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## RDCK Resource Recovery Plan – Capital Project Implementation Plan

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133824  
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## 1. INTRODUCTION

The Regional District of Central Kootenay (RDCK) retained SNC-Lavalin Environment, Division of SNC-Lavalin Inc. (SLE) and Wild Earth Associates Inc. to develop this capital project implementation plan to be incorporated into the Resource Recovery Plan currently being updated.

The capital project implementation plan addresses the sequence of capital works and associated expenditures related to the re-aligning of the resource recovery system with the landfill consolidation and transfer system identified in Scenario 2B in our Technical Report dated March 1, 2010, as well as recommended upgrades to improve organics management documented in our Technical Report dated August 8, 2010. Scenario 2B involves converting the Nakusp and Central landfills from active landfill sites to transfer stations that redirect the mixed waste to the Ootischenia landfill. The intention is to improve the efficiency of the transfer system by shifting from roll-off bin trucks to compactor trailers using a modular fixed bin system for the mixed waste component. A number of projects associated with organics management were also identified for various sites to provide material handling efficiencies and to bring some aspects into regulatory compliance.

In this report the capital works are prioritized in a logical sequence to maximize the benefit of the transition and to ensure continuity of service. The report outlines the overall purpose of the implementation plan and then provides more detailed discussion of: a) the methodology; b) considerations; and, c) the resulting Gantt chart and costing tables.

## 2. PURPOSE

The overall objectives of the implementation plan as outlined by RDCK staff are to:

- Synthesize the findings and recommendations of the first two phases of work completed by SLE into an implementation plan for the capital works identified. The findings are to be included within the overall Resource Recovery Plan.
- Determine the timing of proposed capital works based on a number of key considerations outlined by RDCK staff.
  - Capital works are to be completed over a maximum 5 year time frame beginning in 2012 in a manner that reduces impacts on annual tax requisitions. Projects are to be identified as essential or as non-critical if they can be deferred if resources are not available.
  - Identify in-house RDCK human resources or contracted staff required to coordinate and administer the outlined capital projects.
  - Distribution of in-house staff resources required by the projects throughout the implementation period is to be presented by sub-region.
- Update the high level cost projections to include administration and engineering components. The projected costs will be used for overall business planning purposes. Individual project budgets are to be confirmed through the use of engineering estimates at the time they occur.

In particular, this technical report provides a summary of: a) methodology b) considerations/discussion and c) results in Sections 3, 4 and 5, respectively. The Methodology section provides a brief overview of the approach used. The Considerations section includes discussion regarding sequencing transfer station upgrades and optimization of transfer routing during transition, timing of landfill transitions and equipment purchases. The Results section provides a Gantt chart indicating the projects to be completed each year and tables providing summaries of overall project expenditures in each sub-region on an annual basis and the corresponding administrative costs.

Some refinement in scope from the original terms of reference has been made in conjunction and agreement with RDCK staff in order to honour time and budgetary constraints.

### **3. METHODOLOGY**

This section describes the approach taken in order to reach the capital project implementation plan presented. The following major tasks are described in more detail in the following subsections:

- Develop Implementation Plan framework;
- Project list compilation;
- Project sequencing and scheduling;
- Staff review of project schedule;
- Detailing of costing and Gantt chart; and
- Technical report preparation.

#### **3.1. Develop Implementation Plan Framework**

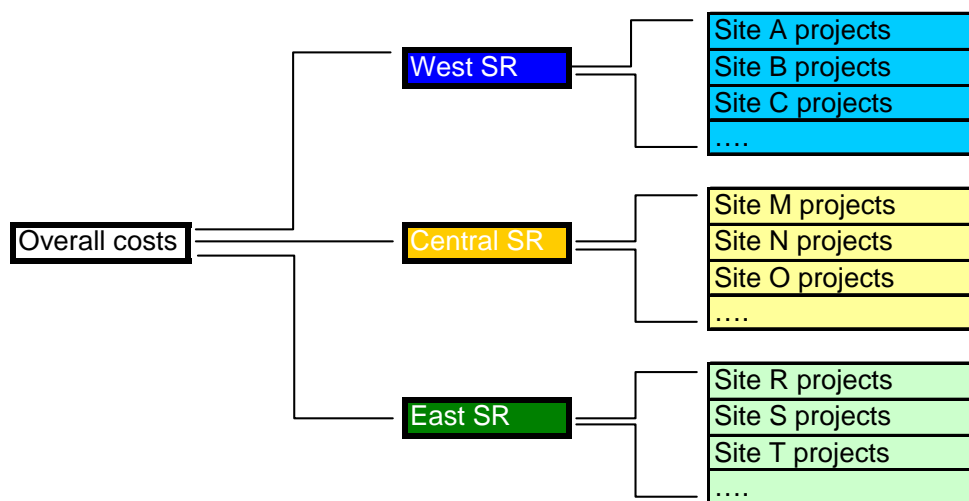
Following a careful review of the proposed deliverables, a streamlined framework was constructed for inputting project information and manipulating it to meet the Resource Recovery Plan objectives and constraints to generate the required outputs in an efficient manner. A Microsoft Excel<sup>®</sup> workbook was developed to allow the input of a master capital project list and site specific project sheets in a manner that costs could be attributed into sub-tasks associated with administrative, engineering and contractor roles occurring in specific years that could then be aggregated as overall and sub-region costs on an annual basis. Since the system was applied over a number of projects at multiple sites and changes are difficult to implement once the worksheet has been populated, the proposed framework was reviewed with RDCK staff for approval prior to populating and linking the spreadsheet.

Categories of administrative cost, engineering costs and contracting cost and overall projects costs were utilized for each project. The breakdown of these costs was accomplished using set percentages of the estimated contracted project cost developed in consultation with RDCK staff and professionals with experience in the industry.

In review with the RDCK, a column for work occurring prior to 2012 was added to flag that some projects' lead administrative and engineering costs will occur in 2011 and also to identify other projects from Phase 1 and 2 reports that were happening prior to 2012.

It was agreed that presenting the Gantt chart project schedules using MS Excel<sup>®</sup> spreadsheets, with the associated cost estimates assigned and updated to the year they occur, rather than using MS Project<sup>®</sup> would best serve the needs of the RDCK.

### Spreadsheet organization



### 3.2. Project List Compilation

The project list for the implementation plan was reviewed and updated with RDCK staff.

A number of projects identified within Phases 1 and 2 were confirmed by RDCK staff to be proceeding prior to 2012 due to the ongoing landfill design and operating plan, or site relocation, or upgrade necessity. Specifically, this involved Stage 1 and 2 landfill developments at Ootischenia along with an upgrade to the public receiving area, which were scheduled before 2012. Stage 1A at the Creston landfill will also be complete before this plan comes into effect. On the transfer site projects, the Boswell site was expected to be reconstructed and upgraded prior to this plan.

As the plan was developed, some administrative and engineering tasks for projects scheduled to occur in 2012 will need some administrative and engineering efforts in 2011 to ensure timely completion. These projects that are expected to incur costs within the 2011 budgets have been identified to RDCK staff. From an engineering end, the detailed transfer design project and Nelson transfer site design engineering will both be anticipated in 2011. Correspondingly, an administrative component of this work is reflected in the administrative tables along with the approvals and tendering process for the design engineering tendering for the Central landfill that happens the following year.

### **3.3. Project Sequencing and Scheduling**

The master project list was imported into a MS Excel<sup>®</sup> worksheet with the projects listed by site within each sub-region. The worksheet was formed into a Gantt chart by allocating the base project costs into specific years within the 5 year timeframe to allow the sequencing of projects and identification of non-critical projects. The sequence of projects was determined using a number of logical rationales such as contracting efficiencies (i.e., amalgamating similar contracts or projects within a single site that could be tendered together) and post-completion operational efficiencies (i.e., upgrading transfer stations prior to shutting down nearby landfills). The rough timelines for projects were referenced from this project sequence when refining the timing of sub-task expenditures for each project at each site. Once the projects were placed in the Implementation Plan spreadsheet, the aggregate expenditures within each sub-region were broken down as administrative, engineering or contractor costs for each year. The annual costs and administrative efforts by sub-region were reviewed to determine whether these factors are equitably distributed. An iterative process between the Gantt chart and the Implementation Plan spreadsheet was carried out to achieve the key considerations outlined in the Scope of Work.

### **3.4. Staff Review of Project Schedule**

After completing the initial project list, project framework and draft schedule, the Implementation Plan spreadsheet was presented to RDCK staff for review and discussion. The RDCK confirmed the completeness of the project list, key assumptions, the budget allocations and timing considerations that were used in developing the implementation plan.

### **3.5. Technical Report Preparation**

The methodology for determining the project sequencing and timing of the project are outlined in this brief report. The report presents the main elements of the Implementation Plan including: a complete project list, simplified Gantt chart, annual budget requirements and project administration workload requirements by sub-region and in total.



## 4. CONSIDERATIONS/DISCUSSION

The following considerations are discussed in further detail in the following sections:

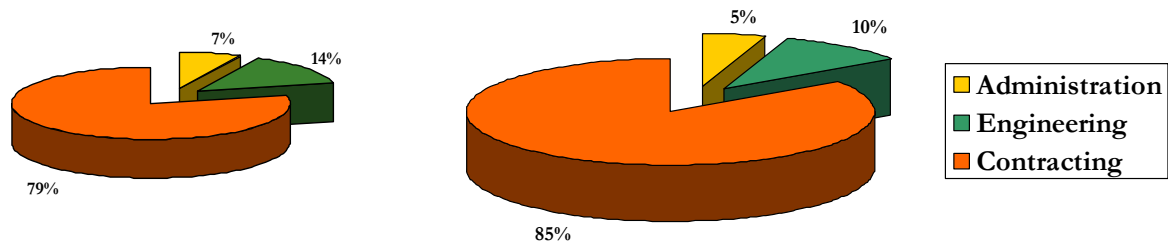
- 1) Updating capital cost projections;
- 2) Developing administrative costs;
- 3) Links between projects/amalgamation;
- 4) Critical path constraints between projects;
- 5) Optimization and efficiencies;
- 6) Other practical or political implications; and
- 7) Equipment procurement.

### 4.1. Updating Capital Cost Projections

Cost projections in the earlier Phase 1 and Phase 2 Technical Reports were based on direct construction costs estimated in 2009 values. These values were amended to include provisions for engineering design and project management services and a 10% contingency. Depending on the proposed year of implementation, the costs were then corrected to current dollar values assuming a 2% inflation rate. Administrative budgets were determined for the purposes of initiating projects and meeting internal reporting requirements to understand the cumulative workload requirements from the project schedule on RDCK staff. These values are not included in project overall cost totals or the values presented in the Gantt chart.

Congruent with past RDCK practice, project management costs are assumed to be contracted out and are thus included in the engineering budgets, which are in turn, included in the overall estimated project costs in the summary tables and the Gantt chart. For both administration and engineering estimates the values are shown as percentages of estimated contracted project costs. The percentages were selected using feedback from managers in the industry and staff at the RDCK. Percentages vary with project size with \$50,000 being the typical point where economy of scale factors in. The proportion of costs for larger and smaller projects attributed to administration, engineering services (design, detailed cost estimates and project management), and contracting are indicated in the figure below:

**Figure 1 Proportion of Costs for Projects <\$50,000 and >\$50,000**



The cost estimates provided are high level projections based on information provided in a variety of RDCK design and operating reports and studies, by RDCK staff and industry averages. These values should be confirmed with engineering estimates when a project is to be budgeted.

#### **4.2. Developing Administrative Costs**

In the scope of work the RDCK requested that the implementation plan identify the in-house RDCK human resources or contracted staff required to coordinate and administer the outlined capital projects by sub-region. In further discussion with the RDCK it was agreed to report the administrative workload as a dollar value to compare in-house RDCK staff commitments required during plan implementation. RDCK staff will translate this value into FTEs if and when necessary.

These administration costs identify and reflect the staff and management time borne internally by the organization in obtaining approvals, pre-design tendering (scope of work, tendering design contract), tendering the contracts, processing payments, providing project updates to the Board, and final commissioning. Due to the number of project schedules in the implementation plan it is recommended that sufficient staff resources be identified and managed accordingly.

Administration costs associated with the projects in the implementation plan are calculated on each project sheet of each site and totalled in the summary tables separately from the overall estimated project costs, contracting and engineering and separate from the Gantt chart. For both administration and engineering estimates the values are calculated as percentages of estimated total project costs as noted in the previous section.

### **4.3. Links between Projects/Amalgamation**

Links between projects that, due to geographical location or common themes in scope and task, provide an opportunity for economy of scale in simplified administration, engineering or contracting when amalgamated were identified.

The primary amalgamations involve septage management upgrades, clean wood receiving and yard & garden composting that were scheduled to happen at any given site. These projects were also amalgamated with general site upgrades where possible for the same reasons. Where a site had transfer systems being installed, it is envisioned that all this work would fall under one tender and be completed by one contractor for efficiency and economy of scale.

### **4.4. Critical Path Constraints between Projects**

Critical paths were defined as occurring when specific capital works projects must proceed before another specific project can begin for practical purposes or other reasons:

- The limiting factor for landfill transitions in Nakusp and Central is in the development of alternative transfer systems. Thus a priority was put on initiating transfer systems and transfer site upgrades before the temporary closure works at these two landfills is completed.
- Some transfer sites may need to be relocated before development can occur. This puts a priority on sites such as Nelson and Kaslo, which are key transfer sites. Marblehead relocation was not prioritized as it is a satellite site and not on the main mixed waste transfer loop.
- Engineering detailed design study to be completed with respect to the transfer and compaction trailer system to confirm the site-specific design parameters before transfer station upgrades take place. This study has been identified to RDCK staff as being completed prior to 2012 and hence does not show on the Gantt chart.
- Heavy equipment upgrades in Ootischenia to occur when consolidation of waste occurs and tonnage increases at the site.

All projects were also individually identified to RDCK staff as essential or non-critical. Non-critical projects can be deferred if resources are not available to complete them in any given year. Non-critical projects centred on organics management: wood receiving and yard and garden composting. Waste transfer projects were deemed essential.

#### **4.5. Optimization and Efficiencies**

Factors that impact the timing of the transitions and how they affect operations efficiency, transfer route optimization and continuity were identified and discussed with RDCK staff.

In order to optimize transfer trailer routing, the Nelson transfer site needs to be upgraded and operational as a first priority. The Nelson site itself generates enough waste to warrant the use of one full compaction trailer. Having that first compaction trailer up and running takes the pressure off the Central landfill to allow closure activities to begin in 2013, and also limits the truck traffic going to Ootischenia (each compaction trailer eliminates multiple roll-offs) in the transition.

The second wave of transfer upgrades would complete the Central loop followed by the West transfer sites the following year. This sequence allows for the optimization of trailer routing while providing the benefit of incorporating any lessons learned during the first installations and the first year of operations.

Once the transfer upgrades are initiated, it is effective to complete them in a sequential process over a short number of years to maximize efficiencies and build continuity.

#### **4.6. Other Practical or Political Implications**

The initial findings were reviewed with RDCK staff to determine any other practical or political implications that may alter the schedule or prioritize projects.

The overall workload entailed by the 5 year project timeframe was reviewed to determine whether extending to a 7 or 8 year plan was warranted. Further review revealed that once the process was started it was important to complete the transition in a timely manner in order to maintain efficiencies and continuity. Thus a five year plan was maintained.

Due to the number of projects occurring over a short period of time and the administrative workload that would impact operation of the RDCK, some projects were deferred later in the five year plan to balance the burden to a certain degree.

While a number of projects at the Creston landfill and in the East sub-region were deemed non-critical with respect to timing, they were moved up in the schedule as practically there was interest to get these developments in place sooner than later. For these projects, the only factor that may delay the implementation is the potential need to spread out the overall costs across the entire region for funding purposes.

#### **4.7. Equipment Procurement**

The topic of equipment procurement with respect to the fixed modular bin system was dealt with under a separate cover from this report

## 5. RESULTS

This section summarizes the following results:

- a) Implementation schedule: Gantt chart;
- b) Overall cost projections; and
- c) Administrative costs by sub-region.

### 5.1. Implementation Schedule

The capital project implementation schedules for each sub-region are shown in Table A, B, and C. The tables provide a list of the projects that are proposed to be constructed during the period of 2012–2016. The projects are listed by location within each sub-region. The projects have been colour coded according to the nature of the project into the following categories: (i) transfer station upgrade; (ii) landfill project; (iii) equipment purchase; and, (iv) organics management upgrade.

As indicated in the notes, the costs provided in the chart include engineering services (design, cost estimating, and project management) in addition to the construction cost and a 10% contingency. Depending on the year of expenditure, the 2009 costs have been adjusted for inflation assuming a 2% annual inflation rate. RDCK in-house administrative commitments associated with the projects that are calculated in the following section are not included in this table as part of the project totals.

**Table A: Project List and Schedule for West Sub-Region**

	2012	2013	2014	2015	2016
<b>West Subregion</b>					
<b>Ootischenia</b>					
Septage facility upgrade			\$ 40,800		
Clean wood receiving and grinding area			\$ 101,400		
Y&G compost area			\$ 71,700		
Site equipment upgrade and replacement		\$ 619,000			
<b>Slocan</b>					
Site improvement + one multi-point bin installation			\$ 14,820	\$ 215,880	
Clean wood receiving and grinding area			\$ 1,500	\$ 15,000	
Closure of former landfill				\$ 80,000	
<b>Roseberry</b>					
Site improvement turnaround expansion, multi-point bins installation			\$ 14,820	\$ 215,980	
Clean wood receiving and grinding area			\$ 2,220	\$ 21,780	
Closure of former landfill					\$ 80,000
<b>Nakusp</b>					
General Public receiving area upgrade			\$ 3,800	\$ 32,000	
Site improvement for two multi-point bins			\$ 33,240	\$ 484,160	
Septage facility upgrade			\$ 1,900	\$ 19,300	
Clean wood receiving and grinding area			\$ 5,800	\$ 57,900	
Y&G compost area			\$ 1,900	\$ 19,300	
Landfill Closure costs				\$ 27,300	\$ 397,200
<b>Burton</b>					
General site upgrade and bin replacement				\$ 87,400	
Clean wood receiving and grinding area				\$ 15,700	
Closure of former landfill				\$ 80,000	
<b>Edgewood</b>					
General site upgrade and bin replacement				\$ 87,400	
Clean wood receiving and grinding area				\$ 15,700	
Closure of former landfill				\$ 80,000	

**Notes:**

1. Costs reported above include engineering/project management services and a 10% contingency and have been adjusted from 2009 dollar values using a rate of inflation of 2%.

2. Where costs for a single project are carried out over more than one year, the first year costs reflect engineering efforts for detailed design and cost estimating.

**Project key:**

Transfer station upgrade
Landfill Closure

Equipment
Organics upgrade

**Table B: Project List and Schedule for Central Sub-Region**

	2012	2013	2014	2015	2016
<b>Central Subregion</b>					
<b>Central landfill</b>					
General Public receiving area upgrade	\$ 7,020	\$ 73,380			
Transfer site development for two multi-point bins	\$ 31,280	\$ 330,920			
Septage facility upgrade	\$ 2,600	\$ 37,500			
Biosolid/septage compost area	\$ 8,100	\$ 118,100			
Clean wood receiving and grinding area	\$ 6,500	\$ 94,200			
Y&G compost area	\$ 6,200	\$ 90,800			
Landfill closure	\$ 158,640	\$ 2,308,760			
<b>Nelson</b>					
Site reconfiguration (including four multi-point bins installation)	\$ 2,154,680				
Clean wood receiving and grinding area	\$ 21,300				
Closure of former landfill		\$ 150,000			
<b>Balfour</b>					
General site upgrade and single multi-point bin installation		\$ 14,520	\$ 211,680		
Y&G compost area		\$ 1,500	\$ 15,300		
Clean wood receiving and grinding area		\$ 2,100	\$ 21,200		
Closure of former landfill					\$ 80,000
<b>Kaslo</b>					
Public receiving area upgrade			\$ 351,700		
Road, power, fencing or site relocation		\$ 333,800			
Clean wood receiving and grinding area			\$ 67,900		
Y&G compost area			\$ 53,100		
Closure of former landfill					\$ 80,000
<b>Marblehead</b>					
Site relocation or upgrade and bin replacement					\$ 377,400
Clean wood receiving and grinding area					\$ 15,700
Closure of former landfill			\$ 80,000		
<b>Ymir</b>					
Convenience site preparation					\$ 70,600
<b>Rolling Stock upgrades</b>					
Bin refurbishing for woodwaste	\$ 31,800	\$ 32,500	\$ 33,100	\$ 33,800	\$ 34,500
Tractor and compactor trailers (2 plus backup)		\$ 714,000		\$ 364,000	
Loader at Nelson Transfer Site	\$ 350,000				

**Notes:**

1. Costs reported above include engineering/project management services and a 10% contingency and have been adjusted from 2009 dollar values using a rate of inflation of 2%.

2. Where costs for a single project are carried out over more than one year, the first year costs reflect engineering efforts for detailed design and cost estimating.

**Project key:**

Transfer station upgrade	Equipment
Landfill Closure	Organics upgrade

**Table C: Project List and Schedule for East Sub-Region**

	2012	2013	2014	2015	2016
<b>East Subregion</b>					
<b>Creston landfill</b>					
General site upgrade	\$ 33,600				
Septage facility upgrade	\$ 130,700				
Biosolid/septage compost area	\$ 125,900				
Clean wood receiving and grinding area	\$ 97,400				
Y&G compost area	\$ 77,200				
Landfill improvements (Closure Phase 1B)	\$ 1,136,055				
Landfill improvements (Closure Phase 1C+ toe stabilization)	\$ 42,767	\$ 937,067			
<b>Boswell</b>					
Closure of former landfill					\$ 80,000
<b>Crawford Bay</b>					
Site improvement (expanded tipping area, new roads) plus bin wall and bins	\$ 365,000				
Clean wood receiving and grinding area	\$ 53,500				
Y&G compost area	\$ 14,900				
Closure of former landfill					\$ 80,000

**Notes:**

1. Costs reported above include engineering/project management services and a 10% contingency and have been adjusted from 2009 dollar values using a rate of inflation of 2%.

2. Where costs for a single project are carried out over more than one year, the first year costs reflect engineering efforts for detailed design and cost estimating.

**Project key:**

Transfer station upgrade	Equipment
Landfill Closure	Organics upgrade

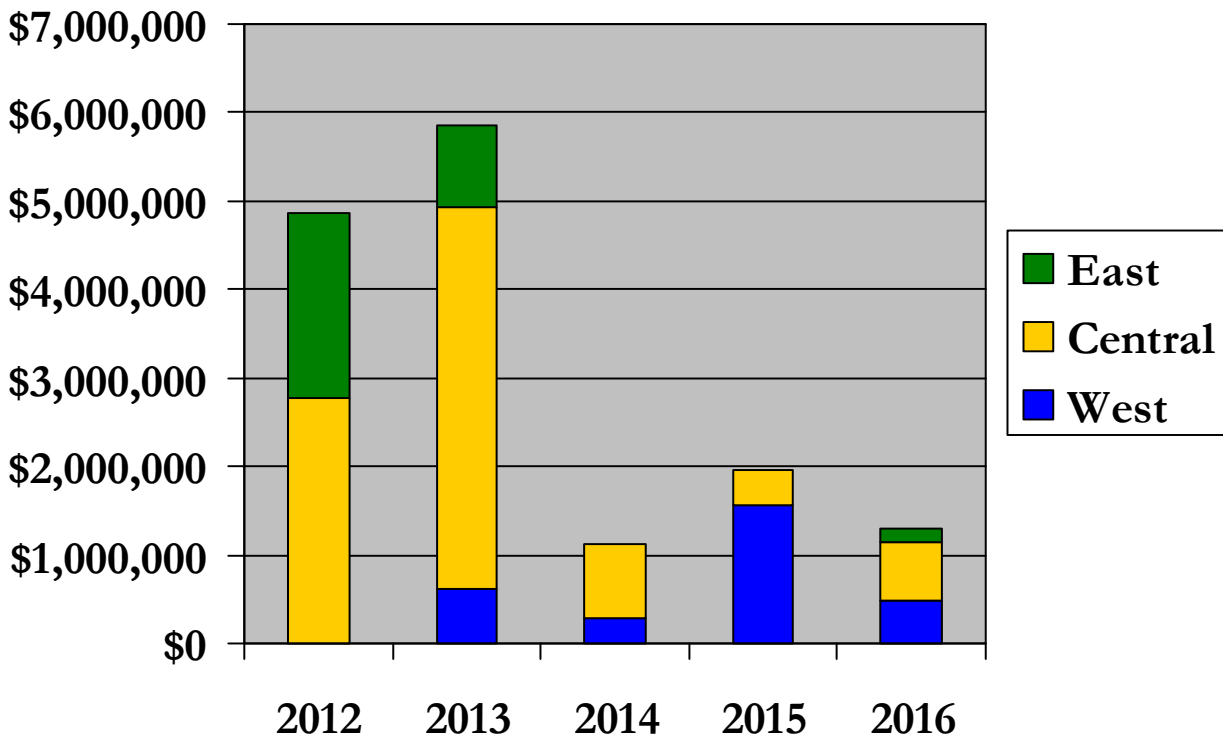


## 5.2. Overall Cost Projections

The overall project costs (excluding administrative costs) are provided for each year by sub-region in Table D.

**Table D: Overall Project Costs for Each Sub-Region for 2012–2016**

Sub-Region	2012	2013	2014	2015	2016
West Sub-Region	\$0	\$619,000	\$294,020	\$1,554,780	\$477,200
Central Sub-Region	\$2,778,120	\$4,302,140	\$833,920	\$397,800	\$658,200
East Sub-Region	\$2,077,122	\$937,067	\$0	\$0	\$160,000
<b>Total</b>	<b>\$4,855,242</b>	<b>\$5,858,207</b>	<b>\$1,127,940</b>	<b>\$1,952,580</b>	<b>\$1,295,400</b>



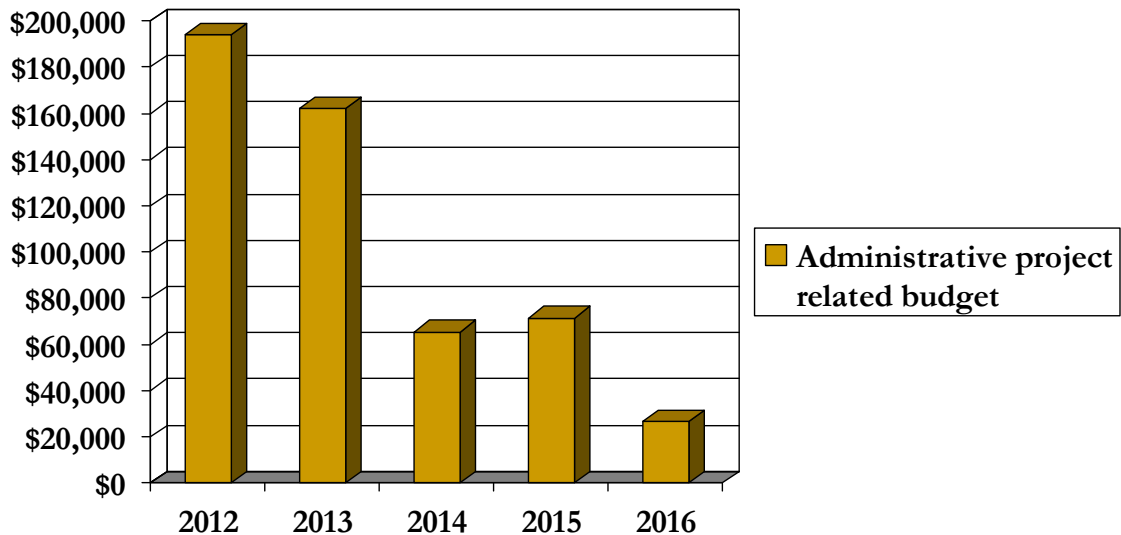
In general, the upgrades in the East sub-region have been scheduled early into the process to take advantage of the benefits of having them implemented sooner. The largest projects are occurring in the Central sub-region and generally need to be completed in a sequential timeframe to maximize the anticipated efficiencies from the various investments. The projects in the West sub-region have been deferred later into the planning period to even out administrative efforts and to align with the increased operating revenues that will occur following the Central sub-region's capital improvements.

### 5.3. Administrative Cost Projections by Sub-region

To assist with identifying internal RDCK staffing needs that will be associated with managing the capital works, an administrative budget associated with each project has been developed and the timing of the expended effort attributed within the appropriate year. The administrative tasks include those that are likely to be carried out in-house and include: defining the project for Board approval; tendering the engineering design and detailed cost estimating contract; tendering the contractor contract; administering the project budget; internal progress reporting and commissioning activities. Generally for larger projects, a portion of the administrative effort is initiated and carried out during the year prior to implementation, while in smaller projects administrative tasks are typically initiated within the same year as construction is completed.

The aggregate administrative workload reflected by the capital works implementation plan over and above the normal ongoing duties of RDCK staff is displayed in the following Figure 2. This figure indicates the greatest administrative load will occur in the first two years of this five year plan. Additional administrative costs that occur in 2011 have been discussed with RDCK staff. In order to deliver the proposed capital work plan, RDCK will need to review staffing capacity and determine whether additional staffing resources will be required.

**Figure 2 Administrative Resource Requirements Associated with the Capital Work Program from 2012–2016**



## 6. GENERAL LIMITATIONS AND CONFIDENTIALITY

This report has been prepared by SNC-Lavalin Environment, Division of SNC-Lavalin Inc. (SLE) for the exclusive use of the Regional District of Central Kootenay (RDCK), who has been party to the development of the scope of work for this project and understands its limitations.

This report is intended to provide information to the RDCK to assist it in making business and operational decisions. SLE is not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions. In providing this report, SLE accepts no liability or responsibility in respect to the residual management system described in this report or for any business decisions relating to the system, including decisions in respect of the modification or investment into the system.

Any use, reliance on, or decision made by a third party based on this report is the sole responsibility of such third party. SLE accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SLE in this report reflect SLE's best judgement based on the residual management system's conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this system and are based, in part, upon visual observation of the sites, review of available reports and records prepared by others as described in this report during a specific time interval. The findings cannot be extended to previous or future conditions or to portions of the system which were unavailable for direct observation.

The findings and conclusions of this report are valid only as of the date of this report. If conditions change, new information is discovered, or unexpected conditions are encountered in future work, including other studies, SLE should be requested to re-evaluate the findings, conclusions and/or recommendations of this report, and to provide amendments as required.

Copying of this report is not permitted without the written permission of the RDCK and SLE.

## 7. REFERENCES

SNC-Lavalin Environment, RDCK Resource Recovery Plan – Landfill Consolidation and Waste Transfer System Financial Modeling - Technical Report dated March 1, 2010

SNC-Lavalin Environment, RDCK Resource Recovery Plan – Organics Management Strategy technical report revised August 8, 2010.