



**WEED AND VEGETATION
MANAGEMENT PLAN
FOR THE
TRANS MOUNTAIN PIPELINE ULC
TRANS MOUNTAIN EXPANSION PROJECT
NEB CONDITION 45**

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Prepared for:



TRANSMOUNTAIN

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TABLE OF CONCORDANCE

National Energy Board (NEB) Condition 45 is applicable to the following legal instruments: Certificate of Public Convenience and Necessity (CPCN), OC2, OC49, Temp, Pump 1, Pump 2, Tanks, and Deact. Terminology used to describe the legal instruments here matches that used in the NEB report. Table 1 describes how this Plan addresses the Condition requirements applicable to Project activities.

TABLE 1

LEGAL INSTRUMENT CONCORDANCE WITH NEB CONDITION 45: WEED AND VEGETATION MANAGEMENT PLAN

NEB Condition 45	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
Trans Mountain must file with the NEB for approval, at least 4 months prior to commencing construction, an updated Weed and Vegetation Management Plan (WVMP) for the Project that includes:								
a) a summary of supplementary survey results, including pre-construction weed surveys,	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan	Section 4.1 of this Plan; Appendix B; Appendix C to J of this Plan
b) a justification of the adequacy of such surveys;	Section 4.1 and Appendix B of this Plan	Section 4.1 and Appendix B of this Plan	Section 4.1 and Appendix B of this Plan	Section 4.1 and Appendix B of this Plan	Section 4.1 and Appendix B of this Plan	Section 4.1 and Appendix B of this Plan	Section 4.1 and Appendix B of this Plan	Section 4.1 and Appendix B of this Plan
c) measurable goals;	Section 1.3 of this Plan	Section 1.3 of this Plan	Section 1.3 of this Plan	Section 1.3 of this Plan	Section 1.3 of this Plan	Section 1.3 of this Plan	Section 1.3 of this Plan	Section 1.3 of this Plan
d) criteria describing when and where problem vegetation will be managed for each project phase, including pre-construction, construction, post-construction, and operations;	Section 5.1 and 5.2 of this Plan	Section 5.1 and 5.2 of this Plan	Section 5.1 and 5.2 of this Plan	Section 5.1 and 5.2 of this Plan	Section 5.1 and 5.2 of this Plan	Section 5.1 and 5.2 of this Plan	Section 5.1 and 5.2 of this Plan	Section 5.1 and 5.2 of this Plan
e) management procedures and a decision-making framework for selecting the appropriate treatment measures, including how stakeholder concerns and potential adverse effects of treatment measures will be considered;	Section 5.2 and Section 2.0 of this Plan	Section 5.2 and Section 2.0 of this Plan	Section 5.2 and Section 2.0 of this Plan	Section 5.2 and Section 2.0 of this Plan	Section 5.2 and Section 2.0 of this Plan	Section 5.2 and Section 2.0 of this Plan	Section 5.2 and Section 2.0 of this Plan	Section 6.0 of this Plan
f) short- and long-term vegetation monitoring;	Section 6.0 and 8.0 of this Plan	Section 6.0 and 8.0 of this Plan	Section 6.0 and 8.0 of this Plan	Section 6.0 and 8.0 of this Plan	Section 6.0 and 8.0 of this Plan	Section 6.0 and 8.0 of this Plan	Section 6.0 and 8.0 of this Plan	Section 6.0 and 8.0 of this Plan
g) a summary of Trans Mountain's consultation concerning a) to e) with Appropriate Government Authorities, landowners, invasive plant councils or committees, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them; and	Section 2.0 and Appendix L of this Plan	Section 2.0 and Appendix L of this Plan	Section 2.0 and Appendix L of this Plan	Section 2.0 and Appendix L of this Plan	Section 2.0 and Appendix L of this Plan	Section 2.0 and Appendix L of this Plan	Section 2.0 and Appendix L of this Plan	Section 2.0 and Appendix L of this Plan
h) confirmation that the relevant Environmental Protection Plans (EPPs) will be updated to include any relevant information from the WVMP.	Appendix B; Appendix C to J of this Plan	Appendix B; Appendix C to J of this Plan	Appendix B; Appendix C to J of this Plan	Appendix B; Appendix C to J of this Plan	Appendix B; Appendix C to J of this Plan	Appendix B; Appendix C to J of this Plan	Appendix B; Appendix C to J of this Plan	Appendix B; Appendix C to J of this Plan

EXECUTIVE SUMMARY

The Weed and Vegetation Management Plan (WVMP or the Plan) was prepared to meet National Energy Board (NEB) Condition 45 regarding the Trans Mountain Pipeline ULC (Trans Mountain) Expansion Project (“the Project” or “TMEP”). The WVMP has been developed following extensive consultation with Aboriginal groups, regulatory authorities, invasive species councils and stakeholders. The WVMP is an update to the WVMP that was previously included in the NEB Facilities Application Pipeline Environmental Protection Plan (EPP) (Volume 6B). This Plan contains components of the first WVMP, with additional detail. The WVMP is aligned with information from other plans that have been prepared in support of the Project and together form the Project Environmental Plans.

The WVMP outlines procedures that will be implemented to identify, prevent, control, contain, and monitor the introduction or spread of invasive plant species (weeds) along the Project area and adjacent lands. The purpose of the WVMP is to provide a framework to manage the introduction of new species and the growth and spread of existing invasive plants. Priority invasive plants pre-construction and construction are Prohibited Noxious (Alberta [AB]) and Proposed Prohibited Noxious (British Columbia [BC]) species and regional high priority invasive plants. All other weed species of concern (Appendix A) will be managed during the reclamation and operations phases of the Project.

The WVMP provides management measures for pre-construction, construction and post-construction phases of the Project and include pre-construction surveys of susceptible areas and control treatments, where warranted; promoting awareness of the primary invasive species of concern and weed prevention techniques; and treating and monitoring weed infestations as warranted.

The WVMP includes mitigation and control measures for containment species and species that regional priority invasive species that require special management procedures. The WVMP identifies site-specific management techniques for invasive species at known locations of organic properties, plant species at risk, traditional use sites, sensitive wildlife habitats, aquatic habitats and areas that did not contain invasive plants when surveyed in 2015. The need for treatment and the type of treatment in these areas will be determined in consultation with regulatory authorities and invasive species specialists, and a process that will be followed to identify treatment type in species at risk critical habitats has been defined.

Details regarding the invasive species of concern identified within the Project Footprint in AB and BC are provided in (Appendix A) as well as a summary of invasive species surveys completed to date by KP range (Appendix B). The Appendices for each Project KP range (Appendices C to I) and facilities (Appendix J) provide a list of priority invasive species for pre-construction and construction as well as their effective treatment methods, the location and type of sensitive areas that may occur in the area, and the known location of each priority species. Appendix K contains an example of the pre- and post-treatment monitoring forms. Appendix L provides summaries of public consultation, Aboriginal engagement and regulatory consultation pertaining to weed and vegetation management.

The information in this Plan will be included in the updated EPPs prepared for the Project to ensure mitigation and restoration measures are implemented. This Plan will be provided in Section 5.0 of Volume 6 of the Environmental Plans. A Biosecurity Plan (Volume 6 of the Environmental Plans) has been prepared to outline equipment cleaning and sanitation procedures and other biosecurity protocols. Additionally, the results of any post-construction monitoring will be provided in the post-construction environmental monitoring reports to be filed by Trans Mountain as per NEB Condition 151.

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1.0 INTRODUCTION

The Weed and Vegetation Management Plan (WVMP or the Plan) was prepared to meet National Energy Board (NEB) Condition 45 regarding the Trans Mountain Pipeline ULC (Trans Mountain) Expansion Project (“the Project” or “TMEP”). The Plan was submitted to Appropriate Government Authorities, potentially affected Aboriginal groups, invasive species councils and stakeholders on September 16, 2016 for review. Feedback was requested by January 13, 2017, although additional feedback was considered up until February 2017. Trans Mountain incorporated any feedback into the final Plan or has provided rationale for why input has not been included in Appendix L.

Since the September 2016 release of the draft Plans, engineering design has continued to progress and there have been design updates that are described in detail in the TMEP Fall 2016 Project Updates (www.transmountain.com/environmental-plans). All of the design updates have been reviewed, and the Project design updates that are relevant have been incorporated into this Plan. Any subsequent design updates will be reviewed in consideration of impacts to this Plan.

This Plan has been prepared to outline methods and management procedures that will be implemented to identify, prevent, control, contain and monitor the introduction or spread of invasive plant species (weeds) in the Project area and adjacent lands. The Plan applies to the Project Footprint and was developed using industry standards and Best Management Practices (BMPs) and is in compliance with existing laws and regulations. The WVMP results from consultation with affected Aboriginal groups, landowners and/or occupants, regulatory authorities, local governments and regional invasive species councils.

1.1 Project Description

Trans Mountain filed its Facilities Application (the Application) with the NEB in December 2013. In developing its Application, Trans Mountain commenced an engagement and communications program of extensive discussions with landowners, engagement with Aboriginal groups and consultation with affected stakeholders. This program was intended to gather input from these groups into the application and supporting Environmental and Socio-Economic Assessment (ESA), and to continue to assist Trans Mountain in the design and execution of the Project. Trans Mountain is also working with various federal, provincial, and municipal authorities to carry out the necessary reviews, studies and assessments required for the Project.

For ease of description, the following terms are used.

Kilometre Post (KP): describes distances measured along the centreline of the pipeline.

Project Footprint: includes the area directly disturbed by surveying, construction, clean-up and operation of the pipeline, as well as associated physical works and activities (including the temporary construction lands and infrastructure, the pipeline, reactivation, facilities, the Westridge Marine Terminal and access roads). For clarity, specific components of the Project Footprint are further described by Trans Mountain below.

- Temporary construction lands and infrastructure refers to preparatory works to support Project construction and includes temporary camps, stockpile sites, equipment staging areas and borrow pits located on land that has been previously disturbed, as well as works on access roads within the first 10 km of each designated construction spread. For ease of assessing Project interactions, these access roads are considered as part of the overall access road network.
- Pipeline construction footprint refers to the total area used to construct the pipeline and includes the right-of-way and temporary workspace.
- Reactivation of currently deactivated pipeline segments include an engineering assessment under Section 45 of the *National Energy Board Onshore Pipeline Regulations* and associated construction activities. Currently known ground disturbance activities and associated access (as of December 2016), were assessed to determine the Project interactions. For ease of assessing Project interactions, these access roads were considered as part of the overall access road network.

- Facilities refer to pump stations, terminals (Edmonton, Sumas and Burnaby), and associated infrastructure (*i.e.*, traps), most of which are located on land that has been previously disturbed. Westridge Marine Terminal has infrastructure located on land and in the marine environment, and is included in the Facilities component of the Project.
- Access roads include new temporary and permanent roads and existing roads that may require upgrades or improvements. For ease of assessing Project interactions, this includes the access roads to be developed as part of temporary construction lands and infrastructure, as well as those accesses associated with reactivation.

Contingency Alternate Routes: refers to three alternate pipeline route segments that have been assessed for use if construction on the preferred route is not feasible. These are not included in the Project Footprint defined above since they are considered contingency alternates.

- Raft River, in British Columbia (BC) (KP 713.1 to 714.4), is an alternate open cut contingency alignment. The preferred primary crossing method, a horizontal directional drill (HDD), does not support an open cut contingency crossing method at the same location.
- Pembina River, in Alberta (AB) (KP 133 to 134.7), is an alternate open cut contingency alignment. Similar to Raft River, the preferred primary crossing method (HDD) does not support an open cut contingency crossing method at the same location.
- Westridge Delivery Lines (WDL KP 0.0 to WDL KP 3.4) is an alternate contingency alignment for a trenched installation around the Burnaby Conservation Area in BC. The preferred pipeline corridor requires tunnel construction and does not support a trenched contingency option; therefore, an alternate trenched contingency alignment has been identified.

Variances: as part of the Project Footprint update that occurred in December 2016, a number of route revisions located outside of the Project corridor were identified. Trans Mountain is seeking approval from the NEB in 2017 for these route realignments. All of the variances have been reviewed in consideration of impacts to this Plan and no revisions were required as a result, with the exception of minor adjustments to KP ranges, where applicable. Traditional Ecological Knowledge and Traditional Land Use

Traditional Ecological Knowledge (TEK) and Traditional Land Use (TLU) information was gathered from Aboriginal groups potentially impacted by the Project.

Table 2 outlines concerns raised from Aboriginal groups.

TABLE 2

WEED AND VEGETATION MANAGEMENT CONCERNS RAISED BY ABORIGINAL GROUPS

Aboriginal Group	Weed and Vegetation Management Concern(s) Raised	Specific Sites Identified for Weed and Vegetation Management Concerns	Location in WVMP
Alexander First Nation	Alexander First Nation is concerned about the use of herbicides and pesticides.	No specific sites identified.	Section 5.2
Alexis Nakota Sioux Nation	Alexis Nakota Sioux Nation is concerned that an increase in forest clearing, coal mining, chemical spraying, and the introduction of invasive plants, such as yellow flower, through construction equipment, has led to a decline in various plants, including Seneca root and berries.	No specific sites identified.	Section 5.2
Chawathil First Nation	Chawathil First Nation expressed concern about the use of herbicides to control weeds.	No specific sites identified.	Section 5.2
Ermineskin Cree Nation	Ermineskin Cree Nation requests that during reclamation, foreign plants not be reseeded or introduced along the Pembina River.	Pembina River	Section 5.2
Katzie First Nation	Katzie First Nation is concerned that medicinal and sustenance plants will be polluted by methods to maintain the right-of-way.	No specific sites identified.	Section 5.2.3
Lower Nicola Indian Band	Lower Nicola Indian Band is concerned for the use and impact of herbicides and pesticides on the Project.	No specific sites identified.	Section 5.2
Michel First Nation	Michel First Nation is concerned about the use of herbicides and pesticides.	No specific sites identified.	Section 5.2

TABLE 2 Cont'd

Aboriginal Group	Weed and Vegetation Management Concern(s) Raised	Specific Sites Identified for Weed and Vegetation Management Concerns	Location in WVMP
Paul First Nation	Paul First Nation is concerned about the introduction of invasive plants through equipment used during construction.	No specific sites identified.	Section 5.2
Popkum First Nation	Popkum First Nation is concerned about loss of plant gathering areas and specific plant species, particularly devil's club.	No specific sites identified.	Section 5.2.3
	Popkum First Nation is concerned that herbicide spraying on the Project Footprint will be toxic to humans and the environment.	No specific sites identified.	Section 5.2
Shackan Indian Band	Shackan Indian Band is concerned about knapweed, an invasive vegetation species that is growing on the existing right-of-way.	No specific sites identified.	Section 4.0 and Section 5.0
Simpow First Nation	Simpow First Nation is concerned about the effects of pesticides used on the Project Footprint. Pesticides will affect the plants used for food and medicine, and will also affect the animals that eat the plants.	No specific sites identified.	Section 5.2
	Simpow First Nation is concerned about the potential introduction of invasive plant species during various construction activities, including remediation.	No specific sites identified.	Section 5.2
Skeetchestn Indian Band	Skeetchestn Indian Band is concerned about the introduction of invasive weed species from the Project.	No specific sites identified.	Section 5.2
Stó:lō Collective	Stó:lō community members indicated that the introduction of weeds and invasive species may affect their traditional land use within their traditional territories.	No specific sites identified.	Section 5.2.3
	Stó:lō community members indicated that the use of herbicides may affect their traditional land use within their traditional territories.	No specific sites identified.	Section 5.2.3
	Skowkale First Nation is concerned about vegetation management along pipelines and the use of herbicides.	No specific sites identified.	Section 5.2
Sunchild First Nation	Sunchild First Nation is concerned about the contamination of plants and berries caused by use of herbicides along the Project Footprint.	No specific sites identified.	Section 5.2.3
Tk'emlups te Secwépemc	Tk'emlups te Secwépemc is concerned about the introduction of invasive weed species from the Project.	No specific sites identified.	Section 5.2
Upper Nicola Band	Upper Nicola Band is concerned about the effects of invasive species (knapweed) on traditionally harvested plants and medicines.	No specific sites identified.	Section 5.2
	Upper Nicola Band is concerned about the effects of herbicides and pesticides on traditionally harvested plants and medicines, as well as herbicides and pesticides leaching into waterways within Upper Nicola Band territory and the subsequent effect on plants, animals, and humans.	No specific sites identified.	Section 5.2.3

1.2 Scope of the Weed and Vegetation Management Plan

This WVMP updates the WVMP that was included in the Application Environmental Protection Plans (EPPs). It includes the management of invasive plant species that may be encountered within the Project Footprint (Appendix A). Priority invasive plant species within the Project Footprint were identified through government authority consultation, desktop reviews of existing databases, and field surveys. The WVMP is focused on management of Noxious (AB and BC), Prohibited Noxious (AB) and Proposed Prohibited Noxious (BC) weeds. Noxious weeds are non-native species introduced to AB or BC without the insect predators and plant pathogens that help keep them in check in their native habitats. These species have aggressive growth, are highly destructive, competitive, and difficult to control (BC Ministry of Agriculture 2013). In BC, Proposed Prohibited Noxious weeds are invasive plant species that are either not present in BC or are very limited in their extent, and have been determined to pose a significant threat to the environment, economy or human health (BC Inter-Ministry Invasive Species Working Group [IMISWG] 2016). The species are referred to as Proposed Prohibited Noxious because they are proposed for inclusion in the *BC Weed Control Act*, but at time of writing, they are not included in the Act. Section 4.0 of this Plan provides further detail on weed categories in AB and BC. Other priority invasive plant species are weeds of regional concern, as identified by regional invasive plant councils.

Additional invasive species (*i.e.*, plant and animal pathogens and insect pests) were identified as potential concerns during Project consultation. The Agriculture Management Plan (Volume 6 of the Environmental Plans) includes information on soil-borne pathogens and crop pests.

Incidents of invasive species of concern that may be present in the Project Footprint will be managed and monitored. If warranted, additional corrective measures will be conducted to ensure the management program is addressing current priorities.

1.3 Measurable Goals, Objectives, Indicators and Targets for Invasive Plant Management

The overall goal of the weed and vegetation management program during all phases of the Project is to prevent the spread of noxious and invasive plants in the Project Footprint while ensuring compliance with all pertinent government regulations, including the Federal *Species at Risk Act* and the *BC Wildlife Act*. Goals, objectives, indicators and targets for each phase of the Project are included below.

Project Phase	Goal	Objective (Project Activity)	Measurement Method (monitoring strategy)	Indicator	Measurable Target at Monitoring Year 5
Pre-Construction	Develop a baseline for the condition of the Project Footprint before soil disturbance	Compile existing weed data prior to construction and develop a Project invasive plant infestations database	Activity completed and a summary of the data is included in Appendices C to J	Existing weed data is tracked in a consistent and comprehensive manner that allows it to be utilized for comparison post-construction.	A Project invasive plant database has been developed and is used to track distribution and density of infestations
	Develop a critical habitat and sensitive site database	Compile Project data that identifies the location (Project kilometer post [KP] range) of critical habitat and sensitive sites in the Project footprint.	Activity completed and a summary of the data is included in Appendices C to J	Existing data is tracked in a consistent manner that allows it to be compared to weed data	A Project weed treatment database has been developed and is used to track weed treatments in highly-valued and sensitive areas
	Minimize the spread of priority invasive species during Project activities.	- Identify priority invasive species applicable to the Project Footprint - Define mitigation and control methods for the pre-construction, construction and post-construction phases of the Project - Prepare a list of known invasive species locations	Activity completed and information is included in Appendix A, Section 5.2 and Appendices C to J of the Plan, respectively	Consultation with regulatory agencies and regional invasive species committees has occurred and their input has been incorporated in the priority species lists (Section 4.0 and Appendix A)	Mitigation and control methods for priority weed species and construction phases are included in the WVMP (Section 5.2)
	Implement invasive plant treatments in the Project Footprint during the pre-construction phase	- Conduct weed treatments May to September 2017 - Evaluate treatment success - Implement remedial actions if weed control efforts are not successful	Visual inspection of treated areas before the end of the growing season and a qualitative or quantitative determination of mortality to the targeted species (Treatment will continue until a 98% kill rate is achieved).	There is a decrease in the number of invasive plant species and a decrease in the distribution and density of the weed species in areas that received weed treatment	Locations, type of invasive plant treatment, success of treatment, and remedial actions that occurred pre-construction and weed distribution and density following treatment are tracked in the Project invasive plant database

Project Phase	Goal	Objective (Project Activity)	Measurement Method (monitoring strategy)	Indicator	Measurable Target at Monitoring Year 5
Construction	- Prevent the introduction of noxious or invasive plants that are not known to occur in the region before Project construction. - Minimize the spread of priority invasive species known to occur in the Project Footprint	Include weed management requirements and control techniques for the construction phase of the Project in the Environmental Compliance and Education Program	- Visual inspection of contractor adherence to cleaning station and high weed density zone protocols - Visual inspection of treated areas (i.e., construction contractor treatments will be manual or mechanical and treatment is successful if seed set is prevented)	- Construction managers and Environmental Inspectors have completed the Environmental Compliance and Education Program - Weed treatments completed by the general contractor are documented in the Environmental Inspector's monthly report	- No introductions of noxious or invasive plants that did not previously occur in the region - Seed set of priority weed species is minimized when priority species are growing during construction activities
Post-Construction	- Reduce existing infestations to a level that is less than or equivalent to the level observed pre-construction, including at environmentally sensitive sites - Desired vegetation, that will compete with invasive plants and over time reduce the need for herbicide use, has established on the Project Footprint. - When present, weed cover is equal to or below the acceptable threshold specified in Project management plans (Grassland Survey and Mitigation Plan; Wildlife Mitigation and Restoration Management Plans, [Volume 6 of the Environmental Plans])	Monitor invasive species establishment during the PCEM phase and implement treatments when new invasive plants are found, invasive plant infestations are more extensive than infestations in adjacent lands or when invasive plants are negatively impacting revegetation.	- Vegetation sample plots - Visual inspection of areas that did not contain invasive plant species in pre-construction survey (2015), known locations of regional priority species and high weed density zones - Visual inspection of treated areas before the end of the growing season and a qualitative or quantitative determination of mortality to the targeted species (Treatment will continue until a 98% kill rate is achieved).	- Weed monitoring data is tracked in a consistent and comprehensive manner that can be compared to pre-construction weed survey data - Completed weed treatments are tracked in a consistent and comprehensive manner - Treatment success is evaluated - Remedial actions are conducted and documented if weed control efforts are not successful	- No introductions of noxious or invasive plants that did not previously occur in the region - No expansion of infestations or new infestations of regional priority species (Section 5.2.2 and Appendices C to J) - Invasive plants are not introduced into Invasive Plant Free Zones - In infested areas, weed species and their distribution and density are less than or equal to pre-construction conditions - Cover of desired vegetation meets Project reclamation targets for the site (Section 9, Volume 6 of the Environmental Plans) and when present the level of invasive plants is within standards specified in the Project management plans

1.4 Links to Other Trans Mountain Management Plans

Information from other Project environmental plans that are related to invasive species management has been considered in the WVMP. The links between the WVMP and other Trans Mountain plans are provided in Table 3.

TABLE 3

TRANS MOUNTAIN MANAGEMENT PLANS LINKED TO THIS PLAN

Environmental Plan	Description of the Environmental Plan	Linkage to this Plan
Project EPPs • Temporary construction Lands and Infrastructure EPP • Pipeline EPP • Facilities EPP • Westridge Marine Terminal EPP • Reactivation EPP • Burnaby Tunnel EPP • (Volumes 1-5, 9, and 10 of the Environmental Plans respectively)	The Project EPPs contain Trans Mountain's environmental procedures and mitigation measures to be implemented during construction of the various components of the Project. The measures serve to avoid, reduce or mitigate potential adverse environmental effects. The EPPs serve as reference information for construction and inspection personnel to support decision-making and to provide direction to more detailed information (<i>i.e.</i>, resource-specific mitigation, management and contingency plans).	The EPPs identify mitigation measures and provide instructions for carrying out activities in a manner that will avoid or reduce adverse environmental effects, and includes measures for weed and vegetation management. Volume 6 of the Environmental Plans includes all Project-related management plans, including the WVMP.
Agricultural Operations (Volume 7 of the Environmental Plans)	Agricultural Operations provides mitigation to prevent the introduction and/or spread of clubroot disease and potato cyst nematode as well as health hazards associated with farming operations. The mitigation strategies are in line with prevention strategies being implemented by regulatory authorities, the municipal governments and the landowner and/or occupant.	Prevention and control measures in the WVMP apply to agriculture lands.
Biosecurity Management Plan (Volume 6 of the Environmental Plans)	The Plan addresses risks associated with clubroot disease and other crop pests, as well as noxious weeds and specific biosecurity protocols for poultry, livestock and dairy farms, nurseries and organic crop production.	Prevention and control measures in the plan are linked to the WVMP.
Reclamation Management Plan and area-specific reclamation plans (Volume 6 of the Environmental Plans)	The Reclamation Management Plan contains the general reclamation measures Trans Mountain will implement in the Project Footprint. The primary objective is to promote the re-establishment of natural ecosystems that are compositionally and functionally similar to pre-disturbance conditions. Volume 6 also includes area-specific reclamation plans that have been prepared for select locations (<i>i.e.</i>, parks).	The Reclamation Management Plan and area-specific reclamation plans include weed species information included in the WVMP and outlines reclamation measures suitable for weed-infested areas.
Rare Ecological Community and Rare Plant Population Management Plan (Volume 6 of the Environmental Plans) (NEB Condition 40)	The purpose of the Rare Ecological Community and Rare Plant Population Management Plan is to recommend construction mitigation when rare ecological communities, rare plants (vascular plant or bryophyte [moss or liverwort]) or rare lichens are encountered. The updated Rare Ecological Community and Rare Plant Population Management Plan will also include mitigation for draft, candidate, proposed or final critical habitat for plant and lichen species under the Species at Risk Act that are potentially affected by the Project during construction or operations.	Some invasive plant treatments may be restricted in areas with rare plants or rare plant communities.
Water Crossing Construction Monitoring Management Plan (Volume 6 of the Environmental Plans)	The Water Crossing Construction Monitoring Management Plan will ensure the watercourses crossed by the Project Footprint are maintained and not adversely affected due to pipeline construction.	Legislation restricts the use of herbicides adjacent to waterbodies.
Sowaqua Spotted Owl Mitigation Plan (Volume 6 of the Environmental Plans) (NEB Condition 38)	This Plan provides mitigation to be implemented within the Sowaqua Spotted Owl Wildlife Habitat Area.	Some invasive plant treatments or timing of treatments may be restricted in the Sowaqua Spotted Owl Wildlife Habitat Area.
Wildlife Species at Risk Mitigation and Habitat Restoration Plans (Volume 6 of the Environmental Plans) (NEB Condition 44)	Species-specific mitigation measures are provided for terrestrial wildlife species that have critical habitat as identified by Environment and Climate Change Canada.	Some invasive plant treatments or timing of treatments may be restricted in areas covered by the Wildlife Species at Risk Mitigation and Habitat Restoration Plans.
Grizzly Bear Mitigation Plan (Volume 6 of the Environmental Plans) (NEB Condition 56)	This Plan provides mitigation measures and information regarding post-construction monitoring for the North Cascades Grizzly Bear Population Unit.	Some invasive plant treatments or timing of treatments may be restricted in areas covered by the Grizzly Bear Mitigation Plan.
Wetland Survey and Mitigation Plan (Volume 6 of the Environmental Plans) (NEB Condition 41)	The Wetland Survey and Mitigation Plan provides an overview of wetlands encountered by the Project, recommended mitigation measures and crossing methods to be implemented during construction, and reclamation measures to be implemented during construction and operations.	Herbicide use is restricted adjacent to waterbodies.
Access Management Plan (Volume 6 of the Environmental Plans) (NEB Condition 47)	The Access Management Plan addresses the management of pipeline construction traffic and access during the pre-construction, construction, clean-up, reclamation and operations phases of the Project.	Invasive plant management will occur on temporary access roads.

TABLE 3 Cont'd

Environmental Plan	Description of the Environmental Plan	Linkage to this Plan
Riparian Habitat Management Plan (RHMP) (Volume 6 of the Environmental Plans) (NEB Condition 71)	The RHMP is an ecosystem-based, site-specific plan that applies to riparian habitats associated with watercourse crossings encountered by the Project Footprint. The RHMP does not include riparian habitats associated with wetlands.	In areas where the restoration prescription includes the provision of wildlife habitat features, some invasive plant treatments or timing of treatments may be restricted. In addition, herbicide use is restricted adjacent to waterbodies.
Post-Construction Environmental Monitoring (PCEM) Reports (NEB Condition 151)	The PCEM Reports will provide a discussion of the effectiveness of mitigation, reclamation, or compensation measures that were committed to and implemented during construction of the Project. The PCEM Reports will describe the corrective actions taken during construction and provide recommendations for future remedial action in order to accomplish the goals of mitigation or reclamation where measures implemented were not effective.	Weed management measures will be monitored during the PCEM Program.

1.5 Commitments Relevant to the Weed and Vegetation Management Plan

Trans Mountain made a number of commitments regarding the Project during the OH-001-2014 proceedings and engagement activities up to May 2016. Commitments were made to improve and optimize Project planning and mitigation measures. As Trans Mountain has consolidated its commitments into a Commitments Tracking Table in accordance with NEB Condition 6, the table of commitments in each plan has been removed.

The updated Commitments Tracking Table will be filed with the NEB pursuant to NEB Condition 6 and is available on Trans Mountain's website at www.transmountain.com. Trans Mountain continues to monitor and track compliance with its commitments and will update, post to its website and file with the NEB updated versions of the Commitments Tracking Table according to the timeframes outlined in NEB Condition 6. Commitments with specific relevance to this Plan have been considered and incorporated into this Plan. Regulatory Guidance.

Within AB under the *Weed Control Act*, all growing plants designated as Prohibited Noxious and their reproductive mechanisms must be destroyed or rendered non-viable. Plants designated as Noxious must be controlled (inhibit growth and spread) or destroyed.

The BC *Weed Control Act* requires all occupiers/owners of land and premises to control Noxious weeds growing or located on their land and premises. The *Weed Control Act* is enabling legislation that local governments may choose to adopt through the appointment of a weed inspector and notification to the Minister. The *Weed Control Regulation* limits the movement of Noxious weeds, contains the provincial and regional Noxious weed lists, and provides structure for weed notices and level of control action weed inspectors may require land owners/occupiers to complete.

The legislative and policy framework for invasive plant species in the Project Footprint is provided in Table 4.

TABLE 4

INVASIVE SPECIES LEGISLATION

Jurisdiction	Legislation	Regulation	Applicable Project Activity
AB	<i>Weed Control Act</i> (2008)	<i>Weed Regulation</i>	Regulates Noxious weeds, Prohibited Noxious weeds and weed seeds through various control measures, such as inspection and enforcement, together with provisions for recovery of expenses in cases of non-compliance.
	<i>AB Environmental Protection and Enhancement Act</i> (2000)	<i>Pesticide Sales, Handling, Use and Application Regulations</i>	Pesticide application and handling.
		<i>Pesticide (Ministerial) Regulation</i>	Pesticide application and handling.
		<i>Environmental Code of Practice for Pesticides</i> (2010)	The <i>Code of Practice for Pesticides</i> provides specific details regarding the safe sales, handling, use and application of pesticides to ensure environmental protection. Pesticide applicators and other described pesticide users, pesticide services and pesticide vendors within the Province of AB must comply with these requirements.
		<i>Code of Practice for Watercourse Crossings</i> (2013)	Pesticide application near water: measures must be implemented to prevent the deposition into the waterbody of deleterious substances and materials that are toxic to fish and other aquatic organisms.
		<i>Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body</i>	Pesticide application near water: measures must be implemented to prevent the deposition into the waterbody of deleterious substances and materials that are toxic to fish and other aquatic organisms.
BC	<i>Weed Control Act</i> (1996)	<i>Weed Control Regulations</i> (2011)	Removal or chemical treatment of weeds on Crown land during the clearing, construction, and restoration phase of the Project. Requires occupiers and/or owners of land and premises to control Noxious weeds growing or located on their land and premises. The <i>Weed Control Regulation</i> limits the movement of noxious weeds, contains the provincial and regional noxious weed lists, and provides structure for weed notices and level of control action weed inspectors may require landowners and/or occupants to complete.
	<i>Integrated Pest Management Act</i> (2003)	<i>Integrated Pest Management Regulation</i>	Require the use of Integrated Pest Management for pesticide use on public land, on private land used for forestry, transportation, public utilities and pipelines, and for pest control service companies and regulates the use of pesticides in and adjacent to water bodies.
	<i>Community Charter</i> (2003)	<i>Spheres of Concurrent Jurisdiction, Environment and Wildlife Regulation</i> (2004)	Pesticide application in municipalities. Municipalities have the authority to control or eradicate invasive species within their jurisdiction. The <i>Environment and Wildlife Regulation</i> includes a list of invasive species.
	<i>Environmental Management Act</i> (2003)	--	Pesticide application, disposal of pesticide materials.
	<i>Water Act</i> (1996)	--	Required if the removal of vegetation or pesticide application near a stream could result in a change in or about a stream.
	<i>Forest and Range Practices Act</i> (2002)	<i>Invasive Plants Regulation</i> (2004)	Regulates herbicide applications that may be used to control invasive plant infestations on Crown land.
	<i>Drinking Water Protection Act</i> (2001)	--	Herbicide application near a point of diversion or potable water source.
	<i>Workers Compensation Act</i> (1996)	<i>Occupational Health and Safety Regulation</i> (296/97)	Removal or chemical treatment of weeds during the clearing, construction and restoration phase of the Project.
	<i>Oil and Gas Activities Act</i> (2008)	--	For the purposes of environmental protection and management, the Lieutenant Governor in Council may make regulations respecting actions that a permit holder and a person carrying out an oil and gas activity must take or refrain from taking to protect or effectively manage the environment, including invasive plants.

TABLE 4 Cont'd

Jurisdiction	Legislation	Regulation	Applicable Project Activity
Federal	<i>Plant Protection Act</i> (1990)	<i>The Plant Protection Regulations</i> , SOR 95-212	Potato cyst nematode management: this directive specifies the phytosanitary requirements for the import and domestic movement of soil and soil-related matter. It includes requirements for soil and soil-related matter, and for items contaminated with soil and soil-related matter, such as logs and/or lumber, vehicles, equipment, tools and containers.
	<i>Migratory Birds Convention Act</i> (1994)	--	Pesticide application: to ensure the long-term conservation of migratory birds, migratory bird populations shall be managed in accord with the following conservation principle: to conserve habitats essential to migratory bird populations.
	<i>Fisheries Act</i> (1985)	<i>Fisheries Productivity Investment Policy: A proponents Guide to Offsetting</i>	Application of pesticides in or around waters frequented by fish.
	<i>Species at Risk Act</i> (2002)	--	Pesticide application: no person shall destroy any part of the critical habitat of any listed endangered species or of any listed threatened species.
	<i>NEB Act</i> (1985)	<i>National Energy Board Onshore Pipeline Regulations</i> (SOR-99-294)	Pesticide application: a company shall develop, implement and maintain an environmental protection program that anticipates, prevents, manages and mitigates conditions that could adversely affect the environment.
	<i>Transportation of Dangerous Goods Act</i> (1992)	<i>Transportation of Dangerous Goods Regulations</i> (SOR/2015-100)	Transportation of pesticides.

1.6 Pest Management Plans

Trans Mountain manages invasive plants according to the principles and BMPs documented in the KMC Integrated Vegetation Management Plan (IVMP) (KMC 2016). The IVMP applies to Trans Mountain pipelines and facilities and outlines the process and methods for invasive plant and vegetation management post-construction and during operations. The IVMP describes an adaptive management process that uses several vegetation control methods in a cost effective and responsible manner. Goals for weed and vegetation management during the Trans Mountain post-construction and pipeline maintenance program are to reduce the use of herbicides, promote healthy ecosystems, provide measurable results and facilitate better management of invasive plants. Trans Mountain will utilize the KMC IVMP practices by incorporating manual / mechanical, cultural (*i.e.*, seeding) and chemical techniques for invasive plant management for the components associated with the TMEP.

1.7 Environment, Health and Safety Policy, and Environmental Standards

The WVMP will be carried out in accordance with KMC's Environment Health and Safety Policy as well as KMC's Environmental Standards for pesticide use and any updated manuals and/or management programs in use by KMC at the time of construction. Vegetation management for the Project will be conducted in compliance with applicable federal and provincial legislation and municipal bylaws and policies.

2.0 CONSULTATION AND ENGAGEMENT

Consultation and engagement activities related to weeds were completed between May 2012 and February 2017 with Appropriate Government Authorities, potentially affected Aboriginal groups, invasive plant councils or committees and affected landowners/tenants. Opportunities to discuss weeds and identify issues or concerns were provided to public stakeholders through online information, workshops, meetings and ongoing engagement activities during the reporting period. Appendix L includes a comprehensive record of these engagement activities, Aboriginal group and stakeholder feedback and Trans Mountain responses.

The draft Plan was released in September 2016 for review. Feedback was requested by January 13, 2017, although additional Appropriate Government Authority and potentially affected Aboriginal group feedback was considered up until February 2017.

Engineering design changes were issued in the TMEP Fall 2016 Project Update document (www.transmountain.com/environmental-plans) along with a further request for feedback. No revisions to this Plan were required as a result of the design updates.

2.1 Integrating Aboriginal and Private Landowner Consultation into the Trans Mountain Expansion Project Vegetation Management Program

The WVMP adheres to the strategies and procedures in the Kinder Morgan Canada Inc. (KMC) Integrated Vegetation Management Plan (IVMP) (KMC 2016). The IVMP lists strategies for the protection of the environment (Section 5.0) and reporting, notification and consultation procedures (Section 6.0).

2.1.1 *Aboriginal Groups, Private Landowners and Vegetation Control Activities*

Consultation is conducted with Aboriginal Groups and private landowners before vegetation management occurs. Each year, prior to treatment, individuals, communities and organizations are notified who may be impacted by the treatment or have expressed an interest in knowing where the proposed treatment areas are located. Landowner permission is received before entering and treating on private properties. Aboriginal groups and private landowners are invited to participate in the pre-treatment field assessments. During pre-treatment assessments, information is provided on the weeds and vegetation of concern are effective treatment options for the species are discussed. Sensitive areas that may occur in the treatment sites are identified and if required, a pesticide-free zone is delineated around the sensitive area. Treatment methods are agreed to during the pre-treatment assessment and invasive plant treatments that will minimize impact to the sensitive areas are implemented.

2.1.2 *Mitigating Impacts to Traditional Use Plants*

In addition to delineating pesticide free zones around plants of concern, Section 5.4 of the IVMP lists strategies to mitigate impacts to traditional use plants. These strategies include:

- non-chemical methods of vegetation management shall be considered where treatment objectives can be achieved;
- where possible, areas containing food plants for human consumption (including berries and medicinal plants) shall be identified and documented; and
- where possible, herbicide treatments shall be conducted at times to minimize impacts on food plants.

2.1.3 *Opportunities for Aboriginal Groups to Access, Harvest, Salvage or Translocate Traditional Use Plants*

Engagement with Aboriginal groups has been ongoing since 2012 and groups are made aware of changes to the Project Footprint. Access to the Project Footprint that occurs on Crown land is not restricted and Aboriginal groups are free to harvest, salvage or translocate traditional use plants until construction commences. To ensure the safety of residents and the construction crews, access to the Project Footprint will be restricted during construction. Aboriginal groups will receive notification of the timing of construction activities and notifications will occur prior to clearing.

3.0 PROJECT INTERACTIONS

Invasive plant survey, mitigation and treatment measures specified in this Plan will apply to all Project components, including temporary construction lands and infrastructure, pipeline construction, access roads, reactivation, facilities, contingency alternate routes and variances. Mitigation measures outlined in Section 5.0 to prevent the introduction of new invasive plants or minimize the spread of existing weeds will be implemented in all Project areas during all project phases, pre-construction, construction and post construction.

Temporary Construction Lands and Infrastructure

Invasive plants can spread from temporary construction lands and infrastructure. The temporary construction lands and infrastructure sites that occur in developed areas will be surveyed before construction. The goal of weed management in temporary construction lands and infrastructure sites is to prevent the spread of weeds from the site to the pipeline construction footprint. Weed management measures may include: stripping topsoils (where present) from the site before it is used; chemically treating weeds that spread by root or shoot fragments that occur in borrow pits; and mechanically treating weeds in and adjacent to temporary construction lands and infrastructure sites to prevent the species from flowering and setting seed. Stockpiled topsoil, cleaning stations that may be located at the temporary construction lands and infrastructure sites and areas immediately adjacent that pose a threat will be monitored during construction and treated, if warranted.

Pipeline Construction Footprint

Invasive plant data has been compiled for approximately 75% of the pipeline construction footprint. Weed treatment of some priority weed species will occur before construction. The species that will be treated and the locations of the treatments will vary depending on the timing of construction, the land use (*i.e.*, agricultural or forestland), the size of the infestation and the growth stage of the invasive plant.

Access Roads

Trans Mountain has completed weed surveys on a small number of new temporary access roads and deactivated/overgrown access roads that may require upgrading. Existing weed data will be compiled for the remaining new temporary or upgraded access roads and weed surveys will be conducted if no weed data is available and the roads occur in areas that are highly susceptible to invasive plants (urban or industrial areas, transportation or utility corridors and grasslands and dry, open forests). Treatments will occur before construction if soil will be disturbed and the weed species has the potential to spread by root or stem fragments. Treatments may occur during construction if the roads will be used when the weeds flower and set seed. The goal of access road weed treatment is to prevent seed set. Mechanical treatments will be used to prevent seed set, where warranted.

Reactivation

Reactivation activities will be confined to the existing TMPL right-of-way. A site assessment, which includes a weed survey, will be conducted at the reactivation sites before construction. Treatment measures that will be implemented will vary depending on construction timing, the land use (*i.e.*, parkland), species present, the size of the infestation and the growth stage of the plant.

Facilities

Weed data has been compiled for 38% of the Project facilities. Weed surveys will occur at the facility sites and treatment will occur before construction if soil will be disturbed and the weed species has the potential to spread by root or stem fragments.

Contingency Alternate Routes

Invasive plant data has not been compiled for the contingency alternate routes. If the alternate route will be used, invasive plant data will be compiled for the site. Invasive plant surveys will be conducted if weed data are not available for the area, and the site occurs in a developed area. Treatments will occur before construction, if warranted.

A brief description of the ecological setting and general land use by geographic location is included in Table 5.

Variances

The South Fraser Perimeter Road route realignment (KP 1159.0 to KP 1162.8) will be surveyed for weeds prior to construction. Weed treatment of some priority weed species will occur before construction. The species that will be treated and the locations of the treatments will vary depending on the timing of construction, the land use (*i.e.*, agricultural or forestland), the reproductive strategy of the plant (plants that reproduce vegetatively will be targeted before construction), the size of the infestation and the growth stage of seed producing invasive plants.

TABLE 5

TRANS MOUNTAIN EXPANSION PROJECT GENERAL LAND USE AND LOCATION OF REACTIVATION AREAS, FACILITIES AND CONTINGENCY ALTERNATE ROUTES

KP Range	General Geographic Location	Contingency Alternate Route	Facilities Included in KP Range	General Land Use/Description
KP 0.0 to KP 49.1	Edmonton to Spruce Grove, AB	--	Edmonton Terminal and Pump Station	Primarily suburban and agricultural land. Mainly located in the Transportation / Utilities Corridor in the Edmonton area. Area is highly susceptible to invasive plants.
KP 49.1 to KP 338	Spruce Grove to Hinton Pump Station, AB	Pembina River	- Gainford Pump Station - Wolf Pump Station - Edson Pump Station - Hinton Pump Station	Forested land, agricultural developments, private acreages, hay and tame pasture lands located between Spruce Grove, AB and the Hinton Pump Station, which is just east of Jasper National Park. Low to moderate susceptibility to weeds. Landowners generally control weeds on their land.
KP 610.6 to KP 861.4	Blue River, BC to Coquihalla (Anderson Creek)	Raft River	- Blue River Pump Station - McMurphy Pump Station - Blackpool Pump Station - Darfield Pump Station - Kamloops Pump Station	Diverse areas located in central BC and contains moist and dry forests, rural acreages and dry interior grasslands. Dry forests and grasslands are highly susceptible to invasive plants.
KP 861.4 to KP 1015.8	Coquihalla (Anderson Creek to Shylock Road)	--	Kingsvale Pump Station	Dry interior grasslands and dry, open canopy and moist, closed canopy forest land in the Cascade Mountains. Grasslands and dry, open forests are highly susceptible to invasive plants.
KP 1015.8 to KP 1148.4	Coquihalla (Shylock Road) to Walnut Grove	--	- Sumas Pump Station - Sumas Tank Farm	Moist closed-canopy forest land on the western side of the Cascade Mountains and agricultural lands in the Fraser Valley. Low weed risk in closed canopy forests. Agricultural weeds are common in the Fraser valley
KP 1148.4 to KP 1179.6 and KP 0.0 to KP 3.2	Walnut Grove, BC to Burnaby Terminal and Burnaby Terminal to Westridge Marine Terminal	Westridge Delivery Lines	- Burnaby Terminal - Westridge Marine Terminal	Primarily suburban and agricultural land in BC Lower Mainland. All areas are highly susceptible to invasive plants
Reactivation Areas				
KP 338 to KP 489.2	Jasper National Park and Mt. Robson Provincial Park (Reactivation Area)	--	Jasper Pump Station	High elevation grasslands and closed-canopy forest land in 2 protected areas, a federal park and a BC provincial park
KP 764.6 to KP 806.6	Darfield to Black Pines (Reactivation Area)	--	Black Pines Pump Station	Included KP from KP 610.6 to KP 861.4

Source: Digital Mapping April 2016

4.0 INVASIVE PLANT SPECIES OF CONCERN

Government authorities such as counties, municipal districts and AEP are responsible for regulating invasive species in AB. Species of concern in AB include legislated Prohibited Noxious and Noxious weeds problematic to the county, municipal district or public area (*i.e.*, park) (Appendix A, Table A-1). Plants designated as Noxious must be controlled (*i.e.*, inhibit growth and spread) or destroyed. Plants designated as Prohibited Noxious and their reproductive mechanisms must be destroyed or rendered non-viable. The Project Footprint crosses Yellowhead County (KP 0 to KP 134) and Parkland County (KP 134 to KP 338). Parkland and Yellowhead Counties refer to the Provincial Noxious and Prohibited Noxious species as priority weed species.

Provincial invasive species designations in BC are Proposed Prohibited Noxious and Noxious. Proposed Prohibited Noxious species are plant species that are not present in BC, or are present but extremely limited in extent and pose a significant threat to BC's environment, economy or human health (BC IMISWG 2016). The 43 Proposed Prohibited Noxious plants are candidates for the BC Early Detection Rapid Response (EDRR) Program (Appendix A, Table A-2) and are proposed for addition to the BC Noxious weed list (Brown pers. comm.). The BC Noxious weed list is included in Appendix A, Table A-2.

Provincial staff at the BC Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO) and land managers (*i.e.*, public and private landowners) work with the regional invasive species councils to jointly establish priorities for treatment (*i.e.*, species to treat and sites that will be targeted for treatment) and improve coordination and collaboration on management actions, and in some regions of the province, pool resources to deliver management activities across jurisdictions. Invasive species priority for management can vary by geographic area. As part of the collaborative provincial and regional approach, the regional invasive species councils classify species as extremely invasive, very invasive, invasive, aggressive, and bio-control available. Councils also develop treatments focused on preventing establishment, eradicating known infestations, controlling small or isolated populations, containing large infestations and distributing biological control agents based on the invasiveness and extent of the species in the region.

The regional invasive species councils that are crossed by the Project Footprint include:

- Northwest Invasive Plant Council (NWIPC) (Fraser – Fort George Regional District, KP 489.2 to KP 550.1);
- Southern Interior Weed Management Committee (SIWMC) (Thompson – Nicola Regional District, KP 550.1 to KP 994.6);
- Fraser Valley Invasive Species Council (Fraser Valley Regional District, KP 994.6 to KP 1141.8); and
- Invasive Species Council of Metro Vancouver (ISCMV) (Metro Vancouver Regional District, KP 1141.8 to Westridge Marine Terminal).

Priority weed species with potential to occur in the Project Footprint are listed in Appendix A. The priority species will be reviewed annually and the WVMP will be updated to include new species, if applicable.

All weeds that are listed in Appendix A are a priority for the Project. However, during the pre-construction and construction phases of the Project a subset of this list is referred to as high-priority species. Weed management of high-priority species will focus on the Prohibited Noxious (AB) and Proposed Prohibited Noxious (BC) species, regional priority species and weed species in Appendix A that reproduce vegetatively, specifically by root fragments. Species that will produce new plants from root fragments are included because there is a risk of spreading these species during construction activities that involve soil movement. Regional priority species were identified through consultation with regulatory agencies and BC invasive plant council (IPC) regional coordinators and a review of the BC IPC annual reports and target weed lists (FVIPC 2017, NWIPC 2015, ISCMV 2017, SIWMC 2015). The other priority species will be considered during the reclamation, post-construction monitoring and operations phases of the Project. Management options for other priority weeds consider the risk the species poses to reclamation success

and the priority of the site (*i.e.*, riparian areas, weed free areas, grasslands and parkland are high priority sites for weed control).

The Prohibited Noxious, Proposed Prohibited Noxious species and regional priority species are included in Appendix A. Known locations of infestations are provided in Appendices C to I for the pipeline construction footprint and Appendix J for facilities. The Project weed database will be updated as information is available.

4.1 Invasive Species Surveys

Trans Mountain has compiled invasive plant data for approximately 75% of the pipeline construction footprint and 69% of the Project deactivated/overgrown and new temporary access road segments. Weed surveys were conducted in areas of: natural vegetation; pasture or rangelands; agricultural land with permanent crops; some facilities and some new or deactivated and overgrown roads that will be used by the Project. Agricultural lands with annual crops and landscaped areas will not be surveyed unless a survey is requested by the landowner. The surveys were concentrated in areas that are highly susceptible to invasive plants because of the vulnerability of the ecosystem (*i.e.*, grasslands and dry open forests) or proximity to urban and industrial development or transportation and utility corridors. The weed surveys have adequately captured invasive species data from the susceptible areas of the Project.

The weed data includes geographic location, invasive plant species present and the distribution and density of the infestation. Trans Mountain has developed a Project weed database based on field surveys and current weed database records (weeds recorded in the pipeline construction footprint between 2013 and 2015). The baseline field survey data was collected by Trans Mountain field crews and KMC operations field crews. Additional 2013 to 2015 invasive plant data was obtained from the BC provincial weed database (*i.e.*, BC IAPP). Database records older than 2013 were not included because invasive species present or size of infestation may change over time. Field surveys were limited in some areas because land access was restricted. Project areas that have not been surveyed include the reactivation sites and some access roads. Trans Mountain will compile existing invasive plant data for the non-surveyed sites and field surveys will occur before construction in areas that do not have existing weed data and are highly susceptible to invasive plants.

The survey weed data will be held in a Project weed database and a spatial file (shapefile). BC weed survey information will be included in the provincial IAPP database. Weed survey data will be provided to KMC operations at the end of the PCEM Program.

A summary of the current invasive plant survey information for each KP Range is provided in Appendix B.

5.0 INVASIVE PLANT SPECIES PREVENTION AND CONTROL STRATEGY

Trans Mountain will work with invasive species councils, Appropriate Government Authorities, Aboriginal groups and affected stakeholders to manage invasive species within the Project Footprint. Table 6 in Section 5.2 includes new mitigation recommendations found in the WVMP. Invasive plant species management during post-construction and operations is described in the KMC IVMP (KMC 2016). The KMC IVMP applies to all Trans Mountain pipelines and facilities. Measurable goals, objectives, indicators and targets for the WVMP are included in Section 1.3.

5.1 Criteria for Management and Management Objectives

Objectives of the WVMP are determined by Project phase as described below.

Pre-Construction

Criteria for Management	Management Objective
Construction activities have the potential to introduce new invasive species or spread existing invasive species, therefore, weed data will be compiled for areas of the Project Footprint likely to contain weeds (adjacent to development)	Compile existing weed data prior to construction and develop an invasive plant infestations database. Identify the locations of critical habitat and other sensitive areas that may be impacted by weed treatment.
Invasive species are a priority for control by the regulatory authorities	Identify priority invasive species applicable to the Project and develop the WVMP specifying known invasive species locations (Appendices C to J), and mitigation and control methods for the pre-construction, construction and post-construction phases of the Project.
High-priority invasive plants occur in the Project Footprint	Implement invasive plant treatments for high-priority species and species of regional, concern during the pre-construction phase, where warranted.

Construction

Criteria for Management	Management Objective
Project personnel are from outside the local area and are not familiar with regulatory or regional concerns related to invasive species.	Inform Project personnel of invasive species of concern in their work area and adhere to invasive species prevention measures provided in Section 5.2.
Invasive plants were identified in the area during pre-construction surveys and construction activities will occur during the growing season in these areas, and topsoil or root zone material piles are stored, as bare soil piles, for more than 2 months during the growing season.	Monitor invasive plants during the construction phase (adjacent areas of the footprint where topsoils were not stripped, access roads and topsoil/root zone material storage piles) and implement treatments, where warranted (prevent invasive plants from setting seed).

Post-Construction

Criteria for Management	Management Objective
Monitoring surveys identified new invasive species in the Project Footprint that are not present in surrounding areas or an increase in the abundance of existing invasive species in the Project Footprint and the change can be attributed to Project activities (<i>i.e.</i> , conditions exist on the Project Footprint and do not exist in land adjacent to the footprint).	Monitor invasive species establishment during the PCEM phase and implement treatments when new invasive plants are found, invasive plant infestations are more extensive than infestations in adjacent lands or when invasive plants are negatively impacting revegetation.

5.2 Prevention, Control and Treatment Decision-Making Framework

The WVMP incorporates integrated vegetation management procedures used by Trans Mountain operations strategies outlined in the Best Practices for Managing Species on Utility Operations (Invasive Species Council of BC 2014), as well as recommendations provided by BC regional invasive species councils and professional judgement. The mitigation and control measures will be implemented in consultation with potentially affected Aboriginal groups and stakeholders. Herbicide applications will be completed by licensed pesticide applicators according to provincial legislation.

Prevention

Invasive plant species prevention strategies are based on keeping Project vehicles and equipment free of soil and plant fragments and limiting the movement of soil in problem areas. Known invasive species infestations are included for Project KP Ranges in Appendices C to I for the pipeline construction footprint and Appendix J for facilities. Control or mitigation activities will be determined prior to soil disturbance because treatment method will vary by species present, the growth stage of the plant and size of the infestation, as well as timing of construction. Equipment and vehicle sanitation measures are included in Table 6 and additional information is included in the Biosecurity Management Plan (Volume 6 of the Environmental Plans). Additional weed and vegetation management measures are included in Table 7.

TABLE 6

EQUIPMENT AND VEHICLE BMP FOR PREVENTING THE SPREAD OF INVASIVE PLANTS

Criteria	BMP	Mitigation	Potential Locations
General	- All contractor vehicles and equipment would be cleaned prior to beginning work on the Project. - Use compressed air or wash equipment after returning it to the marshalling yard or equipment staging area. - Shovel and sweep or use compressed air to clean soil stripping equipment before moving it off site¹.	- Cleaning of all equipment and vehicles would take place in approved cleaning stations (detailed in the Pipeline EPP, Appendix C, Drawing 4) and would be carried out using shovel and sweep, compressed air and/or high-pressure wash equipment to remove seeds, roots, and rhizomes from the equipment. - Cleaning efforts would be concentrated on tracks, feet, or tires and on the undercarriage, with special emphasis on axles, frames, cross members, motor mounts, the underside of running boards, and front bumper/brush guard assemblies. - Equipment cleaning sites would be recorded using GPS equipment and would be recorded for the PCEM Program. - If wet or muddy conditions exist, vehicles and equipment would be cleaned with shovel and sweep methods and followed up with high pressure wash. - Equipment mat platforms would be disinfected with a bleach water solution or other approved cleaning method prior to being transferred off site when construction in an area is completed.	Project Footprint
Project Areas of Concern			
Crossing Provincial Boundaries or entering Parks or Protected Areas	- All equipment and vehicles are clean when they arrive at the work area. - Daily visual check of undercarriage and tires of vehicles and support equipment, including all-terrain vehicles (ATVs) that are crossing the identified sensitive boundary and travelling on soils that have not been stripped.	- Follow general mitigation measures. - Shovel or sweep to remove plant parts and soil that may contain weed seed from equipment and vehicles that enter the area before soil stripping has occurred and during the reclamation program. - Topsoil handling crews will segregate weed contaminated topsoil and place it along one or both sides of the construction footprint, no other crews that follow will need to be cleaned when traveling through these areas, with the exception of survey and clearing/mowing crews that precede topsoil handling and the final reclamation crews that follow topsoil replacement. - Park vehicles and support equipment on stripped topsoil surfaces or non-vegetated areas.	- AB/Jasper National Park boundary - Jasper National Park/Mt. Robson Provincial Park boundary - Entering Lac du Bois Grasslands Provincial Park
Entering areas that did not contain invasive plant species in last survey (2015)	- All equipment and vehicles are clean when they arrive at the work area. - Daily visual check of undercarriage and tires of vehicles and support equipment, including all-terrain vehicles (ATVs) that are crossing the identified sensitive boundary and travelling on soils that have not been stripped.	- Follow general mitigation measures. - Topsoil handling crews will segregate weed contaminated topsoil and place it along one or both sides of the construction footprint, no other crews that follow will need to be cleaned when traveling through these areas, with the exception of survey and clearing/mowing crews that precede topsoil handling and the final reclamation crews that follow topsoil replacement. - Park vehicles and support equipment on stripped topsoil surfaces or non-vegetated areas.	Weed free locations that did not contain non-native invasive plant species when surveyed in 2015 are included in Appendices C to J

TABLE 6 Cont'd

Criteria	BMP	Mitigation	Potential Locations
Entering areas that did not contain invasive plant species in last survey (2015)	• If necessary, prepare staging, parking and storage areas in the infested zone to minimize weed spread. • Strip weed-infested soils from the work area and retain the weed-infested soil in the weed zone. • Keep equipment and support vehicles including ATVs on stripped soil surfaces. • All equipment and vehicles that come into contact with vegetation or disturbed soil in areas where priority noxious weeds have been identified would be cleaned before being allowed to proceed to other Project areas.	• Follow general mitigation measures. • Mow staging and parking areas that contain invasive plants before seed set. • If there is an extensive weed seed bank, cover the weed infestation with mats prior to use. • Remove soil from matting before it is transported to a new site and clean the mats in the infested area. • Seed the topsoil/root zone piles with an annual cover crop to minimize weed regrowth. • Shovel or sweep to remove plant parts and soil that may contain weed seed and leave debris in the infested area.	• Weed free locations that did not contain non-native invasive plant species when surveyed in 2015 are included in Appendices C to J
Access Roads	• Avoid parking, turning around, or staging equipment in invasive plant infested areas that occur along access roads.	• Designate pullout and parking areas for vehicles and equipment along weed-infested access roads. • Mow the designated parking and pullouts before seed set.	• All access roads that contain priority invasive plant species

Note: 1 Off-site refers to equipment leaving the portion of the Project Footprint that is being stripped of topsoil or root zone material. At any given location this area will range from the trench line to the entire footprint.

Control

Control treatments for invasive plants will include manual or mechanical (*i.e.*, hand-pulling, digging and mowing), cultural (*i.e.*, seeding, planting) and chemical methods (*i.e.*, herbicide application). Control methods are conducted in compliance with applicable federal and provincial legislation and municipal bylaws and policies. Pesticide free zones and treatment buffers (*e.g.*, pesticide free zones around and along waterbodies, dry streams and classified wetlands) are strictly enforced.

The appropriate control method depends on species lifeform, mode of reproduction, the location and the extent of the infestation, sensitivity of the site and landowner and/or occupant preference. The invasive plant treatment decision-making framework is provided in Figure 1.

Pre-construction treatments will focus on methods to control small and isolated infestations of high-priority species and prevent seed set in more extensive infestations. Primary pre-construction treatments include manual or mechanical methods, such as hand-pulling, digging and mowing as well as, spot applications or stem injections of herbicide. Selective herbicides (*i.e.*, target specific weed species) or non-selective herbicides (*i.e.*, target all vegetation) will be used. Low residual herbicides will be used that are approved for use in the KMC operations IVMP (KMC 2016).

Pre-construction treatment areas were determined based on invasive plant species priority and extent of the priority weed infestation; the risk of construction activities spreading an invasive species; the efficiency of treatment; and ease of access.

- Sites identified during the Project weed survey that contain isolated occurrences of high-priority (Prohibited Noxious (AB) and Proposed Prohibited Noxious (BC) and regional priority species will be treated before construction. The intent of the treatment is to eradicate the small infestations.
- Invasive plants that reproduce vegetatively can spread by soil disturbance (Bellingham and Sparrow 2000, Grime 2001, Klimešová and Klimeš 2003). Pre-construction treatments will target isolated infestations of priority species that reproduce from root fragments, such as Russian knapweed (*Acroptilon repens*) or Canada thistle (*Cirsium arvense*). The intent is to eradicate the small infestations and prevent the movement of viable root fragments during construction. Larger infestations of these species are identified as High Weed Density (HWD) zones on the Environmental Alignment Sheets (Volume 8 of the Environmental Plans). Mitigation is in place to prevent the spread of these species in these areas, including preventing the movement of soil outside the HWD zone and cleaning vehicles and equipment that travel on unstripped soils in these zones before they leave the HWD zone.

- Additional pre-construction weed treatments will occur on the Project Footprint that are adjacent to sites on the existing Kinder Morgan TMPL right-of-way that are scheduled for maintenance activities during the Project pre-construction phase (2017). Treating the Project Footprint and the adjacent area will slow the re-establishment of weeds.
- The completion of all pre-construction weed treatments is dependent on having approved access to the infested areas. Access road land acquisition is in progress but treatment crews will not access infested areas until land access agreements are in place or landowner permission is received. Infested sites that fall into this category have been identified and will be treated during the next growing season (2018). If construction occurs before treatment is possible, the site will be added to the post-construction treatment list.

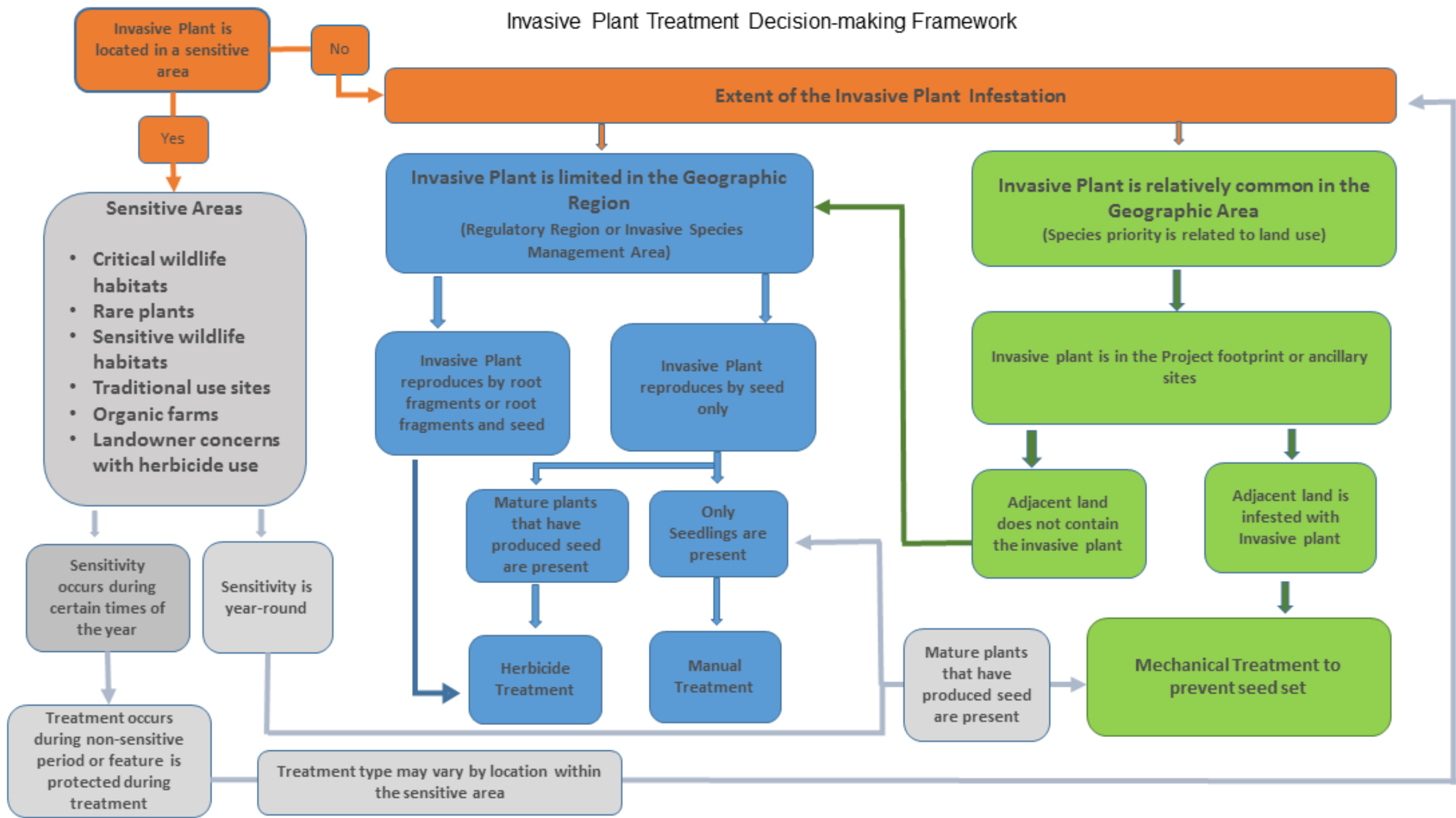
During construction, cultural, manual and mechanical methods, including hand-pulling, cultivation, mowing, and seeding, will be the primary treatments. In some areas, weed patches may be mowed and then covered with mats or mulch to prevent seed and plant material from lodging in Project materials and equipment.

Post-construction treatments will use integrated vegetation management strategies to prevent unacceptable levels of weed density. Strategies will consider the most economical approach available with the least possible hazard to people, property and the environment. Reclaiming suitable plant communities is the goal of the post-construction weed management program and cultural, manual, mechanical and chemical treatment methods that will support that goal will be implemented. In areas where the Project footprint traverses lands that are heavily infested with invasive plants, Trans Mountain will control weeds until the vegetation has re-established and weed density is similar to the adjacent areas outside of the footprint. Where warranted, Trans Mountain will work with regulatory authorities to obtain and release the most effective biological control agent(s) available for the weed species.

Trans Mountain will work with the invasive species councils in BC, Appropriate Government Authorities, Aboriginal groups, and affected stakeholders to identify the most appropriate treatment for the site. KMC Operations will conduct/coordinate the weed treatment program for the Project. All herbicide applications will be conducted in accordance with applicable acts, regulations, Codes of Practice and statutes that regulate the use and application of these chemicals for vegetation management.

General invasive species prevention and control measures are presented in Section 5.2.1. Additional mitigation and control measures for specific invasive plant species or sites are described in Sections 5.2.2 and Section 5.2.3.

Figure 1 Invasive Plant Treatment Decision-Making Framework



5.2.1 Invasive Plant Species Prevention and Control Measures

TABLE 7

INVASIVE PLANT SPECIES PREVENTION AND CONTROL MEASURES

Activity/Concern	Mitigation Measures
Pre-Construction Inventory and Treatment	- Locations of high priority invasive plants within the Project Footprint will be identified in the KP Range Appendices C to I. - High priority invasive plants at temporary Project ancillary sites, along access roads and on the Project right-of-way that are actively growing during construction will be controlled prior to ground disturbance. The treatment method will depend on the invasive plant species, growth stage of the plant and sensitivities of the site location. - Borrow pits that contain invasive plant material will not be used until the plants have been controlled.
Environmental and Compliance Education Program	Provide Project workers (e.g., Crew Supervisors, Environmental Monitors and Environmental Inspectors) with information regarding weed prevention measures, the priority invasive species that have been identified in each KP Range, and location of areas that have recently received chemical treatments.
Invasive Species Prevention	- Inform Crew Supervisors, Environmental Monitors and Environmental Inspectors of responsibilities for ensuring Project personnel implement the invasive species prevention mitigation measures, which include: - following the biosecurity measures for vehicles and equipment; and - soil movement will be restricted, as specified by the Environmental Inspector. - Fills, gravels and mulch materials will not be stored near high priority invasive species sites. - The Environmental Inspector will approve weed-free fills, gravel and mulch materials for use in the Project Footprint, if applicable. - Project vehicles and equipment, including ATV's, will avoid driving and parking on vegetated areas, unless they are designated for Project use by the Environmental Inspector. If vegetated areas that will be used contain invasive plants, invasive plant species treatments will be conducted before Project use. - Consider salvaging topsoil/root zone material from the entire right-of-way or facility site if localized weed infestations are encountered. If warranted, treat the infested soils before soil salvage and seed the soil piles with an annual cover crop to minimize weed regrowth.
Equipment Cleaning Stations Appendix C, Volume 2 of the Environmental Plans	Work with the Contractor and Landowners to identify the most effective locations for cleaning stations and ensure the cleaning stations are established according to specified standards.
Weed Check Sites	Set-up and use invasive plant check sites at locations determined in consultation with the Environmental Inspector. Weed check sites occur along the Project footprint, before entering weed free zones and before leaving weed-infested zones.
Biosecurity Measures	Review biosecurity measures included in the Biosecurity Management Plan (Volume 6 of the Environmental Plans) to determine the most appropriate measures to implement
Invasive Plant Control	- Reduce soil disturbance adjacent to wetlands, in riparian areas and in sensitive areas. - Follow specific invasive plant control prescriptions in areas with invasive plants identified as containment species or species of particular concern (Section 5.2.2). - Disturbed areas of the Project footprint known to contain invasive plants will be seeded with an appropriate seed mix for the location as soon as practical after topsoil or root zone material replacement, weather permitting, to ensure desirable species establish quickly and have a competitive edge over invasive plants. - Monitor topsoil or root zone material piles during construction and control the growth of invasive plants. If applicable, remove plants by hand, brushing, mowing or, if practical, using selective, non-persistent herbicides. Control will be initiated before the weedy species mature and produce seed. - Seed with the highest seed grade available. Do not accept seed that contains seed from plants classified as regionally or provincially Noxious in BC and Noxious or Prohibited Noxious in AB. Seed Certificates of Analysis will be obtained and approved by Trans Mountain prior to purchase of seed. Certificates will be retained and supplied to regulators, if requested. - Seek approval for invasive plant control techniques from the Environmental Inspector prior to implementing a specific control technique.

5.2.2 Invasive Plant Management Measures

British Columbia Provincial Containment and Regional Priority Species

The Province of BC has established containment boundaries for specific invasive plants. Containment invasive plants are species that are prevalent within a geographic area, but are limited outside of the area and so eradication outside the containment area is possible. There is one provincial containment species along the Project route, blueweed. The Project KP Range that corresponds to the blueweed containment boundary and general control measures to follow while working in the containment area is included in Table 8. If the species is encountered outside the containment area, treatment measures that will eradicate the species will be implemented.

TABLE 8
GENERAL CONTROL MEASURES FOR
BLUEWEED, A PROVINCIAL CONTAINMENT INVASIVE PLANT SPECIES

Containment Species	Mitigation Measures
Blueweed KP 908.5 to 929.4 and KP 947.8 to 958.4 	• The Environmental and Compliance Education Program that will be conducted with Project contractors before construction will include weed orientation and awareness information for crews working in the containment areas. • No parking of vehicles or equipment on vegetated areas within infested areas in the containment zones. Refer to Table 6 and the Biosecurity Management Plan (Volume 6 of the Environmental Plans) for equipment and vehicle protocols in weed-infested areas. • Vehicles and equipment travelling through infested areas in the containment zones will be cleaned regularly and routine inspections of vehicle undercarriage and wheel wells will be conducted to ensure there is no movement of seed or plant fragments to areas outside the containment zone. • Unnecessary access through containment areas will be restricted whenever practical. • Earth-moving equipment will be thoroughly cleaned before leaving the containment area. • Infestations of blueweed that are located within the Project Footprint and actively growing during the construction window will be controlled prior to ground disturbance. The treatment objective will be to prevent seed set.

Management Procedures for Regional Priority Invasive Plant Species

The invasive plant species that are a regional priority are extremely aggressive and require immediate control due to their low distribution within the management area. There are six regional priority species in the Project Footprint:

- meadow (*Hieracium caespitosum*);
- orange hawkweed (*H. aurantiacum*) (AB infestations only);
- hoary alyssum (*Berteroa incana*);
- sulphur cinquefoil (*Potentilla recta*);
- Japanese knotweed (*Fallopia japonica*); and
- Princess tree (*Paulownia tomentosa*).

Orange hawkweed is well established in BC and meadow hawkweed is also becoming common in the province. The hawkweeds reproduce from seed and creeping roots. Seed can remain viable in the soil for up to 7 years (Montana State University 2009). The hawkweeds are not well-established in AB and preventing their establishment and spread is a priority (Weyer pers. comm.). Special measures for meadow and orange hawkweed will apply to Project areas from KP 0 to KP 338.

Hoary alyssum is an extremely aggressive invasive plant. It easily invades pastures and may cause illness in horses. The plant flowers and produces seed throughout the growing season and the species is very difficult to control. Plants will displace native species as well as seeded agronomic species. Agriculture, including hay crops and grazing lands, are an important economic sector in the Fraser - Fort George Regional District and hoary alyssum could have a very detrimental impact on forage quality in these areas. Currently, hoary alyssum is restricted in the Fraser – Fort George Regional District. Special measures for hoary alyssum will apply to Project areas from KP 489.2 to KP 544.7.

Sulphur cinquefoil is an extremely invasive plant that reproduces by seed and root fragments. Seeds can live up to 2 years and are transferred through the digestive systems of birds, wildlife and livestock. A single plant can live for up to 20 years as new shoots continue to emerge from the main root. The plant decreases the availability of forage for animals and infestations could have a detrimental impact on the grazing lands in the Fraser – Fort George Regional District. Special measures for sulphur cinquefoil will apply to Project areas from KP 489.2 to KP 544.7.

Japanese knotweed is a long-lived perennial that reproduces vegetatively, by stem pieces and root fragments. A plant fragment as small as 0.5 cm in length will produce a new plant. Once established, Japanese knotweed is extremely difficult to control because the roots are up to 3 m deep and will spread up to 8 m on either side of the plant (Beerling *et al.* 1994). Japanese knotweed is a serious pest in the Lower Mainland, lining road ditches and sections of highways and stream and river banks throughout the region. Riparian habitats are particularly vulnerable to invasion and knotweed infestations will fully replace the native plant communities. The potential to move the species with disturbed soil is extremely high. Special measures for Japanese knotweed will apply to Project areas from KP 1012.3 to the Westridge Marine Terminal.

Princess tree is an ornamental tree, but it is invasive and produces seed at a young age. The tree also reproduces from root and stem buds (Donald 1990). Princess tree will displace native species in disturbed areas (Innes 2009). One site with Princess tree was identified on the pipeline construction footprint in the Fraser Valley Regional District during the 2015 weed surveys (KP 1100.7). Trans Mountain treated the invasive plant in spring 2016. The location will be monitored during the Project and retreatment will occur if warranted.

The mitigation and control recommendations for invasive plant species found along the Project route that require special management are provided in Table 9.

TABLE 9
MITIGATION AND CONTROL MEASURES FOR
REGIONAL PRIORITY INVASIVE PLANTS

Area of Concern	Species	Mitigation Measures and Treatment
Yellowhead (KP 0 to KP 134) and Parkland (KP 134 to KP 338) counties	Meadow hawkweed  Orange hawkweed 	<u>Mitigation</u> Measures 1 to 17 from Table 7 apply. - Extra temporary workspace that contains hawkweed infestations, will be treated prior to construction activities. - Vehicles and equipment working in hawkweed areas will be cleaned before leaving the area to ensure no plant or root fragments are moved outside the infested area. - Where feasible, soils from the infested area will not be moved outside the infested area. If moved, the location of the infested soil piles will be recorded and they will be returned to the infested area during final cleanup. <u>Treatment</u> - Control measures to eradicate the species will occur. Hawkweed control will be conducted by a treatment professional. - Mechanical treatments are not effective. - Chemical control with the herbicide aminopyralid when plants are bolting, or aminopyralid + 2,4-D or picloram in early spring, when plants are in the rosette stage.
North West Invasive Plant Council (NWIPC) (KP 489.2 to KP 550.1) Fraser – Fort George Regional District	Hoary alyssum 	<u>Mitigation</u> Measures 1 to 17 from Table 7 apply. - Extra temporary workspace that contains hoary alyssum infestations will be treated prior to construction activities. - Vehicles and equipment working in hoary alyssum areas will be cleaned before leaving the infested area to ensure no plant or root fragments are moved outside the infested area. - Where feasible, soils from the infested area will not be moved outside the infested area. If moved, the location of the infested soil piles will be recorded and they will be returned to the infested area during final cleanup. <u>Treatment</u> - Control measures to eradicate or prevent the spread of the species will occur. Hoary alyssum control will be conducted by a treatment professional. - Prevent seed set. - Small infestations can be manually controlled. Conduct hand-pulling or hoeing before seed set. Remove the root crown and seed exposed soil with an appropriate seed mixture to establish competition. - Mow roadside infestations. Mow several times during the season, beginning before seed set and reducing mower height with each cutting. - Chemical control with the herbicide 2,4-D, dicamba or glyphosate. Apply in spring or autumn to actively growing plants.

TABLE 9 Cont'd

Area of Concern	Species	Mitigation Measures and Treatment
NWIPC (KP 489.2 to KP 550.1) Fraser – Fort George Regional District	Sulphur cinquefoil 	<u>Mitigation</u> Measures 1 to 17 from Table 7 apply. - Extra temporary workspace that contains sulphur cinquefoil infestations will be treated prior to construction. - Vehicles and equipment working in sulphur cinquefoil areas will be cleaned before leaving the area to ensure that no plant or root fragments are moved outside the infested area. - Where feasible, soils from the infested area will not be moved outside the infested area. If moved, the location of the infested soil piles will be recorded and they will be returned to the infested area during final clean-up. <u>Treatment</u> - Control measures to eradicate or prevent the spread of the species will occur. Sulphur cinquefoil control will be conducted by a weed treatment professional. - Limit the movement of weed infested soils. - Small infestations may be hand-pulled. Remove the growing tissue on the top few inches of the root system. If seeds are mature, cut and bag seed heads prior to mechanical control. - Chemical control is effective with the herbicides picloram, 2,4-D and/or aminopyralid.
Fraser Valley Invasive Plant Council (FVIPC) (KP 994.6 to KP 1141.8) Fraser Valley Regional District	Princess tree 	<u>Mitigation</u> Measures 1 to 17 from Table 7 apply. - Where feasible, soils from the infested area will not be moved outside the infested area. If moved, the location of the infested soil piles will be recorded and they will be returned to the infested area during final clean-up. <u>Treatment</u> - Control measures to eradicate or prevent the spread of the species will occur. Princess tree control will be conducted by a weed treatment professional. - Hand-pull seedlings. - Cut mature trees at ground level, at the onset of flowering. Root sprouts are common after cutting, so repeated cutting of sprouts or herbicide control of suckers is required. - Chemical control is effective with the herbicides glyphosate or triclopyr. - Post-treatment monitoring and retreatment are required.
FVIPC and ISCMV (KP 1141.8 to Westridge Terminal) Fraser Valley Regional District and Metro Vancouver Regional District	Japanese knotweed Knotweed roots can extend 3 m in depth and up to 8 m on either side of the plant. 	<u>Mitigation</u> Measures 1 to 17 from Table 7 apply. - Infestations adjacent to the Project work area should be fenced to avoid disturbance. - Disturbing soil within 8 m of adjacent patches will likely encounter roots. Soils in or close to Japanese knotweed patches must not be moved outside of the infested area. - Extra temporary workspace that contains Japanese knotweed will be treated before construction. - Vehicles or equipment will not park in areas infested with Japanese knotweed. - Where feasible, soils from the infested area will not be moved outside the infested area. If moved, the location of the infested soil piles will be recorded and they will be returned to the infested area during final cleanup. - If soils cannot be buried deeply enough in the construction area, they will be disposed of at a landfill that accepts weed contaminated soils. <u>Treatment</u> - Control measures to eradicate or prevent the spread of the species will occur. Japanese knotweed control will be conducted by a weed treatment professional. - Small infestations may be manually treated. Manual treatment options include mowing, cutting, or digging out the root mass. Cutting or mowing is an option for sensitive areas that can be mowed/cut multiple times per month during the growing season and for multiple years. Cut plant parts are incinerated or elevated until completely dry. Removing the root mass may occur where the infestation is in the trench line. The entire root mass will be removed and disposed of appropriately. - The most effective treatment for large Japanese knotweed infestations is herbicide treatment. Herbicide stem injections using glyphosate are effective in sensitive areas and spot spray applications may be used in other areas. Retreatments will be necessary.

Management of British Columbia Proposed Prohibited Noxious Plants

The BC IMISWG has established a Proposed Prohibited Noxious weed list as candidates for the BC EDRR Program (BC IMISWG 2016). Provincially-listed weeds in BC currently include 42 candidate species on the EDRR list (Appendix A, Table A-2).

The purpose of the BC EDRR Program is to prevent new invasive species from entering and establishing in BC because the species pose a significant threat to the BC environment, economy or human health (BC IMISWG 2016).

The BC EDRR Program applies to all land management agencies in BC, including private industry and it describes the process to follow if an EDRR species is found in BC (BC IMISWG 2016). If a new observation of a species is made, industry completes the first two steps in the six-step EDRR process. The remaining steps, Steps 3 through 6, are completed by the provincial government and include alert screening, risk assessment, rapid response and monitoring, and reassessment. The regulatory authority (BC MFLNRO) may request industry treat the species.

Table 10 outlines the EDRR Process.

TABLE 10
BRITISH COLUMBIA EARLY DETECTION RAPID RESPONSE PROCESS

Step	Description	Responsibility
1. Early Detection	Observing and reporting species believed to be new in BC. Species are to be immediately reported to the local regional invasive species committee or regional office of a provincial government authority.	Industry
2. Identification	Verifying species identification. Voucher specimens are to be collected and provided to the ministry or organization that receives the notification.	
3. Alert Screening	Assess the risk of the species and determine whether the species should continue in the EDRR process or be removed.	Provincial government
4. Risk Assessment	The invasive species is evaluated for likelihood that an introduced invasive species will establish, disperse and become a threat to economic, social and environmental values in its new environment.	
5. Rapid Response	Determine if eradication is feasible, develop a response plan, obtain land access and treatment permits and implement response activities.	
6. Monitor and Reassess	Measure the efficacy of the treatments applied during the Rapid Response step, and determine if changes in the response are necessary to meet the intended objectives.	

Source: BC IMISWG 2016

5.2.3 Site-Specific Invasive Plant Species Management

Site-specific invasive plant management methods will be developed for infestations found in environmentally sensitive areas, as needed. Site-specific management may be required for invasive species at known locations of plant species at risk, traditional use sites, in sensitive wildlife habitats, in or adjacent to aquatic habitats and in areas that did not contain invasive plants during the Project weed survey (2015). The location of the environmentally sensitive areas is included in Appendices C to J. The need for treatment and the appropriate treatment method will be determined in consultation with regulatory authorities and invasive species specialists. A process that will be followed to identify treatment type in species at risk critical habitats and specific management methods that will be implemented for each sensitive area are presented in Table 11. General mitigation targeted at environmentally sensitive areas is provided in Table 11.

TABLE 11

**HIGHLY-VALUED AND SENSITIVE AREAS THAT MAY REQUIRE
SITE-SPECIFIC INVASIVE PLANT MANAGEMENT ACTIONS**

Environmentally Sensitive Area	General Mitigation Measures
• Areas that did not contain weeds during the Project weed survey (2015) • Organic farms • Traditional Land Use sites • Critical habitats and sensitive areas • Watercourses and wetlands • Areas containing plant species at risk	• Refer to Table 6 and Table 7. • Grading equipment will be thoroughly cleaned before entering the sensitive area. • Weed cleaning sites will be constructed outside the sensitive areas, if the sensitive areas are weed free. • Treatments will occur during least-risk windows, as specified by regulatory authorities and resource specialists. • Chemical control will follow regulations and BMPs when applied in close proximity to all environmentally sensitive areas (Government of AB 2010, Government of BC 2003, Government of Canada 2015)

Note: 1 weed-free locations are natural areas or areas with permanent crops (tame pasture) that did not contain non-native invasive plant species when surveyed in 2015

Determining Invasive Plant Treatments in Critical Habitat

The Project has developed a process that will be followed to determine how invasive plants will be treated in critical habitat. Federally defined boundaries of early draft, candidate, proposed and final critical habitat for each federal wildlife species at risk (SAR) that overlaps with the Project have been included in Appendices C to I. The critical habitat areas that are in the Project Footprint are defined by Project kilometer posts (KPs) (*i.e.*, KPs identify the start and stop points of the critical habitat. Areas within the KP range are in critical habitat).

The same invasive plant treatment restrictions apply to all critical habitat areas:

- invasive plant treatment will not occur if the invasive plant is a SAR host species or the invasive plant provides a SAR biophysical attribute, as defined in the SAR recovery plan (note: invasive plants are typically non-native and not known to provide a SAR biophysical attribute); and
- only treatment methods, application techniques and application timing windows that do not harm the SAR will be implemented in critical habitat areas that contain the biophysical attributes for the SAR.

Invasive plant treatments for areas within critical habitat will be determined as follows:

1. The Project Species at risk (SAR) Mitigation and Habitat Restoration Plans (Section 6, Volume 6 of the Environmental Plans) will be reviewed for mitigation specific to activity timing and vegetation management. For critical habitats that may be defined during later stages of the Project, the SAR recovery plans will be reviewed to identify the species life-history characteristics and the biophysical attributes necessary to support the species.
2. A pre-treatment environmental inspection (Appendix K) of the proposed weed treatment area will be completed and the presence or absence of the biophysical attributes necessary for the SAR will be documented and compared to information contained in the Project SAR Mitigation and Habitat Restoration Plans or SAR Recovery Plan.
3. If the invasive plant species in the proposed treatment area provides a biophysical attribute for the SAR, the invasive plant will not be treated.
4. If the site does not contain the biophysical attributes necessary to support the SAR the most effective treatment method will occur during the most opportune treatment time. Regardless of habitat value, measures to avoid incidental impact to individual organisms, habitat components (*i.e.*, soils, coarse woody debris) and non-target vegetation species will be determined during the pre-treatment inspection and from mitigation information contained in the Project SAR Mitigation and Habitat Restoration Plan for the species. Regardless of habitat condition, if effective weed treatment can be completed during a

time period that will not affect the SAR, this will be the preferred action. Sweeps for SAR will occur before treatments in all critical habitat areas, regardless of whether the biophysical attributes for the species are present.

5. If the site contains the biophysical attributes necessary to support the SAR, the effective treatment methods and timing will be compared to the life-history and sensitivity of the SAR (refer to species ecology and mitigation in the species-specific Mitigation and Habitat Restoration Plan, Section 6 of Volume 6 of the Environmental Plans or SAR Recovery Plans for species without Project information). Potential treatments or timing windows that may affect the SAR will be removed from the treatment and timing options list.
6. If an effective treatment can occur in a time period that will not affect the SAR (*i.e.*, the treatment is known not to harm the species, or the treatment can occur when the species is not using the habitat) then the most effective treatment method will be implemented at the appropriate time.
7. If harm associated with a treatment option (*e.g.*, herbicide) can be eliminated by using a specific application method the treatment method will be included on the treatment options list. For example, herbicide stem injections or wipe-on applications that target individual plants and avoid contact with the SAR will be used if herbicide is the only effective way to treat the invasive plant.

Invasive Plant Management Methods for Sensitive Areas

Specific management methods that will be implemented in each sensitive area and the information that will be needed to finalize the treatment type is summarized below.

Sensitive Area	Specific Management Method that will be Implemented	Additional Information Needed to Finalize Treatment
Areas that did not contain invasive plants during the Project survey (2015)	The most effective treatment for the target species will be implemented at the most opportune time. The treatment objective will be to eradicate the introduced species.	Species of invasive plant that will be treated, growth stage of the plant and extent of the infestation
Organic farms	Manual or mechanical weed control methods will be used, unless directed otherwise by the landowner.	- Species of invasive plant that will be treated, growth stage of the plant and extent of the infestation - Consultation with landowner to determine allowable treatment methods and timing restrictions
Traditional Land Use sites	See Section 2.1.2 of the Plan - Where possible, areas containing food plants for human consumption (including berries and medicinal plants) will be identified and documented during the pre-treatment assessment. - Delineate a pesticide free zone (PFZ) around the plants of concern. - Use non-chemical methods of vegetation management when treatment objectives can be achieved. - If herbicides will be used, treatments shall be conducted at times to minimize impacts on food plants.	- Species of invasive plant that will be treated, growth stage of the plant and extent of the infestation - Consultation with the potentially impacted Aboriginal group to determine preferred treatment methods and timing restrictions
Critical Habitats	- Use non-chemical methods of vegetation management when treatment objectives can be achieved; - If herbicides will be used, treatments shall be conducted at times to avoid impacts to SAR	- Species of invasive plant that will be treated, growth stage of the plant and extent of the infestation - Completion of invasive plant treatment determination process (Section 5.2.3 of the Plan)
Water courses and wetlands	- Delineate a pesticide free zone around the waterbody (10 m unless using a herbicide regulators have approved for use within PFZs) - Use non-chemical methods of vegetation management within the PFZ when treatment objectives can be achieved; - If herbicides will be used within the PFZ, use a herbicide and application technique approved by the regulators.	Species of invasive plant that will be treated, growth stage of the plant and extent of the infestation

Sensitive Area	Specific Management Method that will be Implemented	Additional Information Needed to Finalize Treatment
Areas containing plant species at risk	• Use non-chemical methods of vegetation management when treatment objectives can be achieved; • If herbicides will be used, treatments shall be conducted at times to avoid impacts to the plant species at risk.	• Species of invasive plant that will be treated, growth stage of the plant and extent of the infestation • Literature review for plant species at risk to identify sensitive growth stages and dormancy periods. • Literature review for possible effects of herbicide on the plant reproductive structures (seed, stolons, rhizomes)

6.0 MONITORING

The objectives of Project monitoring include:

- monitoring compliance to WVMP and related biosecurity measures during construction;
- post-treatment evaluations to determine the effectiveness of invasive species treatments; and
- PCEM to compare existing Project Footprint conditions to pre-construction conditions or the conditions of the area adjacent to the right-of-way.

The monitoring schedule is included in Table 12.

TABLE 12
INVASIVE SPECIES MONITORING SCHEDULE

Project Phase	Monitoring
Construction	1. The effectiveness of pre-construction weed control measures conducted in the Project Footprint, at permanent and temporary facilities, and existing access roads will be assessed the year treatment occurs. Remedial weed control actions will be conducted if weed control efforts were not successful. Treatments are considered successful if there is a 98% kill rate of the targeted species. 2. Environmental Inspectors will monitor Project staff adherence to cleaning station policies.
Post-treatment evaluations	3. The effectiveness of invasive plant treatments conducted during post-construction will be evaluated before the end of the growing season. Remedial weed control actions will be conducted if weed control efforts were not successful (Treatments are considered successful if there is a 98% kill rate of the targeted species). Remedial actions (re-treatment) are conducted within 1 year, and when possible during the next weed treatment season (<i>i.e.</i>, if a failed treatment is assessed in summer and the species can be effectively re-treated in fall, it will be included on the fall treatment list). The site will remain on the treatment list until weed control objectives have been met.
Post-Construction Environmental Monitoring (PCEM) (Years One, Three and Five)	4. Equipment cleaning stations in the Project Footprint will be assessed in late spring. Weed species of concern that are identified at the sites will be treated. Manual removal of plants or chemical treatment will occur. The type of treatment used to depend on the invasive plant species and the extent of the infestation. If plants are manually removed when they are in flower, the seed heads will be carefully removed from the site and disposed of at an approved land-fill facility. 5. To evaluate the effectiveness of the weed control program, general weed monitoring will be conducted at all locations previously noted within the Environmental Issues List as having problem vegetation and where treatments have been implemented. Weed data will also be collected as part of the reclamation PCEM that will occur to monitor vegetation re-establishment in the Project Footprint. 6. Weed treatment and monitoring records will be kept by Trans Mountain. 7. After the completion of the 5 year PCEM Program, invasive plant species management will be released to KMC operations and will follow the KMC IVMP.

Post-Treatment Evaluations

The purpose of post-treatment evaluation is to measure the success of problem vegetation management and to evaluate the need for follow-up treatment(s). The timing and procedure for evaluating the invasive plant treatment programs will depend on the treatment method. Trans Mountain will inspect problem vegetation management work that is carried out by Vegetation Management Contractors before the end of the growing season using a Post-Treatment Monitoring/Evaluations Form (Appendix K). Representative samples of the Vegetation Management Contractor's work will be inspected to assess:

- compliance with WVMP and KMC IVMP commitments and regulatory authority regulations;
- success of the treatment method and whether site objectives were achieved;
- the maintenance of no treatment and buffer zones;
- protection of environmental features;
- occurrence of negative environmental impacts; and
- if corrective actions are required.

Treatment program evaluations will be based on visual estimates conducted by qualified and experienced personnel. Follow-up treatments will be scheduled until weed control objectives are met. A Post-Treatment Inspection Report will be completed following the evaluation.

Post-Construction Environmental Monitoring

Post-construction monitoring of invasive species will be a component of the Project PCEM Program. Vegetation surveys conducted during PCEM will document the presence of invasive plant species and the species distribution and density. This information will be compared to the pre-construction invasive species survey data. If new species are reported in the Project Footprint and the species does not occur in the adjacent area or existing species infestations are higher than pre-construction distributions and density, additional management measures will be implemented. Problem vegetation management activities will be evaluated and the need for additional treatment strategies will be determined, based on the effectiveness of the treatment strategies, until the problem vegetation species have been reduced to below threshold levels. During PCEM, the threshold for invasive species will be the pre-construction conditions.

Monitoring will be completed by inspecting locations previously noted within the Environmental Issues List as having problem vegetation and where treatments were implemented. The PCEM schedule for invasive plant species is years one, three and five following reclamation as described in NEB Condition 151.

KMC Operations will be involved in the weed treatment and monitoring program throughout the Project and they will assume sole responsibility for the weed control program upon fulfillment of NEB Condition 151 for PCEM (see Section 8.0).

7.0 REPORTING AND ACCOUNTABILITY

Trans Mountain is committed to ensuring the WVMP is well-documented and reviewed, revised on a regular basis (years one, three and five Table 12) and implemented effectively. Trans Mountain will ensure that effective practices are continually used to achieve the management objectives. Tasks involved in implementing the WVMP are separated and assigned to specific Project members (Table 13). Supplemental surveys and invasive plant species treatment will be documented.

Results of post-construction monitoring for weeds will be submitted to the NEB on or before January 31 following the first, third and fifth complete growing seasons after completing final clean-up as per NEB Condition 151. The effectiveness of problem vegetation management measures implemented during the pre-construction and construction phases, will be outlined in the As-Built Report, Environmental Issues List for the Project (to be included and updated in PCEM reports) and will be evaluated by a Vegetation and/or Reclamation Resource Specialist during initial and subsequent PCEM of vegetation and soil conditions.

Trans Mountain is committed to regular review of applicable problem vegetation reports (*i.e.*, Pre-Construction Weed Survey Report, final year PCEM report, Environmental Issues List and Post-Treatment Monitoring Report) prepared for the Project. As part of this commitment, measures will be implemented over the long-term (*i.e.*, ongoing management of problem vegetation) to meet objectives outlined in the WVMP and the KMC IVMP during regular operation and maintenance activities for the Project (Section 8.0).

TABLE 13

WEED AND VEGETATION MANAGEMENT PLAN RESPONSIBILITIES

Tasks	Manager of Resource Specialists	Vegetation/Reclamation Specialist	Environmental Inspector
Task 1: Ensure pre-construction weed surveys are completed prior to treatments and before the commencement of construction activities on the pipeline or facility footprint and/or associated components.	A	R	C
Task 2: Based on the recommendations made by the Vegetation/Reclamation Resource Specialist during the pre-construction weed survey, determine scope of work and proceed with any budgeting and internal approvals requiring action.	A	R	C
Task 3: Advise the Environmental Inspector where treatment and monitoring (pre-construction and construction) is required and provide a timeline for completing the work.	A	R	C
Task 4: Confirm that regulatory approvals are up-to-date and in place for vegetation management. Ensure provincial legislation and requirements in the WVMP are followed during vegetation management activities.	A/R	R	C
Task 5: Hire and supervise the Vegetation Management Contractor.	A	C	R/C
Task 6: Conduct vegetation management activities and monitoring.	C	C	I/A
Task 7: Review herbicide application records and ensure vegetation management has been carried out according to site priorities and timelines.	A	R	R
Task 8: Provide the Post-Treatment Inspection and Monitoring Forms (completed by the Environmental Inspector or Vegetation/Reclamation Resource Specialist) to the Environmental Manager.	I	R	A
Task 9: Ensure that records of vegetation management are included in the Construction Monitoring database and included in the As-Built Report for the Project.	A	I	R

Notes:

- A = Accountable - The individual or group who is ultimately answerable, includes yes/no and power of veto. Only one "A" can be assigned to each task.
- R = Responsible - The individual(s) or group(s) who actually arranges and contracts the task. The degree of responsibility is defined by the accountable person. An "R" can be shared.
- C = Consulted - The individual(s) or group(s) to be consulted prior to a final decision or action being taken. Two-way communication is required.
- I = Informed - The individual(s) or group(s) to be consulted prior to a final decision or action being taken. Two-way communication is required.

8.0 OPERATIONS VEGETATION MANAGEMENT PROGRAM

Invasive plant species management following the PCEM Program will be conducted by KMC operations according to the KMC IVMP (KMC 2016). The IVMP applies to KMC pipeline rights-of-way, access roads, and facilities. KMC utilizes the principles of integrated pest management to manage problem vegetation. Objectives of the IVMP directly related to vegetation management are to manage Noxious and invasive plants, respect agreements made with Aboriginal groups, landowners/tenants and other stakeholders, and to ensure vegetation management activities are conducted in a manner that reduces the risk to the environment and human health.

The KMC IVMP details the prevention, survey and monitoring processes, describes the treatment threshold and vegetation management options selection process, outlines strategies and procedures for environmental protection and provides the reporting, notification and consultation process that is followed. The current IVMP is available on the [KMC website](#).

KMC operations conducts ongoing problem vegetation management according to the objectives and methods included in the KMC IVMP (KMC 2016). Regular inspections to determine the extent of problem vegetation are conducted and Pre-Treatment Weed Monitoring forms for areas with problem vegetation are completed. Annual baseline weed assessments are done for newly constructed or disturbed areas of rights-of-way and access roads to rights-of-way and facilities (Section 2.6.1 of the KMC IVMP).

9.0 SUMMARY

The WVMP provides a framework to manage the growth and spread of invasive plants with a focus on Noxious weeds and regional priority species. The WVMP outlines procedures to identify, prevent, control, contain, and monitor the introduction of new species or the spread of existing invasive plant species in the Project Footprint and adjacent lands. Management measures are provided for pre-construction, construction and post-construction phases of the Project and include pre-construction surveys of susceptible areas and control treatments, where warranted; promoting awareness of the primary invasive species of concern and weed prevention and control techniques during construction; and treating and monitoring weed infestations as warranted post-construction and during operations.

The WVMP includes mitigation and control measures for containment species and regional priority species. The WVMP identifies site-specific management methods for invasive species at known locations of organic properties, plant species at risk, traditional use sites, sensitive wildlife habitats, aquatic habitats and areas that did not contain invasive plants during the Project survey (2015). The need for treatment and the type of treatment in these areas will be determined in consultation with regulatory authorities and invasive species specialists.

Details regarding the invasive species of concern identified within the Project Footprint in AB and BC are provided (Appendix A) as well as a summary of invasive species surveys completed to date by KP range (Appendix B). The Appendices for each Project KP range (Appendices C to I) and facilities (Appendix J) provide a list of priority invasive species, their effective treatment methods, the location and type of sensitive areas that may occur in the area as well as the known location of each priority species. Appendix K contains an example of the pre and post-treatment monitoring form. Appendix L provides summaries of public consultation, Aboriginal engagement and regulatory consultation pertaining to weed and vegetation management and Appendix M contains the record of stakeholder notifications of the Plan. Areas identified for weed treatment pre-construction are included in Appendix N.

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CH2M wishes to acknowledge those people identified in the Personal Communications for their assistance in supplying information and comments incorporated into this report.

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