



# Unsafe Sanitation

## An Analysis of the Commercial Waste Industry's Safety Record

New York City Comptroller Scott M. Stringer

Bureau of Budget and Bureau of Policy and Research

NOVEMBER 2018

### Executive Summary

Every night, an armada of garbage trucks crisscrosses New York City to collect waste from commercial businesses. These private waste haulers collect approximately three million tons of waste per year from restaurants, retailers, hospitals, offices, and other businesses. Unlike residential garbage collection which is managed solely by the City's Department of Sanitation (DSNY), the collection of commercial waste is conducted by a bewildering array of 273 private haulers who operate with significantly less coordination and oversight than their public counterparts and impose significant environmental costs. As a result of crisscrossing the city to visit disparate businesses every night, commercial waste trucks travel over 23 million miles each year.<sup>1</sup>

While commercial waste removal is a necessary part of managing any large city, this report by New York City Comptroller Scott M. Stringer details how New York City's current system poses clear safety risks to both residents and workers, while also pumping out toxic emissions into the City's air. A review of truck safety and maintenance data shows how aging truck fleets, lapses in safety, and poor traffic records form a strong argument for the necessity of comprehensive reform. According to the Comptroller's analysis of truck fleet data:

- Commercial garbage trucks are significantly older and more decrepit than their municipal counterparts. Almost 50 percent of private garbage trucks are 10 years old or older. A further 9 percent of trucks are at least 20 years old. In contrast, municipal Department of Sanitation vehicles average 6 years of age.
- Private waste haulers routinely rack up safety violations relating to the maintenance of their trucks. Among the city's top 20 commercial haulers, two-thirds of inspections resulted in at least one violation in the last two years and 20 percent of inspections produced five or more violations. These violations are not cosmetic – the most commonly issued violation related to defects in a truck's brakes.
- Many commercial waste trucks have racked up fines for running red lights and speeding near schools. Twenty-seven percent of vehicles owned by licensed waste haulers have received at least one red light camera violation and 14 percent have received at least one school speed zone camera violation since 2007.

- The City has caught 178 licensed trade waste vehicles operating with expired or missing inspection stickers and 41 with missing plates. Within this group, 71 vehicles have been caught more than once with inspection sticker violations and 12 vehicles have been caught multiple times for missing plates.
- All told, over the past two years, the top 20 licensed private waste haulers in New York City reported 73 serious crashes, including five fatalities.

The industry's checkered safety record, as well as issues relating to environmental sustainability and labor practices, show the need for urgent reform. With the aim of introducing a baseline level of accountability and sustainability into commercial waste, Comptroller Stringer urges the City to implement a zoned collection system that prioritizes safety on our streets and the well-being of workers.

## Introduction

Private trash haulers serve more than 100,000 commercial customers across the five boroughs, collecting a wide array of materials from restaurant food waste to hospital medical waste to recyclable office paper.<sup>2</sup> Typically businesses or buildings will choose a private hauler on the basis of price, reliability, or the hauler's ability to cope with specialized waste needs, such as grease, medical waste, or landscaping debris.

The scale of private waste collection in the city and the disaggregated way in which individual businesses contract with their own haulers results in industry-wide inefficiencies and intensely competitive markets. Because businesses choose their own haulers, a single city block can be visited by multiple carriers during a single night. For example, a five-block stretch in Manhattan was found to have been serviced by as many as 27 different haulers within a single night according to a report by the Investigative Fund and ProPublica.<sup>3</sup> As a result of crisscrossing the city to visit disparate businesses every night, commercial waste trucks travel over 23 million miles each year – more than 96 times the total distance from earth to the moon.<sup>4</sup>

The cumulative distances traveled by commercial waste garbage trucks impose significant environmental costs. The heavy duty diesel trucks typically used by waste haulers are major contributors of airborne pollution and may have fuel economy standards as low as 4.4 miles per gallon.<sup>5</sup>

In addition, the skewed geography of waste transfer stations where garbage trucks deposit commercial waste means that certain communities bear disproportionate impacts from private carters. According to Transform Don't Trash NYC, residents of communities in the South Bronx, North Brooklyn, and Southwest Brooklyn breathe in two to seven times more asthma-inducing pollutants than low-traffic areas, partially owing to the presence of waste haulers.<sup>6</sup>

Long routes translate into long hours for truck workers, who operate under grueling and unsafe conditions. Waste collection and disposal ranks among the most dangerous professions, averaging about a worker fatality a week nationally.<sup>7</sup> Worker testimony provided at a City Council hearing in 2015 further underscores the punishing conditions for private haulers who may work 16-hour shifts during the night and lift as much as 10 tons of trash, per worker, in one shift.<sup>8</sup> These long shifts occur in spite of federal regulations that set an 11-hour driving limit for truck drivers.<sup>9</sup> Furthermore, workers have accused private waste haulers of failing to provide even basic safety equipment or training to workers.<sup>10</sup>

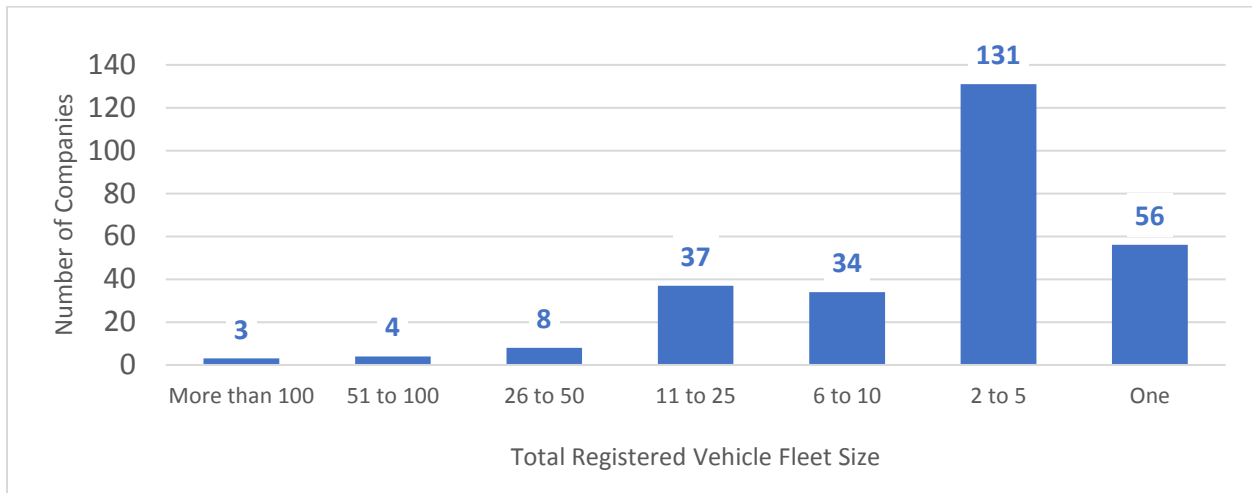
Generally, private carting companies operate on very thin profit margins. In 2016, a City-commissioned study of 90 firms found that about half reported operating losses in 2013.<sup>11</sup> The fierce competition between haulers for profitable customers drives down rates below the price cap set by the industry’s regulator, the Business Integrity Commission (BIC). On average, commercial customers pay \$12.68 per cubic yard of garbage – about 30 percent below the price cap set by BIC.<sup>12</sup> The “race to the bottom” pricing dynamic may contribute to what industry representatives acknowledge is a culture of “widespread price cutting,” including on wages.<sup>13</sup> Indeed, workers routinely complain of wage theft and pay violations.<sup>14</sup>

Though average pickup fees are well below price caps, savings are not spread equally among customers. According to DSNY’s market study of the industry, large customers pay 38 percent less than small customers on average.<sup>15</sup> According to DSNY’s report, small businesses often complain about the opaque nature of pricing and carters’ practices of charging fixed fees for removal rather than exact costs based on the actual quantity of waste removed.<sup>16</sup>

## **Aging Fleets and Unsafe Trucks**

To evaluate the safety and operational records of the 273 private waste companies licensed to work within New York City, this report draws on vehicle data held by the BIC as of September 2018. In total, 2,211 registered vehicles currently are licensed to collect non-construction and demolition (putrescible) commercial waste on New York City streets.<sup>17</sup> These vehicles range from the common “rear end loader” trucks designed for collecting and compressing bags of waste to more specialized vehicles like “roll-off” trucks with equipment for loading and unloading large metal dumpsters. Most fleets only amount to ten or fewer trucks, though the four largest licensed companies – Action Carting Environmental Services, Waste Connections of New York (formerly, IESI NY Corporation, prior to acquisition), Royal Waste Services, and GPB Waste NY (owner of Five Star Carting) – own significantly larger fleets, collectively comprising 22 percent of all registered vehicles. More than two-thirds of private haulers registered five or less vehicles and 56 companies registered only one.

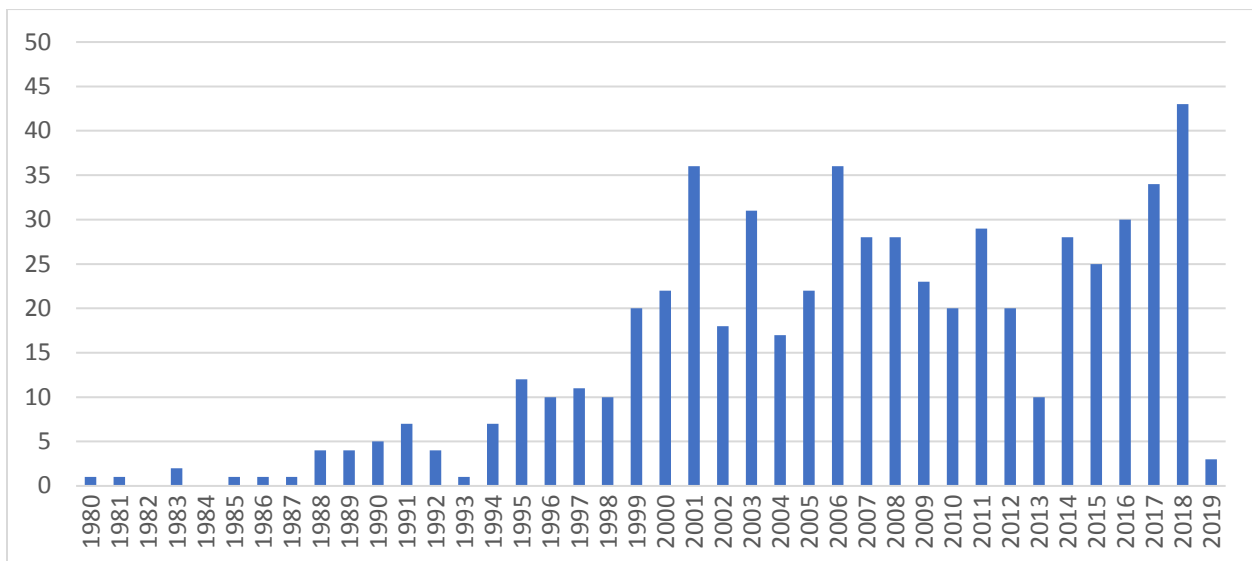
**Chart 1: Number of Licensed New York City Trash Haulers by Registered Fleet Size (September 2018)**



Source: NYC Comptroller analysis of data provided by the NYC Business Integrity Commission.

Despite their heavy workload and demanding yearly mileage, the average commercial waste truck is more than nine years old.<sup>18</sup> In contrast, the average vehicle age of garbage trucks owned by the City’s Department of Sanitation is 5.9 years.<sup>19</sup> Indeed, almost half of all commercial waste trucks (1,076 vehicles) are ten years old or older. Examining just rear end loader trucks, which form the backbone of the commercial waste fleet, 82 vehicles are 20 years or older and 11 trucks are 30 years or older. Shockingly, as of today a 38-year-old (model year 1980) truck is still legally licensed to drive New York City streets.

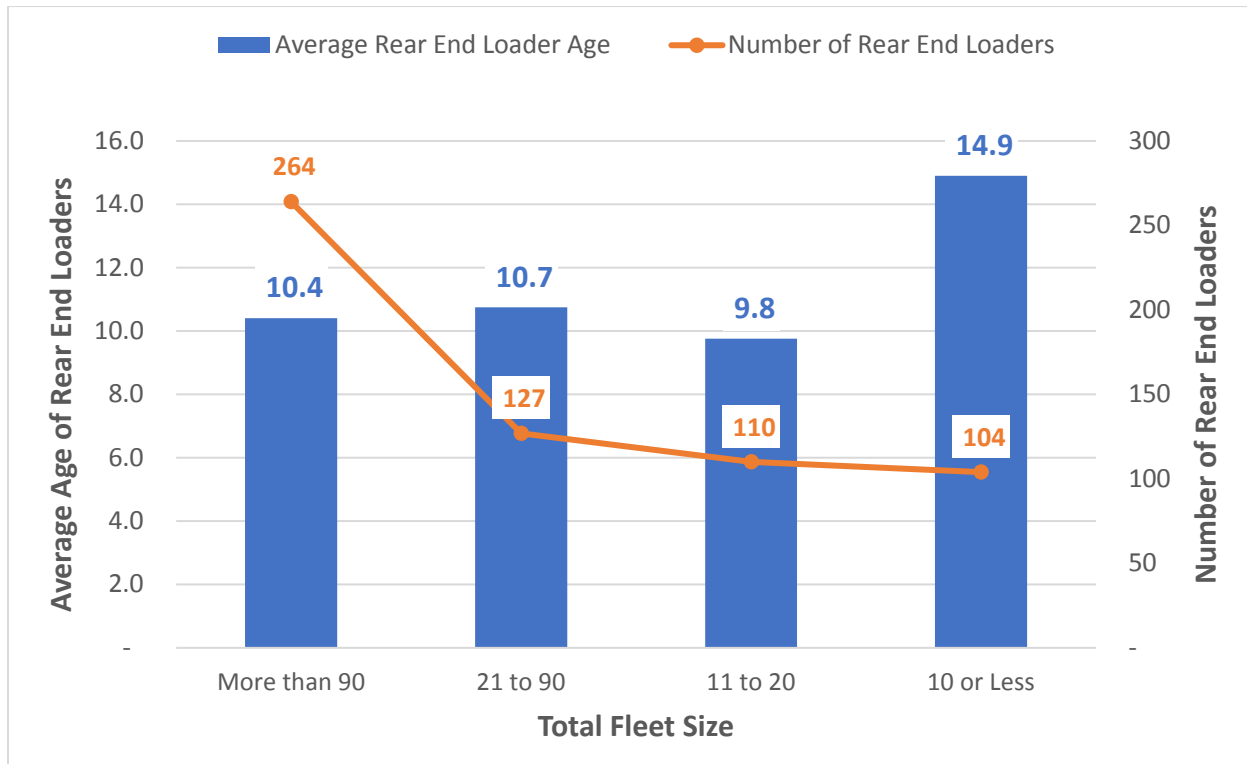
**Chart 2: Number of Rear End Loaders by Model Year**



Source: NYC Comptroller analysis of data provided by the NYC Business Integrity Commission.

On average, the city’s smallest trash haulers own older trucks. While the average age of all registered rear end loaders is about 11 years old, among smaller companies with 10 or less vehicles, the average rear end loader age amounts to nearly 15 years.

**Chart 3: Average Age and Number of Rear End Loaders for Haulers with at Least One Rear End Loader, by Haulers' Total Fleet Size**



Source: NYC Comptroller analysis of data provided by the NYC Business Integrity Commission.

Matching commercial waste vehicle data to inspection and violation information maintained by the Federal Motor Carrier Safety Administration (FMCSA) for the city’s largest 20 licensed waste haulers shows that older vehicles are much more likely to fail roadside inspections than their younger counterparts.<sup>20</sup> Indeed, a staggering 70 percent of trucks older than eight years were taken immediately out of service after failing random roadside inspections. That compares to a more modest 28 percent out-of-service rate for vehicles made in 2010 or later.

FMCSA inspection data further reveals that commercial garbage trucks are regularly deemed too dangerous to drive following a random roadside inspection. These inspections assess important safety indicators such as the condition of brakes, lighting devices, load securement mechanisms, and wheels. If serious defects are documented during an inspection, the vehicle is placed out of service and cannot be driven again until repairs are made. If repairs are not done on site, then the vehicle must be towed. All other violations must be corrected before the vehicle is placed back in service.

Among the city's top 20 licensed commercial haulers, two-thirds of inspections resulted in at least one violation over the past two years. In 20 percent of inspections, five or more violations were identified. In sum, the top 20 haulers had a total of 333 violations – 324 vehicle violations and 9 driver violations – from 142 truck inspections on 114 unique vehicles in the last two years. In many cases, violations are not minor or cosmetic. Indeed, the most common category of violation related to brakes (49), followed by other vehicle defects (36), emergency equipment (30), and improper load securement (30). During a recent crackdown on private trash haulers, the New York City Police Department reported that every truck inspection in Manhattan and the Bronx resulted in multiple violations during the month of October.<sup>21</sup>

Sometimes a truck's safety record is obscured by a company's failure to properly display inspection information. Since 2007, the City has found 178 licensed trade waste vehicles operating with expired or missing inspection stickers and 41 with missing plates.<sup>22</sup> Within this group, 71 vehicles have been caught more than once with inspection sticker violations and 12 vehicles have been caught multiple times for missing plates.

## **Dangerous Driving**

In their extensive nightly journeys around the city, many private haulers also regularly rack up violations for running red lights and speeding past schools. Based on an analysis of license plate numbers belonging to currently licensed trade waste haulers, a shocking 27 percent have received at least one red light camera violation and 14 percent have received at least one school speed zone camera violation since 2007.<sup>23</sup> Several vehicles stand out for repeatedly breaking the law. Among private waste trucks, 118 vehicles have received more than two red light camera violations and 14 have received more than five. Similarly, 60 vehicles received more than two school speed zone violations and 15 have received more than five.

Unfortunately, reckless driving carries real consequences. In the last two years, the top 20 licensed private waste haulers in New York City reported 73 serious crashes, including five fatalities.<sup>24</sup> Tragically, four fatalities occurred in 2017 alone. Nonetheless, the City's municipal sanitation fleet has not been immune from the inherent dangers involved in operating large trucks on dense residential streets. After four years without a single fatal accident, in October 2018 a municipal sanitation truck fatally struck a pedestrian in Brooklyn.<sup>25</sup>

## Conclusion

Commercial waste disposal is an essential service which keeps New York City clean and functional. Unfortunately, a combination of intense competition and lax oversight has fostered a “race-to-the-bottom” dynamic amongst haulers. As a result, the private garbage trucks trundling down a residential street or running a red light could pose a real danger to the public.

With the aim of improving safety and introducing a measure of coordination to a maddeningly chaotic system, Comptroller Stringer supports a comprehensive and transformative solution to fix the commercial waste industry. Preliminary research by the Department of Sanitation shows that a zoned-system could reduce vehicle miles traveled by 49 to 68 percent and cut emissions by 42 percent to 64 percent – drastically reducing the noxious pollution pumped out by sanitation trucks.<sup>26</sup> Incorporating strong standards relating to safety and labor rights into zoned agreements will also help reduce accidents and egregious truck safety violations, while ensuring fair pricing for all businesses. From collection to disposal, New York City deserves a commercial waste system which prioritizes safety and sustainability.

## Endnotes

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<sup>1</sup> Sam Schwartz Engineering, “Private Carting Study Routing Analysis” (June 2, 2016), commissioned by the New York City Department of Sanitation, p. 2, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Routing\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Routing_Analysis.pdf); and NASA, “How Far Away is the Moon” (May 25, 2017), <https://spaceplace.nasa.gov/moon-distance/en/>.

<sup>2</sup> Testimony of Kathryn Garcia, Commissioner of the New York City Department of Sanitation, Before the New York City Council Committee on Sanitation and Solid Waste Management, “Oversight – Sustainability in the Commercial Waste Industry” (April 29, 2015), <https://legistar.council.nyc.gov/MeetingDetail.aspx?ID=390580&GUID=751F3375-34BE-4552-A4DA-250122484829&Options=info&Search=>; and BuroHappold Engineering, “Private Carting Study Market and Cost Analysis” (August 2016), commissioned by the New York City Department of Sanitation, p. 7, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Market\\_and\\_Cost\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Market_and_Cost_Analysis.pdf).

<sup>3</sup> Kiera Feldman, “Trashed: Inside the Deadly World of Private Garbage Collection” *ProPublica* (January 4, 2018), <https://www.propublica.org/article/trashed-inside-the-deadly-world-of-private-garbage-collection>

<sup>4</sup> Sam Schwartz Engineering, “Private Carting Study Routing Analysis” (June 2, 2016), commissioned by the New York City Department of Sanitation, p. 2, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Routing\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Routing_Analysis.pdf); and NASA, “How Far Away is the Moon” (May 25, 2017), <https://spaceplace.nasa.gov/moon-distance/en/>.

<sup>5</sup> Gurdas S. Sandhu, H. Christopher Frey, Shannon Bartelt-Hunt, and Elizabeth Jones, *In-use activity, fuel use, and emissions of heavy-duty diesel roll-off refuse trucks* (February 2015), [https://www.researchgate.net/publication/272682476\\_In-Use\\_Activity\\_Fuel\\_Use\\_and\\_Emissions\\_of\\_Heavy\\_Duty\\_Diesel\\_Roll-off\\_Refuse\\_Trucks](https://www.researchgate.net/publication/272682476_In-Use_Activity_Fuel_Use_and_Emissions_of_Heavy_Duty_Diesel_Roll-off_Refuse_Trucks).

<sup>6</sup> Transform Don’t Trash NYC, *Clearing the Air: How Reforming the Commercial Waste Sector Can Address Air Quality Issues in Environmental Justice Communities* (September 2016), [http://transformdonttrashnyc.org/wp-content/uploads/2016/09/Final-draft-v3\\_TDT-Air-Qual-Report\\_Clearing-the-Air-1.pdf](http://transformdonttrashnyc.org/wp-content/uploads/2016/09/Final-draft-v3_TDT-Air-Qual-Report_Clearing-the-Air-1.pdf).

<sup>7</sup> Kiera Feldman, “Trashed: Inside the Deadly World of Private Garbage Collection” *ProPublica* (January 4, 2018), <https://www.propublica.org/article/trashed-inside-the-deadly-world-of-private-garbage-collection>.

<sup>8</sup> David Giambusso, “Commercial Trash Workers Testify Against Conditions” *Politico* (April 30, 2015), <https://www.politico.com/states/new-york/city-hall/story/2015/04/commercial-trash-workers-testify-against-conditions-021794>; and New York City Council Committee on Sanitation and Solid Waste Management, “Oversight – Sustainability in the Commercial Waste Industry” (April 29, 2015), <https://legistar.council.nyc.gov/MeetingDetail.aspx?ID=390580&GUID=751F3375-34BE-4552-A4DA-250122484829&Options=info&Search=>.

<sup>9</sup> New York State Department of Transportation, Office of Modal Safety and Security, “Truck and Motor Carrier Safety” (accessed October 10, 2018), <https://www.dot.ny.gov/divisions/operating/osss/truck/carrier>.

<sup>10</sup> New York Committee for Occupational Safety and Health, “Dirty and Dangerous: Worker Safety and Health in New York City’s Scofflaw Commercial Waste Industry” (May 2016), [http://nycosh.org/wp-content/uploads/2016/05/DirtyDangerous\\_FullReport\\_Final.pdf](http://nycosh.org/wp-content/uploads/2016/05/DirtyDangerous_FullReport_Final.pdf).



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<sup>11</sup> BuroHappold Engineering, “Private Carting Study Market and Cost Analysis” (August 2016), commissioned by the New York City Department of Sanitation, p. 23, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Market\\_and\\_Cost\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Market_and_Cost_Analysis.pdf).

<sup>12</sup> BuroHappold Engineering, “Private Carting Study Market and Cost Analysis” (August 2016), commissioned by the New York City Department of Sanitation, p. 36, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Market\\_and\\_Cost\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Market_and_Cost_Analysis.pdf).

<sup>13</sup> BuroHappold Engineering, “Private Carting Study Market and Cost Analysis” (August 2016), commissioned by the New York City Department of Sanitation, p. 38, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Market\\_and\\_Cost\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Market_and_Cost_Analysis.pdf).

<sup>14</sup> New York Committee for Occupational Safety and Health, “Dirty and Dangerous: Worker Safety and Health in New York City’s Scofflaw Commercial Waste Industry” (May 2016), [http://nycosh.org/wp-content/uploads/2016/05/DirtyDangerous\\_FullReport\\_Final.pdf](http://nycosh.org/wp-content/uploads/2016/05/DirtyDangerous_FullReport_Final.pdf); and David Giambusso, “Dirty Hands: The Unseen World of New York’s Private Waste Industry” *Politico NY* (May 25, 2016), <https://www.politico.com/states/new-york/city-hall/story/2016/05/dirty-hands-the-unseen-world-of-new-yorks-private-waste-industry-102989>.

<sup>15</sup> BuroHappold Engineering, “Private Carting Study Market and Cost Analysis” (August 2016), commissioned by the New York City Department of Sanitation, p. 36, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Market\\_and\\_Cost\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Market_and_Cost_Analysis.pdf).

<sup>16</sup> BuroHappold Engineering, “Private Carting Study Market and Cost Analysis” (August 2016), commissioned by the New York City Department of Sanitation, p. 46, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Market\\_and\\_Cost\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Market_and_Cost_Analysis.pdf).

<sup>17</sup> An additional 4,400 vehicles are registered with the City’s Business Integrity Commission to collect construction and demolition (non-putrescible) waste.

<sup>18</sup> It is assumed that model year 2018 and 2019 vehicles are zero years old. Model year 2017 vehicles are assumed to be one year old and so forth.

<sup>19</sup> The City did not report the average age of vehicles by agency for FY 2018. New York City Mayor’s Office of Operations, *Fiscal 2017 Mayor’s Management Report* (September 2017), [https://www1.nyc.gov/assets/operations/downloads/pdf/mmr2017/full\\_report\\_additional\\_tables\\_2017.pdf](https://www1.nyc.gov/assets/operations/downloads/pdf/mmr2017/full_report_additional_tables_2017.pdf).

<sup>20</sup> NYC Comptroller analysis of company safety data reported by the U.S. Department of Transportation Federal Motor Carrier Safety Administration, Safety Management System, accessed August 10, 2018, <https://ai.fmcsa.dot.gov/SMS/>. The top 20 haulers included were Action Carting, IESI NY, Five Star Carting, Mr. T Carting, Sanitation Salvage Corp., Boro-Wide Recycling Corp., Royal Waste Services, Crown Container Co., Viking Sanitation, Liberty Ashes, Flag Container Services, Joro Carting, Mid-Bronx Haulage, Gaeta Interior Demolition, Avid Waste Systems, Joe Morea and Sons, M & M Sanitation, City Waste Services, Cinelli Carting, and D&D Carting. The top haulers were based on the 2016 BIC customer register, as reported in Transform Don’t Trash NYC, *More Dangerous Than Ever: New York City’s Unsafe Commercial Garbage Companies Still Put Us All At Risk* (April 2018), p. 10, <http://transformdonttrashnyc.org/wp-content/uploads/2018/04/More-Dangerous-Than-Ever-Final.pdf>. Analysis based on 113 vehicle inspections in the two years ending in August 2018 in which matching Vehicle Identification Numbers (VIN) were available from the New York City Business Integrity Commission.

<sup>21</sup> Shari Logan, “Inspections Show Private Garbage Trucks are Full of Dangerous Infractions” *NY Post* (October 29, 2018), <https://nypost.com/2018/10/29/inspections-show-private-garbage-trucks-are-full-of-dangerous-infractions/>.

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<sup>22</sup> NYC Comptroller analysis of 2,208 unique license plate numbers in BIC’s registry for licensed trade waste haulers, as of September 2018, and data extracted from New York City Open Data, “Open Parking and Camera Violations” on October 10, 2018, <https://data.cityofnewyork.us/City-Government/Open-Parking-and-Camera-Violations/nc67-uf89/data>. License plate numbers may have been affixed to different vehicles but most likely have remained within the same company. If a vehicle is sold, the license plate number may be transferred to a different vehicle with the same owner. License plate numbers cannot be transferred to the new owner of the vehicle. See New York State Department of Motor Vehicles, “Plates” (accessed October 12, 2018), <https://dmv.ny.gov/plates/plates>.

<sup>23</sup> *Ibid.*

<sup>24</sup> NYC Comptroller analysis of company safety data reported by the U.S. Department of Transportation Federal Motor Carrier Safety Administration, Safety Management System, accessed August 10, 2018, <https://ai.fmcsa.dot.gov/SMS/>. The top 20 haulers included were Action Carting, IESI NY, Five Star Carting, Mr. T Carting, Sanitation Salvage Corp., Boro-Wide Recycling Corp., Royal Waste Services, Crown Container Co., Viking Sanitation, Liberty Ashes, Flag Container Services, Joro Carting, Mid-Bronx Haulage, Gaeta Interior Demolition, Avid Waste Systems, Joe Morea and Sons, M & M Sanitation, City Waste Services, Cinelli Carting, and D&D Carting. The top haulers were based on the 2016 BIC customer register, as reported in Transform Don’t Trash NYC, *More Dangerous Than Ever: New York City’s Unsafe Commercial Garbage Companies Still Put Us All At Risk* (April 2018), p. 10, <http://transformdonttrashnyc.org/wp-content/uploads/2018/04/More-Dangerous-Than-Ever-Final.pdf>.

<sup>25</sup> Kathleen Culliton, “Garbage Truck Kills Man in Crown Heights, Police Say” *Patch* (October 11, 2018), <https://patch.com/new-york/prospectheights/garbage-truck-kills-man-crown-heights-police-say>.

<sup>26</sup> Sam Schwartz Engineering, “Private Carting Study Routing Analysis” (June 2, 2016), commissioned by the New York City Department of Sanitation, pp. 24-25, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Routing\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Routing_Analysis.pdf), and Paul Carpenter Associates, Inc., “Private Carting Study Air Quality Analysis” (June 14, 2016), commissioned by the New York City Department of Sanitation, p. 22, [https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private\\_Carting\\_Study-Air\\_Quality\\_Analysis.pdf](https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Air_Quality_Analysis.pdf).