FINAL REPORT | October 25, 2016

GREEN RIVER MUNICIPAL SOLID WASTE OPERATIONS REVIEW

Green River, Wyoming

PREPARED BY:

NewGen Strategies & Solutions

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October 25, 2016

Mr. Chris Meats
Director of Finance
City of Green River
50 E. 2nd North
Green River, WY 82935

Subject: Green River Municipal Solid Waste Operations Review – Final Report

Dear Mr. Meats:

NewGen Strategies and Solutions, LLC (NewGen) is pleased to present the City of Green River (City) with the enclosed report detailing NewGen's operational assessment of the City's municipal solid waste operations. This study focuses on the City's current residential and commercial solid waste and recycling collection operations as well as potential changes to the City's collection vehicle configuration. In addition we have addressed a number of operational and financial policy issues associated with the solid waste utility.

We appreciate the opportunity to assist the City with this engagement. Additionally, we would like to acknowledge the excellent assistance that we received from City staff. Without their support this project could not have been completed. Please contact us if you have any questions regarding this report.

Sincerely,

NewGen Strategies and Solutions, LLC

David S. Yanke
President – Environmental Practice

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Section 1
CURRENT OPERATIONS

1.1 Purpose for Study

In March 2016 NewGen Strategies & Solutions, LLC (NewGen) was retained by the City of Green River to conduct a comprehensive water, wastewater and solid waste cost of service and rate design study. As part of the cost of service study, NewGen conducted a detailed allocation of all equipment and personnel associated with each specific solid waste service provided by the City (garbage collection – 90 and 300 gallon plastic containers; metal dumpster – garbage collection; commercial cardboard collection; etc.). After NewGen completed the allocation of equipment and personnel to the various solid waste services provided by the City, and analyzed the costs of each particular solid waste service, a number of operational issues were raised by NewGen.[1] Discussions between NewGen and City staff concerning these operational issues confirmed that further analysis was needed to look at some of the City's solid waste collection services (commercial cardboard recycling, metal dumpster – garbage collection, on-call bulk trash collection, etc.) and to determine what, if any changes, were needed. As a result, the City retained NewGen in July 2016 to study the City's solid waste utility. The operational analysis specifically focused on the following key components:

- Collection Efficiency
- Routing
- Staffing
- Equipment
- Cost (operating and capital)
- Standard Operating Procedures/Best Management Practices

The report is structured in the following format:

Section 1: Current Operations – This section provides a description of the current services provided by the City, the type of equipment utilized, and some of the operational metrics associated with the various collection activities.

Section 2: NewGen Observations – This section summarizes Mr. Dave Yanke's time in the field observing the various collection activities and discussions with staff as they conducted their tasks. This is a critical component in any operational assessment.

Section 3: Alternative Equipment Configurations – This section identifies some of the other types of equipment that are available for the provision of the services currently provided by the City.

Section 4: Analysis – Based on the review of current operations (Section 1), NewGen's field observations (Section 2) and NewGen's familiarity with different types of solid waste collection equipment (Section 3), NewGen conducted a series of analyses to determine what types of operational changes the City might

[1] It is not uncommon during the course of conducting a solid waste cost of service study that operational issues are identified, which results in operational assessments of the services being provided to see if changes to the operations are necessary.

wish to consider undertaking, if any, to improve the financial and operational performance of the City's solid waste operations.

Section 5: Findings, Recommendations, and Next Steps – This section builds upon the prior four sections of the report and summarizes NewGen's findings and the associated recommendations and next steps that NewGen would propose the City consider implementing.

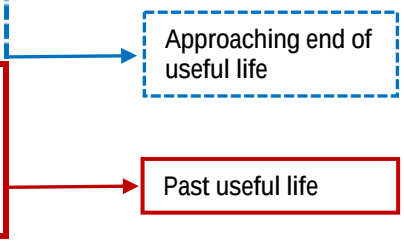
1.2 Current Collection Configuration

The City currently utilizes automated side load and rear load trucks, as well as a flatbed truck to complete City collection of residential and commercial refuse, recycling, and yard waste materials.[2]

Table 1-1
Current Solid Waste Equipment Configuration

Equipment Type	Front Line/ Back-up	Make	Model	Year	Vehicle Age
Automated Side Load [1]	Front Line	Peterbilt	320	2017	New
Automated Side Load	Front Line	Peterbilt	320	2014	2 years
Automated Side Load	Back-up	Peterbilt	320	2008	8 years
Automated Side Load	Back-up	Peterbilt	320	2007	9 years
Automated Side Load [2]	To Be Retired	Volvo	Xpeditor	1998	18 years
Rear Load	Front Line	GMC	Topkick	1992	24 years
Rear Load	Back-up	Ford	LN8000	1995	21 years
Flatbed	Front Line	GMC	Topkick	1994	22 years

1. The City is purchasing a new automated side load truck in the first quarter of 2017.
2. With the addition of the new automated side load truck, this truck will be retired from service.



In New Gen's experience, solid waste front line equipment's useful life typically ranges from seven to ten years, depending on the type of vehicle, and the nature of the collection operation. ***As shown in Table 1-1, the City's current fleet exceeds the typical "vehicle life" for the majority of its equipment, or is approaching the age when it should be considered for replacement.***

[2] For purposes of this study, we will use the terms "garbage" and "refuse" interchangeably to refer to materials collected from residential and commercial accounts that are taken to the landfill for disposal and burial. "Yard waste" refers to brush, leaves, and grass clippings that are collected by the City and taken to the landfill to be mulched and/or turned into compost – this material is NOT landfilled. "Cardboard" is collected from commercial businesses that generate a significant amount of cardboard as part of their business and is baled at the City's recycling center. "Bulk Trash" refers to large items picked up from residential accounts and typically refers to items such as refrigerators, sofas, etc.

New Gen has summarized the expenses associated with the City's solid waste collection trucks in the table below.

Table 1-2
Solid Waste Equipment Capital Costs and O&M Expense [1]

Equipment Type	Collection Operation	City's Capital Cost (Historical Purchase Price)	City's Average Annual O&M [2]	City's Average Annual Fuel [2]
Automated Side Load	Residential and Commercial Cart Collection	$200,000 - $250,000	$26,500	$14,500
Rear Load [3]	Metal Dumpster Collection	$120,000 - $200,000	$9,500	$2,200
Flatbed	10 Cubic Yard (CY) Roll-off Collection	$75,000	$3,000	$1,000

1. The cost data is based on the City's current costs for operating the equipment, as well as historical purchase prices and projected purchase prices.
2. Average O&M and annual fuel prices are per vehicle.
3. The City has not purchased a new rear load truck since 1995, which was purchased for $120,000. Due to the increase in price for rear load trucks over the past twenty years, NewGen has updated the cost of rear load trucks to more accurately reflect the cost of a rear load truck if one were to be purchased by the City in 2017.

Figure 1-1. Current Green River Automated Side Load Vehicle

Figure 1-2. Current Green River Flatbed Vehicle

Figure 1-3. Current Green River Rear Load Vehicle

Table 1-3 summarizes the City's current routing schedule which shows what days the City provides its refuse, cardboard recycling, and yard waste collection services.

Table 1-3
Current Routing Configuration

Collection Activity	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Days per Operated per Week	Months of the Year
Automated Cart Collection - Garbage (Residential and Commercial)	2 [1]	2	2	2	2	1	6	12
Metal Dumpster Collection - Garbage	1		1				2	12
Roll-off Collection - 10 CY							On-Call	
Recycling Collection - Commercial Cardboard		1		1			2	12
On-Call Bulk Trash Collection							On-Call	
Yard Waste Collection								
December – March					N/A			
April – November	1		1		1		3	8
Community Clean Up							3 Times Per Year	

1. Route Terminology: Automated side load (ASL) trucks operate two routes per day, Monday through Friday, and one route on Saturday.

Due to the size of the City, and as a result of the smaller number of commercial businesses within the community, the rear load garbage, yard waste, and commercial cardboard recycling operations (which are collected in metal dumpsters) while listed in the above table as occurring two to three times per week, do not take a full day to complete. For instance, the commercial rear load garbage collection is completed in less than two hours. The amount of time spent on yard waste collection is oftentimes completed in two to four hours. Therefore, when the rear load vehicle finishes collecting garbage on Monday, and has disposed of its garbage at the landfill, that same truck then goes and collects yard waste and deposits the material at the landfill (in an area separate from where garbage is deposited), to be mulched and/or composted at a later date.

1.2.1 Benchmarking Current Equipment Costs

New Gen evaluated the City's current fleet and benchmarked the capital costs and annual O&M expense of the City's equipment versus the following sources: a) other municipalities – including Cody, Casper, and Riverton, Wyoming; b) quotes from solid waste collection equipment vendors; and c) NewGen's industry experience. Table 1-4 compares Green River's costs versus the benchmarked data.

Table 1-4
Benchmarking Solid Waste Equipment Cost [1]

Equipment	Capital Cost		Annual O&M Expense	
	Green River [2]	Average [3]	Green River [2]	Average [3]
Automated Side Load	$200,000 - $250,000	$200,000 - $295,000	$26,500	$26,000
Rear Load	$200,000 [4]	$160,000 - $250,000	$9,500 [5]	$17,000
Commercial Side Load	N/A	$135,000 - $235,000	N/A	$20,000
Font Load	N/A	$210,000 - $270,000	N/A	$23,000
Skid Steer	N/A	$30,000 - $110,000	N/A	$17,000
Transfer Trailer Cab	N/A	$140,000 - $185,000	N/A	$30,000
Transfer Trailer	N/A	$125,000	N/A	$20,000

1. Costs reflected in this table reflect those amounts for a single vehicle.
2. Green River costs have been sourced from the City's historical cost data, shown in Table 1-2.
3. Average capital costs and annual O&M expenses are based on vendor quotes received (e.g., Peterbilt, LaBrie, Kann, etc.), cities in Wyoming, and NewGen's previous work with municipalities across the country.
4. The City has not purchased a new rear load truck since 1995, which was purchased for $120,000. Due to the increase in price for rear load trucks over the past twenty years, NewGen has updated the cost of rear load trucks to more accurately reflect the cost of a rear load truck if one were to be purchased by the City in 2017.
5. The City's annual O&M expense appears lower than the industry average due to the lower utilization of the trucks (i.e., the trucks are oftentimes operated less than 20 hours a week).

As shown in Table 1-4, the City's current equipment capital costs and annual O&M expenses are comparable with other municipal operations, NewGen's experience, and the quotes received from vendors. NewGen would emphasize that the cost of a particular solid waste collection vehicle (e.g., an automated side load) can vary greatly, oftentimes in excess of $100,000. This range in price is due to a number of factors including the size of the packer (the back part of the truck where garbage is collected), which may range from 28 to 44 cubic yards (CY) in capacity; as well as the chassis (cab, engine, etc.) which may range significantly in price due to the type of chassis purchased, size of engine (diesel versus compressed natural gas), transmission, etc.

NewGen would note that the City's annual maintenance expense for rear load equipment is shown as being lower than the average O&M expense NewGen has encountered; however O&M costs will often vary due to internal hourly billing rates, whether parts are marked up, fleet service overhead factors, etc. In addition, the City's rear load trucks are oftentimes run for less than 20 hours a week. NewGen would emphasize that the City's rear load trucks break down fairly frequently and one was recently "rebuilt," which is not captured in the O&M cost data. Therefore, NewGen does not believe the O&M expenditures shown for rear load in Table 1-4 accurately capture the true costs of operating these trucks.[3]

[3] When Mr. Yanke was in Green River conducting field observations one of the rear load trucks had problems starting in the morning, and required repeated attempts to get the vehicle operational.

1.3 Current Collection Operations

City staff compiled three weeks of operational time and motion (T&M) data for NewGen. NewGen then reviewed the T&M data and analyzed it prior to Mr. Yanke spending three days in the field conducting observations. This analysis allowed NewGen to benchmark Green River's operations versus other communities, and what is considered "a normal range" within the industry for various solid waste and recycling collection services provided by Green River. Utilizing this operational data and Mr. Yanke's three days in the field observing operations and visiting with staff, NewGen has completed the operational review of the City's current collection practices.

1.3.1 Automated Cart Collection

The City serves approximately 6,000 cart customers weekly. The City operates two automated side load routes, five days a week (Monday through Friday), and a single route on Saturday. The automated collection operation serves, on average, 80 customers per hour, and 467 customers per route day.[4] Based on the City's collections per route, the current collection operation is appropriately sized at two weekly routes. The average tonnage per load for the automated side load collection operation is 6.4 tons.

1.3.2 Metal Dumpster Collection

The City serves commercial refuse and recycling customers, as well as residential yard waste drop-off sites, with rear load collection trucks. The customer counts for refuse dumpster collection service are listed in Table 1-5.

Table 1-5
Dumpster Customer Lifts Based on City's Time and Motion Data [1]

	Refuse Collection
Dumpster Lifts per Route	6-8
Cubic Yards of Capacity per Route	14-18

1. Refuse collection information is based on data collected from City staff in the month of August 2016.

Table 1-6
Dumpster Customer Lifts Based on NewGen's Time and Motion Data [1]

	Recycling Collection	Yard Waste Collection
Dumpster Lifts per Hour	14	11
Cubic Yards of Capacity per Route	105	48

1. Recycling and yard waste collection information is based on data collected by NewGen during field observations on August 29-31, 2016.

As shown in Tables 1-5 and 1-6, there are relatively few commercial refuse dumpster customers. Due to the low volume of refuse dumpster customers, the City currently runs one dumpster collection route on Monday and Wednesday, which collects garbage and yard waste material. The majority of the dumpster

[4] Metrics were developed based on data collected by City of Green River staff in the month of August 2016. City data indicates there are an average of 5.83 hours of "collection time" for each daily route (excluding pre- and post-trip inspections, travel time to/from the landfill, breaks, etc.). 5.83 hours x 80 collections per hour= 467 customers served per route day.

routes typically take less than four to six hours per day to complete. ***NewGen would note that due to the age of the rear load trucks, yard waste is collected in only 2 CY dumpsters, because the hydraulic systems for the rear load trucks are not capable of lifting 3 CY dumpsters filled with yard waste.*** Rear load trucks should be capable of lifting 3 CY dumpsters filled with yard waste (which is by its nature a heavy material). The inability to use 3 CY dumpsters requires the trucks to lift more containers, which takes longer and is inefficient from an operational standpoint.[5]

It is not uncommon in smaller cities (less than 25,000 in population) that the sizing of commercial routes is not as efficient as in larger cities, because there are simply not enough businesses that require the volume of service (weekly, and or daily "lifts" of dumpsters) to result in an efficiently sized route. As a result, the sizing of Green River's metal dumpster routes (for refuse, cardboard recycling, and yard waste) are not as efficient as they would typically be in a larger city. Therefore, one of the options that NewGen evaluated during the conduct of this study (discussed in Section 4) is the potential conversion from a rear load configuration of trucks to the use of front load vehicles that would also potentially begin collecting some of the City's commercial accounts that currently use 300 gallon plastic containers, and could be converted to front load dumpsters (e.g., McDonalds).[6] This potential option would allow the City to move some of its 300 gallon plastic container customers to front load dumpsters, which would allow the City to begin to "re-balance" some of its routes as the City's automated side load (ASL) trucks begin to direct haul to the county's regional landfill, which will reduce the amount of time that the trucks have to collect containers, as there will be more time spent driving to the county landfill, which is a greater distance than the City's landfill.

The City's current metal dumpster route configuration is presented in Table 1-7 below.

Table 1-7
Current Metal Dumpster Collection Configuration

Collection Activity	Monday	Tuesday	Wednesday	Thursday	Friday
Metal Dumpster – Refuse	1		1		
Recycling Collection – Commercial Cardboard		1		1	
Yard Waste Collection (April – November)	1		1		1

[5] For instance, if a yard waste collection drop-off site has 12 – 2 CY dumpsters, that same site could use 8 – 3 CY dumpsters if the truck was capable of picking up 3 CY dumpsters. Given that each "lift" takes approximately 2-3 minutes, that is a time savings of 10 minutes on average (2.5 minutes times 4 fewer dumpsters). While this does not sound like a big savings in time, when increased lifting capacity is added across all services (yard waste, garbage, and recycling); coupled with the other benefits associated with a front load garbage truck versus a rear load truck, the operational savings begin to accumulate. The benefits of front load collection vehicles will be discussed in more detail in Section 4 of the report.

[6] McDonald's, and several other businesses, have requested the City provide disposal options other than the 300 gallon plastic containers (1.5 cubic yard capacity). For instance, a 6 CY metal front load dumpster would replace the need for the 4 – 300 gallon plastic containers – which McDonald's currently has.

1.3.3 On-Call Bulk Trash Collection

The City's current on-call bulk trash collection operation utilizes a flatbed truck that City staff manually load the bulk trash on. In the solid waste industry, it is not atypical for bulk collection operations to be handled with a knuckle boom (i.e., grapple truck) or small loader to minimize employee injuries caused from lifting heavy materials.[7] Based on current records, it appears the City has less than 50 "on-call" bulk trash collections per year – or less than one per week. ***Due to the infrequency with which citizens utilize this on-call collection service, NewGen does not recommend the City invest in a knuckle boom vehicle, but instead NewGen recommends the City add an automated lift gate to an existing pick-up truck, or the next heavy-duty pick-up truck purchased by the solid waste utility.***

[7] The City has had an employee recently incur a shoulder injury while loading a refrigerator on to the flatbed truck, because of the need to lift the heavy item above their waist to get it on the truck.

Section 2
NEWGEN OBSERVATIONS

Mr. Dave Yanke, of NewGen, spent three days in Green River the week of August 29, 2016. The purpose for this visit was to observe the collection operations for the solid waste utility, as well as to visit with the drivers and supervisor of the solid waste utility. The primary focus of this time in the field was to observe the following activities:

- Automated side load (ASL) collection – 90 and 300 gallon plastic containers
- Metal dumpster collection – garbage
- Metal dumpster collection – commercial cardboard recycling
- Metal dumpster collection – residential yard waste drop-off sites
- Roll-off collection – 10 CY containers
- Scalehouse operations at the landfill
- Recycling/baling operation at the public works building
- Meeting with Inberg-Miller Engineers and City staff
- Conduct other observations and meetings as necessary

The comments below are provided to give the reader of this report an understanding of what operations were observed, and the staff that were interviewed. These meetings and field observations were used as the basis to conduct the analysis described in Section 4, and ultimately resulted in the findings and recommendations provided in Section 5.

2.1 Monday | August 29, 2016

Metal Dumpster Collection – Garbage

The City picks up six to eight commercial metal dumpsters on Monday and a similar number on Wednesday. Depending on whether the containers are over-loaded, etc. it oftentimes takes less than one or two hours to collect and dispose of this material. Given the very low number of containers that are collected prior to landfilling the material, this system is very inefficient.

One of the key goals of this study is to identify ways in which the City can better standardize the process for collecting refuse so as to better utilize it personnel and reconfigure its current trucks, or purchase a new type of truck that will result in a more efficient refuse collection process.

Because Green River is not a large city, it is essential that any recommendations made with regard to any types of new collection vehicles be such that the new vehicle is able to collect both refuse, yard waste and cardboard – as currently done by the rear load trucks – only in a more efficient manner.

Metal Dumpster Collection – Residential Yard Waste Drop-off Sites

Once the City finishes the collection and disposal of garbage from the metal dumpsters on Monday and Wednesday, the workers then collect yard waste from the City's three yard waste drop-off sites. Depending on the amount of material at the sites (e.g., overflowing bins, yard waste placed in the dumpsters in plastic bags – which is prohibited) this collection process usually takes two to four hours.

During the ride-along to observe the collection of these materials, and in discussions with the driver, NewGen learned that the City can only use 2 CY dumpsters to collect the yard waste because the hydraulics on the rear load trucks (which are 21 and 24 years old, respectively) are unable to pick-up 3 CY dumpsters. The need to use 2 CY versus 3 CY dumpsters results in the City having to place more dumpsters at the sites (which results in the City having to buy more dumpsters, and the dumpsters taking up more room), and results in the driver and laborer having to do more "lifts" than would be necessary if the City were able to use 3 CY dumpsters.[8]

It was noted that some citizens do not "break down" their branches prior to placing them in the dumpsters, which requires the laborer and driver to complete that task. It was also observed that some citizens place their yard waste in the dumpsters in the plastic bags they haul the material to the drop-off site in, but do not empty the yard waste out of the plastic bags and into the dumpster – which they are supposed to do. Again, this requires the driver and laborer, when they can visually see the bags, to break the bags apart at the drop-off site, or at the landfill. Figures 2-1 and 2-2 show the City's yard waste collection operations.

Figure 2-1. Yard Waste Collection

Figure 2-2. Yard Waste Collection Operation

Scalehouse Operations at the Landfill

NewGen toured the landfill while on-site the week of August 29th. During the tour, NewGen was able to spend approximately one and a half hours in the scalehouse and observe the citizens coming to the landfill to dispose of residential waste. One of the key observations was that there are numerous residents (not commercial contractors) that come to the landfill several times per month. The residents do this because they can come as many times as they want per month and dispose of their waste for free – there is no charge. This is **not** a standard industry practice for landfill or transfer station operations.

[8] A "lift" is defined as the cycle a rear load truck goes through to lift a dumpster to dump its contents in the back of the garbage truck, and then place the container back on the ground.

When the City begins operation of the new transfer station, NewGen would strongly recommend that the City charge a nominal fee or utilize a punch card system (8-10 "free" visits per year) for residents bringing waste to the transfer station. This will reduce the number of times residents come to the transfer station (they will consolidate their trips to the transfer station, or put their waste at the curb on their collection day). This will reduce the number of pick-ups, trailers, cars, etc. at the transfer station and reduce the possibility of there being an accident and/or a serious injury.

Figures 2-3 and 2-4 show the current landfill entrance and operations.

Figure 2-3. Landfill Entrance

Figure 2-4. Landfill Operations

2.2 Tuesday | August 30, 2016

Metal Dumpster Collection – Commercial Cardboard Recycling

NewGen observed the collection of commercial cardboard from businesses on Tuesday August 30th. The driver and laborer started their route at 8:01am and completed their route at approximately 11:35am. During that time they had 38 stops where they picked up a total of 50 dumpsters, with over 75% of them being 2 CY dumpsters, with the remainder being 3 CY dumpsters. Total weight of the material was 1.7 tons (or 3,420 pounds). Overall, the collection of the material was done in an efficient and safe manner. NewGen did observe that some of the businesses do not "break down" their boxes so they are flat when placed in the dumpster. Not breaking down the boxes is typically not a problem unless it results in the boxes over flowing out of the dumpster, which was observed in several instances.

NewGen observed only one business where if the City were to consider moving to a front load truck to collect commercial cardboard, the location of the dumpster would need to be moved. In conversations with the driver, he agreed that a front load truck would be capable of picking up all of the current commercial cardboard accounts with the exception of the one location identified by NewGen.[9] Figures 2-5 and 2-6 show the City's commercial cardboard collection operations.

[9] As part of this study, NewGen is studying the feasibility of converting the City from rear load collection trucks to front load trucks. To be cost effective, it is essential that garbage, cardboard and yard waste be able to be collected with a front load truck. It was determined during NewGen's observations that conversion to front load for commercial cardboard recycling is feasible.

Figure 2-5. Collection of Overflowing Commercial Cardboard Dumpster

Figure 2-6. Overflowing Commercial Cardboard Dumpster

Recycling/Baling Operation at the Public Works Building

Upon completion of the commercial cardboard collection route, NewGen observed the material being unloaded at the City's recycling/baling facility. During the observation, it was found that the facility is very crowded both with baled materials and the loose materials placed on the floor waiting to be baled. While this facility is sufficient to handle the material, the working floor for feeding the baler is small, and it is essential that all workers be aware when the skid steer is being used to collect material and place it in the baler, so as to avoid any accidents or injuries. Figures 2-7 and 2-8 show the City's recycling and baling center.

Figure 2-7. Tipping Floor

Figure 2-8. City Recycling/Baling Operations

Roll-off Collection – 10 CY Containers

The City provides a limited collection service with regard to roll-off containers (see Figure 2-9). The system utilized by the City includes a pick-up that pulls a trailer that hydraulically pulls the 10 CY roll-off container onto the trailer. The City provides this service primarily for construction and demolition projects – both for residents and commercial businesses. The City does not actively promote this service, and there are some private roll-off companies that provide service in Green River with 20, 30, and 40 CY roll-off containers. The current system is not viable in the long-term in NewGen's opinion due to the fact that 10

CY dumpsters cannot hold much material, at times the hydraulic system on the trailer is insufficient to pull heavier loads onto the trailer, and in our experience, most companies that offer a roll-off service offer a 20 CY roll-off container at a minimum. Most cities and private businesses use a traditional roll-off truck, not a trailer and pick-up "configuration." ***Conceivably, once the City has the transfer station operational and has two roll-off trucks at the transfer station, for direct hauling material to the county landfill, there might be an opportunity to continue to offer roll-off service with larger containers, with a traditional roll-off truck, as shown in Figure 2-10.***

NewGen provides a series of findings and recommendations in Section 5 with regards to the "next steps" proposed by NewGen for the City of Green River concerning its roll-off collection service.

Figure 2-9. C&D Pick-up

Figure 2-10. Roll-off Truck

2.3 Wednesday | August 31, 2016

Automated Side Load Collection – 90 and 300 Gallon Plastic Containers

NewGen observed one of the automated side load (ASL) trucks in operation on Wednesday morning. The route that was collected on this particular day had both residential 90s and commercial 300s. Several observations were made:

- At least 30-50% of the 300 gallon plastic containers that were being collected at commercial businesses could potentially be converted to front load dumpster containers, if the City decides to convert some of their commercial businesses to a front load dumpster configuration.[10]
- In some areas of town the driver is required to do a significant amount of "backing up" which is inherently dangerous in the solid waste industry, even with back-up cameras. By its nature, in some parts of the town, backing up is the only option, however, whenever possible, the City should route its trucks to minimize this practice.
- In certain parts of town the alley collection is made extremely difficult by low hanging power lines, building overhangs, and tree branches. NewGen would encourage the City to examine all 300 gallon containers that are placed in alleys and attempt to move any of those containers to other locations in the alley if they are currently in a location that could result in damage to the City equipment or to private property. In some cases, this may require the movement of a container only five or six feet from its current location.
- The observation of the ASL route was cut short because one of the arms on the ASL truck broke and needed to be repaired by fleet services.

Figure 2-11. 90 Gallon Collection

Figure 2-12. 300 Gallon Container

[10] If the City transitions from rear load to front load trucks, NewGen would recommend that only those businesses that have multiple 300 gallon containers and/or more than three pick-ups per week be considered for the transition to front load dumpsters. This would probably result in less than 20-30% of the City's commercial accounts being transitioned from 300 gallon containers to metal front load dumpsters.

Meeting with Inberg-Miller Engineers and City Staff

A meeting was held with Inberg-Miller Engineers and City staff to discuss the timing of constructing the transfer station and some of the design concepts associated with the project. The meeting was productive and allowed the City staff, Inberg-Miller and NewGen to discuss some of the timing aspects associated with when the transfer station will become operational. In NewGen's opinion the transfer station will be a valuable asset for the City and an integral component for moving waste from Green River to the county landfill.

During this meeting there was discussion regarding the capabilities of the existing City refuse trucks to direct haul to the county landfill, <u>during</u> the interim when the City landfill is closed and the transfer station is still being constructed. There is a general concern about the reliability of the rear load trucks, as well as some of the ASL trucks to be safe enough for driving on the interstate highway.

Section 3
ALTERNATIVE EQUIPMENT CONFIGURATIONS

In addition to providing cost and operational benchmark data comparisons for the City's current equipment, NewGen has included cost and operational data for alternative equipment configurations. NewGen has provided this section as information for the City staff and City Council so they can see some of the other types of equipment configurations that are different from what the City currently utilizes, but which are some of the more common equipment configurations within the solid waste industry. In addition, NewGen has provided commentary as to whether each of the equipment options are potentially viable for consideration by the City.

3.1 Commercial Side Load

A commercial side load collection vehicle utilizes hooks on the metal dumpsters to pick-up the container, without having to exit the vehicle. This is illustrated in Figure 3-1 below. A video of this operation can be viewed at the following website: https://www.youtube.com/watch?v=-wogBL3BqBk

Figure 3-1. Commercial Side Load Truck

A commercial side load collection vehicle is an alternative method that can be used for commercial collection; however, ***NewGen does not recommend this equipment configuration as this type of vehicle for commercial collection is not widely used across the solid waste industry.*** The lack of prevalence of this collection configuration makes the procurement of equipment for this operation challenging as only select vendors provide commercial side load vehicles and containers. Maintenance of the equipment can also be problematic if a vendor is not located nearby. The commercial side load operation is completed by one driver, as the dumpster collection is fully automated. Based on industry research and NewGen's

previous work with municipalities across the country, commercial side load trucks can cost between $135,000 - $235,000[11] depending on the specifications for the vehicle.

3.2 Commercial Front Load

Front load dumpster collection is the most common method of commercial collection in the United States. Like all commercial collection operations, this collection operation requires a location where the dumpster can be placed (a concrete "pad" is typically preferred over asphalt), and the driver needs to be able to approach the container with the front of the vehicle facing the container so it can be lifted over the front of the truck.[12] If the City of Green River adopts this collection method, NewGen recommends incorporating a requirement in the City's commercial building codes requiring that all new commercial construction have a location for front load dumpsters to be placed for easy pick-up by City trucks. This is a very common practice by municipalities. ***The most common impediment for front load collection includes narrow streets and a heavy reliance on alley collection. While Green River has areas of town that have narrow streets and alley collection, NewGen found that from an operational standpoint, front load collection is a viable option for the City of Green River.[13]***

Front load routes are operated by one driver as the dumpster collection is fully automated. Based on industry research and NewGen's previous work with municipalities across the country, commercial front load vehicles can cost between $210,000 - $270,000[12] depending on the specifications for the vehicle. A demonstration of this operational configuration can be viewed at the following website: https://www.youtube.com/watch?v=BeTyyapONho

Figure 3-2. Commercial Front Load Truck

NewGen analyzed the operational and financial implications of the City transitioning to a front load collection operation for commercial refuse, commercial recycling and yard waste collection. The analysis is provided in Section 4 of the report.

[11] Capital cost are based on vendor quotes received (i.e., Peterbilt, LaBrie, Kann, and others), cities in Wyoming, and NewGen's previous work with municipalities across the country.

[12] Observations by NewGen found that within Green River, commercial front load dumpsters could be used for commercial refuse, commercial cardboard, and residential yard waste drop-off site collection.

[13] As mentioned in Section 2 of this report, if the City were to purchase front load trucks, NewGen would recommend some – not all – commercial 300 gallon container accounts be converted to front load dumpsters. Those customers with 300 gallon containers on narrow streets or in alleys would probably keep their current 300 gallon container.

3.3 Rear Load with Skid Steer

An alternative collection method that could be utilized by the City for on-call bulk trash collection is to utilize a skid steer and rear load vehicle. Utilizing a skid steer is a practical alternative to using manual labor for heavy and potentially dangerous collections that could injure workers.

Figure 3-3. Rear Load and Skid Steer

As previously mentioned, the City currently owns two rear load trucks, that could be utilized in this collection configuration. Based on industry research and NewGen's previous work with municipalities across the country, skid steers can cost between $30,000 - $110,000 depending on the specifications for the equipment. ***Since the City only picks up approximately 50 or so on-call bulk trash pick-ups annually, we would not recommend this approach, and instead NewGen recommends installing a lift gate on an existing solid waste utility pick-up or on a new solid waste pick-up.***[14]

3.4 Knuckle Boom Truck

Another common configuration for serving bulk customers is using a knuckle boom truck (commonly known as a grapple truck). A knuckle boom truck is a cost effective configuration that is optimal for on-call or geographically disperse bulk collections. The knuckle boom configuration is shown below in Figure 3-4. Based on NewGen's previous work with municipalities across the country, knuckle boom trucks can cost between $115,000 - $210,000[15] depending on the specifications for the vehicle.

Figure 3-4. Knuckle Boom Truck

Due to the small and irregular nature of the City's bulk collection needs, NewGen does not recommend the rear load/skid steer or the knuckle boom equipment configuration for the City.

[14] A lift gate can be purchased for less than $5,000.
[15] Capital cost are based on NewGen's previous work with municipalities across the country.

Section 4
ANALYSIS

The first section of the report focused on an assessment of the City's current equipment and how it is utilized to provide solid waste services within the City of Green River. In Section 2, NewGen summarized its observations of the City's solid waste operations after spending three days in the field, including talking with the drivers and solid waste utility manager. In Section 3, NewGen described some other types of equipment that the City may wish to consider utilizing to provide solid waste and recycling services in a potentially more cost effective and efficient manner.

Section 4 builds on the work completed in the first three sections, and provides an analysis based on the findings of NewGen's operational assessment to determine whether front load equipment would be more operationally efficient than the City's current rear load trucks. NewGen also conducted a life-cycle cost analysis to compare the total cost of purchasing and operating front load equipment versus purchasing new rear load trucks.[16] Finally, NewGen conducted a high level cost/benefit analysis to determine the financial impact of long-hauling the City's refuse to another landfill, if at some point in the future the City wanted to dispose of its refuse somewhere other than the Rock Springs Landfill.

4.1 Front Load Refuse Collection Operation

NewGen's operational assessment indicated that the City can successfully serve the current rear load metal dumpster refuse customers with a front load truck. With front load commercial refuse collection, NewGen anticipates the City will have capacity to add additional commercial customers to the proposed front load route, allowing for growth in the front load commercial customer base.[17]

[16] The current rear load trucks that are operated by the City are 21 and 24 years old, respectively. Regardless of whether the City decides to move to front load collection, or stays with rear load collection, new trucks are going to need to be purchased by the City to replace the obsolete rear load trucks.

[17] In this scenario, the City would convert some of its commercial 300 gallon plastic container accounts to front load metal dumpsters.

Table 4-1 illustrates the routing capacity of the front load commercial refuse route.

Table 4-1
Time and Motion for Front Load Commercial Refuse Collection

Item	Hours	Minutes
Non-Collection Activities (Pre-check, fueling vehicle, lunch, etc.) [1]	1.67 hours	100 minutes
Disposal Time [2]	2.00 hours	120 minutes
Collection Time	4.83 hours	290 minutes
Total Workday	8.5 hours	510 minutes
Collection Time/Route Day		290 minutes
Time per Dumpster Collection [3]		4.30 minutes
Number of Dumpsters per Route		67 dumpsters

1. Based on data compiled by the drivers for three weeks prior to NewGen's field observations.
2. Assumes two disposal trips to the county landfill each route day.
3. Time per dumpster collection was developed using time and motion data collected by NewGen staff during their on-site visit. To be conservative, NewGen did not assume an increase in collection efficiency in transitioning from the current rear load to a front load collection process; however, based on industry experience, the front load operation will likely achieve greater collection efficiency than the current collection configuration.

The front load collection analysis shown in Table 4-1 was completed under the assumption that the City will direct haul material to the county landfill, which is estimated to take 60 minutes roundtrip (i.e., travel time to the landfill, time to tip the load at the landfill, and then time to travel back). The current City landfill is a 30 minute round trip, or less, depending on where in the City the collection truck is finishing its route prior to heading to the City landfill.

Currently the City collects an average of 12 to 16 refuse dumpsters (i.e., lifts) per route week.[18] Using the time and motion data collected by NewGen staff, the City will be able to conservatively collect 67 dumpsters per 8-hour day, and if only one trip is required to the county landfill, thus allowing more time on the collection route, 81 dumpsters could be collected in one full route day. ***Utilizing a front load commercial collection operation, the City has the ability to accommodate additional commercial customers, larger container sizes, and as a result, collect more refuse per route in less time. With this added capacity, the City can transition 300 gallon plastic container refuse customers, who require frequent collection or multiple containers to front load dumpster service.*** For example, a current customer with four, 300 gallon refuse containers collected five days a week has a weekly collection capacity of 30 cubic yards (4 containers x 1.5 CY x 5 days per week = 30 CY) can be transitioned to two, 6 CY front load containers and receive more weekly collection capacity, as shown in Table 4-2. The City has been approached by several of the businesses in town (primarily restaurants and hotels) requesting that the City move toward a system that would allow for larger dumpsters.

[18] Based on time and motion data collected by City staff between August 1st through August 20th 2016. With metal refuse dumpsters collected twice per week, that equates to only six to eight lifts per "route day."

Table 4-2
Example of Transitioning 300 Gallon Container Customers to Front Load Service

	Current Customer Configuration	Proposed Customer Configuration
Container	300 gallon[1]	6 CY front load
Number of Containers	4	2
Frequency of Collection	5 x week	3 x week
Customer's Weekly Cubic Yards of Capacity	30 CY	36 CY

1. A 300 gallon container is equivalent to approximately 1.5 CY of capacity.

4.2 Font Load Commercial Cardboard Collection Operation

The analysis below shows the actual collection time spent on route on Tuesday August 30, 2016 when NewGen observed the collection of the City's commercial cardboard accounts.

Table 4-3
Time and Motion for Commercial Cardboard Recycling Collection

Item	Amount
Time on route [1]	8:01am to 11:35am
Route minutes	214
Number of dumpsters collected	50
Average time per collection [2]	4 minutes, 17 seconds

1. Assumed one trip to local recycling center at the public works building.
2. 214 minutes / 50 = 4.28 minutes = 4 minutes, 17 seconds

The current commercial cardboard recycling collection occurs twice per week on Tuesday and Thursday. Collectively, approximately 90 to 98, 2 and 3 CY dumpsters are collected on those two days.[19]

The key finding that NewGen observed while on the commercial cardboard collection route, is that with the use of larger dumpsters that are "slotted" as shown below (that come in 4 CY and 6 CY sizes), the City would be able to collect commercial cardboard once per week, instead of twice per week (as is currently done). It is estimated that the amount of time spent collecting cardboard could be reduced by 50% while still providing the same level of service, if a front load truck with dumpsters, as shown in Figure 4-1 were to be used, versus the 2 CY and 3 CY rear load dumpsters.

[19] The exact number of dumpsters collected varies as some customers may request an additional pick-up on Thursday that do not typically get picked up on that day. However, the range of 90-98 collections per week is an accurate range for purpose of this analysis.

Figure 4-1. Slotted Cardboard Recycling Dumpster

It was observed, by NewGen staff, that currently the dumpsters are reaching capacity in some instances, due to the customers not fully breaking down cardboard boxes before placing them into the dumpsters. If customers break down their boxes prior to placing them in the dumpster, the capacity of the dumpster will be better utilized, and reduce the frequency that the container needs to be serviced. Methods the City can implement to increase cardboard dumpster capacity use includes education outreach to customers and the introduction of slotted dumpsters. Slotted dumpsters, as shown in Figure 4-1, are specific to cardboard collection and only allow cardboard to be accepted through a narrow opening.

4.3 Residential Yard Waste Drop-off Sites Collection

NewGen evaluated the residential yard waste drop-off sites to better understand what operational efficiencies might be achieved with regard to this solid waste service. During NewGen's field observations, it was noted that the City cannot currently collect yard waste dumpsters larger than 2 CY, due to the weight of the containers and the inability of the old rear load trucks to pick-up these dumpsters. In a front load operation, the City would have the ability to increase the size of the current yard waste dumpsters to 3 CY and 4 CY containers thereby reducing the quantity of the yard waste containers, while still retaining a similar amount of collection capacity.

The ability to reduce the number of dumpsters (because the dumpsters will have a greater capacity) at the drop-off sites will save the cost of purchasing and maintaining as many dumpsters, and reduce the number of "lifts" that the driver will have to do at the site, resulting in a reduction in the amount of time required to service each drop-off site.

4.4 Life-Cycle Cost Analysis of Front Load versus Rear Load Operations

In this section NewGen compares the life-cycle costs (both capital and operating costs) of rear load versus front load refuse trucks. The cost assumptions are based on quotes provided by vendors, as well as actual expenditures by other cities in Wyoming, and NewGen's personal experience in conducting solid waste operational assessments for other cities. The front load collection operation is more cost efficient than the current rear load operation. The front load operation requires one staff person, whereas the rear load

collection operation requires two full time equivalents (FTEs). Table 4-4 below details the annualized cost of a front load truck and a rear load truck.

Table 4-4
Cost Analysis of Front Load versus Rear Load Operations [1]

Item	Front Load		Rear Load
	Low	High	
Vehicle Expense			
Total Capital	$210,000	$270,000	$200,000 [2]
Useful Life (Years)	7	7	7
Annualized Capital	$30,000	$38,570	$28,570
O&M	23,000	23,000	17,000
Fuel [3]	6,750	6,750	6,750
Container Cost [4]	11,331 [4]	11,331 [4]	734 [5]
Labor(ers) (Salary and Benefits) [6]	54,500	54,500	102,500
Total Annual Cost	$125,581	$134,151	$155,554
Cost of Additional Vehicle	$30,000	$38,570	$28,570
Total Annual Cost with Back-up Vehicle	$155,581	$172,721	$184,124

1. Any discrepancies presented in this table are due to rounding.
2. Number based on the City's budget of $200,000 for a rear load truck in 2017 as presented in Table 1-2.
3. Calculated based on local diesel price in October 2016 ($2.44), an assumed three miles per gallon vehicle efficiency and an average of 32 miles traveled per commercial route reflected in City's time and motion data.
4. See Table 4-5 Dumpster Costs.
5. $734 = [((82 x 15%) x $597) / 10)]. Baseline container count x replacement rate x price for new container / useful life.
6. Calculated based on City's Pay Grade Table and current level of benefits. Front load operations require only one driver ($36,000 salary and $18,500 benefits) whereas rear load operations require a driver and laborer ($67,699 combined salaries and $34,790 combined benefits).

Based on NewGen's observations and financial analysis, the following key findings were made:

1. **Life-cycle cost analysis shows front load collection is less expensive than rear load collection.** The total annual cost of the front load operation is less expensive, by approximately $11,403 to $29,973 when comparing rear load versus front load, under all scenarios. This cost savings includes high and low cost estimates; purchase of front load dumpsters; as well as the cost estimate including the purchase of a second truck.

2. **Purchase of front load dumpsters for garbage, yard waste and cardboard recycling would be required.** The City would need to purchase new front load dumpsters for the customers and services currently provided by the City's rear load trucks. Table 4-5 details the projected number of containers that would be purchased and their estimated cost based on recent conversations with vendors. We have also included a nominal amount for the continued replacement of a portion of the City's aging rear load dumpsters.[20]

[20] This is a preliminary estimate as to the number of front load dumpsters that would be required. As the program matures, NewGen would expect that additional commercial customers may desire to move to this program as well.

Table 4-5
Front Load Dumpster Costs

Service Type	Price Per Container	Quote Source	Quantity	Total Purchase Price	Annualized [1]
Refuse					
4 CY	$ 618	Stepp Equipment	50	$ 30,900	$ 3,090
6 CY	763	Stepp Equipment	50	38,150	3,815
		Total Refuse	100	69,050	6,905
Recycling					
4 CY	721	Stepp Equipment	25	18,025	1,803
6 CY	882	Stepp Equipment	20	17,640	1,764
		Total Recycling	45	35,665	3,567
Yard Waste					
3 CY	510	Waste Equip	12	6,120	612
4 CY	618	Stepp Equipment	4	2,472	247
		Total Yard Waste	16	8,592	859
		Total – All Service Types	161	$ 113,307	$ 11,331

1. NewGen assumed a 10-year useful life for containers. (Annualized amount = Total Purchase Price/10)

3. **Purchase of front load truck and dumpsters will require "up-front funding."** The City will need to fund the purchase of the new front load truck and dumpsters. Based on an estimated cost for the new front load truck of $210,000 to $270,000 and an initial outlay of approximately $113,000 for dumpsters, the City will need to determine how it wishes to finance this purchase. Options to finance these purchases are either with City reserves, a lease, or the issuance of a short-term debt instrument by the City.

4. **Purchase of a second vehicle.** Regardless of whether the City remains with rear load collection or the conversion to front load collection, the City will need to consider how it prepares to finance a second or "back-up" vehicle in case the vehicle that is used every day is down for maintenance. Options include purchasing a second front load truck to serve as the back-up vehicle, purchasing a "slightly used" front load truck or attempting to enter into a contractual relationship with a private operator, another city, or a leasing company to provide the second vehicle on an emergency basis.

5. **Aging rear load vehicles need to be addressed.** NewGen would emphasize that even if the City elects to continue to provide its various collection services with rear load trucks, the two existing trucks need to be replaced. Both trucks are over 20 years old.

4.5 Disposal Options

The City of Green River currently owns and operates a landfill that will reach capacity in 2017, at which time waste will begin to be hauled to the Rock Springs Landfill, which is operated by Sweetwater County Solid Waste Disposal District #1. The landfill is 14.5 miles from Green River and the current tipping fee for out of district haulers is $55.00 per ton.

There are several other regional landfills that NewGen researched as part of this study, including the following:

Table 4-6
Regional Landfills

Name of Landfill	Location	Distance from Green River (one-way)	Tip Fee ($/ton of MSW)
Rock Springs Landfill	Rock Springs, WY	14.5	$55.00
Sublette County Waste Management	Big Piney, WY	110	$15.00
Rawlins Landfill	Rawlins, WY	123	$100.00
Wasatch Integrated Waste Management	Layton, UT	160	$30.00
Bountiful City Landfill	West Bountiful, UT	170	$25.00
Twin Landfill	Milner, CO	217	$57.00

NewGen performed a "high-level" analysis to evaluate the financial benefit of long hauling waste to the landfills listed in Table 4-6. Based on this analysis, if the City is able to operate a long haul operation for approximately $.20 per ton mile, it is potentially financially feasible for the City to long haul material to the Sublette County Waste Management Landfill in Big Piney, Wyoming. ***This analysis is shown in Table 4-7, for illustrative purposes only.***

Table 4-7
Long Haul Costs

Cost per Ton Mile	Cost per Ton (Tip Fee and Hauling Cost) [1]		Landfill
$0.10	$37.00		Sublette County (Big Piney, WY)
$0.15	$48.00		Sublette County (Big Piney, WY)
$0.20	$59.00		Sublette County (Big Piney, WY)
$0.25	$70.00		Sublette County (Big Piney, WY)
$0.10	$57.90	Save $1.80 per ton	Rock Springs (Rock Springs, WY)
$0.15	$59.35		Rock Springs (Rock Springs, WY)
$0.20	$60.80		Rock Springs (Rock Springs, WY)
$0.25	$62.25		Rock Springs (Rock Springs, WY)

1. Cost per Ton = Cost per Ton Mile x Round Trip Distance from Green River x Cost per Ton. Example for Sublette County at $0.10 per ton mile: $0.10 per Ton Mile x (110 miles one-way x 2) + $15.00 tip fee per ton = $37 cost per ton for tip and hauling.

NewGen would emphasize that this is a high-level analysis to compare potential disposal options other than the Rock Springs Landfill. NewGen has seen long-hauling costs range from $.10 to $.40 per ton mile for various solid waste utilities. These costs, when calculated accurately, fully incorporate the capital and operating costs for the equipment. For instance, a current solid waste utility in New Mexico is currently long-hauling recyclables (120 miles roundtrip) at an effective cost of $.20 per ton mile. The key variables in calculating the operating costs on a per ton mile are: fuel costs, tons per load, type of equipment, etc. ***NewGen would recommend that the City haul its waste to the Rock Springs Landfill, but monitor its hauling costs so it can identify if any other more cost effective options become available at a later date.***

Section 5
FINDINGS, RECOMMENDATIONS, AND NEXT STEPS

5.1 Finding and Recommendations

Listed below is a summary of NewGen's findings and recommendations concerning Green River's solid waste and recycling operations. The recommendations are based on the field observations, financial and operational analyses, and our experience gained over the years from studying these issues for other solid waste utilities throughout the country. The recommendations are summarized with some general recommendations concerning the City's equipment, and then specific recommendations concerning the various collection services provided by Green River.

5.1.1 General Equipment

1. **Transition the City's rear load collection vehicles to a front load collection operation.** NewGen has identified cost savings and operational efficiencies associated with transitioning to a front load collection operation. The front load collection operation is completely automated, resulting in improved safety for collection staff and reduced costs, as the front load collection operation is completed with one less FTE.

   However, if the City elects to retain the current rear load configuration, the two rear load trucks need to be replaced, as they are well past their useful life.

2. **Work to standardize the truck chassis, packers, engines, etc. purchased for the solid waste utility.** NewGen has found that solid waste utilities realize cost savings and improved maintenance of their vehicles when they are able to standardize their purchases for their rolling stock. For instance, Peterbilt is a widely recognized manufacturer of truck chassis and also has a major distributor in Rock Springs. To the extent that procurement policies can encourage the standardization of specifications to allow for a more homogenous fleet of vehicles, the City will realize a cost savings in fleet services with a reduction in the variety of parts maintained in inventory, and an increased familiarity amongst the City's mechanics through working on similar type vehicles (engines, transmissions, etc.).

3. **Replace and reduce the number of automated side load vehicles.** NewGen identified that the City is maintaining three front-line and one back-up automated side load vehicles for two collection routes. The reason the City maintains three front-line collection vehicles for two routes, is due to the unreliability of three of the four automated side load vehicles. NewGen recommends the City retire two of the City's automated side load vehicles and purchase one new automated side load vehicle. This would result in the city operating two reliable front-line and one back-up automated side load vehicles.

   The City currently has plans to purchase a new automated side load truck during the first quarter of 2017, and sell the 18 year old Volvo ASL truck, as detailed in Table 1-1.

5.1.2 Residential Collection

4. **Evaluate the benefit of converting to four, 10-hour days.** NewGen would recommend the City consider shifting the City's route schedules from five, 8-hour days (5-8s) to four, 10-hour days (4-10s). As shown in Table 4-1, the City currently spends approximately 1.67 hours on non-collection activities (fueling vehicles, pre- and post-trip checks, etc.). Operating routes on a 10-hour day allows for additional collection time. Additionally, this will allow the City to maximize compaction and increase the amount of refuse in each truck. NewGen has worked with many cities and has found that the cities that chose to employ a schedule of 4-10s also have time during the week for preventative maintenance. For example, the City can operate routes on Monday, Tuesday, Thursday, and Friday while reserving Wednesday for repairs and maintenance.

5. **Relocate 90 and 300 gallon plastic containers in alleys where obstructions make collection difficult and/or dangerous.** In certain locations within the City there are very narrow alleys and/or alleys with power lines, low hanging trees, or building overhangs that make the emptying of 90 and 300 gallon containers difficult, and in some cases, dangerous.[21] NewGen would recommend that the City's solid waste manager review the problem locations (the drivers know where these areas are located), and when possible, relocate the 90 and 300 gallon containers. In many cases, this requires that the container only be moved five to six feet. After moving the container, the customer should be notified and provided an explanation as to why the container was moved.

5.1.3 Commercial Collection

6. **Require all commercial businesses to have a designated collection area for their dumpster or 300 gallon plastic container that can be accessed by City refuse trucks Monday through Friday.** Presently, the City provides refuse collection service on Saturday to certain commercial businesses that have limited parking, and oftentimes have their refuse container blocked by vehicles Monday – Friday. For these few customers, on Saturday there are less vehicles parked in the area thereby allowing for easier dumping of the container. This is a very atypical practice and one that NewGen would recommend be eliminated. It is standard practice within the solid waste industry for cities to require that all commercial businesses have a designated area for their commercial dumpster that can be easily accessed by a refuse collection truck during the weekdays of Monday-Friday. The City should draft an ordinance requiring that this common industry practice be adhered to by all businesses in Green River.

If the City decides to implement a front load collection configuration, the following recommendations should be taken into consideration.

7. **Transition commercial rear load dumpster customers and customers that utilize 300 gallon plastic containers (with multiple containers and/or frequent collections) to front load dumpsters.** The rear load refuse dumpster collection operation is currently operating with significant excess capacity. By transitioning the rear load dumpster customers to front load collection and large volume customers that are currently served by 300 gallon containers (1.5 CY capacity) to front load dumpsters (4 and 6 CY dumpsters) the commercial dumpster collection routes will be operated more efficiently. Collection efficiency will be realized by utilizing fully automated trucks, and the ability to pick-up larger dumpsters (i.e., resulting in less "lifts," while still collecting more garbage). Movement of some (not all) commercial 300 gallon customers to front load dumpsters will also reduce some of the time spent

[21] One driver actually hit a power line when lifting a 300 gallon container and it caused the power line to snap and land on the truck which could have resulted in serious injury. Fortunately, no one was injured.

on route for the City's automated side load (ASL) which will help minimize overtime when the City begins to spend more time "off-route" when they are hauling waste to the Rock Springs Landfill.

8. **Consider modifying routing to exclusively serve front load dumpster customers on Saturday route.** Depending on the number of businesses that are converted to front load dumpsters, the City may wish to require that the sole Saturday refuse collection route be exclusively for front load dumpster customers (convenience marts, hotels, and restaurants), that require additional pick-ups due to the volume of refuse they generate.

9. **Commercial dumpster rate methodology should be modified with conversion to front load dumpster collection.** If and when the City converts to a front load collection system, the City should update its rate methodology to reflect the different levels of service provided based on the size of dumpsters and frequency of pick-ups per week. Most cities that provide front load dumpster collection service with different sized dumpsters have a "rate matrix" that shows the monthly fee charged as shown below. NewGen would recommend the City remain with its current rate methodology, but as the new front load system is phased in, the new rate methodology will need to be implemented.

Table 5-1
Example Rate Matrix for Commercial Dumpster Rates

	Collections per Week					
Cubic Yards	1	2	3	4	5	Extra Pick Up
2 CY	$X	$X	$X	$X	$X	$X
4 CY	$X	$X	$X	$X	$X	$X
6 CY	$X	$X	$X	$X	$X	$X
8 CY	$X	$X	$X	$X	$X	$X

10. **Frequency of commercial front load collection needs to be determined.** Once the City has moved to commercial front load dumpster collection, depending on the number of customers serviced, types of businesses (restaurants, etc.), the City will need to determine the frequency with which to operate the front load trucks. At present, the City operates the rear load trucks two times per week. However, some of the restaurants are picked up daily (because their 300 gallon plastic containers only handle 1.5 CY of waste). With 6 CY front load dumpsters most restaurants could have their material collected 3 times per week if they have one or two dumpsters. Some restaurants in the southern portions of the United States prefer to have their garbage collected five to six times per week due to odor issues because of the longer, hotter summers. This should not be an issue in Wyoming, but the final collection schedule and frequency of collection will need to be finalized. NewGen would recommend that offering 3 times per week collection (or possibly 4 times per week collection) with a commercial front load dumpster route would be sufficient. If a customer requires more frequent collection, they should most likely remain on the 300 gallon plastic container.

    When the City converts 300 gallon plastic container or rear load customers to front load dumpsters it will be critical to clarify the frequency of collection, size of required containers and the pricing structure with all customers.

    NewGen would recommend that they City only offer 4 and 6 CY front load dumpsters (possibly a few 8 CY dumpsters, if the volume is warranted) as they begin to rollout the program. At some point in the future the City may wish to offer a 2 CY dumpster, but because the City already offers commercial

accounts a 300 gallon plastic container (1.5 CY) there is not a significant economies of scale in converting to a 2 CY front load dumpster.

5.1.4 On-Call Bulk Trash Collection

11. **Obtain an automated lift gate for an existing pick-up truck or the next heavy duty solid waste pick-up purchased by the City, and use this piece of equipment to pick-up bulk items.** Due to the infrequency with which citizens utilize this on-call collection service, NewGen does not recommend the City invest in a new knuckle boom vehicle. Instead, NewGen recommends the City invest in purchasing an automated lift gate (they can be purchased for less than $5,000) for an existing pick-up truck, or the next heavy duty pick-up truck purchased by the solid waste utility. NewGen would recommend that the City also sell the current knuckle boom truck which is basically inoperative.

5.1.5 Residential Yard Waste Drop-off Sites

12. **Provide additional signage and stickers on dumpsters at drop-off sites describing the proper way to dispose of yard waste.** NewGen would recommend that signage be placed at the yard waste drop-off sites explaining the proper manner in which to dispose of the residential yard waste. Additionally, large stickers should be placed on each dumpster, showing the proper process for discarding of yard waste (breaking down branches, breaking the plastic bags open to empty them, etc.). The City should also consider providing flyers to the neighborhoods nearest the drop-off sites as well, explaining the proper disposal methods. (This information is especially critical for the Lincoln Middle School drop-off site.)

5.1.6 Commercial Cardboard Collection

13. **Convert the commercial cardboard collection route to a front load truck and collect it one time per week.** The commercial recycling route is collecting cardboard two times per week. Each route serves an average of 50 dumpsters per day. If the City were to convert to front load dumpsters that are 4 and/or 6 CY in capacity (versus the 2 and 3 CY rear load dumpsters currently used), the City could collect the same number of customers once per week, effectively reducing the amount of time spent collecting commercial cardboard from eight hours per week to four hours per week.

14. **Transition cardboard dumpsters to slotted front load dumpsters.** If the City converts to front load dumpsters to collect commercial cardboard, they should purchase slotted dumpsters, which are widely used within the industry to collect cardboard at commercial businesses. These dumpsters are specifically designed for cardboard collection and only allow cardboard to be accepted through a narrow opening. This dumpster design requires customers to break down their cardboard before placing it in the dumpster. Again, these dumpsters are widely used within the industry and should be utilized by Green River if they convert to front load collection vehicles.

15. **Increase education to customers on how to properly break down cardboard boxes before recycling them in a slotted dumpster.** By breaking down cardboard boxes before placing them in the dumpster, the container capacity is more efficiently utilized. If the container capacity is more effectively utilized, more material can be collected with fewer pick-ups. Because the City has less than 60 commercial cardboard accounts, it will be very easy for the City to provide educational material about the new dumpster and how to properly break down the boxes so the dumpster can be efficiently used by the customer.

5.1.7 Roll-off Collection

16. **Continue to provide the 10 CY roll-off collection service in the short term, and evaluate the long term options for roll-off collection once the City's transfer station is operational.** Due to the irregularity and limited demand, NewGen would recommend the City continue to provide the service as it is currently staffed, and with the current equipment in the short term. The City is in the process of designing and building a transfer station, that will require the use of roll-off dumpsters and roll-off trucks. Once the City has purchased two roll-off trucks and the appropriate dumpsters for the City's transfer station, NewGen recommends the City survey the market to determine whether the City should consider offering a 20 CY or 30 CY roll-off service to the public.[22] A 20 CY or 30 CY roll-off container could then replace the 10 CY roll-offs that do not hold a significant amount of construction and demolition (C&D) material.[23] Very few communities, or private haulers offer 10 CY roll-offs. Typically the smallest roll-off container offered is a 20 CY roll-off. ***If the City determines that the private sector is presently providing sufficient service in the area of roll-offs, the City may decide this is not a service they want to continue to provide.***

17. **Require roll-off customers to call in the day before the collection of a roll-off is requested.** Most cities that offer roll-off collection service require notification the day before the collection is requested or by early in the morning, the day of the collection. NewGen would recommend that due to the limited number of solid waste employees with commercial driver licenses (CDL), and their other responsibilities, that customers requesting pick-up of a roll-off be required to notify the City the day before the requested service, by 3pm.[24] This will allow the City to better plan its various collection activities.

5.1.8 Transfer Station

18. **Utilize a tracking mechanism (punch card system) or charge a fee to all customers that bring refuse to the transfer station.** Currently, the City does not charge a fee for residents that bring their residential refuse to the landfill. This results in some customers coming several times a month. When the transfer station is operational, NewGen would strongly recommend the City begin charging a nominal fee or implementing a punch card system. A punch card system would allow a predetermined number of "free" visits (typically 8-10 visits per resident, per year). Additional cards could be purchased for a fee.

    Implementation of a fee or punch card system will reduce the number of times residents come to the transfer station (they will consolidate their trips to the transfer station, or put their waste at the curb on their collection day). This will reduce the number of pick-ups, trailers, cars, etc. at the transfer station and reduce the possibility of there being an accident and/or serious injury.

[22] Oftentimes a junior college or community college will partner with a city to conduct this type of market research utilizing undergraduate business students – overseen by a professor. As a result, the City receives "free research assistance" while providing a learning opportunity for a group of college students.
[23] C&D is what the roll-off containers are most frequently used for.
[24] For instance, if a customer wants a roll-off collected on Tuesday, they must notify the City by 3pm on Monday.

5.1.9 Policy Issues

19. **Issue florescent apparel to all solid waste employees.** The solid waste industry has one of the highest incidents of injuries and fatalities as measured by the Occupational Safety and Health Administration (OSHA). Therefore, it is critical that solid waste utilities do everything possible to protect their workers while on the streets collecting waste; disposing of waste at transfer stations and landfills; and processing recyclables at recycling centers. NewGen would recommend that florescent shirts, sweatshirts and jackets be provided to all solid waste workers (florescent green is the most common color). This clothing is highly visible in the field, versus the brown shirts that the City's solid waste employees currently wear. Florescent attire is also safer to wear than safety vests, as some City employees have actually had their vests hook on parts of the truck when climbing in and out of the vehicle.

5.2 Next Steps

NewGen was engaged to perform a municipal solid waste operations review based on certain operational issues that were identified during the course of conducting the water, wastewater, and solid waste cost of service study. This report identifies the field observations as well as analysis conducted by NewGen as part of the scope for conducting the operational assessment. Based on that work, and NewGen's experience in the conduct of operational assessments, 19 findings and recommendations were summarized in this section of the report concerning changes the City may wish to consider implementing regarding its solid waste utility.

To assist the City staff and City Council in determining which of these recommendations the City should pursue (For instance, should the City convert from rear load to front load trucks for commercial refuse and cardboard collection?), NewGen intends to complete the cost of service and rate design study within the next 30-45 days to provide the financial analysis necessary to assist the City in determining whether it is in the City's financial interest to implement all of these recommendations, or only specific ones that align with the types and levels of solid waste services the City wishes to provide going forward.

NewGen will complete the solid waste cost of service study, and accomplish the following:

1. Identify the cost of service for each solid waste service provided by the City, to each customer class. This will identify the cost of service for all services provided to residential and commercial customers, as well as the cost of operating the new transfer station.
2. Compare the current cost of service for all services provided to the residential and commercial customer classes versus the rates currently being charged by the City for those services.
3. Develop rate scenarios that allow for the transition to rates that fully recover the cost of all services provided to residential and commercial customers.
4. Compare the proposed rates that fully recover the cost of all services, by customer class, versus those charged in other neighboring cities (making sure to identify all costs charged both via user fee as well as through property tax assessments, etc.).
5. Discuss with City staff and/or City Council those services, if any, that should possibly be considered for potential contracting out to a 3rd party.