

Recommendations for DLC Diversion Practices

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1. Purpose

The purpose of this report is to examine mechanisms for further diversion of demolition, land clearing, and construction (DLC) waste originating in the Regional District of North Okanagan. DLC waste materials have been identified in the Phase I of the Solid Waste Management Plan review as a type of waste that should be targeted for more aggressive diversion programs and policies to assist with the overall goal of waste reduction in the regional district.

Definition of DLC:

Demolition, land clearing, and construction (DLC) waste consists of residuals generated from the construction and demolition of buildings and the clearing of undeveloped land. DLC materials include concrete, asphalt, wood, plastic, insulation, roofing, metal and gypsum, etc. Most of these materials, if separated properly, can be readily recycled in the RDNO.

2. Current Practices in RDNO

In general, DLC waste materials are generated in higher amounts in areas where construction and development activities are occurring. According to BC Community Facts on each RDNO community summarized in Exhibit 1, the highest amount of residential building activity occurred in the City of Vernon with 395 permits issued totaling \$104,747,000 in value in 2007. The amount of non-residential construction in the City was not measured by building permit, but rather by value only totaling \$41,200,000. All other communities including the RDNO electoral areas were less than 30% of these values. Clearly the City of Vernon itself generates the majority of DLC waste within the RDNO not considering the existing diversion rate of this material away from disposal.

EXHIBIT 1
Building Permits
2007

| | NUMBER | | VALUE (\$'000) | | TOTAL |
|--------------|-------------|-----------------|----------------|-----------------|----------------|
| | Residential | Non-Residential | Residential | Non-Residential | |
| Vernon | 395 | N/A | 104,747 | 41,200 | 145,947 |
| RDNO | 223 | N/A | 35,896 | 8,328 | 44,224 |
| Lumby | 23 | N/A | 40,550 | 55 | 40,605 |
| Armstrong | 71 | N/A | 15,844 | 8,754 | 24,598 |
| Spallumcheen | 20 | N/A | 6,369 | 2,528 | 8,897 |
| Enderby | 8 | N/A | 1,311 | 35 | 1,346 |
| TOTAL | 740 | N/A | 204,717 | 60,900 | 265,617 |

A good predictor of amount of construction waste expected to be produced in a municipality or specific project is the dollar value of the development. On average, 0.099 kg (Alberta value) of C&D (construction and demolition waste only, not including landclearing debris) waste is produced per dollar of project value. Based on this information and using a value based calculation, it is predicted that construction related C&D wastes in the RDNO would have been about 24,929 tonnes in 2006 and 26,296 tonnes in 2007 corresponding to building permit values of \$251,812,000 and \$265,617,000 respectively although this should be considered an estimate considering that the issuance of a building permit within a year does not necessary mean that construction will be complete that year.

Using actual scale data from three of the RDNO's RDFs, which does not distinguish the source of the waste differently from the type of waste (i.e. dimensional lumber is recorded the same whether it was generated in construction or demolition activity) the amount and types of all DLC wastes disposed of in 2007 are shown in Exhibit 2. Concrete and wood make up the majority of the DLC wastes by weight collected in the RDNO at 34% and 56% respectively. Of the 56%, 7% of the woodwaste is painted or treated – most from the Armstrong/Spallumcheen disposal facility.

EXHIBIT 2
 DLC Materials at RDFs in the Regional District of North Okanagan
 2007

| | ARMSTRONG/ SPALLUMCHEEN | LUMBY and Area D | GREATER VERNON | TOTAL | Percent of DLC total |
|--|------------------------------------|-----------------------------|---------------------------|-----------------|---------------------------------|
| Asphalt | 50.7 | 1.2 | 371.1 | 423.0 | 2% |
| Concrete | 509.2 | 66.2 | 6,693.5 | 7,268.9 | 34% |
| Gypsum | 157.5 | 31.9 | 1,349.4 | 1,538.7 | 7% |
| Dimensional Wood (clean) | 336.61 | 292.34 | 3,867.98 | 4,496.93 | 21% |
| Dimensional Wood (painted & treated) | 1,293.81 | 56.79 | 27.31 | 1,377.91 | 7% |
| Logs & Stumps | 7.39 | 8.74 | 307.36 | 323.49 | 2% |
| Chipped Wood, Brush, and Trimmings | 633.56 | 92.51 | 4,973.00 | 5,699.07 | 27% |
| TOTAL | 2,988.77 | 549.68 | 17,589.65 | 21,128.1 | |

According to the 2005 Solid Waste Composition Study conducted by TRI, construction waste materials comprised between 5 and 21% of the total waste stream samples at each of the RDFs in the RDNO. A list of the percentages of construction material in the waste stream by RDF is shown in Exhibit 3. Vernon and Lumby RDFs show the highest percentages of construction materials in their waste streams. A break down of the construction waste by material type was not conducted in this composition study.

EXHIBIT 3

Percent of waste sample considered as construction materials

TRI Waste Composition Study, 2005

| | Percent of construction material in waste samples (2005) | Total Waste (tonnes) (2005) | Estimated Total Construction Waste (tonnes) (2005) |
|---------------------------|---|--|---|
| Vernon | 11.58% | 37,171.56 | 4,304.47 |
| Armstrong | 5.83% | 12,894.50 | 751.75 |
| Lumby and Area D | 11.80% | 1,772.40 | 209.14 |
| Cherryville and Area E | 17.09% | 189.79 | 32.44 |
| Kingfisher | 21.55% | 284.42 | 61.29 |
| Silver Star | 6.41% | 294.90 | 18.90 |
| Total | | 52,607.57 | 5,377.99 |

DLC materials are currently collected at five locations including the: Greater Vernon RDF, the Armstrong/Spallumcheen RDF, the Cherryville and Area E RDF, the Lumby and Area D RDF, and the Kingfisher RDF (minor amounts of wood and metal). A summary of the tonnages of DLC materials collected at each of the receiving facilities is provided in Exhibit 2.

The RDNO currently charges the following variable rate tipping fees for DLC related waste materials consistently at all their RDFs under Bylaw 2328, 2008 (Exhibit 4). The purpose of these tipping fee charges is to not only recoup on-site landfill and processing costs, but to also encourage facility users to divert their wastes away from disposal. Asphalt and concrete are banned from disposal in all RDNO landfills under Bylaw 1598, 2002.

Treated and untreated dimensional wood waste and logs/stumps/brush collected at the RDF's are ground at each site as well as yard waste materials, and the resulting wood chips are spread onsite during wet weather to improve traction, are mixed with soil (50/50) for daily cover, are composted or are delivered to off site users. A portion of the chips produced from untreated dimensional wood waste and log/stumps/brush collected at the Armstrong/Spallumcheen and Greater Vernon RDFs are sold to a co-generation facility located north of Vernon.

Metal is baled and hauled away by a private company for recycling under contract (currently Richmond Steel) worth \$60 per tonne. Commodity sales revenue is shared with the RDF operator. Both new and used gypsum (aka wallboard or drywall) is collected at Armstrong/Spallumcheen, Kingfisher, Lumby and Greater Vernon RDFs and shipped to a recycler (currently New West Gypsum and Okanagan Gypsum Recycling) to be remanufactured into wallboard or used as soils conditioner or animal bedding. .

Concrete is crushed periodically along with asphalt and masonry and is used (approximately 3 inch minus size) for sub base and roads on site. Aggregate and soil are used for daily and intermediate cover and various filling purposes required to maintain the landfill and access routes.

EXHIBIT 4

DLC Related Material at all RDFs in the Regional District of North Okanagan
2008

| | Tipping Fee per Tonne | Other |
|---|------------------------------|---------------------|
| <i>For Disposal</i> | | |
| Non-recyclable Gypsum Wallboard/Drywall | \$130 | |
| Recyclable Gypsum Wallboard/Drywall | \$192 if mixed with garbage | |
| <i>For Recycling</i> | | |
| Metal (Ferrous and Non Ferrous) | \$20 | |
| Gypsum Wallboard/Drywall | \$130 | |
| Clean Dimensional Wood | \$20 | |
| Logs and Stumps (>20 cm / non-treated) | \$35 | |
| Dimensional Wood (treated and/or preused) | \$20 | |
| Concrete (crushable with some rebar) | \$7 | |
| Asphalt, Masonry, and Bricks | \$7 | |
| Soil and Other Fill Material | | \$10 per Dump Truck |

2.1 Current DLC Policies

There are currently several policies and administrative practices which promote DLC diversion in the RDNO.

Existing Solid Waste Management Plan

The following strategies taken from the Solid Waste Management Plan currently guide implementation of DLC waste management.

- *Eliminate open burning of all municipal waste including DLC in a timely, phased manner.*
- *Review Open Burning Bylaws within the region.*
- *Separate as much clean wood as possible to compost.*
- *Look at providing a curbside yard waste collection service in EAs B and C.*
- *RDNO will encourage businesses to submit waste reduction plans (WRP's)*
- *Consider developing a policy or amend building bylaws to include such things as space requirements for DLC management.*

- *RDNO shall encourage member municipalities to develop bylaws that require participation in regional composting programs for all DLC businesses in RDNO.*
- *Support new DLC sorting and salvaging facilities and programs currently in place and proposed.*
- *The RDNO shall NOT, at this time, consider energy recovery as a component of its solid waste management system.*

Recently, through a Request for Proposals process, the RDNO received two proposals to reduce construction and demolition waste going to disposal at the GVRDF. The terms of reference indicates that there will be no guarantee of quantity provided to the selected contractor, the processing must not interfere with daily landfill activities, and that the process will reduce the quantity (and volume) of C&D waste being disposed of by at least 50%. Landclearing waste is not included in this RFP. A review of the proposals is currently underway.

Existing Bylaws

The following Bylaws support the implementation of the Solid Waste Management Plan and include provisions that can be applied to DLC waste as follows:

- Bylaw 1598, the Recyclable Materials Separation Bylaw:
 - No person may dispose of more than ten percent (10%) by volume per load of recyclables (as defined in schedule A of the bylaw) at a Disposal Facility with the Regional District except in designated containers or in designated areas located at the Disposal Facility.
 - Penalty can be refusal of entry of any person to the disposal facility and/or requiring the person to pay one and one half (1.5) times the applicable tipping fee (\$93/tonne).
 - DLC Materials on the list: All ferrous and non-ferrous metal, grindable concrete, gypsum wallboard/drywall except new and used gypsum wallboard/drywall containing asbestos, vinyl, mesh, and/or stucco
- Bylaw 1747, 2003 to Regulate Building in the RDNO
 - Demolition waste management plans must be approved by a member of the RDNO's solid waste staff. Demolition permits for buildings containing gypsum board/drywall must have a demolition waste management plan for approval.
 - The plan requires information about the estimated volume of gypsum, the recycling facility for the gypsum and the company who will be hauling the materials.
 - Policy that demolition permits must go through solid waste department prior to issuance. Purpose is to make people aware of diversion and waste management opportunities for demolition of recyclables such as drywall (gypsum).

- Bylaw 1915, to Regulate Open Burning
 - The open burning of brush, branches, and large landclearing debris can occur during March 15 until April 30 and November 1 until November 15 during sufficient ventilation conditions.

3. Other Jurisdictions

The information presented in the following was obtained from the results of a recent CH2M HILL literature search, and interviews with eight facility operators at C&D processing facilities located across North America although these facilities were of a considerably larger scale than what would be feasible in RDNO. This information serves to provide RDNO with a 'big picture' of what is happening in the industry.

Recycling Rates

Facilities that accept and process source separated materials, generally have a higher recycling rate than those that accept commingled materials. However, there are many facilities that accept commingled materials that divert 80 percent or more of incoming materials. In our research, we found that recycling rates for facilities that accept only source separated materials range from 78 percent to 100 percent. Those facilities that accept both source separated and commingled materials have recycling rates that range from 55 percent to 90 percent. One study reported a national U.S. average recycling rate of 40 percent (Taylor, 2005).

In summary, the average recycling rate for DLC is 40% however there are many facilities that reach a rate of more than 80%.

Facility Tipping Fees

Tipping fees at different facilities often vary depending on the type of material being accepted. Tipping fees for commingled C&D tend to range from \$75 to over \$100 per ton to the customer. California seems to have the highest fees. Tipping fees at landfills that may compete with these facilities are typically around the same level.

Other facilities charge a tipping fee based on specific types of material being processed because some are easier to process than others. Concrete, asphalt, and fill materials are generally the easiest to process and tip fees for these materials can range from \$0 per ton to \$48 per ton. Some facilities also charge an additional fee for loads that are more than a certain percent commingled.

In summary, tipping fees for DLC recycling materials in the RDNO tend to be similar to the U.S.

Types of C&D Materials Accepted

Most facilities researched will generally accept all non hazardous C&D materials whether they are source separated or commingled. Such materials accepted include: lumber, concrete, asphalt, brick, metal, gypsum, siding, insulation, roofing, cardboard, sediment, plastics, and yard waste. Materials that are not accepted at some facilities include lead based painted wood, and asbestos.

In summary, C&D recycling facilities collect most debris except hazardous materials, leaded paint and asbestos.

Reasons for Variations in Recovery Rates

Variation in the recovery rates of different facilities can be attributed to a variety of factors. One factor is the size of the facility and how much it can process. Some facilities have space constraints that limit how much processing they can do. Another factor is the avoided tip fee: the higher the disposal facility tip fee avoided, the higher the “economic” recovery rate. Well capitalized facilities that compete with high disposal tip fees generally have more equipment and labor, and better technology to separate and process materials with more precision. When competing tipping fees are lower, facilities tend to rely more on labor than equipment and technology to sort through materials, which can lower their recovery rate.

Applying larger or additional tip fees for commingled loads will encourage customers to separate out their loads before they reach the processing facility and allow for a higher recovery rate. The same can be said for those facilities that only accept materials that are easily recyclable.

In summary, variable rate tipping fees are a typical way municipalities use to encourage source separation.

End-Use Markets for Processed Materials

The primary end-use markets for processed C&D discards include:

- Wood used as feedstock for combustion plants to collect heat and energy
- Alternative Daily Cover (ADC) for local landfills to conserve clean fill
- Road base to conserve clean aggregates
- Mulch for landscaping material
- Gypsum for the remanufacture of wall board

This seems to be fairly consistent across North America. Of special significance is the rapidly developing bio-energy market where the federal government is investing fairly substantial sums to help develop this source of energy. Asian markets for plastic, metal, and fiber from paper and OCC may be a growing market in the future.

A list of end-use markets reported in the literature follows:

| Material | End Market |
|-----------------|---|
| Wood | Hog fuel, animal bedding, composting material, wood chips, mulch (designer, colored), building materials, pallets, pulp wood, soil amendments, wood/plastic composite. Potential markets include finger-jointed wood, reconstituted panelboard. |
| Yard Waste | Animal bedding, composting material, soil amendments, chips. |
| Gypsum | Recycled back into new gypsum, soil amendments, added to cement mix, construction materials. Future markets include flea powder. |
| Asphalt | New hot mix hot mix asphalt, cold patch, dust control on rural roads, temporary road or driveway material, construction stone, fill, ADC, fuel, compressed building blocks. |
| Concrete/Brick | Road base, aggregate, fill, ADC, construction stone. |
| Dirt | New clean dirt/soil, fill, ADC |
| Carpet | Carpet backing, industrial flooring, automobile parts, carpet cushion, sod reinforcement. |
| Metal | Scrap yard, shipped off-shore for further processing. |
| Cardboard/Paper | Shipped off-shore for further processing. |
| Plastic | New plastic bales, pallets, shipped off-shore for further processing. |

ADC is a prominent end-use for many facilities. Assuming contaminants are removed, it is fairly easy for commingled C&D to be ground into ADC after removing more high-valued recyclable items.

In summary, there are similar end use markets in the U.S. and Canada, and that it really depends on the initiatives of private enterprise. Part of the strategy would be to contact private companies and work on providing a consistent feedstock with cooperation amongst neighboring Regional Districts to get the economy of scale.

Adjacent Jurisdictions

A brief review of the Central Okanagan (CORD) and Columbia Shuswap Regional District (CSRD) policies to manage the recycling and/or disposal of DLC waste was conducted. The following identifies these policies:

CSRD

The following is a brief summary of DLC related practices in the CSRD:

- The burning of landclearing debris is permitted and was historically done under permit by MOE, but is now generally regulated now through the Open Burning Smoke Control Regulation.
- A & B Contracting provides wood waste grinding services at CSRD landfill sites (interregional contract).
- The MOE regulates a private landfill (operated by Mounce Construction) located adjacent to the Salmon Arm Landfill on 20 Avenue in Salmon Arm, BC through a landfilling and open burning permit. All open burns in BC are governed by the Open Burning Smoke Control Regulation (currently under review). The site could close within a few years.
- Municipalities issue permits for the burning of MSW (wood waste) and provide incentives for fuel restriction and smoke control when open burning and wood burning appliances are used. The City of Salmon Arm offers a spring curbside collection of yard prunings as an incentive to reduce burning.
- The concept of a DLC site adjacent to a transfer station shall be considered. These sites shall provide convenience to residents for disposal of materials not allowed in refuse transfer containers. Site design shall have a fully fenced, restricted access refuse transfer station with a full-time caretaker to direct residential refuse into the appropriate container and DLC refuse through a second gate into the adjacent, fenced DLC refuse disposal site. Materials in this site shall be completely segregated for ease of handling and shall be charged a tipping fee by the caretaker upon providing access.
- DLC facilities in the CSRD include: Falkland – DLC trench landfill, metal, and woodwaste marshalling. Malakwa – woodwaste and metal marshalling. Skimikin and Scotch Creek - woodwaste and metal transfer bin.

CORD

The following is a brief summary of DLC related practices in the CORD:

- A variable tipping fee schedule is in place that will charge lower rates for separated material and, conversely, higher rates for mixed waste.
- A DLC recycling area is at the Glenmore Landfill and Westside Landfills.
- Amendments to the RDCO building bylaws to encourage DLC recycling including the requirement for contractors in the demolition and construction business to prepare waste management plans and provide evidence of materials being recycled or properly disposed.
- Clean dry wood waste is chipped and combined with bio-solids to create “Ogogrow” which is sold to the public at the landfill and commercially. Stumps and small trees are chipped to create mulch for dust control and in city parks.

- Gyproc drywall is either recycled into new drywall or used as a supplement to fertilizer.
- Concrete and asphalt are reused in new concrete and asphalt blends.

EXHIBIT 5

DLC Related Material at all RDFs in the CSRD and CORD

2008

| | Tipping Fee per Tonne | |
|---|-----------------------|-------------------|
| | CORD | CSRD ¹ |
| <i>For Disposal</i> | | |
| Mixed DLC | \$55 | \$140 |
| Non-recyclable Gypsum Wallboard/Drywall | N/A | \$140 |
| Recyclable Gypsum Wallboard/Drywall | Banned | |
| <i>For Recycling</i> | | |
| Metal (Ferrous and Non Ferrous) | \$10 | \$35 |
| Gypsum Wallboard/Drywall | \$145 | \$70 |
| Clean Dimensional Wood | \$10 | \$35 |
| Logs and Stumps (>20 cm / non-treated) | \$55 | \$35 |
| Dimensional Wood (treated and/or preused) | \$55 | \$70 |
| Concrete (crushable with some rebar) | \$10 | N/A |
| Asphalt, Aggregate and Soil | \$10 | \$0 |

1 – The CSRD variable tipping rates are currently being reviewed, but have yet to be implemented.

4. Discussion of Existing System to Manage DLC Waste

The following are general observations and concerns identified through the evaluation of common DLC practices throughout North America and adjacent Regional Districts:

- The differences between estimated DLC generation rates (based on dollar value of construction) versus actual scaled numbers indicates that some of the DLC waste with the RDNO is being dealt with in some other ways (e.g. DLC Landfill in Salmon Arm, the open burning of landclearing debris, etc.). It is important to account for this material in future statistics in order to assist with planning and gaining economies of scale.
- The RDNO, CORD, and CSRD have similar practices in the management of DLC and have future opportunities to work together cooperatively as they currently do and have in the past.
 - Open burning is still permitted in some areas of the regions for woodwaste and brush defined as MSW by each Regional District despite the emission of pollutants and greenhouse gas emissions that exceed alternative approaches such as reuse, co-generation, chipping, and composting.

- As stated in a report by G. Morris *Green Power Institute in Berkeley, California* entitled “The Value of the Benefits of U.S. Biomass Power”, November 1999, NREL/SR-570-27541

“Open burning of forestry and agricultural biomass residues is a major source of air pollution in many regions. Open burning produces massive amounts of visible smoke and particulates, and significant quantities of emissions of nitrogen oxides (NOx), carbon monoxide (CO), and hydrocarbons that contribute to the formation of atmospheric ozone. Quantifying the emissions resulting from open burning is difficult because residues, burning practices, and environmental conditions are extremely variable. Nevertheless, use of these residues as power plant fuel vastly reduces the smoke and particulate emissions associated with their disposal, and significantly reduces the amounts of CO, NOx, and hydrocarbons released to the atmosphere.”

- Unique elements include the CORD’s use of gypsum board for a fertilizer supplement and the use of wood chips in the “Ogogrow” soil amendment product.
- Mixed DLC is currently landfilled in each regional district.
- Variable tipping rate bylaws are currently in place within each regional district.
- There is considerable variability between tipping fees charged at RDNO facilities which could lead to waste migration to and from the RDNO.
- The RDNO is currently commissioning the design and installation of a central composting facility at the Greater Vernon RDF where clean DLC wood waste could be chipped or ground to be included in compost feedstocks and products. Additionally, woodwaste could be directed towards bio-solids composting facilities to aid in the production of marketable bio-solids products. These options are included in the proposed Regional Organics Waste Strategy under separate cover.
- To avoid landfilling, the RDNO may want to consider shipping certain streams of woodwaste to waste-to-energy facilities which is not currently supported in Plan policy and except for the Tolko co-generation facility in Spallumcheen, no waste-to-energy plants exist nearby.

5. Recommendations for DLC Diversion Using Three Key Diversion Mechanisms

There are three key diversion mechanisms to consider in developing and strengthening local government DLC diversion programs. To obtain the highest diversion rates, a combination of all three strategic mechanisms should be explored. These are:

- Economic Incentives and Disincentives
- Regulatory and Policy Requirements
- Voluntary Measures

5.1 Economic Incentives and Disincentives

Most DLC materials are readily recyclable if and when they are separated and prepared in accordance with the end use and end markets. In order to overcome the time and effort

barrier for source separating DLC wastes, it is necessary to create an economic advantage for diversion options over the disposal option (which inherently takes less effort). To this end, recommended economic policies with potential increased DLC diversion results include the following.

- Variable rates to encourage diversion and discourage disposal already exist within the RDNO; however, these rates vary between Regional Districts. The RDNO should meet with adjacent regional districts to discuss the flow and management of DLC in the valleys (Thompson, Shuswap, and Okanagan) and the differing tipping fees affect upon the flow of materials. This could include harmonization of tipping fees, harmonization of regulatory programs (waste stream management licenses), enforcement, out of area bans or the imposition out-of-area surcharges. These approaches are intended to help remove some of the financial incentive for waste migration and to assist with providing guaranteed feedstock for processors and recyclers.
- Further to the aforementioned policy, it is recommended that for materials that have clear alternatives for diversion that separation of recyclables be further encouraged and added to the landfill ban list with a progressive penalty increase that can exceed the current 1.5 times the tipping rate under Bylaw 1598. For example, when a new item has been on the list for a certain amount of time and there is a continued lack of compliance, the RDNO would have the ability to increase the penalty as follows:

| Year | Tipping Fee increase |
|------|----------------------|
| 1 | 50% |
| 2 | 100% |
| 3 | 150% |
| 4 | 200% |
| 5 | 250% |

5.2 Regulatory and Policy Requirements

Introducing or strengthening policies related to the management and disposal of DLC wastes in the RDNO will create an incentive or produce the requirement for diversion. As well, some current bylaws may be hindering the options for DLC waste diversion, and a review of such bylaws should be undertaken. Examples of suggested regulatory and policy requirements with potential DLC diversion results include:

- Requiring that applications for Building and Development Permits be accompanied by a Materials Recovery Plan (MRP) and followed up by a Waste Diversion Statement (WDS) at project completion.
 - The required information in an MRP would include, but not be limited to: a minimum waste diversion percentage; an estimate of quantities to be reused, recycled and/or disposed; a list of reuse, recycling and disposal facilities that will be used, and the service providers to be used.

- The required information in a WDS should include how well diversion targets were achieved. A 50 percent diversion rate is viewed as being a very reasonable diversion target for construction projects.
- Accountability, diversion and source separation efforts, etc. could follow approaches currently required for LEED certification.
- If the open burning of landclearing debris is still an option in the future, ensure that volume estimates of debris piles are provided prior to the burn to help the RDNO better quantify landclearing waste generation in the region.
- Further to this, member municipalities should be encouraged to implement bylaws that mimic the RDNO bylaws for electoral areas, especially considering the majority of DLC material is generated from within the populated centers.
- Strengthening the Demolition Waste Management Plan submission requirement in the building bylaw to:
 - include all demolition projects
 - require a follow up report to show where the recyclables actually went
 - add an incentive for reaching certain diversion targets (such as 50% or higher) or a penalty for non-compliance
 - provide incentives to use deconstruction techniques instead of demolition of the whole building
 - Require hazardous waste material audits and removal prior to mixed loads being accepted at RDNO facilities.
- Provide Materials Recovery Facilities (MRFs) or Collection Depots/Transfer sites at strategic locations throughout the RDNO, especially in areas where high amounts of construction, demolition, or land clearing activities are taking place. Backed up with DLC material bans from the RDNO disposal facilities, these MRFs or collection depots could be used to encourage private contractors to manage this material.
- Reviewing all relevant bylaws and amend as necessary to facilitate DLC material diversion. Specifically, the RDNO should:
 - Review all development bylaws to ensure that DLC collection and processing facilities are able to be situated in the RDNO according to the zoning and community development plans.
 - Review burning bylaws to further restrict the open burning of landclearing waste to reduce pollutants entering the airshed and reduce excessive greenhouse gas emissions when compared to alternatives such as chipping and composting.
 - Continually review Bylaw 1598 to amend Schedule A to include more recyclable construction and demolition materials as practical and when markets become viable.

5.3 Voluntary Initiatives

It has been shown in many jurisdictions that with the appropriate economic and regulatory incentives in place private enterprises will take voluntary actions to increase diversion of DLC materials. The RDNO should take action to support these voluntary diversion efforts. Examples of suggested voluntary initiatives with potential DLC diversion results include:

- Enabling private enterprises to take advantage of the business opportunities created through economic and regulatory incentives and provide reprocessing facilities and services that are cost-competitive to landfill disposal rates. The RDNO can support this strategy:
 - By creating further markets for end use of products (such as wood chips for landscaping, fuel sources, composting etc) at the RDFs and other RDNO facilities.
 - by reviewing land use policies and plans in order to facilitate reprocessing sites, collection depots, and other supporting infrastructure
 - by supporting and promoting private businesses in their direct and indirect DLC diversion efforts through their economic development strategy and the “Waste Reduction Initiative Fund”
 - by considering developing a Resource Recovery Park that attracts and groups recycling related industries in one location and by exploring partnerships with industries involved in diversion activities
 - By exploring partnering with local recyclers on pilot projects and/or discussing with private companies ways that local government could reduce barriers that may be hindering the reprocessing or marketing of DLC waste materials.
- Through education and promotion programs, encouraging better environmental practices at the source including the residential and IC&I sectors, such as reducing waste at the source, re-use of materials, and better tracking and management of waste materials and costs. This could include a review of scale information categories to better reflect the variety of sources and types of DLC related materials to more accurately estimate this stream and provide information to potential partners and private businesses. The RDNO can support this initiative by establishing and adhering to procurement policies that require using recycled products and adopting ‘green’ construction, demolition, and development standards.
- Although the Okanagan Waste Exchange exists currently for the swapping of used materials online, this could be enhanced to include DLC derived materials. As well, local used building materials retail companies could be contracted to a local exchange at disposal facilities.
- Conducting educational and diversion awareness-raising activities such as:
 - Promoting lessons learned from RDNO green building projects
 - Promoting existing tools such as LEED™, BuiltGreen™ and other similar programs
 - Preparing a list of recyclers for DLC materials in RDNO, along with case studies of successful diversion activities, and distribute to interested parties and make available on the website and at trade shows
 - Provide an information tool kit to working in the home construction industry to encourage the minimization of waste
 - Provide information at various stages of building, development and demolition permits (application, inspection and final approval).

The following Exhibit 6 summarizes and provides further suggestions for diverting DLC materials.

EXHIBIT 6

DLC diversion mechanisms in order of priority

| | |
|--------------------------|---|
| Concrete | <ul style="list-style-type: none"> ✓ Continue use on-site at disposal facilities as needed to maintain operations at the landfill. ✓ If private diversion alternatives exist, ban concrete from the RDNO disposal facilities to divert the material to these private facilities. |
| Plastics and fiber | <ul style="list-style-type: none"> ✓ Current bylaw 1598 is sufficient in this regard; however, as noted earlier, penalties could be increased over time. |
| Metal | <ul style="list-style-type: none"> ✓ Current bylaw 1598 is sufficient in this regard; however, as noted earlier, penalties could be increased over time. |
| Asphalt | <ul style="list-style-type: none"> ✓ Continue to use small quantities on-site for improvements to access road and landfill operations. |
| Clean Wood | <ul style="list-style-type: none"> ✓ Encourage re-use as much as possible including for firewood, kindling, and re-use in construction. ✓ Material not re-used to be chipped and used as feedstock in composting operations (See Regional Organics Diversion Strategy) ✓ Chipped wood could be used in RDNO and municipal parks as mulch. ✓ Continue to ship poorer quality and excess clean wood as feedstock to a waste-to-energy system. |
| Contaminated Wood | <ul style="list-style-type: none"> ✓ Continue to focus on reducing the volume and conserving air space in the landfill (be cognizant of health and safety issues surrounding airborne hazardous particles). ✓ Continue to use material for alternate daily cover (ADC). |
| Mixed Demolition Waste | <ul style="list-style-type: none"> ✓ Strong encouragement to deconstruct buildings. ✓ Require hazardous waste assessments to provide assurance hazardous materials have been removed prior to disposal. ✓ Continue to reduce volume and use as ADC. |
| Mixed Construction Waste | <ul style="list-style-type: none"> ✓ Current bylaw 1598 to discourage the collection of mixed construction waste and source separate is sufficient in this regard; however, as noted earlier, penalties could be increased over time. |
| Land Clearing Debris | <ul style="list-style-type: none"> ✓ As per current Plan policy, implement a full ban on the open burning of landclearing debris. ✓ Divert from disposal and chip or grind to provide mulch, supplement composting operations, and/or provide feedstock for waste-to-energy facility. |

Summary

The RDNO received at its scaled sites approximately 21,128 tonnes of DLC waste in 2007 which is considerably lower than what one would expect. When compared to internal CH2M HILL construction and demolition waste only, generated by total building permit value in 2007, this value could exceed 26,000 tonnes annually not including landclearing debris that may be mostly open burned in the RDNO and could increase this total beyond 30,000 tonnes. As the available disposal facilities for this material decline (e.g. private landfill in Salmon Arm) and burning allowances continue to be reduced as per RDNO policy, the RDNO may be faced with an increasing amount of this waste in future.

The RDNO has a number of DLC diversion policies and programs in place, therefore the focus of this initiative is to not only to increase diversion further, but also to improve diversion practices with programs higher in the 3 R diversion hierarchy of reduce, reuse and recycle, as well as energy recovery when facing no alternatives other than landfilling.

The following Exhibit 6 provides a summary of the programs suggested for the RDNO over the next 5 to 10 years and identifies the resourced needed and suggested implementation schedule. As noted earlier in the report, DLC figures from scaled facilities do not fully reflect this waste stream and are not detailed enough to differentiate between the various elements: demolition, construction and landclearing. In order to get a sense of how diversion of this stream can be improved, the following assumed tonnages taken from Exhibit 2 have been used to quantify these elements (gypsum was split 50/50 between demolition and construction). The figures used here do not include the unaccounted for tonnages resulting from open burning and waste migration, therefore they should be considered conservative.

| | Demolition | Landclearing | Construction |
|--------------|-------------|--------------|--------------|
| GVRDF | 7269 | 5699 | 4497 |
| ASRDF | 1378 | 323 | 796 |
| LRDF | 796 | | |
| TOTAL | 9443 | 6022 | 5293 |

EXHIBIT 6

DLC Diversion Programs Incremental Manpower and Cost Estimates

| Strategy Component | RDNO Staff Time | | Capital Cost | Annual O&M Costs | Anticipated Diversion (tonnes/yr) | Implementation Period | | |
|--|-----------------|--------------|----------------|------------------|-----------------------------------|-----------------------|---------|----------|
| | Startup | Routine | | | | 0-2 yrs | 3-5 yrs | 5-10 yrs |
| Set up system for requiring Materials Recovery Plan (MRP) with Building Permits | 40 hrs | 4 hrs/month | N/A | N/A | 2,248 ¹ | | ✓ | |
| Amend bylaws to strengthen the Demolition Waste Management Plan Requirement | 20 hrs | N/A | N/A | N/A | 2,361 ² | ✓ | | |
| Identify property and setup system to allow private DLC Materials Recovery Facilities (MRFs) or Collection Depots/Transfer sites | 120 hrs | 40 hrs/year | N/A | N/A | 2,641 ³ | | | ✓ |
| Review Bylaws and amend to further encourage DLC diversion | 40 hrs | N/A | N/A | N/A | N/A | ✓ | | |
| Consideration of Differing Variable Rates Bylaws, Negative Impacts and Mitigation | 40 hrs | 1 hr/month | N/A | N/A | N/A | ✓ | | |
| Amend Bylaw 1598 to Further Discourage the Disposal of Recyclable Material | 20 hrs | N/A | N/A | N/A | 2,113 ⁴ | ✓ | | |
| Focused DLC Diversion Education and Promotional Activities ⁵ | 80 hrs | 35 hrs/month | \$5,000 | \$22,000 | N/A | | | ✓ |
| Implement ban on concrete from entering RDFs in favour of private enterprise solutions | 40 hrs | N/A | N/A | N/A | N/A | | | ✓ |
| Improved Wood Waste Segregation Program | 80 hrs | 8 hrs/month | 2,500 | 0 | N/A | | | ✓ |
| Encourage the Deconstruction of Buildings | 20 hrs | 40 hrs/year | N/A | N/A | 2,361 ⁶ | | | ✓ |
| Require Hazardous Waste Assessments Prior to Disposal of Demolition Waste | 20 hrs | 4 hrs/month | N/A | N/A | N/A | | | ✓ |
| Mulch Production (Internal feasibility study only) | 120 hrs | N/A | 0 | 0 | N/A | ✓ | | |
| Regional Coordination of Wood Waste Management | 40 h | 8 hrs/month | 0 | 0 | N/A | ✓ | | |
| Totals | | | \$7,500 | \$22,000 | 13,424 | | | |

Notes:

- 1 – Assume 50% of available construction waste would be diverted by this requirement for source separation and diversion.
- 2 – Assume 25% of available demolition waste would be diverted as a result of required diversion.
- 3 – Assume 10% additional diversion would be expected by channeling DLC to these facilities beyond current practices
- 4 – Assume 10% diversion will occur with greater economic pressure to divert material.
- 5 – Assume that a 0.25 full time equivalent will be needed to conduct this public education
- 6 – Assume 25% of demolition waste would be diverted by encouraging deconstruction through Demolition Waste Management Plans