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IMMINENT THREAT ASSESSMENT FOR SMALL WHITE LADY'S-SLIPPER

(*Cypripedium candidum*)

Canada

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EXECUTIVE SUMMARY

This imminent threat assessment was initiated as a result of a petition and letters written to the Minister of Environment and Climate Change (ECCC), received in 2020, requesting that he take action under the *Species at Risk Act* (SARA) to protect a population of Small White Lady's-slipper in Brandon, Manitoba. The petitioners put forth the position that a proposed housing development that had received an exemption under provincial legislation posed a threat to the species and its habitat and requested federal intervention under SARA to protect the species.

Small White Lady's-slipper (Orchidaceae Family) is a perennial orchid found in Manitoba and Ontario. There are 28 extant populations, 21 of which are in Manitoba. The exact current abundance of Canadian populations is unknown due to the difficulty in estimating abundance; however, in 2014, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) estimated the Manitoba population with a high degree of uncertainty to be about 22,000 mature flowering individuals.

The Small White Lady's-slipper is listed as Threatened under Schedule 1 of SARA and is listed as Endangered under Manitoba's *Endangered Species and Ecosystems Act* (ESEA). Provincial responsibilities to support the recovery of Small White Lady's-slipper include ensuring protections for plants and habitat are implemented under the ESEA, monitoring populations where and when possible, and gathering information on current and historic land uses and perceived threats.

The provincial government issued an exemption under the ESEA on March 26, 2020, permitting the proposed housing development to proceed with a condition requiring a fenced 25 m buffer around the population in question. The province confirmed that the exemption had been rescinded on March 23, 2023 and the ESEA fully applies to the species.

An environmental greenspace for the area is proposed by the City of Brandon, and would contain the majority of the plants in the population. The Government of Manitoba has also indicated to ECCC that they are committed to work with the landowner, the City of Brandon and other relevant parties with the intention of establishing a partnership focused on the management of the site to address threats to the Small White Lady's-slippers and their habitat. However, at the date of this assessment, ECCC did not receive confirmation of any active management and/or stewardship plans in place to mitigate or manage the risk of the threats associated with the housing development.

The impacts of the threats were assessed against the species population and distribution objectives set out in the *Recovery Strategy for the Small White Lady's-slipper (Cypripedium candidum) in Canada*, which are to maintain the current Area of Occupancy for all populations known to exist in Canada. In addition to the publicly available information, ECCC received site-specific information from the City of Brandon officials, provincial government officials, and the Nature Conservancy of Canada.

This assessment considers threats to both Small White Lady's-slipper plants and their critical habitat over a one-year time frame. One year was selected as a relevant period in which the initiation of construction and installation of water/sewer infrastructure, houses, and roads are anticipated, and it captures the potential for immediate impact to groundwater flow, which is important to this species. Threats assessed that are anticipated during this period include:

- Threats from housing and urban area development (including new roads and utility/service lines);
- Threats from water infrastructure works, in particular works that will result in altering flow of groundwater and surface water;
- Threats from other activities secondary to housing development and water infrastructure (including introduction of invasive non-native species, increased risk of pesticide accumulation).

Construction activities were described by the City of Brandon as anticipated to begin in summer 2023. At the date of this assessment, the Department does not have updated information on any postponement of the scheduled construction.

The assessment concluded that the species is not facing imminent threats to its survival. The Department's view is that even with the potential reduction in Area of Occupancy (AOO) for the South Brandon population, the species as a whole would continue to survive. This view has considered that, although threats are present, and population size and the AOO is declining, the species continues to be found in 21 populations in Manitoba and 7 in Ontario.

The assessment concluded that the species is not facing imminent threats to its recovery. The species is **not** facing imminent threats to its recovery at this time. If the impacts associated with the housing development were to materialize, the critical habitat in the area would be impacted and would no longer provide the biophysical attributes required for Small White Lady's-slipper, leading to a reduction in the AOO of the South Brandon population, such that recovery would be highly unlikely or impossible. However, given the full application of the ESEA, the planned greenspace and ongoing collaboration between the Province of Manitoba and the City of Brandon, the Department is of the view that the threats associated with the housing development can be adequately mitigated. Measures would need to ensure the direct destruction of known AOOs is avoided, suitable longer-term mitigation related to maintaining hydrology, and the establishment and appropriate management of the greenspace.

Introduction

Minister's obligation

The Minister of Environment and Climate Change (hereafter, the Minister) is the competent minister under SARA for Small White Lady's-slipper.

Pursuant to subsection 80(2) of the *Species at Risk Act* (SARA), the Minister must make a recommendation to the Governor in Council (GiC) to issue an emergency order if the Minister is of the opinion that the species faces imminent threats to its survival or recovery.

Assessment trigger

In 2020, the Minister of Environment and Climate Change was contacted via written correspondence (on June 16, August 25, and October 9) from two separate citizens of Brandon, Manitoba, as well as received an online petition in the same year, requesting that he take action under SARA to protect a population of Small White Lady's-slipper located in southeast Brandon. The two citizens, as well as the petition, allege a proposed housing development poses a threat to the species and have requested federal intervention under SARA to protect the species.

Upon receiving this request, ECCC fact-checked with the province of Manitoba and City of Brandon to confirm that Small White Lady's-slippers and their critical habitat occur within the area and that there is a proposed housing development for the same property. The province provided ECCC with additional information on the species occurrence including previous survey work and other historical information.

The request made in 2020 specifically made reference to the concerns associated with Manitoba's March 26, 2020 exemption of the development under the Endangered Species and Ecosystems Act (ESEA). The exemption from the ESEA was conditional (among other criteria) that the project must have a 25-meter protection buffer around all plants that were located during a 2019 survey. On March 23, 2023, the exemption under the ESEA was rescinded.

HOW THIS DOCUMENT IS DESIGNED

This imminent threat assessment has been developed to support the Minister in forming his opinion on whether the Small White Lady's-slipper is facing imminent threats to its recovery or survival, pursuant to subsection 80(2) of SARA.

The assessment was undertaken in accordance with the draft[1] *Policy on Assessing Imminent Threats under Sections 29 and 80 of the Species at Risk Act: terrestrial species*, where an

[1] This currently internal Policy was developed in order to provide consistency in the interpretation of imminent threat(s) to the survival (under section 29) and to recovery or survival (under section 80) of a terrestrial wildlife species under SARA

imminent threat is one that, without immediate intervention, will render the survival or recovery of the Small White Lady's-slipper impossible or highly unlikely. Under this draft policy, where there is a lack of data or lack of confidence in the data on the species or the impacts of the threat(s), the precautionary-based approach will be applied when conducting an imminent threats assessment, consistent with the preamble and section 38 of SARA.

This assessment considers current best available information and the information provided in the *Recovery Strategy for the Small White Lady's-slipper (Cypripedium candidum) in Canada* [Final] (Environment Canada 2014).

Additional information taken into consideration for this assessment includes the COSEWIC status report, population data obtained from the Manitoba Conservation Data Centre, hydrological information made available by the City of Brandon and the province of Manitoba, expert advice from an ECCC hydrologist, information from the City of Brandon on a designated greenspace, as well as information related to the project provided by the municipality through documentation and personal communication.

This document consists of three parts:

Part 1: Information on the species
Provides the species' characteristics, Canadian range, population parameters, habitat quality and quantity, status, threats and population and distribution objectives.

Part 2: Information on the new or evolving threat
Provides the best available information on the threats.

Part 3: Assessment of threats
Provides an assessment of the threats to the survival and/or recovery of the Small White Lady's-slipper.

Note: This document has been modified in order to limit the release of sensitive information that could further threaten the species. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

Part 1: Information on the species

1.1 Species characteristics

Small White Lady's-slipper (Orchidaceae Family) is a perennial orchid that grows to between 11 to 40 cm in height (Flora of North America Editorial Committee 2002). Plants grow in clumps of one to many stems and spread by creeping rootstocks (Curtis 1943). Three or four lanceolate leaves clasp each stem. One flower, rarely two, form at the tips of stems. Flowers consist of a small (less than 2.7 cm long), white, pouch-shaped "slipper" with purplish veins or spots. The surrounding twisted, greenish-yellow petals and sepals are also streaked or spotted with purple. Flowering usually occurs between mid-May and mid-June in Canada but varies with weather. Fruit capsules reach approximately two to four cm long and contain thousands of tiny seeds (Brownell 1981). It can take up to 16 years for a plant to flower (Curtis 1943, 1954), and seed production is dependent on specific pollinators (Catling and Knerer 1980; COSEWIC 2014). Since Small White Lady's-slipper flowers lack edible rewards, the presence of pollinators is dependent on nectar/pollen produced by other plants with similar flowering periods.

Like all species in the genus *Cypripedium*, germination of Small White Lady's-slipper is fully dependent on the presence of specific soil fungi for nutrition during the reproductive period (Shefferson et al. 2005). Many of the species belonging to the group of fungi commonly associated with Cypripedium are currently considered rare, although they may be more common than believed (Shefferson et al. 2005).

Small White Lady's-slipper hybridizes with two varieties of Yellow Lady's-slipper: *Cypripedium parviflorum* Salisbury var. makasin (Farwell) Sheviak and *Cypripedium parviflorum* var. pubescens (Willedenow) O.W. Knight (Worley et al. 2009). Furthermore, hybrids have been shown to backcross with Small White and Yellow Lady's-slippers (Worley et al. 2009, C. Foster pers. obs.). Hybrids can be differentiated from pure Small White Lady's-slipper based on several characters such as an intermediate flower size, intermediate flower colour, and intermediate plant height to both parental species (Worley et al. 2009).

1.2 Canadian range

The Canadian range of Small White Lady's-slipper encompasses twelve locations throughout southern Manitoba and two locations within southern Ontario. At the time of writing the recovery strategy (2014), there were 18 extant populations known in Manitoba and 7 in Ontario; three additional populations have been discovered in Manitoba since the time of publishing bringing the total to 21 populations within Manitoba (Figure 1).

1.3 Population parameters (relationship to other populations)

The current abundance of Canadian populations is unknown. Individual Small White Lady's-slipper plants spread by underground stems. Plants can be single-stemmed, or form clusters of various sizes and densities. Population abundance of Small White Lady's-slipper has been reported inconsistently as either number of individuals (e.g., number of flowering clumps), or number of stems, and sometimes both. Abundance is also difficult to measure due to issues such as the short flowering period (two weeks), the time required to attain maturity (e.g., it can

take 12 to 16 years to flower for the first time), adult plant dormancy (where the living plant exists in a resting state underground and fails to produce an aboveground stem that can be detected), effects of late spring frosts, and hybridization with other orchids.

Within Manitoba, there are twelve general locations containing 21 extant Small White Lady's-slipper populations[2] (Figure 1, Table 1). None of these populations occur on federal crown land. COSEWIC (2014) have estimated the Manitoba abundance at approximately 22,000 mature flowering individuals (42,000 stems) but cautioned a high degree of uncertainty in this count. Although trends are difficult to assess, there is sufficient monitoring data to provide evidence that several populations in Manitoba are likely decreasing in abundance. Manitoba Conservation Data Centre maintains species data current to May 2020 that includes estimates of population abundance and the area occupied by each extant population in Manitoba (Manitoba Conservation Data Centre, unpublished data, 2020). Due to variation in survey methods, Area of Occupancy may be delineated based on a) point data indicating the location of individual plants, b) point data with an uncertainty buffer indicating the location of individual plants with an estimate of the area they may occupy, or c) polygon data indicating the precise perimeter around a grouping of individual plants (generally, plants that are within 30m of one another are grouped into the same polygon).

The population of Small White Lady's-slipper implicated is referred to as South Brandon (34). South Brandon is the 4th largest population in Manitoba. ECCC does not have sufficient information to allow an estimate of the proportion of the Manitoba and Canadian populations this represents. The South Brandon (34) population is located in, and just south of, the City of Brandon, Manitoba. The area containing critical habitat under threat of a proposed housing development is referred to as "the SE area."

The South Brandon (34) population is one of two remaining extant Small White Lady's-slipper populations that have critical habitat occurring within City of Brandon municipal limits (Table 1). The other population is referred as the Southeast Brandon (32). The Brandon Ditch population (now extirpated) occurred southeast of the South Brandon (34) population and the Brandon Assiniboine River population (now extirpated) occurred to the east. The next closest populations to the Brandon area occur in the Brandon Hills (Figure 1). There is no evidence of dispersal between these populations.

[2] Populations are separated by a minimum of 1 km as per Natureserve (2020) guidelines on element occurrences, as well as COSEWIC (2014) and the federal recovery strategy (Environment Canada 2014) designation of subpopulations and populations, respectively

Table 1. Summary of Populations in Manitoba using best available data as of May 2020 (Manitoba Conservation Data Centre). South Brandon (34) is the implicated population under assessment.

Population	EO_ID	Status	Area of Occupancy (ha)[1]	Highest Population Estimate[2] (Year)	2019 Population Estimate[2]
Oak Lake					
Oak Lake (42)	5305	Extant	0.43	196 (2010)	193
Brandon					
Southeast Brandon (32)	3156	Extant	10.09	819 (2001)	557
South Brandon (34)	***4173***	***Extant***	***19.87***	***1,512 (2011)***	***165[3]***
Brandon Ditch	2039	Extirpated	0		
Brandon Assiniboine R.	2422	Extirpated	0		
Brandon Hills					
Brandon Hills (22)	3061	Extant	18.78	6,660 (2001)	4,032
Southeast Brandon Hills (40)	4959	Extant	1.44	582 (2008)	348
Rounthwaite	6599	Extant	0.02	33 (2012)	5
Brandon Hills	9949	Extant	0.02	13 (2016)	8
Carman					
Carman (43)	5539	Extant	0.07	13 (2013)	9
Kleefeld					
Kleefeld (7)	1202	Extant	0.24	683 (1987)	58
Franklin					
Franklin East (29)	389	Extant	0.03	26 (2019)	26
Franklin South (28)	2311	Extant	0.05	82 (1999)	
Franklin West (27)	446	Extant	0.16	187 (2008)	31
Tolstoi					
Tolstoi (41)	5271	Extant	0.47	150 (2009)	
Tall Grass Prairie Preserve					
Tall Grass Prairie Preserve (33)[4]	4164	Extant	21.52	12,250 (1995)	3,381
Emerson					
Emerson (44)	5540	Extant	0.79	72 (2009)	
Woodlands					

Population	EO_ID	Status	Area of Occupancy (ha)[1]	Highest Population Estimate[2] (Year)	2019 Population Estimate[2]
Woodlands (14)	10971	Extant	4.65	716 (2016)	490
Woodlands Trail (30)	390	Extant	0.07	272 (2012)	113
Woodlands Ditch	431	Extant	0.01	121 (2018)	39
Stonewall area	9924	Historic	0		
Lake Francis					
Lake Francis (8)	86	Extant	0.47	501 (2019)	501
St. Laurent					
St. Laurent (31)	3748	Extant	65.63	3,485 (2001)	1,098
St. Laurent Northwest (39)	4868	Extant	0.85	1,938 (2005)	929
Inwood area	9923	Historic	0		

[1] The cumulative total area occupied, including all extant data up to May 2020 (Manitoba Conservation Data Centre 2020, New West Opportunities 2019). Due to varying survey methods, Area of Occupancy may be delineated based on a) point data indicating the location of individual plants, b) point data with an uncertainty buffer indicating the location of individual plants with an estimate of the area they may occupy, or c) polygon data indicating the precise perimeter around a grouping of individual plants (generally, plants that are within 30m of one another are grouped into the same polygon). Area of Occupancy is not directly comparable between or within populations.

[2] Population estimates are based on counts of either number of stems (both flowering and vegetative), number of flowering clumps of stems, or both. Therefore, population estimates are not directly comparable between years or between populations. Population estimates are not always collected for the entire Area of Occupancy of a population.

[3] Incomplete estimate

[4] Area of Occupancy and population estimate data are for monitoring plots only and do not reflect a census of the entire population

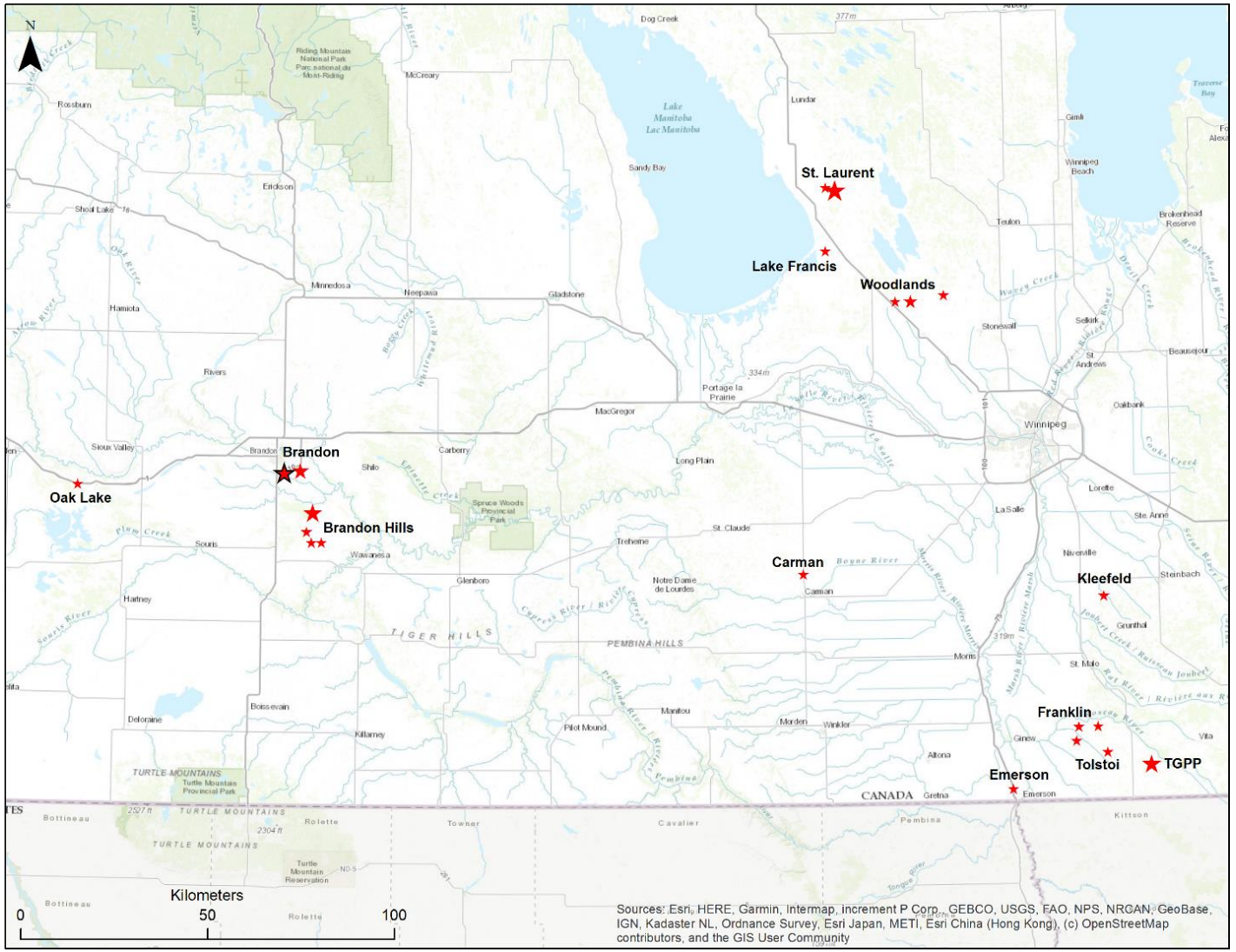

Figure 1. Locations of extant Small White Lady's-slipper populations in Manitoba as of May 2020 (red stars). The size of the star indicates the relative population size (as measured by Area of Occupancy with larger sized stars indicating a greater Area of Occupancy). The implicated population (South Brandon (34)) is represented by the red star with black outlining.

1.4 Habitat attributes, quality and quantity

Habitat attributes

In Manitoba, Small White Lady's-slipper grows in moist, calcareous native prairie with sparse shrub cover, prairie openings amongst tree bluffs, and remnant prairie fragments in roadside ditches/right-of-ways (Environment Canada 2014; COSEWIC 2014). Most sites have some subsurface water seeping through them and are mostly moderately to imperfectly drained; habitat preferences in Canada suggest it is adapted to areas with active groundwater flow (Brownell 1981; Falb and Leopold 1993; COSEWIC 2014; Toop 2018). Seepage areas and hummocks have been observed at some Manitoba sites and may be indicative of fen-like habitat that is dependent on availability of flowing surface or ground water (Environment Canada 2014; Toop 2018). Topography is flat to slightly undulating ridges and swales where it often prefers south or west ridge slopes, as well as areas where there has been more snow cover and spring soil moisture. Soils supporting Small White Lady's-slipper are strongly to moderately calcareous sandy loam to loam over glacial till (Imrie et al. 2005; COSEWIC 2014; Environment Canada 2014).

Small White Lady's-slipper does not tolerate shade and requires full to filtered light for growth and flower development (Falb and Leopold 1993). Like all species in the genus *Cypripedium*, germination of Small White Lady's-slipper is fully dependent on the presence of specific soil fungi for nutrition during the reproductive period (Shefferson et al. 2005). Many of the species belonging to the group of fungi commonly associated with *Cypripedium*, are currently considered rare, although they may be more common than believed (Shefferson et al. 2005). Small White Lady's-slipper also requires specific pollinators (Catling and Knerer 1980; COSEWIC 2014). Since Small White Lady's-slipper flowers lack edible rewards, the presence of pollinators is dependent on nectar/pollen produced by other plants with similar flowering periods.

Habitat quality and quantity

Due to the extensive conversion of prairie habitat to cultivated lands, residential development, or degradation by invasive non-native species, much of the remaining suitable native prairie habitat exists along old roadsides surrounded by agriculture and is highly fragmented. About 80% of Manitoba's populations have some or all portions of the population occurring along roadsides, with 10 of 21 populations in Manitoba being restricted to just roadside/railway habitat (Manitoba Conservation Data Centre, 2020).

Habitat loss, degradation and fragmentation has drastically reduced the amount of suitable habitat quality and quantity available to support Small White Lady's-slipper in Canada (Brownell 1981; Brownell 1999; Samson et al. 2004; Bowles 2005; Koper et al. 2010). In Manitoba, over 99% of the historical range of tall-grass prairies has been converted to other cover types, usually agricultural (Samson and Knopf 1994). Remaining tall-grass prairie has experienced substantial degradation in habitat quality from factors like invasive non-native plant species, which is particularly pronounced in smaller patches of prairie (<21 ha; Koper et al. 2010). Based on evidence of changes over time and observed effects of patch structure, Koper et al (2010)

determined that most remaining tall-grass prairie patches in Manitoba are not self-sustaining or likely to persist over time (COSEWIC 2014). For long-term persistence of quality habitat for Small White Lady's-slipper, active management with disturbance events, such as periodic fires/prescribed burns and/or compatible grazing practices, and invasive species management are required. In the absence of such disturbance, Small White Lady's-slipper can be outcompeted by woody vegetation and invasive non-native plant species encroachment, or negatively affected by shade, litter accumulation, and excessive grass or shrub cover. The loss of other limiting habitat factors, such as presence of soil fungi and pollinators, can also impact Small White Lady's-slipper.

1.5 Threats to the species

The Small White Lady's-slippers threat assessment was updated within this assessment from Table 3 in the Recovery Strategy to align with the IUCN-CMP unified threats classification system (Table 2). Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational). For purposes of this threat assessment, only present and future threats are considered. A detailed description of these threats is found in Annex 1.

The most widely documented threats to Small White Lady's-slipper in North America are related to loss, degradation and fragmentation of habitat. A number of natural and anthropogenic factors contribute to the continuing decline in quality and quantity of suitable habitat in Canada (Table 2). Activities likely to result in the destruction of critical habitat, including permanent or temporary degradation, may occur within or outside of critical habitat and include 1) Compression, covering, inversion, or excavation/extraction of soil, 2) Planting of shrubs, trees, or invasive non-native species, 3) Indiscriminate application of fertilizers and pesticides, and 4) Hydrological alterations (Annex 2).

Limiting factors

Small White Lady's-slipper require specific habitat characteristics that, if altered, can limit their reproduction, growth, and abundance. As discussed in more detail in Annex 1, Small White Lady's-slipper relies on other species during its lifecycle, including the presence of a specific soil fungi for nutrition during the reproductive period and a diversity of flowering plants to attract pollinators as Small White Lady's-slipper flowers lack edible rewards. Small White Lady's-slipper also have a slow reproductive cycle, as it can take up to 12 to 16 years to produce its first flower. These factors mean that Small White Lady's-slipper relies heavily on external factors for its survival and has a slow population growth.

Table 2. Standardized threats assessment for the Small White Lady's-slipper populations in Canada (Environment Canada 2014). The 2014 recovery strategy and the 2014 COSEWIC status report were not prepared using the current method of threats assessment or IUCN categories, so the table used in the 2014 federal recovery strategy is used here with some modifications: threats are listed in order of level of concern, current IUCN categories have been inserted in the Threat Number column for cross-reference. An asterisk (*) indicates that threat is relevant to the South Brandon (34) population.

Threat Number and IUCN Category	Threat Description	Level of Concern	Extent	Occurrence	Frequency	Severity	Causal Certainty[3]
7.2* Dams & Water Management/Use	Alteration of hydrology	High	Widespread	Historic/ Anticipated	Recurrent	High	High
1.1* Housing & Urban Areas 4.1* Roads & Railroads 4.2* Utility & Service Lines	Infrastructure and residential development	High	Localized	Historic/ Anticipated	Recurrent	Medium	High
9.3* Agricultural & Forestry Effluent	Pesticide/ herbicide applications in or near occupied habitat	Low	Unknown	Unknown	Unknown	Low	Low
7.1* Fire Suppression 7.3* Other Ecosystem Modifications	Encroachment by woody plants and thatch accumulation from fire suppression and lack of compatible grazing regimes; inappropriately-timed haying/mowing	High	Widespread	Current	Continuous	High	High
8.1* Invasive Non-Native Species	Invasive non-native plant species creating resource competition	High	Widespread	Current	Seasonal	Medium	High
5.2* Gathering Terrestrial Plants	Poaching	High	Widespread	Historic/ Anticipated	Recurrent	Medium	High

Threat Number and IUCN Category	Threat Description	Level of Concern	Extent	Occurrence	Frequency	Severity	Causal Certainty[3]
6.1* Recreational Activities	Trampling from recreational activities	High	Widespread	Historic/ Anticipated	Recurrent	Medium	High
7.3 Other Ecosystem Modifications	Shoreline Erosion (Ontario only)	Medium	Localized	Current	Recurrent	Medium	Low
2.1 Annual & Perennial Non-timber Crop	Cultivation or conversion to incompatible agriculture	Low	Widespread	Historic/ Unknown	One-time	High	High
3.2 Mining & Quarrying	Gravel extraction	Low	Localized	Anticipated	Unknown	Low	Low
2.3 Livestock Farming & Ranching	Incompatible or inappropriately -timed grazing	Low	Localized	Historic/ Current	Recurrent	Low	High

1.6 Status

Federal protection

Species at Risk Act
The Small White Lady's-slipper is listed as Threatened under Schedule 1 of SARA. The species individuals are protected on federal lands under ss. 32(1) of SARA where no person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species. Critical habitat has been partially identified in the species' recovery strategy. SARA includes prohibitions that could make it an offence to degrade or destroy the species' critical habitat through Ministerial order on federal lands, once such an order is put in place, and by GIC order on non-federal lands.

Provincial protection

The plant is listed as Endangered under the *Manitoba Endangered Species and Ecosystems Act's* (ESEA) Threatened, Endangered and Extirpated Species Regulation. Manitoba's Endangered Species and Ecosystems Act provides protection for Small White Lady's-slipper plants, their habitat, and the natural resources on which they depend for life and propagation on all lands (regardless of ownership) in the province of Manitoba. The prohibitions under section 10 of the Act state that no person shall (a) kill, injure, possess, disturb or interfere with a member of an endangered species; (b) destroy, disturb or interfere with the habitat of an endangered species; or (c) damage, destroy, obstruct or remove a natural resource on which an endangered species depends for its life and propagation, without a permit or exemption from the responsible Minister.

1.7 Recovery objectives

The population and distribution objectives for a species set out the objectives for its recovery. Therefore, these objectives are considered a proxy for assessing recovery for the purposes of an imminent threat assessment.

Population and distribution objective

The population and distribution objective for the Small White Lady's-slipper comes from the *Recovery Strategy for the Small White Lady's-slipper (Cypripedium candidum) in Canada* (Environment Canada 2014). This constitutes the best information available as of the date of this threat assessment.

> *Because population abundance of Small White Lady's-slipper is difficult to accurately measure, it is not currently feasible to determine a population objective based on abundance. However, it is feasible to set a population objective based on maintaining the existence of extant populations.*
>
> *The population and distribution objective for Small White Lady's-slipper is to maintain the current Area of Occupancy for all 25 populations known to exist in Canada within the past 16 years (1995-2010), plus any newly-discovered ones. Populations that have documented occurrences within the past 16 years are considered by Environment and Climate Change Canada to be currently extant, unless habitat is no longer suitable. The rationale for using a 16-year window for establishing these objectives is based on the 12 to16 year period that may be required before Small White Lady's-slippers flower for the first time (Curtis 1943, 1954).*

The current Area of Occupancy includes those occurrences known to exist between 1995 and 2010, plus any new plants or new populations that have been identified post-2010, such that all known occurrences of Small White Lady's-slipper since 1995 are included in the Area of Occupancy for a population (noting that 3 new populations have been documented since the 2014 Recovery Strategy was published). Populations that have documented occurrences are considered by ECCC to be currently extant.

History of recovery efforts

Federal actions

In 2000, the species was assessed as Endangered by COSEWIC and listed under SARA (Schedule 1) as Endangered in 2003. In 2014, COSEWIC reassessed the species as "Threatened". The change in COSEWIC species assessment criteria, discovery of additional populations due to search effort, increased habitat protection, and active management of the species has resulted in a change in status from Endangered to Threatened. In 2014, ECCC posted the federal recovery strategy, containing a partial critical habitat identification, on the Species at Risk Public Registry. In 2019, the species was changed to Threatened under SARA (Schedule 1).

Provincial actions

Information regarding current and historical land uses, and potential threats are identified by provincial officials when conducting surveys of Small White Lady's-slipper. This information has been gathered from some land managers and private landowners (Manitoba Conservation Data Centre 2020).

As of April 6, 2023, Manitoba officials have stated in an email to ECCC they will work with landowner, the City of Brandon and other relevant parties with the intention of establishing a partnership focused on the management of the SE area to address threats to the Small White Lady's-slippers and their habitat (Kristin Hayward pers. comm. 2023). Manitoba anticipates that this group would develop a long-term management plan for this site that would include management objectives and activities, monitoring requirements, and the responsibilities of each agency (Kristin Hayward pers. comm. 2023).

Other (joint) conservation efforts in Manitoba

Stewardship and monitoring efforts such as working with landowners to implement beneficial management practices (Manitoba Conservation Data Center 2020; C. Borkowsky pers. comm. 2010), communication with rural municipalities that have Small White Lady's-slippers on their lands e.g., Foster 2008), and conducting inventories of known populations (e.g., Bleho et al. 2021, Manitoba Conservation Data Centre 2020) have already occurred in Manitoba.

As of December 20, 2022, the City of Brandon has affirmed a resolution that the City of Brandon will donate City held properties to NCC pending the NCC acquiring the 51.3-acre balance of the lands identified as an environmental greenspace on the SE area (reference removed[3]). Additionally, the City of Brandon has supported the concept of a funding agreement with NCC for the operation and stewardship of lands for the Small White Lady's-slipper subject to the NCC acquiring the 51.3-acre balance of lands and approval of the NCC's stewardship plan for the lands by the province of Manitoba. As of January 19, 2023, the NCC did not own this portion of the quarter section, nor has any official agreement been put in place for NCC to manage this area (Kevin Teneycke pers. comm. 2023).

1.8 Habitat requirements (critical habitat)

Identification of the species' critical habitat

The Recovery Strategy for the Small White Lady's-slipper (*Cypripedium candidum*) in Canada (Environment Canada 2014) partially identifies critical habitat for Small White Lady's-slipper within 28 quarter sections and within approximately 63 km of road allowances in Manitoba, and at one site in Ontario. To be considered critical habitat, the biophysical attributes must be present within the geospatial areas identified as containing critical habitat. The critical habitat

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identified in the recovery strategy is necessary for the survival of Small White Lady's-slipper in Canada but, as it is only partially identified, is insufficient to achieve the population and distribution objectives.

Critical habitat is identified at locations that contain the following criteria:

1. Small White Lady's-slipper populations have been observed within the location between 1995 and 2010.
2. Locations occupied by Small White Lady's-slipper have been determined with reasonable accuracy.
3. Habitat biophysical attributes are as follows:
    a) In Manitoba, the habitat is moderately to imperfectly drained, open native prairie; or prairie openings with occasional sparse shrub cover; or prairie openings between tree "bluffs". Slopes are flat to undulating with ridge and swale topography;
    b) In Ontario, the habitat is characterized by moist prairie and savannah or rich calcareous fen with a high water table, organic soils, and marl pools (calcium and magnesium deposits).

Critical habitat in Manitoba

In Manitoba, Small White Lady's-slipper critical habitat is identified for small populations that occur in remnant prairie located in roadside ditches and right-of-ways and for large populations that span multiple quarter sections. Critical habitat in Manitoba encompasses the entire Area of Occupancy for the 18 populations known to occur in that province at the time of writing the recovery strategy. Within these quarter sections and road allowances, critical habitat is identified as all prairie habitat described in section 7.1 of the recovery strategy. Unsuitable habitat such as forests, marshes, cultivated land, roadbeds, rail beds, buildings, driveways, and trails located within the general critical habitat locations at the time of writing the recovery strategy is not necessary for the survival and recovery of the species and, therefore, is not critical habitat. Where populations are located within quarter sections (such as those in the SE area of South Brandon (34)), critical habitat consists of the portions of the quarter section containing the biophysical attributes as described in 3(a).

Critical habitat in the SE area of South Brandon (34)

The definition of critical habitat from the federal Recovery Strategy above applies to the entire SE area, as well as the adjacent ditch along the south border. Therefore, wherever the biophysical attributes are present within the SE area is considered critical habitat. It has been confirmed that there are biophysical attributes the southern portion of the SE area (reference removed[4]), therefore, this whole greenspace has been confirmed as critical habitat. The SE area has a cultivated area where it has been confirmed there are no longer the biophysical

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attributes to be considered critical habitat (reference removed[5]). Although the cultivated area is not critical habitat, it may remain important for maintaining the hydrological regime to support critical habitat in the quarter section. Finally, the remaining areas have not been assessed to determine if the biophysical attributes are present to effectively identify if that area can constitute critical habitat. Associated with critical habitat (and outlined in the federal Recovery Strategy) are the activities likely to destroy critical habitat. Since the Area of Occupancy is within the critical habitat the activities likely to destroy critical habitat are also applicable to the destruction of the Area of Occupancy. Destruction is determined on a case-by-case basis. 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 single or multiple activities at one point in time or from the cumulative effects of one or more activities over time.

Annex 2 outlines the activities likely to result in the destruction of critical habitat.

Part 2: Information on the new or evolving threat

A housing development is proposed on a quarter section of land that has been identified as containing Area of Occupancy and critical habitat for the Small White Lady's-slipper South Brandon (34) population (reference removed[6]). The proposed development of the SE area contains residential housing and an area that has been proposed as environmental greenspace by the City of Brandon (Figures 3 and 4; City of Brandon, 2021). The SE area is owned by multiple landowners. Small White Lady's-slipper Area of Occupancy (and critical habitat) occur directly on and adjacent to the proposed housing development and activities related to the development may result in the destruction/degradation of the critical habitat.

In summer of 2020, ECCC was informed by a concerned member of the public that the province of Manitoba provided an exemption under the *Manitoba Endangered Species and Ecosystem Act*, issued March 26, 2020, permitting a proposed housing development to proceed on the SE area. This exemption required the proponent to meet the following conditions: 1) Maintain a 25-metre buffer the area around all Small White Lady's-slipper occurrences identified in the 2019 field study conducted commissioned by the proponent, 2) The 25-metre buffer is to be protected by fencing during and after construction on the site, and 3) The developer must complete a stewardship protection plan for the proposed development prior to construction. In addition, the potential development will be required to meet any municipal or other approval processes applicable to this type of development in the City of Brandon. This exemption applied to plants that were identified in a 2019 survey, which represented a portion of the South Brandon (34) population of Small White Lady's-slipper that occurs on the SE area (reference removed[7]) and did not take into consideration the 16-year timeframe that biologically applies to this species (it can take up to 16 years for a plant to flower).

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[6] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

[7] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

On March 23, 2023 Manitoba rescinded those exemptions, therefore reinstating the ESEA prohibitions for Small White Lady's-slipper. Under the ESEA (section 10(1)) it is understood that all Small White Lady's-slipper plants would be protected (as it is prohibited under the ESEA to: "*kill, injure, possess, disturb or interfere with a member of an endangered species, a threatened species*…."). The ESEA (section 8.1(1)) states that when a species has been designated as endangered or threatened species, the department must prepare a recovery strategy that sets out the steps to be taken to prevent any further reductions of the species and to promote the recovery of the species.

Since learning of this exemption (in 2020, rescinded March 23, 2023) and the proposed development on critical habitat of the South Brandon (34) population, ECCC has maintained regular communication with the province to better understand what measures are being pursued by the province relative to conservation of this population. Important timelines and their related information are outlined in Annex 3 and are based on information shared by either the province of Manitoba, the City of Brandon, or the landowners.

The City of Brandon has adopted the Southeast Brandon Secondary Plan (City of Brandon 2021) that outlines the types of activities and locations approved to proceed on the SE area (reference removed[8]). Within the SE area the following development has been approved to proceed with planning and potential future development, including:

- Residential Low Density,
- Residential Moderate Density,
- Mixed Use (small portion only),
- Greenspaces (both environmental and other), and
- Municipal infrastructure (includes water distribution, wastewater collection, stormwater management and drainage).

The Southeast Brandon Secondary Plan also outlines plans to upgrade an existing road (reference removed[9]), to a full urban standard (Section 3.4.9, City of Brandon 2021) to accommodate increased traffic loads from the residential development.

Figure 2. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

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[9] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

Figure 3. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

The planned developments within the SE area trigger several activities identified in the federal recovery strategy as likely to destroy critical habitat (Annex 2). These activities, when occurring outside or within the bounds of critical habitat, can cause critical habitat destruction (also applicable to Area of Occupancy), including, but not limited to; hydrological alterations, compression of soils, planting of shrubs, trees, or invasive non-native species; application of fertilizers and pesticides; and that may contribute to a decline in habitat quality and functioning. The project overlaps with the Area of Occupancy that occurs just outside of the north-east corner of the proposed greenspace where 3 stems of Small White Lady's-slipper were observed in 2009 (reference removed[10]). There is the possibility that the project will also overlap with the Area of Occupancy on the central northern tip of the greenspace (may overlap with the "green utility corridor") where 2 stems were observed in 2011 (reference removed[11]). There is uncertainty around this second possible overlap with the Area of Occupancy due to lack of detailed geospatial information of the residential project and a 5-meter margin of error associated with the specific observation. The current presence and quantity of both those occurrences is unknown. Although no proposed activities are within the greenspace (which contains the majority of the Area of Occupancy), the adjacency of the housing construction activities could result in loss of functionality of critical habitat within portions or all of the greenspace.

In the area of critical habitat on the SE area identified as proposed environmental greenspace in the Southeast Brandon Secondary Plan, (reference removed[12]), the City of Brandon (2021) has approved policy (Annex 4) to protect the area from development and retain it in a natural state. It is stated that this protection will be in accordance with federal or provincial legislation and regulations and relies on the province of Manitoba to determine the final boundaries of the greenspace area, with any subdivision/rezoning of land for development in the Secondary Plan area complying with provincial requirements (City of Brandon 2021). Details from this plan are provided in Annex 4.

In January 2023, VBJ Developments submitted a Southeast Brandon Neighbourhood Plan development application to the City of Brandon that includes greater detail about development plans, including timelines for development (reference removed[13]) and the City of Brandon notified ECCC that their engineering consultant is moving towards finishing detailed design and tendering spring/summer 2023 (Mark Allard, pers. comm. 2023). It is anticipated that construction could begin after the tendering process is complete.

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[11] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

[12] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

[13] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

Figure 4. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

Figure 5. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

Figure 6. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

The activities likely to result in the destruction of critical habitat associated with the proposed housing development and infrastructure in the SE area are summarised in more detail below. Although the establishment and active management/stewardship of the proposed greenspace could mitigate these threats, there is currently insufficient information to know whether and when the greenspace, and associated conservation measures, will be established. Manitoba has committed to establish a partnership with the landowner, the City of Brandon, and other relevant parties to develop a long-term management plan for the site (Kristin Hayward, pers comm 2023); however, this is not currently in place.

Hydrological alterations

Construction of the housing development north of the environmental greenspace would alter the groundwater and surface water flow in the SE area. Small White Lady's-slipper is dependent on appropriate moisture regimes and changes in hydrological conditions may result in reduced viability, or extirpation of the species within the critical habitat. There is no hydrological baseline for current or past conditions in the SE area, so it is unknown what hydrological conditions will be necessary to maintain suitable conditions for a long-term viable occurrence of Small White Lady's-slipper. However, changes to surface and ground water conditions are generally irreversible, and it is unknown if mitigation post-construction would be effective. Threats from alterations to hydrological conditions, including direct impacts to ground water and surface water, are discussed in greater detail in Annex 5.

Manitoba provided a summary of hydrological conditions on the SE area to ECCC by email on May 11, 2022:

1. the water table at the site was shallow (often <1m below the surface) at the time of the study,
2. the soil is characterized by a thin clay layer that sits on top of sandy-textured sediments,
3. the sand forms a shallow unconfined aquifer at the site,
4. groundwater recharge very likely occurs throughout the site, with some geographic and temporal variation,
5. there appears to be a groundwater high that separates groundwater dynamics between northern and southern portions of the SE area, and
6. groundwater flow from south of the groundwater high tends to be towards a low area in the southeast of the quarter section.

Development south of a groundwater high that occurs in the north portion of the quarter section may affect the hydrology where the Small White Lady's-slipper plants occur. The City of Brandon's Southeast Brandon Secondary plan and the Southeast Brandon Neighbourhood Plan development application indicate that there are plans to develop areas south of the groundwater high and to develop within the low area in the southeast of the quarter section. Manitoba has stated that development north of the groundwater high is unlikely to affect the plants but they have not assessed how the developments south of the groundwater high will affect the plants. This information gap is where much of the uncertainty regarding impacts to groundwater occurs.

The City of Brandon has committed to installation of an irrigation system (see Annex 5) as part of their water infrastructure to allow for flows to be diverted back to the low area on the south

portion of the SE area (the proposed greenspace), but details on what information will be used to mimic natural flows and ensure that baseline conditions are met are uncertain.

Based on the best available information on the potential impacts to groundwater conditions, ECCC's hydrogeologist was of the opinion that succinct conclusions regarding the groundwater hydrology of the area as it relates to Small White Lady's-slipper are not able to be made based on the information available to ECCC. ECCC's hydrogeologist stated that regional and local groundwater flow maps and piezometric surface maps of the site overlaid by locations of Small White Lady's-slipper and the planned construction area was needed to accurately assess the site. ECCC asked Manitoba to provide an assessment of impacts to Small White Lady's-slipper and its habitat from development south of the groundwater high and from development within the low area in the southeast of the quarter section, but Manitoba was unable to do so. ECCC's hydrogeologist stated that a hydrogeological numerical model that represents both groundwater and surface water flow and that shows pre-construction (current), during construction, and post-construction groundwater and surface water flow estimates for the development area near the Small White Lady's-slipper is required to aid in the determination of how the plants may be affected by the planned project, in terms of its dependence on groundwater flow, as well as to provide for solutions if it is found that Small White Lady's-slipper could be negatively affected by the project.

Without baseline information and further analysis available, there is a high degree of uncertainty as to the effectiveness that the proposed irrigation infrastructure will have in maintaining natural flows to the population of Small White Lady's-slipper within the proposed greenspace.

Figure 7. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

Housing and infrastructure construction

The housing and infrastructure (e.g., roads and water/sewer lines) construction within the proposed neighbourhood and upgrading arterial roads to access the development represents new and evolving threat to the population. Compression, covering, inversion or excavation/extraction of soil will occur along the northern edge of the environmental greenspace as the development footprint overlaps some of the area occupied by the Small White Lady's-slippers , as well as along planned roads adjacent to the SE area (reference removed[14]).

The Southeast Brandon Secondary Plan outlines future plans to upgrade an existing road to a full urban standard (Section 3.4.9, City of Brandon 2021) to accommodate increased traffic loads from the residential development. Therefore, this could further impact Small White Lady's-slipper Area of Occupancy and critical habitat in the Southeast Brandon (34) population.

Additional threats

There are additional secondary threats including the possible increase in presence of invasive non-native species, poaching, additional stress due to recreational activities and also possible pesticide/herbicide leaching that could occur if the development were to go forward. There is also the need to manage disturbances and reduce the threat of woody encroachment and invasive non-native species which necessitates active management of the greenspace. Information on these additional threats are below.

Fire suppression / Other ecosystem modifications

The South Brandon (34) population is threatened by a lack of active habitat management (e.g. grazing, fire, or invasive non-native species control) within the SE area. This threat is an intensifying existing threat. For long-term persistence, appropriate management practices that replicate or mimic the timing, frequency and intensity of natural ecosystem disturbances like fire and grazing are required to maintain habitat quality for Small White Lady's-slipper. Habitat management is particularly important in fragmented and small parcels like South Brandon. It is unclear what bylaws or regulations are in place, or could be put in place, to support active management of the area, including the ability to conduct controlled burns or grazing adjacent to residential properties.

Agricultural & forestry effluent (pesticide/herbicide use)

Use of fertilizers, herbicides, or pesticides is an intensifying existing threat at the South Brandon (34) population and is an activity likely to destroy critical habitat and which can occur within or outside the bounds of critical habitat to cause its destruction. It is anticipated that the residential yards in the South Brandon proposed residential development will likely have fertilizer and pesticides/herbicides applied to them regularly as part of the homeowner's lawn and yard maintenance (as per the Manitoba Pest Control Products Act and the City of Brandon's By-Law

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No. 5806/81/90). Pesticide/herbicide drift and leaching of fertilizer (either air-borne or leaching through groundwater/surface run-off) from immediately adjacent residential properties is anticipated to increase the severity of this threat and degrade the quality of critical habitat and alter the nutrient load and pH of water and soil. Gradual degradation of critical habitat through killing the rare soil fungi required for Small White Lady's-slipper reproduction, altering interspecific competition from changing the soil nutrient status, or altering plant/pollinator communities may render the habitat unable to support Small White Lady's-slipper causing its functional destruction. To date, ECCC is not aware of any mitigation measures that have been proposed or integrated into the Southeast Brandon Secondary Plan to alleviate this threat.

Invasive non-native species

Invasion of non-native plant species is an intensifying existing threat at the South Brandon (34) population and the intentional planting of invasive non-native plant species within the bounds of critical habitat at any time of year is considered an activity likely to destroy critical habitat. Spread of invasive non-native plant species from immediately adjacent residential development (parks, residential yards) is anticipated to increase the severity of this threat at the SE area and degrade the quality of critical habitat. The spread of invasive non-native plant species could exacerbate factors that already limit Small White Lady's-slipper growth and reproduction such as plant/pollinator diversity and shade intolerance. To the knowledge of ECCC, a range health assessment of the SE area has not been completed, although ECCC is aware that invasive plant species like Leafy Spurge, Kentucky Bluegrass, Canada Thistle, and Smooth Brome are previously occurring and on-going threats on the SE area. No mitigation measures to control the spread of invasive non-native plant species from adjacent residential development have been presented.

Gathering terrestrial plants

Increased accessibility to the South Brandon (34) population by creating a residential development immediately adjacent to, and a public environmental greenspace within the area occupied by, Small White Lady's-slipper is a new potential threat that will likely increase the frequency and severity of illegal plant collection unless mitigation measures are implemented and enforced. Illegal poaching has been reported to occur in the South Brandon (34) population (COSEWIC 2014).

Recreational activities

Off-trail foot and bike traffic, as well as off-leash pets is a new potential threat that will increase the risk of trampling of Small White Lady's-slipper plants within the proposed environmental greenspace unless a clear management plan for access to these lands is articulated. ECCC is unaware of any plans in place to enforce the responsible use of the environmental greenspace. Construction of trails within the environmental greenspace, which occurs within critical habitat for the Small White Lady's-slipper, may constitute an activity likely to destroy critical habitat if it involves the compression, covering, inversion, or excavation/extraction of soil. Increasing accessibility to the South Brandon population by creation of a public environmental greenspace within the area occupied by Small White Lady's-slipper at the SE area will increase the

frequency of recreational activities at this population. Section 2.4.3.5 of the Southeast Brandon Secondary Plan states “The environmental greenspace may incorporate education and awareness opportunities, as well as trail connections. Any trails with open public access may be considered as greenway connections and part of a developer’s public reserve contribution.” (City of Brandon 2021).

Part 3: Assessment of threats

According to the draft *Policy on Assessing Imminent Threats under Sections 29 and 80 of the Species at Risk Act: terrestrial species* (April 20, 2023 proposed), a terrestrial wildlife species will be determined to be facing imminent threat(s) to its survival or recovery if the threat(s) identified would render its survival or recovery highly unlikely or impossible and cannot be eliminated or mitigated without immediate intervention.

The answers to the following questions are key considerations in supporting the Minister in forming an opinion on whether a wildlife species is facing imminent threat(s).

This assessment is based on the best information currently available to ECCC. Given the large amount of information available from multiple sources, it is possible that some information may not have been considered by ECCC within the time frame of the analysis. There may also be relevant information that is not available to ECCC.

This assessment focuses on new and intensifying threats to the portion of the South Brandon population of Small White Lady’s-slipper that occurs within quarter section the SE area, and associated threats to critical habitat.

Question 1: Is the wildlife species facing a new or evolving human-induced threat(s) or is the impact of an existing human-induced threat intensifying?

Yes.

The Small White Lady’s-slippers that occur on the SE area (a portion of the South Brandon (34) population) are facing a new human-induced threat of a planned housing development. Construction could begin as early as summer 2023. Once initiated, some impacts will be irreversible, and some impacts could be mitigated through active management, planning, and stewardship.

A Secondary Plan for Southeast Brandon that includes the SE area (identified as containing critical habitat for Small White Lady’s-slipper), has been approved and a development application, the Southeast Brandon Neighbourhood Plan, has been received by the City of Brandon. The proposed housing development on the SE area poses a novel, human-induced threat, which will lead to an intensification of existing threats to Small White Lady’s-slipper and its critical habitat. The threats associated with this development have a high likelihood of materializing by summer of 2023, as the City of Brandon (Mark Allard, pers. comm.

2023) has indicated that detailed design and tendering for initial infrastructure works (which includes infrastructure for water, sewer, and utilities) will be initiated in spring/summer 2023. The effects of this threat will directly impact the South Brandon (34) population of Small White Lady's-slipper by reducing the Area of Occupancy for the South Brandon (34) population of Small White Lady's-slipper. As with most populations of Small White Lady's-slipper, these plants currently face many existing threats, all of which will intensify if the planned housing development proceeds.

For the purposes of this assessment, threats are categorized on a continuum from very high to low based on their potential to occur and/or intensify within a one-year timeframe (from July 2023 to July 2024) (Table 3). This timeframe is used because:

1. the initiation of construction and installation of water/sewer infrastructure, houses, and roads will fall within this period.
2. It captures the potential for immediate, and irreversible, impact to groundwater flow.

Very high – the threat may already be occurring.
High – the threat has high potential to occur within a 1-year timeframe.
Medium – the threat could occur within a 1-year timeframe, but there is uncertainty.
Low – the threat has low potential to occur within a 1-year timeframe.

Only the threats assessed as having a high to very high potential to occur within a 1-year timeframe are included in the discussion below.

Suitable mitigation to avoid the possible direct destruction of one (or possibly 2) Areas of Occupancy could be achieved by reducing the scale of the project to avoid overlap. Avoidance of direct destruction would align with Manitoba ESEA requirements. Before and during construction many effects could be mitigated to achieve appropriate site conditions. Well-developed short- and long-term active management and monitoring plans, a stewardship plan and public education program could mitigate the effects of post-construction effects.

A groundwater flow model showing pre-construction (current), during-construction, and postconstruction groundwater flow estimates for the development area near the Small White Lady's-slipper could aid in the determination of how the plants may be affected by the planned project. Adequate baseline data and further analysis would be needed to determine the probability of success for the City of Brandon's proposed irrigation (see Annex 5). With proper baseline data for groundwater and surface water flow, mitigation plans could be developed to address anticipated impacts to hydrology, pH, and nutrient conditions.

Table 3. Summary of activities associated with the proposed housing development within the SE area within a 1-year assessment timeframe. For a detailed description of threats associated with the project, refer to Section 2.1.

Activity	Effect	Potential for Threat to Occur by July 2024
Construction activities, including installation of infrastructure	Physical destruction of individual plants, compression, covering, inversion, or excavation of vegetation and soil	Very High
Pesticide/herbicide use for weed control associated with construction site	Reduction in pollinator community, reduction in flowering plant diversity needed to sustain pollinator community, soil, surface and groundwater contamination, changes to the PH and nutrient content of surface and groundwater, and reduction in soil fungi.	High
Installation of infrastructure (sewer, water, utilities, roads)	Altered flow of surface water and groundwater, Compression, covering, inversion, or excavation of vegetation and soil; Contamination of soil, surface, and groundwater	Very High
Alteration of groundwater flow through dewatering for installation of infrastructure and construction activities	Alteration of biophysical attributes required by Small White-Lady's-Slipper	Very High
Diversion of surface water through excavation and alteration of topography	Alteration of biophysical attributes required by Small White-Lady's-Slipper	Very High
Introduction of invasive, non-native plant species from contaminated equipment and/or failure to control invasive, non-native plant species in construction areas	Shading, thatch buildup, direct competition for resources, and reduction in flowering plant diversity.	High
Increased public access	Trampling, soil compaction, poaching/plant gathering	Low
Pesticide/herbicide use for weed control associated with residential lawn and road right-of-way maintenance	Reduction in pollinator community, reduction in flowering plant diversity needed to sustain pollinator community, soil, surface and groundwater contamination, changes to the PH and nutrient content of surface and groundwater, and reduction in soil fungi.	Low
Absence of grassland management	Woody encroachment, shading, thatch buildup, direct competition for resources, and reduction in flowering plant diversity.	Low (ongoing)

Question 2: Will the impact of the threat(s) make:

A) Survival of the wildlife species highly unlikely or impossible?

No

The Department's view is that even with the potential reduction in Area of Occupancy for the South Brandon population, the species as a whole would continue to survive. This view has considered that, although threats are present, and population size and the Area of Occupancy is declining, the species continues to be found in 21 populations in Manitoba and 7 in Ontario.

The factors and characteristics that contribute to a species' likelihood of survival are:

- **Stability**: a species that has a stable (or increasing) population and distribution is more likely to survive over the long term
- **Resilience**: a species that has large enough population size(s) to rebound from periodic disturbance and avoid demographic and genetic collapse is more likely to survive over the long-term
- **Redundance**: a species that has multiple (sub) populations or locations, or a distribution that is very widespread, is more likely to survive over the long term because of reduced risk of catastrophic loss or extirpation from a single, local event
- **Connectivity**: a species that has more continuity (less fragmentation) in Canada is in general, more likely to survive in the long-term since recolonization would be facilitated following a local extirpation event
- **Protection from human-caused threats**: a species for which significant impacts caused by humans are ceased, avoided, or mitigated, is more likely to survive over the long-term

Stability: Long-term trend data needed to determine population stability is not available for most of the populations in Canada.

Resilience: In terms of resiliency, 10 of the 21 extant populations in Manitoba had the highest population counts at less than 200 plants. These smaller populations may not be large enough to rebound from periodic or cumulative disturbances, and genetic issues. Additionally, hybridization of Small White Lady's-slipper with Yellow Lady's-slipper may further limit resilience. Small White Lady's-slipper requires specific environmental conditions for survival and long-term viability (e.g. surface and subsurface water conditions, specific soil fungi, and a reliance on other plants to attract pollinators) which makes them lack resilience to threats.

Redundance: Small White Lady's-slipper occurs in 21 populations in Manitoba and 7 in Ontario; however, most populations are isolated and located in high-risk environments like roadside ditches.

Connectivity: No connectivity exists between populations and there is no potential for recolonization from nearby populations.

Protection from human-caused threats: All Small White Lady's-slipper populations are at risk from human-caused threats as most occur in high-risk environments like roadside ditches. While the species is listed as "endangered" and subject to the prohibitions under section 10 of the ESEA in Manitoba, even populations existing on protected lands with active management (e.g., Tall Grass Prairie Preserve in Manitoba) appear to be in decline. There are ongoing threats (Table 3) to Small White Lady's-slipper within the SE area that will continue to intensify.

B) Recovery of the wildlife species highly unlikely or impossible?

Yes.

The proposed housing development has a high potential to alter the Area of Occupancy and amount of habitat available for the South Brandon (34) population of Small White Lady's-slipper, rendering the achievement of the population and distribution objectives for the species highly unlikely, unless:

- Additional analysis on the site's hydrological conditions (for both ground and surface water) is conducted to ensure the effectiveness of the City of Brandon's proposed surface water mitigation proposal;

- Direct destruction of any recorded Area of Occupancy for the species is avoided; and,

- Manitoba confirms that it is working with partners on a stewardship plan that includes active management of the site.

The population and distribution objective in the federal recovery strategy is to maintain all 25 populations that were known to be extant at their current Areas of Occupancy, plus any newly discovered ones (Environment Canada, 2014). The assessment found the following:

Changes to hydrological conditions: There is no hydrological baseline for current or past surface and groundwater conditions in the SE area so it is unknown what hydrological conditions will be necessary for a long-term, viable occurrence of Small White Lady's-slipper, and therefore unclear what impacts the housing development and associated water infrastructure changes would have on the Small White Lady's-slipper plants and their critical habitat. Given the dependence of Small White Lady's-slippers on appropriate moisture regimes, a lack of hydrological model and data to inform the City of Brandon's proposed mitigation measures to address threats from changes to hydrology for the SE area leads to the conclusion that the proposed housing development has a potentially reasonable likelihood of impacting the Area of Occupancy for the Small White Lady's-slipper in the greenspace.

Direct destruction of Areas of Occupancy:. Should project plans not be adjusted to ensure adequate buffering around known Areas of Occupancy, once construction begins, these Areas of Occupancy have a high likelihood of being irreversibly destroyed, according to the Department's estimates of the location of the project.

Lack of active management and stewardship plan for the site: Appropriate management practices that replicate or mimic the timing, frequency and intensity of natural ecosystem disturbances like fire and grazing are important for maintaining habitat quality of Small White Lady's-slipper. This is particularly important in fragmented and small parcels like the Brandon area, where adjacent land uses may alter moisture levels, species composition, nutrient input, and previous management regimes. Active management of the site would also need to address hydrological needs, environmental monitoring of construction activities, protection in perpetuity of the greenspace, threats secondary to the housing development (invasive, non-native alien species, pesticides, etc.), and creation and implementation of a Small White Lady's-slipper management plan for the property that includes plans for effective monitoring, stewardship, and long-term management. This threat is already present and its impacts intensifying.

Given the above noted impacts on the recovery of Small White Lady's-slipper, if the housing development on the SE area proceeds without suitable mitigation measures aimed at maintaining the current Area of Occupancy as identified in the federal recovery strategy, the South Brandon (34) population has a high likelihood of experiencing a reduction in its Area of Occupancy, and therefore the assessment concludes that the threat will render the recovery of the species highly unlikely without suitable mitigation. These mitigation measures include: avoiding development on Areas of Occupancy, analyzing and conserving hydrology on the site, greenspace protection, and the design and implementation of long-term adaptive management, stewardship and monitoring plans.

Question 3: Do the threats require immediate intervention beyond existing protection measures?

Not at this time

Small White Lady's-slippers in the SE area are fully protected under provincial legislation. Section 10 of Manitoba's Endangered Species and Ecosystems Act provides protection for Small White Lady's-slipper plants, their habitat, and the natural resources on which they depend for life and propagation on all lands (regardless of ownership) in the province of Manitoba. The prohibitions of the Act state that no person shall (a) kill, injure, possess, disturb or interfere with a member of an endangered species; (b) destroy, disturb or interfere with the habitat of an endangered species; or (c) damage, destroy, obstruct or remove a natural resource on which an endangered species depends for its life and propagation, without a permit or exemption from the responsible Minister.

Provincial officials have confirmed that the Government of Manitoba has rescinded the prior exemption for this project provided under the ESEA. Additionally, the province has indicated their intention to continue their dialogue with the City of Brandon and the landowner. However, no additional information was provided on how the provincial regime will apply to the Small White Lady's-slippers on at the SE area, including whether there will be any alterations to the project plans and footprint to avoid impacts to the areas of occupancy, whether additional

hydrological studies will be conducted to inform mitigation measures, and whether Manitoba is working with partners to implement active management and stewardship of the site.

At this time, the Department is of the view that provincial legislation and ongoing engagement with the City of Brandon and the landowner can be relied upon to ensure that potential impacts of the housing development are adequately avoided or mitigated. Implementation of the mitigation measures, put forward by the City of Brandon and the landowner, should occur prior to the commencement of any construction activities that would directly impact the Small White Lady's-slipper population. The Department will, however, monitor the situation closely and should insufficient measures be taken to avoid the impacts to the recovery of the species, the Department could revisit this assessment and determine that intervention is required.

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ANNEXES

ANNEX 1 – Detailed description of threats to the species

Threats to the Small White Lady's-slipper populations in Canada are described in Table 2. However, only those threats relevant to the South Brandon (34) population (i.e., indicated with an asterisk in Table 2) are included here.

Housing & Urban Areas / Roads & Railroads / Utility & Service Lines

Residential development can not only lead to the direct loss or fragmentation of a population through the housing development itself, but it can indirectly impact a population by altering the occurrence and frequency of disturbance events required to maintain suitable habitat conditions (e.g. fire or grazing), increasing the introduction and spread of invasive species, altering the hydrology and nutrients the habitat receives, and increasing the amount of trampling or illegal collection of plants through recreational use of surrounding lands. In addition, the fragmentation of native prairie habitat, such as that which happens with urban development, results in smaller parcels that are associated with higher edge effects, loss of genetic biodiversity, higher inbreeding depression, lower quality habitat and lower persistence on the landscape often leading to increased probability of population extirpation (Ouborg et al. 2006; Koper et al. 2010). Several studies have shown a decrease in pollinator diversity due to habitat fragmentation (Ouborg et al. 2006; COSEWIC 2014). Infrastructure associated with development, such as installation and maintenance of utility lines, road expansion or alteration, and clearing and maintenance of ditches may also be a concern since many populations are found along roadsides or right-of-ways. Habitat and plants can be damaged or destroyed by road or utility right-of-way construction activities such as widening, ditch deepening, trenching, drainage projects, and realigning or improvements. Habitat and plants can also be affected by incompatible or inappropriately-timed road or right-of-way maintenance activities on shoulders and in ditches, such as spraying pesticides, grading, and haying or mowing. The linear disturbances from roads and right-of-ways also increase the potential for introduction and invasion by invasive non-native plant species. Residential development south of Brandon, Manitoba has previously affected hydrology at one Small White Lady's-slipper site (J. Greenall, pers. comm. 2011).

Dams & Water Management / Use

Alteration of hydrology is a concern for all populations since Small White Lady's-slipper is dependent on a reliable and appropriate moisture regime, being restricted to areas with moist calcareous soils, with a high water table and groundwater flow (Brownell 1981; Falb and Leopold 1993; COSEWIC 2014; Toop 2018). Hydrological alterations due to damming, ditching, drainage, culverts, and housing and urban developments may change soil moisture, and the amount and flow of groundwater and surface water. Changes in hydrological conditions may cause unsuitable habitat conditions and lead to reduced viability of the population or eventual extirpation from the site. Changes in moisture availability can also have a compounding effect by influencing encroachment by woody species and invasive non-native plant species, leading to direct competition for resources, thatch accumulation, and shading. Hydrological alterations

may also affect nutrient supply and leaching. Drainage for agriculture, and to a lesser extent other purposes such as mosquito reduction or residential development, has already reduced the amount of suitable habitat available to support Small White Lady's-slipper.

Fire Suppression / Other Ecosystem Modifications

In the absence of pre-settlement fire and compatible grazing regimes, encroachment by woody species and accumulation of thatch has reduced the quality of remaining habitat for Small White Lady's-slipper populations in Canada (COSEWIC 2014). Woody vegetation encroachment and thatch accumulation are the most commonly reported threats to Canadian populations (Brownell 1981; Brownell 1999; Punter 1999; Manitoba Conservation Data Centre 2020; COSEWIC 2014). Small White Lady's-slipper is shade intolerant therefore encroachment of trees and shrubs and build-up of thatch can result in competition for limited resources, such as sunlight, and can limit availability of suitable sites for establishment (Falb and Leopold 1993). Vegetation that is too tall can prevent pollinators from accessing flowers of Small White Lady's-slipper, impacting sexual reproduction, and can limit wind-born seed dispersal and seed germination (Wake 2007). Moisture levels and surface temperatures can be affected by the presence of woody vegetation and thatch as well (Sletvold et al. 2010), potentially affecting germination and dormancy. Appropriate levels of thatch cover, however, may benefit Small White Lady's-slipper by providing an insulating effect against late spring frosts by delaying shoot growth and flowering in spring (Wake 2007, COSEWIC 2014). Populations in Canada that are noted to have a very heavy thatch layer bloom later than nearby populations that have less thatch (COSEWIC 2014; Manitoba Conservation Data Centre 2020).

Appropriately timed, and appropriate intensity of, burning, grazing or mowing can help prevent woody vegetation encroachment and heavy thatch encroachment (Wright and Bailey 1980; Towne et al. 2005). Inappropriately timed, or too frequent or infrequent, burning, grazing or mowing, may remove flowering stalks, preventing seed set, or may damage plants and reduce abundance (COSEWIC 2014; Bleho et al. 2021). The use of prescribed burns and grazing has been used at the largest known Small White Lady's-slipper population in the Manitoba Tallgrass Prairie Preserve (Bleho et al. 2021). One site at the preserve, which has not burned since 2001, has been associated with thatch accumulation and a decrease in stem counts since 2004 (C. Borkowsky, pers. comm. 2010). The use of twice-over rotational grazing has also been shown to reduce the accumulation of thatch at the Manitoba Tallgrass Prairie Preserve (Hernandez and Blouin 2001) and grazing has been found to have a positive effect on vegetative and stem growth of Small White Lady's-slipper, likely because of reduced competition and shading from other plants (Bleho et al. 2021); however, grazing too frequently can increase damage to plants by trampling and consumption (Bleho et al. 2021). Nevertheless, more research is needed to determine the specifications of grazing and burning practices that are compatible with the species and would effectively address this threat. At some sites in Manitoba, shrub encroachment and thatch build-up have been steadily increasing despite attempts at periodic mowing and shrub removal (Environment Canada 2014), and despite active management at the Tallgrass Prairie Preserve, monitoring data alludes to a decreasing trend.

Appropriate management practices that replicate or mimic the timing, frequency and intensity of natural ecosystem disturbances like fire and grazing are important for maintaining habitat quality

of Small White Lady's-slipper. This is particularly important in fragmented and small parcels like the Brandon area, where adjacent land uses may alter moisture levels, species composition, nutrient input, and previous management regimes.

Agricultural & Forestry Effluent (Pesticide/herbicide use)

Pesticide runoff and drift can alter plant and pollinator communities, thereby possibly reducing the capability of the habitat for supporting Small White Lady's-slipper. Use of pesticides intended to control undesirable plants (broad-leaf herbicide) or insect pests (indirectly through herbicide or directly through insecticide) in areas occupied by, or adjacent to, Small White Lady's-slipper can affect both Small White Lady's-slipper plants and its pollinators. Broad-leaf herbicides directly sprayed on Small White Lady's-slipper will kill the plant, and use of broad-leaved herbicides in fields adjacent to Small White Lady's-slipper may drift during application or leach out with rains and damage or kill plants. In general, reducing flowering plants in an area through herbicide use, as well as spraying insecticides to control insect pest species, can both reduce pollinators and potentially affect seed production of those plants. Small White Lady's-slipper depends on specific pollinators, which need to be supported by a wide diversity of other native flowering plants throughout their life cycle (Catling and Knerer 1980; COSEWIC 2014). A lack of diversity of flowering plant species in Small White Lady's-slipper habitat could limit pollination success (Catling and Knerer 1980; Bernhardt and Edens-Meier 2010). Additionally, application of fertilizers or changes in nutrient load may kill the rare soil fungi required by the Small White Lady's-slippers to reproduce. Fertilizer runoff can also alter soil nutrient status, creating new conditions that will be suitable for some plant species and unsuitable for others. Changes to soil nutrient status will also influence the outcome of interspecific competition for nutrients.

Invasive Non-native Species

Increasing abundance of invasive non-native plant species is a concern at many populations, particularly those near Brandon, Manitoba where the highly invasive Leafy Spurge (Euphorbia esula) and Smooth Brome (Bromus inermis) have been rapidly expanding and degrading habitat (COSEWIC 2014); shading and competition from Smooth Brome is thought responsible for the loss of at least one roadside occurrence near Brandon (Manitoba Conservation Data Centre 2020). Roadside populations are particularly susceptible to being outcompeted by the invasive species. Invasive non-native plants can pose a direct threat through competition because they can displace native species, decrease species diversity or richness through their superior competitive ability and/or result in overall negative effects on ecosystem functioning (Wilson 1989; Wilson and Belcher 1989; Reader et al. 1994; Christian and Wilson 1999; Bakker and Wilson 2001; Butler and Cogan 2004; Henderson 2005; Henderson and Naeth 2005). Once established, these species can alter hydrology and soil nutrient and moisture availability and create shade resulting in direct competition with Small White Lady's-slippers, such that population declines occur.

Gathering Terrestrial Plants

Poaching has the potential to have a direct effect on the persistence of populations, particularly the smaller ones, by permanently removing plants from the population. Digging up of plants by orchid collectors has been reported numerous times from populations in both Manitoba and Ontario (Environment Canada 2014; COSEWIC 2014; Manitoba Conservation Data Centre 2020) particularly along roadsides where plants are visible and accessible.

Recreational Activities

Trampling of plants and soil compaction from foot traffic, bikes, and all-terrain vehicles has been reported at some populations in Manitoba and Ontario (Environment Canada 2014; COSEWIC 2014; Manitoba Conservation Data Centre 2020). Vehicles involved in mowing or haying can also trample plants and compact soil and create disturbance that can increase opportunities for colonization by invasive non-native plant species.

ANNEX 2 - Activities likely to result in the destruction of critical habitat

Activities likely to result in the destruction of critical habitat as identified in the federal Small White Lady's-slipper recovery strategy (Environment Canada 2014). 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 single or multiple activities at one point in time or from the cumulative effects of one or more activities over time (Government of Canada 2009). Activities likely to result in destruction may occur within the critical habitat but may also occur outside of the critical habitat. Activities that are likely to result in destruction of critical habitat include but are not limited to:

Description of Activity	Description of Effect	Details of Effect
Compression, covering, inversion, or excavation/extraction of soil: Examples of compression include the creation or expansion of permanent/temporary structures, trails, roads, repeated motorized traffic, and objects that concentrate livestock activity and alter current patterns of grazing pressure such as spreading bales, building new corrals, or adding more water troughs. Examples of covering the soil include the new creation or expansion of permanent/temporary infrastructure, spreading of solid waste materials, or roadbed construction. Examples of soil inversion and excavation or extraction include new or expanded cultivation, sand and gravel extraction pits, dugouts, road construction, pipeline installation, and removal of topsoil.	Compression can damage soil structure and porosity or reduce water availability by increasing runoff and decreasing infiltration, such that the habitat is destroyed. Covering the soil prevents solar radiation and water infiltration needed for germination and survival of plants, such that habitat is destroyed. Soil inversion or extraction can alter soil porosity along with temperature and moisture regimes, such that vegetation communities change to those dominated by competitive weedy or invasive species. This then results in habitat destruction.	This activity must occur within the bounds of critical habitat to cause its destruction, can be a direct or cumulative effect, and is applicable at all times of year.
Planting of shrubs, trees or invasive non-native plant species	Once established, these species can alter hydrology and soil nutrient and moisture availability and create shade resulting in direct competition with Small White Lady's-slippers, such that population declines occur. This effectively destroys the critical habitat.	This activity can occur within or adjacent to the bounds of critical habitat to cause its destruction, can be a direct or cumulative effect, and is applicable at all times of year.
Indiscriminate application of fertilizers and pesticides.	Application of fertilizers may kill the rare soil fungi required by the Small White Lady's-slippers to reproduce. Fertilizer runoff can also alter soil nutrient status,	This activity can occur within and outside the bounds of critical habitat to cause its destruction (e.g. chemical drift, groundwater or overland flow of contaminated

	creating new conditions that will be suitable for some plant species and unsuitable for others. Changes to soil nutrient status will also influence the outcome of interspecific competition for nutrients. Pesticide runoff and drift can alter plant and pollinator communities, thereby possibly reducing the capability of the habitat for supporting Small White Lady's-slipper.	water), can be a direct or cumulative effect, and is applicable at all times of year.
Hydrological alterations: Examples include damming, ditching, drainage, or culvert installation or removal	Hydrological alterations may change soil moisture, which is an important component of the Small White Lady's-slipper habitat needs. As a result, changes in hydrological conditions may result in reduced viability, or extirpation of the species within the critical habitat. An increase in moisture could also lead to increased encroachment by woody vegetation and some invasive species such as Common Reed, which are threats to the species. Hydrological alterations may also affect nutrient supply and leaching.	This activity can occur within and outside the bounds of critical habitat to cause its destruction, can be a direct or cumulative effect, and is applicable at all times of year.

ANNEX 3 - Record of communications and timelines

Important timelines and their related information, based on information shared by either the province of Manitoba, the City of Brandon or the landowners.

March 2020:

- The province of Manitoba issues an exemption under their Endangered Species and Ecosystems Act to allow for development to proceed on the SE area, subject to submission of a Stewardship Plan and ensuring 25 m buffers around plants (with locations based on a 2019 survey). This exemption was rescinded in March 2023.

June 2020:

- Members of the public write to the Minister of Environment and Climate Change requesting that the Minister intervene to ensure protection of the population of Small White Lady's-slipper in Brandon. In addition to the letters, a petition (with similar requests asking for the Minister to intervene) is brought to the attention of the Minister of Environment and Climate Change in August of 2020.

September 2020:

- ECCC is informed (by the landowner of the property in question) of a potential urban preserve being negotiated with the NCC. The objective of the urban preserve would be to protect the area with known Small White Lady's-slipper individuals through an active management plan to be spearheaded by the NCC.

March 2021:

- ECCC and Manitoba are each asked to contribute $600,000 to fund the NCC to purchase the lands (to create an urban preserve) with the goal of the NCC taking ownership and managing the lands on the southern portion of the property, which contain the majority of the known location of the Small White Lady's-slipper. ECCC and Manitoba both declined to fund the application.

July 2021:

- The City of Brandon adopted the Southeast Brandon Secondary Plan, which allows for urban residential designations on the north portion of the property as well as an environmental greenspace on the south portion of the property (reference removed[15]). The environmental greenspace is identified to preserve the lands impacted by the Small White Lady's-slipper (See section 2.4.3 of the Southeast Brandon Secondary Plan)

June 2022:

- The City of Brandon has confirmed (Ryan Nickel, pers comm. 2022) their intention to begin water infrastructure work in the area (in support of future housing developments to the north) in the fall of 2022.
- The City of Brandon and its consultant are taking the environmental preserve area into consideration as part of the planned construction activities and have given consideration to avoidance and mitigative measures to be included in the tender for the construction works.
- City of Brandon is completing a preliminary review of a neighbourhood plan by a developer for the area to the north of the Small White Lady's-Slipper Preserve. The City

[15] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

is anticipating that a formal application will be made by the end of December along with an initial subdivision/ rezoning application for the first stage of development on lands to the north of Maryland Avenue (outside the identified quarter section). Initial servicing to the development area (water, sewer, and land drainage) could be installed for the first phase as early as Summer of 2024.

- City of Brandon conducted sampling from groundwater and surface water:
    - Surface water sampling was conducted Sampling results showed no traces of herbicide.
    - Groundwater sampling was conducted from piezometers installed in May 2022. Sampling results indicated no hydrocarbon contamination.
    - Surface water Phosphorus concentrations were measured to be 0.050 mg/L and 0.037 mg/L
    - Surface water Total Calcium concentrations were measured to be 43.8 mg/L and 66.5 mg/L
    - Surface water Nitrogen was not measured.
    - Ground water Total Calcium concentrations were measured to be 168 mg/L (N of preserve area) and 144 mg/L (NE of preserve area).
    - Ground water Nitrate + Nitrite was very low, <0.025 mg/L (North) and <0.010 mg/L (NE).
- Prior to construction of any irrigation system, future water sampling will be undertaken to confirm the water quality from these sources has remained consistent. Utilization of one source vs. the other would be subject to review and assessment by subject matter experts

November 2022:

- The City of Brandon confirmed that water infrastructure works have not begun. The City is looking to tender work related to the Southeast Drainage Improvement Project Phase 1 in early 2023. This is stormwater management or land drainage work.The City of Brandon confirmed this stormwater management work or land drainage work is necessary to provide a much-needed outlet and relief to the existing stormwater system. That is the primary goal of this project. Secondary to that the City is looking to create a trunk system. This trunk system will also serve future planned development. Completion of the first phases of this project are just the beginning and further work to the east is required to establish a more defined outlet to the River and to allow for future land drainage service to existing and proposed urban development areas along the proposed trunk drainage system.

January 2023:

- VBJ Developments submitted a neighbourhood plan application, titled the “Southeast Brandon Neighbourhood Plan”, to enable development on the SE area. The environmental greenspace is identified in this document as ‘Nature Conservancy of Canada lands”, however NCC does not currently own these lands (Kevin Teneycke pers. comm. 2023).
- The City of Brandon notified ECCC that their engineering consultant is moving towards finishing detailed design and tendering spring 2023.

March 23, 2023:

- The Province of Manitoba rescinded the exemption under their Endangered Species and Ecosystems Act that allowed for development to proceed on the SE area, subject to

submission of a Stewardship Plan and ensuring 25 m buffers around plants (with locations based on a 2019 survey).

ANNEX 4 – City of Brandon Environmental Greenspace and Street Network Policies

Policy excerpts from the City of Brandon's Southeast Brandon Secondary Plan, Schedule of By-lay No. 7302 (City of Brandon 2021):

2.4.3 Environmental Greenspace Policies

2.4.3.1 The Secondary Plan area has natural features that are unique to the area, including the endangered Small White Lady's Slipper Orchid. These areas shall be protected from development and retained in a natural state in accordance with federal or provincial legislation and regulations.

2.4.3.2 The environmental greenspace shall coincide with the area established to protect the Small White Lady's Slipper Orchid generally located in the southern portion of the Secondary Plan area [reference removed[16]]*. The province of Manitoba shall determine the final boundaries of the preserve area, and any subdivision/rezoning of land for development in the Secondary Plan area shall comply with provincial requirements for the protection of the Small White Lady's-slipper Orchid.*

2.4.3.3 The City and owners of lands impacted by the Small White Lady's Slipper Orchid shall explore partnerships with non-profit environmental groups (e.g. NCC) to own or operate the environmental greenspace to ensure the successful preservation of the White Lady's-slipper Orchid.

2.4.3.4 The City shall coordinate with the province of Manitoba and impacted landowners to explore options for managing drainage into the environmental greenspace to promote the preservation and success of the Small White Lady's Slipper Orchid.

2.4.3.5 The environmental greenspace may incorporate education and awareness opportunities, as well as trail connections. Any trails with open public access may be considered as greenway connections and part of a developer's public reserve contribution.

2.4.3.6 A conservation easement may be registered on the titles of the environmental greenspace and other lands protected under the provincially approved stewardship protection plan to further define the protected area.

2.4.3.7 To minimize the impact of construction and salt, sand, and other debris, a street shall not be developed directly adjacent to the environmental greenspace.

3.4 ***Street Network Policies***

[16] Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment

3.4.9 Prior to upgrading an existing road to a full urban standard, the City may explore options with the RM of Cornwallis, the operators of the environmental greenspace, and the owners of lands south of the Avenue to re-route the street further to the south of known occurrences of the Small White Lady's Slipper flowers.

ANNEX 5 – Summary of hydrological review

Best available information related to hydrology and any hydrological assessments was requested and received by the City of Brandon and the province of Manitoba. This information was sent to ECCC's hydrogeologist who, upon review, was of the opinion that succinct conclusions regarding the groundwater hydrology of the area as it relates to Small White Lady's-slipper are not able to be made based on the information available to ECCC.

ECCC's hydrogeologist provided the following feedback relative to the information available, and in relation to what additional information would be required to be able to provide a more complete assessment:

- Regional and local groundwater flow maps and piezometric surface maps of the site overlaid by locations of Small White Lady's-slipper and the planned construction area was needed to accurately assess the site.
- A hydrogeological numerical model that represents both groundwater and surface water flow and shows pre-construction (current), during-construction, and post-construction groundwater and surface water flow estimates for the development area near the Small White Lady's-slipper is required to aid in the determination of how the plants may be affected by the planned project, in terms of its dependence on groundwater flow, as well as to provide solutions if it is found that Small White Lady's-slipper could be negatively affected by the project.

ECCC noted that the City of Brandon's proposed mitigation measures consider surface water recharge (City of Brandon 2022); however, it is unclear if changes to groundwater conditions can be mitigated by surface water manipulation. The best available information from Toop (2018) indicates that suitable habitat conditions tend to be controlled by groundwater leaching and hydrology: soil pH ranges between 7.5 to 8.5, calcium carbonate precipitation is evident in the soil indicating active discharge of carbonate-rich groundwater, and shallow groundwater levels peak in May/June then decline over the summer (Toop 2018). As a result, changes in hydrological conditions from primarily groundwater sourced to surface water sourced may affect nutrient supply obtained from groundwater leaching, and may result in reduced viability, or extirpation of the species within the critical habitat.

The Southeast drainage improvement project (City of Brandon 2022) includes a mitigation option that proposes using surface water irrigation from a existing pond/wetland) through the proposed environmental greenspace in phase 4 to "re-establish overland flow to the environmental preserve" (Figures 8 and 9). The proposed seasonal irrigation system has not been developed beyond the conceptual stage (City of Brandon, pers. comm. 2023). However, in preparation for such a concept, the City's consultant is proposing construction to the existing stormwater pond to include a small wet bottom pond that could feed a small pump station for irrigation purposes. The City of Brandon confirmed that the existing drainage network upstream of the environmental preserve, is inadequate due to lack of pond storage and limited outflow (only pumping). This is the primary reason the City is looking to complete the Southeast Drainage Improvements Project, in order to mitigate the existing storage constraints and create a proper permanent outlet for the stormwater flows. During high runoff events, a large portion of

surface water from this catchment will be diverted. The remaining portion will be stored for the purpose of a potential source for irrigation through the environmental greenspace. A 900 mm culvert exists in a local low area. In large rain events it is possible that a Pond would back up into the ditches then drain across the environmental greenspace (Figure 10; City of Brandon, pers. comm. 2023). Generally, in response to small rain events, the environmental greenspace is more likely to see infiltration and evaporation occur than for the ditch to overflow into the preserve area.

However, as there is no hydrological baseline for current or past conditions in the SE area it is unknown what hydrological conditions will be necessary to maintain suitable conditions for a long-term viable occurrence of Small White Lady's-slipper.

Because of this information gap, increasing water flow from a existing pond/wetland to irrigate the proposed environmental greenspace may not be necessary and may indeed be detrimental by causing changes to the current pH of the water and soil, excess nutrient load from the irrigated water which likely has increased nutrients due to fertilizer use in the adjacent neighbourhoods, and increasing moisture levels in the proposed environmental greenspace beyond what is tolerated by Small White Lady's-slipper and the rest of the current plant community there.

This would be heightened in years with high rainfall events where excess water will be pumped out of an existing pond/wetland. It is unknown what additional disturbances will occur in relation to the planned irrigation project within the proposed environmental greenspace and critical habitat, however the City of Brandon has considered designing an irrigation system that would cause the least disturbance to the greenspace lands (City of Brandon, pers. comm. 2023). Additionally, phase 4 is planned a few years following phase 1 and 2 so there will be a gap between when construction occurs and when irrigation is planned. The City of Brandon has also considered the implementation of a groundwater irrigation system, using irrigation wells constructed on site or adjacent to the environmental preserve (City of Brandon, pers. comm. 2023).

Figure 8. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

Figure 9. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.

Figure 10. Due to vulnerability of the species, specific references providing sensitive information have been removed from this version of the Imminent Threat Assessment. Therefore, in the best interest of the species, the specific location information associated with this assessment has not been disclosed and that information can be made available to land managers and other potentially affected parties, upon request to Prairie Region of the Canadian Wildlife Service at Environment and Climate Change Canada.