WASCANA CENTRE LANDSCAPE ASSESSMENT

FINAL REPORT

Submitted to
Wascana Centre Authority

By
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And

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EXECUTIVE SUMMARY

Crosby Hanna and Associates was engaged by Wascana Centre Authority (WCA) to perform a landscape assessment for all the lands within the Wascana Centre boundary. The landscape assessment included: “soft landscape” - turf, trees, shrub beds, flower beds, naturalized areas, play fields, ball diamonds, and crusher dust / wood chip pathways; bollards; site furniture; irrigation; select art features, monuments and memorials; and two play areas. The project team included those with expertise in plant assessment, structural engineering, art conservation and play structure assessment, as well as computer programming.

Landscape data was collected electronically using handheld GPS enabled devices into which the approved assessment criteria had been loaded. 2009 air photos purchased from the City of Regina were also uploaded and served as a guide while assessors were in the field. Landscape assessment was completed between June 6th and July 10th, 2012. In total 13,405 points of data were collected which represented 1.1 million m² of turf, over 60,000 trees, and 157,000 m² of shrub beds, as well as other landscape items.

In general, the landscape in a large portion of Wascana Centre is a combination of trees and shrub beds in irrigated turf. The majority of the tree and shrub plantings are old and will soon be coming to the end of their useful life. The aging tree and shrub population requires regeneration if it is to be retained in a healthy state. In some areas, new planting is occurring, but more is required. The existing trees and shrubs require pruning to remove dead material and improve plant health.

Wascana Centre contains a number of expansive rototilled beds of trees. We understand that rototilling is used to address weeds; however, rototilling can damage tree roots and creates a risk of damaging trunks and lower branches. It is typical to find rototilled shrub beds as well. Current practises would recommend that shrub beds be mulched to improve moisture retention and to reduce weed growth. Wascana Centre does contain some mulched beds; however, the practise is not widely or consistently applied. Careful consideration should be given to the future use of rototilled tree beds, as large areas of mulch may not be feasible. A re-design in these areas could create more space for park users.

Another important concern is the prevalence of weedy or invasive species. These are mostly found in the naturalized areas. Especially concerning are the caragana that can be found along the shoreline, and noxious weeds that can be found in the naturalized grass areas.

The existing irrigation system is aging, highly manual, and contains outmoded materials and components. A recommendation is made to automate the system including electric valves, controllers, a central controller and environmental sensors. Employing these

methods and technologies will improve the efficiency of watering and reduce the manual input required to operate the system.

The structural assessment included 18 monuments, structures and art features. A number of minor improvements were recommended such as filling concrete cracks, replacing grout and sealing concrete. Of all the items that were assessed, Speakers Corner requires the most intervention, with the rebuilding of a wall, replacement of brick and unit pavers.

The art assessment included 6 pieces. The most common concerns were biological build-up, scratches, cracks and grout. The Lakeshore Park Totem Pole is highlighted as the piece that requires the most attention. As it is made of wood, it contains a number of long and deep cracks, as well as significant rot at the top and bottom. The assessor has recommended that an art conservator specializing in totem poles be engaged to complete the work.

The Candy Cane and Wascana Park play structures were assessed in relation to current CSA requirements. While minor improvements are required in Candy Cane Park, it is recommended the Wascana Park play equipment be replaced completely.

The landscape assessment provides Wascana Centre with good baseline data on the existing conditions of their landscape. The existing conditions and the associated costs to bring conditions to an acceptable level will help to prioritize funding and projects. The method of collecting data is repeatable and Wascana Centre could use it again to track the effect that prioritized funding has on the landscape condition.

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ACKNOWLEDGEMENTS

We extend our thanks to Wascana Centre personnel who participated in the landscape assessment through their feedback and reviews, the timely provision of documents and drawings, and as invaluable resources regarding Wascana Centre landscape assets.

Thanks to all members of the consulting team. Bill Kalyn was responsible for the development of the assessment criteria, field coordinator for data collection, summaries of overall park status, and general reports on trees, shrubs and natural areas for the parks system. Other landscape data collection personnel were Christine Bachinsky and Stephanie McKichan. Computer programming, database queries and data analysis was completed by Johannes Lindenbaum. Jim Kenyon and Brad Taylor (J.C. Kenyon Engineering) completed structural assessments. Jerome Pratchler reviewed play structures and Brenda Smith completed the assessment of art features.

1. INTRODUCTION

In March of 2012 Crosby Hanna & Associates (CHA) was retained by Wascana Centre Authority (WCA) to conduct a landscape assessment for all the lands within the Wascana Centre boundary. Items included in the audit: turf, trees, shrub beds, flower beds, soccer/football fields, ball diamonds, crusher dust and wood chip walkways, natural areas, bollards, site furniture, irrigation, art features, two play areas, monuments and memorials. Hardscape features such as concrete and asphalt walkways and retaining walls were excluded from this assessment, but were included in the infrastructure audit conducted by Associated Engineering which was completed concurrent with this study.

This audit is intended to provide an evaluation of the current condition of all Wascana lands; to develop a framework for collection of data relating to the current condition of park components; and to develop budget estimates for landscape upgrades. It was considered important to collect data that was comprehensive and reproducible so that the results could updated and compared to earlier data as required for monitoring maintenance progress and identifying significant problems. The collected data is to be used to compare landscape components with new condition and determine the cost to upgrade to new or acceptable condition where required. In addition, components whose condition present a safety hazard were to be identified as needing urgent attention so expedient maintenance repairs can be implemented.

This report is intended to provide a general overview of the status of Wascana lands and identify costs associated with upgrading to an acceptable standard. In addition to the report, the final product includes digital copies of the collected landscape data, the database component of the data, spreadsheets of reported landscape data; brief written summaries; recommended upgrades for all elements; and construction costing.

2. METHODOLOGY

2.1 LANDSCAPE

2.1.1 AREA DEFINITION

Wascana Centre personnel met with the Consulting Team and agreed to subdivide the entire Wascana lands to facilitate assessment by sectors of the park rather than collecting all data as a single area. The most recent Master Plan (2006) was used as the basis for the subdivision. The subdivision followed boundaries suggested by the Manager of Maintenance and the Forestry/Horticulture Manager. Generally the sub-areas are defined by: roadways or pathways; maintenance boundaries; and similar functional use. The data analysis would, therefore, be presented in discreet manageable units that were already associated with various maintenance and operations functions. A list of and map indicating these areas can be found in Section 4 of this report.

2.1.2 DESKTOP REVIEW

The Consulting Team carried out a review of available Wascana Centre Authority base information related to the project area. This information consisted of as-built documentation and digital drawings. WCA purchased 2009 aerial photographs from the City of Regina. These were inserted into ArcGIS software (version 10) and geolocated. In addition, CHA reviewed archived drawing files for further information. Previous documents such as the tree inventory were provided by WCA for review and information.

Existing electronic and hard copy mapping of irrigation systems were reviewed. To the extent that information was available, the installation dates and the types of components were documented. Field review of the existing system was not completed as this intensive review was beyond the scope of this project.

2.1.3 WASCANA CONSULTATION

The Consulting Team held several meetings with Wascana Centre Authority Operations and Maintenance personnel to discuss the current condition of park assets and identify known issues, and problems. Specifically these meetings were used:

- to discuss and confirm the proposed landscape assessment criteria;
- to determine sub-area boundaries and identification names;
- to identify irrigation system components and concerns;
- to identify any initial maintenance, plant or weed concerns; and
- to discuss greenhouse crop assessment.

The assessment criteria designed for this project were presented and reviewed with WCA Staff. An explanation was provided to indicate how these criteria would be applied in the field and ultimately how the information gathered by this method would then be collated,

presented to indicate the condition of landscape components, and accompanied by an estimate of cost to accomplish rehabilitation observed necessary by the Assessment.

The Consulting Team met with WCA personnel in charge of irrigation in each of the five maintenance areas. Available mapping of the existing irrigation components was reviewed at the meeting and irrigation types were provided by WCA personnel and roughly mapped out. Information provided by WCA personnel included primary pipe types, irrigation head types, valve types, water source, pump location and other features unique to each area.

WCA staff also initially identified concerns about their present irrigation system, the maintenance costs of shrub beds and problems of invasive plant species in naturalized landscapes. In addition WCA staff asked that the assessment project consider the general condition of the Centre's tree population and that a specific assessment be carried out on the Wascana Centre Greenhouse crop production operation.

Once developed, the Consulting Team presented a Greenhouse Crop Production Assessment Criteria document to WCA Staff. The document was reviewed and accepted to serve as a standard by which the plant production operation at the Wascana Centre Greenhouse would be assessed.

The Consulting Team met with staff of WCA to confirm that the scope of the Landscape Assessment Project was to include the following components of the soft landscape: trees, shrubs, turf, flowerbeds, naturalized areas and natural or native stands of plant material. Walkways covered with crusher dust, loose aggregate or wood chips, and bollards throughout the Park would become part of this Assessment. The Consulting Team would also undertake an assessment of the present irrigation system employed by Wascana Centre Authority. The Assessment Project would apply to all lands within the jurisdiction of the Authority.

2.1.4 DEMONSTRATION

Data collection began with a demonstration of the landscape assessment process in the field in Wascana Park (sub-area 1a). The demonstration was attended by the WCA Maintenance Manager and the Forestry/Horticulture Manager and key members of the Consulting Teams. During this meeting the application of the assessment criteria was applied to typical park components.

2.1.5 DATA COLLECTION

Field data was collected electronically using Trimble Juno 3Bs which are GPS-based hand held data collection units, operating ArcPad (Version 10). Each day an aerial photograph of the area to be reviewed was loaded onto the units upon which points were located. Each point automatically was given a unique ID number, a time marker, and geographic marker. Dropdown menu forms provided the framework for assessing each landscape component. At the end of each day the data was downloaded into the central

ArcGIS file. In addition to gathering specific data based on the criteria, each member of the field assessment team also made field notes to elaborate on observed problems, or detail landscape conditions for future reference, and to aid in the interpretation of the computer generated data analysis.

Three members of the Consulting Team made up the field assessment team. All landscape components within each sector were assessed at one time, within a day or two. Each field member undertook the same specific set of components in each sector to become more intimately with the assessment criteria for those specific components. This method of work assignment also provided consistent interpretation of each landscape component throughout all sectors.

The fieldwork began in early June and was completed by approximately the third week of July. Working through this part of the season provided fairly consistent plant growth conditions which in turn limited the variation within each landscape component throughout the park. The resulting data is therefore more reliable across the Centre.

2.1.6 DATA ANALYSIS

ESRI's ArcGIS 10 exposes information housed in a geo database through an Application Programming Interface (API) written in the Python Programming Language. The interaction with the geo database was easy to employ. With very little logic it was possible to extract all points for a given land area.

The presentation layer of the final report was completed using Microsoft Excel. A template file, the final look and layout of the report, which contained all the information grouped logically, was created. For every sub-area (1a, 1b, etc.) the template was filled with appropriate information, and saved with its appropriate name.

To increase the report's flexibility the reports were made reliant upon four external files: Costs, Area Information, Trees and Bollards. This allowed the costs, area sizes, tree quantities and bollard information to be changed at a later time without the need to rerun the report every time.

The report took approximately 12 minutes to compile, during which time approximately 13,400 individual assessment points were retrieved and analyzed. The processed points are then automatically entered into their appropriate Excel file report.

2.2 STRUCTURES

Each item to be structurally assessed was visually reviewed based on criteria provided in the section. Materials and measurements were noted. No destructive means of testing were performed.

2.3 ART FEATURES

Art features were visually assessed using the established criteria. Measurements of objects and damage were taken. Materials and conditions were noted. No destructive means of testing were performed.

2.4 PLAY STRUCTURES

Two play structures at Wascana Playground and Candy Cane Park were visually assessed.

3. ASSESSMENT CRITERIA

3.1 LANDSCAPE

Turf, trees, shrubs, flower / perennial beds, greenhouse crop, sports fields, naturalized areas, crusher dust and woodchip pathways, bollards and site furniture, were assessed using the following criteria.

3.1.1 TURF

- Turf health measured by taking approximately 8 samples in each sub-area. Each sample was 30cm x 30 cm (one foot square) and was taken at various locations throughout the park excluding sports fields. Turf within each sample was assessed on basis of; broadleaf weed count, density of grass growth and presence of thatch build-up.
- Ratings in this section were applied to irrigated turf only. Dryland turf was assessed under Naturalized Parks/Areas as Grass/Herbaceous Vegetation.

a. Turf Condition

Weed Count (per square foot)

Good	Up to 5 broadleaf weeds
Fair	6 to 10 broadleaf weeds
Critical	Over 10 broadleaf weeds

Extent of weed condition will depend on total of each rating (i.e. good, fair, critical) over the eight sample sites.

Turf Density

Good	Grass blades growing closely together. Individual leaves touching to appear as one ground cover. Individual leaves somewhat flat in shape and dark green in color. Difficult or impossible to see thatch or soil through turf cover without brushing leaves aside.
Fair	Grass blades not growing closely together. Individual leaves somewhat flat in shape and dark green in color. Individual leaves may not be touching and thatch or soil can be seen through turf cover without brushing leaves aside.
Poor	Grass blades sparse and can be seen as individual leaves. Individual leaves thin and needle like in shape and light green in color. Individual leaves are not touching and thatch or soil can be seen over most of sample area.

Turf density will depend on total of each rating (i.e. good, fair, critical) over the eight sample sites.

Thatch

Good	Thatch is visible but cannot be accumulated by digging fingers into thatch and pulling in a raking manner. Thatch cover may be thin and compressed or thatch accumulation may be low.
Poor	Thatch can be accumulated by digging fingers into thatch cover and pulling in a raking manner. Accumulation of dead plant material predominantly grass clippings shows thatch build-up excessive.
Critical	Thatch is not evident. Turf may be worn and soil may be compacted.
	or
	Thatch can be readily accumulated by digging fingers into thatch cover and pulling in a raking manner. Difficult to reach soil surface by digging through thatch build-up.

Thatch condition will depend on total of each rating (i.e. good, fair, critical) over the eight sample sites.

b. Turf Problems

Grading

Sites demonstrating visible ponding problems were categorized as:

- conditions negatively affecting plant growth (water logged soil),

or

- conditions posing a safety hazard to park users (holes that would cause injury to pedestrians).

The locations will be captured on GPS and extent of problem indicated as:

- less than one meter in radius from point
- over one metre but not more than 5 metres in radius from point or if linear configuration, extending 2.5 metres from centre point of problem area.\
- over 5 metres up to 20 metres in radius or more likely if in linear configuration, extending equidistantly from centre point of problem area

Irrigation

Sites demonstrating visible irrigation problems such as broken sprinkler head, dry areas of turf indicating poor coverage, or excessively wet areas where drainage and grading not a problem. These sites were captured on GPS and extent rating was:

- irrigation head damaged
- dry turf area indicating poor irrigation coverage
- excessive moisture where grading is not a contributing factor

Turf Wear Patterns

Sites that demonstrate excessive pedestrian wear by worn pathways, compacted soil and grade depressions along path of traffic. The locations were captured on GPS and extent of problem indicated as:

- less than one meter in radius from point
- over one metre but not more than 5 metres in radius from point or if linear configuration, extending 2.5 metres from centre point of problem area.
- over 5 metres up to 20 metres in radius or more likely if in linear configuration, extending equidistantly from centre point of problem area

Sites that demonstrate excessive wear or damage resulting from vehicular traffic. These sites may be characterized by ruts in turf, damaged shrubs or trees or compacted pathways where turf had begun to die or was dead. The locations were captured on GPS and extent of problem indicated as:

- less than one meter in radius from point
- Over one metre but not more than 5 metres in radius from point or if linear configuration, extending 2.5 m from centre point of problem area.
- Over 5m up to 20m in radius or more likely if in linear configuration, extending equidistantly from centre point of problem area

3.1.2 TREES

a. General Tree Health

The tree canopy is a reliable indicator of the health of a tree or group of trees. The percentage of tree canopy diseased, dying or dead is used to indicate the level of health in the canopy. Information was recorded on a grouping of trees in tree bed or linear extension of trees by the area covered. All trees in the area will be assessed.

Good	10% or less disease or dieback in tree or tree canopy
Fair	10 to 25 % disease or dieback in tree or tree canopy
Poor	25 to 50% disease or dieback in tree or tree canopy
Critical	Greater than 50% disease or dieback in tree or tree canopy

b. Tree Problems

Indication of visible physical damage to trunks or root systems of trees in the park will be rated by identifying the location using GPS and describing extent of damage.

Trunk Damage

Fair	Bark broken but cambium layer not exposed.
Poor	Bark broken and cambium layer of wood exposed over small area not more than 100mm square.

Critical Bark broken and cambium layer of wood exposed nearly or completely around trunk of tree.

Root Damage
Indication of visible physical damage to tree roots to be rated by identifying the location using GPS and describing the nature of damage by the extent rating

Fair Roots shallow and exposed resulting in damage to roots.
Poor Roots exposed and damaged in cultivated areas.
Critical Roots exposed and damaged by excavation.

c. Urban Forest Perspective

A measure of health of tree population (urban forest) is indicated by diversity of tree species present, and the age distribution of trees within the forest. The assessment also acknowledged that the urban forest is a designed and 'built' landscape. Thus consideration must be given to the designer's intention to create a certain context for park users by repeated or intentional use of similar species, or tree size, shape, texture or color. These design parameters will not always conform to aspects of a natural or naturalized forest. Assessment of the health of such an arrangement of trees must therefore become somewhat subjective supported by a sound understanding of good arboricultural practices.

3.1.3 SHRUBS

a. General Condition

Percentage of shrubs diseased, dying or dead was assessed by shrub bed. These were identified by GPS and rate condition of shrubs in each bed according to the following categories:

Good Plants require thinning out because branching too dense restricting light from entering interior of plant. Little or no leaf development except on outside of plant. 25% or less disease or dieback.
Fair Plants require heading back and thinning because branching very dense, evidence of sucker growth, branches may be weak. Over 25% but less than 50 % disease or dieback.
Critical Plants show excessive sucker growth, evidence of root rot or weak wood at ground level, numerous tall and leggy branches of old wood. Greater than 50% disease or dieback.

b. Density of Shrub Beds

Fair Canopy cover thin (can walk through without difficulty however branches close together with few holes).

Poor	No canopy present however individual plants are healthy and spaced on uniform and regular spacing (easy to walk through however plants present on uniform and regular spacing).
Critical	No canopy present and individual plants in poor health, weak annual growth, irregular plant spacing.

c. Weed Growth

Moderate	Average five to 10 weeds/square metre
Heavy	Average over 10 weeds/square metre

d. Mulch

Wood bark or wood shavings mulch may be used as a ground cover to conserve moisture and suppress weeds in shrub beds. WCA maintenance may elect to use mulch fairly extensively or sparingly in different areas. The assessment will rate the effectiveness of mulch where it is present. In planting beds, which are not mulched the assessment will provide cultural recommendations based on site and plant condition observations.

Heavy	Mulch relatively new between 50 and 100 mm thick, showing little or no contamination with weeds (average one to five weeds/square metre), soil or other plant material such as grass clippings.
Insufficient	Mulch grey in color and mulch fibres somewhat decayed and not distinct, between 10 and 25 mm thick but not showing soil through mulch yet, contamination with soil and/or other dead plant material.
Critical	Soil visible through mulch or mulch non-existent.

e. Impact of Shrubs in Parks

The use of shrub material in parks creates interest in the landscape, provides visual and physical screening and integrates structures into the landscape. Shrub populations in different parks may provide different impacts. The effectiveness of a shrub or shrub bed also depends on the health of the plant material as a function of growing conditions. The assessment recognized design intent as well as plant health in consideration of appropriateness of certain species for existent growing conditions. At sites where plant health problems were critical, recommendations were made based on a subjective interpretation of design and objective assessment of plant condition.

3.1.4 FLOWER / PERENNIAL BEDS

Annual and perennial flowerbeds were rated using the following system of criteria.

a. Soil Condition

Flowerbed soil sample was taken by removing a small divot of soil with a trowel. Soil sample should be between 45 and 75mm in diameter and between 75 and 100mm deep.

One sample was taken in every 10 square metres of bed. Plant material was not damaged when taking the sample.

Very good Soil falls away from the trowel and readily falls apart after removal from the bed. Visual inspection reveals a dispersal of identifiable organic matter as a component of the sample. Soil does not stay in a ball when compressed in the palm of your hand when released.

Fair Soil clings to trowel although some portion drops away after removal from the bed. Visual inspection reveals some identifiable organic matter however this is a small component of the sample to make up less than 10% of sample. Soil stays in a ball when compressed in the palm of your hand but shows signs of cracking apart or falls apart in large pieces when released.

Poor Soil clings to trowel although with few or no portion dropping away after removal from the bed. Visual inspection reveals no identifiable organic matter. Soil stays in a ball when compressed in the palm of your hand and shows no signs of cracking apart or falling apart when released.

b. Edging

Inspected to determine that edging was straight and forms a crisp line between soil in bed and turf or other material surrounding the bed. Where no edging structure was present by design the assessment will consider the condition and effectiveness of the line designating the bed.

Good Line formed by the edging is straight (to be determined visually) and provides a clean crisp distinction between soil in bed and surrounding material (usually turf).

Fair Line formed by the edging is not straight but deviates not more than 50mm from a straight line in any 3 metre length (to be determined visually) Edging provides a separation between soil in bed and surrounding material (usually turf) but is not crisp nor distinct.

Critical Line formed by the edging is not straight or undistinguishable. Edging fails to provide a separation between soil in bed and surrounding material (usually turf).

c. Weed Population

Weeds in the beds might be expected especially early in the annual flower bed season (i.e. month of June)

Good Weed population in month of June or earlier should be 10 or fewer plants in any 25 square cm area. Weed population in months of July or August should be 5 plants or fewer in any 25 square cm area. Three samples to be taken per 10 square metres of bed

Fair	Weed population in month of June or earlier should be between 10 and 20 plants in any 25 square cm area. Weed population in months of July or August should be 10 plants or fewer in any 25 square cm area. Three samples to be taken per 10 square metres of bed
Critical	Weed population in month of June or earlier is greater than 20 plants in any 25 square cm area. Weed population in months of July or August is greater than 10 plants in any 25 square cm area. Three samples to be taken per 10 square metres of bed.

d. Effectiveness of Design

Effectiveness of flowers/perennial beds is a subjective consideration based on size of bed as a function of size of park, location in the park, the spacing of plants within the bed, the variety of species used in the bed and how that variety impacts the range of colour display throughout the season.

3.1.5 GREENHOUSE CROP

The Greenhouse Crop Assessment process followed the points of inquiry outlined below. The observations and information collected along these avenues of inquiry were collated into a subjective assessment report.

a. Ground History

The purpose of the greenhouse operation, its mandate and objectives over the past 5 years and into the near future (next 5 years), provides the basis for review of the operation and the parameters for crop assessment.

Good	A consistent pattern of crop production and production practices over the last five years indicating stability in the operation and direction given to the Greenhouse operators
Fair	Deviation of crop size and crop variety in response to changing directions and objectives set out for the greenhouse operation.
Concern	Changes in crop size and crop variety from year to year where 'bench space' is left empty through a production year or crop variety changes for example from perennial indoor plants to bedding plants within a 5 year time line without a consistent pattern.

b. Greenhouse Crop Production

A greenhouse is a building constructed of glass or plastic for the cultivation of plants under controlled environmental conditions. The key operational components of a controlled plant growth environment are:

- Temperature, light and air control
- Growing media and nutrient control
- Irrigation

- Pest and foreign materials control
- Cultural practices applicable to specific crops

Temperature, air control and light assessment considered the safe and effective function of greenhouse operation components such as heat source, ventilating mechanisms, and light sources. The availability of light as a function of glazing used on the greenhouse and/or effectiveness of artificial light. This does not attempt to assess the mechanical, electrical or structural building components beyond observing that they 'do' or 'do not' support the effective function of the crop production operation.

Growing media and nutrient control reviewed the use of soil amendments and fertilizer in the crop production program. Points of inquiry will be:

- To what extent is the use of fertilizers determined by soil analysis, plant growth symptoms, plant species, and crop production objectives (i.e. expected size of annual at point of planting outdoors)?
- What is the method of applying fertilizers to the crop?
- Is growing media a combination of soil and soil amendments or is a soil-less mix used? If soil amendments are used what are they? If soil is used what is the source of material?
- Is any greenhouse refuse being composted and subsequently re-introduced to the growing operation?

Irrigation methods used in the production of the various crops were considered in view of their effectiveness and efficiency to provide water to living plant material. Use of hydroponics and automated irrigating systems are generally be preferred over manual application of water.

Control of insect pests, diseases and foreign materials including weeds in the Greenhouse operation is a large factor in effective and efficient crop production.

- Are integrated pest management practices such as use of predatory insects, plant hygiene and selective chemical controls being applied?
- What pesticides are being used and what records are kept documenting use?
- What precautions are in place to secure plants and protect staff and public?
- Is there evidence of insect or disease damage on greenhouse plants? To what extent are these symptoms prevalent throughout the greenhouse?
- To what extent is there evidence of weed growth or infestation? Does the production program include weed control even if that is just the passive removal of unwanted plant species and plant debris from the inside growing area and the outdoor greenhouse environment?

Specific greenhouse crops require certain cultural practices intended to address the various growth needs of the crop plants. Cultural practices such as seeding dates, transplanting or potting, plant spacing, pruning, and harvesting or shipping of plant products were considered. Consideration was given to the efficient and effective application of cultural practices in crop production.

3.1.6 SPORTS FIELDS

Sports fields were assessed separately as Soccer/Football fields and Ball diamonds. Rating criteria considered: high traffic areas such as goal areas, centre fields, aggregate (skinned) infield surfaces and overall turf condition.

SOCCER/FOOTBALL

Goal Areas – Turf Quality

Good	Grass blades growing closely together. Individual leaves touching to appear as one ground cover. Individual leaves somewhat flat in shape and dark green in color. Difficult or impossible to see thatch or soil through turf cover without brushing leaves aside. Little or no depression at goal line.
Fair	Grass blades not growing closely together. Areas of soil showing through grass cover however turf growing over at least 50% of goal mouth.
Poor	Grass blades sparse or non-existent at goal mouth. Soil appears compacted and forms depression at goal line.

Centre Field – Turf Quality

Good	Grass blades growing closely together. Individual leaves touching to appear as one ground cover. Individual leaves somewhat flat in shape and dark green in color. Difficult or impossible to see thatch or soil through turf cover without brushing leaves aside.
Fair	Grass blades not growing closely together. Soil surface showing through grass cover however turf growing over at least 50% of area within 5m radius of centre field.
Poor	Grass blades sparse or non-existent. Soil surface appears compacted and shows evidence of pedestrian traffic such as soil divots, or cleat impressions. Turf growing over less than 50% of area within a 5m radius of centre field.

a. Overall Turf Condition

Turf quality outside goal and centre field area based on four samples taken outside these two areas along a diagonal line from opposite corners of the field.

Weed Count (per square foot)

Good	Up to 5 broadleaf weeds
Fair	6 to 10 broadleaf weeds
Critical	Over 10 broadleaf weeds per square foot

Extent of weed condition will depend on total of each rating (i.e. good, fair, critical) at the four sample sites.

b. Turf density

Good	Grass blades growing closely together. Individual leaves touching to appear as one ground cover. Individual leaves somewhat flat in shape and dark green in color. Difficult or impossible to see thatch or soil through turf cover without brushing leaves aside.
Fair	Grass blades not growing closely together. Individual leaves somewhat flat in shape and dark green in color. Individual leaves may not be touching and thatch or soil can be seen through turf cover without brushing leaves aside.
Poor	Grass blades sparse and can be seen as individual leaves. Individual leaves thin and needle like in shape and light green in color. Individual leaves are not touching and thatch or soil can be seen over most of sample area.

Extent of weed condition will depend on total of each rating (i.e. good, fair, critical) at the four sample sites.

c. Thatch

Good	Thatch is visible but cannot be accumulated by digging fingers into thatch and pulling in a raking manner. Thatch cover may be thin and compressed or thatch accumulation may be low.
Poor	Thatch can be accumulated by digging fingers into thatch cover and pulling in a raking manner. Accumulation of dead plant material predominantly grass clippings shows thatch build-up excessive.
Critical	Thatch is not evident. Turf may be worn and soil may be compacted.

Extent of weed condition will depend on total of each rating (i.e. good, fair, critical) at the four sample sites.

d. Ground Squirrel Damage

Burrows excavated by Ground Squirrels in athletic fields creates a serious hazard to park users. Park audit included a visual assessment of the extent of burrows found on or around sports fields.

Fair	Burrows present however, only outside the playing surface of the sports field.
Critical	Burrows present on the playing surface of the sport field.

e. Grading Problems

Sites demonstrating visible ponding problems were captured on GPS and extent indicated as:

- less than one meter in radius from point
- Over one metre but not more than 5 metres in radius from point or if linear configuration, extending 2.5 metres from centre point of problem area.
- Over 5 metres up to 20 metres in radius or more likely if in linear configuration, extending equidistantly from centre point of problem area

f. Irrigation Problems

Sites demonstrating visible irrigation problems such as broken sprinkler head, dry areas of turf indicating poor coverage, or excessively wet areas where drainage and grading not a problem. These sites were captured on GPS and extent rating should be:

- irrigation head damaged
- dry turf area indicating poor irrigation coverage
- excessive moisture where grading is not a contributing factor

BALL DIAMONDS

a. Infield Condition (aggregate/skinned infield)

Layout	Layout of infield area compared to the preferred design layout. This will be a visual assessment to determine if the layout on site conforms to the preferred layout or not.
Weed Growth	Weed growth in the infield is an indication of lack of grooming, and/or a playing surface material high in soil content. This will be a visual assessment to determine if weed growth is present or not.

b. Surfacing Material

Good	Shale used as surfacing
Fair	Screened aggregate/sand/soil mix
Poor	Predominantly soil with some sand or aggregate

c. Grading

Good	Grade is uniform throughout infield with evidence of recent mechanical scarification.
Fair	Grade is uniform except for depressions along running lanes between bases and in the batter's box and catcher's area. Evidence of recent mechanical scarification.
Poor	Grade is uneven throughout infields with depressions along running lanes, between bases and in batter's box and catcher's area deep enough to

collect and retain water from irrigation or rain. No evidence of recent mechanical scarification.

d. Outfield Condition (turf outfield)

Turf condition - Turf condition is determined by assessing three samples in outfield. One approximately 5 metres behind first base, one approximately 5 metres behind second base and one approximately 5 metres behind third base

e. Weed Count (per square foot)

Good	up to 5 broadleaf weeds
Fair	6 to 10 broadleaf weeds
Critical	Over 10 broadleaf weeds per square foot

Extent of weed condition will depend on total of each rating (i.e. good, fair, critical) at the three sample sites.

f. Turf Density

Good	Grass blades growing closely together. Individual leaves touching to appear as one ground cover. Individual leaves somewhat flat in shape and dark green in color. Difficult or impossible to see thatch or soil through turf cover without brushing leaves aside.
Fair	Grass blades not growing closely together. Individual leaves somewhat flat in shape and dark green in color. Individual leaves may not be touching and thatch or soil can be seen through turf cover without brushing leaves aside.
Poor	Grass blades sparse and can be seen as individual leaves. Individual leaves thin and needle like in shape and light green in color. Individual leaves are not touching and thatch or soil can be seen over most of sample area.

Turf density will depend on total of each rating (i.e. good, fair, critical) at the three sample sites.

g. Thatch

Good	Thatch is visible but cannot be accumulated by digging fingers into thatch and pulling in a raking manner. Thatch cover may be thin and compressed or thatch accumulation may be low.
Poor	Thatch can be accumulated by digging fingers into thatch cover and pulling in a raking manner. Accumulation of dead plant material predominantly grass clippings shows thatch build-up excessive.
Critical	Thatch is not evident. Turf may be worn and soil may be compacted.

Thatch condition will depend on total of each rating (i.e. good, fair, critical) at the three sample sites.

h. Grading Problems

Sites demonstrating visible ponding problems were captured on GPS and extent indicated as:

- Less than one meter in radius from point
- Over one metre but not more than 5 metres in radius from point or if linear configuration, extending 2.5 metres from centre point of problem area.
- Over 5 metres up to 20 metres in radius or more likely if in linear configuration, extending equidistantly from centre point of problem area

i. Irrigation Problems

Sites demonstrating visible irrigation problems such as broken sprinkler head, dry areas of turf indicating poor coverage, or excessively wet areas where drainage and grading not a problem. These sites were captured on GPS and extent rating was:

- irrigation head damaged
- dry turf area indicating poor irrigation coverage
- excessive moisture where grading is not a contributing factor

j. Ground Squirrel Damage

Burrows excavated by Ground Squirrels in athletic fields create a serious hazard to park users. Park audit included a visual assessment of the extent of burrows found on or around sports fields.

Fair	Burrows present however, only outside the playing surface of the sports field.
Critical	Burrows present on the playing surface of the sports field.

3.1.7 NATURALIZED AREAS

GRASS/HERBACEOUS VEGETATION

a. Ground Cover - continuity of vegetative ground cover

Good	Grass and or herbaceous plant material provide uniform and dense cover over soil. No areas of bare soil greater than one 150mm in diameter.
Fair	Grass and or herbaceous plant material provide thin cover over soil. Small patches (approximately 300mm in diameter) appear scattered throughout landscape but not consistently.
Poor	Grass and or herbaceous plant material provide sparse cover over soil. Small patches (greater than 300mm in diameter) appear regularly throughout landscape.

b. Plant Species - uniformity of plant species

Good	The same grass/herbaceous plant species occur throughout site. Little or no species deviation from design intent. Few invasive weed species such as Canada thistle or dandelions apparent.
Fair	An unintended variety of grass/herbaceous plant species occur throughout site. Two or three different species apparent which do not conform to design intent. Invasive weed species such as Canada thistle or dandelions colonizing and crowding out desired plants in some areas.
Poor	Various grass/herbaceous plant species occur throughout site all deviating from design intent. Invasive weed species such as Canada thistle or dandelions colonizing and crowding out desired plants in numerous large areas greater than 2m in diameter.

TREES AND SHRUBS

a. Plant Species Variety- evidence of plant species from designed plant list

Good	All species from plant list evident and growing
Fair	Only approximately 50% of species from plant list evident and growing
Poor	Less than 25% of species from plant list evident and growing

b. Extent of Species - evidence of expansion of species populations through natural means of propagation (i.e. suckering, stooling, seeding, layering)

Good	All species from plant list displaying natural propagation by at least one instance in each planting bed.
Fair	Only approximately 50% of species from plant list displaying natural propagation by at least one instance in each planting bed.
Poor	Less than 25% of species from plant list displaying natural propagation by at least one instance in each planting bed.

NATIVE PLANT STANDS

Areas of native plant stands were identified by GPS and assessment was made regarding: amount of deadfall, amount of re-growth evident, amount of invasive weed species. Each was qualified by extent with a written summary where appropriate.

a. Deadfall - Deadfall consisting of branches and limbs over 50mm in diameter hanging or leaning on adjacent plant material to cause hazard to park users.

Extent:
- *non apparent*
- *isolated locations*
- *numerous and prevalent throughout area*

b. Re-growth - Amount of re-growth of native plant species.

Extent: *- limited and hard to locate*
- evident through approximately 50% of area
- numerous and prevalent throughout area

c. Weed Infestation - Amount of invasive weed species such as Canada thistle, dandelions, brome grass or others.

Extent: *- limited and in small areas less than 1m in diameter*
- limited but in larger areas greater than 1m in diameter
- evident throughout area and/or in several large areas greater than 1m in diameter.

3.1.8 CRUSHER DUST / WOOD CHIP PATHWAYS

Common problems with pathway surfacing material will affect the ease of walking, running or cycling on the loose surface. Problems to be considered were areas of erosion, sudden depressions in the surface or contamination of surfacing material. A pathway in good condition will be level and texture of aggregate will be uniform. There will be no stones present in the surfacing and the aggregate will be free of soil contamination. There should be no weeds growing in the surface of the pathway. The edge of the pathway will be fairly distinct with little or no plant intrusion onto the pathway surface. Where the pathway surface material is a fine granular material commonly known as crusher dust or similar inert material the above criteria will apply. Where the pathway surface material consists of wood chips or wood bark material the above criteria will also apply. In addition the condition of wood chip or wood bark surface material was assessed on depth of material over the soil base. Pathways were then be rated according to the criteria below. The extent of the problem will then be described in terms of; less than 1m, 1m to 5m in diameter or linear distance, 6 to 20 metres in linear distance, or 20 to 100 metres in linear distance. In all cases the GPS reference point will be in the approximate centre of the problem.

a. Surface Condition (crusher dust and wood chips)

Fair Surface of pathway may show some uneven areas due to erosion or tire track impressions from heavy equipment. Depressions or areas of unevenness do not deviate from the general surface any more than 10mm. The texture of aggregate is uniform. There are no small stones present in the surfacing and the aggregate is free of soil contamination. There are some weeds growing only at the edge of the pathway. The edge of the pathway is not distinct with some plant intrusion onto the pathway surface.

Poor Surface of pathway may show some uneven areas due to erosion or tire track impressions from heavy equipment. Depressions or areas of unevenness may deviate from the general surface by more than 10mm. The texture of aggregate is not uniform. There may be small stones present in the surfacing and the aggregate shows signs of soil contamination where soil has been washed, blown or thrown onto the

pathway surface. There are weeds growing at the edge and through the center of the pathway. The edge of the pathway is not distinct with repeated areas of plant intrusion onto the pathway surface.

b. Wood Chip Condition (wood chips or wood bark only)

Good	Wood chips relatively new between 25 and 50 mm thick, showing little or no contamination with soil or other inert material
Fair	Wood chips grey or black in color and wood fibres somewhat decayed and not distinct, between 10 and 25 mm thick but not showing soil through surfacing yet.
Critical	Soil visible through wood chip surfacing or wood chips non-existent.

3.1.9 BOLLARDS

Bollards in parks will include permanent or semi permanent vertical wooden, concrete or metal posts used for the purpose of restricting vehicle/motorized traffic from accessing park property. The problems whether they are single bollards or several units were located by GPS and then described by extent. A single bollard was identified in the less than 5 metres category of extent.

Fair	Bollards are vertical and secure in soil but may be damaged. Where bollards form a line or curve all units conform to intended design alignment however some units are missing from the intended sequence or spacing (no two adjacent bollards in a sequence are missing).
Critical	Bollards are not vertical, are loose or show sign of rot at ground level. Where bollards form a line or curve not all units conform to intended design alignment and/or some units are missing from the intended sequence or spacing (two or more adjacent bollards in a sequence are missing). Bollards are ineffective in deterring vehicle access.

a. Effectiveness of Barrier

Assessment of parks will include an evaluation of the impact bollards have on the traffic in the park. Typically bollards are installed to prevent unwanted or unauthorized vehicles from entering the park. In some instances placement of bollards does prevent park access by vehicles; however, in some instances either by location, alignment or the absence of these barriers results in damage to park property. Locations where bollards are not effective as barriers, or where a barrier should be installed, were located on GPS. An assessment to briefly describe the problem, the extent of damage to the park and a possible solution was included in the park notes where appropriate.

3.1.10 SITE FURNITURE

Furniture, including benches, picnic tables, trash containers, BBQ units and information kiosks, were assessed using criteria developed for each of their component materials: concrete, wood and metal.

a. Concrete

Good No repair required. New or near new condition: May be some cracks in concrete bench or table pedestals or waste container or barbecue unit. No material missing from cracked area. There are no chips or flakes of concrete missing from the units. There is no vandalism evident.

Fair Repair/replacement required in 5 Years. One or more cracks evident in concrete bench or table pedestals or waste container or barbecue unit. Concrete and aggregate material is missing from one or more cracks. Corners of components may be chipped or flaked away where concrete and aggregate is missing. Evidence of vandalism such as spray paint anywhere on components.

Poor Replace. Cracks or flakes of concrete missing exposing reinforcement rod. Strength and safety of components has been compromised. Immediate replace required.

b. Wood

Good No repair required. New or near new condition: wood planking is solid with no indication of rot or delamination or cracking of planking. Wood stain sealant is not flaking, discoloring or wearing away at any point. No evidence of vandalism such as wood carving spray painting or scratches on surfaces. Units need not be replaced

Fair Repair within 5 years. Aged and slightly damaged: wood planking shows signs of cracking or delamination although the cracks or separations are not more than 5mm in depth. End grain of planking is showing checking and grain separation however the checks are not deeper than 2 or 3mm. Wood stain is faded, pealing or wearing on flat top surface. Some evidence of vandalism such as wood carving in not more than 6 places on any one plank and no incident of vandalism covers an area greater than 100mm square. No more than two incidents of painting evident and no instance of painting vandalism covers and area greater than 150mm square. Units need not be replaced however, should be refinished.

Poor Repair within 1 year. Repair Required: Cracks or delamination in planks are between 5mm and 15mm in depth. Cracks extend beyond 100mm in length and cracks or separation is evident in more than 4 locations on any one plank. End grain of planking is showing checking and grain separation extends from top to bottom surface of plank along the end of the plank. Wood is still solid with no evidence of rot in any part of the plank. Wood stain is faded or worn completely away and wood is starting

to age and discolor turning grey or black. More than six incidents of vandalism on any one plank all or any of which are greater than 100mm square.

Critical Replacement required. Replacement Required: Cracks or delamination in planks are greater than 15mm in depth and extend beyond 100mm in length. Separation of wood in cracks is 5mm or greater in width and rotten or soft wood can be found in any of these cracks or pieces of wood are missing from the plank. End grain cracks are showing separation from top to bottom surface and into the end wood by over 20mm in depth. End grain may be showing rot and parts of the wood may be missing.

c. Metal

Good Barbecue may be blackened with soot but show no sign of being bent, or warped or damaged by vandalism. Grill is flat and is not missing any rods. Grill spins freely on vertical spindle. Garbage bag retainer rings are functional. Kiosk top is not bent and securely attached.

Fair Repair required. Barbecue may be bent or warped in places but shows no holes in the top where briquettes are held or in ash drawer. Grill maybe somewhat bent or warped but still spins freely on spindle. Garbage bag retainer rings are functional. Kiosk top is bent or loose; may have graffiti.

Poor Replacement required. Barbecue has holes in the top where briquettes are held or in ash drawer or ash drawer is missing. Grill is bent or warped so that is spins only with an effort. Garbage bag retainer rings are not functional. Kiosk top is dented or steel is broken. Metal is gouged.

3.2 STRUCTURES

The following criteria provide a framework for the assessment of the selected structures.

Structural integrity Looking at the overall performance of the structure and assessing if there is a risk of failure

Durability The long-term ability of the structure to endure changing environmental and physical conditions

Serviceability The structure's ability to perform without causing bystanders or occupants discomfort. For example, the structure should not be leaning or deflecting.

The following monuments, structures and art features were assessed. Locations are noted on Drawing L.1.

Item	Identification Number
Haultain, Ross, Darin & Dunning Monument	1
Speaker's Corner	2
Regina Boat Club Monument	3

Wascana Playground	4
Oskana	5
Lady Slipper Courtyard Structures	6
Saskatchewan War Memorial	7
Saluting Monument	8
Ross Thatcher Monument	9
Lakeshore Park Totem Pole	10
Boy Scout Monument	11
Surveyor's Monument	12
Candy Cane Park Structures	13
Sculpture Four Seasons	14
Waterfowl Park Display Ponds	15
Ducks Unlimited Monument	16
Mind's Garden	17
Structures Sculpture Firehouse Elements	18

3.3 ART FEATURES

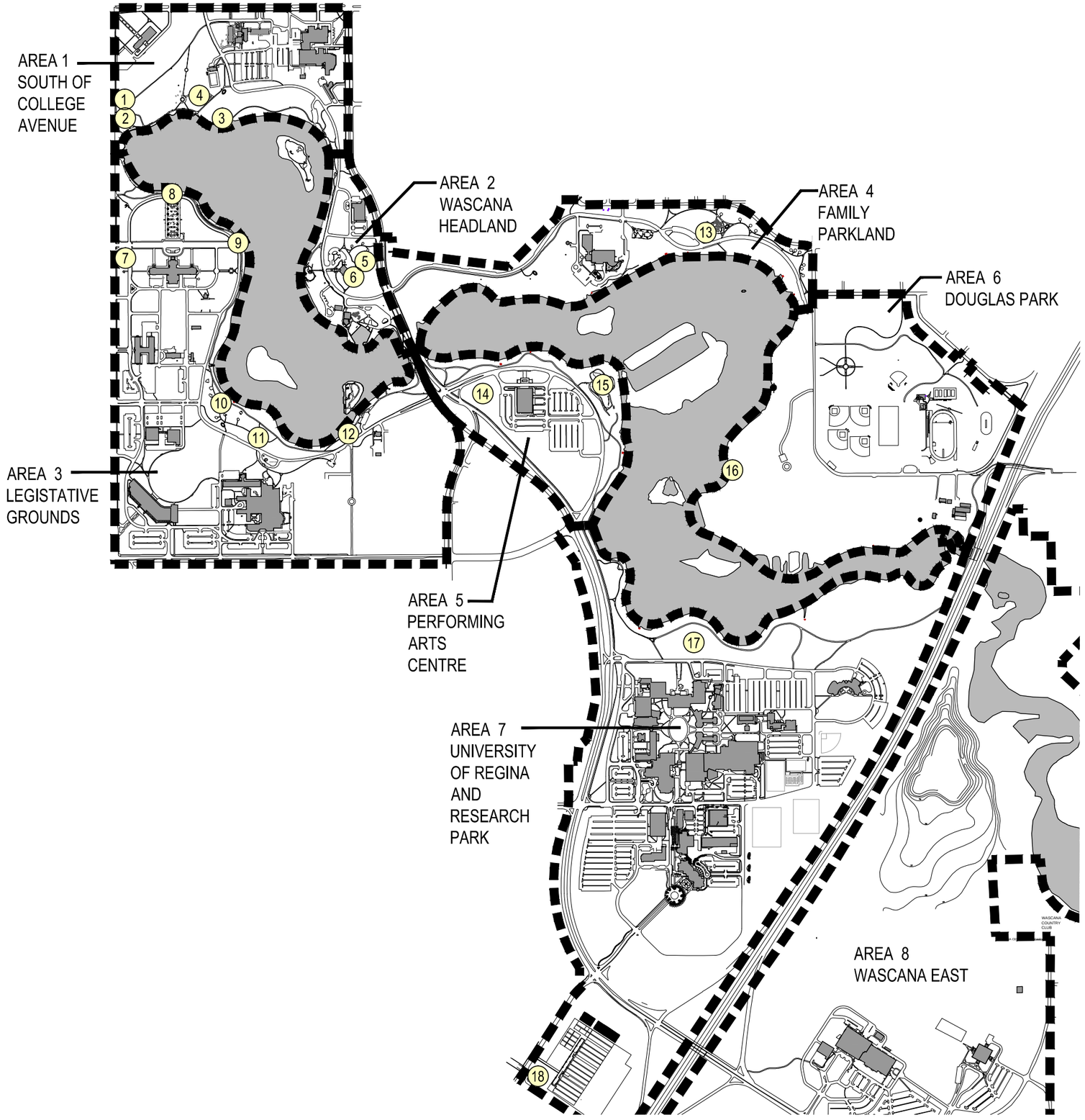
The physical condition of the art features were assessed for corrosion, paint condition, weld strength, organic buildup (excretions), scratches, gouges, dents, rust (where not intended), grout soundness and graffiti.

The following art features were assessed:

Item	Identification Number
Oskana	5
Lakeshore Park Totem Pole	10
Boy Scout Monument	11
Four Seasons	14
Mind's Garden	17
Firehouse Elements	18

3.4 PLAY STRUCTURES

Play structures were assessed at Candy Cane Park and Wascana Playground in relation to the most recent version of the Canadian Standards Association safety standards for "Children's playspaces and equipment" (CAN/CSA-Z614-07).



1 - Haultain, Ross, Davin and Dunning Monument
2 - Speakers Corner
3 - Regina Boat Club Monument
4 - Wascana Playground
5 - "Oskana" - Sculpture
6 - Lady Slipper Courtyard Structures
7 - Saskatchewan War Memorial
8 - Saluting Monument
9 - Ross Thatcher Memorial
10 - Lakeshore Park Totem Pole
11 - Boy Scout Monument
12 - Surveyor's Monument
13 - Candy Cane Park Structures
14 - "Four Seasons" - Sculpture
15 - Waterfowl Park Display Ponds
16 - Ducks Unlimited Monument
17 - "Mind's Garden" - Sculpture
18 - "Firehouse Element"

General Notes

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LANDSCAPE ASSESSMENT

Project Title

MONUMENTS, STRUCTURES AND ART FEATURES

Drawing Title

Drawn	AA	Checked	LS
Scale	1:150000	Date	2012/08/23
Project No.	12.026R	Drawing	L.1

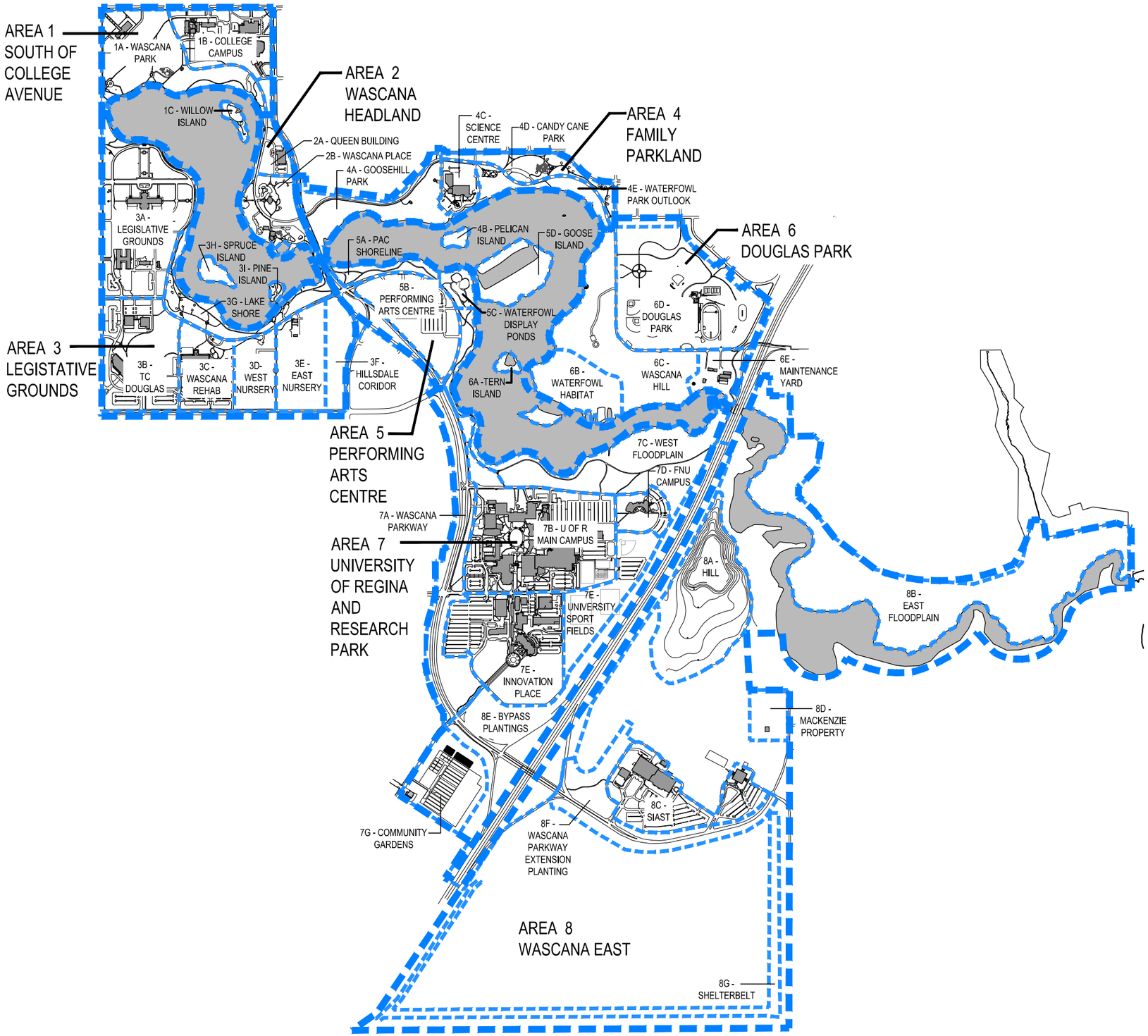
4. ASSESSMENT

4.1 AREA LIST & MAP

Area #	Master Plan Area	Sub-Area	Sub-Area Name
1	South of College Ave	A	Wascana Park
		B	College Campus
		C	Willow Island
2	Wascana Headland	A	Queen Building
		B	Wascana Place
3	Legislative Grounds	A	Legislative Grounds
		B	TC Douglas
		C	Wascana Rehab
		D	West Nursery
		E	East Nursery
		F	Hillsdale Corridor
		G	Lake Shore
		H	Spruce Island
		I	Pine Island
4	Family Parkland	A	Goosehill Park
		B	Pelican Island
		C	Science Centre
		D	Candy Cane Park
		E	Waterfowl Park Outlook
5	Performing Arts Centre	A	Performing Arts Centre Shoreline
		B	Performing Arts Centre
		C	Waterfowl Display Ponds
		D	Goose Island
6	Douglas Park	A	Tern Island
		B	Waterfowl Habitat
		C	Wascana Hill
		D	Douglas Park
		E	Maintenance Yard
7	University of Regina & Innovation Place	A	Wascana Parkway
		B	U of R Main Campus
		C	West Floodplain
		D	First Nations University Campus
		E	Innovation Place

		F	University Sports Fields
		G	Community Gardens
8	Wascana East	A	Hill
		B	East Floodplain
		C	SIAST
		D	Mackenzie Property
		E	Bypass Planting
		F	Wascana Parkway Extension Planting
		G	Shelterbelt

Areas and sub-areas are illustrated on Drawing L.2.



General Notes

1. Existing conditions provided by Wascana Centre, Regina, SK

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LANDSCAPE ASSESSMENT

Project Title

ASSESSMENT AREAS AND SUB-AREAS

Drawing Title

Drawn	AA	Checked	LS
Scale	1:200000	Date	2012/08/23
Project No.	12.026R	Drawing	L.2

4.2 LANDSCAPE

4.2.1 TURF ANALYSIS SUMMARY & RECOMMENDATIONS

Irrigated turf makes up the majority of the manicured open spaces commonly found throughout the western sections of Wascana Centre. These turf areas provide space for people to gather and spend time in the park and are used for both relaxing and informal recreational activities. These open spaces and turf areas require regular maintenance and upkeep in order to preserve the beauty of the Centre and safety of the users.

In the areas South of College Ave the pathways are too narrow for the amount of pedestrian traffic in the park. Because of this the turf is worn along the edges of the pathways. Along the waterfront in Wascana Park, wood fiber mulch has been installed along the edge of the pathway to remedy the wear; this is only a temporary fix and does not provide a solution to the issue. In all subareas throughout the Centre where sidewalks are not provided along the roads, pedestrian wear patterns are present. This problem is demonstrated along the water's edge by the Queen Building where pedestrians have worn a path along the berm. Both along the road and water edge are ideal locations for permanent pathways in order to protect the turf and improve pedestrian circulation.

In some areas it is obvious that turf mowing is completed by two pieces of equipment with different mow heights. This is most commonly seen around tree bases and along the edges of the Wascana Parkway centre median. In the latter case, a smaller mower is used along the curb because of the uneven grades found there. A regrading of these areas to create a smooth transition from grass to curb would eliminate the need for the two pieces of equipment, and the resulting uneven mow pattern.

As the volume of park users causes damage to the turf, greater care should be taken by the WCA maintenance personnel to reduce their impact on the grass as they transport equipment throughout the Centre. The full sized staff trucks do not properly fit on the small pedestrian pathways resulting in added damage to the turf along the edges. Large maintenance vehicles should be restricted to the pathways provided for them while small utility vehicles could be used on the smaller pathways.

During the field assessment, large patches of exposed soil from underground construction were found in areas such as Candy Cane Park, Performing Arts Centre and T.C. Douglas building. In Candy Cane Park and at the Performing Arts Centre these patches were from recent construction but around TC Douglas the soil appears to have been there for an extended period of time resulting in an uneven surface and the growth of large weeds. Along the South shore, the geese are prevalent on many of the lawns around the Legislative Grounds and the Performing Arts Centre areas. In these areas the grass has been grazed extensively creating a very short, thin cover, resulting in no competition and weeds. In all subareas, excluding the areas South of College Ave and Wascana Headland, ground squirrel holes are abundant throughout the turf. Around the holes there is often a large pile of soil which is unsightly. By pathways and areas of high traffic, these holes

become safety hazards for the park users. (Turf that has been assessed as critical is illustrated in Drawing L.3)

Apart from combating the results of human and animal traffic, the turf areas have healthy grass and a good cover. Under groupings of trees the turf occasionally becomes patchy but this has a minor impact on the overall turf appearance. Improving and upgrading the irrigation systems throughout the Centre would regulate the moisture and appearance of the turf throughout the park.

Recommendations:

- Improve and upgrade irrigations systems throughout the Centre.
- Institute a policy of greater care by operating staff for established turf in considering the transport of equipment throughout the Centre.
- Implement a ground squirrel control program in areas of high pedestrian traffic to address public safety.
- Develop pathway system to address increased pedestrian traffic load

General Notes

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WASCANA PARK ASSESSMENT

Project Title

TURF IN CRITICAL CONDITION

Drawing Title

Drawn	AA	Checked	LS
Scale	1:150000	Date	2012/08/23
Project No.	12.026R	Drawing	L.3

4.2.2 TREE ANALYSIS SUMMARY & RECOMMENDATIONS

Many of the trees, having been planted when the park was established 50 years ago, are coming to the end of their life span and require removal immediately or will require removal within the next few years. Percentages of required tree removal and required pruning have been included in each section assessment. Overall the percentages for removal are quite low with the highest numbers being at the South end of Wascana Centre especially the highways, where the percentage of tree removal is approximately 10%. Infill and replacement plantings are required as the older trees begin to die off. In a number of sites infill is already present but proper placement and species needs to be considered. Around the Legislative Grounds some current infill plantings are inappropriate for the space. In locations, pine trees have been planted underneath elm trees and as they grow will result in overcrowding and tree damage. Around the College Campus, there appears to be some disorder arising from old landscape plantings being replaced by new segments of landscape development. The result is a somewhat disjointed landscape with old and new areas standing apart from one another.

With the aging tree population the implementation of an annual tree pruning program to achieve a once in ten year tree pruning cycle throughout the Centre is required. As trees die, branches present a public safety, disease and pest concern. Tree sanitation is required to prevent disease and pests. Regular pruning will aid in the preservation of older trees and prolong the life and effectiveness of younger trees.

Numerous trees throughout the Centre have had previous pruning, some to the extent of disfiguration. When leaders or major limbs die the tree is likely to decline further. If pruned, the life of the tree may be prolonged for a short period of time major pruning cuts become avenues of disease and secondary rot to enter the tree further reducing the tree's life span.

Due to the maturity of the trees many tree beds are overcrowded. This has resulted in inner branch die back or tree loss. Around the Legislative Grounds numerous beds require thinning while others require infill planting. Overcrowded beds should be thinned to provide room for future infill planting as the trees begin to die off. At the University of Regina and the Queen building the trees are often planted too close to the buildings.

Large tree beds throughout the Centre, most commonly in the Legislative Grounds Area, are being rototilled to control weeds. An alternative ground cover should be considered for these areas, such as turf or mulch. Cultivation can cause damage to tree roots while also exposing soil, depleting it of moisture and making it susceptible to weed growth. A ground cover in these areas would control the weeds much more effectively as well as promote pedestrian use and increase usable space within Wascana lands.

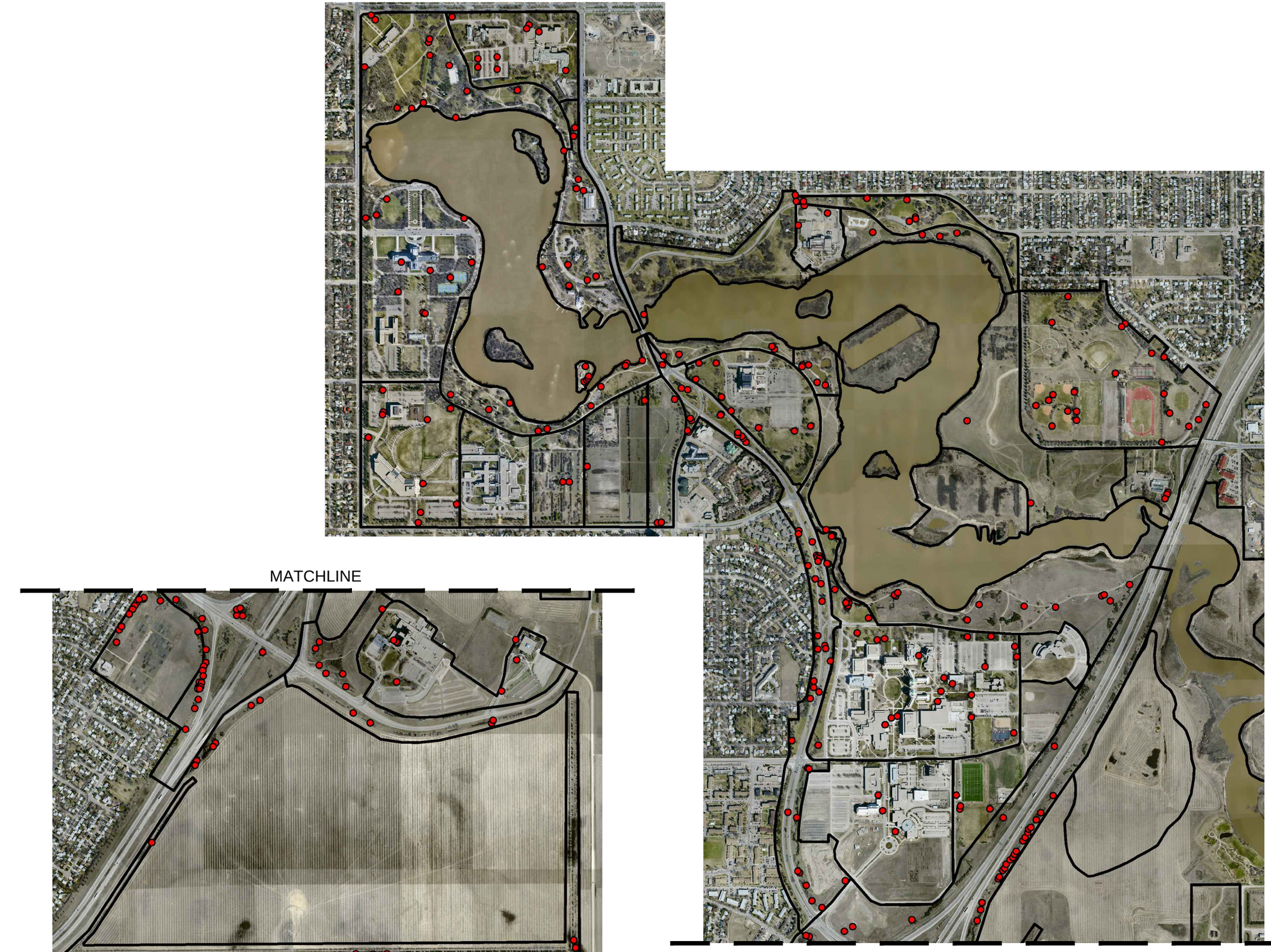
Precautions should be taken when mowing turf around trees in order to prevent damage to the bark. Bark damage is also often found in the cultivated tree beds from manoeuvring the machines around the trees. Trunk guards are recommended for all trees to help prevent this damage from machinery as well as from rodents.

Other less frequent problems that were found were the appearance of spider mites in the Spruce trees along Wascana Parkway and exposed tree roots at the University of Regina. In both of these cases the trees should be monitored and pruned or removed if damage becomes evident. Exposed tree roots may also affect the maintenance of the turf or create a possible tripping hazard, if problems arise the roots should be removed. (Trees that have been assessed as critical are illustrated in Drawing L.4).

Wascana Park has an abundant amount of trees and a wide variety of species. Pruning and replacement is required throughout the entire Centre as the trees continue to age, but the large number of mature trees creates a beautiful space in the center of the city.

Recommendations:

- Institute an annual tree pruning program to achieve a once in ten year tree pruning cycle throughout the Centre for public safety, tree sanitation, preservation of older trees and prolonging the life and effectiveness of younger trees.
- Install tree guards at base of trunks of all young trees to prevent mechanical damage.
- Adopt a standard practice of maintaining a mulch cover for all tree beds throughout the entire Centre.
- Employ a long term plan to eliminate the use of rototilling as a means of weed suppression and replace cultivated areas with turf and/or shrub beds.



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WASCANA PARK ASSESSMENT

Project Title

TREES IN CRITICAL CONDITION

Drawing Title

Drawn	AA	Checked	LS
Scale	1:150000	Date	2012/08/23
Project No.	12.026R	Drawing	L.4

4.2.3 SHRUB ANALYSIS SUMMARY & RECOMMENDATIONS

Within Wascana Centre shrubs are used as a means to create screening between the park and adjacent land uses, define gathering areas and create visual interest. Shrubs are found along building faces, at entrances, at key points of interest such as monuments, play structures, picnic areas and partnered with tree groupings. In certain areas, shrubs are planted along the perimeter of tree beds leaving void areas within tree groupings.

It appears that the quantity of shrub material exceeds the resources available for shrub maintenance. Generally, throughout Wascana Center the majority of the shrub material is overgrown and appears to be near the end of its life cycle. Based on this observation it is expected that many of the older shrub plantings will not survive into the next 50 years. Lack of pruning throughout Wascana Centre has contributed to overgrown shrub beds. Overgrown shrubs are commonly long and leggy and have little to no foliage within the interior and at the base of the shrub. Often shrubs have grown too large and exceed the edge of the shrub bed making it difficult for mowers to get close to the beds to mow.

The majority of shrub and trees beds within WCA are rototilled to control weeds while some high profile areas were noted as having wood fiber mulch. Rototilling has resulted in large expanses of exposed soil throughout all of WCA. For example, the Legislative Grounds has many of these rototilled areas that have large shade trees within and shrubs along the perimeter. These large areas for the most part are unseen and inaccessible to the public. Removal most of the perimeter shrubs in these locations is recommended to allow more light into the interior area and provide pedestrian access. Additionally, it is recommended that the exposed soil is seeded with a dryland turf mix and that low growing shrubs be used as a ground cover. We recommend this intervention to provide more usable space for park users as well as create a more diverse habitat environment for bird, animal and insect species; to reduce maintenance efforts in rototilling; and to reduce damage to tree shrub roots.

Honeysuckle, Caragana, Lilac and Cotoneaster are the dominant shrub species throughout all of Wascana Centre. If left unmaintained these shrubs grow into tree form and are consequently too large for many landscape applications. Often, limbs on these species range between 3”-6” in diameter. Commonly, these shrub plantings are overgrown and no longer function effectively due to the lack of foliage at base and centre of shrubs. Regular pruning in the past would have ensured these shrubs maintained a denser shrub form. However, lack of maintenance over time has allowed these shrub species to become overgrown. Alternate shrubs that exhibit more desirable plant growth characteristics are cotoneaster, ninebark and dogwood as well as smaller shrubs such as juniper, currant, rose and dwarf lilacs varieties. All of these shrubs species functioned well in the park because they provide barrier and screen planting while maintaining a dense form. An increased use of these alternate shrub species as replacements for the more traditional caragana, lilac and honeysuckle throughout the Park is recommended.

Caragana arborescens or Common Caragana has been identified as an invasive species by the Saskatchewan Conservation Data Center, a partnership between the Province of

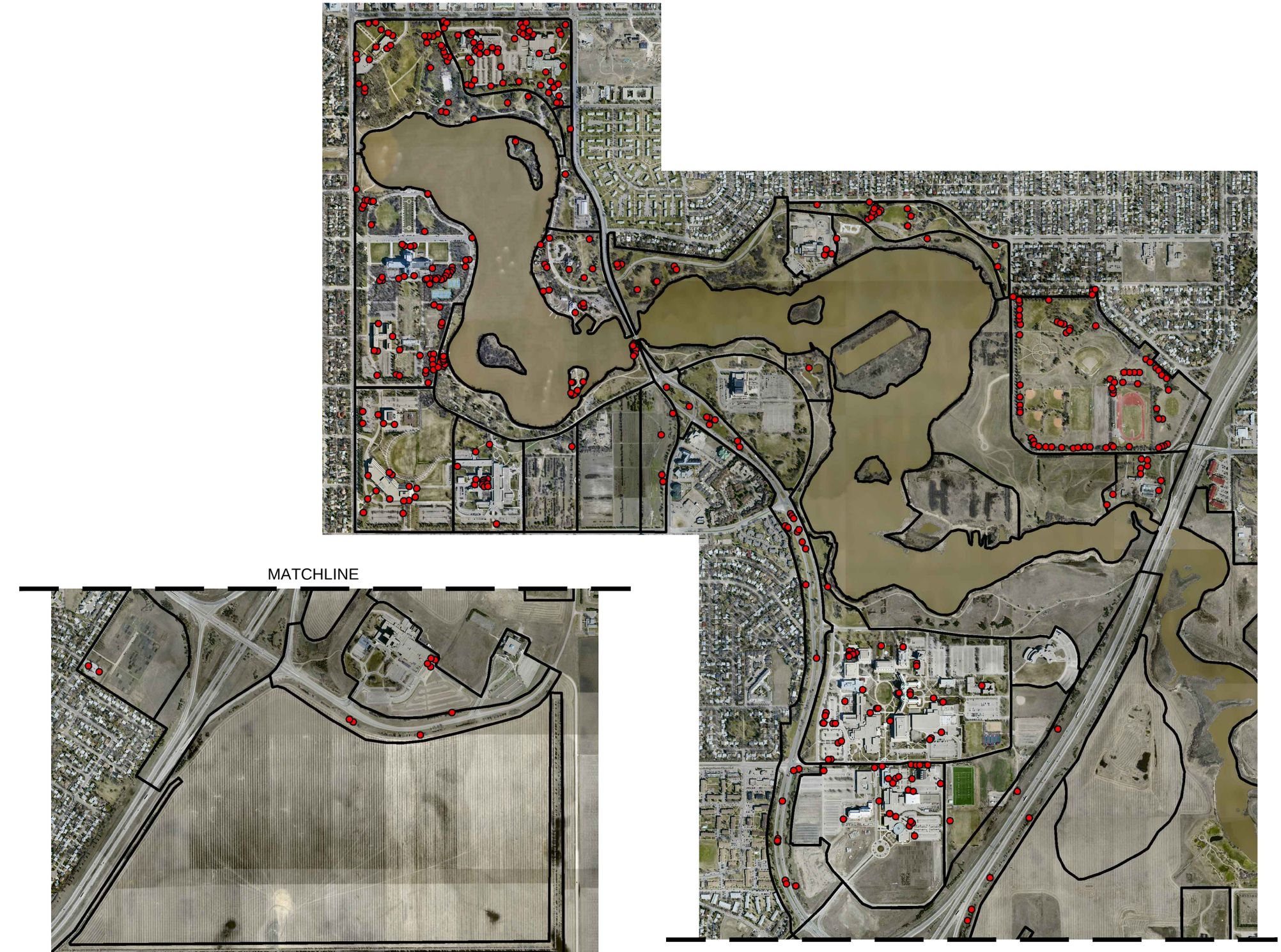
Saskatchewan and Nature Saskatchewan. Caragana is present throughout all of Wascana Center including screen plantings, lakeshore plantings and Native Plant Stands. Caragana planted in beds that are surrounded by regularly mown turf will not likely spread. Lakeshore and Native Plant Stand areas have a higher potential to see Caragana migrate and threaten the survivability of native plants. It was observed that Caragana is the dominant lakeshore species west of Broad Street. Caragana was observed as invading the Native Plant Stands along the shoreline east of Broad Street.
Although this plant plays a critical role in lakeshore stabilization a park management strategy needs to be developed to control the spread of this plant species and to replace it with several alternate slope stabilization species such as native alder, dogwood, buffaloberry, rose, sandbar willow, chokecherry, pincherry and others indigenous plant species.

Overall, the condition of shrubs in Wascana Center raised the issue of long term planning for WCA shrub beds. Due primarily to age and current lack of maintenance many shrub beds will require replacement over the next 10-20 years. Thinning and pruning of shrubs will resolve many of the immediate issues noted in the assessment however over the long term replacements will be required to ensure a healthy park planting for the future. (Shrub beds in critical condition are illustrated in Drawing L.5).

Recommendations:

- Thin, head back and remove shrubs as necessary from bed to create healthier, less dense shrub planting.
- Install and maintain a mulch cover for shrub beds throughout the entire Centre.
- Develop a park management strategy to replace shrubs that cannot be renewed by pruning or thinning, with a variety of alternate species better suited to different landscape applications to establish a species diverse ecosystem throughout WCA.
- Remove invasive shrub species particularly Caragana wherever that plant population threatens the establishment or survival of other plant species in the designed or natural landscape. Over the long term, removal of Caragana is recommended and replacement with alternate indigenous plant species is recommended.

Further, we recommend that Wascana Centre undertake a review of Best Practises for landscape maintenance procedures. This review should include turf, trees, and shrub and perennials. We believe that this review is important to ensure that WCA is using the best possible techniques for maintaining a healthy plant and turf population.



General Notes

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WASCANA PARK ASSESSMENT

Project Title

SHRUBS IN CRITICAL CONDITION

Drawing Title

Drawn	AA	Checked	LS
Scale	1:150000	Date	2012/08/23
Project No.	12.026R	Drawing	L.5

4.2.4 GREENHOUSE ASSESSMENT

Ground History and Management Strategy

Operation of a greenhouse at Wascana Centre has been part of the history of the Authority since its inception. Although the operation of the greenhouse has changed over time, within the past five years the management and staff have secured a fairly stable crop production and greenhouse operation strategy.

Greenhouse staff has secured a five year contract to supply the City of Regina with all annual bedding plants for outdoor flower beds in Regina's parks. In addition the Greenhouse is growing and maintaining a supply of ornamental indoor plants for public display at the Regina City Display Greenhouse and for public civic events and seasonal celebrations such as Christmas and Easter. This contractual work has become a major cornerstone of the strategy to maintain an economically viable crop production operation. The contract work for the City of Regina fits well with crop production objectives to meet the needs of the Provincial Government, the University of Regina and Saskatchewan Institute of Applied Science Technology. The services provided to these clients consist of indoor plant decorations for offices, public spaces and public functions such as the Legislative House opening, official political visits and convocation exercises for the University. To secure a full year of work Greenhouse staff are also committed to producing, planting and maintaining annual and perennial flower crops for flowerbeds in Wascana Centre as well as production of liner stock of ornamental trees and shrubs for landscape renovation and reforestation.

This management strategy has given the Greenhouse Operation a diversity of crops, a consistent pattern of crop production and production practices, and relative stability in the direction the greenhouse crop production will go in the next five years. This is a good indicator of an economically healthy and viable operation.

Greenhouse Crop Production

The production of a greenhouse crop is essentially the cultivation of plants under controlled environmental conditions. The Assessment considers how well the key operational components of this controlled environment are being managed.
The components and their management are assessed as follows:

Temperature, Air and Light Control

Temperature and air control in the greenhouse is maintained primarily by the supply of heat from a hot water furnace and the manipulation of venting devices in the structure. The various plant crops did not show signs of heat stress nor of excessive low temperatures. In the North and South greenhouses the supply of heat comes from a conventional hot water heater. The function of traditional greenhouse ventilation mechanisms such as roof and wall vents have been compromised because of the necessary conversion from original glass glazing to a poly carbonate glazing on the North

Greenhouse. Glass has a natural tendency to break at sub-zero temperatures and during extremes of weather like hail storms. Repairing glass has become prohibitively expensive requiring the conversion of the North Greenhouse to a poly carbonate material. This conversion has made the original ventilating systems non-functional leading to the need for more labour intensive manipulation of wall ventilation and forced air ducts. The South Greenhouse is still covered with glass because funding for a conversion is not available. The new Polyethylene covered greenhouse is heated by a forced air heater and ventilated with polyethylene air ducts and wall mounted fans. Temperature and air control in this House is adequate despite the end walls being completely closed with solid wood construction walls.

Light in the North greenhouse, which is covered with poly carbonate glazing, is poorest because the glazing material discolors over time exposed to sunlight. Some foliage crops and flowering crops in this Greenhouse required supplemental light fixtures to achieve adequate light quality however the plants show no sign of light deficiency. The glass in the South greenhouse allows adequate sunlight to pass through for production of annual bedding plants, however, panels of glass will at times break requiring expensive repair and putting plants at risks. The new Poly-covered house provides better light quality than the one covered with poly carbonate and the annual bedding plants in this house do not require supplemental lighting.

Overall greenhouse management has been able to overcome the temperature, light and air circulation problems related to operation of the two old greenhouses (the North and South ones). They have adjusted plant growing techniques and practices to function effectively and produce a quality crop.

Growing Medium and Nutrient Control

Growing medium or substrate used for crop production is selected specifically for different crops grown in the Greenhouse. All annual crops are grown in a commercially prepared material called “Pro-mix” which contains; peat moss, perlite, slow release fertilizer, but no soil. This material has already been mixed to meet the nutrient demands of annual bedding crops. Evidence that this growth substrate is very effective shows in the vigorous healthy growth of annual plants. Potting soil for foliage plants, other than the annual crop, consists of a soil base amended with peat moss, perlite compost and aged livestock manure. This potting soil is generated by greenhouse staff and used to grow indoor display plants. For some specific crops such as tropical plants and woody ornamentals grown as nursery liner material wood bark is added to the potting soil to encourage a more vigorous and healthier root mass in a short growing time. The content of the potting soil mix is determined mostly by the crop it is intended to support. Little emphasis is placed on soil analysis and a greater attention is given to observed results from different soil amendment blends.

Compost material is generated from leaf litter collected by park maintenance staff. This compost material is added to outdoor flowerbeds at the rate of 1 inch of compost over the entire bed each year. In addition rotted manure is also purchased and additionally aged to

destroy weed seeds before being used as a source of organic matter. Previously used Pro-Mix potting material is also salvaged and reused in the compost mix unless it shows evidence of disease.

Liquid fertilizer is used to supplement naturally occurring soil nutrients. The fertilizer is added to the plant watering system through a mechanical injection system.

Irrigation

Greenhouse staff has tried implementing a hydroponic watering system however they found that the variety of crops grown in a relatively small greenhouse operation made this automatic watering system impractical. Similarly other forms of automated irrigation proved to be too general to supply the correct amounts of water for the varied crops.

Pest and Foreign Material Control

An Integrated Pest Management program is practiced by Greenhouse staff. The components of the program include; the introduction of insect pest predators, insecticidal soaps, plant washes, a consistent practice of greenhouse cleanliness, and adjustment of growing conditions such as temperature and air movement. Systemic insecticides such as Intercept with a residual effective life of one month are also used for control of some insect pests like aphids if biological controls are not effective and crop health is in jeopardy.

Ultimately the Integrated Pest Management program is made effective through staff training to enable them to make early detection of plant pest problems and understand which controls should be applied.

Cultural Practices

The crop of annual flowers consist of a broad variety of species from the common petunias, marigolds, pansies, geraniums and snapdragons to the less familiar salvia, cosmos, kochia and fountain grass and other more exotic species. Approximately 75% of the crop is seeded, germinated and grown at the Greenhouse using automated seeding systems, in plugs or growth trays to avoid the need for labour intensive transplanting. About 25% of the crop is purchased as very young rooted seedlings from commercial growers where plant patents prevent availability of seed stock. These plants are grown an additional 2 to 3 three months in the Greenhouse. Greenhouses used solely for annual crop production are taken out of service during the fall and winter to minimize operational costs.

Tropical plants and office display crops requiring a 12 month growing period are consolidated in one greenhouse which is operated all year. This greenhouse also contains the mist frame for rooting cuttings.

The use of rolling benches in all greenhouses maximizes the space available for plant production eliminating the need for all but one walkway.

The Greenhouse Operation also includes a root cellar which is used to advantage to over winter certain plants for repeated use each year by rootstock regeneration and plant propagation. This facility eliminates the need to purchase new crops each year.
The root cellar is also used to over-winter ornamental tree seedlings which are grown as liner material for the Nursery.

Synopsis

The Wascana Centre Greenhouse Operation is indicative of a healthy and progressive management strategy. Good crop production practices are used throughout and a large variety of crops optimize use of the facility throughout the year. The success in achieving crop production goals are made complicated and more difficult by the aging and ailing physical plant. The building review has been completed the engineering assessment team.

4.2.5 NATURALIZED AREA ANALYSIS SUMMARY & RECOMMENDATIONS

One of Wascana Centre's mandates is the conservation of the environment. Several areas around the park are being maintained as naturalized areas in which maintenance practices utilize the natural processes of plant growth to establish stands of native plants and provide habitat for wildlife. (Landscape management types, including naturalized can be found on Drawing L.6). Throughout Wascana Centre there are examples of successful and problematic practices used to maintain naturalized landscapes.

Generally the grass and herbaceous cover is well established in naturalized areas and creates a good ground cover. Where naturalized grass and dryland grass is mown, such as around the Legislative Grounds, Waterfowl Park Outlook, and Douglas Park, the grasses have outcompeted weeds that threaten the area. In sectors where grasses are not mown throughout the growing season such as Wascana Hill, the First Nations University and Pelican Island, there evinedce of invasive weed species colonizing large areas displacing native plants species. Weeds such as *Cirsium arvense* (common name Canada Thistle) and *Melilotus officinalis* (common name Yellow Clover) are on the Saskatchewan Conservation Data Centre Invasive Weed Species List. These plants are very aggressive and need to be controlled to encourage a more diverse ground cover. Methods of aggressive control would include spot application of a selective herbicide like 2,4-D, or a broad spectrum herbicide like glyphosate. More passive and less environmentally intrusive control methods would include mowing areas of infestation more frequently to encourage grasses to stool out and compete, and to remove and destroy flower buds before seed set. The implementation of controlled burn practices particularly on isolated islands, is another effective tool in the control of invasive plant species.

During the landscape assessment Native Plant Stands were identified as being primarily along the lakeshore edge and are composed of a range of self-propagating tree and shrub species. Native Plant Stands were found along the lakeshore edge and dryland landscapes which had originally been planted and manicured but had been allowed to naturalize after becoming part of Wascana Centre Authority. In the formalized area or sectors west of Broad Street the native plant stands are predominantly along the water's edge. The shoreline of the Lakeshore Park, Wascana park, College Campus, Queen Building and parts of Wascana Place subareas consist predominantly of Caragana growing up to 12 feet tall. This plant is vigorous, and provides slope stabilization along the shoreline. However, it also creates a dense tall screen that block views to the lake from pedestrian corridors along the lakeshore. A more diverse native plant population along the shoreline would create a more beneficial plant ecosystem. The Centre should address this objective in the long term by replacing most of Caragana along the edge of Wascana Lake with a more diverse complement of plant species. The first phase of Caragana removal and replacement would include thinning and pruning of certain sections of lakeshore to allow for views and physical access to the lake.

The sectors east of Broad Street such as Goosehill Park, Science Center and Waterfowl Park subareas have a range of species present including Willow, Green Ash, Manitoba Maple, Russian Olive, Siberian Elm, Sandbar Willows, Snowberry, Dogwood, Cotoneaster and grasses. The Native Plant stands along the lake edge are generally well established with little weeds or deadfall. To address public safety along the lakeshore, consideration should be given to provide somewhat more formal lake access along the shoreline where there is evidence of pedestrians walking to or along the lakeshore. Native Plant Stands within Wascana Hill subarea includes the species listed above with the addition of *Caragana arborescens* invading and dominating long extensions of the shoreline. Removal of Caragana and the establishment of native plant species is required to maintain the health of the naturalized habitat area.

Within the Waterfowl Habitat subarea, shoreline vegetation is vigorous and clear of invasive species. Within the interior of this subarea are a variety of plant species. Old plantings of Caragana and Lilac are found throughout and are growing vigorously. Maltese Cross, Juniper, Hawthorne and Currant are remnants of old plantings and appear to only be growing in isolated areas. Additionally, Irises are spreading along lower areas of the grassland where moisture is readily available. These plants may not cause any great concern for the habitat. Snowberry can be found spreading throughout the grasslands providing evidence of good natural species variation. There are some patches of Canada thistle that are colonizing areas of land.

Along the Performing Arts Center Shoreline subarea Native Plant Stands of Willow have suffered some dieback. Deadwood should be removed to encourage new growth before weeds invade the area. This area also include a cat tail marsh in which tremendous habitat value is available and many species of birds were noted.

Generally, Native Plant Stands within the naturalized area east of Broad Street are successfully self-propagating to maintain a diverse plant population. However, there is

evidence in these areas that plant species such as American elm, poplar, Manitoba Maple and Willow are old and declining health. A planned tree replacement program in these areas would ensure the next generation of the tree species is established when the old trees die.

Recommendations:

- Establish an invasive species list that should be eradicated
- Establish a Native Plant Stand rehabilitation plant list that could be used to aid naturalization efforts.
- Employ a long term restoration program to replace Caragana and other identified invasive species along all shorelines of Wascana Lake with a diverse population of native plant species to establish a healthy ecosystem along the lake edge.
- Maintain Native Plant Stands to ensure the continued suppression of invasive species.
- Implement a weed control program for dryland grass areas.