CAROLINE SOLAR PROJECT

(CSP)

NE-14-036-06W5M

ENVIRONMENTAL PROTECTION PLAN (EPP)

Operated by

PACE Canada LP

('PACE')

May 29, 2023

1 DOCUMENT VERSION CONTROL

Version Number	Date Issued	Updated Section	Updated Information
1	**May 27, 2023**		
2			

2 INTRODUCTION

McCallum Environmental Ltd. ('McCallum Environmental') was retained by PACE Canada LP ('PACE') to prepare an Environmental Protection Plan ('EPP') for the proposed Caroline Solar ('CSP') facility located within NE-14-036-06W5M.

The purpose of this EPP is to provide regulatory bodies and the landowner with a commitment to reduce, mitigate, and where possible eliminate potential environmental impacts of construction and operations on the natural systems at, or near, the CSP. The EPP will serve as a guide to ensure successful conservation and reclamation of valued ecosystem components in the area and ensure regulatory compliance during construction, operations, and reclamation at the CSP.

The operating procedures contained in this document are intended as a guide for conducting operations in consideration of environmental protection. The procedures included herein are based on regulatory requirements but are not intended to be used in substitution to regulations, nor are they intended to be an exhaustive review or interpretation of applicable legislation. When used in conjunction with legislation and permitting documents for the CSP, including those which may be provided by the Engineering, Procurement and Construction ('EPC') contractors, the procedures contained herein are a valuable tool in guiding construction and operations.

Environmental legislation is designed to protect the environment. All employees and contractors at the CSP work site must comply with applicable regulatory requirements. These requirements include acts, regulations, policies, guidelines, practices and procedures that are administered by governments and their agencies.

In general, the proposed CSP is not expected to significantly alter the existing grades. The solar panels will be aligned in tables and will be mounted on single axis tracking racking structures. It is expected that the use of a racking system will have little effect on the imperviousness of the CSP Location, both above and below ground, as the area of the piles compared to the area of the CSP Location is minimal. Re-vegetated ground cover will be located in and around the base of the solar panel racking. The facility will include solar panel areas (including combiner boxes, solar panels, racking and piles), electrical conduit, inverters, control house, access roads, collector lines, and a perimeter fence. Foundations for infrastructure are anticipated to be piles (for solar panel areas) and concrete pads (for inverters and control house). Permanent gravel access roadways will be constructed using a suitable depth of granular material. The entire CSP, with the exception of new access roads, is anticipated to be covered with low growing perennial vegetation.

3 GENERAL OPERATIONAL GUIDELINES

The CSP is committed to operating in the following manner:

- Ensure approvals are in place prior to beginning construction or operations;
- Follow approval conditions;
- Conduct reporting as required by approval conditions;
- Practice good housekeeping;
- Understand the emergency response plans in place;
- Conduct inspections as required;
- Maintain equipment;
- Report incidents;
- Participate in inspections whether internal, external or regulatory;
- Be a good neighbour;
- Keep abreast of changing regulations;
- Manage waste appropriately;
- Maintain vegetative cover and control weeds;
- Prevent erosion;
- Control surface water releases;
- Minimize impact to and effectively care for top soil;
- Communicate and share knowledge; and,
- Maintain records.

4 ACCOUNTABILITY

The EPC Contractor (the "Contractor") will be competitively selected prior to construction and will be accountable for ensuring environmental compliance during the construction of the CSP. All incidents that qualify as being in non-compliance of applicable laws, regulations, or commitments made by the CSP and/or specific approval conditions by regulators, shall be reported by the Contractor to PACE. PACE shall take necessary steps to rectify the situation, which may include appropriate notification of regulators, implementation of suitable mitigation measures, and record keeping of the circumstances that resulted in the non-compliance, including any remedial measures taken and any recommendations for future monitoring.

5 CONSTRUCTION/OPERATIONS MANAGEMENT

To ensure that procedures are followed to reduce or eliminate impacts on the environment, reduce liability and promote compliance with applicable regulatory requirements, the following may be implemented.

5.1 Material Handling & Storage

The following material handling and storage procedures or other measures as authorized by the Contractor should be followed:

1. Potentially hazardous materials (e.g., fuel) will be stored and handled at dedicated areas in accordance with all regulatory requirements.

2. All hazardous materials will be labeled and stored in accordance with applicable regulatory requirements.

3. Any hazardous materials will be transported in accordance with the Dangerous Goods Handling and Transportation Act.

5.2 Spill Response

There are no liquids in Solar Photovoltaic (PV) panels, as they use crystalized silicon to generate electricity. Similarly, no liquids are included in the solar PV racking or piles which are typically aluminum and galvanized steel, respectively. There is minimal risk for a potential hazardous spill through the construction and operations of a solar PV facility.

Sources of contaminants at solar projects are few and generally limited to:

1. **Transformer Oil**: Routine maintenance helps avoid transformer leakage. A transformer leak can cause land contamination and other safety risks. Knowing if a leak is present and planning for maintenance to repair or replace it can be key in keeping energy generation at a maximum. There are several ways to carry out preventive maintenance in transformers; PACE has chosen to remotely monitor all levels and conditions (temperature, pressure), of the biodegradable oil in inverter transformer stations onsite. Low levels indicating possible spills will be alarmed to notify the CSP Operator

2. **Oil spills associated with maintenance vehicles**: Routine maintenance and travel associated with normal vehicle operation can result in incidental surface soil contamination from leaking service vehicles. Unless a vehicle has a catastrophic failure resulting in release of motor oil or hydraulic fluid, incidental spills associated with normal equipment operations are not expected to be significant. In the event of catastrophic failure, spill response as outlined in Section 6.2.1 would be initiated.

The following summary of potential effects is provided from the *Assessment of the Environmental Performance of Solar Photovoltaic Technologies* (Environment Canada, 2012).

> "There are no emissions associated with the operational or use phase of PV modules. The modules are enclosed and sealed within two glass modules, and therefore there are no expected emissions while the modules are in use."

5.3 Basic Spill Response Procedure

In the event of a spill, the following response will be implemented:

1. Assess for immediate safety hazards.
2. Eliminate the spill source and contain, if possible.
3. Notify the appropriate personnel.
4. Notify Regulatory Agencies, as required.
5. Recover any spill material.
6. Initiate waste management procedure, if necessary.
7. File an incident report, as necessary, per regulatory requirements.
8. Identify remediation options and requirements and implement as approved.
9. Waste materials that are generated from a spill will be minimized and managed so that there are no concerns with disposal.

5.4 Waste Management

All domestic, construction and operations waste will be disposed of at an approved landfill by the Contractor or reputable professional waste management companies. All hazardous waste will be disposed of at an approved hazardous waste disposal facility.

6 CONSERVATION & RECLAMATION PLANNING

As per Conservation and Reclamation Directive for Renewable Energy Operations, 2018 (Government of Alberta – Alberta Environment and Parks), PACE will complete a Pre-Disturbance Site Assessment (PDSA) at the CSP, prior to the start of construction.

A Conservation and Reclamation Plan - Desktop Review Assessment was completed for the CSP on May 25, 2023

7 SOILS HANDLING

Although the PDSA has not yet been completed, the following information provides general guidance on soils handling until such a time that site specific soils information is collected.

All soil stripping and leveling is anticipated to use a two-lift soil stripping method but this will be determined following completion of the Conservation and Reclamation Plan, which includes field collected information on soils.

7.1 Soil Disturbance Timing

Construction procedures which involve surface disturbance such as stripping, grading or travelling on un-stripped soil will be limited to an as-needed basis, and ideally performed only once, if possible. When surface disturbance is required, it will be conducted under suitably dry and/or frozen ground conditions, as much as possible. This helps to minimize the potential disturbance to un-stripped sod/topsoil and allows construction to take place unimpeded by most adverse weather. Once construction is complete, the soil will be reseeded with a seed mix to preserve the soil and reduce erosion.

7.2 General Soil Management

The following table outlines various activities and potential considerations with regards to soil activity and presents mitigation measures to reduce or eliminate potential negative impacts on the environment.

Activity/Concern	Mitigation
Wet/Thawed Soil Conditions	• Minimize use of heavy machinery in the event of wet or thawed soil conditions to reduce terrain disturbance and soil structure damage. • Initiate contingency measures once one of the following indicators occurs: excessive rutting; wheel slip, build-up of mud on tires and cleats, formation of puddles, and/or tracking of mud down the road as vehicles leave the site. • Limit equipment traffic to the late afternoon or early morning when ground conditions are frozen or delay construction until soils dry or become frozen. • Restrict construction vehicle traffic to equipment with low-ground-pressure tires or wide pad tracks.
Topsoil Salvage Schedule	• For construction scheduled to occur during frozen conditions, attempt to pre-strip topsoil prior to freeze-up, if feasible. Attempt to have all topsoil salvage completed prior to November 15th, where possible. • If construction is scheduled to occur during non-frozen conditions, post-pone topsoil salvage until after spring break-up when ground conditions are not excessively wet for construction.

Activity/Concern	Mitigation
Topsoil Salvage- Non-Frozen Conditions	• Salvage topsoil on all lands from the travel lane and all areas that will be subject to grading. • Restrict the extent of topsoil salvage wherever possible; • If topsoil is being degraded, consider installing matting (or equivalent) to protect topsoil degradation.
Topsoil Salvage - Frozen Conditions	• Reduce the area of land subject to topsoil salvage during frozen conditions to areas that will be subject to grading. • Limit topsoil stripping activities to specialized equipment capable of accurately separating variable depths of topsoil from subsoil (*e.g.*, frozen topsoil cutter, if available). If a frozen topsoil cutter/mulcher is not available, rip frozen topsoil to the same depth as the salvage requirements. • Do not salvage topsoil during frozen conditions unless the construction area will be graded. Implement the Wet/Thawed Soils Contingency Plan (see above) if thawed conditions are encountered during winter construction.
Stripping Depth	• Salvage all available soils to colour change that may be visible between soil layers or as indicated in the Pre-Disturbance Site Assessment.
Wind Erosion of Topsoil Windrow	• Erosion-prone soils require wind erosion protection during drought conditions. Tackify or apply water or pack the topsoil windrow with approved equipment. Application of a tackifier following topsoil removal can be more cost effective than repeated watering of topsoil windrows and piles. • Other options include: flattening the windrows to reduce the erosion-prone surface and reducing the time between stripping and replacement.
Grading	• Salvage topsoil from areas to be graded and store in a location that will not allow for mixing of topsoil with excavated subsoil and graded material. • The area stripped is to correspond to the area to be graded.
Spoil Storage	• During non-frozen conditions on cultivated lands, place excavated soil material on the stripped area adjacent to the excavation. Ensure enough workspace is available to allow for a sufficient distance to be left in place between the soil and the excavation to reduce the risk of soil material sloughing into the excavation. • During frozen conditions, place excavated soil material on a buffer of snow, if available. Otherwise place excavated material on the unstripped topsoil adjacent to the excavation. Ensure enough

Activity/Concern	Mitigation
	workspace is available to allow for a sufficient distance to be left in place between the soil and the excavation to reduce the risk of soil material sloughing into the excavation.
Dewatering	• Pump water onto stable and well-vegetated areas, tarpaulins or sheeting in a manner that does not cause erosion or any unfiltered or silted water to directly re-enter a watercourse. Place pumps on polyethylene sheeting above the high-water mark of the watercourse. • Ensure all erosion control measures are in place to direct run off and reduce the potential for erosion.
Backfilling	• To the extent feasible, attempt to schedule delivery of imported fill so it can be installed directly into the excavation upon arrival at the site rather than being temporarily stored prior to being backfilled. • Avoid mixing snow into backfill material. • Feather out excess spoil material across the area that has been stripped of topsoil. Avoid mixing topsoil and feathered subsoil material. Blend feathered material into the natural grade of the area to not change local surface drainage patterns.
Excess Spoil	• Dispose of excess spoil material on site.

7.3 Sediment and Erosion Control

The lands proposed for development are agricultural. Although the solar panels themselves are impervious, rainwater will land on the solar collector panels and run off directly onto the ground below, and immediately surrounding, the individual panels. Minimal erosion is expected beneath each solar panel, particularly once the ground cover vegetation is re-established following construction. The overall effects of the runoff generated from the solar panels is anticipated to be minimal, as the majority of the ground cover during the operations phase will improve hydrologic conditions relative to existing conditions (i.e., longer duration flow paths and reduced runoff potential).

Guidelines, measures and best management practices for erosion and sediment control include, but are not limited to:

- Develop and implement Erosion and Sediment Control (ESC) measures.
- Install, monitor, and maintain ESC measures (i.e., erosion fencing) around the CSP footprint, where there is a reasonable risk of erosion impacts (e.g., proximity to tree stands, moderate to steep slopes, etc.) for the duration of the construction or decommissioning activities.
- Clearly delineate work area using erosion fencing or other suitable barrier to avoid accidental damage or removal of retained species.
- Place the erosion fencing, or other barrier, as far away as practicable from any tree stands, and no closer than the dripline.

- Stabilize all disturbed areas, by:
    - Immediately installing temporary erosion control measures; and,
    - Allow measures to remain in place until vegetation or other long-term erosion control methods are fully established and functioning.
- Construction may be halted when adverse conditions caused by heavy rains or other weather exist.
- Temporary erosion controls will be installed prior to any disturbance in an erosion prone area; and,
- Erosion controls will be properly maintained and reinstalled as necessary until replaced by permanent erosion controls (where necessary) or soils and vegetation restoration is complete.

8 WEED MANAGEMENT

PACE recognizes that each operational region is unique and that weed management that is effective in one area, may not be effective in another. Vegetation control will be based upon the species identified, discussions with the landowner, seed mix professionals and what seed mix has been successful grown to choke out potential weeds.

PACE will take the following approach to vegetation management:

1. Identification
2. Prevention
3. Procedures for Vegetation Control
4. Monitoring

8.1 Identification

Species identified during site assessments will be compared with those listed in the *Alberta Weed Control Act.*

8.2 Prevention

Prevention is vital to an effective weed management program. PACE will attempt to minimize the potential for weed introduction/invasion by ensuring all equipment is cleaned prior to entering the site.

8.3 Procedures for Vegetation Control

As no single method of vegetation control may be effective, the following procedures may be implemented in a synergistic manner for all operations on CSP lands.

8.3.1 Chemical Controls

If required, permits will be obtained from regulatory bodies for the application of herbicides on the CSP lands, if application is deemed necessary. All applicable regulations and requirements will be adhered to if applying herbicides to any area of the CSP lands.

8.3.2 Mowing

Mowing may be required to alleviate problems as they occur or until weeds are controlled and seeded vegetation has established, as appropriate.

8.3.3 Grazing:

Sheep may be allowed to graze the lands during operations. Sheep are considered to be an excellent means for control of herbaceous weeds. Weedy forbs are generally the most problematic weeds in grasslands, and sheep are specially adapted to forage on this particular plant type; therefore, sheep are the ideal candidate for control of weeds in perennial grasslands. Should weeds become problematic, adaptive management of sheep grazing can be used to target specific problem weeds; this can be accomplished through modifying stocking density and/or seasonality of grazing based on the particular features of the weedy species.

8.4 Monitoring

The presence and abundance of weeds located on the CSP lands will be monitored by construction and operations staff to ensure the management program outlined above is implemented and effective at controlling weed introduction or invasion.

8.5 Seeding

A diverse seed blend of perennial grass will be used following construction of the facility. The species composition will be determined at a later date in consultation with the landowner.

9 WATERCOURSE PROTECTION

No infilling of the watercourses is expected as part of the CSP as none are present.

10 WETLAND PROTECTION

There are no Semi-permanent, Permanent or Intermittent wetlands (*i.e.*, Class IV, V or VI) with infrastructuere placed over top within the CSP, on wetlands defined in the Alberta Wetland Classification System (GOA 2015a). The Project design completely avoids any wetlands.

For general mitigation to surrounding waterbodies and watercourses in the area, a stormwater management plan will be developed to adequately manage surface runoff associated with the CSP to ensure the existing drainage patterns within the project are not compromised. Pre-construction drainage patterns should be matched post-construction where feasible to reduce changes in downstream flows.

11 EXCESS MATERIAL & WASTE

Prior to decommissioning of the CSP, the Proponent will complete a waste audit and prepare a waste reduction work plan in accordance with any applicable guidance, requirements, and/or relevant regulations in effect at the time of decommissioning.

Major pieces of equipment will be sold, recycled or reused, wherever possible. Components such as the cabling would likely have a high resale value due to copper and aluminum content, thus improving the potential for sale or recycling of major components. As much of the facility will consist of reusable or recyclable materials, there will be minimal residual waste for disposal resulting from decommissioning of the CSP.

Small amounts of registerable waste materials will be managed in accordance with applicable legislation. Residual non-hazardous wastes will be disposed of at a licensed landfill in operation at the time of decommissioning.

Typical components and methods of disposal are expected as follows:

Project Component	Expected Method of Disposal
Solar Panels	Refurbish, reuse and/or recycle
Steel and aluminum support racks	Refurbish, reuse and/or recycle as scrap
Collector lines	Recycle
Inverters, transformers, circuit breakers	Refurbish, reuse and/or recycle as scrap
Concrete (foundations)	Crush and recycle
Hazardous materials	Dispose of as per applicable regulations
Non-hazardous materials (i.e., wood waste; geotextiles)	Recycle or dispose of in approved landfill facility

12 DECOMMISSIONING

The requirements for environmental protection outlined in this document would be maintained and followed during decommissioning activities. Most, if not all, activities during decommissioning would be comparable to the construction phase.

All decommissioning and reclamation activities will be completed as per the regulatory requirements in place at the time of such activities.

12.1 Pre-dismantling Activities

At the end of the life, the CSP will be de-energized and isolated from external electrical lines and interconnection points. Staging areas for equipment placement prior to final removal from the CSP lands will be determined and constructed as per this document or construction requirements in place at the time.

12.2 Equipment Dismantling and Removal

12.2.1 Solar Panels and Rack Supports

Each solar panel will be mounted on a galvanized steel and/or aluminum rack system. Each panel will be disconnected from the electrical system and the mounting rack. Following removal, the panels will be removed to an adequately located staging area and loaded for transport to either an approved recycling and/or disposal facility.

All rack system surface components and subsurface components, including those related to foundations, will be removed to a minimum of 1.5m depth below ground surface. This may involve either complete removal of support posts or cutting posts/foundations to a depth of 1.5m. A depth of 1.5m has been included as it is a standard burial depth for oil and gas pipelines; telecommunications lines, etc., and once removed, allows for future agricultural land without risk of striking infrastructure below this depth.

12.2.2 Panel Recycling

Panels removed will be recycled by third party vendors using processes in place at the time of panel decommissioning.

12.2.3 Electrical Equipment and Collector Lines

Inverters and inverter step-up transformer skids, including the associated pilings or supports, will be removed from the location, sent to an adequately located staging area and loaded for transport to an approved recycling and/or disposal facility.

Underground lines that are buried less than 1.5m below grade will be removed.

All work to decommission the overhead/underground connection lines will be conducted within the boundaries of the CSP to the Point of Common Coupling, after which point the infrastructure is owned by Fortis.

12.2.4 Access Roads

All access roads will be removed unless they are requested by the landowner to remain in place. The exception to removal of the access roads and associated culverts or their related material would be upon written request from the landowner to leave all or a portion of these facilities in place for future use by the landowner.

Road restoration includes removal of any geotextile material beneath the roads, including granular material. All granular and geotextile materials would be removed from the site by dump truck. Topsoil will be redistributed to provide substantially similar ground cover as was present within the areas prior to site disturbance.

12.2.5 Storage Areas and Perimeter Fence

Storage areas will be restored unless they are requested by the landowner to remain in place. The exception to removal of the storage areas or their related material would be upon written request from the landowner to leave all or a portion of these facilities in place for future use by the landowner.

Storage area restoration includes removal of any geotextile material beneath the area, including granular material. All granular and geotextile materials will be removed from the site by dump truck. Topsoil would be redistributed to provide substantially similar ground cover as was present within the areas prior to site disturbance.

Any foundations associated with these facilities will be removed to a depth of at least 1.5m below original grade or to the depth originally installed, if less than 1.5m below original grade.

Perimeter fencing will be removed and recycled or re-used. Where the landowner prefers to retain the fencing, these portions of fence would be left in place.

13 RECLAMATION PLAN

The objective of the reclamation plan is to remove all garbage from the site, control erosion as necessary, restore soil capability, and reclaim the disturbed areas to pre-disturbance conditions.

Reclamation will take place once construction equipment has left the location or as soon as soil and weather conditions permit. The landowner will be notified prior to the initiation of the reclamation activities and again upon completion. Reclamation success is dependent upon landowner communication and favourable conditions in the root zone for optimum crop growth. The key soil factors that determine root zone quality include the water holding capacity, organic content, structure and consistency, salinity, nutrient balance and soil regime.

PACE will complete a Reclamation Certificate Site Assessment and apply for a reclamation certificate for any and all areas (e.g., temporary workspace, temporary access) used to construct, operate and reclaim the CSP. The application may be for all, or parts, of the CSP and will be specific with respect to the footprint area for which the application is being made.

The 2010 Reclamation Criteria for Wellsites and Associated Facilities provides the framework for how final reclamation success will be determined at the time of reclamation certification. As the lifetime of

the CSP is estimated at greater than 20 years, it would be expected that the updates to the above-mentioned criteria will be in effect.

13.1 Final Project Reclamation

Reclamation of the CSP will be completed to typical reclamation practice at the time. The following would be considered a generic plan in line with current practice.

13.1.1 Anticipated Timeline

Decommissioning	Activity	Typical Timeline
Solar Site/Access Roads	Removal of panels and infrastructure	May – August
	Removal of transformers	May – August
	Partial excavation and removal of concrete base to approximate depth of 1.5m	June – August
	Removal of gravel pads and gravel from access roads	July – August
	Recontouring of pad and access roads	July – August
	Reclamation of surface soils	August – September
	Re-seeding	September - October
Power infrastructure	Removal of any aboveground poles and lines	May – July
	Belowground collector lines will remain in place if depth greater than 1.5m	N/A
	Removal of inverters and associated infrastructure	May – July
	Removal of gravel pads	June – July
	Removal of access roads	July – August
	Recontouring of pad and access roads	August – September
	Reclamation of surface soils	September - October

13.2 Soils

The following steps will be considered in regard to soil reclamation at the CSP site:

1. Upon removal of equipment, all disturbed areas are to be re-contoured to pre-construction conditions. Loading of slopes with unconsolidated material will be avoided during slope re-contouring.

2. All grades and drainage will be restored by removing any culverts and fills.

3. Topsoil replacement should not be started until all subsoil levelling, decompaction and cleanup has been completed, to prevent mixing by levelling after topsoil replacement.

4. Remove all foreign materials including geotextile.

5. Fences and culverts are to be restored to meet or exceed pre-construction conditions.

6. Any areas with rutting or erosion gullies will be re-contoured and all stripping will be replaced evenly over all portions of disturbed areas. Replacement of soils during wet weather or high winds will be avoided. This will prevent damage to soil structure and reduce the potential for erosion of topsoil.

7. Once sub-soil has been adequately reclaimed, topsoil will be replaced. Replaced topsoil will be diced to alleviate compaction and break up aggregates then harrowed to create an adequate seed bed.

8. Complete re-contouring and stabilization of disturbed areas. Smooth water channeling ruts and outside berms. Ensure that all erosion control and water management measures (e.g., water bars, drainage dips, culverts and ditches) are functioning per design.

9. Where soils have been disturbed, implement appropriate reclamation procedures (i.e., seeding, erosion blankets, slash rollback, straw crimping, etc.) to promote stability of the site, soil preservation, and plant re-establishment. Ensure the natural drainage is restored.

10. Spread mulch, wood chips, straw/hay, or other organic material over areas where the soil is susceptible to erosion, pulverization, or compaction.

11. Rocks/stones exposed on the surface due to construction activity will be removed prior to and after topsoil/surface material replacement. The concentration of surface and profile rocks will be equivalent to, or better than the surrounding fields. Rocks/stones will be disposed of at a site approved by the landowner.

13.3 Vegetation

The following steps will be considered for vegetation re-estabishment during the reclamation phase at the CSP site:

1. The species composition will be determined at a later date in consultation with the landowner.

2. Fertilizer may be needed in some cases but will not be applied unless approved by the landowner(s).

3. If livestock are proposed to be frequently grazing through the area, reclaimed areas will require access restrictions (fencing) to ensure newly seeded/fertilized areas are not disturbed. Fencing may be electrical, temporary and/or permanent depending upon the requirements and grazing practices of landowners.

4. Locations should be monitored monthly during growing seasons. Typical monitoring should occur in June, July and August. Monitoring will consist of visually inspecting the areas to ensure vegetation has been established and is healthy, erosion has been mitigated, and landowner concerns have been addressed.

14 Post Construction Monitoring

Due to active farming proposed to occur during operations between solar arrays which would significantly inhibit post construction monitoring methods, no post construction monitoring is proposed.

15 Clubroot Management Protocol

1. PACE will consult with landowners to determine if there is known clubroot within the CSP on lands with infrastructure.
2. PACE will take soil samples or samples of canola / mustard species planted at the time of sampling at cultivated quarter sections with CSP infrastructure to determine if clubroot disease is present. PACE will use standard sampling methodologies, as per approved laboratory requirements. Stirling will take these samples prior to construction.
3. Clubroot Sampling:
    a. Park vehicle in an approach or off to the side of the road in a safe location. Do not drive or park vehicle in fields.
    b. Locate and verify field on map. Record location on map and in Inspection Report.
    c. Visually assess field for suspect infection of clubroot (premature ripening, yellowing or browning of plants) in crop.
    d. Before entering field, wear a protective disposable slipper over their footwear to stop the transfer of soil from one site to the next.
    e. The crop shall be walked in a pre-determined travel pattern (such as a W configuration). Areas of potential contamination such as field entrances, sloughs, water runs should be closely examined. A minimum of **six** plants should be pulled in this travel pattern so as to give the best representation of the crop.
    f. When the presence of clubroot is found upon a plant, take a root sample, bag the sample, record and mark with field reference location. If a positive sample is identified in the field of a producer who has not previously had clubroot, lab samples must be taken for confirmation.
4. Record Keeping Guidelines:
    a. Keep records on all fields sampled.
    b. Information to record on inspection form:
        i. Field reference number
        ii. Legal land location
        iii. GPS location of field
        iv. Surveyor
        v. Date inspected/sampled
        vi. Size of field
        vii. GPS locations of sites sampled
        viii. Pictures of field
        ix. Date samples submitted
        x. Lab numbers for samples submitted
        xi. Results of samples
        xii. If landowner or other witness present, have them sign field form.

In the event clubroot is detected, PACE will implement a clubroot mitigation plan. PACE will:

1. Ensure that all construction equipment arrives on the right-of-way in a clean condition to reduce the risk of introducing or spreading clubroot disease on cultivated lands.
2. The general spread prevention strategy is to thoroughly clean vehicles and equipment such that topsoil and vegetation from cultivated fields that might contain clubroot spores and/or weed seeds are not carried by equipment/vehicles to adjacent fields.
3. After removal of soil lumps, wash equipment with a power washer.
4. Finish by misting equipment with disinfectant. Recommended products include 1 to 2 per cent active ingredient bleach solution (UFA carries 12 per cent sodium hypochlorite in 5-gallon pails or 45-gallon drums), or HyperOx or EcoClear. The use of a disinfectant without first removing soil is not recommended because soil inactivates most disinfectants. A twenty to thirty-minute wet period is necessary for good efficacy.
5. Disinfectant footbaths can be an effective first line of defense in a biosecurity program. However, footbaths are not able to completely eliminate biosecurity risks in all situations. Disposable foot coverings should be utilized where possible and in combination with a foot bath to more fully minimize biosecurity risks associated with soil-borne diseases like clubroot.
6. In situations where fields are lightly infested only near the current access, create a new exit at another edge of the field if possible.
7. If support vehicles can be left along roads or in ditches, without creating traffic safety concerns, these vehicles will not require cleaning.
8. Water used to wash vehicles will be contained and managed so as to adhere to provincial and municipal regulations, and landowner requirements.
9. Once topsoils are stripped from the working areas, equipment that works and uses access along clay soils will not require cleaning.
10. Once topsoils are stripped, consider spraying piled topsoil piles with hydro- mulch to limit wind erosion of topsoils onto the working areas.

16 REFERENCES

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