

Illegal Dumping in Dysart et al

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1 Introduction

Illegal dumping involves the disposal of waste and other unwanted material in non-designated spaces, including but not limited to landfill perimeters, public roads, public property, vacant lots, public litter bins, and remote terrain (Municipality of Dysart, 2021).

In the Municipality of Dysart et al, anecdotal records have established that roads with low foot/vehicular traffic and visibility, as well as the peripheral area of local waste disposal sites are among the most common dumping grounds within the boundaries of the municipality (Municipality of Dysart, 2021).

To mitigate the health, environmental, financial, and reputational risks associated with illegal dumping, Dysart et al developed the By-law 2021-29 to Govern the Management of Waste, which came into force and effect on May 1, 2021, replacing the previous by-law from 2006.

In order to supplement the efficacy of the new by-law, this paper will examine the risks and behaviours associated with illegal dumping, as well as provide promotion and education methods drawn from best practices enacted by other municipalities.

Approximately 320 hours of time was dedicated to the research and development of this paper. If Dysart had engaged consultants to conduct similar work, at \$29 per hour, this project would have cost the municipality \$9,280.

2 What is Illegal Dumping?

The definition of illegal dumping varies slightly between municipalities and between countries. Generally, illegal dumping is the disposal of material in areas not designated for that purpose, including public roads, vacant lots, ditches, landfill gates, rural areas and public litter bins (Municipality of Dysart et al, 2021). Although not always the case, the composition of illegal dumping tends to be non-hazardous. According to the United States Environmental Protection Agency (1998), materials typically consist of:

- I. construction and demolition waste (including concrete, drywall, shingles, wood, and bricks),
- II. white goods (such as refrigerators and small appliances),
- III. leaf & yard waste,
- IV. household trash,
- V. automobile parts and tires, and

VI. furniture.

Due to decreased visibility and risk of being caught, illegal dumping is most likely to take place at night. This highlights the necessity for persistent monitoring in illegal dumping hotspots using surveillance cameras and lighting to deter offenders (United States Environmental Protection Agency, 1998). The crime is not unique to any one type of culprit — everyone including businesses, individual residents and organized criminals have been charged with the offense (Brandt, 2017).

For the purposes of this paper, illegal dumping does not include “littering” which is more often the act of impromptu disposal of small individual items (cigarette butts, coffee cups, etc.).

3 Risks Associated with Illegal Dumping

Illegal dumping brings with it an increase of exposure to potential hazards, posing a variety of health, environmental, financial, and reputational risks.

3.1 Human Health

Illegal dumping poses several human health risks depending on its waste composition. Injuries that take place in public and easily accessible areas are often the result of the waste’s physical characteristics. Abandoned white goods such as refrigerators, have historically posed the risk of suffocation. It was not uncommon for playful children to become entombed in mid-20th century model refrigerators, so much so that the United States enacted the Refrigerator Safety Act in 1956 (United States Consumer Product Safety Commission, 1956). These days, that risk is fortunately rare but not unheard of.

Commonly disposed construction and demolition (C&D) waste may contain sharp edges or nails. These types of wastes are not easily seen in forested areas or when concealed in opaque garbage bags, and nail punctures may result in a tetanus infection if the victim has not been immunized (National Center for Immunization and Respiratory Diseases, 2019).

Individuals who go out of their way to discard unwanted items in remote areas could also fall and become seriously injured. Medical response for these types of incidents can be hampered or delayed by difficult terrain and distance from the nearest paramedical and emergency response units.

Automobile parts and tires are also very commonly disposed of in illegal dumping sites. The latter especially creates the opportunity for stagnant water to collect and remain for prolonged periods of time. This environment is the ideal breeding ground for mosquitoes, multiplying at a much faster rate (United States Environmental Protection Agency, 1998).

The transmission of the West Nile Virus continues to be a concern during Ontario summers, and coincides with cottage season. In Dysart et al, the population is estimated to increase from 6,280 residents, to over an estimated 20,000 residents during the peak of the season (Fleming College's Sustainable Waste Management Program, 2020). As a result of this and increased outdoor activity, the increased risk of West Nile Virus transmitting throughout the community should be expected. The Haliburton, Kawartha, Pine Ridge District Health Unit had detected a case of the virus as recently as September 2020 (Ovcharovich, 2020). In that same year, 77 people tested positive throughout the province of Ontario (Public Health Ontario, 2020).

Other than mosquitoes, illegal dumping sites can attract other pests and vermin to the area, including mice and ticks (United States Environmental Protection Agency, 1998). A study conducted by Duh et al (2017) concluded that endemic pathogens can significantly increase in dumping hotspots, where rodents were 19 per cent more likely to be infested by ticks than in natural sites. Similar to the prevalence of the West Nile virus, Lyme disease transmitted via blacklegged ticks is heavily monitored in the summer months. In 2019, Public Health Ontario reported 1,159 cases of the disease, with a total of 36 hospitalizations.

3.2 Environmental Health

The environmental risks of illegal dumping are likewise dependent on the composition and the geography of the surrounding area. A report conducted by the Recycling Council of British Columbia (2017) noted that in the most serious incidents, pollutants can likely leach into ground and surface water. While the aforementioned refrigerators are unlikely to cause suffocation, abandoned white goods may contain Freon and other deleterious gases that volatilize into the air.

Rodents and other vermin are more commonly associated with illegal dumping sites. However, they may also encourage foraging from other wildlife, such as deer, that have reportedly been killed in countries like Japan and the UK due to illegally dumped plastic and litter (Recycling Council of British Columbia, 2017; BBC East Midlands, 2018).

Illegal dumping can also alter the natural processes of the local ecosystem in Dysart et al. Haliburton County has forests and wetland areas that support biodiversity. Rare species such as the Canada warbler, olive-sided flycatcher, incurvate emerald dragonfly, and the brush-tipped emerald dragonfly are drawn to the area due to its calcium-rich terrain (Arike and Desrosiers, 2014). These species are usually found in warmer, southern climates.

Not only does the region attract rare species, it is also home to wildlife that is native to Ontario. Local ecologists have documented sightings of the Blanding's turtle, one of the five

turtle species in the wetlands (Haliburton Highlands Land Trust, n.d.). This turtle is currently categorized as *Threatened*, both provincially and federally. Similarly, the snapping turtle inhabits the shallow waters of the Haliburton wetlands and is currently a species of *Special Concern* provincially and federally (Haliburton Highlands Land Trust, n.d.).

These creatures can die from ingesting garbage and debris or from being entangled in plastic (Institute for Local Government Administration and Rural Development, 2005). Meanwhile, leachate runoff from the illegally dumped bags can deprive marine ecosystems of oxygen in the water (Institute for Local Government Administration and Rural Development, 2005). Illegal dumping puts these animals in a vulnerable state and increases their risk of endangerment.

Dumped organic matter that attracts wildlife can likewise serve as tinder that ignite wildfires (Recycling Council of British Columbia, 2017). If severe enough, these fires burn trees, create uninhabitable soils, destroy ecosystems, and travel onto private properties within the vicinity. Forest fires are more common to Northern Ontario, and the number of fires thus far in 2021 have already more than doubled those reported in all of 2020 (Government of Ontario, 2016).

Lastly, illegal dumping has the potential to cause flooding in susceptible areas. Especially when deposited on the sides of roads or in ditches, waste can accumulate in drainage basins, in addition to blocking ravines, creeks and culverts (United States Environmental Protection Agency, 1998).

3.3 Financial Cost

Illegal dumping comes with significant financial costs to local governments and industries that are burdened with its cleanup (United States Environmental Protection Agency, 1998). To complement their report, the Recycling Council of British Columbia conducted a survey with participating municipalities regarding illegal dumping. Those that responded varied in size and thus, costs ranged from \$2,000 to \$1,500,000 CAD. In addition, half of the responders noted that they allocate a portion of their annual municipal budget to deal with the cleanup of illegally dumped waste (Recycling Council of British Columbia, 2017).

To put the costs into perspective, the District of Squamish has a population of 20,000 residents. This is similar to the summer population of Dysart et al, or the permanent population of Haliburton County (Fleming College's Sustainable Waste Management Program, 2020; Statistics Canada, 2017). The district has received increased reports of illegal dumping incidents throughout the years, and in 2015, spent \$15,000 on cleanup efforts (Thuncher, 2016).

In January 2017, Kamloops City Council voted (6-2) to close the Ord Road Recycling Depot due to being overwhelmed by illegal dumpers and the costs associated with managing the materials (Norwell, 2016).

Deterring illegal dumping comes with its own costs. Effective management of illegal dumping requires a multifaceted approach — one that might require additional capital costs for gates, better fencing, cameras and lighting. Glen Farrow, the Environmental Services Manager for the City of Kamloops, reported an estimate of \$50,000 to \$60,000 CAD to implement these security measures (Ybarra, 2016).

To bear the cost of persistent illegal dumping and the mitigation efforts associated with the act, some communities in British Columbia have experienced an increase in municipal taxes and service fees (Recycling Council of British Columbia, 2017).

3.4 Community Reputation

Persistent crimes tend to fall victim to social normality. Illegal dump sites can encourage other dumpers to dispose of their own waste in the hopes that their additions go unnoticed. Furthermore, illegal dumping can increase the rate of other, non-environmental related crimes in the surrounding area. Cottage country areas like Haliburton County are susceptible to a decrease in tourism and other short-term visitors when they become unsightly. Choosing not to be proactive can lead to decreased property values, and the area becoming unattractive to future commercial and residential developers (United States Environmental Protection Agency, 1998).

Aside from the monetary loss from the forfeiture of businesses and future prospects, illegal dumping has the potential to damage the reputation of the local government and its sectors, especially those that address the issue of illegal dumping such as the municipality's waste management and by-law departments (New South Wales Environment Protection Authority, 2015). This is a plausible concern if residents begin to believe the idea that the municipality is unable to effectively mitigate the problems associated with illegal dumping. In turn, this would diminish the credibility of the local government when establishing new rules or amending existing by-laws. In other words, residents are less likely to give municipal regulations any serious consideration.

4 Illegal Dumping and COVID-19

Like most industries, waste management has been affected by the ongoing COVID-19 pandemic. Unfortunately, the rate of illegal dumping has increased since its onset. Overseas,

the issue had become so persistent that Richard Burton, the Irish Minister for Communications, Climate Action and Environment, increased funding for anti-dumping measures by one million euros in April 2020 (Department of the Environment, Climate and Communications, 2020). However, the issue has been especially problematic in developing countries where strict quarantine protocols were being enforced. In a report published by The United Nations Environment Programme (2020), local governments and stakeholders in countries like Sri Lanka were recommended to identify quarantined homes with a warning not to illegally dump (Tsukiji et al, 2020). Locally, there has been a notable increase of illegal dumping in the Greater Toronto Area. In Caledon, the rise of the problem is thought to be due to waste management service disruptions, including pauses on curbside garbage bag exemptions, as a result of the pandemic (Martin-Robbins, 2021).

The unemployment rate undoubtedly has been affected by the COVID-19 pandemic. Between the months of February and April 2020, there was a 15 per cent reduction in employment and a 32 per cent reduction in weekly hours worked (Lemieux et al, 2020). According to their study (2011), Matsumoto and Takeuchi concluded that the frequency of illegal dumping is well explained by the socioeconomic conditions of the community – increased unemployment leads to increased illegal dumping. This is especially concerning for municipalities like Dysart et al, which pre-pandemic, already suffered from a relatively high rate of poverty.

Population has also been in flux. Neighbours to Dysart et al, the Township of Minden Hills conducted a waste management survey in October 2020. The results concluded that 60 per cent of the current residency was seasonal. Of those residents, 14 per cent plan to become permanent residents within the next five years, with another 12 per cent becoming permanent within a longer timeframe. When asked for the motivations for their decisions, a common response was the COVID-19 pandemic (Minden Hills Public Works, 2021). It is likely that Dysart et al has and will experience these same changes, and newcomers will require education and time to adjust to their new waste management policies. Since waste generation increases with population size, waste management systems need to adapt accordingly (Kaza et al., 2018). Those unable to uphold the influx of new residents could potentially lead to improper waste handling, including illegal dumping.

5 Motivations and Behaviours Behind Illegal Dumping

Researching the motivations and behaviours behind illegal dumping is difficult because illegal dumpers are less likely to be surveyed about their behaviours, and less likely to admit to their behaviours. Most illegal dumping literature was based on surveys conducted to key stakeholders such as municipality and general public. One study incorporated a survey conducted to the general public that included self-reported illegal dumpers. Therefore, there was not enough information to have conclusive answers to the questions outlined in the project agreement. As an alternative solution, we are presenting general causes for the behaviour and motivation of illegal dumping and the requested questions are incorporated whenever possible.

5.1 Awareness

The motivations and behaviours behind illegal dumping are presumed to be attributed to the level of awareness; whether people are aware that dumping of waste in unauthorized public land is illegal. The public opinion in regard to this matter is torn; many claim that illegal dumpers are not aware that their action is illegal, while others claim that they are in fact aware of the illegality of their action. We will examine both sides of this argument.

5.1.1 Awareness – Not Aware

Researchers suggest that illegal dumpers are not aware of the illegality of their action of “illegal dumping.” Such unawareness can stem from the historical method of waste disposal and general unawareness of the local waste management services.

According to the study conducted to characterize the illegal dumping in rural area throughout the upper Midwest in the United States, rural area residents may not be aware of the illegality of dumping the waste in the unauthorized public area because they have been disposing the waste in the public area even before the concept of illegal dumping was introduced. The study suggests that people may simply continue to “illegally dump” their waste as it is the norm in their social setting and are not aware of the illegality of their action (United States Environmental Protection Agency, 1998). This finding may apply to Dysart et al. Some permanent residents who have lived in the area for generations may not be aware of the concept of illegal dumping.

Other research suggests that the illegal dumpers are not aware of the waste collection programs offered by their municipalities, therefore resort to illegal dumping. According to the consumer research in addressing illegal dumping by Dr. Calvin Lakhan, more than 70 per cent of the respondents indicated that they did not know how to dispose of more than one waste stream. For example, residents may be aware of disposing household waste, yet are not aware

of how to dispose of mattresses. Further, Dr. Lakhan uses the report submitted by Eunomia Research and Consulting to suggest that residents are simply not aware of the types of waste collection services offered by the municipalities and were not able or unwilling to find out how to dispose of unusual household waste (Lakhan, 2014). His finding further corresponds to other studies. For example, the resident survey conducted by Keep Truckee Meadows Beautiful (KTMB), a northern Nevada nonprofit agency revealed that 40 per cent of respondents did not know the local municipality hosts free dump days (Cowee & Curtis, 2011). Dr. Lakhan suggests that such unawareness of proper methods of waste disposal may encourage illegal dumpers to dispose of waste on unauthorized public space (Lakhan, 2014). To conclude, it is unknown whether illegal dumpers are aware of the illegality of their actions, yet the lack of awareness in waste collection programs is one of the leading factors in their engagement to illegal dumping, and such attribute may apply to the residents in the Municipality of Dysart et al.

Dr. Lakhan's illegal dumping research also suggests that renters of multi-residential buildings are less likely to be aware of the various waste collection services than those who own homes. Additionally, renters are not motivated to find out the proper waste disposal methods. Such un-awareness of proper waste disposal methods leads to illegal dumping (Lakhan, 2014).

Interestingly, the report from the Brisbane City Council, Department of Environment and Heritage Protection in Australia revealed people perceive leaving certain items on the curbside is not illegally dumping. The survey was conducted by directly interviewing illegal dumpers, specifically dumping large items on the curbside in urban areas. Their interviews revealed that some people believed leaving furniture and other usable bulky items on the curbside is not illegal dumping, rather, it is a street donation where another resident who may find value in the dumped item will take it away. If no one takes the item, it is magically taken away by the municipality. They did not realize that it was illegal to leave their furniture on the curbside (Comeford et al., 2015).

5.1.2 Awareness – Aware

On the other hand, there is research that suggests illegal dumpers are in fact aware that their action is illegal. Dr. Lakhan's survey responses indicate that the general public believe people are aware of the illegality of illegal dumping. In his survey, following responses indicate that there is moral wrongness and shame present in the illegal dumpers. Such psychological awareness indicates that the public is aware of its illegality and wrongness of illegal dumping:

- I. "88 per cent of respondents agreed or strongly agreed, with the statement "I think illegal dumping is wrong"

- II. “80 per cent of urban respondents (who admitted to illegally dumping) agreed or strongly agreed with the statement “I feel guilty when I dump waste in places where I know it doesn’t belong.” Here, a caution should be noted as 24 per cent of rural residents showed some level of guilt when dumping the waste in the unauthorized public land.
- III. “74 per cent of respondents reported that they would be deterred from illegal dumping if they were noticed by neighbours, loved ones or the broader community.”

Additionally, 55 per cent of respondents agreed or strongly agreed that illegal dumping should be fined or face a penalty. They further expressed that the bylaws barring the illegal dumping of waste were ineffective because of the lack of enforcement (Lakhan, 2014). These survey responses indicate that the general public not only understands the illegal dumping is wrong, but also are aware of the illegal dumping by-laws.

Further, the illegal dumping survey conducted by New South Wales Environmental Protection Authority reported that some key stakeholders (councils, residents, businesses) strongly believe that illegal dumpers are aware of the illegality of their actions. They state that “the lack of correct waste disposal knowledge is not driver of illegal dumping.” (NSW Environment Protection Authority, 2020). Residents and businesses are aware of its illegality. Some comment that they know illegal dumping of their business waste is a norm in their industry (NSW Environment Protection Authority, 2015).

To apply these findings in the context of the Municipality of Dysart et al, we can speculate that the general public in Dysart et al may be aware of the illegality of the illegal dumping.

To summarize the awareness attribute in illegal dumping, the various surveys conducted revealed opposite responses, therefore leading to an inconclusive answer to the question, “Do people know dumping waste in unauthorized public land is illegal?” Some believe illegal dumpers are not aware of the illegality of their action while others believe illegal dumpers are willfully dumping their waste in the unauthorized public land. To apply these findings in Dysart et al, it is possible that some rural residents may not be aware of the illegality of their illegal dumping behaviours as it has been a norm for them. Additionally, the lack of awareness in available waste management services may be another contributor to the illegal dumping behaviours especially from the short-term renters. In urban settings, the idea of street donation (leaving the furniture curbside) was seen as a good attribute among residents and the illegality of the action was not recognized. This idea may apply to the Municipality of Dysart et al; if seasonal residents carry over this idea to Dysart et al’s jurisdiction, they may be leaving their

bulky items on the side of the road. On the other hand, many believe that illegal dumpers are willfully engaging in their action. As many survey respondents answered that illegal dumping is wrong, it is plausible that many residents in the Municipality of Dysart et al, including the illegal dumpers generally understand that illegal dumping is wrong and illegal.

5.2 Psychology

Another factor that may help explain the motivations and behaviours of illegal dumping is perceived psychology of illegal dumpers. Research suggests that one of the main psychological motivations in illegal dumping is that illegal dumpers do not feel responsible for public areas and parks. They believe that once the waste is offloaded to the public land, the waste is now the government's responsibility to clean up (Abel, 2014). According to the survey response from the research conducted by Dr. Lakhan, illegal dumpers rationalize their illegal dumping behaviours by the frustration they feel when they are not able to properly dispose of their waste in an accessible manner. They feel as though they were "forced" to engage in illegal dumping because of the lack of accessible service. The survey revealed that rural residents feel neglected in terms of waste services, and only 24 per cent of respondents indicated that they feel guilty of illegal dumping behavior (Lakhan, 2014). This indicates the majority of the respondents (rural residents) do not feel guilty in engaging in illegal dumping behaviours. It can be speculated from the finding by Abel and the survey by Dr. Lakhan that illegal dumpers believe it is the government's responsibility to collect their illegally dumped waste caused by their perceived inadequate waste collection service.

On the other hand, from an economic point of view, research suggests that illegal dumpers simply dump their waste because there are jobs to collect those waste, therefore they do not believe their action is bad. In their definition, they are simply creating jobs (Ann, 2019).

Another factor that attributes to the psychology of illegal dumping is a social norm. People rationalize and justify behaviour by pointing out the other people who resort to the same behaviour; "If other people don't care, why should I?" (Ann, 2019). Illegal dumpers may be justifying their behaviour by pointing fingers to others.

These psychological factors may answer the question; why do people illegally dump? Illegal dumpers may be engaging in illegal dumping because they feel as though it is the government's responsibility to provide an accessible waste service and feel that illegal dumpers should be able to dispose their waste when they want to at a place that is convenient for them at that time. Further, they may be rationalizing their behaviour by mistakenly considering their

action is providing employment while pointing fingers to other illegal dumpers when their action is singled out.

5.3 Convenience

Most of the studies identify convenience as one of the important predictors of the waste dumping behaviours. In a 2020 survey conducted by York University in Ontario, the lack of authorized collection places was identified as the most pressing issue by rural respondents, with the majority responding that they would not be willing to travel more than 15 minutes to dispose of waste at a depot/transfer station. Interestingly, in the research, some 80 per cent of respondents said that they would dispose of hazardous materials in landfills/depots if they are accessible rather than affordable (Gomez, 2017). According to the same poll, just over half of respondents (57 per cent) judged 2 to 10 miles to be reasonable, but only 25 per cent were willing to drive more than 10 miles.

In another survey conducted by the Environmental Protection Authority (EPA) for New South Wales, respondents speculated that those who dump illegally can contend that garbage disposal facilities are too few and far between. Respondents also recognized the challenges that long distances and limited opening hours presented for businesses (EPA, 2015). It should be noted that most studies argue that illegal dumping cannot be effectively reduced until an adequate infrastructure can be established. Most studies suggest that the lack of appropriate and accessible waste management infrastructure is the primary cause of illegal dumping. The rates of illegal dumping are found to be significantly less in areas with proper waste management systems and accessible collection points such as waste depots, transfer stations etc. Various studies have discovered a direct inverse link between the density of garbage collection sites and incidences of illegal dumping: as the distance to the waste collection sites increases, the incidence of illegal dumping also increases (Lakhan, 2015). A study conducted in northern Nevada, 40 per cent of the respondents thought illegal disposal was due to a lack of proper transportation (Cowee and Curtis, 2011). Since Dysart et al does not have public transportation facilities, more research in this direction can find the influence of this to the occurrences of illegal dumping.

5.4 Socio-Demographic

The broader literature features several socio-demographic drivers that influence illegal dumping behaviour, but it is often challenging to establish a link between any of these drivers and the frequency of illegal dumping. Population density, unemployment, income, per centage of renters in the area are found to influence illegal dumping, but there exists a collinearity

between two variables: demography, and infrastructure (Lakhan and Adjei, 2021). Despite the evidence to support the relationship between these variables and dumping behaviours, one must examine them in the broader context of access to adequate infrastructure, enforcement and other important factors that influence illegal dumping.

Studies suggest that the percentage of short-term renters has a direct link with the incidence of illegal dumping. One such study noted that the issue appears to be greater in regions where there are many renters who have little stake in the community (U.S. EPA Region, 1998). Greater population mobility generates more garbage for disposal, and rental units have considerably higher turnover rates, therefore these populations may need to dispose of durable waste more frequently (U.S. EPA Region, 1998). When households including single-family residents move out of a building, the rates of illegal dumping are at their highest (Abel, 2014). During this time, households not only generate more durable garbage, but they are also less likely to adhere to community expectations and social norms surrounding the upkeep of public spaces. These observations might be applicable in the case of Dysart et al, where there is a significant population of short-term renters and seasonal residents.

The waste disposal behaviour, especially the willingness to abide by rules and regulations is linked to the sense of “ownership” of residents. When opposed to rental units, involvement in source separation activities is substantially higher and contamination rates of the organics/recycling stream are lower in multi-residential buildings where people own their apartments (vs. renting) or belong to a cooperative. People are less likely to litter or harm areas they own/use and consider to be part of their neighbourhood (Lakhan and Adjei, 2021).

5.5 Site-Specific Characteristics

Characteristics of the problem location and situation can encourage or deter the occurrence of illegal dumping. Access to roadways, proper lighting, population density, mixed land use, foot/vehicle traffic, and site visibility are all geospatial attributes that affect the rate of illegal dumping (U.S. EPA, 1998). Numerous studies have highlighted that geographical features, such as the placement of road networks, the position of road networks, access to roads, and distance to residential areas can help predict the location of illegal dumping sites. It is observed that illegal dumping in public spaces is prominent in areas that are easily accessible with limited visibility, such as rural areas with road access and low population density (Lakhan and Adjei, 2021).

Illegal dumping can be characterized as a ‘crime of opportunity’ as it often depends how easy it is to carry out the act and get away with it. Studies argue that areas with mixed land-use

(where residential and commercial land use coexist, e.g., homes, apartments, retail shops and industrial sites) can support illegal dumping behaviour if there are areas with less traffic and lighting or isolated and unoccupied areas (Lakhan and Adjei, 2021).

Maintenance of a public site is an important factor in determining the illegal dumping behaviour. The aesthetics or cleanliness of an area is inversely related to rates of illegal dumping (Abel, 2014). The good news is that people are less likely to illegally dump waste in areas that are properly maintained whereas people will be more motivated to discard rubbish if an area is regarded to be badly maintained (litter, overflowing waste containers, and other unlawful dumping).

5.6 Cost

Apart from infrastructural access, waste disposal fees have been identified as another important driver of illegal dumping. Various studies show that increased disposal fees can lead to an increased number of illegal dumping incidents in the community. Implementation of unit pricing on garbage disposal (also known as “pay-as-you-toss,” “PAYT,” or “variable-rate pricing”) has been linked too much greater rates of unlawful dumping in communities (Lakhan, 2015). Landfills and transfer stations that have high disposal fees are not conveniently located, have minimum tipping fees, or do not accept small loads, encouraging dumping. According to the EPA survey conducted in New South Wales, a lack of financial resources is an issue for both homeowners and businesses. This would include persons who do not have the financial resources to pay for garbage disposal in the case of homeowners.

Landfill bans of certain waste materials have been found to increase the illegal dumping of those materials as their appropriate waste management can be expensive. According to the survey conducted by York Region, the materials that are illegally disposed of in rural areas included a wider range of large and durable items such as mattresses, furniture, and appliances, for which the cost of disposal including that of transportation is higher. Convenience being one of the most significant predictors of behaviour, they are not willing to incur a significant cost (measured in terms of effort or resources) to engage in the behaviour (Lakhan and Adjei, 2021).

6 Best Practices from Other Rural Communities

Best Practices from Other Rural Communities

6.1 Municipal By-laws

In Ontario, there are 444 municipalities. Under the Municipal Act of 2001, the City of Toronto Act of 2006, and over 100 provincial statutes, municipalities have a wide range of powers and responsibilities. Depending on whether they operate under a single-tier or two-tier government structure, there are three types of municipalities in Ontario (Ministry of Municipal Affairs and Housing, 2021). In these municipalities, illegal dumping is a problem to some degree.

Illegal rubbish dumping is taken very severely by the Ministry of the Environment, Conservation and Parks, therefore a variety of regulatory measures and consequences, including investigation and possibly prosecution, are formed and each violation of the Environmental Protection Act might result in severe penalties for an individual or organization. Classified on those ground wastes differentiated into two types: 1) hazardous waste, and 2) non-hazardous waste. For further classification, in order for the province to respond to illegal dumping, it must hire an Environmental Officer to inspect the site and make all reasonable measures to locate the waste's owner and have them remove it. Whereas in local municipalities there are many towns that have by-laws and property standards in place to prevent the illegal dumping of minor amounts of non-hazardous solid waste on private and in public property. (Ministry of the Environment, Conservation and Parks, 2019).

6.2 By-laws of Dysart et al

The Municipality of Dysart et al is one such example, it is a lower-tier municipality that forms a part of an upper-tier municipality (County of Haliburton) to fulfil the responsibilities set out under the Municipal Act and other provincial legislation. Responsibilities are divided between the upper-tier and lower-tier municipalities (Queens Library, 2004). The Municipality of Dysart et al, officially known as the United Townships of Dysart, Dudley, Harcourt, Guilford, Harburn, Bruton, Havelock, Eyre, and Clyde, is a municipality in Haliburton County, Ontario, Canada (Government of Canada., 2021). The Illegal dumping has a negative impact on the environment and people, and it also creates nuisance and that affect the cleanliness of the surrounding area. This situation is not only harmful to the ecosystem in that area, but it also affects individuals' perception of natural beauty as it has a negative impact on people's mental health. Additionally, it can potentially affect the economy through lost tourism. The Illegal dumping occurs in open spaces, along highways, in woodland regions, and near streams and rivers. Although it is rule of thumb that household garbage must disposed of at the landfill, illegal dumpers engage in the act mainly to avoid disposal fees or in order to eliminate the time and effort necessary for appropriate disposal (the Cuyahoga Soil & Water Conservation

District, n.d.). The same can be said in the case of the Municipality of Dysart et al. To prevent this problem necessary measures are taken, and by-laws are one of them. A by-law is a piece of legislation enacted by a local government that only pertains to that municipality's jurisdiction (Collins, 2021).

The by-laws of the Municipality of Dysart et al include a broader view on waste management regulations than just assessing a particular issue; they also cover behavior at landfills, illegal dumping, public space litter bins, multi-residential structures, and special events held on municipal property. The Municipality of Dysart et al modified the pre-existing by-laws and reframed them under various Acts and Sections. These by-laws fall under By-Law No. 2021-29 and it includes the Municipal Act, S.O. 2001, C.25, Section 8, which stipulates that a municipality's powers shall be interpreted liberally in order to provide broad jurisdiction in order to improve a municipality's ability to respond to municipal issues. Sections 74; 425(1); 426; and 429 of the Municipal Act 2001 enable the municipality to establish a by-law forbidding or regulating any matter that falls under the area of jurisdiction of waste management. Meanwhile, S.O. 2001, c.25, Section 127 of the Municipal Act permits councils of local municipalities to pass by-laws for requiring the owner or occupant of land to clean and clear the land. Lastly, Section 180 of the Highway Traffic Act R.S.O. 1990 c. H.8, and s. 180 describe littering on highways. These problems can be partly attributed to tourism, where tourism places a huge strain on local land use including soil erosion, pollution, habitat loss, and increasing pressure on endangered species. These consequences have the potential to deplete the environmental resources that tourism relies on (The World Counts, 2021). In respect to boundaries and needs, each municipality has created their own sets of by-laws in the waste management sector with specific subsections.

This version of by-laws covers a broader aspect of the waste management and is similar to many other lower-tier municipalities (Municipality of Dysart et al, 2021). The following are some by-laws from various locations that can help us get a better sense of the overall issue.

6.3 By-laws of Hastings Highlands

Hastings Highlands created By-law 2018-074, also cited as the "Clean Municipality By-law." According to the Ontario Municipality Section S.O. c. 25, Section 127, it explicitly states that local governments may enact their own by-laws to address issues such as illegal dumping on public and private property. This By-law applies to all property owners and occupants within the municipality's geographic boundaries. The scope of the by-law is as follows:

- I. No person shall dump, drop, sweep, throw, cast, or otherwise deposit any material whatsoever on or in any road, road allowance, or public property, or permit his or her contractor, agent, employee, minor child under his or her care or control, or animal under his or her care or control to dump, drop, sweep, throw, cast, or otherwise deposit any material whatsoever at the entrance to or around the perimeter of a Waste Disposal Site.
- II. No person shall dump or deposit any material generated on a premise owned or occupied by that person into litter bins on any road, or public property, nor shall he or she permit his or her contractor, agent, employee, minor child under his or her care or control, any item generated on a premise owned or occupied by that person to discard or deposit into litter bins on any road, road allowance, or public property.

Moreover, the general provision outlines that:

- I. Unless and otherwise stated, the provisions of this By-law shall be regarded to be the minimum requirements for the promotion of public health, safety, comfort, convenience, and general welfare near the entrance to a Waste Disposal Site or along its perimeter.
- II. The Township Council considers standing water, loose trash, and garbage on lands, as well as untidy property, to be a nuisance that may pose a health and safety risk to the public.

Finally, the by-law outlines the penalties, stating that: "Every person who contravenes any provision of this Bylaw is guilty of an offence and on conviction is liable to a penalty as provided for in the Provincial Offences Act, R.S.O. 1990, c.P.33" (Municipality of Hastings Highlands, 2018).

6.4 By-law of the Township of King

Other rural municipal by-laws, such as the one by the Township of King, are governed by sections such as Section 11(3) of the Municipal Act, 2001, which binds local governments and allows them to pass legislation. By-laws govern the jurisdiction and highway regulations. Section 122 of the Municipal Act of 2001 states: "The law relating to snow removal." These sections are governed by the By-law Number 2016-68. The "Clean Yards By-law" is another name for this by-law (The Corporation of the Township of King, 2016).

6.5 By-laws of Grey Highland Municipality

Grey Highland Municipality By-law No. 2019-071 is also cited as the "Illegal Dumping By-law". Section 74, Sections 425(1), 426, and 429 of the Municipal Act 2001, S.O. 2001, c.25, respectively.

As modified, a municipality may provide in a bylaw forbidding or regulating any matter passed under the sphere of jurisdiction of waste management that a person who violates the bylaw is in violation of the law and is subject to a fine.

Section 127 of the Municipal Act, S.O. 2001, c. 25, permits local municipalities' councils to pass by-laws requiring the owner or occupant of land to clean and clear the land, not including buildings, or to clear refuse or debris from the land, not including buildings, to regulate when and how such matters.

Littering the roadway is defined as throwing or depositing or causing to be dumped any glass, nails, tacks, or scraps of metal, or any debris, refuse, waste, or litter on, along, or adjacent to a highway, except in dumpsters established for the purpose. The terms of this By-law apply to all residential, industrial, commercial, and institutional facilities within the municipality, as well as their owners and tenants.

The general provisions are as followed:

- I. Without the permission of the owner or occupants of the property, no garbage shall be thrown, placed, dumped, or deposited on private property or the property of the Municipality of Grey Highlands.
- II. On a highway, no one may throw, drop, dump, or deposit rubbish except when situated out in the Grey Highlands Municipality according to the By-laws
- III. Without the owner's or occupants' permission, no one may throw, drop, dump, or deposit rubbish, litter, or debris on private property of a local board. (The Corporation of the Municipality of Grey Highlands, 2020)

6.6 Methods Used by Various Towns to Combat Illegal Dumping

However, the outcome of these by-laws depends on how efficiently they are set and how strict the consequences are. In British Columbia, dumping garbage, hazardous waste, or green waste is illegal and can result in fines of up to \$1 million or six months in prison. In addition to by-laws, several of the latest, cost-efficient technologies are used to manage waste. Using such tools and bringing signage programs into action led to a reduction of illegal dumping from 83 per cent to 56 per cent. Compared to Ontario, British Columbia appears to be more successful when it comes to waste management.

The majority of the rubbish is dispersed by people who are unaware of the community's ordinances or who doesn't care about the community, majority of them comes from tourism industry and due to it the community can experience both positive and negative effects. A new and innovative solution was launched by the Government of India and the country has launched

various events that have contributed to the improvement of illegal dumping situations in this densely populated country. Swachh Bharat Abhiyan is one of them. (National Informatics Centre, 2021). The Government of India has launched various missions where it the people about the concept of minimizing the waste by introducing slogans like “Everyone must be their own scavenger”, “waste on the road is an environmental grave”, and “Collaboration is the key to success” and following these ideologies in reality they have appointed education at different levels and improved the conditions of Illegal dumping. India has a large population, which means that employment rates are low and earnings are poor. So many professions have emerged in the Indian market to manage not just these poverty-related criteria, but also to assist in illegal dumping situations. India has created a secondary market for all types of garbage, and the "Ragman" is an important figure in keeping things under check, the role is very simple the Ragman buys the item from the people dismantle the waste and extract the resourceful products out of it and sells the item. The government provides them with proper education of how to handle the waste and how to properly manage the items and thus it covers the concept of waste scavenging. (The News Minute, 2017)

The second concept was introduced when Indian environmental minister Nitin Gadkari introduced the concept of plastic roads and how scavenging of plastic can be turned out as a great source of income. This concept turned out to be a great source of income of needy and homeless people and gave them financial support with each kilometer of road required nine tones of bitumen and one tone of plastic garbage to construct. This means that one tone of bitumen, worth around \$600 is saved for every kilometer of road. (India News, 2018). Following those missions and introducing the third concept, India has made many reforms in the tourism industry. In tourist destinations where curbside pickup is not available, such as Manali, Shimla, and Nainital, tourists submit their legal documents to Hotels and Airbnb. They are only returned after receiving a receipt from the nearby landfills. The tourist is given a hotel garbage card that allows guests to enter the landfill. For a small fee, they can then deposit their trash at a nearby landfill or transfer station (Fortune Park Hotels Limited, 2021). With this collaborative approach, illegal dumping is not only minimized, but waste generation is also kept in record.

7 Reporting

Reporting illegal dumping and abandoned rubbish serves to improve the overall standard of living and promotes efficient waste management practices. Besides, illegal waste

dumping is taken very severely by the Ministry of the Environment. A variety of regulatory measures and consequences, including investigation and possibly prosecution, are available. Each violation of the Environmental Protection Act might result in severe penalties for an individual or organization (Ministry of the Environment, Conservation and Parks, 2019).

The Ministry has divided the illegal waste dumping into two broad categories namely hazardous (chemicals, oil, paint, and used batteries) and non-hazardous waste (waste wood, household garbage, used furniture, and used tires) (Ministry of the Environment, Conservation and Parks, 2019).

7.1 Reporting in Upper-Tier Municipalities

Various municipalities in Ontario assist people in reporting unlawful waste disposal through a variety of methods. In comparison to some of other upper-tier communities, the regional municipalities of Niagara Region has some of the most advanced anti-illegal dumping strategies. To address the public issue of unlawful dumping, Niagara Region is collaborating with all 12 of its lower-tier municipalities. There are online forms and two toll-free numbers to report illegal dumping. Every year, illegal dumping costs Niagara Region tens of thousands of dollars. As a result, Crime Stoppers Niagara and the Niagara Region have partnered to urge more individuals to report illegal dumping. Crime Stoppers of Niagara Inc. is a citizen, media, and law enforcement partnership that aims to engage the public in the battle against crime, including illegal dumping. Citizens can anonymously offer the information to the police using this service. People who phone the hotline with information that leads to an arrest are eligible for cash incentives. There is also an app that can be used to report unlawful trash dumping, with rewards offered for doing so. Table 1 illustrates the number of reports submitted from 2013 to 2020. (Niagara region, 2021)

YEAR	REPORTS SUBMITTED	WARNINGS ISSUED
2013	394	35
2014	506	42
2015	530	39
2016	589	37

2017	680	47
2018	755	140
2019	677	74
2020	678	42
TOTAL	4809	456

Table 1. Number of reports submitted from 2013-2020

The number of illegal dumping reports has increased significantly, as seen in table 1. This is linked to the success of the numerous methods for reporting illegal dumping.

In other jurisdiction , people can report illegal trash dumps using both an online reporting form and a toll-free number provided by the Municipality of East Hants and City of Toronto. Durham Region collects reports in a similar manner, using an online form and toll-free numbers. The website also includes information such as the vehicle's number plate, location, general description of the vehicle, time of the occurrence, date of dumping, and a short description of the waste that should be included when reporting an incident (Durham Region, 2021).

Only toll-free numbers are used by the cities of Brampton, Hamilton, and Kingston to receive reports of illegal dumping. Moreover, the City of Hamilton advises people to not approach the suspect one believes is responsible for the dumping. Staff from the city have been trained to deal with these scenarios and are in charge of the inquiry (City of Hamilton, 2020).

The city of Mississauga, on the other hand, has supplied its residents with a variety of phone numbers to report illegal dumping. For example, the numbers for debris left in a park and on 400 series motorways or ramps are different (City of Mississauga, 2021).

7.1.1 Illegal Dumping Enforcement Plan

Niagara Region questioned municipal peers in advance of every other week garbage pickup to learn how this curbside service shift affects illegal dumping. Barrie, Durham, Halton, Markham, Ottawa, Toronto, Vaughan, Peel, and Waterloo were among the municipalities contacted. Every other week garbage collection is currently provided by these municipalities. All nine municipalities did not keep track of statistical information on illegal dumping before and

after. These municipalities did, however, provide circumstantial feedback to Niagara Region. The overall response to how every other week garbage collection affected illicit disposal of the waste was that it did not cause a substantial long-term concern, but that there was a short-term rise in the number of illegal dumping issues during the transitional period. (Niagara Region, 2020)

Items that are not collected curbside, i.e., construction and renovation waste and shingles from non-residential sources, were also commonly illegally discarded during this transition period, according to municipal comparators. This led to the development of an Illegal Dumping Enforcement Plan (the Plan) to combat the impact of service level changes on illegal dumping. The Plan outlines the current approach to enforcing illegal dumping as well as an enhanced strategy Niagara Region has committed to, in order to deal with a potential increase in illegal dumping events. (Niagara Region, 2020)

The Plan outlines the following in summary:

- I. Additional information on garbage pickup every other week and the status of the Illegal Dumping Working Group (IDWG). The IDWG's mission is to provide a consistent and collaborative approach to illegal dumping, as well as to raise public awareness about illicit dumping through public awareness initiatives. To date, the IDWG has collaborated and presented a number of deliverables that have improved the way illegal dumping in the Niagara region is reported, managed, and monitored.
- II. Niagara Region staff is in charge of investigating, enforcing, and cleaning up illegal dump incidents, as well as how information about illegal dumping is managed.
- III. Niagara Region's current procedure for dealing with illegal dumping incidents also describes the present process for receiving, dispatching, investigating, cleaning, and enforcing illegal dumping reports. Also, it highlights how locals are rewarded for reporting non-compliant behaviors through a rewards program in which citizens who report illegal dumping may be eligible for a reward of up to \$200 if the complaint results in a conviction, or \$50 if the report results in compliance. This incentive policy encourages residents to report non-compliant behavior and aids by-law officers in their investigation and enforcement efforts.
- IV. Niagara Region has devised a strategy to improve its existing approach to illegal dumping and enforcement measures. This includes;
 - i. To refresh the illegal dumping campaign, integrate illegal dumping message into the implementation plan for the new waste collection

agreement, and launch a new anti-litter campaign to educate and raise awareness about how to reduce the quantity of litter in the neighborhoods.

- i. Improve the tracking of illegal dumping data by developing a mobile app to track and analyze illegal dumping data.
- ii. Create by-law revisions to enhance and simplify the phrasing of illegal dumping and other non-compliant behaviors, allowing by-law officials to more quickly and effectively execute these concerns.
- iii. Improve the IDWG's functionality by upgrading registration, increasing member participation, adding more structure to attendance, and assessing the overall efficacy of the group's functioning.
- iv. Dispatch personnel to do more proactive monitoring at hot spots and litter containers.
- v. To work with local governments to ensure that street litter bins are built in such a way that they cannot be exploited for illicit dumping.

7.2 Reporting in other municipalities- Hasting Highlands, Dysart et al and Vancouver

Lower-tier municipalities utilize similar strategies to deal with unlawful dumping in their communities as the upper-tier municipalities do. The Municipality of Hasting Highlands has a detailed online form for the general public to report the incidents (Hasting Highlands, n.d.). Similarly, Dysart et al offers an online portal that allows residents of Dysart et al to directly report an occurrence. There is also a column for contact information on the form, which is optional to fill out (Dysart et al, 2019). The illegal dumping reporting form is also available to Dysart users of the Haliburton County Waste Wizard mobile app for Apple and Android devices. Dysart et al also has its own Facebook page, "Dysart et al Waste Management," where the municipality coordinates environmental programs to assist citizens and businesses in successfully managing their waste.

On the other hand, many individuals take advantage of the pleasant weather in the summer to deep clean their homes in Vancouver, British Columbia. Old furniture and beds are sometimes the first significant items to go when they thoroughly cleaned. Similarly, people frequently pack up and relocate throughout the summer, whether to a new rental or a new

home. Illegal dumping has increased in Metro Vancouver as a result of these large events. (Canadian Mattress Recycling Inc., 2011)

To report the problem, city dwellers utilize the City's Van Connect phone app. Alternatively, one can do the same thing by going to their website. Simply submitting a description of what was illegally disposed, along with a photograph if possible. The city team then gets alerted, and they will create a ticket and ensure that the dumped waste is cleaned up. According to the website, the easiest method to prevent illegal dumping is to start a dialogue with family and friends about why it is such a big deal. Mention or recommend alternatives to the current large-item pickup services in cities when relevant. They also encourage consumers to use Waste Wizard and Metro Vancouver Recycles, among other options. (Canadian Mattress Recycling Inc., 2011)

8 Promotion and Education

Ultimately, the management of illegal dumping in other rural communities is similar to the experience in Dysart et al. Other rural communities that mention illegal dumping on their waste management web page focus mostly on encouraging residents to report illegal dumping, while many communities do not have any mention of illegal dumping on their web pages. However, Hastings Highlands, a municipality adjacent to Dysart et al, does discuss illegal dumping on their web page, including a promotion and education (P&E) poster (see Appendix A) that briefly discusses the impacts of illegal dumping and how to report incidents of illegal dumping.

Both the Township of Algonquin Highlands and the Township of Minden Hills, located in the same county as Dysart et al, have introduced a P&E tactic, The Cottage Kit (see Appendix A), that targets short-term renters. The Cottage Kit does not address illegal dumping, though it provides property owners a convenient method to provide targeted education to their short-term renters to raise their awareness while reducing the cost and inconvenience of disposing of their waste. The Kits provide short-term renters with information regarding waste management in the Townships, as well as bags for the proper bags for the waste they generate and a single-use landfill pass (Township of Algonquin Highlands, n.d.). This P&E approach provides clear information to renters (such as waste disposal site locations and hours of operation), while the single-use landfill pass eliminates the need for renters to return landfill cards to property owners (Township of Algonquin Highlands, n.d.). The Manager of Waste Facilities in Minden Hills explained via email that the Township has found the Kits to be “a successful tool in assisting short-term renters with navigating our waste management system” (T. Stephen, personal

communication, June 29, 2021). Additionally, Stephen explained that the township intends to increase the price of the kits (from \$3.00 each or \$25.00 for 10, to \$4.00 each or \$30.00 for 10) “strictly to cover our cost — we are currently losing money on the kits” (T. Stephen, personal communication, June 29, 2021).

9 Municipal Survey

9.1 Methodology

To determine if illegal dumping is an issue in other rural communities in Ontario, the Fleming College authors of this paper conducted a municipal survey. The survey was developed using Google Forms and consisted of 11 questions, with a combination of Likert scale, multiple choice, and open-ended questions. 21 municipalities and townships in Ontario were selected for the survey on the basis that they are comparable to Dysart et al, with the exception of the Regional Municipality of Peel and the Regional Municipality of Niagara, which were selected because they have implemented a comprehensive approach to addressing illegal dumping (see Appendix B). The 21 municipalities and townships were sent a request for participation in the survey via email, which included the purpose of the survey, what the collected data would be used for, and a link to complete the survey. The survey was open on Google Forms for 10 days, beginning on June 21 and closing on June 30, 2021. The survey received a total of eight responses, which were analyzed in Microsoft Excel.

9.2 Survey Results

The group has developed some practical questions to help the client better understand customers' and residents' needs and desires through neighbouring municipalities' experience (see Appendix C). Getting a sufficient quantity of municipalities to complete the survey is vital to be able to use the survey data for decision-making. Therefore, specific barriers to the municipality or community were aimed to complete the study. From 21 municipalities, only eight replies were collected, showing that this is the quantity side of the survey challenge. Hence, common barriers were found, getting significant data and results from our research that can be analyzed to Dysart purpose. The top barriers to municipalities participating altogether in our survey are (see Appendix C):

- I. In the first question, it was possible to assess that illegal dumping is a neutral problem in the surrounding municipalities, considering neutral as a consolidation of partially agree,

partially disagree and impartial answers. Unfortunately, as some answers were not highlighted as mandatory, we only had seven and not eight replies for this question.

- II. The second question showed us that the pandemic has absolutely increased illegal dumping problems. Furthermore, this result indicates that the proliferation of medical waste and the intensification of single-use products and panic buying have increased production and consumption, hence thwarting efforts towards reducing plastic pollution. All of this has created a relatively unnoticed environmental catastrophe that is affecting all sizes of municipalities during these times.
- III. The third question indicates illegal dumping occurs mostly weekly. In contrast, the fourth question brings the information that in its majority, illegal dumping occurs on the side of the roads, having eight replies, and outside closed landfill gates/transfer stations with five answers. Note that illegal dumping occurs is a more common problem than it was thought, not exclusive to the Municipality of Dysart et al. Other illegal dumping sites are selected, such as illegal dumping in public litter bins/receptacles, private properties, and forested areas.
- IV. The fifth question presents the construction and demolition waste and household residual waste as the most common waste involved in illegal dumping in the neighbouring municipalities. The results for these two types of waste are far greater than other types of garbage available for selection in the survey.
- V. Then, in the sixth question, we find that tipping fees/costs of landfill use are the biggest complaints among residents. It seems that residents are sensitive to the fees they will spend on waste disposal. As can be seen in the sixth graph (see Appendix C), other responses such as complaints about confusion over how to sort waste, the availability of public garbage and recycling containers were also collected.

After that, most municipalities claim that the current illegal dumping by-law is neutrally effective in the seventh question. Finally, skipping to the last multiple question, the ninth one, additional public education campaigns are needed to inform short-term residents of waste management in the community to get around this situation.

In addition, some open questions were included to allow municipalities to respond more freely, including questions eight, ten and eleven. Information gathered include practices to inform communities, best practices to have applied to engage/educate short-term residents, and successful approaches at reducing illegal dumping in the community. The answers were quite varied, each municipality with its own points. So, we were able to compare with Dysart and

define what we can use. Some answers, such as media use for enforcement advertising, were highlighted for its most appearance.

10 Recommendations

10.1 Short-term Accommodations (STA) License Waste Management

As of May 2021, regulation of short-term accommodations (STAs), such as those offered by services like Airbnb, is being considered by Haliburton County Council after years of discussion at the lower-tier municipal level (Ingram, 2021). A licensing by-law is being proposed, similar to those already used in other parts of Ontario, like The Town of the Blue Mountains. Licensed property owners are required to provide a Property Management Plan, of which a portion outlines compliance with the waste collection by-laws (The Corporation of the Town of The Blue Mountains, 2013). Unlike Dysart et al, The Blue Mountains utilizes curbside collection in their waste management system. As such, the relevant regulations under this by-law remain fairly general, requiring STA owners to provide adequate measures of disposal (e.g. separate waste room, container, etc.) to their tenants. If Haliburton County decides to move forward in implementing a STA Licensing by-law, the waste management-related regulations should be tweaked to better suit the systems in their jurisdiction.

10.1.1 Transparency of Waste Disposal Methods in Airbnb Listings

Prior discussions with our client at Dysart et al suggested that illegal dumping incidents were more commonly reported during the summer: the peak season for cottage country and short-term visitors (J. Watson, personal communication, May, 2021). To better understand how well-informed of waste disposal short-term residents are prior to relocating, an analysis of current Airbnb listings in Dysart et al was conducted. Specifically, listings were analyzed to determine if STA owners disclose the self-hauling waste disposal that is required, before accepting any booking requests.

10.1.2 Methodology

A search for a weeklong stay in Dysart et al from July to September 2021 was conducted. It returned 247 listings. A sample of 50 listings (~20 per cent) was taken and analyzed. To eliminate any biases towards popular listings that are listed first in these search results, one out of every five listings were chosen for the sample. Once analyzed, the listings were sorted into the following categories:

- I. *No Mention*
- II. *Renter's Responsibility (e.g., "you must remove all garbage from the property before*

checkout”)

III. *Renter’s Responsibility + Additional Disposal Information Provided (e.g., directions to the closest landfill, temporary resident landfill pass provided, etc.)*

IV. *Landlord’s Responsibility*

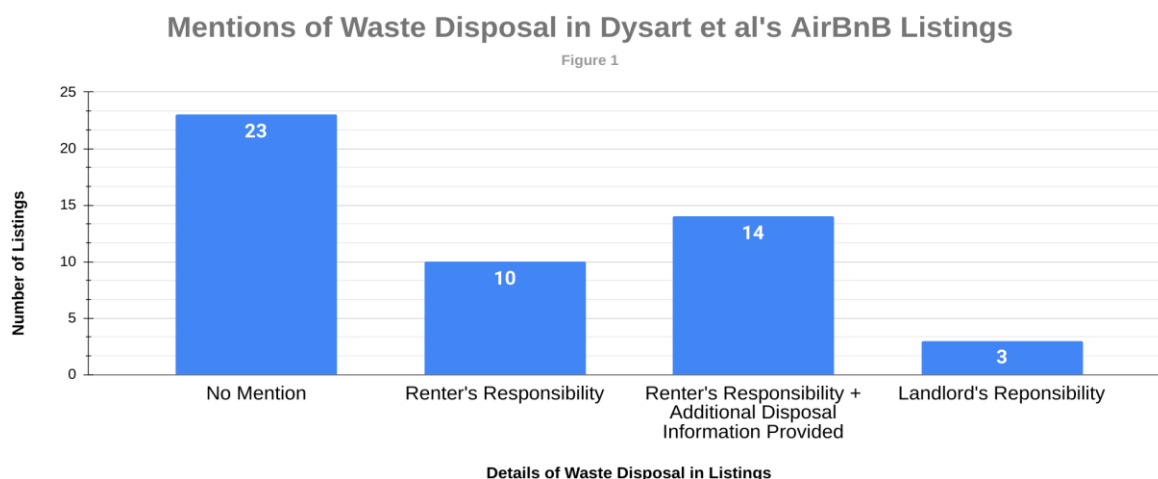


Figure 1. *Mentions of Waste Disposal in Dysart et al's AirbnB Listings*

Based on the results of the analysis depicted in **Figure 1**, 23 Airbnb listings — or nearly half of the sample — fail to make any mention of waste disposal. Ten listings informed the renter that they would be responsible for removing any waste from the property prior to checkout, but did not provide any further information. Conversely, 14 listings provided additional information, some going as far as providing the landfill access passes themselves, when noting that it was the renter’s responsibility to self-dispose of their waste. Finally, three listings either explicitly mentioned or inferred that the landlord would take responsibility for disposing of their renter’s waste.

There are additional points of interest that can be gleaned from this analysis. One of the listings analyzed indirectly mentioned illegal dumping, warning prospective tenants not to dispose of their waste on the sides of roads. This suggests that there have been prior mishaps with previous renters that resorted to illegally dumping. Five listings explicitly stated that landfill passes would be provided, removing that barrier of cost from the renter. It should be noted that the most common checkout time was determined to be 11 a.m. During the days that they operate, all Dysart et al landfills open no later than this time, eliminating any conflicts with checkout parameters as a potential issue (Municipality of Dysart et al, 2021).

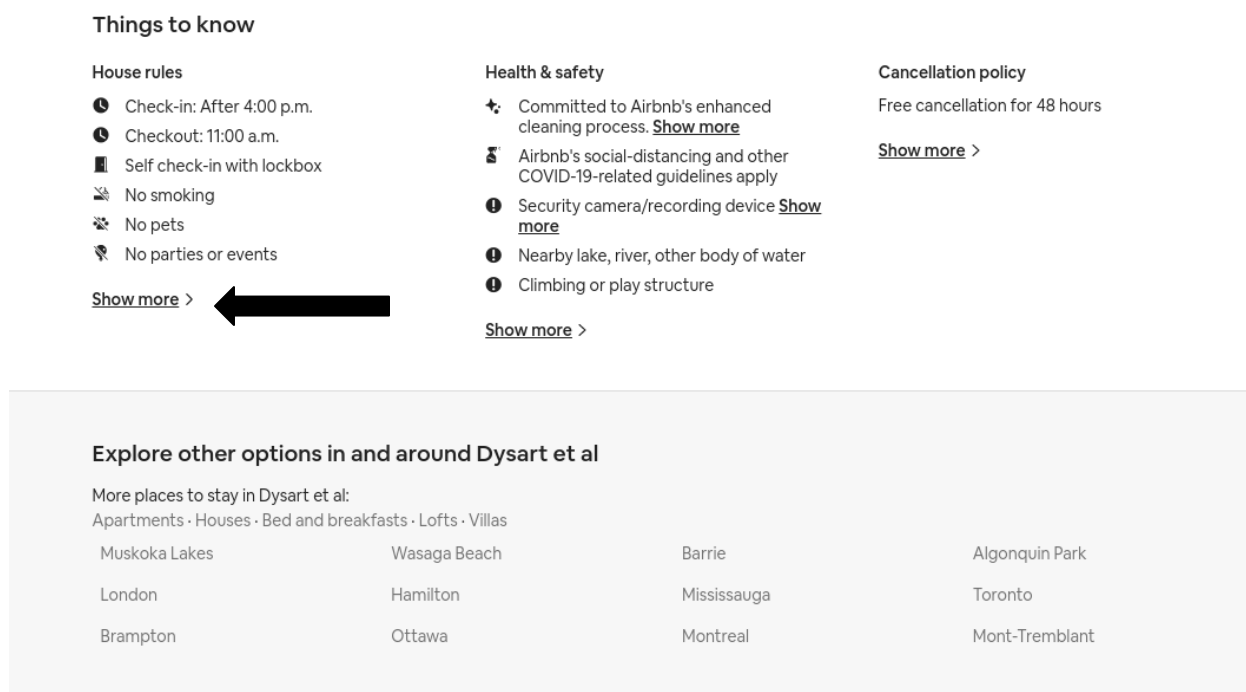


Figure 2. *Things to Know* is the last portion of Airbnb listings. The arrow indicates where most mentions of waste disposal are located. Source: airbnb.com

Of the 27 listings that did disclose the self-haul method for waste disposal, the majority were located in the last portion titled *Things to Know*. As seen in **Figure 2**, these mentions are notably absent due to the webpage layout, requiring additional interaction from the user. Although more than half of the listings sampled do mention waste disposal, it is likely that this information goes unnoticed due to web design choices made by Airbnb.

Based on this data, Haliburton County should implement clear and concise waste management regulations if the STA Licensing By-law is passed. For example, it should be mandatory for listings on Airbnb and similar platforms to be transparent about the county's self-hauled waste disposal. In addition, STA owners should be providing their renters with necessary items to dispose of their waste easily and properly, including landfill passes and clear waste bags. Or as suggested by some of the listings samples, the onus could be placed on the owners to manage their renter's waste. If short-term renters are given prior notice, the tools for proper and easy disposal, or removed of the responsibility completely, there may be less risk of improper waste disposal.

10.2 Data Collection

Another recommendation is data collection. As discussed earlier, the current literature

on the subject only reveal generic reasons for illegal dumping. By looking at reports from other parts of the world, only speculations can be made as to why illegal dumping is also happening in the Municipality of Dysart et al. To understand the cause specifically in Dysart and to create appropriate solutions, data collection about illegal dumping in Dysart is recommended. Such data may be beneficial in planning for the future illegal dumping approach. Three kinds of data collection are presented in this report that could meet the needs and means of the Municipality of Dysart et al.

First, data collection on a large scale is recommended by Dr. Lakhan. This method will require time, funding and resources; therefore this method should be taken as a reference at this point in time. Dr. Lakhan points out that “good data” is required to develop any effective policy and programs. Such data in case of illegal dumping includes the profile of illegal dumpers, the timing of illegal dumping incidents, a hot spot map to describe frequent incident areas, characterization of illegally dumped items, disposal costs and so forth. To collect good data, he recommends involving all stakeholders such as municipality, police, lake associations, business improvement area, community, and local NGOs so that resources and knowledge can be pooled together to conduct effective data collection. Pooled resources and knowledge are beneficial because a lack of certain resource and knowledge in one organization can be complemented by another organization. For example, the Municipality of Dysart et al may not be eligible to apply for grants, but NGOs may be eligible. NGOs may not have enough resource to go around town to record illegal dumping hot spot areas, but the police may already be aware those areas because they go around town as part their job. Municipal workers may be too busy to work on the characterization study of illegally dumped waste, but NGOs may be able to gather volunteers or students to do so. Working together across the key stakeholders will allow them to create more comprehensive illegal dumping program (Lakhan, 2014). Once all data is collected, they can proceed to forming illegal dumping solutions that are better suited for the Municipality of Dysart et al.

However, this method will take months and possibly years, and may not be feasible and realistic for the current situation at the Municipality of Dysart et al. Thus, the modified data collection is recommended in this paper. The modified data collection is a quick data collection to gain opinions from residents in the Municipality of Dysart et al.

Modified data collection is a general municipal feedback survey to the residents regarding the general services by the Municipality of Dysart et al. The survey questions can include any feedback for any departments at the Municipality of Dysart et al that they are

interested in gaining, which include waste management department feedback. The general feedback is recommended because it conveniently allows the Municipality to have feedback on any department while gaining opinions regarding the illegal dumping. The sample questions for the waste management department are listed below:

- I. Are you a permanent resident or seasonal resident?
- II. Did you know dumping waste on the side of the road was illegal?
- III. If you were to ever illegally dump your waste, what would deter you from doing so?
 - i. Clear signage
 - ii. Higher fine
 - iii. Better disposal accessibility
- IV. Which aspects of the waste management service are you satisfied/unsatisfied with?
 - i. Waste disposal cost – financial factor
 - ii. Distance – convenience factor
 - iii. Self-haul – convenience factor
 - iv. Landfill hour – convenience factor

These questions will provide insight of if the residents are aware of the illegality of illegal dumping, what may be causing the illegal dumping, and possible deterrence solutions. This survey can be conducted in-person at landfill sites by a landfill attendant or an educational campaign intern. An incentive can be offered to participate in the survey, including the chance to win a backyard composter or grocery store cards.

There are four pros and two cons to be considered when conducting an in-person general feedback survey at the landfill site. The first pro is that a general feedback survey provides the insight of not only the waste management service but also any other department that the Municipality of Dysart et al would like to hear about. It is a convenient way to receive feedback about the service in general and is a quick way to conduct a waste management survey compared to the thorough data collection proposed by Dr. Lakhan. Since the survey will be conducted at landfill sites, the survey is made accessible to residents as they can participate while they dispose of their waste. Finally, the in-person survey at landfill sites does not require a large amount of funding. It only requires a few people to conduct the survey, which can be even more cost-friendly if interns are designated to conduct the survey.

On the other hand, there are two cons to be addressed. The first issue is that the survey conducted at landfill sites may not attract illegal dumpers. This is mainly because people who come to landfill for waste disposal during the operation hours are less likely to be illegal

dumpers. Therefore, the result of the survey in the waste management section may be similar to the research finding presented earlier, the generic motivations of illegal dumping suggested by general public who are not illegal dumpers. In addition, surveying at landfill could cause traffic congestion. In-person surveys will stop each participant to explain the survey, which may take a few minutes longer than simply disposing the waste, thus it may cause traffic at the landfill site. The alternative method is an online survey, yet online survey may not be feasible considering the lack of adequate internet service in the region.

Lastly, another example of a survey to be presented in this report. If the Municipality of Dysart et al is interested in gaining more insight of waste management feedback yet does not have means or resources to do so, a waste management survey may be recommended. A good example of the waste management survey is the waste management survey conducted by the Township of Minden Hills. They have conducted an online survey to receive feedback about their waste management service in general. The survey was advertised on social media and local communication platforms such as email and newspaper. The survey was conducted online and there were 19 questions which took approximately seven minutes to complete. The survey was open for about one month, and they received 429 valid responses (Minden Hills Public Works, 2021). Some of the examples of questions are listed below. The full list of questions is listed in the Appendix in this report (see Appendix B).

- I. Are you a permanent or seasonal resident?
- II. Which landfills site do you use the most?
- III. Which waste management program have you used? (Blue box, scrap metal, construction waste disposal, plastic disposal, electronics, etc.)
- IV. How do you find information about waste disposal? (MH website, tax bill newsletter, newspaper, word of mouth, ask site attendant, radio, etc.)
- V. How would you like to find out the information (website, newsletter, tax bill etc.)
- VI. Landfill hour convenience (Minden Hills Public Works, 2021).

The waste management feedback provides not only a better understanding of the illegal dumping issue in the region, but also provides insight on what educational campaign or approach works the best in the community. The online survey may understandably be difficult to implement at the Municipality of Dysart et al, but it is an easy and cost-friendly alternative to conduct a survey.

A cost-effective public educational campaign can be achieved by using an existing service offered by local organizations in the area such as the Repair Café operated by SIRCH

Community Services. This program allows experts to teach attendees how to repair broken items they bring in such as furniture and appliances (SIRCH Community Services, 2021). SIRCH's website contains a detailed list that outlines the acceptable materials patrons can bring in. However, this list currently does not include large furniture and bulky appliances.

It is recommended that Dysart propose an amendment to SIRCH's existing acceptance criteria, which would effectively allow the admittance of these omitted items to their Repair Café program in order to hold a reupholstery or restoration workshop for at least one session per month. Through experiential learning, workshops of this nature impart valuable knowledge to the public as it allows participants to give new life to old and unwanted items that would otherwise be improperly discarded in non-designated areas. SIRCH Community Services may opt to charge an admission fee to conduct this type of workshop in order to retain the financial sustainability of the Repair Café's operations.

10.5 Signage with Call to Action

Another approach is through advertising that appeals to the emotions of the residents and short-term renters of Dysart. For example, effective advertising could include signage with a persuasive call to action, paired with images of local species at risk, such as the Canada warbler, the Olive-sided flycatcher, and the Blanding's turtle.

This approach of appealing to people's emotions also holds educational value as it allows the public to be enlightened about the species that are (or would be) affected by illegal dumping. Haliburton County's natural systems attract rare species and wildlife that is native to Ontario. Some of these animals are susceptible to the direct environmental impacts of illegal dumping as they are not always capable of discerning the difference between garbage or food. Hence, these creatures tend to ingest garbage and they can also get entangled in plastic.

In order to increase the efficacy of this approach, this type of signage must be posted within hotspots that experience a great deal of illegal dumping. Attaching signage to a message board at municipal facilities, parks, and boat launches or entrances of trails would also be beneficial.

10.6 Rental Advertisement

We are very familiar with the saying that "a picture speaks a thousand words." Images are far more memorable than spoken word or written text. Considering that, the group concluded that although property owners may not be directly involved in the physical aspect of waste disposal, the problems that short term renters impart affect the community and its residents on a systematic level. Therefore, it needs to be recognized that due to the additional

pressures that continue to hamper the area's waste management, it must require property owners to be part of the solution.

Thus, one approach to this can be an aesthetically pleasing poster placed in short-term rental properties to promote accurate and precise information on waste management in Dysart (see Appendix D). The environmental poster illustrates the benefits of recycling and how it contributes to community and the environment. The colourful and educational poster is designed to help bring awareness to teens and adults about environmental issues. The signs are illustrated with cartoon images and humour, but these posters contain more advanced vocabulary, unlike the 'kids' version. The file with the poster document would be available on Dysart's website and can be printed and placed in a frame that becomes a part of the decoration of the place to be rented. It is affordable, visible, and gives credibility if it follows a pattern. The sign must then be posted in a unit's common area with the most foot traffic, such as at the dining room, kitchen, or above the garbage bin, to influence customers' subconscious responses more effectively, bringing a local impact. The rental owner can choose more than one poster.

It is good to remember that the poster is not only a recycling guide. The Municipality's waste collection guidelines outline will be used, such as locations, cost, bags, material, days, and time. While being implemented, it will sustain a guide for the generated waste at the rental property, building at their initiative and cost. We created some examples and would be released an informative flyer about all the alternatives that will be taken. The idea is for these newsletters to circulate together with tax letters every year.

11 Conclusion

Illegal dumping is an issue that affects most municipalities, including the Municipality of Dysart et al. Anecdotal records suggest that permanent residents, seasonal residents, and short-term renters engage in the act of illegal dumping.

The motivation and behaviors behind the illegal dumping may be attributed to the lack of awareness about the illegality of illegal dumping, yet there is no definitive proof of as such. By exploring the psychology of illegal dumping, it was found that individuals who partake in the act tend to blame others for their own actions. However, It should be noted that the definitive behavioral and psychological motivation for illegal dumping remains unclear.

Additionally, socioeconomic issues may drive individuals to partake in illegal dumping, as does the perceived entitlement to municipal waste management programs and disposal sites.

Dysart has recently implemented a waste management by-law that addresses illegal dumping, including fines, one-time landfill passes for short-term renters, and an online form for reporting illegal dumping activities. To supplement this new by-law, Dysart uses social media to educate the public about illegal dumping and its associated issues.

To further prevent the instances of illegal dumping, this report recommends Dysart to implement robust data collection, a reuse/repair workshop in partnership with SIRCH Community Services, signage at illegal dumping hotspots, and promotional materials at short term rentals. In addition, this report recommends Dysart and the County of Haliburton implement a short-term accommodations license that directs property owners to include relevant waste management information in bookings and on-property.

References

- Abel, D. (2014, January). *Perceptions On Illegal Dumping In The Ethekwini Municipality*. In the Faculty of Natural and Agricultural Sciences Centre for Environmental Management University of Free State Bloemfontein.
<https://scholar.ufs.ac.za/bitstream/handle/11660/633/AbelDJ.pdf?sequence=1&isAllowed=y>
- All Ontario Info. (2013, May 23). *Ontario Municipal Bylaws*. Retrieved from allontario.ca:
<https://allontario.ca/municipal-by-laws-in-ontario/>
- Ann, S. (2019, July 18). *The Psychology Behind Littering*. Paul's Rubbish Removal.
<https://www.paulsrubbish.com.au/psychology-behind-littering/>
- Arike, M., & Desrosiers, M. (2014). *Wild About Nature: Discover and Celebrate the Highlands' Natural Heritage*. Haliburton; Haliburton Highlands Land Trust. Retrieved from:
<https://www.haliburtonlandtrust.ca/wp-content/uploads/2014/10/H14-804-HHLT-WAN-Magazine-2014.pdf>
- BBC East Midlands. (2018, November 15). *Plastic pollution: Deer died after plastic bag got stuck*. BBC News. <http://www.bbc.com/news/uk-england-nottinghamshire-46222392>.
- Brandt, A. A. (n.d.). *Illegal Dumping as an Indicator for Community Social Disorganization and Crime*. <https://doi.org/10.31979/etd.9hq7-yrq>
- City of Mississauga. (2021). *Report litter or dumping*. Retrieved from
<https://www.mississauga.ca>: <https://www.mississauga.ca/services-and-programs/home-and-yard/report-litter-or-dumping/>
- Collins. (2021). *Definition of 'bylaw'*. Retrieved from www.collinsdictionary.com:
<https://www.collinsdictionary.com/dictionary/english/bylaw>
- Comeford, E., Durante, J., & Goldsworthy, R. (2015, May). *Understanding Kerbside Dumping Behaviour in Brisbane*. The State of Queensland (Department of Science, Information Technology and Innovation).
https://www.qld.gov.au/__data/assets/pdf_file/0024/68307/report-kerbside-dumping.pdf
- Cowee, M., & Curtis, K. (2011). *Resident Perceptions of Illegal Dumping In Northern Nevada*. Extension | University of Nevada, Reno.
<https://extension.unr.edu/publication.aspx?PubID=2971>
- Department of the Environment, Climate and Communications. (2020, April 22). *Funding ringfenced to tackle illegal dumping during COVID-19*. Government of Ireland.

- <http://www.gov.ie/en/press-release/46f2f8-funding-ringfenced-to-tackle-illegal-dumping-during-covid-19/>.
- Duh, D., Hasic, S., & Buzan, E. (2017). The impact of illegal waste sites on a transmission of zoonotic viruses. *Virology Journal*, 14(1). <https://doi.org/10.1186/s12985-017-0798-1>
- Durham Region. (2021). *Person tossing trash from a vehicle*. Retrieved from <https://www.durham.ca: https://www.durham.ca/en/regional-government/illegal-dumping.aspx>
- Dysart et al. (2019). *Report Illegal Dumping*. Retrieved from <https://forms.dysartetel.ca: https://forms.dysartetel.ca/Public-Works/Report-Illegal-Dumping>
- Fleming College's Sustainable Waste Management Program. (2020). Plastic Waste & Litter Reduction: Municipality of Dysart et al. <https://database.ulinks.ca/files/original/21c2bee5e4f172dc42eedd4bee6ed2ff.docx>.
- Fortune Park Hotels Limited. (2021). SWACHH BHARAT ABHIYAN. Retrieved from www.fortunehotels.in: https://www.fortunehotels.in/swachh-bharat-abhiyan
- Government of Ontario. (2016, June 16). *Forest Fires*. Government of Ontario. <http://www.ontario.ca/page/forest-fires#section-8>.
- Government of Canada. (2021, February 16). *Canadian Geographical Names Database (CGNDB)*. Retrieved from www4.rncan.gc.ca: http://www4.rncan.gc.ca/search-place-names/unique.php?id=FELOV&output=xml
- Haliburton Highlands Land Trust. (n.d.). Species at Risk. Haliburton Highlands Land Trust. <https://www.haliburtonlandtrust.ca/wildlife/species-at-risk/#OSF>.
- Hamilton. (2020). *Illegal Dumping*. Retrieved from <https://www.hamilton.ca: https://www.hamilton.ca/garbage-recycling/garbage-bulk-items/illegal-dumping>
- Hasting Highlands. (N.D.). *Hasting Highlands Complain Form*. Retrieved from <https://hastingshighlands.ca: https://hastingshighlands.ca/wp-content/uploads/2020/04/HH-Complaint-Form-1.pdf>
- Institute for Local Government Administration and Rural Development (2005). Project Green Sweep: Environmental, Health, and Economic Effects of Illegal Dumping. Retrieved from <http://pulse.pharmacy.arizona.edu/resources/EffectsofDumping.pdf>
- India News. (2018). 1 lakh km of road built using plastic waste, govt aims to double it. Retrieved from www.hindustantimes.com: https://www.hindustantimes.com/india-news/1-lakh-km-of-road-built-using-plastic-waste-govt-aims-to-double-it/story-iwmkiKjIG86BYIDlg2aLtM.html

- Kaza, S., Yao, L. C., Bhada-Tata, P., & Van Woerden, F. (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. *Urban Development*.
<https://doi.org/10.1596/978-1-4648-1329-0>
- Lakhan. C, (2015), "Evaluating the effect of unit based waste disposal schemes on collection of household recyclables in Ontario, Canada", *Resources Conservation and Recycling* 2015a, 95(2)
- Lakhan. C & Adjei. N (April, 2021) "Best Practices In Addressing Illegal Dumping Of Durable Waste – A Guide For Policy Makers" Faculty of Environmental and Urban Change, York University
- Lemieux, T., Milligan, K., Schirle, T., & Skuterud, M. (2020). Initial Impacts of the COVID-19 Pandemic on the Canadian Labour Market. *Canadian Public Policy*, 46(s1).
<https://doi.org/10.3138/cpp.2020-049>
- Martin-Robbins, K. (2021, April 22). 'Everyone should be embarrassed': Illegal dumping on the rise in Caledon amid COVID-19 pandemic. *The Toronto Star*.
<http://www.thestar.com/local-caledon/news/2021/04/22/everyone-should-be-embarrassed-illegal-dumping-on-the-rise-in-caledon-amid-covid-19-pandemic.html>.
- Matsumoto, S., & Takeuchi, K. (2011). The effect of community characteristics on the frequency of illegal dumping. *Environmental Economics and Policy Studies*, 13(3), 177–193.
<https://doi.org/10.1007/s10018-011-0011-5>
- Minden Hills Public Works. (2021, February 11). Waste Services Survey: Summary of Results. Minden Hills; Township of Minden Hills.
- Ministry of Municipal Affairs and Housing. (2021, May 11). *List of Ontario municipalities*. Retrieved from www.ontario.ca: <https://www.ontario.ca/page/list-ontario-municipalities>
- Ministry of the Environment, Conservation and Parks. (2019, August 19). *Illegal waste dumping*. Retrieved from www.ontario.ca: <https://www.ontario.ca/page/illegal-waste-dumping>
- Ministry of the Environment, Conservation and Parks. (2019). *Illegal waste dumping*. Retrieved from <https://www.ontario.ca>: <https://www.ontario.ca/page/illegal-waste-dumping>
- Municipality of Dysart et al. (2019). *Report Illegal Dumping*. Retrieved from forms.dysartetal.ca: <https://forms.dysartetal.ca/Public-Works/Report-Illegal-Dumping>
- Municipality of Dysart et al. (2021, April 27). *By-law 2021-29 to Govern the Management of Waste*. Retrieved from: <https://dysartetal.civicweb.net/document/389109/By-law%202021->

29%20to%20Govern%20the%20Management%20of%20Wast.pdf?handle=9A1B910B67B94789A0E444151AB660DE

Municipality of Dysart et al. (2021, April 27). *Committee of the Whole*. Retrieved from dysartetal.civicweb.net: <https://dysartetal.civicweb.net/document/388404/Draft%20By-law%202021-XX%20to%20Govern%20the%20Management%20o.pdf?handle=B7C1BAE2ACDA4341ADD7C10974208B74>

Municipality of Dysart et al. (2021). *Landfills*. Municipality of Dysart et al. <https://www.dysartetal.ca/en/living-in-our-community/landfills.aspx>.

Municipality of Hastings Highlands. (n.d.). *Waste management and disposal* <https://hastingshighlands.ca/services/waste-disposal-recyclable/>

Municipal Waste Association. (2012). *Member inquiry: Illegal dumping at gates*. <https://municipalwaste.ca/wp-content/uploads/2021/01/illegal-dumping-at-gates-Member-inquiry-results.pdf>

Municipal Waste Association. (2014). *Member's inquiry - Illegal dumping at gates*. <https://municipalwaste.ca/wp-content/uploads/2021/05/Members-Inquiry.-Illegal-dumping-Oct-15-2014-1.pdf>

National Informics Centre. (2021, 06 27). Swachh Bharat PinBoard. Retrieved from [swachhbharat.mygov.in: https://swachhbharat.mygov.in/](https://swachhbharat.mygov.in/)

National Center for Immunization and Respiratory Diseases. (2019, February 28). *Tetanus - Causes and Transmission*. Centers for Disease Control and Prevention. <http://www.cdc.gov/tetanus/about/causes-transmission.html>.

New South Wales Environment Protection Authority. (2015, July). *Illegal Dumping Research Report*. State of NSW, Environment Protection Authority. <https://www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/illegaldumping/150481-illegal-dumping-report.ashx>.

NSW Environment Protection Authority (EPA). (2020, July). *Illegal dumping research report Summary*. <https://www.epa.nsw.gov.au/~media/epa/corporate-site/resources/illegaldumping/ipsos-summary-report-illegal-dumping-research-2019.pdf?la=en&hash=3AB8265BD270F1C8BC1B0C76F2553A897B2FBE9B>

NSW Environment Protection Authority (EPA). (2015, July). *Illegal Dumping Research Report*. <https://www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/illegaldumping/150481-illegal-dumping-report.ashx>

- Niagara region. (2021). *Illegal Dumping in Niagara*. Retrieved from <https://www.niagararegion.ca:https://www.niagararegion.ca/waste/contact/dumping/default.aspx>
- Norwell, J. (2016, November 23). *Trash dumping forces Kamloops to close Ord Road recycling depot* | CBC News. CBC News. <http://www.cbc.ca/news/canada/british-columbia/kamloops-city-council-closing-ord-road-depot-1.3863918>.
- Ovcharovich, R. (2020, September 2). *Take Precautions as West Nile Virus Detected in Area*. Haliburton, Kawartha, Pine Ridge District Health Unit. http://www.hkpr.on.ca/news_items/take-precautions-as-west-nile-virus-detected-in-area/.
- Public Health Ontario. (2019, May 1). *Lyme disease*. Public Health Ontario. <http://www.publichealthontario.ca/en/diseases-and-conditions/infectious-diseases/vector-borne-zoonotic-diseases/lyme-disease>.
- Public Health Ontario. (2020, July 8). *West Nile Virus Surveillance*. Public Health Ontario. <http://www.publichealthontario.ca/en/data-and-analysis/infectious-disease/west-nile-virus>
- Queens's Library. (2004, April). *Description Of Data Attributes Provided By*. Retrieved from <https://library.queensu.ca/webdoc/maps/guides/ontario%20municipal%202004.pdf:library.queensu.ca>
- Recycling Council of British Columbia. (2017, April). *Illegal Dumping in BC*. Recycling Council of British Columbia. Retrieved from https://www.rcbccconference.ca/uploads/3/8/4/1/38412063/rcbc2017_factsheetillegaldumping.pdf
- Recycling Council of British Columbia. (2017, October). *Illegal Dumping in BC: An Overview*. Vancouver; Recycling Council of British Columbia.
- SIRCH Community Services. (2021, February 22). *SIRCH Repair Café*. SIRCH Community Services. <https://www.SIRCH.on.ca/repaircafe/>.
- Statistics Canada. (2017, November 29). *Census Profile, 2016 Census Haliburton, County [Census division], Ontario and Ontario [Province]*. Statistics Canada. <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CD&Code1=3546&Geo2=PR&Code2=35&SearchText=haliburton&SearchType=Begins&SearchPR=01&B1=All&TABID=1&type=0>.
- Swachh Bharat PinBoard. Retrieved from [swachhbharat.mygov.in:https://swachhbharat.mygov.in/](https://swachhbharat.mygov.in/)

- The Corporation of the Municipality of Grey Highlands. (2020, February 5). *By-law No. 2019-071*. Retrieved from greyhighlands.civicweb.net:
<https://greyhighlands.civicweb.net/document/206312>
- The Corporation of the Township Of King. (2016, May 30). *The Corporation of the Township Of King*. Retrieved from king.civicweb.net: <https://king.civicweb.net/document/65470>
- The Cuyahoga Soil & Water Conservation District. (n.d.). *Illegal Dumping - A Serious Issue*. Retrieved from www.cuyahogawcd.org:
<https://www.cuyahogawcd.org/files/assets/illegaldumping-aseriousissue.pdf>
- Thuncher, J. (2020). *Illegal dumping not just an eyesore*. Squamish Chief.
<http://www.squamishchief.com/local-news/illegal-dumping-not-just-an-eyesore-3346053>.
- The Municipality of Hastings Highlands. (2018, June 20). *The Corporation of the Municipality Of Hastings Highlands*. Retrieved from hastingshighlands.ca:
https://hastingshighlands.ca/wp-content/uploads/2019/07/2018-074.Clean_.Municipality.pdf
- The News Minute. (2017, November 30). Unpaid and undervalued, how India's waste pickers fight apathy to keep our cities clean. Retrieved from www.thenewsminute.com:
<https://www.thenewsminute.com/article/oppressed-and-unrecognised-life-waste-pickers-crucial-india-s-sanitation-72426>
- Township of Algonquin Highlands. (n.d.). *Garbage & recycling*.
<https://www.algonquinhighlands.ca/garbage-recycling.php>
- Tsukiji, M., Gamaralalage, P. J. D., Pratomo, I. S. Y., Onogawa, K., Alverson, K., Honda, S., Ternald, D., Dilley, M., Fujioka, J., & Condorini, D. (2020). *Waste Management during the COVID-19 Pandemic From Response to Recovery*. Osaka; United Nations Environmental Programme.
- U.S. EPA Region 5. (1998, March). *Illegal Dumping Prevention Guidebook*. Chicago; United States Environmental Protection Agency.
- United States Consumer Product Safety Commission. (1956, August 2). *Refrigerator Safety Act*. Bethesda; CPSC.
- Watkiss, U. S. (2020, August 25). *Toronto Municipal Code*. Retrieved from www.toronto.ca:
https://www.toronto.ca/legdocs/municode/1184_548.pdf

Ybarra, V. (2016, November 22). *Kamloops council votes to close Ord Road Recycling Depot*. CFJC Today . <https://cfjctoday.com/2016/11/23/kamloops-council-votes-to-close-ord-road-recycling-depot/>.

|

Appendix A



Figure 1

Promotion and Education Poster from the Municipality of Hastings Highlands

Note. Poster explaining the impact of and how to report illegal dumping in the Municipality of Hastings Highlands (Municipality of Hastings Highlands, n.d.).

Appendix B

List of municipalities contacted to complete the municipal survey:

- Algonquin Highlands
- City of Kawartha Lakes
- Greenstone
- Grey Highlands
- Hastings Highlands
- Highland East
- Lanark Highlands
- Laurentian Hills
- Madawaska Valley
- Marmora and Lake
- Minden Hills
- Moonbeam
- Morris-Turnberry
- North Bay
- Northern Bruce Peninsula
- Red Lake
- Regional Municipality of Niagara
- Regional Municipality of Peel
- South Bruce
- Trent Lakes
- Tweed

The Township of Minden Hill Survey Questions:

1. Are you a permanent or seasonal resident, or a business?
2. If you are a permanent resident, how long have you lived here?
3. If you are a seasonal resident, do you plan to turn your cottage into a permanent home?
4. If you have recently moved to this region, what were the reasons to move here?
5. Which waste facility do you use most frequently?
6. How often do you attend a waste facility?
7. How many bags of waste does your household generate each week?
8. Have you used any of the waste diversion programs? (Blue box, scrap metal, construction waste disposal, plastic disposal, electronics, etc)

9. Which disposal alternative have you used in the last year? (deposit return, donation to thrift store, give away, clothing drop off bins, selling online/classifieds, self-haul scrap metal, bottle divers, electronics drives, roadside scrap metal)
10. How do you find information about waste services? (MH website, tax bill newsletter, newspaper, word of mouth, ask site attendant, radio, MH Facebook, roadside signs, other's social media, other, call the township, speak to councilor, MH Twitter)
11. Would you benefit from another outreach model? (annual guide, information with tax bill, mobile phone app, info boards, increased social media, increased newspaper, flyers, others)
12. How do you feel about the hours of operation?
13. What is the most important part of the waste disposal experience?
14. Please grade Minden Hill's performance on each of the experience criteria. Score 1 if the performance was unacceptable, and score 5 if the performance was excellent.
 - a. Rules are easy to understand
 - b. Trip is quick
 - c. Access to diversion programs
 - d. Site is clean and organized
 - e. Hours are plentiful
 - f. Staff are friendly and helpful
 - g. Disposal is low cost
15. Prioritize the area of focus for the next 5-year planning window.
 - a. ☐ Increase waste reduction efforts
 - b. ☐ Increase recycling efforts
 - c. ☐ Seek alternatives to landfill
 - d. ☐ Increase convenience
 - e. ☐ Increase education efforts
 - f. ☐ Reduce costs
 - g. ☐ Improve facilities
16. Is your business based in Minden Hills?
17. How many bags of garbage does your business generate each week?
18. How do you get your garbage to a waste site?
19. Are there any suggestions?

(Minden Hills Public Works, 2021)

1. Illegal dumping is a problem in my community

2. The COVID19 pandemic has led to an increase of illegal dumping incidents

3. How often does illegal dumping happen in your community?

4. Illegal dumping mostly occurs

5. The composition of illegally dumped waste is mostly

6. Resident complaints are often in regards to... (select all that apply)

Figure 1
Questions from 1 to 6

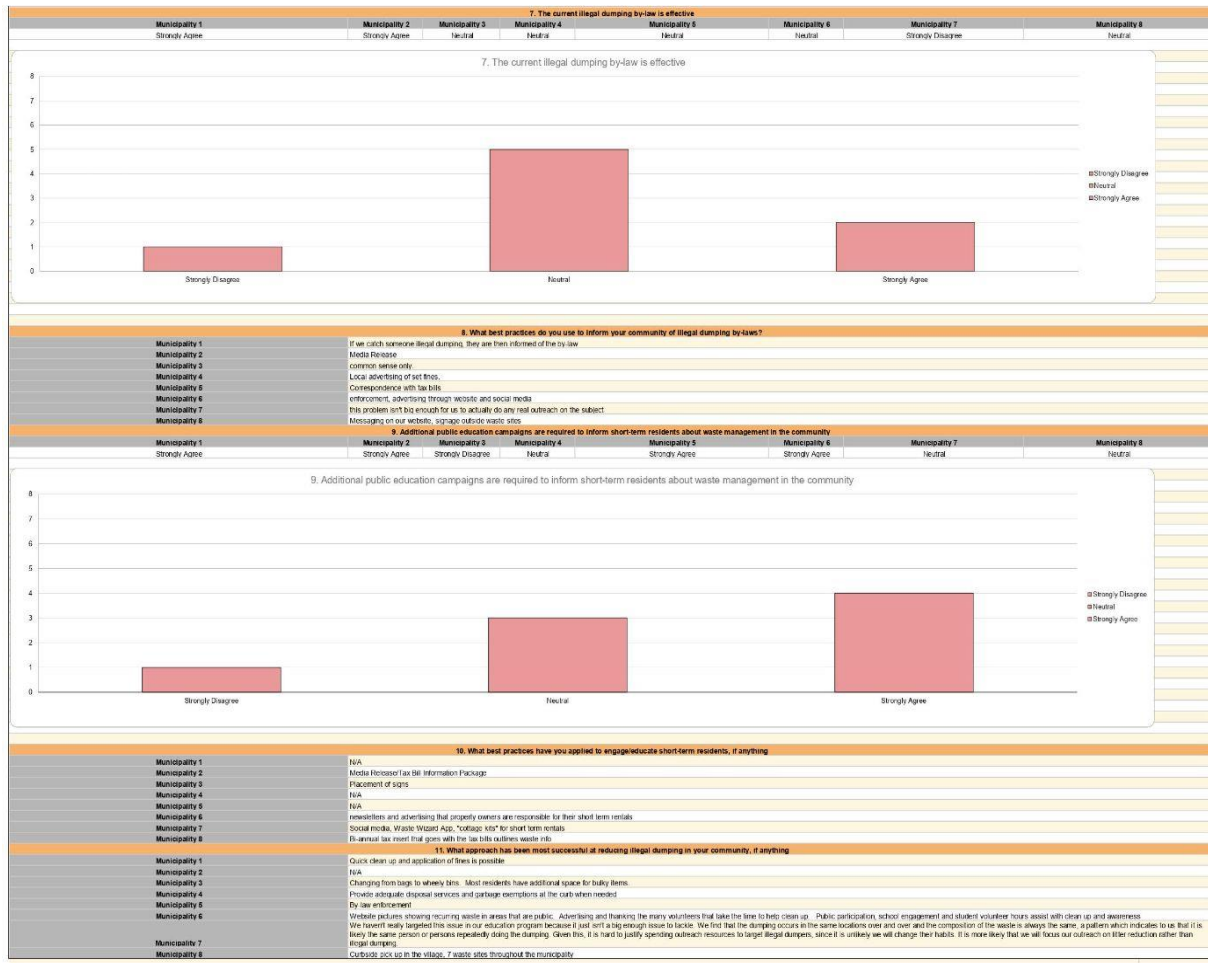


Figure 2
Questions from 7 to 11

Full Spreadsheet: [Answers](#)

Appendix D

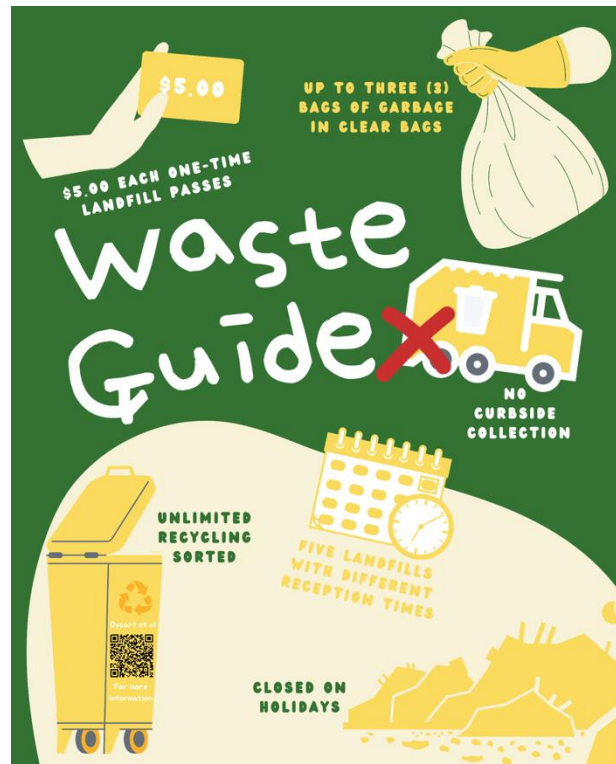


Figure 1

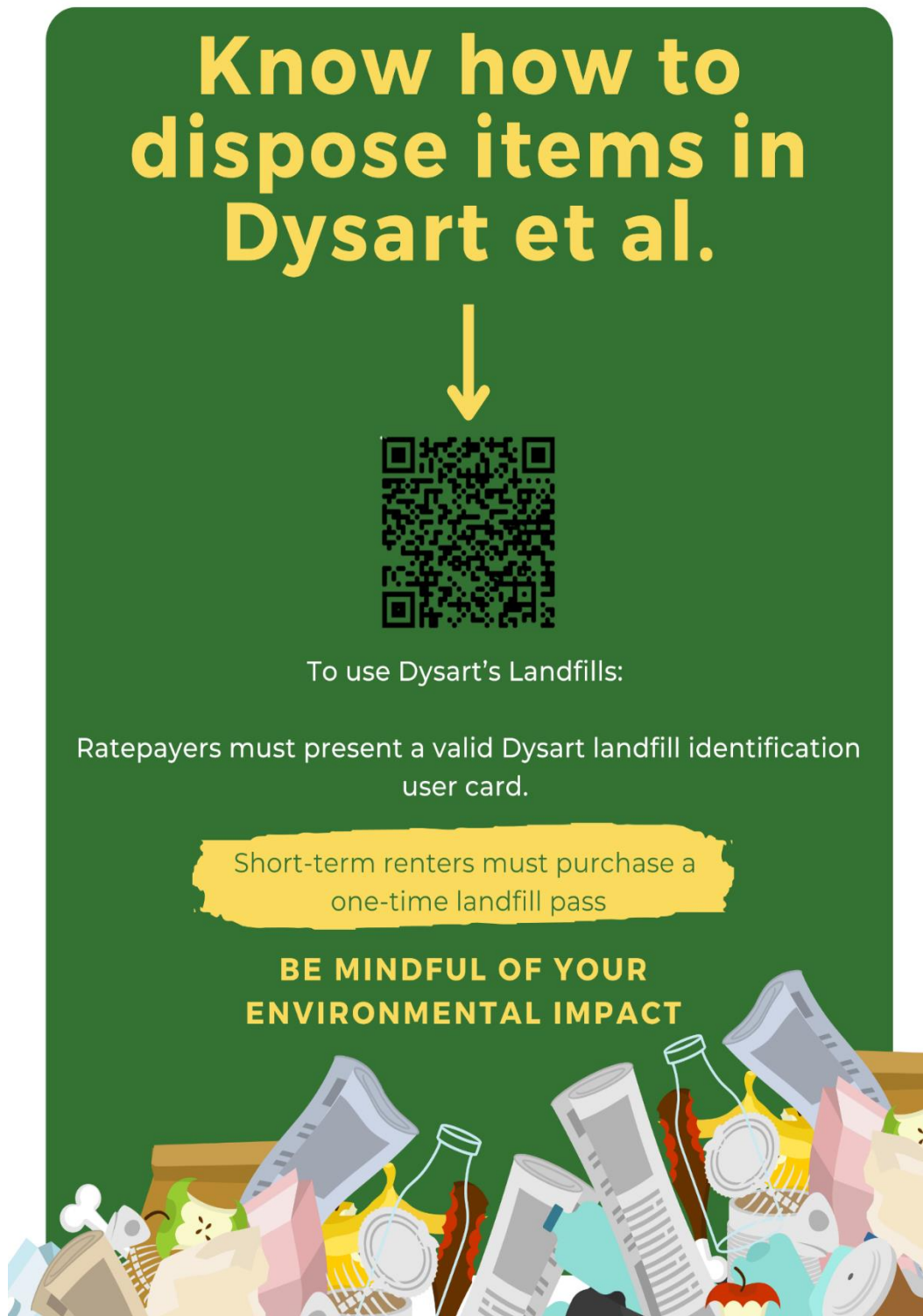


Figure 2
Poster



Figure 3
Poster