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Activity Set-back Distance Guidelines for Prairie Plant Species at Risk

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Canadian Wildlife Service

Canada

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1.0 PURPOSE AND SCOPE

These guidelines constitute advice only. All persons must adhere to all pertinent laws, regulations and permit requirements including but not restricted to the *Species at Risk Act* (SARA). In order to protect individual plants and their critical habitat and adhere to pertinent laws, regulations and permit requirements, alternatives to these guidelines may be necessary in some circumstances.

The appropriateness of measures used to protect individual plant species at risk and their critical habitat will be determined on a case-by-case basis by considering all pertinent facts, including but not limited to these guidelines. If there is any doubt about the effectiveness of these guidelines in protecting plant species at risk and their critical habitat, a SARA permit should be sought prior to initiating potentially harmful activities. For information on SARA, please consult the SARA Registry at www.sararegistry.gc.ca; the Act itself can found in the Registry at www.sararegistry.gc.ca/approach/act/default_e.cfm; SARA Schedule 1 species (endangered, threatened, and special concern risk categories) in any region of Canada can be found at: www.sararegistry.gc.ca/sar/listing/schedules_e.cfm?id=1.

These plant setback distance guidelines were developed for use in Manitoba, Saskatchewan and Alberta. These guidelines represent advice to help land managers make proactive mitigation decisions about **new** industrial disturbances, agricultural or recreational activities on natural landscapes dominated by native vegetation where plant species at risk (Table 1) occur on federal lands. These guidelines are not intended to change activities required for the maintenance and operation of **existing** developments and infrastructure. Specifically, these guidelines will help land managers and development proponents avoid:

- killing, harming or harassing endangered or threatened plant species at risk individuals (sections 32 and 36 of SARA);
- destroying any part of the critical habitat of an endangered or threatened plant species at risk (sections 58, 60 and 61 of SARA);
- contravention of any other regulations established from an action plan (section 53), management plan (section 71), or otherwise established to protect critical habitat (section 59 of SARA).

Plant species at risk are currently afforded protection under SARA on federal lands, and these guidelines are intended for application on those lands at this time (e.g. military bases, federal community pastures and National Wildlife Areas). Provincial legislation may now or in the future extend similar protection to provincial, municipal or private lands. Where provincial guidelines are not available, we encourage proponents of new developments to use these guidelines as advice for mitigating risks to plant species at risk.

Environment Canada, in cooperation with the Recovery Team for Plant Species at Risk in the Prairie Provinces, will review any proposed revisions to these guidelines. Environment Canada will update these guidelines on at least a five-year cycle beginning spring 2015. This document has the endorsement of the Recovery Team for Plant Species at Risk in the Prairie Provinces.

2.0 BACKGROUND

Set-back distance guidelines exist for a number of recreational, agricultural and industrial activities that take place adjacent to human habitations or other valued locations (e.g. AEUB 2006; Alberta Government 2006; BC Ministry of Environment 2006). Most set-back distance guidelines for wildlife species at risk in Manitoba, Saskatchewan and Alberta rely on science and expert opinion to rank industrial activities, and the perceived magnitude and risk of each (Scobie and Faminow 2001; ASRD 2001; SKCDC 2003). Environment Canada is currently refining guidelines for prairie animal species at risk, and new guidelines are being developed in Alberta based on detailed literature reviews (Joel Nicholson pers. comm.). The impact of activities on wildlife takes into account that animals are mobile, respond behaviourally to industrial noise and movement, and can quickly return once noise and movement subside, even using drastically disturbed habitats. Conversely, plants are sessile and must be considered separately; plants are oblivious to noise and movement, most are adapted to survive some above-ground trampling and defoliating damage, but most soil disturbance can kill individual plants and destroy part of the critical habitat.[1] Additionally, cumulative edge effects or chronic disturbance have significant potential to gradually destroy critical habitat and thereby threaten long-term survival of these sessile organisms.

Scientific literature specifically addressing set-backs for conserving species at risk in grassland ecosystems is not readily available. As such, the following guidelines represent an interpretation of related literature and expert opinions. There is a body of scientific knowledge developing on industrial “edge effects” and “buffer zones,” but this research has focused on watershed and animal protection in forested environments (Ries et al. 2004), with few examples for plants (i.e. Honnay et al. 2005) and fewer still for grassland plants (i.e. Hansen and Clevenger 2005). Research to investigate edge effects on plant species at risk is identified as a needed activity in

[1] While some soil disturbance can create or maintain habitat for populations of some annual plant species at risk like small-flowered sand-verbena, SARA prohibits the killing of “individual” plants under sections 32 and 36, and the destruction of critical habitat under sections 58, 60 and 61. Enforcement officers are not in a position to make judgments about what is good for the population. However, these officers can very easily make judgments about what is injurious for individuals as described in sections 32 and 36, and use recovery strategy information to determine what constitutes destruction of critical habitat prohibited under sections 58, 60 and 61. Where potential conservation conflicts arise, it is best to consult Environment Canada and recommended management practices for the species; permits under sections 73, 74 or 78 to contravene sections 32, 36, 58, 60 or 61 for the good of the population may be applicable. Future regulations established under sections 53 or 59 may address this particular concern.

recovery strategies completed or in development; thus, the following guidelines are precautionary. Adjustments to these guidelines will be made once results of research are available, to reflect the improved state of knowledge at that time. However, because new information may become available before these guidelines are updated, project proponents should review any new, pertinent information to assess the applicability of these set-backs to their particular circumstances.

Set-back distance guidelines for "valued ecosystem components," like plant species at risk and their critical habitat, should be based upon "reasonable and foreseeable" potential cumulative edge effects imposed by several direct and indirect human activities (Hegmann et al. 1999). For example, it may not matter to a plant whether a pipeline installation:

- was small or large diameter, because there can be direct and irreversible mortality within the area disturbed;
- took a single day or three months to complete, because cumulative edge effects can continue indefinitely afterwards; or
- limits current road and trail traffic, as road traffic tends to increase in future.

Thus, the set-backs should address both acute disturbance impacts and potential cumulative impacts of chronic disturbance activities.

Recovery Strategies for plant species at risk in Manitoba, Saskatchewan and Alberta provide further guidance on what constitutes disturbance or destruction to plant species in at-risk habitats. In regards to critical habitat, destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a singular or multiple activities at one point in time or from the cumulative effects of one or more activities over time. No consideration of the spatial proportion destroyed, or the temporal duration of destruction is considered in this document.

3.0 SET-BACK DISTANCE RECOMMENDATIONS

There is no set-back distance for a number of existing and traditional land uses or natural disturbance regimes; examples of **Class 1: 0 m** activities are described in Table 2. Two additional classes of set-backs have been created to provide protection from more severe acute or chronic disturbances.

3.1 Protecting Plants and Habitats from Acute Disturbance (Class 2: 30 m)

A minimum set-back distance of **30 m** from all detectable individuals is recommended in this case.

SARA prohibits the killing or harming of individuals under sections 32 and 36. Those individuals are defined to include "a part or derivative of an individual," "at any developmental stage and includes … embryos, seeds, pollen, spores and asexual propagules." Technical violations occur at distinct points in time when removal of a single leaf, root, seed or any other part of a plant occurs, in which case extreme precaution is required when in proximity to these species. Some examples of activities likely to result in those violations are described in Table 2.

The rationale for a 30 m buffer stems from a number of sources. The only research found to actually describe edge effects on short-term survival of plant species at risk indicated that 40 m was the minimum distance needed to avoid negative impacts of road dust (Gleason et al. 2007); that was also the maximum distance at which measurements were made. Research elsewhere indicates a single contact with humans can affect a plant's susceptibility to herbivory, parasitism, disease, and ultimately growth, reproductive output and survival (Cahill et al. 2001; Hik et al. 2003). There is also a rapid decline in survival and biomass of many plant species with an increase in frequency of trampling by people, their livestock and their vehicles (Liddle 1991; Yorks et al. 1997; Leung and Marion 1996). Much of that damage in prairies occurs under wet conditions, and particularly to rhizomatous growth forms (Dickson et al. 2008). This type of damage can occur several metres beyond the location of easily detected aboveground stems, where many perennial plants have roots and buds just beneath the soil surface. Most plants also produce a soil seedbank, and each seed represents a living and genetically unique individual. Long-distance dispersal events are common in plants, but the large part of a soil seedbank exists in a "shadow" of several metres surrounding the known locations of parent plants (Okubo and Levin 1989). Based on these sources of information, a 30 m buffer was selected.

3.2 Protecting Plants and Habitats from Acute and Chronic Disturbance (Class 3: 300 m)

A minimum set-back distance of **300 m** from all detectable individuals is recommended in this case.

The SARA prohibitions for killing and harming individuals (sections 32 and 36) do not distinguish damage due to acute or chronic disturbance, although the latter is very important to consider for sessile organisms like plants. Chronic disturbance likely to result in the ultimate killing or harming of an individual plant is also likely to destroy all or part of the habitat critical to the survival of those plants (also prohibited under sections 58 and 61). Technical violations may only be identified at a distinct point in time, but may have been preceded by repeated and incremental harm to the plant and its habitat, and/or are likely to be followed by repeated and incrementally harmful activities. In anticipation of these cumulative effects to plants and their habitats, the guidelines are intended to help all potential contributors avoid adding to those effects. Some examples of these activities are described in Table 2.

The rationale for a 300 m buffer stems from a number of sources. In detailed reviews by Forman and Alexander (1998) and Forman et al. (2003), most roadside edge effects resulting from

construction and repeated traffic have their greatest impact within the first 30 to 50 m, but salinity, nitrogen and hydrological effects could extend 100 to 200 m, and alien invasive species may spread up to 1 km. Hansen and Clevenger (2005) observed no decline in the frequency of invasive alien species encountered up to 150 m away from roads and railways in a grassland environment, although they did not sample farther than 150 m. Gelbard and Harrison (2005) concluded that edge effects of roads on the plant and soil habitat was such that invasive species could more readily establish and survive within 10 m of roads compared with plants up to 1000 m from roads. Different types of roads appear to have different effects: paved or graded roads tend to have a higher cover and richness of invasive species than 4 × 4 vehicle tracks, but both created habitat for dispersal and establishment of invasive species in roadside verges and up to 50 m away (Gelbard and Belnap 2003). The greater frequency of traffic and intensity of disturbance on improved roads merely speeds the process of invasion. Accepting that significant effects of invasive species can be detected up to 150 m from roads and other developed sites, and invasive species can occur up to 1 km from roads, a compromise buffer distance of 300 m was selected. Considering the road density typical of the Canadian prairies every 1.6 to 3.2 km, it is unlikely that source populations for invasive alien species can be accurately identified beyond 800 m from roadside edges (the centre of a section assuming it is surrounded by roads).

Research is needed to evaluate the cumulative effects of sulphur and nitrogen emissions and deposition on surrounding soils and survival of plant species at risk because elevated deposition from such emission-producing facilities has been detected in plants and soils 1–2 km away (Meshalkina et al. 1996; Hao et al. 2006). However, it is not clear if these detectable levels are biologically meaningful. Regionally, Kochy and Wilson (2001) observed nitrogen deposition in Elk Island National Park several kilometres downwind of petroleum refineries and an urban centre to be 22 kg ha^{-1} $year^{-1}$, while background rates in the wilderness at Jasper National Park were only 8 kg ha^{-1} $year^{-1}$. These increased rates appeared to promote forest encroachment into native grasslands. Experiments by Plassmann et al. (2008) found that low additions of nitrogen (15 kg ha^{-1} $year^{-1}$) to sand dunes increased germination rates of annual plants from the seedbank. This risks depleting the seedbank and eliminating a species from a low-nitrogen site to which it is adapted. Worse yet, some of the invasive species themselves like sweet clover (*Melilotus officinale*) can elevate soil nitrogen content through biological fixation and facilitate invasions by other alien species (Jordan et al. 2008). In light of these findings, a 300 m buffer is a reasonable and precautionary compromise.

4.0 ALTERNATIVES TO SET-BACK DISTANCE RECOMMENDATIONS

There are a number of instances where strict adherence to these set-back distances could result in greater destruction of native vegetation, actions that are contradictory to best management practices for the same species, or otherwise fail to achieve the intent of the protective measures. In all of these cases, alternatives to these recommendations should be considered, and, where appropriate, a permit may be required.

4.1 Contradiction with Best Management Practices for Plant Species at Risk

Set-back distances can be lifted, reduced or modified seasonally, year-round or on a case-by-case basis where contradictions arise between these guidelines and recommended best management practices for plant species at risk and their habitat (established pursuant to sections 41 “recovery strategies,” 49 “action plans,” 56 “codes of practice, national standards or guidelines with respect to the protection of critical habitat,” or otherwise endorsed by Environment Canada in cooperation with the recovery team established for those plant species at risk). Some examples of conflicts and resolutions include:

1. Restrictions on pipeline installations that supply water to livestock are put in place due to risks of damaging/killing individual plants or destroying critical habitat during construction, reclamation or flooding from a pipeline rupture. However, if grazing is a recommended management practice and grazing cannot occur without a water supply for the livestock, a pipeline installation may be the best land management decision. To protect the land manager from any liability, application for a SARA permit or agreement is recommended to allow such an installation contrary to the recommended set-back distance or timing restriction. These permits are issued pursuant to sections 73, 74 or 78 of SARA, and can be obtained from Environment Canada for federal lands.

2. Restrictions on new fencing or salting stations are put in place due to risks of altered grazing pressure threatening survival of existing individual plants and critical habitat. However, if a more intensively managed grazing system is a recommended management practice for maintaining or enhancing the population or habitat for the species, a fence or salting station installation may be the best land management decision. To reduce liability for the land user, an application for a SARA permit or agreement is recommended to carry out these activities contrary to the recommended set-back distance or timing restriction. These permits are issued pursuant to sections 73, 74 or 78 of SARA, and can be obtained from Environment Canada for federal lands.

3. Restrictions on herbicide, mowing or haying are put in place due to risks of damaging actively growing or flowering plants, or subsequently collecting and possessing individual plant parts like seeds. However, if a carefully timed and applied herbicide, mowing or haying system is a recommended management practice for maintaining or enhancing the population or habitat for the species, that particular type of herbicide application, mowing or haying activity may be the best land management decision. To reduce liability for the land user, an application for a SARA permit or agreement is recommended to carry out these activities contrary to the recommended set-back distance or timing restriction. These permits are issued pursuant to sections 73, 74 or 78 of SARA, and can be obtained from Environment Canada for federal lands.

4.2 Seasonal Lifting of Set-backs for Annual Plants

All activities described under Class 2: 30 m set-backs (Table 2) can be reclassified as Class 1: 0 m during the winter period of seed dormancy from **October 1 through to March 31** of each year, for annual plant species at risk. However, activities described under Class 3: 300 m set-backs remain unchanged, as the impacts of those land uses occur regardless of season.

Annual plants rely entirely on germination from a soil seed bank for genetic out-crossing and dispersal over time (Nunney 2002; Templeton and Levin 1979). The period of time between germination and seed dispersal is a crucial period for annual plants not to be disturbed within 30 m, however individual seeds are not normally at risk from trampling during the winter period of seed dormancy. Conversely, perennial plants largely rely on vegetative growth and asexual reproduction for population persistence over time (Silvertown and Charlesworth 2001). For that reason, primary set-back distance restrictions should continue to apply throughout the year surrounding known perennial and biennial plant species at risk occurrences.

4.3 Maintenance or Redevelopment within Existing Disturbed Footprints

No new development should be allowed within 300 m of a plant species at risk occurrence unless it occurs in an area where there is an existing disturbance that is similar in nature to the disturbance that will be caused by the new development, with the following restrictions:

1. no expansion of the disturbed area into undisturbed areas; and
2. no activity within 30 m of an individual plant within the existing disturbed area; and
3. impact monitoring for five years (protocol to follow).

Many plant occurrences are located within 300 m or 30 m of existing disturbances, such as roadside edges, cultivated lands and petroleum well pads. In all of these cases, the majority of the damage has already been done to the habitat or individuals, and continued maintenance of the existing disturbances is almost always necessary for public safety or socio-economic reasons. Redevelopment or upgrading of a site, such as paving an existing gravel road, re-grading road ditches, or directionally drilling from an existing petroleum well pad, is likely to add some disturbance, but those impacts are minimal when compared with the prospect of adding new roads and well pads to the landscape. In these cases, strict adherence to the set-back distances does not always make sense. To reduce liability for the land user, an application for a SARA permit or agreement is recommended to carry out these activities contrary to the recommended set-back distance or timing restriction. These permits are issued pursuant to sections 73, 74 or 78 of SARA, and can be obtained from Environment Canada for federal lands. In the case of repeated or routine maintenance where a plant species at risk or critical habitat will be disturbed or destroyed, a multi-year permit (three years) or agreement (five years) may be issued along with requirements for impact monitoring (e.g., monthly grading of a gravel road where plant species at risk occur on road edges or in the ditch). Monitoring protocols are being developed to support the monitoring requirement described above.

5.0 RESEARCH OPPORTUNITIES

The intent of set-back distances is to re-route, re-locate, or re-time proposed new disturbances (Figure 1). The only alternative mitigations considered at this time are described above in Section 4. The following sections call for further research, but it is important to emphasize that this research needs to use relevant hypotheses for mitigating effects on plant species at risk survival and persistence, and attention to both type one and type two errors in the interpretation of results (see McGarvey 2007).

5.1 Minimum Disturbance Construction Techniques for Pipelines and Wellsites

The setback distance for all pipelines is a minimum of 300 m regardless of diameter, contents or construction method. Even where minimum disturbance construction for "ploughed-in" narrow-diameter pipelines occurs to supply livestock water or petroleum, cumulative surface impacts are anticipated that could threaten individual plant species at risk or their critical habitat. Construction involves heavy equipment trampling, and the removal and replacement of intact native grassland sod over a narrow and shallow trench in the same day; no further reclamation actions are taken (Sinton 2001). This approach is normally recommended to reduce environmental impacts and improve the chances of meeting reclamation success criteria by means of natural recovery. However, temporary damage to plant species at risk individuals, populations and habitat cannot be mitigated as easily.

First, water, hydrocarbons or other fluids leaking from pipeline ruptures will have an edge effect that varies greatly depending upon topography of the site. For example, an Alberta Energy Resources Conservation Board (ERCB) investigation during 2008 at CFB Suffield found a surface leak of crude oil spread 165 m along ungulate trails and ultimately covered 1200 m^2 of native grassland, killing more than 200 migratory birds (ERCB Investigation Report 2009-06-18). A second incident investigated by the ERCB involved a natural gas blowout that released "lower explosive levels" of gas at 100% within 50 m of a well head, decreasing to 0% at 500 m, and a spill of fluids up to 25 m from the head that resulted in excavation and removal of 540 tonnes of soil for remediation (ERCB Investigation Report 2009-06-01). ERCB investigations elsewhere have found oil spills that spread 1.6 km across the surface from rupture points before clean-up could begin (ERCB Investigation Report 2007-05-09). Plants are not mobile, so flooding and inundation for any period of time may be sufficient to quickly kill individual plants adapted to semiarid terrestrial ecosystems, and could destroy critical habitat for several months, years or decades. If evidence indicates the probability of such a rupture is low, in proportion to the density of all existing and planned pipelines, and in proportion to habitat availability and species at risk occupancy in the area, there could be a case for modifying this set-back for this particular land use. Further research is needed to answer this question.

Second, once a linear disturbance like a pipeline is introduced to the landscape, it is common for new trails and pipelines to parallel this disturbance. In effect, a single pipeline installation sets in motion future cumulative impacts that would not have otherwise occurred had the pipeline not

been installed in the first place (Scobie and Faminow 2001). Some of those impacts could include the invasion or introduction of invasive alien plant species. Narrowing pipeline right-of-way width may reduce the initial area disturbed, but this logically has less influence on edge effects compared to right-of-way length. Therefore, regardless of the method used for construction, the edge effects may ultimately be the same. If evidence indicates that some types of pipeline construction do not result in these cumulative traffic or invasive species effects, there could be a case for modifying this set-back. Further research is needed to answer this question.

Third, the long-lasting changes in soil physical, chemical and biological properties can change the habitat indefinitely (Naeth et al. 1993; 1987) and may prevent recolonization by a plant species at risk if it was killed during construction. The response of most plant species at risk to changes in soil physical, chemical and biological properties is not known, but if evidence indicates some types of industrial disturbance have neutral impacts, there could be a case for modifying this set-back. Further research is also needed to answer this question.

5.2 Plant or Seed Salvage, Transplanting and Translocation

Environment Canada and the Recovery Team for Plant Species at Risk in the Prairie Provinces have not endorsed any “salvage” methods for translocating or reseeding plant species at risk, where individuals could be or have been destroyed by industrial activities. Initial demonstration projects and follow-up monitoring with a few occurrences of other rare plant species indicates variable mitigation success and some possible approaches that warrant further investigation (i.e. Fahselt 2007; Fryer et al. 2002; AXYS Environmental Consulting Ltd. 2006; Allen 1994). Until such time that species-specific research considering the habitat requirements, regeneration ecology and genetic diversity of these species leads to scientifically defensible methods for translocation, reseeding or other conservation measures (see Falk et al. 1996; Austin 2004; Fahselt 2007), it is these set-back distance and timing restriction guidelines that take precedence. This research will be reviewed every five years according to the schedule of recovery strategy updates required under SARA, at which time revisions to acceptable alternative mitigations may be made. In all of those cases, permits would be required to gather seed or translocate plants on federal lands.

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Table 1. Plant species at risk in the Prairie Ecozone afforded protection under the *Species at Risk Act*, current to October 2010.

Common Name	**Scientific Name**	**Status 2007**	**Life History and Form**
Rough agalinis	*Agalinis aspera*	Endangered	Annual
Small-flowered sand-verbena	*Tripterocalyx micranthus*	Endangered	Annual
Small white lady's-slipper	*Cypripedium candidum*	Endangered	Perennial, herbaceous
Tiny cryptanthe	*Cryptantha minima*	Endangered	Annual
Western prairie fringed-orchid	*Platanthera praeclara*	Endangered	Perennial, herbaceous
Buffalograss	*Buchloë dactyloides*	Threatened	Perennial, herbaceous
Hairy prairie-clover	*Dalea villosa* var. *villosa*	Threatened	Perennial, herbaceous
Slender mouse-ear-cress	*Halimolobos virgata*	Threatened	Biennial
Smooth goosefoot	*Chenopodium subglabrum*	Threatened	Annual
Soapweed	*Yucca glauca*	Threatened	Perennial, evergreen
Western silvery aster	*Symphyotrichum sericeum*	Threatened	Perennial, herbaceous
Western spiderwort	*Tradescantia occidentalis*	Threatened	Perennial, herbaceous

Table 2. Examples of activities for which set-back distances apply.[1]

Activity	Set-Back Distance		
	CLASS 1: **0 m** (unrestricted)	CLASS 2: **30 m**	CLASS 3: **300 m**
Recreational			
Walking, skiing, equestrian or all-terrain vehicles (randomly dispersed – dry weather)	×		
Camping (tent >1 night, no fire pit)		×	
Walking, skiing, cycling, equestrian or all-terrain vehicles (repeated to create a visible and lasting track-trail)		×	
Moto-cross or 4 x 4 vehicles (always causing damage to soil)			×
Improved recreational trail, parking lot or campground surfacing (gravel or paved)			×
Buildings and other permanent structures			×
Agricultural – Rangeland			
Walking, equestrian or all-terrain vehicles (e.g. to check livestock) (randomly dispersed – dry weather)	×		
Prescribed burning	×		
Livestock grazing	×		
Haying or mowing vegetation	(BMP?)	×	
Walking, equestrian or all-terrain vehicles (repeated to create a visible and lasting track-trail)		×	
Vehicles and trailers requiring Class 1-5 driver's licence (randomly dispersed – dry weather)		×	
Fencing (temporary posts and hot wire)		×	
Salting station placement		×	
Spraying of pesticides or release of biological control agents	(BMP?)	(BMP?)	×
Spreading of hay or straw bales for feed			×
Fencing (permanent posts and smooth or barbed wire)			×
Placement of above- or below-ground pipelines and troughs for water supply			×
Vehicles requiring Class 1-5 driver's licence (repeated to create a visible and lasting track-trail)			×
Spreading of liquid or solid manure, rotten bales or other farm wastes			×
Seeding of non-native crops or forages			×
Cultivation, tillage or harrowing			×
Fireguard blading			×
Construction of water wells or dugouts			×
Buildings, corrals and other permanent structures			×

Table 2. Continued.

Activity	Set-Back Distance		
	CLASS 1: **0 m** (unrestricted)	CLASS 2: **30 m**	CLASS 3: **300 m**
Industrial			
Walking or all-terrain vehicles for pre-disturbance assessment (randomly dispersed – dry weather)	×		
Walking or all-terrain vehicles (repeated to create a visible and lasting track-trail)		×	
Vehicles requiring Class 1-5 driver's licence (randomly dispersed – dry weather)		×	
Above-ground transmission lines		×	
Vehicles requiring Class 1-5 driver's licence (repeated to create a visible and lasting track-trail)			×
Bladed or gravelled trails			×
Construction of transmission line or communications towers requiring soil disturbance, vehicle traffic and/or reclamation			×
Below-ground pipelines or utilities requiring soil disturbance, vehicle traffic and/or reclamation			×
Roadbed and ditch construction or expansion			×
Drilling or excavation for below-ground mineral resources	(DD?)	(DD?)	×
Spreading of liquid or solid waste materials resulting from industrial activity			×
Inundation from downstream impoundments (dams) that alter large-scale hydrologic regimes			×
Buildings and other structures			×

1: The rationale for these set-backs is described in Section 3 and alternative mitigations and exemptions are described in Section 4.

BMP: "Beneficial Management Practice" is a land management activity that is consistent with natural disturbance regimes, needed to mimic those regimes or to control alien invasive species, all of which benefit the population and habitat of a species, despite possible incidental losses to individual plants. In these cases, the set-backs could be lifted seasonally or year-round, or otherwise modified to accommodate the beneficial management practice. These will vary according to species, and the SARA public registry should be consulted for more information.

DD: "Directional Drilling" for water or petroleum can occur beneath plant species at risk occurrences, as long as the surface disturbance is at least 300 m away and drilling depth is below the rooting zone of plants.

Annual plants may have Class 2 activities changed to Class 1 from October 1 to March 31 (see Section 4.2).

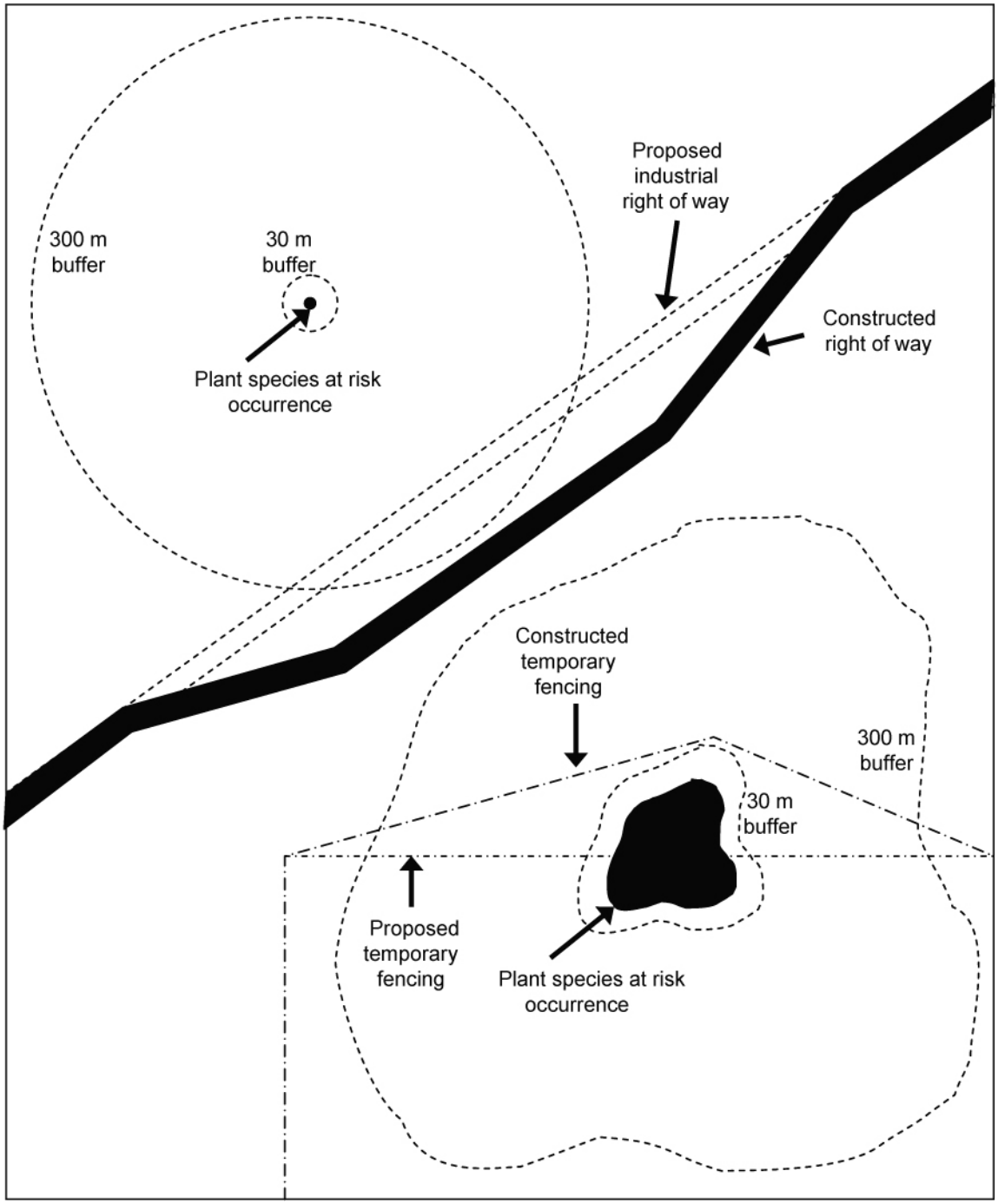

Figure 1. Conceptual representation of how set-back distance guidelines for 30 m and 300 m are used to protect individual plants and habitat by altering the construction of new developments on the landscape. Plant occurrences may be points, lines or polygons, and set-backs are created by buffering the boundary of those occurrences.

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Additional information can be obtained at:

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