ECOLOGICAL RESTORATION AND MONITORING RESULTS

SUMMARY OF FINDINGS

BASED ON 2009 AND 2010 MONITORING REPORTS

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FEBRUARY 11, 2014

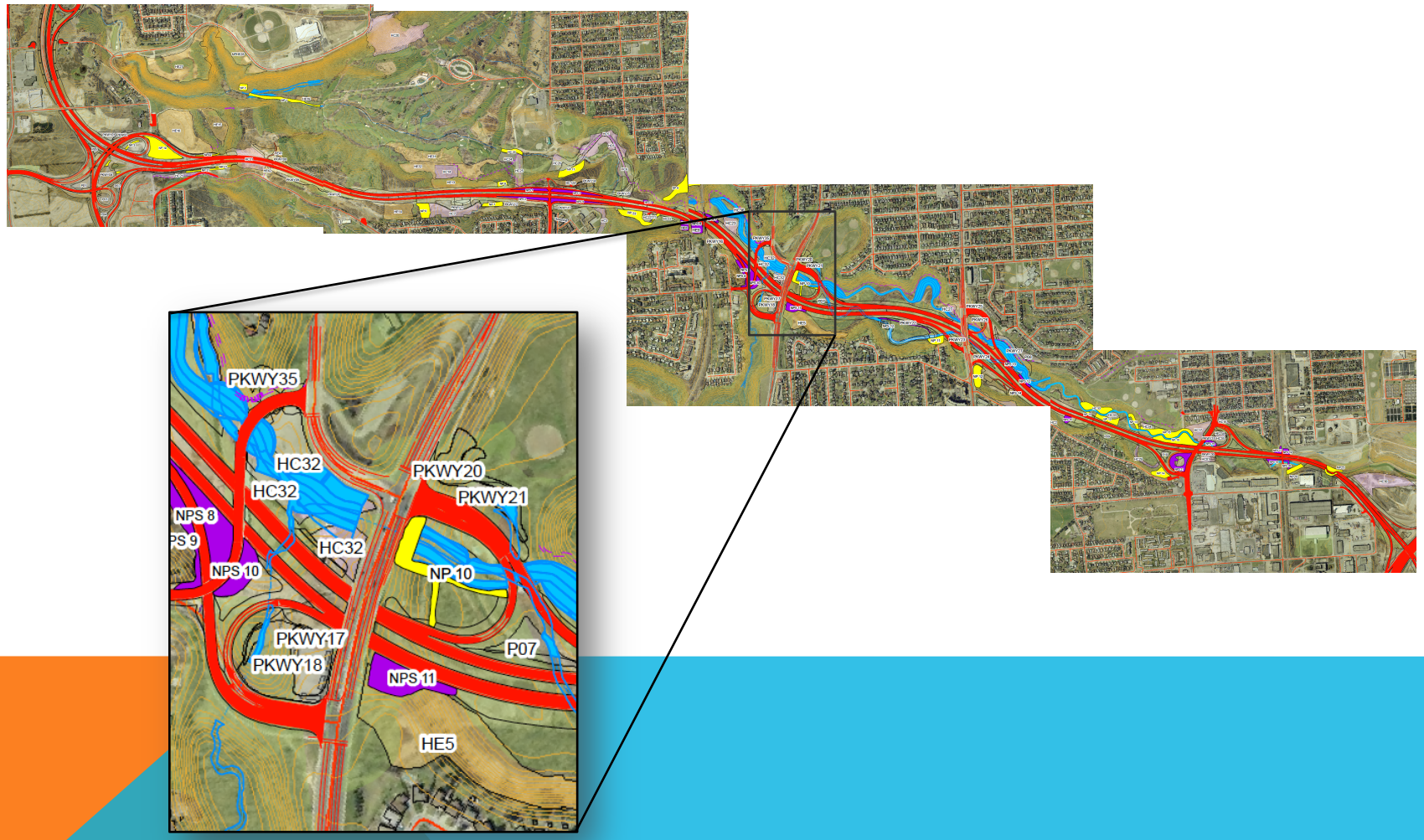
BACKGROUND

Restoration Project Area:

- Over 100 hectares of green space located within Red Hill Valley project site
- 313 distinct restoration units
- Within 116 project polygons
- See map on next slide for visual
- 5 year restoration began Spring 2007
- Majority of restoration seeding and planting completed in 2007, 2008, 2009
- Monitoring began 2007, and continued for five years 2011

* Source: Kayanase, no date. Red Hill Valley Project Ecological Restoration Plan, Detailed Design Plan Report, page 3.

PROJECT RESTORATION KEY MAP



* Source: Kayanase, no date. Red Hill Valley Project Ecological Restoration Plan, Detailed Design Plan Report, Maps A4-1 through A4-4

2009 MONITORING METHODS

- 2009 survey conducted in July and August
- 206 plots (each sized 3.99 meter radius)
- Covering more than 165 restoration units
- Within 84 project polygons

* Source: Allan Arthur, 2009. Red Hill Valley Project, Ecological Restoration Monitoring Report, December 18, 2009, page 3.

(INPUT) PLANTING - RESULTS AS OF JULY 31, 2009*

Trees	Shrubs	Herbaceous
• > 86,082 seedlings and larger stock of native trees (76.5% of target) • Including 30 canopy or large tree species (300% of target) • > 300,000 acorns (oaks), hickory and walnuts (butternut) directly seeded • Large quantities of finer seeds (black cherry, sugar maple, white ash, eastern cottonwood and sycamore) directly seeded	• 45,170 shrubs • 43 native species planted as seedlings and potted stock • In addition, 250 kg of shrub and small tree species seed, directly seeded	• 104,688 herbaceous (grasses, sedges and wildflowers) plugs and potted stock • Comprised 90 native species • In addition, over 500 kg of native herbaceous species seeds/seed mixes

As of July 31, 2009, more than 165 native species were planted or seeded.

* Source: Allan Arthur, 2009. Red Hill Valley Project, Ecological Restoration Monitoring Report, December 18, 2009, page 3.

(IMPACT) MONITORING (POINT-IN-TIME) RESULTS – AUGUST 31, 2009

- 2009 surveys represented 56.9 hectares
- Estimated total 150,278 trees and 307,884 shrubs surviving on site
- 90% healthy to very healthy
- Extrapolated to full 100 hectares =
- 768,728 native trees and shrubs established by project
- Average height of all native trees and shrubs at time of survey 72 cm

* Source: Allan Arthur, 2009. Red Hill Valley Project, Ecological Restoration Monitoring Report, December 18, 2009, page 3.

2010 MONITORING METHODS

- 2010 survey in mid-September to mid-October
- 88 plots (206 in 2009)
- Covering more than 147 restoration units
- Within 27 project polygons

* Source: Allan Arthur, 2019. Red Hill Valley Project, Ecological Restoration Monitoring Report, January 31, 2011, page 4.

2010 RESULTS – AND 2009 COMPARISON

- 74 woody species found during monitoring in 2010
- 54 native, 17 exotic/invasive species
- 3 species – white spruce, red pine, blue spruce are naturalized to the area
- Actual abundance of exotics – 4%

Comparison to 2009

- Total density of native trees remained unchanged or increased slightly from 2009
- The density of small tress and shrubs was lower than in 2009 but unrepresentative sampling may account for this decline
- Surviving stems show an overall increase by 30% compared to 2009
- Some spatial variations between upland, upland slopes, and bottomland

* Source: Allan Arthur, 2019. Red Hill Valley Project, Ecological Restoration Monitoring Report, January 31, 2011, page 16.

CONCLUSIONS

- Only two years of monitoring results were available
- Contained only aggregate data (summary results and findings)
- The monitoring two years represent results from primary planting
- Unable to identify from these documents the 2 to 3 primary locations where additional planting could enhance the past work, or where attention was needed
- Uncertainty around the extent of invasive species is also an influencing variable

<u>Actions:</u>

→ Met with Kayanase early February to discuss methods for updated assessment of restoration

→ Kayanase to provide options for assessment to determine – 2-3 areas where planting was effective and where additional plant is needed, and the extent of invasive species