# TERRACE AREA SOLLID INTEGRATED SOLLID WANAGEMENT PROGRAM

Title: 2018 Excellence Award Entry Category: Integrated Solid Waste Management Entrant Organization: Regional District of Kitimat-Stikine Contact Person: Roger Tooms | rtooms@rdks.bc.ca | 250-615-6100 Entry Title: Terrace Area Integrated Solid Waste Management Program Jurisdiction: Regional District of Kitimat-Stikine, British Columbia: Terrace Solid Waste Service Area Approximate Population of the Service Area: 19,073 Cost Per Household for the Project: \$0.691 tax rate and \$200.00 annual fee for curbside service Budget: \$3 million\*

\*Covers annual cost of operations, closure reserve contributions, and capital dept.

Regional District of **Kitimat-Stikine** 



### MINIMIZE WASTE **GENERATION** MAXIMIZE SOLID WASTE **DIVERSION**

#### **EXECUTIVE SUMMARY**

The goal behind the development of the Terrace Area Integrated Solid Waste Management Program (TAISWMP) was to minimize the generation of waste and to maximize the diversion of solid waste in the Terrace area. The TAISWMP integrates infrastructure, services, programs, bylaws, and policies to manage and optimize solid waste diversion in the Terrace area. Related program objectives are; protecting human health and the environment, fiscal stability, and meeting community expectations of program affordability and convenience.

The integrated nature of TAISWMP means the system manages waste from the moment it is generated to the moment it is landfilled. Since the Regional District of Kitimat-Stikine manages the entire system, there are no conflicts of interest; waste reduction and diversion all support the end goal of minimizing the impacts of waste. This system, along with the newly constructed state-of-the-art facilities will service Terrace area residents for generations.







## SYSTEM OVERVIEW



Located within the Regional District of Kitimat-Stikine (Regional District), Terrace is situated in North Western British Columbia. The Terrace area is home to a large black bear and grizzly population, several creeks, crystal blue lakes, and rivers, including the Skeena River which is world renowned for salmon fishing, making environmental standards and expectations high.

The Terrace Area Integrated Solid Waste Management Program spans approximately 282 square kilometers serving a population of 19,073 residents (Statistics Canada, 2016), and includes the City of Terrace, First Nation communities of Kitsumkalum and Kitselas, and Regional District Electoral Areas C and E. Users of the TAISWMP include; single family households, multifamily housing units, schools, medical facilities, various types of businesses, restaurants, grocers, and industry.

The TAISWMP includes a transfer station, a solid waste management facility including a GORE® composting facility, a commercial paper & cardboard collection facility, as well as a three-stream residential curbside collection service provided to 6738 single family homes, which collects organics, recyclables and garbage. The TAISWMP required several years of planning, consultation and collaboration with Regional District residents, the City of Terrace, First Nation communities, government regulators, and subject matter experts. Program success

can be attributed to the various forms of extensive education and outreach that were conducted through each stage of the TAISWMP.

In 2014, the Regional District Board confirmed project plans and authorized the design of Forceman Ridge Waste Management Facility (Forceman Ridge) and Thornhill Transfer Station. Detailed site investigations resulted in facilities that would co-exist with the surrounding environment. In addition to new facilities, a comprehensive curbside collection program was developed to support program goals.





# SOLID WASTE FACILITIES

#### THORNHILL TRANSFER STATION

The Thornhill Transfer Station is constructed at the site of the recently closed Thornhill Landfill, which is undergoing perpetual closure monitoring by the Regional District. The Thornhill Transfer Station serves as a staging location for residential curbside and commercial haulers. The transfer station consists of an attendant gate house, scales, a "Z-Wall" for residential drop off, including bins for organics, garbage, metal, and construction materials, a multi bay building with a tip floor for garbage from commercial and curbside collection haulers, and an organics collection area for commercial and curbside haulers.

Waste deposited on the tip floor is pushed into a trailer staged below and then compacted. The Titan Trailer has a waste capacity of 69 cubic meters. Once at capacity, the Titan Trailer is hauled to Forceman Ridge.



#### FORCEMAN RIDGE WASTE MANAGEMENT FACILITY

Located 30 kilometers south of Terrace, the Forceman Ridge Waste Management Facility was commissioned in November 2016. Based on recommendations arising from extensive facility site investigations and a variety of stakeholder engagement and consultation, the Regional District Board made substantial commitments to solid waste management infrastructure. Forceman Ridge will provide a higher level of environmental protection and serve to enhance social benefits to the community while aspiring to be fiscally responsible and operationally efficient. The British Columbia Ministry of Environment and Climate Change Strategy observed the ambition of the Regional District and Terrace area communities to excel beyond the standards; they confirmed, "The solid waste management planning process, careful landfill siting, genuine and meaningful First Nations and public consultation, and design and construction of the facilities clearly demonstrate that the Regional District has gone above and beyond. Forceman Ridge is the most environmentally protective landfill in its class, in Canada, possible North America at this time".



WASTE VOLUMES AND DIVERSION The Regional District Bylaw No. 671 regulates what is permitted in the landfill, deeming materials requiring segregation as either "Prohibited" or "Restricted". The practical result of this Bylaw is that residents and businesses must separate all organic materials, metal, cardboard, tires, and Extended Producer Responsibility (EPR) materials from the general garbage, such as printed paper and packaging materials, which are collected as curbside recycling.



- Tires
- Small Appliances & power tools
- Used oil & Antifreeze





### SYSTEM PERFORMANCE AND INTEGRATION

There have been several significant enhancements to the Terrace Area Integrated Solid Waste Management Program including; the closure of two landfills that had reached capacity, the opening of a transfer station, the opening of a state-of the-art waste management facility, and the introduction of curbside collection of organics. The diversion of organics from the waste stream was a long-time goal of the Regional District Board. In addition to facility enhancements, the Regional District shifted program awareness efforts from broad-scale outreach to targeted forms of education, for example, specific class room learning sessions, farmers market booths, and catered information sessions for businesses.



#### Safety First

Public safety has increased with the introduction of 3-stream curbside collection by removing the need for nearly 3000 Regional District households to drive to the landfill. Public safety is also at the forefront of the Thornhill Transfer Station user interface, with the construction of a Z-Wall with ground-level disposal bins, eliminating the need for public to drop their loads off at an active landfill face.

Reduction in traffic not only increases public safety, it improves the impact of solid waste management on the local environment by reducing vehicle exhaust emissions. In addition to decreased traffic with the use of curbside collection, sorting and consolidating loads at the transfer station reduces large-hauler traffic volumes to Forceman Ridge by more than 90%. Commercial hauler safety is improved with the use of the transfer station tip floor, removing the need to dump loads at the active face of the landfill.



### PERFORMANCE ASSESSMENT

#### **Recycling Audit**

In August 2017 an audit was conducted internally by Regional District staff on curbside recyclables to determine levels of contamination, with a goal of improvement. The audit was conducted by assessing each bag of recyclables on the collection routes prior to pickup. Each bag was inspected for incorrect items, such as glass or non-recyclable materials. If contamination was discovered, a tailored letter was sent to the occupant of the household, detailing the concerns about the specific material, and providing the proper disposal requirements.

Similar audits will be conducted in the future to continually reduce the number of contaminants found in the recyclables waste stream. Feedback from the receiving facility indicate the audit was successful in improving the quality of recyclable materials collected from Regional District residents.



#### Waste Composition Audit

In September 2017 a solid waste composition audit was conducted on Terrace area municipal solid waste by Tetra Tech Canada Inc. Samples were randomly selected from curbside collection routes, commercial loads, and waste self-hauled by the public to the Transfer Station.

Waste was segregated into 12 primary categories, with a total of 64 material subcategories. Emphasis of this study was placed on prohibited and restricted materials still entering the waste stream, particularly those that pose risk to human and environmental health.

The results of this audit indicate that, after only one year of program operation, the Terrace area has a comparable solid waste profile to other jurisdictions in British Columbia with similar services and material restrictions, such as the Regional District of Metro-Vancouver.

Audits such as the two described will be used to measure actual diversion and contamination rates within municipal solid waste and curbside recycling collection and will help determine where to focus education. For example, if a specific material such as recyclable film plastic is identified in garbage, efforts and education materials can be focused on increasing film plastic diversion. It is the goal of the Regional District to continually improve results with each audit.



#### **Forceman Ridge Environmental Features**

Additional environmental protection comes with the closure of two landfills that had reached capacity and replacing the use of these landfills with consolidation of waste at the state-of-the-art Forceman Ridge Waste Management Facility. Exciting environmental and safety features of Forceman Ridge include:

The composting of organics is conducted with an advanced GORE® Composting facility, resulting in Class A compost. Organics diversion reduces generation of methane gas and leachate production in the landfill.



An engineered landfill double lined with a highdensity polyethylene composite and geosynthetic clay.

A five-step leachate treatment system, which includes an equalization pond, aeration pond, sedimentation pond, and a sand filter. The final step in leachate treatment is the phytoremediation component, in which the treated effluent is used to irrigate Cottonwood, Alder and Poplar trees, which have the capacity to transpire up



to 25 L each of treated water per day as seedlings, and 200 L when fully matured. The phytoremediation will allow for the treated leachate effluent to be consumed, significantly reducing the volume of leachate that is discharged to the environment, ensuring stakeholder values are protected.



The septage receiving facility has engineered filtration beds, which promotes efficient dewatering, resulting in a higher storage capacity. The septage solids will be composted through the GORE® facility, and the liquids are conveyed to the leachate treatment system. The resulting product will be utilized within the footprint of the landfill as final cover material or to enhance phytoremediation soils.

To enhance groundwater protection, an early-warning detection system was installed, including monitoring wells located at the property boundary as well as landfill liner and treatment lagoon leak detection. These wells are to provide early detection in the chance that the groundwater quality has become impacted.

Forceman Ridge utilizes the Revelstoke Iron Grizzly as alternative daily cover, which are large steel plates that significantly reduce daily soil cover. This increases the landfill lifespan, serves as vector control (birds), and reduces odour and windblown litter.



The site's footprint is constructed in such a way to maintain wildlife corridors for moose, deer, black bear, and grizzly bear. Additionally, the tenure area was shifted to accommodate nesting goshawks and respect their territory. Buffers have been stringently maintained as part of a desire to reduce impacts to the surrounding environment.

To enhance wildlife safety, a 2.1-meter-high electrified composite fence was designed to prevent wildlife from entering the facility.



The Regional District has designed and will develop several reforestation projects to enhance habitat diversity in the surrounding second growth forests and compensate for lost habitat associated with site clearing.



The Ministry of Environment and Climate Change Strategy confirmed the high level of standards applied to the site development with the following statement: "The Ministry recently released the revised landfill criteria for Municipal Waste. Even prior to its release, the Regional District was planning on far exceeding these guidelines. The quality and the level of environmental protection at these sites have set a new standard for other projects to match".



#### **Innovation - Transferability**

One innovative feature of the TAISWMP is the transferability. Components of the program can be easily transferred and applied to other communities and service areas.

#### Innovation – Accounting for all materials

As materials were defined as either prohibited or restricted at the Regional District waste management facilities, it was important to ensure there were avenues for diversion of the respective materials. An inventory was taken of waste diversion opportunities in the Terrace area to identify any possible service gaps. As a result of this, the Regional District contracted a collection facility for commercial cardboard and paper fiber to ensure an avenue of diversion for these materials.

#### Innovation – Knowledge Sharing

To encourage and support post-secondary students in environmental studies, the Regional District offers job shadowing and learning opportunities with Regional District staff and consultants working on Regional District projects.

#### Lessons learned - Stakeholder engagement is key

The TAISWMP represents a major shift in solid waste management for the Terrace area. Some residents were resistant to the changes due to costs, behavioral adaptations, requirements to sort waste into three streams, and mandatory curbside collection service for the Regional District residents in the service area. The Regional District managed community expectations through extensive stakeholder engagement over several years, ongoing education and awareness campaigns through printed materials, open houses, special committees and hands-on workshops, and direct site visits to commercial and institutional establishments and multifamily units.

#### Lessons learned - Maintain balanced workloads

Planning, implementing and maintaining the TAISWMP was a project undertaken within a functional organization which, at times, taxed Regional District staff and those managing the projects. Subject matter experts were

hired to assist with planning, outreach and execution of program aspects to assist the project team as required.



### FINANCIAL, EMPLOYEE AND BUSINESS MANAGEMENT

#### Solid Waste Management Plan (SWMP)

Solid waste management in the Regional District is driven by the Solid Waste Management Plan developed in 1995. Criteria, goals, and service plans were outlined in the document. The Regional District uses this document to measure achievements, for example, the construction of the new TAISWMP facilities and diversion requirements. The Regional District is currently conducting an update to the SWMP, setting new diversion requirements, community engagement goals, and targeted education and awareness programs. The updated SWMP will focus on finding efficiencies and maximizing performance of facilities. services, and programs, including financial budget efficiencies and objectives.

#### **Support local contractors**

The construction of Forceman Ridge and the Thornhill Transfer Station was a \$17.5 million capital project. The Regional District utilized local contractors and suppliers whenever possible, with



83% of total expenditures awarded locally.

Construction of Forceman Ridge was utilized as a valuable training opportunity for Northwest Community College students enrolled in the Heavy Equipment Operator Program. The students took part in the Earthworks stage of construction, providing learning opportunities to 19 students.

Forceman Ridge and the Thornhill Transfer Station

operations contract was developed to ensure local contractors were able to compete. With new facilities in the area, the tender process did not require experienced landfill and transfer station contractors: instead, the successful bidder was provided extensive training including shadowing experienced facility operators. This allowed a \$1.1 million annual contract to be kept locally.



The financial goal of the TAISWMP is to maintain the current revenue schematic. which is based 50% on tipping fees and 50% on taxation, while covering the operational costs of the facilities, as well as future costs involved with closure of the facilities, and post closure monitoring. Forceman Ridge was designed and constructed to have a minimum 100-vear life span, so that one facility can be sustained over multiple generations.

To improve the economy of scale, the Regional District plans to offer organics disposal services to other neighboring jurisdictions, as well as disposal options to industrial users. The system is based on a user pay model, meaning the more waste a user generates, the more they are required to pay, for example, through the purchase of 'bag tags' or tipping fees at the transfer station. This model encourages people to reduce, repurpose, and recycle items. Households pay through bi-annual utility billing for their threestream curbside collection. Commercial users pay by the tonnage based on material type.

To ensure financial goals are meeting expectations the Regional District utilizes an annual budgeting process, which includes a 20-year business plan to maintain financial objectives.

#### Unusual Revenue Through Environmental Protection

The Regional District has begun the process of utilizing the design of Forceman Ridge to generate Green House Gas Offset credits. Any funds received from Green House Gas Offset credits would be put towards reducing fees and taxes for residents. One opportunity where the Regional District will receive credits is through organics diversion, which has the potential to provide the Regional District an estimated total of \$15 million throughout the life of the landfill.

Landfill Gas extraction will provide another opportunity to acquire Green House Gas Offset credits, with an estimated value of \$7.7 million throughout the life of the landfill.

#### Estimated Value Green House Gas Offset Credits \$22.7 Million

The landfill at Forceman Ridge was designed so an active landfill gas extraction system can capture methane once it begins to be generated, reducing up to 80% of methane released to the environment over the life of the landfill.

The Regional District recyclable curbside collection program aligns with the criteria set by Recycle BC, the Stewardship group responsible for residential printed paper and packaging in British Columbia. The goal is to eventually receive funding from Recycle BC, reducing the cost of curbside collection.

#### Forecasting

Waste quantities are forecasted based on actual population numbers as well as extrapolated population projections. Actual construction costs are used to project estimates for future capital and replacement of infrastructure. This information is essential in assisting with future budget planning.

#### **Facility Staff**

The Regional District utilizes a local contractor to operate the Thornhill Transfer Station and Forceman Ridge. The Regional District provides continual support and training to the operations contractor through manuals and hands on guidance. Updates are continually reviewed with the operations contractor to assist in the efficient and safe operation of the facilities.







#### Waste Collection Staff

The collection of curbside materials has been contracted to a local waste management company. The **Regional District maintains** open communication and provides ongoing support to ensure safe and efficient collection of waste. In addition to the contractor's own safety protocols, the Regional District implemented a stringent weight limit of 50 lbs. on all bins and bagged materials set out for collection.



### Safety through inspections

The operations contractor is required to conduct daily inspections and submit them to the Regional District, to assure expected standards at facilities are maintained. Inspection reports are a way to report and document concerns. The Regional District staff conduct regular inspections of the facilities, to ensure operations are running as intended and all safety and environmental procedures are being met and followed.

#### Safety through procedure

The Regional District has developed operation manuals, Standard Operating Procedures. Protocols. and Emergency Response criteria. These documents are reviewed regularly with Regional District staff, and any contractors employed by the Regional District. The Regional District requires employees to receive adequate training and mentorship before commencing with a task. As a result of this diligence, the Regional District has an impeccable safety record, with no lost time injuries for staff, or contractors.

#### **Continual Improvement**

Since the facilities in the TAISWMP were completely new to the Regional District, not all safety concerns were foreseen before commissioning and captured in existing safety documentation. To compensate for this, safety documentation is regularly reviewed and updated to ensure the highest level of safety is met.

#### Regional District Employee Empowerment, Health, and Safety

To promote growth, Regional District employees are encouraged to pursue continual training in their area of expertise and applicable areas of interest, whether it be in compost operations, water treatment, or in environmental sampling. New hires of the Regional District are mentored, and work alongside experienced senior staff for support, to help new hires feel comfortable in their positions.

#### Development of Independent Initiatives to Achieve Goals

Employees are encouraged to develop independent initiatives to achieve department goals. The Regional District has an excellent employee retention history, with some employees celebrating 30 and even 40 years of service. Regional District employee concerns can be raised to their department manager, and if required, will involve the Human Resources representative. The Regional District also has a Health and Safety Committee that meets regularly to address concerns raised by staff and provide ongoing improvements to the work environment.



# **COMMUNITY RELATIONS**

#### **Initial Community Engagement-Through Working Groups**

Extensive pre-service engagement was conducted to assess the wishes and concerns of the community. Included in this was the formation of multiple working-groups, such as:

- Solid Waste Plan Monitoring Advisory Committee
- Financial Working Committee
- Curbside Collection Program Working Committee
- Institution, Commercial and Industry Working Group
- Landfill Siting Advisory Committee

Groups were consulted to ensure the Terrace Area Integrated Solid Waste Management Program was optimized to support the needs of residents and businesses. Feedback from working groups and the public helped shape the TAISWMP.



#### Initial Community Engagement-Addressing Concerns

Stakeholder engagement in the form of training and information sharing took place with residents, business owners, multi-family dwellings, and industry prior to the implementation of the TAISWMP. This was accomplished with hands-on workshops, preparation of sector-specific tool-kits, newspaper notifications, mail-outs, fact-sheets, updates on the Regional District website, information sessions, open houses, and visits to commercial and institutional establishments.



The Regional District visited all businesses that would likely need to adjust their waste management systems to adhere to the new Bylaw to provide information and answer questions. This included grocery stores, restaurants, retail stores, and those with unique waste such as roofing companies and medical clinics.



Tree **Buffer** 

Concern for impacts on the watershed resulted in the installation of composite liners and an extensive leachate treatment system including phytoremediation.

The treed buffer zone on the east side of Forceman Ridge was extended from 30m to 50m deep to maintain a visually appealing landscape for recreational users.

Nesting Monitor

Siting of Forceman Ridge was shifted south to accommodate nesting Goshawks. The nest site is now being monitored, providing a wildlife research opportunity.

Wildlife Protection

In response to concern for wildlife protection, a 2.1 m composite electric fence surrounds the Forceman Ridge facility.



To protect habitat of species important to the sustenance of local communities, 'no build zones' of the tenure were identified to provide robust wildlife corridors.



Fee exemptions for residents with excess medical waste, and waste bin management for residents with mobility

issues are included in the curbside collection service free of charge for residents requiring assistance due to medical reasons. These programs were added to the service in response to input from residents.

#### Initial Community **Engagement-First Nation Communities**

Representatives from four First Nation communities were consulted over several years to confirm traditional land use and values. Feedback from this consultation influenced design and planning, increasing environmental and wildlife protection.

#### **Approach to Customer** Service - Information sharing

The Solid Waste Plan Monitoring Advisory Committee (PMAC), is kept informed through regular meetings on the results and progress of the program. The intent of PMAC is to assist the Regional District Board in assuring adequate stakeholder engagement and the implementation of services and programs are in line with the over-arching Solid Waste Management Plan.

All reports and updates on the progress and performance of the TAISWMP are available to the public and will be posted on the new Regional District website, which is currently being upgraded to improve service delivery. As the Forceman Ridge site is not open to public access, the Regional District also offers tours of the facilities to interested groups. Tours support transparency on the results of the large capital project and provide educational opportunities.



#### Approach to Customer Service - Ongoing education

Educational programs throughout the planning and implementation of the TAISWMP continue to ensure residents and businesses understand program diversion objectives and how best to participate.

To provide easilyaccessible waste management information to residents, the Regional District provides an easy to use Smart Phone app which residents can access free of charge. This app is also available on our website for those that do not use a Smart Phone. Features available on this app include; personalized curbside collection schedule, the ability to set collection reminders, receive service notifications from the Regional District, and access to a "what goes where" search tool to help determine if a material is recyclable, and if so, where to take it.





Information Sessions for Businesses and Office Buildings

Organics program educational outreach

The Regional District continues to engage the business sector with site visits to assess waste management practices and assist in removing any perceived barriers to diverting waste from the landfill. In 2017, over 90 documented Industrial Commercial & Institutional site visits were conducted by Regional District staff to evaluate program progress and receive feedback.

The Regional District offers 'lunch and learn' information sessions to all businesses and institutions. This option is shared with businesses during site visits and are available upon request.



#### **Elementary School Students**

A classroom information session for elementary school students was developed, which includes a "place that waste" interactive game and a take-home challenge to engage their families in assessing waste diversion in the home. This was shared with the local school board, and any interested school or teachers may contact the Regional District to schedule an event.



"Place that Waste" game for elementary school students



#### **Attending Community Events**

The Regional District continues to attend events, such as the Farmer's Market and the yearly Trade Expo, to engage with the public, answer questions, and receive feedback on how the program is being received.

#### RESULTS

#### **Behavior has Changed!**

It is a direct result of the extensive consultation, engagement, and education throughout all stages of the Terrace Area Integrated Solid Waste Management Program that our residents are, after only one year, achieving diversion results comparable to jurisdictions working on similar diversion efforts for a decade or more.

#### **Benefits to the Environment**

The organics diversion has made measurable improvements to the carbon footprint of waste generators in the Terrace area. The 1363 tonnes diverted in 2017 converts to 2,044 tonnes of CO2-eqivalent greenhouse gasses prevented, should the organics have been landfilled.

#### **Positive Feedback**

During 2017, the TAISWMP was recognized through four awards:

- North Central Local Government Association Community Leadership Award
- Union of British Columbia Municipalities (UBCM), Community Excellence Award in the category of Leadership & Innovation, Green Initiatives
- Community Energy Association in Climate and Energy Action Award, in the category of Corporate Operations
- Federation of Canadian Municipalities 2018 Sustainable Community award in the category of Waste