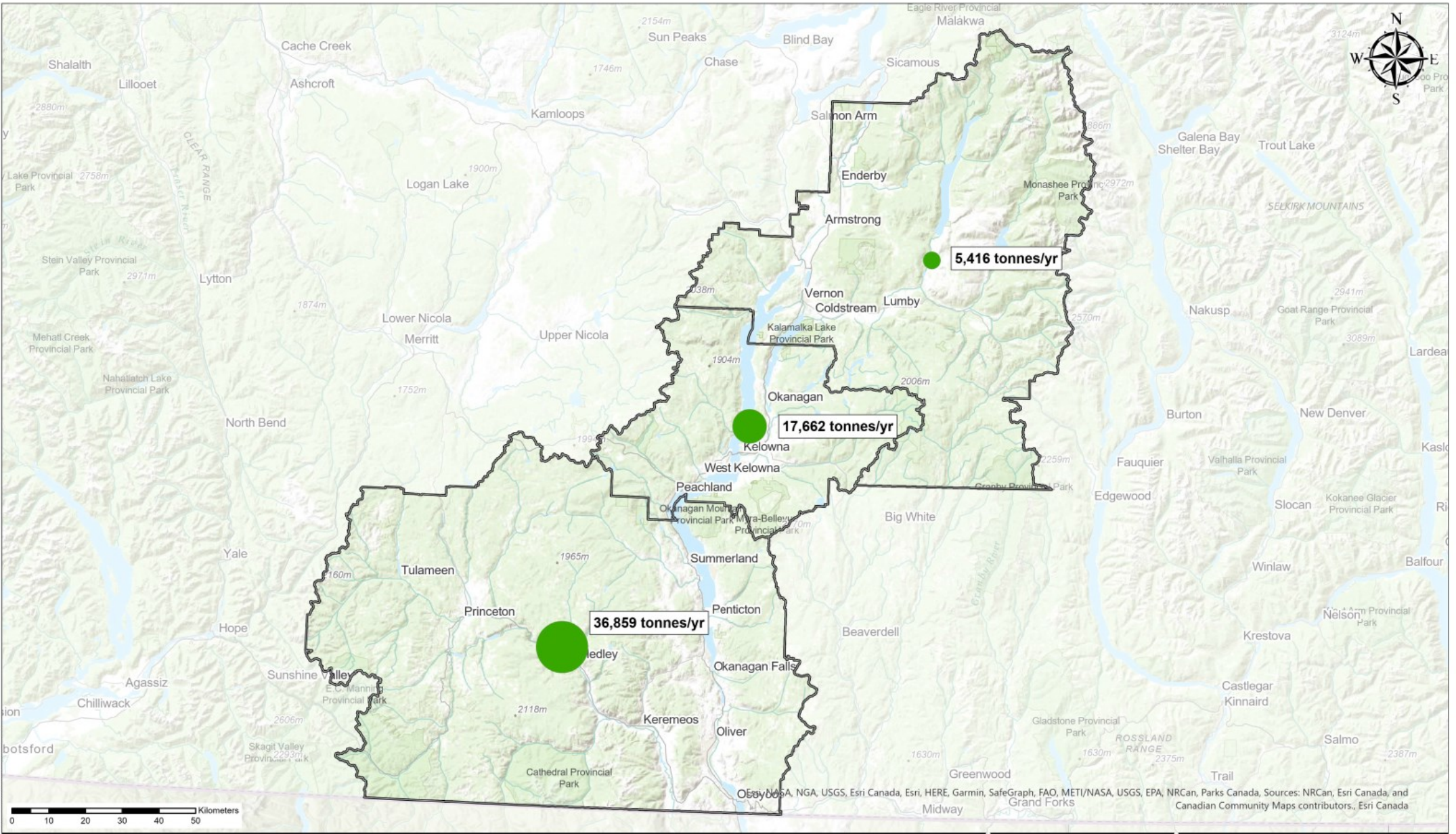
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- Regional District Boundary
- Facility Location
- Waste Water Residuals
45,891 tonnes/yr

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FIGURE 2: WASTE WATER RESIDUALS
 Regional District Central Okanagan and Okanagan Sustainability Leadership Council
 Okanagan Biomass Inventory



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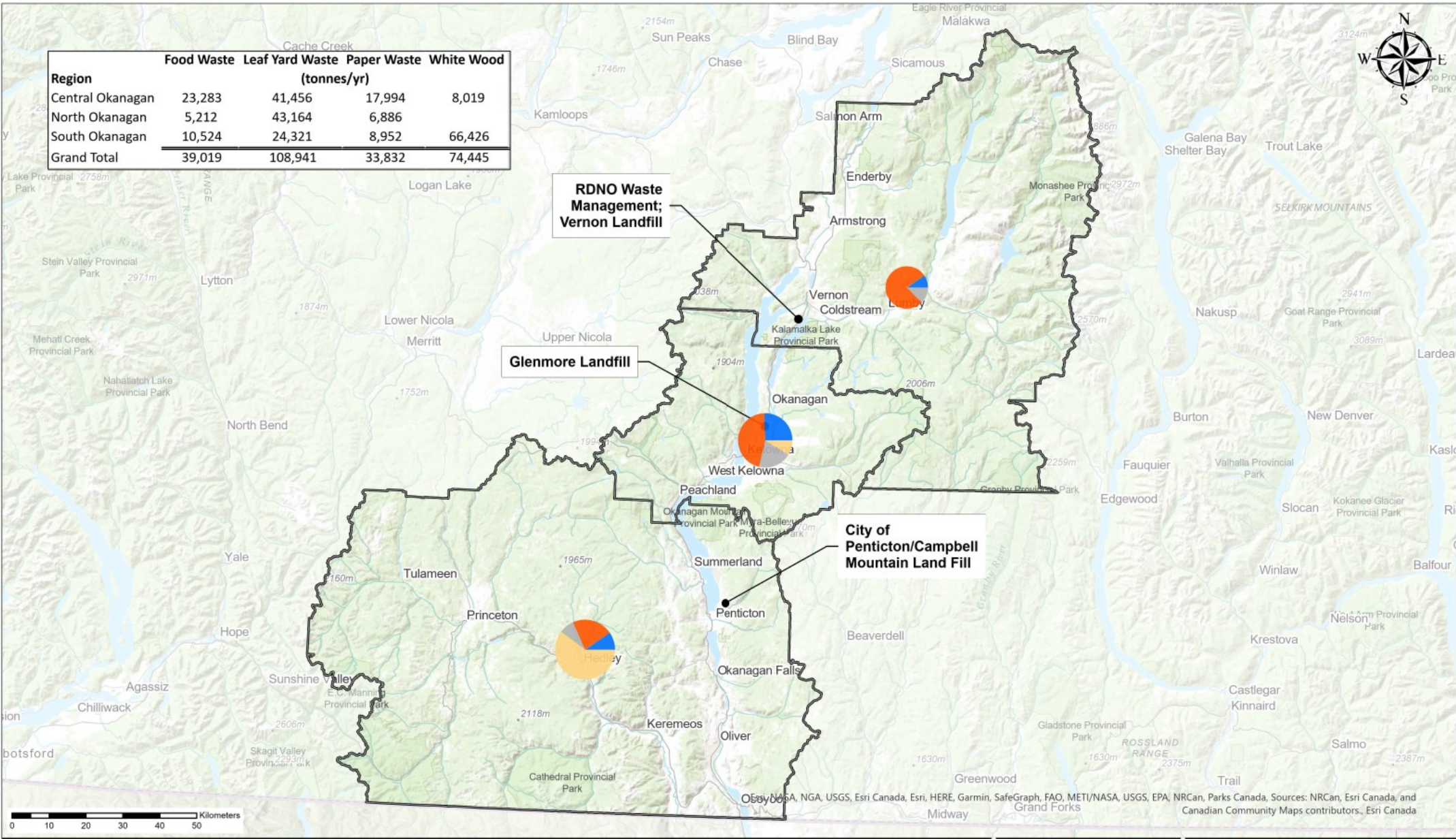


Regional District Boundary
Plant Residuals
 59,937 tonnes/yr

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FIGURE 3: PLANT RESIDUALS
 Regional District Central Okanagan and Okanagan Sustainability Leadership Council
 Okanagan Biomass Inventory

Region	Food Waste	Leaf Yard Waste	Paper Waste	White Wood
Central Okanagan	23,283	41,456	17,994	8,019
North Okanagan	5,212	43,164	6,886	
South Okanagan	10,524	24,321	8,952	66,426
Grand Total	39,019	108,941	33,832	74,445



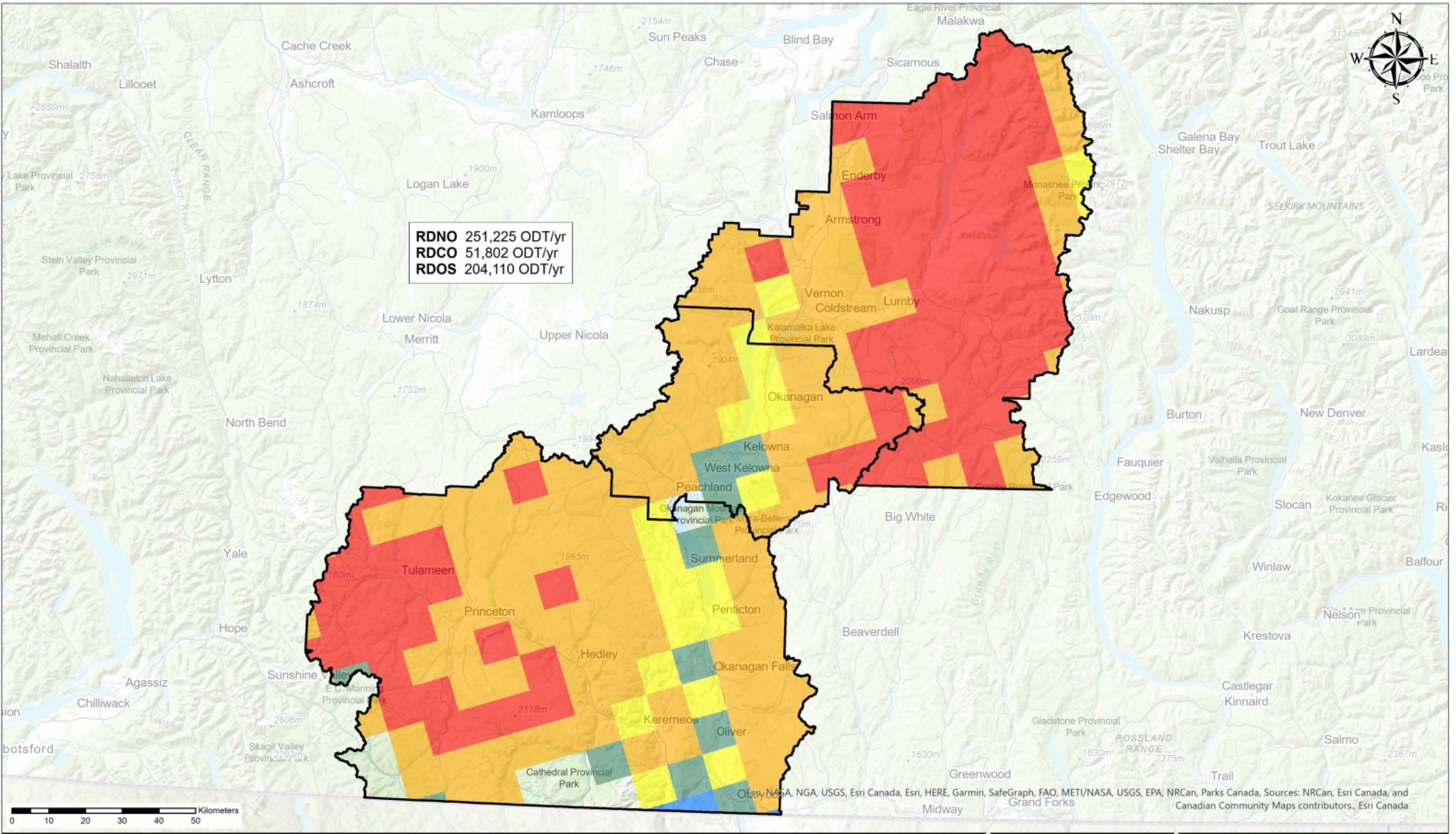
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- Regional District Boundary
- Landfills
- Food waste
- Leaf yard waste
- Paper waste
- White wood

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FIGURE 4: LANDFILL LOCATIONS
 Regional District Central Okanagan and Okanagan Sustainability Leadership Council
 Okanagan Biomass Inventory



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Regional District Boundary	178 - 724
Forecasting logging residues in Canada, (ODT/year)	724 - 2826
0 - 37	2826 - 10,927
37 - 178	

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FIGURE 5: CLEAN WOOD - ROADSIDE
 Regional District Central Okanagan and Okanagan Sustainability Leadership Council
 Okanagan Biomass Inventory

Potential Uses

High-Level Matrix

Categories of Biomass



Commercially available conversion technology



Type of fuel



Possible end use

Biomass Matrix

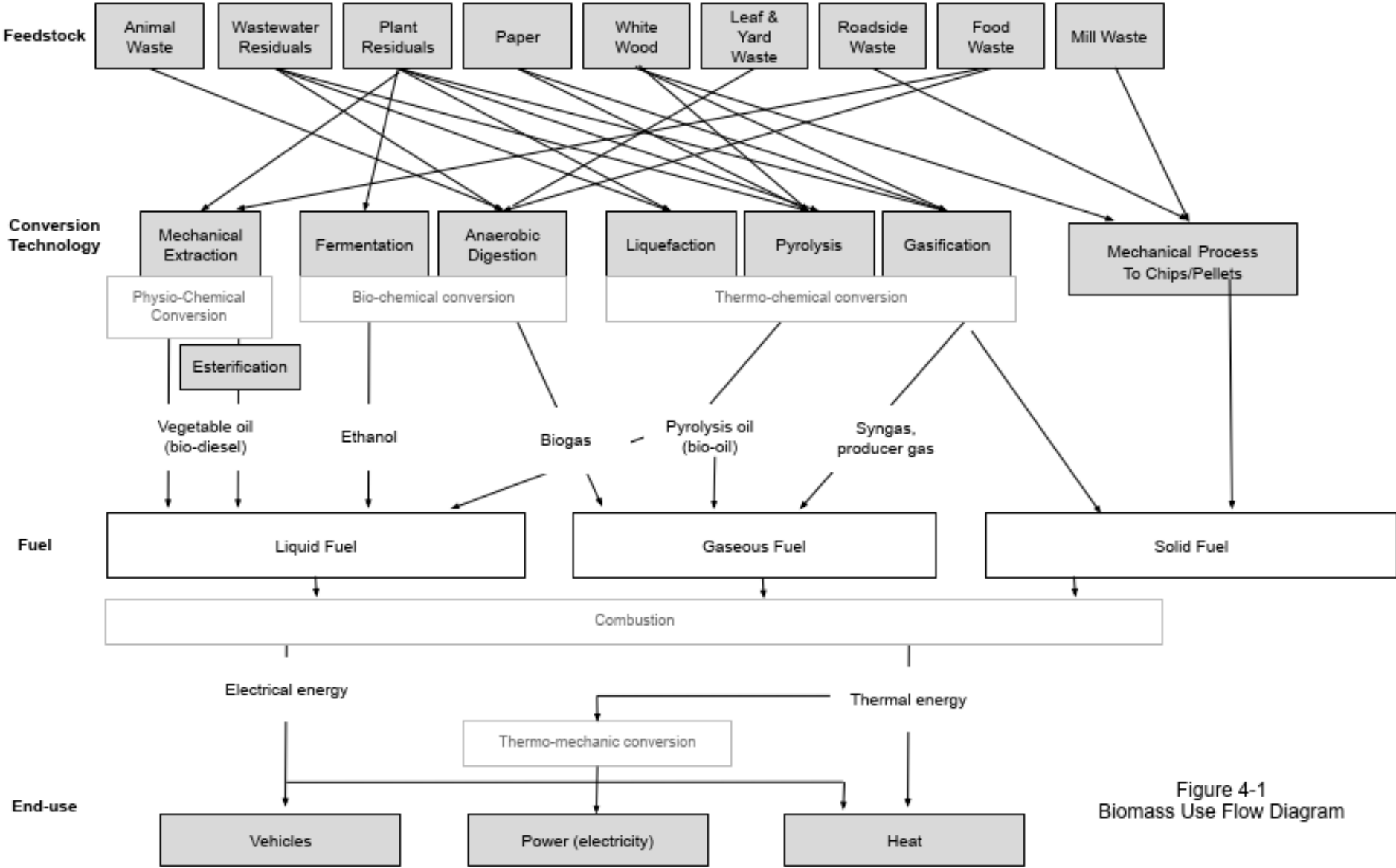


Figure 4-1
Biomass Use Flow Diagram



Conclusions and Recommendations

Conclusions

- Largest volumes: clean wood
 - Roadside (refine data with economic review)
 - Mill (already has market and use for biogas)
- Second largest: animal waste
- Most accurate and accessible:
 - biosolids, leaf and yard, paper, white wood
- Technology to combine biosolids and animal waste
= 191,791 wet tonnes / year

Additional Work

Improve accuracy

- Collaborate with municipalities
- Collaborate with FLNR and review FP Innovations study
- Update based on up-to-date datasets as populations increase

Okanagan Timber Supply Area Timber Supply Analysis Discussion Paper

January 2021



Additional Work

Due diligence review by category by potential investor

Conversion from wet to dry tonnes

Cost analysis

Supply chain risk:

- Supplier Risk
- Competitor Risk
- Supply Chain Risk
- Feedstock Quality Risk
- Feedstock Scale-Up Risk





Questions?

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