



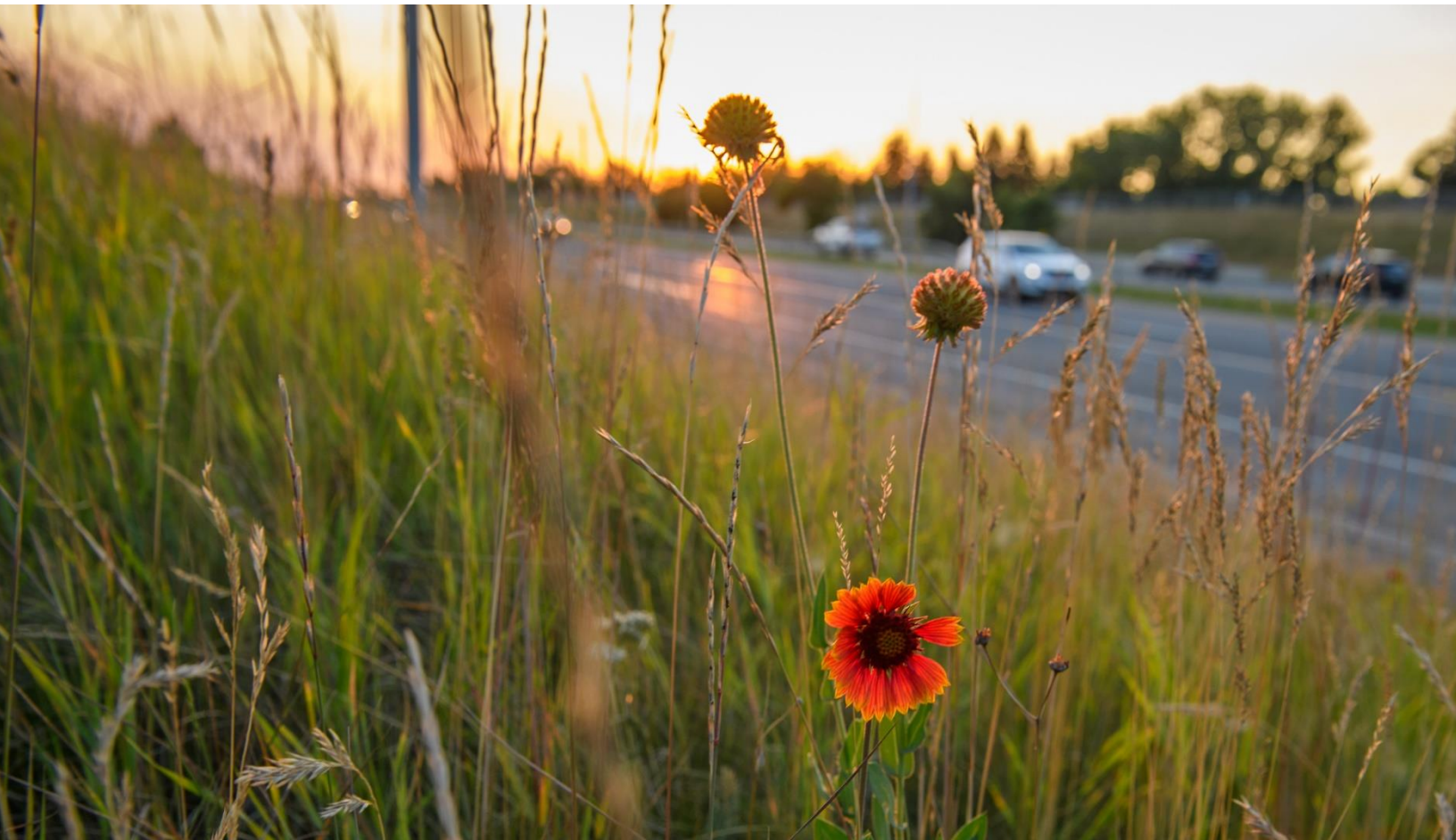
# 16<sup>th</sup> Ave NE Roadside Naturalization Pilot Project

Final Report and Recommendations

RFP No. 20-1776

**Prepared for:  
The City of Calgary**

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## EXECUTIVE SUMMARY

The City of Calgary (The City) initiated a pilot project in February 2020 concerned with the “naturalization” of roadside areas as an alternative to conventional landscaping with agronomic turfgrass that requires regular mowing. With the City and its partners having done the initial project planning and landscape design work in 2020 and 2021, Earthmaster Environmental Strategies Inc. (Earthmaster) was engaged through a competitive bid process as prime contractor for landscape construction beginning in spring 2021. The work involved an innovative landscaping treatment and associated site preparation, vegetation monitoring and assessment, and related scientific trials and site maintenance activities over a 3-year period. The pilot project treatment site is located on 16<sup>th</sup> Ave between 52<sup>nd</sup> St. and 68<sup>th</sup> St. in NE Calgary. This report summarizes project outcomes, findings, and recommendations.

The overall goals of the project were to:

- Naturalize a roadside at a large scale to determine and document landscaping design details, construction and related costs, maintenance effort and associated costs, and outcomes over multiple years including the feasibility for cost savings and environmental benefits compared with conventional landscaping;
- Establish proof of concept that an existing area of conventional roadside landscaping (i.e. a non-native plant community comprising turfgrass and introduced weedy species) can be converted to a naturalized urban meadow with predominantly native species of grass and wildflowers, by design;
- Use the pilot project treatment site to contribute towards The City’s 2025 goal of naturalizing 20% of municipal “open space” as set out in Our BiodiverCity, The City’s biodiversity strategic plan;
- Utilize this project to share information and help inform public dialogue on alternative landscaping treatments, in support of the “eco literacy” goal of Our BiodiverCity.

### Pilot Project Findings

Project findings emanate from the pilot project treatment site (5 hectares in size, along 16<sup>th</sup> Ave NE between 52 and 68 Streets), the adjacent project control site (5 hectares in size, between 36 and 52 Streets), and from other roadside and natural area sites around the city where field surveys and assessment were completed by the project team and partners. Key project findings include the following:

- Boulevard and other wide road rights-of-way in Calgary traditionally are landscaped with a mix of non-native, turf-forming grasses that are susceptible to invasion by other introduced plant species that become established over time. Roadsides are not irrigated or maintained to the same standards of sports fields, golf courses, or lawns beyond what is required to meet obligations under provincial law for the control of regulated weeds. Regular mowing (i.e. 4 cycles of mowing per year) maintains a trim appearance to roadside areas that are a mix of turfgrass and weeds.
- Most roadsides in Calgary contain virtually no plants that are native to the region, and instead they are dominated by a mix of introduced (agronomic and weedy) species that are primarily of Eurasian origin including Kentucky blue grass, smooth brome, quackgrass, crested wheatgrass, Canada thistle, common dandelion, and (closest to the road edges most affected by road salts) salt-tolerant kochia and saltgrass.
- A site in Nose Hill Park was selected as a reference area for this project, having a mature plant community that has persisted since at least 1926 (the oldest aerial photos available for the site) and containing 50



native species of grass and wildflower which comprised about 80% of the plant cover with the remainder being non-native species. The forbs were documented to be blooming from early spring to late fall for the benefit of pollinators. This reference site offers further insight to suitable plant selection for naturalization projects, and it informs a key project finding that attaining 100% native species cover is unrealistic.

- Other reference sites identified for the project include 5 roadside areas throughout the city that are not regularly mowed, where assessment was conducted to determine if they develop into predictable plant communities that could be described as being naturalized. Two of the sites were dominated by the usual introduced plants, with less than 2% native species cover. However, the other three sites had between 7 % and 38% native species cover, including a diversity of shrubs and wildflowers known to support pollinators, which appeared to be the result of past planting with native species and/or favourable soils and topography that differ from typical graded and compacted roadside slopes. A related key project finding is that active intervention is required for successful naturalization of open spaces, beyond just letting turfgrass grow out.
- The control site established adjacent to the pilot project treatment site comprised turfgrass and introduced plants which were left to grow out over a three-year period with only one mowing cycle completed in 2022 for reasons of managing grass fire risk. Smooth brome and Kentucky blue grass were dominant in most areas of the control site, with exceptions being crested wheatgrass being dominant on drier south-facing slopes and saltgrass dominating the road edges that are subject to salt spray and vehicle compaction. Weediness (sow thistle and yellow sweet-clover were most abundant) increased one year after mowing cessation, and then decreased thereafter.
- The pilot project treatment site was successfully converted from its turfgrass condition to an urban meadow mixture of perennial flowering species and native grasses, following specific site preparation and a carefully selected seed mix design. The seed mixes contained mostly native species of grass and wildflowers, with additional non-native annual cover crop species, that were selected based on site characteristics, climate change stresses on native species, and seed availability.
- The seed mixes contained a higher percentage of flowers than normally used in naturalization projects due to the expected invasion of adjacent agronomic grasses. The ratio used was successful for this site.
- Site preparation and seed installation methods used in this project played a critical role in plant survival and proliferation despite the very late seed installation date and extreme weather events encountered throughout the project.
- Annual flowering cover crop species dominated in Year 1 (providing a very showy display by August 2021), followed in succession by native and non-native perennial species in Years 2 and 3. The site achieved a balance of native grasses, perennial flowering species, and non-native species by Year 3.
- While many of the species established on the site were similar to what was found in the reference area at Nose Hill Park, several other naturally occurring species could be added to future seed mixes if seed could be sourced in sufficient quantities and would be expected to do quite well based the reference site.
- Areas of the site prone to compaction by frequent vehicle traffic could not sustain vegetation growth. Areas being driven on regularly are not worth the effort required for re-establishing vegetation unless they are protected from vehicles.
- The bee boxes installed on the site were not well used and required a significant amount of maintenance; however, they were by far the aspect of the project that the public was most engaged with. Future use of bee boxes should be assessed for potential adoption by community residents.



- Field studies completed by project partners revealed that unmowed roadsides with some degree of naturalization (flowering plants) support in the order of 3000 pollinators per hectare, which in turn support the birds that feed on these beneficial insects, while regularly mowed turfgrass supported virtually none.
- An artistic rendering of prairie plants native to the Calgary area was commissioned for this project and it was executed by an artist trained in ecology who applied considerable research to the work in order to accurately represent the comparative rooting depths of different plant species; the product of this work is a valuable graphic communications tool that helps to explain the drought-resistance of native plants.
- The core construction cost (i.e. materials, labour and equipment) for drill-seeding the native grass and wildflower mix in the pilot project treatment area was approximately \$11,000 per hectare, excluding the costs for planning, design, site preparation and public engagement/communication.
- Conventional landscaping for City projects involving disturbed areas typically rely on hand seeding, hydro seeding or sodding strategies. A review of other recently completed City road construction projects revealed that for small scale construction (less than 10 hectares in size) in Calgary the cost for conventional landscaping by seed methods is in the order of \$13,000 per hectare, and substantially more than that for sod installation. The pilot project has demonstrated proof of concept that landscaping with primarily native plant seed mixes using a drill-seeder can be done cost-effectively.
- The annual maintenance costs for this project are anticipated to be approximately \$600 per hectare per year for selective weed control. During initial establishment of the native planting on the pilot project site a decision was made to complete one pass of mowing with removal of the biomass to facilitate growth of the native plants, which cost \$3,200 per hectare. It is anticipated that weed control costs may be higher in the first few years and then reduce as perennial native species become established and outcompete the weeds.
- The incorporation of naturalized landscaping in City open spaces aligns with the Biodiversity Strategy, the Climate Strategy, the Stormwater Strategy, the YardSmart program, and the Natural Infrastructure program.

### Pilot Project Recommendations

Based on the naturalization work conducted during the pilot project and observations made at other natural areas around the city, the following recommendations have been provided for future work:

- Change The City's approach to landscaping and maintenance for larger (e.g. arterial) road rights-of-way, with incorporation of naturalized landscaping on an opportunistic basis for new development and disturbed areas (e.g. after utility maintenance and repairs, road widening)
- Consider the pilot project findings in this report in future updates to bylaws (including the Community Standards Bylaw), policies, plans and specifications that address landscaping requirements.
- Continue to build awareness and capacity in The City and in private industry for the specialized design, construction and maintenance of landscaping with native plants.
- Modify the mix of plants installed in these types of projects to incorporate more of the observed native species in the undisturbed prairie meadow reference plot at Nose Hill Park.
- Work with partners to increase the native plant and seed supply at a national level (i.e., National Native Seed Strategy program) to support naturalization initiatives.
- Undertake native seed collection from this project site and in parks and naturalized areas to facilitate an increase in the seed supply locally, and to minimize seed purchase from more costly US suppliers.
- Engage the public early and often to facilitate acceptance of these types of naturalized open spaces.