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ATTENTION: Matthew Arnill

RE: Ross Property SE-35-32-06 W5

OVERVIEW

The intent of this letter report is to provide a description of the vegetation type for planting in returning the land to its former agriculture land capacity of class 5 based on Canada Land inventory to support perennial forage cropping for hay or pasture. Following industry restoration practices and incorporating good agronomic and land husbandry restoration technics will also provide beneficial habitat opportunities for wildlife. Following a managed grazing or haying system will encourage wildlife use with increased repeated use over a continuous grazing/haying system.

Ducks Unlimited Canada's (DUC) knowledge in establishing, maintaining, and management of hay and pasture systems is our intrinsic value of marrying the biological and economic benefits of marginal land management solutions together that provides habitat improvements and opportunities while ensuring sustainable agriculture land use practices. DUC's involvement in managed grazing/haying system is to provide science-based solutions for designing, installing, restoring and managing upland ecosystems. One of our greatest assets is our research-based and practical understanding of how upland habitats function, and the relationship between wildlife and agricultural cropping systems in western Canada. West-Can Seal Coating Inc. is committed to providing environmental restoration on the Ross property to its former use based on sound science, combined with traditional ecological knowledge that will also encourage wildlife use.

DUC is driven by our experience in conservation initiatives and are proud to have a reputation for creating projects that are environmentally and financially sustainable. The key to DUC's fundamental understanding of how the relationship between wildlife and agricultural cropping systems function lies in our 80+ years of experience in researching, restoring, designing, constructing and managing upland and wetland habitats across Canada. Restoration and installation plans are based on DUC's on-the-ground conservation of, and research on, these landscapes.

A site visit conducted in June 2018 at the Ross Property SE-35-32-06 W5 was to identify opportunities and relationships between wildlife and agricultural practices for future restoration activities. Restoration of the agriculture lands through integration of a DUC rotational grazing/haying system model would require monitoring for plant stand establishment, health, and appropriate stocking and/or haying regime. Additionally, we recommended initially that yearly monitoring and adjustments occur as required, to encourage forage establishment and survival required for both objectives as outlined above.

Grazing response has been a tool used for measuring rangeland health to delineate plant communities for decades. It provides for a consistent and effective tool to gauge reclamation success and ecosystem functions, as well as forecasting site trajectory in a temporal community composition based scale.

We recommended that species most adaptable to the substrate and local environment be selected as part of the restoration protocol at the Ross Property SE-35-32-06 W5.

SITE INVESTIGATION

The following provides a description of the in-situ topsoil to be stripped stockpiled and relayed in support of the restoration activities in returning the land to its former agriculture land capacity. The topsoil is characterized as having good cation exchange capacity (CEC) readings, which has a greater need for managing soil nutrients. The pH of the topsoil is 8.0, which is slightly alkaline to moderately alkaline with salinity measurements in the range considered safe for forage plant growth. Organic matter (OM) content is normal at 5.0%. The textural classification of the topsoil is Loam: Sand 47%, Silt 38%, Clay 15%, and considered moderately erosive.

SEED MIX

Permanent stabilization of the pasture with a sustainable vegetative cover is the underlying objective of the revegetation for all reclaimed upland areas. The successful re-establishment of forage vegetation as a component of the revegetation plan will contribute to suitable, long lasting cover. Seed mix design should be derived after investigation of native species growing in and around the Sundre area.

Species richness and plant diversity contribute to increased structural diversity and patchiness. These desirable pasture and habitat feature considerations and should be designed into the revegetation plan seed mix.

The seed mix order needs to be based on the number of acres of revegetation, plus an additional 10% for a total of acres. The additional seed will account for drill calibration losses and overlap during the seeding operation.

Species selection criteria considered:

- Availability of seed
- Species establishment requirements
- Adaptability to site and climate conditions
- Long term land use considerations

SEED QUALITY AND SOURCING

An essential first step toward ensuring a successful revegetation plan is to purchase certified seed of varieties known or specified to be adapted to the region. Certified seed provides superior results when

planting either native or introduced tame species. If certified seed is not available, it may be necessary to purchase common stock. Seed sourcing/quality control should commence well in advance of planting schedules and include careful attention to the following criteria:

- Source of seed should be determined by asking the potential supplier to provide information on the genetic origin of the species. Specified varieties and or sources should be adhered to, however if the seed specified is not available, substitutions of alternative seed lots should be considered.
- Prior to purchasing seed, a current Certificate of Seed Analysis for each seed lot is required from the supplier and carefully reviewed. Each lot should meet or exceed Canadian Certified seed standards. Germination tests are reported on the certificate of Seed Analysis and required in determining Pure Live Seed content (PLS). PLS is calculated by multiplying the purity of a seed lot by the germination and dividing by 100. The resulting figure measures the amount of live seed present in the seed lot.
- Weed seed counts shown in the seed certificate should be reported at the .01 percent level
- All seed should be purchased based on a price of PLS per pound
- Allow zero tolerance for undesirable, highly invasive and or noxious weed species including but not limited to: downy brome, Japanese brome, smooth brome, quack grass, rattailed fescue, and Canada thistle

The supplied product should be tagged, bagged, palletized, shrink-wrapped, and positioned for pick up or delivery no later than May 1st of the planting year.

TIMING

Spring seeding of the permanent vegetation should be completed by June 1st of the seeding year. In the event of unforeseen circumstances or inclement weather/site conditions, a contingency or dormant planting is possible. Dormant planting dates for this area range from October 20th through to November 15. Soil temperatures should be lower than 5 degrees Celsius to ensure fall germination of the seed does not occur.

MONITORING AND MAINTENANCE PLAN

There is a need to evaluate the success of the revegetation plan after plants are established to identify any remedial or corrective measures required to achieve ground cover and a sustainable plant population. In addition, early (first year) establishment monitoring will help provide a baseline with respect to the monitoring of changes in species composition and species present, on a square foot basis. Those experienced with both native and introduced plant ecology and plant identification should conduct evaluation and monitoring of the seeded areas.

PLANT ESTABLISHMENT DATA COLLECTION AND MONITORING

Preliminary evaluation of the planted areas should be made four to six weeks after germination. This inspection of seedling density and distribution may provide an opportunity to address or correct weak areas. A second inspection late in the summer can coincide with the growth medium monitoring and

sampling mobilizations. This inspection is necessary to evaluate stand adequacy based on density of established plants and their stage of development. The final establishment inspection should ideally be made after the stand has gone through at least one winter. Suggested actions based on seedling densities in the planting year:

<u>Average Seedlings per square foot</u>	<u>Action/Condition</u>
<1	Reseed
1 – 3	Wait and re-evaluate next year
4 – 5	Successful planting
>6	Very good

FORAGE ESTABLISHMENT TIMELINES – THE CHALLENGE

Generally, most forage species are somewhat less competitive than annual cropping species at the seedling stage. During establishment, the importance of site preparation and weed control is more critical than establishing an annual crop. The extra effort in site preparation and managing the seedling stand will pay off in a long-lived, low maintenance stand.

Pre-seeding weed control is of critical importance to successful revegetation. In most cases, it means devoting a couple growing seasons to weed eradication and reduction. Depending on the existing weed community, more than two years may be necessary. Principal targets are the perennials: smooth Bromegrass, quackgrass, foxtail barley, Canada thistle, field bindweed and absinth wormwood.

The most commonly used options for pre-plant weed control include both chemical and/or mechanical weed control in the preceding site prep cover crop. Generally, tillage is not recommended as, in most cases, the land to be revegetated is prone to erosion and should not be deeply disturbed or left bare. An integrated weed management approach is more effective.

If there are any questions or comments regarding this document, please do not hesitate to contact the undersigned at 204-953-8206.

T. Glen Koblun
 Certified Crop Advisor

