City of Peterborough

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| **To:** | **Members of the Committee of the Whole** |
| **From:** | **W. H. Jackson, Director of Utility Services** |
| **Meeting Date:** | **November 30, 2015** |
| **Subject:** | **Report USDIR15-005**<br>**Overview of Snow Disposal Area Operations and Condition of the Kennedy Road Woodlot** |

## Purpose

A report to provide an update on the operation of the Snow Disposal Area and the condition of the Kennedy Road Woodlot.

## Recommendations

That Council approve the recommendations outlined in Report USDIR15-005 dated November 30, 2015, of the Director of Utility Services, as follows:

a) That Appendix A of Report USDIR15-005 be adopted for implementation and that staff be requested to immediately initiate the actions described in Appendix A; and

b) That staff be requested to report back in one year's time on the success of actions taken to improve the state of the Kennedy Road Woodlot.

## Budget and Financial Implications

Snow removal and disposal costs are contained within the Public Works Winter Control Operating budget. Annual costs vary depending on snow accumulation and the quantity

of snow removed. Annual snow disposal area maintenance and monitoring costs are also funded through the same Winter Control Operating Budget.

# Background

The Planning Committee, at its meeting of November 16, 2015 under "Other Business" requested:

> That staff provide a report on the woodlot management/snow dump issue (raised at the Otonabee Ward public meeting), in the next cycle of Council meetings.

Relocation of the Snow Disposal Area (SDA) from Ashburnham Drive to its present location adjacent to the Wastewater Treatment Plant near Highway 115 occurred for the 2008/2009 winter season. The move was approved by City Council at its meeting of November 10, 2008

### 1. Operation of the Snow Disposal Area

The design of the SDA was reviewed and approved by the MOE, MTO and ORCA. The site is managed by the Utility Services Department both in day-to-day operation and on-site monitoring. The SDA occupies about 0.3 hectares or three-quarters of an acre as shown in Figure No. 1. An annual monitoring report for the site is published. Management and operations of snow disposal areas are dictated by best practices as published by the Transportation Association of Canada, Synthesis of Best Practices for

Figure No. 1

Location of Snow Disposal Area

## 2. Why is a Snow Disposal Area Required

The SDA is used to hold snow removed from sidewalks and roadways. The snow is typically removed to facilitate public access at bus stops, in the downtown and at other locations where snow storage space is scarce. Snow is also removed to provide safe line of sight for traffic and pedestrian movement when snow banks exceed viewing heights.

The City of Peterborough receives an average of 160cms of snow per year although this varies year by year depending upon snowfall. The City experienced twice the expected snow fall amount in 2008 and 2013. In the spring, the snow melts and discharges through storm sewers and overland to eventually find the Otonabee River.

## 3. Salt Management Plan

The City of Peterborough has a Salt Management Plan that describes the efforts made to minimize salt use throughout the City. Methods to reduce salt include outfitting snow plow vehicles with electronic spreader controls and in the future the ability to pre-wet the salt before it is applied to the road. Salt usage data is captured and utilized for mandatory annual reporting obligations to Environment Canada by the CPS/AVL systems in the winter fleet.

In general, limited salt (10-15% mixed in sand) is applied to local streets or sidewalks. It is anticipated that with the move to the new Public Works Yard on Webber Street, the application of brine solutions will also form part of the City's Salt Management Plan to further reduce the amount of salt applied to City roads to enhance safe movement during the winter season.

## 4. Concerns About the Operation of the Snow Disposal Area

Over the last year to year and a half, portions of the woodlot between the SDA and the Otonabee River are showing signs of tree die back. Residents have expressed concern about this die back and are of the opinion the introduction of the SDA in 2008 is the cause for this die back.

## 5. Studies Undertaken to Understand the Impact of the Snow Disposal Area

In an effort to determine possible impacts of the SDA on the tree die back, a number of investigations were undertaken as described below.

### 5.1 Surface Water Sampling

Sampling of the surface water at six locations as shown in Figure 2 is undertaken on an annual basis as part of snow disposal area best practices.

Figure No. 2: Surface Water Sampling Locations


Each sample taken was evaluated and compared to the:

- Provincial Water Quality Objectives;
- Ontario Drinking Water Standards; and
- Canadian Environmental Quality Guidelines.

Testing was undertaken by the provincially accredited laboratory at the Wastewater Treatment Plant and the measured parameters included nitrates, phosphorous, iron and sodium. Based on these samples, no statistical significance could be ascertained within the standards of the above parameters from snow disposal activities.

Further, it was concluded that the currently available data, from the snow disposal area monitoring, indicates that use of this location as a snow disposal site does not have a deleterious impact on the Otonabee River.

## 5.2 Soil Sampling

To further analyse the impact of the SDA on the health of the woodlot, a number of soil samples were taken between May and November 2015 as shown in Figure No. 3.

Figure No. 3: Soil Sampling Locations


Sampling was repeated three times at each location in May, July and November. Results from this soil sampling showed that overall, sodium levels in the woodlot are significantly higher than the background average. Sodium levels in the soil sample sites start from a low in May, peak in July and reduce later in the year, as expected, but with notable exceptions at sites 1B, 2A and 3A. In these three areas sodium levels are increasing over time.

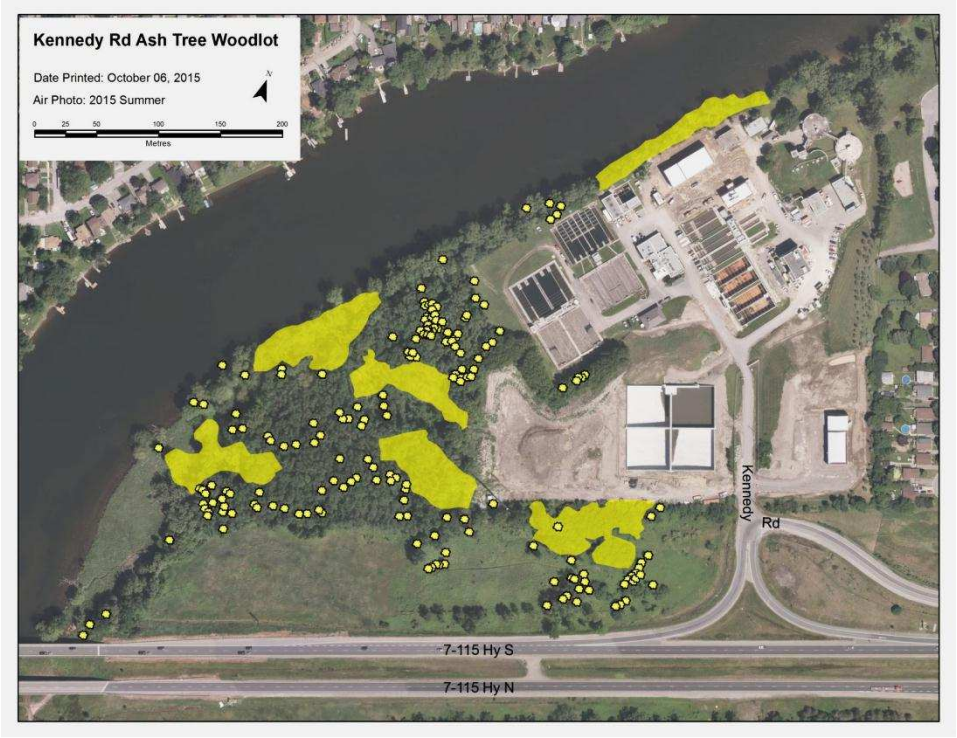
### 5.3 Assessment of the Woodlot

In January 2015, a forest management consultant was engaged to assess the woodlot. They found that the woodlot is dominated by mature trees ranging from 40-70 years old. There were about 11 species identified in the woodlot with 65% green ash (see Figure 4). Thirty-three percent of the trees are in an unhealthy condition mainly due to:

- Over-maturity;
- Overcrowding; and
- Lack of proactive management.

Although no symptomatic evidence of Emerald Ash Borer was found, it's just a matter of time. The consultant's assessment of the woodlot was that many trees are in decline.

Figure No. 4: Ash Tree Distribution in the Woodlot




## 5.4 Topographic Surveys

A topographic (ground levels) survey was undertaken in November 2014. Ground observations by Staff identified areas of standing water and anaerobic soil conditions. Some areas were seen to be laying wet constantly throughout the year as depicted in Figure No. 5.

Figure No. 5: Low-lying Areas within the Woodlot

## 5.5 Aerial Photography

A number of aerial photography runs were done with the use of a drone in 2015. Figure No. 6 shows the results of one such run.

Figure No. 6: Drone photo Showing Dead and Dying Trees and Early Fall Colour

By overlapping the topography surveys and the aerial photography (Figure No. 7), it could be seen that the areas of tree die back corresponded extremely well with the areas of low lying lands and the areas with elevated soil sodium levels.

Figure No. 7: Overlay of Topography Surveys and Aerial Photography

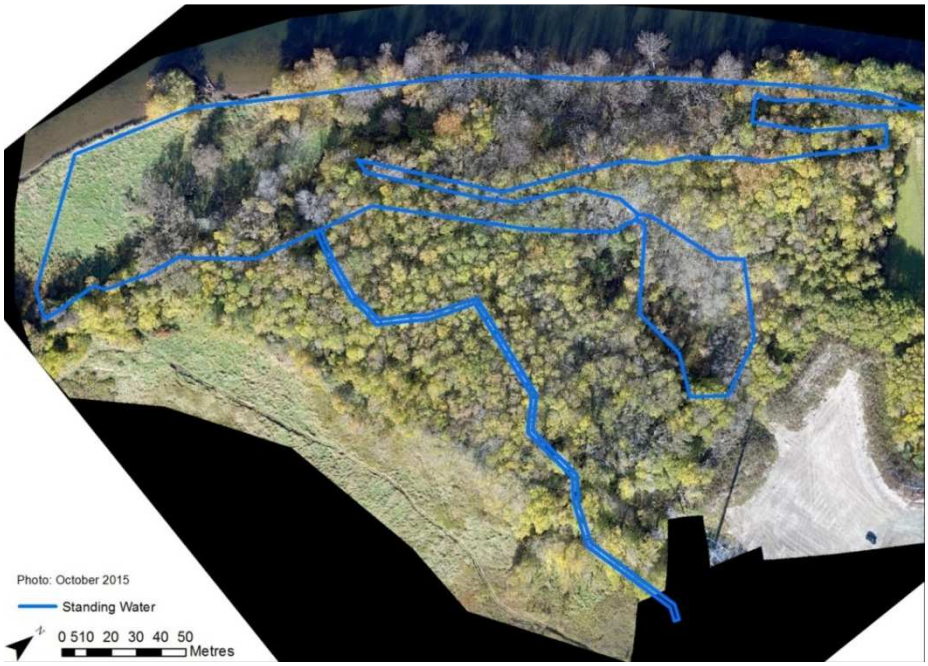
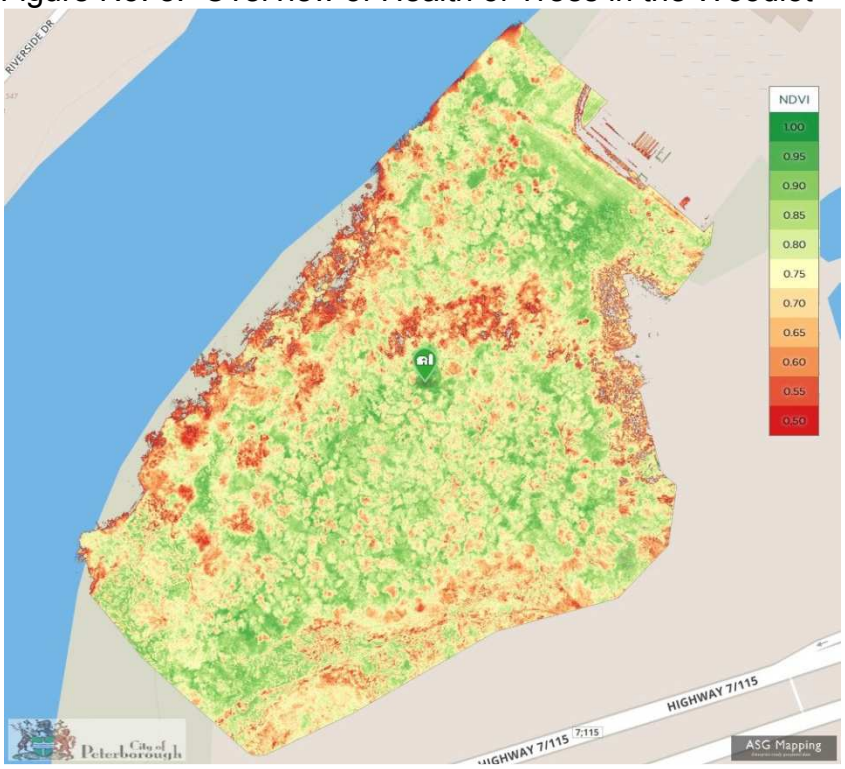


Figure No. 8 shows an overview of the health of trees in the woodlot.

Figure No. 8: Overview of Health of Trees in the Woodlot




The red colour indicates trees in poor health, green indicates good health. This aerial photography shows declining health in the saturated areas as well as significant declining health throughout the woodlot as indicated by the Forest management consultants and related mainly to tree maturity.

## 5.6 Salt and Trees

Salt damage to trees can be both direct and indirect. Direct damage is done to the tree by the lowering of soil water potential through a reduction in osmotic potential, because of the presence of salt. This reduction in soil water potential is similar to the effects of a soil water deficit in the soil, i.e. similar to drought conditions.

The tree has to generate a larger potential in the foliage to acquire water from the soil that, in turn, will limit photosynthesis. Problems may not be apparent until tree transpiration is substantial i.e. later in the growth season.

Indirect damage occurs through the accumulation of sodium in the soil which can alter water penetration and aeration. High sodium levels can also affect nutrient uptake by the trees.

The predominant species of tree in the woodlot is green ash, which has a high tolerance to salt. However consistently high levels of salt will ultimately damage any species of tree.

## 6. Discussion

A thorough assessment of snow disposal activities, environmental conditions, an appraisal of the woodlot and factors affecting tree growth have been examined in response to the declining condition of trees noted on the west side of the Kennedy Road woodlot.

Levels surveys have identified low-lying areas of the woodlot that regularly flood and do not always naturally drain or evaporate throughout the course of the following growth season. Watershed into to these areas has increased as a result of snow disposal, which, together with high river levels in recent years, has resulted in parts of the woodlot failing to dry out over the course of the summer.

In tandem with this, the rainfall needed to flush the salt from soil has not always occurred following the snow melt. This has resulted in a cumulative salt build up over time.

At the same time, the woodlot itself is entering a final phase in its natural growth cycle, with many trees becoming over-mature and in a declining condition.

In addition to this, within the next few years all of the ash trees in the woodlot will become infested with the emerald ash borer and likely die. Unfortunately it is not economic or practical to treat the ash trees in the woodlot; costs are estimated to be at least $20,000 per year to save trees, many of which already have a limited future life expectancy.

Much can be done to improve the appearance of the woodlot and moderate the impact of the changing environment and natural decline of the woodlot.

The studies carried out to date direct the immediate management of the SDA and the woodlot as well as a realignment of drainage from the snow disposal area. Repeat sampling and further studies of the woodlot will be required to guide future remediation efforts and longer-term management objectives.

## 7. Next Steps

The Kennedy Road Woodlot is important both from a forest/canopy viewpoint and as a visual block to shield the Wastewater Treatment Plant and Highway 115 from residents on the west side of the Otonabee River. Accordingly, steps need to be taken to ensure this woodlot is able to survive as best it can. A Forest Management Plan (in partnership with ORCA) is an important step for the future survival of the woodlot. Also important is a plan to improve the woodlot drainage. This would include both realigning the drainage

of the snow disposal area and trying to improve the drainage of the woodlot itself. Monitoring must be continuous, not only as part of the best practices associated with snow disposal areas but as a means of evaluating the success of the various initiatives being undertaken in the woodlot.

Appendix A presents the next steps in more detail.

## SUMMARY

With the winters experienced in Peterborough, a snow disposal area is a necessary component of our winter services. The snow disposal area at the Wastewater Treatment Plant is ideally placed to minimize adverse impacts to residents and the environment.

Studies have been undertaken that adjacent woodlot tree dieback is mainly because of low lying lands within the woodlot that retain water ultimately killing the trees because of the anaerobic condition the tree roots find themselves in. A higher sodium level in the soil exacerbates the problem.

A program has been suggested that includes eliminating the dead trees, managing the woodlot, replanting of the woodlot and realigning the drainage of the snow disposal area.

Submitted by,

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Appendix A: Work Plan to Improve the Kennedy Road Woodlot

# Appendix A: Work Plan to Improve the Kennedy Road Woodlot

Based on the work that has been done so far, it is suggested that the following steps be undertaken:

**a) Implement a Forest Management Plan in Partnership with ORCA**

This plan would include both ecology and succession planning in partnership with ORCA. Some of the immediate and salient points that would be in this management plan include:

- Removal of dead trees to clear out dead wood and open up the woodlot to encourage regeneration. Some deadwood (standing and fallen) will be left for habitat and ecological benefit but within the parameters of good safety management. The anticipated start of this work would be in the winter of 2015/2016;

- Replanting of the woodlot with species more appropriate to the existing conditions. A fall 2016 start to this work would be anticipated.

- The reforestation program would include a Buckthorn management plan to allow for proper growth and regeneration of desirable trees.

**b) Implement a Drainage Improvement Plan.**

Initially, and most importantly, this involves re-grading the snow dump such that the melt waters will move to the south, toward Hwy 115 and away from the woodlot. Plans for this have been drawn and the work is expected to happen within the next 3 months.

In addition, there will be further investigation into the possibility of mitigating the impact of the low areas in the woodlot although this is most likely a longer term project.

**c) Continue Monitoring**

Both surface water and soil samples will continue to be taken and analyzed to satisfy best practices efforts and to evaluate the impacts of any actions taken to improve the state of the woodlot.