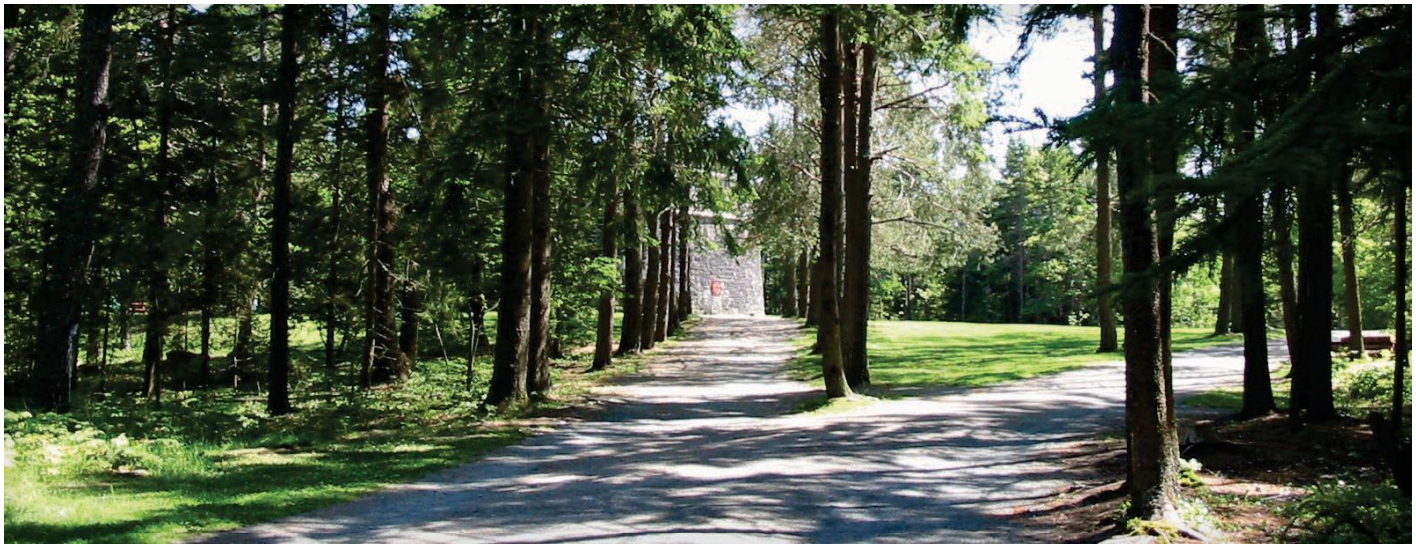
# Chapter 04: MANAGEMENT PLAN

*The overall Park plan builds upon the symbolic and well-known nature of the Park as a naturalistic forest in the city.*

This chapter will help guide Park management decisions over the life of the comprehensive plan. The management directions in this chapter have been fine-tuned through collaboration among this document's authors, Park managers and staff, as well as key HRM staff and departments. These directions provide the structure and approach for achieving the desired outcomes of the guiding principles in Chapter 3, while responding to existing Park conditions outlined in Chapter 2. Similarly, the management decisions help explain the design rationale that appears in the next chapter.

Point Pleasant Park's management plan is presented in three themes: forest, shoreline and cultural heritage (Figure 4.1). This chapter provides detailed guidance on the most appropriate management strategy for each of these three important areas.

**Figure 4.1. Park management framework**

Prince of Wales Tower (Martello Tower) before Hurricane Juan

## 4.1 Forest Framework

The Point Pleasant Park management plan must incorporate a wide array of societal values, from ecological sustainability and cultural-heritage conservation to forest-character preference and species diversity. The approach must blend both the art and science of forest management and balance form with function.

In framing a positive future for the Park's forest, the management plan lays out both broad and focused principles for forest management; embraces the public's forest values; translates those values into objectives, indicators, targets and generic actions or treatments; outlines strategic directions for forest management; and lists goals for strategy implementation and evaluation.

Point Pleasant Park - 2007

## Adaptive Framework and Management

Adaptive management is a common approach to learning about resource and environmental-management systems at the real scales of management, especially when the long-term outcomes of managing natural resources and ecosystems are highly uncertain.

There is a wealth of literature on the subject of adaptive management (Holling, 1978; Walters, 1986; and Lee, 1993). Numerous papers and reports explain the concept and show successes and failures in applying it (Baskerville, 1985; Duinker and Trevisan, 2003). Adaptive management is a paradigm, or way of thinking; it permeates the entire management and assessment process, from scoping and problem definition to implementation, monitoring and reassessment.

It is clear from all formal descriptions of adaptive management that the scientific tasks of (A) making impact predictions in the form of testable hypotheses, (B) measuring outcomes during and after implementation, and (C) rigorous comparison of predictions and measurements are all necessary parts of the process. Two levels of adaptive management can be applied. The first is passive in the sense that the scientific tasks described above are simply applied to a "normal" resource management plan. The second is active adaptive management, broad-scale experiments that occur where systems are managed in radically different ways to generate information about the best management actions.

Unfortunately, there is a lot of misunderstanding about what adaptive management is and should be. Too many people presume that it just means to "learn from one's mistakes," or "trial and error." Some think that adaptive management applies essentially to field practices undertaken to rectify unwanted impacts documented through monitoring. However, adaptive management is not an afterthought that one applies when absolutely necessary. The only times when adaptive management is not appropriate in resource and environmental management are when scientific uncertainty is non-existent, which is rare, or when unintended negative consequences of risky actions are completely unacceptable, such as in the destruction of a critical habitat for an endangered species.

How should we interpret adaptive management in the case of the Park's forest? If we accept the concept of passive adaptive management, we will:

- make explicit statements about how we want the forest to look many decades from now;
- design actions that we believe will set the forest on the right course;
- implement those actions;
- measure forest conditions over time; and
- create new management knowledge by comparing expectations and realities as they unfold.

### Precautionary Approach

Here's one way of stating the precautionary principle: "Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation" (taken from the Rio Declaration, a product of the United Nations Conference on Environment and Development, UNCED, 1992).

Viewed in this way, the precautionary principle complements the principle of adaptive management. Just as adaptive management suggests taking action in uncertain situations and risks making mistakes, so too does the precautionary principle admit the real risks of error. Indeed, it would not have to be used if a problematic situation could be evaluated with low scientific uncertainty (Goldstein, 1999). Invoking the precautionary principle should actually spur scientific research, particularly on-the-ground research into the effects of precautionary regulatory actions since "there is a much greater need to determine if the action is effective in achieving its goals" (Goldstein, 1999).

Clearly, scientific experimentation, adaptive management and the principle of precaution are mutually compatible. In the context of Point Pleasant Park, the precautionary approach can be interpreted this way: faced with a management problem in any area or aspect of the Park where managers are uncertain about both the consequences of doing nothing and the effectiveness of taking corrective measures, the preferred response shall be to take action. Active adaptive management can be used in some circumstances where the problem repeats itself in several areas of the Park, and managers wish to experiment with the no-action alternative.

*"Faced with a management problem in any area or aspect of the Park where managers are uncertain about both the consequences of doing nothing and the effectiveness of taking corrective action, the preferred response shall be to take action."*

*- Point Pleasant Park Comprehensive Plan 2008*

## The Public's Forest Values

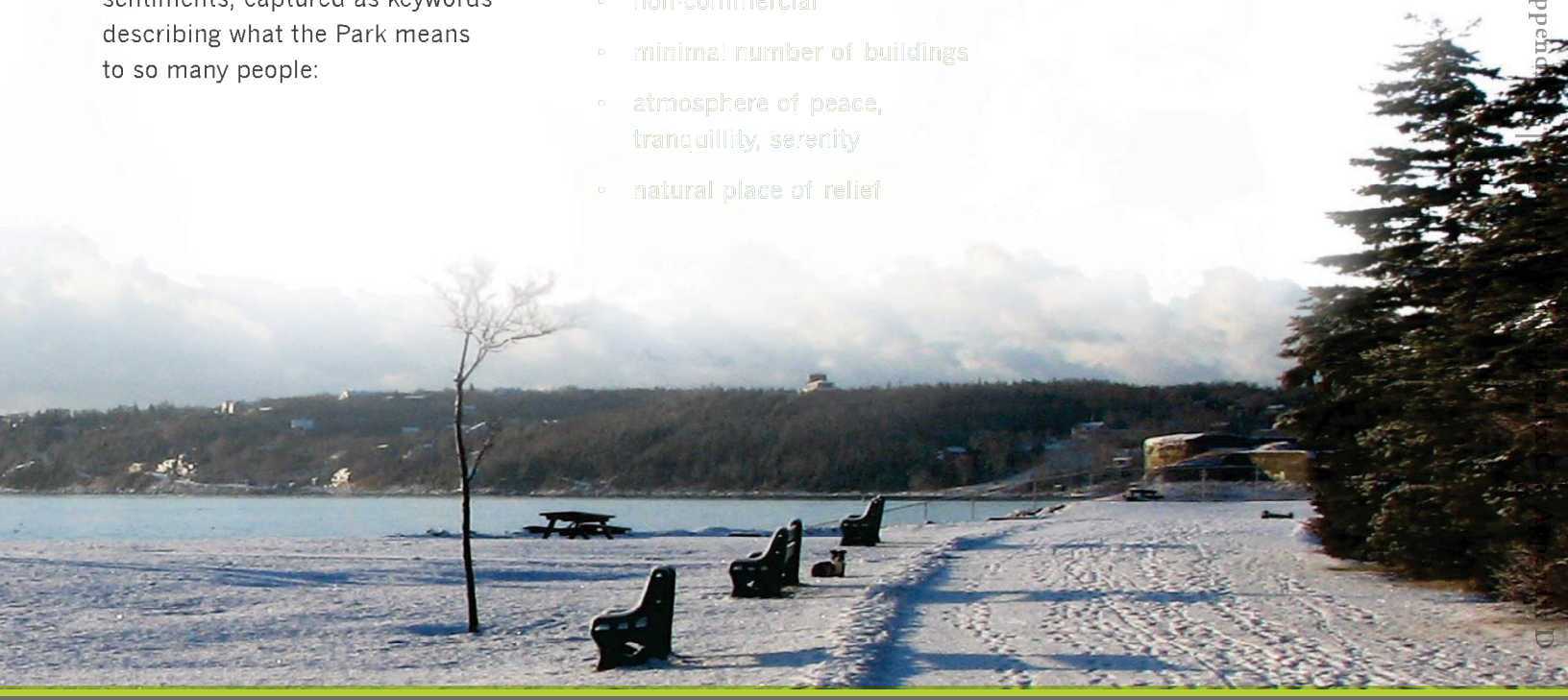
The planning team used a variety of relevant documents, as well as numerous exposures to and discussions with relevant stakeholders, to assemble a suite of values that needs to be satisfied regarding Point Pleasant Park. In organizing these values into a framework, the planning team was guided by two well-tested aids to organize concepts of forest sustainability: (1) the Criteria for Sustainable Forest Management (SFM), developed by the Canadian Council of Forest Ministers (CCFM, 2003); and (2) Elements of Sustainable Forest Management, developed by the Canadian Standards Association (CSA, 2002).

### Outcomes of Forest-Values Identification

Prior to the formal start of the park planning exercise, two processes were implemented to determine people's values associated with the Park: (1) consultations in January of 2005, as a lead-in to the Point Pleasant Park Design Competition (HRM G, 2007); and (2) a workshop associated with immediate management needs, held in October of 2006 (Charles et al., 2006). The 2005 workshop and survey yielded the following sentiments, captured as keywords describing what the Park means to so many people:

- an oasis from the surrounding city
- a nature-dominated landscape
- natural beauty
- friendly community
- place to connect with local history
- place for walking, dog-walking, running, picnicking
- place of contemplation
- park for all seasons, for all citizens
- non-commercial
- minimal number of buildings
- atmosphere of peace, tranquillity, serenity
- natural place of relief

By and large, people really want to have a mature forest again, to serve as a sanctuary from the bustle of city life. The 2006 workshop yielded similar sentiments from participants.



## Objectives, Indicators, Targets

It seems clear that HRM citizens and other Park stakeholders would like a naturalized forest to be the dominant ecosystem of Point Pleasant Park. The management plan takes the view that the widest range of people's values—consistent with the concept of an urban park—should be satisfied. Those values must include ecological, social and economic components, the three pillars of sustainable development.

Following the United Nations Conference on Environment and Development in 1992, the Canadian Council of Forest Ministers (CCFM) embarked on a process to define sustainable forests in a Canadian context. The CCFM's framework is led by six criteria that define the broadest spectrum of possible forest values (Table 4.1). The CCFM also developed elements to define the criteria; they were modified by the Canadian Standards Association (CSA) to be applied at the local level. In addition, the CSA developed a framework for translating local values into objectives, indicators and targets so that forest managers could be clearly guided in determining what management actions could be designed and implemented. While the CSA's framework was developed mainly for timber-producing forests, it also applicable in the management of "protection forests," of which Point Pleasant Park is one.

Thus, the framework for sustainable forest management that guides the future development of the Park's woodland includes criteria, elements, values, goals, indicators, targets and actions. The first step was to organize a series of forest values into the CCFM and CSA framework (Table 4.1). The second step was to identify appropriate goals, indicators and targets for the identified values (Table 4.2). The final step was to identify the kinds of actions Park managers would need to take to satisfy the targets and thus move Point Pleasant Park in directions that satisfy the public's values (Table 4.3).

**Table 4.1.** Criteria, elements and values for sustainable forest management in Point Pleasant Park.

| SFM Criteria (adapted from CCFM, 2003) | SFM Elements (adapted from CSA, 2002) | Values Associated with PPP (inspired by various PPP-related documents, forums and discussions) |
|---|---|---|
| 1. Biological Diversity | Ecosystem diversity | 1.1 diverse forest ecosystems |
| | Species diversity | 1.2 natural species abundance and distribution |
| | Genetic diversity | 1.3 native species of trees and other organisms |
| | Sites of special biological significance | 1.4 sites of special biological significance |
| 2. Ecosystem Condition and Productivity | Forest ecosystem resilience | 2.1 resilient forest ecosystems |
| | Forest ecosystem productivity | 2.2 productive forest ecosystems |
| 3. Soil and Water | Soil quality and quantity | 3.1 nutrient-rich soils free of toxins<br>3.2 soils kept in place |
| | Water quality and quantity | 3.3 sediment and toxin-free freshwater<br>3.4 abundant groundwater |
| 4. Role in Global Ecological Cycles | Carbon uptake and storage | 4.1 high rates of carbon uptake<br>4.2 large carbon reservoirs in soil and plants |
| | Forest land conversion | 4.3 minimum amount of land not forested |
| 5. Economic and Social Benefits | Non-timber benefits | 5.1 diverse recreational opportunities<br>5.2 preserved cultural heritage<br>5.3 rich cultural heritage appreciation<br>5.4 diverse opportunities for nature appreciation<br>5.4 diverse educational opportunities |
| 6. Society s Responsibility | Respect for Aboriginal Forest Values, Knowledge and Uses | 6.1 respectful appreciation of Aboriginal forest values, knowledge and uses |
| | Fair and effective decision-making | 6.2 fair and effective processes for stakeholder and public engagement in Park decision-making |
| | Criteria are large groupings of forest values and elements are smaller groups of forest values. Values are attributes associated with the Point Pleasant Park forest that will assist in achieving stakeholder satisfaction. The values are formulated as completions to the following sentence: "We value: . . . | |

**Table 4.2.** Values, objectives, indicators and targets for Point Pleasant Park.

| Values Associated with PPP (see Table 4.1) | Objectives | Indicators | Targets |
|---|---|---|---|
| 1.1 diverse forest ecosystems | • establish diverse forest ecosystems across the Park landscape | • degree of concordance of Park forest ecosystems with applicable Acadian forest types | • all forest ecosystems in Park conform to applicable Acadian forest types in NS |
| 1.2 natural species abundance and distribution | • encourage natural abundances and distributions of native species | • population status of all native plant and animal species | • healthy populations of all native plant and animal species except those that cannot survive in a small urban-isolated forest |
| 1.3 native species of trees and other organisms | • except in the case of adaptation to climate change, foster establishment and growth of species native to the Acadian forest | • number of non-native plant and animal species with expanding populations within the park | • zero non-native species with expanding populations |
| 1.4 sites of special biological significance | • conserve sites of special biological significance such as wetlands and ponds | • status of sites of special biological significance | • stability (non-decline) of sites of special biological significance |
| 2.1 resilient forest ecosystems | • maintain resilience of forest ecosystems | • adequacy of regeneration of all forest sites | • full regeneration success of all forest sites |
| 2.2 productive forest ecosystems | • maintain processes of primary productivity | • rate of net primary productivity | • NPP to conform to the average of similar sites in rural NS |
| 3.1 nutrient-rich soils free of toxins<br>3.2 soils kept in place | • maintain soil nutrient pools<br>• increase soil organic matter<br>• prevent soil erosion | • soil pools of Ca and Mg<br>• average thickness of surface organic soil horizon<br>• rate of soil loss from forest ecosystems | • minimize reductions in Ca and Mg pools<br>• increased average thickness of surface organic soil horizon<br>• minimize rate of soil loss from forest ecosystems |
| 3.3 sediment and toxin-free freshwater<br>3.4 abundant groundwater | • maintain clean stream waters<br>• maintain maximum groundwater recharge rates | • turbidity of stream flow<br>• depth to water table | • clear stream flow<br>• minimize depth to water table |
| 4.1 high rates of carbon uptake<br>4.2 large carbon reservoirs in soil and plants | • maximize net carbon uptake<br>• maximize carbon pools | • net carbon flux<br>• total carbon stocks | • forest ecosystems are net carbon sink<br>• increased total carbon stocks |
| 4.3 minimum amount of land not forested | • maximize land area in forest cover | • net land area in forest | • net maintenance or increase in forested land area (see note below) |
| 5.1 diverse recreational opportunities<br>5.2 preserved cultural heritage<br>5.3 rich cultural-heritage appreciation<br>5.4 diverse opportunities for nature appreciation<br>5.5 diverse educational opportunities | • provide diverse opportunities for foot based (and wheelchair accessible) recreation<br>• preserve/maintain selected sites of cultural heritage<br>• provide diverse opportunities for appreciation of cultural heritage<br>• provide diverse opportunities for nature appreciation<br>• provide diverse opportunities for all levels of education | • satisfaction of Park users with opportunities for recreation, education and appreciation of cultural and natural heritage | • majority of Park users satisfied (or better) with opportunities for recreation, education and appreciation of cultural and natural heritage |
| 6.1 respectful appreciation of aboriginal forest values, knowledge and uses | • respect Aboriginal values, knowledge and uses associated with the PPP lands | • satisfaction of Aboriginal stakeholders with park management | • Aboriginal stakeholder leadership satisfied or better with respect for Aboriginal values, knowledge and uses |
| 6.2 fair and effective processes for stakeholder and public engagement in Park decision-making | • implement fair and effective processes for stakeholder and public engagement in Park decision-making | • satisfaction of HRM residents and other Park stakeholders with Park decision-making processes | • majority of HRM residents and other Park stakeholders satisfied (or better) with opportunities for participation in Park decision-making processes |
| | Values are attributes associated with the Point Pleasant Park forest that will assist in achieving stakeholder satisfaction. Objectives are qualitative directional statements for the values. Indicators are ways to measure the state of the value. Targets are directional statements for the respective indicators. | | |

**Table 4.3. Targets and generic actions for management of Point Pleasant Park.**

| Targets | Generic Actions |
|---|---|
| • all forest ecosystems in Park conform to relevant FEC types in NS | • create a soils map, with topographic data also shown<br>• establish FEC vegetation types consistent with the soil types |
| • healthy populations of all native plant and animal species except those which cannot survive in a small urban-isolated forest | • as above<br>• encourage diverse habitat conditions, including large snags and downed woody debris<br>• maintain diversity of sizes within stands, consistent with silvics of the respective species |
| • zero non-native species with expanding populations | Tree species – for all non-natives except Norway maple, remove regenerating plants while maintaining mature individuals where there are no neighbouring mature native species individuals; for Norway maple, implement a gradual program of removal of all sizes of individuals<br>Non-tree species – implement program to reduce stands of Japanese knotweed; prevent heather patches from increasing beyond their current extent |
| • stability (non-decline) of sites of special biological significance | • take site-specific actions to maintain, enhance, restore and recreate wetlands and ponds |
| • full regeneration success of all forest sites | • where necessary (e.g., grassy areas), plant seedlings of native species appropriate to the site; where necessary, use manual weeding to reduce vegetative competition and maintain viability of planted seedlings |
| • NPP to conform to the average of similar sites in rural NS | • keep forests in natural conditions for species balances and age-class structures of trees |
| • minimize reductions in Ca and Mg pools<br>• increased average thickness of surface organic soil horizon<br>• minimize rate of soil loss from forest ecosystems | • keep all fine and coarse woody debris on site<br>• minimize site disturbance during woodlands operations |
| • clear stream flow<br>• minimize depth to water table | • minimize site disturbance during woodlands operations<br>• channel road runoff to holding ponds |
| • forest ecosystems net carbon sink<br>• increased total carbon stocks | • keep forests in natural conditions for species balances and age-class structures of trees<br>• keep all forest litter on site |
| • net maintenance or increase in forested land area | • keep the forest at its present extent, or allow it to increase<br>• if forest area within the Park is converted to non-forest cover, increase its extent elsewhere in the Park |
| • majority of Park users satisfied (or better) with opportunities for recreation, education and appreciation of cultural and natural heritage | • implement an annual satisfaction survey of Park users<br>• improve facilities (paths, signage, other amenities) and information programs to improve satisfaction if warranted |
| • Aboriginal leadership satisfied with respect for aboriginal values, knowledge and uses | • implement a satisfaction survey (by interview) of Aboriginal leaders<br>• improve actions associated with respect for Aboriginal values, knowledge and uses, if warranted |
| • majority of HRM residents and other Park stakeholders satisfied (or better) with opportunities for participation in Park decision-making processes | • implement an annual satisfaction survey of HRM citizens and other Park stakeholders<br>• implement improved participatory processes if warranted |
| | Targets are directional statements for the respective indicators. Generic actions are the types of management actions, activities or treatments that will help Park managers meet the targets. |

In setting indicators and targets in Table 4.3, it becomes important to have clear definitions for what is measured. The term "forest" is a tree-dominated ecosystem; many areas of Point Pleasant Park are thus forests. Others are not, such as the grassy lawns between Sailors Memorial Way and the ocean shoreline and the heather patches. "Forest," in the context of the Park, is land that is currently dominated by trees, as well as regenerating areas that will eventually be dominated by trees. A pathway or narrow road where the tree canopy closes overhead could be considered as part of the forest; so could the site of a small building such as a washroom. The target "net maintenance or increase of forested land area" is meant to signal that Point Pleasant is a forest park, not a park of meadows, sports fields and large buildings. It does not prevent Park managers from installing infrastructure as required for park maintenance and operations. Except in designated areas where tree cover is explicitly considered undesirable, such as to preserve some historical sightlines, the rest of the Park will be managed to create and maintain tree cover.

## 4.2 Forest Management Strategies

### Approach: Values-Directed Adaptive Forest Management

Following a major storm such as Hurricane Juan, a forest could be managed according to any one of a range of strategies. For example, in a remote setting such as Cape Breton Highlands National Park, it could be a wise decision to let nature take its own course. Dead trees could be left to fall and rot, or perhaps even burn in a wildfire. Where timber is an important forest value it could be salvaged, and regeneration could be left to occur naturally. In a garden-like setting such as the Halifax Public Gardens, trees would be strategically replanted in carefully chosen locations to recreate the atmosphere of a manicured garden.

In Point Pleasant Park, the best way to give visitors the kind of ecosystem they prefer, as reflected above in the discussion on forest values, is to implement values-directed adaptive forest management. This approach has two main themes. First, "values-directed" means that the public's forest values influence the way the forest is managed. Second, "adaptive" means that management activities are designed and implemented so as to direct forest development in specific directions. If monitoring shows that the actions will not result in the expected forest development, the management strategy will be reviewed to determine a more appropriate direction. Basically, managers will adapt in response to uncertainties and weaknesses in the management system as they are revealed.

The kind of forest ecosystem that will best meet public expectations in Point Pleasant Park is a naturalized forest. This means that managers will try to establish as natural a forest ecosystem as possible, with modest interventions and localized tweaks to meet specific needs and values.

## Lessons Learned from the Harvard Forest

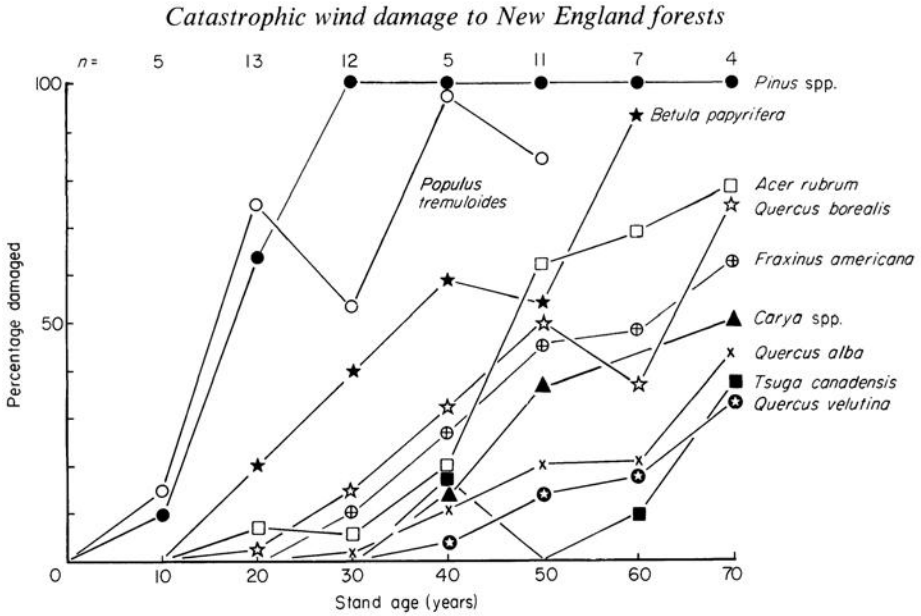
The Harvard Forest in New England has been one of the most intensively studied forests in North America since 1907. The forest is characteristic of the Transition Hardwood-White Pine-Hemlock vegetation zone, and the area encompasses over 1,200 hectares. In 1938, a Category 3 hurricane destroyed more than 70% of the forest. Since then, Harvard University and other researchers have studied the impact of catastrophic hurricanes on patterns of forest damage and long-term response.

With global warming and the likely shift toward more temperate species in the Acadian forest mix, the Harvard Forest provides an excellent model for research and management in Point Pleasant Park. Dozens of research papers have been written about it, and the results are both directly and indirectly transferable to Halifax. The research approach used at Harvard Forest is also a model for Point Pleasant.

A review of scientific papers on the ecological effects of hurricanes on temperate forests reveals the following lessons:

1. Forests on the immediate coastline and at higher elevations are regularly subject to higher winds and may be more resilient to wind damage than forests in surrounding areas. The spruce–fir forests of northern New England and the Maine coast, although less exposed to hurricane damage on average, are more likely to experience fires after a major hurricane than the hardwood forests of southern New England, where fewer fine fuels are generated and decomposition is faster.
2. Conifer stands in the Harvard Forest (mostly white pine) sustained greater damage than hardwood stands of the same height and exposure, while damage increased with stand height (Figure 4.2).
3. The relationship between wind damage and age is quite different for conifer stands and hardwood stands. From about 15 years of age, conifers increase sharply in susceptibility to damage. By 30 years of age, conifer stands had been completely destroyed by the 1938 hurricane. In contrast, hardwoods showed a more gradual increase in damage with age. Complete damage occurred only in stands that were older than 70 years of age.

**Figure 4.2 Relationship between age and average percentage of damage of the important tree species in all the plots following the 1938 hurricane at the Harvard Forest. (Source: Foster, 2003.)**



4. Trees in recently thinned plots were much more susceptible than in adjacent unmanaged stands, but edge trees that were continually exposed to wind were more resistant.
5. Forests on leeward slopes suffered little damage and were apparently shielded from the wind by the hill.
6. Using the HURRICON model for the 1938 event, 54% of the stands sustained more than 50% damage. If the same forest structure were converted fully to conifers, this figure would increase to 69%; under a scenario of 20-metre-tall conifers, it would increase to 97%. In contrast, if the forest structure were converted fully to hardwoods, the figure would decrease to 32%; under a scenario of 20-metre-tall hardwoods, it would be 66%. So, alternative management schemes could greatly alter the damage experienced by storms such as the one that occurred in 1938.

The lessons that can be learned from the results and the implications for Point Pleasant Park include:

1. Catastrophic hurricanes for Halifax originate from the south over the ocean (they quickly lose speed when they travel over land from any other direction) and will pass over Halifax from the west, causing south-originating windthrow.
2. Wind damage is largely controlled by topographic position, aspect, vegetation structure and composition. Stand damage is quite predictable.
3. Hurricanes are a major component in creating forest diversity by creating mosaics of patches of different age and successional status.
4. Aspect is an important determinant of forest susceptibility to wind. Stands on north and northeast slopes are much more protected and experience less force from the wind. In contrast, south and southwest slopes are more vulnerable.
5. Broadleaf trees are much less susceptible to damage than needleleaf types. Broadleaf stands should be encouraged on south and southeast slopes.
6. Age and height variation in the stand creates a more diverse forest, one that is resistant to hurricane damage. Hurricanes actually help create this type of structure in a forest.
7. The microtopography created by windfalls creates a perfect environment for succession and reveals propagules (any plant material that can lead to new plants) embedded deep in the soil.
8. Hurricane damage decreases susceptibility to future damage by creating a more resilient mixed-age forest. The deadfall improves soil structure, in turn increasing root strength. A hurricane can be a positive force on forest ecosystems by creating structural and vertical diversity and improving soil.
9. Uprooting mixes the upper soil layers, exposes a broad surface of mineral soil, creates considerable microtopographic and micro-environmental variation and locally removes or exposes buried seed pools.
10. Slope position would be expected to be more important as the sharpness of relief becomes more exaggerated.

## The Ecological Forest Management Framework

With an understanding of the public's forest values and with the lessons learned from similar coastal forests in New England and Atlantic Canada, an ecological forest framework can be adopted for Point Pleasant Park. One of the main goals of the management plan is to create a diverse and sustainable forest. Therefore, it is important to define areas of uniform landscape character that will support a mix of suitable Acadian forest tree species. Some species grow well in poorly drained soils, while others cannot tolerate shade, wind or salt spray. Classifying the landscape is the first step in determining vegetation suitability in the Park. Generally, plants will thrive where the habitat is best suited for them. However, unsuitable plants can still grow and compete with better-suited plants, hampering their growth or slowing stand succession. Ultimately, species that are not suited to a site can be a safety or nuisance problem.

While numerous biophysical elements such as soil, vegetation and slope characterize the Park's ecosystem, some are more relevant for species suitability than others. This is especially true given that certain elements contribute to or deter large-scale forest threats. The long-term, large-scale threats to forest sustainability in Point Pleasant Park include hurricanes, ice storms, fire, global warming, pests and poor management. Most of these threats can be ameliorated through insightful management.

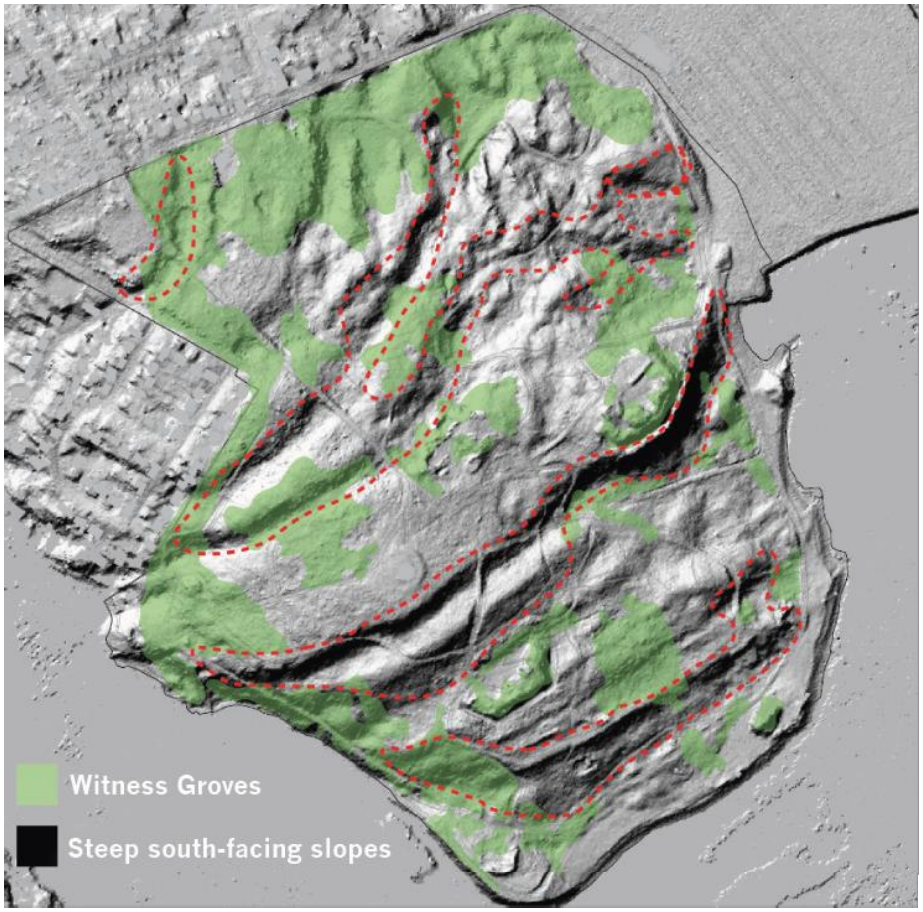
The forest-management framework begins by prioritizing a sustainable structure for a future forest. The following concepts outline the priorities for the forest, and their placement is illustrated on Map 4.1:

## MAP 4.1: FOREST MANAGEMENT ZONES


### Protect the Existing Remnant Forests (Witness Groves)

The trees that were left standing after Hurricane Juan are both a testament to the past and the remains of the previous forest. The patches of remaining forest, which are dominated by needleleaved species, improve the prospects for recolonization and naturalization of the surrounding forest matrix. They provide a nearby seed source, improve the surrounding microclimate for other colonizers, enhance soil moisture and retention, and offer a valuable natural habitat. Remnant forest areas in the Park will be subject to minimal management actions.

Figure 4.3 Existing forest patches (witness groves) overlaid on LIDAR imagery




### Focus First on Establishing Mixed Broadleaves on Steep South-Facing Slope

Hurricanes that pass to the west of or directly over Halifax pose the greatest threat to Point Pleasant Park, where southerly winds can devastate wind-intolerant species on steep south-facing slopes. Needleleaved stands in Harvard Forest (Foster, 1988) sustained greater damage than broadleaved stands of the same height and exposure. Establishing a mixed broadleaved forest on the south-facing slopes of the Park is a top priority. Needleleaved species will be de-emphasized on south-facing slopes; indeed, many were already wiped out during Hurricane Juan.

The topography of Point Pleasant Park clearly shows three east–west oriented bands of south-facing slopes bisecting the Park (Figure 4.3). All three of these slopes were decimated in the Hurricane (note the lack of green, depicting witness groves, on these slopes within the dashed red boundary).

The south-facing slopes are also drier and more erosion-prone than other areas of the Park. Establishing broadleaved forest cover on these slopes will require a focused management effort. Work has already started near the shoreline and will move northward.

### Eliminate Vegetation That Could Jeopardize Important Cultural Remains

Tree roots or trees that have the potential to fall or uproot around important archaeological remains will be removed on an individual basis as determined by both an archaeologist and arborist. See the guidelines on vegetation management protocols associated with cultural features (Section 4.4).

### Focus Remaining Forest Matrix on Mixedwood

The remnant forest witness groves are primarily a needleleaved forest. These groves occupy 38 per cent of the Point Pleasant Park forest area. The remaining 62 per cent forest matrix should favour a mixedwood and broadleaved-dominant forest composition (see Note below). The reasons for this include:

- needleleaved-dominant forests are generally more fire-prone and windthrow-prone than mixedwood or broadleaved-dominant forests;
- litter from mixedwood forests is less acidic than from needleleaved-dominant forests;
- forests with high tree-species diversity are less likely to suffer catastrophic damage from insects and diseases;
- broadleaved-species rooting systems generally exploit more of the soil profile and can access nutrients from deep soils;
- climax forests on such lands along the Atlantic coast of Nova Scotia are typically mixed woods; and
- mixedwood forests are visually pleasing year round.

*[Note: Foresters usually classify forest stands into composition classes based on species composition to the nearest 10 percentage points. For our purposes, needleleaved stands are those with 70 per cent or more trees of needleleaved species, broadleaved stands are those with 30 per cent or fewer trees of needleleaved species and mixedwood stands have 40 to 60 per cent needleleaved trees.]*

## Management of Trees of Non-native Species

There are three management approaches for non-native tree species, depending on the particular species. Table 4.4 shows a list of species that will be managed as follows:

- removed with high priority due to their ability to spread within the Park and impede the growth of native trees;
- removed with medium priority due to their foreign nature and potential to out-compete native species over time; or
- removed with low priority due to their cultural importance or ability to stand in for natives that are prone to disease. Some culturally significant trees and attractive specimens will be preserved; trees used to create special landscape features may even be replaced where they pose low risk for invasion into the wider Park landscape.

Table 4.4 Non-native species removal strategy

| High Priority Removals (invasive non-native species): | Removal Approach |
|---|---|
| Norway Maple | remove all seedlings and saplings annually; remove large trees as long as treed character of immediate area is not compromised |
| Knotweed | dig out where possible; if not possible, cover growth area with black plastic |
| **Moderate Priority Removals (non-native species):** | |
| European White Poplar | remove all seedlings and saplings every 3 to 5 years; remove large trees as long as treed character of immediate area is not compromised |
| Horse Chestnut | same |
| European Linden | same |
| Austrian Pine | same |
| Scots Pine | same |
| Norway Spruce | same |
| Douglas Fir | same |
| Black Locust | same |
| Sycamore Maple | same |
| English Walnut | same |
| English Oak | same |
| **Low Priority removals (non-native but culturally important species):** | |
| Heather | remove plants if patches expand beyond current extent; remove trees only in the shoreline heather patch |
| European Beech | Copper varietal: remove all seedlings and saplings ever 3 to 5 years; greenleaved varietal: leave untouched until disease-resistant native beech may become successfully established |

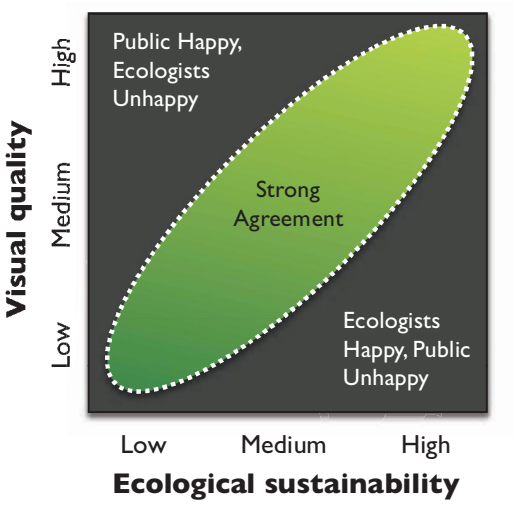
In the Park, all trees of non-native species allocated to high- and medium-priority removal will be pursued without delay. Exceptions include European beeches and particularly striking mature individuals of any other non-native species except Norway maple (for example, the horse chestnut trees along Cambridge Drive could remain). In addition, where mature non-native trees are vital in defining Park spaces or character in highly visible areas, the non-native trees should be preserved until suitable native substitutes can take their place (for example, the Norway maples at the entrance to the Cambridge Battery define the entrance, and their removal would reduce the visual quality of the space). In some cases, special vegetation features may be replanted to ensure their continuity. The Norway maples at Cambridge Battery will be replaced with a native tree that can perform a similar role. The row of copper beech trees on the north side of Heather Road will be maintained with infill planting.

## The Forest Aesthetics Management Framework

In addition to the previous ecological forest-management framework, which provides a broad, sustainable, forest framework for the whole Park, the aesthetic forest framework outlines different factors that take into account the scenic qualities of the forest. Forest aesthetics becomes a secondary element in the forest framework.

Landscape preferences are influenced by age, gender, ethnicity, region and recreational activity. Forest preferences can often be at odds with ecological principles (Figure 4.4; Sheppard, 2001). For instance, decaying snags have tremendous ecological value, but Park users often dislike their appearance. Park managers will lean toward the ecological forest-management approach that takes into account aesthetic forest-management factors.

**Figure 4.4. Dichotomy between forest visual quality and ecological sustainability (Sheppard, 2001).**




Forest aesthetics is a relatively new trend in forest management; however, in the last 20 years the subject has received considerable attention and research (Marc and Hill, 2001). Most of the research, unfortunately, focuses on long-distance visual resource management (views from highways of distant mountain timber cutting). There is little research on the aesthetics of forest design as it could be applied to an urban park such as Point Pleasant. Several notable landscape architects have used aesthetic principles in forest design. Capability Brown, for instance, pioneered an approach to aesthetics in forest design. In 1857 Frederick Law Olmsted used picturesque and "pastoral" principles in laying out New York's Central Park. For the picturesque, Olmsted "employed rich and varied plantings that created complexity of light and shadow near the eye, in contrast to the open spaces and delicate, indefinite boundaries of the pastoral style" (McLaughlin, 1983).

There are six aesthetic styles that could be used sparingly in the Park to increase public access to different forest views. Application of these styles will take place within the background matrix of the Acadian forest. Table 4.5 lists the aesthetic style, the characteristics of the style and appropriate management techniques. To realize the full intent of the style, the table also identifies a minimum size for using the approach. Map 4.2 potential locations for each forest aesthetic style. Ideally, pathways in the Park should bisect these areas so that visitors are immersed in the aesthetic style.

**Table 4.5 Forest aesthetic management approaches**

| Aesthetic Style | Min. Size (hectares) | Characteristics | Management Techniques |
|---|---|---|---|
| **Sacred Forest** | 1 | Monoculture or dominant tree. Presence of certain culturally sacred species. Much light and shadow (contrast). Visually permeable canopy. Low, fine, textured understorey (easy to walk through). | Dominant stands (or monoculture) of deciduous trees that are culturally sacred (e.g. birch, poplar, hemlock, red pine). Low understorey with texture and colour. Variable spacing of trees with ability to walk under lower limbs. Clearings in the forest create shafts of light. Single showcased tree with space around it. |
| **Picturesque** | 2 | Progressively realized views. Changes in topography. Anomalous subject elements (built object, rock outcrop, ruins, etc.), enclosure and expansion of space by forest. Visibility and variation in the natural horizon. Layered forest and glade. Dappled light and shade. | Forest clearing with anomalous subject element. Variation in the horizon from viewpoint. Succinct foreground / midground /background from the viewpoint. Views of subject framed by plant material. Colour and texture in foreground plant material. Smell and sound adds another dimension. Play of light and shade. |
| **Pastoral** | 1 | Characterized by open spaces of gently sloping lawn or meadow. Irregular forest edges. | Meadow or turf clearing with forest creating a constricted gateway entry. No abrupt forest edge on the periphery. Undulating topography. Easily walkable. |
| **Gardenesque** | N/A | Garden style characterized by geometry and formal shapes, decorative bedding and individual plantings to highlight exotic plants or planting groups. Use of garden furniture or art. | Mildly applicable for Point Pleasant Park. May have bearing at the Park lodge or around summerhouses. More formal plantings in landscaped beds. Smell and colour is important. Not necessarily restricted to native plant species. |
| **Forest Primeval** | 3 | Dark, mysterious, high understorey, very dense canopy, more irregular shaped branch habit, textural bark, no views of natural horizon. | Narrow, winding paths. Dense, mostly coniferous, plantings. Few views of sky with low canopy. No view of natural horizon. Introduce select mysterious species (witch hazel, Jack pine, hemlock, beech). Low-light and thicket type understorey (cinnamon fern, mosses, blackberry) encouraged. Moss in trees. Snags and course woody debris. |
| **Coastal Barrens** | N/A | Stunted wind-tolerant species. frames views of the coast. Boulders or bedrock present. | Maintain openings that don t endanger the interior forest, evergreen understorey (bayberry, juniper, blueberry, kalmia, etc.). |

## MAP 4.2: FOREST AESTHETICS

## Principles for Species and Stand Management in Point Pleasant Park

The following list of specific management principles provide detail to the Design Criteria for Forests outlined in Chapter 3:

### Native Tree Species

In this Plan, Point Pleasant Park will become a more natural Acadian forest ecosystem. Thus, it is important to choose native tree species (Table 2.2) in tree regeneration. For the following three reasons, it may be necessary to depart somewhat from this principle:

1. Across the Maritimes, American beech (Fagus grandifolia) has been stricken with a non-native bark disease, so it may be impossible today to grow disease-free American beeches to maturity in Point Pleasant Park. In this case, options include excluding the species from natural regeneration or planting the disease-resistant European beech (Fagus sylvatica, greenleaved varietal). The extant European beeches in the Park largely survived the ravages of Hurricane Juan, and European beech seedlings and saplings have already become established near the parent veteran trees. The copper-leaved varietal is important along certain allees (broad paths bordered by trees) and will be perpetuated there. The green-leaved varietal will be conserved in other areas until it is known whether the disease-resistant native American beech can be successfully established.
2. Some native species such as red spruce may be susceptible to damage from non-native pests such as the brown spruce longhorn beetle (BSLB), and it may therefore become necessary to reduce the occurrence of such susceptible species to help control non-native pests.
3. With impending climate change, in particular the trend of warmer temperatures, some native tree species may fail to grow vigorously. Therefore, it may be wise to consider which tree species from milder climates, such as that in southwestern Ontario and the New England states, might be better suited to the upcoming century's climate in Halifax, and plant some of those species in the Park.

### Tolerant Tree Species

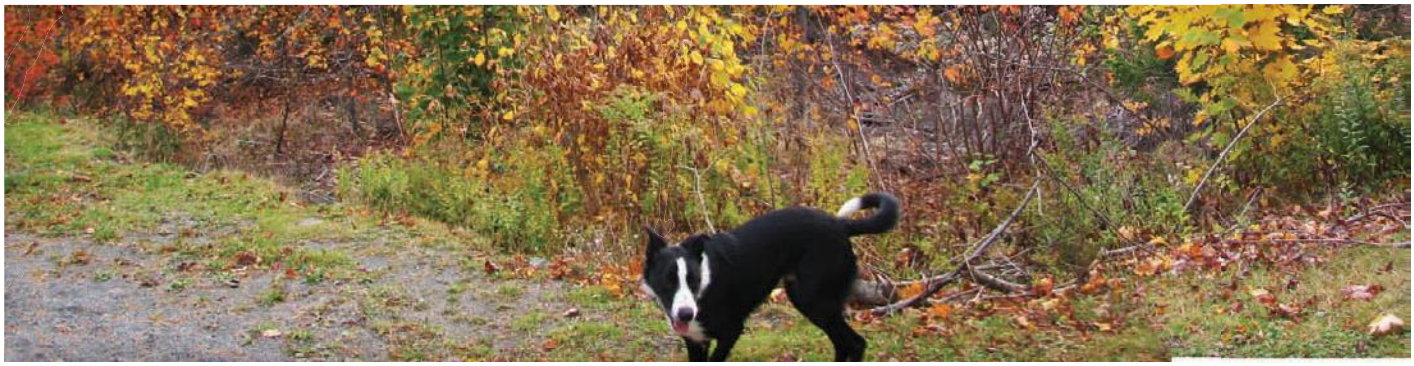
The natural Acadian forest is diverse and includes 40-plus native tree species. Some of these, such as aspen/poplar and white birch, are abundant and relatively shade intolerant and short lived; others such as sugar maple and hemlock are shade tolerant and long lived. While all native tree species should be represented in Point Pleasant Park, the shade-tolerant, long-lived species will be favoured immediately. This approach will hasten the development of a relatively stable overstorey canopy. A focus on six tree species is highly consistent with the Government of Nova Scotia's policy on old forests across the province: sugar maple, yellow birch, red oak, eastern hemlock, white pine and red spruce.

### Mixed-Age Trees

In a mature or old-growth Acadian forest dominated by shade-tolerant species, stands are characterized by trees of all ages: old ones that may soon die and turn into snags or large fallen logs on the forest floor; mature trees forming the main canopy; saplings that may join the canopy when a veteran tree dies and fall down; and seedlings eager to join the ranks of the saplings. This mixed-age situation is visually attractive and diverse. Park managers will use restoration practices that promote mixed-age stands as soon as possible. With time, such stands will form the characteristics commonly associated with old-growth forests.

### Natural Regeneration

The best way to recreate a dynamic natural-forest ecosystem in Point Pleasant Park is to encourage natural tree regeneration wherever it can and will occur. Natural regeneration is favoured when the propagules needed to establish seedlings of native species are more or less well distributed in and on the soil across the Park. The following four-step strategy for tree regeneration across most of the Park guides the regeneration process:



(a) Planting to diversify the mix of long-lived Acadian forest species growing in the Park, and to establish appropriate species balances in the designated areas for broadleaved, mixedwood and needleleaved stands. Some of these plantings took place in both 2007 and 2008 (Table 4.6) to take advantage of time-limited funding opportunities, and to lose no time in getting appropriate stands established.

(b) Fill-planting in areas where few trees of any desired species seem to be growing naturally. These too have been part of the 2007–08 plantings.

(c) Allow regrowth to occur naturally, with few interventions, within five to 10 years.

(d) Editing of the natural regeneration by cutting out unwanted seedlings and saplings to provide the best possible species mix and a healthy spacing of trees. Some such editing occurred in the autumn of 2007, mainly in the northwest section of the Park.

**Table 4.6 Seedling plantings in Point Pleasant Park (2007-08)**

| Species | Spring 2007 | Fall 2007 | Spring 2008 (planned) | Total |
|---|---|---|---|---|
| Ash, Black | 600 | 2,000 | 6,000 | 8,600 |
| Ash, White | 1,400 | 500 | 1,000 | 2,900 |
| Aspen, Largetooth | 1,000 | | | 1,000 |
| Aspen, Trembling | 1,400 | | | 1,400 |
| Birch, Yellow | 1,200 | 4,500 | 4,000 | 9,700 |
| Cherry, Black | | 750 | | 750 |
| Elm, American | | 1,000 | | 1,000 |
| Hemlock, Eastern | 1,250 | | 3,000 | 4,250 |
| Ironwood | | 750 | 4,000 | 4,750 |
| Larch | | 750 | 2,000 | 2,750 |
| Maple, Red | 1,300 | | | 1,300 |
| Maple, Sugar | 1,600 | 3,000 | 6,000 | 10,600 |
| Oak, Red | 1,700 | 1,000 | 6,000 | 8,700 |
| Pine, Jack | | | 3,000 | 3,000 |
| Pine, Red | | | 3,000 | 3,000 |
| Pine, White | 3,550 | | 3,000 | 6,550 |
| Willow, Pussy | | 50 | | 50 |
| Total | 15,000 | 14,300 | 41,000 | 70,300 |

## Snags and Fallen Trees

A healthy, natural, Acadian forest ecosystem contains standing dead trees (snags) and fallen dead trees (downed logs). Both snags and downed logs provide an essential habitat for hole-nesting birds such as woodpeckers, insects, amphibians and decomposers such as fungi. Park managers will leave all snags standing until they fall naturally, except where public safety near pathways is a risk. All fallen logs will be left in place except where they may contribute to the proliferation of non-native species such as the BSLB. Unsightly downed woody debris near pathways will be pulled deeper into the forest, with any butt ends of cut logs located out of path users' view. Downed logs may also be placed to slow or redirect runoff, block unauthorized paths or create seedling nursery areas. When used for these purposes, their position should appear to be entirely natural.

## Understorey Vegetation Management

For Park visitors, the forest's understorey is a highly conspicuous element in the woodland landscape that merits conservation for its aesthetic value. Within the forest ecosystem, the understorey is the nursery that shapes renewal, as well an important habitat for fauna. Understorey vegetation management aims to enhance our awareness of understorey health and promote an understanding of the dynamics that shape its development. The current state of understorey vegetation provides little immediate concern but warrants ongoing study.

**Table 4.7 Understorey non-native plant treatments**

| Invasive Non-native | Treatment |
|---|---|
| **Hemp-nettle (Galeopsis tetrahit)** | A colony of this annual weed exists on a nutrient-rich area adjacent to Bridle Path between Cambridge Drive and Francklyn Street; its seed bank has a lifespan of five years. This weed should be eradicated though annual cutting before it sets seed. A dedicated plan will be required to ensure it eventual elimination, which should be accomplished with a decade. |
| **Common hawkweed (Hieracium lachenalii)** | Found in fields and forest openings where soil is well drained, coarse textured and low in organic content and nutrients. Spreads through prolific asexual seed production. Small populations can be removed by digging out the entire root. Beneficial species should be preserved to help prevent re-invasion. Amendments of fertilizer and organic matter may help in the management of the weed. If plant is in flower, they should be bagged for disposal. Begin control in least infested areas first. A long-term plan is needed to ensure successful eradication. |
| **Spotted devil's paintbrush (Hieracium maculatum)** | Burley et al. found this to be the most common non-native in the forest understorey. Follow treatment above. |
| **Japanese knotweed (Polygonum cuspidatum)** | This persistent pest tends to spread at a relatively slow rate, and therefore poses less of a risk than some of the other invasive species identified. It should be removed by repeated excavation of its roots, done by hand to minimize disturbance to adjacent areas. It s presence in the Park should be mapped and any new colonies to emerge should be eliminated upon detection. Existing colonies should be eliminated from the Park within a decade. |
| **Heather (Calluna spp.)** | Heather produces prodigious quantities of seed that may endure for a century. Hence it is able to form large colonies that tend to exclude all other plants. Clipping, grazing and burning have been used to rejuvenate colonies of heather. Occurrences outside of intended colonies should be removed promptly by hand weeding, which may stir up the soil and promote the emergence of new seedling plants, so follow-up monitoring is required. |

## Understorey Vegetation Monitoring

Understanding of the Acadian forest understorey is not well developed, and this is particularly true for urban forests. Burley et al. (2007) provided baseline data on the understorey condition that should help motivate ongoing monitoring. Park managers will implement a program of regular monitoring to ensure effective long-term understorey vegetation management. Rapid change in the early years following Hurricane Juan may require more frequent initial work. Park managers will capitalize on opportunities for continued research now that considerable baseline work has been completed since the hurricane.

Wetlands and other special understorey habitats within the Park will be protected from harm. A detailed survey will identify special areas of concern and appropriate management guidelines will be developed.

## Eliminate Invasive Non-native Plant Species

Invasive non-native plant species with the potential to interfere with the natural ecology of the forest understorey will be selectively removed from the Park. Although heather has the potential to become a serious pest, because of its cultural significance it will be retained but restricted to approved locations. Outside those approved areas, it will be removed.

Treatments for the removal of invasive herbaceous plants are presented in Table 4.7.

Forest Management Work

## Strategy Implementation and Monitoring

### Responsibilities

Responsibility for implementing the forest-management strategy contained in this plan lies with HRM (see Chapter 6). Physical treatments, such as tree planting, tree removal and understorey vegetation control, will be undertaken by staff, contractors or, in certain cases, volunteers. Monitoring will be co-ordinated by staff, contractors and volunteer researchers (professors and students) from universities and colleges. Staff, with the help of the Point Pleasant Park Advisory Committee, will perform strategy review and evaluation.

**Table 4.8. Forest monitoring requirements**

| Value No.) (see Table 4.2) | Indicator (see Table 4.2) | Monitoring Requirements |
|---|---|---|
| 1.1 | Degree of concordance of Park forest ecosystems with the relevant FEC types | • Forest inventory (5-10-year intervals)<br>• Photo monitoring of selected stands/vistas (monthly) |
| 1.2 | Population status of all native plant and animal species | Forest inventory for all native species; special inventories of selected plant and animal species (especially species at risk) (variable intervals) |
| 1.3 | Number of non-native plant and animal species with expanding populations within the Park | Forest inventory for non-native species; special inventories for selected plant and animal species (variable intervals) |
| 1.4 | Status of sites of special biological significance | Special assessment of all such sites (annual) based on monthly photo monitoring |
| 2.1 | Adequacy of regeneration of all forest sites | Regeneration survey of all sites (20% of the forest area each year, 5-year rotation) |
| 2.2 | Rate of net primary productivity | Calculations based on forest inventory |
| 3.1–3.2 | • Soil pools of Ca and Mg<br>• Average thickness of surface organic soil horizon<br>• Rate of soil loss from forest ecosystems | Soil sampling and analysis (5-year interval) |
| 3.3 | • Turbidity of stream flow<br>• Depth to water table | • Visual inspections immediately following rainfall events and snow melt<br>• Monthly measurements of small array of piezometers in areas of deep soil |
| 4.1–4.2 | • Net carbon flux<br>• Total carbon stocks | Calculations based on forest inventory |
| 4.3 | Net land area in forest | Annual inventory of additions and deletions |
| 5.1–5.5 | Satisfaction of Park users with opportunities for recreation, education and appreciation of cultural and natural heritage | Biennial survey of park users |
| 6.1 | Satisfaction of Aboriginal stakeholders with Park management | Interviews with Aboriginal leaders associated with Park (5-year intervals) |
| 6.2 | Satisfaction of HRM residents and other Park stakeholders with Park decision-making processes | Survey of Park stakeholders (5-year intervals) |

### Monitoring

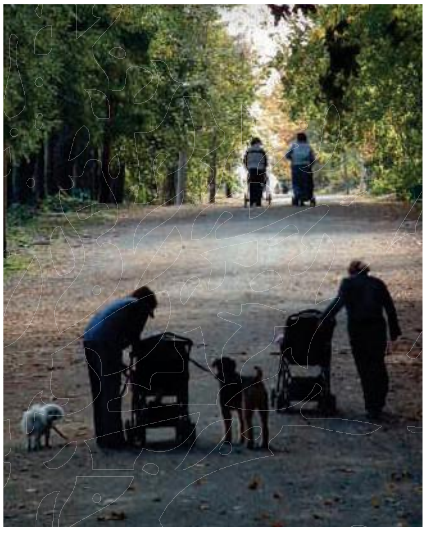
Adaptive management requires a strong program of monitoring to determine actual ecosystem conditions as they unfold. Therefore, the plan includes a comprehensive program of forest monitoring (Table 4.5). Datafrom the monitoring program will be analyzed and interpreted by appropriate experts as determined by the Monitoring and Research Committee.

### Roles for the Public

HRM citizens have several potential roles in implementing the forest-specific parts of the Point Pleasant Park comprehensive plan. Some relate to what citizens can contribute to the Park, while others relate to what they can take from it. On the "to" side, they will have frequent opportunities to express their views on how Park management is proceeding and how their values are being met or compromised. In addition, two other roles will be available:

(a) helping with Park maintenance. Trained volunteers would help manage vegetation by removing non-native plants and placing wood chips on forest paths; and

(b) helping monitor Park conditions. Citizens can register their observations on a wide range of species and natural events, including birds, mammals, insects and flowers, and take part in a photo-monitoring program.



Canopy - Cambridge Drive

On the "from" side, citizens stand to gain new levels of understanding about forests, how they work and how they benefit society. In this way, staff and Park-related groups, along with education institutions in HRM, will explore partnerships and other opportunities for organizing a wide range of citizens' learning opportunities, of which field trips and outdoor seminars will play a major part. Volunteer programs will require administrative support and integration into Park administration.

### Strategy Evaluation

In all managed systems, managers want to know as quickly as possible if current strategies are working as expected. Forests do not grow like cornfields, where a farmer can determine within weeks whether fertilizer or weed control is necessary. Instead, they grow slowly, and it takes years before managers can be sure whether the strategies are working. Thus, the following schedule will be followed to evaluate the level of success in managing the Park's forests:

(a) annual review to examine measurements of fast-responding variables such as vegetation control (for example, non-native understorey plants) and to prepare for the annual work plan;

(b) five-year review to examine measurements of slower variables, such as regeneration and stand responses to thinnings and other harvests, and to provide for interim evaluation of forest-management strategies; and

(c) 10-year review to examine measurements of slow variables such as forest development (based on full forest inventory) and full evaluation of forest-management strategies.

## 4.3 Shoreline Framework

This section outlines the management approach recommended for the shoreline of Point Pleasant Park. As was outlined in Chapter 2, there are four primary shoreline zones (Maps 2.3 and 4.3).

The management protocols for these areas are described below. A more detailed coastal dynamics investigation should be completed to supplement the management plan's recommendations and inform the design of shoreline protection works, as soon as is possible.

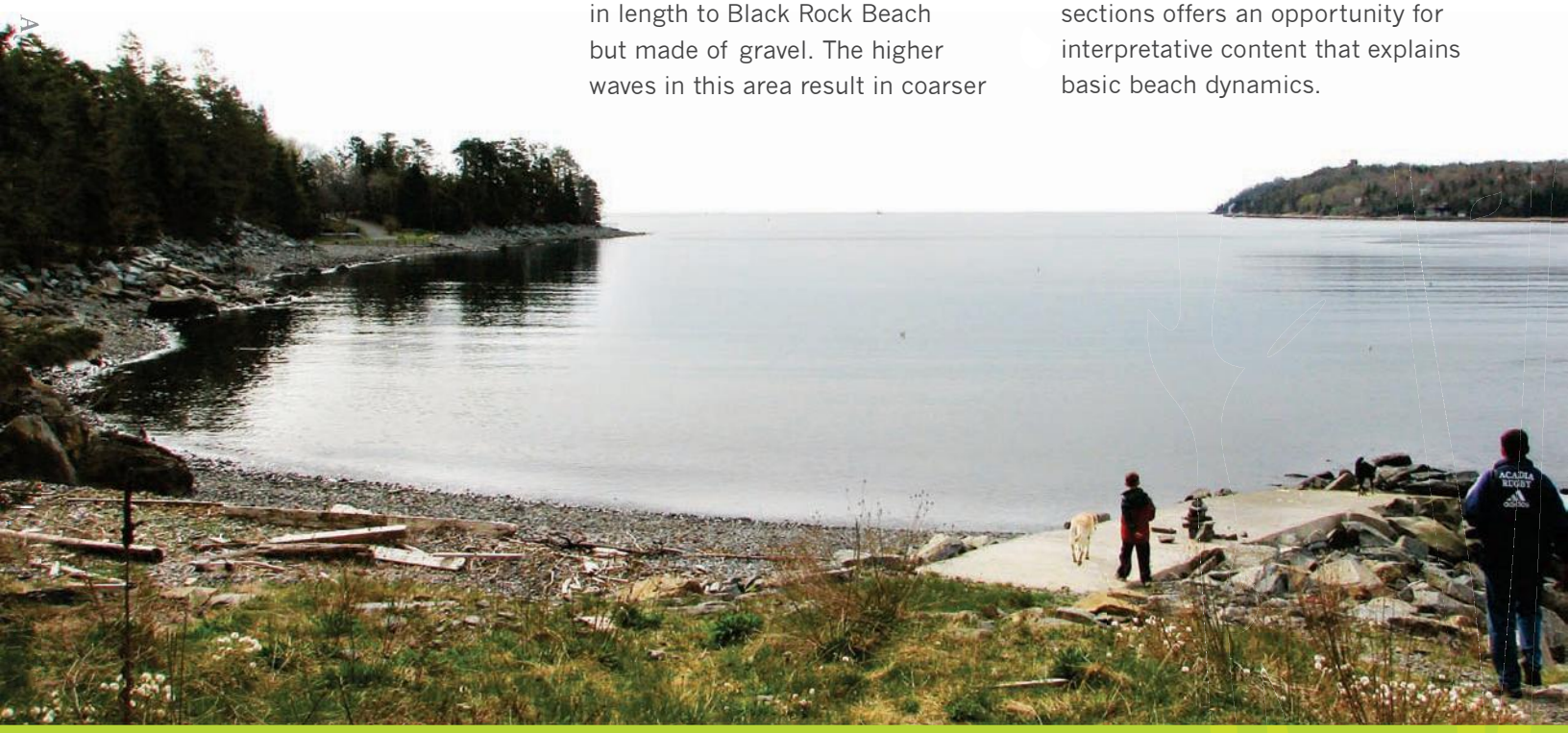
### Black Rock Beach to North of the Bonaventure Anchor

This part of the Park's coastline supports activities such as sunbathing, beachcombing, sand-beach play, picnicking and some outdoor theatrical activity. It is arguably the most visible and regularly used part of the Park.

The area includes Black Rock Beach and two other beach sections, each created between rock outcroppings extending as fingers into Halifax Harbour. The northernmost beach is Black Rock Beach, which has a history of sand addition and grooming by Park staff. This level of maintenance can continue, with the exception of the grooming of upper beach levels near the grassy area where beach stones have been piled to try to reduce erosion. This practice may actually increase loss of sand and gravel from the beach.

Moving south along the coastline, the next beach section is similar in length to Black Rock Beach but made of gravel. The higher waves in this area result in coarser particles than in the sheltered cove of Black Rock. Particle size gets progressively coarser moving south along the shore as wave energy and exposure increases. Adding sand to this middle beach to augment Black Rock Beach for recreational use is not likely to be feasible on an ongoing basis, unless a protective groyne were constructed to reduce the wave energy effecting the beach. Capital costs for a groyne and shoreline grading could easily exceed $500,000, and sand replenishment would be higher than current rates at Black Rock Beach. That said, future demand might warrant exploring this idea further if use and demand become an issue. In the meantime, this beach is good for beachcombing and is still quite walkable.

The southernmost beach section consists of coarse-diameter beach rock. It is harder to walk on, more rugged and not as suited to recreational uses. The transition displayed in the three beach sections offers an opportunity for interpretative content that explains basic beach dynamics.



## MAP 4.3: COASTAL MANAGEMENT ZONES

## The Bonaventure Anchor to Point Pleasant Bluff

### Bonaventure Anchor

Much of this section of shoreline is subject to significant coastal erosion. The geologic conditions do not favour easy shoreline stabilization because of the shallow bedrock beneath erosive soils. Storm waves tend to wash around and protective measures and erode them from the sides and behind. As a result, stabilization measures are expensive.

### Point Pleasant Battery

Significant erosion has occurred in the last 150 years (Map 2.4) between the Bonaventure Anchor and the Point Pleasant Battery. The first Point Pleasant Battery extended almost 20 metres seaward of the existing shoreline. The remaining structure is currently experiencing severe loss of ballast stone and physical damage caused by coastal erosion. This structure requires immediate stabilization, which can take the form of architectural "as-found" recording and subsequent removal, or architectural "as-found" recording and subsequent coastal protection and entombment of the remaining structure. The latter option of recording and stabilization is preferred and should be acted on as soon as possible (Figure 4.6).

For more than a century, a rock crib protected the Point Pleasant Battery. An updated design would help preserve the World War II battery; however, it will be difficult to protect this feature without causing an increase in shoreline erosion of the land on either side of whatever new protection is erected. To do this work simply by adding more rock in front of the battery may mean having to do extra work along both sides of the structure to avoid any erosion of the shore on either side.

**Figure 4.5: Bonaventure Anchor relocation**


To better understand how best to protect the battery, a detailed wave-modelling exercise should be conducted. This can have a significant benefit in directing stone placement to where it does the most good and the least harm to the rest of the shoreline.

**Figure 4.6: Section "C . See Map 4.3 for section locations.**

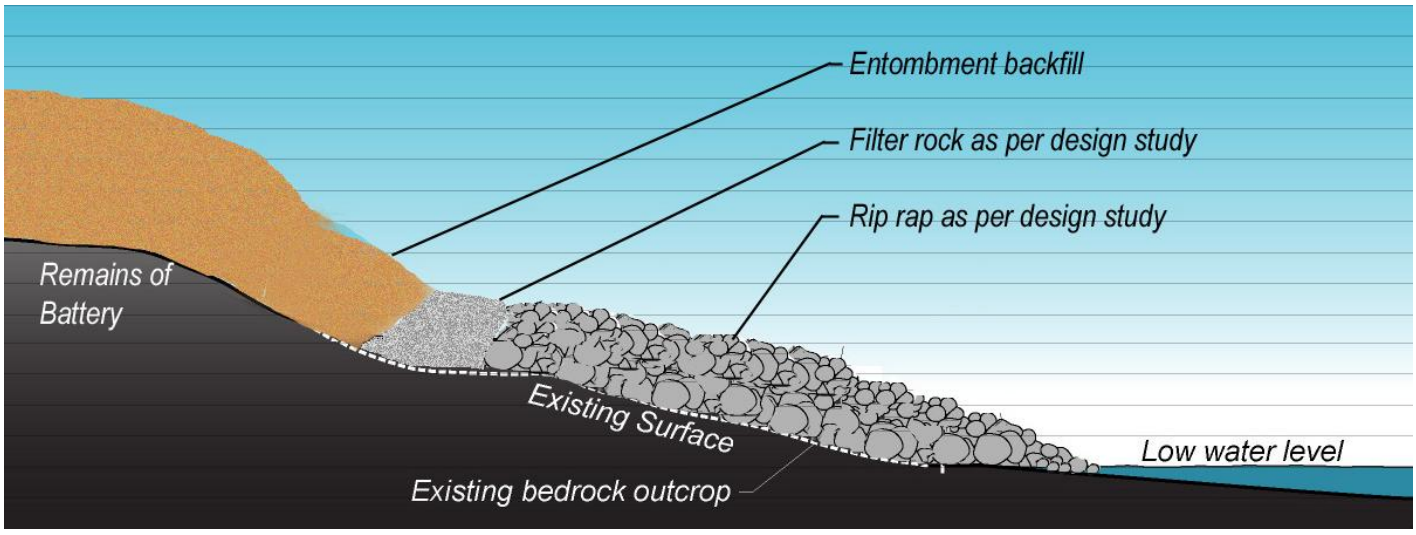
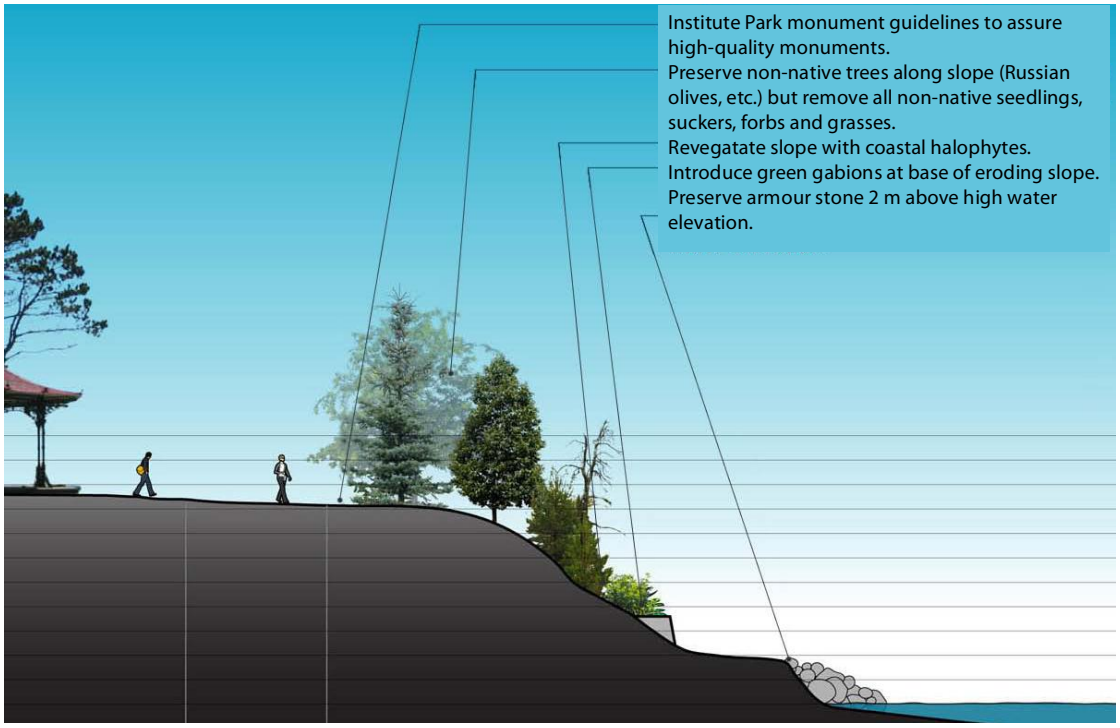


**Figure 4.7: Section "B . See Map 4.3 for section locations.**



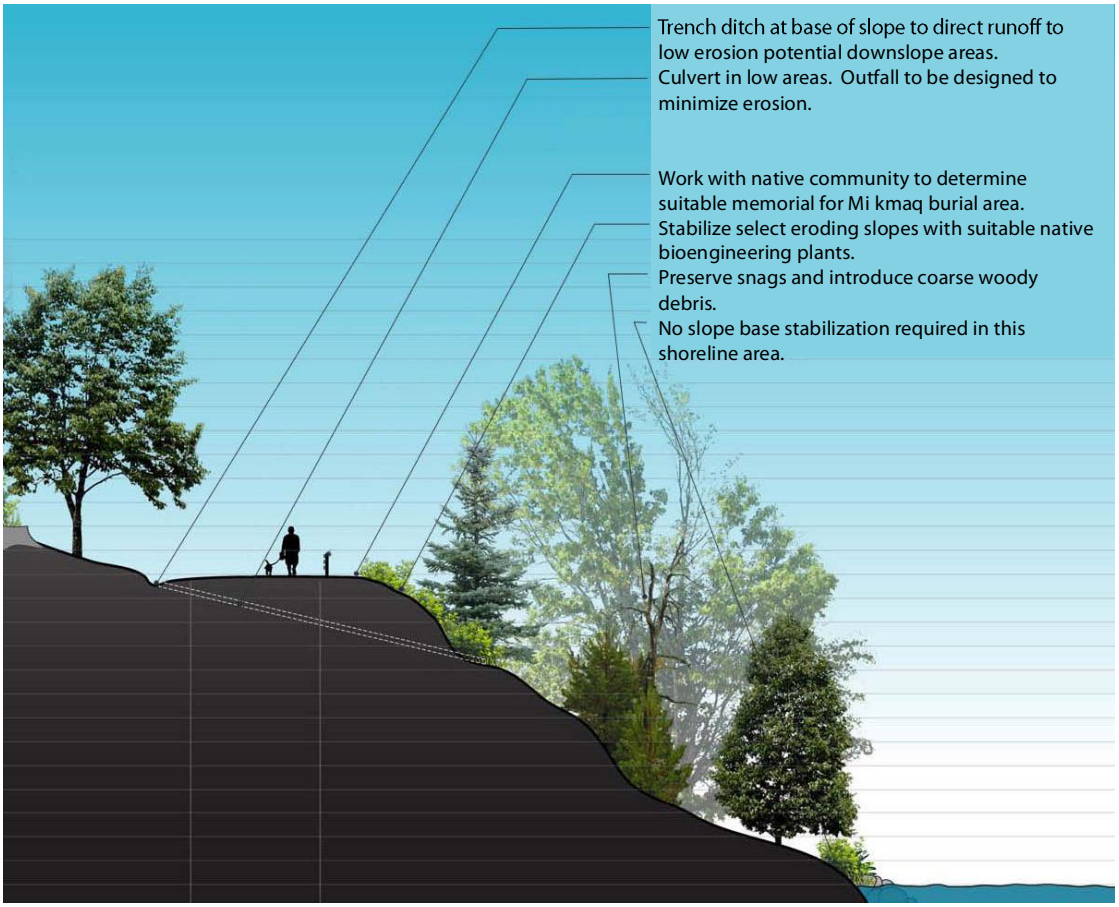

The level of fill around the actual masonry ruin can be designed to allow aspects to protrude, which will create opportunities for interpretation and enhance the visitor experience.

### Searchlight Emplacements

In the 1890s, defences at Point Pleasant Battery were upgraded with the addition of two linked searchlight emplacements, located some 80 metres west of the battery, and an electric generating station was also built close to the north side of the battery to power the lights. The chambers are now severely eroded and littered with brick and concrete rubble. The structure is seriously compromised by coastal erosion and is a major safety hazard. Unlike the Point Pleasant Battery, this structure cannot be preserved without significant investment and, as a result, it should be documented and removed as soon as possible.

The remaining cobble-beach shoreline south of the searchlight emplacement has been stable over the last 150 years, probably due to offshore shoals that minimize wave action, although it will become more exposed with sea level rise. In this area, the only management strategy is to improve the turf along the back beach, which is in very poor condition due to compaction and thin soil. The Park's operations plan should specify turf-cultivation measures for this area.

**Figure 4.8: Section A. See Map 4.3 for section locations.**




## Point Pleasant Bluff to Purcell's Landing

The bluff at the Park's southern tip presents perhaps the greatest shoreline-stabilization challenge. The top of this bluff housed North West Arm Battery; because there is risk of potential slope failure here, the shoreline requires some form of stabilization in order to preserve at least part of the battery.

As noted in Chapter 2, there are two distinct shoreline zones in this area; the most easterly is experiencing concentrated wave energy as a result of deflection from the Hen and Chickens. In this zone, the riprap protection is not holding up as well as it is to the west.

The shoreline in this area needs augmentation to reduce the overall slope of placed rock, as well as some additional height to ensure its utility and longevity. The design should be part of a future shoreline-stabilization investigation. The riprap design to the west appears to be working.

The bank above the riprap slope protection is eroding, and small surface-slump failures have occurred. This suggests that some bio-remediation of the exposed slope using rooted shrubs and small trees may be beneficial (Figure 4.7).

Some immediate work to expand and improve the shoreline works already in place in this area is recommended. In addition, detailed slope-stability analyses, informed by a geotechnical drilling program, are also recommended to properly assess the risk of a more catastrophic slope failure occurring, as the undermining of the slope tends to increase the possibility of such an event.

Shoreline - Black Rock to Bonaventure Anchor

Subject to the geotechnical work, drainage-control works—shallow enough to not intrude on the archaeological resource—may be required to protect the slope from a larger-scale failure and to reduce the gradual retreat due to surface slumps.

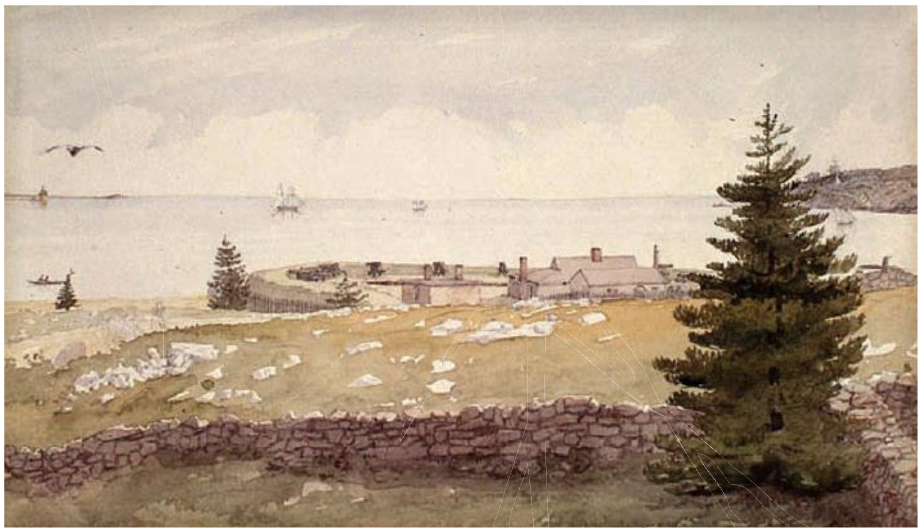
This active area needs immediate attention, first to record its archaeological resources and secondly to stabilize the headland.

## The Shore of Northwest Arm from Purcell's Landing to Chain Battery

This part of the coastline is mainly a rocky shore with exposed bedrock and steep cliffs leading to a stone beach. The Chain Battery is well protected by bedrock outcroppings; it is also the location of known First Nations' features that require careful management during the course of any work on-site.

The main cultural feature at risk here is the path along the shore that runs above the beach on top of the cliff. Parts of the slope reveal a significant recession of the cliff edge due to slope failure. This is due to shallow groundwater seepage, especially at times of the year when the soil is saturated. In several places, the cliff edge is at or close to the edge of the path. In these erosion locations water drainage from several well defined "valleys" channels to points where the slope is receding..

In these areas, drainage improvements, including cut-off trenches, and a piped diversion of the shallow groundwater under the path to the rocky beach is recommended (Figure 4.8).



View from above Point Pleasant Battery - 1842

Shoreline - Bonaventure Anchor to Point Pleasant Bluff

Point Pleasant Battery - 2007

## 4.4 Cultural Management Framework

Many of the fortifications in Point Pleasant Park have histories of construction followed by periods of neglect and decay, then reconstruction and rearmament in time of war. The pre-Juan, hands-off cultural resource-management approach may have been accepted in the past, but a more active cultural resource-management strategy is needed today, especially as it relates to vegetation management around cultural resources.

An effective cultural resource-management practice in the Park should be based upon:

- an up-to-date historic resources inventory;
- effective use of management tools such as GIS, archaeological protocols and staff training;
- an evaluation of resources;
- the consideration of historic value in decisions affecting conservation and presentation;
- a clear understanding of commemorative intent;
- clearly defined vegetation-management protocols for historic sites
- periodic monitoring and review to ensure that conservation and presentation goals continue to be met.

Looking to Halifax from Point Pleasant - 1789

## MAP 4.4: CULTURAL MANAGEMENT ZONES

Fort Ogilvie - 2002

## Archaeological Guidelines

### Archaeological Inventory

An archaeological inventory of the Park involves a survey recording all surface-visible features, as well as subsurface testing to verify and define archaeological locations. To date, no comprehensive inventory of the Park's historic resources has been done, although several sites have been found during the course of cleanup work after Hurricane Juan (Schwarz, 2004; Schwarz and Schwarz, 2006). An inventory would provide a more detailed management tool for staff, painting a better picture of where and what the historic resources of the Park are. It would also give a baseline picture of the Park's cultural heritage for the future.

An archaeological inventory is also needed to answer questions about cultural resources. Title search and historical research by Paul and Dawn Erickson in 2004 revealed that more than one home was built during the 18th century at Point Pleasant. For example, we have tantalizing clues in the form of artifact scatters and a picture (Figure 4.9; Hicks, 1782) about the location of Lt.-Gov. Edmond Fanning's once-splendid house and gardens at Point Pleasant, but the estate of this notable figure in the history of Nova Scotia and Prince Edward Island (he also served as lieutenant-governor of P.E.I.) has yet to be found. The well and musket ball at Green Fields indicate that the area should be examined further for domestic structures. Cellars found near Heather Road also need to be assessed, because it is unclear whether they are domestic or related to the Point Pleasant Battery. More 18th-century field walls may also be found with more research.

A comprehensive archaeological inventory should be undertaken in the Park before the area returns to heavy forest.

### Historic Resources: GIS

Halifax Regional Municipality uses a computerized Geographic Information System (GIS) to manage many of its assets. Data from previous archaeological work, results of the archaeological inventory and information on standing heritage should be entered into this system as a management tool for Park staff, planners and managers.

### Protocols for Staff

After further consultation with Park staff and HRM officials, information on the location and nature of all of the Park's historic and archaeological resources should be shared with staff via reports, maps, pictures and seminars. Some of the issues that need to be addressed centre around the different types of resources and how routine Park activities can be organized to avoid negative impacts. Protocols also include the creation of clear reporting procedures for different types of cultural resource-management issues.

### Archaeological Presentation Planning

"Presentation planning" covers many categories, including signage, landscaping, construction, preparation of written materials, photographs and other documentary history and museum/interpretive displays. Archaeological and historical materials are necessary to present an authentic picture of the Park's history. These would be part of the archaeological inventory.

### Archaeological Assessment and Monitoring of Stabilization and Construction

During the next five years, the stabilization of fortifications, reforestation and other construction projects will have impacts on the Park's historic resources; these impacts must be reviewed and managed. The following work will require consultation to ensure historic integrity: the stabilization and construction of viewing decks on the earthworks at Fort Ogilvie; the entombment of Point Pleasant Battery; the clearing and stabilization at Cambridge Battery and nearby features; and the clearing at North West Arm Battery and Chain Battery. Depending on the nature of the impacts, full-scale archaeological excavation may be required. Work on the Park's trails, some of which date to the latter half of the 18th century, and the installation of signage and commemorative structures tend to involve subsurface impacts and therefore involve archaeological mitigation. This is especially crucial in the Mi'kmaq Commemoration Area, where significant features and pre-Contact artifacts are often difficult for staff to recognize.

Archaeological field marking and planning consultation were part of the process in the spring of 2007 during tree planting; they will form part of HRM's management of the replanting program.

Staff will consult maps, GIS data and reports before deciding whether an area can be excavated without archaeological input unless they already have firm knowledge that the area was extensively disturbed after 1950.

### Resource Stabilization

Resource stabilization of major fortifications or endangered resource areas will to be done in consultation with engineering, archaeology and forestry professionals.

### Vegetation Management Protocols for Historic Sites

Vegetation control around cultural resources is essential to avoid potential damage from upturned roots resulting from treethrows and to enhance the interpretive value of historic sites. The following protocols will guide future decisions on planting, clearing and maintaining vegetation near historic sites.

The battery locations marked on Map 2.10, including their defensive ditches and courtyards, will have all trees, saplings and large shrubs removed from them, cut at the base with root masses left in place. In addition, they will be stabilized with indigenous grass species or other low-growing plants where necessary to control slope erosion. Each feature will be surrounded by a two-metre to five-metre treeless buffer zone.

Only low height trees of less than 10 metres at mature height will be permitted in areas near major fortifications, including Cambridge Battery, North West Arm Battery and Chain Battery. Ideally, this will lessen the potential for damage due to windthrow. The health of existing trees around the fortifications will be checked regularly to ensure that they are not candidates for windthrow. If existing trees are thought to have a high potential for windthrow, they will be removed with their rootmasses left in place.

The defensive ditch at Fort Ogilvie is massively infilled. The ditch will be bio-stabilized and planted with native groundcovers, grasses and shrubs.

The two summerhouses, the lodge, the entrance gates and the light standards are lovely examples of Victoriana, standing symbols of the Park's creation. The summerhouses were meant to have views, and vegetation will be managed to enhance them.

A section of 18th-century field clearance between Heather Drive and Sailors Memorial Way, overlooking Point Pleasant Battery, will be preserved as a grass meadow, with occasional trees to signify the 18th-century domestic/military uses of the Park. This is consistent with a major look-off point toward McNabs Island and Halifax Harbour.

The Western Resource Area on the Northwest Arm has special significance for the Mi'kmaq community. The subtle nature of the cultural resources in the area will require sensitive and careful forest regeneration and maintenance practices.

## Periodic Monitoring

Upon completion of the mitigative archaeological survey and monitoring after Hurricane Juan (Schwarz, 2004), more assessment and artifact collection was needed in certain areas of the Park. Some upended trees revealed a wealth of artifacts eroding out of crumbling root masses, often near major fortifications and pathways, which had to be collected. Other hidden areas near major fortifications also have to be monitored and the artifacts collected.

During the winter of 2006-07, a major storm caused serious shoreline erosion, particularly at the Point Pleasant Battery. It also revealed possible wooden-pier footings along the shoreline near North West Arm Battery. There is speculation that some First Nations burials may also be subject to erosion. Since the location of these burials is not known (some stone features are thought to be burials), and subsurface testing to locate burials is generally unacceptable unless they are under immediate threat, ongoing monitoring of the eroding shoreline, especially along the Northwest Arm, is strongly recommended. This should be done every spring to assess the effects of winter-storm damage.

The extensive work detailed above should repair the damage caused by Hurricane Juan and help avoid similar catastrophes in the future. However, periodic monitoring by archaeologists, preferably with engineering input, is needed to ensure that the structures are stable and unthreatened by vandalism, erosion or other negative impacts.

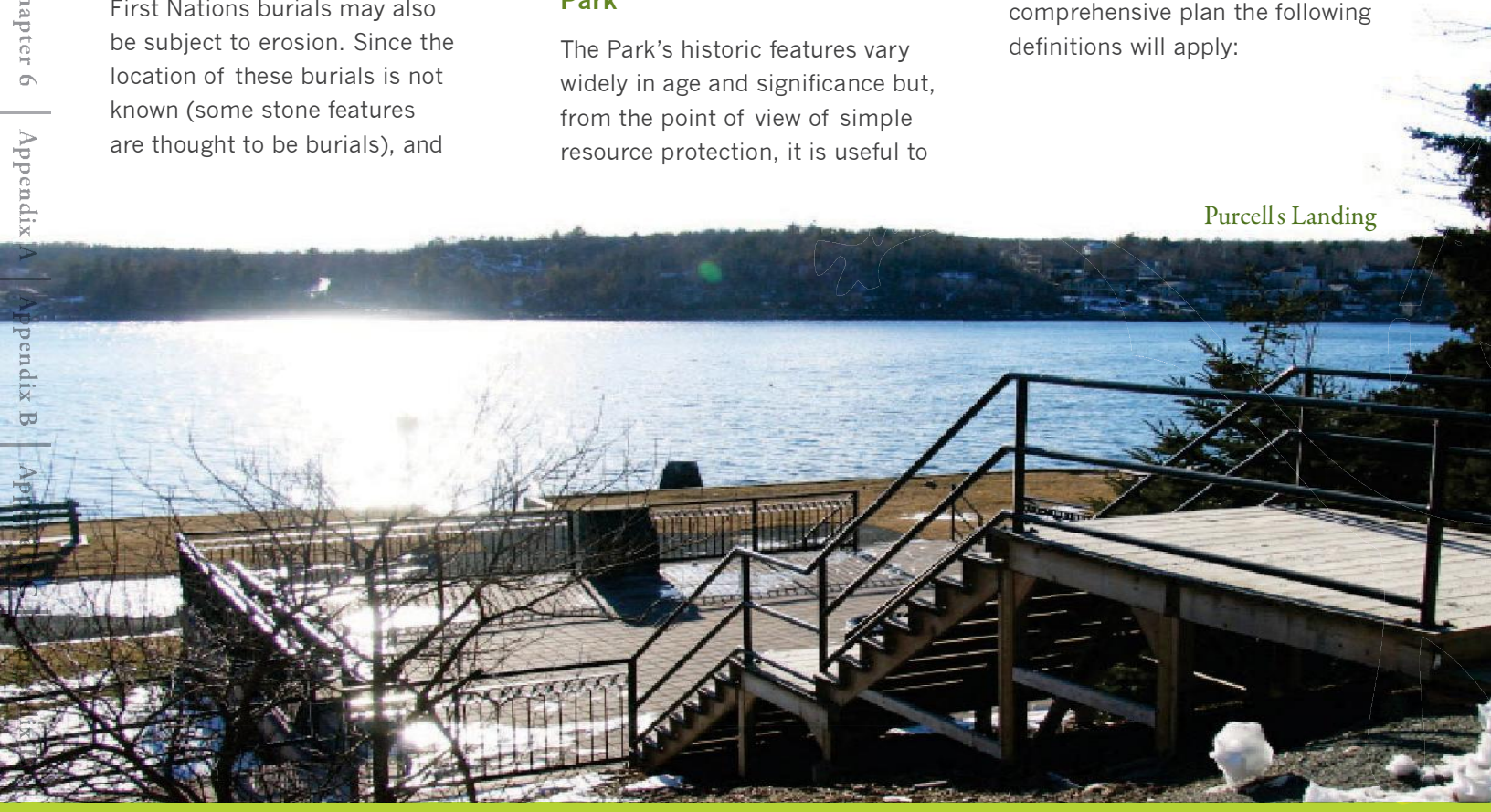
## Management and Conservation of Historic Resources in Point Pleasant Park

The Park's historic features vary widely in age and significance but, from the point of view of simple resource protection, it is useful to classify them according to their composition and durability. There are seven types of archaeological features and deposits as outlined in yellow in Table 4.9. The treatments and outcomes are described for each deposit in this table.

## Monuments, Memorials, Commemorative Markers, Public Art

Nature and the beauty of the natural landscape are key defining elements of the identity of Point Pleasant Park. Placement of public art, monuments, memorials and commemorative markers must be done without compromising the beauty, integrity, or ecology of the natural landscape, and must take into account long term financial sustainability.

For the purpose of this comprehensive plan the following definitions will apply:



Purcell's Landing

**Monument or memorial:** any structure or object of a commemorative nature with any dimension equal to, or greater than, 914 millimetres (36 inches). Typically these include monuments like the Halifax Memorial, the Bonaventure Anchor, and Historic Sites and Monuments Board of Canada plaques and cairns.

**Commemorative marker:** any structure or object of a commemorative nature with all dimensions less than 914 millimetres (36 inches). Typically these include commemorative tree markers, small boulders with plaques, and plaques affixed to park furnishing or park structures.

Monuments, memorials, and public art in Point Pleasant Park will be guided by Halifax Regional Municipality Public Art Procedures (2008) and future Public Art policy to be adopted in 2008.

Placement of commemorative markers in Point Pleasant Park will be directed by future guidelines on donations, donor recognition, and commemorative markers to be appended to the comprehensive plan with the adoption of the operations plan for the park.

Sailors Memorial

## Table 4.9: Cultural resource outcomes and treatments

| Description and Example of | Treatment/ Management | Expected Outcome |
|---|---|---|
| **Composite structures** (brick, concrete) Point Pleasant Battery | Record its pre-stabilized condition. Entomb structures as per the masterplan. Biostablize resulting earthworks where necessary and keep free of trees and large shrubs. Remove trees and large shrubs located within 2 metres of the new earthworks and only plant low-crowned trees within a further buffer zone, if reforestation is advised for this area. | Safe earthworks that protect the resource from erosion by the sea. |
| **Composite structures** (brick, concrete) Fort Ogilvie | Enter location into Point Pleasant Park GIS database for management purposes and record pre-stabilized condition. Clear standing trees and large shrubs growing on structures, in areas surrounded by the structures and on ancillary structures by cutting all trees and shrubs within a 2-metre zone close to ground level, leaving root masses in place unless engineers recommend removal. Biostabilize where necessary and especially in the defensive ditch, using species such as blueberry. Establish a further buffer zone of low-crowned trees around fortifications and ancillary structures. | Stablized, safe historic structures whose historic role is made more intelligible by removing vegetation. |
| **Earthworks** North West Arm Battery Chain Battery Walker Battery 1778 Entrenchment House cellars Sentry pickets | Some earthworks are part of historic fortifications while others entomb historic structures. To protect these resources, standing trees should be cleared from the earthworks, areas enclosed by earthworks and ancillary structures. Biostablize where necessary to control erosion. Clear trees from a 2-metre buffer zone around the features and establish a surrounding buffer zone of low-crowned trees. Periodically clear saplings. Enter location into Point Pleasant Park GIS database for management purposes. | Earthworks stabilized by low-growing plants and shrubs, no threat to the resources from tree and root growth. |
| **Stone structures** 18th century stone walls Possible house foundations (Prince of Wales Tower-under federal management) | Stone structures are, with the exception of the Martello Tower, very vulnerable to root disturbance because they are mostly dry-laid. Establish and maintain a 2-metre tree and large shrub-free zone around features. Avoid disturbance. Enter location into the GIS database. | Stone walls, wells, etc. preserved for interpretive and heritage purposes. |
| **First Nations Resources** Stone circles Stone pile | First Nations site stone features should be inventoried and recorded. The ceremonial complex of sites should not be reforested, built upon or subject to routine maintenance without consulting and strictly following the operational protocols. | |
| **Artifact scatters** | Stray, low-density scatters of artifacts are common at Point Pleasant. Concentrated scatters, though, are often historic middens (garbage dumps) that can yield valuable information. Other dense concentrations are often indicators of as-yet-undiscovered nearby features. Significant concentrations of artifacts will be mapped for the use of Park managers and staff. Disturbances should be avoided where possible, and scatters should be archeologically assessed if disturbance is unavoidable. | Middens will be preserved for future research and more historic features will be discovered in the Park. |
| **Roads** | Design proposal includes plans to widen those roads that will constitute the Upper and Lower loops. Significant archeological features and deposits are found in certain locations close to the Sailors Memorial Way, Heather Drive, and part of Pine Road. Cultural resource management measures will vary from testing prior to subsurface impacts to archeological excavation where historic resources will be impacted.<br><br>In general, the alignments of historic roads and trails at Point Pleasant such as Cambridge Drive and Sailors Memorial Way , should be maintained. | Impacts caused by road widening mitigated, 18th-century road alignments maintained, where possible. |

## MAP 4.5: EXISTING PARK MONUMENTS