



HABITAT RESTORATION PROJECT FRAMEWORK



THE CITY OF
CALGARY
PARKS

Q3 2014

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July 2014

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MANUAL REVISION NOTICE

The 2014 *Habitat Restoration Project Framework* replaces the 2010 *Habitat Restoration Framework*, and has been substantially re-written to align with understood best practices, to establish specifics around project responsibilities and sign-off and to restructure the document for ease of use.

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ABBREVIATIONS and ACRONYMS

ACIMS	Alberta Conservation Information Management System
AESRD	Alberta Environment and Sustainable Resource Development
CCC	Construction Completion Certificate
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPAG	Corporate Planning Applications Group
ECO Plan	Environmental Construction Operation Plan
ER	Environmental Reserve
ESC	Erosion and Sediment Control
FAC	Final Acceptance Certificate
FWMIS	Fisheries & Wildlife Management Information System
GPS	Global Positioning System
HRP	Habitat Restoration Project
HRPF	Habitat Restoration Project Framework
ISO	International Organization for Standardization
MR	Municipal Reserve
NAD	North American Datum
NEP	Natural Environment Park
PARIS	Parks Asset Reporting and Information System
PDI	Parks Development Inspector
PM	Project Manager
SARA	Species at Risk Act
SER	Society for Ecological Restoration
UTM	Universal Transverse Mercator
WGS	World Geodetic System

EXECUTIVE SUMMARY

Many ecologically significant areas in Calgary have been altered or disturbed by human activity, resulting in an ecosystem that has been degraded, damaged or destroyed. The resulting degraded habitat has decreased ecological function and biodiversity. The process of habitat restoration returns the level of biodiversity and ecosystem function of a degraded habitat back to a target natural state. Habitat restoration can be defined as the process of assisting the recovery of a degraded habitat through land management activities in order to initiate or accelerate its succession towards a reference habitat. The degree of recovery can be described by a series of habitat restoration levels, from purely reclamation, to naturalization, to rehabilitation, to true restoration.

The City of Calgary (The City) requires the restoration and protection of native habitat and areas of biodiversity to reduce the disruption and fragmentation of natural habitats through its *Municipal Development Plan* (The City of Calgary 2009). The *Open Space Plan* (The City of Calgary Parks 2003) requires a restoration plan prior to approval of construction activities in a natural environment park, whether the disturbance is a consequence of approved or unauthorized disturbance. Preparation of a restoration plan assures accordance to meet Final Acceptance Certificate requirements of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks 2013).

The Habitat Restoration Project Framework helps to guide the habitat restoration project process, including the production of a restoration plan and report that align with industry agreed-upon guidelines; other municipal, provincial and federal legislation and guidelines; The City's *Project Management Practices* (The City of Calgary 2013), *Open Space Plan*, and *Development Guidelines and Standard Specifications: Landscape Construction* manual; and other Council-approved documents. This framework defines the professional qualifications required to carry out habitat restoration projects, and helps ensure restoration project consistency, defensibility and compliance.

The habitat restoration project process is a 10-phase progression beginning with the conditions that trigger project need, followed by the project itself, and then transfer of the project site to The City after Final Acceptance Certificate requirements have been met. The process allows for adaptive management for site-specific conditions, and uses ecological restoration principles that consider the ecosystem function and biodiversity of the project site. This framework outlines the process of project planning, approval, implementation, and monitoring, as well as restoration plan and report preparation. This framework also recommends helpful readings, defines restoration project terminology, and provides a checklist for habitat restoration projects.

INTRODUCTION

ENABLING POLICY

The Habitat Restoration Project Framework (HRPF) has been prepared under the direction of the *Municipal Development Plan* (The City of Calgary 2009) and the *Open Space Plan* (The City of Calgary Parks 2003). The City of Calgary (The City) requires the restoration and protection of native habitat and areas of biodiversity to reduce the disruption and fragmentation of natural habitats within The City's parks (*Municipal Development Plan: The City of Calgary 2009*). A restoration plan is required prior to the approval of construction activities in a natural environment park (see The City of Calgary Parks *Open Space Plan 2003*, p. 45):

Before The City will issue a stripping and grading permit for developments with approved encroachments into natural areas on reserve lands (a natural environment park), the developer shall submit, for approval by Parks, a Natural Area/ER (environmental reserve) Restoration Plan, in accordance with the most current edition of the *Development Guidelines and Standard Specifications: Landscape Construction*.

PURPOSE OF THE FRAMEWORK

The HRPF is a resource that provides guidance and outlines requirements for managing habitat restoration projects that are a consequence of approved or unauthorized encroachments into a natural environment park. The framework may also be used as a reference for construction and habitat restoration projects on land not owned by The City of Calgary, or where private lands might, through subdivision, sale or other mechanism be coming into City inventory.

By adhering to this framework, the project proponent will produce a habitat restoration plan and report in alignment with the requirements of the *Open Space Plan* (The City of Calgary Parks 2003) and Final Acceptance Certificate requirements of current edition of The City of Calgary Parks (2013) *Development Guidelines and Standard Specifications: Landscape Construction* manual. For the purposes of this framework, the habitat restoration plan and report will herein be collectively referred to as the "habitat restoration report" and the construction and monitoring stage will be referred to as the "habitat restoration project."

The Habitat Restoration Project Framework aims to,

1. Provide an overview of habitat restoration;
2. Outline criteria for when a habitat restoration project is required;
3. Provide a consistent decision making approach to assessing proposed development and construction projects in a natural environment park;
4. Ensure fair and consistent application of City policies and guidelines, while ensuring compliance and alignment with provincial and federal regulations;

5. Provide a clear and concise framework for the development and implementation of a scientifically defensible habitat restoration report;
6. Provide a structure to strengthen project assessment and monitoring;
7. Ensure that habitat restoration projects achieve quality results; and
8. Present criteria to help meet the requirements of completing a successful restoration project.

The intent of the HRPF is to align a restoration project with existing industry agreed-upon guidelines and Council-approved documents. The Framework will help restoration practitioners comply with Municipal, Provincial, and Federal legislations and guidelines but does not prescribe mandatory requirements for construction approvals or permits except where prescribed by the current edition of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks 2013). Proponents are encouraged to supplement the framework with guidelines and best practices documents from recognized authorities in the field, such as those provided by the Society for Ecological Restoration, and others listed in the suggested readings of this document (see *Appendix A – Suggested Resources*).

SCOPE OF THE FRAMEWORK

The information provided in this document is designed for a technical audience, but does not cover a technical process for habitat restoration. The HRPF recognizes two stages in managing a habitat restoration project: 1) development of the restoration report, and 2) physical restoration. The HRPF is comprised of a process for developing, implementing and monitoring a habitat restoration project using ecological restoration principles, while allowing for adaptive management based on site-specific conditions. Proponents and City officials are to work closely together to ensure each step in the process is adhered to and approved in tandem.

Habitat restoration projects are intended to result in restoration areas that are self-sustaining over the long-term, and often require maintenance or other inputs beyond initial construction. Adopting a long-term perspective will increase the likelihood of successfully achieving the desired ecological structure, function and biodiversity outcomes. To realize success, projects should be framed around a hypothesis in which management actions (restoration activities) lead to specific outputs (constructed or natural elements) and outcomes relative to the reference habitat (see *Appendix B – Restoration Visioning Terminology* for details). Performance measures used to measure project or landscape elements may be monitored consistently over time, and to demonstrate whether maintenance or management actions match project goals and objectives. To guide changes in project maintenance or management, adaptive management approaches should be employed.

Ideally, restoration actions taken will align with plans or policies from The City, Province or Federal levels, including relationship of the project with specific targets outlined in such plans or policies. Legislation relevant to the proposed construction activities is to be consulted independently of adherence to the HRPF. The HRPF must be used in conjunction with the

current edition of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks 2013), as referenced throughout the framework.

PROFESSIONAL QUALIFICATIONS

The habitat restoration report, biophysical inventory and monitoring are to be produced and performed by a qualified environmental consultant or biologist able to,

- Demonstrate expertise in applicable discipline(s);
- Identify biophysical elements with accuracy and consistency;
- Identify the potential project impacts and mitigation measures; and
- Produce a biophysical assessment (see *Phase 4 – Project Initiation: Step 4.2 – Biophysical Inventory*).

Landscape construction plans included as part of the restoration report are to be prepared and submitted by Registered Landscape Architects, as per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). The restoration plans shall,

- Reflect the policies and conditions approved at the Outline Plan or Development Permit stage;
- Conform to Council approved policies and Federal/Provincial legislation; and
- Reflect further requirements outlined in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition).

HABITAT RESTORATION

OVERVIEW

For the purposes of this HRPF, degraded habitat will refer to any ecosystem or site which has been degraded, damaged, or destroyed. This habitat condition may be restored to its natural levels of ecological function and biodiversity through the process of ecological restoration. The intent of ecological restoration is to ensure sustainability, ecological integrity and health of the ecosystem. Though a restored area may not possess the ecosystem attributes, productivity, and biodiversity of an undisturbed native area, it nevertheless provides a higher level of benefit and value to wildlife and people compared to disturbed areas. For more information on ecological restoration, see the Society for Ecological Restoration's *International Primer on Ecological Restoration* (SER 2004).

For the purposes of this HRPF, the ecological restoration of degraded habitat will be referred to as habitat restoration. Habitat restoration is defined as an active process of assisting, through land management activities, the recovery of a degraded habitat to initiate or accelerate its succession towards a reference habitat. A reference habitat refers to the target ecosystem for habitat restoration, and may be described from historic or contemporary data sources, or may be represented by undisturbed, similar native habitat or similar habitat appropriate for the site conditions, which may be adjacent to the project site or elsewhere in the appropriate Natural Region/Subregion (Natural Regions Committee 2006).

The level of land management intervention can be categorized along a spectrum of habitat restoration types defined by the project goals for ecosystem function and biodiversity (Figure 1), which increase through a general spectrum from:

Reclamation → Naturalization → Rehabilitation → Restoration

Reclamation is a type of habitat restoration that aims to stabilize disturbed lands to an ecologically productive use, and therefore results in the least biodiversity and ecosystem function compared to other types of habitat restoration (Figure 1).

Defined in the context of habitat restoration, naturalization is a set of activities intended to improve and enhance the natural environment through the deliberate reintroduction of species native to a given area or that are well adapted to the climate circumstance. A naturalized site is characterized by higher levels of ecosystem function and biodiversity compared to a reclaimed site, but has lower levels of ecosystem function compared to rehabilitated or restored sites in a similar ecosystem.

Although naturalization is commonly defined as leaving a disturbed site to natural processes, such a passive process is not considered a type of habitat restoration, and therefore is not the

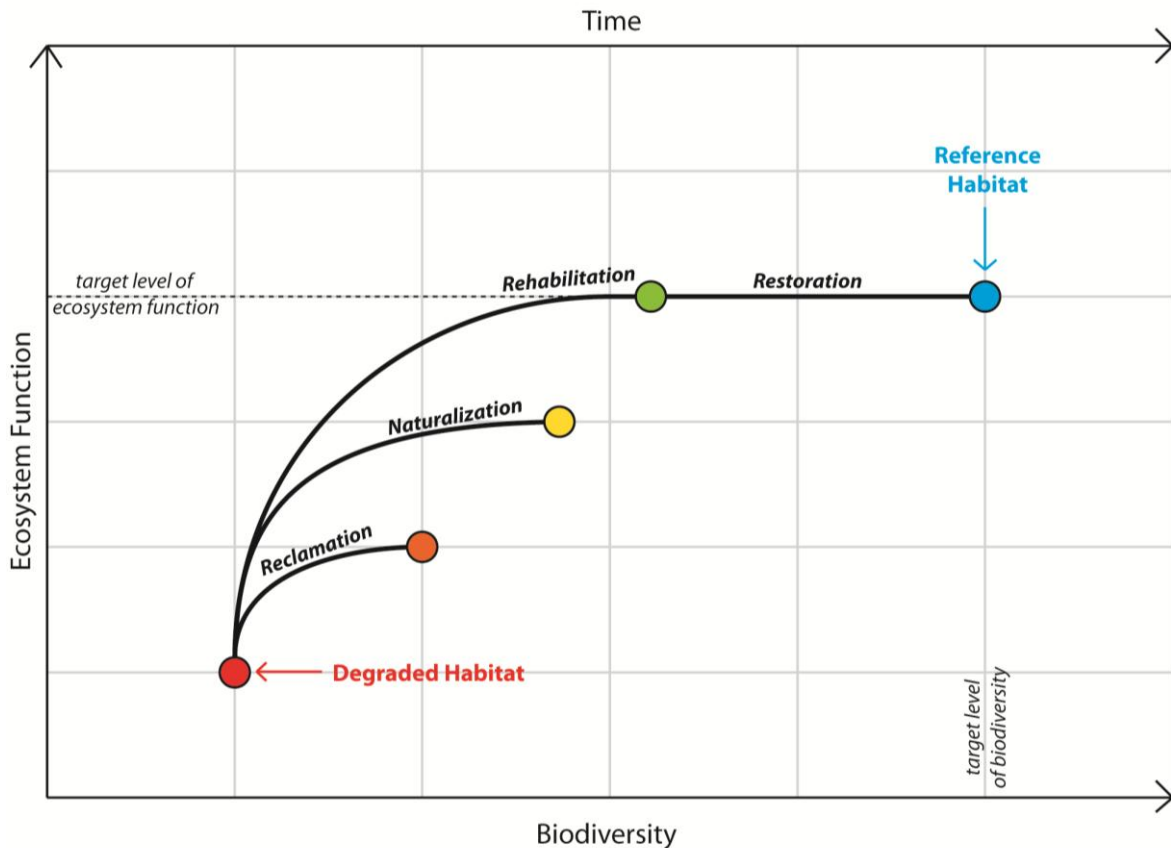


Figure 1. The range of habitat restoration types includes reclamation, naturalization, rehabilitation, and restoration. The starting point of habitat restoration is a degraded habitat that has less biodiversity and lower ecosystem function than a reference habitat. Through the processes of reclamation (orange) and naturalization (yellow), ecosystem function and biodiversity will increase over time, but result in an ecosystem that would not normally occur along a natural successional trajectory. Rehabilitation (green) restores ecosystem function and biodiversity to a level similar to, but lower than, a reference habitat and would allow the ecosystem to recover naturally to reference habitat conditions. Restoration (blue) returns the degraded habitat to the full ecosystem function and biodiversity levels of the reference habitat. Figure modified from Bradshaw (2002) and Naeem (2006).

definition of naturalization used in this framework. Leaving a degraded habitat to natural processes may not result in natural recovery of the ecosystem; if the level of degradation has surpassed disturbance thresholds preventing natural recovery, it may result in further degradation of the site. Natural recovery is the long term re-establishment of native ecosystems involving revegetation from the soil seedbank and/or natural encroachment without seeding of non-native species; however, this passive process is not considered to be a type of habitat restoration.

Rehabilitation and restoration are both active processes that are considered to be habitat restoration types. Rehabilitation aims to repair the ecosystem function and biodiversity of a degraded habitat along a natural successional trajectory to a level similar to, but less than, the reference habitat (Figure 1). Natural recovery processes will allow the habitat to become fully restored after rehabilitation is complete. Restoration of a degraded habitat fully re-establishes

the target level of ecosystem function and biodiversity as defined by the reference habitat (Figure 1), including species composition and vegetation community structure.

The type of habitat restoration and therefore the type of intervention for the habitat restoration project is based on: 1) the goals of the project and, 2) the degree and type of disturbance of the degraded habitat. In some cases intervention may involve purposeful degradation necessary for site preparation, natural recovery processes, or may focus on specific habitat features by means of enhancement activities. Enhancement is not considered a type of habitat restoration, and although its intent is to increase biodiversity or specific ecological functions, it could result in a decrease in other functions.

HABITAT RESTORATION PROJECT PROCESS

OVERVIEW

Completing a habitat restoration project is a 10-phase iterative process (Figure 2), where each step in the restoration process may build upon or refine elements required in the previous step. Each step will highlight required elements and approvals/check-in points. The process begins with determining whether or not a habitat restoration project is needed. The habitat restoration project itself involves the conception, planning, evaluation, and approval prior to construction. Once construction has been implemented, project monitoring and performance reporting is completed throughout the construction completion, maintenance period, and final acceptance phases. The ultimate phase in the process involves monitoring and maintenance of the site by The City after final acceptance.

For more information, see the Society for Ecological Restoration's *Guidelines for Developing and Managing Ecological Restoration Projects* (SER 2005), and the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition).

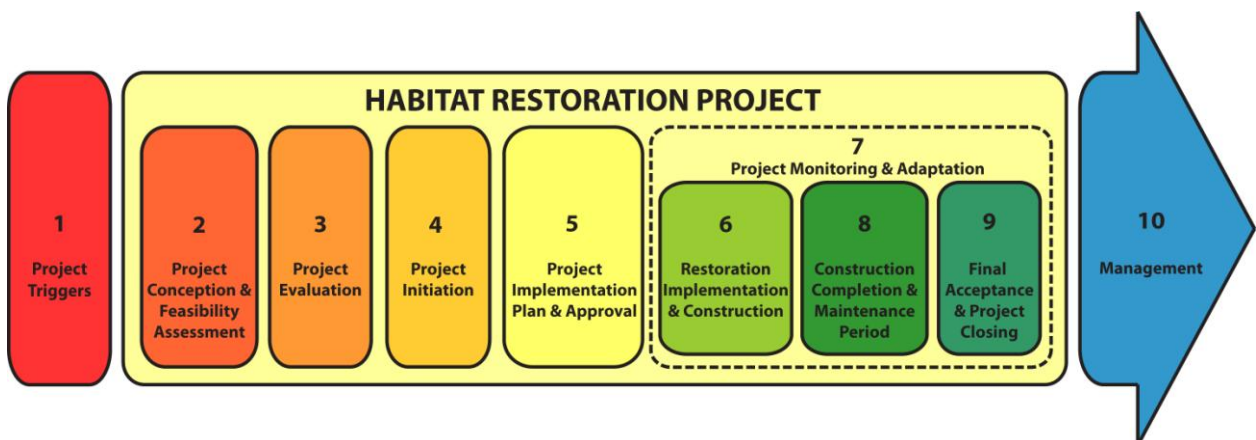


Figure 2. The 10 phases of the habitat restoration project process. At project implementation (Phase 6), project monitoring and adaptation (Phase 7) is also initiated, which continues until project closing (Phase 9).

PHASE 1

PROJECT TRIGGERS

PURPOSE

The purpose of the project triggers phase is to determine whether or not a habitat restoration project will be required. This determination may be made during several different stages in park development or operations (Figure 3): the Outline Plan and Landscape Construction process of development, the Development Permit process, during maintenance operations in a park that is in The City's inventory, or in certain other situations at the discretion of The City of Calgary Parks. A habitat restoration project may be triggered by disturbance to a natural environment park that is either expected, requested, approved, or occurs without authorization (Figure 3).

PHASE 1 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction</i> manual (The City of Calgary Parks, current edition) 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	1.1	Establish Parks Representative for City Approvals and Project Review Coordination
	1.2	Verify Disturbance to Future Natural Environment Park at Outline Plan Stage
	1.3	Verify Disturbance to Future Natural Environment Park at Landscape Construction Stage
	1.4	Verify Disturbance to Existing Natural Environment Park in The City's Inventory
	1.5	Discretionary Requirement of Parks Representative for Habitat Restoration
Phase Deliverables		Phase Approvals
Concept Plan		The City of Calgary Parks
Request for approval of intentional disturbance		The City of Calgary Parks, Natural Areas representative
Next Phase	Phase 2 – Project Conception and Feasibility Assessment	

STEPS

1.1. Establish Parks Representative for City Approvals and Project Review Coordination

Throughout the habitat restoration project process the proponent is to be in regular contact with the established Parks representative to ensure that the procedures outlined in this document are adhered to for determination of project need, approvals, and ensuring project success. As per requirements of the current *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks 2013), the Parks representative will be established by geographic assignment via the Parks Planning Generalist (CPAG Planner).

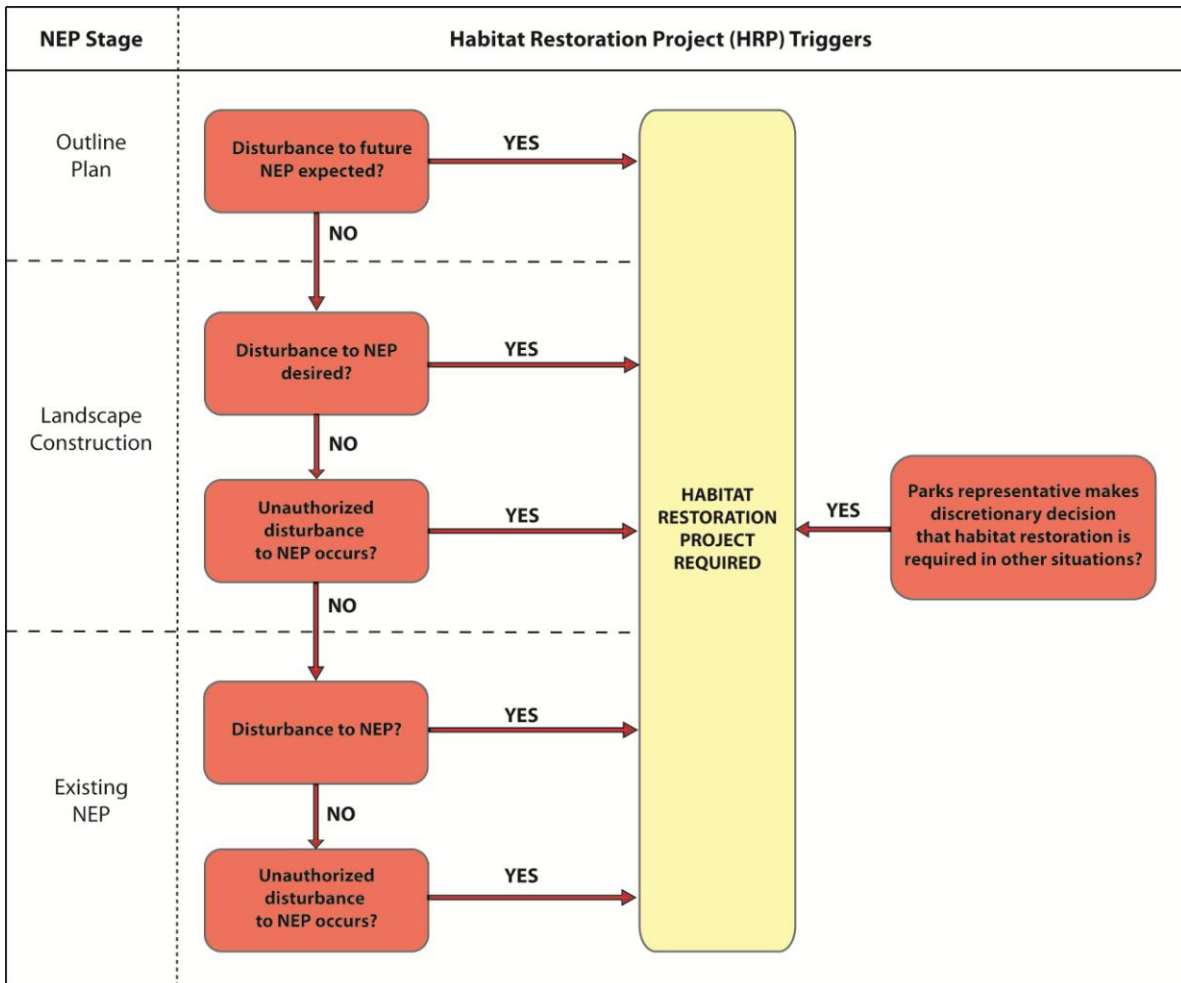


Figure 3. Habitat Restoration Project (HRP) triggers at varying stages of natural environment park (NEP) development.

1.2. Verify Disturbance to Future Natural Environment Park at Outline Plan Stage

Alternative 1 – No disturbance to a natural environment park anticipated (concept plan required)

As per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), if a natural environment park is not to be disturbed though the development of the subdivision, a concept plan stating so is required when the outline plan is submitted. All other Concept Plan Requirements must be met as per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). A habitat restoration project will not be required. Proceed to *Step 1.3*.

Alternative 2 – Disturbance to a natural environment park expected (concept plan and habitat restoration report required)

If disturbance or development of a natural environment park is anticipated when the outline plan is submitted, the concept plan must specify this, and a habitat restoration project will be required. Once complete, the proponent may proceed to *Phase 2 – Project Conception and Feasibility Assessment*.

1.3. Verify Disturbance to Future Natural Environment Park at Landscape Construction Stage

Alternative 1 – Disturbance to a natural environment park desired (habitat restoration project may be required)

If during development of the subdivision, the proponent determines that disturbance to a natural environment park is desired for development activity, a request for approval of intentional disturbance must be submitted to Parks at time of drawings submission (see *Phase 2 – Project Conception and Feasibility Assessment* for all requirements related to intentional disturbance requests). If the encroachment is initially approved, a habitat restoration project will be required. Note that subsequent approval of the Conceptual Habitat Restoration Report will be required prior to site disturbance (see *Phase 3 – Project Evaluation*).

If request for disturbance is refused, disturbance to the natural environment park will not be permitted. Subsequent unauthorized disturbance must follow requirements of *Step 1.4 – Alternative 2*, along with other City of Calgary requirements associated with regulating/enforcing against unauthorized construction activities.

Alternative 2 – Unauthorized disturbance to a natural environment park occurs (habitat restoration project required)

A habitat restoration project will be required when, either intentionally or unintentionally, an unauthorized disturbance occurs in a natural environment park during the:

- Development of the subdivision, or
- Maintenance period of the natural environment park's development

The party responsible for the disturbance will be required to conduct the habitat restoration project. See in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition) for details.

Alternative 3 – No disturbance to a natural environment park (habitat restoration project NOT required)

If during development of the subdivision, there is no disturbance to a natural area, a habitat restoration project will not be required. Requirements for a natural environment park in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition) must still be met for maintenance of a natural area.

1.4. Verify Disturbance to Existing Natural Environment Park in The City's Inventory

Alternative 1 – Approved disturbance to a natural environment park occurs (habitat restoration project required)

A habitat restoration project will be required when an authorized disturbance occurs in a natural environment park. The party responsible for the disturbance will be required to conduct the habitat restoration project. This process also provides direction for a development permit proposal either adjacent to or in a natural area.

Alternative 2 – Unauthorized disturbance to a natural environment park occurs (habitat restoration project required)

An unauthorized disturbance in a park is considered a prohibited activity under the *Parks and Pathways Bylaw* (The City of Calgary 2003), and the person responsible may be subject to remedy orders and penalties.

A habitat restoration project will be required when an unauthorized disturbance occurs in a natural environment park, either intentionally or unintentionally. The party responsible for the disturbance will be required to conduct the habitat restoration project. This process also provides direction for a development permit proposal either adjacent to or in a natural environment park.

Alternative 3 – No disturbance to a natural environment park (habitat restoration project NOT required)

A habitat restoration project will not be required if there is no disturbance to a natural environment park owned by The City, unless habitat restoration is deemed desirable by Parks Natural Areas in order to improve the park's biodiversity and ecosystem function. Requirements for a natural environment park in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition) must still be met for maintenance of a natural area.

1.5. Discretionary Requirement of Parks Representative for Habitat Restoration

Habitat restoration projects may be required in situations not covered in the above steps, at the discretion of The City of Calgary Parks representative.

PHASE 2

PROJECT CONCEPTION and FEASIBILITY ASSESSMENT

PURPOSE

To develop the basic concept for the project, determine whether or not the project is feasible, and to produce the Conceptual Restoration Plan and Conceptual Restoration Report. This phase is where preliminary work takes place to evaluate the potential for restoration at a site. The basic concept for the project includes a mission statement, a reference habitat description, and a restoration hypothesis based on an initial evaluation of the site (see *Appendix B – Restoration Visioning Terminology* for further details). This phase is conducted when restoration appears to be a feasible option but before a decision has been made to exercise that option, with the conceptual habitat restoration report designed to aid decision-makers in determining whether the project should proceed (see *Phase 3 – Project Evaluation*) to the initiation phase (see *Phase 4 – Project Initiation*).

PHASE 2 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction manual</i> (The City of Calgary Parks, current edition) 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	2.1	Project Summary and Mission Statement
	2.2	Project Area Ecological Overview
	2.3	Reference Habitat
	2.4	Restoration Hypothesis
	2.5	Project Conceptual Implementation Planning
	2.6	Feasibility Assessment
	2.7	Conceptual Habitat Restoration Report
Project Deliverables		Project Approvals
Conceptual Habitat Restoration Report development		Project Manager
Next Phase	Phase 3 – Project Evaluation	

STEPS

2.1. Project Summary and Mission Statement

A summary of the Conceptual Habitat Restoration Project should be prepared that includes all of the components listed below.

Project Name and Purpose

Identifiable project name consistent with the location (UTM coordinates or legal location) and purpose of the project.

Project Location

Project location details as described in *Appendix D – Restoration Report Requirements: Section 4 – Project Location*. Location information must include ownership and stewardship of the site and surrounding regional areas, as well as the physical scale and boundaries of both the disturbance footprint and restoration area (to be identified separately if they differ).

Project Management Details

Identify the names, qualifications and roles of the project team including the key roles of the project manager, project sponsor, Parks representative, technical team members and other

project team members. Where applicable, potential stakeholders should be identified, including adjacent landowners, community groups and environmental stewardship organizations.

Mission Statement

The mission statement describes what the overall goal of a habitat restoration project is, including how a specific organization intends to restore (and/or disturb) a given area, the type of habitat restoration (Figure 1) and why the project is taking place (see *Appendix B – Restoration Visioning Terminology*). Each habitat restoration project will have a single project mission statement that will be drafted at the conceptual planning stage (*Phase 2*) and finalized during the implementation planning stage (*Phase 5*). The mission statement summarizes the purpose of the project (i.e. type of, and justification for habitat restoration, as well as potential reference habitats), and loosely defines the scope of the project (i.e. project complexity, physical scale, and expected duration of both the development activity and restoration project).

2.2. Project Area Ecological Overview

The project area ecological overview describes the preliminary pre-disturbance biophysical site assessment of the project area in general. A more detailed biophysical inventory will occur in *Phase 4 – Project Initiation*. Where unauthorized disturbance has occurred and a pre-disturbance overview is not possible, post-disturbance conditions and a reference habitat must be described. The overview must include a site visit between the proponent and City staff.

Initial site assessment photographs may be useful for project monitoring, and the proponent may wish to review *Appendix E – Photomonitoring Guidelines* in order to anticipate use of site photographs for monitoring project progress at the conceptual planning phase. The overview provides preliminary information such as site reconnaissance observations, the kind of ecosystem to be restored, site disturbance conditions and environmental stressors (Cairns 2013), as well as a few representative measurements.

2.3. Reference Habitat

A reference habitat is an intact habitat in terms of ecosystem processes, structure, and function. It is representative of the Natural Region/Subregion in which the project is taking place (Natural Regions Committee 2006), and may or may not be defined by a naturally occurring reference plant community defined by Alberta's *Range Plant Community Type Guides* (AESRD 2013), at the discretion of The City of Calgary Parks representative. It represents the restoration target, which is the habitat condition on which the restoration project is designed, and serves as the basis for project evaluation. The reference habitat description may be used to assist in the performance evaluation of the restored site (see *Appendix B – Restoration Visioning Terminology* for more detail), and should be chosen early in the planning process.

A reference habitat can be described from historical air photos, site photographs, previous biophysical inventories, historical records, reference documents, and/or actual undisturbed habitat. Undisturbed habitats must be assessed during the season appropriate (e.g. spring and summer for wetlands, spring bird surveys, etc.) to the most up-to-date regulatory guidelines, and may be either adjacent to the restoration site or within the Natural Region/Subregion. Reference habitat descriptions should include soil types, moisture regime, topography, aspect, slope, and floral and faunal communities. A single reference habitat is described for each project (*Appendix B – Restoration Visioning Terminology*), except where multiple habitat types occur across different restoration zones, with each reference habitat described by one or more data sources.

2.4. Restoration Hypothesis

The restoration hypothesis is a concise statement or brief paragraph that proposes an idea of what is happening on the landscape based on the disturbed habitat's biophysical inventory and reference habitat, and generally explains how habitat restoration will lead to a general outcome (*Appendix B – Restoration Visioning Terminology*). For each habitat restoration project, a single project restoration hypothesis must be drafted at the conceptual planning stage (*Phase 2 – Project Conception and Feasibility Assessment*) and finalized at the end of the implementation planning stage (*Phase 5 – Project Implementation Plan and Approval*).

2.5. Project Conceptual Implementation Planning

A conceptual implementation plan must be developed based on the restoration hypothesis and site conditions identified in the ecological overview and reference habitat (see *Appendix D – Restoration Report Requirements: Section 11 – Implementation Plan*). A preliminary review of similar projects for direction may be conducted, as needed. The conceptual implementation plan is to include an estimated project timeline that includes descriptions of key interventions and deliverables. In addition, a high level cost estimate is to include all anticipated needs and sources of biological materials, equipment, and labour, and should identify potential project funding sources. The conceptual report is to include a high-level review of restoration goals and objectives, as well as strategies for long-term protection and management of the site.

2.6. Feasibility Assessment

Project feasibility assessments include an outline of project alignment, constraints, assumptions and risks. This assessment will provide a structure in which implementation plans can be developed and will support later development of contingency plans (see *Phase 5 – Project implementation Plan and Approval: Step 5.8 – Contingency Plan*).

Alignment and Legal Constraints

The Conceptual Restoration Report should demonstrate how the project aligns with Municipal, Provincial and Federal regulations, policies, guidelines, standards and implementation documents. When contacting a Parks representative during project conception process, the proponent can discuss project alignment details. Additional legal

constraints, permit requirements and access/land title restrictions must be identified in the Conceptual Habitat Restoration Report.

Landscape Constraints

Landscape constraints may include those from the built environment (e.g. utilities, roads, buildings, etc.), social context (e.g. site programming considerations, stakeholder interests, etc.), and natural conditions (e.g. weather, climate, disturbance patterns, etc.).

Assumptions

Project feasibility is dependent on assumptions made about the availability of materials, equipment and labour. In addition, assumptions regarding legal and landscape constraints should be specified.

Risks

Outline the potential risks associated with project alignment, constraints and assumptions made in project planning. A list of risks for the feasibility assessment should identify unavoidable and mitigable risks, as well as their likelihood, risk thresholds and potential impacts on project success.

2.7. Conceptual Habitat Restoration Report

Conceptual Habitat Restoration Plan (i.e. Landscape Construction Drawings)

The Conceptual Habitat Restoration Plan must include all requirements outlined in *Appendix C – Restoration Plan Requirements*, as well as under the Professional Qualifications section (above).

Conceptual Habitat Restoration Report

The Conceptual Habitat Restoration Report must include details of the project summary, high-level site assessment, conceptual planning, and feasibility assessment. The report must include all appropriate sections outlined in *Appendix D – Restoration Report Requirements*.

PHASE 3

PROJECT EVALUATION

PURPOSE

To obtain official approval for project initiation, and to build a foundation for commitment among project partners and key stakeholders. This requires the submission of the Conceptual Habitat Restoration Report and Conceptual Habitat Restoration Plan (i.e. Landscape Construction Drawings) for review, and evaluation by The City of Calgary Parks. This phase also outlines requirements to modify Conceptual Habitat Restoration Project documents in the case of project refusal, and the requirement for final drawing submission of approved habitat restoration projects prior to *Phase 4 – Project Initiation*.

PHASE 3 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction manual</i> (The City of Calgary Parks, current edition) 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	3.1	Submit Conceptual Habitat Restoration Report
	3.2	Conceptual Project Review and Approval by The City
	3.3	Modification and Re-submission of Conceptual Habitat Restoration Report
Project Deliverables		Project Approvals
Conceptual Habitat Restoration Report submission		The City of Calgary Parks, Natural Areas representative
Next Phase	Phase 4 – Project Initiation	

STEPS

3.1. Submit Conceptual Habitat Restoration Report

One (1) copy of the Conceptual Habitat Restoration Report is to be submitted along with each set of the Conceptual Habitat Restoration Plan. In addition to the requirements for various forms of development outlined in the *Development Guidelines and Standard Specifications: Landscape Construction manual* (City of Calgary Parks, current edition), the following requirements apply to habitat restoration projects:

Construction Type	Requirements for Approval	Time for Review and Comments
Conceptual Habitat Restoration Project	7 sets of drawings folded and collated into sets; to Parks	15 working days

3.2. Conceptual Project Review and Approval by The City

As per the *Development Guidelines and Standard Specifications: Landscape Construction manual* (City of Calgary Parks, current edition), fifteen (15) working days time is allotted for the established Parks representative to review and provide comments on development of new subdivisions, which includes the Conceptual Habitat Restoration Report. Parks will ensure the project aligns with construction plan requirements of the *Development Guidelines and Standard Specifications: Landscape Construction manual* (City of Calgary Parks, current edition), content requirements for the Conceptual Habitat Restoration Report (see *Appendix D – Restoration Report Requirements*) and habitat restoration project checklist (see *Appendix F – HRP Checklist*).

Alternative 1: Project Approval

The City approves Conceptual Habitat Restoration Plan and Report. All project approvals will be documented in writing and will include review comments as needed.

Alternative 2: Project Refusal

If a Conceptual Habitat Restoration Project is not approved, neither the proposed disturbance nor the associated restoration project will be permitted to continue to the initiation phase. If a project for an unauthorized disturbance is not approved, the party responsible will be required to modify the Conceptual Habitat Restoration Plan and Report based on The City's review comments. All project refusals will be documented in writing and will include review comments.

3.3. Modification and Re-submission of Conceptual Habitat Restoration Report

Alternative 1: Project Approval

This step may be required, at the discretion of the established Parks representative, even if the project has been approved.

Alternative 2: Project Refusal

If refused, the Conceptual Habitat Restoration Report will require modification based on Parks' review comments and must be resubmitted for approval.

PHASE 4

PROJECT INITIATION

PURPOSE

To conduct a detailed biophysical inventory of the project site (i.e. inventory, site assessment and reference habitat(s)), as well as select the restoration team, determine the governance structure, and develop a communication strategy for the project. These preliminary tasks are to be completed after approval of the Conceptual Habitat Restoration Report (*Phase 3 – Project Evaluation*) and prior to project implementation planning (*Phase 5 – Project Implementation Plan and Approval*).

PHASE 4 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction manual</i> (The City of Calgary Parks, current edition) 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	4.1	Preliminary Tasks
	4.2	Biophysical Inventory
	4.3	Restoration Team
	4.4	Communication Plan
Project Deliverables		Project Approvals
Biophysical inventory		The City of Calgary Parks, Natural Areas representative
Next Phase	Phase 5 – Project Implementation Plan and Approval	

STEPS

4.1. Preliminary Tasks

A preliminary budget is to be prepared in order to ensure that project initiation steps can take place. Any permits required to meet legal requirements (see *Phase 2 – Project Conception and Feasibility Assessment: Step 2.6 – Feasibility Assessments*) must be secured upon project initiation. To follow up on the preliminary review of similar projects at the conceptual planning stage, detailed examinations of restoration strategies may be needed in order to determine the effectiveness of conceptual plans and to prepare for implementation planning.

4.2. Biophysical Inventory

The biophysical inventory and assessment of the project site and reference habitat(s) must be undertaken in advance of site disturbance, and must meet all requirements set out in *Appendix D – Restoration Report Requirements: Section 8 – Pre-disturbance Biophysical Inventory*. Site condition descriptions are to include the existing land-use designation, site history, overall vegetation community structure and composition, and other requirements for climate, topography, geology, soils, hydrology, vegetation, fauna, cultural resources, aesthetic value, and environmentally significant areas, as per *Appendix D*. All native and non-native species present should be identified as part of the biophysical inventory using various field methods, resources, and search tools identified in *Appendix D*. The inventory will include provincially and federally ranked rare plant species and listed fauna species, as defined in the *Glossary* of this framework. Their presence in the area should inform the project plan and schedule whether to avoid, defer, mitigate or incorporate into the habitat restoration project

goals and objectives. Autoecological investigations for all key native and non-native species are to be conducted.

Any methodologies used to conduct the biophysical inventory and data recorded during the inventory and assessments are to be described in the Habitat Restoration Report as per requirements set out in *Appendix D – Restoration Report Requirements: Section 8 – Pre-disturbance Biophysical Inventory*. The inventory and assessments must be conducted during the appropriate season and using the most up-to-date regulatory guidelines in order to ensure accurate capture of representative biophysical elements. The inventory should include a review of existing biophysical impact assessment reports, where available.

4.3. Restoration Team

The project governance structure is determined by the configuration of the restoration team, which consists of a project manager, technical staff, contractors, possibly volunteers, and the established Parks representative. Team members should be hired, appointed, or established, and briefed on the project mission, roles, and responsibilities. Team members should be trained on carrying out restoration tasks as required. Depending on the scale of the project, a team agreement may be warranted to simplify project implementation. A team directory that includes a list of team members with contact information and project roles is required. Creation of the restoration team at project initiation provides the first opportunity to engage stakeholders and team members to achieve a common understanding and agreement on project goals and objectives, as well as initiating the process of setting and managing expectations of all project stakeholders and team members.

4.4. Communication Plan

At project initiation, a general communication plan should be established that includes all stakeholders, such as interested public agencies, the public, Parks representatives and the project team. The plan should discuss strategies for public outreach and aspects of public communication such as how and when to notify the public of the project,) and how it will be managed. The communication plan should clarify stakeholder priorities, decision points and public involvement. Depending on the scale and complexity of the project, it may be desirable to develop a project records repository that is accessible to stakeholders as required. This is recommended for a project but not approved by Parks.

PHASE 5

PROJECT IMPLEMENTATION PLAN and APPROVAL

PURPOSE

To define and add structure to the project by developing the restoration approach and implementation plan, and to present this information in the form of the Final Restoration Report in order to meet the requirements of Habitat Restoration Project process (Plan and Report), as documented through the Construction Completion Certificate (CCC) and Final Acceptance Certificate (FAC) process (CCC and FAC details are found in The City of Calgary Parks, *Development Guidelines and Standard Specifications: Landscape Construction* manual) (The City of Calgary Parks, current edition). Implementation planning requires defining the site context and evaluating alternative approaches, resulting in a preferred restoration approach. Planning includes an assessment of site level context including, defining scope, deliverables, schedules, cost, risk, quality, communication, procurement, staffing needs and all other details required to execute the project.

PHASE 5 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction manual</i> (The City of Calgary Parks, current edition) • <i>Guidelines for Erosion & Sediment Control</i> (The City of Calgary Water Services 2011) • <i>Contractor Environmental Responsibilities Package</i> (The City of Calgary 2012) 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	5.1	Restoration Approach
	5.2	Evaluation and Selection of Restoration Alternatives
	5.3	Performance Measures
	5.4	Monitoring Program
	5.5	Implementation Plan
	5.6	Site Management and Maintenance
	5.7	Project Milestones and Deliverables
	5.8	Contingency Plan
	5.9	Project Cost and Funding
	5.10	Mapping
	5.11	Create Final Restoration Report
	5.12	Restoration Report Submission
	5.13	Final Habitat Restoration Plan and Report Review and Approval by The City
	5.14	Approved Restoration Plan (Final Drawings Portion)
Project Deliverables		Project Approvals
Final Habitat Restoration Report		The City of Calgary Parks, Natural Areas representative
Final Drawings		The City of Calgary Parks
Next Phase	Phase 6 – Project Implementation and Construction	

STEPS

5.1. Restoration Approach

Planning the restoration approach involves reviewing the mission statement and restoration hypothesis in order to generate project goals and objectives (see *Appendix B – Restoration*

Visioning Terminology), and restoration prescriptions. Alternative restoration approaches are optional restoration strategies collectively derived from alternative goals, objectives and restoration prescriptions, and are presented in the restoration approach section of the Final Habitat Restoration Report (see *Appendix D – Restoration Report Requirements: Section 10 – Restoration Approach*). The aim of planning the restoration approach is to outline how a restoration alternative was chosen in a transparent manner and provide for performance management and monitoring.

Finalize Mission Statement

During the conceptual planning phase (*Phase 2 – Project Conception and Feasibility Assessment*), the overall goal of the habitat restoration project was established in the mission statement, which should be reviewed and finalized during the implementation planning phase. The mission statement will be presented in the executive summary of the Habitat Restoration Report (see *Appendix D – Restoration Report Requirements*).

Finalize Restoration Hypothesis

The restoration hypothesis that was established at the conceptual planning phase (*Phase 2*) should be reviewed to ensure that it incorporates the results of the biophysical inventory (*Phase 4 – Project Initiation*) including but not limited to project constraints and design parameters. The hypothesis should describe how restoration activities will achieve a site trajectory toward the desired outcome, as derived from the reference habitat.

Restoration Goals

Restoration goals are broad statements about the desired states and conditions a restoration project is trying to accomplish (see *Appendix B – Restoration Visioning Terminology*). Goals should anticipate the degree to which ecosystem recovery is expected within the context of project management areas, the reference habitat condition and the given type of habitat restoration (Figure 1). Each goal is linked to one or more related, measurable project objectives and there may be one or more goals per project.

Planning restoration goals should include consideration of alternative restoration approaches and cultural goals for the site. Each alternative includes a set of proposed activities and associated goals and objectives. The role of passive restoration in achieving project goals should be considered, so that associated objectives acknowledge the contribution of natural recovery in achieving project goals.

Project goals may include some of the following, whereby the restored ecosystem:

- Contains a species assemblage, community composition, cover and structure characteristic of the reference habitat
- Suitably integrates with the adjacent habitat
- Exhibits expected ecosystem processes and functions based on project performance measures
- Is sufficiently resilient to maintain its integrity through normal periodic stress events

- Reduces potential threats to the health and integrity of adjacent natural habitat
- Contains all ecosystem elements required for sustained natural recovery and ecosystem stability
- Is self-sustaining to the same degree as the reference habitat, and has the ability to persist under existing or expected environmental conditions
- Is free of provincially regulated weed species

Restoration Objectives

Restoration objectives are the specific, measurable, intended (target) end results that indicate the achievement of specific restoration goals, or steps toward those goals, which are attained by undertaking explicit restoration actions. Each restoration goal may result in one or more restoration objectives, so there may be one or more objectives per project (see *Appendix B – Restoration Visioning Terminology*).

Restoration Prescriptions

Restoration prescriptions are the collection of restoration activities, interventions, and treatments required to attain specific project objectives. Descriptions of restoration activities must include site preparation methods, seeding and planting methods (i.e. species mixes, application methods, and application rates), required materials and equipment, erosion and sediment controls, and labour needs (see *Appendix D – Restoration Report Requirements: Section 10 – Habitat Restoration Approach*).

Alternative Restoration Approaches

Each alternative restoration approach will involve different combinations of restoration goals, objectives and prescriptions, and will have a unique overall goal. Alternative habitat restoration approaches may be established through an evaluation of the prioritization and necessary sequence of treatments. For each alternative habitat restoration approach the following should be described:

- The associated goals and objectives;
- Expected long-term outcome;
- Type of habitat restoration (see Figure 1);
- Scale and size of disturbance;
- Timing of activities (e.g. late April, early June, etc.);
- Restoration prescriptions involved; and
- Expected duration of the project (e.g. 1 season, 1 year, multiple years).

5.2. Evaluation and Selection of Restoration Alternatives

Evaluation of alternative approaches should include, at minimum, a review of site context, site suitability, and consideration of cumulative effects. At the discretion of The City of Calgary Parks, evaluation of restoration alternatives may require a restoration trajectory analysis (Society for Ecological Restoration 2004), and/or a biophysical impact assessment that follows The City's requirements (The City of Calgary 2010). Selection of the preferred

alternative will be based on which alternative is predicted to have optimal restoration results and on the likelihood of achieving realistic ecosystem goals. Implementation plans will be based on the restoration prescription associated with the selected restoration approach.

5.3. Performance Measures

Performance measures are qualitative or quantitative attributes of a restoration objective that confirm whether that objective has been attained within a specified timeframe and collectively inform whether project goals have been achieved. Performance measures are a set of achievable criteria described as a specific abiotic, biotic, or cultural target state of ecosystem recovery. These are measureable aspects of the project determined by either a single observation or through a monitoring program, with one or more performance measures for each related restoration objective, and one or more per project (see *Appendix B – Restoration Visioning Terminology*).

Performance measures define the optimal and acceptable range of values for a parameter with the intent to achieve the expected structure, function and appearance of the desired system. The performance measures help to define restoration success and direct the monitoring program and must be prepared in consultation with The City of Calgary Parks. Description of performance measures must meet requirements outlined in *Appendix D – Restoration Report Requirements*.

5.4. Monitoring Program

As part of performance management, a monitoring program provides updates on the progress of achieving restoration project success against the established restoration hypothesis and project objectives. The functions of the monitoring program are to: 1) track progress toward project goals via the performance measures, and 2) allow for adaptations as necessary. When photomonitoring is used, the methodology must be consistent with the methodology outlined in *Appendix E – Photomonitoring Guidelines*.

The monitoring program should have a detailed sampling design that identifies the performance measures being assessed, assessment methodology, and monitoring schedules. The monitoring program schedule must include, at minimum, start and end dates, frequency, duration, and the time of year monitoring was performed. Ensure details of monitoring performed can provide enough information for the same work to be repeated in the same manner at a later date. The program should take into consideration the transition to post-project monitoring (see *Phase 10 – Management: Step 10.2 – Monitoring and Reporting*). As applicable, monitoring schedules must adhere to accepted standards and project constraints (e.g. bird breeding season, vegetation growing season, etc.) and these standards must be referenced when applied.

Design of the monitoring program must adhere to all requirements outlined in *Phase 7 – Project Monitoring and Adaptation*, and *Appendix D – Restoration Report Requirements*. Prior to project implementation, monitoring should be conducted as needed and may utilize appropriate data or photographs from previous site assessments or biophysical inventories.

5.5. Implementation Plan

Development of the implementation plan involves establishing site management, maintenance, and restoration practices, and preparing a schedule and budget for these project activities. The implementation plan should cover the duration of the project, from initial construction to transition and acquisition of the site by The City. This information is to be outlined in the implementation plan section of the final Habitat Restoration Report (see *Appendix D – Restoration Report Requirements*).

Project Scope

The project scope is a statement that introduces the finalized implementation plan by summarizing the extent of project activities. The scope of activities includes the range of activity types, and their spatial and temporal extent. Depending on the scale and complexity of the project, it may be appropriate to further clarify the project scope by describing activities excluded from the habitat restoration project. For example, activities out of scope could include restoration activities that could otherwise take place on adjacent land, or activities limited by project constraints.

5.6. Site Management and Maintenance

All site management practices must adhere to requirements of the Contractor Environmental Responsibilities Package (The City of Calgary 2012) and the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary, current edition). Management practices must include consideration of the below-listed factors.

Planting and Seeding

Planting and seeding plans will be subject to approval by The City of Calgary Parks, Natural Areas representative and must adhere to requirements set out in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), as well as the following requirements:

- Nomenclature (scientific and common names) of native plants shall conform to the latest update of provincial Element Occurrence data (Alberta Conservation Information Management System 2013b);
- Species appropriate to the Natural Subregion (Natural Regions Committee 2006);
- Planting list identifying species (scientific and common name), quantities, sizes, habit, and spacing densities;
- Seed mixes identifying species (scientific and common name), total quantity (weight and volume), percent species by weight, percent species by volume, expected germination rates, application rates, and seeding area;
- Seed mix application rates will be site specific and subject to approval;
- Collected plants may only be used when approved in writing by The City of Calgary Parks;

- Seed Testing Certificates shall be submitted for approval by The City of Calgary Parks prior to application, in order to ensure quality/authenticity of seed mixes in accordance with accepted guidelines on purchasing high quality seed (Alberta Agriculture and Rural Development 2009);
- Submissions must indicate seed suppliers for verification of source; and
- If plants are required to be stored at The City of Calgary's nursery, they must come with a phytosanitation certification.

Weed Management

The weed management plan must identify all non-native species present on site and their regulated status (i.e. prohibited noxious, noxious, or non-regulated), plans for their management during project implementation, mitigation measures to prevent their spread, and recommended long term maintenance of the area. Weed species located on adjacent sites that could pose a threat to the restoration project should also be identified. All prohibited noxious and noxious weeds within the project site shall be either destroyed or controlled, as specified by the Alberta (2010) *Weed Control Act and Regulation*, and site management must meet all other requirements of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition) for weed control and weed-free sites and materials, as applicable.

Environmental Construction Operation (ECO) Plan (if applicable)

An Environmental Construction Operation (ECO) plan may be required for projects performed on behalf of The City of Calgary. An ECO plan consists of written procedures on environmental protection measures that a contractor is to follow during the project, along with applicable legislation, regulation and approvals. Details on creating an ECO plan, along with the *ECO Plan Framework* and *ECO Plan Checklist* (The City of Calgary 2014) can be found on The City of Calgary website.

Erosion and Sediment Control (ESC)

Erosion and Sediment Control (ESC) management must adhere to requirements of the *Contractor Environmental Responsibilities Package* (The City of Calgary 2012) and the *Guidelines for Erosion & Sediment Control* (The City of Calgary Water Services 2011). Plans for installation and maintenance of erosion and sediment controls must be prepared and described within the final Habitat Restoration Report.

Soil Management

Soil management, inspections, testing, and use must adhere to the requirements of the *Contractor Environmental Responsibilities Package* (The City of Calgary 2012), the *Guidelines for Erosion & Sediment Control* (The City of Calgary Water Services 2011), and the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). Soil management practices must describe soil conservation and testing protocols, and details of disturbed and imported soils as described below.

For soils disturbed on site:

- Organic layer (A horizon) should be stripped and stockpiled separately;
- Construction drawings must indicate the disturbance footprint and location of stockpiles; and
- Description of the predisturbance topsoil depth and Soil Great Group as per *The Canadian System of Soil Classification* (Alberta Agriculture and Agri-Food Canada 1998).

For soils imported onto the restoration site:

- Native soils from the same or similar habitat type should be used where habitat restoration is required of a natural area;
- Describe the origin and pre-disturbance condition of the native soil and vegetation community, including which plant species were present;
- Imported soil must be weed free and only be used at the discretion of The City of Calgary Parks;
- Describe the topsoil storage conditions and location;
- Construction drawings must label placement location and depth of imported soils.

For soil stockpiles:

- Stockpiling must adhere to all mandatory stockpile requirements set out in the *Guidelines for Erosion & Sediment Control* (The City of Calgary Water Services 2011);
- Stockpiling should follow good housekeeping practices and best practices for stockpiles appropriate to natural areas set out in the *Guidelines for Erosion & Sediment Control* (The City of Calgary Water Services 2011);
- As per The City of Calgary (2011) *Guidelines for Erosion & Sediment Control*, it should be noted that stripping and stockpiling of topsoil causes a decrease in the incorporated biomass. Soil disturbance makes the soil more erodible because the soil is less consolidated and stable aggregates are broken up. In particular:
 - Construction drawings must label long term (in place more than 30 days) on-site or off-site stockpile staging areas, and haul routes if soil is being hauled off site;
 - Stockpiles that will be in place more than thirty (30) days must be vegetated. Vegetation cover on long-term topsoil stockpiles helps maintain the biological integrity of the topsoil, which will help provide an improved erosion control and growing medium when the topsoil is replaced during final site stabilization;
 - Stockpiles in place for more than seven (7) days must be protected with temporary erosion control such as mulch/tackifier or covered. Stockpiles in place less than 30 days must also have functional sediment control practices on the down-gradient side of the pile that will contain sediment (silt fence, fibre rolls, compost socks, etc.);

- To control erosion on small sites (<0.4 ha or 1 acre), including wind-blown dust, all stockpiles must be covered with tarps, plastic sheeting or other suitable cover;
- Topsoil and subsoil should be salvaged and stockpiled in separate lifts and piles;
- Vegetation cover species must be approved by The City of Calgary Parks, and native species are preferred;
- The use of mulch/tackifier for habitat restoration projects must be approved by The City of Calgary Parks;
- Stockpiles should be covered with tarps, plastic sheeting or other suitable cover to prevent weed colonization;
- Stockpile depth should be minimized to no more than the rooting depth of pre-disturbance vegetation (Tate and Klem 1985) to prevent disruption of soil structure, abiotic and biotic processes; and
- The duration of stockpile storage should be minimized to reduce loss of beneficial soil microorganisms (Center for Environmental Excellence 2008).

The depth and finish grade of the topsoil in a restoration project should be equivalent to the depths and finish of the pre-existing native profile. This should be specified in the restoration report and approved by The City of Calgary Parks.

Maintenance Schedule

The required project site maintenance schedule for a proposed project must take into consideration any means of protecting the site including legislated invasive species control and watering of plant materials. The maintenance schedule must clearly outline site maintenance required during project construction as defined in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), as well as short- and long-term maintenance required after issuance of the Final Acceptance Certificate (see *Phase 10 – Management: Step 10.2 – Monitoring and Reporting*).

5.7. Project Milestones and Deliverables

Based on the selected restoration approach, tasks should be scheduled to accomplish each objective, and should be tied to specific deliverables. A schedule of major project milestones should be developed, including major tasks, key deliverables, site assessments, inspections, and project approvals, as well as key steps outlined in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). In addition, deliverables related to the transition of the project site to The City should be included. Milestones should indicate monitoring program start and end dates. The project schedule should outline the schedule item, date, associated habitat restoration project process step (Figure 2) and be included within the implementation section of the final Habitat Restoration Report (see *Appendix D – Restoration Report Requirements*). Include specific dates if known (e.g. dates of completed site assessments and biophysical inventory), scheduled, or

where project constraints dictate the implementation schedule and estimated dates should be denoted as such. For construction milestones, see *Appendix F – HRP Checklist*.

5.8. Contingency Plan

The project contingency plan will identify potential threats to restoration success, building on the project risks, assumptions, and constraints identified in the conceptual planning phase (see *Phase 2 – Project Conception and Feasibility Assessment: Step 2.6 – Feasibility Assessments*), and will document any related dependencies. It should include adaptive management strategies that describe how to deal with issues such as risk management, long-term site protection and management, changes to timelines, scope, budget, or resources, as well as issues that may reasonably arise during planning, construction, and site maintenance, such as a need to modify restoration objectives.

Dependencies

Describe elements upon which implementation of the restoration project is dependent. This may include, but not be limited to:

- Documenting and meeting of regulatory approvals and legislative requirements;
- Securing permits;
- Obtaining legal site access;
- Feasibility of approach;
- Availability of manpower, equipment, materials and funding;
- Obtaining and submitting for approval Seed Testing Certificates; and
- Availability of native species seed and planting stock.

5.9. Project Cost and Funding

A project budget must be prepared that includes the cost to implement tasks for the selected restoration approach, site maintenance and monitoring during project implementation, and long-term maintenance and monitoring expected after FAC. Consideration should be given to the potential costs of contingency plans associated with project risks, assumptions, constraints and dependencies. Funding sources and funding opportunities should be identified and tied to specific costs as necessary.

5.10. Mapping

Any supplementary site mapping that does not form a component of the landscape construction drawings is to be included in the final Habitat Restoration Report and must meet requirements outlined in *Appendix D – Restoration Report Requirements*. Supplementary site maps must include at minimum the most recently available aerial photography, project area and location, disturbance footprint, restoration area, and significant biophysical elements.

5.11. Create Final Restoration Report

The Habitat Restoration Report consists of the restoration plan construction drawings and a report (*Appendix D – Restoration Report Requirements*). The restoration plan shall adhere to the construction plan requirements as specified in *The City of Calgary Parks, Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition) and requirements outlined in *Appendix C – Restoration Plan Requirements*. The restoration report must include the information discussed herein, and adhere to the report sections outlined in *Appendix D – Restoration Report Requirements*.

5.12. Restoration Report Submission

As per requirements set out in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), seven (7) sets of drawings are to be folded and collated into sets and submitted to Parks for approval. Two (2) copies of the restoration report are to be submitted.

5.13. Final Habitat Restoration Plan and Report Review and Approval by The City

Project approval must be received prior to commencing construction and restoration activities.

Alternative 1: Project Approval

The City approves final habitat restoration project. All project approvals will be documented in writing and will include review comments as needed.

Alternative 2: Project Rejection

If a final habitat restoration project is not approved, neither the proposed disturbance nor the associated restoration project will be permitted to continue to the implementation phase. If a project for an unauthorized disturbance is not approved, the party responsible will be required to modify the final Habitat Restoration Plan and Report based on The City's review comments. All project refusals will be documented in writing and will include review comments.

5.14. Approved Restoration Plan (Final Drawings Portion)

As per requirements of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), the proponent must submit two (2) copies of rolled, unstapled paper drawings of the approved habitat restoration plan within 30 days of the review date on the construction drawings. One (1) copy will be sent back to the proponent for their records. Where the Parks representative has made review comments for minor modifications, these changes will be reflected in the final drawings. Once the drawings are submitted, the project may continue to *Phase 6 – Restoration Implementation and Construction*.

PHASE 6

RESTORATION IMPLEMENTATION and CONSTRUCTION

PURPOSE

To receive final approval from The City on the Habitat Restoration Report and to coordinate and implement the selected restoration approach by preparing the site for construction, executing tasks for the restoration prescription and maintaining the site until all deliverables and objectives have been met. Once implementation of restoration activities has begun, monitoring of project effectiveness will be required and may result in a need for adaptation of restoration activities and amendments to the restoration report. See *Phase 7 – Project Monitoring and Adaptation* for more details. Supervision of this stage is to be performed by a qualified environmental consultant or project manager.

PHASE 6 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction</i> manual (The City of Calgary Parks, current edition) 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	6.1	Notification of Project Approval from The City to Proponent
	6.2	Obtain Materials, Equipment, and Permits
	6.3	Site Preparation
	6.4	Project Implementation and Construction
Project Deliverables		Project Approvals
Notification of Final Approval		The City of Calgary Parks
Next Phase	Phase 7 – Project Monitoring and Adaptation	

STEPS

6.1. Notification of Project Approval from The City to Proponent

Upon receiving the final drawings, The City will send a notification of receipt to the proponent for their records. This communication will constitute the final approval from The City in order to implement the project. The proponent may wish to brief the restoration team on the final drawings and next steps.

6.2. Obtain Materials, Equipment, and Permits

Prior to project implementation, all required permits must be in place, including regulatory and zoning permits. All necessary construction materials, equipment and supplies must be procured prior to project implementation or at a time appropriate for specific restoration tasks. Where biotic resources are obtained, the appropriate documentation must be acquired along with the materials. Native seed mixes require a Seed Testing Certificate to ensure quality/authenticity of seed mixes in accordance with accepted guidelines on purchasing high quality seed (Alberta Agriculture and Rural Development 2009). Contracts with the restoration team must be secured.

6.3. Site Preparation

Site preparation activities ready the project site for implementation of restoration activities and may include, but not be limited to:

- Delineation of the restoration project area and other staging areas
- Installation of access roads and other infrastructure needed to facilitate project implementation
- Installation of permanent monitoring fixtures (if applicable)
- Protection of the project site against vandals and herbivores

The construction activities outlined in the restoration documents may be field-fit; however, significant changes may require amendment of the restoration report (see *Phase 7 – Project Monitoring and Adaptation: Step 7.5 – Amendments to Restoration Report Approved by Parks*).

6.4. Project Implementation and Construction

Project implementation involves execution of the implementation plan outlined in the final Habitat Restoration Report (see *Phase 5 – Project Implementation Plan and Approval: Steps 5.5 to 5.8*). During project construction, the restoration prescription deliverables are to be completed to the satisfaction of qualified inspectors; the proponent, contractor(s), the Development Inspector and the Parks Natural Areas representative shall be in attendance at each critical stage inspection (see *Phase 7 – Project Monitoring and Adaptation: Step 7.2 Construction Inspections by Parks*). In addition to implementing restoration activities, site maintenance will be required throughout the duration of the project and maintenance logs may be required at the discretion of The City of Calgary Parks. If required, completed maintenance logs are to be included within project progress reports (see *Phase 7 – Project Monitoring and Adaptation: Step 7.4 – Progress Reports*). Where changes to project implementation have occurred or where the contingency plan has been activated this must be recorded in progress reports, and may require amendment to the Habitat Restoration Report (see *Phase 7 – Project Monitoring and Adaptation: Step 7.5 – Amendments to Restoration Report Approved by Parks*). Project construction must adhere to all legal requirements and practices stated in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition) and the *Contractor Environmental Responsibilities Package* (The City of Calgary 2012).

PHASE 7

PROJECT MONITORING and ADAPTATION

PURPOSE

The purpose of the monitoring and adaptation phase is to monitor project progress throughout *Phase 6 – Restoration Implementation and Construction* to *Phase 9 – Final Acceptance and Project Closing*, and to adapt the project goals, objectives and restoration activities as needed, and as approved, based on the results of monitoring. The success of a restoration project is estimated at the planning stage. Monitoring and adaptive management are critical to maximize the likelihood of success, ensuring quality is maintained through the project. Monitoring of this stage is to be performed by a qualified environmental consultant or project manager.

PHASE 7 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction manual</i> (The City of Calgary Parks, current edition) • <i>Construction Inspection Checklist and CCC Report</i> 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	7.1	Monitor Restoration Success
	7.2	Construction Inspections by Parks
	7.3	Track Project Performance
	7.4	Progress Reports
	7.5	Amendments to Restoration Report Approved by Parks
Project Deliverables		Project Approvals
Construction Inspections		Parks Development Inspector
Progress Reports		The City of Calgary Parks, Natural Areas representative
Next Phase	Phase 8 – Construction Completion and Maintenance Period	

STEPS

7.1. Monitor Restoration Success

Restoration success will be evaluated using the sampling design of the monitoring program (see *Phase 5 – Project Implementation Plan and Approval: Step 5.3 – Performance Measures* and *Step 5.4 – Monitoring Program*). Success will be determined by the performance measure outputs associated with restoration objectives, and will be summarized as restoration outcomes (see *Appendix B – Restoration Visioning Terminology*). Monitoring of performance measure outputs and outcomes may involve various biotic, abiotic, cultural or photographic parameters. Where photomonitoring is used, the methodology must be consistent with the methodology outlined in *Appendix E – Photomonitoring Guidelines*.

Outputs are the results of each objective as determined by the performance measures, which can be described at each identified stage of the restoration project. The number of outputs will be equal to the number of performance measures. There may be one or more outputs per project, with outputs produced at each monitoring interval.

Outcomes are broad statements about the final states and conditions of ecosystem recovery a restoration project has accomplished, as determined by restoration outputs. Outcomes can also be described and compared to restoration goals at each identified stage of the restoration project. The number of outcome statements will be determined by the number of goals for the project.

Outputs and outcomes will continue to be measured and described after project completion in the operational maintenance phase (see *Phase 10 – Management: Step 10.2 – Monitoring and Reporting Continued by The City*).

7.2. Construction Inspections by Parks

Construction Period

Habitat restoration site inspections are required at key times during project construction, as outlined in each section of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). The proponent, contractor(s), the Development Inspector and the Parks Natural Areas representative shall be in attendance at each critical stage inspection. The City of Calgary Parks must be given a minimum of 24 hours notice when requesting an inspection, as per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition).

At each inspection stage, the *Construction Inspection Checklist and CCC Report* (The City of Calgary Parks, current edition) will be used to record satisfactory construction inspection details of essential and non-essential deficiencies, and will verify that the restoration has been completed in conjunction with the final Habitat Restoration Report. The proponent and the Parks Development Inspector will sign off on each inspection stage. Copies of the *Construction Inspection Checklist and CCC Report* (The City of Calgary Parks, current edition) must be kept on site to verify previous site inspections and must be included in project progress reports in the form of an appendix.

Maintenance Period

Restoration sites within a natural environment park will receive regular inspections during the maintenance period (see *Phase 8 – Construction Completion and Maintenance Period: Step 8.3 – Maintenance Period* for full details) to ensure that habitat restoration is on track. Maintenance logs may be required at the discretion of The City of Calgary Parks, and shall be provided during maintenance period inspections, as applicable. Inspection times and frequency will be determined through the habitat restoration project. For example, inspections may need to be conducted during the active growth period in order to confirm that plant material is healthy. The consultant can contact Parks Planning and Development Services, call 3-1-1 to arrange for an inspection during the maintenance period, as applicable to the Habitat Restoration Project.

Final Construction

Construction inspections will occur on a regular basis during project construction, until the end of conditional FAC (see *Phase 9 – Final Acceptance and Project Closing: Step 9.6 – FAC Approval/ Conditional/Rejection* for details).

7.3. Track Project Performance

Project performance is informed by results from both restoration success monitoring and construction inspections. Records should be kept for all project issues (i.e. description, impacts on restoration success, project timeline, cost or resources and issue resolutions), changes (i.e. description, options considered, impacts on project, justification, expected outcome, recommended implementation), decisions (i.e. description, impact on project plan and outcomes, and authority), and lessons learned. Project performance will be tracked via these records and reported on via progress reports.

7.4. Progress Reports

Progress reports will describe the progress of restoration success and project performance from project implementation (see *Phase 6 – Project Implementation and Construction*) to the end of final acceptance (see *Phase 9 – Final Acceptance and Project Closing*) and will be submitted to The City of Calgary Parks on a regular basis. Reporting frequency (e.g. seasonally, annually) and the need for on-site progress meetings will be determined at the discretion of The City of Calgary Parks. Progress reports will inform The City of Calgary Parks, the restoration team, and other project stakeholders on restoration project progress and will act to inform planning of future habitat restoration projects.

Reports should include written descriptions of methods used, type and format of data collected, and an analysis of progress results and outcomes. Raw data may be required for inclusion in progress reports at the discretion of The City of Calgary Parks. Progress reports must include:

- Report preparation details (who prepared report, date prepared, date submitted);
- The reporting period;
- Milestone and deliverable scheduling updates;
- Project status; and
- The issues, risks, changes, decisions or related actions taken during the reporting period.

Where photomonitoring has taken place, progress reports must adhere to methodology outlined in *Appendix E – Photomonitoring Guidelines*. Copies of completed *Construction Inspection Checklist and CCC Reports* (The City of Calgary Parks, current edition) and maintenance logs must be included in project progress reports in the form of appendices.

Where progress reports imply that significant adjustment to the final restoration report is needed, restoration report amendments may be required, at the discretion of The City of Calgary Parks.

7.5. Amendments to Restoration Report Approved by Parks

At the discretion of The City of Calgary Parks, amendments to the Habitat Restoration Report and implementation plan may be required. Amendment will be considered if project issues, changes or decisions have a significant impact on the implementation plan, if contingency plans (see *Phase 5 – Project Implementation Plan and Approval: Step 5.8 – Contingency Plan*) have had to be implemented, or if altered locations of project elements require updated mapping (see *Phase 5 – Project Implementation Plan and Approval: Step 5.10 – Mapping*). Changes to the original plan must be documented in the construction monitoring and inspection schedules of the amended report. The established goals, objectives and performance criteria may also require updates.

The decision to amend the final restoration report will be documented through subsequent progress reports and approval of amended reports will be documented through the habitat restoration project checklist (see *Appendix F – HRP Checklist*). Amended reports must be submitted with appropriate version control details to The City of Calgary Parks for approval.

PHASE 8

CONSTRUCTION COMPLETION and MAINTENANCE PERIOD

PURPOSE

To ensure those activities addressed by the Construction Completion Certificate (CCC) process are on track to meet the requirements of Final Acceptance Certificate (FAC). The maintenance period for each item covered by the CCC commences on the date acknowledged by the CCC. The maintenance period for each item is in accordance with final restoration report or the development agreement, as applicable. See The City of Calgary Parks, *Development Guidelines and Standard Specifications: Landscape Construction* manual (current edition) for details on the CCC.

PHASE 8 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction manual</i> (The City of Calgary Parks, current edition) • <i>Construction Inspection Checklist and CCC Report</i> • <i>Construction Completion Certificate (CCC)</i> 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	8.1	Apply for Construction Completion Certificate (CCC)
	8.2	Submit CCC to The City
	8.3	Maintenance Period
	8.4	CCC Approval/Refusal
	8.5	CCC Appeal Process (if applicable)
Project Deliverables		Project Approvals
Preliminary “as constructed” drawings		The City of Calgary Parks
Construction Completion Certificate (CCC)		Urban Development, Park Development Inspector, Established Parks representative
Next Phase	Phase 9 – Final Acceptance and Project Closing	

STEPS

8.1. Apply for Construction Completion Certificate (CCC)

As per the *Development Guidelines and Standard Specifications: Landscape Construction manual* (The City of Calgary Parks, current edition), the proponent will apply to Urban Development for a *Construction Completion Certificate (CCC)* at the end of the fifth critical stage construction inspection when all construction work has been completed. Habitat restoration project construction is considered complete when:

- All work has been completed at the end of the stage 5 construction inspection (see *Phase 7 – Project Monitoring and Adaptation: Step 7.2 Construction Inspections by Parks*);
- All landscaping requirements outlined in the *Development Guidelines and Standard Specifications: Landscape Construction manual* (The City of Calgary Parks, current edition) are complete;
- All construction components of the final restoration report and approved amendments have been constructed to the satisfaction of The City of Calgary Parks;
- All construction components outlined in the Habitat Restoration Project checklist (see *Appendix F – HRP Checklist*) are complete; and
- Preliminary “as constructed” drawings have been submitted to The City of Calgary Parks.

Along with the application, the proponent must submit a copy of the signed-off *Construction Inspection Checklist and CCC Report* and the habitat restoration project checklist, noting the projected maintenance period expiry date to complete all non-essential work. The report and checklist will verify that the restoration has been completed in conjunction with the final Habitat Restoration Report and approved amendments, if applicable. Landscape components submitted for construction completion should be submitted in the appropriate development phase grouping to reduce the frequency of inspections and the volume of documentation by The City of Calgary Parks, Urban Development and the proponent. All natural environment parks are included as a recommended grouping.

8.2. Submit CCC to The City

As per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary, current edition), the proponent must prepare and issue four (4) copies of the CCC form, which must include the projected maintenance period expiry date, and which is signed, sealed and certified by the signing officer of the consultant. Within thirty (30) days of the Development Inspector signing the *Construction Inspection Checklist and CCC Report*, the proponent must forward four (4) copies to The City of Calgary Urban Development, along with four (4) copies of the CCC. Urban Development must acknowledge receipt of the CCC within fourteen (14) days, sign four (4) copies of the CCC and forward one (1) copy to the established Parks representative. No further site inspection by the Parks Development Inspector will occur until the final acceptance phase.

8.3. Maintenance Period

Maintenance period expiry date

As per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary, current edition), at no expense to The City, the proponent shall continuously maintain a site for one (1) growing season. This minimum maintenance period shall also apply to habitat restoration projects, unless otherwise specified in the approved restoration report. One growing season is defined as the period of time between the date that the Parks Development Inspector signs the CCC to,

- June 30th of the following year; or
- Date when irrigation systems are operating and the vegetation is in full leaf, whichever event occurs last (in the sole opinion of Parks).

As per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), the maintenance period for the restoration project area is to continue until established to the satisfaction of The City of Calgary Parks, as per monitoring of performance measures set out in the final habitat restoration plan and report. Weed/pest management activities are to continue throughout the maintenance time period.

Maintenance Period Expiry Date – Exceptions

The proponent, at no expense to The City, shall maintain engineered stormwater wetlands for three (3) years from the date that the Park Development Inspector signs the Construction Completion Certificate.

Where landscaping is to receive CCC after September 30th, Parks may extend the maintenance period to a maximum of September 30th in following year from the CCC date. CCC inspections are subject to the seasonal limits identified in the CCC Construction Inspection Schedule, as per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition).

Deciduous trees that are 100mm caliper or larger and coniferous trees that are 4.0m high or taller will require a warranty and a five (5) year maintenance period, as per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). The five (5) year maintenance period is calculated from the date of issuance of CCC.

Completion of non-essential work

As per the Residential Development Agreement, if the Developer does not complete the non-essential deficiencies within the expiry date period, the CCC will either be revoked or the maintenance period extended one year from the time the deficiencies are completed.

Maintenance period inspections

As per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), a natural environment park/ER restoration sites may receive regular inspections during their maintenance period to ensure that site restorations are on track. Maintenance logs may be required at the discretion of The City of Calgary Parks, and shall be provided during maintenance period inspections, as applicable. The proponent can contact Parks Planning and Development Services by calling 3-1-1 between May and September to arrange for a yearly inspection during the maintenance period.

8.4. CCC Approval/Refusal

As per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), the proponent must complete all non-essential work items before the maintenance period expiry date. If the proponent does not complete non-essential deficiencies within the expiry date period, the CCC will either be revoked or the maintenance period will be extended one year from the time deficiencies are completed.

8.5. CCC Appeal Process (if applicable)

If CCC is refused, the proponent may wish to file an appeal according to the process outlined in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition):

Step 8.5.1: If CCC is refused by the Parks Development Inspector, the review will be conducted with the Manager Parks Operations Division, proponent and the Parks Coordinator – Development. Where agreement or consensus is not achieved, proceed to *Step 8.5.2*.

Step 8.5.2: If consensus is not reached, refusal considered by Manager (North or South) Parks Planning and Development Services, and Manager Urban Development or designate. The decision made at *Step 8.5.2* will be final.

PHASE 9

FINAL ACCEPTANCE and PROJECT CLOSING

PURPOSE

To transfer full responsibility of the project and associated construction activities from the proponent to The City upon expiry of the maintenance period of the project, as per requirements of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). This phase involves site inspections conducted by the proponent and by Parks, submission of as-built restoration report and construction drawings, and *Final Acceptance Certificate* (FAC) application, prior to transfer. The end of this phase represents the end of habitat restoration project proper.

PHASE 9 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Development Guidelines and Standard Specifications: Landscape Construction manual</i> (The City of Calgary Parks, current edition) • <i>Final Acceptance Certificate (FAC)</i> • <i>Final Acceptance Inspection Checklist and Report</i> 	
Responsibility	<ul style="list-style-type: none"> • Project manager • The City of Calgary Parks 	
Steps	9.1	Final Construction Inspection by Proponent
	9.2	Submit As-built Restoration Report and Construction Drawings to The City
	9.3	As-built Documents Review and Approval by The City
	9.4	Apply for Final Acceptance Certificate (FAC)
	9.5	Final Construction Inspection by Parks
	9.6	FAC Approval/Conditional/Rejection
	9.7	FAC Appeal Process (if applicable)
	9.8	Acquisition and Close-out
	9.9	Evaluation and Publicity (optional)
Project Deliverables		Project Approvals
As-built habitat restoration report		The City of Calgary Parks, Natural Areas representative
As-built construction drawings		The City of Calgary Parks, Natural Areas representative
Final Acceptance Certificate (FAC)		Parks Development Inspector
Next Phase	Phase 10 – Management	

STEPS

9.1. Final Construction Inspection by Proponent

No less than 3 months prior to maintenance period expiry date, or earlier if weather conditions permit, the proponent shall conduct an inspection of the project site. As per requirements of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition), the proponent shall ensure that all defects and deficiencies due to damage and other causes are corrected, except defects or deficiencies caused by the negligence of The City or its agents, employees or servants in the performance of their duties on behalf of The City. The inspection should include:

- Confirmation that all construction components outlined in the Habitat Restoration Project Checklist (see *Appendix F – HRP Checklist*) are complete;
- Confirmation that all plant material is healthy and native; and
- An assessment of project performance measures to determine if project goals and objectives have been achieved to the level expected given the project schedules, construction timelines, and stage of restoration at the time of inspection.

Final inspection results should fulfill all necessary information requirements to complete the as-built habitat restoration report and as-built construction drawings (see *Step 9.2* for details). The date of inspection shall be added to the *Final Acceptance Inspection Checklist and Report* (see *Step 9.4 – Apply for Final Acceptance Certificate* for details).

9.2. Submit As-built Restoration Report and Construction Drawings to The City

Simple habitat restoration projects may result in as-built reports and construction drawings that exactly match the final habitat restoration report and construction drawings. At the discretion of The City of Calgary Parks, the final report and drawings (see *Phase 5 – Project Implementation Plan and Approval: Steps 5.11 to 5.14*) may be submitted in lieu of as-built documents, with this decision and approval documented in writing. In all other cases, the following requirements for as-built restoration reports and construction drawings shall apply.

As-built Restoration Report

The as-built restoration report is the conclusive amendment to the final restoration report (see *Phase 7 – Project Monitoring and Adaptation: Step 7.5 – Amendments to Restoration Report Approved by Parks*). It summarizes all previous progress reports and represents the site conditions at the end of the maintenance period. The as-built report must include all requirements outlined in *Appendix D – Restoration Report Requirements*, including:

- A final ecological evaluation of the project site;
- A detailed assessment and inventory of vegetation species, including an evaluation of native and non-native canopy cover compared to the reference habitat;
- Site maintenance logs;
- Performance measure data collected and monitoring logs;
- Site photographs and photomonitoring logs (see *Appendix E – Photomonitoring Guidelines*);
- A summary of progress reports, final restoration report amendments, and approvals;
- Copies of completed *Construction Inspection Checklist and CCC Reports* included as appendices; and
- Lessons learned and suggestions for improvement (optional).

As-built Construction Drawings

The as-built construction drawings represent the final site conditions at the end of the maintenance period, including all constructed elements, and are the conclusive amendment to the final drawings (see *Phase 5 – Project Implementation Plan and Approval: Step 5.14 – Approved Restoration Plan (Final Drawings Portion)*).

Maintenance Manuals

Maintenance manuals are to be submitted to The City prior to FAC approval for all optional amenities associated with irrigation and/or water systems, as per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition).

9.3. As-built Documents Review and Approval by The City

The as-built report and construction drawings will be reviewed for approval by The City of Calgary Parks Natural Areas representative prior to FAC application.

Alternative 1: As-built Approval

The City approves as-built restoration report. All approvals will be documented in writing and will include review comments as needed. The proponent may proceed to *Step 9.4 – Apply for Final Acceptance Certificate*.

Alternative 2: As-built Rejection, Modification, and Re-submission

If the as-built restoration documents are not approved, The City will document the rejection in writing and provide review comments. The proponent may not apply for a Final Acceptance Certificate until the as-built documents are modified and re-submitted based on The City's review comments, and have received subsequent approval.

9.4. Apply for Final Acceptance Certificate (FAC)

If the restoration criteria have been met and as-built documents have been approved, a Final Acceptance Certificate (FAC) for the restoration project may be applied for in accordance with the requirements for the FAC process, as per The City of Calgary Parks, *Development Guidelines and Standard Specifications: Landscape Construction* manual (current edition). FACs are not to be submitted prior to site completion; Inspectors will not hold the document until the site is ready. The date of inspection shall be added to the *Final Acceptance Inspection Checklist and Report*.

Subsequent to the correction of defects and deficiencies, the proponent shall submit to The City of Calgary Urban Development four (4) copies of the FAC duly signed and sealed by a signing officer of the proponent. FAC for a habitat restoration project should be completed in accordance with the habitat restoration project checklist (see *Appendix F – HRP Checklist* for details).

Landscape components submitted for final acceptance should be submitted in specific groupings by development phase to reduce the frequency of inspections and the volume of documentation by The City of Calgary Parks, Urban Development, and the proponent. All natural environment parks are included as a recommended grouping.

9.5. Final Construction Inspection by Parks

Within thirty (30) days of receipt of the FAC by Urban Development, The City of Calgary Parks will schedule an on-site inspection with the proponent that will take place during the active growth period. Prior to inspection with the proponent, inspections will be performed by The City (at minimum a Parks Development Inspector and Natural Areas representative) to confirm the findings of the as-built report to determine if the restoration criteria have been met and if all deficiencies have been corrected.

Inspections with the proponent will not be scheduled if:

- As-built restoration documents have not been approved;
- Advice of defects or deficiencies have been sent to the proponent within that time; and
- The City has not deemed improvement of defects or deficiencies to be complete.

9.6. FAC Approval/Conditional/Rejection

Alternative 1: FAC Approval

If the final construction inspection shows that, to the satisfaction of Parks, project goals and objectives have been achieved, improvements are complete, and any third party damages are rectified, the Parks Development Inspector will sign the FAC application. The proponent may proceed to *Step 9.8 – Acquisition and Close-out*.

Alternative 2: Conditional FAC

Conditional FAC will be considered if site was complete and third party damage occurs where time restraints do not permit restoration, or when there are exceptional circumstances (e.g. drought or flood), as per the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). At the discretion of The City of Calgary Parks, the proponent may be required to amend the as-built restoration report and construction drawings (see *Steps 9.2 and 9.3* for details) if conditional FAC is issued.

Alternative 3: FAC Rejection (*Final Acceptance Inspection Checklist and Report*)

If defects or deficiencies exist, or if project goals and objectives have not been achieved to the satisfaction of Parks, the Parks Development Inspector will issue a *Final Acceptance Inspection Checklist and Report* detailing the shortcomings. The Inspector retains the FAC for one (1) month from the date of notification, and records the last day of the one month period on *Final Acceptance Inspection Checklist and Report* as the Application Expiry Date. Only one *Final Acceptance Inspection Checklist and Report* will be issued during the inspection process.

Deficiencies noted on the *Final Acceptance Inspection Checklist and Report* are to be corrected as soon as possible; not at the end of the 30 day expiration period. If defects or deficiencies are not corrected by the Application Expiry Date, the FAC will be returned to the proponent unsigned. The proponent subsequently re-submits the FAC once all defects or deficiencies are correct, and project objective shortcomings are completed.

If weeds are identified in the *Final Acceptance Inspection Checklist and Report* and herbicide is applied to rectify the deficiency, a biocide application report must be submitted prior to the Parks Development Inspector signing the FAC. A copy of the biocide application report must be included as an addendum to the as-built restoration report (see *Appendix D – Restoration Report Requirements*). Where marketing signs and flags are present on the restoration site, the procedures outlined in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition) must be adhered to.

The *Final Acceptance Inspection Checklist and Report* must be included as an addendum to the as-built restoration report (see *Appendix D – Restoration Report Requirements*). At the discretion of The City of Calgary Parks, the proponent may be required to amend the as-built restoration report and construction drawings (see *Steps 9.2 and 9.3* for details) if the FAC application is rejected.

9.7. FAC Appeal Process (if applicable)

If FAC is refused, the proponent may wish to file an appeal according to the process outlined in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition):

Step 9.7.1: If FAC refused by Parks Development Inspector, review will be conducted with Manager Parks Operations Division, Developer or their representative, and Parks Coordinator – Development. Where agreement or consensus not achieved, proceed to *Step 9.7.2*.

Step 9.7.2: If consensus not reached, refusal considered by Manager (North or South) Parks Planning and Development Services, and Manager Urban Development or designate. The decision made at *Step 9.7.2* will be final.

9.8. Acquisition and Close-out

The proponent must provide 30 days notice of intent to turn parcel(s) over to The City, as outlined in the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition). The proponent must ensure the restoration site and project deliverables are successfully transitioned to The City for ongoing site maintenance and monitoring.

Project close-out ensures contract closure and transition of administrative records as needed, including submission of any amendments or addenda to the as-built restoration report and construction drawings.

9.9. Evaluation and Publicity (optional)

Project publicity should include a general evaluation and executive summary of the project outcomes reached, and written descriptions suitable for public and technical audiences. The proponent may wish to host recognition events for the restoration team, particularly if public volunteers were involved. This stage is optional and based on the proponent's objectives of the project.

PHASE 10

MANAGEMENT

PURPOSE

To ensure that maintenance and monitoring of the project site is continued by The City after final acceptance so that long-term restoration success can be achieved. Following the issuance of the FAC, ongoing monitoring and reporting of the project site will be performed by Parks in accordance with the final habitat restoration report for the site, as-built construction drawings, the *Natural Area Management Plan* (The City of Calgary Parks & Recreation 1994), and/or park management plan specific to the natural area.

PHASE 10 SUMMARY

Supporting Documents	<ul style="list-style-type: none"> • <i>Natural Area Management Plan</i> (The City of Calgary Parks & Recreation 1994) • As-built Restoration Report and construction drawings 	
Responsibility	<ul style="list-style-type: none"> • The City of Calgary Parks 	
Steps	10.1	Maintenance Program Continued by The City
	10.2	Monitoring and Reporting Continued by The City
	10.3	Lessons Learned Applied by The City
Phase Deliverables		Phase Approvals
Site monitoring reports		The City of Calgary Parks (internal)
Lessons learned		The City of Calgary Parks (internal)

STEPS

10.1. Maintenance Program Continued by The City

Following site acquisition, The City should ensure resources are available to conduct the maintenance program outlined in the final restoration report, and conduct ongoing maintenance of the restoration site in accordance with the maintenance schedule and the *Natural Area Management Plan* (The City of Calgary Parks & Recreation 1994). Maintenance logs should be kept to help inform best practices for future habitat restoration projects, and follow the format of the final restoration report or through the Parks Asset Reporting and Information System (PARIS).

10.2. Monitoring and Reporting Continued by The City

Following site acquisition, The City should ensure resources are available to conduct the monitoring program outlined in the final restoration report. The City must continue the monitoring program in order to ensure long-term restoration success of the site, and report on restoration progress to help inform best practices for future habitat restoration projects.

10.3. Lessons Learned Applied by The City

Following site acquisition, The City should continue to identify and record lessons learned and experiences gained from the project and restoration site, so that best practices increase efficiencies in future habitat restoration projects. This information should include a list of accomplishments, best practices, and challenges, along with their impacts on various stages of the project, and the potential for recurrence on similar restoration projects.

GLOSSARY

Adaptive management: An empirically based management approach designed to monitor actions and activities to increase the chances for successful habitat restoration. In practice, restoration projects are estimated with a probability of success. Monitoring enables midcourse corrections to actions and activities to meet project objectives and goals.

Alternative restoration approach: Optional restoration strategies collectively derived from alternative goals, objectives and restoration prescriptions.

Autoecology: That part of ecology which deals with individual species and their reactions to environmental factors (European Environmental Agency 2013).

Collected plants: Any plant material not conforming to Canadian Nursery Landscape Association standards and specifications and/or not grown according to good nursery practices, as defined by The City of Calgary Parks' *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks, current edition).

Degraded habitat: An ecosystem that has been degraded, damaged, or destroyed, and which has reduced ecological structure, function and biodiversity as a result of passive, non-intentional processes or intentional human activities.

Enhancement: The manipulation of one or more specific habitat features to increase ecological function or biodiversity of a restored ecosystem. Enhancement activities may however, result in a decrease in other ecosystem functions.

Habitat restoration: The active process of assisting, through land management activities, the recovery of a degraded habitat to initiate or accelerate its succession towards a reference habitat.

Habitat restoration project: The undertaking of habitat restoration of a specific degraded habitat, as defined spatially by a project area, temporally by project schedules and the CCC/FAC process, and for which the type of habitat restoration and activities implemented define the project scope. Undertaking a habitat restoration project is a ten-phase iterative process that involves conception, planning, evaluation, implementation, monitoring, and maintenance of a project area, as well as the production of a restoration report and associated project approvals.

Listed fauna species: Any native animal species or subspecies that meets one or more of the following criteria:

1. Are included on the current Alberta Conservation Information Management System (ACIMS 2013c) *List of Tracked and Watched Elements*;

2. Are provincially listed as 'At Risk', 'May Be at Risk', or 'Sensitive' by the *General Status of Alberta Wild Species* (AESRD 2010) and *Alberta Wild Species Status Search* (AESRD 2011);
3. Are provincially regulated as 'Endangered' or 'Threatened' under the *Wildlife Act* (Province of Alberta 2000);
4. Are listed as 'Endangered', 'Threatened', or 'Special Concern' by the Endangered Species Conservation Committee (AESRD 2012);
5. Are federally regulated as 'Endangered', 'Threatened', or 'Special Concern' on Schedule 1 of Canada's *Species at Risk Act (SARA)*; or
6. Are listed as 'Endangered', 'Threatened', or 'Special Concern' by the *COSEWIC (Committee on the Status of Endangered Wildlife in Canada) Wildlife Species Search* (Government of Canada 2014).

Mitigation: The process of conserving an area of land through the application of a hierarchical progression of alternatives, which includes:

- Avoidance of impacts;
- Minimization of and mitigation for unavoidable impacts; and
- Mitigation for development impacts that cannot be minimized.

Natural area: A City-owned park where the primary role is the protection of an undisturbed or relatively undisturbed parcel or parcels of land with characteristics of a natural/native plant community (*Open Space Plan 2003*).

Natural environment park: A planned or existing City-owned park, classified as MR and/or ER, where the primary role is the protection of an undisturbed or relatively undisturbed area of land or water, or both, and which has existing characteristics of a natural/native plant or animal community and/or portions of a natural ecological and geographic system. Examples include wetlands, escarpments, riparian corridors, natural grasslands and woodlots. Note: A relatively undisturbed Natural Environment Park would either retain or have re-established a natural character, although it need not be completely undisturbed. See the *Open Space Plan* for further details.

Natural recovery: The long term natural re-establishment of native ecosystems involving revegetation from soil seedbank and/or natural encroachment without seeding of non-native species.

Natural Region/Subregion: Natural Regions are the largest ecological classification unit in Alberta and allow for the geographic classification of the province based on ecological criteria. Each Natural Region is further categorized into Natural Subregions (Natural Regions Committee 2006).

Naturalization: A type of habitat restoration; the deliberate reintroduction of species that are native to a given area or are well adapted to the climate circumstance; activities that are intended to improve and enhance the natural environment. The biodiversity and ecosystem function of a naturalized ecosystem is lower compared to a reference habitat but higher compared to a reclaimed ecosystem.

Rare plant species: For the purposes of the Habitat Restoration Project Framework, the definition of rare plant species has been modified from the Alberta Native Plant Council's *Rare Plant Survey Guidelines* (ANPC 2000) and the ANPC (2012) *Guidelines for Rare Vascular Plant Surveys in Alberta*, and includes lichens and fungi, although they are not technically classified as plants. A rare plant species is defined as any native species, subspecies or variety of vascular plant, non-vascular (bryophyte) plant (mosses, hornworts, liverworts), lichen, or fungi that, because of its biological characteristics or for some other reason, exists in low numbers or in very restricted areas in Alberta, that meets one or more of the following criteria:

1. Are included on the current Alberta Conservation Information Management System (ACIMS 2013c) *List of Tracked and Watched Elements*;
2. Are provincially listed as 'At Risk', 'May Be at Risk', or 'Sensitive' by the *General Status of Alberta Wild Species* (AESRD 2010) and *Alberta Wild Species Status Search* (AESRD 2011);
3. Are provincially regulated as 'Endangered' or 'Threatened' under the *Wildlife Act* (Province of Alberta 2000);
4. Are listed as 'Endangered', 'Threatened', or 'Special Concern' by the Endangered Species Conservation Committee (AESRD 2012);
5. Are federally regulated as 'Endangered', 'Threatened', or 'Special Concern' on Schedule 1 of Canada's *Species at Risk Act (SARA)*; or
6. Are listed as 'Endangered', 'Threatened', or 'Special Concern' by the *COSEWIC (Committee on the Status of Endangered Wildlife in Canada) Wildlife Species Search* (Government of Canada 2014).

Restoration prescription: The collection of restoration activities, interventions, and treatments required to attain specific project objectives.

Reclamation: A type of habitat restoration that aims to stabilize disturbed lands to an ecologically productive use. A reclaimed ecosystem has less biodiversity and ecosystem function compared to a reference habitat, and the least compared to other types of habitat restoration.

Reference habitat: The target ecosystem for restoration of a degraded habitat; the reference habitat may be described from historic or contemporary data sources, or may be physically represented by undisturbed, similar native habitat appropriate for the site conditions of the degraded habitat, and which may be adjacent to the project site or elsewhere in the Natural Region/Subregion. The reference habitat may include multiples sites and sources of information where appropriate for a particular habitat restoration project.

Rehabilitation: A type of habitat restoration; the repair of ecosystem function and biodiversity along a natural successional trajectory to a level similar to, but lower than, a reference habitat.

Reserve: Reserve lands as defined by the *Municipal Government Act* (Province of Alberta 2000), which include lands designated as environmental reserve, municipal reserve,

community services reserve, school reserve or municipal reserve by a subdivision authority of a municipality under Division 8.

Restoration: A type of habitat restoration; the process of fully re-establishing a target level of ecosystem function and biodiversity to a degraded habitat as defined by the reference habitat, including species composition and vegetation community structure.

Restoration report: Documents the process for developing and implementing a scientifically defensible habitat restoration project in The City of Calgary in alignment with The City of Calgary Parks, *Development Guidelines and Standard Specifications: Landscape Construction* manual. See *Appendix D – Restoration Report Requirements* for details.

Special ecological community: A rare or locally significant ecological community (a distinct assemblage of plant species with similar total species composition and vegetation structure that can often be associated with particular environmental conditions; that when given the right conditions, reoccurs predictably; and which may be terrestrial, wetland, aquatic, or other), as defined by the ACIMS (2011) *Ecological Community Sampling Guidelines*, meets one or more of the following criteria:

1. On the ACIMS (2013a) *Ecological Community Tracking List* or watch list, and hence already considered significant at the provincial or greater level;
2. A community that is unusual, uncommon or of limited extent and so could be considered for addition to the tracking or watch list;
3. One that is locally significant (ACIMS 2011 *Ecological Community Sampling Guidelines*).

REFERENCES

- Agriculture and Agri-Food Canada. 1998. *The Canadian System of Soil Classification, 3rd edition*. [Online]: <http://sis.agr.gc.ca/cansis/taxa/cssc3/index.html> Accessed: Feb 24, 2014.
- Alberta Agriculture and Rural Development. 2009. How to purchase high quality forage seed. [Online]: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex131](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex131) Accessed: Dec 2, 2013.
- Alberta Agriculture and Rural Development. 2012. Alberta Weed Regulatory Advisory Committee Watch (AWRAC). Last updated: Dec 4, 2013. [Online]: [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/prm14073](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/prm14073) Accessed: Mar 17, 2014.
- Alberta Biodiversity Monitoring Institute (ABMI). 2005, 2007, 2008, 2009, 2010, 2011, 2012. *Terrestrial Data Collection Protocols*. Last updated: Mar 21, 2014. [Online]: <http://www.abmi.ca/abmi/reports/reports.jsp?categoryId=0> Accessed: Mar 25, 2014.
- Alberta Conservation Information Management System (ACIMS). n.d. Rare ecological community site description form. [Online]: http://www.albertaparks.ca/media/387819/rare_ecological_community_site_description_form.pdf Accessed: Mar 13, 2014.
- Alberta Conservation Information Management System (ACIMS). n.d. Rare ecological community vegetation description form. [Online]: http://www.albertaparks.ca/media/387822/rare_ecological_community_vegetation_description_form.pdf Accessed: Mar 13, 2014.
- Alberta Conservation Information Management System (ACIMS). 2006. *Minimum Patch Size Specifications for Ecological Community Occurrences (DRAFT 2006)*. [Online]: http://www.albertaparks.ca/media/2195320/community_minimum_patch_size_specifications.pdf Accessed: Mar 13, 2014.
- Alberta Conservation Information Management System (ACIMS). 2011. *Alberta Conservation Information Management Center Ecological Community Sampling Guidelines*. Alberta Tourism Parks and Recreation. Edmonton, Alberta. Last updated: Nov 2011. [Online]: http://www.albertaparks.ca/media/1365919/ecological_community_sampling_guidelines_2011.pdf Accessed: Mar 13, 2014.
- Alberta Conservation Information Management System (ACIMS). 2013a. *Alberta Conservation Information Management System Ecological Community Tracking List*. Compiled by L. Allen. Alberta Tourism Parks and Recreation. Edmonton, Alberta. [Online]: http://www.albertaparks.ca/media/3259838/tracked_watched_list_ecological_communities_full_report.pdf Accessed: Mar 13, 2014.
- Alberta Conservation Information Management System (ACIMS). 2013b. *Element Occurrence Data*. Alberta Tourism Parks and Recreation. Edmonton, Alberta. Last updated: June 2013. [Online]: [http://albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-\(acims\)/download-data.aspx](http://albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-(acims)/download-data.aspx) Accessed: Mar 25, 2014.
- Alberta Conservation Information Management System (ACIMS). 2013c. *List of Tracked and Watched*

- Elements*. [Online]: [http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-\(acims\)/tracking-watch-lists.aspx](http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-(acims)/tracking-watch-lists.aspx) Accessed: Mar 11, 2014.
- Alberta Conservation Information Management System (ACIMS). 2013d. *Plant, Lichen and Fungi Data Submission Form*. [Online]: [http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-\(acims\)/submit-data.aspx](http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-(acims)/submit-data.aspx) Accessed: Mar 13, 2014.
- Alberta Environment and Sustainable Resource Development (AESRD). 2010. *General Status of Alberta Wild Species 2010*. [Online]: <http://esrd.alberta.ca/fish-wildlife/species-at-risk/albertas-species-at-risk-strategy/general-status-of-alberta-wild-species-2010/default.aspx> Accessed: Mar 11, 2014.
- Alberta Environment and Sustainable Resource Development (AESRD). 2011. *Wild Species Status Search*, 2011. Accessed: Dec 2, 2013. [Online]: <http://srd.alberta.ca/FishWildlife/SpeciesAtRisk/WildSpeciesStatusSearch.aspx>
- Alberta Environment and Sustainable Resource Development (AESRD). 2012. Species assessed by Alberta's Endangered Species Conservation Committee: Short List; Alberta Species at Risk: list of endangered and threatened species currently listed under Alberta's *Wildlife Act* and other species assessed by the Endangered Species Conservation Committee (ESCC) and its Scientific Subcommittee (SSC). Last updated: Nov 6, 2012. [Online]: <http://esrd.alberta.ca/fish-wildlife/species-at-risk/documents/SpeciesAssessed-EndangeredSpeciesConservationCommittee-ShortList-Nov06-2012.pdf> Accessed: Mar 11, 2014.
- Alberta Environment and Sustainable Resource Development (AESRD). 2013. Range Plant Community Guides & Stocking Rates. Last updated: May 23, 2013. [Online]: <http://esrd.alberta.ca/lands-forests/grazing-range-management/range-plant-community-guides-stocking-rates.aspx> Accessed: Mar 21, 2014.
- Alberta Environment and Sustainable Resource Development (AESRD). 2014a. *FWMIS (Fisheries & Wildlife Management Information System)*. Last updated: Jan 6, 2014. [Online]: <http://srd.alberta.ca/fishwildlife/fwmis/default.aspx> Accessed: Mar 11, 2014.
- Alberta Environment and Sustainable Resource Development (AESRD). 2014b. Wildlife Loadforms. Last updated: Jan 6, 2014. [Online]: <http://esrd.alberta.ca/fish-wildlife/fwmis/wildlife-load-forms.aspx> Accessed: Mar 18, 2014.
- Alberta Environment and Sustainable Resource Development (AESRD). 2014c. Wildlife Research & Collection. Last updated: Mar 17, 2014. [Online]: <http://esrd.alberta.ca/fish-wildlife/wildlife-research-collection/default.aspx> Accessed: Mar 24, 2014.
- Alberta Environmental Protection. 1994. *Ecological Land Survey Site Description Manual*. Alberta Forestry, Lands and Wildlife, Land Information Services Division, Resource Information Branch. Edmonton, AB. 193 pp.
- Alberta Native Plant Council (ANPC). 2000. *Rare Plant Survey Guidelines*. [Online]: <http://www.anpc.ab.ca/assets/rareplant.pdf> Accessed: Dec 2, 2013.

- Alberta Native Plant Council (ANPC). 2010. *Alberta Native Plant Council Recommended Documents for Botanical Surveys in Areas of Proposed Disturbance*. [Online]:
http://www.anpc.ab.ca/assets/ANPC_Recommended_Documents_for_Botanical_Surveys.pdf
Accessed: Mar 12, 2014.
- Alberta Native Plant Council (ANPC). 2012. *ANPC Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update*. Alberta Native Plant Council, Edmonton, AB. [Online]:
<http://www.anpc.ab.ca/content/resources.php> Accessed: Mar 12, 2014.
- Alberta Native Plant Council (ANPC). 2013. A Rogue's Gallery of Invasive Non-native Plants of Alberta. Last updated: Jul 19, 2013. [Online]: http://www.anpc.ab.ca/wiki/index.php/Main_Page Accessed: Mar 17, 2014.
- Archibald, J.H., Klappstein, G.D. and I.G.W. Corns. 1996. *Field Guide to Ecosites of Southwestern Alberta*. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Centre, Edmonton, AB. Special Report 8. 492 pp.
- Bradshaw, A.D. 2002. Introduction and philosophy. In: Eds. Perrow, M.R. and A.J. Davy (Eds.). 2002. *Handbook of Ecological Restoration*, Volume 1: Principles of Restoration. Cambridge University Press. [Online]:
<http://pages.uoregon.edu/ecolrest/Bradshaw%20Intro%20and%20Phil%20Handbook.pdf>
Accessed: Dec 2, 2013.
- Cairns, J. Jr. 2013. Stress, Environmental. In: Levin, S.A. (ed.). 2013. *Encyclopedia of Biodiversity*, 2nd ed., Volume 7. Pp. 39-44. Academic Press. Waltham, MA. [Online]:
<http://www.johncairns.net/Papers/Stress.pdf> Accessed: Dec 2, 2013.
- Center for Environmental Excellence. 2008. Soil Management in Construction, In: Chapter 4, Construction Practices for Environmental Stewardship. Center for Environmental Excellence by AASHTO (American Association of State Highway and Transportation Officials). [Online]:
http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/4_11.aspx Accessed: Mar 6, 2014.
- European Environmental Agency. 2013. Autoecology, Environmental Terminology and Discovery Service (ETDS). [Online]:
http://glossary.eea.europa.eu/terminology/concept_html?term=autoecology Accessed: Dec 2, 2013.
- Government of Alberta. 2013a. *Integrated Standards and Guidelines*. Enhanced Approval Process (EAP). Last updated: Dec 1, 2013. [Online]: <http://esrd.alberta.ca/forms-maps-services/enhanced-approval-process/eap-manuals-guides/documents/EAP-IntegratedStandardsGuide-Dec01-2013.pdf> Accessed: Mar 24, 2014.
- Government of Alberta. 2013b. *Sensitive Species Inventory Guidelines*, April 2013. Alberta Environment and Sustainable Resource Development – Wildlife Management. 128 pp. [Online]:
<http://esrd.alberta.ca/fish-wildlife/wildlife-management/sensitive-species-inventory-guidelines.aspx> Accessed: Mar 18, 2014.
- Government of Canada. 2002. *Species at Risk Act*. Canada Gazette, Part III: 25(3). Queen's Printer of Canada, Ottawa, ON. Last updated: Jan 31, 2003. [Online]:
http://www.sararegistry.gc.ca/approach/act/sara_e.pdf Accessed: Mar 24, 2014.

- Government of Canada. 2014. COSEWIC (Committee on the Status of Endangered Wildlife in Canada) Wildlife Species Search. Last updated: Feb 19, 2014. [Online]: http://www.cosewic.gc.ca/eng/sct5/index_e.cfm Accessed: Mar 24, 2014.
- Lucey, W.P. and C.L. Barraclough. 2001. *A User Guide to Photopoint Monitoring Techniques for Riparian Areas - Field Test Edition*. Aqua-Tex Scientific Consulting Ltd. Kimberley, BC. 90 pp. [Online]: <http://www.sccp.ca/sites/default/files/species-habitat/documents/usfs%20riparian%20pp%20monitoring.pdf> Accessed: Dec 3, 2013.
- Naeem, S. 2006. Chapter 10: Biodiversity and ecosystem functioning in restored ecosystems: extracting principles for a synthetic perspective. Pp. 210-237. In: Falk, D.A., Palmer, M.A. and J.B. Zedler (Eds.). 2006. *Foundations for Restoration Ecology*. Society for Ecological Restoration International. Island Press, Washington, D.C. 364 pp. [Online]: http://www1.inecol.edu.mx/repara/download/III_1_FoundationsofRestorationEcologyThe%20ScienceandPracticeof%20EcologicalRestoration.pdf Accessed: Dec 3, 2013.
- Natural Regions Committee. 2006. Natural Regions and Subregions of Alberta. Compiled by Downing, D.J. and W.W. Pettapiece. Government of Alberta. Pub. No. T/852. [Online]: http://albertaparks.ca/media/2942026/nrsrcomplete_may_06.pdf Accessed: Mar 25, 2014.
- Province of Alberta. 2000. *Municipal Government Act*. Alberta Queen's Printer. Edmonton, AB. [Online]: http://www.qp.alberta.ca/1266.cfm?page=m26.cfm&leg_type=Acts&isbncln=9780779777488 Accessed: Mar 17, 2014.
- Province of Alberta. 2000. *Wildlife Act*. Alberta Queen's Printer. Edmonton, AB. [Online]: <http://www.qp.alberta.ca/documents/acts/w10.pdf> Accessed: Mar 17, 2014.
- Province of Alberta. 2010. *Weed Control Act and Weed Control Regulation* (Alberta Regulation 19/2010). Alberta Queen's Printer. Edmonton, AB. [Online]: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/acts6156](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts6156) Accessed: Mar 17, 2014.
- Scrimgeour, G., Hvenegaard, P., Wildeman, A., Tchir, J., Kendall, S. 2003. Stream fish management: relationships between landscape characteristics and fish communities in the Notikewin River Basin, Alberta. Report produced by the Alberta Conservation Association (Peace River, Alberta) and the Alberta Research Council (Vegreville, Alberta) for the Northern Watershed Project Stakeholder Committee. Northern Watershed Project Final Report No. 2. 109 pp. [Online]: <http://www.ab-conservation.com/go/default/custom/uploads/reportseries2/NWP%20REPORT%202.pdf>
- Society for Ecological Restoration International Science and Policy Working Group (SER). 2004. SER International Primer on Ecological Restoration, Version 2, October 2004. *Society for Ecological Restoration International*. [Online]: <http://www.ser.org/resources/resources-detail-view/ser-international-primer-on-ecological-restoration> Accessed: Mar 25, 2014.
- Society for Ecological Restoration International Science and Policy Working Group (SER). 2005. Guidelines for Developing and Managing Ecological Restoration Projects, 2nd Edition, December 2005. *Society for Ecological Restoration International*. [Online]: <http://www.ser.org/resources/resources-detail-view/guidelines-for-developing-and-managing-ecological-restoration-projects> Accessed: Mar 25, 2014.
- Stewart, R.E. and H.A. Kantrud. 1971. Classification of natural ponds and lakes in the glaciated prairie region. Resource Publication 92, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. (Version 16APR1998). Last updated: Feb 2, 2013. [Online]: <http://www.npwrc.usgs.gov/resource/wetlands/pondlake/index.htm> Accessed: Dec 3, 2013.

- Tate, R.L. and D.A. Klem (Eds.). 1985. *Soil Reclamation Processes: Microbiological Analyses and Applications*. New York: Marcel Dekker, Inc. In: Strohmayer, P. 1999. Soil stockpiling for reclamation and restoration activities after mining and construction. *Restoration and Reclamation Review* 4(7): 1-6. [Online]: <http://conservancy.umn.edu/bitstream/59360/1/4.7.Strohmayer.pdf> Accessed: Mar 6, 2014.
- The City of Calgary. 2003. *Parks and Pathways Bylaw, Bylaw Number 20M2003*. [Online]: <https://www.calgary.ca/CA/city-clerks/Documents/Legislative-services/Bylaws/20m2003-ParksPathways.pdf?noredirect=1> Accessed: Mar 25, 2014.
- The City of Calgary. 2009. *Municipal Development Plan*. [Online]: <http://www.calgary.ca/PDA/LUPP/Pages/Municipal-Development-Plan/Municipal-Development-Plan-MDP.aspx> Accessed: Mar 25, 2014.
- The City of Calgary. 2012. *Contractor Environmental Responsibilities Package*. [Online]: <http://www.calgary.ca/UEP/ESM/Documents/ESM-Documents/ceerp.pdf> Accessed: Dec 2, 2013.
- The City of Calgary. 2013. *Project Management Practices* (internal use only). Corporate Project Management Centre, Infrastructure and Information Services.
- The City of Calgary. 2014. *ECO Plan Framework and ECO Plan Checklist*. [Online]: www.calgary.ca/UEP/ESM/Pages/Contractor-environmental-responsibilities/ECO-Plans.aspx Accessed: Mar 25, 2014.
- The City of Calgary Parks. 1993. *Calgary Urban Parks Program Biophysical Assessment*. Prepared for: The City of Calgary Parks and Recreation. Prepared jointly by: Gaia Consultants Inc., Sentar Consultants Ltd., Ecological Land Surveys Ltd. Calgary, AB. 96 pp.
- The City of Calgary Parks. 2003. *Open Space Plan*. [Online]: <http://www.calgary.ca/CSPS/Parks/Documents/Planning-and-Operations/open-space-plan.pdf?noredirect=1> Accessed: Mar 25, 2014.
- The City of Calgary Parks. 2004. *Calgary Wetland Conservation Plan*. [Online]: http://www.calgary.ca/CSPS/Parks/Documents/Planning-and-Operations/Natural-Areas-and-Wetlands/wetland_conservation_plan.pdf?noredirect=1 Accessed: Mar 25, 2014.
- The City of Calgary Parks. 2013. *Development Guidelines and Standard Specifications: Landscape Construction*. [Online]: <http://www.calgary.ca/PDA/DBA/Pages/Urban-Development/Publications.aspx> Accessed: Mar 25, 2014.
- The City of Calgary Parks & Recreation. 1994. *Natural Area Management Plan*. [Online]: <http://www.calgary.ca/CSPS/Parks/Documents/Planning-and-Operations/Natural-Areas-and-Wetlands/natural-area-management-plan.pdf?noredirect=1> Accessed: Mar 25, 2014.
- The City of Calgary Water Services. 2011. *Guidelines for Erosion and Sediment Control*. [Online]: http://www.calgary.ca/PDA/DBA/Documents/urban_development/publications/ESC-guidelines-2011.pdf Accessed: Mar 25, 2014.

APPENDIX A

SUGGESTED RESOURCES

Adams, B.W., Ehlert, G., Stone, C., Lawrence, D., Alexander, M., Willoughby, M., Hincz, C., Moisey, D., Burkinshaw, A., Carlson, J. And K. France. 2009. *Rangeland Health Assessment for Grassland, Forest and Tame Pasture*. Pub. No. T/044. Alberta Sustainable Resource Development, Lands Division, Rangeland Management Branch, Government of Alberta. 152 pp. [Online]: <http://esrd.alberta.ca/lands-forests/grazing-range-management/documents/RangelandHealthAssessmentforGrasslandForestTamePasture-Revised-Apr2009.pdf> Accessed: Mar 21, 2014.

Alberta Native Plant Council (ANPC). 2009. *Guidelines on Plant Rescues*. [Online]: http://www.anpc.ab.ca/assets/2009_plant_rescue.pdf

Alberta Native Plant Council (ANPC). 2010. *Native Plant Source List*. [Online]: http://www.anpc.ab.ca/assets/ANPC_2010_Native_Plant_Source_List.pdf

Alberta Environment and Sustainable Resource Development (AESRD). 2013. Range health. Last updated: Nov 26, 2013. [Online]: <http://esrd.alberta.ca/lands-forests/grazing-range-management/range-health.aspx> Accessed: Mar 21, 2014.

Alberta Sustainable Resource Development (ASRD). 2008. Alberta's Strategy for the Management of Species at Risk (2009-2014). Alberta Sustainable Resource Development, Fish and Wildlife Division, Edmonton, AB. 30 pp. [Online]: <http://esrd.alberta.ca/fish-wildlife/species-at-risk/documents/Alberta'sStrategyForManagementOfSpeciesAtRisk2009-14.pdf> Accessed: Mar 17, 2014.

The City of Calgary. 2013. Contractor environmental regulations. [Online]: <http://www.calgary.ca/UEP/ESM/Pages/Contractor-environmental-responsibilities/Working-with-The-City-of-Calgary.aspx>

The City of Calgary Water Services. 2011. *Field Manual for Effective Erosion and Sediment Control*. [Online]: http://www.calgary.ca/PDA/DBA/Documents/urban_development/publications/ESC-field-manual-2011.pdf

APPENDIX B

RESTORATION VISIONING TERMINOLOGY

Habitat restoration projects involve three general restoration visioning stages (conceptual planning, followed by implementation planning, and then by monitoring, adaptation and management) that align with the 10-phase habitat restoration project process (Table B.1). These stages help set up the project for success by framing the project around a mission statement and restoration hypothesis relative to a reference habitat, from which project goals, objectives, and performance measures are derived. These in turn determine the restoration activities, which lead to specific outputs and outcomes from which project success is determined by project performance measures relative to the reference habitat.

Table B.1. Habitat restoration project planning concepts and the project phases in which they are developed.

Conceptual Planning (HRP Phases 1-4)		
Mission Statement	1 per project	The mission statement describes what the overall goal of a habitat restoration project is, including how a specific organization intends to restore (and/or disturb) a given area, and why the project is taking place.
Reference Habitat	1 per project (described by ≥1 data source)	A reference habitat (described from actual non-disturbed locations, historical air photos, biophysical inventories, and/or reference documents) represents the restoration target, which is the habitat condition on which the restoration project is designed and serves as the basis for project evaluation. A single reference habitat is described for each project, except where multiple habitat types occur across different restoration zones.
Restoration Hypothesis	1 per project	The restoration hypothesis outlines an idea of what is happening on the landscape based on the disturbed habitat's biophysical inventory and reference habitat, and generally explains how habitat restoration will lead to a general outcome.
Implementation Planning (HRP Phase 5)		
Restoration Goals	≥1 per project	Restoration goals are broad statements about the ideal states and conditions that a restoration project is trying to accomplish. Goals should anticipate the degree to which ecosystem recovery is expected within the context of project management areas, the reference habitat condition and certain types of habitat restoration (reclamation, naturalization, rehabilitation, or restoration). Each goal is linked to one or more related, measurable project objectives.
Restoration Objectives	≥1 per project (≥1 per goal)	Restoration objectives are the measurable, intended (target) end results that indicate the achievement of specific restoration goals, or steps toward those goals, and which are attained by undertaking explicit restoration actions. Each restoration goal may result in one or more restoration objectives.
Performance Measures	≥1 per project (≥1 per objective)	Performance measures are qualitative or quantitative attributes of a restoration objective that confirm whether that objective has been attained within a specified timeframe. Performance measures describe a specific target state of ecosystem recovery, determined by either a single observation or through a monitoring program, with one or more performance measures established for each related restoration objective.
Monitoring, Adaptation, and Management (HRP Phases 6-10)		
Outputs	≥1 per project (= to # of performance measures)	Outputs are the measured results of each objective as determined by the performance measures, which can be described at intermediate (e.g. seasonally, annually) or ultimate (final acceptance) stages of the restoration project duration. Outputs may again be measured after project completion in the operations and maintenance phase.
Outcomes	≥1 per project (approximately = to # of goals)	Outcomes are broad statements about the final states and conditions of ecosystem recovery that a restoration project has accomplished, as determined by restoration outputs, and can be described and compared to restoration goals at intermediate (e.g. seasonally, annually) or ultimate (final acceptance) stages of a restoration project. Outcomes may again be described after project completion in the operations and maintenance phase.

APPENDIX C

RESTORATION PLAN

REQUIREMENTS

The restoration plan consists of a cover sheet and landscape construction drawing that includes the required drawing elements listed below (Table C.1), and the construction plan requirements outlined in the current edition of the *Development Guidelines and Standard Specifications: Landscape Construction* manual (The City of Calgary Parks 2013).

Table C.1. Restoration plan landscape construction drawing requirements.

Restoration Plan drawing requirements.	
Title	<ul style="list-style-type: none"> • Label as “Restoration Plan”
Project area	<ul style="list-style-type: none"> • Outline restoration area; label size in m²
Disturbance footprint	<ul style="list-style-type: none"> • Outline disturbance footprint area; label size in m² • Access, staging, hoarding, and storage areas, and proposed location of soil stockpile • Site disturbance methods and equipment to be used
Topography	<ul style="list-style-type: none"> • Existing and proposed contours at 0.5m intervals • Topographical description (e.g. hummocky – rolling with micro-topographic variation of approximately 5.0m) • Aspect and exposure (e.g. south facing, windy) • Slope position (e.g. crest, mid-slope, level)
Soil	<ul style="list-style-type: none"> • Soil type classified to at least Great Group • Depth of predevelopment topsoil
Ecological features	<ul style="list-style-type: none"> • Mapped plant community type polygons • Invasive species and biocide application areas, as needed • Wildlife activity, habitat and use, as needed • Environmentally Significant Areas
Hydrology	<ul style="list-style-type: none"> • Standing water features; label wetland classification • Water courses; label stream order • Other natural hydrological sources, surficial drainage patterns, depth to water table, or other features
Site features	<ul style="list-style-type: none"> • Utilities and Rights-of-Way • Features of interest or importance to the site
Plant material	<ul style="list-style-type: none"> • Outline planting areas; label size in m² <ul style="list-style-type: none"> ○ Planting list identifying species (botanical and common name), quantities, sizes, habit, spacing densities and specific remarks as required ○ Plant material shown with crowns at 2/3 maximum size • Outline seeding areas; label size in m² <ul style="list-style-type: none"> ○ Seed mix(es) and application rate(s) specific to the site conditions ○ Seeding method (hydroseeding, brillion, etc.)
Project implementation	<ul style="list-style-type: none"> • Site preparation methods • Restoration activity areas, as needed; label activity and size in m² • Erosion and sediment controls • Location of restoration/reclamation signs • Location and type of fencing • Proposed (photo)monitoring schedule, monitoring areas, plots, points, or fixtures, including GPS coordinate table, location, size in m² • Proposed maintenance schedule and equipment to be used

APPENDIX D

RESTORATION REPORT REQUIREMENTS

The restoration report accompanies the restoration plan and must include all sections listed below (Table D.1), plus additional relevant information, as required.

Table D.1. Requirements for the conceptual (C), final (F), and “as-built” (B) habitat restoration report.

Section No.	RESTORATION REPORT CONTENT REQUIREMENT	REPORT		
		C	F	B
1. PROJECT TITLE PAGE		✓	✓	✓
1.1	Project Title	✓	✓	✓
1.2	Author	✓	✓	✓
2. TABLE OF CONTENTS			✓	✓
2.1	Report sections		✓	✓
2.2	List of figures		✓	✓
2.3	List of tables		✓	✓
3. EXECUTIVE SUMMARY			✓	✓
3.1	Purpose of document		✓	✓
3.2	Restoration Mission Statement	✓	✓	✓
3.3	Goals		✓	✓
3.4	Key recommendations		✓	✓
3.5	Project duration		✓	✓
4. PROJECT LOCATION		✓	✓	✓
4.1	Location: address, legal land description, ownership	✓	✓	✓
4.2	Area/Size: area/boundaries of disturbance footprint and restoration; size of area and shown on map	✓	✓	✓
4.3	Ownership/stewardship	✓	✓	✓
5. PROJECT TEAM		✓	✓	✓
5.1	Project manager, project sponsor	✓	✓	✓
5.2	Parks representative	✓	✓	✓
5.3	Consultants/contractors/technical team	✓	✓	✓
5.4	Stakeholders or potential stakeholders	✓	✓	✓

5.5	Team directory		✓	✓
6. PROJECT AREA ECOLOGICAL OVERVIEW		✓	✓	✓
6.1	Natural Region and Subregion (Natural Regions Committee 2006)	✓	✓	✓
6.2	Description of pre-existing disturbed conditions/site history	✓	✓	✓
6.3	Soils type, including texture and horizon depths, classified to at least Great Group as per <i>The Canadian System of Soil Classification</i> , 3rd edition (Agriculture and Agri-Food Canada 1998)	✓	✓	✓
6.4	Aspect and exposure (e.g. south facing, windy)	✓	✓	✓
6.5	Slope position (e.g. crest, mid-slope, level)	✓	✓	✓
6.6	Topography (e.g. hummocky – rolling with micro-topographic variation of approximately 5.0m)	✓	✓	✓
6.7	Landscape context	✓	✓	✓
7. PROJECT NEED and FEASIBILITY		✓	✓	✓
7.1	Proposed disturbance activities	✓	✓	✓
7.1.1	Description of proposed disturbance activities and impact	✓	✓	✓
7.1.2	Description of proposed post-disturbance conditions and footprint	✓	✓	✓
7.1.3	Depth of predevelopment topsoil and location of proposed stockpile	✓	✓	✓
7.2	Restoration Project Need	✓	✓	✓
7.2.1	Description of physical site conditions in need of repair	✓	✓	✓
7.2.2	Threats, including cultural/anthropogenic; stressors in need of regulation or re-initiation	✓	✓	✓
7.2.3	Encroachments/Disturbances	✓	✓	✓
7.2.4	Invasive species	✓	✓	✓
7.2.5	List kinds of biotic interventions needed	✓	✓	✓
7.3	Project Feasibility and Alignment	✓	✓	✓
7.3.1	Feasibility assessment (certainties and uncertainties)	✓	✓	✓
7.3.2	Preliminary review of similar projects for direction	✓		
7.3.3	Project constraints (e.g. landscape restrictions)	✓	✓	✓
7.3.4	Legal constraints: Identify existing City, Provincial and Federal plans, policies, guidelines, implementation documents, regulation, and legislative requirements that may direct or influence project.	✓	✓	✓
7.3.5	Permits that need to be secured and permit specifications	✓	✓	✓
7.3.6	Project risks/dependencies/assumptions	✓	✓	✓
7.3.7	Describe project alignment with all of the above	✓	✓	✓
8. PRE-DISTURBANCE BIOPHYSICAL INVENTORY		✓	✓	✓
8.1	Methodology	✓	✓	✓
8.1.1	Project site		✓	✓
8.1.2	Reference Habitat Description (see 10. Habitat Restoration Approach)	✓	✓	✓
8.1.3	Summary/listing of existing information/reports reviewed		✓	✓
8.1.4	Summary of methodology used to collect novel data and to conduct inventory		✓	✓
8.2	Climate		✓	✓
8.2.1	Natural Region and Subregion climate		✓	✓
8.2.2	Urban climate data		✓	✓
8.2.3	Climate change considerations		✓	✓

8.3	Topography	✓	✓	✓
8.3.1	Physical description of existing landform; in most cases this may require presentation of a survey		✓	✓
8.3.2	Aspect and exposure (e.g. south facing, windy)	✓	✓	✓
8.3.3	Slope position within the landscape as applicable (e.g. crest, mid-slope, level)	✓	✓	✓
8.3.4	Topography (e.g. rolling with micro-topographic variation of approximately 5.0m – hummocky)	✓	✓	✓
8.4	Geology / Geomorphology		✓	✓
8.4.1	A description of surficial and, if possible, sub-surficial geological features at the site and its immediate environment		✓	✓
8.4.2	Identified glacial landforms should be included in the preliminary site report		✓	✓
8.4.3	Stability issues should be included in the preliminary site report		✓	✓
8.5	Pedology / Soils	✓	✓	✓
8.5.1	Soils classification: Soil type classified to at least Great Group as per The <i>Canadian System of Soil Classification</i> , 3rd edition (Agriculture and Agri-Food Canada 1998)	✓	✓	✓
8.5.2	Soil physical properties and structure: <ul style="list-style-type: none"> • Horizon descriptions and depths ("depth of predevelopment topsoil") • Soil texture • Drainage/seepage • Salinity/sodicity • Soil nutrient regime • Soil moisture regime 		✓	✓
8.6	Hydrology	✓	✓	✓
8.6.1	List, description, and map of all hydrologic features, including springs <ul style="list-style-type: none"> • Classification must be consistent with the Government of Alberta's (2013a) <i>Integrated Standards and Guidelines' Provincial Watercourse and Waterbody Descriptions</i> • Probable stream order as derived by Scrimgeour <i>et al.</i> (2003) • Classification of wetlands must be consistent with methods described below 	✓	✓	✓
8.6.2	List, description, and map of all surficial drainage patterns, riparian habitats, and groundwater recharge and discharge areas, including depth to water table.		✓	✓
8.6.3	Description and map of watershed basins and sub-basins, including constructed catchment area boundaries.	✓	✓	✓
8.6.4	Wetland classification and delineation <ul style="list-style-type: none"> • All wetlands are to be classified and delineated according to methods specified in the <i>Calgary Wetland Conservation Plan</i> (The City of Calgary Parks 2004) • Wetlands are to be classified using the Stewart and Kantrud (1971) wetland classification system. Classification should be determined in part by existing plant communities and a review of historical air photos, ensuring that the sites are reviewed throughout the range of climatic variation. Detailed mapping of plant communities and boundary delineation (using soil data or other suitable information) will be required for any wetlands determined to be Class III through VI • Detailed plant community mapping may be required to delineate between Class II and Class III wetlands in some cases • Surface and sub-surface hydrological data sufficient to determine wetland functional hydrology (inputs, outflows, water balance, and other relevant information) where an impact is anticipated to the wetland • Proposed, planned, or existing use/function as stormwater infrastructure 	✓	✓	✓
8.7	Vegetation Inventory		✓	✓
8.7.1	Plant community type(s) classification <ul style="list-style-type: none"> • Quantitative assessment of the vegetation to obtain: 		✓	✓

	<ul style="list-style-type: none"> ○ Composition, structure and relative abundance ○ Percent coverage of vegetation ○ Mapped plant community type polygons (lowest taxonomic unit in the classification system; represent subdivided ecological site phase) • Survey methods – describe methodology used that is consistent with standard references, such as: <ul style="list-style-type: none"> ○ <i>Ecological Community Sampling Guidelines</i> (ACIMS 2011) and <i>Minimum Patch Size Specifications for Ecological Community Occurrences</i> (ACIMS 2006) ○ <i>Calgary Urban Parks Program Biophysical Assessment</i> (The City of Calgary Parks 1993) ○ <i>Field Guide to Ecosites of Southwestern Alberta</i> (Archibald et al. 1996) ○ <i>Ecological Land Survey Site Description Manual</i> (Alberta Environmental Protection 1994) ○ <i>Range Plant Community Type Guides</i> (AESRD 2013) for appropriate Natural Subregions 			
8.7.2	<p>Special ecological communities</p> <ul style="list-style-type: none"> • Survey methods – describe standard methodology used that is consistent with <i>Ecological Community Sampling Guidelines</i> (ACIMS 2011) and <i>Minimum Patch Size Specifications for Ecological Community Occurrences</i> (ACIMS 2006) • List and mapping of ecological communities on the ACIMS (2013a) <i>Ecological Community Tracking List</i> or watch lists, or that could be considered for addition to the tracking or watch list • List and mapping of locally significant ecological communities, as per (ACIMS 2011 <i>Ecological Community Sampling Guidelines</i>) • Documentation – describe/document occurrences on ACIMS (n.d.) <i>Rare Ecological Community Site Description Form</i> and ACIMS (n.d.) <i>Rare Ecological Community Vegetation Description Form</i> • Copies of rare ecological community forms submitted to ACIMS (may be included as an Appendix to the Restoration Report) 		✓	✓
8.7.3	<p>Botanical species diversity</p> <ul style="list-style-type: none"> • Species list with common and scientific names as per current ACIMS (2013b) Element Occurrence data nomenclature • Plant species identification and listing including non-vascular plants • Role of resident vegetation within the localized system 		✓	✓
8.7.4	<p>Rare plant species: vascular plants</p> <ul style="list-style-type: none"> • Study design – describe rationale for study design according to the ANPC (2012) <i>Guidelines for Rare Vascular Plant Surveys in Alberta</i> • Survey methods – describe pre-survey investigations, survey techniques, and field resource methodology according to the ANPC (2012) <i>Guidelines for Rare Vascular Plant Surveys in Alberta</i> • Documentation – describe/document search effort, surveys, no detection areas, and rare plant occurrences on the ACIMS (2013d) <i>Plant, Lichen and Fungi Data Submission Form</i>, according to the ANPC (2012) <i>Guidelines for Rare Vascular Plant Surveys in Alberta</i> • Copy of forms submitted to ACIMS (may be included as an Appendix to the Restoration Report) • Voucher specimens – include details of voucher specimen collection, submission, and identification, if applicable • Map rare plant populations in relation to proposed disturbance • List rare plants and their provincial status according to ACIMS (2013c) <i>List of Tracked and Watched Elements, General Status of Alberta Wild Species</i> (AESRD 2010), Alberta <i>Wild Species Status Search</i> (AESRD 2011), Province of Alberta (2000) <i>Wildlife Act</i>, and the Endangered Species Conservation Committee (AESRD 2012); and federal status according to Canada's <i>Species at Risk Act</i> (Government of Canada 2002), and the 		✓	✓

	<p><i>COSEWIC Wildlife Species Search</i> (Government of Canada 2014)</p> <ul style="list-style-type: none"> • As applicable, for rare plant populations that will potentially be affected by a proposed disturbance, recommendations should represent what actions may be taken and why. Both potential direct effects (<i>e.g.</i>, rare plant population is under development footprint) and indirect effects (<i>e.g.</i>, changes in moisture or light regimes) should be considered (ANPC 2012) • Provide rationale for not conducting surveys in proposed disturbance areas (ANPC 2010), if applicable 			
8.7.5	<p>Rare plant species: non-vascular plants, lichens, and fungi</p> <ul style="list-style-type: none"> • Bryophytes and lichens – describe methods for pre-survey investigations, survey techniques, and field methodology of non-vascular (bryophyte) plants (mosses, hornworts, liverworts) and lichens following the most recently updated recommendations from the ANPC (2010) <i>Recommended Documents for Botanical Surveys in Areas of Proposed Disturbance</i> • Fungi – describe methods for pre-survey investigations, survey techniques, field methodology, and laboratory protocols for fungi following the most recently updated recommendations from the ABMI (2005, 2007, 2008, 2009, 2010, 2011, 2012) <i>Terrestrial Data Collection Protocols</i> • Documentation – describe/document search effort, surveys, no detection areas, and rare plant occurrences on the ACIMS (2013d) <i>Plant, Lichen and Fungi Data Submission Form</i>, according to the ANPC (2010) <i>Recommended Documents for Botanical Surveys in Areas of Proposed Disturbance</i> • Copy of forms submitted to ACIMS (may be included as an Appendix to the Restoration Report) • Voucher specimens – include details of voucher specimen collection, submission, and identification, if applicable • Map rare plant populations in relation to proposed disturbance • List rare plants and their provincial status according to ACIMS (2013c) <i>List of Tracked and Watched Elements, General Status of Alberta Wild Species</i> (AESRD 2010), <i>Alberta Wild Species Status Search</i> (AESRD 2011), <i>Province of Alberta (2000) Wildlife Act</i>, and the Endangered Species Conservation Committee (AESRD 2012); and federal status according to <i>Canada’s Species at Risk Act</i> (Government of Canada 2002), and the <i>COSEWIC Wildlife Species Search</i> (Government of Canada 2014) • As applicable, for rare plant populations that will potentially be affected by a proposed disturbance, recommendations should represent what actions may be taken and why. Both potential direct effects (<i>e.g.</i>, rare plant population is under development footprint) and indirect effects (<i>e.g.</i>, changes in moisture or light regimes) should be considered (ANPC 2012) • If applicable, provide rationale for not conducting surveys in proposed disturbance areas, as recommended in the ANPC (2010) <i>Rare Plant Survey Guidelines</i> 		✓	✓
8.7.6	<p>Invasive/exotic species</p> <ul style="list-style-type: none"> • Identify all botanical species that meet one or all of the following criteria: <ul style="list-style-type: none"> ○ Regulated species as per Alberta (2010) <i>Weed Control Act and Regulation</i> ○ Alberta <i>Wild Species Status Search</i> “Exotic/Alien” status (AESRD 2011) ○ Species listed by the current ACIMS (2013b) Element Occurrence data as “exotic” in origin ○ Species listed on the current Alberta Native Plant Council ‘s(2013) Rogue’s Gallery ○ Species listed on the current Alberta Weed Regulatory Advisory Committee Watch List, proposed Prohibited Noxious List, or proposed Noxious List (Alberta Agriculture and Rural Development 2012) • List invasive plants and their status by common and scientific names as per current ACIMS (2013b) Element Occurrence data nomenclature, including their status • Map locations and abundance of weeds identified 		✓	✓

	<ul style="list-style-type: none"> • Role of invasive/exotic vegetation within the localized system 		✓	✓
8.7.7	Autoecological descriptions for all key native and non-native species		✓	✓
8.8	Faunal Inventory		✓	✓
8.8.1	Background data collection from previous reports and occurrence databases: <ul style="list-style-type: none"> • ACIMS – Alberta Conservation Information Management System • FWMIS – Fish and Wildlife Management Information System (AESRD 2014a) • Existing biophysical inventories or impact assessments 		✓	✓
8.8.2	Wildlife activity and use: <ul style="list-style-type: none"> • Incidental observations/survey • Breeding bird survey in appropriate seasonal window • Waterfowl and waterbird survey in wetlands • Amphibian survey in wetlands • Reconnaissance-level wildlife and habitat surveys to note general habitat conditions, to evaluate habitat suitability and to collect signs of wildlife use 		✓	✓
8.8.3	Wildlife habitat: <ul style="list-style-type: none"> • Identification of significant movement patterns, wildlife corridors and constraints (primarily based upon habitat) • Habitat value • Additional analysis, such as HSI (habitat suitability index) may be required 		✓	✓
8.8.4	Faunal species diversity <ul style="list-style-type: none"> • Wildlife species identification and list with common and scientific names as per current ACIMS (2013b) Element Occurrence data nomenclature • Role of resident wildlife within the localized system 		✓	✓
8.8.5	Listed fauna species <ul style="list-style-type: none"> • Survey methods – describe survey methodology used according to the Government of Alberta’s (2013b) <i>Sensitive Species Inventory Guidelines</i> and (2013a) <i>Integrated Standards and Guidelines</i>, and/or the ABMI (2005, 2007, 2008, 2009, 2010, 2011, 2012) <i>Terrestrial Data Collection Protocols</i>, as appropriate • Documentation – describe/document surveys and results using the appropriate FWMIS wildlife loadforms (AESRD 2014b), according to the <i>FWMIS Data Submission Guide</i> (AESRD 2014b) • Copy of wildlife loadforms (AESRD 2014b) submitted to FWMIS (may be included as an Appendix to the Restoration Report) • Copy of Wildlife Research Permit and Collection Licenses obtained (AESRD 2014c), as applicable • List species and their provincial status according to ACIMS (2013c) <i>List of Tracked and Watched Elements</i>, <i>General Status of Alberta Wild Species</i> (AESRD 2010), <i>Alberta Wild Species Status Search</i> (AESRD 2011), Province of Alberta (2000) <i>Wildlife Act</i>, and the Endangered Species Conservation Committee (AESRD 2012); and federal status according to Canada’s <i>Species at Risk Act</i> (Government of Canada 2002), and the <i>COSEWIC Wildlife Species Search</i> (Government of Canada 2014) 		✓	✓
8.8.6	Invasive/exotic species <ul style="list-style-type: none"> • Identify all faunal species that meet one or all of the following criteria: <ul style="list-style-type: none"> ○ Alberta <i>Wild Species Status Search</i> “Exotic/Alien” status (AESRD 2011) ○ Species listed by the current ACIMS (2013b) Element Occurrence data as “exotic” in origin • List invasive animals and their status by common and scientific names as per current ACIMS (2013b) Element Occurrence data nomenclature, including their status • Map locations of observations • Role of invasive/exotic fauna within the localized system 		✓	✓
8.8.7	Autoecological descriptions for all key native and non-native species		✓	✓

8.9	Cultural Resources		✓	✓
8.9.1	Prehistoric, historic, and current social, economic, and cultural resources		✓	✓
8.9.2	Existing historical, interpretive, or recreational features		✓	✓
8.9.3	Potential for developing recreational, interpretive, or educational facilities at the site when completed		✓	✓
8.10	Aesthetic		✓	✓
8.10.1	Subjective description of how the site fits into the landscape and/or cityscape		✓	✓
8.10.2	Describe aesthetic value of prominent views, human disturbance, aesthetic features, hydrological/geological/biological resources, etc.		✓	✓
8.10.3	Other noted significant features such as planned vision from Council-approved policy and plans		✓	✓
8.11	Environmentally Significant Areas (see <i>Open Space Plan</i>)		✓	✓
8.11.1	Quality of biotic habitat		✓	✓
8.11.2	Level of importance to the healthy maintenance of the human system		✓	✓
8.11.3	Level of importance to the healthy maintenance of the natural system		✓	✓
8.11.4	Presence of distinctive and/or unusual landform (e.g. escarpments)		✓	✓
8.11.5	Limited representation within the area or city		✓	✓
8.12	Other features		✓	✓
8.12.1	Descriptions or features of interest or importance to the site, and are not included in the previous categories (e.g. man-made features: power lines, buildings, roads, etc.; items of special concern).		✓	✓
9. REFERENCE HABITAT DESCRIPTION			✓	✓
9.1	Location, size, ownership (if physical location is used)		✓	✓
9.2	Reference Habitat ecological overview: <ul style="list-style-type: none"> Natural Region and Subregion Description of pre-existing disturbed conditions/site history Landscape context 		✓	✓
9.3	Reference habitat biophysical inventory		✓	✓
9.4	Site selection criteria: <ul style="list-style-type: none"> Relationship and proximity to restoration site 		✓	✓
9.5	Reference Habitat as the restoration target(s)		✓	✓
9.6	List of reference, historical air photos, etc. used to describe reference habitat		✓	✓
10. HABITAT RESTORATION APPROACH			✓	✓
10.1	Restoration Hypothesis		✓	✓
10.1.1	Outline idea of what is happening on the landscape based on the biophysical inventory and reference habitat, and explain how habitat restoration will lead to a general outcome.		✓	✓
10.1.2	Explanation of how the proposed restoration will integrate with the surrounding landscape		✓	✓
10.2	Restoration Goals and Objectives		✓	✓
10.2.1	Project goals (high-level for conceptual report)		✓	✓
10.2.2	Type of habitat restoration (reclamation, naturalization, rehabilitation, or restoration)		✓	✓
10.2.3	Project objectives (high level for conceptual report)		✓	✓
10.3	Restoration Prescription		✓	✓
10.3.1	Restoration activities required for the project		✓	✓
10.3.2	Site preparation methods, i.e. a season of weed control prior to reseeding		✓	✓
10.3.3	Seed mix(es) and application rate(s) specific to the site conditions		✓	✓

10.3.4	Seeding method (hydroseeding, brillion, etc.)		✓	✓
10.3.5	Planting list identifying species (botanical and common name), quantities, sizes, habit, spacing densities and specific remarks as required (note: plant cultivars are only acceptable if approved by Parks; the spacing and densities of plantings are to replicate the biophysical inventory)	✓	✓	✓
10.3.6	Erosion and sediment controls		✓	✓
10.3.7	Procurement of materials and resources (biotic and non-biotic) required; sources of materials and resources	✓	✓	✓
10.3.8	Labour sources (contractors, volunteers, etc.) and equipment needs	✓	✓	✓
10.4	Evaluation of Restoration Alternatives		✓	✓
10.4.1	Restoration alternatives/options		✓	✓
10.4.2	Prioritization of treatments		✓	✓
10.4.3	Restoration trajectory analysis		✓	✓
10.4.4	Selection of preferred alternative		✓	✓
10.5	Performance Measures		✓	✓
10.5.1	Measuring indicators (performance standards and monitoring protocols by which the project can be evaluated for CCC and FAC)		✓	✓
10.5.2	An achievable set of criteria that constitutes a successful restoration of the site to be prepared in consultation with the Developer.		✓	✓
10.5.3	Tolerance levels		✓	✓
10.5.4	Details of the performance criteria including a monitoring program based on, <ul style="list-style-type: none"> • Net contribution to the landscape, watershed and the region • Integrity of the surrounding ecosystem • The reference habitat • Sufficient detail must be provided so that the current condition of the site can be assessed and used to determine the desired restoration objectives 		✓	✓
10.5.5	Biotic <ul style="list-style-type: none"> • Wildlife assessments • Vegetation cover 		✓	✓
10.5.6	Abiotic <ul style="list-style-type: none"> • Soil • Hydraulic recovery, water quality, quantity, frequency 		✓	✓
10.6	Monitoring Program	✓	✓	✓
10.6.1	Collection of baseline data		✓	✓
10.6.2	Performance measure monitoring methods		✓	✓
10.6.3	The reference habitat		✓	✓
10.6.4	Monitoring plots, including GPS coordinates, location, size		✓	✓
10.6.5	Monitoring schedule		✓	✓
10.6.6	Photomonitoring (see <i>Appendix E – Photomonitoring Guidelines</i>)	✓	✓	✓
10.6.7	Written descriptions summarizing methodologies, type and manner of information and data.		✓	✓
10.6.8	Synthesis and analysis of compiled data		✓	✓
11. IMPLEMENTATION PLAN		✓	✓	✓
11.1	Project scope	✓	✓	✓
11.1.1	Project extent summary	✓	✓	✓
11.1.2	Out of scope activities	✓	✓	✓

11.2	Site management and maintenance	✓	✓	✓
11.2.1	Basic implementation plans and schedules for site preparation, installation, construction and maintenance activities	✓	✓	✓
11.2.2	Proposed maintenance schedule	✓	✓	✓
11.2.3	Planting and seeding		✓	✓
11.2.4	Weed management		✓	✓
11.2.5	ECO Plan (The City of Calgary 2014)		✓	✓
11.2.6	Erosion and sediment controls		✓	✓
11.2.7	Soil management		✓	✓
11.2.8	Maintenance schedule		✓	✓
11.3	Project Milestones and Deliverables	✓	✓	✓
11.3.1	Project schedule and deliverables	✓	✓	✓
11.3.2	Project milestones, including transition to The City	✓	✓	✓
11.4	Contingency plan		✓	✓
11.4.1	Dependencies		✓	✓
11.4.2	Strategy for adaptive management		✓	✓
11.4.3	Strategy for long-term protection and management		✓	✓
11.5	Cost Estimate	✓	✓	✓
11.5.1	Project funding sources	✓	✓	✓
11.5.2	High-level cost/budget	✓	✓	✓
11.5.3	Detailed cost/budget; cost effectiveness of restoration prescription		✓	✓
11.5.4	Initial costs, materials, labour, monitoring	✓	✓	✓
12. MAPPING		✓	✓	✓
12.1	Project location (overview of area and specific boundaries)	✓	✓	✓
12.2	Project site restoration area and disturbance footprint (location of encroachment into natural area); scale and scope of construction project or site damage	✓	✓	✓
12.3	Reference habitat location (overview of area and specific boundaries)	✓	✓	✓
12.4	Aerial photographs (current and historic), including year of photography, and data source	✓	✓	✓
12.5	Identify and map Environmentally Significant Areas (see 8. Pre-disturbance Biophysical Inventory)		✓	✓
12.6	Water bodies and wetlands <ul style="list-style-type: none"> Identify and map the wetland zones and phases present in each wetland and link to wetland communities (ecosites) 		✓	✓
12.7	Mapping and description of wildlife observations		✓	✓
12.8	Mapping and description of any species at risk		✓	✓
12.9	Mapping and description of other significant site features (e.g. escarpments)		✓	✓
12.10	Description and reference to digital map data supplied to The City of Calgary Parks to facilitate final mapping of the biophysical inventory. Data must be in a GIS format compatible with City mapping standards: <ul style="list-style-type: none"> File format: ESRI shapefile (.shp) or file geodatabase (.gdb) Geographic Coordinate System: GCS_WGS_1984 Projected Coordinate System: Calgary_3TM_WGS_1984_W114 Metadata schema: ISO 19115:2003 Geographic Information 		✓	✓
13. SITE PHOTOGRAPHS (see Appendix E)		✓	✓	✓
13.1	Photomonitoring logs		✓	✓
13.2	Site photographs	✓	✓	✓

14. REFERENCES		✓	✓	✓
15. HABITAT RESTORATION PROJECT CHECKLIST (see Appendix F)		✓	✓	✓
16. APPENDICES			✓	✓
16.1	Completed <i>Construction Inspection Checklist and CCC Reports</i>		✓	✓
16.2	Maintenance logs		✓	✓
16.3	Seed Testing Certificates		✓	✓
16.4	Copies of applicable biophysical inventory forms and permits, including but not limited to: <ul style="list-style-type: none"> • ACIMS <i>Plant, Lichen and Fungi Data Submission Form</i> • ACIMS <i>Rare Ecological Community Site Description Form and Rare Ecological Community Vegetation Description Form</i> • FWMIS wildlife loadforms • Wildlife Research Permit and Collection Licenses 		✓	✓
17. ADDENDA			✓	✓
17.1	Copy of completed <i>Final Acceptance Inspection Checklist and Report</i>		✓	✓
17.2	Biocide application reports (if applicable)		✓	✓
17.3	Summary of progress reports, final report amendments, approvals			✓
17.4	Post-restoration project ecological evaluation/vegetation species inventory			✓
17.5	Monitoring logs and performance measure data			✓

APPENDIX E

PHOTOMONITORING

GUIDELINES

Reporting for habitat restoration projects

Restoration project photographs must be taken of both the degraded habitat and reference habitat sites according to the project timelines and reporting requirements outlined in *Appendix D – Restoration Report Requirements: Section 13 – Site Photographs*.

Establishing baseline photographs

Baseline photographs are taken during the project conception and feasibility assessment phase, prior to approval of the restoration report, and prior to disturbance. Data recorded during establishment of baseline photographs includes project details (title, phase, location, park name), general information on the site visit (date, GPS datum, photographer, weather, temperature, incidental observations), and detailed information for each baseline photograph (photo point number, photograph number, bearing, distance to meter board, time, GPS coordinates, and photo description). See the sample “Habitat Restoration Photomonitoring – Baseline Photos Data Sheet” for details.

Baseline photographs should provide a representative view of site conditions (Lucey and Barraclough 2001) at both the degraded habitat site and reference habitat site, and relate to the planned performance measures for the habitat restoration project. The number of baseline photographs established for each project is dependent on the size and diversity of the site, and the need to represent different aspects of the monitoring program.

The methods recommended by Lucey and Barraclough (2001) for photopoint photographs are acceptable for habitat restoration photomonitoring. It is recommended to use a marked, standard sized object such as a meter board that can act as a standard scale and repeatable focal point. The location of the meter board and camera should be permanently marked; however, the locations must be recorded using GPS coordinates at a minimum. Data boards including unique photopoint information also recorded on the “Habitat Restoration Photomonitoring – Baseline Photos Data Sheet” should be included within the field of view in order to embed photopoint details within each photograph. All unique camera points should be identified using a unique code, and all photographs should be taken in a landscape orientation.

Photomonitoring replication methods

Upon establishment of baseline photographs, data sheets which include the project details (title, phase, location, park name) and original photograph details (date, time, GPS datum, GPS coordinates, bearing, distance to meter board, camera model and lens, weather and temperature, and photo description) and the original photograph must be prepared in advance of each subsequent site visit to obtain replicate photographs for photomonitoring. See the sample “Habitat Restoration Photomonitoring – Replicated Photos Data Sheet” for details. The frequency and timing of photograph replication should be predetermined according to the monitoring program and performance measures used to assess the habitat restoration project.

Photomonitoring points may be found in the field using GPS coordinates, as well as metal detectors where permanent marking pins have been installed (Lucey and Barraclough 2001). Both the camera and meter board should be placed in the same location as the baseline photograph, and an identical camera angle and view should be used to replicate photos. Data to be recorded when replicate photographs are taken includes date, time, camera model and lens, photograph number, weather and temperature, and incidental observations. See the sample “Habitat Restoration Photomonitoring – Replicated Photos Data Sheet” for details.

Photomonitoring logs

Logs of photomonitoring activities should be kept that summarize the series of photomonitoring dates and other relevant data collected on the data sheets. Photomonitoring logs will be included on the final restoration report, progress reports, and the as-built restoration report (see *Appendix D – Restoration Report Requirements*).

Digital photograph files

At the discretion of The City of Calgary Parks, submission of digital photograph files in JPG (.jpg) format may be required. File names must reflect project name, date, and a photograph identifier linking it to the location and purpose of each photograph, submitted with an associated list of file names.

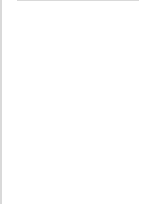
HABITAT RESTORATION PHOTOMONITORING - BASELINE PHOTOS DATA SHEET



HABITAT RESTORATION PROJECT		<input type="checkbox"/> Restoration Site <input type="checkbox"/> Reference Habitat	
Project Title:			
Project Phase:			
Park Name:			
Project Address:			
Legal land description:			
BASELINE PHOTOGRAPH GENERAL INFORMATION			
Date:	YYYY / MM / D	GPS Datum:	<input type="checkbox"/> NAD83 <input type="checkbox"/> WGS84
Photographer Name:		Camera Model/Lens:	
Temperature:		Camera/Focal Pt Ht	
Weather:			
Incidental observations:			
BASELINE PHOTO POINT INFORMATION		PHOTO POINT #:	1
Photograph #:		Bearing (true N):	
Distance to Meter Board:		Time (24 hr):	HH : MM
GPS Coordinates:			
Photo description:			
BASELINE PHOTO POINT INFORMATION		PHOTO POINT #:	2
Photograph #:		Bearing (true N):	
Distance to Meter Board:		Time (24 hr):	HH : MM
GPS Coordinates:			
Photo description:			
BASELINE PHOTO POINT INFORMATION		PHOTO POINT #:	3
Photograph #:		Bearing (true N):	
Distance to Meter Board:		Time (24 hr):	HH : MM
GPS Coordinates:			
Photo description:			
BASELINE PHOTO POINT INFORMATION		PHOTO POINT #:	4
Photograph #:		Bearing (true N):	
Distance to Meter Board:		Time (24 hr):	HH : MM
GPS Coordinates:			
Photo description:			

HABITAT RESTORATION PHOTOMONITORING – REPLICATED PHOTOS DATA SHEET



HABITAT RESTORATION PROJECT INFORMATION		<input type="checkbox"/> Restoration Site <input type="checkbox"/> Reference Habitat	
Project Title:			
Project Phase:			
Park Name:			
Project Address:			
Legal land description:			
ORIGINAL PHOTOGRAPH INFORMATION			
Date:	YYYY/MM/DD	Time (24 hr):	HH:MM
GPS Datum:	<input type="checkbox"/> NAD83 <input type="checkbox"/>	Bearing (true N):	
GPS Coordinates:		Distance to Meter	
Temperature:		Camera Model/Lens:	
Weather:		Camera/Focal Pt Ht	
Photo description:			
PHOTO POINT #:		INSERT PHOTOGRAPH	
			
REPLICATE PHOTOGRAPH INFORMATION		Date:	YYYY/MM/DD
Photograph #:		Time (24 hr):	HH:MM
Photographer Name:		Camera Model/Lens:	
Temperature:		Camera/Focal Pt Ht	
Weather:			
Incidental observations:			

APPENDIX F

HRP CHECKLIST

CCC and FAC for a habitat restoration project should be completed in concert with this checklist, which shall be updated throughout the course of the project. Some items may not be applicable to all projects or situations and are denoted with an asterisk (*), while all other items are mandatory.

HABITAT RESTORATION PROJECT CHECKLIST (Part 1)

To be used in conjunction with CCC / FAC.



Phase 1: Check the appropriate habitat restoration project (HRP) trigger process and disturbance category.			
Applicable Process Stage:	<input type="checkbox"/> Outline Plan <input type="checkbox"/> Landscape Construction <input type="checkbox"/> Maintenance Period <input type="checkbox"/> City-owned		
A natural environment park disturbance:	<input type="checkbox"/> none (must be stated in Concept Plan) <input type="checkbox"/> expected/desired/approved <input type="checkbox"/> unauthorized		
Phases 2-9: Habitat restoration project (HRP) information.			
PROJECT TITLE			HRP Checklist #
LOCATION	Community	Subdivision	Plan Block Lot
	Description		Phase
	Developer		Development Agreement #
	Restoration Site:		
	Legal/ Municipal Address	GPS coordinates	GPS Datum: <input type="checkbox"/> NAD83 <input type="checkbox"/> WGS84
	Reference Habitat:		
	Legal/ Municipal Address	GPS coordinates	GPS Datum: <input type="checkbox"/> NAD83 <input type="checkbox"/> WGS84
CONTACTS	Habitat Restoration Project:		
	Restoration site owner	Contact Person	Phone ()
	Project Manager (HRP PM)	Contact Person	Phone ()
	Restoration Consultant	Contact Person	Phone ()
	Restoration Contractor	Contact Person	Phone ()
	The City of Calgary Parks:		
	Parks Representative (CPAG)	Contact Person	Phone ()
	Parks Natural Areas representative (NA Rep.)	Contact Person	Phone ()
	Parks Development Inspector (PDI)	Contact Person	Phone ()
	Parks Manager Operations Division	Contact Person	Phone ()
	Parks Coordinator - Development	Contact Person	Phone ()
	Parks Manager Planning and Development Services	Contact Person	Phone ()

HABITAT RESTORATION PROJECT CHECKLIST (Part 2)

To be used in conjunction with CCC / FAC.

✂

Phases 2-9: Habitat restoration project (HRP) checklist items by HRP phase.						
Checklist Item*	Date YYYY/MM/DD	Approval Initials				Comments (deficiencies, notes, etc.)
		NA Rep.	HRP PM	PDI	CPAG	
2 Site visit with proponent and Parks Reference habitat described						
3 Conceptual Restoration Plan: 7 copies						
Conceptual Restoration Report: 7 copies						
City approves HRP with comments						
*Modified conceptual plan and report submitted						
4 Preliminary tasks complete		N/A		N/A	N/A	
Biophysical inventory complete		N/A		N/A	N/A	
Restoration team created		N/A		N/A	N/A	
Communication plan developed		N/A		N/A	N/A	
5 Restoration goals and objectives						
Alternative restoration approaches/ prescriptions						
Preferred alternative selected						
Performance measures prepared						
Monitoring program designed						
Implementation, maintenance, and management plans developed						
*ECO Plan						
Project milestone schedule created						
Contingency plan developed						
Project budget developed						
Site mapping complete						
Final Restoration Plan: 7 copies						
Final Restoration Report: 2 copies						
City approves HRP with comments						
*Modified final plan and report submitted						
Approved final drawings submitted						
6 City acknowledges final drawings receipt						
Materials, equipment, permits, etc. obtained						
Seed Testing Certificates submitted to Parks						
Site preparation						
HRP implementation/construction						
7 Monitor restoration success outputs						
Construction Inspection #1 by Parks						
Construction Inspection #2 by Parks						
Construction Inspection #3 by Parks						
Construction Inspection #4 by Parks						
Construction Inspection #5 by Parks						
Construction Inspection Checklist and CCC Report						
Maintenance period inspections by Parks						
Monitor project performance						
Progress reports						
*Restoration report amendments						



8	Preliminary "as constructed" drawings						
	Construction Inspection Checklist and CCC Report submitted						
	Construction Completion Certificate (CCC): 4 copies						
	Projected Maintenance Period Expiry Date (matches Construction Inspection Checklist and CCC Report)						
	City acknowledges CCC receipt						
	*Maintenance logs						
	Deficiency completion letter submitted						
	*CCC appeal						
9	Final construction inspection by proponent						
	As-built restoration report submitted						
	As-built restoration plan submitted						
	*Maintenance manuals						
	Final Acceptance Certificate (FAC): 4 copies						
	Final Acceptance Inspection Check List and Report						
	Final construction inspection by Parks						
	*Application Expiry Date (matches Construction Inspection Checklist and CCC Report)						
	*Conditional FAC						
	*FAC appeal						
	Project transition to The City						

Inspection Date: _____ Parks Area Rep: _____

No deficiencies noted Industry Rep: _____

Application Expiration Date: _____ Park Inspector: _____

Report Distribution: Industry Rep. Area Superintendent Design and Development File

HABITAT RESTORATION PROJECT CHECKLIST (Part 3)

Phase 10: Post-Habitat restoration project (HRP) checklist for The City of Calgary Parks. INTERNAL USE ONLY.		
Park name		PARIS Asset Code
Post-Project / Restoration Continuation Checklist:		Comments:
		Date YYYY/MM/DD
HRP as-builts received	<input type="checkbox"/> YES <input type="checkbox"/> NO	
PARIS updated	<input type="checkbox"/> YES <input type="checkbox"/> NO	
Staff assigned	<input type="checkbox"/> YES <input type="checkbox"/> NO	
Budget assigned	<input type="checkbox"/> YES <input type="checkbox"/> NO	
Monitor restoration success outputs	<input type="checkbox"/> YES <input type="checkbox"/> NO	