SOLID WASTE MANAGEMENT:
ILLEGAL DUMPING MITIGATION STRATEGY

Prepared by:
Land Forest People Consulting Ltd.
1076 Verdier Avenue
Brentwood Bay, BC V8M 1E6

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Land Forest People wishes to thank Lower Nicola Indian Band for the opportunity to be of service. We acknowledge the contributions made to this project by:

- The staff of Lower Nicola Indian Band
- The First Nations Land Management Resource Centre

Executive Summary

This report is a product of the second phase in LNIB solid waste management planning that began in early 2019. At the outset of the project, LNIB identified the elimination of inappropriate dumping as one of the project goals. Initial recommendations in 2019 include implementing low- and no-cost educational resources that encourage residents to use existing recycling programs for many household items that are being illegally dumped. This report is the result of further investigation into possible strategies that LNIB might employ to combat illegal dumping at known sites on their land.

We examined seven distinct known illegal dumping sites on LNIB land. The environmental site assessment process designates them as, areas of potential concern (APECs). A number of smaller undesignated dumping sites occur in close proximity to those APEC sites, and where it makes sense to do so, we include them in this assessment.

We have attempted to understand the range of physical and social factors that contribute to an individual's decision to engage in illegal dumping which we discuss in section 3.0. In section 4.0 we survey different strategies to combat illegal dumping, some of which were of particular interest to LNIB, and some of which are taken from a survey of best practices. We looked specifically at trail cameras, security gates and other physical barriers, and the use of other tools such as lighting and signage, as potential strategies that LNIB might employ. We did not look at legislation as a tool to combat illegal dumping as that is being developed by LNIB as part of another project. The seven known dump sites we investigated are:

- APEC 5 Mamit Lake Road 4 Mile Dump;
- AEPC 6 Buried Dump 1 Mamit Lake Branch Road South[1];
- APEC 7 Buried Dump 2 Mamit Lake Branch Road North;
- APEC 4 Lot 11 Dump Site;
- APEC 1 Lot 9 Residential Dump;
- APEC 3 Lot 6 Residential Dump; and
- APEC 21 Nicola River Dump.

Finally, we make the following recommendations to combat illegal dumping on LNIB land:

- Install three gates or four gates and locks, plus one additional lock;
- Install sufficient trail cameras at individual sites, plus one series of cameras;
- Install conspicuous signage at all known dump sites;
- Implement a reporting mechanism, and develop appropriate messaging;
- Continue to offer or promote strategies that enable people to avoid illegal dumping; and

[1] Note that Mamit Lake Branch Road South and Mamit Lake Branch Road North have been previously misidentified in other studies and reports as Mamit Lake Ranch Road South and Mamit Lake Ranch Road North.

- Engage individuals with land interests in Joeyaska IR 2 to determine strategies to combat illegal dumping on those sites.

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1.0 INTRODUCTION

Illegal dumping is a significant issue for all communities across British Columbia, but can be particularly so for First Nations. Illegal dumping contributes to social stigma, and has negative effects on property values, public health and safety, and peoples' recreation and enjoyment of natural spaces. It also creates significant burdens on the authorities that must deal with the problem, in terms of the financial costs and the provision of staff time and other resources associated with cleanup and prevention. The potential for environmental damage and contamination from illegal dumping are serious concerns.

First Nations are uniquely challenged by illegal dumping, owing mainly to the problematic environmental management provisions of the *Indian Act*. In those First Nations communities where land management is governed by the Act, a summary conviction is required before a penalty can be imposed or a cleanup order issued. Because of this and other factors, the penalties themselves – a $100 fine, 3 months in prison, or both – are unlikely to discourage people from participating in the practice. The federal government is responsible for surveillance and enforcement of waste disposal through a project-based permit system. According to a 2009 report by the Auditor General, INAC "neither promotes nor conducts significant surveillance on reserves to look for illegal dump sites … and is not equipped to monitor compliance, conduct inspections, or enforce the regulations.".

The Lower Nicola Indian Band (LNIB) is a signatory to the *Framework Agreement on First Nations Land Management*, and as such has resumed control and governance of its reserve lands and resources. One task associated with this step is to enact LNIB legislation to replace those sections of the *Indian Act* that govern land management. LNIB is currently developing legislation to address illegal dumping on LNIB lands.

LNIB is faced with the issue of managing and preventing widespread illegal dumping of waste on LNIB lands. In 2019, a study of solid waste management on LNIB land was undertaken, in part to better understand this issue. Two recommendations regarding illegal dumping may be found in that document, each meant to contribute to addressing the issue on a different timeline. It was advised that in the short-term LNIB implement low- or no-cost educational resources regarding inappropriate dumping. The rationale was that educating community members on the full range of items that are accepted at local waste facilities at no cost should increase their participation and compliance in those programs, thereby reducing illegal dumping that is motivated by a lack of awareness of those programs, or false assumptions about their cost.

Further, LNIB were advised to investigate the feasibility of implementing new strategies or programs to combat inappropriate dumping, such as physical barriers, surveillance, signage, and legislative tools. This report is in response to this recommendation, and is an examination of the cost, utility, maintenance, and other relevant considerations of employing various tools to combat inappropriate dumping on LNIB lands.

2.0 METHODOLOGY

We visited three known dump sites on LNIB land on March 3, 2020. Due to inaccessibility at that time of year we were unable to visit the remaining known, however LNIB staff did visit them in the summer of 2019.

Through discussions, research on potential tools, and touring the sites, we attempt to understand the physical characteristics of each site and the potential opportunities and constraints associated with the different mitigation strategies. Given that LNIB are developing legislation that will enable more effective enforcement in conjunction with this report, this report does not investigate legislative tools.

We looked at strategies to combat illegal dumping at seven main sites, an overview map of which is shown below in Figure 1. There are also a number of small sites across LNIB lands that have not been formally identified. Where possible, we have attempted to address these sites as well, particularly when they occur in close proximity to any of the main sites.

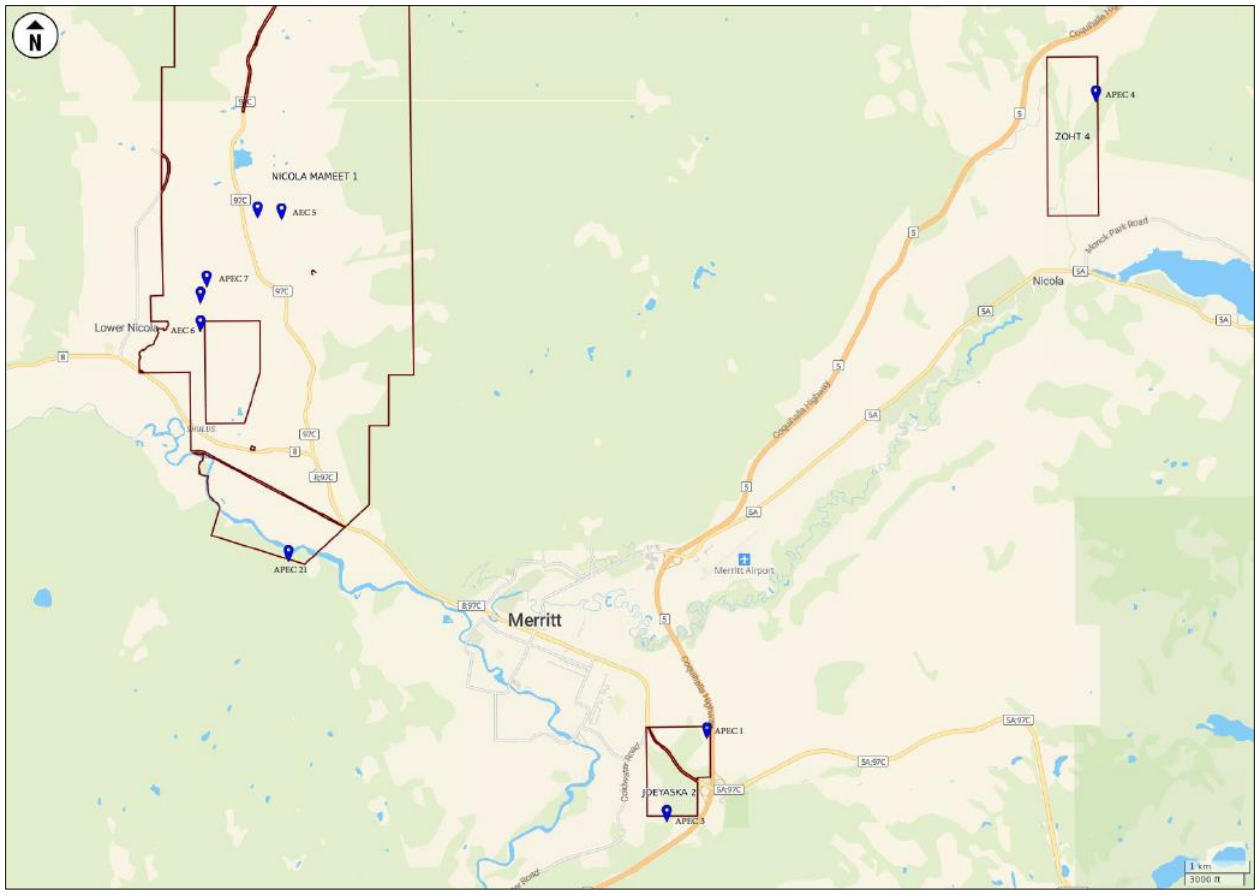


Figure 1 – Overview of LNIB illegal dump sites

On March 3, 2020 we visited the three sites listed below and referred to in Figure 2:

- APEC 5 Mamit Lake Road Four Mile Dump;
- APEC 6 Buried Dump 1 Mamit Lake Branch Road South; and
- APEC 7 Buried Dump 2 Mamit Lake Branch Road South

Note that both APEC 5 and APEC 7 comprise the two blue markers nearest the given site.

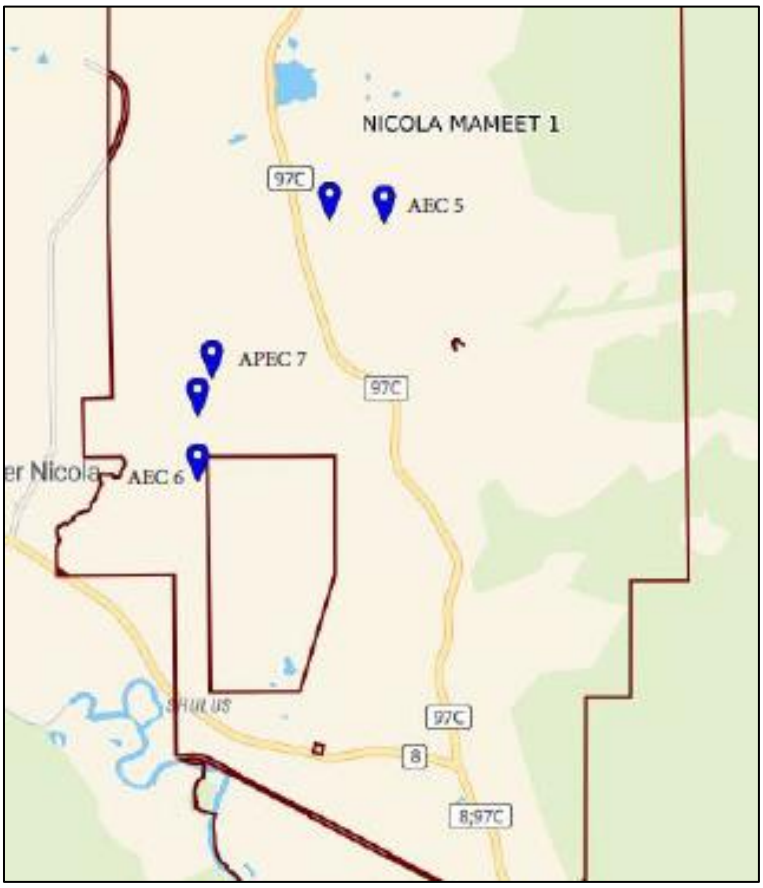


Figure 2 – Three dump sites visited on March 3: APEC 5, APEC 6, and APEC 7

The focus of this report is to investigate strategies to prevent further illegal dumping activity at these sites. Cleanup efforts, and activities related to the environmental site assessment process are outside the scope of this report.

In our research we focused on specific tools of interest to LNIB (*i.e.* wildlife or trail cameras and physical gates), as well as other recommended tools, best practices and generally accepted strategies employed in site security worldwide.

3.0 CONTRIBUTING FACTORS

Due to the covert nature of illegal dumping, it is difficult to conduct empirical research or draw definitive conclusions about why people dump waste material illegally. It is generally accepted opinion that people who participate in inappropriate dumping are a small minority of the population. Research suggests that the following factors contribute to illegal dumping.

Cost and effort

It is thought that illegal dumping is done as a way to avoid paying to dispose of certain materials, or to avoid onerous disposal measures associated with certain kinds of waste such as asbestos.

Lack of concern

It is likely that the average person is not fully aware of all of the negative impacts associated with illegal dumping, such as the environmental, financial, and social costs. It naturally follows then that such people may justify illegal dumping to themselves by minimizing the negative effects the practice, or not appreciating that the practice is in fact a crime.

Perception of risk and lenient penalties

Illegal dumping, by its nature, can be difficult to detect in real time. People who engage in illegal dumping are likely to have a very low expectation of being caught. If they are caught, they are also unlikely to expect significant consequences for their actions.

Social acceptance of the practice

While illegal dumping is widely regarded as unacceptable, some research indicates that people are more likely to participate in illegal dumping in areas where the practice is seen as more socially acceptable. For commercial operators, the public's disapproval of illegal dumping is a deterrent to their participation in the practice as their business and livelihood depends on their reputation.

Access to disposal facilities

Research has shown that illegal dumping activity increases with distance from disposal facilities, indicating that access to disposal facilities is a factor in a person's decision to dump illegally.

Ultimately, the choice to participate in illegal dumping of waste is likely influenced by a range of factors. Therefore, any strategy to combat illegal dumping must be comprehensive and take into account all of these contributing factors described above in order to maximize its effectiveness.

4.0 MITIGATION TOOLS

Mitigating illegal dumping requires an integrated approach and consideration of the unique characteristics of a given site, as well as that of the landscape as a whole. Some of our strategies, such as physical barriers and surveillance devices, are aimed at combatting illegal dumping at individual sites. Others, such as a reporting tool and legislation, are meant to apply more generally, partly because they change the social context of the practice.

It is important to employ different tools or strategies aimed across the spectrum of activity: from deterrence, to detection, to enforcement. When considering what interventions are appropriate to combat illegal dumping on LNIB land, we have considered the following factors of behavioural change:

- Changing the physical environment (e.g. physical barriers such as gates);
- Changing the social context (e.g. implementing a citizen reporting mechanism);
- Implementing rules or restrictions (e.g. in legislation delivered under this or other projects);
- Education and persuasion (e.g. the *Community Education and Engagement Plan* delivered under this project);
- Coercion, or creating the expectation of a punishment or cost (e.g. knowledge of the existence of trail cameras); and
- Enablement, or increasing means or reducing barriers to participate in the desired activity (e.g. “Spring Cleanup” or similar events).

4.1 TRAIL CAMERAS

Trail cameras may be used as both a means of coercion (if their existence is advertised), and a means of enforcement. It should be noted however, that studies have shown that cameras are more effective as a means to detect and investigate crime, rather than of deterrence. Advertising their existence may also make them more susceptible to vandalism or theft.

Privacy

Privacy is a fundamental right guaranteed to all citizens by the *Canadian Charter of Rights and Freedoms*. Legislation governing freedom of information, privacy and personal information (which includes recorded audio or images of a person) on Indian Reserves is complex and beyond the scope of this report. LNIB has previously installed recording devices at certain administration buildings on Nicola Mameet IR 1 as a means of security for staff. At that time, they received legal advice regarding privacy and the collection and use of personal information.

LNIB should continue to seek legal advice in order to be satisfied that any future actions that may be taken on LNIB land in respect of surveillance, privacy, and the rights of LNIB members to their personal information is lawful.

Features and Specifications

Trail cameras are designed to be used by hunters to track and capture footage of wildlife in a certain area, but can be easily adapted for security and surveillance. They are capable of

capturing either still or video images – some will do both – and work on a motion sensor. Data can then either be downloaded at a later time or sent in real time to an email or smartphone. Depending on the unit, images may be sent via a free app or software for which LNIB would pay a monthly fee.

A single unit ranges in cost from under $100 to over $700. For LNIB's purposes, we recommend purchasing units with the following features and specifications:

- High-Definition (HD) video to ensure nighttime vision is of high enough quality to identify features;
- Image quality of at least 10 megapixels (MP) for decent capture of nighttime still images;
- The range of the motion sensor (distance it can detect motion) and the field of view (width of angles that can be detected) that is appropriate to the site;
- Wireless or cellular capability (subject to cellular coverage[2]) so that images can be sent to LNIB in real time. This ensures that if a unit is stolen or tampered with, LNIB will still have the images of the activity. A unit that internally stores images or video until they are physically downloaded is useless in the case of theft or tampering;
- No-glow infrared (IR), which uses an invisible flash;
- Time stamp feature and lock feature;
- A battery indicator so that battery life can be easily ascertained by staff during checks;
- The lowest trigger time that is feasible so that moving cars can be captured before they have driven out of the range of vision; and
- Anti-theft cables and a security box.

Consider weighing the benefits of a viewing screen, which can help users ensure the correct angle when setting up, against the drawbacks, which include increasing the weight and bulk of the unit and draining the battery faster;

Batteries

Another important consideration beyond features and specifications is batteries. Generally speaking, the more features the unit has, the shorter the battery lifespan. Battery life will be generally in the range of six months to one year, but can be much shorter if low quality batteries are used, especially if the unit drains batteries quickly due to a high number of features.

The type of battery used matters a great deal, particularly in this application for LNIB.

Alkaline Batteries

Ensure to never use standard alkaline batteries. While they are inexpensive and readily available, they lose voltage quickly and fail in temperatures below freezing because they use a water-based electrode.

[2] Coverage maps can be found online for all major cellular carriers. See for example https://www.telus.com/en/bc/mobility/network/coverage-map

NIMH Rechargeable Batteries

NIMH batteries are rechargeable, and operate at a lower voltage than alkaline, but they maintain it. Because they use a metal-based electrode they are operational at temperatures below freezing. However, keeping track of used and charged batteries over several cameras can become problematic.

Lithium Ion Batteries

Lithium-ion batteries are recommended. They are more expensive than the other two options, but have a higher voltage, a longer lifespan, and are unaffected by cold.

Care should also be taken when placing the unit so as to extend the battery life. The motion of twigs or branches or even the rising or setting sun will set off the camera, shortening the batteries' lifespan unnecessarily.

Protecting from Theft and Damage

Trail cameras are vulnerable to theft or damage, particularly when being used for security surveillance purposes. Subject to legal advice, LNIB should consider whether they choose to advertise their use of trail cameras to combat illegal dumping. Some measures against theft are inherent in the features of the unit itself. For instance, no-glow IR cameras will not give away the unit's location. A lock feature uses a password to access images, meaning thieves will not be able to do so. A unit that sends images in real time ensures that even if a unit is stolen, LNIB will still have the images – as opposed to a unit that stores images on a memory card within the unit. Always use a theft cable or a security box. Security boxes can also enhance the unit's covertness.

Maintenance

Maintenance is an important consideration that must also be planned for. Ensure that units are checked at regular intervals. When performing a maintenance check, do all of the following:

- Inspect the batteries;
- Inspect for insect pests or use an insecticide around the unit;
- Update the software, if necessary;
- Keep the unit as dry as possible (this will depend in part on the consideration given to where it is set up);
- Clean the lens according to directions;
- Test the unit by walking up and making sure it captures your image;
- Inspect the exterior for animal damage – look for saliva, bite marks, dents, or scratches;
- Inspect the buckles and straps as they are most prone to wearing out. Replace as necessary; and
- Clean the unit regularly and always store it completely clean and dry.

Subject to the manufacturer's directions, maintenance checks are recommended every two weeks at a minimum and must be factored into LNIB's planning.

4.2 SECURITY GATES AND OTHER BARRIERS

There appears to be no standard name for the type of gate that LNIB is interested in using as a means of blocking access to illegal dump sites. For the purposes of this report, we refer to swinging single or double arm security gates (as depicted in Figure 3) that block road or other access to an area. They can be a strong deterrent to illegal dumping, as long as they cannot be easily circumvented. They will also be less effective at sites that can be accessed by foot. When deciding whether to install a swinging arm security gate, the characteristics of the individual site must be considered.

Figure 3 – Example of a Swinging Single Arm Security Gate

Specifications and Cost

Swinging arm security gates are a proven, relatively low-cost, and effective means of mitigating illegal dumping. They are generally made from either steel or aluminum. If feasible, aluminum alloy is preferred because it is as strong as steel while being lighter, and will not rust.

There are a number of suppliers of metal gates in Kamloops and the Lower Mainland[3]. Initial research into the cost of a single arm swinging gate ranges from approximately $900 - $1,300, but quotes should be obtained, and are dependent on the actual specifications required. A gate in this price range still requires cutting, welding, drilling and bolting.

LNIB installed a single swinging arm gate on OK road in April, 2019 for Aspen Planers Ltd. The total cost was $5,061, including $1856 for installation, and $60 for a sign notifying the public of the locked gate. The gate itself was $3145.

Other Considerations

The most obvious consideration associated with installing a gate is access. While the gate's purpose is to bar access, LNIB must also consider what access they will need to maintain to an area and for whom. Any person who lives or has reason to travel beyond a gate must be able to access the area, as do emergency or other personnel who have reason to. The ability to quickly and safety evacuate an area in an emergency must be maintained.

[3] Acumen Machine, DSI Mechanical and Mario's Welding are three potential fabricators located in Kamloops. Graybar Metalworks in Richmond, Vulcan Metalworks in Langley, and Riteway Fencing in Kamloops all carry pre-fabricated gates.

Liability and the chance of injury due to poor design, or improper installation or maintenance must be considered by LNIB. Legal advice is recommended. As the gates are very heavy, a model that locks both in the closed and in the open position is recommended to lessen the chances of injury or damage caused by the swinging arm.

While no lock is completely tamper-proof, using a poor lock that is easily cut renders the gate essentially useless. Combination locks are recommended over a model that uses a key. It is easier to provide a code than a key to members and other users who require access past a gate, and codes can be changed periodically to increase security. Fun-Key Enterprises, Inc. in Merritt is a potential supplier of industrial code locks.

Similarly, gates are only useful in areas where they block the only feasible access point, which depends in part on how far the dump site is from the gate, and whether vehicle access would be required to reach the site. A gate set across a road that can easily be bypassed because of open, flat terrain surrounding the area will not be effective. Additional barricades such as concrete blocks or earth berms can be used in conjunction with a gate in areas such as these.

Previous gates that have been installed on LNIB lands have been subjected to tampering, and even to unauthorized removal. It is recommended that any gate is installed securely such that removal by means of a winch or by towing is made more difficult. Other strategies, such as signage and other communication methods may also help to prevent unauthorized removal by alerting users to a gate's presence, allowing people to plan their movement accordingly.

While the maintenance of metal gates is relatively low, regular inspections and maintenance schedules must always be followed.

Other Physical Barriers

Other types of barriers may be used with greater effectiveness or lower cost than a swinging arm gate, depending on the site. Bollards are good choice for sites where it is desirable to maintain access by foot while blocking vehicle access. Bollards may be padlocked to be removable or hinged to allow vehicle access when necessary. Some examples of bollards are shown in Figure 4.

Figure 4 – Examples of Bollards

Installation requirements

For both swinging arm gates and bollards, installation will require excavation and concrete footings and should be factored into the overall cost. As mentioned, LNIB have experienced issues in the past with tampering, and even unauthorized removal, of gates. It is recommended that LNIB consider more robust installation methods than have been used previously, such as deeper concrete footings. Despite such efforts however, tampering may never be fully prevented.

4.3 OTHER TOOLS

In this section we discuss other potential interventions that we recommend LNIB implement to combat illegal dumping. LNIB can maximize their efforts with a range of strategies to address the broadest range of factors that change behaviour, as discussed in section 5.0.

Lighting

Where feasible, lighting (especially in conjunction with increased monitoring) is believed to be an effective deterrent to crimes of this nature, especially in well-populated areas. However, given the nature of the known dump sites on LNIB land, lighting is not a feasible or effective option at this juncture. If LNIB experiences issues with illegal dumping around buildings or other populated areas, lighting should be considered as an effective tool in those instances.

Reporting

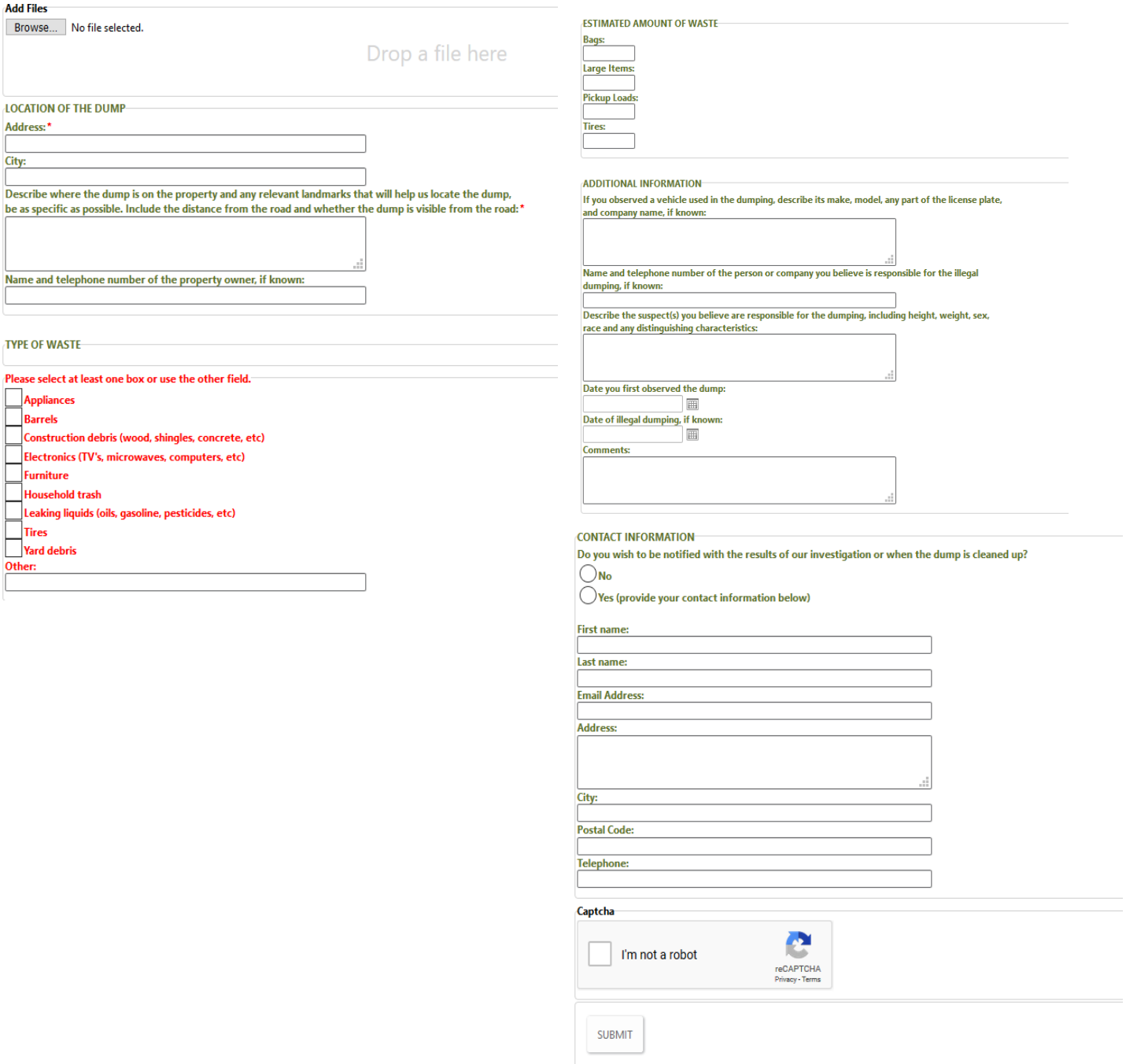
Reporting by citizens is continually cited as an effective strategy against illegal dumping. Not only does it serve as a means of providing information on illegal dumping to the relevant authorities, it also helps to change the social context around the practice, both increasing the stigma associated with participating in the activity while also decreasing the stigma associated with reporting it.

LNIB is strongly encouraged to consider implementing a mechanism to report illegal dumping and publicly encouraging members and residents make use of it. A dedicated text, email, phone number, or website may be set up for this purpose, and would ideally allow users to remain anonymous. The Thompson-Nicola Regional District (TNRD) website (https://tnrd.ca/content/illegal-dump-sites) has an excellent example of a comprehensive tool that allows residents to report illegal dumping online - anonymously, if they choose. Screenshots of the TNRD website are depicted in Figure 5, and illustrate the level of detail that may be gathered.

A reporting mechanism may be implemented at no cost by using an existing contact, such as an email address or phone number already in use by staff in the Public Works Department. Quotes should be obtained should LNIB wish to develop of an online tool such as that used by the TNRD.

A reporting mechanism also serves as a tool of coercion, as it gives people who participate in illegal dumping an increased sense that there may be consequences for their actions.

A communication campaign aimed at normalizing or reducing the stigma associated with reporting illegal dumping should be coupled with this strategy.



Add Files

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Drop a file here

LOCATION OF THE DUMP

Address: *

City:

Describe where the dump is on the property and any relevant landmarks that will help us locate the dump, be as specific as possible. Include the distance from the road and whether the dump is visible from the road: *

Name and telephone number of the property owner, if known:

TYPE OF WASTE

Please select at least one box or use the other field.

- Appliances
- Barrels
- Construction debris (wood, shingles, concrete, etc)
- Electronics (TV's, microwaves, computers, etc)
- Furniture
- Household trash
- Leaking liquids (oils, gasoline, pesticides, etc)
- Tires
- Yard debris

Other:

ESTIMATED AMOUNT OF WASTE

Bags:

Large Items:

Pickup Loads:

Tires:

ADDITIONAL INFORMATION

If you observed a vehicle used in the dumping, describe its make, model, any part of the license plate, and company name, if known:

Name and telephone number of the person or company you believe is responsible for the illegal dumping, if known:

Describe the suspect(s) you believe are responsible for the dumping, including height, weight, sex, race and any distinguishing characteristics:

Date you first observed the dump:

Date of illegal dumping, if known:

Comments:

CONTACT INFORMATION

Do you wish to be notified with the results of our investigation or when the dump is cleaned up?

- No
- Yes (provide your contact information below)

First name:

Last name:

Email Address:

Address:

City:

Postal Code:

Telephone:

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I'm not a robot

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SUBMIT

Figure 5 – TNRD Illegal Dumping Online Reporting Tool

Signage

Signage in and of itself is not necessarily a highly effective intervention against illegal dumping but when used in conjunction with other methods it is worth considering. The presence of signage contributes to changing the social context, communicating rules and restrictions, educating, and coercing people who might consider dumping illegally. Signage may be stand-alone or affixed to physical barriers such as gates.

Generic "No Dumping", "Keep Out" or similar messages is inexpensive and readily available, and reinforce the message and purpose of physical barriers. Specially made signage that advertises the presence and location of gates, the use of surveillance, reporting mechanisms, or specific laws, offences and penalties for illegal dumping will be more expensive, but only relatively so.

Enabling strategies

There are a number of ways that LNIB can help to lower the barriers for their members and residents to properly dispose of household items. LNIB have previously had success with community wide cleanup events. One event held in 2018, in which LNIB rented a roll-off bin and invited members and residents to dump all manner of waste for free, was well received by the community. It did however cost LNIB approximately $7,500 in tipping fees to dispose of. As stated in the 2019 *Solid Waste Management Plan*, LNIB should consider repeating this event, perhaps on an annual basis. Lessons learned from the 2018 event, such as separating out materials that may be dumped for free, will help to lower LNIB's cost.

LNIB may also consider implementing a service to collect and dispose of items that may otherwise be illegally dumped (such as appliances) on behalf of their members. This could be as simple as advertising that members and residents may call or email the Department of Infrastructure to request the service. The option must be considered in relation to the availability of resources, such as Public Works staff time and equipment availability.

The 2019 *Solid Waste Management Plan* details other potential strategies, such as hosting a free store and making use of scrap vehicle collection programs.

5.0 SITE CHARACTERIZATIONS AND STRATEGIES

The majority of known dump sites have been designated as areas of potential environmental concern (APECs) under the environmental site assessment process. We refer to those sites using that terminology for the sake of consistency.

It should be noted that there are a number of non-designated dump sites on LNIB land, often in close proximity to APECs. Where it makes sense to do so, we treat those sites as belonging to the APEC.

5.1 APEC 5 MAMIT LAKE ROAD FOUR MILE DUMP

Figure 6 – Overhead view of APEC 5 Mamit Lake Road Four Mile Dump

Located on Nicola Mameet IR 1, APEC 5 is a short five-minute drive off the main road. A former dump that has since been decommissioned, this site was described in a 2011 Phase I Environmental Site Assessment by Columbia Environmental as follows:

A buried dump (80m x 15m) was observed within a fenced and gated compound east of Mamit Lake Road. The gate has been removed and some recent dumping has occurred at the gate. Contents and environmental impact of the buried materials is unknown. Two monitoring wells are installed adjacent to the buried debris. Dump has been decommissioned and covered.

- *Three (3) monitoring wells surround the buried dump*
- *Covered mound measures 80m x 15m x 1.2m*
- *Fence surrounds property, but gate has been removed & small pile of domestic waste is observed at entrance (3m diameter)*
- *Former dump site has been covered with soil.*
- *Dumped materials reportedly buried at the site include domestic waste, vehicle parts, building materials, appliances, metals, and various other wastes.*
- *Dumping was unsupervised and there is the potential for various types of waste within the buried dump.*
- *A recent pile of debris is located at the north gated entrance and includes mostly domestic waste.*

For our purposes, we are concerned with the dumping of domestic waste on the surface rather than the buried waste associated with the decommissioned dump, which the environmental site assessment process is addressing.

There has continued to be illegal dumping activity at this site following the covering of the former dump site. There are also a number of smaller, undesignated dump sites in the vicinity of APEC 5, particularly on the "low road", which is a secondary access route to the site.

In addition to illegal dumping, animal poaching is a major concern in this area. Bear, cattle, and horses (including a foal), have all been found shot near this site. It is hoped that restricting access here will help to combat to these illegal activities.

APEC 5 Strategy

APEC 5 is well-suited to a gate located immediately after the turn off of Mamit Lake Road, just before the corrals. A gate in this location would block access to both routes to APEC 5, and to the smaller undesignated dump sites along the route. There is a wooden gate already in this location, which has recently been upgraded by a member, at his own cost of approximately $1,000 - $1,500, since the photo in Figure 7 was taken on March 3, 2020.

Access will need to be granted to a number of LNIB members who use the community corrals just beyond the gate. Many of these members also actively report illegal dumping and poaching activity, so are expected to be supportive of this strategy. These users will be given access via a combination lock.

Because the wooden gate has recently been upgraded, we recommend that LNIB consider using the existing gate in conjunction with a new, sturdy lock and a trail camera. If this doesn't prove to be an effective strategy, we recommend that LNIB incur the cost of installing a swinging-arm gate.

Figure 7 –Potential gate location leading to APEC 5 Mamit Lake Road Four Mile Dump

Ground level view of potential gate location leading to APEC 5 Mamit Lake Road Four Mile Dump, taken March 3, 2020

5.2 APEC 6 BURIED DUMP 1 AND APEC 7 BURIED DUMP 2

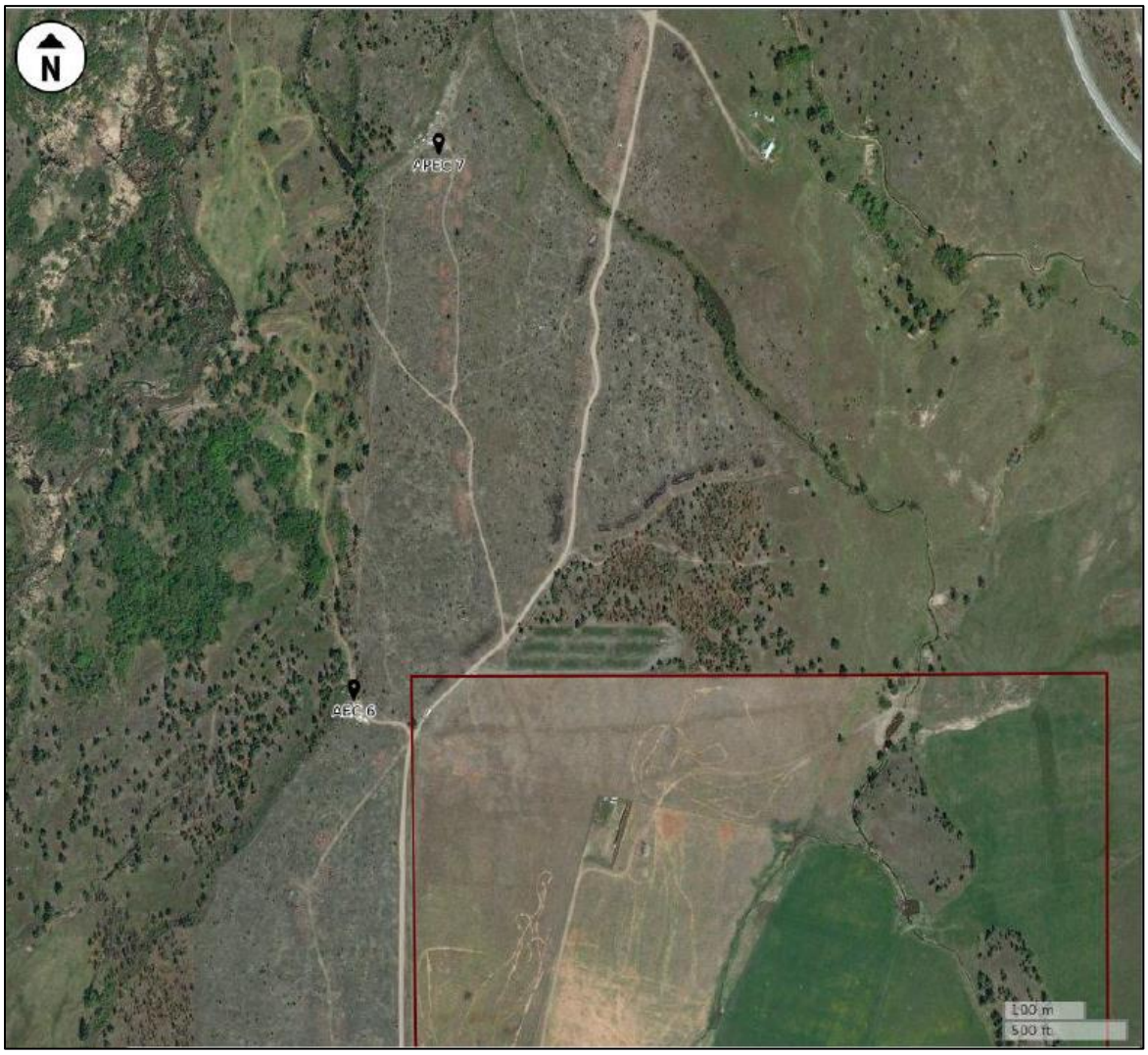

Figure 8 – Overhead view of APEC 6 and APEC 7 Buried Dumps

APEC 6 is a buried dump on Mamit Lake Branch Road South and APEC 7 is a buried dump on Mamit Lake Branch Road North.

APEC 6 and APEC 7 are located just off of Mamit Lake Branch Road on Nicola Mameet IR 1. Both are former dumps that are now buried. Several small, undesignated dump sites are located in proximity to APEC 6 and APEC 7, an example of which is shown in figure 9.

Figure 9 – Small, undesignated dump site in the vicinity of APEC 6 and APEC 7

As with APEC 5, we are concerned with surface deposits of household waste rather than the buried dump sites, which continue to be addressed through the Environmental Site Assessment process.

APEC 6 is on a small spur road that terminates at a creek where irrigation intake infrastructure is located. The area is subject to seasonal flooding. APEC 6 is described in a 2019 Phase II Environmental Site Assessment report by Gandalf Consulting as follows:

Surface debris includes electronics, appliances, building materials, furniture, paint cans, scrap metals, rubber tires, and domestic waste.

Figure 10 – Ground level view of APEC 6 Buried Dump 1 Mamit Lake Branch Road South

APEC 7 is described in the same report as follows:

Surface debris includes electronics, appliances, building materials, furniture, paint cans, scrap metals, rubber tires, and domestic waste.

Figure 11 – Ground level view of APEC 7 Buried Dump 2 Mamit Lake Branch Road North

APEC 6 and APEC 7 Strategy

We recommend that LNIB direct a significant portion of their resources toward APEC 6 and APEC 7. These two sites, as well as the general area around them, are the most active illegal dump sites on LNIB land owing to their close proximity to the community and extensive tree cover.

We recommend the use of gates and cameras in this area. It is not possible to completely block access to both sites, nor to all of the smaller undesignated sites in the vicinity, with a single gate or even series of gates. The aim would be to use both gates and cameras strategically in order to reduce activity in this area as much as possible.

Recommended gate locations for APEC 6 are shown below in figure 12, near the entrance to the access road. Restricting access here rather than closer to the site will help to mitigate dumping at undesignated sites along the route, as well as making use of the fencing here. There are two entrances, so both must be blocked. This may be accomplished with one gate at each entrance, or by completing the fencing of the entrance seen on the right, and installing a gate at the entrance on the left. More research should be done to determine which of the two options (two gates, or one gate plus fencing), is a better or more cost-effective option. Either of these options to restrict access to APEC 6 would provide an additional benefit of restricting access to the irrigation intake infrastructure and flooding area, which are concerns for LNIB. As far as we are aware, there is no need to give access to the APEC 6 site, and in fact access here should be broadly restricted for safety reasons.

It is slightly more difficult to restrict access entirely to APEC 7. The entire area is flat and drivable, making a gate easily circumvented. We recommend using two gates, located at some distance from the actual site itself, as a means of controlling access to APEC 7. The first gate would be located north of the entrance to APEC 7 on Mamit Lake Branch Road at close to the driveway of the one residential trailer here. A second gate would be located at the intersection of Mamit Lake Branch Road and Highway 97C. Access for the trailer resident is maintained from the south, or from the north by obtaining the access code for the lock. In winter the road to the north is not plowed, and often not accessible. An additional benefit of restricting access at the trailer site is that access to the irrigation ditch will also be restricted, which is of interest to LNIB.

We understand this area may be developed in the future, both for housing and as a secondary access to the Rocky Pines subdivision, which has been cut off by flooding in the past. We expect that this area will be less appealing for illegal dumping if it is subject to more development. LNIB should weigh the investment associated with these strategies against the likelihood, timeframe, and degree of future development.

Figure 12 – Potential Gate Locations near APEC 6

5.3 APEC 4 LOT 11 DUMP SITE

Figure 13 – Overhead view of APEC 4 Zoht Lot 11 Dump Site

APEC 4 Zoht Lot 11 Dump Site is described in the 2019 Gandalf report as follows:

Dump contains two areas of debris scattered down a steep ravine and embankment. Debris includes domestic waste, one appliance, occasional 20L pails, furniture, and dimensional wood waste. Recent debris was noted in the 2014 site reconnaissance.

APEC 4 Strategy

Mill Creek Road, the main road by which APEC 4 is accessed, is heavily travelled by members and the wider community and the secondary road is generally unfenced, making a gate impractical here. APEC 4 is a suited to the use of a camera.

5.4 APEC 1 LOT 9 RESIDENTIAL DUMP AND APEC 3 LOT 6 RESIDENTIAL DUMP

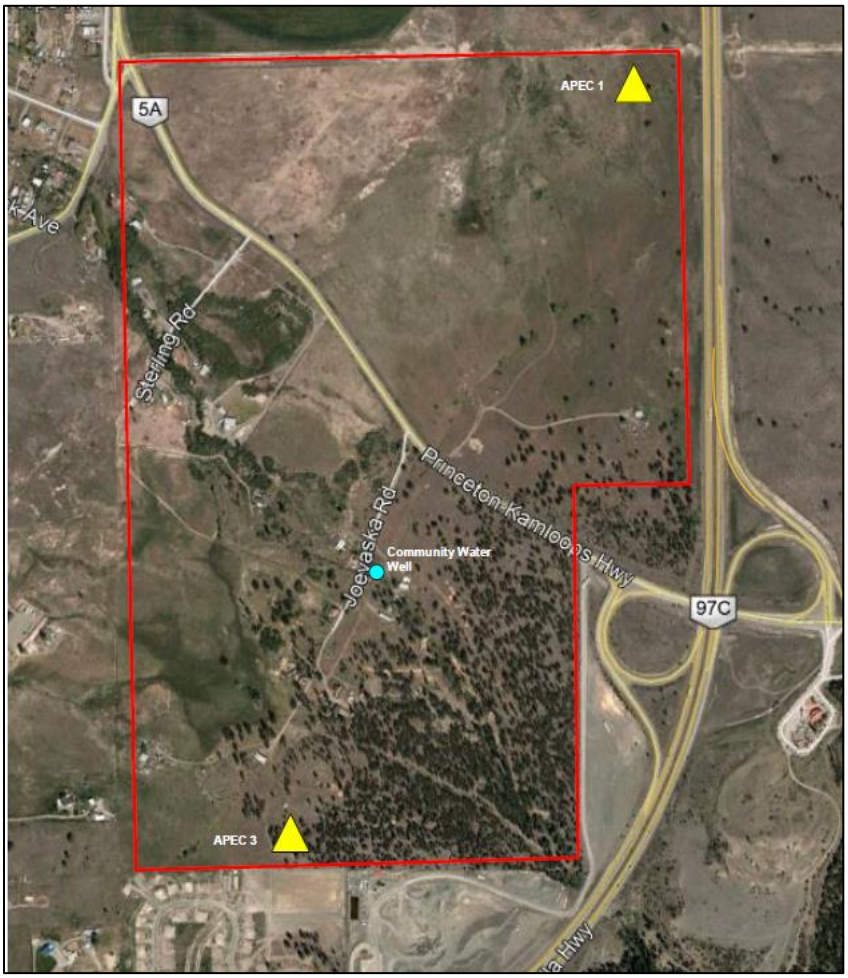

Figure 14 – Overhead view of APEC 1 Lot 9 Residential Dump and APEC 3 Lot 6 Residential Dump

APEC 1 and APEC 3 are located on Joeyaska IR 2 near the junction of Highway 97C and Highway 5A. The *2015 Phase I Environmental Site Assessment Update* report by Columbia Environmental describes the sites as follows:

APEC 1: Dump contains abandoned vehicles, empty oil containers, automotive parts, metal debris, domestic waste, furniture, and building materials spread over a shallow ravine measuring approximately 8 m in width by 35 m in length. No longer appears in use.

APEC 3: Dump contains abandoned vehicles, metal debris, automotive parts, appliances, propane tanks, furniture, domestic waste, and building materials.

APEC 1 and APEC 3 Strategy

Joeyaska IR 2 is subject to unresolved land claims from within the community. In light of this, it is inadvisable for LNIB to make any decisions with respect to access or surveillance until

appropriate discussions have taken place with all individuals who have or assert interests in this area. We understand that LNIB is actively engaged in resolving traditional land holdings; engagement may be done subject to that work, or any policies or laws that are developed as an outcome of that work.

UPDATE AUGUST 24, 2020

Based on discussions held subsequent to the initial submission of this report, we include the following information to inform the illegal dumping mitigation strategy for IR 2.

An initial investigation indicates that the perimeter of IR 2 is fenced, but that there is no existing fencing within the reserve that would be suitable to locate a swinging arm gate to deter illegal dumping at either site. This should be confirmed. It also appears there are also no trees in the area that could be used to attach trail cameras. For these reasons, signage appears to be the only suitable mitigation tools at these two sites at this time.

LNIB will be undertaking a project in 2020-2021 to implement the recommendations found in this report. Further development of a strategy to combat illegal dumping on IR 2 will be done as part of that project.

APEC 3

The area where APEC 3 is located in a wide-open space used by the Sterling family for haying, and is therefore not suitable to be fenced. The family has a well-established and effective approach to engaging with LNIB administration in which one or two members bring forward a family response following internal meetings with other most other family members. There is one member who would likely require separate engagement.

Virtual meetings and conference calls to discuss the options for mitigation are possible.

APEC 1

The area where APEC 1 is located contains some fencing but on initial investigation appears to be unsuitable for locating a gate.

LNIB member Marvin Shuter lives in the only home in the vicinity of APEC 1. The dump site is in a small valley surrounded by hay field and small hills. It is very likely that Mr. Shuter would be aware if someone was using the site. There does not appear to be access to the site from the highway that runs along the north edge of the reserve, and the internal road is hard to find unless one knows what to look for. For these reasons, it is not clear that APEC 1 is an active dump site. Confirmation of this will help to determine the most suitable mitigation measures at APEC 1.

Mr. Shuter would be best served by in-person engagement, if possible.

5.5 APEC 21 NICOLA RIVER DUMP

Figure 15 – Overhead view of APEC 21 Nicola River Dump

This site is located on the south side of the Nicola River, close to the boundary of Nicola Mameet IR 1. Access to this site is across IR 1.

The 2019 Gandalf report describes the site as follows:

Site is down a bedrock slope between Lindley Creek Road and the Nicola River. The area is densely vegetated riparian area at the toe of slope and is within the floodplain of the Nicola River. Debris includes numerous abandoned vehicles, appliances, domestic waste, scrap metals, furniture, building materials, and rubber tires. Debris and abandoned vehicles were observed within the wetted portion of the river.

APEC 21 Strategy

A previous attempt to restrict access to this site using cylindrical cement blocks was thwarted by residents, who physically removed the blocks. The road is also an access route to homes and

hunting areas, so cannot be blocked. For these reasons, this site is suited to the use of a trail camera and signage.

6.0 RECOMMENDATIONS

Our recommendations are based on the following strategies to prompt those residents who would consider engaging in illegal dumping to change their behavior:

- Restrict access to known dump sites by installing gates in strategic locations;
- Increase the perception and potential for consequences by installing monitoring cameras and erecting conspicuous signage;
- Reinforce the social stigma associated with illegal dumping by implementing a reporting mechanism; and
- Enable LNIB members to properly dispose of material by offering regular "Spring Cleanup" type events for residents, and promoting "Free Disposal Days" offered by the TNRD.

These recommendations are meant to work together with those of other products delivered under this project to target the spectrum of behavioural change discussed in section 4.0.

Communication and Education

It should be noted that many of the illegally dumped items found at the known dump sites, such as appliances, paint cans, tires, and electronics may be disposed of for free at the nearby Lower Nicola Eco-Depot. Communicating this to LNIB members and residents is crucial. The *Community Education and Engagement Plan* and resources (delivered separately as part of this project) address this and other aspects of solid waste management.

Costs

Where possible, we include an estimate of the costs associated with each recommendation. Please see the *Residual Waste Improvement Strategy* delivered under this project for details on recommendations to implement a user fee and investigate potential funding sources in order to recoup these and other costs associated with solid waste management.

Recommendations

Recommendation #1	Install three or four gates, plus one additional lock.

As discussed in section 5.0, the following sites are well suited to the use of a gate to physically restrict access. Because LNIB have experienced issues with tampering and removal, we recommend the use of gates over less robust structures such as bollards or chains.

- A lock only on the existing wooden gate at APEC 5, as described in 5.1;
- On or two gates at APEC 6, as decided by LNIB; and
- Two gates near APEC 7, as described in 5.2

Access will be maintained for corral users at APEC 5, and the general membership for the gates around APEC 7, by using a combination lock. Signage will be used to let users know how to obtain the code from LNIB.

The estimated cost of this recommendation is $18,000 - $24,000. We estimate that LNIB should budget up to $6,000 per gate based on the 2019 cost of $5,000 plus an additional 20% for more robust installation. Supplier Funkey Enterprises in Merritt advises that specialized locks cost in

the range of approximately $150 to $250, and that a model that suits LNIB's purposes is approximately $175. Total cost for four or five locks is therefore approximately $700 - $875, but may be as much as $1,000 to $1,250.

Recommendation #2	Install sufficient trail cameras at individual sites, plus one series of cameras.

The use of trail cameras is the best strategy for sites where it would not be appropriate to restrict access by installing a gate. Accordingly, we recommend installing trail cameras at the following sites:

- APEC 4
- APEC 5
- Vicinity of APEC 6 and APEC 7 (series of cameras)
- APEC 21

More investigation should be done at the individual sites to determine the number of trail cameras that will be required in order to provide effective surveillance at each site. The number of cameras required will depend on the model chosen, its field of view, and specific factors at each site that can only be known with more research. A series of cameras is recommended in the area of APEC 7, owing to the flat, open terrain and the number of dumping areas.

The total estimated cost depends on the number of cameras required, up to $700 per camera, plus installation and ongoing maintenance.

Recommendation #3	Install conspicuous signage at all known dump sites.

Signage is recommended at all sites, regardless of other strategies used. Signs that convey that dumping is illegal, the penalties associated with illegal dumping, and how to report illegal dumping are appropriate at all sites. Signs advertising the presence of a gate, as well as how to get access, and the presence of surveillance (in accordance with legal advice), are appropriate at the sites that employ those strategies.

LNIB should engage with any individuals who have land interests in Joeyaska IR 2 prior to erecting signage at APEC 1 and APEC 3.

Recommendation #4	Implement a reporting mechanism, and develop appropriate messaging.

A reporting tool is recommended for several reasons.

First, it will help to provide LNIB with information about who is engaging in the practice of illegal dumping, as well as which sites are actively being used, and any potential new sites that can then be investigated.

Secondly, a reporting mechanism helps to reinforce the social context around illegal dumping – both that the practice is stigmatized, and that reporting it is encouraged. Coupling the implementation of the tool with proper messaging will be important. Messaging should highlight positive concepts of reporting, such as good citizenship and the benefits to the community as a whole.

As discussed in section 4.3, there are a number of methods that could be employed, from an existing phone number or email address to a dedicated web application. Costs will range depending on the tool. Costs may be minimized by using an existing phone number or email address. Quotes should be obtained for new tools, such as a web application, if necessary.

Recommendation #5	Continue to offer or promote strategies that enable people to avoid illegal dumping.

We recommend that LNIB offer regular "Spring Cleanup" events, annually if possible, and actively promote other "free dump days" held by TNRD. Increasing awareness of these events that allow people to appropriately dump all kinds of material, especially bulky items.

A Spring Cleanup event held in 2018 cost approximately $7,500 but that cost could be reduced by removing items that may be dumped for free at the TNRD Eco-Depot. Costs associated with promoting TNRD events is minimal.

Recommendation #6	Engage individuals with land interests in Joeyaska IR 2 to determine strategies to combat illegal dumping on those sites.

We are aware that LNIB is actively working to address traditional land holdings and interests on LNIB lands. Subject to that process, we recommend that LNIB engage directly with individuals who have such interests on Joeyaska IR 2 to reach an agreement on the use of physical barriers, trail cameras, or other means to address illegal dumping at the two known sites on this reserve.

7.0 REFERENCES

https://www.buildingtalk.com/blog-entry/a-best-practice-guide-to-specifying-manual-and-automated-gates/

SecuraGate Industrial Gates and Perimeter Security Handbook, Leda Security Products, 2013

Vehicle Barriers: Their Use and Planning Consideration, US Department of Agriculture, 2006

Public Sector Surveillance Guidelines, Office of the Information and Privacy Commissioner for British Columbia, updated January 2014

Illegal Dumping Prevention Guidebook, United States Environmental Protection Agency, 1998

Illegal Dumping Research Report, Environment Protection Authority, State of New South Wales, 2015

Illegal Dumping Prevention and Enforcement, Regional District of Nanaimo, 2019 https://www.rdn.bc.ca/illegal-dumping-prevention-and-enforcement

2009 Fall Report of the Auditor General of Canada, Chapter 6

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