UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(Mark One)

☑ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2019

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from ___________ to ___________

Commission File No. 1-34370

WASTE CONNECTIONS, INC.

(Exact name of registrant as specified in its charter)

Ontario, Canada
(State or other jurisdiction of incorporation or organization)
98-1202763
(I.R.S. Employer Identification No.)
610 Applewood Crescent, 2nd Floor
Vaughan
Ontario L4K 0E3
Canada
(Address of principal executive offices)

(905) 532-7510
(Registrant's telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Shares, no par value	WCN	New York Stock Exchange ("NYSE") Toronto Stock Exchange ("TSX")

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
Yes ☑ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.
Yes ☐ No ☑

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.
Yes ☑ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).
Yes ☑ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

☑ Large accelerated filer	☐ Accelerated filer	☐ Non-accelerated filer	☐ Smaller reporting company	☐ Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).
Yes ☐ No ☑

As of June 30, 2019, the aggregate market value of shares held by non-affiliates of the registrant, based on the closing sales price for the registrant's common shares, as reported on the New York Stock Exchange, was $25,124,471,729.

Number of common shares outstanding as of February 3, 2020: 263,689,637

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Management Information Circular and Proxy Statement for the 2020 Annual and Special Meeting of Shareholders (which will be filed with the SEC pursuant to Regulation 14A of the Securities Exchange Act of 1934, as amended, or the Exchange Act, and with the securities commissions or similar regulatory authorities in Canada within 120 days after the end of our 2019 fiscal year) are incorporated by reference into Part III hereof.

WASTE CONNECTIONS, INC.
ANNUAL REPORT ON FORM 10-K
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PART I

ITEM 1. BUSINESS

Our Company

Waste Connections, Inc. is the third largest solid waste services company in North America, providing non-hazardous waste collection, transfer, disposal and recycling services in mostly exclusive and secondary markets in the U.S. and Canada. Through our R360 Environmental Solutions subsidiary, we are also a leading provider of non-hazardous exploration and production, or E&P, waste treatment, recovery and disposal services in several of the most active natural resource producing areas in the U.S. We also provide intermodal services for the rail haul movement of cargo and solid waste containers in the Pacific Northwest through a network of intermodal facilities.

As of December 31, 2019, we served residential, commercial, industrial and E&P customers in 42 states in the U.S. and six provinces in Canada: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, Wisconsin and Wyoming, and the provinces of Alberta, British Columbia, Manitoba, Ontario, Québec and Saskatchewan.

Our senior management team has extensive experience in operating, acquiring and integrating non-hazardous waste services businesses, and we intend to continue to focus our efforts on both internal and acquisition-based growth. We anticipate that a part of our future growth will come from acquiring additional waste businesses and, therefore, we expect that additional acquisitions could continue to affect period-to-period comparisons of our operating results.

Our Operating Strategy

Our operating strategy seeks to improve financial returns and deliver superior shareholder value creation within the solid waste industry. We generally seek to avoid highly competitive, large urban markets and instead target markets where we can attain high market share either through exclusive contracts, vertical integration or asset positioning. We also target niche markets, like E&P waste treatment and disposal services, with similar characteristics. We are a leading provider of waste services in most of our markets, and the key components of our operating strategy, which are tailored to the competitive and regulatory factors that affect our markets, are as follows:

Target Secondary and Rural Markets. By targeting secondary and rural markets, we believe that we are able to achieve a higher local market share than would be attainable in more competitive urban markets, which we believe reduces our exposure to customer churn and improves financial returns. In certain niche markets, like E&P waste treatment and disposal, early mover advantage in certain rural basins may improve market positioning and financial returns given the limited availability of existing third-party-owned waste disposal alternatives.

Control the Waste Stream. In markets where waste collection services are provided under exclusive arrangements, or where waste disposal is municipally owned or funded or available at multiple sources, we believe that controlling the waste stream by providing collection services under exclusive arrangements is often more important to our growth and profitability than owning or operating landfills.

Optimize Asset Positioning. We believe that the location of disposal sites within competitive markets is a critical factor to success in the waste services industry. Given the importance of and costs associated with the transportation of waste to treatment and disposal sites, having disposal capacity proximate to the waste stream may provide a competitive advantage and serve as a barrier to entry.

Provide Vertically Integrated Services. In markets where we believe that owning landfills is a strategic advantage to a collection operation because of competitive and regulatory factors, we generally focus on providing integrated services, from collection through disposal of solid waste in landfills that we own or operate. Similarly, we see this strategic advantage in E&P waste services where we offer closed loop systems for liquid and solid waste storage, transportation, treatment, and disposal.

Manage on a Decentralized Basis. We manage our operations on a decentralized basis. This places decision-making authority closer to the customer, enabling us to identify and address customers' needs quickly in a cost-effective manner. We believe that decentralization provides a low-overhead, highly efficient operational structure that allows us to expand into geographically contiguous markets and operate in relatively small communities that larger competitors may not find attractive. We believe that this structure gives us a strategic competitive advantage, given the relatively rural nature of many of the markets in which we operate, and makes us an attractive buyer to many potential acquisition candidates.

We manage our operations through five geographic solid waste operating segments and our E&P segment, which includes the majority of our E&P waste treatment and disposal operations. As of December 31, 2019, we delivered our services from operating locations grouped into the following operating segments: our Eastern segment services customers located in northern Illinois, Kentucky, Maryland, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, eastern Tennessee, Vermont, Virginia and Wisconsin; our Southern segment services customers located in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, southern Oklahoma, western Tennessee and Texas; our Western segment services customers located in Alaska, California, Idaho, Montana, Nevada, Oregon, Washington and western Wyoming; our Central segment services customers located in Arizona, Colorado, southern Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, western Texas, Utah and eastern Wyoming; and our Canada segment services customers located in the state of Michigan and in the provinces of Alberta, British Columbia, Manitoba, Ontario, Québec and Saskatchewan. The E&P segment services E&P customers located in Louisiana, New Mexico, North Dakota, Oklahoma, Texas, Wyoming and along the Gulf of Mexico. Some E&P revenues are also included in other operating segments, where we accept E&P waste at some of our municipal solid waste, or MSW, landfills. In addition, a small amount of solid waste revenue is included in our E&P segment.

We manage and evaluate our business on the basis of the operating segments' geographic characteristics, interstate waste flow, revenue base, employee base, regulatory structure, and acquisition opportunities. Each operating segment has a regional vice president and a regional controller reporting directly to our corporate management. These regional officers are responsible for operations and accounting in their operating segments and supervise their regional staff. See Note 16 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10-K for further information on our segment reporting of our operations.

Each operating location has a district or site manager who has a high degree of decision-making authority for his or her operations and is responsible for maintaining service quality, promoting safety, implementing marketing programs and overseeing day-to-day operations, including contract administration. Local managers also help identify acquisition candidates and are responsible for integrating acquired businesses into our operations and obtaining the permits and other governmental approvals required for us to operate.

Implement Operating Standards. We develop company-wide operating standards, which are tailored for each of our markets based on industry norms and local conditions. We implement cost controls and employee training and safety procedures and establish a sales and marketing plan for each market. By internalizing the waste stream of acquired operations, we can further increase operating efficiencies and improve capital utilization. We use a wide-area information system network, implement financial controls and consolidate certain accounting, personnel and customer service functions. While regional and district management operate with a high degree of autonomy, our executive officers monitor regional and district operations and require adherence to our accounting, purchasing, safety, marketing, legal and internal control policies, particularly with respect to financial matters. Our executive officers regularly review the performance of regional officers, district managers and operations. We believe we can improve the profitability of existing and newly acquired operations by establishing operating standards, closely monitoring performance and streamlining certain administrative functions.

Our Growth Strategy

We tailor the components of our growth strategy to the markets in which we operate and into which we hope to expand.

Obtain Additional Exclusive Arrangements. Our operations include market areas where we have exclusive arrangements, including franchise agreements, municipal contracts and governmental certificates, under which we are the exclusive service provider for a specified market. These exclusive rights and contractual arrangements create a barrier to entry that is usually obtained through the acquisition of a company with such exclusive rights or contractual arrangements or by winning a competitive bid.

We devote significant resources to securing additional franchise agreements and municipal contracts through competitive bidding and by acquiring other companies. In bidding for franchises and municipal contracts and evaluating acquisition candidates holding governmental certificates, our management team draws on its experience in the waste industry and knowledge of local service areas in existing and target markets. Our district management and sales and marketing personnel maintain relationships with local governmental officials within their service areas, maintain, renew and renegotiate existing franchise agreements and municipal contracts, and secure additional agreements and contracts while targeting acceptable financial returns. Our sales and marketing personnel also expand our presence into areas adjacent to or contiguous with our existing markets, and market additional services to existing customers. We believe our ability to offer comprehensive rail haul disposal services in the Pacific Northwest improves our competitive position in bidding for such contracts in that region.

Generate Internal Growth. To generate internal revenue growth, our district management and sales and marketing personnel focus on increasing market penetration in our current and adjacent markets, soliciting new customers in markets where such customers have the option to choose a particular waste collection service and marketing upgraded or additional services (such as compaction or automated collection) to existing customers. We also seek price increases necessary to offset increased costs, to improve operating margins and to obtain adequate returns on our deployed capital. Where possible, we intend to leverage our franchise-based platforms to expand our customer base beyond our exclusive market territories. As customers are added in existing markets, our revenue per routed truck increases, which generally increases our collection efficiencies and profitability. In markets in which we have exclusive contracts, franchises and governmental certificates, we expect internal volume growth generally to track population and business growth.

In niche disposal markets, like E&P, our focus is on increasing market penetration, and providing additional service offerings in existing markets where appropriate. In addition, we focus on developing and permitting new treatment and disposal sites in new and existing E&P markets to position ourselves to capitalize on current and future drilling activity in those areas.

Expand Through Acquisitions. We intend to expand the scope of our operations by continuing to acquire waste businesses in new markets and in existing or adjacent markets that are combined with or “tucked-in” to our existing operations. We focus our acquisition efforts on markets that we believe provide significant growth opportunities for a well-capitalized market entrant and where we can compete efficiently with potential new competitors. This focus typically highlights markets in which we can: (1) provide waste collection services under exclusive arrangements such as franchise agreements, municipal contracts and governmental certificates; (2) gain a leading market position and provide vertically integrated collection and disposal services; or (3) gain a leading market position in a niche market through the provision of treatment and disposal services. We believe that our experienced management, decentralized operating strategy, financial strength, size and public company status make us an attractive buyer to certain waste collection and disposal acquisition candidates. We have developed an acquisition discipline based on a set of financial, market and management criteria to evaluate opportunities. Once an acquisition is closed, we seek to integrate it while minimizing disruption to our ongoing operations and those of the acquired business.

In new markets, we often use an initial acquisition as an operating base and seek to strengthen the acquired operation’s presence in that market by providing additional services, adding new customers and making “tuck-in” acquisitions of other waste companies in that market or adjacent markets. We believe that many suitable “tuck-in” acquisition opportunities exist within our current and targeted market areas that may provide us with opportunities to increase our market share and route density.

The North America solid waste services industry has experienced continued consolidation over the past several years, most notably with our acquisition of Progressive Waste (as defined below) in June 2016. In spite of this consolidation, the solid waste services industry remains regional in nature, with acquisition opportunities available in select markets. The E&P waste services industry is similarly regional in nature and is also highly fragmented, with acquisition opportunities available in several active natural resource basins. In some markets in both MSW and E&P waste, independent landfill, collection or service providers lack the capital resources, management skills and/or technical expertise necessary to comply with stringent environmental and other governmental regulations and to compete with larger, more efficient, integrated operators. In addition, many of the remaining independent operators may wish to sell their businesses to achieve liquidity in their personal finances or as part of their estate planning.

During the year ended December 31, 2019, we completed 21 acquisitions for consideration having a net fair value of $837.7 million. During the year ended December 31, 2018, we completed 20 acquisitions for consideration having a net fair value of $1.032 billion. During the year ended December 31, 2017, we completed 14 acquisitions for consideration having a net fair value of $562.2 million.

WASTE SERVICES

Collection Services

We provide collection services to residential, commercial, municipal, industrial and E&P customers. Our services are generally provided under one of the following arrangements: (1) governmental certificates; (2) exclusive franchise agreements; (3) exclusive municipal contracts; (4) residential subscriptions; (5) residential contracts; or (6) commercial, industrial and E&P service agreements.

Governmental certificates, exclusive franchise agreements and exclusive municipal contracts grant us rights to provide MSW services within specified areas at established rates and are long-term in nature. Governmental certificates, or G Certificates, are unique to the State of Washington and are awarded by the Washington Utilities and Transportation Commission, or WUTC, to solid waste collection service providers in unincorporated areas and electing municipalities. These certificates typically grant the holder the exclusive and perpetual right to provide specific residential, commercial and/or industrial waste services in a defined territory at specified rates, subject to divestiture and/or overlap or cancellation by the WUTC on specified, limited grounds. Franchise agreements typically provide an exclusive period of seven years or longer for a specified territory; they specify a broad range of services to be provided, establish rates for the services and can give the service provider a right of first refusal to extend the term of the agreement. Municipal contracts typically provide a shorter service period and a more limited scope of services than franchise agreements and generally require competitive bidding at the end of the contract term. In markets where exclusive arrangements are not available, we may enter into residential contracts with homeowners' associations, apartment owners and mobile home park operators, or work on a subscription basis with individual households. In such markets, we may also provide commercial and industrial services under customer service agreements generally ranging from one to five years in duration. Finally, in certain E&P markets with "no pit" rules or other regulations that limit on-site storage or treatment of waste, we offer containers and collection services to provide a closed loop system for the collection of drilling wastes at customers' well sites and subsequent transportation of the waste to our facilities for treatment and disposal.

Landfill Disposal Services

As of December 31, 2019, we owned or operated 70 MSW landfills, 12 E&P waste landfills, which only accept E&P waste, 14 non-MSW landfills, which only accept construction and demolition, industrial and other non-putrescible waste, and one development stage landfill. Nine of our MSW landfills also received E&P waste during 2019. We generally own landfills to achieve vertical integration in markets where the economic and regulatory environments make landfill ownership attractive. We also own landfills in certain markets where it is not necessary to provide collection services because we believe that we are able to attract volume to our landfills, given our location or other market dynamics. Over time, MSW landfills generate a greenhouse gas, methane, which can be converted into a valuable source of clean energy. We deploy gas recovery systems at 53 of our landfills to collect methane, which can then be used to generate electricity for local households, fuel local industrial power plants or power alternative fueled vehicles. In some cases, landfill gas generated at our landfills qualifies as a renewable fuel for which renewable fuel credits may be available.

For landfills we operate but do not own, the owner of the property, generally a municipality, usually holds the permit and we operate the landfill pursuant to a landfill operating agreement for a contracted term, which may be the life of the landfill. Where the contracted term is not the life of the landfill, the property owner is generally responsible for final capping, closure and post-closure obligations. We are responsible for all final capping, closure and post-closure obligations at our operated landfills for which we have life-of-site agreements.

The expiration dates for the four operating agreements for which the contracted term is less than the life of the landfill range from 2022 to 2027. We intend to seek renewal of all four contracts prior to, or upon, their expiration.

Based on remaining permitted capacity as of December 31, 2019, and projected annual disposal volumes, the average remaining landfill life for our owned and operated landfills and landfills operated, but not owned, under life-of-site agreements, is estimated to be approximately 26 years. Many of our existing landfills have the potential for expanded disposal capacity beyond the amount currently permitted. We regularly consider whether it is advisable, in light of changing market conditions and/or regulatory requirements, to seek to expand or change the permitted waste streams or to seek other permit modifications. We also monitor the available permitted in-place disposal capacity of our landfills on an ongoing basis and evaluate whether to seek capacity expansion using a variety of factors.

We are currently seeking to expand permitted capacity at nine of our landfills, for which we consider expansions to be probable. Although we cannot be certain that all future expansions will be permitted as designed, the average remaining landfill life for our owned and operated landfills and landfills operated, but not owned, under life-of-site agreements is estimated to be approximately 29 years when considering remaining permitted capacity, probable expansion capacity and projected annual disposal volume.

The following table reflects estimated landfill capacity and airspace changes, as measured in tons, for owned and operated landfills and landfills operated, but not owned, under life-of-site agreements (in thousands):

	2019			2018		
	Permitted	**Probable Expansion**	**Total**	**Permitted**	**Probable Expansion**	**Total**
Balance, beginning of year	1,190,544	171,403	1,361,947	1,170,671	183,626	1,354,297
Acquired landfills	58,780	—	58,780	39,990	21,536	61,526
Developed landfills	14,625	—	14,625	—	—	—
Permits granted	47,542	(47,542)	—	32,997	(32,997)	—
Airspace consumed	(47,394)	—	(47,394)	(44,989)	—	(44,989)
Changes in engineering estimates	17,221	33,998	51,219	(8,125)	(762)	(8,887)
Balance, end of year	1,281,318	157,859	1,439,177	1,190,544	171,403	1,361,947

The estimated remaining operating lives for the landfills we own and landfills we operate under life-of-site agreements, based on remaining permitted and probable expansion capacity and projected annual disposal volume, in years, as of December 31, 2019, and December 31, 2018, are shown in the tables below. The estimated remaining operating lives include assumptions that the operating permits are renewed.

	2019						
	0 to 5	6 to 10	11 to 20	21 to 40	41 to 50	51+	Total
Owned and operated landfills	6	5	18	30	8	18	85
Operated landfills under life-of-site agreements	1	1	—	2	—	3	7
	7	6	18	32	8	21	92

	2018						
	0 to 5	6 to 10	11 to 20	21 to 40	41 to 50	51+	Total
Owned and operated landfills	4	6	19	26	9	17	81
Operated landfills under life-of-site agreements	—	1	—	4	1	2	8
	4	7	19	30	10	19	89

The disposal tonnage that we received in 2019 and 2018 at all of our landfills is shown in the tables below (tons in thousands):

	Three Months Ended								
	March 31, 2019		June 30, 2019		September 30, 2019		December 31, 2019		Twelve Months Ended December 31, 2019
	Number of Sites	Total Tons	Number of Sites	Total Tons	Number of Sites	Total Tons	Number of Sites	Total Tons	
Owned operational landfills and landfills operated under life-of-site agreements	89	10,253	92	12,234	92	12,925	92	11,982	47,394
Operated landfills	4	127	4	151	4	155	4	137	570
	93	10,380	96	12,385	96	13,080	96	12,119	47,964

	Three Months Ended								
	March 31, 2018		June 30, 2018		September 30, 2018		December 31, 2018		Twelve Months Ended December 31, 2018
	Number of Sites	Total Tons	Number of Sites	Total Tons	Number of Sites	Total Tons	Number of Sites	Total Tons	
Owned operational landfills and landfills operated under life-of-site agreements	88	9,910	89	11,386	89	12,091	89	11,602	44,989
Operated landfills	4	126	4	137	4	136	4	132	531
	92	10,036	93	11,523	93	12,227	93	11,734	45,520

Transfer Station and Intermodal Services

We own or operate MSW transfer stations and E&P waste transfer stations with marine access. Transfer stations receive, compact and/or load waste to be transported to landfills or treatment facilities via truck, rail or barge. They extend our direct-haul reach and link collection operations or waste generators with distant disposal or treatment facilities by concentrating the waste stream from a wider area and thus providing better utilization rates and operating efficiencies.

Intermodal logistics is the movement of containers using two or more modes of transportation, usually including a rail or truck segment. We provide these services for railing containerized international import and export goods through the Pacific Northwest, along with the transport of MSW waste and industrial construction debris. Additionally we operate two intermodal facilities primarily for the shipment of waste by rail to distant disposal facilities that we do not own. Our fleet of double-stack railcars provides dedicated direct-line haul services among terminals in Portland, Boardman, Tacoma and Seattle. We have a contract with Union Pacific railroad for the movement of containers among our intermodal operations. We also provide our customers container and chassis sales and leasing services.

We have increased the amount of waste we transport by rail to our landfills and intend to further expand our intermodal business through cross-selling efforts with our solid waste services operations. We believe that a significant amount of solid waste is transported currently by truck, rail and barge from primarily the Seattle-Tacoma and Metro Portland areas to remote landfills in Eastern Washington and Eastern Oregon. We believe our ability to market both intermodal and disposal services will enable us to more effectively compete for these volumes.

Recycling Services

We offer residential, commercial, industrial and municipal customers recycling services for a variety of recyclable materials, including compost, cardboard, mixed paper, plastic containers, glass bottles and ferrous and aluminum metals. We own or operate recycling operations and market other collected recyclable materials to third parties for processing before resale. The majority of the recyclables we process for sale are paper products and are shipped to customers in the United States and Canada, as well as other markets, including Asia. Changes in end market demand as well as other factors can cause fluctuations in the prices for such commodities, which can affect revenue, operating income and cash flows. We believe that recycling will continue to be an important component of local and state solid waste management plans due to the public’s increasing environmental awareness and expanding regulations that mandate or encourage recycling. We also believe that the costs of processing recyclables, including the costs of contamination, which have historically been subsidized by the sale of recycled commodities, need to be fully recognized. To that end, we have increased the fees that we charge for the collection of recyclables and for processing at our recycling facilities to more fully reflect the processing costs associated with the separation of recyclables into marketable commodities. In some instances, we will look to pass the risk associated with the volatility of recycled commodity prices onto our customers.

E&P Waste Treatment, Recovery and Disposal Services

E&P waste is a broad term referring to the by-products resulting from oil and natural gas exploration and production activity. These generally include: waste created throughout the initial drilling and completion of an oil or natural gas well, such as drilling fluids, drill cuttings, completion fluids and flowback water; production wastes and produced water during a well’s operating life; contaminated soils that require treatment during site reclamation; and substances that require clean-up after a spill, reserve pit clean-up or pipeline rupture. E&P customers are oil and natural gas exploration and production companies operating in the areas that we serve. E&P revenue is therefore driven by vertical and horizontal drilling, hydraulic fracturing, production and clean-up activity; it is complemented by other services including closed loop collection systems and the sale of recovered products. E&P activity varies across market areas which are tied to the natural resource basins in which the drilling activity occurs and reflects the regulatory environment, pricing and disposal alternatives available in any given market.

We provide E&P waste treatment, recovery and/or disposal services from a network of E&P waste landfills, MSW landfills that also receive E&P waste, E&P liquid waste injection wells and E&P waste treatment and oil recovery facilities. Treatment processes vary by site and regulatory jurisdiction. At certain treatment facilities, loads of flowback and produced water and other drilling and production wastes delivered by our customers are sampled, assessed and tested by third parties according to state regulations. Solids contained in a waste load are deposited into a land treatment cell where liquids are removed from the solids and are sent through an oil recovery system before being injected into saltwater disposal injection wells or placed in evaporation cells that utilize specialized equipment to accelerate evaporation of liquids. In certain locations, fresh water is then added to the remaining solids in the cell to “wash” the solids several times to remove contaminants, including oil and grease, chlorides and other contaminants, to ensure the solids meet specific regulatory criteria that, in certain areas, are administered by third-party labs and submitted to the regulatory authorities.

COMPETITION

The North America MSW services industry is highly competitive and requires substantial labor and capital resources. Our competition includes three national, publicly-held solid waste companies – Waste Management, Inc., Republic Services, Inc. and Advanced Disposal Services, Inc.; several regional, publicly held and privately owned companies; and several thousand small, local, privately owned companies, including independent waste brokers, some of which we believe have accumulated substantial goodwill in their markets. In 2019, the stockholders of Advanced Disposal Services, Inc. agreed to the acquisition of the company by Waste Management, Inc., which is expected to close in the first quarter of 2020. We compete for collection, transfer and disposal volume based primarily on the price and, to a lesser extent, quality of our services. We also compete with operators of alternative disposal facilities, including incinerators, and with counties, municipalities and solid waste districts that maintain their own waste collection and disposal operations. Public sector operators may have financial and other advantages over us because of their access to user fees and similar charges, tax revenues, tax-exempt financing and the ability to flow-control waste streams to publicly owned disposal facilities.

From time to time, competitors may reduce the price of their services in an effort to expand their market shares or service areas or to win competitively bid municipal contracts. These practices may cause us to reduce the price of our services or, if we elect not to do so, to lose business. We provide a significant amount of our residential, commercial and industrial collection services under exclusive franchise and municipal contracts and G Certificates. Exclusive franchises and municipal contracts may be subject to periodic competitive bidding. Competition in the solid waste industry is also affected by the increasing national emphasis in the U.S. and Canada on recycling and other waste reduction programs, which may reduce the volume of waste we collect or deposit in our landfills.

The U.S. and Canadian MSW services industries have undergone significant consolidation, and we encounter competition in our efforts to acquire collection operations, transfer stations and landfills. We generally compete for acquisition candidates with publicly owned regional and national waste management companies. Accordingly, it may become uneconomical for us to make further acquisitions or we may be unable to locate or acquire suitable acquisition candidates at price levels and on terms and conditions that we consider appropriate, particularly in markets we do not already serve.

Competition for E&P waste comes primarily from smaller regional companies that utilize a variety of disposal methods and generally serve specific geographic markets. We also compete in certain markets with publicly held and privately owned companies such as Waste Management, Inc., Republic Services, Inc., Clean Harbors, Inc., US Ecology, Inc., Secure Energy Services Inc., Nuverra Environmental Solutions, Trinity Environmental Services, LLC, Ecoserv and others. In addition, customers in many markets have the option of using internal disposal methods or outsourcing to another third-party disposal company. The principal competitive factors in this business include: gaining customer approval of treatment and disposal facilities; location of facilities in relation to customer activity; reputation; reliability of services; track record of environmental compliance; ability to accept multiple waste types at a single facility; and price.

The intermodal services industry is also highly competitive. We compete against other intermodal rail services companies, trucking companies and railroads, many of which have greater financial and other resources than we do. Competition is based primarily on price, reliability and quality of service.

REGULATION

Introduction

Our operations in the United States and Canada, including landfills, transfer stations, solid waste transportation, intermodal operations, vehicle maintenance shops, fueling facilities and oilfield waste treatment, recovery and disposal operations, are all subject to extensive and evolving federal, state, provincial and, in some instances, local environmental, health and safety laws and regulations, the enforcement of which has become increasingly stringent. These laws and regulations may, among other things, require securing permits or other authorizations (collectively, “permits”) for regulated activities; govern the amount and type of substances that may be released or emitted into the environment in connection with our operations; impose clean-up or corrective action responsibility for releases of regulated substances into the environment; restrict the way we handle, manage or dispose of wastes; limit or prohibit our activities in sensitive areas such as wetlands, wilderness areas or areas inhabited by endangered or threatened species; require investigatory and remedial actions to mitigate pollution conditions caused by our operations or attributable to former operations; and impose specific standards addressing worker protection and health. Compliance is often costly or difficult, and the violation of these laws and regulations may result in the denial or revocation of permits, issuance of corrective action orders, assessment of administrative and civil penalties and even criminal prosecution.

In many instances in the United States, liability is often "strict," meaning it is imposed without a requirement of intent or fault on the part of the regulated entity. The environmental regulations that affect us in the United States are generally administered by the Environmental Protection Agency, or the EPA, and other federal, state and local agencies having jurisdiction over our U.S. operations.

The environmental legislation that affects us in Canada is administered by federal and provincial regulatory agencies, which have jurisdiction over certain aspects of our Canadian operations. The relevant Canadian federal environmental legislation that affects our operations is administered by federal departments such as Environment and Climate Change Canada. Provincial and local agencies and departments administer their own environmental legislation, such as the Ontario Ministry of the Environment, Conservation and Parks. In most instances in Canada, liability for violations of environmental and health and safety laws is imposed without a requirement of intent on the part of the regulated entity, but is subject to a defense of due diligence.

Compliance with existing environmental regulatory requirements and permits requires significant capital and operating expenditures. It is possible that substantial costs for compliance or penalties for non-compliance may be incurred in the future. We believe that in recent years, environmental regulation of the industry has increased as have the number of enforcement actions brought by regulatory agencies. It is also possible that other developments, such as the adoption of additional or more stringent environmental laws, regulations and enforcement policies, could result in additional costs or liabilities that we cannot currently foresee or quantify. Moreover, changes in environmental laws or regulations could reduce the demand for our services and adversely impact our business. We also expend significant resources (both administrative and financial) directed toward development, expansion, acquisition, and permitting of landfills, transfer stations, and other facilities we operate. Regarding any permit issued by a regulatory agency necessary for our operations, there are no assurances that we will be able to obtain or maintain all necessary permits or that any such permit held may ultimately be renewed on the same or similar terms. Further, permits obtained impose various requirements and may restrict the size and location of disposal operations, impose limits on the types and amount of waste a facility may receive or manage, as well as a waste disposal facility's overall capacity. Additional operational conditions or restrictions may be included in the renewal or amendment of a previously issued permit. As regulations change, our permit requirements could become more stringent and compliance may require material expenditures at our facilities, impose significant operational restraints, or require new or additional financial assurance related to our operations. Regarding any permit that has been issued, it remains subject to renewal, modification, suspension or revocation by the agency with jurisdiction.

Various laws impose clean-up or remediation liability on responsible parties, which are discussed in more detail below. Substances subject to clean-up liability have been or may have been disposed of or released on or under certain of our facility sites. At some of our facilities, we have conducted and continue to conduct monitoring or remediation of known soil and groundwater contamination and, as required, we will continue to perform such work. It is possible that monitoring or remediation could be required in the future at other facilities we own or operate or previously owned or operated. These monitoring and remediation efforts are usually overseen by environmental regulatory agencies. Further, it is not uncommon for neighboring landowners and other third parties to file claims for personal injury or property damage allegedly caused by the release of regulated substances into the environment. In addition, from time to time, our intermodal services business undertakes the transport of hazardous materials. This transportation function is also regulated by various federal, state, provincial and potentially local agencies.

A number of major statutes and regulations apply to our operations, which are generally enforced by regulatory agencies. Typically, in the United States, federal statutes establish the general regulatory requirements governing our operations, but in many instances these programs are delegated to the states, which have independent and sometimes more strict regulation. In Canada, it is typically provincial statutes that establish the primary regulatory requirements governing our waste operations. Federal statutes in Canada govern certain aspects of waste management, including international and interprovincial transport of certain kinds of waste. Certain of these statutes in the United States and Canada contain provisions that authorize, under certain circumstances, lawsuits by private citizens to enforce certain statutory provisions. In addition to penalties, some of these statutes authorize an award of attorneys' fees to parties that successfully bring such an action. Enforcement actions for a violation of these statutes or for a violation of or failure to have a permit, which is required by certain of these statutes, may include administrative, civil and criminal/regulatory penalties, as well as injunctive relief in some instances. In our ordinary course of business, we incur significant costs complying with these regulations and applicable standards.

A brief description of certain of the primary statutes affecting our operations is discussed below.

Laws and Regulations

A. Waste and Hazardous Substances

1. The Resource Conservation and Recovery Act of 1976, or RCRA

In the United States, RCRA regulates the generation, treatment, storage, handling, transportation and disposal of hazardous and non-hazardous waste and requires states to develop programs to ensure the safe disposal of solid waste. Regulations promulgated under RCRA impose broad requirements on the waste management industry. In October 1991, the EPA adopted what are known as the Subtitle D Regulations, which govern solid non-hazardous waste landfills. The Subtitle D Regulations establish, among other things, location restrictions, minimum facility design and performance standards, operating criteria, closure and post-closure requirements, financial assurance requirements, groundwater monitoring requirements, groundwater remediation standards and corrective action requirements. These and other applicable requirements, including permitting, are typically implemented by the states, but in some instances, states have enacted more stringent requirements.

Regarding the management and disposal of E&P waste, although E&P wastes may contain hazardous constituents, most E&P waste is exempt from stringent RCRA regulation as a hazardous waste. We are required to obtain permits for the land treatment and disposal of E&P waste as part of our operations. The construction, operation and closure of E&P waste land treatment and disposal operations are generally regulated at the state level. These regulations vary widely from state to state. None of our oilfield waste recycling, treatment and disposal facilities are currently permitted to accept hazardous wastes for disposal. Some wastes handled by us that currently are exempt from regulation as hazardous wastes may in the future be designated as "hazardous wastes" under RCRA or other applicable statutes if changes in laws or regulations were to occur. If the RCRA E&P waste exemption is repealed or modified, we could become subject to more rigorous and costly operating and disposal requirements.

A breach of laws or regulations governing facilities we operate may result in suspension or revocation of necessary permits, civil liability, and imposition of fines and penalties. Moreover, if we experience a delay in obtaining, are unable to obtain, or suffer the revocation of required permits, we may be unable to serve our customers, our operations may be interrupted and our growth and revenue may be limited.

RCRA also regulates underground storage of petroleum and other materials it defines as "regulated substances." RCRA requires registration, compliance with technical standards for tanks, release detection and reporting and corrective action, among other things. Certain of our facilities and operations are subject to these requirements, which are typically implemented at the state level and may be more stringent in certain states.

2. The Comprehensive Environmental Response, Compensation and Liability Act of 1980, or CERCLA

CERCLA, which is also known as the "Superfund" law, established a program in the United States allowing federal authorities to provide for the investigation and clean up of facilities where, or from which, a release of any hazardous substance into the environment has occurred or is threatened. CERCLA defines "hazardous substances" broadly. One of the primary ways that CERCLA addresses a release or threatened release of hazardous substances is by imposing strict, joint and several liability for clean up on its broad categories of responsible parties. This means that responsible parties can bear liability without fault and that each responsible party potentially could bear liability for the entirety of clean-up costs, notwithstanding its individual contribution. Generally, responsible parties are current owners and operators of the contaminated site; former owners and operators of the site at the time when the hazardous substances were disposed; any person who arranged for treatment or disposal of the hazardous substances; and transporters who selected the disposal site. In addition to CERCLA's liability framework, the EPA may issue orders directing responsible parties to respond to releases of hazardous substances. Further, the EPA and private parties, who have response liability to the EPA or who have incurred response costs, can bring suit against other responsible parties to seek to recover certain costs incurred in their response efforts. CERCLA also imposes liability for the cost of evaluating and remedying damage to natural resources. Various states have enacted laws analogous to and independent of CERCLA that also impose liability, which is typically strict and joint and several, for investigation, clean-up and other damages associated with the release of hazardous or other regulated substances. We may handle hazardous substances within the meaning of CERCLA, or hazardous and other substances regulated under similar state statutes, in the course of our ordinary operations. As a result, we may be jointly and severally liable under CERCLA or similar states statutes for all or part of the costs required to clean up sites if and where these hazardous substances have been released into the environment. CERCLA and these analogous state laws and regulations may also expose us to liability for acts or conditions that were in compliance with applicable laws at a prior time. Under certain circumstances, our sales of residual crude oil collected as part of the saltwater injection process could result in liability to us if the residual crude contains hazardous substances or is covered by one of the state statutes and the entity to which the oil was transferred fails to manage and, as necessary, dispose of it or components thereof in accordance with applicable laws.

3. Canadian Waste Legislation

The primary waste laws regulating our business in Canada are imposed by the provinces. These include provincial laws that regulate waste management, including requirements to obtain permits and approvals, and regulations with respect to the operation of transfer stations and landfilling sites. Each provincial jurisdiction in Canada has its own regulatory regime; however, the key requirements under these regimes are similar across Canada. For example, the Environmental Protection Act, or the EP Act, in Ontario and its underlying regulations regulate the generation, treatment, storage, handling, transportation and disposal of wastes in Ontario, among other things. The EP Act requires an approval or, in some cases, a registration, for the establishment, operation or alteration of a waste management system (which includes all facilities or equipment used in connection with waste) or a waste disposal site. The specific terms and conditions of an approval may impose emission limits, monitoring and reporting requirements, siting and operating criteria, financial assurance or insurance and decommissioning requirements. Certain landfilling sites are subject to more stringent regulatory requirements that can include detailed prescribed design standards, leachate collection systems, landfill gas management or collection systems and/or site closure plans including post-closure care requirements. The federal Canadian Environmental Protection Act, 1999 imposes requirements with respect to the interprovincial and international movement of hazardous wastes and hazardous recyclable material, which can affect the movement of wastes and recyclables to our Canadian facilities. The expansion or establishment of certain waste management projects, including waste treatment and landfilling sites, may also be subject to provincial or federal environmental assessment requirements.

A breach of laws or regulations governing our operations may result in suspension or revocation of necessary approvals and imposition of fines and penalties. Moreover, if we experience a delay in obtaining, are unable to obtain, or suffer the revocation of required approvals, we may be unable to serve our customers, our operations may be interrupted, and our growth and revenue may be limited.

4. Canadian Contaminated Sites Legislation

There are provincial and federal laws in Canada that regulate spills and releases of substances into the environment and require the remediation of contaminated sites. Clean up of contaminated sites in connection with our business is primarily regulated by provincial environmental laws. Each province has its own regulatory regime; however, the key requirements under these regimes are similar across Canada. For example, the EP Act in Ontario authorizes the agency to issue orders to responsible persons to undertake remedial or other corrective actions to investigate, monitor and remediate the discharge or presence of contaminants in the environment. These orders can generally be issued on a joint and several liability basis to categories of responsible persons, including persons who caused or permitted the discharge of a contaminant, persons who owned the discharged substance, as well as current and past owners of lands or the source of the contamination and persons who have or have had management or control over lands or the source of the contamination. Responsible parties can bear liability under an order without fault. The costs to comply with an order can be very substantial. Some provincial jurisdictions provide a statutory right to compensation from the owner or person in control of a substance that is discharged into the environment to any person who suffers loss as a result. The federal government has also enacted laws that regulate the release of certain substances into the environment. We handle many contaminants and pollutants in the course of our ordinary operations and, as a result, may be liable under provincial and federal statutes for all or part of required clean-up costs if substances have been released into the environment. Under such laws, we could be required to remove previously disposed substances and wastes (including substances disposed of or released by prior owners or operators) or remediate contaminated property (including soil and groundwater contamination, whether from prior owners or operators or other historic activities or spills).

B. Wastewater/Stormwater Discharge

1. The Federal Water Pollution Control Act of 1972, or the Clean Water Act

The Clean Water Act regulates the discharge of pollutants from a variety of sources, including, without limitation, solid waste disposal sites, transfer stations and oilfield waste facilities into Waters of the United States, or WOTUS, including surface and potentially ground waters. Under the Clean Water Act, sites or facilities that discharge pollutants to waters of the United States must have a permit authorizing that discharge. If run-off or other contaminants from our owned or operated transfer stations or oilfield waste facilities, or run-off, collected leachate or other contaminants from our owned or operated landfills or other facilities is discharged into streams, rivers or other regulated waters, the Clean Water Act would require a discharge permit, typically containing requirements to conduct monitoring and, under certain circumstances, to treat and reduce the quantity of pollutants in such discharge. Further, if a landfill or other facility discharges wastewater through a treatment works, it may be required to comply with additional permitting and other specific requirements. Also, virtually all landfills are required to comply with the EPA's storm water regulations, which are designed to prevent the introduction of contaminated storm water run-off into United States' waters.

At this time, the ultimate regulatory test for defining WOTUS is unclear, and the determination therefor will be based upon the outcome of regulatory promulgations and associated litigation which are currently pending. The manner in which WOTUS is defined could affect our operations by potentially increasing or modifying regulatory requirements governing our discharges. In 2015, the Clean Water Rule was promulgated, which would expand federal control over many U.S. water resources by broadening the definition of WOTUS, thereby potentially classifying a larger range of water resource types as jurisdictional under the Clean Water Act. Since promulgation of the 2015 Clean Water Rule, the EPA and the Army Corps of Engineers, or the Corps, have sought to rescind it and to promulgate a revised definition of WOTUS that would establish federal jurisdiction more narrowly, thereby reducing the scope of Clean Water Act applicability. To that end, on December 11, 2018, the EPA and the Corps proposed a rule to redefine WOTUS. Eventually, in October 2019, the 2015 Clean Water Rule was repealed and the pre-2015 regulatory text was re-codified, with changes effective December 23, 2019. The newly finalized rule has already been challenged in court. The scope of the WOTUS definition will likely remain fluid until a final regulatory determination is made and subsequent litigation, if any, is finalized. To the extent a rule ultimately promulgated expands the scope of the jurisdiction under the Clean Water Act with respect to WOTUS, we could face increased costs and delays with respect to obtaining permits under the Clean Water Act.

Additionally, the Clean Water Act's spill prevention, control and countermeasure requirements require appropriate containment berms and similar structures to help contain and prevent the contamination of regulated waters in the event of a hydrocarbon storage tank release. The Clean Water Act also contains provisions which can prohibit or require permitting before development or expansion of a landfill may occur in areas designated as wetlands. Various states in which we operate or may operate in the future have been delegated authority to implement the Clean Water Act and its permitting requirements, and some of these states have adopted regulations that are more stringent than federal Clean Water Act requirements.

2. Safe Drinking Water Act, or SDWA

Our United States E&P underground injection operations are subject to the SDWA, as well as analogous state laws and regulations. Under the SDWA, the EPA established the underground injection control, or UIC, program, which includes requirements for permitting, testing, monitoring, record keeping and reporting of injection well activities, as well as a prohibition against the migration of fluid containing any contaminant into underground sources of drinking water. Certain state regulations require us to obtain permits from the applicable regulatory agencies to operate our underground injection wells. Leakage from the subsurface portions of the injection wells could cause degradation of fresh groundwater resources, potentially resulting in suspension of our UIC permit, fines and penalties, the incurrence of expenditures for remediation of the affected resource and potential liability to third parties for property damages. In July 2018, the EPA partnered with New Mexico to assess alternatives to immediate disposal of E&P wastewater by reusing it and/or treating it for reintroduction into the hydrologic cycle, as well as potential regulations related thereto. Moreover, in May 2019, EPA issued its draft Study of Oil and Gas Extraction Wastewater Management Under the Clean Water Act regarding EPA's examination of whether to alter its regulation of the treatment and discharge of E&P wastewater. If regulations requiring reuse or treatment are developed and implemented on a broad scale, it may increase our compliance costs or reduce the volume of E&P wastes that may be disposed of via underground injection.

3. Canadian Water Protection Legislation

There is legislation in Canada at both the federal and provincial levels that protects water quality and regulates the discharge of substances into the aquatic environment. Federal water pollution control authority is derived primarily from the Fisheries Act, which contains provisions for the protection of water quality and fish habitat. This includes a general prohibition on the deposit of any deleterious substances into water that is frequented by fish, unless otherwise authorized. There is legislation in each provincial jurisdiction that also protects water sources and regulates water pollution, and generally requires an approval or permit for a discharge of any effluent, including in some cases stormwater, into a water body. For example, in Ontario, the Ontario Water Resources Act, or OWRA, prohibits the discharge of material of any kind into any water that may impair the quality of the water. The OWRA requires that an approval be obtained for the use and operation of certain sewage and stormwater works. Such approvals typically contain monitoring requirements and impose restrictions on effluent characteristics. Other provinces in Canada have similar regimes for the protection of water. If run-off or other contaminants from our landfills, transfer stations or other waste facilities is discharged or migrates into waters and causes impairment, we could face significant liability under provincial and federal laws.

C. Air Emissions

1. The Clean Air Act, or CAA

In the United States, the CAA generally regulates the emissions of air pollutants from a variety of sources, including certain landfills and oilfield waste facilities, based on factors such as the date of the construction and tons per year of emissions of regulated pollutants. Typically, federal requirements are delegated to the states and implemented at the state level. The CAA and analogous state laws require permits for and impose other restrictions on facilities and equipment that have the potential to emit pollutants into the atmosphere. Under the CAA, a source deemed to be a major source generally must be authorized by a permit. In those situations where major source permitting is not required, typically state laws and rules will require permitting as a type of minor source. Larger landfills and landfills located in areas where the ambient air does not meet certain air quality standards called for by the CAA may be subject to even more extensive air pollution controls and emissions limitations. In addition to the potential CAA permitting of landfill facilities, CAA permitting may be required for the construction of gas collection and flaring systems, composting and other operations. In some instances, federal operating permits may be required depending on the nature and volume of air emissions.

In addition to permitting, the CAA imposes other regulatory obligations, including, in some instances, performance standards on operations and equipment. The EPA has issued what are known as new source performance standards, or NSPS, and emissions guidelines, which impose requirements regarding control of landfill gases from new and existing large landfills. The EPA has also issued regulations imposing maximum achievable control technology, or MACT, on large MSW landfills. The MACT standards impose limits on landfill emissions and often require installation of landfill gas collection system tanks. Additional or more stringent regulations of our facilities may occur in the future, which could increase operating costs or impose additional compliance burdens. On August 29, 2016, the EPA issued "Subpart XXX" that applies to MSW landfills constructed, modified or reconstructed after July 17, 2014. Subpart XXX reduces the non-methane organic compounds, or NMOC, emissions threshold at which MSW landfills must install emission controls, requires monitoring surface emissions of methane, monitoring of temperature and pressure at the well head of landfill gas collection systems and imposes other requirements. Further, the EPA promulgated "Guidelines" on August 29, 2016, known as Subpart Cf, which require states to implement similar requirements on existing landfills that are not subject to NSPS Subpart XXX. Subpart Cf updates existing Emission Guidelines and Compliance Times for existing MSW landfills. The Subpart Cf Guidelines apply to landfills that accepted waste after November 8, 1987 and commenced construction or modification on or before July 17, 2014. Subpart XXX and Subpart Cf are intended to result in the reduction of landfill gas emissions, including methane, by lowering the thresholds where an MSW landfill must install a gas collection and control system. Subpart Cf will ultimately affect existing sources that are not affected by Subpart XXX. In October 2018, the EPA proposed a rule to delay implementation of the Guidelines, and indicated that it was reconsidering certain portions thereof. EPA published its final rules on August 29, 2019, under which the deadline for states to submit their plans to effectuate the emission control requirements was extended from May 29, 2017 to August 29, 2019. The rules also give EPA up to six months to review the completeness of such plans and an additional 12 months thereafter to approve or disapprove such plans. Regardless of the time extensions that the new rules allow, eventual compliance with these regulatory requirements could result in significant additional compliance costs, which we will incur in our ordinary course of business. In addition, state air regulatory requirements may impose additional restrictions beyond federal requirements, which could also result in compliance costs. For example, some state air programs uniquely regulate odor and the emission of certain specific toxic air pollutants.

The EPA recently modified, or is in the process of modifying, other standards promulgated under the CAA in a manner which could increase our compliance costs. For example, the EPA has recently modified or discussed modifying national ambient air quality standards applicable to particulate matter, carbon monoxide and oxides of sulfur and nitrogen, ozone and other standards to make them more stringent. It is possible these additional regulations could result in additional capital or operating expenditures. We do not believe, however, they will have a material adverse effect on our business as a whole. Further, our customers' operations may be subject to existing and future CAA permitting and regulatory requirements that could have a material effect on their operations, which could have an adverse effect on our business.

2. Canadian Air Quality Legislation

In Canada, the primary laws regulating air emissions from our operations come from provincial laws. Provincial laws may require approvals for air emissions and may impose other restrictions on facilities and equipment that have the potential to emit pollutants into the atmosphere. Provincial laws may require the construction of landfill gas management systems, including gas collection and flaring systems, which are subject to approvals or other regulatory requirements. Failure to obtain an approval or comply with approval requirements could result in the imposition of substantial administrative or regulatory penalties.

D. Occupational Health and Safety

1. The Occupational Safety and Health Act of 1970, or the OSH Act

In the United States, the OSH Act is administered by the Occupational Safety and Health Administration, or OSHA, and many state agencies whose programs have been approved by OSHA. The OSH Act establishes employer responsibilities for worker health and safety, including the obligation to maintain a workplace free of recognized hazards likely to cause death or serious injury, comply with adopted worker protection standards, maintain certain records, provide workers with required disclosures, and implement certain health and safety training programs. Various OSHA standards may apply to our operations, including standards concerning notices of hazards, safety in excavation and demolition work, the handling of asbestos and asbestos-containing materials and worker training and emergency response programs. Moreover, the Department of Transportation, OSHA, and other agencies regulate and have jurisdiction concerning the transport, movement, and related safety of hazardous and other regulated materials. In some instances, state and local agencies also regulate the safe transport of such materials to the extent not preempted by federal law.

2. Canadian Occupational Health and Safety Laws

In Canada, each province establishes and administers a provincial occupational health and safety regime. Similar to the United States, these regimes generally identify the rights and responsibilities of employers, supervisors and workers. Employers are required to implement all prescribed safety requirements and to exercise reasonable care to protect employees from workplace hazards, among other things. Various occupational health and safety standards may apply to our Canadian operations, including requirements relating to communication of and exposure to hazards, safety in excavation and demolition work, the handling of asbestos and asbestos-containing materials and worker training and emergency response programs. In addition to the provincial departments of transportation, Transport Canada has jurisdiction to regulate the transportation of dangerous goods, which can include wastes.

E. Additional Regulatory Considerations

We also review regulatory developments that may affect our business, including, among others, those described below.

1. State, Provincial and Local Regulation

In addition to the federal statutes regulating our operations, each state where we operate or may operate in the future has laws and regulations governing the management, generation, storage, treatment, handling, transportation, and disposal of solid waste, E&P waste, occupational safety and health, water and air pollution and, in most cases, the siting, design, operation, maintenance, corrective action, closure and post-closure maintenance of landfills and transfer stations. Further, many municipalities have enacted or could enact ordinances, local laws and regulations affecting our operations, including zoning and health measures that limit solid waste management activities to specified sites or activities. Other jurisdictions have enacted “fitness” rules focusing on companywide and overall corporate compliance history in making permitting decisions. In addition, certain jurisdictions have enacted flow control provisions that direct or restrict the delivery of solid wastes to specific facilities, laws that grant the right to establish franchises for collection services and bidding for such franchises and bans or other restrictions on the movement of solid wastes into a municipality. Specific state and local permits for our operations may be required and may be subject to periodic renewal, modification or revocation by the issuing agencies. There has also been an increasing trend at the state, provincial and local levels to mandate and encourage waste reduction at the source and recycling, and to prohibit or restrict landfill disposal of certain types of solid wastes, such as food waste, yard waste, leaves, tires, electronic equipment waste, painted wood and other construction and demolition debris. The enactment of laws or regulations reducing the volume and types of wastes available for transport to and disposal in landfills could prevent us from operating our facilities at their full capacity.

2. Hydraulic Fracturing Regulation

We do not conduct hydraulic fracturing operations, but we do provide treatment, recovery and disposal services for the fluids used and wastes generated by our customers in such operations. Recently, there has been increased public concern regarding the alleged potential for hydraulic fracturing to adversely affect drinking water supplies, and proposals have been made to enact separate federal, state or local legislation that would increase the regulatory burden imposed on hydraulic fracturing. Laws and regulations have been proposed and/or adopted at the federal, state and local levels that would regulate, restrict or prohibit hydraulic fracturing operations or require the reporting and public disclosure of chemicals used in the hydraulic fracturing process. Certain states and localities have placed moratoria or bans on hydraulic fracturing or the disposal of waste therefrom, or have considered the same.

In June 2016, the EPA promulgated a rule prohibiting discharges of wastewater pollutants from onshore unconventional oil and gas extraction facilities to publicly-owned treatment works, or POTWs. Further, the EPA promulgated regulations known as Reg. OOOO and Reg. OOOOa, which, among other things, require control of methane and VOC emissions related to certain well completions and certain tankage and equipment. Certain provisions of Reg. OOOOa are currently the subject of litigation. In June 2017, the EPA proposed a two-year stay of portions of the rules and in October 2018, the EPA proposed revisions to Reg. OOOOa. No long term stays have yet become effective. Regardless of potential regulatory revisions, these rules can require oil and gas operators to expend material sums, which may reduce our customers’ E&P activities and could have an adverse impact on our business. Additionally, several states have adopted or proposed laws and regulations analogous to the federal rules that would remain in effect regardless of the outcome of any federal stay or litigation. Further, several states in which we conduct business require oil and natural gas operators to disclose information concerning their operations, which could result in increased public scrutiny.

The EPA has contemplated additional rule making. In May 2014, the EPA issued an Advanced Notice of Proposed Rulemaking, or ANPR, under the Toxic Substances Control Act, or TSCA, seeking comment on whether and how the EPA should regulate the reporting or disclosure of the use of hydraulic fracturing chemical substances and mixtures and their constituents. Several states have already implemented such requirements. Additionally, in December 2016, the EPA released a study on the environmental impacts of hydraulic fracturing on drinking water. In that study, the EPA found evidence that hydraulic fracturing activity can impact drinking water resources under some circumstances, but data gaps limited the EPA's ability to fully assess the matter. The EPA also published in May 2018 a detailed study of centralized waste treatment, or CWT, facilities accepting oil and gas extraction wastewater. The study assessed the regulatory status of CWTs, characteristics of wastewaters discharged from them, available treatment technologies and associated costs. The impact of rules that the EPA is contemplating, has proposed or has recently promulgated will be uncertain until the rules are finalized and fully implemented.

If the EPA's newly promulgated or proposed rules, or other new federal, state or local laws, regulations or policies restricting hydraulic fracturing are adopted, such legal requirements could result in delays, eliminate certain drilling and injection activities and make it more difficult or costly for our customers to perform hydraulic fracturing. Any such regulations limiting, prohibiting or imposing operational requirements on hydraulic fracturing could reduce oil and natural gas E&P activities by our customers and, therefore, adversely affect our business. Such laws or regulations could also materially increase our costs of compliance.

3. Disposal of Drilling Fluids

Certain of our facilities accept drilling fluids and other E&P wastes for disposal via underground injection. The disposal of drilling fluids is generally regulated at the state level, and claims, including some regulatory actions, have been brought against some owners or operators of these types of facilities for nuisance, seismic disturbances and other claims in relation to the operation of underground injection facilities. To date, our facilities have not been subject to any such litigation, but could be in the future.

4. Climate Change Laws and Regulations

Generally, the promulgation of climate change laws or regulations restricting or regulating greenhouse gas, or GHG, emissions could increase our costs to operate. The EPA's current and proposed regulation of GHG emissions may adversely impact our operations. In 2009, the EPA made an endangerment finding allowing GHGs to be regulated under the CAA. The CAA requires stationary sources of air pollution to obtain New Source Review, or NSR, permits prior to construction and, in some cases, Title V operating permits. Pursuant to the EPA's rulemakings and interpretations, certain Title V and NSR Prevention of Significant Deterioration, or PSD, permits issued on or after January 2, 2011, must address GHG emissions. As a result, new or modified emissions sources may be required to install Best Available Control Technology to limit GHG emissions. The EPA's recently adopted Subpart XXX also requires the reduction of GHG emissions from new or modified landfills, and the Guidelines, known as Subpart Cf, published by the EPA in August 2016, will require the reduction of GHG emissions from existing landfills, although the EPA has delayed implementation of, and is reconsidering portions of, these regulations, as detailed above. In addition, the EPA's Mandatory Greenhouse Gas Reporting Rule sets monitoring, recordkeeping and reporting requirements applicable to certain landfills and other entities.

In June 2018, the Canadian federal government enacted the Greenhouse Gas Pollution Pricing Act, which established a national carbon-pricing regime starting in 2019 for provinces and territories in Canada where there is no provincial regime in place or where the provincial regime does not meet the federal benchmark. Often referred to as the federal backstop, the federal carbon-pricing regime consists of a carbon levy that is applied to fossil fuels and an output-based pricing system ("OBPS") that is applied to certain industrial facilities with reported emissions of 50,000 tonnes of carbon dioxide equivalent ("CO2e") or more per year. The carbon levy applies to prescribed liquid, gaseous, and solid fuels at a rate that is equivalent to $20 per tonne of CO_2e in 2019, increasing annually, until it reaches $50 per tonne of CO_2e by 2022.

Certain states and several Canadian provinces have promulgated legislation and regulations to limit GHG emissions through requirements of specific controls, carbon levies, cap and trade programs or other measures. Comprehensive GHG legislation or regulation, including carbon pricing, affects not only our business, but also that of our customers.

Heightened regulation of our customers' operations could also adversely affect our business. The regulation of GHG emissions from oil and gas E&P operations may increase the costs to our customers of developing and producing hydrocarbons and, as a result, may have an indirect and adverse effect on the amount of E&P waste delivered to our facilities. On June 3, 2016, the EPA promulgated NSPS Subpart OOOOa, which in conjunction with NSPS Subpart OOOO sets methane and VOC requirements for certain new and modified sources, including hydraulically fractured oil wells, certain tankage and equipment. Although the EPA has proposed delaying implementation of, and is reconsidering portions of, these regulations, they will continue to require, in some instances, additional emissions controls and increased capital costs for our customers, which could reduce their E&P activities, and subsequently negatively impact our business operations. As discussed above, certain states have enacted rules analogous to the federal rules.

These statutes and regulations increase our costs and our customers' costs, and future climate change statutes and regulations may have an impact as well. If we are unable to pass such higher costs through to our customers, or if our customers' costs of developing and producing hydrocarbons increase, our business, financial condition and operating results could be adversely affected. The impact of any potential rules affecting existing sources is uncertain.

5. Flow Control/Interstate Waste Restrictions

Certain permits and state and local regulations, known as flow control restrictions, may limit a landfill's or transfer station's ability to accept waste that originates from specified geographic areas, to import out-of-state waste or wastes originating outside the local jurisdictions or to otherwise accept non-local waste. While certain courts have deemed these laws to be unenforceable, other courts have not. Certain state and local jurisdictions may seek to enforce flow control restrictions contractually. These actions could limit or prohibit the importation of wastes originating outside of local jurisdictions or direct that wastes be handled at specified facilities. These restrictions could limit the volume of wastes we can manage in jurisdictions at issue and also result in higher disposal costs for our collection operations. If we are unable to pass such higher costs through to our customers, our business, financial condition and operating results could be adversely affected. Additionally, certain local jurisdictions have sought or may seek to impose extraterritorial obligations on our operations in an effort to affect flow control and may enforce tax and fee arrangements on behalf of such jurisdictions.

F. Renewable and Low Carbon Fuel Standards

Pursuant to the Energy Independence and Security Act of 2007, the EPA promulgated the Renewable Fuel Standards, or RFS, which require refiners to either blend "renewable fuels," such as ethanol and biodiesel, into their transportation fuels or to purchase renewable fuel credits, known as renewable identification numbers, or RINs, in lieu of blending. In some cases, landfill gas generated at our landfills in the United States qualifies as a renewable fuel for which RINs are available. Such RINs can be sold by the Company. The price of RINs has been extremely volatile and the value of RINs is dependent upon a variety of factors. The EPA annually establishes the renewable fuel volumes required under the RFS for the following year. Reductions or limitations on the requirement to blend renewable fuel would likely reduce the volume of RINs purchased to meet the RFS blending requirements. Further, there have been proposals to revise, and in some instances limit, the RFS program in the United States. As recently as October 2019, House Energy and Commerce Committee members, Representatives Shimkus and Flores, introduced the 21st Century Transportation Fuels Act which aims to eliminate volume-based renewable fuels mandates and instead rely upon the transition to a national octane standard and automobile manufacturing standards to govern fuel composition. Various parties have also sought for the executive branch to revise the RFS. Limiting or eliminating the RFS could have the effect of reducing or eliminating the volume of RINs required to meet blending requirements, which could adversely affect the demand for RINS and accordingly the revenue stream we have historically derived from the sale of RINs.

In Canada, the Renewable Fuels Regulations under the Canadian Environmental Protection Act, 1999 require producers and importers of gasoline, diesel fuel and heating distillate to acquire a certain number of renewable fuel compliance units, or Compliance Units, in connection with the volumes of fuel they produce or import. Compliance Units can be generated in a number of ways, including through the blending of renewable fuel into liquid petroleum fuels. Certain provincial jurisdictions in Canada also impose obligations to incorporate renewable fuels into fuels that are distributed within the jurisdiction. In some cases, landfill gas generated at our landfills in Canada is sold by our Company as a renewable fuel for which RINs are available under the United States RFS. Our Company could also sell landfill gas generated in Canada in connection with renewable fuel obligations in Canada. The price for our renewable fuel is dependent on a variety of factors, including demand. The Canadian federal government announced in late 2016 that it was developing a new "Clean Fuel Standard" to reduce greenhouse gas emissions from fuel use. Since that time, Environment and Climate Change Canada has engaged in consultations with respect to the new standard. Details of the proposed new clean fuel regulatory framework were released at the end of 2017, and indicated, among other things, that the proposed framework would impose lifecycle carbon intensity requirements on certain liquid, gaseous and solid fuels that are used in transportation, industry and buildings, and establish rules relating to the trading of compliance credits. The carbon intensity requirements would become more stringent over time. Carbon intensity would be differentiated between different types of renewable fuels to reflect the associated emissions reduction potential. Regulated parties, which may include fuel producers and importers, would have some flexibility with respect to how to achieve lower carbon fuels in Canada. Environment and Climate Change Canada has since published a Regulatory Design Paper for the Clean Fuel Standard in December 2018 and a Proposed Regulatory Approach for the Clean Fuel Standard in June 2019. These documents present additional details of the proposed regulatory design of the Clean Fuel Standard. The Canadian Government is reporting that new regulations under the Clean Fuel Standard are targeted to come into force on January 1, 2022 (for liquid fuels) and January 1, 2023 (for gaseous and solid fuel regulations). The Canadian federal government has indicated that over time, the new Clean Fuel Standard would replace the current Renewable Fuels Regulations. At this time, we do not know how a new clean fuel regulatory framework in Canada could impact demand for our renewable fuel.

A significant reduction in the value of RINs in the United States or the price paid for our renewable fuel in Canada could adversely impact our reported results.

G. Regulation of Naturally Occurring Radioactive Metals, or NORM

Certain states have enacted laws and regulations regulating NORM. In the course of our E&P waste operations, some of our equipment involved in E&P waste management and disposal may be exposed to naturally occurring radiation associated with oil and gas deposits. Further, certain E&P wastes we handle could be NORM contaminated. NORM wastes exhibiting levels of naturally occurring radiation exceeding established state standards are typically subject to special handling and disposal requirements, and any storage vessels, piping, equipment and work area affected by NORM waste may be subject to remediation or restoration requirements. It is possible that we may incur significant costs or liabilities associated with inadvertently handling NORM contaminated waste or equipment that becomes NORM contaminated based on exposure or contact with elevated levels of NORM.

H. Extended Producer Responsibility, or EPR, Regulations

EPR regulations place responsibility on product manufacturers or suppliers to assume certain waste management or recycling responsibility for their products after such products' useful life or otherwise impose obligations on product manufacturers or suppliers to reduce the volume of waste associated with their products.

EPR regulations have yet to be promulgated at the federal level in the United States, but have been promulgated or considered in state and local jurisdictions in the United States. EPR regulations could have an adverse effect on our business if enacted at the federal level or if widely enacted by state or local governments.

Numerous provincial jurisdictions in Canada have promulgated EPR and related waste diversion legislation and other programs that mandate or encourage recycling and waste reduction and restrict the landfill disposal of certain types of waste. The enactment of new and more stringent regulations reducing the types or volumes of wastes available for disposal in landfills could impact our future operations.

I. State Public Utility Regulation

In some states, public authorities regulate the rates that landfill operators may charge. The adoption of rate regulation or the reduction of current rates in states in which we own or operate landfills could adversely affect our business, financial condition and operating results.

RISK MANAGEMENT, INSURANCE AND FINANCIAL SURETY BONDS

Risk Management

We maintain environmental and other risk management programs that we believe are appropriate for our business. Our environmental risk management program includes evaluating existing facilities and potential acquisitions for environmental law compliance. We do not presently expect environmental compliance costs to increase materially above current levels, but we cannot predict whether future acquisitions will cause such costs to increase. We also maintain a worker safety program that encourages safe practices in the workplace. Operating practices at our operations emphasize minimizing the possibility of environmental contamination and litigation. Our facilities comply in all material respects with applicable federal, state and provincial regulations.

Insurance

We maintain an insurance program for automobile liability, general liability, employer’s liability claims, environmental liability, cyber liability, employment practices liability and directors’ and officers’ liability as well as for employee group health insurance, property and workers’ compensation. Our loss exposure for insurance claims is generally limited to per incident deductibles or self-insured retentions. Losses in excess of deductible or self-insured retention levels are insured subject to policy limits.

Under our current company-wide insurance program, we carry per incident deductibles or self-insured retentions ranging from $100,000 to $2 million for cyber liability and directors’ and officers’ liability claims. Additionally, we have umbrella policies with insurance companies for automobile liability, general liability and employer’s liability. Our property insurance limits are in accordance with the replacement values of the insured property.

Under our current insurance program for our U.S. operations, we carry per incident deductibles or self-insured retentions ranging from $250,000 to $20 million for automobile liability claims, workers’ compensation and employer’s liability claims, general liability claims, employee group health insurance and employment practices liability, environmental liability, and for most property claims, subject to certain additional terms and conditions. Since workers’ compensation is a statutory coverage limited by the various state jurisdictions, the umbrella coverage is not applicable. Our environmental protection insurance policy covers all owned or operated landfills, certain transfer stations and other facilities, subject to the policy terms and conditions. From time to time, actions filed against us include claims for punitive damages, which are generally excluded from coverage under our liability insurance policies. Our policy provides insurance for new pollution conditions that originate after the commencement of our coverage. Pollution conditions existing prior to the commencement of our coverage, if found, could be excluded from coverage.

Under our current insurance program for our Canadian operations, we carry per incident deductibles or self-insured retentions ranging from $100,000 to $5 million for automobile liability claims, property claims and environmental liability. Since workers’ compensation is a provincial coverage limited by the various province jurisdictions, the umbrella coverage is not applicable. Employees are eligible to receive health coverage under Canada’s public health care system and, in addition, most employees of our Canadian operations are eligible to participate in group medical and drug coverage plans sponsored by us. Our environmental protection insurance policy covers all owned or operated landfills, certain transfer stations and other facilities, subject to the policy terms and conditions. Our policy provides insurance for new pollution conditions that originate after the commencement of our coverage. Pollution conditions existing prior to the commencement of our coverage, if found, could be excluded from coverage.

Financial Surety Bonds

We use financial surety bonds for a variety of corporate guarantees. The financial surety bonds are primarily used for guaranteeing municipal contract performance and providing financial assurances to meet asset closure and retirement requirements under certain environmental regulations. In addition to surety bonds, such guarantees and obligations may also be met through alternative financial assurance instruments, including insurance, letters of credit and restricted cash and investment deposits. At December 31, 2019 and 2018, we had provided customers and various regulatory authorities with surety bonds in the aggregate amount of approximately $661.6 million and $619.8 million, respectively, to secure our asset closure and retirement requirements and $419.3 million and $357.8 million, respectively, to secure performance under collection contracts and landfill operating agreements.

We source financial surety bonds from a variety of third-party insurance and surety companies, including a company in which we own a 9.9% interest that, among other activities, issues financial surety bonds to secure landfill final capping, closure and post-closure obligations for companies operating in the solid waste sector.

EMPLOYEES

At December 31, 2019, we had 18,204 employees, of which 3,159, or approximately 17.4% of our workforce, were employed under collective bargaining agreements. The majority of our collective bargaining agreements are with the Teamsters Union in both the U.S. and Canada. These collective bargaining agreements are renegotiated periodically. We have 21 collective bargaining agreements covering 1,522 employees that have expired or are set to expire during 2020. We do not expect any significant disruption in our overall business in 2020 as a result of labor negotiations, employee strikes or organizational efforts by labor unions or their representatives.

SEASONALITY

We expect our operating results to vary seasonally, with revenues typically lowest in the first quarter, higher in the second and third quarters and lower in the fourth quarter than in the second and third quarters. This seasonality reflects (a) the lower volume of solid waste generated during the late fall, winter and early spring because of decreased construction and demolition activities during winter months in Canada and the U.S., and (b) reduced E&P activity during harsh weather conditions, with expected fluctuation due to such seasonality between our highest and lowest quarters of approximately 10%. In addition, some of our operating costs may be higher in the winter months. Adverse winter weather conditions slow waste collection activities, resulting in higher labor and operational costs. Greater precipitation in the winter increases the weight of collected MSW, resulting in higher disposal costs, which are calculated on a per ton basis.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

The following table sets forth certain information concerning our executive officers as of February 3, 2020:

Name	Age	Position
Ronald J. Mittelstaedt [(1)]	56	Executive Chairman
Worthing F. Jackman	55	President and Chief Executive Officer
Darrell W. Chambliss	55	Executive Vice President and Chief Operating Officer
James M. Little	58	Executive Vice President – Engineering and Disposal
Patrick J. Shea	49	Executive Vice President, General Counsel and Secretary
Mary Anne Whitney	56	Senior Vice President and Chief Financial Officer
Matthew S. Black	47	Senior Vice President and Chief Tax Officer
David G. Eddie	50	Senior Vice President and Chief Accounting Officer
David M. Hall	62	Senior Vice President – Sales and Marketing
Eric O. Hansen	54	Senior Vice President – Chief Information Officer
Robert M. Cloninger	47	Vice President, Deputy General Counsel and Assistant Secretary
Keith P. Gordon	56	Vice President – Information Systems
Shawn W. Mandel	53	Vice President – Safety and Risk Management
Susan R. Netherton	50	Vice President – People, Training and Development
Jason W. Pratt	40	Vice President – Corporate Controller
Scott I. Schreiber	63	Vice President – Equipment and Operations Support
Gregory Thibodeaux	53	Vice President – Maintenance and Fleet Management
Colin G. Wittke	57	Vice President – Sales
Richard K. Wojahn	62	Vice President – Business Development

(1) Member of the Executive Committee of the Board of Directors.

Ronald J. Mittelstaedt has been Executive Chairman of the Company since July 2019. From its formation in 1997 to that date, Mr. Mittelstaedt served as Chief Executive Officer of the Company. Mr. Mittelstaedt has served as a director of the Company since its formation, and was elected Chairman in January 1998. He also served as President of the Company from its formation through August 2004. Mr. Mittelstaedt has more than 31 years of experience in the solid waste industry. He serves as a director of SkyWest, Inc. Mr. Mittelstaedt holds a B.A. degree in Business Economics with a finance emphasis from the University of California at Santa Barbara.

Worthing F. Jackman has been President and Chief Executive Officer of the Company since July 2019. From July 2018 to that date, Mr. Jackman served as President of the Company. From September 2004 to July 2018, Mr. Jackman served as Executive Vice President and Chief Financial Officer of the Company. From April 2003 to September 2004, he served as Vice President – Finance and Investor Relations of the Company. Mr. Jackman held various investment banking positions with Alex. Brown & Sons, now Deutsche Bank Securities, Inc., from 1991 through 2003, including most recently as a Managing Director within the Global Industrial & Environmental Services Group. In that capacity, he provided capital markets and strategic advisory services to companies in a variety of sectors, including solid waste services. Mr. Jackman serves as a director of Quanta Services, Inc. He holds a B.S. degree in Finance from Syracuse University and an M.B.A. from the Harvard Business School.

Darrell W. Chambliss has been Executive Vice President and Chief Operating Officer of the Company since October 2003. From October 1, 1997 to that date, Mr. Chambliss served as Executive Vice President – Operations of the Company. Mr. Chambliss has more than 29 years of experience in the solid waste industry. Mr. Chambliss holds a B.S. degree in Business Administration from the University of Arkansas.

James M. Little has been Executive Vice President – Engineering and Disposal of the Company since July 2019. From February 2009 to that date, Mr. Little served as Senior Vice President – Engineering and Disposal of the Company. From September 1999 to February 2009, Mr. Little served as Vice President – Engineering of the Company. Mr. Little held various management positions with Waste Management, Inc. (formerly USA Waste Services, Inc., which acquired Waste Management, Inc. and Chambers Development Co. Inc.) from April 1990 to September 1999, including

Regional Environmental Manager and Regional Landfill Manager, and most recently Division Manager in Ohio, where he was responsible for the operations of ten operating companies in the Northern Ohio area. Mr. Little is a certified professional geologist and holds a B.S. degree in Geology from Slippery Rock University.

Patrick J. Shea has been Executive Vice President, General Counsel and Secretary of the Company since July 2019. From August 2014 to that date, Mr. Shea served as Senior Vice President, General Counsel and Secretary of the Company. From February 2009 to August 2014, Mr. Shea served as Vice President, General Counsel and Secretary of the Company. He served as General Counsel and Secretary of the Company from February 2008 to February 2009 and Corporate Counsel of the Company from February 2004 to February 2008. Mr. Shea practiced corporate and securities law with Brobeck, Phleger & Harrison LLP in San Francisco from 1999 to 2003 and Winthrop, Stimson, Putnam & Roberts (now Pillsbury Winthrop Shaw Pittman LLP) in New York and London from 1995 to 1999. Mr. Shea holds a B.S. degree in Managerial Economics from the University of California at Davis and a J.D. degree from Cornell University.

Mary Anne Whitney has been Senior Vice President and Chief Financial Officer of the Company since July 2018. From February 2018 to that date, Ms. Whitney served as Senior Vice President – Finance of the Company. From March 2012 to February 2018, Ms. Whitney served as Vice President – Finance of the Company. From November 2006 to March 2012, Ms. Whitney served as Director of Finance of the Company. Ms. Whitney held various finance positions for Wheelabrator Technologies from 1990 to 2001. Ms. Whitney holds a B.A. degree in Economics from Georgetown University and an M.B.A. in Finance from New York University Stern School of Business.

Matthew S. Black has been Senior Vice President and Chief Tax Officer of the Company since January 2017. From March 2012 to that date, Mr. Black served as Vice President and Chief Tax Officer of the Company. From December 2006 to March 2012, Mr. Black served as Executive Director of Taxes of the Company. Mr. Black served as Tax Director for The McClatchy Company from April 2001 to November 2006, and served as Tax Manager from December 2000 to March 2001. From January 1994 to November 2000, Mr. Black held various positions, including Tax Manager, for PricewaterhouseCoopers LLP. Mr. Black is a Certified Public Accountant and holds a B.S. degree in Accounting and Master's degree in Taxation from California State University, Sacramento.

David G. Eddie has been Senior Vice President and Chief Accounting Officer of the Company since January 2011. From February 2010 to that date, Mr. Eddie served as Vice President – Chief Accounting Officer of the Company. From March 2004 to February 2010, Mr. Eddie served as Vice President – Corporate Controller of the Company. From April 2003 to February 2004, Mr. Eddie served as Vice President – Public Reporting and Compliance of the Company. From May 2001 to March 2003, Mr. Eddie served as Director of Finance of the Company. Mr. Eddie served as Corporate Controller for International Fibercom, Inc. from April 2000 to May 2001. From September 1999 to April 2000, Mr. Eddie served as the Company's Manager of Financial Reporting. From September 1994 to September 1999, Mr. Eddie held various positions, including Audit Manager, for PricewaterhouseCoopers LLP. Mr. Eddie holds a B.S. degree in Accounting from California State University, Sacramento.

David M. Hall has been Senior Vice President – Sales and Marketing of the Company since October 2005. From August 1998 to that date, Mr. Hall served as Vice President – Business Development of the Company. Mr. Hall has more than 34 years of experience in the solid waste industry with extensive operating and marketing experience in the Western U.S. Mr. Hall received a B.S. degree in Management and Marketing from Missouri State University.

Eric O. Hansen has been Senior Vice President – Chief Information Officer of the Company since February 2019. From July 2004 to that date, Mr. Hansen served as Vice President – Chief Information Officer of the Company. From January 2001 to July 2004, Mr. Hansen served as Vice President – Information Technology of the Company. From April 1998 to December 2000, Mr. Hansen served as Director of Management Information Systems of the Company. Mr. Hansen holds a B.S. degree from Portland State University.

Robert M. Cloninger has been Vice President, Deputy General Counsel and Assistant Secretary of the Company since August 2014. From February 2013 to that date, Mr. Cloninger served as Deputy General Counsel of the Company. He served as Corporate Counsel of the Company from February 2008 to February 2013. Mr. Cloninger practiced corporate, securities and mergers and acquisitions law with Schiff Hardin LLP in Chicago from 1999 to 2004 and

Downey Brand LLP in Sacramento from 2004 to 2008. Mr. Cloninger holds a B.A. degree in History from Northwestern University and a J.D. degree from the University of California at Davis.

Keith P. Gordon has been Vice President – Information Systems of the Company since January 2017. From September 2010 to that date, Mr. Gordon served as Director of Information Systems of the Company. Prior to joining the Company, he spent 14 years in leadership roles with CableData, DST Innovis and Amdocs, Inc. leading an international software development organization, as well as serving as CTO for a startup company that was acquired by LivingSocial. Mr. Gordon spent 11 years as an Army officer in a number of leadership positions including Company Commander and Battalion staff positions. Mr. Gordon has a B.S. in Mechanical Engineering from United States Military Academy, West Point, and M.S. in Computer Science from Stanford University.

Shawn W. Mandel has been Vice President – Safety and Risk Management of the Company since January 2017. From May 2011 to that date, Mr. Mandel served as Director of Safety of the Company. From 1995 to 2011, Mr. Mandel held various Safety leadership positions with Republic Services (formerly Browning-Ferris Industries and Allied Waste) including Director of Safety. Mr. Mandel holds a B.A. degree in Business Administration from National University.

Susan R. Netherton has been Vice President – People, Training and Development of the Company since July 2013. From February 2007 to that date, Ms. Netherton served as Director of Human Resources and Employment Manager of the Company. From 1994 to 2007, Ms. Netherton held various human resources positions at Carpenter Technology Corporation, a publicly-traded, specialty metals and materials company. Ms. Netherton holds a B.S. in Elementary Education from Kutztown University and an M.B.A. from St. Mary's College of California.

Jason W. Pratt has been Vice President – Corporate Controller of the Company since February 2020. From June 2016 to that date, Mr. Pratt served as Region Controller - Canada of the Company. From October 2012 to May 2016, Mr. Pratt served as Region Controller – Western Region of the Company. From January 2007 to September 2012, Mr. Pratt served as Division Controller – Mountain West Division and Division Controller – Northern Washington Division of the Company. From July 2005 to December 2006, Mr. Pratt held various Assistant Controller and District Controller positions with the Company. From August 2003 to June 2005, Mr. Pratt served as Tax Accountant for LeMaster and Daniels, PLLC. Mr. Pratt holds a B.S. degree in Business Administration with a concentration in Accounting and an M.B.A with a concentration in Finance from the University of Portland in Oregon.

Scott I. Schreiber has been Vice President – Equipment and Operations Support of the Company since the completion of the Progressive Waste acquisition on June 1, 2016. From February 2009 to that date, Mr. Schreiber served as Vice President – Disposal Operations of the Company. From October 1998 to February 2009, he served as Director of Landfill Operations of the Company. Mr. Schreiber has more than 39 years of experience in the solid waste industry. From September 1993 to September 1998, Mr. Schreiber served as corporate Director of Landfill Development and corporate Director of Environmental Compliance for Allied Waste Industries, Inc. From August 1988 to September 1993, Mr. Schreiber served as Regional Engineer (Continental Region) and corporate Director of Landfill Development for Laidlaw Waste Systems Inc. From June 1979 to August 1988, Mr. Schreiber held several managerial and technical positions in the solid waste and environmental industry. Mr. Schreiber holds a B.S. degree in Chemistry from the University of Wisconsin at Parkside.

Gregory Thibodeaux has been Vice President – Maintenance and Fleet Management of the Company since January 2011. From January 2000 to that date, Mr. Thibodeaux served as Director of Maintenance of the Company. Mr. Thibodeaux has more than 33 years of experience in the solid waste industry having held various management positions with Browning Ferris Industries, Sanifill, and USA Waste Services, Inc. Before coming to the Company, Mr. Thibodeaux served as corporate Director of Maintenance for Texas Disposal Systems.

Colin G. Wittke has been Vice President – Sales of the Company since the completion of the Progressive Waste acquisition on June 1, 2016. From June 2011 to that date, he served as Vice President, Sales and Marketing of Progressive Waste Solutions Ltd. Prior to that time, Mr. Wittke held various roles with Waste Management, Inc. for 19 years, including the position of Vice President, Sales and Customer Service. He has more than 31 years of experience in the solid waste industry. Mr. Wittke holds a BSc in Finance (cum laude) from Biola University in La Mirada, California.

Richard K. Wojahn has been Vice President – Business Development of the Company since February 2009. From September 2005 to that date, Mr. Wojahn served as Director of Business Development of the Company. Mr. Wojahn served as Vice President of Operations for Mountain Jack Environmental Services, Inc. (which was acquired by the Company in September 2005) from January 2004 to September 2005. Mr. Wojahn has more than 38 years of experience in the solid waste industry having held various management positions with Waste Management, Inc. and Allied Waste Industries, Inc. Mr. Wojahn attended Western Illinois University.

AVAILABLE INFORMATION

Our corporate website address is http://www.wasteconnections.com. We make our reports on Forms 10-K, 10-Q and 8-K and any amendments to such reports available on our website free of charge as soon as reasonably practicable after we file them with or furnish them to the Securities and Exchange Commission, or SEC, and with the securities commissions or similar regulatory authorities in Canada. The SEC maintains an internet website at http://www.sec.gov that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC. The references to our website address, the SEC's website address and the website maintained by the securities commissions or similar regulatory authorities in Canada do not constitute incorporation by reference of the information contained in those websites and should not be considered part of this document.

ITEM 1A. RISK FACTORS

Certain statements contained in this Annual Report on Form 10-K are forward-looking in nature, including statements related to the impact of global economic conditions, including the price of crude oil, on our volume, business and results of operations; our ability to generate internal growth or expand permitted capacity at landfills we own or operate; our ability to grow through acquisitions and our expectations with respect to the impact of acquisitions on our expected revenues and expenses following the integration of such businesses; the competitiveness of our industry and how such competition may affect our operating results; the possibility of losing contracts through competitive bidding, early termination or governmental action; the effects of financial difficulties of some of our customers, including governmental entities, affecting their credit risk; our ability to provide adequate cash to fund our operating activities; our ability to draw from our credit facility or raise additional capital; our ability to generate free cash flow and reduce our leverage; the impact on our tax positions by recent changes in U.S. tax law; the effects of landfill special waste projects on volume results; the impact that price increases may have on our business and operating results; demand for recyclable commodities and recyclable commodity pricing; the effects of seasonality on our business and results of operations; our ability to obtain additional exclusive arrangements; increasing alternatives to landfill disposal; increases in labor and pension plan costs or the impact that labor union activity may have on our operating results; operational and safety risks, including the risk of personal injury to employees and others; our expectations with respect to the purchase of fuel and fuel prices; our expectations with respect to capital expenditures; our expectations with respect to the outcomes of our legal proceedings; the impairment of our goodwill; insurance costs; disruptions to or breaches of our information systems and other cybersecurity threats; and environmental, health and safety laws and regulations, including changes to the regulation of landfills, solid waste disposal, E&P waste disposal, or hydraulic fracturing. These statements can be identified by the use of forward-looking terminology such as "believes," "expects," "may," "will," "should," or "anticipates," or the negative thereof or comparable terminology, or by discussions of strategy. Our business and operations are subject to a variety of risks and uncertainties and, consequently, actual results may differ materially from those projected by any forward-looking statements. Factors that could cause actual results to differ from those projected include, but are not limited to, those listed below and elsewhere in this Annual Report on Form 10-K. There may be additional risks of which we are not presently aware or that we currently believe are immaterial which could have an adverse impact on our business. We make no commitment to revise or update any forward-looking statements in order to reflect events or circumstances that may change.

Our results are vulnerable to economic conditions.

Our business and financial results would be harmed by downturns in the global economy, or in the economy of the regions in which we operate as well as other factors affecting those regions, including the price of crude oil. In an economic slowdown, we experience the negative effects of decreased waste generation, increased competitive pricing pressure, customer turnover, and reductions in customer service requirements, any of which could negatively impact our operating income and cash flows. Two of our business lines that could see a more immediate impact would be construction and demolition debris and E&P waste disposal as demand for new construction or energy exploration decreases. In addition, a weaker economy may result in declines in recycled commodity prices. Worsening economic conditions or a prolonged or recurring economic recession could adversely affect our operating results and expected seasonal fluctuations. Further, we cannot assure you that any improvement in economic conditions after such a downturn will result in an immediate, if at all, positive improvement in our operating results or cash flows.

Our industry is highly competitive and includes companies with lower prices, return expectations or other advantages, and governmental service providers, which could adversely affect our ability to compete and our operating results.

Our industry is highly competitive and requires substantial labor and capital resources. Some of the markets in which we compete or will seek to compete are served by one or more large, national companies, as well as by regional and local companies of varying sizes and resources, some of which we believe have accumulated substantial goodwill in their markets. Some of our competitors may also have greater name recognition than we do, or be able to provide or be willing to bid their services at a lower price than we may be willing to offer. In addition, existing and future competitors may develop or offer services or new technologies, new facilities or other advantages. Our inability to compete effectively could hinder our growth or negatively impact our operating results.

In our solid waste business, we also compete with counties, municipalities and solid waste districts that maintain or could in the future choose to maintain their own waste collection and disposal operations, including through the implementation of flow control ordinances or similar legislation. These operators may have financial advantages over us because of their access to user fees and similar charges, tax revenues and tax-exempt financing.

In our E&P waste business, we compete for disposal volumes with existing facilities owned by third parties (including those owned by municipalities or quasi-governmental entities), and we face potential competition from new facilities that are currently under development. Increased competition in certain markets may result in lower pricing and decreased volumes at our facilities. In addition, customers in certain markets may decide to use internal disposal methods for the treatment and disposal of their waste.

Competition for acquisition candidates, consolidation within the waste industry and economic and market conditions may limit our ability to grow through acquisitions.

We seek to grow through strategic acquisitions in addition to internal growth. Although we have and expect to continue to identify numerous acquisition candidates that we believe may be suitable, we may not be able to acquire them at prices or on terms and conditions favorable to us.

Other companies have adopted or may in the future adopt our strategy of acquiring and consolidating regional and local businesses, and they may be willing to accept terms and conditions or valuations that we deem inappropriate. To the extent that competition increases, it may become uneconomical for us to make further acquisitions or we may be unable to locate or acquire suitable acquisition candidates at price levels and on terms and conditions that we consider appropriate, particularly in markets we do not already serve.

We expect that increased consolidation in the solid waste services industry will continue to reduce the number of attractive acquisition candidates. Moreover, general economic conditions and the environment for attractive investments may affect the desire of the owners of acquisition candidates to sell their companies. As a result, we may have fewer acquisition opportunities, and those opportunities may be on less attractive terms than in the past, which could cause a reduction in our rate of growth from acquisitions.

Our ability to access the capital markets may be severely restricted at a time when we would like, or need, to do so. While we expect we will be able to fund some of our acquisitions with our existing resources, additional financing to pursue additional acquisitions may be required. However, particularly if market conditions deteriorate, we may be unable to secure additional financing or any such additional financing may not be available to us on favorable terms, which could have an impact on our flexibility to pursue additional acquisition opportunities. In addition, disruptions in the capital and credit markets could adversely affect our ability to draw on our credit facility or raise other capital. Our access to funds under the credit facility is dependent on the ability of the banks that are parties to the facility to meet their funding commitments. Those banks may not be able to meet their funding commitments if they experience shortages of capital and liquidity or if they experience excessive volumes of borrowing requests within a short period.

Price increases may not be adequate to offset the impact of increased costs, or may cause us to lose customers.

We seek price increases necessary to offset increased costs, to improve operating margins and to obtain adequate returns on our deployed capital. Contractual, general economic, competitive or market-specific conditions may limit our ability to raise prices. As a result of these factors, we may be unable to offset increases in costs, improve operating margins and obtain adequate investment returns through price increases. We may also lose customers to lower-price competitors, and new competitors may enter our markets as we raise prices.

We may lose contracts through competitive bidding, early termination or governmental action.

We derive a significant portion of our revenues from market areas where we have exclusive arrangements, including franchise agreements, municipal contracts and certificates issued by Washington State known as G Certificates. Many franchise agreements and municipal contracts are for a specified term and are, or will be, subject to competitive bidding in the future. For example, we have approximately 480 contracts, representing approximately 3.9% of our annual revenues, which are set for expiration or automatic renewal on or before December 31, 2020. Although we intend to bid on existing contracts subject to competitive bidding in the future and additional municipal contracts and franchise agreements, we may not be the successful bidder, or we may need to lower our price in order to retain the contract. In addition, some of our customers, including municipalities, may terminate their contracts with us before the end of the terms of those contracts. Similar risks may affect our contracts to operate municipally-owned assets, such as landfills.

Governmental action may also affect our exclusive arrangements. Municipalities may annex unincorporated areas within counties where we provide collection services. As a result, our customers in annexed areas may be required to obtain services from competitors that have been previously franchised by the annexing municipalities to provide those services. For example, municipalities in the State of Washington may, by law, annex any unincorporated territory, which could remove such territory from an area covered by a G Certificate issued to us by the Washington Utilities and Transportation Commission, or WUTC. Such occurrences could subject more of our Washington operations to competitive bidding. Moreover, legislative action could amend or repeal the laws governing WUTC regulation, which could eliminate or diminish service exclusivity, subjecting more areas to competitive bidding and/or overlapping service. In addition, municipalities in which we provide services on a competitive basis may elect to franchise those services to other service providers. Unless we are awarded franchises by these municipalities, we will lose customers. Municipalities may also decide to provide services to their residents themselves, on an optional or mandatory basis, causing us to lose customers. If we are not able to replace revenues from contracts lost through competitive bidding or early termination or from the renegotiation of existing contracts with other revenues within a reasonable time, our revenues could decline.

Our financial and operating performance may be affected by the inability to renew landfill operating permits, obtain new landfills and expand existing ones.

We currently own and/or operate 96 landfills and one development stage landfill throughout the United States and Canada. Our ability to meet our financial and operating objectives may depend in part on our ability to acquire, lease, or renew landfill operating permits, expand existing landfills and develop new landfill sites, especially in our E&P waste business. It has become increasingly difficult and expensive to obtain required permits and approvals to build, operate and expand solid waste management facilities, including landfills and transfer stations. Although the process generally takes less time, the process of obtaining permits and approvals for E&P landfills has similar uncertainties. Operating permits for landfills in states and provinces where we operate must generally be renewed every five to ten years, although some permits are required to be renewed more frequently. These operating permits often must be renewed several times during the permitted life of a landfill. The permit and approval process is often time consuming, requires numerous hearings and compliance with zoning, environmental and other requirements, is frequently challenged by special interest and other groups, including those utilizing social media to further their objectives, and may result in the denial of a permit or renewal, the award of a permit or renewal for a shorter duration than we believed was otherwise required by law, or burdensome terms and conditions being imposed on our operations. We may not be able to obtain new landfill sites or expand the permitted capacity of our existing landfills when necessary, and may ultimately be required to expense up to the carrying value of the landfill or expansion project, less the recoverable value of the property and other amounts recovered. Obtaining new landfill sites is important to our expansion into new, non-exclusive solid waste markets and in our E&P waste business. If we do not believe that we can obtain a landfill site in a non-exclusive market, we may choose not to enter that market. Expanding existing landfill sites is important in those markets where the remaining lives of our landfills are relatively short. We may choose to forego acquisitions and internal growth in these markets because increased volumes would further shorten the lives of these landfills. Any of these circumstances could adversely affect our operating results.

Lower crude oil prices may adversely affect the level of exploration, development and production activity of E&P companies and the demand for our E&P waste services.

Lower crude oil prices and the volatility of such prices may affect the level of investment and the amount of linear feet drilled in the basins where we operate, as it may impact the ability of E&P companies to access capital on economically advantageous terms or at all. In addition, E&P companies may elect to decrease investment in basins where the returns on investment are inadequate or uncertain due to lower crude oil prices or volatility in crude oil prices. Such reductions in capital spending would negatively impact E&P waste generation and therefore the demand for our services. Further, we cannot provide assurances that higher crude oil prices will result in increased capital spending and linear feet drilled by our customers in the basins where we operate.

Increases in labor costs and limitations on labor availability could impact our financial results.

Labor is one of our highest costs and relatively small increases in labor costs per employee could materially affect our cost structure. We compete with other businesses in our markets for qualified employees and the labor supply is sometimes tight in our markets, which can drive higher turnover and increase the time it takes to fill job openings. In our E&P waste business, for example, we are exposed to the cyclical variations in demand that are particular to the development and production of oil and natural gas. A shortage of qualified employees in solid waste or E&P would require us to incur additional costs related to wages and benefits, to hire more expensive temporary employees or to contract for services with more expensive third-party vendors. In addition, higher turnover can result in increased costs associated with recruiting and training; it can also impact operating costs, including maintenance and risk.

Increases in capital expenditures could impact our financial results.

Increases in fleet, equipment and landfill construction costs due to the imposition of tariffs on steel and other items, as well as other cost pressures, could result in capital expenditures being higher than anticipated. In addition, acquisitions and new contracts may increase capital expenditures. This could impact our ability to generate free cash flow in line with our expectations.

A portion of our growth and future financial performance depends on our ability to integrate acquired businesses, and the success of our acquisitions.

A component of our growth strategy involves achieving economies of scale and operating efficiencies by growing through acquisitions. We may not achieve these goals unless we effectively combine the operations of acquired businesses with our existing operations. Similar risks may affect contracts that we are awarded to operate municipally-owned assets, such as landfills. In addition, we are not always able to control the timing of our acquisitions. Our inability to complete acquisitions within the time frames that we expect may cause our operating results to be less favorable than expected, which could cause our share price to decline.

Even if we are able to make acquisitions on advantageous terms and are able to integrate them successfully into our operations and organization, some acquisitions may not fulfill our anticipated financial or strategic objectives in a given market due to factors that we cannot control, such as market conditions, including the price of crude oil, market position, competition, customer base, loss of key employees, third-party legal challenges or governmental actions. In addition, we may change our strategy with respect to a market or acquired businesses and decide to sell such operations at a loss, or keep those operations and recognize an impairment of goodwill and/or intangible assets. Similar risks may affect contracts that we are awarded to operate municipally-owned assets, such as landfills.

The seasonal nature of our business and “event-driven” waste projects cause our results to fluctuate.

Based on historic trends, we expect our operating results to vary seasonally, with revenues typically lowest in the first quarter, higher in the second and third quarters, and lower in the fourth quarter than in the second and third quarters. We expect the fluctuation in our revenues between our highest and lowest quarters to be approximately 10%. This seasonality reflects the lower volume of solid waste generated during the late fall, winter and early spring because of decreased construction and demolition activities during the winter months in Canada and the U.S., and reduced E&P activity during harsh weather conditions. Conversely, mild winter weather conditions may reduce demand for oil and natural gas, which may cause our customers to curtail their drilling programs, which could result in production of lower volumes of E&P waste.

Adverse winter weather conditions, including severe storms or extended periods of inclement weather, slow waste collection activities, resulting in higher labor and operational costs. Greater precipitation in the winter increases the weight of collected solid waste, resulting in higher disposal costs, which are calculated on a per ton basis. Certain weather conditions, including severe storms, may result in temporary suspension of our operations, which can significantly impact the operating results of the affected areas. Conversely, weather-related occurrences and other “event-driven” waste projects can boost revenues through heavier weight loads or additional work for a limited time. These factors impact period-to-period comparisons of financial results, and our share price may be negatively affected by these variations.

Our results will be affected by changes in recycled commodity prices and quantities.

We provide recycling services to some of our customers. The majority of the recyclables we process for sale are paper products that are shipped to customers in the United States, as well as other markets, including Asia. The sale prices of and the demand for recyclable commodities, particularly paper products, are frequently volatile and when they decline, our revenues, operating results and cash flows will be affected. In 2017, the Chinese government announced a ban on certain materials, including mixed waste paper and mixed plastics, effective January 1, 2018, as well as extremely restrictive quality requirements effective March 1, 2018 that have been difficult for the industry to achieve. Also in 2017, the Chinese government began to limit the flow of material into the country by restricting the issuance of required import licenses, and this practice continued through 2018 and 2019. Many other markets, both domestic and foreign, have also tightened their quality requirements. In addition, other countries have limited or restricted the import of certain recyclables. Singlestream recycling facilities process a wide range of commingled materials and tend to receive a higher percentage of non-recyclables, which results in increased processing and residual disposal costs to achieve quality standards.

The new quality standards imposed by China and the restrictions on import licenses have made the sale of recycled commodities more difficult and have resulted in lower prices for such commodities, higher operating costs or additional capital expenditures in order to meet the requirements, or higher fees imposed by third parties for the processing of recyclables. As a result, we have increased the fees that we charge customers at our recycling facilities in order to recover the higher processing costs for recyclables. This may result in lower recycled commodity volumes at our recycling facilities, as customers may elect to pursue cheaper alternatives for processing or disposal. Any such reduction could impact revenues, operating results and cash flow. Some of our recycling operations offer rebates to customers based on the market prices of commodities we buy to process for resale. Therefore, if we recognize increased revenues resulting from higher prices for recyclable commodities, the rebates we pay to suppliers will also increase, which also may impact our operating results.

Our results will be affected by changes in the value of renewable fuels.

Variations in the price of methane gas and other energy-related products that are marketed and sold by our landfill gas recovery operations affect our results. Pursuant to the Energy Independence and Security Act of 2007, the United States EPA has promulgated the Renewable Fuel Standards, or RFS, which require refiners to either blend "renewable fuels," such as ethanol and biodiesel, into their transportation fuels or to purchase renewable fuel credits, known as renewable identification numbers, or RINs, in lieu of blending. In some cases, landfill gas generated at our landfills qualifies as a renewable fuel for which RINs are available. The price of RINs has been extremely volatile and is dependent upon a variety of factors, including potential legislative changes, the availability of RINs for purchase, the demand for RINs, which is dependent on transportation fuel production levels, the mix of the petroleum business' petroleum products and fuel blending performed at the refineries and downstream terminals, all of which can vary significantly from period to period. In addition, demand for RINs can be impacted by the ability of refineries to obtain small refinery exemptions, or SREs, through the EPA. In December 2019, the EPA released its targets for renewable volume obligations, or RVOs, for 2020, which included a slight increase over the 2019 RVOs with no change to the EPA's plan to account for the impact of granting SREs. Any reductions or limitations on the requirement to blend renewable fuel would likely reduce the demand for RINs, which could impact the value of RINs.

In Canada, the Renewable Fuels Regulations under the Canadian Environmental Protection Act, 1999 require producers and importers of gasoline, diesel fuel and heating distillate to acquire a certain number of renewable fuel compliance units, or Compliance Units, in connection with the volumes of fuel they produce or import. Compliance Units can be generated in a number of ways, including through the blending of renewable fuel into liquid petroleum fuels. Certain provincial jurisdictions in Canada also impose obligations to incorporate renewable fuels into fuels that are distributed within the jurisdiction. In some cases, landfill gas generated at our landfills in Canada is sold by our Company as a renewable fuel for which RINs are available under the United States RFS. Our Company could also sell landfill gas generated in Canada in connection with renewable fuel obligations in Canada. The price for our renewable fuel is dependent on a variety of factors, including demand. The Canadian federal government released details on a proposed new clean fuel regulatory framework at the end of 2017 called the “Clean Fuel Standard.” The proposed framework would impose lifecycle carbon intensity requirements on certain liquid, gaseous and solid fuels that are used in transportation, industry and buildings, and establish rules relating to the trading of compliance credits. The carbon intensity requirements would become more stringent over time. Carbon intensity would be differentiated between different types of renewable fuels to reflect the associated emissions reduction potential. Regulated parties, which may include fuel producers and importers, would have some flexibility with respect to how to achieve lower carbon fuels in Canada. The Canadian federal government has indicated that over time, the new Clean Fuel Standard would replace the current Renewable Fuels Regulations. Since January 2017, the Canadian federal government has been conducting public consultation on the proposed framework. The Canadian Government is reporting that new regulations under the Clean Fuel Standard are targeted to come into force on January 1, 2022 (for liquid fuels) and January 1, 2023 (for gaseous and solid fuel regulations). At this time, we do not know how a new clean fuel regulatory framework in Canada could impact demand for our renewable fuel.

A significant reduction in the value of RINs in the United States or the price paid for our renewable fuel in Canada could adversely impact our reported results.

Increases in the price of diesel or compressed natural gas fuel may adversely affect our collection business and reduce our operating margins.

The market price of diesel fuel is volatile. We generally purchase diesel fuel at market prices, and such prices have fluctuated significantly in recent years. A significant increase in market prices for fuel could adversely affect our waste collection business through a combination of higher fuel and disposal-related transportation costs and reduce our operating margins and reported earnings. To manage a portion of this risk, we have entered into fixed-price fuel purchase contracts. During periods of falling diesel fuel prices, it may become more expensive to purchase fuel under fixed-price fuel purchase contracts than at market prices.

We utilize compressed natural gas, or CNG, in a small percentage of our fleet and we may convert more of our fleet from diesel fuel to CNG over time. The market price of CNG is also volatile; a significant increase in such cost could adversely affect our operating margins and reported earnings.

Increases in insurance costs and the amount that we self-insure for various risks could reduce our operating margins and reported earnings.

We maintain insurance policies for automobile, general, employer's, environmental, cyber, employment practices and directors' and officers' liability as well as for employee group health insurance, property insurance and workers' compensation. We carry umbrella policies for certain types of claims to provide excess coverage over the underlying policies and per incident deductibles or self-insured retentions. The amounts that we effectively self-insure could cause significant volatility in our operating margins and reported earnings based on the event and claim costs of incidents, accidents, injuries and adverse judgments. Our insurance accruals are based on claims filed and estimates of claims incurred but not reported and are developed by our management with assistance from our third-party actuary and our third-party claims administrator. To the extent these estimates are inaccurate, we may recognize substantial additional expenses in future periods that would reduce operating margins and reported earnings. Furthermore, while we maintain liability insurance, our insurance is subject to coverage limitations. If we were to incur substantial liability, our insurance coverage may be inadequate to cover the entirety of such liability. This could have a material adverse effect on our financial position, results of operations and cash flows. One form of coverage limitation concerns claims for punitive damages, which are generally excluded from coverage under all of our liability insurance policies. A punitive damage award could have an adverse effect on our reported earnings in the period in which it occurs. Significant increases in premiums on insurance that we retain also could reduce our margins.

Our financial results are based upon estimates and assumptions that may differ from actual results.

In preparing our consolidated financial statements in accordance with U.S. generally accepted accounting principles, estimates and assumptions are made that affect the accounting for and recognition of assets, liabilities, revenues and expenses. These estimates and assumptions must be made because certain information that is used in the preparation of our financial statements is dependent on future events, cannot be calculated with a high degree of precision from data available or is not capable of being readily calculated based on generally accepted methodologies. In some cases, these estimates are particularly difficult to determine and we must exercise significant judgment. The most difficult, subjective and complex estimates and the assumptions that deal with the greatest amount of uncertainty are related to our accounting for landfills, self-insurance accruals, income taxes, allocation of acquisition purchase price, asset impairments and litigation, claims and assessments. Actual results for all estimates could differ materially from the estimates and assumptions that we use, which could have an adverse effect on our financial condition and results of operations.

Our accruals for our landfill site closure and post-closure costs may be inadequate.

We are required to pay capping, closure and post-closure maintenance costs for landfill sites that we own and operate. We are also required to pay capping, closure and post-closure maintenance costs for operated landfills for which we have life-of-site agreements. Our obligations to pay closure or post-closure costs may exceed the amount we have accrued and reserved and other amounts available from funds or reserves established to pay such costs. In addition, the completion or closure of a landfill site does not end our environmental obligations. After completion or closure of a landfill site, there exists the potential for unforeseen environmental problems to occur that could result in substantial remediation costs or potential litigation. Paying additional amounts for closure or post-closure costs and/or for environmental remediation and/or for litigation could harm our financial condition or operating results.

We may be subject in the normal course of business to judicial, administrative or other third-party proceedings that could interrupt or limit our operations, require expensive remediation, result in adverse judgments, settlements or fines and create negative publicity.

Governmental agencies may, among other things, impose fines or penalties on us relating to the conduct of our business, attempt to revoke or deny renewal of our operating permits, franchises or licenses for violations or alleged violations of environmental laws or regulations or as a result of third-party challenges, require us to install additional pollution control equipment or require us to remediate potential environmental problems relating to any real property that we or our predecessors ever owned, leased or operated or any waste that we or our predecessors ever collected, transported, disposed of or stored. Individuals, citizens groups, trade associations or environmental activists may also bring actions against us in connection with our operations that could interrupt or limit the scope of our business. Any adverse outcome in such proceedings could harm our operations and financial results and create negative publicity, which could damage our reputation, competitive position and share price.

Pending or future litigation or governmental proceedings could result in material adverse consequences, including judgments or settlements.

We are, and from time to time become, involved in lawsuits, regulatory inquiries, and governmental and other legal proceedings arising out of the ordinary course of our business. Many of these matters raise complicated factual and legal issues and are subject to uncertainties and complexities, all of which make the matters costly to address. For example, in recent years, wage and employment laws have changed regularly and become increasingly complex, which has fostered litigation, including purported class actions. Similarly, citizen suits brought pursuant to environmental laws, such as those regulating the treatment of storm water runoff, have proliferated. The timing of the final resolutions to lawsuits, regulatory inquiries, and governmental and other legal proceedings is uncertain. Additionally, the possible outcomes or resolutions to these matters could include adverse judgments or settlements, either of which could require substantial payments, adversely affecting our consolidated financial condition, results of operations and cash flows. See discussion in Note 12, “Commitments and Contingencies,” of our consolidated financial statements included in Item 8 of this Annual Report on Form 10-K.

Our financial results could be adversely affected by impairments of goodwill, indefinite-lived intangibles or property and equipment.

As a result of our acquisition strategy, we have a material amount of goodwill, indefinite-lived intangibles and property and equipment recorded in our financial statements. We do not amortize our existing goodwill or indefinite-lived intangibles and are required to test goodwill and indefinite-lived intangibles for impairment annually in the fourth quarter of the year and whenever events or changes in circumstances indicate that the carrying value of goodwill and/or indefinite-lived intangible assets may not be recoverable using the one-step process prescribed in the new accounting guidance that we early adopted on January 1, 2017. The process screens for and measures the amount of the impairment, if any. The recoverability of property and equipment is tested for impairment whenever events or changes in circumstances indicate that their carrying amount may not be recoverable. Application of the impairment test requires judgment. A significant deterioration in a key estimate or assumption or a less significant deterioration to a combination of assumptions could result in an impairment charge in the future, which could have a significant adverse impact on our reported results. See the section Goodwill and Indefinite-Lived Intangible Assets in Note 3, “Summary of Significant Accounting Policies” of our consolidated financial statements included in Item 8 of this Annual Report on Form 10-K.

Income taxes may be uncertain.

Our actual effective tax rate may vary from our expectation and that variance may be material. Tax interpretations, regulations and legislation in the various jurisdictions in which we and our affiliates operate are subject to measurement uncertainty and the interpretations can impact net income, income tax expense or recovery, and deferred income tax assets or liabilities. In addition, tax rules and regulations, including those relating to foreign jurisdictions, are subject to interpretation and require judgment by us that may be challenged by the taxation authorities upon audit.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act, or the Tax Act. The Tax Act makes broad and complex changes to the U.S. tax code, including, but not limited to, a reduction of the U.S. federal corporate income tax rate from 35 percent to 21 percent, requiring a one-time transition tax on certain unrepatriated earnings of foreign subsidiaries, the creation of the base erosion anti-abuse tax, a new provision designed to tax global intangible low-taxed income, a new limitation on deductible interest expense, and bonus depreciation that will allow for full expensing of qualified property.

Changes in our tax provision or an increase to our tax liabilities, whether due to the Tax Act or interpretations of the Tax Act, which include, but are not limited to, the potential finalization of proposed regulations released by the U.S. Department of Treasury during 2018 under Internal Revenue Code (“I.R.C.”) section 163(j) related to the deductibility of certain interest, I.R.C. section 267A related to the deductibility of certain related-party payments, as well as other tax regulations, or a final determination of tax audits, could have a material adverse effect on our financial position, results of operations, and cash flows.

Future changes to U.S., Canadian and foreign tax laws could materially adversely affect us.

We cannot give any assurance as to what our effective tax rate will be in the future, because of, among other things, uncertainty regarding the tax policies of the jurisdictions where we operate.

For example, the U.S. Congress, the Canadian government, the Organisation for Economic Co-operation and Development ("OECD") and other government agencies in jurisdictions where we and our affiliates do business have had an extended focus on issues related to the taxation of multinational corporations. One example is in the area of "base erosion and profit shifting," where payments are made between affiliates from a jurisdiction with high tax rates to a jurisdiction with lower tax rates. In 2019, Canada ratified the Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting, or MLI, as part of the OECD/G20 initiative to counter what was perceived as base erosion and profit shifting. The MLI entered into force in Canada on December 1, 2019 and will enter into effect with respect to certain of Canada's tax treaties on January 1, 2020 for withholding taxes and for other taxes (including capital gains taxes) for tax years beginning on or after June 1, 2020. As a result of these and other changes, the tax laws in the United States, Canada, and other countries in which we and our affiliates do business could change on a prospective or retroactive basis, and any such changes could adversely affect us and our affiliates.

Each business that we acquire or have acquired may have liabilities or risks that we fail or are unable to discover, or that become more adverse to our business than we anticipated at the time of acquisition.

It is possible that the corporate entities or sites we have acquired, or which we may acquire in the future, have liabilities or risks in respect of former or existing operations or properties, or otherwise, which we have not been able to identify and assess through our due diligence investigations. As a successor owner, we may be legally responsible for those liabilities that arise from businesses that we acquire. Even if we obtain legally enforceable representations, warranties and indemnities from the sellers of such businesses, they may not cover the liabilities fully or the sellers may not have sufficient funds to perform their obligations. Some environmental liabilities, even if we do not expressly assume them, may be imposed on us under various regulatory schemes and other applicable laws. In addition, our insurance program may not cover such sites and will not cover liabilities associated with some environmental issues that may have existed prior to attachment of coverage. A successful uninsured claim against us could harm our financial condition or operating results. Additionally, there may be other risks of which we are unaware that could have an adverse effect on businesses that we acquire or have acquired, such as foreign, state and local regulation and administrative risks. Another example of risk is interested parties that may bring actions against us in connection with operations that we acquire or have acquired. Furthermore, risks or liabilities we judge to be not material or remote at the time of acquisition may develop into more serious risks to our business. Any adverse outcome resulting from such risks or liabilities could harm our operations and financial results and create negative publicity, which could damage our reputation, competitive position and share price. For example, see the discussions regarding the Lower Duwamish Waterway Superfund Site Allocation Process in Note 12, "Commitments and Contingencies," of our consolidated financial statements included in Item 8 of this Annual Report on Form 10-K.

Our indebtedness could adversely affect our financial condition and limit our financial flexibility.

As of December 31, 2019, we had approximately $4.376 billion of total indebtedness outstanding, and we may incur additional debt in the future. This amount of indebtedness could:

- increase our vulnerability to general adverse economic and industry conditions;
- expose us to interest rate risk since a significant portion of our indebtedness is at variable rates;
- limit our ability to obtain additional financing or refinancing at attractive rates;
- require the dedication of a substantial portion of our cash flow from operations to the payment of principal of, and interest on, our indebtedness, thereby reducing the availability of such cash flow to fund our growth strategy, working capital, capital expenditures, dividends, share repurchases and other general corporate purposes;
- limit our flexibility in planning for, or reacting to, changes in our business and the industry; and

- place us at a competitive disadvantage relative to our competitors with less debt.

In addition, a portion of our indebtedness, including interest rate swaps, is at variable rates which are based on the London Interbank Offered Rate, or LIBOR, which is expected to no longer be published by 2021. The FASB added the Secured Overnight Financing Rate, or SOFR, as an eligible benchmark interest rate in order to facilitate the LIBOR to SOFR transition and provide sufficient lead time for entities to prepare for changes to interest rate risk hedging strategies for both risk management and hedge accounting purposes. We are developing a plan to transition our indebtedness from LIBOR to SOFR.

Further, our outstanding indebtedness is subject to financial and other covenants, which may be affected by changes in economic or business conditions or other events that are beyond our control. If we fail to comply with the covenants under any of our indebtedness, we may be in default under the indebtedness, which may entitle the lenders or holders of indebtedness to accelerate the debt obligations. A default under one of our loans or debt securities could result in cross-defaults under our other indebtedness. In order to avoid defaulting on our indebtedness, we may be required to take actions such as reducing or delaying capital expenditures, reducing or eliminating dividends or share repurchases, selling assets, restructuring or refinancing all or part of our existing debt, or seeking additional equity capital, any of which may not be available on terms that are favorable to us, if at all.

We may be unable to obtain performance or surety bonds, letters of credit or other financial assurances or to maintain adequate insurance coverage.

If we are unable to obtain performance or surety bonds, letters of credit or insurance, we may not be able to enter into additional solid waste or other collection contracts or retain necessary landfill operating permits. Collection contracts, municipal contracts, transfer station operations and landfill closure and post-closure obligations may require performance or surety bonds, letters of credit or other financial assurance to secure contractual performance or comply with federal, state, provincial or local environmental laws or regulations. We typically satisfy these requirements by posting bonds or letters of credit. As of December 31, 2019, we had approximately $1.081 billion of such surety bonds in place and approximately $107.6 million of letters of credit issued. Closure bonds are difficult and costly to obtain. If we are unable to obtain performance or surety bonds or additional letters of credit in sufficient amounts or at acceptable rates, we could be precluded from entering into additional collection contracts or obtaining or retaining landfill operating permits. Any future difficulty in obtaining insurance also could impair our ability to secure future contracts that are conditional upon the contractor having adequate insurance coverage. Accordingly, our failure to obtain performance or surety bonds, letters of credit or other financial assurances or to maintain adequate insurance coverage could limit our operations or violate federal, state, provincial, or local requirements, which could have a materially adverse effect on our business, financial condition and results of operations.

Our operations in Canada expose us to exchange rate fluctuations that could adversely affect our financial performance and our reported results of operations.

Our operations in Canada are conducted primarily in Canadian dollars. Our consolidated financial statements are denominated in U.S. dollars, and to prepare those financial statements we must translate the amounts of the assets, liabilities, net sales, other revenues and expenses of our operations in Canada from Canadian dollars into U.S. dollars using exchange rates for the current period. Fluctuations in the exchange rates that are unfavorable to us would have an adverse effect on our financial performance and reported results of operations.

Alternatives to landfill disposal may cause our revenues and operating results to decline.

Counties and municipalities in which we operate landfills may be required to formulate and implement comprehensive plans to reduce the volume of municipal solid waste deposited in landfills through waste planning, composting, recycling or other programs, while working to reduce the amount of waste they generate. Some state, provincial and local governments mandate diversion, recycling and waste reduction at the source and prohibit the disposal of certain types of wastes, such as yard waste, food waste and electronics, at landfills. Even where not prohibited by state, provincial or local law, some grocery stores and restaurants have chosen to divert their organic waste from landfills, while other companies have set zero-waste goals and communicated an intention to cease the disposal of any waste in landfills. Although such actions are useful to protect our environment, these actions, as well as the actions of our customers to reduce waste or seek disposal alternatives, have reduced and may in the future further reduce the volume of waste going to landfills in certain areas, which may affect our ability to operate our landfills at full capacity and could adversely affect our operating results.

Labor union activity could divert management attention and adversely affect our operating results.

From time to time, labor unions attempt to organize our employees, and these efforts are likely to continue in the future. Certain groups of our employees are represented by unions, and we have negotiated collective bargaining agreements with most of these unions. Additional groups of employees may seek union representation in the future. As a result of these activities, we may be subjected to unfair labor practice charges, grievances, complaints and other legal and administrative proceedings initiated against us by unions or federal, state or provincial labor boards, which could negatively impact our operating results. Negotiating collective bargaining agreements with these unions could divert our management's attention, which could also adversely affect our operating results. If we are unable to negotiate acceptable collective bargaining agreements, we might have to wait through "cooling off" periods, which may be followed by work stoppages, including strikes or lock-outs. Depending on the type and duration of any such labor disruptions, our operating expenses could increase significantly, which could adversely affect our financial condition, results of operations and cash flows.

We could face significant withdrawal liability if we withdraw from participation in one or more multiemployer pension plans in which we participate and the accrued pension benefits are not fully funded.

We participate in 11 "multiemployer" pension plans administered by employee and union trustees. We make periodic contributions to these plans to fund pension benefits for our union employees pursuant to our various contractual obligations to do so. In the event that we withdraw from participation in or otherwise cease our contributions to one of these plans, then applicable law regarding withdrawal liability could require us to make additional contributions to the plan if the accrued benefits are not fully funded, and we would have to reflect that "withdrawal liability" as an expense in our consolidated statement of operations and as a liability on our consolidated balance sheet. Our withdrawal liability for any multiemployer plan would depend on the extent to which accrued benefits are funded. In the ordinary course of our renegotiation of collective bargaining agreements with labor unions that participate in these plans, we may decide to discontinue participation in a multiemployer plan, and in that event, we could face withdrawal liability. Some multiemployer plans in which we participate may from time to time have significant accrued benefits that are not funded. The size of our potential withdrawal liability may be affected by the level of unfunded accrued benefits, the actuarial assumptions used by the plan and the investment gains and losses experienced by the plan.

We rely on computer systems to run our business and disruptions or privacy breaches in these systems could impact our ability to service our customers and adversely affect our financial results, damage our reputation, and expose us to litigation risk.

Our businesses rely on computer systems to provide customer information, process customer transactions and provide other general information necessary to manage our businesses. We also rely on a payment card industry-compliant third party to protect our customers' credit card information. We have an active disaster recovery plan in place that we continuously review and test. However, our computer systems are subject to damage or interruption due to cybersecurity threats, system conversions, power outages, computer or telecommunication failures, catastrophic physical events such as fires, tornadoes and hurricanes and usage errors by our employees. Given the unpredictability of the timing, nature and scope of such disruptions, we could be potentially subject to operational delays and interruptions in our ability to provide services to our customers. Any disruption caused by the unavailability of our computer systems could adversely affect our revenues or could require significant investment to fix or replace them, and, therefore, could affect our operating results.

In addition, cybersecurity attacks are evolving and include, but are not limited to, malicious software, attempts to gain unauthorized access to data and other electronic security breaches that could lead to disruptions in systems, unauthorized release of confidential or otherwise protected information and corruption of data. We are regularly the target of attempted cyber and other security threats and must continuously monitor and develop our information technology networks and infrastructure to prevent, detect, address and mitigate the risk of unauthorized access, misuse, computer viruses and other events that could have a security impact.

Further, as we pursue our acquisition growth strategy and pursue new initiatives that improve our operations and reduce our costs, we are also expanding and improving our information technologies, resulting in a larger technological presence and corresponding exposure to cybersecurity risk. If we fail to assess and identify cybersecurity risks associated with acquisitions and new initiatives, we may become increasingly vulnerable to such risks. Additionally, while we have implemented measures to prevent security breaches and cyber incidents, our preventative measures and incident response efforts may not be entirely effective. If our network of security controls, policy enforcement mechanisms or monitoring systems we use to address these threats to technology fail, the theft or compromise of confidential or otherwise protected company, customer or employee information, destruction or corruption of data, security breaches or other manipulation or improper use of our systems and networks could result in financial losses from remedial actions, business disruption, loss of business or potential liability, liabilities due to the violation of privacy laws and other legal actions, and damage to our reputation.

Extensive and evolving environmental, health and safety laws and regulations may restrict our operations and growth and increase our costs.

Existing environmental laws and regulations have become more stringently enforced in recent years. In addition, our industry is subject to regular enactment of new or amended federal, state, provincial and local environmental and health and safety statutes, regulations and ballot initiatives, as well as judicial decisions interpreting these requirements, which have become more stringent over time. Citizen suits brought pursuant to environmental laws have proliferated, along with the use of social media to drive such efforts. We expect these trends to continue, which could lead to material increases in our costs for future environmental, health and safety compliance. These requirements also impose substantial capital and operating costs and operational limitations on us and may adversely affect our business. In addition, federal, state, provincial and local governments may change the rights they grant to, the restrictions they impose on or the laws and regulations they enforce against, solid waste and E&P waste services companies. These changes could adversely affect our operations in various ways, including without limitation, by restricting the way in which we manage storm water runoff, comply with health and safety laws, treat and dispose of E&P or other waste or our ability to operate and expand our business.

Governmental authorities and various interest groups in the United States and Canada have promoted laws and regulations designed to limit greenhouse gas, or GHG, emissions in response to growing concerns regarding climate change. For example, the State of California, the Canadian federal government and several Canadian provinces have enacted climate change laws, and other states and provinces in which we operate are considering similar actions. The US EPA made an endangerment finding in 2009 allowing certain GHGs to be regulated under the CAA. This finding allows the EPA to create regulations that will impact our operations – including imposing emission reporting, permitting, control technology installation and monitoring requirements, although the materiality of the impacts will not be known until all applicable regulations are promulgated and finalized. The Canadian federal government enacted the Greenhouse Gas Pollution Pricing Act in June 2018, which established a national carbon-pricing regime starting in 2019 for provinces and territories in Canada where there is no provincial regime in place or where the provincial regime does not meet the federal benchmark. Often referred to as the federal backstop, the federal carbon-pricing regime consists of a carbon levy that is applied to fossil fuels and an output-based pricing system (“OBPS”) that is applied to certain industrial facilities with reported emissions of 50,000 tonnes of carbon dioxide equivalent (“CO2e”) or more per year. The carbon levy applies to prescribed liquid, gaseous, and solid fuels at a rate that is equivalent to $20 per tonne of CO2e in 2019, increasing annually, until it reaches $50 per tonne of CO2e by 2022. Several Canadian provinces have promulgated legislation and regulations to limit GHG emissions through requirements of specific controls, carbon levies, cap and trade programs or other measures. Comprehensive GHG legislation or regulation, including carbon pricing, affects not only our business, but also that of our customers.

Regulation of GHG emissions from oil and natural gas E&P operations may also increase the costs to our customers of developing and producing hydrocarbons, and as a result, may have an indirect and adverse effect on the amount of oilfield waste delivered to our facilities by our customers. These statutes and regulations increase the costs of our operations, and future climate change statutes and regulations may have an impact as well.

Our business is subject to operational and safety risks, including the risk of personal injury to employees and others.

Providing environmental and waste management services, including constructing and operating landfills, involves risks such as truck accidents, equipment defects, malfunctions and failures. Additionally, we closely monitor and manage landfills to minimize the risk of waste mass instability and releases of hazardous materials or odors that could be triggered by weather or natural disasters. There may also be risks presented by the potential for subsurface chemical reactions causing elevated landfill temperatures.

We also build and operate natural gas fueling stations, some of which also serve the public or third parties. Operation of fueling stations and landfill gas collection and control systems involves additional risks of fire and explosion. Any of these risks could potentially result in injury or death of employees and others, a need to shut down or reduce operation of facilities, increased operating expense and exposure to liability for pollution and other environmental damage, and property damage or destruction.

While we seek to minimize our exposure to such risks through comprehensive training, compliance and response and recovery programs, as well as vehicle and equipment maintenance programs, if we were to incur substantial liabilities in excess of any applicable insurance coverage, our business, results of operations and financial condition could be adversely affected. Any such incidents could also tarnish our reputation and reduce the value of our brand. Additionally, a major operational failure, even if suffered by a competitor, may bring enhanced scrutiny and regulation of our industry, with a corresponding increase in operating expense.

Future changes in laws regulating the flow of solid waste in interstate commerce could adversely affect our operating results.

Various state, provincial and local governments and the Canadian federal government have enacted, have the authority to enact or are considering enacting laws and regulations that restrict disposal within the jurisdiction of solid waste generated outside the jurisdiction. In addition, some state, provincial and local governments and the Canadian federal government have promulgated, have the authority to promulgate or are considering promulgating laws and regulations which govern the flow of waste generated within their respective jurisdictions. These “flow control” laws and regulations typically require that waste generated within the jurisdiction be retained within the jurisdiction or be directed to specified facilities for disposal or processing, which could limit or prohibit the disposal or processing of waste in our transfer stations and landfills or require notices be delivered or permits to be obtained prior to transport or final disposal. Certain of these flow control laws and regulations could also require us to deliver waste we collect within a particular jurisdiction to facilities not owned or controlled by us, which could increase our costs and reduce our revenues. In addition, such laws and regulations could require us to obtain additional costly licenses or authorizations in order to be deemed an authorized hauler or disposal facility. All such waste disposal laws and regulations are subject to judicial interpretation and review. Court decisions, legislation and federal, state, provincial and local regulation in the waste disposal area could adversely affect our operations.

Extensive regulations that govern the design, operation, expansion and closure of landfills may restrict our landfill operations or increase our costs of operating landfills.

If we fail to comply with federal, state and provincial regulations, as applicable, governing the design, operation, expansion, closure and financial assurance of MSW, non-MSW and E&P waste landfills, we could be required to undertake investigatory or remedial activities, curtail operations or close such landfills temporarily or permanently. Future changes to these regulations may require us to modify, supplement or replace equipment or facilities at substantial costs. If regulatory agencies fail to enforce these regulations vigorously or consistently, our competitors whose facilities are not forced to comply with the regulations may obtain an advantage over us. Our financial obligations arising from any failure to comply with these regulations could harm our business and operating results.

Our E&P waste business could be adversely affected by changes in laws regulating E&P waste.

We believe that the demand for our E&P waste services is directly related to the regulation of E&P waste. In particular, the U.S. Resource Conservation and Recovery Act, or RCRA, which governs the disposal of solid and hazardous waste, currently exempts certain E&P wastes from classification as hazardous wastes. In recent years, proposals have been made to rescind this exemption from RCRA. If the exemption covering E&P wastes is repealed or modified, or if the regulations interpreting the rules regarding the treatment or disposal of this type of waste were changed, our operations could face significantly more stringent regulations, permitting requirements, and other restrictions, which could have a material adverse effect on our business.

In addition, if new federal, state, provincial or local laws or regulations that significantly restrict hydraulic fracturing are adopted, such legal requirements could result in delays, eliminate certain drilling and injection activities and make it more difficult or costly for our customers to perform fracturing. Any such regulations limiting or prohibiting hydraulic fracturing could reduce our customers' oil and natural gas E&P activities and, therefore, adversely affect our business. Such laws or regulations could also materially increase our costs of compliance and doing business by more strictly regulating how hydraulic fracturing wastes are handled or disposed. Conversely, any loosening of existing federal, state, provincial or local laws or regulations regarding how such wastes are handled or disposed could adversely impact demand for our services.

Liabilities for environmental damage may adversely affect our financial condition, business and earnings.

We may be liable for any environmental damage that our current or former operations cause, including damage to neighboring landowners or residents, particularly as a result of the contamination of soil, groundwater or surface water, and especially drinking water, or to natural resources. We may be liable for damage resulting from conditions existing before we acquired these operations. Even if we obtain legally enforceable representations, warranties and indemnities from the sellers of these operations, they may not cover the liabilities fully or the sellers may not have sufficient funds to perform their obligations.

We may also be liable for any on-site environmental contamination caused by pollutants or hazardous substances whose transportation, treatment or disposal we or our predecessors arranged or conducted. Some environmental laws and regulations may impose strict, joint and several liability in connection with releases of regulated substances into the environment. Therefore, in some situations we could be exposed to liability as a result of our conduct that was lawful at the time it occurred or the conduct of, or conditions caused by, third parties, including our predecessors. If we were to incur liability for environmental damage, environmental clean-ups, corrective action or damage not covered by insurance or in excess of the amount of our coverage, our financial condition or operating results could be materially adversely affected. For example, see the discussion regarding the Lower Duwamish Waterway Superfund Site Allocation Process in Note 12, "Commitments and Contingencies," of our consolidated financial statements included in Item 8 of this Annual Report on Form 10-K.

We depend significantly on the services of the members of our senior and regional management team, and the departure of any of those persons could cause our operating results to suffer.

Our success depends significantly on the continued individual and collective contributions of our senior and regional management team. Key members of our management have entered into employment agreements, but we may not be able to enforce these agreements. The loss of the services of any member of our senior and regional management or the inability to hire and retain experienced management personnel could harm our operating results.

Our decentralized decision-making structure could allow local managers to make decisions that may adversely affect our operating results.

We manage our operations on a decentralized basis. Local managers have the authority to make many decisions concerning their operations without obtaining prior approval from executive officers, subject to compliance with general company-wide policies. Poor decisions by local managers could result in the loss of customers or increases in costs, in either case adversely affecting operating results.

If we are not able to develop and protect intellectual property, or if a competitor develops or obtains exclusive rights to a breakthrough technology, our financial results may suffer.

Our existing and proposed service offerings to customers may require that we develop or license, and protect, new technologies. We may experience difficulties or delays in the research, development, production and/or marketing of new products and services which may negatively impact our operating results and prevent us from recouping or realizing a return on the investments required to bring new products and services to market. Further, protecting our intellectual property rights and combating unlicensed copying and use of intellectual property is difficult, and any inability to obtain or protect new technologies could impact our services to customers and development of new revenue sources. Additionally, a competitor may develop or obtain exclusive rights to a "breakthrough technology" that claims to provide a revolutionary change in traditional waste management. If we have inferior intellectual property to our competitors, our financial results may suffer.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

As of December 31, 2019, we owned 300 solid waste collection operations, 124 transfer stations, 60 MSW landfills, 12 E&P waste landfills, 14 non-MSW landfills, one development stage landfill, 66 recycling operations, four intermodal operations, 23 E&P liquid waste injection wells and 19 E&P waste treatment and oil recovery facilities, and operated, but did not own, an additional 51 transfer stations, 10 MSW landfills and two intermodal operations, in 42 states in the U.S. and six provinces in Canada. Non-MSW landfills accept construction and demolition, industrial and other non-putrescible waste. We lease certain of the sites on which these facilities are located. We lease various office facilities, including our combined corporate and regional offices in Ontario, Canada, where we occupy approximately 12,000 square feet of space, and our administrative and regional offices in The Woodlands, Texas, where we occupy approximately 82,000 square feet of space. We also maintain regional administrative offices in each of our segments. We own a variety of equipment, including waste collection and transportation vehicles, related support vehicles, double-stack rail cars, carts, containers, chassis and heavy equipment used in landfill, collection, transfer station, waste treatment and intermodal operations. We believe that our existing facilities and equipment are adequate for our current operations. However, we expect to make additional investments in property and equipment for expansion and replacement of assets in connection with future acquisitions.

ITEM 3. LEGAL PROCEEDINGS

Information regarding our legal proceedings can be found under the "Legal Proceedings" section in Note 12 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10K and is incorporated herein by reference.

ITEM 4. MINE SAFETY DISCLOSURE

None.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED SHAREHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

In 2016, Waste Connections, Inc., a Delaware corporation, entered into a business combination transaction with Progressive Waste Solutions Ltd., a corporation organized under the laws of Ontario, Canada ("Progressive Waste" and the transaction, the "Progressive Waste acquisition"). The public company that remained following the transaction is Waste Connections, Inc., a corporation organized under the laws of Ontario, Canada. References to the "Company" and "Waste Connections" refer to the Delaware corporation, Waste Connections, Inc. (now known as Waste Connections US, Inc.) before the Progressive Waste acquisition and the combined business thereafter. All references to "dollars" or "$" used herein refer to U.S. dollars, and all references to CAD $ used herein refer to Canadian dollars, unless otherwise stated.

Our common shares are listed on the New York Stock Exchange, or NYSE, and the Toronto Stock Exchange, or TSX, under the symbol "WCN".

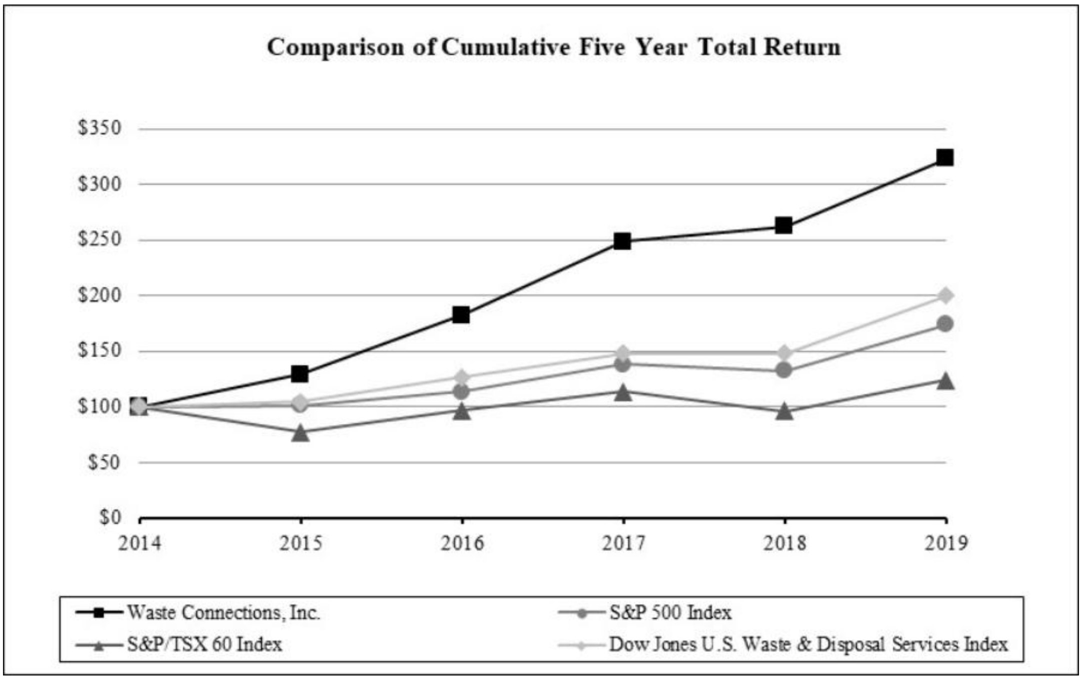
As of February 3, 2020, there were 99 holders of record of our common shares. Because many of our common shares are held by brokers and other institutions on behalf of shareholders, we are unable to estimate the total number of shareholders represented by these record holders.

On February 12, 2020, we announced that our Board of Directors approved a regular quarterly cash dividend of $0.185 per common share. All dividends paid by the Company on its common shares after June 1, 2016 are designated as "eligible dividends" for Canadian federal income tax purposes and such treatment will continue unless a notification of change is posted on our website. Our Board of Directors will review the cash dividend periodically, with a long-term objective of increasing the amount of the dividend. We cannot assure you as to the amounts or timing of future dividends. We have the ability under our Credit Agreement (as defined below) and master note purchase agreements to repurchase our common shares and pay dividends provided we maintain specified financial ratios.

Performance Graph

The following performance graph compares the total cumulative shareholder returns on our common shares over the past five fiscal years with the total cumulative returns for the S&P 500 Index, the S&P/TSX 60 Index and the Dow Jones U.S. Waste and Disposal Services Index.

The graph depicts a five-year comparison of cumulative total returns for the Company's common shares. The graph assumes an investment of US$100 in our common shares on December 31, 2014, and the reinvestment of all dividends. This chart has been calculated in compliance with SEC requirements and prepared by Capital IQ® using the USD index in the case of the S&P/TSX 60 Index.



This graph and the accompanying text is not "soliciting material," is not deemed filed with the SEC, and is not to be incorporated by reference in any filing by us under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

	Base Period	Indexed Returns Years Ending				
Company Name / Index	**Dec14**	**Dec15**	**Dec16**	**Dec17**	**Dec18**	**Dec19**
Waste Connections, Inc.	$ 100	$ 129.43	$ 182.21	$ 248.65	$ 262.26	$ 323.08
S&P 500 Index	$ 100	$ 101.38	$ 113.51	$ 138.29	$ 132.23	$ 173.86
S&P/TSX 60 Index	$ 100	$ 76.91	$ 96.68	$ 113.60	$ 96.32	$ 123.69
Dow Jones U.S. Waste & Disposal Services Index	$ 100	$ 104.19	$ 126.22	$ 147.78	$ 147.95	$ 199.87

THE SHARE PRICE PERFORMANCE INCLUDED IN THIS GRAPH IS NOT NECESSARILY INDICATIVE OF FUTURE SHARE PRICE PERFORMANCE.

ITEM 6. SELECTED FINANCIAL DATA

This table sets forth our selected financial data for the periods indicated. This data should be read in conjunction with, and is qualified by reference to, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” included in Item 7 of this Annual Report on Form 10-K and our audited consolidated financial statements, including the related notes and our independent registered public accounting firm’s report and the other financial information included in Item 8 of this Annual Report on Form 10-K. The selected data in this section is not intended to replace the consolidated financial statements included in this Annual Report on Form 10-K.

	Years Ended December 31,				
	2019 (a)	2018 (a)	2017 (a)	2016	2015
	(in thousands of U.S. dollars, except share and per share data)				
STATEMENT OF OPERATIONS DATA:					
Revenues	$ 5,388,679	$ 4,922,941	$ 4,630,488	$ 3,375,863	$ 2,117,287
Operating expenses:					
Cost of operations	3,198,757	2,865,704	2,704,775	1,957,712	1,177,409
Selling, general and administrative	546,278	524,388	509,638	474,263	237,484
Depreciation	618,396	572,708	530,187	393,600	240,357
Amortization of intangibles	125,522	107,779	102,297	70,312	29,077
Impairments and other operating items	61,948	20,118	156,493	27,678	494,492
Operating income (loss)	837,778	832,244	627,098	452,298	(61,532)
Interest expense	(147,368)	(132,104)	(125,297)	(92,709)	(64,236)
Interest income	9,777	7,170	5,173	602	487
Other income (expense), net	5,704	(170)	1,536	1,174	(1,005)
Income (loss) before income tax provision	705,891	707,140	508,510	361,365	(126,286)
Income tax (provision) benefit	(139,210)	(159,986)	68,910	(114,044)	31,592
Net income (loss)	566,681	547,154	577,420	247,321	(94,694)
Plus (less): Net loss (income) attributable to noncontrolling interests	160	(283)	(603)	(781)	(1,070)
Net income (loss) attributable to Waste Connections	$ 566,841	$ 546,871	$ 576,817	$ 246,540	$ (95,764)
Earnings (loss) per common share attributable to Waste Connections’ common shareholders:					
Basic	$ 2.15	$ 2.07	$ 2.19	$ 1.07	$ (0.52)
Diluted	$ 2.14	$ 2.07	$ 2.18	$ 1.07	$ (0.52)
Shares used in the per share calculations:					
Basic (b)	263,792,693	263,650,155	263,682,608	230,325,012	185,237,896
Diluted (b)	264,526,561	264,395,618	264,302,411	231,081,496	185,237,896
Cash dividends per common share	$ 0.665	$ 0.580	$ 0.500	$ 0.410	$ 0.357
Cash dividends paid	$ 175,067	$ 152,550	$ 131,975	$ 92,547	$ 65,990

(a) For more information regarding this selected financial data, see the Management’s Discussion and Analysis of Financial Condition and Results of Operations section included in Item 7 of this Annual Report on Form 10-K.

(b) Share amounts have been retroactively adjusted to reflect the split of our common shares on a three-for-two basis, effective as of June 16, 2017.

	December 31, 2019	2018	2017	2016	2015
	(in thousands of U.S. dollars)				
BALANCE SHEET DATA:					
Cash and equivalents	$ 326,738	$ 319,305	$ 433,815	$ 154,382	$ 10,974
Working capital surplus (deficit)	123,370	206,068	374,269	51,215	(65,575)
Property and equipment, net	5,516,347	5,168,996	4,820,934	4,738,055	2,738,288
Total assets	13,737,695	12,627,329	12,014,681	11,103,925	5,072,071
Long-term debt and notes payable	4,353,782	4,153,465	3,899,572	3,616,760	2,147,127
Total equity	6,938,354	6,460,188	6,274,070	5,654,877	1,991,784

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion should be read in conjunction with the "Selected Financial Data" included in Item 6 of this Annual Report on Form 10-K, our consolidated financial statements and the related notes included elsewhere in this Annual Report on Form 10-K.

Industry Overview

The solid waste industry is local and highly competitive in nature, requiring substantial labor and capital resources. The participants compete for collection accounts primarily on the basis of price and, to a lesser extent, the quality of service, and compete for landfill business on the basis of tipping fees, geographic location and quality of operations. The solid waste industry has been consolidating and continues to consolidate as a result of a number of factors, including the increasing costs and complexity associated with waste management operations and regulatory compliance. Many small independent operators and municipalities lack the capital resources, management, operating skills and technical expertise necessary to operate effectively in such an environment. The consolidation trend has caused solid waste companies to operate larger landfills that have complementary collection routes that can use company-owned disposal capacity. Controlling the point of transfer from haulers to landfills has become increasingly important as landfills continue to close and disposal capacity moves farther from the collection markets it serves.

Generally, the most profitable operators within the solid waste industry are those companies that are vertically integrated or enter into long-term collection contracts. A vertically integrated operator will benefit from: (1) the internalization of waste, which is bringing waste to a company-owned landfill; (2) the ability to charge third-party haulers tipping fees either at landfills or at transfer stations; and (3) the efficiencies gained by being able to aggregate and process waste at a transfer station prior to landfilling.

The E&P waste services industry is regional in nature and is also highly fragmented, with acquisition opportunities available in several active natural resource basins. Competition for E&P waste comes primarily from smaller regional companies that utilize a variety of disposal methods and generally serve specific geographic markets, and other solid waste companies. In addition, customers in many markets have the option of using internal disposal methods or outsourcing to another third-party disposal company. The principal competitive factors in this business include: gaining customer approval of treatment and disposal facilities; location of facilities in relation to customer activity; reputation; reliability of services; track record of environmental compliance; ability to accept multiple waste types at a single facility; and price. The demand for our E&P waste services depends on the continued demand for, and production of, oil and natural gas. Crude oil and natural gas prices historically have been volatile. If the prices of crude oil and natural gas substantially decline, it could lead to declines in the level of production activity and demand for our E&P waste services, which could result in the recognition of impairment charges on our intangible assets and property and equipment associated with our E&P operations.

Executive Overview

We are an integrated solid waste services company that provides non-hazardous waste collection, transfer, disposal and recycling services in mostly exclusive and secondary markets in the U.S. and Canada. Through our R360 Environmental Solutions subsidiary, we are also a leading provider of non-hazardous E&P waste treatment, recovery and disposal services in several of the most active natural resource producing areas in the U.S. We also provide intermodal services for the rail haul movement of cargo and solid waste containers in the Pacific Northwest through a network of intermodal facilities.

We generally seek to avoid highly competitive, large urban markets and instead target markets where we can attain high market share either through exclusive contracts, vertical integration or asset positioning. In markets where waste collection services are provided under exclusive arrangements, or where waste disposal is municipally owned or funded or available at multiple municipal sources, we believe that controlling the waste stream by providing collection services under exclusive arrangements is often more important to our growth and profitability than owning or operating landfills. We also target niche markets, like E&P waste treatment and disposal services.

2019 Financial Performance

The functional currency of the Company, as the parent corporate entity, and its operating subsidiaries in the United States is the U.S. dollar. The functional currency of the Company's Canadian operations is the Canadian dollar. The reporting currency of the Company is the U.S. dollar. The Company's consolidated Canadian dollar financial position is translated to U.S. dollars by applying the foreign currency exchange rate in effect at the consolidated balance sheet date. The Company's consolidated Canadian dollar results of operations and cash flows are translated to U.S. dollars by applying the average foreign currency exchange rate in effect during the reporting period. The resulting translation adjustments are included in other comprehensive income or loss. Gains and losses from foreign currency transactions are included in earnings for the period.

Operating Results

Revenues in 2019 increased 9.5% to $5.389 billion from $4.923 billion in 2018, due partly to acquisitions closed during, or subsequent to, the prior year, net of divestitures, which accounted for $292.0 million in incremental revenues in 2019, with the remainder due primarily to internal growth in solid waste and higher E&P waste activity. Solid waste internal growth was 4.3%, due to price increases and fuel, materials and environmental surcharges, which were partially offset by lower volumes and recycled commodity values. Pricing growth was 5.2%, with core pricing up 5.1% and fuel, materials and environmental surcharges adding another 0.1%. Volumes decreased by 0.2% on increases in landfill and hauling volumes, more than offset by purposeful shedding of poor quality volumes at certain Progressive Waste operations. Decreases in recycled commodity prices resulted in another 0.7% decrease to internal solid waste growth. E&P waste revenues increased to $256.0 million from $244.6 million in 2018, due primarily to increased activity at existing facilities.

In 2019, adjusted earnings before interest, taxes, depreciation and amortization, or adjusted EBITDA, a non-GAAP financial measure (refer to page 68 of this Annual Report on Form 10-K for a definition and reconciliation to Net income attributable to Waste Connections), increased 6.8% to $1.674 billion, from $1.566 billion in 2018. As a percentage of revenue, adjusted EBITDA decreased from 31.8% in 2018, to 31.1% in 2019. This 0.7 percentage point decrease was primarily due to lower recycled commodity values and renewable energy credits derived from the sale of landfill gas. Adjusted net income attributable to Waste Connections, a non-GAAP financial measure (refer to page 69 of this Annual Report on Form 10-K for a definition and reconciliation to Net income attributable to Waste Connections), in 2019 increased 7.8% to $719.6 million from $667.3 million in 2018.

Adjusted Free Cash Flow

Net cash provided by operating activities increased 9.2% to $1.541 billion in 2019, from $1.411 billion in 2018, and capital expenditures for property and equipment increased from $546.1 million in 2018 to $634.4 million in 2019, an increase of $88.3 million, or 16.2%. The increase in capital expenditures was primarily due to acquisitions closed during, or subsequent to, the prior year, as well as new municipal contracts awarded during the year. Adjusted free cash flow, a non-GAAP financial measure (refer to page 67 of this Annual Report on Form 10-K for a definition and reconciliation to Net cash provided by operating activities), increased by $36.9 million to $916.8 million in 2019, from $879.9 million in 2018. Adjusted free cash flow as a percentage of revenues was 17.0% in 2019, as compared to 17.9% in 2018.

Return of Capital to Shareholders

In 2019, we returned $175.1 million to shareholders through cash dividends declared by our Board of Directors, which also increased the quarterly cash dividend by 15.6%, from $0.16 to $0.185 per common share in October 2019. Cash dividends increased $22.5 million, or 14.8%, from $152.6 million in 2018, due to a 14.3% increase in the quarterly cash dividend declared by our Board of Directors in October 2018, followed by the additional increase in October 2019. Our Board of Directors intends to review the quarterly dividend during the fourth quarter of each year, with a long-term objective of increasing the amount of the dividend. In 2019, we did not repurchase any common shares due to expectations regarding the size and timing of acquisitions. We expect the amount of capital we return to shareholders through share repurchases to vary depending on our financial condition and results of operations, capital structure, the amount of cash we deploy on acquisitions, expectations regarding the timing and size of acquisitions, the market price of our common shares, and overall market conditions. We cannot assure you as to the amounts or timing of future share repurchases or dividends. We have the ability under our Credit Agreement and master note purchase agreements to repurchase our common shares and pay dividends provided that we maintain specified financial ratios.

Capital Position

We target a leverage ratio, as defined in our Credit Agreement, of approximately 2.5x – 3.0x total debt to EBITDA. The percentage increase in EBITDA in 2019 more than offset the percentage increase in debt in 2019; therefore, our leverage ratio decreased to 2.41x at December 31, 2019, from 2.45x at December 31, 2018.

Critical Accounting Estimates and Assumptions

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires estimates and assumptions that affect the reported amounts of assets and liabilities, revenues and expenses and related disclosures of contingent assets and liabilities in the consolidated financial statements. As described by the SEC, critical accounting estimates and assumptions are those that may be material due to the levels of subjectivity and judgment necessary to account for highly uncertain matters or the susceptibility of such matters to change, and that have a material impact on the financial condition or operating performance of a company. Such critical accounting estimates and assumptions are applicable to our reportable segments. Based on this definition, we believe the following are our critical accounting estimates.

Insurance liabilities. We maintain insurance policies for automobile, general, employer's, environmental, cyber, employment practices and directors' and officers' liability as well as for employee group health insurance, property insurance and workers' compensation. We carry umbrella policies for certain types of claims to provide excess coverage over the underlying policies and per incident deductibles or self-insured retentions. Our insurance accruals are based on claims filed and estimates of claims incurred but not reported and are developed by our management with assistance from our third-party actuary and third-party claims administrator. The insurance accruals are influenced by our past claims experience factors, which have a limited history, and by published industry development factors. If we experience insurance claims or costs above or below our historically evaluated levels, our estimates could be materially affected. The frequency and amount of claims or incidents could vary significantly over time, which could materially affect our self-insurance liabilities. Additionally, the actual costs to settle the self-insurance liabilities could materially differ from the original estimates and cause us to incur additional costs in future periods associated with prior year claims.

Income taxes. Deferred income tax assets and liabilities are determined based on differences between the financial reporting and income tax bases of assets and liabilities and are measured using the enacted tax rates and laws that are expected to be in effect when the differences are expected to reverse. If our judgment and estimates concerning assumptions made in calculating our expected future income tax rates are incorrect, our deferred income tax assets and liabilities would change. Based on our deferred income tax liability balance at December 31, 2019, each 0.1 percentage point change to our expected future income tax rates would change our deferred income tax liability balance and income tax expense by approximately $3.1 million.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act, or the Tax Act. The Tax Act made broad and complex changes to the U.S. tax code that affected 2017, including, but not limited to, (1) requiring a one-time transition tax on certain unrepatriated earnings of foreign subsidiaries that is payable over eight years and (2) bonus depreciation that will allow for full expensing of qualified property.

The Tax Act also established new tax laws that affected years beginning after December 31, 2017, including, but not limited to, (1) a reduction of the U.S. federal corporate income tax rate from 35 percent to 21 percent; (2) elimination of the corporate alternative minimum tax; (3) the creation of the base erosion anti-abuse tax, which acts similar to a new minimum tax; (4) a general elimination of U.S. federal income taxes on dividends from foreign subsidiaries; (5) a new provision designed to tax global intangible low-taxed income, which allows for the possibility of using foreign tax credits, or FTCs, and a deduction of up to 50 percent to offset the income tax liability (subject to some limitations); (6) a new limitation on deductible interest expense; (7) limitations on the deductibility of certain executive compensation; (8) bonus depreciation that allows for full expensing of qualified property; and (9) limitations on net operating losses.

On December 22, 2017, the SEC staff issued Staff Accounting Bulletin No. 118, or SAB 118, which provides guidance on accounting for the tax effects of the Tax Act. SAB 118 provides a measurement period that should not extend beyond one year from the Tax Act enactment date for companies to complete the accounting under ASC 740. In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Act for which the accounting under ASC 740 is complete. To the extent that a company's accounting for certain income tax effects of the Tax Act is incomplete but it is able to determine a reasonable estimate, it must record a provisional estimate in the financial statements. If a company cannot determine a provisional estimate to be included in the financial statements, it should continue to apply ASC 740 on the basis of the provisions of the tax laws that were in effect immediately before the enactment of the Tax Act.

In connection with our analysis of the Tax Act, we recorded a discrete net income tax benefit of $269.8 million in the year ended December 31, 2017. This net income tax benefit was primarily the result of the reduction to the corporate income tax rate. Additionally, the Tax Act's one-time deemed repatriation transition tax, or the Transition Tax, on certain unrepatriated earnings of non-U.S. subsidiaries is a tax on previously untaxed accumulated and current earnings and profits of certain of our non-U.S. subsidiaries. To determine the amount of the Transition Tax, we had to determine, in addition to other factors, the amount of post-1986 earnings and profits of the relevant subsidiaries, as well as the amount of non-U.S. income taxes paid on such earnings. We were able to make a reasonable estimate of the Transition Tax and recorded a provisional Transition Tax obligation of $1.0 million for the year ended December 31, 2017. The Transition Tax, which has been determined to be complete, resulted in a total Transition Tax obligation of $0.7 million, with a corresponding adjustment of $0.3 million to income tax expense for the year ended December 31, 2018. Further, as it relates to our policy regarding the accounting for the tax impacts of global intangible low-taxed income, we have elected to record the tax impacts as period costs.

Additionally, in conjunction with the Tax Act, we recorded a provisional deferred income tax expense of $62.4 million for the year ended December 31, 2017 associated with a portion of our U.S. earnings no longer permanently reinvested. During the year ended December 31, 2018, we recorded a deferred income tax expense of $6.4 million associated with refinements to the prior year estimate as a measurement period adjustment pursuant to SAB 118. This resulted in total deferred income tax expense of $68.8 million which has been determined to be complete.

Accounting for landfills. We recognize landfill depletion expense as airspace of a landfill is consumed. Our landfill depletion rates are based on the remaining disposal capacity at our landfills, considering both permitted and probable expansion airspace. We calculate the net present value of our final capping, closure and post-closure commitments by estimating the total obligation in current dollars, inflating the obligation based upon the expected date of the expenditure and discounting the inflated total to its present value using a credit-adjusted risk-free rate. Any changes in expectations that result in an upward revision to the estimated undiscounted cash flows are treated as a new liability and are inflated and discounted at rates reflecting current market conditions. Any changes in expectations that result in a downward revision (or no revision) to the estimated undiscounted cash flows result in a liability that is inflated and discounted at rates reflecting the market conditions at the time the cash flows were originally estimated. This policy results in our final capping, closure and post-closure liabilities being recorded in "layers." The resulting final capping, closure and post-closure obligations are recorded on the consolidated balance sheet along with an offsetting addition to site costs, which is amortized to depletion expense as the remaining landfill airspace is consumed. Interest is accreted on the recorded liability using the corresponding discount rate. The accounting methods discussed below require us to make certain estimates and assumptions. Changes to these estimates and assumptions could have a material effect on our financial condition and results of operations. Any changes to our estimates are applied prospectively.

Landfill development costs. Landfill development costs include the costs of acquisition, construction associated with excavation, liners, site berms, groundwater monitoring wells, gas recovery systems and leachate collection systems. We estimate the total costs associated with developing each landfill site to its final capacity. Total landfill costs include the development costs associated with expansion airspace. Expansion airspace is described below. Landfill development costs depend on future events and thus actual costs could vary significantly from our estimates. Material differences between estimated and actual development costs may affect our cash flows by increasing our capital expenditures and thus affect our results of operations by increasing our landfill depletion expense.

Final capping, closure and post-closure obligations. We accrue for estimated final capping, closure and post-closure maintenance obligations at the landfills we own, and the landfills that we operate, but do not own, under life-of-site agreements. We could have additional material financial obligations relating to final capping, closure and post-closure costs at other disposal facilities that we currently own or operate or that we may own or operate in the future. Our discount rate assumption for purposes of computing 2019 and 2018 “layers” for final capping, closure and post-closure obligations was 4.75% for both years, which reflects our long-term credit adjusted risk free rate as of the end of both 2018 and 2017. Our inflation rate assumption was 2.5% for the years ended December 31, 2019 and 2018. Significant reductions in our estimates of the remaining lives of our landfills or significant increases in our estimates of the landfill final capping, closure and post-closure maintenance costs could have a material adverse effect on our financial condition and results of operations. Additionally, changes in regulatory or legislative requirements could increase our costs related to our landfills, resulting in a material adverse effect on our financial condition and results of operations.

We own two landfills for which the prior owner is obligated to reimburse us for certain costs we incur for final capping, closure and post-closure activities on the portion of the landfills utilized by the prior owner. We accrue the prior owner’s portion of the final capping, closure and post-closure obligation within the balance sheet classification of Other long-term liabilities, and a corresponding receivable from the prior owner in long-term Other assets.

Disposal capacity. Our internal and third-party engineers perform surveys at least annually to estimate the remaining disposal capacity at our landfills. Our landfill depletion rates are based on the remaining disposal capacity, considering both permitted and probable expansion airspace, at the landfills that we own and at landfills that we operate, but do not own, under life-of-site agreements. Our landfill depletion rate is based on the term of the operating agreement at our operated landfill that has capitalized expenditures. Expansion airspace consists of additional disposal capacity being pursued through means of an expansion that has not yet been permitted. Expansion airspace that meets the following criteria is included in our estimate of total landfill airspace:

1) whether the land where the expansion is being sought is contiguous to the current disposal site, and we either own the expansion property or have rights to it under an option, purchase, operating or other similar agreement;
2) whether total development costs, final capping costs, and closure/post-closure costs have been determined;
3) whether internal personnel have performed a financial analysis of the proposed expansion site and have determined that it has a positive financial and operational impact;
4) whether internal personnel or external consultants are actively working to obtain the necessary approvals to obtain the landfill expansion permit; and
5) whether we consider it probable that we will achieve the expansion (for a pursued expansion to be considered probable, there must be no significant known technical, legal, community, business or political restrictions or similar issues existing that we believe are more likely than not to impair the success of the expansion).

We may be unsuccessful in obtaining permits for expansion disposal capacity at our landfills. In such cases, we will charge the previously capitalized development costs to expense. This will adversely affect our operating results and cash flows and could result in greater landfill depletion expense being recognized on a prospective basis.

We periodically evaluate our landfill sites for potential impairment indicators. Our judgments regarding the existence of impairment indicators are based on regulatory factors, market conditions and operational performance of our landfills. Future events could cause us to conclude that impairment indicators exist and that our landfill carrying costs are impaired. Any resulting impairment loss could have a material adverse effect on our financial condition and results of operations.

Goodwill and indefinite-lived intangible assets testing. Goodwill and indefinite-lived intangible assets are tested for impairment on at least an annual basis in the fourth quarter of the year. In addition, we evaluate our reporting units for impairment if events or circumstances change between annual tests indicating a possible impairment. Examples of such events or circumstances include, but are not limited to, the following:

- a significant adverse change in legal factors or in the business climate;
- an adverse action or assessment by a regulator;
- a more likely than not expectation that a segment or a significant portion thereof will be sold;
- the testing for recoverability of a significant asset group within the segment; or
- current period or expected future operating cash flow losses.

We elected to early adopt the guidance issued by the Financial Accounting Standards Board, or FASB, "Simplifying the Test for Goodwill Impairment" on January 1, 2017. The new guidance removes Step 2 of the goodwill impairment test, which required a hypothetical purchase price allocation. As such, the impairment analysis is only one step. In this step, we estimate the fair value of each of our reporting units, which consisted of testing our five geographic solid waste operating segments and our E&P segment at December 31, 2019, 2018, and 2017, using discounted cash flow analyses, which require significant assumptions and estimates about the future operations of each reporting unit. We compare the fair value of each reporting unit to the carrying value of its net assets. If the fair value of a reporting unit is greater than the carrying value of the net assets, including goodwill, assigned to the reporting unit, then no impairment results. If the fair value is less than its carrying value, an impairment charge is recorded for the amount by which the carrying value exceeds its fair value, not to exceed the carrying amount of goodwill. In testing indefinite-lived intangible assets for impairment, we compare the estimated fair value of each indefinite-lived intangible asset to its carrying value. If the fair value of the indefinite-lived intangible asset is less than its carrying value, an impairment charge would be recorded to earnings in our Consolidated Statements of Net Income.

Significant judgments inherent in these analyses include the determination of appropriate discount rates, the amount and timing of expected future cash flows and growth rates. In assessing the reasonableness of our determined fair values of our reporting units, we evaluate our results against our current market capitalization. For our impairment testing of our solid waste geographic operating segments for the year ended December 31, 2019, we determined that the indicated fair value of our reporting units exceeded their carrying value by approximately 120% on average and, therefore, we did not record an impairment charge. The detailed results of our 2019, 2018 and 2017 impairment tests are described in Note 3 of our consolidated financial statements included in Item 8 of this Annual Report on Form 10-K.

Upon adopting the goodwill impairment accounting guidance in the first quarter of 2017, we performed an updated impairment test for our E&P segment. The impairment test involved measuring the recoverability of goodwill by comparing the E&P segment's carrying amount, including goodwill, to the fair value of the reporting unit. The fair value was estimated using an income approach employing a DCF model. The DCF model incorporated projected cash flows over a forecast period based on the remaining estimated lives of the operating locations comprising the E&P segment. This was based on a number of key assumptions, including, but not limited to, a discount rate of 11.7%, annual revenue projections based on E&P waste resulting from projected levels of oil and natural gas exploration and production activity during the forecast period, gross margins based on estimated operating expense requirements during the forecast period and estimated capital expenditures over the forecast period, all of which were classified as Level 3 in the fair value hierarchy. The impairment test showed the carrying value of the E&P segment exceeded its fair value by an amount in excess of the carrying amount of goodwill, or $77.3 million. Therefore, we recorded an impairment charge of $77.3 million, consisting of the carrying amount of goodwill at our E&P segment at January 1, 2017, to Impairments and other operating charges in the Consolidated Statements of Net Income during the year ended December 31, 2017.

Additionally, we evaluated the recoverability of the E&P segment's indefinite-lived intangible assets (other than goodwill) by comparing the estimated fair value of each indefinite-lived intangible asset to its carrying value. We estimated the fair value of the indefinite-lived intangible assets using an excess earnings approach. Based on the result of the recoverability test during the years ended December 31, 2019, 2018 and 2017, we did not record an impairment charge.

Business Combination Accounting. We recognize, separately from goodwill, the identifiable assets acquired and liabilities assumed at their estimated acquisition date fair values. We measure and recognize goodwill as of the acquisition date as the excess of: (a) the aggregate of the fair value of consideration transferred, the fair value of any noncontrolling interest in the acquiree (if any) and the acquisition date fair value of our previously held equity interest in the acquiree (if any), over (b) the fair value of net assets acquired and liabilities assumed. At the acquisition date, we measure the fair values of all assets acquired and liabilities assumed that arise from contractual contingencies. We measure the fair values of all noncontractual contingencies if, as of the acquisition date, it is more likely than not that the contingency will give rise to an asset or liability.

General

Our revenues consist mainly of fees we charge customers for collection, transfer, recycling and disposal of non-hazardous solid waste and treatment, recovery and disposal of non-hazardous E&P waste.

Our solid waste collection business involves the collection of waste from residential, commercial and industrial customers for transport to transfer stations, or directly to landfills or recycling centers. Solid waste collection services include both recurring and temporary customer relationships. The services are performed under service agreements, municipal contracts or franchise agreements with governmental entities. Our existing franchise agreements and most of our existing municipal contracts give us the exclusive right to provide specified waste services in the specified territory during the contract term. These exclusive arrangements are awarded, at least initially, on a competitive bid basis and subsequently on a bid or negotiated basis. The standard customer service agreements generally range from one to three years in duration, although some exclusive franchises are for significantly longer periods. Residential collection services are also provided on a subscription basis with individual households.

The fees received for collection services are based primarily on the market, collection frequency and level of service, route density, type and volume~~,~~ or weight of the waste collected, type of equipment and containers furnished, the distance to the disposal or processing facility, the cost of disposal or processing, and prices charged by competitors for similar services.

The terms of our contracts sometimes limit our ability to pass on price increases. Long-term solid waste collection contracts often contain a formula, generally based on a published price index, that automatically adjusts fees to cover increases in some, but not all, operating costs, or that limit increases to less than 100% of the increase in the applicable price index.

Revenue at landfills is primarily generated by charging tipping fees on a per ton and/or per yard basis to third parties based on the volume disposed and the nature of the waste.

Revenue at transfer stations is primarily generated by charging tipping or disposal fees on a per ton and/or per yard basis. The fees charged to third parties are based primarily on the market, type and volume or weight of the waste accepted, the distance to the disposal facility and the cost of disposal.

Many of our landfill and transfer station customers have entered into one to ten year disposal contracts with us, most of which provide for annual indexed price increases.

Our revenues from E&P waste services are primarily generated through the treatment, recovery and disposal of non-hazardous exploration and production waste from vertical and horizontal drilling, hydraulic fracturing, production and clean-up activity, as well as other services including closed loop collection systems, the transportation of waste to the disposal facility in certain markets and the sale of recovered products. E&P activity varies across market areas that are tied to the natural resource basins in which the drilling activity occurs and reflects the regulatory environment, pricing and disposal alternatives available in any given market.

Our revenues from recycling services are generated by offering residential, commercial, industrial and municipal customers recycling services for a variety of recyclable materials, including compost, cardboard, mixed paper, plastic containers, glass bottles and ferrous and aluminum metals. The Company owns recycling operations and markets collected recyclable materials to third parties for processing before resale. In certain instances, the Company issues recycling rebates to municipal or commercial customers, which can be based on the price it receives upon the sale of recycled commodities, a fixed contractual rate or other measures. The Company also receives rebates when it disposes of recycled commodities at third-party facilities.

Other revenues consist primarily of the sale of methane gas generated from our MSW landfills and revenues from intermodal services. Intermodal revenue is primarily generated through providing intermodal services for the rail haul movement of cargo and solid waste containers in the Pacific Northwest through a network of intermodal facilities. The fees received for intermodal services are based on negotiated rates and vary depending on volume commitments by the shipper and destination.

No single contract or customer accounted for more than 10% of our total revenues at the consolidated or reportable segment level during the periods presented. The following table disaggregates our revenue by service line for the periods indicated (dollars in thousands of U.S. dollars).

	Years Ended December 31,		
	2019	2018	2017
Commercial	$ 1,593,217	$ 1,452,831	$ 1,343,590
Residential	1,380,763	1,189,148	1,130,842
Industrial and construction roll off	841,173	768,687	707,015
Total collection	3,815,153	3,410,666	3,181,447
Landfill	1,132,935	1,063,243	988,092
Transfer	771,316	670,129	589,883
Recycling	64,245	92,634	161,730
E&P	271,887	256,262	203,473
Intermodal and other	121,137	139,896	146,749
Intercompany	(787,994)	(709,889)	(640,886)
Total	$ 5,388,679	$ 4,922,941	$ 4,630,488

Cost of operations includes labor and benefits, tipping fees paid to third-party disposal facilities, vehicle and equipment maintenance, workers' compensation, vehicle and equipment insurance, insurance and employee group health claims expense, third-party transportation expense, fuel, the cost of materials we purchase for recycling, district and state taxes and host community fees and royalties. Our significant costs of operations in 2019 were labor, third-party disposal and transportation, vehicle and equipment maintenance, taxes and fees, insurance and fuel. We use a number of programs to reduce overall cost of operations, including increasing the use of automated routes to reduce labor and workers' compensation exposure, utilizing comprehensive maintenance and health and safety programs, and increasing the use of transfer stations to further enhance internalization rates. We carry insurance for automobile liability, general liability, employer's liability, environmental liability, cyber liability, employment practices liability and directors' and officers' liability as well as for employee group health claims, property and workers' compensation. If we experience insurance claims or costs above or below our historically evaluated levels, our estimates could be materially affected.

Selling, general and administrative, or SG&A, expense includes management, sales force, clerical and administrative employee compensation and benefits, legal, accounting and other professional services, acquisition expenses, bad debt expense and lease cost for our administrative offices.

Depreciation expense includes depreciation of equipment and fixed assets over their estimated useful lives using the straight-line method. Depletion expense includes depletion of landfill site costs and total future development costs as remaining airspace of the landfill is consumed. Remaining airspace at our landfills includes both permitted and probable expansion airspace. Amortization expense includes the amortization of finite-lived intangible assets, consisting primarily of long-term franchise agreements and contracts, customer lists and non-competition agreements, over their estimated useful lives using the straight-line method. Goodwill and indefinite-lived intangible assets, consisting primarily of certain perpetual rights to provide solid waste collection and transportation services in specified territories, are not amortized.

We capitalize some third-party expenditures related to development projects, such as legal and engineering. We expense all third-party and indirect acquisition costs, including third-party legal and engineering expenses, executive and corporate overhead, public relations and other corporate services, as we incur them. We charge against net income any unamortized capitalized expenditures and advances (net of any portion that we believe we may recover, through sale or otherwise) that may become impaired, such as those that relate to any operation that is permanently shut down and any landfill development project that we believe will not be completed. We routinely evaluate all capitalized costs, and expense those related to projects that we believe are not likely to succeed. For example, if we are unsuccessful in our attempts to obtain or defend permits that we are seeking or have been awarded to operate or expand a landfill, we will no longer generate anticipated income from the landfill and we will be required to expense in a future period up to the carrying value of the landfill or expansion project, less the recoverable value of the property and other amounts recovered.

Presentation of Results of Operations, Segment Reporting, and Liquidity and Capital Resources

The following discussion and analysis of our Results of Operations, Segment Reporting, and Liquidity and Capital Resources includes a comparison for the year ended December 31, 2019 to the year ended December 31, 2018. A similar discussion and analysis that compares the year ended December 31, 2018 to the year ended December 31, 2017 can be found in Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” in our Annual Report on Form 10-K for the year ended December 31, 2018.

Results of Operations

The following table sets forth items in our Consolidated Statements of Net Income in thousands of U.S. dollars and as a percentage of revenues for the periods indicated:

	Years Ended December 31,			
	2019	**% of Revenues**	**2018**	**% of Revenues**
Revenues	$ 5,388,679	100.0 %	$ 4,922,941	100.0 %
Cost of operations	3,198,757	59.4	2,865,704	58.2
Selling, general and administrative	546,278	10.1	524,388	10.7
Depreciation	618,396	11.5	572,708	11.6
Amortization of intangibles	125,522	2.3	107,779	2.2
Impairments and other operating items	61,948	1.2	20,118	0.4
Operating income	837,778	15.5	832,244	16.9
Interest expense	(147,368)	(2.7)	(132,104)	(2.7)
Interest income	9,777	0.2	7,170	0.2
Other income (expense), net	5,704	0.1	(170)	(0.0)
Income tax provision	(139,210)	(2.6)	(159,986)	(3.3)
Net income	566,681	10.5	547,154	11.1
Net loss (income) attributable to noncontrolling interests	160	0.0	(283)	(0.0)
Net income attributable to Waste Connections	$ 566,841	10.5 %	$ 546,871	11.1 %

Years Ended December 31, 2019 and 2018

Revenues. Total revenues increased $465.8 million, or 9.5%, to $5.389 billion for the year ended December 31, 2019, from $4.923 billion for the year ended December 31, 2018.

During the year ended December 31, 2019, incremental revenue from acquisitions closed during, or subsequent to, the year ended December 31, 2018, increased revenues by approximately $312.7 million.

Operations that were divested in 2018 decreased revenues by approximately $20.7 million for the year ended December 31, 2019.

During the year ended December 31, 2019, the net increase in prices charged to our customers at our existing operations was $237.0 million, consisting of $230.5 million of core price increases and $6.5 million from surcharges.

During the year ended December 31, 2019, volume decreases in our existing business decreased solid waste revenues by $8.9 million due primarily to declines in transfer station volumes in our Eastern segment resulting from the termination of our New York City Department of Sanitation marine terminal operations contract with a third party, declines in residential collection in certain markets at our Eastern segment due to competition from lower-priced haulers, declines in residential collection in our Southern and Canada segments due to the non-renewal of certain contracts acquired in the Progressive Waste acquisition and declines in landfill municipal solid waste volumes in our Southern and Central segments exceeding increased collection and landfill volumes in our Western segment.

E&P revenues at facilities owned and fully-operated during the years ended December 31, 2019 and 2018 increased by $10.8 million due to increased drilling activity and E&P disposal volumes primarily in our Louisiana Gulf of Mexico and Permian Basins.

A decrease in the average Canadian dollar to U.S. dollar currency exchange rate resulted in a decrease in revenues of $16.6 million for the year ended December 31, 2019. The average Canadian dollar to U.S. dollar exchange rates on our Canadian revenues were 0.7537 and 0.7713 in the years ended December 31, 2019 and 2018, respectively.

Revenues from sales of recyclable commodities at facilities owned during the years ended December 31, 2019 and 2018 decreased $31.9 million, due primarily to decreased prices for old corrugated cardboard and other fiber products resulting from a reduction in overseas demand.

Other revenues decreased by $16.6 million during the year ended December 31, 2019, due primarily to a decrease in intermodal revenues resulting from customer losses causing a reduction in cargo volume as well as a reduction in the prices for renewal energy credits associated with the generation of landfill gas primarily in our Canada segment.

Cost of Operations. Total cost of operations increased $333.1 million, or 11.6%, to $3.199 billion for the year ended December 31, 2019, from $2.866 billion for the year ended December 31, 2018. The increase was primarily the result of $210.4 million of operating costs from acquisitions closed during, or subsequent to, the year ended December 31, 2018 and an increase in operating costs at our existing operations of $149.5 million, assuming foreign currency parity, partially offset by a decrease in operating costs of $17.7 million at operations divested during, or subsequent to, the year ended December 31, 2018 and a decrease of $9.1 million resulting from a decrease in the average foreign currency exchange rate in effect during the comparable reporting periods.

The increase in operating costs at our existing operations of $149.5 million for the year ended December 31, 2019, assuming foreign currency parity, was comprised of an increase in labor expenses of $48.1 million due primarily to employee pay rate increases, an increase in truck, container, equipment and facility maintenance and repair expenses of $27.1 million due to parts and service rate increases and variability impacting the timing of major repairs, an increase in third-party trucking and transportation expenses of $18.3 million due primarily to outsourcing transportation services to third party operators at certain locations and increased rates charged by third parties to provide trucking and transportation services, an increase of $13.6 million resulting from higher costs per ton charged by third party processors of recyclable commodities, an increase in 401(k) matching expenses of $9.5 million due to our increasing the maximum matching contribution rate to our employees and higher credits recorded in the prior year period resulting from employee forfeitures, an increase in leachate disposal expenses of $7.6 million due to increased precipitation from harsh weather generating higher leachate volumes primarily in our Eastern and Southern segments as well as higher costs per gallon for leachate transportation and treatment, an increase in subcontracted operating expenses of $6.6 million due primarily to utilizing third party haulers to assist in the performance of certain collection contracts at our solid waste segments and certain operating activities at our E&P segment, an increase in taxes on revenues of $6.5 million due primarily to increased revenues in our solid waste markets, an increase in landfill monitoring, environmental compliance and daily cover expenses of $5.2 million due to increased compliance requirements under our landfill operating permits, an increase in diesel fuel expense of $4.8 million due primarily to the prior year period benefiting from purchasing a portion of our diesel fuel needs under a favorable fuel hedge agreement that expired in December 2018, a $4.4 million increase in expenses for auto and workers' compensation claims due primarily to higher adjustments recorded in the prior year period to decrease projected losses on outstanding claims and an increase in the deductible on our auto claims resulting in a higher portion of costs being paid by us, an increase in equipment and facility rental expenses of $3.1 million due primarily to increased truck rental expenses in our Southern segment and the adoption on January 1, 2019 of new accounting standards associated with leases, an increase in insurance premiums for our auto and workers' compensation policies of $2.1 million due primarily to insurance cost increases, growth from acquisitions and a non-recurring reduction in expense during the prior year period in our Canada segment resulting from an annual workers' compensation premium audit and $8.2 million of other net expense increases, partially offset by a decrease in employee benefits expenses of $5.9 million due primarily to a reduction in the employer-paid portion of medical claims resulting from a change in medical plan providers, a decrease in compressed natural gas expense of $5.0 million due primarily to the recognition in 2019 of two years of tax credits associated with the purchase of compressed natural gas fuel and a $4.7 million decrease in intermodal expenses resulting from a decrease in intermodal cargo volume due to customer losses.

Cost of operations as a percentage of revenues increased 1.2 percentage points to 59.4% for the year ended December 31, 2019, from 58.2% for the year ended December 31, 2018. The increase as a percentage of revenues consisted of a 0.5 percentage point increase from the net impact of cost of operations expenses from acquisitions closed during, or subsequent to, the year ended December 31, 2018, a 0.2 percentage point increase from higher maintenance and repair expenses, a 0.2 percentage point increase from higher labor expenses, a 0.2 percentage point increase from higher 401(k) matching expenses, a 0.2 percentage point increase from an increase in recyclable commodities processing expenses, a 0.1 percentage point increase from higher leachate disposal expenses and a 0.1 percentage point increase from higher subcontracted operating expenses, partially offset by a 0.3 percentage point decrease from improved internalization of collected waste volumes disposed at third party locations.

SG&A. SG&A expenses increased $21.9 million, or 4.2%, to $546.3 million for the year ended December 31, 2019, from $524.4 million for the year ended December 31, 2018. The increase was comprised of $25.9 million of additional SG&A expenses from operating locations at acquisitions closed during, or subsequent to, the year ended December 31, 2018, partially offset by a decrease of $1.0 million in SG&A expenses at our existing operations, assuming foreign currency parity, a decrease of $1.7 million resulting from a decrease in the average foreign currency exchange rate in effect during the comparable reporting periods and a decrease of $1.3 million consisting of SG&A expenses from operations divested during, or subsequent to, the year ended December 31, 2018.

The decrease in SG&A expenses at our existing operations of $1.0 million, assuming foreign currency parity, for the year ended December 31, 2019 was comprised of a decrease in professional fees expense of $13.1 million primarily due to reduced legal expenses resulting from reimbursements related to legal matters covered under our insurance policies and the settlement of certain legal matters subsequent to December 31, 2018, a decrease of $5.0 million in equity-based compensation expenses associated with the prior year adjustment of Waste Connections, Inc. common shares held in our deferred compensation plan by certain key executives to fair value as a result of the shares being exchanged for other investment options, a further decrease in equity-based compensation expenses of $1.1 million associated with equity awards accounted for as liabilities that were granted to employees of Progressive Waste prior to June 1, 2016 which are subject to valuation adjustments each period based on changes in fair value, a decrease of $4.6 million in expenses for uncollectible accounts receivable resulting primarily from improved collection results in our solid waste segments and adjustments to prior period reserve estimates at our E&P segment, a decrease in employee benefits expenses of $2.9 million due primarily to a reduction in the employer-paid portion of medical claims resulting from a change in medical plan providers and a decrease in integration-related expenses of $2.8 million incurred in the prior year period resulting from the acquisition of Progressive Waste, partially offset by an increase in deferred compensation expenses of $5.9 million as a result of increases in the market value of investments to which employee deferred compensation liability balances are tracked, an increase in equity-based compensation expenses of $5.6 million associated with our annual recurring grant of restricted share units to our personnel, an increase in direct acquisition expenses of $3.7 million due to higher acquisition activity, an increase in 401(k) matching expenses of $3.4 million due to our increasing the maximum matching contribution rate to our employees and credits recorded in the prior year period from employee forfeitures, an increase in payroll and payroll-related expenses of $2.8 million due primarily to annual compensation increases, an increase in management training expenses of $1.5 million due to an expansion of our management training curriculum, an increase in credit card fee expenses of $1.5 million due to an increase in the volume of customers paying for services with credit cards, an increase in software licenses and subscriptions expenses of $1.5 million due primarily to the addition of new human resources and data security applications and $2.6 million of other net expense increases.

SG&A expenses as a percentage of revenues decreased 0.6 percentage points to 10.1% for the year ended December 31, 2019, from 10.7% for the year ended December 31, 2018. The decrease as a percentage of revenues consisted of a 0.3 percentage point decrease from lower legal expenses, a 0.1 percentage point decrease from equity-based compensation expenses associated with the exchange of shares held in our deferred compensation plan, a 0.1 percentage point decrease from lower expenses for uncollectible accounts receivable and a 0.1 percentage point decrease from all other changes.

Depreciation. Depreciation expense increased $45.7 million, or 8.0%, to $618.4 million for the year ended December 31, 2019, from $572.7 million for the year ended December 31, 2018. The increase was comprised of depreciation and depletion expense of $24.9 million from acquisitions closed during, or subsequent to, the year ended December 31, 2018, an increase in depletion expense of $16.0 million at our existing landfills due primarily to expected increases in future site build out and closure costs increasing our per unit depletion rates and higher E&P and municipal solid waste volumes and additional depreciation expense of $7.0 million associated with additions to our fleet and equipment purchased to support our existing operations exceeding the impact of certain equipment acquired from the acquisition of Progressive Waste becoming fully depreciated subsequent to June 1, 2019, partially offset by a decrease of $2.2 million resulting from a decrease in the average foreign currency exchange rate in effect during the comparable reporting periods.

Depreciation expense as a percentage of revenues decreased 0.1 percentage points to 11.5% for the year ended December 31, 2019, from 11.6% for the year ended December 31, 2018. The decrease as a percentage of revenues was attributable to certain equipment acquired from the acquisition of Progressive Waste becoming fully depreciated subsequent to June 1, 2019.

Amortization of Intangibles. Amortization of intangibles expense increased $17.7 million, or 16.5% to $125.5 million for the year ended December 31, 2019, from $107.8 million for the year ended December 31, 2018. The increase was the result of $28.8 million from intangible assets acquired in acquisitions closed during, or subsequent to, the year ended December 31, 2018, partially offset by a decrease of $10.4 million from certain intangible assets becoming fully amortized subsequent to December 31, 2018 and a decrease of $0.7 million resulting from a decrease in the average foreign currency exchange rate in effect during the comparable reporting periods.

Amortization expense as a percentage of revenues increased 0.1 percentage points to 2.3% for the year ended December 31, 2019, from 2.2% for the year ended December 31, 2018. The increase as a percentage of revenues was due primarily to the impact of amortization expense associated with acquisitions closed during, or subsequent to, the year ended December 31, 2018.

Impairments and Other Operating Items. Impairments and other operating items increased $41.8 million, to net losses totaling $61.9 million for the year ended December 31, 2019, from net losses totaling $20.1 million for the year ended December 31, 2018.

The net losses of $61.9 million recorded during the year ended December 31, 2019 consisted of $25.8 million of charges in our Eastern segment associated with the write-down of an operating permit and equipment at a non-strategic materials recovery facility that was disposed of by sale on January 2, 2020, $15.4 million of charges to terminate or write off the carrying cost of certain contracts that were not, or are not expected to be, renewed prior to their original estimated termination date, $8.5 million of losses on property and equipment at our existing operations that were disposed of through sales or as a result of being damaged in operations, $8.0 million resulting from the abandonment of a landfill development project at our E&P segment, $2.0 million of expenses associated with the settlement of various litigation claims, a $1.5 million expense charge to increase the fair value of amounts payable under liability-classified contingent consideration arrangements from acquisitions closed in periods prior to 2019 and $0.7 million of other net losses.

The net losses of $20.1 million recorded during the year ended December 31, 2018 consisted of an $11.0 million charge recorded for the potential settlement of a final judgment obtained against Progressive Waste Solutions of FL, Inc., now known as Waste Connections of Florida, Inc., $8.5 million of losses on trucks and equipment that were scrapped, disposed of through sales or disposed of as a result of being damaged in operations, $3.8 million of charges to write off the carrying cost of certain contracts that were not expected to be renewed prior to their original estimated termination date and $2.8 million of other net charges, partially offset by the reversal of $6.0 million of expenses recognized in prior periods to adjust the carrying cost of assets held for disposal to fair market value due to modifications to our divestiture plan and changes in the fair market value of the divested operations.

Operating Income. Operating income increased $5.6 million, or 0.7%, to $837.8 million for the year ended December 31, 2019, from $832.2 million for the year ended December 31, 2018. The increase was primarily attributable to operating income generated from acquisitions, price-led growth in our existing solid waste business and gross margins recognized on E&P volume growth, partially offset by an increase in impairments and other operating charges.

Operating income as a percentage of revenues decreased 1.4 percentage points to 15.5% for the year ended December 31, 2019, from 16.9% for the year ended December 31, 2018. The decrease as a percentage of revenues was comprised of a 1.2 percentage point increase in cost of operations, a 0.8 percentage point increase in impairments and other operating items and a 0.1 percentage point increase in amortization expense, partially offset by a 0.6 percentage point decrease in SG&A expense and a 0.1 percentage point decrease in depreciation expense.

Interest Expense. Interest expense increased $15.3 million, or 11.6%, to $147.4 million for the year ended December 31, 2019, from $132.1 million for the year ended December 31, 2018. The increase was primarily attributable to an increase of $18.6 million from the November 2018 issuance of our 2028 Senior Notes (as defined below), an increase of $12.4 million from the April 2019 issuance of our 2029 Senior Notes (as defined below) and an increase of $2.1 million due to higher interest rates on outstanding borrowings under our Credit Agreement (as defined below), partially offset by a decrease of $15.1 million due to a decrease in the average borrowings outstanding under our Credit Agreement, a decrease of $2.0 million from the repayment at maturity of our 2018 Senior Notes (as defined below) and 2019 Senior Notes (as defined below) using proceeds from our Credit Agreement and $0.7 million of other net decreases.

Interest Income. Interest income increased $2.6 million, to $9.8 million for the year ended December 31, 2019, from $7.2 million for the year ended December 31, 2018. The increase was primarily attributable to higher reinvestment rates in the current period and higher average cash balances.

Other Income (Expense), Net. Other income (expense), net increased $5.9 million, to an income total of $5.7 million for the year ended December 31, 2019, from an expense total of $0.2 million for the year ended December 31, 2018. The increase was due primarily to a $6.1 million increase in income earned on investments purchased to fund our employee deferred compensation obligations and a $2.8 million increase in foreign currency transaction gains, partially offset by a $2.8 million decrease in adjustments to accrued liabilities acquired in prior year acquisitions and a $0.2 million decrease in other net income sources.

Income Tax Provision. Income taxes decreased $20.8 million, or 13.0%, to $139.2 million for the year ended December 31, 2019, from $160.0 million for the year ended December 31, 2018. Our effective tax rate for the year ended December 31, 2019 was 19.7%. Our effective tax rate for the year ended December 31, 2018 was 22.6%.

The income tax provision for the year ended December 31, 2019 included a $3.8 million expense primarily associated with a reduction in deferred income tax assets related to compensation of executive officers no longer deemed deductible for tax purposes. Additionally, the income tax provision for the year ended December 31, 2019 included a benefit of $5.5 million from share-based payment awards being recognized in the income statement when settled.

The income tax provision for the year ended December 31, 2018 included a $6.4 million expense primarily associated with refinements to the estimates, as provided by Staff Accounting Bulletin No. 118, of the impact of a portion of the Company's U.S. earnings no longer permanently reinvested in conjunction with the Tax Act. Additionally, the income tax provision for the year ended December 31, 2018 included a $5.6 million expense associated with the restructuring of our internal refinancing in conjunction with the Tax Act, as well as a $3.1 million benefit related to a reduction in our deferred income tax liabilities resulting from state legislation enacted in the current year and changes in our geographical apportionment due to acquisition activity. Additionally, the income tax provision for the year ended December 31, 2018 included a benefit of $5.0 million from share-based payment awards being recognized in the income statement when settled.

Our effective tax rate is dependent upon the proportion of pre-tax income among the jurisdictions where we do business. As such, our effective tax rate will be subject to some variability depending upon the proportional contribution of pre-tax income across jurisdictions in any period.

Segment Reporting

Our Chief Operating Decision Maker evaluates operating segment profitability and determines resource allocations based on several factors, of which the primary financial measure is segment EBITDA. We define segment EBITDA as earnings before interest, taxes, depreciation, amortization, impairments and other operating items and other income (expense). Segment EBITDA is not a measure of operating income, operating performance or liquidity under GAAP and may not be comparable to similarly titled measures reported by other companies. Our management uses segment EBITDA in the evaluation of segment operating performance as it is a profit measure that is generally within the control of the operating segments.

We manage our operations through five geographic solid waste operating segments and our E&P segment, which includes the majority of our E&P waste treatment and disposal operations. Our five geographic solid waste operating segments and our E&P segment comprise our reportable segments. Each operating segment is responsible for managing several vertically integrated operations, which are comprised of districts. In the third quarter of 2017, we moved a district from our Eastern segment to our Canada segment as a significant amount of its revenues are received from Canadian-based customers. In the first quarter of 2019, we moved two districts from our Eastern segment to our Central segment because their location was closer in proximity to operations in our Central segment. The segment information presented herein reflects the realignment of these districts.

At December 31, 2019, under the current orientation, our Eastern segment services customers located in northern Illinois, Kentucky, Maryland, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, eastern Tennessee, Vermont, Virginia and Wisconsin; our Southern segment services customers located in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, southern Oklahoma, western Tennessee and Texas; our Western segment services customers located in Alaska, California, Idaho, Montana, Nevada, Oregon, Washington and western Wyoming; our Central segment services customers located in Arizona, Colorado, southern Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, western Texas, Utah and eastern Wyoming; and our Canada segment services customers located in the state of Michigan and in the provinces of Alberta, British Columbia, Manitoba, Ontario, Québec and Saskatchewan. The E&P segment services E&P customers located in Louisiana, New Mexico, North Dakota, Oklahoma, Texas, Wyoming and along the Gulf of Mexico.

Revenues, net of intercompany eliminations, for our reportable segments are shown in the following table in thousands of U.S. dollars and as a percentage of total revenues for the periods indicated:

	Years Ended December 31,			
	2019	% of Revenues	2018	% of Revenues
Eastern	$ 1,268,964	23.5 %	$ 1,071,990	21.8 %
Southern	1,192,922	22.1	1,122,548	22.8
Western	1,098,849	20.4	1,043,928	21.2
Central	838,584	15.6	711,554	14.4
Canada	733,282	13.6	727,213	14.8
E&P	256,078	4.8	245,708	5.0
	$ 5,388,679	100.0 %	$ 4,922,941	100.0 %

Segment EBITDA for our reportable segments is shown in the following table in thousands of U.S. dollars and as a percentage of segment revenues for the periods indicated:

	Years Ended December 31,			
	2019	% of Revenues	2018	% of Revenues
Western	$ 338,563	30.8 %	$ 318,401	30.5 %
Eastern	330,578	26.1 %	295,016	27.5 %
Southern	305,999	25.7 %	276,791	24.7 %
Central	292,111	34.8 %	259,794	36.5 %
Canada	256,405	35.0 %	261,233	35.9 %
E&P	135,426	52.9 %	129,825	52.8 %
Corporate[(a)]	(15,438)	—	(8,211)	—
	$ 1,643,644	30.5 %	$ 1,532,849	31.1 %

(a) Corporate functions include accounting, legal, tax, treasury, information technology, risk management, human resources, training, direct acquisition expenses, other administrative functions and share-based compensation expenses associated with Progressive Waste share-based grants existing at June 1, 2016. Amounts reflected are net of allocations to the six operating segments. For the years ended December 31, 2018 and 2017, amounts also include Progressive Waste integration-related expenses.

A reconciliation of segment EBITDA to Income before income tax provision is included in Note 16 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10-K.

Significant changes in revenue and segment EBITDA for our reportable segments for the year ended December 31, 2019, compared to the year ended December 31, 2018, are discussed below.

Segment Revenue

Revenue in our Eastern segment increased $197.0 million, or 18.4%, to $1.269 billion for the year ended December 31, 2019, from $1.072 billion for the year ended December 31, 2018. The components of the increase consisted of net revenue growth from acquisitions closed during, or subsequent to, the year ended December 31, 2018, of $158.7 million and net price increases of $59.4 million, partially offset by decreased recyclable commodity sales of $11.8 million resulting from the impact of declines in prices for old corrugated cardboard and other fiber products, solid waste volume decreases of $8.8 million primarily due to declines in residential collection in our Albany, NY market and declines in transfer station volumes in our New York City market exceeding higher landfill special waste volumes and other revenue decreases of $0.5 million.

Revenue in our Southern segment increased $70.4 million, or 6.3%, to $1.193 billion for the year ended December 31, 2019, from $1.123 billion for the year ended December 31, 2018. The components of the increase consisted of net price increases of $57.9 million and net revenue growth from acquisitions closed during, or subsequent to, the year ended December 31, 2018, of $57.2 million, partially offset by net revenue reductions from divestitures closed subsequent to December 31, 2018 of $20.7 million, solid waste volume decreases of $19.7 million primarily associated with losses in residential revenue resulting from the non-renewal of certain contracts acquired in the Progressive Waste acquisition, decreases in commercial volumes in certain markets and reductions in landfill municipal solid waste volumes, decreased recyclable commodity sales of $4.2 million resulting from the impact of declines in prices for old corrugated cardboard and other fiber products and other revenue decreases of $0.1 million.

Revenue in our Western segment increased $54.9 million, or 5.3%, to $1.099 billion for the year ended December 31, 2019, from $1.044 billion for the year ended December 31, 2018. The components of the increase consisted of net price increases of $35.3 million, solid waste volume increases of $27.0 million due to the net impact of increases associated with landfill municipal solid waste, landfill special waste, residential collection and commercial collection and net revenue growth from acquisitions closed during, or subsequent to, the year ended December 31, 2018, of $1.9 million, partially offset by decreased recyclable commodity sales of $5.6 million resulting from the impact of declines in prices for old corrugated cardboard and other fiber products, decreased intermodal revenue of $3.5 million resulting from customer losses causing a reduction in cargo volume and other revenue decreases of $0.2 million.

Revenue in our Central segment increased $127.0 million, or 17.9%, to $838.6 million for the year ended December 31, 2019, from $711.6 million for the year ended December 31, 2018. The components of the increase consisted of revenue growth from acquisitions closed during, or subsequent to, the year ended December 31, 2018, of $90.2 million, net price increases of $41.0 million and other revenue increases of $1.3 million, partially offset by decreased recyclable commodity sales of $3.1 million resulting from the impact of declines in prices for old corrugated cardboard and solid waste volume decreases of $2.4 million due primarily to declines in landfill special waste volumes.

Revenue in our Canada segment increased $6.1 million, or 0.8%, to $733.3 million for the year ended December 31, 2019, from $727.2 million for the year ended December 31, 2018. The components of the increase consisted of net price increases of $43.3 million, revenue growth from acquisitions closed during, or subsequent to, the year ended December 31, 2018, of $4.7 million and $0.7 million of other revenue increases, partially offset by a decrease of $16.6 million resulting from a lower average foreign currency exchange rate in effect during the comparable reporting periods, a decrease of $13.4 million resulting from reduced demand causing a reduction in the prices for renewal energy credits associated with the generation of landfill gas, decreased recyclable commodity sales of $7.2 million resulting from the impact of declines in prices for old corrugated cardboard and other fiber products and solid waste volume decreases of $5.4 million primarily associated with losses in residential revenue resulting from the non-renewal of certain contracts acquired in the Progressive Waste acquisition.

Revenue in our E&P segment increased $10.4 million, or 4.2%, to $256.1 million for the year ended December 31, 2019, from $245.7 million for the year ended December 31, 2018. The increase was due to increased drilling activity and E&P disposal volumes primarily in our Louisiana Gulf of Mexico and Permian Basins.

Segment EBITDA

Segment EBITDA in our Western segment increased $20.2 million, or 6.3%, to $338.6 million for the year ended December 31, 2019, from $318.4 million for the year ended December 31, 2018. The increase was due primarily to an increase in revenues of $54.9 million, a decrease in intermodal expenses of $4.6 million resulting from a decrease in intermodal cargo volume due to customer losses, a decrease in corporate overhead expense allocations of $4.2 million due to a reduction in expenses qualifying for allocation resulting in a decrease in the overhead allocation rate, a decrease in professional fees expense of $1.4 million resulting primarily from reduced legal expenses resulting from the settlement of certain legal matters subsequent to December 31, 2018, a decrease in compressed natural gas expense of $1.1 million due primarily to the recognition in 2019 of two years of tax credits associated with the purchase of compressed natural gas fuel and a decrease in uncollectible accounts receivable of $1.1 million resulting primarily from improved collection results and the recovery of certain accounts reserved against in the prior period, partially offset by an increase in direct and administrative labor expenses of $11.5 million due primarily to employee pay rate increases, an increase in taxes on revenues of $7.2 million due primarily to higher landfill and collection revenues, an increase in disposal expenses of $4.7 million due primarily to higher residential and commercial collection volumes disposed at third party facilities, an increase of $4.7 million resulting from higher costs per ton charged by third party processors of recyclable commodities, an increase in expenses for auto and workers' compensation claims of $3.6 million due primarily to higher adjustments recorded in the prior year period to decrease projected losses on outstanding claims and an increase in the deductible on our auto claims resulting in a higher portion of costs being paid by us, an increase in truck, container, equipment and facility maintenance and repair expenses of $3.3 million due to parts and service rate increases and variability impacting the timing of major repairs, an increase in third-party trucking and transportation expenses of $3.2 million due primarily to increased rates charged by third parties to provide trucking and transportation services, an increase in 401(k) matching expenses of $2.2 million due to our increasing the maximum matching contribution rate to our employees, an increase in property tax expenses of $0.9 million due to the reassessment of a landfill site following the receipt of an airspace expansion permit, an increase in landfill monitoring, environmental compliance and daily cover expenses of $0.9 million due to increased compliance requirements under our landfill operating permits, an increase in leachate disposal expenses of $0.8 million due to higher costs per gallon for leachate transportation and treatment, an increase in insurance premiums for our auto and workers' compensation policies of $0.8 million due primarily to insurance cost increases and $3.3 million of other net expense increases.

Segment EBITDA in our Eastern segment increased $35.6 million, or 12.1%, to $330.6 million for the year ended December 31, 2019, from $295.0 million for the year ended December 31, 2018. The increase was due primarily to an increase in revenues of $197.0 million, a decrease in disposal expenses of $4.4 million due to improved internalization of collected volumes into our disposal locations, a decrease in employee benefits expenses of $2.2 million due primarily to a reduction in the employer-paid portion of medical claims resulting from a change in medical plan providers and a decrease in compressed natural gas expense of $0.9 million due primarily to the recognition in 2019 of two years of tax credits associated with the purchase of compressed natural gas fuel, partially offset by a net $124.8 million increase in cost of operations and SG&A expenses attributable to acquired operations, an increase in direct and administrative labor expenses of $7.6 million due primarily to employee pay rate increases, an increase in truck, container, equipment and facility maintenance and repair expenses of $7.2 million due to parts and service rate increases and variability impacting the timing of major repairs, an increase of $6.3 million resulting from higher costs per ton charged by third party processors of recyclable commodities, an increase in third-party trucking and transportation expenses of $5.0 million due primarily to increased rates charged by third parties to provide trucking and transportation services, an increase in expenses for auto and workers' compensation claims of $4.7 million due primarily to higher adjustments recorded in the prior year period to reduce projected losses on outstanding claims, an increase in leachate disposal expenses of $3.8 million due to increased precipitation generating higher leachate volumes as well as higher costs per gallon for leachate treatment, an increase in 401(k) matching expenses of $2.1 million due to our increasing the maximum matching contribution rate to our employees, an increase in diesel fuel expense of $1.6 million due primarily to the prior year period benefiting from a favorable diesel fuel hedge agreement that expired in December 2018, an increase in subcontracted operating expenses of $0.9 million due primarily to utilizing third party haulers to assist in the performance of certain collection contracts, an increase in professional fees expenses of $0.9 million due primarily to increased costs associated with converting newly acquired sites to our third party billing statement solutions processor, an increase in insurance premiums for our auto and workers' compensation policies of $0.6 million due primarily to insurance cost increases and growth from acquisitions, an increase in corporate overhead expense allocations of $0.6 million due to higher revenues for which overhead allocations are based and $2.8 million of other net expense increases.

Segment EBITDA in our Southern segment increased $29.2 million, or 10.6%, to $306.0 million for the year ended December 31, 2019, from $276.8 million for the year ended December 31, 2018. The increase was due to an increase in revenues of $91.1 million from organic growth and acquisitions, a decrease in third party disposal expenses of $5.4 million due to improved internalization of waste collected at certain operating locations in Florida and Louisiana, a decrease in corporate overhead expense allocations of $4.0 million due to a reduction in expenses qualifying for allocation resulting in a decrease in the overhead allocation rate, a decrease in compressed natural gas expense of $2.1 million due primarily to the recognition in 2019 of two years of tax credits associated with the purchase of compressed natural gas fuel, a decrease in employee benefits expenses of $1.6 million due primarily to a reduction in the employer-paid portion of medical claims resulting from a change in medical plan providers, and a decrease in auto and workers' compensation claims of $1.3 million due primarily to decreased claim severity in the current year period, partially offset by a net $32.0 million increase in cost of operations and SG&A expenses attributable to acquired operations, an increase in direct and administrative labor expenses of $12.6 million due primarily to employee pay rate increases, an increase in truck, container, equipment and facility maintenance and repair expenses of $10.7 million due to parts and service rate increases and variability impacting the timing of major repairs, an increase in third-party trucking and transportation expenses of $4.9 million due primarily to increased rates charged by third parties to provide trucking and transportation services, an increase in 401(k) matching expenses of $3.4 million due to our increasing the maximum matching contribution rate to our employees, an increase in diesel fuel expense of $2.7 million due primarily to the prior year period benefiting from purchasing a portion of our diesel fuel needs under a favorable fuel hedge agreement that expired in December 2018, an increase in leachate disposal expenses of $2.2 million due to increased precipitation generating higher leachate volumes as well as higher costs per gallon for leachate treatment, a decrease to EBITDA of $1.7 million from the impact of operations disposed of during, or subsequent to, the year ended December 31, 2018, an increase in equipment and facility rental expenses of $1.4 million due primarily to increased truck rental expenses and the adoption on January 1, 2019 of new accounting standards associated with leases, an increase of $1.4 million resulting from higher costs per ton charged by third party processors of recyclable commodities, an increase in professional fees expenses of $1.1 million due primarily to increased costs associated with converting newly acquired sites to our third party billing statement solutions processor, an increase in insurance premiums for our auto and workers' compensation policies of $0.7 million due primarily to insurance cost increases and growth from acquisitions and other expense increases of $1.5 million.

Segment EBITDA in our Central segment increased $32.3 million, or 12.4%, to $292.1 million for the year ended December 31, 2019, from $259.8 million for the year ended December 31, 2018. The increase was due primarily to an increase in revenues of $127.0 million and a decrease in employee benefits expenses of $2.6 million due primarily to a reduction in the employer-paid portion of medical claims resulting from a change in medical plan providers, partially offset by a net $74.5 million increase in cost of operations and SG&A expenses attributable to acquired operations, an increase in direct and administrative labor expenses of $8.5 million due primarily to employee pay rate increases, an increase in third-party trucking and transportation expenses of $6.7 million due primarily to outsourcing transportation services to third party operators at certain locations, transportation associated with increased landfill special waste volumes and increased rates charged by third parties to provide trucking and transportation services, an increase in disposal expenses of $1.8 million due to increased disposal rates and strategic adjustments to redirect certain collected waste to third party disposal facilities, an increase in 401(k) matching expenses of $1.8 million due to our increasing the maximum matching contribution rate to our employees, an increase in diesel fuel expense of $1.3 million due primarily to the prior year period benefiting from purchasing a portion of our diesel fuel needs under a favorable fuel hedge agreement that expired in December 2018, an increase of $1.2 million resulting from higher costs per ton charged by third party processors of recyclable commodities, an increase in truck, container, equipment and facility maintenance and repair expenses of $1.2 million due to the variability and timing of major repairs and an increase in corporate overhead expense allocations of $0.3 million due to higher revenues for which overhead allocations are based.

Segment EBITDA in our Canada segment decreased $4.8 million, or 1.8%, to $256.4 million for the year ended December 31, 2019, from $261.2 million for the year ended December 31, 2018. The decrease was comprised of $5.8 million from a reduction in the average foreign currency exchange rate in effect during the comparable reporting periods, partially offset by an increase of $1.0 million assuming foreign currency parity during the comparable reporting periods. The $1.0 million increase, which assumes foreign currency parity, was due primarily to an increase in revenues of $22.7 million, partially offset by an increase in direct labor expenses of $8.4 million due primarily to a reduction in open employment positions and employee pay rate increases, an increase in third-party disposal expenses of $5.9 million due to higher disposal rates charged by operators, an increase in truck, container, equipment and facility maintenance and repair expenses of $5.2 million due to the variability and timing of major repairs and an increase in subcontracted operating expenses of $2.2 million due primarily to subcontracting the performance of a collection contract.

Segment EBITDA in our E&P segment increased $5.6 million, or 4.3%, to $135.4 million for the year ended December 31, 2019, from $129.8 million for the year ended December 31, 2018. The increase was due primarily to an increase in revenues of $10.4 million, a decrease in third-party trucking and transportation expenses of $1.9 million due primarily to changes in customer mix in the Williston Basin reducing the requirement to provide trucking and transportation services and a decrease in expenses for uncollectible accounts receivable of $1.7 million due to adjustments to prior period reserve estimates, partially offset by an increase in subcontracted operating expenses of $3.8 million due primarily to subcontracting certain operating activities to third parties, an increase in direct labor expenses of $2.1 million due to employee pay rate increases and increased headcount to support higher disposal volumes, an increase in corporate overhead expense allocations of $1.5 million due primarily to higher revenues for which overhead allocations are based and other expense increases of $1.0 million.

Segment EBITDA at Corporate decreased $7.2 million, to a loss of $15.4 million for the year ended December 31, 2019, from a loss of $8.2 million for the year ended December 31, 2018. The decrease was due to a reduction in corporate overhead allocated to our segments of $6.3 million due to a reduction in expenses qualifying for allocation resulting in a decrease in the overhead allocation rate, an increase in deferred compensation expenses of $5.9 million as a result of increases in the market value of investments to which employee deferred compensation liability balances are tracked, an increase in equity-based compensation expenses of $5.6 million associated with our annual recurring grant of restricted share units to our personnel, an increase in direct acquisition expenses of $3.7 million due to higher acquisition activity, an increase in 401(k) matching expenses of $3.1 million due to our increasing the maximum matching contribution rate to our employees and credits recorded in the prior year period from employee forfeitures, an increase in payroll and payroll-related expenses of $2.1 million due primarily to annual compensation increases, an increase in software licenses and subscriptions expenses of $1.5 million due primarily to the addition of new human resources and data security applications, an increase in management training expenses of $1.2 million due to an expansion of our management training curriculum and $1.1 million of other net expense increases, partially offset by a decrease of $13.4 million in professional fees expense resulting primarily from reduced legal expenses resulting from the settlement of certain legal matters subsequent to December 31, 2018, a decrease of $5.0 million in equity-based compensation expenses associated with adjusting common shares of Waste Connections, Inc. held in our deferred compensation plan by certain key executives to fair value as a result of the shares being exchanged for other investment options, a further decrease in equity-based compensation expenses of $1.1 million for equity awards accounted for as liabilities that were granted to employees of Progressive Waste prior to June 1, 2016 which are subject to valuation adjustments each period based on changes in fair value, a decrease in integration-related expenses of $2.8 million incurred in the prior year period resulting from the acquisition of Progressive Waste and a decrease in accrued recurring cash incentive compensation expense to our management of $1.0 million.

Liquidity and Capital Resources

The following table sets forth certain cash flow information for the years ended December 31, 2019 and 2018 (in thousands of U.S. dollars):

	2019	2018
Net cash provided by operating activities	$ 1,540,547	$ 1,411,235
Net cash used in investing activities	(1,426,006)	(1,371,820)
Net cash used in financing activities	(95,894)	(187,578)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	608	(1,290)
Net increase (decrease) in cash, cash equivalents and restricted cash	19,255	(149,453)
Cash, cash equivalents and restricted cash at beginning of period	403,966	553,227
Plus: change in cash held for sale	—	192
Cash, cash equivalents and restricted cash at end of period	$ 423,221	$ 403,966

Operating Activities Cash Flows

For the year ended December 31, 2019, net cash provided by operating activities was $1.541 billion. For the year ended December 31, 2018, net cash provided by operating activities was $1.411 billion. The $129.3 million increase was due primarily to the following:

1) *Increase in earnings* — Our increase in net cash provided by operating activities was favorably impacted by $134.3 million from an increase in net income, excluding depreciation, intangible amortization, lease amortization, deferred taxes, equity based compensation, adjustments to and payments of contingent consideration recorded in earnings and impairments and other operating items, due primarily to the impact of acquisitions closed subsequent to December 31, 2018, price-led earnings growth at certain solid waste segments and gross margins recognized on E&P volume growth.
2) *Accounts payable and accrued liabilities* — Our increase in net cash provided by operating activities was favorably impacted by $29.7 million from accounts payable and accrued liabilities due primarily to period end timing of payments to vendors for goods and services.
3) *Accounts receivable* — Our increase in net cash provided by operating activities was favorably impacted by $14.8 million from accounts receivable due to improved collection results.
4) *Prepaid expenses* – Our increase in net cash provided by operating activities was unfavorably impacted by $30.6 million from prepaid expenses due primarily to a higher utilization of prepaid income taxes during the prior year period.
5) *Other long-term liabilities* – Our increase in net cash provided by operating activities was unfavorably impacted by $16.9 million from other long-term liabilities due primarily to lease payments, partially offset by increased liabilities associated with new or renewed leases and an increase in employee contributions and earnings under our deferred compensation plan.

As of December 31, 2019, we had a working capital surplus of $123.4 million, including cash and equivalents of $326.7 million. Our working capital surplus decreased $82.7 million from a working capital surplus of $206.1 million at December 31, 2018, including cash and equivalents of $319.3 million, due primarily to decreased cash balances and the adoption of new accounting standards associated with leases requiring a current liability to be recorded for the portion of lease payments payable with the next twelve months. To date, we have experienced no loss or lack of access to our cash and equivalents; however, we can provide no assurances that access to our cash and equivalents will not be impacted by adverse conditions in the financial markets. Our strategy in managing our working capital is generally to apply the cash generated from our operations that remains after satisfying our working capital and capital expenditure requirements, along with share repurchase and dividend programs, to reduce the unhedged portion of our indebtedness under our Credit Agreement and to minimize our cash balances.

Investing Activities Cash Flows

Net cash used in investing activities increased $54.2 million to $1.426 billion for the year ended December 31, 2019, from $1.372 billion for the year ended December 31, 2018. The significant components of the increase included the following:

1) An increase in capital expenditures of $46.9 million due to an increase in landfill site costs, facilities and heavy equipment for operations owned in the comparable periods;
2) An increase in capital expenditures of $41.4 million due to additional trucks, containers, heavy equipment and landfill site costs for operations acquired subsequent to December 31, 2017;
3) An increase in capital expenditures of $31.7 million due to the purchase of a greenfield landfill site in our Southern segment that will be developed into an operating location in the future; less
4) A decrease in cash paid for acquisitions of $93.5 million due primarily to a decrease in the overall size of acquisitions closed during the year ended December 31, 2019.

Financing Activities Cash Flows

Net cash used in financing activities decreased $91.7 million to $95.9 million for the year ended December 31, 2019, from $187.6 million for the year ended December 31, 2018. The significant components of the decrease included the following:

1) A decrease from the net change in long-term borrowings of $53.2 million (long-term borrowings increased $105.1 million during the year ended December 31, 2019 and increased $51.9 million during the year ended December 31, 2018) due primarily to the net of higher repayments in the prior year of long term debt assumed and paid in full from acquisitions being partially offset by prior year borrowings to fund acquisitions; and
2) A decrease in payments to repurchase our common shares of $58.9 million due to no shares being repurchased during the year ended December 31, 2019; less
3) An increase in cash dividends paid of $22.5 million due primarily to an increase in our average quarterly dividend rate for the year ended December 31, 2019 to $0.166 per share, from $0.145 per share for the year ended December 31, 2018.

Our business is capital intensive. Our capital requirements include acquisitions and capital expenditures for landfill cell construction, landfill development, landfill closure activities and intermodal facility construction in the future.

On July 25, 2019, our Board of Directors approved, subject to receipt of regulatory approvals, the annual renewal of our normal course issuer bid, or the NCIB, to purchase up to 13,184,474 of our common shares during the period of August 8, 2019 to August 7, 2020 or until such earlier time as the NCIB is completed or terminated at our option. Shareholders may obtain a copy of our TSX Form 12 – Notice of Intention to Make a Normal Course Issuer Bid, without charge, by request directed to our Senior Vice President and Chief Financial Officer at (832) 442-2200. The timing and amounts of any repurchases pursuant to the NCIB will depend on many factors, including our capital structure, the market price of our common shares and overall market conditions. All common shares purchased under the NCIB will be immediately cancelled following their repurchase. Information regarding our NCIB plan can be found under the “Shareholders’ Equity” section in Note 13 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10K and is incorporated herein by reference.

The Board of Directors authorized the initiation of a quarterly cash dividend in October 2010 and has increased it on an annual basis. In October 2019, our Board of Directors authorized an increase to our regular quarterly cash dividend of

$0.025, from $0.16 to $0.185 per share. Cash dividends of $175.1 million and $152.6 million were paid during the years ended December 31, 2019 and 2018, respectively. We cannot assure you as to the amounts or timing of future dividends.

We made $634.4 million in capital expenditures for property and equipment and $31.7 million for the purchase of a greenfield landfill site during the year ended December 31, 2019, and we expect to make total capital expenditures for property and equipment of between $600 million and $625 million in 2020. We intend to fund our planned 2020 capital expenditures principally through cash on hand, internally generated funds and borrowings under our Credit Agreement. In addition, we may make substantial additional capital expenditures in acquiring MSW and E&P waste businesses. If we acquire additional landfill disposal facilities, we may also have to make significant expenditures to bring them into compliance with applicable regulatory requirements, obtain permits or expand our available disposal capacity. We cannot currently determine the amount of these expenditures because they will depend on the number, nature, condition and permitted status of any acquired landfill disposal facilities. We believe that our cash and equivalents, Credit Agreement and the funds we expect to generate from operations will provide adequate cash to fund our working capital and other cash needs for the foreseeable future. However, disruptions in the capital and credit markets could adversely affect our ability to draw on our Credit Agreement or raise other capital. Our access to funds under the Credit Agreement is dependent on the ability of the banks that are parties to the agreement to meet their funding commitments. Those banks may not be able to meet their funding commitments if they experience shortages of capital and liquidity or if they experience excessive volumes of borrowing requests within a short period of time.

We have a revolving credit and term loan agreement (the “Credit Agreement”) with Bank of America, N.A., acting through its Canada Branch, as global agent, the swing line lender and letter of credit issuer, Bank of America, N.A., as the U.S. Agent and a letter of credit issuer, the lenders (the “Lenders”) and any other financial institutions from time to time party thereto. There are no subsidiary guarantors under the Credit Agreement. The Credit Agreement has a scheduled maturity date of March 21, 2023.

As of December 31, 2019, $700.0 million under the term loan and $916.2 million under the revolving credit facility were outstanding under our Credit Agreement, exclusive of outstanding standby letters of credit of $107.6 million.

On June 1, 2016, we entered into a Master Note Purchase Agreement (as supplemented by the First Supplement dated as of February 13, 2017 (the “2016 First Supplement”) and as amended, restated, amended and restated, assumed, supplemented or modified from time to time, the “2016 NPA”) with certain accredited institutional investors. On April 20, 2017, pursuant to the 2016 NPA, and the 2016 First Supplement, we issued and sold to certain accredited institutional investors $400.0 million aggregate principal amount of senior unsecured notes consisting of $150.0 million aggregate principal amount, which will mature on April 20, 2024, with an annual interest rate of 3.24% (the “2024 Senior Notes”) and $250.0 million aggregate principal amount, which will mature on April 20, 2027, with an annual interest rate of 3.49% (the “2027 Senior Notes” and collectively with the 2024 Senior Notes, the “2017A Senior Notes”) in a private placement.

On March 21, 2018, we entered into that certain Amendment No. 1 to Master Note Purchase Agreement (the “2016 NPA First Amendment”), with each of the holders party thereto, which amended the 2016 NPA.

The 2016 NPA First Amendment, among other things, provided for certain amendments to the 2016 NPA to facilitate (i) certain conforming changes to align certain provisions of the 2016 NPA, the 2008 NPA (as defined below) and the Credit Agreement and (ii) the release of all subsidiary guarantors in relation to obligations under the 2016 NPA and the 2016 NPA Notes (as defined below) (the “2016 Release”).

Pursuant to the terms and conditions of the 2016 NPA, we have outstanding senior unsecured notes (the “2016 NPA Notes”) at December 31, 2019 consisting of (i) $150.0 million of 2.39% senior notes due June 1, 2021 (the “New 2021 Senior Notes”), (ii) $200.0 million of 2.75% senior notes due June 1, 2023 (the “2023 Senior Notes”), (iii) $400.0 million of 3.03% senior notes due June 1, 2026 (the “2026 Senior Notes”) and (iv) $400.0 million of the 2017A Senior Notes.

The New 2021 Senior Notes, the 2023 Senior Notes, the 2026 Senior Notes and the 2017A Senior Notes bear interest at fixed rates with interest payable in arrears semi-annually, and on the respective maturity dates, until the principal thereunder becomes due and payable.

In July 2008, the Company, certain subsidiaries of the Company (together with the Company, the “Obligors”) and certain accredited institutional investors entered into that certain Master Note Purchase Agreement, dated July 15, 2008 (as amended, restated, assumed, supplemented or otherwise modified from time to time, the “2008 NPA”).

On March 21, 2018, we entered into that certain Amendment No. 7 to the 2008 NPA (the “2008 NPA Seventh Amendment”), with each of the holders party thereto, which amended the 2008 NPA. The 2008 NPA Seventh Amendment, among other things, provides certain amendments to the 2008 NPA to facilitate (i) certain conforming changes to align the provisions of the 2008 NPA, the 2016 NPA and the Credit Agreement and (ii) the release of all subsidiary guarantors in relation to obligations under the 2008 NPA and the 2008 NPA Notes (the “2008 Release”).

Pursuant to the terms and conditions of the 2008 NPA, we have outstanding senior unsecured notes (the “2008 NPA Notes”) at December 31, 2019 consisting of (i) $100.0 million of 4.64% senior notes due 2021 (the “2021 Senior Notes”), (ii) $125.0 million of 3.09% senior notes due 2022 (the “2022 Senior Notes”) and (iii) $375.0 million of 3.41% senior notes due 2025 (the “2025 Senior Notes”). We repaid at maturity our $50.0 million of 4.00% senior notes due April 2018 (the “2018 Senior Notes”) in April 2018. We also repaid at maturity our $175.0 million of 5.25% senior notes due 2019 (the “2019 Senior Notes”) in November 2019.

The 2021 Senior Notes, the 2022 Senior Notes and the 2025 Senior Notes bear interest at fixed rates with interest payable in arrears semi-annually, and on the respective maturity dates, until the principal thereunder becomes due and payable.

On November 16, 2018, we completed an underwritten public offering of $500.0 million aggregate principal amount of our 4.25% Senior Notes due 2028 (the “2028 Senior Notes”). The 2028 Senior Notes were issued under the Indenture, dated as of November 16, 2018 (the “Base Indenture”), by and between the Company and U.S. Bank National Association, as trustee (the “Trustee”), as supplemented by the First Supplemental Indenture, dated as of November 16, 2018 (the Base Indenture as so supplemented, the “Indenture”).

We will pay interest on the 2028 Senior Notes semi-annually, commencing on June 1, 2019, and the 2028 Senior Notes will mature on December 1, 2028. The 2028 Senior Notes are our senior unsecured obligations, ranking equally in right of payment with our other existing and future unsubordinated debt and senior to any of our future subordinated debt. The 2028 Senior Notes are not guaranteed by any of our subsidiaries.

On April 16, 2019, we completed an underwritten public offering of $500.0 million aggregate principal amount of our 3.50% Senior Notes due 2029 (the “2029 Senior Notes”). The 2029 Senior Notes were issued under the Indenture, dated as of November 16, 2018, by and between the Company and U.S. Bank National Association, as trustee, as supplemented by the Second Supplemental Indenture, dated as of April 16, 2019.

We will pay interest on the 2029 Senior Notes semi-annually, commencing on November 1, 2019, and the 2029 Senior Notes will mature on May 1, 2029. The 2029 Senior Notes are our senior unsecured obligations, ranking equally in right of payment with our other existing and future unsubordinated debt and senior to any of our future subordinated debt. The 2029 Senior Notes are not guaranteed by any of our subsidiaries.

See Note 10 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10-K for further details on the debt agreements.

Contractual Obligations

As of December 31, 2019, we had the following contractual obligations:

	Payments Due by Period (amounts in thousands of U.S. dollars)				
Recorded Obligations	Total	Less Than 1 Year	1 to 3 Years	3 to 5 Years	Over 5 Years
Long-term debt	$ 4,375,885	$ 465	$ 379,728	$ 1,967,186	$ 2,028,506
Cash interest payments	$ 748,412	$ 132,213	$ 267,351	$ 147,388	$ 201,460
Contingent consideration	$ 90,452	$ 26,159	$ 23,992	$ 3,224	$ 37,077
Operating leases	$ 227,085	$ 36,718	$ 65,519	$ 49,132	$ 75,716
Final capping, closure and post-closure	$ 1,506,491	$ 7,707	$ 45,356	$ 14,541	$ 1,438,887

Long-term debt payments include:

1) $916.2 million in principal payments due March 2023 related to our revolving credit facility under our Credit Agreement. Advances are available under the Credit Agreement in U.S. dollars and Canadian dollars and bear interest at fluctuating rates (See Note 10). At December 31, 2019, $897.0 million of the outstanding borrowings drawn under the revolving credit facility were in U.S. LIBOR rate loans, bearing interest at a total rate of 2.90% on such date. At December 31, 2019, $19.2 million of the outstanding borrowings drawn under the revolving credit facility were in Canadian-based bankers' acceptances, bearing interest at a total rate of 3.18% on such date.

2) $700.0 million in principal payments due March 2023 related to our term loan under our Credit Agreement. Outstanding amounts on the term loan can be either base rate loans or LIBOR loans. At December 31, 2019, all amounts outstanding under the term loan were in LIBOR loans which bear interest at the LIBOR rate plus the applicable margin (for a total rate of 2.90% on such date).

3) $100.0 million in principal payments due 2021 related to our 2021 Senior Notes. The 2021 Senior Notes bear interest at a rate of 4.64%.

4) $150.0 million in principal payments due 2021 related to our New 2021 Senior Notes. The New 2021 Senior Notes bear interest at a rate of 2.39%.

5) $125.0 million in principal payments due 2022 related to our 2022 Senior Notes. The 2022 Senior Notes bear interest at a rate of 3.09%.

6) $200.0 million in principal payments due 2023 related to our 2023 Senior Notes. The 2023 Senior Notes bear interest at a rate of 2.75%.

7) $150.0 million in principal payments due 2024 related to our 2024 Senior Notes. The 2024 Senior Notes bear interest at a rate of 3.24%.

8) $375.0 million in principal payments due 2025 related to our 2025 Senior Notes. The 2025 Senior Notes bear interest at a rate of 3.41%.

9) $400.0 million in principal payments due 2026 related to our 2026 Senior Notes. The 2026 Senior Notes bear interest at a rate of 3.03%.

10) $250.0 million in principal payments due 2027 related to our 2027 Senior Notes. The 2027 Senior Notes bear interest at a rate of 3.49%.

11) $500.0 million in principal payments due 2028 related to our 2028 Senior Notes. The 2028 Senior Notes bear interest at a rate of 4.25%.

12) $500.0 million in principal payments due 2029 related to our 2029 Senior Notes. The 2029 Senior Notes bear interest at a rate of 3.50%.

13) $9.6 million in principal payments related to our notes payable to sellers and other third parties. Our notes payable to sellers and other third parties bear interest at rates between 2.75% and 10.90% at December 31, 2019, and have maturity dates ranging from 2020 to 2036.

The following assumptions were made in calculating cash interest payments:

1) We calculated cash interest payments on the Credit Agreement using the LIBOR rate plus the applicable LIBOR margin and the Canadian Dollar Offered Rate plus the applicable acceptance fee at December 31, 2019. We assumed the Credit Agreement is paid off when it matures in March 2023.

2) We calculated cash interest payments on our interest rate swaps using the stated interest rate in the swap agreement less the LIBOR rate through the earlier expiration of the term of the swaps or the term of the credit facility.

Contingent consideration payments include $69.0 million recorded as liabilities in our consolidated financial statements at December 31, 2019, and $21.5 million of future interest accretion on the recorded obligations.

We are party to operating lease agreements as discussed in Note 8 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10 K. These lease agreements are established in the ordinary course of our business and are designed to provide us with access to facilities at competitive, market-driven prices.

The estimated final capping, closure and post-closure expenditures presented above are in current dollars.

	Amount of Commitment Expiration Per Period (amounts in thousands of U.S. dollars)				
Unrecorded Obligations[(1)]	**Total**	**Less Than 1 Year**	**1 to 3 Years**	**3 to 5 Years**	**Over 5 Years**
Unconditional purchase obligations	$ 129,373	$ 76,799	$ 52,574	$ —	$ —

(1) We are party to unconditional purchase obligations as discussed in Note 12 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10 K. These purchase obligations are established in the ordinary course of our business and are designed to provide us with access to products at competitive, market-driven prices. At December 31, 2019, our unconditional purchase obligations consisted of multiple fixed-price fuel purchase contracts under which we have 49.0 million gallons remaining to be purchased for a total of $129.4 million. The current fuel purchase contracts expire on or before December 31, 2021. These arrangements have not materially affected our financial position, results of operations or liquidity during the year ended December 31, 2019, nor are they expected to have a material impact on our future financial position, results of operations or liquidity.

We have obtained standby letters of credit as discussed in Note 10 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10-K and financial surety bonds as discussed in Note 12 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10-K. These standby letters of credit and financial surety bonds are generally obtained to support our financial assurance needs and landfill and E&P operations. These arrangements have not materially affected our financial position, results of operations or liquidity during the year ended December 31, 2019, nor are they expected to have a material impact on our future financial position, results of operations or liquidity.

From time to time, we evaluate our existing operations and their strategic importance to us. If we determine that a given operating unit does not have future strategic importance, we may sell or otherwise dispose of those operations. Although we believe our reporting units would not be impaired by such dispositions, we could incur losses on them.

New Accounting Pronouncements

See Note 2 to the consolidated financial statements included in Item 8 of this Annual Report on Form 10-K for a description of the new accounting standards that are applicable to us.

Non-GAAP Financial Measures

Adjusted Free Cash Flow

We present adjusted free cash flow, a non-GAAP financial measure, supplementally because it is widely used by investors as a valuation and liquidity measure in the solid waste industry. Management uses adjusted free cash flow as one of the principal measures to evaluate and monitor the ongoing financial performance of our operations. We define adjusted free cash flow as net cash provided by operating activities, plus or minus change in book overdraft, plus proceeds from disposal of assets, less capital expenditures for property and equipment and distributions to noncontrolling interests. We further adjust this calculation to exclude the effects of items management believes impact the ability to assess the operating performance of our business. This measure is not a substitute for, and should be used in conjunction with, GAAP liquidity or financial measures. Other companies may calculate adjusted free cash flow differently. Our adjusted free cash flow for the years ended December 31, 2019, 2018 and 2017, are calculated as follows (amounts in thousands of U.S. dollars):

	Years Ended December 31,		
	2019	2018	2017
Net cash provided by operating activities	$ 1,540,547	$ 1,411,235	$ 1,187,260
Plus (less): Change in book overdraft	(2,564)	(839)	8,241
Plus: Proceeds from disposal of assets	3,566	5,385	28,432
Less: Capital expenditures for property and equipment	(634,406)	(546,145)	(479,287)
Less: Distributions to noncontrolling interests	(570)	(103)	—
Adjustments:			
Payment of contingent consideration recorded in earnings [(a)]	—	11	10,012
Cash received for divestitures [(b)]	(2,376)	(2,030)	(21,100)
Transaction-related items [(c)]	12,335	8,607	5,700
Integration-related and other expenses [(d)]	—	2,760	10,602
Pre-existing Progressive Waste share-based grants [(e)]	4,810	5,772	17,037
Synergy bonus [(f)]	—	—	11,798
Tax effect [(g)]	(4,565)	(4,752)	(14,804)
Adjusted free cash flow	$ 916,777	$ 879,901	$ 763,891

(a) Reflects the addback of acquisition-related payments for contingent consideration that were recorded as expenses in earnings and as a component of cash flows from operating activities as the amounts paid exceeded the fair value of the contingent consideration recorded at the acquisition date.

(b) Reflects the elimination of cash received in conjunction with the divestiture of certain Progressive Waste operations.

(c) Reflects the addback of acquisition-related transaction costs.

(d) Reflects the addback of integration-related items, including rebranding costs, associated with the Progressive Waste acquisition.

(e) Reflects the cash settlement of pre-existing Progressive Waste share-based awards during the period.

(f) Reflects the addback of cash bonuses paid pursuant to our Synergy Bonus Program in conjunction with the Progressive Waste acquisition.

(g) The aggregate tax effect of footnotes (a) through (f) is calculated based on the applied tax rates for the respective periods.

Adjusted EBITDA

We present adjusted EBITDA, a non-GAAP financial measure, supplementally because it is widely used by investors as a performance and valuation measure in the solid waste industry. Management uses adjusted EBITDA as one of the principal measures to evaluate and monitor the ongoing financial performance of our operations. We define adjusted EBITDA as net income attributable to Waste Connections, plus or minus net income (loss) attributable to noncontrolling interests, plus or minus income tax provision (benefit), plus interest expense, less interest income, plus depreciation and amortization expense, plus closure and post-closure accretion expense, plus or minus any loss or gain on impairments and other operating items, plus other expense, less other income. We further adjust this calculation to exclude the effects of other items management believes impact the ability to assess the operating performance of our business. This measure is not a substitute for, and should be used in conjunction with, GAAP financial measures. Other companies may calculate adjusted EBITDA differently. Our adjusted EBITDA for the years ended December 31, 2019, 2018 and 2017, are calculated as follows (amounts in thousands of U.S. dollars):

	Years Ended December 31,		
	2019	**2018**	**2017**
Net income attributable to Waste Connections	$ 566,841	$ 546,871	$ 576,817
Plus (less): Net income (loss) attributable to noncontrolling interests	(160)	283	603
Plus (less): Income tax provision (benefit)	139,210	159,986	(68,910)
Plus: Interest expense	147,368	132,104	125,297
Less: Interest income	(9,777)	(7,170)	(5,173)
Plus: Depreciation and amortization	743,918	680,487	632,484
Plus: Closure and post-closure accretion	14,471	12,997	11,781
Plus: Impairments and other operating items	61,948	20,118	156,493
Plus (less): Other expense (income), net	(5,704)	170	(1,536)
Adjustments:			
Plus: Transaction-related expenses [(a)]	12,335	8,607	5,700
Plus: Fair value changes to certain equity awards [(b)]	3,104	9,205	16,357
Plus: Integration-related and other expenses [(c)]	—	2,760	10,612
Adjusted EBITDA	$ 1,673,554	$ 1,566,418	$ 1,460,525

(a) Reflects the addback of acquisition-related transaction costs.
(b) Reflects fair value accounting changes associated with certain equity awards.
(c) Reflects the addback of integration-related items, including rebranding costs, associated with the Progressive Waste acquisition.

Adjusted Net Income Attributable to Waste Connections and Adjusted Net Income per Diluted Share Attributable to Waste Connections

We present adjusted net income attributable to Waste Connections and adjusted net income per diluted share attributable to Waste Connections, both non-GAAP financial measures, supplementally because they are widely used by investors as a valuation measure in the solid waste industry. Management uses adjusted net income attributable to Waste Connections and adjusted net income per diluted share attributable to Waste Connections as one of the principal measures to evaluate and monitor the ongoing financial performance of our operations. We provide adjusted net income attributable to Waste Connections to exclude the effects of items management believes impact the comparability of operating results between periods. Adjusted net income attributable to Waste Connections has limitations due to the fact that it excludes items that have an impact on our financial condition and results of operations. Adjusted net income attributable to Waste Connections and adjusted net income per diluted share attributable to Waste Connections are not a substitute for, and should be used in conjunction with, GAAP financial measures. Other companies may calculate these non-GAAP financial measures differently. Our adjusted net income attributable to Waste Connections and adjusted net income per diluted share attributable to Waste Connections for the years ended December 31, 2019, 2018 and 2017, are calculated as follows (amounts in thousands of U.S. dollars, except per share amounts):

	Years Ended December 31,		
	2019	2018	2017
Reported net income attributable to Waste Connections	$ 566,841	$ 546,871	$ 576,817
Adjustments:			
Amortization of intangibles (a)	125,522	107,779	102,297
Impairments and other operating items (b)	61,948	20,118	156,493
Transaction-related expenses (c)	12,335	8,607	5,700
Fair value changes to certain equity awards (d)	3,104	9,205	16,357
Integration-related and other expenses (e)	—	2,760	10,612
Tax effect (f)	(50,189)	(37,165)	(91,979)
Tax items (g)	—	9,093	(205,631)
Adjusted net income attributable to Waste Connections	$ 719,561	$ 667,268	$ 570,666
Diluted earnings per common share attributable to Waste Connections' common shareholders:			
Reported net income	$ 2.14	$ 2.07	$ 2.18
Adjusted net income	$ 2.72	$ 2.52	$ 2.16

(a) Reflects the elimination of the non-cash amortization of acquisition-related intangible assets.
(b) Reflects the addback of impairments and other operating items.
(c) Reflects the addback of acquisition-related transaction costs.
(d) Reflects fair value accounting changes associated with certain equity awards.
(e) Reflects the addback of integration-related items, including rebranding costs, associated with the Progressive Waste acquisition.
(f) The aggregate tax effect of the adjustments in footnotes (a) through (e) is calculated based on the applied tax rates for the respective periods.
(g) In 2018, primarily reflects refinements to the estimates, as provided by Staff Accounting Bulletin No. 118, of the impact of a portion of our U.S. earnings no longer permanently reinvested in conjunction with the Tax Act. In 2017, reflects income tax benefit primarily resulting from a reduction of deferred tax liabilities due to enactment of the Tax Act, partially offset by deferred income tax expense due to a portion of our U.S. earnings no longer permanently reinvested, also related to the Tax Act.

Inflation

Other than volatility in fuel prices, third party brokerage and labor costs in certain markets, inflation has not materially affected our operations in recent years. Consistent with industry practice, many of our contracts allow us to pass through certain costs to our customers, including increases in landfill tipping fees and, in some cases, fuel costs. Therefore, we believe that we should be able to increase prices to offset many cost increases that result from inflation in the ordinary course of business. However, competitive pressures or delays in the timing of rate increases under our contracts may require us to absorb at least part of these cost increases, especially if cost increases exceed the average rate of inflation. Management's estimates associated with inflation have an impact on our accounting for landfill liabilities.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

In the normal course of business, we are exposed to market risk, including changes in interest rates and prices of certain commodities. We use hedge agreements to manage a portion of our risks related to interest rates and fuel prices. While we are exposed to credit risk in the event of non-performance by counterparties to our hedge agreements, in all cases such counterparties are highly rated financial institutions and we do not anticipate non-performance. We do not hold or issue derivative financial instruments for trading purposes. We monitor our hedge positions by regularly evaluating the positions at market and by performing sensitivity analyses over the unhedged fuel and variable rate debt positions.

At December 31, 2019, our derivative instruments included 16 interest rate swap agreements that effectively fix the interest rate on the applicable notional amounts of our variable rate debt as follows (dollars in thousands of U.S. dollars):

Date Entered	Notional Amount	Fixed Interest Rate Paid*	Variable Interest Rate Received	Effective Date	Expiration Date
May 2014	$ 50,000	2.344 %	1-month LIBOR	October 2015	October 2020
May 2014	$ 25,000	2.326 %	1-month LIBOR	October 2015	October 2020
May 2014	$ 50,000	2.350 %	1-month LIBOR	October 2015	October 2020
May 2014	$ 50,000	2.350 %	1-month LIBOR	October 2015	October 2020
April 2016	$ 100,000	1.000 %	1-month LIBOR	February 2017	February 2020
June 2016	$ 75,000	0.850 %	1-month LIBOR	February 2017	February 2020
June 2016	$ 150,000	0.950 %	1-month LIBOR	January 2018	January 2021
June 2016	$ 150,000	0.950 %	1-month LIBOR	January 2018	January 2021
July 2016	$ 50,000	0.900 %	1-month LIBOR	January 2018	January 2021
July 2016	$ 50,000	0.890 %	1-month LIBOR	January 2018	January 2021
August 2017	$ 100,000	1.900 %	1-month LIBOR	July 2019	July 2022
August 2017	$ 200,000	2.200 %	1-month LIBOR	October 2020	October 2025
August 2017	$ 150,000	1.950 %	1-month LIBOR	February 2020	February 2023
June 2018	$ 200,000	2.925 %	1-month LIBOR	October 2020	October 2025
June 2018	$ 200,000	2.925 %	1-month LIBOR	October 2020	October 2025
December 2018	$ 200,000	2.850 %	1-month LIBOR	July 2022	July 2027

* Plus applicable margin.

Under derivatives and hedging guidance, the interest rate swap agreements are considered cash flow hedges for a portion of our variable rate debt, and we apply hedge accounting to account for these instruments. The notional amounts and all other significant terms of the swap agreements are matched to the provisions and terms of the variable rate debt being hedged.

We have performed sensitivity analyses to determine how market rate changes will affect the fair value of our unhedged floating rate debt. Such an analysis is inherently limited in that it reflects a singular, hypothetical set of assumptions. Actual market movements may vary significantly from our assumptions. Fair value sensitivity is not necessarily indicative of the ultimate cash flow or earnings effect we would recognize from the assumed market rate movements. We are exposed to cash flow risk due to changes in interest rates with respect to the unhedged floating rate balances owed at December 31, 2019 and 2018, of $766.2 million and $885.0 million, respectively, including floating rate debt under our Credit Agreement and floating rate tax-exempt bond obligations. A one percentage point increase in interest rates on our variable-rate debt as of December 31, 2019 and 2018, would decrease our annual pre-tax income by approximately $7.7 million and $8.9 million, respectively. All of our remaining debt instruments are at fixed rates, or effectively fixed under the interest rate swap agreements described above; therefore, changes in market interest rates under these instruments would not significantly impact our cash flows or results of operations, subject to counterparty default risk.

The market price of diesel fuel is unpredictable and can fluctuate significantly. Because of the volume of fuel we purchase each year, a significant increase in the price of fuel could adversely affect our business and reduce our operating margins. To manage a portion of this risk, we periodically enter into fuel hedge agreements related to forecasted diesel fuel purchases, and we also enter into fixed price fuel purchase contracts. At December 31, 2019, we had no fuel hedge agreements in place; however, we have entered into fixed price fuel purchase contracts for 2020 as described below.

For the year ending December 31, 2020, we expect to purchase approximately 78.6 million gallons of fuel, of which 49.9 million gallons will be purchased at market prices and 28.7 million gallons will be purchased under our fixed price fuel purchase contracts. We have performed sensitivity analyses to determine how market rate changes will affect the fair value of our unhedged, market rate diesel fuel purchases. Such an analysis is inherently limited in that it reflects a singular, hypothetical set of assumptions. Actual market movements may vary significantly from our assumptions. Fair value sensitivity is not necessarily indicative of the ultimate cash flow or earnings effect we would recognize from the assumed market rate movements. With respect to the approximately 49.9 million gallons of unhedged fuel we expect to purchase in 2020 at market prices, a $0.10 per gallon increase in the price of fuel over the year would decrease our pre-tax income during this period by approximately $5.0 million.

We market a variety of recyclable materials, including cardboard, mixed paper, plastic containers, glass bottles and ferrous and aluminum metals. We own and operate recycling operations and sell other collected recyclable materials to third parties for processing before resale. To reduce our exposure to commodity price risk with respect to recycled materials, we have adopted a pricing strategy of charging collection and processing fees for recycling volume collected from third parties. In the event of a decline in recycled commodity prices, a 10% decrease in average recycled commodity prices from the average prices that were in effect during the years ended December 31, 2019 and 2018, would have had a $6.2 million and $8.9 million impact on revenues for the year ended December 31, 2019 and 2018, respectively.

We have operations in Canada and, where significant, we have quantified and described the impact of foreign currency translation on components of income, including operating revenue and operating costs. However, the impact of foreign currency has not materially affected our results of operations in 2018 or 2019. A $0.01 change in the Canadian dollar to U.S. dollar exchange rate would impact our annual revenue and EBITDA by approximately $10.0 million and $3.6 million, respectively.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

WASTE CONNECTIONS, INC.

Report of Independent Registered Public Accounting Firm

Board of Directors and Shareholders
Waste Connections, Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of Waste Connections, Inc. (an Ontario, Canada corporation) and subsidiaries (the "Company") as of December 31, 2019 and 2018, the related consolidated statements of net income, comprehensive income, equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes and financial statement schedule included under Item 15(a) (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in the 2013 Internal Control — Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"), and our report dated February 13, 2020 expressed an unqualified opinion.

Change in accounting principle

As discussed in Note 2 to the consolidated financial statements, the Company changed its method of accounting for leases on January 1, 2019 due to the adoption of Accounting Standard Codification ("ASC") 842, *Leases*.

Basis for opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical audit matters

The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements, and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Valuation of intangible assets in business combinations

As described in Note 5 to the consolidated financial statements, the Company acquired 21 businesses during 2019. These transactions were accounted for as business combinations in accordance with ASC 805, *Business Combinations*.

The principal consideration for our determination, that the accounting for these acquisitions represents a critical audit matter, is the judgments and assumptions associated with management's determination of the fair value of assets acquired and liabilities assumed, including fair value determinations related to transfer station permits, residential customer lists, acquisition site costs and commercial customer lists, all of which are recorded as intangible assets. Auditing the fair value involved a high degree of subjectivity, auditor judgment and effort in evaluating management's significant assumptions, primarily due to the complexity of the valuation models used to measure the fair value of the aforementioned intangible assets, as well as the sensitivity of the underlying significant assumptions. The Company used a discounted cash flow model to estimate the fair values of the intangible assets, which included assumptions such as discount rate, revenue growth rates, operating expenses, earnings before interest, taxes, depreciation, and amortization ("EBITDA") margins, capital expenditures, customer turnover rates, and contributory asset charges that form the basis of the forecasted results. These significant assumptions are forward-looking and could be affected by future economic and market conditions.

The audit procedures related to the accounting for the acquisitions included the following:

- We tested the design and operating effectiveness of key controls related to the accounting for the 2019 acquisitions, including controls relating to management's development of forecasts for discount rate, revenue growth rates, operating expenses, EBITDA margins, capital expenditures, customer turnover rates, and contributory asset charges;
- We obtained certain of the purchase price allocation analyses from management and third-party specialists engaged by management. We assessed the qualifications and competence of management and the third-party specialists and evaluated the methodologies used to determine the fair value of the fixed assets and intangible assets;
- We tested the assumptions used within the discounted cash flow models to estimate the fair value of the intangible assets which included assumptions such as discount rate, revenue growth rates, operating expenses, EBITDA margins, capital expenditures, customer turnover rates, and contributory asset charges;
- We tested the Company's ability to forecast future cash flows for acquired businesses by reviewing actual results in the first year after being acquired compared to amounts forecasted when the fair values of acquired assets and liabilities were determined.

Landfill Accounting

At December 31, 2019, the Company's final capping, closure, and post-closure liability was $291.5 million. As explained in Note 3 to the consolidated financial statements, the net present value of the landfill final capping, closure, and post-closure liabilities are calculated by estimating the total obligation in current dollars, inflating the obligation based upon the expected future date of the expenditures and discounting the inflated total to its present value using a credit-adjusted risk-free rate.

The principal consideration for our determination that landfill accounting represents a critical audit matter is the judgments and estimates associated with management's determination of the liability, due to the nature of the inputs and significant assumptions used in the process including the discount rate, inflation rate, accretion rates, survey data, acreage information, permitted, deemed and remaining airspace, and probability of landfill expansions, all of which can have a significant impact on the calculation of the final capping, closure, and post-closure liability. Auditing the net present value of the obligation involved a high degree of subjectivity, auditor judgment and effort in evaluating management's assumptions primarily due to the complexity of the models used to measure the landfill liability, as well as the sensitivity of the underlying significant assumptions.

Our audit procedures related to the accounting for the final capping, closure, and post-closure liability included the following:

- We tested the design and operating effectiveness of key controls related to landfill accounting, including controls relating to management's development of discount rate, inflation rate, accretion rates, survey data, acreage information, permitted, deemed and remaining airspace, and probability of landfill expansions;
- We assessed the qualifications and competence of management and the third-party specialists used to provide the inputs used in developing the models;
- We tested key inputs such as discount rate, inflation rate, accretion rate, survey data, acreage information, permitted, deemed and remaining airspace, and probability of landfill expansions;
- We obtained and reviewed the associated permits for a sample of landfill models to further validate certain inputs used in the models;
- We compared previously deemed expansion amounts to the subsequent actual permitted amounts;
- We obtained and reviewed supporting documentation to support management's criteria for deemed expansions.

/s/ GRANT THORNTON LLP

We have served as the Company's auditor since 2017.

Houston, Texas
February 13, 2020

Report of Independent Registered Public Accounting Firm

Board of Directors and Shareholders
Waste Connections, Inc.

Opinion on internal control over financial reporting

We have audited the internal control over financial reporting of Waste Connections, Inc. (an Ontario, Canada corporation) and subsidiaries (the "Company") as of December 31, 2019, based on criteria established in the 2013 Internal Control — Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in the 2013 Internal Control — Integrated Framework issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the consolidated financial statements of the Company as of and for the year ended December 31, 2019, and our report dated February 13, 2020 expressed an unqualified opinion on those financial statements.

Basis for opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and limitations of internal control over financial reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ GRANT THORNTON LLP

Houston, Texas
February 13, 2020

WASTE CONNECTIONS, INC.
CONSOLIDATED BALANCE SHEETS
(IN THOUSANDS OF U.S. DOLLARS, EXCEPT SHARE AND PER SHARE AMOUNTS)

	December 31, 2019	December 31, 2018
ASSETS		
Current assets:		
Cash and equivalents	$ 326,738	$ 319,305
Accounts receivable, net of allowance for doubtful accounts of $16,432 and $16,760 at December 31, 2019 and 2018, respectively	662,808	609,545
Prepaid expenses and other current assets	141,052	164,053
Total current assets	1,130,598	1,092,903
Restricted cash	96,483	84,661
Restricted investments	51,179	47,486
Property and equipment, net	5,516,347	5,168,996
Operating lease right-of-use assets	183,220	—
Goodwill	5,510,851	5,031,685
Intangible assets, net	1,163,063	1,128,628
Other assets, net	85,954	72,970
Total assets	$ 13,737,695	$ 12,627,329
LIABILITIES AND EQUITY		
Current liabilities:		
Accounts payable	$ 436,970	$ 359,967
Book overdraft	15,954	18,518
Accrued liabilities	281,308	315,670
Current portion of operating lease liabilities	29,929	—
Current portion of contingent consideration	26,159	11,612
Deferred revenue	216,443	179,282
Current portion of long-term debt and notes payable	465	1,786
Total current liabilities	1,007,228	886,835
Long-term portion of debt and notes payable	4,353,782	4,153,465
Long-term portion of operating lease liabilities	160,033	—
Long-term portion of contingent consideration	42,825	43,003
Deferred income taxes	818,622	760,033
Other long-term liabilities	416,851	323,805
Total liabilities	6,799,341	6,167,141
Commitments and contingencies (Note 12)		
Equity:		
Common shares: 263,699,675 shares issued and 263,618,161 shares outstanding at December 31, 2019; 263,271,302 shares issued and 263,141,413 shares outstanding at December 31, 2018	4,135,343	4,131,307
Additional paid-in capital	154,917	133,577
Accumulated other comprehensive loss	(10,963)	(74,786)
Treasury shares: 81,514 and 129,889 shares at December 31, 2019 and 2018, respectively	—	—
Retained earnings	2,654,207	2,264,510
Total Waste Connections' equity	6,933,504	6,454,608
Noncontrolling interest in subsidiaries	4,850	5,580
Total equity	6,938,354	6,460,188
	$ 13,737,695	$ 12,627,329

The accompanying notes are an integral part of these consolidated financial statements.

WASTE CONNECTIONS, INC.
CONSOLIDATED STATEMENTS OF NET INCOME
(IN THOUSANDS OF U.S. DOLLARS, EXCEPT SHARE AND PER SHARE AMOUNTS)

	Years Ended December 31,		
	2019	2018	2017
Revenues	$ 5,388,679	$ 4,922,941	$ 4,630,488
Operating expenses:			
Cost of operations	3,198,757	2,865,704	2,704,775
Selling, general and administrative	546,278	524,388	509,638
Depreciation	618,396	572,708	530,187
Amortization of intangibles	125,522	107,779	102,297
Impairments and other operating items	61,948	20,118	156,493
Operating income	837,778	832,244	627,098
Interest expense	(147,368)	(132,104)	(125,297)
Interest income	9,777	7,170	5,173
Other income (expense), net	5,704	(170)	1,536
Income before income tax provision	705,891	707,140	508,510
Income tax (provision) benefit	(139,210)	(159,986)	68,910
Net income	566,681	547,154	577,420
Plus (less): Net loss (income) attributable to noncontrolling interests	160	(283)	(603)
Net income attributable to Waste Connections	$ 566,841	$ 546,871	$ 576,817
Earnings per common share attributable to Waste Connections' common shareholders:			
Basic	$ 2.15	$ 2.07	$ 2.19
Diluted	$ 2.14	$ 2.07	$ 2.18
Shares used in the per share calculations:			
Basic	263,792,693	263,650,155	263,682,608
Diluted	264,526,561	264,395,618	264,302,411
Cash dividends per common share	$ 0.665	$ 0.580	$ 0.500

The accompanying notes are an integral part of these consolidated financial statements.

WASTE CONNECTIONS, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(IN THOUSANDS OF U.S. DOLLARS)

	Years Ended December 31,		
	2019	2018	2017
Net income	$ 566,681	$ 547,154	$ 577,420
Other comprehensive income (loss), before tax:			
Interest rate swap amounts reclassified into interest expense	(8,027)	(5,669)	2,805
Fuel hedge amounts reclassified into cost of operations	—	(6,531)	2,818
Changes in fair value of interest rate swaps	(43,873)	(1,213)	7,835
Changes in fair value of fuel hedges	—	2,651	1,326
Foreign currency translation adjustment	101,970	(175,233)	142,486
Other comprehensive income (loss), before tax	50,070	(185,995)	157,270
Income tax (expense) benefit related to items of other comprehensive income (loss)	13,753	2,796	(5,856)
Other comprehensive income (loss), net of tax	63,823	(183,199)	151,414
Comprehensive income	630,504	363,955	728,834
Plus (less): Comprehensive loss (income) attributable to noncontrolling interests	160	(283)	(603)
Comprehensive income attributable to Waste Connections	$ 630,664	$ 363,672	$ 728,231

The accompanying notes are an integral part of these consolidated financial statements.

WASTE CONNECTIONS, INC.
CONSOLIDATED STATEMENTS OF EQUITY
YEARS ENDED DECEMBER 31, 2017, 2018 AND 2019
(IN THOUSANDS OF U.S. DOLLARS, EXCEPT SHARE AMOUNTS)

	WASTE CONNECTIONS' EQUITY								
	COMMON SHARES		ADDITIONAL PAID-IN CAPITAL	ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)	TREASURY SHARES		RETAINED EARNINGS	NONCONTROLLING INTERESTS	TOTAL
	SHARES	AMOUNT			SHARES	AMOUNT			
Balances at December 31, 2016	262,803,271	$ 4,174,808	$ 102,220	$ (43,001)	337,397	$ —	$ 1,413,488	$ 7,362	$ 5,654,877
Sale of common shares held in trust	171,264	10,814	—	—	(171,264)	—	—	—	10,814
Vesting of restricted share units	545,238	—	—	—	—	—	—	—	—
Vesting of performance-based restricted share units	122,786	—	—	—	—	—	—	—	—
Restricted share units released from deferred compensation plan	37,263	—	—	—	—	—	—	—	—
Tax withholdings related to net share settlements of equity-based compensation	(251,738)	—	(13,994)	—	—	—	—	—	(13,994)
Equity-based compensation	—	—	25,435	—	—	—	—	—	25,435
Exercise of options and warrants	66,586	1,946	—	—	—	—	—	—	1,946
Cash dividends on common shares	—	—	—	—	—	—	(131,975)	—	(131,975)
Amounts reclassified into earnings, net of taxes	—	—	—	4,174	—	—	—	—	4,174
Changes in fair value of cash flow hedges, net of taxes	—	—	—	4,754	—	—	—	—	4,754
Foreign currency translation adjustment	—	—	—	142,486	—	—	—	—	142,486
Cumulative effect adjustment from adoption of new accounting pronouncement	—	—	1,384	—	—	—	(1,384)	—	—
Acquisition of noncontrolling interest	—	—	698	—	—	—	—	(2,565)	(1,867)
Net income	—	—	—	—	—	—	576,817	603	577,420
Balances at December 31, 2017	263,494,670	4,187,568	115,743	108,413	166,133	—	1,856,946	5,400	6,274,070
Sale of common shares held in trust	36,244	2,667	—	—	(36,244)	—	—	—	2,667
Vesting of restricted share units	483,232	—	—	—	—	—	—	—	—
Vesting of performance-based restricted share units	154,181	—	—	—	—	—	—	—	—
Restricted share units released from deferred compensation plan	5,069	—	—	—	—	—	—	—	—
Fair value adjustment for common shares in deferred compensation plan exchanged for other investment options	—	—	(1,734)	—	—	—	—	—	(1,734)
Tax withholdings related to net share settlements of equity-based compensation	(217,850)	—	(15,032)	—	—	—	—	—	(15,032)
Equity-based compensation	—	—	34,600	—	—	—	—	—	34,600
Exercise of warrants	17,571	—	—	—	—	—	—	—	—
Repurchase of common shares	(831,704)	(58,928)	—	—	—	—	—	—	(58,928)
Cash dividends on common shares	—	—	—	—	—	—	(152,550)	—	(152,550)
Amounts reclassified into earnings, net of taxes	—	—	—	(9,071)	—	—	—	—	(9,071)
Changes in fair value of cash flow hedges, net of taxes	—	—	—	1,105	—	—	—	—	1,105
Foreign currency translation adjustment	—	—	—	(175,233)	—	—	—	—	(175,233)
Cumulative effect adjustment from adoption of new accounting pronouncement	—	—	—	—	—	—	13,243	—	13,243
Distributions to noncontrolling interests	—	—	—	—	—	—	—	(103)	(103)
Net income	—	—	—	—	—	—	546,871	283	547,154
Balances at December 31, 2018	263,141,413	$ 4,131,307	$ 133,577	$ (74,786)	129,889	$ —	$ 2,264,510	$ 5,580	$ 6,460,188

The accompanying notes are an integral part of these consolidated financial statements.

WASTE CONNECTIONS, INC.
CONSOLIDATED STATEMENTS OF EQUITY
YEARS ENDED DECEMBER 31, 2017, 2018 AND 2019
(IN THOUSANDS OF U.S. DOLLARS, EXCEPT SHARE AMOUNTS)

	WASTE CONNECTIONS' EQUITY								
	COMMON SHARES		ADDITIONAL PAID-IN CAPITAL	ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)	TREASURY SHARES		RETAINED EARNINGS	NONCONTROLLING INTERESTS	TOTAL
	SHARES	AMOUNT			SHARES	AMOUNT			
Balances at December 31, 2018	263,141,413	$ 4,131,307	$ 133,577	$ (74,786)	129,889	$ —	$ 2,264,510	$ 5,580	$ 6,460,188
Sale of common shares held in trust	48,375	4,036	—	—	(48,375)	—	—	—	4,036
Vesting of restricted share units	416,691	—	—	—	—	—	—	—	—
Vesting of performance-based restricted share units	180,258	—	—	—	—	—	—	—	—
Restricted share units released from deferred compensation plan	16,375	—	—	—	—	—	—	—	—
Tax withholdings related to net share settlements of equity-based compensation	(210,018)	—	(17,660)	—	—	—	—	—	(17,660)
Equity-based compensation	—	—	39,000	—	—	—	—	—	39,000
Exercise of warrants	25,067	—	—	—	—	—	—	—	—
Cash dividends on common shares	—	—	—	—	—	—	(175,067)	—	(175,067)
Amounts reclassified into earnings, net of taxes	—	—	—	(5,900)	—	—	—	—	(5,900)
Changes in fair value of cash flow hedges, net of taxes	—	—	—	(32,247)	—	—	—	—	(32,247)
Foreign currency translation adjustment	—	—	—	101,970	—	—	—	—	101,970
Cumulative effect adjustment from adoption of new accounting pronouncement	—	—	—	—	—	—	(2,077)	—	(2,077)
Distributions to noncontrolling interests	—	—	—	—	—	—	—	(570)	(570)
Net income (loss)	—	—	—	—	—	—	566,841	(160)	566,681
Balances at December 31, 2019	263,618,161	$ 4,135,343	$ 154,917	$ (10,963)	81,514	$ —	$ 2,654,207	$ 4,850	$ 6,938,354

The accompanying notes are an integral part of these consolidated financial statements.

WASTE CONNECTIONS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(IN THOUSANDS OF U.S. DOLLARS)

	Years Ended December 31,		
	2019	**2018**	**2017**
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income	$ 566,681	$ 547,154	$ 577,420
Adjustments to reconcile net income to net cash provided by operating activities:			
Loss on disposal of assets and impairments	60,592	10,193	134,491
Depreciation	618,396	572,708	530,187
Amortization of intangibles	125,522	107,779	102,297
Amortization of leases	24,099	—	—
Deferred income taxes, net of acquisitions	54,637	77,859	(153,283)
Amortization of debt issuance costs	5,001	4,158	4,341
Share-based compensation	42,671	43,803	39,361
Interest accretion	16,426	14,861	13,822
Payment of contingent consideration recorded in earnings	—	(11)	(10,012)
Adjustments to contingent consideration	1,498	349	17,754
Other	(2,240)	943	1,611
Changes in operating assets and liabilities, net of effects from acquisitions:			
Accounts receivable, net	(22,933)	(37,724)	(38,934)
Prepaid expenses and other current assets	9,135	39,758	(51,457)
Accounts payable	71,147	16,135	50,012
Deferred revenue	19,156	17,916	4,205
Accrued liabilities	(24,039)	1,314	(15,002)
Capping, closure and post-closure expenditures	(5,062)	(2,702)	(8,845)
Other long-term liabilities	(20,140)	(3,258)	(10,708)
Net cash provided by operating activities	1,540,547	1,411,235	1,187,260
CASH FLOWS FROM INVESTING ACTIVITIES:			
Payments for acquisitions, net of cash acquired	(736,610)	(830,091)	(410,695)
Capital expenditures for property and equipment	(634,406)	(546,145)	(479,287)
Capital expenditure for purchase of greenfield landfill site	(31,683)	—	—
Investment in noncontrolling interest	(25,000)	—	—
Proceeds from disposal of assets	3,566	5,385	28,432
Change in restricted investments, net of interest income	(2,183)	—	—
Other	310	(969)	636
Net cash used in investing activities	(1,426,006)	(1,371,820)	(860,914)
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from long-term debt	1,575,795	1,022,737	973,754
Principal payments on notes payable and long-term debt	(1,470,711)	(970,773)	(770,106)
Payment of contingent consideration recorded at acquisition date	(3,200)	(6,127)	(17,158)
Change in book overdraft	(2,564)	(839)	8,241
Payments for repurchase of common shares	—	(58,928)	—
Payments for cash dividends	(175,067)	(152,550)	(131,975)
Tax withholdings related to net share settlements of equity-based compensation	(17,660)	(15,032)	(13,994)
Debt issuance costs	(5,953)	(8,630)	(3,667)
Proceeds from sale of common shares held in trust	4,036	2,667	10,814
Other	(570)	(103)	851
Net cash provided by (used in) financing activities	(95,894)	(187,578)	56,760
Effect of exchange rate changes on cash, cash equivalents and restricted cash	608	(1,290)	1,795
Net increase (decrease) in cash, cash equivalents and restricted cash	19,255	(149,453)	384,901
Cash, cash equivalents and restricted cash at beginning of year	403,966	553,227	168,476
Plus (less): change in cash held for sale	—	192	(150)
Cash, cash equivalents and restricted cash at end of year	$ 423,221	$ 403,966	$ 553,227

The accompanying notes are an integral part of these consolidated financial statements.

WASTE CONNECTIONS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(IN THOUSANDS OF U.S. DOLLARS)

SUPPLEMENTARY DISCLOSURES OF CASH FLOW INFORMATION AND NON-CASH TRANSACTIONS:

	Years Ended December 31, 2019	2018	2017
Cash paid for income taxes	$ 81,049	$ 52,464	$ 155,532
Cash paid for interest	$ 139,694	$ 124,338	$ 115,645
Changes in accrued capital expenditures for property and equipment	$ (7,528)	$ 1,825	$ 10,447
In connection with its acquisitions, the Company assumed liabilities as follows:			
Fair value of assets acquired	$ 910,177	$ 1,100,880	$ 635,361
Fair value of operations exchanged	—	—	(81,097)
Cash paid for current year acquisitions	(736,610)	(830,091)	(410,695)
Change in open working capital settlements at year end	(5,272)	8,507	—
Liabilities assumed and notes payable issued to sellers of businesses acquired	$ 168,295	$ 279,296	$ 143,569
Non-cash consideration received for asset sales	$ —	$ —	$ 12,573

The accompanying notes are an integral part of these consolidated financial statements.

WASTE CONNECTIONS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

1. BUSINESS

The financial statements presented in this report represent the consolidation of Waste Connections, Inc., a corporation organized under the laws of Ontario, Canada, and its wholly-owned and majority-owned subsidiaries. When the terms the “Company” or “Waste Connections” are used in this document, those terms refer to Waste Connections, Inc. and its consolidated subsidiaries. All significant intercompany accounts and transactions have been eliminated in consolidation.

The Company is an integrated solid waste services company that provides non-hazardous waste collection, transfer, disposal and recycling services in mostly exclusive and secondary markets in the U.S. and Canada. Through its R360 Environmental Solutions subsidiary, the Company is also a leading provider of non-hazardous exploration and production (“E&P”) waste treatment, recovery and disposal services in several of the most active natural resource producing areas in the U.S. The Company also provides intermodal services for the rail haul movement of cargo and solid waste containers in the Pacific Northwest through a network of intermodal facilities.

2. NEW ACCOUNTING STANDARDS AND RECLASSIFICATIONS

Accounting Standards Adopted

Lease Accounting. In February 2016, the Financial Accounting Standards Board (“FASB”) issued guidance that requires lessees to recognize a right-of-use asset and a lease liability for virtually all of their leases (other than leases that meet the definition of a short-term lease). The liability will be equal to the present value of lease payments. The asset will be based on the liability, subject to adjustment, such as for initial direct costs. For income statement purposes, the FASB retained a dual model, requiring leases to be classified as either operating or finance. Operating leases will result in straight-line expense (similar to current operating leases) while finance leases will result in a front-loaded expense pattern (similar to current capital leases). Classification will be based on criteria that are largely similar to those applied in current lease accounting, but without explicit bright lines. The new standard was effective for public companies for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, with early adoption permitted. The FASB issued new guidance in July 2018, which amended the guidance to allow the issuer to elect from two adoption alternatives: 1) apply the new guidance at the beginning of the earliest comparative period presented; or 2) apply the new guidance at the effective date and recognize a cumulative-effect adjustment, without adjusting the comparative periods presented.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The Company adopted the new standard on January 1, 2019 and elected to apply the new guidance at the effective date and recognize a cumulative-effect adjustment, without adjusting the comparative periods presented. The Company applied the package of practical expedients to leases that commenced before the effective date whereby the Company elected not to reassess the following: (1) whether any expired or existing contracts are or contain leases; (2) the lease classification for any expired or existing leases; and (3) whether initial direct costs exist for any existing leases. The Company also applied the (1) practical expedient for land easements where the Company elected to not apply the leases standard to certain existing land easements at transition and (2) practical expedient to include both the lease and nonlease components as a single component and account for it as a lease. The Company has completed its assessment of the provisions of the lease accounting guidance and implementation of its leasing software solution to manage and account for leases under the new standard.

	As Reported December 31, 2018	Adoption of Lease Guidance Increase (Decrease)	Balance January 1, 2019
Operating lease right-of-use assets	$ -	$ 206,501	$ 206,501
Total assets	$ 12,627,329	$ 206,501	$ 12,833,830
Current portion of operating lease liabilities	$ -	$ 29,640	$ 29,640
Total current liabilities	$ 886,835	$ 29,640	$ 916,475
Long-term portion of operating lease liabilities	$ -	$ 180,005	$ 180,005
Deferred income taxes	$ 760,033	$ (1,066)	$ 758,967
Total liabilities	$ 6,167,141	$ 208,579	$ 6,375,720
Retained earnings	$ 2,264,510	$ (2,077)	$ 2,262,433
Total liabilities and equity	$ 12,627,329	$ 206,501	$ 12,833,830

The adoption of the new standard did not have a material impact on the Company's consolidated statements of net income or consolidated statements of cash flows. See Note 8 for additional information and disclosures related to the adoption of this amended guidance.

Derivatives and Hedging: Targeted Improvements to Accounting for Hedging Activities. In August 2017, the FASB issued guidance which improves the financial reporting of hedging relationships to better portray the economic results of an entity's risk management activities in its financial statements and make certain targeted improvements to simplify the application of the hedge accounting guidance in current GAAP. The amendments in this update are intended to better align an entity's risk management activities and financial reporting for hedging relationships through changes to both the designation and measurement guidance for qualifying hedging relationships and presentation of hedge results. The effective date for the standard is for fiscal years beginning after December 15, 2018. The adoption of this guidance, effective January 1, 2019, did not have a material impact on the Company's consolidated financial statements.

Derivatives and Hedging: Inclusion of the Secured Overnight Financing Rate ("SOFR") Overnight Index Swap ("OIS") Rate as a Benchmark Interest Rate for Hedge Accounting. As LIBOR is expected to no longer be published by 2021, the FASB issued guidance in October 2018 which added the OIS rate based on SOFR as an eligible benchmark interest rate in order to facilitate the LIBOR to SOFR transition and provide sufficient lead time for entities to prepare for changes to interest rate risk hedging strategies for both risk management and hedge accounting purposes. The Company adopted the new guidance effective January 1, 2019 on a prospective basis. The Company is developing a plan to transition its interest rate swaps from LIBOR to SOFR. The adoption of this guidance did not have a material impact on the Company's consolidated financial statements.

SEC modernizes and simplifies certain Regulation S-K disclosure requirements. In March 2019, the U.S. Securities and Exchange Commission (the "SEC") amended its rules to modernize and simplify certain disclosure requirements in Regulation S-K and the related rules and forms. These changes include, among other things, (1) allowing registrants to redact confidential information from most exhibits to their filings without filing a confidential treatment request; (2) revising the requirements for management's discussion and analysis to allow flexibility, including allowing registrants providing three years of financial statements to omit discussion of the earliest year and cross-reference its discussion in a previous filing; (3) removing the example risk factors in Regulation S-K to encourage more meaningful company-specific disclosure; (4) clarifying the description of property requirements to emphasize that those disclosures should only include properties that are material to the registrant; and (5) requiring XBRL data tagging for items on the cover pages of certain filings, as well as the use of hyperlinks for information that is incorporated by reference and available on EDGAR. The provisions regarding the redaction of confidential information in exhibits were effective upon publication in the Federal Register. The provisions requiring XBRL data tagging are subject to a three-year phase-in, depending on the filing status of the registrant, which, for the Company, were effective for the period ending June 30, 2019. All other provisions were effective on May 2, 2019.

Accounting Standards Pending Adoption

Financial Instruments - Credit Losses: Measurement of Credit Losses on Financial Instruments. In June 2016, the FASB issued guidance which introduces a new forward-looking approach, based on expected losses, to estimate credit losses on certain types of financial instruments, including trade receivables, which will require entities to incorporate considerations of historical information, current information and reasonable and supportable forecasts. The standard will be effective for public business entities that are SEC filers for annual periods beginning after December 15, 2019 and interim periods within those years. Early adoption is permitted. The Company does not expect the adoption of this guidance to have a material impact on its consolidated financial statements.

Income Taxes – Simplifying the Accounting for Income Taxes. In December 2019, the FASB issued guidance that simplifies the accounting for income taxes as part of its overall initiative to reduce complexity in applying accounting standards while maintaining or improving the usefulness of the information provided to users of financial statements. The amendments include removal of certain exceptions to the general principles of income taxes, and simplification in several other areas such as accounting for a franchise tax that is partially based on income. The standard will be effective for public business entities that are SEC filers for annual periods beginning after December 15, 2020, and interim periods within those reporting periods. Early adoption is permitted. The Company has not yet assessed the potential impact of implementing this new guidance on its consolidated financial statements.

Reclassification

As disclosed within other footnotes of the financial statements, segment information reported in the Company's prior year have been reclassified to conform with the 2019 presentation.

3. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Reporting Currency

The functional currency of the Company, as the parent corporate entity, and its operating subsidiaries in the United States, is the U.S. dollar. The functional currency of the Company's Canadian operations is the Canadian dollar. The reporting currency of the Company is the U.S. dollar. The Company's consolidated Canadian dollar financial position is translated to U.S. dollars by applying the foreign currency exchange rate in effect at the consolidated balance sheet date. The Company's consolidated Canadian dollar results of operations and cash flows are translated to U.S. dollars by applying the average foreign currency exchange rate in effect during the reporting period. The resulting translation adjustments are included in other comprehensive income or loss. Gains and losses from foreign currency transactions are included in earnings for the period.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Cash Equivalents

The Company considers all highly liquid investments with a maturity of three months or less at purchase to be cash equivalents. As of December 31, 2019 and 2018, cash equivalents consisted of demand money market accounts.

Concentrations of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk consist primarily of cash and equivalents, restricted cash, restricted investments and accounts receivable. The Company maintains cash and equivalents with banks that at times exceed applicable insurance limits. The Company reduces its exposure to credit risk by maintaining such deposits with high quality financial institutions. The Company's restricted cash and restricted investments are invested primarily in money market accounts, bank time deposits, U.S. government and agency securities and Canadian bankers' acceptance notes. The Company has not experienced any losses related to its cash and equivalents, restricted cash or restricted investment accounts. The Company generally does not require collateral on its trade receivables. Credit risk on accounts receivable is minimized as a result of the large and diverse nature of the Company's customer base. The Company maintains allowances for losses based on the expected collectability of accounts receivable.

Revenue Recognition and Accounts Receivable

The Company's operations primarily consist of providing non-hazardous waste collection, transfer, disposal and recycling services, non-hazardous exploration and production ("E&P") waste treatment, recovery and disposal services, and intermodal services. The following table disaggregates the Company's revenues by service line for the periods indicated:

	Years Ended December 31,		
	2019	**2018**	**2017**
Commercial	$ 1,593,217	$ 1,452,831	$ 1,343,590
Residential	1,380,763	1,189,148	1,130,842
Industrial and construction roll off	841,173	768,687	707,015
Total collection	3,815,153	3,410,666	3,181,447
Landfill	1,132,935	1,063,243	988,092
Transfer	771,316	670,129	589,883
Recycling	64,245	92,634	161,730
E&P	271,887	256,262	203,473
Intermodal and other	121,137	139,896	146,749
Intercompany	(787,994)	(709,889)	(640,886)
Total	$ 5,388,679	$ 4,922,941	$ 4,630,488

The factors that impact the timing and amount of revenue recognized for each service line may vary based on the nature of the service performed. Generally, the Company recognizes revenue at the time it performs a service. In the event that the Company bills for services in advance of performance, it recognizes deferred revenue for the amount billed and subsequently recognizes revenue at the time the service is provided.

See Note 16 for additional information regarding revenue by reportable segment.

Revenue by Service Line

Solid Waste Collection

The Company's solid waste collection business involves the collection of waste from residential, commercial and industrial customers for transport to transfer stations, or directly to landfills or recycling centers. Solid waste collection services include both recurring and temporary customer relationships. The services are performed under service agreements, municipal contracts or franchise agreements with governmental entities. Existing franchise agreements and most of the existing municipal contracts give the Company the exclusive right to provide specified waste services in the specified territory during the contract term. These exclusive arrangements are awarded, at least initially, on a competitive bid basis and subsequently on a bid or negotiated basis. The standard customer service agreements generally range from one to three years in duration, although some exclusive franchises are for significantly longer periods. Residential collection services are also provided on a subscription basis with individual households. The fees received for collection services are based primarily on the market, collection frequency and level of service, route density, type and volume or weight of the waste collected, type of equipment and containers furnished, the distance to the disposal or processing facility, the cost of disposal or processing, and prices charged by competitors for similar services.

In general, residential collection fees are billed monthly or quarterly in advance. Substantially all of the deferred revenue recognized as of September 30, 2019 was recognized as revenue during the three months ended December 31, 2019 when the service was performed. Commercial customers are typically billed on a monthly basis based on the nature of the services provided during the period. Revenue recognized under these agreements is variable in nature based on the number of residential homes or businesses serviced during the period, the frequency of collection and the volume of waste collected. In addition, certain contracts have annual price escalation clauses that are tied to changes in an underlying base index such as a consumer price index which are unknown at contract inception.

Solid waste collection revenue from sources other than customer contracts primarily relates to lease revenue associated with compactors. Revenue from these leasing arrangements was not material and represented an insignificant amount of total revenue for each of the reported periods.

Landfill and Transfer Station

Revenue at landfills is primarily generated by charging tipping fees on a per ton and/or per yard basis to third parties based on the volume disposed and the nature of the waste. In general, fees are variable in nature and revenue is recognized at the time the waste is disposed at the facility.

Revenue at transfer stations is primarily generated by charging tipping or disposal fees on a per ton and/or per yard basis. The fees charged to third parties are based primarily on the market, type and volume or weight of the waste accepted, the distance to the disposal facility and the cost of disposal. In general, fees are billed and revenue is recognized at the time the service is performed. Revenue recognized under these agreements is variable in nature based on the volume of waste accepted at the transfer facility.

Many of the Company's landfill and transfer station customers have entered into one to ten year disposal contracts, most of which provide for annual indexed price increases.

Solid Waste Recycling

Solid waste recycling revenues are generated by offering residential, commercial, industrial and municipal customers recycling services for a variety of recyclable materials, including compost, cardboard, mixed paper, plastic containers, glass bottles and ferrous and aluminum metals. The Company owns recycling operations and markets collected recyclable materials to third parties for processing before resale. In certain instances, the Company issues recycling rebates to municipal or commercial customers, which can be based on the price it receives upon the sale of recycled commodities, a fixed contractual rate or other measures. The Company also receives rebates when it disposes of recycled commodities at third-party facilities. The fees received are based primarily on the market, type and volume or weight of the materials sold. In general, fees are billed and revenue is recognized at the time title is transferred. Revenue recognized under these agreements is variable in nature based on the volume of materials sold. In addition, the amount of revenue recognized is based on commodity prices at the time of sale, which are unknown at contract inception.

E&P Waste Treatment, Recovery and Disposal

E&P revenue is primarily generated through the treatment, recovery and disposal of non-hazardous exploration and production waste from vertical and horizontal drilling, hydraulic fracturing, production and clean-up activity, as well as other services including closed loop collection systems, the transportation of waste to the disposal facility in certain markets and the sale of recovered products. E&P activity varies across market areas that are tied to the natural resource basins in which the drilling activity occurs and reflects the regulatory environment, pricing and disposal alternatives available in any given market. Revenue recognized under these agreements is variable in nature based on the volume of waste accepted or processed during the period.

Intermodal and Other

Intermodal revenue is primarily generated through providing intermodal services for the rail haul movement of cargo and solid waste containers in the Pacific Northwest through a network of intermodal facilities. The fees received for intermodal services are based on negotiated rates and vary depending on volume commitments by the shipper and destination. In general, fees are billed and revenue is recognized upon delivery.

Other revenues consist primarily of the sale of methane gas generated from the Company’s MSW landfills.

Revenue Recognition

Service obligations of a long-term nature, e.g., solid waste collection service contracts, are satisfied over time, and revenue is recognized based on the value provided to the customer during the period. The amount billed to the customer is based on variable elements such as the number of residential homes or businesses for which collection services are provided, the volume of waste collected, transported and disposed, and the nature of the waste accepted. The Company does not disclose the value of unsatisfied performance obligations for these contracts as its right to consideration corresponds directly to the value provided to the customer for services completed to date and all future variable consideration is allocated to wholly unsatisfied performance obligations.

Additionally, certain elements of long-term customer contracts are unknown upon entering into the contract, including the amount that will be billed in accordance with annual price escalation clauses, fuel recovery fee programs and commodity prices. The amount to be billed is often tied to changes in an underlying base index such as a consumer price index or a fuel or commodity index, and revenue is recognized once the index is established for the period.

Accounts Receivable

Accounts receivable are recorded when billed or accrued and represent claims against third parties that will be settled in cash. The carrying value of the Company’s receivables, net of the allowance for doubtful accounts, represents their estimated net realizable value. The Company estimates its allowance for doubtful accounts based on historical collection trends, type of customer such as municipal or non-municipal, the age of outstanding receivables and existing economic conditions. If events or changes in circumstances indicate that specific receivable balances may be impaired, further consideration is given to the collectability of those balances and the allowance is adjusted accordingly. Past-due receivable balances are written off when the Company's internal collection efforts have been unsuccessful in collecting the amount due.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Contract Acquisition Costs

The incremental direct costs of obtaining a contract, which consist of sales incentives, are recognized as Other assets in the Company's Consolidated Balance Sheet, and are amortized to Selling, general and administrative expense over the estimated life of the relevant customer relationship, which ranges from one to five years. The Company recognizes the incremental costs of obtaining a contract as an expense when incurred if the amortization period of the asset that the entity would have recognized is one year or less. The Company had approximately $16,900 of deferred sales incentives at both December 31, 2019 and 2018. During the years ended December 31, 2019 and 2018, the Company recorded a total of $19,673 and $17,313, respectively, of sales incentive amortization expense for deferred sales incentives and sales incentive expense for contracts with original terms of less than one year.

Property and Equipment

Property and equipment are stated at cost. Improvements or betterments, not considered to be maintenance and repair, which add new functionality or significantly extend the life of an asset are capitalized. Third-party expenditures related to pending development projects, such as legal and engineering expenses, are capitalized. Expenditures for maintenance and repair costs, including planned major maintenance activities, are charged to expense as incurred. The cost of assets retired or otherwise disposed of and the related accumulated depreciation are eliminated from the accounts in the year of disposal. Gains and losses resulting from disposals of property and equipment are recognized in the period in which the property and equipment is disposed. Depreciation is computed using the straight-line method over the estimated useful lives of the assets or the lease term, whichever is shorter.

The estimated useful lives are as follows:

Buildings	10 – 20 years
Leasehold and land improvements	3 – 10 years
Machinery and equipment	3 – 12 years
Rolling stock	3 – 10 years
Containers	3 – 12 years

Landfill Accounting

The Company utilizes the life cycle method of accounting for landfill costs. This method applies the costs to be capitalized associated with acquiring, developing, closing and monitoring the landfills over the associated consumption of landfill capacity. The Company utilizes the units of consumption method to amortize landfill development costs over the estimated remaining capacity of a landfill. Under this method, the Company includes future estimated construction costs using current dollars, as well as costs incurred to date, in the amortization base. When certain criteria are met, the Company includes expansion airspace, which has not been permitted, in the calculation of the total remaining capacity of the landfill.

- Landfill development costs. Landfill development costs include the costs of acquisition, construction associated with excavation, liners, site berms, groundwater monitoring wells, gas recovery systems and leachate collection systems. The Company estimates the total costs associated with developing each landfill site to its final capacity. This includes certain projected landfill site costs that are uncertain because they are dependent on future events and thus actual costs could vary significantly from estimates. The total cost to develop a site to its final capacity includes amounts previously expended and capitalized, net of accumulated depletion, and projections of future purchase and development costs, liner construction costs, and operating construction costs.

Total landfill costs include the development costs associated with expansion airspace. Expansion airspace is addressed below.

- Final capping, closure and post-closure obligations. The Company accrues for estimated final capping, closure and post-closure maintenance obligations at the landfills it owns and the landfills that it operates, but does not own, under life-of-site agreements. Accrued final capping, closure and post-closure costs represent an estimate of the current value of the future obligation associated with final capping, closure and post-closure monitoring of non-hazardous solid waste landfills currently owned or operated under life-of-site agreements by the Company. Final capping costs represent the costs related to installation of clay liners, drainage and compacted soil layers and topsoil constructed over areas of the landfill where total airspace capacity has been consumed. Closure and post-closure monitoring and maintenance costs represent the costs related to cash expenditures yet to be incurred when a landfill facility ceases to accept waste and closes. Accruals for final capping, closure and post-closure monitoring and maintenance requirements in the U.S. consider site inspection, groundwater monitoring, leachate management, methane gas control and recovery, and operating and maintenance costs to be incurred during the period after the facility closes. Certain of these environmental costs, principally capping and methane gas control costs, are also incurred during the operating life of the site in accordance with the landfill operation requirements of Subtitle D and the air emissions standards. Daily maintenance activities, which include many of these costs, are expensed as incurred during the operating life of the landfill. Daily maintenance activities include leachate disposal; surface water, groundwater, and methane gas monitoring and maintenance; other pollution control activities; mowing and fertilizing the landfill final cap; fence and road maintenance; and third-party inspection and reporting costs. Site specific final capping, closure and post-closure engineering cost estimates are prepared annually for landfills owned or landfills operated under life-of-site agreements by the Company.

The net present value of landfill final capping, closure and post-closure liabilities are calculated by estimating the total obligation in current dollars, inflating the obligation based upon the expected date of the expenditure and discounting the inflated total to its present value using a credit-adjusted risk-free rate. Any changes in expectations that result in an upward revision to the estimated undiscounted cash flows are treated as a new liability and are inflated and discounted at rates reflecting current market conditions. Any changes in expectations that result in a downward revision (or no revision) to the estimated undiscounted cash flows result in a liability that is inflated and discounted at rates reflecting the market conditions at the time the cash flows were originally estimated. This policy results in the Company's final capping, closure and post-closure liabilities being recorded in "layers." The Company's discount rate assumption for purposes of computing 2019 and 2018 "layers" for final capping, closure and post-closure obligations was 4.75% for both years, which reflects the Company's long-term credit adjusted risk free rate as of the end of both 2018 and 2017. The Company's inflation rate assumption was 2.5% for the years ended December 31, 2019 and 2018.

In accordance with the accounting guidance on asset retirement obligations, the final capping, closure and post-closure liability is recorded on the balance sheet along with an offsetting addition to site costs which is amortized to depletion expense on a units-of-consumption basis as remaining landfill airspace is consumed. The impact of changes determined to be changes in estimates, based on an annual update, is accounted for on a prospective basis. Depletion expense resulting from final capping, closure and post-closure obligations recorded as a component of landfill site costs will generally be less during the early portion of a landfill's operating life and increase thereafter. Owned landfills and landfills operated under life-of-site agreements have estimated remaining lives, based on remaining permitted capacity, probable expansion capacity and projected annual disposal volumes, that range from approximately 1 to 176 years, with an average remaining life of approximately 29 years. The costs for final capping, closure and post-closure obligations at landfills the Company owns or operates under life-of-site agreements are generally estimated based on interpretations of current requirements and proposed or anticipated regulatory changes.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The following is a reconciliation of the Company's final capping, closure and post-closure liability balance from December 31, 2017 to December 31, 2019:

Final capping, closure and post-closure liability at December 31, 2017	$ 237,817
Liabilities incurred	2,640
Accretion expense associated with landfill obligations	12,777
Closure payments	(2,731)
Assumption of closure liabilities from acquisitions	4,408
Foreign currency translation adjustment	(3,129)
Final capping, closure and post-closure liability at December 31, 2018	251,782
Liabilities incurred	19,846
Accretion expense associated with landfill obligations	14,251
Closure payments	(5,059)
Assumption of closure liabilities from acquisitions	8,707
Foreign currency translation adjustment	1,947
Final capping, closure and post-closure liability at December 31, 2019	$ 291,474

Liabilities incurred of $19,846 and $2,640 for the years ended December 31, 2019 and 2018, respectively, represent non-cash increases to final capping, closure and post-closure liabilities and are recorded on the Condensed Consolidated Balance Sheets along with an offsetting addition to site costs, which is amortized to depletion expense as the remaining landfill airspace is consumed. The final capping, closure and post-closure liability is included in Other long-term liabilities in the Consolidated Balance Sheets. The Company performs its annual review of its cost and capacity estimates in the first quarter of each year.

- Disposal capacity. The Company's internal and third-party engineers perform surveys at least annually to estimate the remaining disposal capacity at its landfills. This is done by using surveys and other methods to calculate, based on the terms of the permit, height restrictions and other factors, how much airspace is left to fill and how much waste can be disposed of at a landfill before it has reached its final capacity. The Company's landfill depletion rates are based on the remaining disposal capacity, considering both permitted and probable expansion airspace, at the landfills it owns, and landfills it operates, but does not own, under life-of-site agreements. The Company's landfill depletion rate is based on the term of the operating agreement at its operated landfill that has capitalized expenditures. Expansion airspace consists of additional disposal capacity being pursued through means of an expansion that has not yet been permitted. Expansion airspace that meets the following criteria is included in the estimate of total landfill airspace:

1) whether the land where the expansion is being sought is contiguous to the current disposal site, and the Company either owns the expansion property or has rights to it under an option, purchase, operating or other similar agreement;
2) whether total development costs, final capping costs, and closure/post-closure costs have been determined;
3) whether internal personnel have performed a financial analysis of the proposed expansion site and have determined that it has a positive financial and operational impact;
4) whether internal personnel or external consultants are actively working to obtain the necessary approvals to obtain the landfill expansion permit; and
5) whether the Company considers it probable that the Company will achieve the expansion (for a pursued expansion to be considered probable, there must be no significant known technical, legal, community, business, or political restrictions or similar issues existing that the Company believes are more likely than not to impair the success of the expansion).

It is possible that the Company's estimates or assumptions could ultimately be significantly different from actual results. In some cases, the Company may be unsuccessful in obtaining an expansion permit or the Company may determine that an expansion permit that the Company previously thought was probable has become unlikely. To the extent that such estimates, or the assumptions used to make those estimates, prove to be significantly different than actual results, or the belief that the Company will receive an expansion permit changes adversely in a significant manner, the costs of the landfill, including the costs incurred in the pursuit of the expansion, may be subject to impairment testing, as described below, and lower profitability may be experienced due to higher amortization rates, higher capping, closure and post-closure rates, and higher expenses or asset impairments related to the removal of previously included expansion airspace.

The Company periodically evaluates its landfill sites for potential impairment indicators. The Company's judgments regarding the existence of impairment indicators are based on regulatory factors, market conditions and operational performance of its landfills. Future events could cause the Company to conclude that impairment indicators exist and that its landfill carrying costs are impaired.

Cell Processing Reserves

The Company records a cell processing reserve related to its E&P segment for certain locations in Louisiana and Texas for the estimated amount of expenses to be incurred upon the treatment and excavation of oilfield waste received. The cell processing reserve is the future cost to properly treat and dispose of existing waste within the cells at the various facilities. The reserve generally covers estimated costs to be incurred over a period of time up to 24 months, with the current portion representing costs estimated to be incurred in the next 12 months. The estimate is calculated based on current estimated volume in the cells, estimated percentage of waste treated, and historical average costs to treat and excavate the waste. The processing reserve represents the estimated costs to process the volumes of oilfield waste on-hand for which revenue has been recognized. At December 31, 2019 and 2018, the current portion of cell processing reserves was $3,518 and $2,835, respectively, which is included in Accrued liabilities in the Consolidated Balance Sheets. At December 31, 2019 and 2018, the long-term portion of cell processing reserves was $1,270 and $1,211, respectively, which is included in Other long-term liabilities in the Consolidated Balance Sheets.

Business Combination Accounting

The Company accounts for business combinations as follows:

- The Company recognizes, separately from goodwill, the identifiable assets acquired and liabilities assumed at their estimated acquisition date fair values. The Company measures and recognizes goodwill as of the acquisition date as the excess of: (a) the aggregate of the fair value of consideration transferred, the fair value of any noncontrolling interest in the acquiree (if any) and the acquisition date fair value of the Company's previously held equity interest in the acquiree (if any), over (b) the fair value of net assets acquired and liabilities assumed.

- At the acquisition date, the Company measures the fair values of all assets acquired and liabilities assumed that arise from contractual contingencies. The Company measures the fair values of all noncontractual contingencies if, as of the acquisition date, it is more likely than not that the contingency will give rise to an asset or liability.

Finite-Lived Intangible Assets

The amounts assigned to franchise agreements, contracts, customer lists, permits and other agreements are being amortized on a straight-line basis over the expected term of the related agreements (ranging from 1 to 56 years).

Goodwill and Indefinite-Lived Intangible Assets

The Company acquired indefinite-lived intangible assets in connection with certain of its acquisitions. The amounts assigned to indefinite-lived intangible assets consist of the value of certain perpetual rights to provide solid waste collection and transportation services in specified territories and to operate E&P waste treatment and disposal facilities. The Company measures and recognizes acquired indefinite-lived intangible assets at their estimated acquisition date fair values. Indefinite-lived intangible assets are not amortized. Goodwill represents the excess of: (a) the aggregate of the fair value of consideration transferred, the fair value of any noncontrolling interest in the acquiree (if any) and the acquisition date fair value of the Company's previously held equity interest in the acquiree (if any), over (b) the fair value of assets acquired and liabilities assumed. Goodwill and intangible assets, deemed to have indefinite lives, are subject to annual impairment tests as described below.

Goodwill and indefinite-lived intangible assets are tested for impairment on at least an annual basis in the fourth quarter of the year. In addition, the Company evaluates its reporting units for impairment if events or circumstances change between annual tests indicating a possible impairment. Examples of such events or circumstances include, but are not limited to, the following:

- a significant adverse change in legal factors or in the business climate;
- an adverse action or assessment by a regulator;
- a more likely than not expectation that a segment or a significant portion thereof will be sold;
- the testing for recoverability of a significant asset group within the segment; or
- current period or expected future operating cash flow losses.

The Company elected to early adopt the guidance issued by the FASB "Simplifying the Test for Goodwill Impairment" on January 1, 2017. The new guidance removes Step 2 of the goodwill impairment test, which required a hypothetical purchase price allocation. As such, the impairment analysis is only one step. In this step, the Company estimates the fair value of each of its reporting units, which consisted of testing its five geographic solid waste operating segments and its E&P segment at December 31, 2019, 2018 and 2017, using discounted cash flow analyses. The Company compares the fair value of each reporting unit with the carrying value of the net assets assigned to each reporting unit. If the fair value of a reporting unit is greater than the carrying value of the net assets, including goodwill, assigned to the reporting unit, then no impairment results. If the fair value is less than its carrying value, an impairment charge is recorded for the amount by which the carrying value exceeds its fair value, not to exceed the carrying amount of goodwill. In testing indefinite-lived intangible assets for impairment, the Company compares the estimated fair value of each indefinite-lived intangible asset to its carrying value. If the fair value of the indefinite-lived intangible asset is less than its carrying value, an impairment charge would be recorded to earnings in the Company's Consolidated Statements of Net Income.

During the Company's annual impairment analysis of its solid waste operations, the Company determined the fair value of each of its five geographic solid waste operating segments at December 31, 2019, 2018 and 2017 and each indefinite-lived intangible asset within those segments using discounted cash flow analyses, which require significant assumptions and estimates about the future operations of each reporting unit and the future discrete cash flows related to each indefinite-lived intangible asset. Significant judgments inherent in these analyses include the determination of appropriate discount rates, the amount and timing of expected future cash flows and growth rates. The cash flows employed in the Company's 2019 discounted cash flow analyses were based on ten-year financial forecasts, which in turn were based on the 2020 annual budget developed internally by management. These forecasts reflect operating profit margins that were consistent with 2019 results and perpetual revenue growth rates of 4.5%. The Company's discount rate assumptions are based on an assessment of the market participant rate which approximated 5.7%. In assessing the reasonableness of the Company's determined fair values of its reporting units, the Company evaluates its results against its current market capitalization. The Company did not record an impairment charge to any of its five geographic solid waste operating segments as a result of its annual goodwill and indefinite-lived intangible assets impairment tests for the years ended December 31, 2019, 2018 or 2017.

Upon adopting the goodwill impairment accounting guidance in the first quarter of 2017, the Company performed an updated impairment test for its E&P segment. The impairment test involved measuring the recoverability of goodwill by comparing the E&P segment's carrying amount, including goodwill, to the fair value of the reporting unit. The fair value was estimated using an income approach employing a discounted cash flow ("DCF") model. The DCF model incorporated projected cash flows over a forecast period based on the remaining estimated lives of the operating locations comprising the E&P segment. This was based on a number of key assumptions, including, but not limited to, a discount rate of 11.7%, annual revenue projections based on E&P waste resulting from projected levels of oil and natural gas exploration and production activity during the forecast period, gross margins based on estimated operating expense requirements during the forecast period and estimated capital expenditures over the forecast period, all of which were classified as Level 3 in the fair value hierarchy. The impairment test showed the carrying value of the E&P segment exceeded its fair value by an amount in excess of the carrying amount of goodwill, or $77,343. Therefore, the Company recorded an impairment charge of $77,343, consisting of the carrying amount of goodwill at its E&P segment at January 1, 2017, to Impairments and other operating charges in the Consolidated Statements of Net Income during the year ended December 31, 2017.

Additionally, the Company evaluated the recoverability of the E&P segment's indefinite-lived intangible assets (other than goodwill) by comparing the estimated fair value of each indefinite-lived intangible asset to its carrying value. The Company estimated the fair value of the indefinite-lived intangible assets using an excess earnings approach. Based on the result of the recoverability test during the years ended December 31, 2019, 2018 and 2017, the Company did not record an impairment charge.

Impairments of Property and Equipment and Finite-Lived Intangible Assets

Property, equipment and finite-lived intangible assets are carried on the Company's consolidated financial statements based on their cost less accumulated depreciation or amortization. Finite-lived intangible assets consist of long-term franchise agreements, contracts, customer lists, permits and other agreements. The recoverability of these assets is tested whenever events or changes in circumstances indicate that their carrying amount may not be recoverable.

Typical indicators that an asset may be impaired include, but are not limited to, the following:

- a significant adverse change in legal factors or in the business climate;
- an adverse action or assessment by a regulator;
- a more likely than not expectation that a segment or a significant portion thereof will be sold;
- the testing for recoverability of a significant asset group within a segment; or
- current period or expected future operating cash flow losses.

If any of these or other indicators occur, a test of recoverability is performed by comparing the carrying value of the asset or asset group to its undiscounted expected future cash flows. If the carrying value is in excess of the undiscounted expected future cash flows, impairment is measured by comparing the fair value of the asset to its carrying value. Fair value is determined by an internally developed discounted projected cash flow analysis of the asset. Cash flow projections are sometimes based on a group of assets, rather than a single asset. If cash flows cannot be separately and independently identified for a single asset, the Company will determine whether an impairment has occurred for the group of assets for which the projected cash flows can be identified. If the fair value of an asset is determined to be less than the carrying amount of the asset or asset group, an impairment in the amount of the difference is recorded in the period that the impairment indicator occurs. Several impairment indicators are beyond the Company's control, and whether or not they will occur cannot be predicted with any certainty. Estimating future cash flows requires significant judgment and projections may vary from cash flows eventually realized. There are other considerations for impairments of landfills, as described below.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

During the year ended December 31, 2019, the Company recorded an $8,000 impairment charge, which is included in Impairments and other operating items in the Consolidated Statements of Net Income, for property and equipment associated with a landfill development project in its E&P segment that the Company is no longer pursuing. During the year ended December 31, 2018, the Company did not record an impairment charge for property and equipment. During the year ended December 31, 2017, the Company recorded an $11,038 impairment charge, which is included in Impairments and other operating items in the Consolidated Statements of Net Income, for property and equipment associated with a project to develop a new landfill in its Central segment that the Company is no longer pursuing.

There are certain indicators listed above that require significant judgment and understanding of the waste industry when applied to landfill development or expansion projects. A regulator or court may deny or overturn a landfill development or landfill expansion permit application before the development or expansion permit is ultimately granted. Management may periodically divert waste from one landfill to another to conserve remaining permitted landfill airspace. Therefore, certain events could occur in the ordinary course of business and not necessarily be considered indicators of impairment due to the unique nature of the waste industry.

Restricted Cash and Restricted Investments

Restricted cash and restricted investments consist of the following:

	December 31, 2019		December 31, 2018	
	Restricted Cash	Restricted Investments	Restricted Cash	Restricted Investments
Settlement of insurance claims	$ 77,680	$ —	$ 66,573	$ —
Landfill closure and post-closure obligations	12,324	48,590	12,325	44,939
Other financial assurance requirements	6,479	2,589	5,763	2,547
	$ 96,483	$ 51,179	$ 84,661	$ 47,486

See Note 11 for further information on restricted cash and restricted investments.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Fair Value of Financial Instruments

The Company's financial instruments consist primarily of cash and equivalents, trade receivables, restricted cash and investments, trade payables, debt instruments, contingent consideration obligations, interest rate swaps and fuel hedges. As of December 31, 2019 and 2018, the carrying values of cash and equivalents, trade receivables, restricted cash and investments, trade payables and contingent consideration are considered to be representative of their respective fair values. The carrying values of the Company's debt instruments, excluding certain notes as listed in the table below, approximate their fair values as of December 31, 2019 and 2018, based on current borrowing rates, current remaining average life to maturity and borrower credit quality for similar types of borrowing arrangements, and are classified as Level 2 within the fair value hierarchy. The carrying values and fair values of the Company's debt instruments where the carrying values do not approximate their fair values as of December 31, 2019 and 2018, are as follows:

	Carrying Value at		Fair Value* at	
	December 31, 2019	December 31, 2018	December 31, 2019	December 31, 2018
5.25% Senior Notes due 2019	$ —	$ 175,000	$ —	$ 177,870
4.64% Senior Notes due 2021	$ 100,000	$ 100,000	$ 102,654	$ 101,292
2.39% Senior Notes due 2021	$ 150,000	$ 150,000	$ 149,823	$ 144,305
3.09% Senior Notes due 2022	$ 125,000	$ 125,000	$ 126,884	$ 120,682
2.75% Senior Notes due 2023	$ 200,000	$ 200,000	$ 201,121	$ 188,363
3.24% Senior Notes due 2024	$ 150,000	$ 150,000	$ 153,804	$ 142,877
3.41% Senior Notes due 2025	$ 375,000	$ 375,000	$ 389,127	$ 355,541
3.03% Senior Notes due 2026	$ 400,000	$ 400,000	$ 406,768	$ 367,143
3.49% Senior Notes due 2027	$ 250,000	$ 250,000	$ 259,789	$ 234,243
4.25% Senior Notes due 2028	$ 500,000	$ 500,000	$ 562,050	$ 506,100
3.50% Senior Notes due 2029	$ 500,000	$ —	$ 533,500	$ —

*Senior Notes are classified as Level 2 within the fair value hierarchy. Fair value is based on quotes of bonds with similar ratings in similar industries.

For details on the fair value of the Company's interest rate swaps, fuel hedges, restricted cash and investments and contingent consideration, see Note 11.

Derivative Financial Instruments

The Company recognizes all derivatives on the balance sheet at fair value. All of the Company's derivatives have been designated as cash flow hedges; therefore, the gain or loss on the derivatives will be recognized in accumulated other comprehensive income (loss) ("AOCIL") and reclassified into earnings in the same period during which the hedged transaction affects earnings and is presented in the same income statement line item as the earnings effect of the hedged item. The Company classifies cash inflows and outflows from derivatives within operating activities on the statement of cash flows.

One of the Company's objectives for utilizing derivative instruments is to reduce its exposure to fluctuations in cash flows due to changes in the variable interest rates of certain borrowings under the Credit Agreement (defined below). The Company's strategy to achieve that objective involves entering into interest rate swaps. The interest rate swaps outstanding at December 31, 2019 were specifically designated to the Credit Agreement and accounted for as cash flow hedges.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

At December 31, 2019, the Company's derivative instruments included 16 interest rate swap agreements as follows:

Date Entered	Notional Amount	Fixed Interest Rate Paid*	Variable Interest Rate Received	Effective Date	Expiration Date
May 2014	$ 50,000	2.344 %	1-month LIBOR	October 2015	October 2020
May 2014	$ 25,000	2.326 %	1-month LIBOR	October 2015	October 2020
May 2014	$ 50,000	2.350 %	1-month LIBOR	October 2015	October 2020
May 2014	$ 50,000	2.350 %	1-month LIBOR	October 2015	October 2020
April 2016	$ 100,000	1.000 %	1-month LIBOR	February 2017	February 2020
June 2016	$ 75,000	0.850 %	1-month LIBOR	February 2017	February 2020
June 2016	$ 150,000	0.950 %	1-month LIBOR	January 2018	January 2021
June 2016	$ 150,000	0.950 %	1-month LIBOR	January 2018	January 2021
July 2016	$ 50,000	0.900 %	1-month LIBOR	January 2018	January 2021
July 2016	$ 50,000	0.890 %	1-month LIBOR	January 2018	January 2021
August 2017	$ 100,000	1.900 %	1-month LIBOR	July 2019	July 2022
August 2017	$ 200,000	2.200 %	1-month LIBOR	October 2020	October 2025
August 2017	$ 150,000	1.950 %	1-month LIBOR	February 2020	February 2023
June 2018	$ 200,000	2.925 %	1-month LIBOR	October 2020	October 2025
June 2018	$ 200,000	2.925 %	1-month LIBOR	October 2020	October 2025
December 2018	$ 200,000	2.850 %	1-month LIBOR	July 2022	July 2027

* Plus applicable margin.

Another of the Company's objectives for utilizing derivative instruments is to reduce its exposure to fluctuations in cash flows due to changes in the price of diesel fuel. The Company's strategy to achieve that objective involves periodically entering into fuel hedges that are specifically designated to certain forecasted diesel fuel purchases and accounted for as cash flow hedges. At December 31, 2019 and 2018, the Company had no fuel hedge agreements in place.

The fair values of derivative instruments designated as cash flow hedges as of December 31, 2019, were as follows:

Derivatives Designated as Cash Flow Hedges	Asset Derivatives		Liability Derivatives	
	Balance Sheet Location	Fair Value	Balance Sheet Location	Fair Value
Interest rate swaps	Prepaid expenses and other current assets(a)	$ 2,845	Accrued liabilities(a)	$ (3,680)
			Other long-term liabilities	(38,967)
Total derivatives designated as cash flow hedges		$ 2,845		$ (42,647)

(a) Represents the estimated amount of the existing unrealized gains and losses, respectively, on interest rate swaps as of December 31, 2019 (based on the interest rate yield curve at that date), included in AOCIL expected to be reclassified into pre-tax earnings within the next 12 months. The actual amounts reclassified into earnings are dependent on future movements in interest rates.

The fair values of derivative instruments designated as cash flow hedges as of December 31, 2018, were as follows:

Derivatives Designated as Cash Flow Hedges	Asset Derivatives		Liability Derivatives	
	Balance Sheet Location	Fair Value	Balance Sheet Location	Fair Value
Interest rate swaps	Prepaid expenses and other current assets	$ 10,737	Other long-term liabilities	$ (9,314)
	Other assets, net	10,675		
Total derivatives designated as cash flow hedges		$ 21,412		$ (9,314)

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The following table summarizes the impact of the Company's cash flow hedges on the results of operations, comprehensive income (loss) and AOCIL for the years ended December 31, 2019, 2018 and 2017:

Derivatives Designated as Cash Flow Hedges	Amount of Gain or (Loss) Recognized as AOCIL on Derivatives, Net of Tax [(a)] Years Ended December 31, 2019	2018	2017	Statement of Net Income Classification	Amount of (Gain) or Loss Reclassified from AOCIL into Earnings, Net of Tax [(b), (c)] Years Ended December 31, 2019	2018	2017
Interest rate swaps	$ (32,247)	$ (892)	$ 3,795	Interest expense	$ (5,900)	$ (4,167)	$ 2,062
Fuel hedges	—	1,997	959	Cost of operations	—	(4,904)	2,112
Total	$ (32,247)	$ 1,105	$ 4,754		$ (5,900)	$ (9,071)	$ 4,174

(a) In accordance with the derivatives and hedging guidance, the changes in fair values of interest rate swaps and fuel hedges have been recorded in equity as a component of AOCIL. As the critical terms of the interest rate swaps match the underlying debt being hedged, all unrealized changes in fair value are recorded in AOCIL. Because changes in the actual price of diesel fuel and changes in the DOE index price did not offset exactly each reporting period, the Company assessed whether the fuel hedges were highly effective using the cumulative dollar offset approach.
(b) Amounts reclassified from AOCIL into earnings related to realized gains and losses on interest rate swaps are recognized when interest payments or receipts occur related to the swap contracts, which correspond to when interest payments are made on the Company's hedged debt.
(c) Amounts reclassified from AOCIL into earnings related to realized gains and losses on the fuel hedges are recognized when settlement payments or receipts occur related to the hedge contracts, which correspond to when the underlying fuel is consumed.

See Note 14 for further discussion on the impact of the Company's hedge accounting to its consolidated Comprehensive income (loss) and AOCIL.

Income Taxes

Deferred tax assets and liabilities are determined based on differences between the financial reporting and income tax bases of assets and liabilities and are measured using the enacted tax rates and laws that are expected to be in effect when the differences are expected to reverse. The Company records valuation allowances to reduce net deferred tax assets to the amount considered more likely than not to be realized.

The Company is required to evaluate whether the tax positions taken on its income tax returns will more likely than not be sustained upon examination by the appropriate taxing authority. If the Company determines that such tax positions will not be sustained, it records a liability for the related unrecognized tax benefits. The Company classifies its liability for unrecognized tax benefits as a current liability to the extent it anticipates making a payment within one year.

On December 22, 2017, the SEC staff issued Staff Accounting Bulletin No. 118 ("SAB 118") which provides guidance on accounting for the tax effects of the Tax Cuts and Jobs Act ("Tax Act"). The Tax Act, enacted on December 22, 2017, is comprehensive tax legislation which makes broad and complex changes to the U.S. tax code that affected 2017 and subsequent years. SAB 118 provides a measurement period that should not extend beyond one year from the Tax Act enactment date for companies to complete the accounting under Accounting Standards Codification 740 ("ASC 740"). In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Act for which the accounting under ASC 740 is complete. To the extent that a company's accounting for certain income tax effects of the Tax Act is incomplete but it is able to determine a reasonable estimate, it must record a provisional estimate in the financial statements.

In connection with the Company's analysis of the Tax Act, a discrete net income tax benefit of $269,804 was recorded in the year ended December 31, 2017. This net income tax benefit was primarily the result of the reduction to the corporate income tax rate from 35 percent to 21 percent. Additionally, the Tax Act's one-time deemed repatriation transition tax (the "Transition Tax") on certain unrepatriated earnings of non-U.S. subsidiaries is a tax on previously untaxed accumulated and current earnings and profits of certain of the Company's non-U.S. subsidiaries. To determine the amount of the Transition Tax, the Company had to determine, in addition to other factors, the amount of post-1986 earnings and profits of the relevant subsidiaries, as well as the amount of non-U.S. income taxes paid on such earnings. The Company was able to make a reasonable estimate of the Transition Tax and recorded a provisional Transition Tax obligation of $1,000 for the year ended December 31, 2017. The Transition Tax, which has been determined to be complete, resulted in a total Transition Tax obligation of $746 with a corresponding adjustment of $254 to income tax expense for the year ended December 31, 2018. Further, as it relates to the Company's policy regarding the accounting for the tax impacts of global intangible low-taxed income, it has elected to record the tax impacts as period costs.

Additionally, in conjunction with the Tax Act, the Company recorded a provisional deferred income tax expense of $62,350 for the year ended December 31, 2017 associated with a portion of its U.S. earnings no longer permanently reinvested. During the year ended December 31, 2018, the Company recorded a deferred income tax expense of $6,429 associated with refinements to the prior year estimate as a measurement period adjustment pursuant to SAB 118. This resulted in total deferred income tax expense of $68,779 which has been determined to be complete.

Share-Based Compensation

The fair value of restricted share unit ("RSU") awards is determined based on the number of RSUs granted and the closing price of the common shares in the capital of the Company adjusted for future dividends. The fair value of deferred share unit ("DSU") awards is determined based on the number of DSUs granted and the closing price of the common shares in the capital of the Company.

Compensation expense associated with outstanding performance-based restricted share unit ("PSU") awards is measured using the fair value of the Company's common shares adjusted for future dividends and is based on the estimated achievement of the established performance criteria at the end of each reporting period until the performance period ends, recognized ratably over the performance period. Compensation expense is only recognized for those awards that the Company expects to vest, which it estimates based upon an assessment of the probability that the performance criteria will be achieved.

All share-based compensation cost is measured at the grant date, based on the estimated fair value of the award adjusted for future dividends, and is recognized on a straight-line basis as expense over the employee's requisite service period. The Company recognizes gross share compensation expense with actual forfeitures as they occur.

Warrants are valued using the Black-Scholes pricing model with a contractual life of five years, a risk free interest rate based on the 5-year U.S. treasury yield curve and expected volatility. The Company uses the historical volatility of its common shares over a period equivalent to the contractual life of the warrants to estimate the expected volatility. The fair market value of warrants issued to consultants for acquisitions are recorded immediately as share-based compensation expense.

Share-based compensation expense recognized during the years ended December 31, 2019, 2018 and 2017, was $42,671 ($31,926 net of taxes), $43,803 ($32,774 net of taxes) and $39,361 ($25,608 net of taxes), respectively. This share-based compensation expense includes RSUs, PSUs, DSUs, share option and warrant expense. The share-based compensation expense totals include amounts associated with the Progressive Waste share-based compensation plans, continued by the Company following the Progressive Waste acquisition, which allow for the issuance of shares or cash settlement to employees upon vesting. The Company records share-based compensation expense in Selling, general and administrative expenses in the Consolidated Statements of Net Income. The total unrecognized compensation cost at December 31, 2019, related to unvested RSU awards was $39,126 and this future expense will be recognized over the remaining vesting period of the RSU awards, which extends to 2023. The weighted average remaining vesting period of the RSU awards is 1.1 years. The total unrecognized compensation cost at December 31, 2019, related to unvested PSU awards was $13,221 and this future expense will be recognized over the remaining vesting period of the PSU awards, which extends to 2023. The weighted average remaining vesting period of PSU awards is 1.0 years.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Other Restricted Share Units

As of December 31, 2019, 2018 and 2017, the Company had a liability of $7,178, $9,799 and $10,785, respectively, representing the December 31, 2019, 2018 and 2017 fair values, respectively, of outstanding Progressive Waste restricted share units which are expected to be cash settled. For the years ended December 31, 2019 and 2018, the fair value was calculated using the number of shares granted and the closing price of the common shares in the capital of the Company. All remaining unvested Progressive Waste restricted share units vested during the year ended December 31, 2019.

Other Performance-Based Restricted Share Units

As of December 31, 2018 and 2017, the Company had a liability of $1,923 and $3,500, respectively, representing the December 31, 2018 and 2017 fair values, respectively, of outstanding Progressive Waste performance-based restricted share units, which were cash settled, less unrecognized compensation cost. The fair value was calculated using the volume weighted average price of the Company's shares for the five preceding business days as of December 31, 2018 and 2017 which were $73.06, and $71.50, respectively. All remaining unvested Progressive Waste performance-based restricted share units vested during the year ended December 31, 2018. All remaining outstanding Progressive Waste performance-based restricted share units were settled during the year ended December 31, 2019.

Other Share Based Options

The fair value of the Progressive Waste share based options outstanding was calculated using a Black-Scholes pricing model with the following weighted average assumptions for the years ended December 31, 2019, 2018 and 2017:

	Years Ended December 31,		
	2019	2018	2017
Expected remaining life	1.50 years	2.50 years	0.92 to 2.30 years
Share volatility	16.14%	14.86%	12.09% to 26.07%
Discount rate	1.61%	2.51%	1.75% to 1.92%
Annual dividend rate	0.82%	0.86%	0.79%

All remaining unvested Progressive Waste share based options vested during the year ended December 31, 2017. As of December 31, 2019, 2018 and 2017, the Company had a liability of $8,559, $8,812 and $10,751, respectively, representing the December 31, 2019, 2018 and 2017 fair value, respectively, of outstanding Progressive Waste share based options which are expected to be cash settled.

Per Share Information

Basic net income per share attributable to holders of the Company's common shares is computed using the weighted average number of common shares outstanding and vested and unissued restricted share units deferred for issuance into the deferred compensation plan. Diluted net income per share attributable to holders of the Company's common shares is computed using the weighted average number of common and potential common shares outstanding. Potential common shares are excluded from the computation if their effect is anti-dilutive.

Advertising Costs

Advertising costs are expensed as incurred. Advertising expense for the years ended December 31, 2019, 2018 and 2017, was $5,410, $5,029 and $5,047, respectively, which is included in Selling, general and administrative expense in the Consolidated Statements of Net Income.

Insurance Liabilities

As a result of its insurance policies, the Company is effectively self-insured for automobile liability, general liability, employer's liability, environmental liability, cyber liability, employment practices liability, and directors' and officers' liability as well as for employee group health insurance, property and workers' compensation. The Company's insurance accruals are based on claims filed and estimates of claims incurred but not reported and are developed by the Company's management with assistance from its third-party actuary and its third-party claims administrator. The insurance accruals are influenced by the Company's past claims experience factors, which have a limited history, and by published industry development factors. At December 31, 2019 and 2018, the Company's total accrual for self-insured liabilities was $127,029 and $119,506, respectively, which is included in Accrued liabilities in the Consolidated Balance Sheets. For the years ended December 31, 2019, 2018 and 2017, the Company recognized $155,748, $146,940 and $141,405, respectively, of self-insurance expense which is included in Cost of operations and Selling, general and administrative expense in the Consolidated Statements of Net Income.

4. USE OF ESTIMATES AND ASSUMPTIONS

In preparing the Company's consolidated financial statements, several estimates and assumptions are made that affect the accounting for and recognition of assets, liabilities, revenues and expenses. These estimates and assumptions must be made because certain of the information that is used in the preparation of the Company's consolidated financial statements is dependent on future events, cannot be calculated with a high degree of precision from data available or is simply not capable of being readily calculated based on generally accepted methodologies. In some cases, these estimates are particularly difficult to determine and the Company must exercise significant judgment. The most difficult, subjective and complex estimates and the assumptions that deal with the greatest amount of uncertainty are related to the Company's accounting for landfills, self-insurance accruals, income taxes, allocation of acquisition purchase price, contingent consideration accruals and asset impairments, which are discussed in Note 3. An additional area that involves estimation is when the Company estimates the amount of potential exposure it may have with respect to litigation, claims and assessments in accordance with the accounting guidance on contingencies. Actual results for all estimates could differ materially from the estimates and assumptions that the Company uses in the preparation of its consolidated financial statements.

5. ACQUISITIONS

The Company recognizes, separately from goodwill, the identifiable assets acquired and liabilities assumed at their estimated acquisition date fair values. The Company measures and recognizes goodwill as of the acquisition date as the excess of: (a) the aggregate of the fair value of consideration transferred, the fair value of any noncontrolling interest in the acquiree (if any) and the acquisition date fair value of the Company's previously held equity interest in the acquiree (if any), over (b) the fair value of assets acquired and liabilities assumed. If information about facts and circumstances existing as of the acquisition date is incomplete by the end of the reporting period in which a business combination occurs, the Company will report provisional amounts for the items for which the accounting is incomplete. The measurement period ends once the Company receives the information it was seeking; however, this period will not exceed one year from the acquisition date. Any material adjustments recognized during the measurement period will be reflected prospectively in the period the adjustment is identified in the consolidated financial statements. The Company recognizes acquisition-related costs as expense.

The Company acquired 21 individually immaterial non-hazardous solid waste collection, transfer, recycling and disposal businesses during the year ended December 31, 2019. The purchase consideration recorded during this period included contingent consideration based upon future asset and revenue growth associated with the acquired businesses. The fair value of the total contingent consideration recorded during the year ended December 31, 2019 of $14,038 was determined using probability assessments of the expected future cash flows over a one to four year period in which the obligations are expected to be settled, and applying an average discount rate of 2.3%. As of December 31, 2019, the obligations recognized at the purchase date have not materially changed. Any changes in the fair value of the contingent consideration subsequent to the acquisition date will be charged or credited to expense until the contingency is settled. The total acquisition-related costs incurred during the year ended December 31, 2019 for these acquisitions was $12,335. These expenses are included in Selling, general and administrative expenses in the Company’s Consolidated Statements of Net Income.

The Company acquired 20 individually immaterial non-hazardous solid waste collection, transfer, recycling and disposal businesses during the year ended December 31, 2018. The purchase price for one of these acquisitions included contingent consideration of $11,593, representing the fair value of up to $12,582 of amounts payable to the former owners based on the achievement of certain operating targets specified in the asset purchase agreement. The fair value of the contingent consideration was determined using probability assessments of the expected future cash flows over the three-year period in which the obligation is expected to be settled, and applying a discount rate of 2.7%. As of December 31, 2019, the obligation recognized at the purchase date has not materially changed. Any changes in the fair value of the contingent consideration subsequent to the acquisition date will be charged or credited to expense until the contingency is settled. The total acquisition-related costs incurred during the year ended December 31, 2018 for these acquisitions was $8,607. These expenses are included in Selling, general and administrative expenses in the Company’s Consolidated Statements of Net Income.

The Company acquired 14 individually immaterial non-hazardous solid waste collection, transfer and recycling businesses during the year ended December 31, 2017. The total acquisition-related costs incurred during the year ended December 31, 2017 for these acquisitions was $5,700. These expenses are included in Selling, general and administrative expenses in the Company’s Consolidated Statements of Net Income.

The results of operations of the acquired businesses have been included in the Company’s consolidated financial statements from their respective acquisition dates. The Company expects these acquired businesses to contribute towards the achievement of the Company’s strategy to expand through acquisitions. Goodwill acquired is attributable to the synergies and ancillary growth opportunities expected to arise after the Company’s acquisition of these businesses.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The following table summarizes the consideration transferred to acquire these businesses and the amounts of identifiable assets acquired and liabilities assumed at the acquisition dates for the acquisitions consummated in the years ended December 31, 2019, 2018 and 2017:

	2019 Acquisitions	2018 Acquisitions	2017 Acquisitions
Fair value of consideration transferred:			
Cash	$ 736,610	$ 830,091	$ 410,695
Debt assumed	95,809	210,461	56,958
Notes issued to sellers	—	—	13,460
Fair value of operations exchanged	—	—	81,097
Change in open working capital settlements at year end	5,272	(8,507)	—
	837,691	1,032,045	562,210
Recognized amounts of identifiable assets acquired and liabilities assumed associated with businesses acquired:			
Accounts receivable	25,220	23,682	19,228
Prepaid expenses and other current assets	4,970	4,614	10,722
Property and equipment	294,037	437,914	169,433
Long-term franchise agreements and contracts	78,312	10,888	54,674
Indefinite-lived intangibles	—	—	5,830
Customer lists	52,422	133,387	33,529
Permits and other intangibles	48,141	23,935	27,261
Other assets	7	19	3,052
Accounts payable and accrued liabilities	(19,209)	(25,005)	(12,020)
Deferred revenue	(17,245)	(16,238)	(6,883)
Contingent consideration	(14,038)	(11,669)	(2,885)
Other long-term liabilities	(8,707)	(15,532)	(1,080)
Deferred income taxes	(13,287)	(391)	(50,283)
Total identifiable net assets	430,623	565,604	250,578
Goodwill	$ 407,068	$ 466,441	$ 311,632

Goodwill acquired in 2019 totaling $266,310 is expected to be deductible for tax purposes. Goodwill acquired in 2018 totaling $455,283 is expected to be deductible for tax purposes. Goodwill acquired in 2017 totaling $62,887 is expected to be deductible for tax purposes.

The fair value of acquired working capital related to nine individually immaterial acquisitions completed during the year ended December 31, 2019, is provisional pending receipt of information from the acquirees to support the fair value of the assets acquired and liabilities assumed. Any adjustments recorded relating to finalizing the working capital for these nine acquisitions are not expected to be material to the Company’s financial position.

The gross amount of trade receivables due under contracts acquired during the year ended December 31, 2019, was $27,297, of which $2,077 was expected to be uncollectible. The gross amount of trade receivables due under contracts acquired during the year ended December 31, 2018, was $27,795, of which $4,113 was expected to be uncollectible. The gross amount of trade receivables due under contracts acquired during the year ended December 31, 2017, was $20,746, of which $1,518 was expected to be uncollectible. The Company did not acquire any other class of receivable as a result of the acquisition of these businesses.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

6. INTANGIBLE ASSETS, NET

Intangible assets, exclusive of goodwill, consisted of the following at December 31, 2019:

	Gross Carrying Amount	Accumulated Amortization	Accumulated Impairment Loss	Net Carrying Amount
Finite-lived intangible assets:				
Long-term franchise agreements and contracts	$ 550,340	$ (192,462)	$ —	$ 357,878
Customer lists	587,562	(308,427)	—	279,135
Permits and other	367,127	(63,299)	—	303,828
	1,505,029	(564,188)	—	940,841
Indefinite-lived intangible assets:				
Solid waste collection and transportation permits	158,591	—	—	158,591
Material recycling facility permits	42,283	—	—	42,283
E&P facility permits	59,855	—	(38,507)	21,348
	260,729	—	(38,507)	222,222
Intangible assets, exclusive of goodwill	$ 1,765,758	$ (564,188)	$ (38,507)	$ 1,163,063

The weighted-average amortization period of long-term franchise agreements and contracts acquired during the year ended December 31, 2019 was 16.1 years. The weighted-average amortization period of customer lists acquired during the year ended December 31, 2019 was 10.5 years. The weighted-average amortization period of finite-lived permits and other acquired during the year ended December 31, 2019 was 38.8 years.

Intangible assets, exclusive of goodwill, consisted of the following at December 31, 2018:

	Gross Carrying Amount	Accumulated Amortization	Accumulated Impairment Loss	Net Carrying Amount
Finite-lived intangible assets:				
Long-term franchise agreements and contracts	$ 476,833	$ (157,986)	$ —	$ 318,847
Customer lists	530,614	(232,461)	—	298,153
Permits and other	338,601	(49,195)	—	289,406
	1,346,048	(439,642)	—	906,406
Indefinite-lived intangible assets:				
Solid waste collection and transportation permits	158,591	—	—	158,591
Material recycling facility permits	42,283	—	—	42,283
E&P facility permits	59,855	—	(38,507)	21,348
	260,729	—	(38,507)	222,222
Intangible assets, exclusive of goodwill	$ 1,606,777	$ (439,642)	$ (38,507)	$ 1,128,628

Estimated future amortization expense for the next five years relating to finite-lived intangible assets is as follows:

For the year ending December 31, 2020	$ 126,000
For the year ending December 31, 2021	$ 109,234
For the year ending December 31, 2022	$ 94,173
For the year ending December 31, 2023	$ 79,710
For the year ending December 31, 2024	$ 68,350

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

7. PROPERTY AND EQUIPMENT, NET

Property and equipment, net consists of the following:

	December 31,	
	2019	2018
Landfill site costs	$ 4,334,562	$ 3,981,870
Rolling stock	2,011,283	1,736,673
Land, buildings and improvements	1,079,420	963,903
Containers	764,607	682,990
Machinery and equipment	749,557	660,961
Construction in progress	23,739	25,692
	8,963,168	8,052,089
Less accumulated depreciation and depletion	(3,446,821)	(2,883,093)
	$ 5,516,347	$ 5,168,996

The Company's landfill depletion expense, recorded in Depreciation in the Consolidated Statements of Net Income, for the years ended December 31, 2019, 2018 and 2017, was $225,687, $206,404 and $196,314, respectively.

8. LEASES

The Company rents certain equipment and facilities under both short-term agreements and non-cancelable operating lease agreements. The Company determines if an arrangement is or contains a lease at contract inception. The Company recognizes a right-of-use ("ROU") asset and a lease liability at the lease commencement date. The lease liability is initially measured at the present value of the unpaid lease payments at the lease commencement date.

Key estimates and judgments include how the Company determines (1) the discount rate it uses to discount the unpaid lease payments to present value, (2) lease term and (3) lease payments.

The lease guidance requires a lessee to discount its unpaid lease payments using the interest rate implicit in the lease or, if that rate cannot be readily determined, its incremental borrowing rate. Generally, the Company cannot determine the interest rate implicit in the lease because it does not have access to the lessor's estimated residual value or the amount of the lessor's deferred initial direct costs. Therefore, the Company generally uses its incremental borrowing rate as the discount rate for the lease. The Company's incremental borrowing rate for a lease is the rate of interest it would have to pay on a collateralized basis to borrow an amount equal to the lease payments under similar terms.

The lease term for the Company's leases includes the noncancelable period of the lease, plus any additional periods covered by either a Company option to extend (or not to terminate) the lease that the Company is reasonably certain to exercise, or an option to extend (or not to terminate) the lease controlled by the lessor.

Lease payments included in the measurement of the lease liability comprise fixed payments or variable lease payments. The variable lease payments take into account annual changes in the consumer price index and common area maintenance charges, if known.

ROU assets for operating leases are periodically reviewed for impairment losses. The Company uses the long-lived assets impairment guidance in ASC Subtopic 360-10, Property, Plant, and Equipment – Overall, to determine whether an ROU asset is impaired, and if so, the amount of the impairment loss to recognize. The Company did not recognize an impairment charge for any of its ROU assets during the year ended December 31, 2019.

The Company monitors for events or changes in circumstances that require a reassessment of one of its leases. When a reassessment results in the remeasurement of a lease liability, a corresponding adjustment is made to the carrying amount of the corresponding ROU asset. The Company did not recognize any significant remeasurements during the year ended December 31, 2019.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The Company has elected not to recognize ROU assets and lease liabilities for short-term leases that have a lease term of 12 months or less. The Company has elected to apply the short-term lease recognition and measurement exemption allowed for in the lease accounting standard. The Company recognizes the lease payments associated with its short-term leases as an expense on a straight-line basis over the lease term.

Lease cost for operating leases for the year ended December 31, 2019 was as follows:

	Year Ended December 31, 2019
Operating lease cost	$ 38,710

Supplemental cash flow information and non-cash activity related to the Company's operating leases are as follows:

	Year Ended December 31, 2019
Operating cash flow information:	
Cash paid for amounts included in the measurement of lease liabilities	$ 38,226
Non-cash activity:	
Right-of-use assets obtained in exchange for lease liabilities	$ 10,746

Weighted-average remaining lease term and discount rate for the Company's operating leases are as follows:

	Year Ended December 31, 2019
Weighted average remaining lease term	8.7 years
Weighted average discount rate	3.99 %

As of December 31, 2019, future minimum lease payments, as calculated under the new lease guidance and reconciled to the operating lease liability, are as follows:

2020	$ 36,718
2021	33,432
2022	32,087
2023	28,750
2024	20,382
Thereafter	75,716
Minimum lease payments	227,085
Less: imputed interest	(37,123)
Present value of minimum lease payments	189,962
Less: current portion of operating lease liabilities	(29,929)
Long-term portion of operating lease liabilities	$ 160,033

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

As of December 31, 2018, minimum lease payments under non-cancelable operating leases by period were expected to be as follows:

2019	$ 37,902
2020	35,204
2021	32,259
2022	30,974
2023	27,882
Thereafter	94,205
	$ 258,426

A summary of rent expense for both short-term agreements and non-cancelable operating lease agreements for the years ended December 31, 2018 and 2017 was as follows:

	2018	2017
Rent expense	$ 42,646	$ 43,383

9. ACCRUED LIABILITIES

Accrued liabilities consist of the following:

	December 31,	
	2019	2018
Insurance claims	$ 127,029	$ 119,506
Payroll and payroll-related	71,593	87,136
Interest payable	17,286	16,971
Final capping, closure and post-closure liability - current portion	7,707	26,126
Unrealized cash flow hedge losses	3,680	—
Cell processing reserve - current portion	3,518	2,835
Environmental remediation reserve - current portion	2,314	3,592
Share-based compensation plan liability – current portion	930	6,209
Other	47,251	53,295
	$ 281,308	$ 315,670

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

10. LONG-TERM DEBT

The following table presents the Company's long-term debt as of December 31, 2019 and 2018:

	December 31, 2019	December 31, 2018
Revolver under Credit Agreement, bearing interest ranging from 2.90% to 3.18% [a]	$ 916,247	$ 481,610
Term loan under Credit Agreement, bearing interest at 2.90% [a]	700,000	1,237,500
5.25% Senior Notes due 2019	—	175,000
4.64% Senior Notes due 2021	100,000	100,000
2.39% Senior Notes due 2021	150,000	150,000
3.09% Senior Notes due 2022	125,000	125,000
2.75% Senior Notes due 2023	200,000	200,000
3.24% Senior Notes due 2024	150,000	150,000
3.41% Senior Notes due 2025	375,000	375,000
3.03% Senior Notes due 2026	400,000	400,000
3.49% Senior Notes due 2027	250,000	250,000
4.25% Senior Notes due 2028	500,000	500,000
3.50% Senior Notes due 2029	500,000	—
Tax-exempt bonds	—	15,930
Notes payable to sellers and other third parties, bearing interest ranging from 2.75% to 10.90%, principal and interest payments due periodically with due dates ranging from 2020 to 2036 [a]	9,638	14,653
	4,375,885	4,174,693
Less – current portion	(465)	(1,786)
Less – debt issuance costs	(21,638)	(19,442)
	$ 4,353,782	$ 4,153,465

(a) Interest rates represent the interest rates incurred at December 31, 2019.

Credit Agreement

The Company has a revolving credit and term loan agreement (the "Credit Agreement") with Bank of America, N.A., acting through its Canada Branch, as global agent, the swing line lender and letter of credit issuer, Bank of America, N.A., as the U.S. Agent and a letter of credit issuer, the lenders (the "Lenders") and any other financial institutions from time to time party thereto. There are no subsidiary guarantors under the Credit Agreement. The Credit Agreement has a scheduled maturity date of March 21, 2023.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Details of the Credit Agreement are as follows:

	December 31, 2019	December 31, 2018
Revolver under Credit Agreement		
Available	$ 538,642	$ 955,779
Letters of credit outstanding	$ 107,611	$ 125,111
Total amount drawn, as follows:	$ 916,247	$ 481,610
Amount drawn - U.S. LIBOR rate loan	$ 897,000	$ 357,000
Interest rate applicable - U.S. LIBOR rate loan	2.90 %	3.62 %
Interest rate margin - U.S. LIBOR rate loan	1.10 %	1.10 %
Amount drawn – Canadian bankers' acceptance	$ 19,247	$ 124,610
Interest rate applicable – Canadian bankers' acceptance	3.18 %	3.40 %
Interest rate acceptance fee – Canadian bankers' acceptance	1.10 %	1.10 %
Commitment – rate applicable	0.12 %	0.12 %
Term loan under Credit Agreement		
Amount drawn – U.S. based LIBOR loan	$ 700,000	$ 1,237,500
Interest rate applicable – U.S. based LIBOR loan	2.90 %	3.62 %
Interest rate margin – U.S. based LIBOR loan	1.10 %	1.10 %

Pursuant to the terms and conditions of the Credit Agreement, the Lenders provide a $3,200,000 credit facility to the Company, consisting of (i) revolving advances up to an aggregate principal amount of $1,562,500 at any one time outstanding, and (ii) a term loan in an aggregate principal amount of $1,637,500. As part of the aggregate commitments under the revolving advances, the Credit Agreement provides for letters of credit to be issued at the request of the Company in an aggregate amount not to exceed $320,000 and for swing line loans to be issued at the request of the Company in an aggregate amount not to exceed the lessor of $75,000 and the aggregate commitments under the revolving advances. Both the letter of credit sublimit and the swing line sublimit are part of, and not in addition to, the aggregate commitments under the revolving advances. Subject to certain specified conditions and additional deliveries, the Company has the option to request increases in the aggregate commitments for revolving advances and one or more additional term loans, provided that (i) the aggregate principal amount of such requests does not exceed $500,000 and (ii) the aggregate principal amount of commitments and term loans under the credit facility does not exceed $3,700,000. The Company has $3,939 of debt issuance costs related to the Credit Agreement recorded in Other assets, net in the Consolidated Balance Sheets at December 31, 2019, which are being amortized through the maturity date, or March 21, 2023.

Advances are available under the Credit Agreement in U.S. dollars and Canadian dollars. Interest accrues on the term loan at a LIBOR rate or a base rate, at the Company's option, plus an applicable margin. Interest accrues on revolving advances, at the Company's option, (i) at a LIBOR rate or a base rate for U.S. dollar borrowings, plus an applicable margin, and (ii) at the Canadian prime rate for Canadian dollar borrowings, plus an applicable margin. Canadian dollar borrowings are also available by way of bankers' acceptances or BA equivalent loans ("BA loans"), subject to the payment of a drawing fee. The fees for letters of credit in US dollars and Canadian dollars are also based on the applicable margin. The applicable margin used in connection with interest rates and fees is based on the Company's Leverage Ratio (as defined below). The applicable margin for LIBOR rate loans, drawing fees for bankers' acceptance and BA loans and letter of credit fees ranges from 1.00% to 1.50%, and the applicable margin for base rate loans, Canadian prime rate loans and swing line loans ranges from 0.00% to 0.50%. The Company will also pay a fee based on its Leverage Ratio (as defined below) on the actual daily unused amount of the aggregate revolving commitments.

The borrowings under the Credit Agreement are unsecured. The Credit Agreement contains customary representations, warranties, covenants and events of default, including, among others, a change of control event of default and limitations on the incurrence of indebtedness and liens, new lines of business, mergers, transactions with affiliates and burdensome agreements. During the continuance of an event of default, the Lenders may take a number of actions, including, among others, declaring the entire amount then outstanding under the Credit Agreement to be due and payable. The Credit Agreement includes a financial covenant limiting, as of the last day of each fiscal quarter, the ratio of (a) (i) Consolidated Total Funded Debt (as defined in the Credit Agreement) as of such date less (ii) the sum of cash and cash equivalents of the Company and its subsidiaries on a dollar-for-dollar basis as of such date in excess of $50,000 up to a maximum of $200,000 (such that the maximum amount of reduction pursuant to this calculation does not exceed $150,000) to (b) Consolidated EBITDA (as defined in the Credit Agreement), measured for the preceding 12 months (the “Leverage Ratio”), to not more than 3.50 to 1.00 (or 3.75 to 1.00 during material acquisition periods, subject to certain limitations). The Credit Agreement also includes a financial covenant requiring the ratio of Consolidated EBIT (as defined in the Credit Agreement) to Consolidated Total Interest Expense (as defined in the Credit Agreement), in each case, measured for the preceding 12 months, (the “Interest Coverage Ratio”) to be not less than 2.75 to 1.00. As of December 31, 2019 and 2018, the Company was in compliance with all applicable covenants in the Credit Agreement.

2016 Master Note Purchase Agreement

On June 1, 2016, the Company entered into a Master Note Purchase Agreement (as supplemented by the First Supplement dated as of February 13, 2017 (the “2016 First Supplement”) and as amended, restated, amended and restated, assumed, supplemented or modified from time to time, the “2016 NPA”) with certain accredited institutional investors. On April 20, 2017, pursuant to the 2016 NPA, and the 2016 First Supplement, the Company issued and sold to certain accredited institutional investors $400,000 aggregate principal amount of senior unsecured notes consisting of $150,000 aggregate principal amount, which will mature on April 20, 2024, with an annual interest rate of 3.24% (the “2024 Senior Notes”) and $250,000 aggregate principal amount, which will mature on April 20, 2027, with an annual interest rate of 3.49% (the “2027 Senior Notes” and collectively with the 2024 Senior Notes, the “2017A Senior Notes”) in a private placement.

On March 21, 2018, the Company entered into that certain Amendment No. 1 to Master Note Purchase Agreement (the “2016 NPA First Amendment”), with each of the holders party thereto, which amended the 2016 NPA.

The 2016 NPA First Amendment, among other things, provided for certain amendments to the 2016 NPA to facilitate (i) certain conforming changes to align certain provisions of the 2016 NPA, the 2008 NPA (as defined below) and the Credit Agreement and (ii) the release of all subsidiary guarantors in relation to obligations under the 2016 NPA and the 2016 NPA Notes (as defined below) (the “2016 Release”).

Pursuant to the terms and conditions of the 2016 NPA, the Company has outstanding senior unsecured notes (the “2016 NPA Notes”) at December 31, 2019 consisting of (i) $150,000 of 2.39% senior notes due June 1, 2021 (the “New 2021 Senior Notes”), (ii) $200,000 of 2.75% senior notes due June 1, 2023 (the “2023 Senior Notes”), (iii) $400,000 of 3.03% senior notes due June 1, 2026 (the “2026 Senior Notes”) and (iv) $400,000 of the 2017A Senior Notes.

The New 2021 Senior Notes, the 2023 Senior Notes, the 2026 Senior Notes and the 2017A Senior Notes bear interest at fixed rates with interest payable in arrears semi-annually, and on the respective maturity dates, until the principal thereunder becomes due and payable. The Company is amortizing the $9,011 of debt issuance costs through the maturity dates of the respective notes.

Under the terms and conditions of the 2016 NPA, the Company is authorized to issue and sell notes in the aggregate principal amount of $1,500,000, inclusive of the outstanding $1,150,000 aggregate principal amount of 2016 NPA Notes that have been issued and sold by the Company, provided that the purchasers of the 2016 NPA Notes shall not have any obligation to purchase any additional notes issued pursuant to the 2016 NPA.

The 2016 NPA Notes are unsecured obligations and rank *pari passu* with obligations under the Credit Agreement and the 2008 NPA Notes (defined below). Following the 2016 Release, there are currently no subsidiary guarantors in relation to the obligations under the 2016 NPA or the 2016 NPA Notes.

The 2016 NPA Notes are subject to representations, warranties, covenants and events of default customary for a private placement of senior unsecured notes. Upon the occurrence of an event of default, payment of the 2016 NPA Notes may be accelerated by the holders of the 2016 NPA Notes. The 2016 NPA Notes may also be prepaid by the Company at par plus a make-whole amount determined by the amount of the excess, if any, of the discounted value of the remaining scheduled payments with respect to the called principal of such 2016 NPA Notes minus the amount of such called principal, provided that the make whole shall in no event be less than zero. The discounted value is determined using market-based discount rates. In addition, the Company will be required to offer to prepay the 2016 NPA Notes upon certain changes in control. The 2016 NPA also contemplates certain offers of prepayments for specified tax reasons or certain noteholder sanctions events. The 2016 NPA requires that the Company comply with the specified quarterly leverage ratio and interest coverage ratio, in each case, as of the last day of each fiscal quarter. The required leverage ratio cannot exceed 3.75 to 1.00. The required interest coverage ratio must not be less than 2.75 to 1.00. As of December 31, 2019 and 2018, the Company was in compliance with all applicable covenants in the 2016 NPA.

2008 Master Note Purchase Agreement

In July 2008, the Company, certain subsidiaries of the Company (together with the Company, the “Obligors”) and certain accredited institutional investors entered into that certain Master Note Purchase Agreement, dated July 15, 2008 (as amended, restated, assumed, supplemented or otherwise modified from time to time, the “2008 NPA”).

On March 21, 2018, the Company entered into that certain Amendment No. 7 to the 2008 NPA (the “2008 NPA Seventh Amendment”), with each of the holders party thereto, which amended the 2008 NPA. The 2008 NPA Seventh Amendment, among other things, provided certain amendments to the 2008 NPA to facilitate (i) certain conforming changes to align the provisions of the 2008 NPA, the 2016 NPA and the Credit Agreement and (ii) the release of all subsidiary guarantors in relation to obligations under the 2008 NPA and the 2008 NPA Notes (the “2008 Release”).

Pursuant to the terms and conditions of the 2008 NPA, the Company has outstanding senior unsecured notes (the “2008 NPA Notes”) at December 31, 2019 consisting of (i) $100,000 of 4.64% senior notes due 2021 (the “2021 Senior Notes”), (ii) $125,000 of 3.09% senior notes due 2022 (the “2022 Senior Notes”) and (iii) $375,000 of 3.41% senior notes due 2025 (the “2025 Senior Notes”). The 2021 Senior Notes, the 2022 Senior Notes and the 2025 Senior Notes bear interest at fixed rates with interest payable in arrears semi-annually, and on the respective maturity dates, until the principal thereunder becomes due and payable. The Company is amortizing the $3,863 of debt issuance costs through the maturity dates of the respective notes. The Company repaid at maturity its $50,000 of 4.00% senior notes due April 2018 (the “2018 Senior Notes”) in April 2018. The Company also repaid at maturity its $175,000 of 5.25% senior notes due 2019 (the “2019 Senior Notes”) in November 2019.

Under the terms and conditions of the 2008 NPA, the Company is authorized to issue and sell notes in the aggregate principal amount of $1,250,000, provided that the purchasers of the 2008 NPA Notes shall not have any obligation to purchase any additional notes issued pursuant to the 2008 NPA.

The 2008 NPA Notes are unsecured obligations and rank *pari passu* with obligations under the Credit Agreement and the 2016 NPA Notes. Following the 2008 Release, there are no subsidiary guarantors in relation to the Company’s obligations under the 2008 NPA or the 2008 NPA Notes.

The 2008 NPA Notes are subject to representations, warranties, covenants and events of default customary for a private placement of senior unsecured notes. Upon the occurrence of an event of default, payment of the 2008 NPA Notes may be accelerated by the holders of the 2008 NPA Notes. The 2008 NPA Notes may also be prepaid by the

Company at par plus a make-whole amount determined by the amount of excess, if any, of the discounted value of the remaining scheduled payments with respect to the called principal of such 2008 NPA Notes minus the amount of such called principal, provided that the make whole shall in no event be less than zero. The discounted value is determined using market-based discount rates. In addition, the Company will be required to offer to prepay the 2008 NPA Notes upon certain changes in control; however, no such prepayment offer was accepted in connection with the Progressive Waste acquisition. The 2008 NPA also contemplates certain offers of prepayments for specified tax reasons or certain noteholder sanctions events. The 2008 NPA requires that the Company comply with the specified quarterly leverage ratio and interest coverage ratio, in each case, as of the last day of each fiscal quarter. The required leverage ratio cannot exceed 3.75 to 1.00. The required interest coverage ratio must not be less than 2.75 to 1.00. As of December 31, 2019 and 2018, the Company was in compliance with all applicable covenants in the 2008 NPA.

Senior Notes due 2028 and 2029

On November 16, 2018, the Company completed an underwritten public offering of $500,000 aggregate principal amount of its 4.25% Senior Notes due 2028 (the “2028 Senior Notes”). The 2028 Senior Notes were issued under the Indenture, dated as of November 16, 2018 (the “Base Indenture”), by and between the Company and U.S. Bank National Association, as trustee (the “Trustee”), as supplemented by the First Supplemental Indenture, dated as of November 16, 2018 (the Base Indenture as so supplemented, the “Indenture”).

The Company will pay interest on the 2028 Senior Notes semi-annually in arrears and the 2028 Senior Notes will mature on December 1, 2028. The 2028 Senior Notes are the Company’s senior unsecured obligations, ranking equally in right of payment with its other existing and future unsubordinated debt and senior to any of its future subordinated debt. The 2028 Senior Notes are not guaranteed by any of the Company’s subsidiaries. The Company is amortizing the $5,052 of debt issuance costs through the maturity date.

The Company may redeem some or all of the 2028 Senior Notes at its option prior to September 1, 2028 (three months before the maturity date) at any time and from time to time at a redemption price equal to the greater of 100% of the principal amount of the 2028 Senior Notes redeemed, or the sum of the present values of the remaining scheduled payments of principal and interest on the 2028 Senior Notes redeemed, plus accrued and unpaid interest to, but excluding, the redemption date. Commencing on September 1, 2028 (three months before the maturity date), the Company may redeem some or all of the 2028 Senior Notes, at any time and from time to time, at a redemption price equal to the principal amount of the 2028 Senior Notes being redeemed plus accrued and unpaid interest to, but excluding, the redemption date.

On April 16, 2019, the Company completed an underwritten public offering of $500,000 aggregate principal amount of 3.50% Senior Notes due 2029 (the “2029 Senior Notes”). The 2029 Senior Notes were issued under the Indenture, dated as of November 16, 2018 (the “Base Indenture”), by and between the Company and U.S. Bank National Association, as trustee (the “Trustee”), as supplemented by the Second Supplemental Indenture, dated as of April 16, 2019 (the Base Indenture as so supplemented, the “Indenture”).

The Company will pay interest on the 2029 Senior Notes semi-annually in arrears and the 2029 Senior Notes will mature on May 1, 2029. The 2029 Senior Notes are senior unsecured obligations, ranking equally in right of payment with the Company’s other existing and future unsubordinated debt and senior to any of the Company’s future subordinated debt. The 2029 Senior Notes are not guaranteed by any of the Company’s subsidiaries. The Company is amortizing the $4,644 of debt issuance costs through the maturity date.

The Company may redeem some or all of the 2029 Senior Notes at its option prior to February 1, 2029 (three months before the maturity date) at any time and from time to time at a redemption price equal to the greater of 100% of the principal amount of the 2029 Senior Notes redeemed, or the sum of the present values of the remaining scheduled payments of principal and interest on the 2029 Senior Notes redeemed, plus accrued and unpaid interest to, but excluding, the redemption date. Commencing on February 1, 2029 (three months before the maturity date), the Company may redeem some or all of the 2029 Senior Notes, at any time and from time to time, at a redemption price equal to the principal amount of the 2029 Senior Notes being redeemed plus accrued and unpaid interest to, but excluding, the redemption date.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Under certain circumstances, the Company may become obligated to pay additional amounts (the "Additional Amounts") with respect to the 2028 and/or 2029 Senior Notes (the "Notes") to ensure that the net amounts received by each holder of the Notes will not be less than the amount such holder would have received if withholding taxes or deductions were not incurred on a payment under or with respect to the Notes. If such payment of Additional Amounts is a result of a change in the laws or regulations, including a change in any official position, the introduction of an official position or a holding by a court of competent jurisdiction, of any jurisdiction from or through which payment is made by or on behalf of the Notes having power to tax, and the Company cannot avoid such payments of Additional Amounts through reasonable measures, then the Company may redeem the 2028 and/or 2029 Notes then outstanding at a redemption price equal to 100% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but excluding, the redemption date (subject to the right of holders of record on the relevant record date to receive interest due on an interest payment date that is on or prior to the redemption date).

If the Company experiences certain kinds of changes of control, each holder of the Notes may require the Company to repurchase all or a portion of the Notes for cash at a price equal to 101% of the aggregate principal amount of such Notes, plus any accrued but unpaid interest to, but excluding, the date of repurchase.

The covenants in the Indenture include limitations on liens, sale-leaseback transactions and mergers and sales of all or substantially all of the Company's assets. The Indenture also includes customary events of default with respect to the Notes. As of December 31, 2019, the Company was in compliance with all applicable covenants in the Indenture.

Upon an event of default, the principal of and accrued and unpaid interest on all the Notes may be declared to be due and payable by the Trustee or the holders of not less than 25% in principal amount of the outstanding 2028 and/or 2029 Senior Notes. Upon such a declaration, such principal and accrued interest on all of the 2028 and/or 2029 Senior Notes will be due and payable immediately. In the case of an event of default resulting from certain events of bankruptcy, insolvency or reorganization, the principal (or such specified amount) of and accrued and unpaid interest, if any, on all outstanding 2028 and/or 2029 Senior Notes will become and be immediately due and payable without any declaration or other act on the part of the Trustee or any holder of the Notes.

Tax-Exempt Bonds

In January 2019, the Company gave notice to redeem its LeMay Washington Bond with a remaining principal balance of $15,930 prior to the April 1, 2033 maturity date. The Company paid in full the principal and accrued interest on this bond on March 6, 2019. The Company has no further tax-exempt bond financings.

As of December 31, 2019, aggregate contractual future principal payments by calendar year on long-term debt are due as follows:

2020	$ 465
2021	254,298
2022	125,430
2023	1,816,703
2024	150,483
Thereafter	2,028,506
	$ 4,375,885

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

11. FAIR VALUE OF FINANCIAL INSTRUMENTS

The Company uses a three-tier fair value hierarchy to classify and disclose all assets and liabilities measured at fair value on a recurring basis in periods subsequent to their initial measurement. These tiers include: Level 1, defined as quoted market prices in active markets for identical assets or liabilities; Level 2, defined as inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active, model-based valuation techniques for which all significant assumptions are observable in the market, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities; and Level 3, defined as unobservable inputs that are not corroborated by market data.

The Company's financial assets and liabilities recorded at fair value on a recurring basis include derivative instruments and restricted cash and investments. At December 31, 2019 and 2018, the Company's derivative instruments included pay-fixed, receive-variable interest rate swaps. The Company's interest rate swaps are recorded at their estimated fair values based on quotes received from financial institutions that trade these contracts. The Company verifies the reasonableness of these quotes using similar quotes from another financial institution as of each date for which financial statements are prepared. For the Company's interest rate swaps, the Company also considers the Company's creditworthiness in its determination of the fair value measurement of these instruments in a net liability position and the counterparties' creditworthiness in its determination of the fair value measurement of these instruments in a net asset position. The Company's restricted cash and investments are valued at quoted market prices in active markets for similar assets, which the Company receives from the financial institutions that hold such investments on its behalf. The Company's restricted cash and investments measured at fair value are invested primarily in money market accounts, bank time deposits, U.S. government and agency securities and Canadian bankers' acceptance notes.

The Company's assets and liabilities measured at fair value on a recurring basis at December 31, 2019 and 2018, were as follows:

	Fair Value Measurement at December 31, 2019 Using			
	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Interest rate swap derivative instruments – net liability position	$ (39,802)	$ —	$ (39,802)	$ —
Restricted cash and investments	$ 147,318	$ —	$ 147,318	$ —
Contingent consideration	$ (68,984)	$ —	$ —	$ (68,984)

	Fair Value Measurement at December 31, 2018 Using			
	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Interest rate swap derivative instruments – net asset position	$ 12,098	$ —	$ 12,098	$ —
Restricted cash and investments	$ 131,422	$ —	$ 131,422	$ —
Contingent consideration	$ (54,615)	$ —	$ —	$ (54,615)

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The following table summarizes the changes in the fair value for Level 3 liabilities related to contingent consideration for the years ended December 31, 2019 and 2018:

	Years Ended December 31,	
	2019	2018
Beginning balance	$ 54,615	$ 47,285
Contingent consideration recorded at acquisition date	14,038	11,669
Payment of contingent consideration recorded at acquisition date	(3,200)	(6,127)
Payment of contingent consideration recorded in earnings	—	(11)
Adjustments to contingent consideration	1,498	349
Interest accretion expense	1,852	1,756
Foreign currency translation adjustment	181	(306)
Ending balance	$ 68,984	$ 54,615

12. COMMITMENTS AND CONTINGENCIES

COMMITMENTS

Financial Surety Bonds

The Company uses financial surety bonds for a variety of corporate guarantees. The two largest uses of financial surety bonds are for municipal contract performance guarantees and asset closure and retirement requirements under certain environmental regulations. Environmental regulations require demonstrated financial assurance to meet final capping, closure and post-closure requirements for landfills. In addition to surety bonds, these requirements may also be met through alternative financial assurance instruments, including insurance, letters of credit and restricted cash and investment deposits.

At December 31, 2019 and 2018, the Company had provided customers and various regulatory authorities with surety bonds in the aggregate amounts of approximately $661,593 and $619,830, respectively, to secure its asset closure and retirement requirements and $419,259 and $357,820, respectively, to secure performance under collection contracts and landfill operating agreements.

The Company owns a 9.9% interest in a company that, among other activities, issues financial surety bonds to secure landfill final capping, closure and post-closure obligations for companies operating in the solid waste industry. The Company accounts for this investment under the cost method of accounting. There have been no identified events or changes in circumstances that may have a significant adverse effect on the carrying value of the investment. This investee company and the parent company of the investee have written financial surety bonds for the Company, of which $392,592 and $381,770 were outstanding as of December 31, 2019 and 2018, respectively. The Company's reimbursement obligations under these bonds are secured by a pledge of its stock in the investee company.

Unconditional Purchase Obligations

At December 31, 2019, the Company's unconditional purchase obligations consist of multiple fixed-price fuel purchase contracts under which it has 49.0 million gallons remaining to be purchased for a total of $129,373. These fuel purchase contracts expire on or before December 31, 2021.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

As of December 31, 2019, future minimum purchase commitments, by calendar year, are as follows:

2020	$ 76,799
2021	52,574
	$ 129,373

CONTINGENCIES

Environmental Risks

The Company expenses costs incurred to investigate and remediate environmental issues unless they extend the economic useful lives of the related assets. The Company records liabilities when it is probable that an obligation has been incurred and the amounts can be reasonably estimated. The remediation reserves cover anticipated costs, including remediation of environmental damage that waste facilities may have caused to neighboring landowners or residents as a result of contamination of soil, groundwater or surface water, including damage resulting from conditions existing prior to the Company’s acquisition of such facilities. The Company’s estimates are based primarily on investigations and remediation plans established by independent consultants, regulatory agencies and potentially responsible third parties. The Company does not discount remediation obligations. At December 31, 2019 and 2018, the current portion of remediation reserves was $2,314 and $3,592, respectively, which is included in Accrued liabilities in the Consolidated Balance Sheets. At December 31, 2019 and 2018, the long-term portion of remediation reserves was $18,770 and $18,362, respectively, which is included in Other long-term liabilities in the Consolidated Balance Sheets. Any substantial increase in the liabilities for remediation of environmental damage incurred by the Company could have a material adverse effect on the Company’s financial condition, results of operations or cash flows.

Legal Proceedings

In the normal course of its business and as a result of the extensive governmental regulation of the solid waste and E&P waste industries, the Company is subject to various judicial and administrative proceedings involving Canadian regulatory authorities as well as U.S. federal, state and local agencies. In these proceedings, an agency may subpoena the Company for records, or seek to impose fines on the Company or revoke or deny renewal of an authorization held by the Company, including an operating permit. From time to time, the Company may also be subject to actions brought by special interest or other groups, adjacent landowners or residents in connection with the permitting and licensing of landfills, transfer stations, and E&P waste treatment, recovery and disposal operations, or alleging environmental damage or violations of the permits and licenses pursuant to which the Company operates.

In addition, the Company is a party to various claims and suits pending for alleged damages to persons and property, alleged violations of certain laws and alleged liabilities arising out of matters occurring during the normal operation of the Company’s business. Except as noted in the matters described below, as of December 31, 2019, there is no current proceeding or litigation involving the Company or its property that the Company believes could have a material adverse effect on its business, financial condition, results of operations or cash flows.

Lower Duwamish Waterway Superfund Site Allocation Process

In November 2012, the Company’s subsidiary, Northwest Container Services, Inc. (“NWCS”), was named by the U.S. Environmental Protection Agency, Region 10 (the “EPA”) as a potentially responsible party (“PRP”), along with more than 100 others, under the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA” or the “Superfund” law) with respect to the Lower Duwamish Waterway Superfund Site (the “LDW Site”). Listed on the National Priorities List in 2001, the LDW Site is a five-mile stretch of the Duwamish River flowing into Elliott Bay in Seattle, Washington. A group of PRPs known as the Lower Duwamish Working Group (“LDWG”) and consisting of the City of Seattle, King County, the Port of Seattle, and Boeing Company conducted a Remedial

Investigation/Feasibility Study for the LDW Site. On December 2, 2014, the EPA issued its Record of Decision (the "ROD") describing the selected clean-up remedy, and therein estimated that clean-up costs (in present value dollars as of November 2014) would total approximately $342,000. However, it is possible that additional costs could be incurred based upon various factors. The EPA estimates that it will take seven years to implement the clean-up. The ROD also requires ten years of monitoring following the clean-up, and provides that if clean-up goals have not been met by the end of this period, then additional clean-up activities, at additional cost, may be required at that time. Implementation of the clean-up will not begin until after the ongoing Early Action Area ("EAA") clean-ups have been completed. Typically, costs for monitoring may be in addition to those expended for the clean-up. While three of the EAA clean-ups have been completed to date, some work remains to be done on three other EAAs. Implementation of the clean-up also must await additional baseline sampling throughout the LDW Site and the preparation of a remedial design for performing the clean-up. On April 27, 2016, the LDWG entered into a third amendment of its Administrative Order on Consent with the EPA (the "AOC 3") in which it agreed to perform the additional baseline sediment sampling and certain technical studies needed to prepare the actual remedial design. The LDWG and the EPA entered into a fourth amendment to the AOC in July 2018 primarily addressing development of a proposed remedy for the upper reach of the LDW Site, river mile 3 to river mile 5. At the April 24, 2019 stakeholders meeting the LDWG projected completion of the remedial design for the upper reach could be completed by August 2024.

On August 16, 2016, the EPA sent individual letters to each of the PRPs for the LDW Site, including NWCS, stating that it expects to initiate negotiations with all PRPs in early 2018 relating to a Remedial Design/Remedial Action ("RD/RA") Consent Decree. An RD/RA Consent Decree provides for the cleanup of the entire site and is often referred to as a "global settlement." In August 2014, NWCS entered into an Alternative Dispute Resolution Memorandum of Agreement with several dozen other PRPs and a neutral allocator to conduct a confidential and non-binding allocation of certain past response costs allegedly incurred at the LDW Site as well as the anticipated future response costs associated with the clean-up. The pre-remedial design work under the AOC 3 was not expected to conclude until the end of 2019, and in March 2017, the PRPs provided the EPA with notice that the allocation was not scheduled to conclude until mid-2019. Later extensions pushed the allocation conclusion date to early 2020 and the EPA was informed of that schedule. The allocation participants voted in June 2019 to extend the final allocation report deadline to July 2020. The EPA has been informed of that change. In January 2020, the allocator informed the parties that the allocation report will be delayed but he did not provide an expected delivery date. In June 2017, attorneys for the EPA informed attorneys for several PRPs that the EPA expected to begin RD/RA negotiations in the late summer or early fall of 2018. Those negotiations have not been scheduled and there is no recent indication from the EPA regarding when they will begin. NWCS is defending itself vigorously in this confidential allocation process. At this point, the Company is not able to determine the likelihood of the allocation process being completed as intended by the participating PRPs, its specific allocation, or the likelihood of the parties then negotiating a global settlement with the EPA. Thus, NWCS cannot reasonably determine the likelihood of any outcome in this matter, including its potential liability.

On February 11, 2016, NWCS received a letter (the "Letter") from the United States Department of Commerce, National Oceanic and Atmospheric Administration ("NOAA"), describing certain investigatory activities conducted by the Elliott Bay Trustee Council (the "Council"). The Council consists of all of the natural resources trustees for the LDW Site as well as two nearby Superfund sites, the Harbor Island site and the Lockheed West site. The members of the Council include the United States, on behalf of the U.S. National Oceanic and Atmospheric Administration and the U.S. Department of the Interior, the Washington State Department of Ecology, and the Suquamish and Muckleshoot Indian Tribes (together, the "Trustees"). The Letter appears to allege that NWCS may be a potentially liable party that allegedly contributed to the release of hazardous substances that have injured natural resources at the LDW Site. Damages to natural resources are in addition to clean-up costs. The Letter, versions of which NWCS believes were sent to all or a group of the PRPs for the LDW Site, also notified its recipients of their opportunity to participate in the Trustees' development of an Assessment Plan and the performance of a Natural Resources Damages Assessment ("NRDA") in accordance with the Assessment Plan for both the LDW Site and the east and west waterways of the Harbor Island site. NWCS timely responded with correspondence to the NOAA Office of General Counsel, in which it declined the invitation at that time. NWCS does not know how other PRPs responded to the Letter, and has not received any further communication from NOAA or the Trustees. The Trustees have not responded to NWCS' letter. The

Trustees released their Assessment Plan in March 2019. The Assessment Plan does not set forth a timeline for implementation. At this point, the Company is not able to determine the likelihood or amount of an assessment of natural resource damages against NWCS in connection with this matter.

Los Angeles County, California Landfill Expansion Litigation

A. Chiquita Canyon, LLC Lawsuit Against Los Angeles County

In October 2004, the Company's subsidiary, Chiquita Canyon, LLC ("CCL"), then under prior ownership, filed an application (the "Application") with the County of Los Angeles (the "County") Department of Regional Planning ("DRP") for a conditional use permit (the "CUP") to authorize the continued operation and expansion of the Chiquita Canyon Landfill (the "Landfill"). The Landfill has operated since 1972, and as a regional landfill, accepted approximately two million tons of materials for disposal and beneficial use in 2018. The Application requested expansion of the existing waste footprint on CCL's contiguous property, an increase in maximum elevation, creation of a new entrance and new support facilities, construction of a facility for the County or another third-party operator to host household hazardous waste collection events, designation of an area for mixed organics/composting, and other modifications.

After many years of reviews and delays, upon the recommendation of County staff, the County's Regional Planning Commission (the "Commission") approved the Application on April 19, 2017, but imposed operating conditions, fees and exactions that substantially reduce the historical landfill operations and represent a large increase in aggregate taxes and fees. CCL objected to many of the requirements imposed by the Commission. Current estimates for new costs imposed on CCL under the CUP are in excess of $300,000.

CCL appealed the Commission's decision to the County Board of Supervisors, but the appeal was not successful. At a subsequent hearing, on July 25, 2017, the Board of Supervisors approved the CUP. On October 20, 2017, CCL filed in the Superior Court of California, County of Los Angeles a verified petition for writ of mandate and complaint against the County and the County Board of Supervisors captioned *Chiquita Canyon, LLC v. County of Los Angeles*, No. BS171262 (Los Angeles Co. Super Ct.) (the "Complaint"). The Complaint challenges the terms of the CUP in 13 counts generally alleging that the County violated multiple California and federal statutes and California and federal constitutional protections. CCL seeks the following relief: (a) an injunction and writ of mandate against certain of the CUP's operational restrictions, taxes and fees, (b) a declaration that the challenged conditions are unconstitutional and in violation of state and federal statutes, (c) reimbursement for any such illegal fees paid under protest, (d) damages, (e) an award of just compensation for a taking, (f) attorney fees, and (g) all other appropriate legal and equitable relief.

Responding to a procedural suggestion from the Court, CCL filed its First Amended Complaint on March 23, 2018. After full briefing, the hearing on the demurrer took place on July 17, 2018. The Superior Court sustained the demurrer and granted the motion to strike. The effect of the Court's rulings was to bar CCL from proceeding with its challenges to 14 of the 29 CUP conditions at issue in the litigation, including 13 operational conditions and CCL's challenge to the $11,600 B&T Fee discussed below. The Superior Court granted CCL leave to amend its Complaint if CCL chose to pay the $11,600 B&T fee to allow a challenge to the B&T fee to proceed under the Mitigation Fee Act. CCL paid the $11,600 B&T fee on August 10, 2018 and filed its Second Amended Complaint on August 16, 2018, reflecting that the B&T fee had been paid under protest and allowing the challenges to the B&T fee to go forward.

On September 14, 2018, CCL sought discretionary review by the California Court of Appeal of the Superior Court's July 17, 2018 decision barring the challenge to 13 operational conditions. The Court of Appeal agreed to hear CCL's appeal and on February 25, 2019, the Court of Appeal issued its decision, reversing the trial court orders that granted the County's motion to strike and demurrer. The Court of Appeal ruled that CCL had adequately pled a claim that the County was equitably estopped from contending that CCL had forfeited its rights to challenge the legality of the 13 operational conditions. CCL's Complaint sets forth that CCL relied on representations made by the County in 2017 that

CCL could reserve its legal rights to challenge the CUP in a separate reservation of rights letter rather than the affidavit of acceptance of the CUP that the County compelled Chiquita to file.

At a trial setting conference on May 28, 2019, the equitable estoppel issues in this case were discussed and the Superior Court continued the June 18, 2019 trial date to April 23, 2020. The Superior Court also set an evidentiary hearing on the equitable estoppel issues for November 12, 2019. Discovery occurred on these issues in July through September 2019. Following full briefing and oral argument on November 12, 2019, the Superior Court issued its decision on November 13th, finding that the County was estopped from contending that CCL has waived its rights to challenge the legality of the 13 operational conditions. The County sought interlocutory review of the Superior Court's decision in the Court of Appeal, which denied the County's petition on February 7, 2020. Trial remains set for April 23, 2020. CCL will continue to vigorously prosecute the lawsuit. However, at this point, the Company is not able to determine the likelihood of any outcome in this matter.

B. CEQA Lawsuit Against Los Angeles County Challenging Environmental Review for Landfill Expansion

A separate lawsuit involving CCL and the Landfill was filed on August 24, 2017 by community activists alleging that the environmental review underlying the CUP was inadequate under state law. The Val Verde Civic Association, Citizens for Chiquita Canyon Landfill Compliance, and the Santa Clarita Organization for Planning the Environment filed a petition for writ of mandate in the Superior Court of California, County of Los Angeles against the County, naming CCL as the real party in interest. The lawsuit seeks to overturn the County's approval of the CUP for the expansion of the Landfill and the certification of the final Environmental Impact Report, arguing that the report violates the California Environmental Quality Act. Pursuant to Condition No. 6 of the CUP, which requires CCL to defend, indemnify, and hold harmless the County, its agents, officers, and employees from any claim or proceeding against the County brought by any third party to attack, set aside, void, or annul the CUP approval, CCL has agreed to reimburse the County for its legal costs associated with defense of the lawsuit. As the real party in interest, CCL has a right to notice and an opportunity to be heard in opposition to the petition for writ of mandate. The petitioners filed their Opening Brief with the court on September 27, 2018. CCL filed its Opposition Brief with the court on November 28, 2018 and the petitioners filed their Reply Brief on December 20, 2018. A trial date had been scheduled for February 8, 2019, but on February 6, 2019, the court reassigned the case to a different judge and vacated the trial date. A new trial date was scheduled for August 23, 2019. At the conclusion of oral argument on August 23, 2019, the court asked the parties to return on September 13, 2019 for further oral argument on the odor mitigation issue. The court issued a final ruling on October 10, 2019 and a final judgment on December 4, 2019, denying the writ petition in full. On December 6, 2019, one of the petitioners, Santa Clarita Organization for Planning the Environment, filed an appeal of the court's October 10, 2019 ruling. On December 9, 2019, the same petitioner filed an appeal of the court's December 4, 2019 judgment.

C. December 11, 2017 Notice of Violation Regarding Certain CUP Conditions.

The County, through its DRP, issued a Notice of Violation, dated December 11, 2017 (the "NOV"), alleging that CCL violated certain conditions of the CUP, including Condition 79(B)(6) of the CUP by failing to pay an $11,600 Bridge & Thoroughfare Fee ("B&T Fee") that was purportedly due on July 25, 2017. The alleged B&T fee was ostensibly to fund the construction of transportation infrastructure in the area of the Landfill. At the time the NOV was issued, CCL had already contested the legality of the B&T fee in the October 20, 2017 Complaint filed against the County in Los Angeles County Superior Court.

On January 12, 2018, CCL filed an appeal of the alleged violations in the NOV. Subsequently, CCL filed additional legal arguments and exhibits contesting the NOV. On March 6, 2018, a DRP employee designated as hearing officer sustained the NOV, including the $11,600 B&T fee, and imposed an administrative penalty in the amount of $83 and a noncompliance fee of $0.75. A written decision memorializing the hearing officer's findings and order, dated July 10, 2018, was received by CCL on July 12, 2018. On April 13, 2018, CCL filed in the Superior Court of California, County of Los Angeles a Petition for Writ of Administrative Mandamus against the County seeking to overturn the decision sustaining the NOV, contending that the NOV and decision are not supported by the facts or law. On June 22, 2018, Chiquita filed a Motion for Stay seeking to halt enforcement of the B&T fee and penalty and the accrual of any further penalties pending the resolution of the Petition for Writ of Mandamus. The motion was heard and denied by the Court on July 17, 2018. As explained above, the Court granted CCL leave to pay the $11,600 B&T fee and to amend its Complaint to reflect the payment under protest, allowing the challenge to the B&T fee to proceed. CCL paid the B&T fee on August 10, 2018, and also paid on that date the administrative penalty of $83 and a noncompliance fee of $0.75. As directed by the Court, CCL amended its Complaint in a Second Amended Complaint filed in the CUP action on August 16, 2018. The Court indicated that the NOV case would likely be tried in conjunction with the CUP case, set for June 18, 2019, and that the cases would be coordinated. At the May 28, 2019 trial setting conference referenced above where the trial of the CUP case was set for April 23, 2020, the Superior Court set the trial for the B&T fee/NOV case for June 25, 2020. CCL will continue to vigorously prosecute the lawsuit. However, at this point, the Company is not able to determine the likelihood of any outcome in this matter.

Town of Colonie, New York Landfill Expansion Litigation

On April 16, 2014, the Town of Colonie (the “Town”) filed an application (the “Application”) with the New York State Department of Environmental Conservation (“DEC”) to modify the Town’s then-current Solid Waste Management Facility Permit and for other related permits to authorize the development and operation of Area 7 of the Town of Colonie Landfill (the “Landfill”), which is located in Albany County, New York. DEC issued the requested permits on April 5, 2018 (the “Permits”). The Company’s subsidiary, Capital Region Landfills, Inc. (“CRL”), has been the sole operator of the Landfill since September 2011 pursuant to an operating agreement between CRL and the Town.

On May 7, 2018, the Town of Halfmoon, New York, and five of its residents, commenced an Article 78 special proceeding in the Supreme Court of the State of New York, Saratoga County, against DEC, the Town, CRL, and the Company (the “Halfmoon Proceeding”). On that same date, the Town of Waterford, New York, and eleven of its residents, also commenced an Article 78 special proceeding in the Supreme Court of the State of New York, Saratoga County, against the same respondents (the “Waterford Proceeding”). On June 4, 2018, the Town and CRL filed Verified Answers, including motions to dismiss the petitions, and the Company separately moved to dismiss the petitions. The Waterford Petitioners stipulated to removing the Company as a respondent when they filed an Amended Verified Petition on June 15, 2018. The Halfmoon Petitioners served an Amended Verified Petition on July 5, 2018, retaining all originally named parties, including the Company.

The Petitioners alleged that, in granting the Permits, DEC failed to comply with the procedural and substantive requirements of New York’s Environmental Conservation Law and State Environmental Quality Review Act, and their implementing regulations. The Petitioners asked the court to: annul the Permits and invalidate DEC’s Findings Statement, enjoin the Town and CRL from taking any action authorized by the Permits, require an issues conference and possibly an adjudicatory hearing before DEC can re-consider the Town’s permit application; remand all regulatory issues to a DEC Administrative Law Judge; and award costs and disbursements. The Waterford Petitioners also requested reasonable attorneys’ fees.

On July 13, 2018, the Honorable Ann C. Crowell granted a venue change motion filed by DEC, and ordered that the Halfmoon Proceeding and the Waterford Proceeding be transferred to the Supreme Court, Albany County. CRL’s opposition submissions, including its responsive pleadings, Memorandum of Law, and supporting Affidavits, were filed and served on or before July 25, 2018. On August 28, 2018, the Towns of Waterford and Halfmoon filed a motion seeking an order preliminarily enjoining during the pendency of the proceedings all activities relating to the expansion of the Landfill which are authorized by the Permits. On September 18, 2018, CRL and the Company filed and served Memoranda of Law in opposition to the preliminary injunction motion, with supporting Affidavits, and, on September 24, 2018, the Towns of Waterford and Halfmoon filed a Reply Memorandum of Law in further support of their injunctive motion. The Honorable Debra J. Young denied the Petitioners’ motion for preliminary injunction on November 30, 2018.

On January 23, 2019, the court held that the Petitioners lacked standing to maintain the proceedings and dismissed both the Waterford and Halfmoon Amended Verified Petitions in their entirety. In late February and early March 2019, the Waterford and Halfmoon Petitioners filed notices of appeal to the Appellate Division, Third Department, of both Judge Crowell's decision to transfer the proceedings to Albany County and of Judge Young's dismissal of the Amended Verified Petitions.

On March 7, 2019, the Waterford Petitioners moved, with consent of the Halfmoon Petitioners, to consolidate the appeals. Respondents opposed the consolidation motion to the extent that it may result in inequitable briefing under the Appellate Division rules. On April 4, 2019, the Appellate Division, Third Department granted the consolidation motion "to the extent that the appeals shall be heard together and may be perfected upon a joint record on appeal."

On April 26, 2019, the Waterford Petitioners filed a motion with the Appellate Division, Third Department, seeking an order preliminarily enjoining construction activities or the acceptance of waste at the Landfill. The Company, CRL, and the Town of Colonie opposed the motion, which was summarily denied by the Third Department, Appellate Division on June 20, 2019.

On June 25, 2019, the Waterford Petitioners filed their appellate brief and the joint record on appeal. The Halfmoon Petitioners filed their appellate brief on August 21, 2019. The Company, CRL, and the Town filed their joint appellee brief and supplemental appendix on November 20, 2019. On January 8, 2020, the Office of the Attorney General of the State of New York filed a motion seeking a 45-day extension of the date by which DEC is required to file its appellee brief, which was granted. Its brief is now due by February 25, 2020. The Waterford and Halfmoon Petitioners' reply briefs will be due ten days from service of DEC's appellee brief.

Collective Bargaining Agreements

Twenty-one of the Company's collective bargaining agreements have expired or are set to expire in 2020. The Company does not expect any significant disruption in its overall business in 2020 as a result of labor negotiations, employee strikes or organizational efforts.

13. SHAREHOLDERS' EQUITY

Share split

On April 26, 2017, the Company announced that its Board of Directors approved a split of its common shares on a three-for-two basis, which was approved by its shareholders at the Company's Annual and Special Meeting of Shareholders on May 23, 2017. Shareholders of record on June 7, 2017 received from the Company's transfer agent on June 16, 2017, one additional common share for every two common shares held. All share and per share amounts for all periods presented have been retroactively adjusted to reflect the share split.

Cash Dividend

The Board of Directors authorized the initiation of a quarterly cash dividend in October 2010 and has increased it on an annual basis. In October 2019, the Company announced that its Board of Directors increased its regular quarterly cash dividend by $0.025, from $0.16 to $0.185 per Company common share. Cash dividends of $175,067, $152,550 and $131,975 were paid during the years ended December 31, 2019, 2018 and 2017, respectively.

Normal Course Issuer Bid

On July 25, 2019, the Board of Directors of the Company approved, subject to receipt of regulatory approvals, the annual renewal of the Company's normal course issuer bid (the "NCIB") to purchase up to 13,184,474 of the Company's common shares during the period of August 8, 2019 to August 7, 2020 or until such earlier time as the NCIB is completed or terminated at the option of the Company. The renewal followed the conclusion of the Company's NCIB that expired August 7, 2019. The Company received Toronto Stock Exchange (the "TSX") approval for its annual renewal of the NCIB on August 2, 2019. Under the NCIB, the Company may make share repurchases only in the open market, including on the NYSE, the TSX, and/or alternative Canadian trading systems, at the prevailing market price at the time of the transaction.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

In accordance with TSX rules, any daily repurchases made through the TSX and alternative Canadian trading systems is limited to a maximum of 79,933 common shares, which represents 25% of the average daily trading volume on the TSX of 319,734 common shares for the period from February 1, 2019 to July 31, 2019. The TSX rules also allow the Company to purchase, once a week, a block of common shares not owned by any insiders, which may exceed such daily limit. The maximum number of shares that can be purchased per day on the NYSE will be 25% of the average daily trading volume for the four calendar weeks preceding the date of purchase, subject to certain exceptions for block purchases.

The timing and amounts of any repurchases pursuant to the NCIB will depend on many factors, including the Company's capital structure, the market price of the common shares and overall market conditions. All common shares purchased under the NCIB will be immediately cancelled following their repurchase.

For the year ended December 31, 2019, the Company did not repurchase any common shares pursuant to the NCIB in effect during that period. For the year ended December 31, 2018, the Company repurchased 831,704 common shares pursuant to its NCIB in effect during such period at an aggregate cost of $58,928. For the year ended December 31, 2017, the Company did not repurchase any common shares pursuant to the NCIB in effect during that period. As of December 31, 2019, the remaining maximum number of shares available for repurchase under the current NCIB was 13,184,474.

Common Shares

The Company is authorized to issue an unlimited number of common shares, that have no par value, and uses reserved but unissued common shares to satisfy its obligations under its equity-based compensation plans. As of December 31, 2019, the Company has reserved the following common shares for issuance:

For outstanding RSUs, PSUs and warrants	1,991,919
For future grants under the 2016 Incentive Award Plan	5,431,669
	7,423,588

Common Shares Held in Trust

Common shares held in trust at December 31, 2019 consist of 81,514 shares of the Company held in a trust that were acquired by Progressive Waste prior to June 1, 2016 for the benefit of its U.S. and Canadian employees participating in certain share-based compensation plans. A total of 735,171 common shares were held in the trust on June 1, 2016 when it was acquired by the Company in the Progressive Waste acquisition. Common shares held in trust are classified as treasury shares in the Company's Consolidated Balance Sheets. The Company will sell shares out of the trust and remit cash or shares to employees and non-employee directors as restricted share units vest and deferred share units settle, under the Progressive Waste share-based compensation plans that were continued by the Company. During the years ended December 31, 2019, 2018 and 2017, the Company sold 48,375, 36,244 and 171,264 common shares held in the trust, respectively, to settle vested restricted share units and deferred share units.

Special Shares

The Company is authorized to issue an unlimited number of special shares. Holders of special shares are entitled to one vote in matters of the Company for each special share held. The special shares carry no right to receive dividends or to receive the remaining property or assets of the Company upon dissolution or wind-up. At December 31, 2019, 2018 and 2017, no special shares were issued.

Preferred Shares

The Company is authorized to issue an unlimited number of preferred shares, issuable in series. Each series of preferred shares issued shall have rights, privileges, restrictions and conditions as determined by the Board of Directors prior to their issuance. Preferred shareholders are not entitled to vote, but take preference over the common shareholders rights in the remaining property and assets of the Company in the event of dissolution or wind-up. At December 31, 2019, 2018 and 2017, no preferred shares were issued.

Restricted Share Units, Performance-Based Restricted Share Units, Share Options and Share Purchase Warrants

In connection with the Progressive Waste acquisition, each Waste Connections US, Inc. restricted stock unit award, deferred restricted stock unit award and warrant outstanding immediately prior to the Progressive Waste acquisition was automatically converted into a restricted share unit award, deferred restricted share unit award or warrant, as applicable, relating to an equal number of common shares of the Company, on the same terms and conditions as were applicable immediately prior to the Progressive Waste acquisition under such equity award. Such conversion of equity awards was approved by the Company’s shareholders at its shareholder meeting as part of the shareholders’ approval of the Progressive Waste acquisition. At its meeting on June 1, 2016, the Company’s Board of Directors approved the assumption by the Company of the Waste Connections US, Inc. 2014 Incentive Plan Award (the “2014 Plan”), the Waste Connections US, Inc. Third Amended and Restated 2004 Equity Incentive Plan (the “2004 Plan”), and the Waste Connections US, Inc. Consultant Incentive Plan (the “Consultant Plan,” and, together with the 2014 Plan and the 2004 Plan, the “Assumed Plans”) for the purposes of administering the Assumed Plans and the awards issued thereunder. No additional awards will be made under any of the Assumed Plans. Upon the vesting, expiration, exercise in accordance with their terms or other settlement of all of the awards made pursuant to an Assumed Plan, such Assumed Plan shall automatically terminate.

Participation in the 2004 Plan was limited to employees, officers, directors and consultants. Restricted share units (“RSUs”) granted under the 2004 Plan generally vest in installments pursuant to a vesting schedule set forth in each agreement. The Board of Directors authorized the granting of awards under the 2004 Plan, and determined the employees and consultants to whom such awards were to be granted, the number of shares subject to each award, and the exercise price, term, vesting schedule and other terms and conditions of each award. RSU awards granted under the plan did not require any cash payment from the participant to whom an award was made. No grants have been made under the 2004 Plan since May 16, 2014 pursuant to the approval by the stockholders of the 2014 Plan on such date.

The 2014 Plan also authorized the granting of RSUs, as well as performance awards payable in the form of the Company’s common shares or cash, including equity awards and incentive cash bonuses that may have been intended to qualify as “performance-based compensation” under Section 162(m) of the Internal Revenue Code of 1986, as amended (“Section 162(m)”). Participation in the 2014 Plan was limited to employees and consultants of the Company and its subsidiaries and non-employee directors. The 2014 Plan is administered by the Company’s Board of Directors with respect to awards to non-employee directors and by its Compensation Committee with respect to other participants, each of which may delegate its duties and responsibilities to committees of the Company’s directors and/or officers, subject to certain limitations (collectively, the “administrator”).

RSUs granted under the 2014 Plan generally vest in installments pursuant to a vesting schedule set forth in each award agreement. RSU awards under the 2014 plan do not require any cash payment from the participant to whom an award was made. The vesting of performance awards, including performance-based restricted share units ("PSUs"), was dependent on one or more performance criteria determined by the administrator on a specific date or dates or over any period or periods determined by the administrator.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

On June 1, 2016, the Company's Board of Directors adopted the 2016 Incentive Award Plan (the "2016 Plan"), which was approved by Progressive Waste's shareholders on May 26, 2016. On each of July 24, 2017 and 2018, the Board of Directors approved certain housekeeping amendments to the 2016 Plan. The 2016 Plan, as amended, is administered by the Company's Compensation Committee and provides that the aggregate number of common shares which may be issued from treasury pursuant to awards made under the 2016 Plan is 7,500,000 common shares. Awards under the 2016 Plan may be made to employees, consultants and non-employee directors and may be made in the form of options, warrants, restricted shares, restricted share units, performance awards (which may be paid in cash, common shares, or a combination thereof), dividend equivalent awards (representing a right of the holder thereof to receive the equivalent value (which may be paid in cash or common shares) of dividends paid on common shares), and share payments (a payment in the form of common shares or an option or other right to purchase common shares as part of a bonus, defined compensation or other arrangement). Non-employee directors are also eligible to receive deferred share units, which represent the right to receive a cash payment or its equivalent in common shares (or a combination of cash and common shares), or which may at the time of grant be expressly limited to settlement only in cash and not in common shares.

Restricted Share Units

A summary of the Company's RSU activity is presented below:

	Years Ended December 31,		
	2019	2018	2017
Weighted average grant-date fair value of restricted share units granted	$ 81.24	$ 69.22	$ 57.09
Total fair value of restricted share units vested	$ 21,136	$ 18,795	$ 16,715

A summary of activity related to RSUs during the year ended December 31, 2019, is presented below:

	Unvested Shares	Weighted-Average Grant Date Fair Value Per Share
Outstanding at December 31, 2018	987,563	$ 56.43
Granted	345,127	$ 81.24
Forfeited	(54,987)	$ 66.73
Vested and issued	(416,691)	$ 50.72
Outstanding at December 31, 2019	861,012	$ 68.47

Recipients of the Company's RSUs who participate in the Company's Nonqualified Deferred Compensation Plan may have elected in years prior to 2015 to defer some or all of their RSUs as they vest until a specified date or dates they choose. At the end of the deferral periods, unless a qualified participant makes certain other elections, the Company issues to recipients who deferred their RSUs common shares of the Company underlying the deferred RSUs. At December 31, 2019, 2018 and 2017, the Company had 247,999, 264,374 and 351,570 vested deferred RSUs outstanding, respectively.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Performance-Based Restricted Share Units

A summary of the Company's PSU activity is presented below:

	Years Ended December 31,		
	2019	2018	2017
Weighted average grant-date fair value of PSUs granted	$ 80.85	$ 68.77	$ 56.55
Total fair value of PSUs vested	$ 7,683	$ 5,886	$ 4,098

A summary of activity related to PSUs during the year ended December 31, 2019, is presented below:

	Unvested Shares	Weighted-Average Grant Date Fair Value Per Share
Outstanding at December 31, 2018	532,086	$ 53.43
Granted	152,656	$ 80.85
Vested and issued	(180,258)	$ 42.62
Outstanding at December 31, 2019	504,484	$ 65.59

During the year ended December 31, 2019, the Company's Compensation Committee granted PSUs with three-year performance-based metrics that the Company must meet before those awards may be earned, and the performance period for those grants ends on December 31, 2021. During the same period, the Company's Compensation Committee also granted PSUs with a one-year performance-based metric that the Company must meet before those awards may be earned, with the awards then subject to time-based vesting for the remaining three years of their four-year vesting period. During the year ended December 31, 2018, the Company's Compensation Committee granted PSUs with three-year performance-based metrics that the Company must meet before those awards may be earned, and the performance period for those grants ends on December 31, 2020. During the same period, the Company's Compensation Committee also granted PSUs with a one-year performance-based metric that the Company was required to meet before those awards were earned, with the awards then subject to time-based vesting for the remaining three years of their four-year vesting period. During the year ended December 31, 2017, the Company's Compensation Committee granted PSUs with three-year performance-based metrics that the Company was required to meet before those awards were earned, and the performance period for those grants ended on December 31, 2019. During the same period, the Company's Compensation Committee also granted PSUs with a one-year performance-based metric that the Company was required to meet before those awards were earned, with the awards then subject to time-based vesting for the remaining three years of their four-year vesting period. The Compensation Committee determines the achievement of performance results and corresponding vesting of PSUs for each performance period.

Share Purchase Warrants

The Company has outstanding share purchase warrants issued under the 2014 Plan and the 2016 Plan. Warrants to purchase the Company's common shares were issued to certain consultants to the Company. Warrants issued were fully vested and exercisable at the date of grant. Warrants outstanding at December 31, 2019, expire between 2020 and 2024.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

A summary of warrant activity during the year ended December 31, 2019, is presented below:

	Warrants	Weighted-Average Exercise Price
Outstanding at December 31, 2018	268,211	$ 63.49
Granted	151,008	$ 91.43
Forfeited	(15,728)	$ 35.05
Exercised	(25,067)	$ 33.38
Outstanding at December 31, 2019	378,424	$ 77.81

The following table summarizes information about warrants outstanding as of December 31, 2019 and 2018:

Grant Date	Warrants Issued	Exercise Price	Fair Value of Warrants Issued	Outstanding at December 31, 2019	Outstanding at December 31, 2018
Throughout 2014	75,604	$30.41 to $32.71	276	—	15,416
Throughout 2015	136,768	$28.30 to $36.32	1,333	21,515	45,978
Throughout 2016	15,666	$42.22 to $51.55	189	7,158	7,440
Throughout 2017	35,382	$53.65 to $69.96	595	35,382	35,382
Throughout 2018	163,995	$70.91 to $80.90	2,591	163,361	163,995
Throughout 2019	151,008	$74.25 to $95.61	2,634	151,008	—
				378,424	268,211

Deferred Share Units

A summary of the Company’s deferred share units (“DSUs”) activity is presented below:

	Years Ended December 31, 2019	2018	2017
Weighted average grant-date fair value of DSUs granted	$ 83.80	$ 70.47	$ 57.65
Total fair value of DSUs awarded	$ 319	$ 285	$ 272

The DSUs consist of a combination of DSU grants outstanding under the Progressive Waste share-based compensation plans that were continued by the Company following the Progressive Waste acquisition and DSUs granted by the Company since the Progressive Waste acquisition.

A summary of activity related to DSUs during the year ended December 31, 2019, is presented below:

	Vested Shares	Weighted-Average Grant Date Fair Value Per Share
Outstanding at December 31, 2018	17,176	$ 48.24
Granted	3,804	$ 83.80
Cash settled	(2,010)	$ 68.83
Outstanding at December 31, 2019	18,970	$ 53.19

Other Restricted Share Units

RSU grants outstanding under the Progressive Waste share-based compensation plans were continued by the Company following the Progressive Waste acquisition and allow for the issuance of shares or cash settlement to employees upon vesting. A summary of activity related to Progressive Waste RSUs during the year ended December 31, 2019, is presented below:

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Outstanding at December 31, 2018	122,259
Cash settled	(46,023)
Forfeited	(2,352)
Outstanding at December 31, 2019	73,884

A summary of vesting activity related to Progressive Waste RSUs during the year ended December 31, 2019, is presented below:

Vested at December 31, 2018	120,153
Vested over remaining service period	2,106
Cash settled	(46,023)
Forfeited	(2,352)
Vested at December 31, 2019	73,884

No RSUs under the Progressive Waste share-based compensation plans were granted subsequent to June 1, 2016. During the year ended December 31, 2019, 964 Progressive Waste RSUs were forfeited and have been redistributed to the other remaining active participants. All remaining RSUs were vested as of December 31, 2019.

Other Performance-Based Restricted Share Units

PSU grants outstanding under the Progressive Waste share-based compensation plans were continued by the Company following the Progressive Waste acquisition and allow for cash settlement only to employees upon vesting based on achieving target results. A summary of activity related to Progressive Waste PSUs during the year ended December 31, 2019, is presented below:

Outstanding at December 31, 2018	22,791
Cash settled, net of notional dividend	(22,791)
Outstanding at December 31, 2019	—

No PSUs under the Progressive Waste share-based compensation plans were granted subsequent to June 1, 2016. All outstanding PSUs were vested as of December 31, 2018.

Share Based Options

Share based options outstanding under the Progressive Waste share-based compensation plans were continued by the Company following the Progressive Waste acquisition and allow for the issuance of shares or cash settlement to employees upon vesting. A summary of activity related to Progressive Waste share based options during the year ended December 31, 2019, is presented below:

Outstanding at December 31, 2018	165,156
Cash settled	(38,995)
Outstanding at December 31, 2019	126,161

No share based options under the Progressive Waste share-based compensation plans were granted subsequent to June 1, 2016. All outstanding share based options were vested as of December 31, 2017.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

14. OTHER COMPREHENSIVE INCOME (LOSS)

Other comprehensive income (loss) includes changes in the fair value of interest rate swaps and fuel hedges that qualify for hedge accounting. The components of other comprehensive income (loss) and related tax effects for the years ended December 31, 2019, 2018 and 2017, are as follows:

	Year Ended December 31, 2019		
	Gross	Tax Effect	Net of Tax
Interest rate swap amounts reclassified into interest expense	$ (8,027)	$ 2,127	$ (5,900)
Changes in fair value of interest rate swaps	(43,873)	11,626	(32,247)
Foreign currency translation adjustment	101,970	—	101,970
	$ 50,070	$ 13,753	$ 63,823

	Year Ended December 31, 2018		
	Gross	Tax Effect	Net of Tax
Interest rate swap amounts reclassified into interest expense	$ (5,669)	$ 1,502	$ (4,167)
Fuel hedge amounts reclassified into cost of operations	(6,531)	1,627	(4,904)
Changes in fair value of interest rate swaps	(1,213)	321	(892)
Changes in fair value of fuel hedge	2,651	(654)	1,997
Foreign currency translation adjustment	(175,233)	—	(175,233)
	$ (185,995)	$ 2,796	$ (183,199)

	Year Ended December 31, 2017		
	Gross	Tax Effect	Net of Tax
Interest rate swap amounts reclassified into interest expense	$ 2,805	$ (743)	$ 2,062
Fuel hedge amounts reclassified into cost of operations	2,818	(706)	2,112
Changes in fair value of interest rate swaps	7,835	(4,040)	3,795
Changes in fair value of fuel hedges	1,326	(367)	959
Foreign currency translation adjustment	142,486	—	142,486
	$ 157,270	$ (5,856)	$ 151,414

A roll forward of the amounts included in AOCIL, net of taxes, is as follows:

	Fuel Hedges	Interest Rate Swaps	Foreign Currency Translation Adjustment	Accumulated Other Comprehensive Income (Loss)
Balance at December 31, 2017	$ 2,907	$ 13,951	$ 91,555	$ 108,413
Amounts reclassified into earnings	(4,904)	(4,167)	—	(9,071)
Changes in fair value	1,997	(892)	—	1,105
Foreign currency translation adjustment	—	—	(175,233)	(175,233)
Balance at December 31, 2018	—	8,892	(83,678)	(74,786)
Amounts reclassified into earnings	—	(5,900)	—	(5,900)
Changes in fair value	—	(32,247)	—	(32,247)
Foreign currency translation adjustment	—	—	101,970	101,970
Balance at December 31, 2019	$ —	$ (29,255)	$ 18,292	$ (10,963)

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

15. INCOME TAXES

The Company's operations are conducted through its various subsidiaries in countries throughout the world. The Company has provided for income taxes based upon the tax laws and rates in the countries in which operations are conducted and income is earned.

Income before provision for income taxes consists of the following:

	Years Ended December 31,		
	2019	2018	2017
U.S.	$ 477,203	$ 491,506	$ 301,962
Non – U.S.	228,688	215,634	206,548
Income before income taxes	$ 705,891	$ 707,140	$ 508,510

The provision (benefit) for income taxes for the years ended December 31, 2019, 2018 and 2017, consists of the following:

	Years Ended December 31,		
	2019	2018	2017
Current:			
U.S. Federal	$ 45,475	$ 37,419	$ 45,089
State	27,528	27,057	19,848
Non – U.S.	11,570	17,651	18,537
	84,573	82,127	83,474
Deferred:			
U.S. Federal	58,291	85,926	(203,131)
State	6,331	1,991	7,534
Non – U.S.	(9,985)	(10,058)	43,213
	54,637	77,859	(152,384)
Provision (benefit) for income taxes	$ 139,210	$ 159,986	$ (68,910)

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The Company is organized under the laws of Ontario, Canada; however, since the proportion of U.S. revenues, assets, operating income and associated tax provisions is significantly greater than any other single taxing jurisdiction within the worldwide group, the reconciliation of the differences between the Company's income tax provision (benefit) as presented in the accompanying Consolidated Statements of Net Income and income tax provision (benefit) computed at the federal statutory rate is presented on the basis of the U.S. federal statutory income tax rate of 21%for the years ended December 31, 2019 and 2018 and 35% for the year ending December 31, 2017, as opposed to the Canadian statutory rate of approximately 27% to provide a more meaningful insight into those differences. The items shown in the following table are a percentage of pre-tax income:

	Years Ended December 31,		
	2019	2018	2017
U.S. federal statutory rate	21.0 %	21.0 %	35.0 %
State taxes, net of federal benefit	4.4	4.4	4.1
Deferred income tax liability adjustments	0.6	(0.2)	0.5
Effect of international operations	(6.3)	(3.9)	(14.6)
Enactment of the Tax Act	—	—	(53.1)
Deferred tax on undistributed earnings	—	0.9	12.3
Goodwill impairment	—	—	2.1
Other	—	0.4	0.1
	19.7 %	22.6 %	(13.6)%

The comparability of the Company's income tax provision (benefit) for the reported periods has been affected by variations in its income before income taxes.

The effects of international operations are primarily due to the Company's non-U.S. income being taxed at rates substantially lower than the U.S. federal statutory rate for the year ended December 31, 2017, as well as a portion of the Company's income from internal financing that is taxed at effective rates substantially lower than the U.S. federal statutory rate for each of the years presented. Additionally, for the year ended December 31, 2019, a reduction in deferred income tax assets primarily related to compensation of executive officers no longer deemed deductible for tax purposes resulted in an increase to tax expense of $3,805.

For the year ended December 31, 2018, the restructuring of the Company's internal refinancing in conjunction with the Tax Act resulted in an increase to tax expense of $5,572. Further, a reduction in the Company's deferred income tax liabilities due to enacted state legislation and changes in the Company's geographical apportionment due to acquisition activity resulted in a tax benefit of $3,057.

During the year ended December 31, 2017, in conjunction with the Tax Act, the Company recorded a provisional deferred income tax expense of $62,350 associated with a portion of its U.S. earnings no longer permanently reinvested. During the year ended December 31, 2018, the Company recorded a deferred income tax expense of $6,429 associated with refinements to the prior year estimate as a measurement period adjustment pursuant to Staff Accounting Bulletin No. 118. This resulted in total deferred income tax expense of $68,779 which has been considered to be complete.

During the year ended December 31, 2017, as a result of the enactment of the Tax Act, the Company recorded a net deferred income tax benefit of $269,804 primarily due to the reduction of the corporate income tax rate effective for tax years beginning in 2018. Additionally, the goodwill impairment within the E&P segment and disposal of goodwill from the divesture of certain operations, resulted in the write off of goodwill that was not deductible for tax purposes resulting in an increase to tax expense of $11,825.

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The significant components of deferred income tax assets and liabilities, reduced by valuation allowances as applicable, as of December 31, 2019 and 2018 are presented below.

	2019	2018
Deferred income tax assets:		
Accrued expenses	$ 23,536	$ 26,128
Compensation	17,532	19,830
Contingent liabilities	15,228	14,043
Finance costs	—	2,329
Tax credits and loss carryforwards	18,693	20,438
Interest rate and fuel hedges	10,548	—
Gross deferred income tax assets	85,537	82,768
Less: Valuation allowance	—	—
Total deferred income tax assets	85,537	82,768
Deferred income tax liabilities:		
Goodwill and other intangibles	(311,404)	(283,671)
Property and equipment	(497,768)	(461,071)
Landfill closure/post-closure	(12,159)	(8,892)
Prepaid expenses	(8,542)	(11,581)
Interest rate and fuel hedges	—	(3,206)
Investment in subsidiaries	(69,597)	(69,383)
Other	(4,689)	(4,997)
Total deferred income tax liabilities	(904,159)	(842,801)
Net deferred income tax liability	$ (818,622)	$ (760,033)

The Company has $29,460 of Canadian tax loss carryforwards with a 20-year carryforward period which will begin to expire in 2034, as well as various U.S. state tax losses with carryforward periods up to 20 years.

As of December 31, 2019, the Company had undistributed earnings of approximately $2,609,805 for which income taxes have not been provided on permanently reinvested earnings of approximately $1,434,805. Additionally, the Company has not recorded deferred taxes on the amount of financial reporting basis in excess of tax basis of approximately $319,046 attributable to the Company’s non-U.S. subsidiaries which are permanently reinvested. It is not practical to estimate the additional tax that may become payable upon the eventual repatriation of these amounts; however, the tax impacts could result in a material increase to the Company’s effective tax rate.

The Company and its subsidiaries are subject to U.S. federal and Canadian income tax, which are its principal operating jurisdictions. The Company has concluded all U.S. federal income tax matters for years through 2015, except for the Progressive Waste U.S. federal income tax jurisdiction, which remains open for years subsequent to 2007. Additionally, the Company has concluded all Canadian income tax matters for years through 2014.

The Company did not have any unrecognized tax benefits recorded at December 31, 2019, 2018 or 2017. The Company does not anticipate the total amount of unrecognized tax benefits will significantly change by December 31, 2020. The Company recognizes interest and/or penalties related to income tax matters in income tax expense.

16. SEGMENT REPORTING

The Company's revenues are generated from the collection, transfer, recycling and disposal of non-hazardous solid waste and the treatment, recovery and disposal of non-hazardous E&P waste. No single contract or customer accounted for more than 10% of the Company's total revenues at the consolidated or reportable segment level during the periods presented.

The Company manages its operations through five geographic solid waste operating segments and its E&P segment, which includes the majority of the Company's E&P waste treatment and disposal operations. The Company's five geographic solid waste operating segments and its E&P segment comprise the Company's reportable segments. Each operating segment is responsible for managing several vertically integrated operations, which are comprised of districts. In the third quarter of 2017, the Company moved a district from the Eastern segment to the Canada segment as a significant amount of its revenues are received from Canadian-based customers. In the first quarter of 2019, the Company moved two districts from the Eastern segment to the Central segment because their locations in Iowa were closer in proximity to operations in the Company's Central segment. The segment information presented herein reflects the realignment of these districts.

Under the current orientation, the Company's Eastern segment services customers located in northern Illinois, Kentucky, Maryland, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, eastern Tennessee, Vermont, Virginia and Wisconsin; the Company's Southern segment services customers located in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, southern Oklahoma, western Tennessee and Texas; the Company's Western segment services customers located in Alaska, California, Idaho, Montana, Nevada, Oregon, Washington and western Wyoming; the Company's Central segment services customers located in Arizona, Colorado, southern Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, western Texas, Utah and eastern Wyoming; and the Company's Canada segment services customers located in the state of Michigan and in the provinces of Alberta, British Columbia, Manitoba, Ontario, Québec and Saskatchewan. The E&P segment services E&P customers located in Louisiana, New Mexico, North Dakota, Oklahoma, Texas, Wyoming and along the Gulf of Mexico.

The Company's Chief Operating Decision Maker evaluates operating segment profitability and determines resource allocations based on several factors, of which the primary financial measure is segment EBITDA. The Company defines segment EBITDA as earnings before interest, taxes, depreciation, amortization, impairments and other operating items, and other income (expense). Segment EBITDA is not a measure of operating income, operating performance or liquidity under generally accepted accounting principles and may not be comparable to similarly titled measures reported by other companies. The Company's management uses segment EBITDA in the evaluation of segment operating performance as it is a profit measure that is generally within the control of the operating segments. A reconciliation of segment EBITDA to Income before income tax provision is included at the end of this Note 16.

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Summarized financial information concerning the Company's reportable segments for the years ended December 31, 2019, 2018 and 2017, is shown in the following tables:

Year Ended December 31, 2019	Revenue	Intercompany Revenue[(b)]	Reported Revenue	Segment EBITDA[(c)]	Depreciation and Amortization	Capital Expenditures	Total Assets[(e)]
Eastern	$ 1,524,648	$ (255,684)	$ 1,268,964	$ 330,578	$ 204,221	$ 154,218	$ 3,099,283
Southern	1,355,753	(162,831)	1,192,922	305,999	160,038	141,157	2,990,247
Western	1,234,669	(135,820)	1,098,849	338,563	102,067	147,893	1,718,015
Central	958,139	(119,555)	838,584	292,111	106,391	116,831	1,885,468
Canada	835,603	(102,321)	733,282	256,405	113,944	61,119	2,490,291
E&P	267,861	(11,783)	256,078	135,426	48,929	36,970	962,202
Corporate[(a), (d)]	—	—	—	(15,438)	8,328	7,901	592,189
	$ 6,176,673	$ (787,994)	$ 5,388,679	$ 1,643,644	$ 743,918	$ 666,089	$ 13,737,695

Year Ended December 31, 2018	Revenue	Intercompany Revenue[(b)]	Reported Revenue	Segment EBITDA[(c)]	Depreciation and Amortization	Capital Expenditures	Total Assets[(e)]
Eastern	$ 1,296,823	$ (224,833)	$ 1,071,990	$ 295,016	$ 166,715	$ 136,214	$ 2,673,316
Southern	1,273,033	(150,485)	1,122,548	276,791	153,923	97,442	2,892,994
Western	1,170,382	(126,454)	1,043,928	318,401	95,400	125,112	1,596,129
Central	815,520	(103,966)	711,554	259,794	89,001	91,646	1,506,326
Canada	823,989	(96,776)	727,213	261,233	124,155	66,319	2,412,971
E&P	253,083	(7,375)	245,708	129,825	44,175	25,937	969,808
Corporate[(a), (d)]	—	—	—	(8,211)	7,118	3,475	575,785
	$ 5,632,830	$ (709,889)	$ 4,922,941	$ 1,532,849	$ 680,487	$ 546,145	$ 12,627,329

Year Ended December 31, 2017	Revenue	Intercompany Revenue[(b)]	Reported Revenue	Segment EBITDA[(c)]	Depreciation and Amortization	Capital Expenditures	Total Assets[(e)]
Eastern	$ 1,120,221	$ (178,394)	$ 941,827	$ 269,106	$ 135,737	$ 100,025	$ 2,009,328
Southern	1,262,147	(146,283)	1,115,864	258,560	151,417	117,441	2,718,296
Western	1,127,146	(119,916)	1,007,230	323,648	95,724	100,000	1,573,955
Central	734,042	(88,488)	645,554	241,972	79,460	79,544	1,312,317
Canada	828,755	(99,978)	728,777	264,693	121,174	62,690	2,677,557
E&P	199,063	(7,827)	191,236	90,597	42,500	12,274	981,980
Corporate[(a), (d)]	—	—	—	(32,501)	6,472	7,313	741,248
	$ 5,271,374	$ (640,886)	$ 4,630,488	$ 1,416,075	$ 632,484	$ 479,287	$ 12,014,681

(a) Corporate functions include accounting, legal, tax, treasury, information technology, risk management, human resources, training, direct acquisition expenses, other administrative functions and share-based compensation expenses associated with Progressive Waste share-based grants existing at June 1, 2016. Amounts reflected are net of allocations to the six operating segments. For the years ended December 31, 2018 and 2017, amounts also include Progressive Waste integration-related expenses.

(b) Intercompany revenues reflect each segment's total intercompany sales, including intercompany sales within a segment and between segments. Transactions within and between segments are generally made on a basis intended to reflect the market value of the service.

(c) For those items included in the determination of segment EBITDA, the accounting policies of the segments are the same as those described in Note 3.

(d) Corporate assets include cash, debt issuance costs, equity investments, operating lease right-of-use assets and corporate facility leasehold improvements and equipment.

(e) Goodwill is included within total assets for each of the Company's six operating segments.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

The following table shows changes in goodwill during the years ended December 31, 2018 and 2019, by reportable segment:

	Eastern	Southern	Western	Central	Canada	E&P	Total
Balance as of December 31, 2017	$ 804,133	$ 1,436,320	$ 397,508	$ 468,275	$ 1,575,538	$ —	$ 4,681,774
Goodwill transferred	(16,869)	—	—	16,869	—	—	—
Goodwill acquired	339,222	71,109	666	55,291	153	—	466,441
Goodwill adjustment for assets sold	—	10,181	—	—	—	—	10,181
Impact of changes in foreign currency	—	—	—	—	(126,711)	—	(126,711)
Balance as of December 31, 2018	1,126,486	1,517,610	398,174	540,435	1,448,980	—	5,031,685
Goodwill acquired	204,694	11,460	1,863	189,035	16	—	407,068
Goodwill divested	—	(845)	—	—	—	—	(845)
Impact of changes in foreign currency	—	—	—	—	72,943	—	72,943
Balance as of December 31, 2019	$ 1,331,180	$ 1,528,225	$ 400,037	$ 729,470	$ 1,521,939	$ —	$ 5,510,851

Property and equipment, net relating to operations in the United States and Canada are as follows:

	December 31, 2019	December 31, 2018
United States	$ 4,862,557	$ 4,516,966
Canada	653,790	652,030
Total	$ 5,516,347	$ 5,168,996

A reconciliation of the Company's primary measure of segment profitability (segment EBITDA) to Income before income tax provision in the Consolidated Statements of Net Income is as follows:

	Years ended December 31, 2019	2018	2017
Eastern segment EBITDA	$ 330,578	$ 295,016	$ 269,106
Southern segment EBITDA	305,999	276,791	258,560
Western segment EBITDA	338,563	318,401	323,648
Central segment EBITDA	292,111	259,794	241,972
Canada segment EBITDA	256,405	261,233	264,693
E&P segment EBITDA	135,426	129,825	90,597
Subtotal reportable segments	1,659,082	1,541,060	1,448,576
Unallocated corporate overhead	(15,438)	(8,211)	(32,501)
Depreciation	(618,396)	(572,708)	(530,187)
Amortization of intangibles	(125,522)	(107,779)	(102,297)
Impairments and other operating items	(61,948)	(20,118)	(156,493)
Interest expense	(147,368)	(132,104)	(125,297)
Interest income	9,777	7,170	5,173
Other income (expense), net	5,704	(170)	1,536
Income before income tax provision	$ 705,891	$ 707,140	$ 508,510

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

17. NET INCOME PER SHARE INFORMATION

The following table sets forth the calculation of the numerator and denominator used in the computation of basic and diluted net income per common share attributable to the Company's shareholders for the years ended December 31, 2019, 2018 and 2017:

	Years Ended December 31,		
	2019	2018	2017
Numerator:			
Net income attributable to Waste Connections for basic and diluted earnings per share	$ 566,841	$ 546,871	$ 576,817
Denominator:			
Basic shares outstanding	263,792,693	263,650,155	263,682,608
Dilutive effect of equity-based awards	733,868	745,463	619,803
Diluted shares outstanding	264,526,561	264,395,618	264,302,411

18. EMPLOYEE BENEFIT PLANS

Retirement Savings Plans: Waste Connections and certain of its subsidiaries have voluntary retirement savings plans in Canada (the "RSPs"). RSPs are available to all eligible Canadian employees of Waste Connections and its subsidiaries. For eligible non-union Canadian employees, Waste Connections and its subsidiaries make a matching contribution to a deferred profit sharing plan ("DPSP") of up to 4% of the employee's eligible compensation, subject to certain limitations imposed by the Income Tax Act (Canada).

Certain of Waste Connections' subsidiaries also have voluntary savings and investment plans in the U.S. (the "401(k) Plans"). The 401(k) Plans are available to all eligible U.S. employees of Waste Connections and its subsidiaries. Waste Connections and its subsidiaries make matching contributions under the 401(k) Plans of 100% of every dollar of a participating employee's pre-tax contributions until the employee's contributions equal 5% of the employee's eligible compensation, subject to certain limitations imposed by the U.S. Internal Revenue Code.

Total employer expenses, including employer matching contributions, for the DPSP and 401(k) Plans were $26,111, $12,055 and $14,703, respectively, during the years ended December 31, 2019, 2018 and 2017. These amounts include matching contributions Waste Connections made under the Deferred Compensation Plan, described below.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

Multiemployer Pension Plans: The Company also participates in 11 "multiemployer" pension plans. The Company does not administer these multiemployer plans. In general, these plans are managed by the trustees, with the unions appointing certain trustees, and other contributing employers of the plan appointing certain others. The Company is generally not represented on the board of trustees. The Company makes periodic contributions to these plans pursuant to its collective bargaining agreements. The Company's participation in multiemployer pension plans is summarized as follows:

Plan Name	EIN/Pension Plan Number/ Registration Number	Pension Protection Act Zone Status (a) 2019	Pension Protection Act Zone Status (a) 2018	FIP/RP Status (a),(b)	Company Contributions 2019	Company Contributions 2018	Company Contributions 2017	Expiration Date of Collective Bargaining Agreement
Local 731, I.B. of T., Private Scavengers, Garage Attendants, and Textile Maintenance Pension Trust Fund	36-6513567 - 001	Green for the plan year ended 9/30/2019	Green for the plan year ended 9/30/2017	Not applicable	$ 4,570	$ 4,600	$ 4,342	9/30/2023
Western Conference of Teamsters Pension Trust	91-6145047 - 001	Green	Green	Not applicable	4,550	4,399	4,191	12/31/2019 to 7/31/2022
Suburban Teamsters of Northern Illinois Pension Fund	36-6155778 - 001	Green for the plan year beginning 1/1/2019	Yellow	Not applicable	1,844	1,569	877	1/31/2024
Teamster Local 301 Pension Fund	36-6492992 - 001	Green	Green	Not applicable	624	581	489	9/30/2023
Automobile Mechanics' Local No. 701 Union and Industry Pension Fund	36-6042061 - 001	Yellow	Yellow	Implemented	492	484	837	12/31/2022
Midwest Operating Engineers Pension Plan	36-6140097 - 001	Green for the plan year beginning 4/1/2019	Yellow for the plan year ended 3/31/2017	Not applicable	339	289	207	10/31/2020
Locals 302 & 612 of the IOUE - Employers Construction Industry Retirement Plan	91-6028571 - 001	Green	Green	Not applicable	290	284	275	11/16/2022
Local 813 Pension Trust Fund	13-1975659 - 001	Critical	Critical	Implemented	281	165	158	11/30/2019
IAM National Pension Fund	51-6031295 - 002	Green	Green	Not applicable	256	240	215	12/31/2022
International Union of Operating Engineers Pension Trust	85512-1	Green as of 4/30/2017	Green as of 4/30/2017	Not applicable	238	224	219	3/31/2020 to 3/31/2021
Multi-Sector Pension Plan	1085653	Green as of 1/1/2019	Green	Not applicable	202	191	228	12/31/2018
					$ 13,686	$ 13,026	$ 12,038	

(a) Unless otherwise noted in the table above, the most recent Pension Protection Act zone status available in 2019 and 2018 is for the plans' years ended December 31, 2018 and 2017, respectively.
(b) The "FIP/RP Status" column indicates plans for which a Funding Improvement Plan ("FIP") or a Rehabilitation Plan ("RP") has been implemented.
(c) A multiemployer defined benefit pension plan that has been certified as endangered, seriously endangered or critical may begin to levy a statutory surcharge on contribution rates. Once authorized, the surcharge is at the rate of 5% for the first 12 months and 10% for any periods thereafter, until certain conditions are met. The Company was not required to pay a surcharge to these plans during the years ended December 31, 2019 and 2018.

The status is based on information that the Company received from the pension plans and is certified by the pension plans' actuary. Plans with "green" status are at least 80% funded. Plans with "yellow" status are less than 80% funded. Plans with "critical" status are less than 65% funded. The Company's contributions to each individual multiemployer pension plan represent less than 5% of total contributions to such plan. Under current law regarding multiemployer benefit plans, a plan's termination, the Company's voluntary withdrawal, or the withdrawal of all contributing employers from any under-funded multiemployer pension plan would require the Company to make payments to the plan for its proportionate share of the multiemployer plan's unfunded vested liabilities. The Company could have adjustments to its estimates for these matters in the near term that could have a material effect on its consolidated financial condition, results of operations or cash flows.

Deferred Compensation Plan: The Waste Connections US, Inc. Nonqualified Deferred Compensation Plan was assumed by the Company on June 1, 2016 (as amended, restated, assumed, supplemented or otherwise modified from time to time, the "Deferred Compensation Plan"). The Deferred Compensation Plan is a non-qualified deferred compensation program under which the eligible participants, including officers and certain employees who meet a minimum salary threshold, may voluntarily elect to defer up to 80% of their base salaries and up to 100% of their bonuses, commissions and restricted share unit grants. Effective as of December 1, 2014, the Board of Directors determined to discontinue the option to allow eligible participants to defer restricted share unit grants pursuant to the Deferred Compensation Plan. Members of the Company's Board of Directors are eligible to participate in the Deferred Compensation Plan with respect to their director fees. Although the Company periodically contributes the amount of its obligation under the plan to a trust for the benefit of the participants, the amounts of any compensation deferred under the Deferred Compensation Plan constitute an unsecured obligation of the Company to pay the participants in the future and, as such, are subject to the claims of other creditors in the event of insolvency proceedings. Participants may elect certain future distribution dates on which all or a portion of their accounts will be paid to them, including in the case of a change in control of the Company. Their accounts will be distributed to them in cash, except for amounts credited with respect to deferred restricted share unit grants, which will be distributed in the Company's common shares pursuant to the 2014 Plan or the 2004 Plan. In addition to the amount of participants' contributions, the Company will pay participants an amount reflecting a deemed return based on the returns of various mutual funds or measurement funds selected by the participants, except in the case of restricted share units that were deferred and not subsequently exchanged into a measurement fund pursuant to the terms of the Deferred Compensation Plan, which will be credited to their accounts as Company common shares. The measurement funds are used only to determine the amount of return the Company pays to participants and participant funds are not actually invested in the measurement fund, nor are any Company common shares acquired under the Deferred Compensation Plan. During the year ended December 31, 2019, the Company also made matching contributions to the Deferred Compensation Plan of 100% of every dollar of a participating employee's pre-tax eligible contributions until the employee's contributions equaled 5% of the employee's eligible compensation, less the amount of any match the Company made on behalf of the employee under the Waste Connections 401(k) Plan, and subject to certain deferral limitations imposed by the U.S. Internal Revenue Code on 401(k) plans, except that the Company's matching contributions under the Deferred Compensation Plan were 100% vested when made. During each of the two years ended December 31, 2018 and 2017, the Company also made matching contributions to the Deferred Compensation Plan of 50% of every dollar of a participating employee's pre-tax eligible contributions until the employee's contributions equaled 6% of the employee's eligible compensation, less the amount of any match the Company made on behalf of the employee under the Waste Connections 401(k) Plan, and subject to certain deferral limitations imposed by the U.S. Internal Revenue Code on 401(k) plans, except that the Company's matching contributions under the Deferred Compensation Plan were 100% vested when made. The Company's total liability for deferred compensation at December 31, 2019 and 2018 was $37,707 and $32,024, respectively, which was recorded in Other long-term liabilities in the Consolidated Balance Sheets.

(DOLLAR AMOUNTS IN THOUSANDS OF U.S. DOLLARS, EXCEPT PER SHARE, PER TON AND PER GALLON AMOUNTS)

19. SELECTED QUARTERLY FINANCIAL DATA (UNAUDITED)

The following table summarizes the Company's unaudited consolidated quarterly results of operations for 2019:

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Revenues	$ 1,244,637	$ 1,369,639	$ 1,412,444	$ 1,361,960
Operating income	$ 184,860	$ 222,134	$ 236,600	$ 194,184
Net income	$ 125,577	$ 148,839	$ 159,074	$ 133,191
Net income attributable to Waste Connections	$ 125,622	$ 148,848	$ 159,109	$ 133,262
Basic income per common share attributable to Waste Connections' common shareholders	$ 0.48	$ 0.56	$ 0.60	$ 0.51
Diluted income per common share attributable to Waste Connections' common shareholders	$ 0.48	$ 0.56	$ 0.60	$ 0.50

During the first quarter of 2019, the Company recorded $12,230 of charges to terminate or write off the carrying cost of certain contracts, primarily acquired in the Progressive Waste acquisition, that were not, or are not expected to be, renewed prior to their original estimated termination date. During the third quarter of 2019, the Company recorded $8,000 resulting from the abandonment of a landfill development project at the Company's E&P segment. During the fourth quarter of 2019, the Company recorded $25,798 of charges associated with the write-down of an operating permit and equipment at a non-strategic materials recovery facility that was disposed of by sale on January 2, 2020.

The following table summarizes the Company's unaudited consolidated quarterly results of operations for 2018:

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Revenues	$ 1,140,131	$ 1,239,968	$ 1,281,110	$ 1,261,732
Operating income	$ 188,707	$ 210,688	$ 232,869	$ 199,980
Net income	$ 125,032	$ 138,814	$ 150,766	$ 132,543
Net income attributable to Waste Connections	$ 124,869	$ 138,682	$ 150,843	$ 132,478
Basic income per common share attributable to Waste Connections' common shareholders	$ 0.47	$ 0.53	$ 0.57	$ 0.50
Diluted income per common share attributable to Waste Connections' common shareholders	$ 0.47	$ 0.52	$ 0.57	$ 0.50

During the third quarter of 2018, the Company reversed $6,257 of expenses recognized in prior periods to adjust the carrying cost of assets held for disposal to fair market value due to modifications to its divestiture plan and changes in the fair market value of the divested operations. During the third quarter of 2018, the Company also recorded $5,005 in equity-based compensation expenses associated with adjusting common shares of Waste Connections, Inc. held in the

Company's deferred compensation plan by certain key executives to fair value as a result of the shares being exchanged for other investment options. During the fourth quarter of 2018, the Company recorded $11,043 for the potential settlement of a final judgment obtained against Progressive Waste Solutions of FL, Inc., now known as Waste Connections of Florida, Inc.

20. SUBSEQUENT EVENTS

On January 23, 2020, the Company completed an underwritten public offering of $600,000 aggregate principal amount of 2.60% Senior Notes due 2030 (the "2030 Senior Notes"). The 2030 Senior Notes were issued under the Indenture, dated as of November 16, 2018, by and between the Company and U.S. Bank National Association, as trustee, as supplemented by the Third Supplemental Indenture, dated as of January 23, 2020. The Company will pay interest on the Notes semi-annually in arrears and the Notes will mature on February 1, 2030. The Notes are the Company's senior unsecured obligations, ranking equally in right of payment with its other existing and future unsubordinated debt and senior to any of its future subordinated debt. The Notes are not guaranteed by any of the Company's subsidiaries. Net proceeds to the Company from the offering were used to repay a portion of the Company's borrowings outstanding under its Credit Agreement and for general corporate purposes.

On February 12, 2020, the Company announced that its Board of Directors approved a regular quarterly cash dividend of $0.185 per Company common share. The dividend will be paid on March 12, 2020, to shareholders of record on the close of business on February 27, 2020.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Disclosure Controls and Procedures

We carried out an evaluation, under the supervision and with the participation of our management, including our President and Chief Executive Officer and our Senior Vice President and Chief Financial Officer, of the effectiveness of the design and operation of our disclosure controls and procedures, as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended. Based on this evaluation, our President and Chief Executive Officer and Senior Vice President and Chief Financial Officer concluded that our disclosure controls and procedures were effective as of December 31, 2019, at the reasonable assurance level such that information required to be disclosed in our Exchange Act reports: (1) is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms; and (2) is accumulated and communicated to our management, including our President and Chief Executive Officer and Senior Vice President and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended. Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles. This process includes policies and procedures that: (1) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect our transactions and any dispositions of our assets; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. generally accepted accounting principles; (3) provide reasonable assurance that receipts and expenditures of ours are being made only in accordance with authorizations of our management; and (4) provide reasonable assurance that unauthorized acquisition, use or disposition of our assets that could have a material affect on our financial statements would be prevented or timely detected.

We carried out an evaluation, under the supervision and with the participation of our management, including our President and Chief Executive Officer and Senior Vice President and Chief Financial Officer, of the effectiveness of the design and operation of our internal control over financial reporting as of December 31, 2019. In conducting our evaluation, we used the framework set forth in the report titled "*Internal Control – Integrated Framework*" (2013) published by the Committee of Sponsoring Organizations of the Treadway Commission. Based on the results of our evaluation, our management has concluded that our internal control over financial reporting was effective as of December 31, 2019.

The effectiveness of our internal control over financial reporting as of December 31, 2019, has been audited by Grant Thornton LLP, our independent registered public accounting firm, as stated in its report which appears in Item 8 of this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

Based on an evaluation under the supervision and with the participation of our management, including our President and Chief Executive Officer and Senior Vice President and Chief Financial Officer, there has been no change to our internal control over financial reporting that occurred during the three month period ended December 31, 2019, that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Except as set forth above in Part I under "Information About Our Executive Officers" and in the paragraph below, the information required by Item 10 has been omitted from this Annual Report on Form 10-K, and is incorporated by reference to the sections "Election of Directors," "Corporate Governance and Board Matters" and "Delinquent Section 16(a) Reports" (if applicable) in our definitive Management Information Circular and Proxy Statement for the 2020 Annual and Special Meeting of Shareholders, which we will file with the SEC pursuant to Regulation 14A within 120 days after the end of our 2019 fiscal year.

We have adopted a Code of Conduct and Ethics that applies to our officers, including our principal executive officer, principal financial officer, principal accounting officer and all other officers, directors and employees. We have also adopted Corporate Governance Guidelines and Board Charter to promote the effective functioning of our Board of Directors and its committees, to promote the interests of shareholders and to ensure a common set of expectations concerning how the Board, its committees and management should perform their respective functions. Our Code of Conduct and Ethics and our Corporate Governance Guidelines and Board Charter are available on our website at http://www.wasteconnections.com as are the charters of our Board's Audit, Nominating and Corporate Governance and Compensation Committees. Information on or that can be accessed through our website is not incorporated by reference into this Annual Report on Form 10-K. We intend to satisfy the disclosure requirement under Item 5.05 of Form 8-K regarding any amendments to, or waiver from, a provision of our Code of Conduct and Ethics by posting such information on our website.

Shareholders may also obtain copies of the corporate governance documents discussed above by contacting our Secretary at 3 Waterway Square Place, Suite 110, The Woodlands, Texas 77380, or (832) 442-2200.

ITEM 11. EXECUTIVE COMPENSATION

Information required by Item 11 has been omitted from this Annual Report on Form 10-K and is incorporated by reference to the sections "Executive Compensation" and "Corporate Governance and Board Matters" in our definitive Management Information Circular and Proxy Statement for the 2020 Annual and Special Meeting of Shareholders.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED SHAREHOLDER MATTERS

Information required by Item 12 has been omitted from this Annual Report on Form 10-K and is incorporated by reference to the sections "Principal Shareholders" and "Equity Compensation Plan Information" in our definitive Management Information Circular and Proxy Statement for the 2020 Annual and Special Meeting of Shareholders.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information required by Item 13 has been omitted from this Annual Report on Form 10-K and is incorporated by reference to the sections "Certain Relationships and Related Transactions" and "Corporate Governance and Board Matters" in our definitive Management Information Circular and Proxy Statement for the 2020 Annual and Special Meeting of Shareholders.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

Information required by Item 14 has been omitted from this Annual Report on Form 10-K and is incorporated by reference to the section "Appointment of Independent Registered Public Accounting Firm and Authorization of the Board of Directors to Fix the Remuneration of the Independent Registered Public Accounting Firm" in our definitive Management Information Circular and Proxy Statement for the 2020 Annual and Special Meeting of Shareholders.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) See Index to Consolidated Financial Statements on page 72. The following Financial Statement Schedule is filed herewith on page 149 and made a part of this Annual Report on Form 10-K:

Schedule II - Valuation and Qualifying Accounts

All other schedules for which provision is made in the applicable accounting regulations of the SEC are not required under the related instructions or are inapplicable, and therefore have been omitted.

(b) Exhibits.

Exhibit Number	Description of Exhibits
3.1	Articles of Amendment (incorporated by reference to Exhibit 3.1 of the Registrant's Form 8-K filed on May 26, 2017)
3.2	Articles of Amalgamation (incorporated by reference to Exhibit 3.2 of the Registrant's Form 8-K filed on June 7, 2016)
3.3	Articles of Amendment (incorporated by reference to Exhibit 3.1 of the Registrant's Form 8-K filed on June 7, 2016)
3.4	By-law No. 1 of the Registrant (incorporated by reference to Exhibit 3.3 of the Registrant's Form 8-K filed on June 7, 2016)
3.5	Form of Common Share Certificate (incorporated by reference to Exhibit 3.4 of the Registrant's Form 8-K filed on June 7, 2016)
4.1	Master Note Purchase Agreement, dated as of June 1, 2016 (incorporated by reference to Exhibit 4.2 of the Registrant's Form 8-K filed on June 7, 2016)
4.2	First Supplement to Master Note Purchase Agreement, dated as of February 13, 2017 (incorporated by reference to Exhibit 4.2 of the Registrant's Form 8-K filed on February 17, 2017)
4.3	Amendment No. 1 to Master Note Purchase Agreement, dated as of March 21, 2018 (incorporated by reference to Exhibit 4.2 of the Registrant's Form 8-K filed on March 27, 2018)
4.4	Master Note Purchase Agreement, dated July 15, 2008 (incorporated by reference to Exhibit 4.3 of the Registrant's Form 8-K filed on June 7, 2016)
4.5	Amendment No. 1 to Master Note Purchase Agreement, dated as of July 20, 2009 (incorporated by reference to Exhibit 4.4 of the Registrant's Form 8-K filed on June 7, 2016)
4.6	First Supplement to Master Note Purchase Agreement, dated as of October 26, 2009 (incorporated by reference to Exhibit 4.5 of the Registrant's Form 8-K filed on June 7, 2016)
4.7	Amendment No. 2 to Master Note Purchase Agreement, dated as of November 24, 2010 (incorporated by reference to Exhibit 4.6 of the Registrant's Form 8-K filed on June 7, 2016)

Exhibit Number	Description of Exhibits
4.8	Second Supplement to Master Note Purchase Agreement, dated as of April 1, 2011 (incorporated by reference to Exhibit 4.7 of the Registrant's Form 8-K filed on June 7, 2016)
4.9	Amendment No. 3 to Master Note Purchase Agreement, dated as of October 12, 2011 (incorporated by reference to Exhibit 4.8 of the Registrant's Form 8-K filed on June 7, 2016)
4.10	Amendment No. 4 to Master Note Purchase Agreement, dated August 9, 2013 (incorporated by reference to Exhibit 4.9 of the Registrant's Form 8-K filed on June 7, 2016)
4.11	Amendment No. 5 to Master Note Purchase Agreement, dated February 20, 2015 (incorporated by reference to Exhibit 4.10 of the Registrant's Form 8-K filed on June 7, 2016)
4.12	Third Supplement to Master Note Purchase Agreement, dated as of June 11, 2015 (incorporated by reference to Exhibit 4.11 of the Registrant's Form 8-K filed on June 7, 2016)
4.13	Amendment No. 6 to Master Note Purchase Agreement, dated June 1, 2016 (incorporated by reference to Exhibit 4.12 of the Registrant's Form 8-K filed on June 7, 2016)
4.14	Assumption and Exchange Agreement, dated June 1, 2016 relating to the Master Note Purchase Agreement dated July 15, 2008 as amended and supplemented through and including June 1, 2016 and as further modified by the Assumption and Exchange Agreement (incorporated by reference to Exhibit 4.13 of the Registrant's Form 8-K filed on June 7, 2016)
4.15	Amendment No. 7 to Master Note Purchase Agreement, dated March 21, 2018 (incorporated by reference to Exhibit 4.3 of the Registrant's Form 8-K filed on March 27, 2018)
4.16	Amended and Restated Revolving Credit and Term Loan Agreement, dated as of March 21, 2018 (incorporated by reference to Exhibit 4.1 of the Registrant's Form 8-K filed on March 27, 2018)
4.17	Indenture, dated as of November 16, 2018, by and between Waste Connections, Inc. and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.1 of the Registrant's Form 8-K filed on November 16, 2018)
4.18	First Supplemental Indenture, dated as of November 16, 2018, by and between Waste Connections, Inc. and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.2 of the Registrant's Form 8-K filed on November 16, 2018)
4.19	Second Supplemental Indenture, dated as of April 16, 2019, by and between Waste Connections, Inc. and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.2 of the Registrant's Form 8-K filed on April 16, 2019)
4.20	Third Supplemental Indenture, dated as of January 23, 2020, by and between Waste Connections, Inc. and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.2 of the Registrant's Form 8-K filed on January 23, 2020)
4.21 *	Description of Securities
10.1 +	Form of Indemnification Agreement dated June 1, 2016, between Waste Connections, Inc. and each of its directors and officers (incorporated by reference to Exhibit 10.12 of the Registrant's Form 8-K filed on June 7, 2016)
10.2 +	Waste Connections, Inc. 2016 Incentive Award Plan (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q filed on July 26, 2017)

Exhibit Number	Description of Exhibits
10.3 +	Form of Restricted Share Unit Award Agreement (with One-Year Performance Period) under the Waste Connections, Inc. 2016 Incentive Award Plan (incorporated by reference to Exhibit 10.14 of the Registrant's Form 8-K filed on June 7, 2016)
10.4 +	Form of Performance-Based Restricted Share Unit Award Agreement (with Three-Year Performance Period) under the Waste Connections, Inc. 2016 Incentive Award Plan (incorporated by reference to Exhibit 10.15 of the Registrant's Form 8-K filed on June 7, 2016)
10.5 +	Form of Restricted Share Unit Agreement for Non-Employee Directors under the Waste Connections, Inc. 2016 Incentive Award Plan (incorporated by reference to Exhibit 10.16 of the Registrant's Form 8-K filed on June 7, 2016)
10.6 +	Form of Restricted Share Unit Agreement under the Waste Connections, Inc. 2016 Incentive Award Plan (incorporated by reference to Exhibit 10.17 of the Registrant's Form 8-K filed on June 7, 2016)
10.7 +	Form of Deferred Share Unit Agreement for Non-Employee Directors under the Waste Connections, Inc. 2016 Incentive Award Plan (incorporated by reference to Exhibit 10.3 of the Registrant's Form 10-Q filed on October 31, 2016)
10.8 +	Form of Warrant to Purchase Common Shares of Waste Connections, Inc. under the Waste Connections, Inc. 2016 Incentive Award Plan (incorporated by reference to Exhibit 10.23 of the Registrant's Form 10-K filed on February 15, 2018)
10.9 +	Waste Connections US, Inc. 2014 Incentive Award Plan (incorporated by reference to Exhibit 10.20 of the Registrant's Form 8-K filed on June 7, 2016)
10.10 +	Form of Grant Agreement for Restricted Stock Units under Waste Connections US, Inc. 2014 Incentive Award Plan (incorporated by reference to Exhibit 10.21 of the Registrant's Form 8-K filed on June 7, 2016)
10.11 +	Form of Grant Agreement for Restricted Stock Units (with One-Year Performance Period) under Waste Connections US, Inc. 2014 Incentive Award Plan (incorporated by reference to Exhibit 10.26 of the Registrant's Form 10-K filed on February 15, 2018)
10.12 +	Form of Warrant to Purchase Common Stock under the Waste Connections US, Inc. 2014 Incentive Award Plan (incorporated by reference to Exhibit 10.24 of the Registrant's Form 8-K filed on June 7, 2016)
10.13 +	Waste Connections US, Inc. Third Amended and Restated 2004 Equity Incentive Plan (incorporated by reference to Exhibit 10.25 of the Registrant's Form 8-K filed on June 7, 2016)
10.14 +	Waste Connections US, Inc. Nonqualified Deferred Compensation Plan, amended and restated as of December 1, 2014 (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q filed on August 5, 2016)
10.15 +	Amendment to the Waste Connections, Inc. Nonqualified Deferred Compensation Plan (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K filed on July 22, 2016)

Exhibit Number	Description of Exhibits
10.16 +	Amendment No. 2 to the Waste Connections, Inc. Nonqualified Deferred Compensation Plan (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q filed on October 26, 2017)
10.17 +	Waste Connections, Inc. Compensation Recoupment Policy (incorporated by reference to Exhibit 10.35 of the Registrant's Form 10-K filed on February 15, 2018)
10.18 +	Separation Benefits Plan of Waste Connections US, Inc., effective July 24, 2018 (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K/A filed on August 31, 2018)
10.19 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and Matthew S. Black, effective October 19, 2018 (incorporated by reference to Exhibit 10.2 of the Registrant's Form 8-K filed on October 19, 2018)
10.20 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and David G. Eddie, effective October 19, 2018 (incorporated by reference to Exhibit 10.3 of the Registrant's Form 8-K filed on October 19, 2018)
10.21 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and David M. Hall, effective October 19, 2018 (incorporated by reference to Exhibit 10.4 of the Registrant's Form 8-K filed on October 19, 2018)
10.22 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and Mary Anne Whitney, effective October 19, 2018 (incorporated by reference to Exhibit 10.7 of the Registrant's Form 8-K filed on October 19, 2018)
10.23 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and Eric O. Hansen, effective February 12, 2019 (incorporated by reference to Exhibit 10.32 of the Registrant's Form 10-K filed on February 14, 2019)
10.24 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and Ronald J. Mittelstaedt, effective July 25, 2019 (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K filed on July 26, 2019)
10.25 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and Worthing F. Jackman, effective July 25, 2019 (incorporated by reference to Exhibit 10.2 of the Registrant's Form 8-K filed on July 26, 2019)
10.26 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and Darrell W. Chambliss, effective July 25, 2019 (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q filed on July 30, 2019)
10.27 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and James M. Little, effective July 25, 2019 (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q filed on July 30, 2019)
10.28 +	Separation Benefits Plan Participation Letter Agreement by and between Waste Connections US, Inc. and Patrick J. Shea, effective July 25, 2019 (incorporated by reference to Exhibit 10.3 of the Registrant's Form 10-Q filed on July 30, 2019)
21.1 *	Subsidiaries of the Registrant
23.1 *	Consent of Independent Registered Public Accounting Firm

Exhibit Number	Description of Exhibits
24.1 *	Power of Attorney (see signature page of this Annual Report on Form 10-K)
31.1 *	Certification of Chief Executive Officer
31.2 *	Certification of Chief Financial Officer
32.1 *	Certificate of Chief Executive Officer
32.2 *	Certificate of Chief Financial Officer
101.INS *	XBRL Instance Document
101.SCH *	XBRL Taxonomy Extension Schema Document
101.CAL *	XBRL Taxonomy Extension Calculation Linkbase Document
101.LAB *	XBRL Taxonomy Extension Labels Linkbase Document
101.PRE *	XBRL Taxonomy Extension Presentation Linkbase Document
101.DEF *	XBRL Taxonomy Extension Definition Linkbase Document
104	Cover Page Interactive Data File – The cover page interactive data file does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.

* Filed herewith.
\+ Management contract or compensatory plan, contract or arrangement.

ITEM 16. FORM 10-K SUMMARY

None.

SIGNATURES

Pursuant to the requirements of Sections 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Waste Connections, Inc.

By: /s/ Worthing F. Jackman
Worthing F. Jackman
President and Chief Executive Officer

Date: February 13, 2020

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Worthing F. Jackman and Mary Anne Whitney, jointly and severally, his or her true and lawful attorneys-in-fact, each with the power of substitution, for him or her in any and all capacities to sign any amendments to this Annual Report on Form 10-K, and to file the same with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission and the securities commissions or similar regulatory authorities in Canada, hereby ratifying and confirming all that each of said attorneys-in-fact, or his or her substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signature	**Title**	**Date**
/s/ Worthing F. Jackman Worthing F. Jackman	President and Chief Executive Officer (principal executive officer)	February 13, 2020
/s/ Mary Anne Whitney Mary Anne Whitney	Senior Vice President and Chief Financial Officer (principal financial officer)	February 13, 2020
/s/ David G. Eddie David G. Eddie	Senior Vice President and Chief Accounting Officer (principal accounting officer)	February 13, 2020
/s/ Ronald J. Mittelstaedt Ronald J. Mittelstaedt	Executive Chairman	February 13, 2020
/s/ Edward E. Guillet Edward E. Guillet	Director	February 13, 2020
/s/ Michael W. Harlan Michael W. Harlan	Director	February 13, 2020
/s/ Larry S. Hughes Larry S. Hughes	Director	February 13, 2020
/s/ Elise L. Jordan Elise L. Jordan	Director	February 13, 2020
/s/ Susan Lee Susan Lee	Director	February 13, 2020
/s/ William J. Razzouk William J. Razzouk	Director	February 13, 2020

WASTE CONNECTIONS, INC.

SCHEDULE II - VALUATION AND QUALIFYING ACCOUNTS
Years Ended December 31, 2019, 2018 and 2017
(in thousands of U.S. dollars)

Description	Balance at Beginning of Year	Additions: Charged to Costs and Expenses	Additions: Charged to Other Accounts	Deductions (Write-offs, Net of Collections)	Balance at End of Year
Allowance for Doubtful Accounts:					
Year Ended December 31, 2019	$ 16,760	$ 11,973	$ —	$ (12,301)	$ 16,432
Year Ended December 31, 2018	$ 17,154	$ 13,814	$ —	$ (14,208)	$ 16,760
Year Ended December 31, 2017	$ 13,160	$ 14,363	$ —	$ (10,369)	$ 17,154

Exhibit 4.21

DESCRIPTION OF SECURITIES

The following description sets forth certain material terms and provisions of the securities of Waste Connections, Inc. (the "Company") that are registered under Section 12 of the Securities Exchange Act of 1934, as amended, our common shares. The following summary does not purport to be complete and is subject to, and is qualified in its entirety by reference to, the applicable provisions of the Business Corporation Act (Ontario) ("OBCA") and our Articles and By-laws. We encourage you to review our Articles of Amendment dated June 7, 2017, Articles of Amalgamation dated June 1, 2016, Articles of Amendment dated June 1, 2016, and By-law No. 1.

Our authorized share capital consists of an unlimited number of common shares, no par value, an unlimited number of special shares and an unlimited number of preferred shares issuable in series. As of February 3, 2020, there were 263,689,637 common shares, no special shares and no preferred shares outstanding. The outstanding common shares are validly issued, fully paid, and nonassessable.

Common Shares

The holders of common shares have the following rights, restrictions and privileges in respect of their common shares:

1. The right to vote, one vote per share, at all meetings of shareholders (except meetings at which only holders of another specified class of shares are entitled to vote pursuant to the provisions of the Company's Articles or pursuant to the provisions of the OBCA);
2. Cumulative voting for the election of directors is not permitted;
3. After payments of dividends to the holders of preferred shares, the right to receive dividends, as and when declared by the Board of Directors of the Company; and
4. Upon the liquidation, dissolution, or winding up of the Company, whether voluntary or involuntary, or in the event of any other distribution of assets of the Company among its shareholders for the purpose of winding up its affairs, after payment to the holders of the preferred shares of the amount or amounts to which they may be entitled, the holders of the common shares shall be entitled to share pro rata in any distribution of the property or assets of the Company.

.

EXHIBIT 21.1

SUBSIDIARIES OF WASTE CONNECTIONS, INC.

Subsidiary	Jurisdiction of Formation	Other Names Under Which Conducts Business
10100 HOLDINGS, LLC	Colorado	
115 W MAIN HOLDINGS, LLC	Colorado	
1755869 ALBERTA ULC	Alberta	
1895548 ONTARIO LIMITED	Ontario	
1922464 ALBERTA LTD.	Alberta	
19TH & LOWER BUCKEYE, LLC	Delaware	
2201080 ALBERTA ULC	Alberta	
2201093 ALBERTA ULC	Alberta	
2201898 ALBERTA ULC	Alberta	
2596557 ONTARIO LTD.	Ontario	
2900 DEDE ROAD, LLC	Maryland	
371 BRIAN HOLDINGS, LLC	Colorado	
9164-9608 QUEBEC INC.	Quebec	
9199-5290 QUEBEC INC.	Quebec	
A.C.M.S., INC.	Florida	Heart of Florida Environmental
ACE SOLID WASTE, INC.	Minnesota	
ADVANCED SYSTEMS PORTABLE RESTROOMS, INC.	Oregon	Advanced Mobile Storage
		Advanced Systems Portable Restrooms
		McDonald Portable Toilets
ALASKA WASTE-DENALI, LLC	Alaska	
ALASKA WASTE-DUTCH HARBOR, LLC	Alaska	
ALASKA WASTE-INTERIOR, LLC	Alaska	
ALASKA WASTE-JUNEAU, LLC	Alaska	
ALASKA WASTE-KENAI PENINSULA, LLC	Alaska	
ALASKA WASTE-KETCHIKAN, LLC	Alaska	
ALASKA WASTE MAT-SU, LLC	Alaska	
ALASKA WASTE-NOME, LLC	Alaska	
ALASKA WASTE-SITKA, LLC	Alaska	
AMERICAN DISPOSAL COMMERCIAL SERVICES, INC.	Virginia	
AMERICAN DISPOSAL COMPANY, INC.	Washington	Vashon Disposal
AMERICAN DISPOSAL MAINTENANCE SERVICES, INC.	Virginia	
AMERICAN DISPOSAL PROPERTY HOLDINGS, LLC	Delaware	
AMERICAN DISPOSAL RECYCLING SERVICES, INC.	Virginia	
AMERICAN DISPOSAL ROLL-OFF SERVICES, INC.	Virginia	
AMERICAN DISPOSAL SERVICE OF GEORGIA, INC.	Georgia	
AMERICAN DISPOSAL SERVICES, INC.	Virginia	
AMERICAN DISPOSAL SERVICES OF COLORADO, INC.	Colorado	
AMERICAN DISPOSAL SERVICES OF MARYLAND, INC.	Virginia	
AMERICAN RECYCLING CENTER, INC.	Virginia	
ANDERSON COUNTY LANDFILL, INC.	Delaware	Anderson County Landfill
ANDERSON REGIONAL LANDFILL, LLC	Delaware	
ARKANSAS RECLAMATION COMPANY, LLC	Arkansas	
AULC HOLDINGS, LLC	Delaware	
AUSTIN LANDFILL HOLDINGS, INC.	Delaware	
BAY DISPOSAL, LLC	Virginia	
BAY DISPOSAL HOLDINGS, INC.	Delaware	
BAY DISPOSAL PROPERTY HOLDINGS, LLC	Delaware	
BETHLEHEM LANDFILL COMPANY	Delaware	Bethlehem Landfill Company
BISON BUTTE ENVIRONMENTAL, LLC	Minnesota	
BITUMINOUS RESOURCES, INC.	Kentucky	Hopkins County Regional Landfill
BLOSSOM PRAIRIE LANDFILL, INC.	Texas	
BLUE RIDGE LANDFILL COMPANY	Pennsylvania	Blue Ridge Landfill Company
BRENT RUN LANDFILL, INC.	Delaware	Brent Run Landfill
BROADACRE LANDFILL, INC.	Colorado	Pueblo Landfill and Recycling Center
BULLDOG ACQUISITION, LLC	Delaware	Bulldog Systems LLC
BULLDOG WEST END HOLDINGS, INC.	Delaware	
BUTLER COUNTY LANDFILL, INC.	Nebraska	
CALPET, LLC	Wyoming	
CAMINO REAL ENVIRONMENTAL CENTER, INC.	New Mexico	
CAPITAL REGION LANDFILLS, INC.	New York	
CAROLINA LANDFILL, LLC	South Carolina	
CAROLINA PROCESSING & RECYCLING, LLC	South Carolina	
CAROLINA WASTE & RECYCLING LLC	South Carolina	
CARPENTER WASTE HOLDINGS, LLC	New York	Carpenter Waste
		Carpenter Waste Removal
CH4, LLC	Illinois	
CHAMBERS DEVELOPMENT OF NORTH CAROLINA, INC.	North Carolina	Anson County Landfill
CHAMP LANDFILL COMPANY, LLC	Missouri	Champ Landfill Company

CHEROKEE SANITARY LANDFILL COMPANY	Arkansas	Cherokee Sanitary Landfill Company
CHIMNEY BUTTE ENVIRONMENTAL L.L.C.	Minnesota	
CHIQUITA CANYON, INC.	Delaware	
CHIQUITA CANYON, LLC	Delaware	Chiquita Canyon Landfill
CLAY BUTTE ENVIRONMENTAL, LLC	Minnesota	
CLIFTON ORGANICS, LLC	New York	
COLD CANYON LAND FILL, INC.	California	Cold Canyon Processing Facility
COLUMBIA RESOURCE CO., L.P.	Washington	
COLUMBIA RIVER DISPOSAL, INC.	Washington	Bingen Garbage Service
		Skamania County Sanitary Service
COMMUNITY REFUSE DISPOSAL, INC.	Nebraska	
COMPLEXE ENVIRO CONNEXIONS LTEE	Canada	
CORRAL DE PIEDRA LAND COMPANY	California	
COUNTY WASTE AND RECYCLING SERVICE, INC.	New York	Ace Carting
		County Waste
		D.J.'s Roll Off Service
		Hardesty and Sons Sanitation
		Spaulding Waste Services
		Superior Waste
		Valley View Sanitation Services
COUNTY WASTE TRANSFER CORP.	New York	Troy Transfer
		Troy Transfer Station
COUNTY WASTE -- ULSTER, LLC	New York	Big Top Disposal
COUNTY WASTE - CANAAN B3 TRANSFER STATION, LLC	New York	EACO/B-3
COWLITZ COUNTY LANDFILL, INC.	Washington	
CRI HOLDINGS, LLC	Delaware	
CRM SITE SERVICES, LLC	Colorado	Aspen Excavation and Demolition
		Colorado Resource Management
CURRY TRANSFER & RECYCLING, INC.	Oregon	City Transfer and Recycling
		County Transfer & Recycling
		Country Transfer & Recycling
		Harrell's Septic
		Roto-Rooter of Curry County
CWR HOLDINGS, LLC	South Carolina	
D.M. DISPOSAL CO., INC.	Washington	American Portable Storage
		D.M. Recycling
		Superior Refuse Removal
DENVER REGIONAL LANDFILL, INC.	Colorado	
DNCS PROPERTIES, LLC	Arizona	
DURHAM REGIONAL LANDFILL, INC.	Delaware	
DURHAM REGIONAL LANDFILL, LLC	Arizona	
EAGLE FORD RECLAMATION COMPANY, LLC	Texas	
EAGLE DISPOSAL OF PA INC.	Pennsylvania	Eagle Disposal
EAGLE TOWING & REPAIR, INC.	Pennsylvania	
ECO-STORAGE INVESTMENTS, LLC	Delaware	
ECOSORT, L.L.C.	Oregon	
EL PASO DISPOSAL, LP	Texas	El Paso Disposal
ELKO SANITATION COMPANY	Nevada	Waste Connections of Nevada
EMPIRE DISPOSAL, INC.	Washington	
ENTECH ALASKA, LLC	Alaska	
ENTREPRISE SANITAIRE F.A. LTEE.	Canada	
ENVIRONMENTAL TRUST COMPANY	Tennessee	
EVERGREEN DISPOSAL, INC.	Montana	Eureka Disposal
		Glacier Disposal
		Kootenai Disposal
FINLEY-BUTTES LIMITED PARTNERSHIP	Oregon	Finley Buttes Landfill Company
FINNEY COUNTY LANDFILL, INC.	Delaware	
FLORIDA WASTE HOLDINGS, INC.	Delaware	Waste Connections of FL
FORT ANN TRANSFER STATION, LLC	New York	
FRONT RANGE LANDFILL, INC.	Delaware	Front Range Landfill
F.W. DISPOSAL, L.L.C.	Missouri	Valley Park Transfer Station
FW DISPOSAL SOUTH, LLC	Missouri	
G&P DEVELOPMENT, INC.	Nebraska	
GOD BLESS THE USA, INCORPORATED	North Carolina	Waste Connections of the Carolinas
		WC of the Carolinas
GOLD RIVER HOLDINGS, LLC	Delaware	
GREEN WASTE SOLUTIONS OF ALASKA, LLC	Alaska	
GROOT, INC.	Illinois	
GROOT INDUSTRIES, INC.	Delaware	
GROOT RECYCLING & WASTE SERVICES, INC.	Illinois	Accurate Document Destruction
		Accurate Document Destruction, Inc.
GROVELAND TRANSFER AND RECYCLING, INC.	Florida	
HAMPTON ROADS RECOVERY CENTER, LLC	Virginia	
HARDIN SANITATION, INC.	Idaho	Idaho Garbologist

HAROLD LEMAY ENTERPRISES, INCORPORATED	Washington	AA Better Trash & Junk Clean Up
		AA Lucky Portable Storage
		Aberdeen Sanitation Co.
		Butler's Cove Refuse Service
		City Sanitary Co.
		Eastern Grays Harbor Disposal
		EGH Disposal
		Harbor Disposal Co.
		Harold LeMay Enterprises
		HE Recycling
		Joes Refuse Service
		Lakewood Recycling Service
		Lakewood Refuse Service
		LeMay Inc
		LeMay Mobile Shredding
		LeMay Transportation Services
		Pacific Disposal
		Pierce County Refuse
		Recycle Services
		Rural Garbage Service
		White Pass Garbage
HIGH DESERT SOLID WASTE FACILITY, INC.	New Mexico	
HONEYWAGON ORGANICS, LLC	Colorado	
HUDSON VALLEY WASTE HOLDING, INC.	Delaware	
INTERMOUNTAIN ENVIRONMENTAL SERVICES, INC.	Colorado	InterMountain Waste & Recycling
		Mountain Waste & Recycling
INTERMOUNTAIN WASTE & RECYCLING, LLC	Colorado	
IOWA WASTE SERVICES, LLC	Delaware	
IOWA WASTE SERVICES HOLDINGS, INC.	Delaware	
ISLAND DISPOSAL, INC.	Washington	Whidbey Recycling Services
J BAR J LAND, INC.	Nebraska	
LAKESHORE DISPOSAL, INC.	Idaho	
LANDFILL L.L.C.	Illinois	
LAUREL RIDGE LANDFILL, L.L.C.	Delaware	
LCRD HAULING OF INM, LLC	Delaware	Lewis Clark Recycling and Disposal
		Shenandoah Sanitation
		Waste Connections of Iowa
LEALCO, INC.	Texas	ABC Waste Collection
		Pro Star Waste
		Waste Connections of Texas
		Waste Connections of Texas Rio Grande Valley
LES ENTREPRISES RAYLOBEC INC.	Quebec	
LEWIS CLARK RECYCLING AND DISPOSAL, LLC	Delaware	
LIGHTNING BUTTE ENVIRONMENTAL, LLC	Minnesota	
LOUISIANA RECLAMATION COMPANY, L.L.C.	Louisiana	
LOUISIANA REGIONAL LANDFILL COMPANY	Delaware	Timberlane Landfill Company
MADERA DISPOSAL SYSTEMS, INC.	California	Allied Disposal Company
		Avenal Landfill
		Bishop Waste Disposal
		Coastal Rolloff Service
		Riverdale Disposal Service
		Sierra Disposal
MAINLY SANITATION BUSINESS, LLC	Delaware	
MAMMOTH DISPOSAL COMPANY	California	
MANAGEMENT ENVIRONMENTAL NATIONAL, INC.	Washington	
MASON COUNTY GARBAGE CO., INC.	Washington	
MBO, LLC	Delaware	Lacassine Oilfield Services
MDSI OF LA, INC.	California	
METROPOLITAN TRANSFER STATION, INC.	New York	
MILLENNIUM WASTE INCORPORATED	Indiana	Quad Cities Landfill
MISSION COUNTRY DISPOSAL	California	
MORRO BAY GARBAGE SERVICE	California	
MOUNTAIN ROLL-OFFS, INC.	Colorado	Mountain Refuse
		Mountain Refuse, Inc.
		Mountain Refuse, LLC
		Mountain Recycling, Inc.
		Mountain Waste & Recycling
		MRI
MOUNTAIN WASTE - DENVER, LLC	Colorado	Pro Disposal & Recycling
MOUNTAIN WASTE & RECYCLING, INC.	Colorado	
MRL PROPERTY HOLDINGS, INC.	Delaware	
MTG DISPOSAL, LLC	Massachusetts	Mega
MURREY'S DISPOSAL COMPANY, INC.	Washington	Olympic Disposal
MUSIC CITY PICK-A-PART	Tennessee	
MUSIC CITY PICK-A-PART HOLDINGS I, LLC	Delaware	
MUSIC CITY PICK-A-PART HOLDINGS II, LLC	Delaware	
NEBRASKA ECOLOGY SYSTEMS, INC.	Nebraska	

NOBLES COUNTY LANDFILL, INC.	Minnesota	
NORTHWEST CONTAINER SERVICES, INC.	Oregon	
NWCS CONTAINER, INC.	Delaware	
OKLAHOMA CITY WASTE DISPOSAL, INC.	Oklahoma	
OKLAHOMA LANDFILL HOLDINGS, INC.	Delaware	
OSAGE LANDFILL, INC.	Oklahoma	
PALADIN COMMODITIES, INC.	Delaware	
PENN WASTE INC.	Pennsylvania	
PENN WASTE PROPERTY HOLDINGS, LLC	Delaware	
PIERCE COUNTY RECYCLING, COMPOSTING AND DISPOSAL, LLC	Washington	LRI
POST OAK CLEAN GREEN, INC.	Texas	
POTRERO HILLS LANDFILL, INC.	California	Potrero Hills Landfill
PRAIRIE DISPOSAL LLC	North Dakota	
PRAIRIE LIQUIDS, LLC	Delaware	
PSI ENVIRONMENTAL SERVICES, INC.	Indiana	PSI WASTE
PSI ENVIRONMENTAL SYSTEMS, INC.	Indiana	PSI WASTE
R360 ARTESIA, LLC	Delaware	
R360 ENVIRONMENTAL SOLUTIONS, LLC	Delaware	
R360 ENVIRONMENTAL SOLUTIONS HOLDINGS, INC.	Delaware	
R360 ENVIRONMENTAL SOLUTIONS OF LOUISIANA, LLC	Delaware	
R360 ENVIRONMENTAL SOLUTIONS OF MISSISSIPPI, LLC	Delaware	
R360 ENVIRONMENTAL SOLUTIONS OF TEXAS, LLC	Delaware	
R360 ES HOLDINGS, INC.	Delaware	
R360 HITCHCOCK, LLC	Delaware	
R360 OKLAHOMA, LLC	Delaware	J. Scott Mudd Disposal
R360 PERMIAN BASIN, LLC	New Mexico	
R360 RED BLUFF, LLC	Texas	
R360 SHUTE CREEK, LLC	Delaware	
R360 SILO, LLC	Delaware	
R360 WILLISTON BASIN, LLC	Delaware	
R.A. BROWNRIGG INVESTMENTS, INC.	Oregon	Cascade Disposal Company
		Cascade Recycling Co.
		Kelvic Disposal Co.
		Kelvic Dropbox Company
		Sun Country Disposal
RAILROAD AVENUE DISPOSAL, LLC	Delaware	
RED CARPET LANDFILL, INC.	Oklahoma	
RENSSELAER REGION LANDFILLS, INC.	Delaware	
RH FINANCIAL CORPORATION	Washington	
RICH VALLEY, LLC	Minnesota	
RIDGE (CHATHAM) HOLDINGS G.P. INC.	Canada	
RIDGE (CHATHAM) HOLDINGS L.P.	Manitoba	
RIGHT AWAY DISPOSAL, L.L.C.	Arizona	Arizona Sanitation Services
		Sun Lakes Disposal
RIP, INC.	Florida	
R.J.C. TRUCKING CO.	Oregon	Eugene Drop Box
ROCHELLE WASTE DISPOSAL, L.L.C.	Illinois	
ROCK RIVER ENVIRONMENTAL SERVICES, INC.	Illinois	
ROCK RIVER ENVIRONMENTAL SOLUTIONS, LLC	Illinois	
ROLL-OFF EXPRESS, INC.	Maryland	
RRD HOLDING COMPANY	Illinois	Disposal Services of Belvidere, Inc.
		G&B Disposal, Inc.
		Gill's Freeport Disposal, Inc.
		Illinois Valley Waste Services, Inc.
		Marengo Disposal Company
		MDC Environmental Services, Inc.
		Northern Illinois Disposal Services, Inc.
		Rock River Disposal Services, Inc.
S.A. DUNN & COMPANY, LLC	New York	
SAN LUIS GARBAGE COMPANY	California	
SANFORD RECYCLING AND TRANSFER, INC.	Florida	
SANIPAC, INC.	Oregon	Star Garbage
SANITATION SOLUTIONS, INC.	Texas	
SANITATION SOLUTIONS PROPERTIES, LLC	Texas	
SCOTT SOLID WASTE DISPOSAL COMPANY	Tennessee	Volunteer Landfill
SCOTT WASTE SERVICES, LLC	Kentucky	
SEABREEZE RECOVERY, INC.	Delaware	Seabreeze Environmental
		Seabreeze Environmental Landfill
SECTION 18, LLC	Minnesota	
SEDALIA LAND COMPANY	Colorado	
SENECA MEADOWS, INC.	New York	
SERVICES ENVIRONNEMENTAUX RICHELIEU INC.	Quebec	
SHALE GAS SERVICES, LLC	Arkansas	
SIERRA HOLDING GROUP, LLC	New York	
SIERRA PROCESSING, LLC	New York	
SILVER SPRINGS ORGANICS L.L.C.	Washington	

SJ RECLAMATION, INC.	Delaware	
SKB ENVIRONMENTAL, INC.	Minnesota	Shamrock Trucking
SKB ENVIRONMENTAL CLOQUET LANDFILL, INC.	Minnesota	
SLD LANDFILL, INC.	Delaware	
SMOKY BUTTE ENVIRONMENTAL, LLC	Minnesota	
SOUTH COUNTY SANITARY SERVICE, INC.	California	
STEAMBOAT CREEK TERMINALS, INC.	Virginia	
STUTZMAN REFUSE DISPOSAL INC.	Kansas	
SUMTER RECYCLING AND SOLID WASTE DISPOSAL, INC.	Florida	
SUN COUNTRY MATERIALS, LLC	Delaware	
TACOMA RECYCLING COMPANY, INC.	Washington	
TAFT RECYCLING, INC.	Florida	
TENNESSEE WASTE MOVERS, INC.	Delaware	TWM-Landfill
TEXAS REGIONAL LANDFILL COMPANY LP	Texas	Bowie Transfer Station
		Buffalo Creek Landfill
		East Texas Regional Landfill Company
		Fort Worth C&D Landfill
		Jacksboro Landfill
		Travis County Landfill
		Turkey Creek Landfill
		Weatherford Landfill
THUNDER BUTTE ENVIRONMENTAL, LLC	Minnesota	
TIMBER RIDGE LANDFILL COMPANY	Missouri	Timber Ridge Landfill Company
TIMBERLINE DISPOSAL, L.L.C.	Colorado	
US LIQUIDS OF LA., L.P.	Delaware	R360 Environmental Solutions, Inc.
VAIL HONEYWAGON ENTERPRISES, LLC	Colorado	Vail Honeywagon Ltd.
		Vail Honeywagon Rubbish & Recycling
WARM ASSOCIATES II, LLC	Rhode Island	
WASCO COUNTY LANDFILL, INC.	Delaware	
WASTE CONNECTIONS BAYOU, INC.	Delaware	Delta Disposals
		WC of Louisiana
WASTE CONNECTIONS HOLDINGS LTD.	Canada	
WASTE CONNECTIONS LONE STAR, INC.	Texas	Archer Waste
		Corpus Christi Disposal Service
		Crouch Sanitation and Disposal
		Eagle Disposal
		Good Ol' Boys Curbside
		GW Waste Services
		Main Street Disposal
		Skid-O-Kan
		Texas Jack
		Triple H Trash Solutions
		Waste Connections of TX
		Waste Wranglers
		WC of Texas
WASTE CONNECTIONS MANAGEMENT SERVICES, INC.	Delaware	
WASTE CONNECTIONS OF ALABAMA, INC.	Delaware	Competitive Waste Systems
		Rumsey Environmental
WASTE CONNECTIONS OF ALASKA, INC.	Delaware	Alaska Green Waste Solutions
		Alaska Pacific Environmental Services Anchorage
		Alaska Waste
		Alaska Waste - Anchorage
		Alaska Waste Transfer
		Anchorage Refuse
		Commercial Refuse
		DH Transit
		Eagle River Refuse
		Green Waste
		Kodiak Sanitation
		Peninsula Sanitation
		Valley Refuse
		Wasilla Refuse
WASTE CONNECTIONS OF ARIZONA, INC.	Delaware	
WASTE CONNECTIONS OF ARKANSAS, INC.	Arkansas	WCN of Arkansas
WASTE CONNECTIONS OF CALIFORNIA, INC.	California	Amador Disposal Service
		Ebbetts Pass Disposal Service
		El Dorado Disposal Service
		Green Team of Los Angeles
		GreenTeam
		GreenTeam of San Jose
		GreenWaste of Tehama
		SEI Debris Box
		SEI Solid Waste
		West LA Reclamation
		Western El Dorado Recovery Systems
WASTE CONNECTIONS OF CANADA INC.	Ontario	

WASTE CONNECTIONS OF COLORADO, INC.	Delaware	All Trash Service
		Aspen Waste
		Aspen Waste Systems
		Community Recycling
		Denver Roll-Off Service
		Diamond Disposal
		Eagle Waste & Recycling Service
		Eagle Waste Services
		Eagle Waste Services, Inc.
		Eagle Roll-Off, Inc.
		El Paso Disposal Services
		Fremont Disposal
		Horizon Property Management
		Platte Valley Disposal
		Pueblo Disposal
		Pueblo Disposal & Recycling Service
		Snowy Peaks Trash Company
		Solid Waste Transfer Services
		Southside Landfill
		The Trash Company
		Town & Country Disposal
		U.S. Disposal
		U.S. Disposal Services
WASTE CONNECTIONS OF FLORIDA, INC.	Delaware	Good Fella's Roll-Off & Waste Disposal
		Waste Connections of Florida
WASTE CONNECTIONS OF GEORGIA, INC.	Delaware	
WASTE CONNECTIONS OF IDAHO, INC.	Indiana	Mountain Jack Environmental Services
		T, T & R Enterprises
		Valley Waste and Recycling
WASTE CONNECTIONS OF ILLINOIS, INC.	Delaware	Millennium Waste - IL
WASTE CONNECTIONS OF IOWA, INC.	Iowa	Chitty Garbage
		Chitty Garbage Service
		E-Z Sanitation
		Stone Sanitation
		Town & Country Disposal
		Whaley Waste Systems
WASTE CONNECTIONS OF KANSAS, INC.	Delaware	Anderson Trash Service
		Best Yet Refuse
		Collectia LTD.
		Dual County Sanitation
		Northend Disposal
		Plumb Thicket Landfill
		R-Arrow
		Salina Waste Systems
		Schaben Sanitation
		Stutzman Refuse Disposal
WASTE CONNECTIONS OF KENTUCKY, INC.	Delaware	Kentucky Waste Systems, Inc.
		Mid-State Recycling Waste Disposal
		Mid-State Recycling Waste Systems
		Mid-State Waste
		Poff Carting Services
WASTE CONNECTIONS OF LOUISIANA, INC.	Delaware	Delta Disposals
		Diamond Disposal
		Good Neighbor Disposal
WASTE CONNECTIONS OF MARYLAND, INC.	Delaware	
WASTE CONNECTIONS OF MINNESOTA, INC.	Minnesota	Hendrickson Sanitation
		L & L Sanitation
		Schaap Sanitation
		Scotting Sanitation
		Ulrich Sanitation
WASTE CONNECTIONS OF MISSISSIPPI DISPOSAL SERVICES, LLC	Mississippi	
WASTE CONNECTIONS OF MISSISSIPPI, INC.	Delaware	Asco Sanitation
		Buck Run Landfill
		Northeast Mississippi Regional Landfill
WASTE CONNECTIONS OF MISSOURI, INC.	Missouri	Waste Connections of Cape Girardeau
		Waste Connections of St. Louis
		Waste Connections Timber Ridge
WASTE CONNECTIONS OF MONTANA, INC.	Delaware	Bitterroot Disposal
		Valley Recycling
		Victor Transfer

WASTE CONNECTIONS OF NEBRASKA, INC.	Delaware	Allied Refuse
		Art's Garbage Service
		B&B Sanitary Service
		Big Red Roll Off
		Central Waste Disposal
		Countryside Services
		Duren Sanitation
		J&J Sanitation
		Junk in the Box
		Midwest Refuse Service Commercial
		Omega Systems
		Papillion Sanitation
		Sanitation Systems
		Saunders County Disposal
		Schaben Sanitation
		SGS Sanitation
		Shrader Refuse and Recycling Service Company
		Steve's Sanitation
		Steve's Sanitation Service
		The Garbage Company
		Ummel Sanitation
		Wahoo Sanitation
		White Sanitation
WASTE CONNECTIONS OF NEVADA, INC.	Delaware	
WASTE CONNECTIONS OF NEW JERSEY, INC.	Delaware	
WASTE CONNECTIONS OF NEW MEXICO, INC.	Delaware	Silva Sanitation
		Southwest Disposal
WASTE CONNECTIONS OF NEW YORK, INC.	Delaware	County Waste
		Waste Connections
WASTE CONNECTIONS OF NORTH CAROLINA, INC.	Delaware	Queen City Transfer Station
		Waste Connections of the Carolinas
WASTE CONNECTIONS OF NORTH DAKOTA, INC.	Delaware	Armstrong Sanitation Plus
WASTE CONNECTIONS OF OKLAHOMA, INC.	Oklahoma	B & B Sanitation
		Metropolitan Waste Services
		Oklahoma Disposal & Sanitation
		Waste Connections
WASTE CONNECTIONS OF OREGON, INC.	Oregon	American Sanitary Service
		Arrow Sanitary Service
		Babe's Garbage Service
		Bandon Disposal & Recycling
		Clatskanie Sanitary Service
		EWSI
		Environmental Waste Systems
		Hood River Garbage Service
		Hudson Portable Toilet Service
		Hudson's Garbage Service
		Les' County Sanitary
		Les' Sanitary Service
		North Bend Sanitation Service
		Oregon Paper Fiber
		Public Disposal and Recyling Center
		Sweet Home Sanitation Service
		Sweet Home Transfer & Recycling
		The Dalles Disposal
		The Dalles Transfer Station
		Wally's Portable Restrooms
WASTE CONNECTIONS OF OSCEOLA COUNTY, LLC	Florida	J.E.D. Landfill
WASTE CONNECTIONS OF PENNSYLVANIA, INC.	Delaware	Waste Connections of Pennsylvania
WASTE CONNECTIONS OF RHODE ISLAND, INC.	Delaware	Link Environmental
		Link Environmental Equipment
		Patriot Disposal
		Patriot Hauling
WASTE CONNECTIONS OF SOUTH CAROLINA, INC.	Delaware	Waste Connections of the Carolinas
WASTE CONNECTIONS OF SOUTH DAKOTA, INC.	South Dakota	A & C Keiffer Sanitation
		Art's Garbage Service
		Cook's Wastepaper & Recycling
		Dakota Data Shred
		Envirotech Waste Services
		Kieffer Sanitation
		Novak Enterprises
		Novak Sanitary Service
		Pierre Recycling Center
		Ron's Dray
		Sioux Valley Sanitation Service
		Steve's Garbage Service
		Walker Refuse

WASTE CONNECTIONS OF TENNESSEE, INC.	Delaware	Asco Sanitation
		Clarksville Disposal
		Cumberland Waste
		Cumberland Waste Disposal
		Ocoee Environmental Services
		Queen City Disposal
		Scott Solid Waste
		Southern Disposal
WASTE CONNECTIONS OF TEXAS, LLC	Delaware	Caprock Waste
		Hardy Road Transfer Station
		Hill Country Refuse
		Vaquero Waste & Recycling
		Waste Connections of Texas
		West Texas Disposal
WASTE CONNECTIONS OF UTAH, INC.	Delaware	City Sanitation
		Roche & Sons
WASTE CONNECTIONS OF WASHINGTON, INC.	Washington	Buchmann Sanitation Service
		Empire Disposal Hauling
		Lakeside Disposal & Recycling Company
		The Disposal Group
		Triangle Resources
		Twin City Sanitary Service
		Vancouver Sanitary Service
		Waste Connections of Spokane
WASTE CONNECTIONS OF WYOMING, INC.	Delaware	American Disposal
		American Disposal, Inc.
		BW Waste
		Edwal Services
		Green River Valley Refuse
		Kieffer Sanitation
		Ryan Sanitation
WASTE CONNECTIONS PALMETTO, INC.	Delaware	
WASTE CONNECTIONS US, INC.	Delaware	
WASTE CONNECTIONS US HOLDINGS, INC.	Delaware	
WASTE INNOVATIONS, LLC	Arizona	Waste Innovations
		Waste Innovations Leasing
WASTE REDUCTION SERVICES, L.L.C.	Oregon	
WASTE SERVICES OF N.E. MISSISSIPPI, INC.	Mississippi	
WASTE SOLUTIONS GROUP OF SAN BENITO, LLC	Delaware	John Smith Road Landfill
WATERWAY TRAILS INC.	Texas	
WC INDUSTRIALS, INC.	Delaware	
WCC FINANCE LTD.	Cayman Islands	
WCI AUSTIN LANDFILL, LLC	Minnesota	
WCI CROSSINGS ULC	Alberta	
WCI GLOBAL HOLDINGS ULC	Alberta	
WCI NORTH INVESTMENTS, GP	Alberta	
WCI SOUTH INVESTMENTS, LP	Delaware	
WCI VENTURE I, LLC	Delaware	
WCI VENTURE II, LLC	Delaware	
WCI-WHITE OAKS LANDFILL, INC.	Delaware	White Oaks Landfill
WCN DE LP CORPORATION	Delaware	
WCN HOLDINGS, INC.	Ontario	
WCN TX GP CORPORATION	Delaware	
WCUK FINANCE LTD	United Kingdom (England and Wales)	
WCUK HOLDINGS LTD	United Kingdom (England and Wales)	
WCUK MANAGEMENT LTD	United Kingdom (England and Wales)	
WEST BANK ENVIRONMENTAL SERVICES, INC	Indiana	Leftovers of Wyoming
		Westbank Sanitation
WEST COAST RECYCLING AND TRANSFER, INC.	Oregon	Public Disposal and Recycling Center
		Store-It
WEST VALLEY COLLECTION & RECYCLING, LLC	California	
WINNEBAGO LANDFILL COMPANY, LLC	Illinois	
WINNEBAGO RECLAMATION SERVICE, INC.	Illinois	
WYOMING ENVIRONMENTAL SERVICES, INC.	Indiana	Lander Valley Sanitation
		Wyoming Waste Systems
YAKIMA WASTE SYSTEMS, INC.	Washington	

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We have issued our reports dated February 13, 2020, with respect to the consolidated financial statements and internal control over financial reporting included in the Annual Report of Waste Connections, Inc. on Form 10-K for the year ended December 31, 2019. We hereby consent to the incorporation by reference of said reports in the Registration Statements of Waste Connections, Inc. on Forms S-8 (Nos. 333-168064, 333-212245, 333-212244, and 333-212243) and Form S-3 (333- 225219).

/s/ GRANT THORNTON LLP
Houston, Texas
February 13, 2020

Exhibit 31.1

CERTIFICATION PURSUANT TO EXCHANGE ACT RULE 13a-14(a) OR RULE 15d-14(a) AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Worthing F. Jackman, certify that:

1. I have reviewed this Annual Report on Form 10-K of Waste Connections, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

    a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

    b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 13, 2020

/s/ Worthing F. Jackman

Worthing F. Jackman
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION PURSUANT TO EXCHANGE ACT RULE 13a-14(a) OR RULE 15d-14(a) AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Mary Anne Whitney, certify that:

1. I have reviewed this Annual Report on Form 10-K of Waste Connections, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 13, 2020

/s/ Mary Anne Whitney

Mary Anne Whitney
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER

Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
(Subsections (a) and (b) of Section 1350, Chapter 63 of Title 18, United States Code)

I , Worthing F. Jackman, being the duly elected and acting President and Chief Executive Officer of Waste Connections, Inc., a corporation organized under the laws of Ontario, Canada (the “Company”), hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

1. The Annual Report of the Company on Form 10-K for the year ended December 31, 2019 (the “Report”), fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 13, 2020

By: /s/ Worthing F. Jackman
Worthing F. Jackman
President and Chief Executive Officer

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. Section 1350, and shall not be deemed filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and shall not be deemed to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing, except to the extent that the Company specifically incorporates it by reference.

Exhibit 32.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER

Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
(Subsections (a) and (b) of Section 1350, Chapter 63 of Title 18, United States Code)

I, Mary Anne Whitney, being the duly elected and acting Senior Vice President and Chief Financial Officer of Waste Connections, Inc., a corporation organized under the laws of Ontario, Canada (the “Company”), hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

1. The Annual Report of the Company on Form 10-K for the year ended December 31, 2019 (the “Report”), fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 13, 2020

By: /s/ Mary Anne Whitney
Mary Anne Whitney
Senior Vice President and
Chief Financial Officer

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. Section 1350, and shall not be deemed filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and shall not be deemed to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing, except to the extent that the Company specifically incorporates it by reference.