



STRATFORD FOREST CONNECTIVITY & MANAGEMENT STRATEGY

A conservation guide on resource management

Maritime Forestry
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INTRODUCTION:

In 2020 the Government of Prince Edward Island established a \$1-million annual Climate Challenge Fund (CC Fund). The CC Fund is intended to support the development of innovative solutions to the threat of climate change.

The Town of Stratford put forward a funding application under the title Nature-Based Climate Change Mitigation and Adaptation.

The intent of the application was to acquire funding to conduct a survey and inventory of the municipality's natural resources such as forests, shrublands and wetlands due to the ability to sequester atmospheric carbon. Furthermore, the Town of Stratford intends that the funding for the management document will help form a solid foundation upon which to build policies, programs, and bylaws that will mitigate the effects of climate change and contribute to climate change adaptation through municipal natural area management.

This management document will also focus on and discuss connectivity between forested properties and is intended to work in accordance with the Prince Edward Island 2040 Net Zero Framework. This document will also follow the considerations of the guide Protecting Habitat – A Guide for Municipalities of Prince Edward Island.

Prince Edward Island is the traditional and unceded territory of several Mi'kmaq First Nations. The Mi'kmaq people have lived on PEI for thousands of years. It is important to note that since being settled by Europeans that the historical dominant land-use has been agriculture within the municipal area and that historical land-use changes into

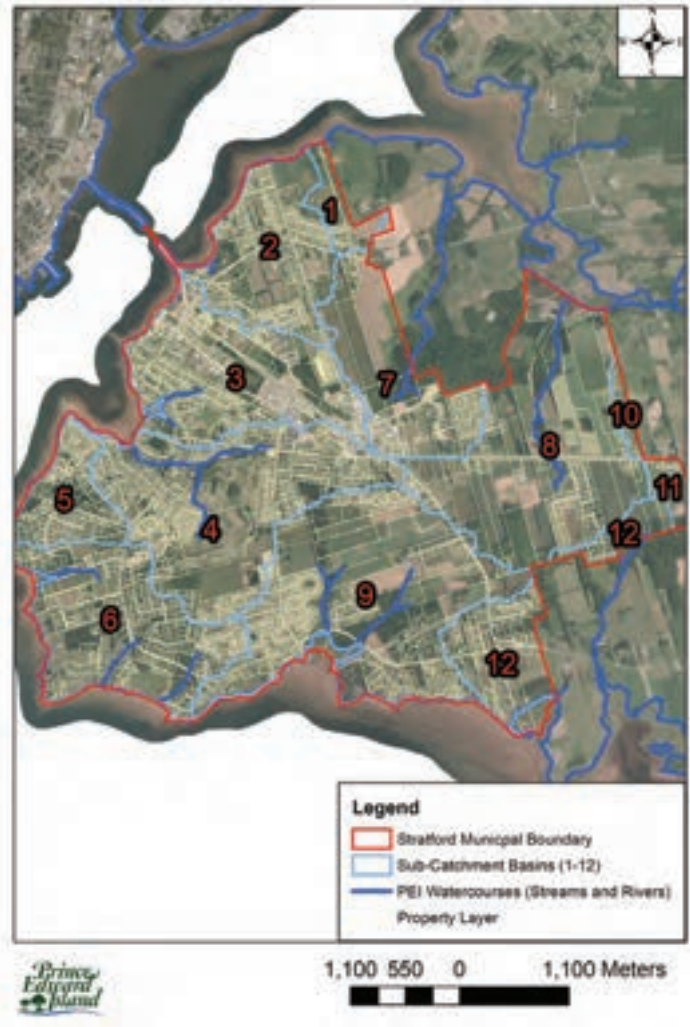
current land-use changes like development of the landscape have caused the loss of natural ecosystem functions such as forest connectivity and wetlands. These impacts have reduced the function of many watersheds' drainage patterns or catchment channels for surface water runoff. These changes have altered wetlands, floodplains, streams, and rivers which are naturally engineered to manage surface water runoff. It is also important to note that the loss of natural ecosystem functions across the municipal landscape has been happening for at least 88 years (based on 1935 aerial photography) and much more likely a couple hundred years. This amount of time makes the landscape changes since European settlement immeasurable.

The Stratford municipality encompasses about 2,297 hectares of land within its municipal boundary with Town-owned parcels all throughout the area. To assess the Town of Stratford's forested properties for overall forest stand and ecosystem health, all forested properties within the municipality will be assessed for connectivity across a watershed sub-catchment basin. This is done by utilizing the natural boundary lines of the sub-catchment basin within the larger watershed and determining the amount of area various land uses are encroaching into forests. There are twelve such sub-catchment basins throughout the municipal area. The Town of Stratford owns parcels of land in ten of these sub-catchments which will be the ten sub-catchments discussed. The land use categories will be represented by amount of area (hectares) and a percentage of land use area in each sub-catchment basin. The land use categories have percentages of cover

types, such as buildings, pavement, bare ground, etc., to describe the categories and are only estimations of percent of area. When discussing the dominant land use categories of a sub-catchment basin, such as Residential and Urban areas, the amount of land that has an impermeable surface such as pavement will be generalized and added to the Roads category to provide an estimated total area of pavement per sub-catchment basin.

Since wetlands play an integral part in maintaining ecosystem health and are often beneficial carbon sinks, they will be given special consideration throughout this document. The number of lost wetlands across PEI is unknown. The Wetland Conservation Policy for Prince Edward Island states "Current pressures from large scale farming operations and commercial developments continue to degrade both the quantity and quality of freshwater wetlands. Degradation of wetland function from accelerated terrestrial erosion and resulting sedimentation reduces the capacity of wetlands to filter, assimilate and purify "natural" runoff from these operations with potentially harmful results downstream." This is important information for consideration as there are properties downstream, along watercourses or drainage channels, which could be impacted by changes to the functionality of catchment channels and wetlands. The provincial 2040 Net Zero Framework states, "There is also a need to protect and increase the number of wetlands across the province." Based on these statements priority should be given to re-establishing wetlands and ephemerally flooded areas while increasing forest cover for connectivity through the appropriate efforts.

Property Arrangement Across Municipal Landscape



Additionally, in the province of PEI there exists a document titled "A Wetland Conservation Policy for Prince Edward Island" and in that document there is a policy of "No Net Loss (NNL) of wetlands and wetland function" and if there are wetlands lost that "the proponent is now required to provide funding or conduct the work to replace wetland lost 'in the public interest'."

1935 Municipal Landscape



When encountering wetlands in a developing landscape, the possibility of expanding the capacity of any wetland areas should be considered if they are found, as their capacity or function has potentially been diminished by historic land uses, such as land conversion to agricultural fields.

The first step to understanding the overall forest across the municipality is to take a quick look at the history of land-use within what is now the Town of Stratford's municipal boundary line. In the 1935 aerial photos the landscape within the municipality is predominantly agriculture. There are several forested areas across the municipality that have maintained forest cover since 1935. In 1935 many of the watercourses (streams, creeks, and drainage channels) within the municipality had been heavily encroached upon if not partially plowed under by historical farming and land use practices. Most of the watercourses found within the Stratford municipality have had little to no buffer zones, wetlands, or upland forest cover since at least the 1935 imagery.

When comparing the 1935 aerial imagery to the 2020 imagery it is evident that at least 88 years have passed since there has been any forest connectivity across the landscape of Stratford. Most of the forested area that exists today within the Town of Stratford has been standing as remnants since 1935. A few of these older forested stands are owned by the Town of Stratford.

Within the Stratford municipality, the town owns 89 properties under unique identifiers called property identification numbers (PID #'s). From the total of 2,285 hectares of land found in the municipality, the Town of Stratford properties are equal to a sum of 331

hectares or about 14% of the land within the municipal area.

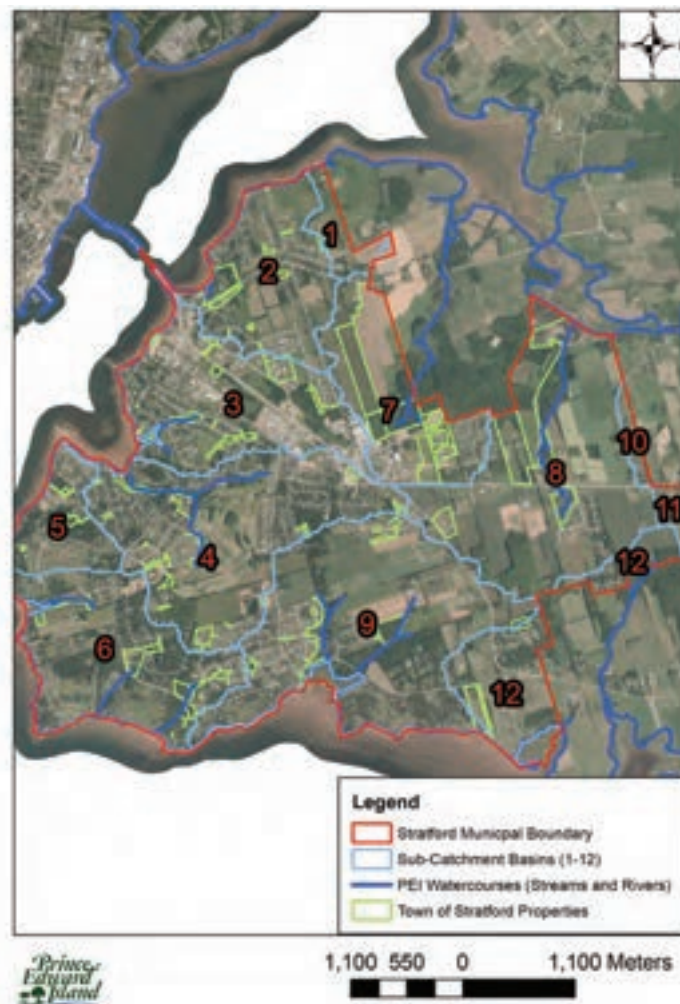
Forest cover throughout the municipal area is equal to about 289 hectares or represents about 14.5% of the land use and is unfortunately still declining.

For this document, Town-owned properties will also have an identifier for the watershed sub-catchment basin that the properties fall within (i.e. Sub-CB #1, PID #123456). This will help with organizing the properties and help prioritize areas or properties over others. Land-use across each sub-catchment basin will be considered and discussed, since land use can have implications on forest connectivity and overall ecosystem health.

A Cartographic Depth to Water Mapping geographic information system (GIS) layer was used to identify priority areas for forest connectivity in each sub-catchment basin. This layer was also used to determine the potential to create ephemerally flooded pools or increase the potential size of wetlands over each sub-catchment basin through its respective catchment channels. The layer displays the drainage patterns across the landscape and helps identify where a potential loss in ecosystem function is occurring. The drainage patterns identified are often associated with problem erosion areas in agricultural fields and sub-divisions. These natural catchment channels often have storm water management systems installed as they become subdivided. These drainage patterns can also sometimes indicate where historical drainage ditches were installed in the attempt to convert wetlands into agriculture fields.

On September 23, 2022, a destructive Category 4 Atlantic hurricane named Fiona

Locations of Municipally Owned Properties



made landfall on PEI resulting in a drastic change to some of PEI's forested landscape. This document will help address some of the changes from Fiona. Hopefully there is some conversation and consideration of developing plans and facilities for the use of the available biomass after events like Fiona happen, so that natural resources can be better salvaged. It is important to note that though Fiona had a large and drastic impact on PEI, windfall events are a natural part of forest succession and will help create uneven-aged forest structure within forest stands.

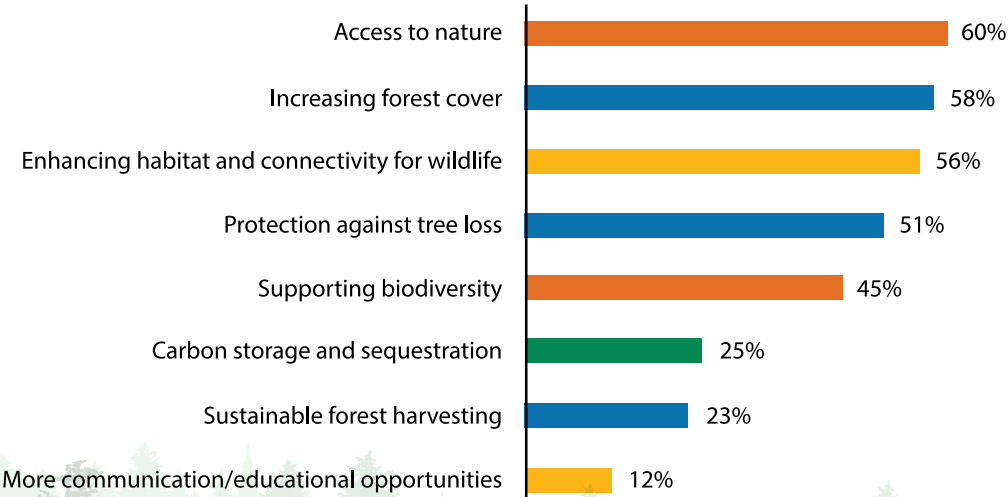
MUNICIPAL AND RESIDENTIAL ENVIRONMENTAL MANAGEMENT GOALS:

For a project covering this much area there needs to be an umbrella of goals to maintain the focus and direction of the project to best represent all parties across the landscape. The main goals of the funding for the project are to identify its natural resources and then maximize the potential for these areas to mitigate climate change effects through the process of carbon sequestration. To help achieve this, the municipality has adopted some short and long-term environmental initiatives such as the acquisition of additional natural areas and the consolidation of a green corridor network.

Since the Town of Stratford owns several parcels of forested land that are fragmented across the landscape in various settings from a small forest stand on the residential landscape to several forest stands among agriculture fields or a small urban forest patch, each individual stand may also have its own unique goals as well as a generalized set of goals for the sub-catchment basin with multiple properties in discussion for management. Having strong short and long-term initiatives in conjunction with the main goals that the Town of Stratford have chosen will help prioritize the sub-catchment basin's goals as well as the individual parcel's goals to best meet the desired outcome.

The Town of Stratford has been conducting an Annual Resident Survey since 2012, which is a statistically-valid annual survey of residents. In 2023 residents were asked what their most important aspects of forest management are, with 60% of residents indicating access to nature is the most important. This is closely followed by increasing forest cover (58%) and enhancing habitat and connectivity for wildlife (56%).

These top three goals can be achieved simply by planting trees and not allowing deforestation to continue. If the town acquired areas that followed the natural contour of the sub-catchment basins and was to convert them into afforestation sites, the town would be accomplishing many goals at once. For example, planting sites along drainage channels within a sub-catchment basin would have several outcomes such as providing an increase in carbon sequestration potential, providing an increase in forested area, providing more access to nature for residents, and providing connectivity for both wildlife and the watercourses across



the sub-catchment basin. Planting these areas would also help to reduce erosion from surface water runoff, thus benefiting existing streams and creeks within the sub-catchment basin while also giving the town the opportunity to rehabilitate or replace lost wetlands in these areas.

There was also a goal setting workshop held at Stratford Town Hall in June 2023. This workshop was held to develop individual goals for some of the Town-owned properties. The overall results from the workshop were used to develop goals for the management of all town-owned forested land within a sub-catchment basin.

The workshop results were categorized and prioritized as such:

#1.	Recreation	Define Trails
#2.	Forest Health	Connectivity Wetland Identification/ Rehabilitation Forest Cover Along Water Courses Carbon Sequestration and Storage
#3.	Wildlife	Wildlife Conscientious Management



SUB-CATCHMENT BASIN DESCRIPTIONS:

SUB-CATCHMENT BASIN #1:

Sub-Catchment Basin #1 (Sub-CB #1) encompasses 92 hectares in the Fullerton's Creek area. Of the 92 hectares found in the sub-catchment basin there are 32.9 hectares that fall within the Town of Stratford's municipal boundary that will be considered for forest connectivity. There is one municipally owned parcel of land identified as PID #1068410 (Sub-CB #1, PID #1068410).

The municipally owned forested property within this sub-catchment basin has maintained forest cover since before 1935 and appears to have last undergone a partial harvest sometime in the 1960s based on the 1968 aerial photography.

There are three smaller forest stands that fall within the area of this sub-catchment basin that are within the Town of Stratford's boundary. There is currently no connectivity between these forested stands. While there is the potential to afforest private land for forest connectivity, this area appears to be ready for development so planting is unlikely. However, if even a small area of 1.2 hectares was planted it could account for an additional 2,750 saplings and would double the amount of town-owned forested land within this sub-catchment basin.

There was a large ephemerally flooded pool in the agriculture field northeast of the town-owned parcel. This area has the potential to become an ephemerally flooded area or seasonal wetland. If the area is just left to rest, it will eventually go natural via ephemeral succession. A more rehabilitative approach

Sub-CB #1, Forest Cover



could see the ephemerally flooded area expand and undergo an intensive planting of native trees and shrubs. Due to the hardwood dominant stand adjacent to this area there would be a good seed source for longer lived trees to move into the area and the ephemerally flooded area would likely be a suitable site for eventually planting Black Ash saplings.

Sub-CB #1, Property Descriptions:

The town-owned property is identified as PID #1068410 and is 1.24 hectares in size. The access to this property is not easily found with limited area for parking. This property has 1.12 hectares of forest cover on it.

The remaining 0.12 hectares of the property is being used by adjacent properties that are maintained as agriculture fields and mowed yards. There is space to plant approximately 300 saplings within these maintained areas.

This forested property has retained forest cover since before 1935 giving it characteristics of an older forested stand. There was one large windfallen Red Maple that quite possibly was around 200 years of age (sampling tools were not large enough). Though the property had a partial harvest before 1968 it still shows characteristics of a mature to over mature forest stand, with several trees at 100 years of age and older and with the stand average at 93 years of age. The forest floor is heavily undulated, suggesting that this parcel has never been farmed or plowed under, however, this stand likely has a long history of uses such as fuel wood for winter heating, building material, and possible syrup production throughout the years.

This property is currently heavily utilized by local traffic. A well-established foot path is found throughout the property. There is a lack of shade tolerant saplings regenerating within the stand which could be attributed to the frequent localized use within a small and fragmented stand. This can be easily

Sub-CB #1, PID #1068410 — Stand 1 and 2



remedied with Diversity Planting and adding some posted signage inside diversity plots that could be established. A few large mature Red Maple fell during Fiona and have pulled up large root wads on this property which will eventually become ephemerally flooded habitat and be beneficial to local amphibian populations (though this may take a few years to establish). Some work has already been done by locals to fill these areas with rock to re-establish some parts of trails.

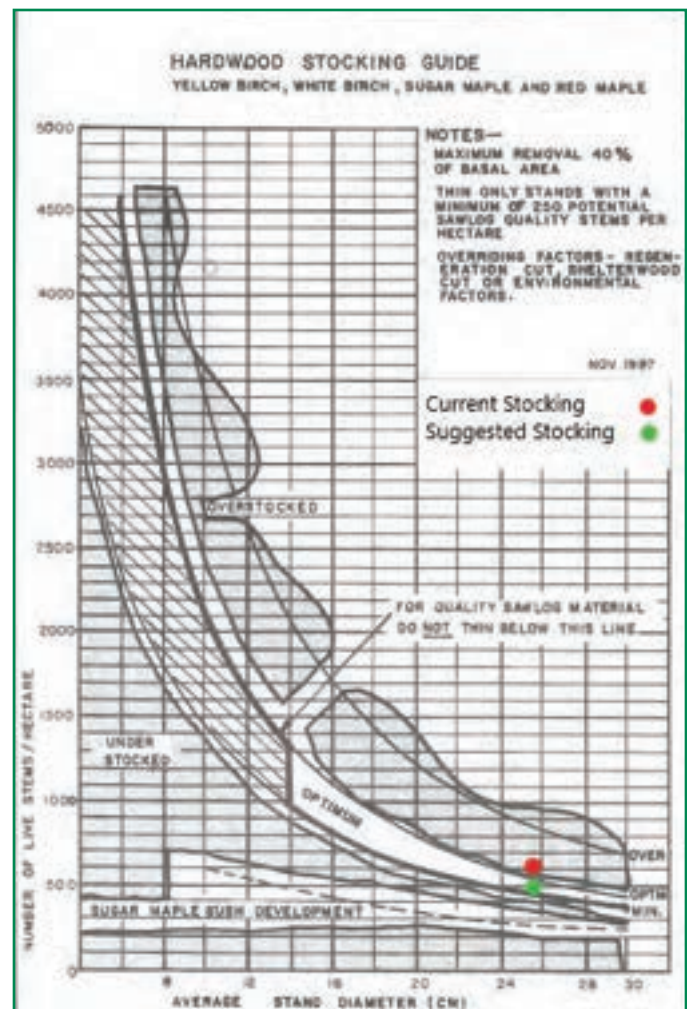
Sub-CB #1, PID #1068410 Forest Stand Descriptions:

Stand 1: Is a Red Maple dominant stand containing several trees over 100 years of age. This stand encompasses 0.70 hectares of area and pre-Fiona had approximately 808 mature stems per hectare with a basal area of about 33.95 meters² and with an average stand DBH (Diameter at Breast Height) of 25.5 centimeters. Post-Fiona this stand has approximately 640 stems per hectare at an average height of 22.4 meters tall. This stand is still slightly overstocked. There are roughly 1350 stems per hectare that are regenerating within the stand that are of a 9.9 cm DBH or less. Stand 1 is an overall healthy forest stand in good condition. Hurricane Fiona damaged about 10% of this stand which created some canopy gaps by causing windfallen trees that will allow for a more diverse age structure as it matures. The internal edge habitat that is created by the canopy gaps will be beneficial to various passerine species that use the regenerating stems growing canopy cover.

Stand 2: Is a White birch dominant stand that is mixed with some White Spruce and Red Maple with an average stand age of 57 years. Stand 2 is exhibiting the successional growth expected from a partial harvest in the 1960s. However, there are some poorly formed stems that are found within Stand 2. Pre-Fiona there was approximately 913 mature stems per hectare with a basal area of 29.49 meters² and an average stand DBH of 16.7 centimeters. Post-Fiona there are approximately 831 stems per hectare and an average height of 17.1 meters tall. This stand is currently at an optimum stocking level. There are about 1,250 regenerating stems per hectare that are 9.9 cm DBH or less. There is a fair amount of European Mountain Ash around the edges of the stand and is found regenerating within this stand. The foot path is also more defined in this stand. There has also been some local dumping of yard waste in this stand.

Sub-CB #1, PID #1068410 Forest Stand Treatments:

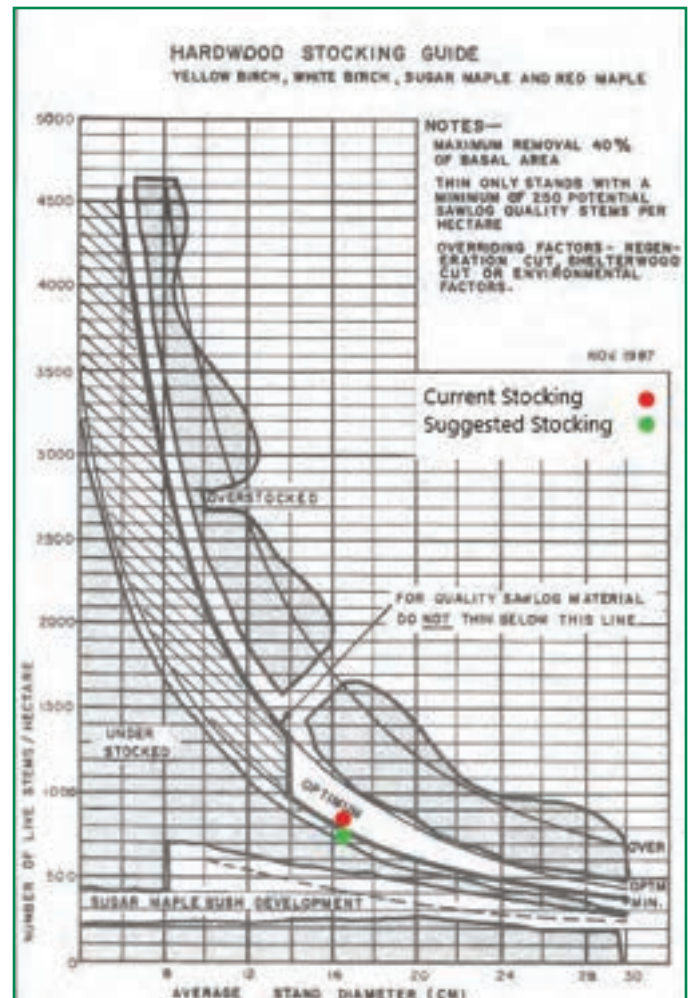
Stand 1: This stand is currently overstocked but will also grow fine for a while yet. However, a cleaning could be done of windfallen trees and a Selective Tree Harvest of 22% of mature stems in poor form could be completed to better place the stand within the optimal stocking level of around 500 stems per hectare. There are some excellent formed trees in this stand. Any work should be followed by a Diversity Planting of longer-lived species such as Northern Red Oaks, Sugar Maples, Yellow Birches, White Ashes, and White Pines.



Stand 2: This stand is currently at an optimal stocking ratio for its average DBH size. Fiona and the resulting damage reduced the density of this stand placing it within an optimal density for future growth. However, a Commercial Thinning of a further 10% of the mature stems in poor form could be completed to allow for more variation in age structure and increased growth of the remaining stems. The European Mountain Ash stems should be cut back to the property boundary lines. However, some European Mountain Ash stems that fall on or closely located to the boundary line should be left as a wildlife food source as there is limited forest cover around. With the cleaning of some of the damaged stems and removal of an additional 10% of undesirable stems from the canopy, an increase in light will reach the forest understory. A Diversity Planting should then occur with longer-lived species such as Sugar Maple, White Ash, Northern Red Oak, White Pine, and Yellow Birch.

Sub-CB #1, Discussion:

Though there is overall little forest cover across the area of this sub-catchment basin that falls within the Town of Stratford's boundary line, there is still the possibility to design forest connectivity into the future subdivision development of this area with residential boundary line planting. Increasing the potential for atmospheric carbon sequestration will prove difficult without the consideration of afforestation throughout the municipality and newly developing areas. Stand maintenance to stimulate new



growth will help this stand; however any work should be completed throughout fall to spring. The mature Red Maple stems in Stand 1 have been sequestering carbon for almost 100 years now (some longer) and are likely beginning to slow their potential for carbon sequestration and temporary storage with age. Younger stems will sequester more carbon in a few years with more rapid growth.

SUB-CATCHMENT BASIN #2:

Sub-Catchment Basin #2 is about 182.8 hectares in size and has 16 town-owned properties that fall within it, equaling 14.7 hectares or 8% of the land use.

Type of Land Use	Area in Hectares
Agriculture	41.4
Hedgerows	1.6
Farmsteads	2.0
Forest	4.4
Non-evident	15.2
Residential	2.4
Roads	6.7
Urban Area	106.5
Wetlands	0.5
Institutions	0.3
Recreational	1.8

Sub-CB #2 is heavily developed with a few larger parcels of land not yet sub-divided in the 2020 aerial imagery. However, there have been a significant number of undeveloped areas in the image that have become subdivided since the image was taken. The land use category Urban Area was about equal to 106.5 hectares and accounted for about 58% of the land use within the sub-catchment basin. A total estimated area of 27.7 hectares of pavement is in this sub-catchment basin. This is equal to about 15% of the sub-catchment basin area when combined with the Roads category. Furthermore, we find that the amount of wetland identified in this sub-catchment basin has been reduced in size by about 0.2 hectares. This is evident as there is an apartment building where the missing

Sub-CB #2, Forest Cover



wetland was in 2010. This is a considerable amount of wetland loss for this area as there are very few wetlands located in this sub-catchment basin. For evaluation a 0.2 hectare loss is equal to losing 28% of the remaining wetland area within the sub-catchment basin. A replacement (hopefully within the same sub-catchment basin) of the lost wetland would be expected since PEI has a No Net Loss policy for wetlands.

Within Sub-CB #2 there is little forest cover left across the landscape with just 4.4 hectares or 2% of the area being identified as Forest land use.

Sub-CB #2, Property Descriptions:

Sub CD #2, PID #860379
Stands 1, 2, 3, 4, 5, 6 & 7



The area known as Robert Cotton Park has some mature tree canopy or coverage which does not cover enough area to meet the criteria to be classified as forest cover. This property will be the only municipally owned land within Sub-CB #2 that will have a management strategy discussed other than

afforestation. This property has 1.96 hectares available to plant up to 4,900 saplings. It is noteworthy that planting the small area of 1.96 hectares would greatly add to the existing forest cover in this sub-catchment basin which is only 2% of the land use.

This property has some introduced species present. Some of these species have moved into the more naturalized areas on this property and should be targeted for removal from the identified forest stands. The forest stands found on this property have the potential to be utilized as demonstration stands or educational stands to promote forest management within the municipality.

There is a small ephemeral flooded area located in the northwest corner of Stand 6 on the Cotton Park property. This area has been created from the back flooding caused by the established shoreline trail network. There is the potential to create a deeper ephemeral pool at this location due to the culvert placement being elevated to drain the discharge from surface water runoff. The culvert could be manipulated to increase the depth of the ephemeral area. There have been various Post-Fiona cleanups that have happened on this property with some forested areas completely cleaned.

The property has some nesting potential for breeding birds as well as cover for small mammals with various food opportunities. However, the overall carrying capacity of this area would be limited.

Sub-CB #2, PID #860379 Forest Stand Descriptions:

Stand 1: This stand encompasses an area of 0.11 hectares and consists of a variety of species. Stand 1 has some introduced species regenerating throughout the stand but is dominated by immature Large-Toothed Aspen growth. There are approximately 3,500 stems per hectare within this stand with an average stem DBH of 11.7cm with an average height of 5.25 meters. There are approximately 13,000 regenerating stems per hectare in the understory of this stand. This stand is also located over a small catchment channel. There are mature Black Locust trees within this stand which can prove difficult to remove as they will require constant pruning of redeveloping shoots or root suckers. However, they do not tolerate shade well and could eventually be shaded out of the stand. There was also some English Oak found growing within this stand.

Stand 2: This stand consists of a variety of species. This form of growth would be considered primary succession. Stand density and heights vary considerably across Stand 2. There are several regenerating English Oak and a few Scotch Pine that have been establishing within this stand. There was an average height of 5.3 meters with an average density of 19,850 regenerating stems per hectare. This stand encompasses an area of 0.47 hectares and has about a 35% softwood component with a few Gray Birch having a DBH of 14 centimeters.

Stand 3: Is a White Spruce plantation about 43 years old that encompasses an area of 0.14 hectares. Stand 3 experienced some tree loss along the north boundary of the stand with approximately 12% of the total stems experiencing windfall from the strong winds of post tropical storm Fiona. Pre-Fiona Stand 3 had approximately 1,125 stems per hectare. Post-Fiona there were approximately 1,000 stems per hectare at a height of 16.3 meters tall with a basal area of 41.84 meters² per hectare with an average DBH of 23.0 centimeter. There were several snag trees (dead standing stems) within this stand as well which will benefit wildlife. There was no natural regeneration within the stand that had heights yet reaching 1.3 meters tall. However, there was evidence of a diversity planting that had recently happened. Some of the planted stems are showing signs of stress from a lack of available light. This stand is overstocked and had started self-thinning when Fiona caused some individual tree loss. However, with some additional spacing the stand could achieve better growth as well as increasing the amount of ground vegetation and stem diversity within the stand.

Stand 4: This stand encompasses 0.15 hectares of area and has a variety of shrubs and trees. European Mountain Ash is the dominant vegetation in this stand. However natural succession is slowly working to re-establish tree species into this forest stand. Stand 4 has approximately 700 stems per hectare that average 8.3 centimeters DBH. Several planted Rose species were throughout the southern portion of this stand. There was approximately an 11% softwood component to the regenerating stand.

Stand 5: This stand is an over mature Large-Toothed Aspen dominant hedgerow with a mix of White Birch and White Spruce. Stand 5 encompasses 0.44 hectares of area and has a variety of tree species with a dominant European Mountain Ash understory. Tree heights across Stand 5 vary from 14 meters to 22 meters height. There is also a walking trail through Stand 5 along the boundary line of PID #860379 indicating that the public is using this forest stand for recreation purposes. It should be noted that this trail acts as a ditch for surface water runoff and was at one point very icy and dangerous. Approximately 25% of the stems in Stand 5 have damage from post tropical storm Fiona. Most of the windfall damage is located at the center of Stand 5. However, there was an over mature Large-Toothed Aspen patch located at the west end of Stand 5 that is leaning towards the walking trail and should be felled for public safety. There are also a few broken tops or hanging branches in the Large-Toothed Aspen patch that do pose a safety risk to users of the walking trail.

Stand 6: This stand encompasses 0.34 hectares of area and has a small ephemerally flooded area located in the north section. There are essentially two small stands within Stand 6, the first is throughout the wet area and is dominated by Large-Toothed Aspen which transitions to a Scotch Pine dominant

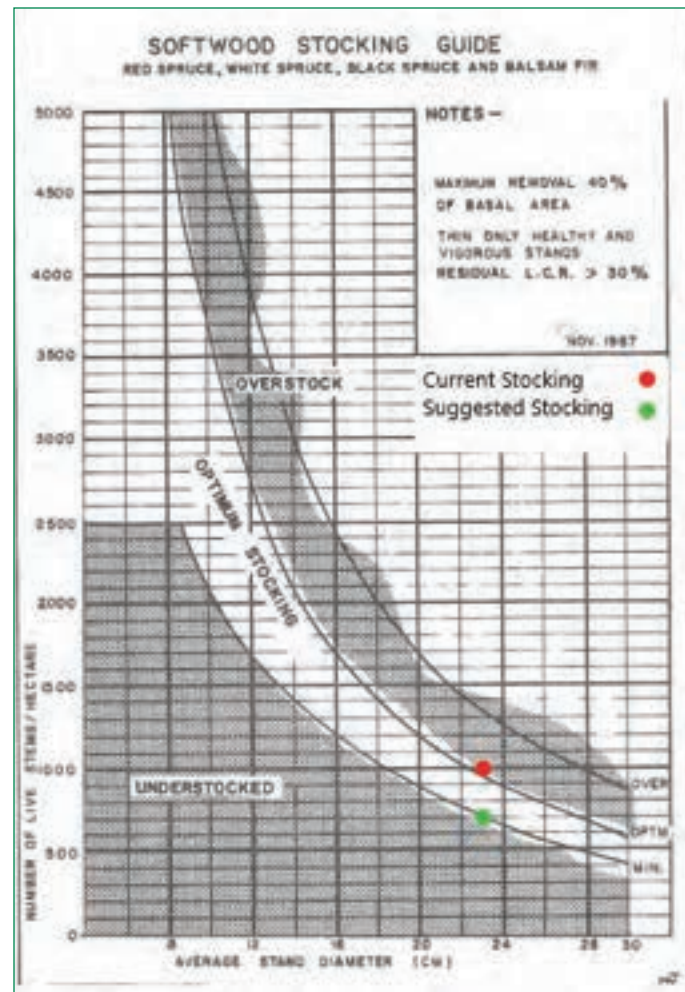
stand heading south through Stand 6. Both stands are grouped together due to their similarities in height and basal area. Stand 6 has approximately 625 stems per hectare with an average basal of 32.15 meters², an average stand DBH of 23.9 centimeters and has a height of 19.2 meters tall. Snag trees or dead standing stems represent about 24% of Stand 6. Tree mortalities in Stand 6 were likely caused by the stand being overstocked with over mature trees and naturally occurring thinning has resulted in some individual tree mortality. The understory or regeneration within Stand 6 has approximately 6,000 stems per hectare of which about 9% are a softwood species.

Stand 7: This stand encompasses 0.53 hectares of area and has a variety of species throughout the stand. A couple immature American Elm have been established throughout the stand and appear to be in good form. Most of Stand 7 is in primary succession with a dominant immature Trembling Aspen, and White Birch canopy. There are approximately 18,250 stems per hectare regenerating within this stand. Individual tree heights vary across Stand 7 with an average height of 10.7 meters.

Sub-CB #2, Forest Stand Treatments:

Stand 1: The recommended treatment for Stand 1 is Pre-Commercial Thinning. The Pre-Commercial Thinning should target the removal of non-native species and stems in poor health or growing condition that are competing for canopy space to allow healthy native trees and shrubs to grow into. The density of Stand 2 post-treatment should fall between 1,600 – 3,000 stems per hectare. A Diversity Planting of longer-lived native species should be completed post treatment. Suggested species for a Diversity Planting would be Northern Red Oak, White Pine, Eastern Larch, Red Spruce, Yellow Birch, Red Maple, and Sugar Maple. The thinned biomass should be left to decompose and recycle its nutrients as there is little potential for a final product or enough biomass to be worth the removal. Some Artificial Brush Cover Piles and Nesting Areas could be constructed within the stand for wildlife use.

Stand 2: The recommended treatment for Stand 2 is also Pre-Commercial Thinning. The thinning should target the removal of introduced species in this stand as well, and stems or trees in poor health or growing condition. The density of Stand 2 post-treatment should fall between 1,600 – 3,000 stems per hectare, with 15-30% of residual density being of good quality softwood trees. A Diversity Planting of longer-lived native species should be completed. Suggested species for enrichment planting would be Northern Red Oak, White Pine, Eastern Larch, Red Spruce, Yellow Birch, Red Maple, and Sugar Maple.

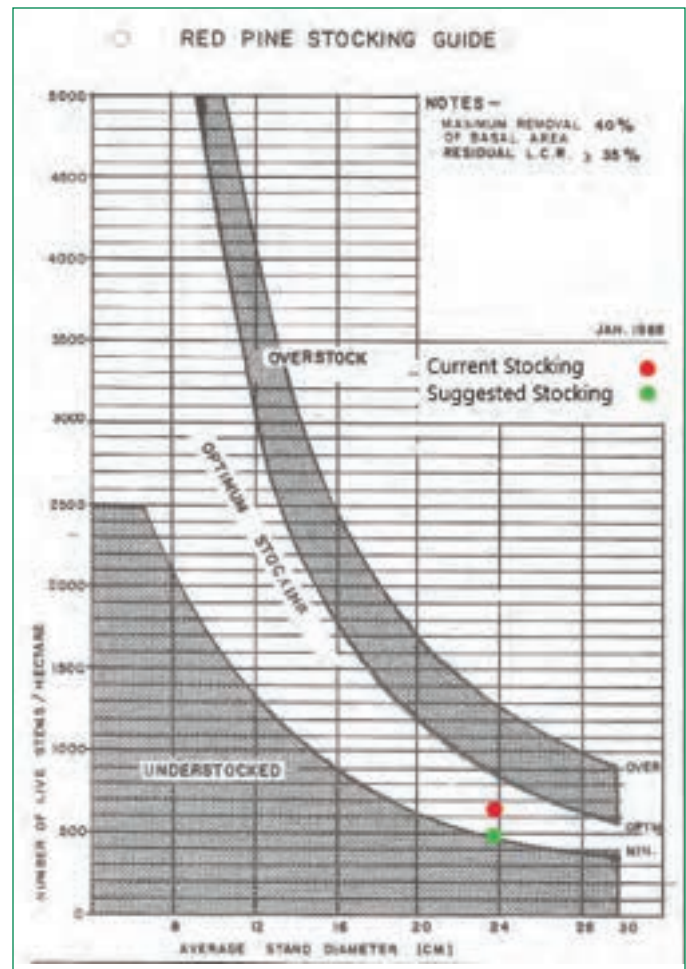


Stand 3: The recommended treatment for Stand 3 is Commercial Thinning of 30%. Stems of poor health or quality will be targeted for removal allowing increased growth of good quality, healthy stems. This thinning would help with the Diversity Planting that has happened within Stand 3 by increasing the available sunlight that is penetrating gaps in the stand canopy. A denser Diversity Planting could again be done throughout the stand, planting along the existing rows about 1 meter out on all

sides of the remaining stumps from the thinned mature trees. This type of dense Diversity Planting would be an attempt to increase height growth in the newly planted trees. An additional effort should also be made to salvage and replant the small area that experienced tree loss from Fiona's winds along the northern stand boundary. Replanting a denser softwood component to this area would eventually help with sheltering the remaining area of the stand's understory from strong winds.

Stand 4: The recommended treatment for Stand 4 is Pre-Commercial Thinning. This would result in the removal of most of the European Mountain Ash stems, leaving stems of native species that are in good health and condition such as Balsam Fir, Gray Birch, and Trembling Aspen. The density of Stand 4 post-treatment should be around 2,200 stems per hectare with 25% of residual density being of good quality softwood trees. A Diversity Planting of longer-lived native species should occur. Suggested species for Diversity Planting would be Northern Red Oak, White Pine, Eastern Larch, Red Spruce, White Spruce, Yellow Birch, Red Maple, and Sugar Maple.

Stand 5: The suggested treatment for Stand 5 is to drop windfall trees as close to the ground as possible, create brush piles for wildlife use and remove any overhead safety hazards for recreational users of the property. A light Pre-Commercial Thinning could be done to reduce the amount of European Mountain Ash stems throughout this stand and could be followed by a light Diversity Planting to help



with the regeneration of this stand. Suggested species for enrichment planting would be Northern Red Oak, White Pine, Eastern Larch, White Spruce, Yellow Birch, Red Maple, Sugar Maple, and White Ash. It should be noted that some of the over mature Large-Toothed Aspen could be girdled to remove them from the canopy as well as provide good large snag trees as wildlife trees. Girdling a mature stem will allow the sequestered carbon to be stored for longer than if the stem had been burned or fallen to the ground, which it will eventually do.

Stand 6: The best treatment would be to Commercially Thin 20% of the lower quality Scotch Pine stems and lower quality Large-Toothed Aspen stems that fall into the co-dominant canopy which will help accelerate regeneration of the understory. This could be followed by a Pre-Commercial Thinning to help the best growing regenerating stems by reducing the competition for sunlight. Post-treatment stem counts should fall between 1,600 - 3,000 stems per hectare. This could then be followed by a Diversity Planting. Species that would be planted around this area should be both salt tolerant and partial to wet areas such as White Ash, American Elm, Red Maple, and White Birch, with a few Northern Red Oak, White Pine, White Spruce, and Yellow Birch.

Stand 7: The suggested treatment for Stand 7 is Pre-Commercial Thinning to reduce stem counts. A post-treatment stem count should fall between 1,600 - 3,000 stems per hectare with 15-30% of residual density being of good quality softwood trees. The thinned biomass should be left to decompose on site. Some small brush piles could be created for wildlife use. Diversity Planting this stand should follow the thinning. Suggested species for a Diversity Planting would be Northern Red Oak, White Pine, Eastern Larch, Red Spruce, White Spruce, Yellow Birch, Red Maple, Sugar Maple, and White Ash.

Sub-CB #2, Afforestation Sites:

Since this sub-catchment basin has so little forest cover remaining, afforestation of any available area is needed. The remaining Town of Stratford properties found in Sub-CB #2 that have maintained grass cover should be considered for potential afforestation sites. An estimate of saplings that could be planted on each Town of Stratford owned property is provided.

- Sub-CB #2, PID #694117 is 0.3 hectares and could have 750 saplings planted.
- Sub-CB #2, PID #430009 has about 0.9 hectares available to plant 2,250 saplings.
- Sub-CB #2, PID #429936 has about 0.16 hectares to plant about 400 saplings.
- Sub-CB #2, PID #1050665 has about 0.6 hectares to plant about 1500 saplings.
- Sub-CB #2, PID #1068402 has about 0.22 hectares to plant about 550 saplings (this area appears to be collecting storm water as well).
- Sub-CB #2, PID #784983 has about 0.13 hectares to plant about 325 saplings.

If the available 2.31 hectares was planted with the suggested 5,775 saplings across these Town of Stratford properties as well as the suggested area of 1.96 to plant the 4,900 saplings at Robert Cotton Park, it would account for an additional 10,675 regenerating saplings that when planted would almost double the forested area within this sub-catchment basin.

Sub-CB #2, Discussion:

Forest connectivity across this sub-catchment basin would be difficult to re-establish due to the layout of development. However, there are areas that should be targeted for afforestation efforts to increase the potential for carbon sequestration within this sub-catchment. Afforestation efforts would not establish connectivity within this sub-catchment but would however reduce the distance between the fragmented forest stands. Because there is so little forest cover remaining within the sub-catchment basin, afforestation is a priority for this area. Consideration should be given to an urban forest management document to help establish connectivity by planting property boundary lines. A residential program for boundary line planting would increase the potential for forest connectivity as well as increase the potential for carbon sequestration within the sub-catchment basin.

Since the possibility exists to double the identified 2020 forested area within this sub-catchment basin by planting just a few hectares of mowed grass (which has a carbon footprint), it should be completed with limited delay. There are also a few private homes that are maintaining municipally owned land as their private yards within this sub-catchment basin. Afforestation of these areas will possibly need notification to stop lawn maintenance in these areas, as planted trees are often damaged by mowing. Without communication, residents may be unaware that the resulting damage can end up affecting the stem for its life.

Sub-CB #2, Property Arrangement



Deforestation unfortunately has continued within this sub-catchment basin. It should be noted that since the 2020 aerial image was taken there has been an estimated 1.3 hectares of further deforestation for the encroachment of development. This brings forest cover down to around 1.7% of the land use for a sub-catchment basin of 182.8 hectares. Connecting forested stands across an area this large with so little forest cover left across a heavily sub-divided landscape is an

impossible goal. If the Town of Stratford was to consider afforestation of all the remaining undeveloped non-evident areas in the 2020 aerial image, it would have only increased the forest cover to about 10%. This would still not be enough forest cover to be able to re-establish forest connectivity or meet the PEI 2040 Net Zero Framework of 30% forest cover per watershed. Therefore, afforestation cannot be stressed enough as the single most important management technique for this sub-catchment basin if carbon sequestration is also a goal. Reducing the distance between fragmented forest stands would be a secondary benefit to afforestation.



SUB-CATCHMENT BASIN #3:

Sub-CB #3, Forest Cover



Sub-Catchment Basin #3 (Sub-CB #3) encompasses 244.9 hectares of area in which the Town of Stratford owns 18 properties equal to a sum of 12.9 hectares.

Development in Sub-CB #3 creates some difficult barriers to re-establishing forest connectivity across the landscape of Sub-CB #3.

Type of Land Use	Area in Hectares
Agriculture	5.9
Hedgerows	0.2
Forests	21.7
Non-evident	21.2
Residential	5.9
Roads	18.1
Urban Area	109.9
Wetlands	2.8
Commercial	32.7
Institutions	12.9
Industrial	13.6

The dominant land use identified within this sub-catchment basin was Urban area, which accounts for 109.9 hectares or about 45% of the land use. The estimated total paved area within the sub-catchment basin is 57.9 hectares or 24% of the land use while the amount of Forest land use was 9%. This sub-catchment basin had the largest forested area that fell within the municipal area in the 1935 aerial photos.

The wetlands in this sub-catchment basin also merit some discussion. The two smaller areas identified as wetlands to the northwest of the sub-catchment basin were sewage treatment areas which have since been

decommissioned. Though these treatment areas were mapped as wetlands and did provide a form of habitat they will not be included in discussion throughout this document as functional wetlands but were included in the amount of wetland area. That leaves one functional wetland in the landscape which has since been encroached upon by developing highway infrastructure, in which the mapping information was unavailable at the time of this document. However, with the provincial No Net Loss policy, compensation would be expected and hopefully found within the same sub-catchment basin.

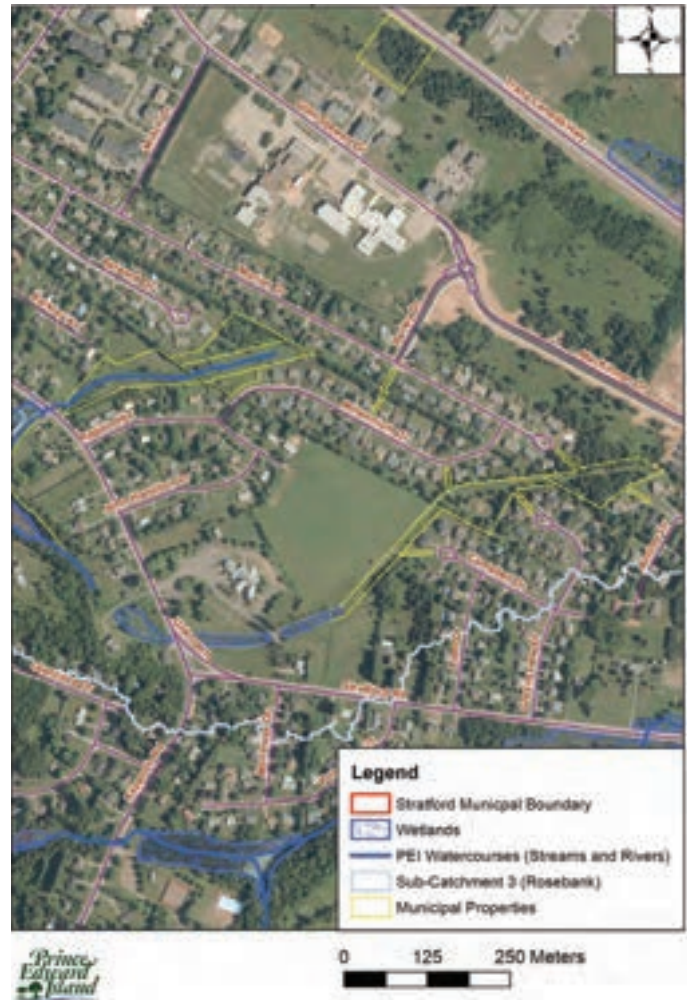
Within this sub-catchment basin there were 21.7 hectares or 9% of the land use identified as Forest. Forest connectivity is overall poor throughout this sub-catchment basin and would be difficult to re-establish due to the layout of the developed area. Therefore protecting existing forest cover combined with afforestation efforts should be an absolute priority for this sub-catchment basin and the same can be said for the remaining wetlands.

Sub-CB #3, Property Descriptions:

Within this sub-catchment basin, the properties with PID #s 885517, 934117 and 765693 contain a small creek or stream that has been reduced in function with the loss of upland wetlands as well as encroachment upon the headwaters over the last few hundred years of land management. There is a trail network crossing these properties that is located on the edge of the floodplain that has a section through a grassy, ephemeral wet area. This part of the trail could be considered for relocation and this wet area could be designed to hold more surface water runoff while also potentially providing planting space for White Ash, Black Ash, Red Maple, and Yellow Birch. One property in this area, PID #765693 was experiencing a small amount of localized flooding during a site visit with heavy precipitation happening. There is a park located around the area that was flooded; this park has been built into the floodplain of the watercourse. There is a series of events that can lead to infrastructure or areas being impacted by flood waters or spring freshets. In this case, the park's location in the floodplain is followed by the lack of remaining wetlands within the sub-catchment basin (currently less than 2.8% of the area), and a lack of natural catchment channels for surface water runoff. Combined with the fact that about 24% of the land use in this sub-catchment basin now has an impermeable surface to precipitation, such as pavement, some localized flooding is understandable. A grassed area about 50 meters across the water channel from the park could be a rehabilitation project to restore the floodplain for carbon sequestration.

During the first site visit, at the northeast end of the property PID #914117, surface water

Sub-CB #3, PID #885517, #934117, #765693 & PID #886770, #895896 & #855064



runoff was seen entering a hole in the ground and re-emerging a short distance later at the headwater location carrying a heavy sediment load. During a second site visit (not raining) it was noted that this hole was an old culvert that had been placed here for a crossing. This culvert is now essentially the headwaters of this stream and should be considered for removal with some possible small wetland rehabilitation efforts about 25 meters northeast upstream.

Due to the limited amount of forest cover across these properties, afforestation efforts should be a priority. It was also noted that there is no designated public parking space for use of this public area. Without a parking area, use of this public space is likely very limited to local traffic only.

Within this sub-catchment basin, under the properties with PID #s 886770, 895896, and 855064, there is an engineered catchment channel for surface water runoff. There is a trail that runs through this public area as well. Due to the engineered component of this catchment, channel rehabilitation into a functioning natural area could prove difficult. A few small flooded pools for habitat could possibly be created with woody debris, but would need careful consideration for placement to handle the amount of flow found in this catchment channel during precipitation events.

The forested area around these properties saw heavy individual tree loss from hurricane Fiona. Attempts should be made to replant these areas with a diversity of species.

It was again noted that there is no available area for parking to access this public space, thus likely resulting in only localized use. Parking along the cul-de-sac is difficult during summer and near impossible when snow is present. Parking around the trail heads without blocking local traffic or without impacting recreational accessibility to the trail or without infringing upon a residents driveway was so difficult during winter it would absolutely be a deterrent for non-local residents of the area and non-residents of the municipality alike. Due to this oversight in the development of these areas, the trail's potential use may be limited.

Sub-CB #3, Forest Stand Descriptions:

Stand 1: This stand encompasses 0.35 hectares of area and lost roughly 20% of the forest cover to Fiona. Stand 1 is still in the early primary succession stages but has a good diversity of trees. A healthy immature White Pine is growing in the stand that is in excellent form.

Sub-CB #3, PID #885517 – Stand 1



Since this stand is within proximity to the stream, it could likely serve as breeding bird habitat for the area. The next closest forested stand that is about this size is located 320 meters away.

There is also residential encroachment where part of the property is being maintained as a residential yard with mowed grass.

Stand 2: This stand encompasses 0.35 hectares of area and was a mix of mature Large-Toothed Aspen and old field White Spruce with an average age of 43 years old. There was heavy individual tree loss within this stand from the strong winds of Fiona. Most of the above ground biomass has been removed from the area. There will be some natural regeneration of a similar species composition.

Stand 2 also has some potential for a small educational component such as the installation of amphibian boards trail side and into the newly regenerating stand. There is a small unmapped wet area that has been created from past land use. This wet area could possibly be excavated to create an ephemeral pool at the upper end of the catchment channel. Amphibian boards could be installed at various distances from this wet area to promote a self-learning experience with nature as people use the trail system. This may also encourage residents to get off trail a bit as well.

Sub-CB #3, PID #886770 – Stand 2



Stand 3: This stand encompasses 0.4 hectares of area and is in primary succession. This stand mostly contains regenerating old field White Spruce and Trembling Aspen. This stand had an average age of 19 years old. There are approximately 1,238 maturing stems per hectare with an average basal area of 25.62 meters² that has an average DBH of 15.2 centimeters and an average height of 11.25 meters. Fiona damaged about 10% of this stand.

The stand is possibly going to experience encroachment and will not currently have a treatment discussed for management. However, it is possible that some of the stand may remain intact, and a possible treatment will be prescribed later.

Sub-CB #3, Forest Stand Treatments:

Stand 1: For a treatment of this stand, efforts should be kept to a minimum footprint. Pruning the White pine to a height of 2 meters is the first small thing that could be done within this stand. A bit of growing space could be created around the immature White Pine by removing a few stems that will be suppressed into an early mortality by the canopy of the White Pine as it matures. As this area is likely used as nesting habitat for passerines, work should be limited to the fall in this stand. This treatment is only a suggestion to encourage healthy growth of the single White Pine as this tree will potentially sequester atmospheric carbon for a few hundred years if healthy. Some

Sub-CB #3, PID #684019 – Stand 3



improved air flow around the base of the tree will prevent White Pine Blister Rust and pruning will help encourage vertical growth and limit the potential for large branch scars to occur.

Stand 2: It is crucial to replant this area with a variety of tree species and shrubs to stop the stand from repeating the same succession of re-growing a similar species composition over again. This area should be planted with longer-lived species such as Yellow Birch, White Pine, Red Maple, White Ash, and Northern Red Oak.

Sub-CB #3, Discussion:

Overall forest connectivity is again impossible to achieve within this sub-catchment. There remains very little forest cover and encroachment continues into forest stands throughout this sub-catchment basin. It should be noted that some of the areas identified as Forest land use in the 2020 aerial imagery have since been converted. Deforestation has continued to happen across this sub-catchment basin as well as wetland encroachment. Deforestation and wetland encroachment are subjects of concern as conversion of these areas directly impacts and minimizes the municipality's potential for forest connectivity and carbon sequestration. Again, with PEI's No Net Loss Policy, compensation should be expected and hopefully within the same sub-catchment.

With a lack of forest cover and wetlands across the sub-catchment basin re-establishing forest connectivity is unlikely. Therefore, afforestation efforts are the only course of action to increase potential carbon sequestration. If all the Non-evident land use in the 2020 imagery had been planted, it would have essentially doubled the forest cover in this sub-catchment basin in 2020. Though doubling the forest cover to 17.5%

Sub-CB #3, Property Arrangement



within this sub-catchment would have been an amazing achievement towards the municipal goals for this project of maximizing carbon sequestration, it would not achieve the larger goal for forest connectivity. Afforestation, however, would significantly reduce the distance between fragmented forest stands.

SUB-CATCHMENT BASIN #4:

Sub-Catchment Basin #4 (Sub-CB #4) encompasses 340 hectares of land in which the Town of Stratford owns 17 parcels equal to approximately 13 hectares.

Type of Land Use	Area in Hectares
Agriculture	1.6
Hedgerows	1.6
Forest	26.3
Non-evident	21.4
Residential	15.6
Roads	10.9
Urban Area	172.9
Wetlands	5.9
Commercial	2.8
Institutions	1.2
Recreational	77.0
Industrial	2.8

Urban area is the prominent land use type within the sub-catchment basin occupying about 172.9 hectares of land or 50.8% of the area within the sub-catchment basin. The estimated total paved area is about 56.4 hectares or 16.6% percent of the land use. Since heavy development is across the landscape of Sub-CB #4, re-establishing forest connectivity proves difficult. There were 26.3 hectares or about 8% of the area identified as Forest land use within this sub-catchment basin. There are a small number of forested areas that have maintained forest cover since at least 1935.

Sub-CB #4, Forest Cover



Within this sub-catchment basin some of the riparian area has a small amount of forest cover, but over the years the headwaters of the watercourses have been heavily encroached upon. There are three wetlands identified within this sub-catchment basin, all of which are along the same watercourse from east to west. Two of the three wetlands are man-made impoundments and the third is a result of converting the stream's headwaters into a shallow instream pond. While these man-made impoundments may

provide some wildlife habitat, they likely have limited functionality as beneficial wetlands and are present for recreational use. There is evidence that the third identified wetland area, at the current headwaters to the eastern branch of the watercourse, was completely plowed under in the 1935 imagery. This man-made pond in an area that was an agricultural field is an example of how these areas can be re-claimed. There is also another small pond created adjacent to Stand 4 to the east that with ephemeral flows has now become part of the watercourse.

The creation of permanent open water instream wetlands should be carefully considered as there could also be consequences for converting these areas to instream open water ponds such as the potential release of greenhouse gasses. Temperature increases, excessive growth, and die off from nutrient rich surface water runoff are some of the impacts expected from the installation of instream ponds within a developing sub-catchment basin.

There is one remaining undeveloped property that not only has the potential to establish some ephemerally flooded areas across the upper catchment channels as well as afforest

a larger unforested area of the sub-catchment basin, but also has a section of mixed forest cover that has been remaining since 1935. This area of forest cover has also been identified as suitable habitat for a species of Special Concern. There is one other mature forested parcel within this sub-catchment.

Sub-CB #4, Property Descriptions:

The town-owned properties within this sub-catchment basin are predominantly recreational areas. These properties are mostly connected to the Pondside Park trail system and are often located within the riparian area of the watercourses. Parking is available at Pondside Park for use of the trail. Some of the riparian area on the municipally owned properties has maintained forest cover since 1935, however these forested riparian areas have been quite small with more forest cover existing now as the areas have naturally succeeded.

The town properties are quite small throughout this sub-catchment basin but some do have the opportunity to be afforested which would add a small amount of forest cover.

Sub-CB #4, Forest Stand Descriptions:

Stand 1: This stand encompasses 0.72 hectares and makes up the riparian area for the stream flowing into Hatchery Pond. There has been a small amount of forest cover here since 1935. The stand is dominated by Red Maple with a mix of White Spruce, Trembling Aspen, and White Birch. There were some mature Yellow Birch and Eastern Hemlock that had windfallen because of Fiona.

There are approximately 962 stems per hectare with an estimated basal area of 39.85 meters² and an average DBH of 22.3 centimeters. The stand's average height was about 17.5 meters. There are several trees approaching a 20 meter height along the steep slope of the bank within this stand. There is some damage from Fiona that could be cleaned up. The only exception for the removal of biomass material should be for the purpose of making a final product, such as the boards from the wind fallen Eastern Hemlock or Yellow Birch.

There is also a large amount of maintained grass on the property that could be planted. There are 1.34 hectares of mowed area that could have 3,350 saplings planted.

Stand 2: This area is more accurately described as a hedgerow. This area encompasses 0.27 hectares or area and consists of primary succession species like Trembling Aspen, White Spruce, and White Birch. This stand has a young mature treed canopy and is lacking sufficient understory regeneration. Some of the understory here is encroached upon by local use. There were some leaning trees here that could be removed if they are still leaning.

Sub-CB #4, PID #329193 – Stands 1 & 2



Stand 3: This stand encompasses 0.72 hectares of area. Parking in this area was less difficult during summer and more difficult in winter when snow was present. However, parking can be provided at Pondside Park.

This stand was dominated by White Spruce with a Trembling Aspen and White Birch mix. There were approximately 1,098 stems per hectare with an estimated basal area of 27.66 meters² per hectare with an average DBH of 18.1 centimeters. There was a cleanup of this stand due to the amount of damage from Fiona, however almost all of the biomass has been removed. There are some residual stems throughout the stand but an estimated 80% of the stand was removed. There is a dense area of mature White Spruce to the south of this stand that has some individual tree loss but has maintained the most forest cover in this stand. This stand is also located within the riparian area and was possibly breeding bird habitat. During the Fiona cleanup there was too much woody debris removed from the stream. Woody debris works as fish cover and macro-invertebrate habitat.

There is residential encroachment into this stand with a couple homes maintaining some of the property as mowed grass.

Stand 4: Damage from Fiona resulted in about a 60% tree loss to this stand. Pre-Fiona there were approximately 1,070 stems per hectare with an estimated basal area of 29.73 meters² and an average stand DBH of 18.6 centimeters. There is a mix of remaining trees, predominantly White Spruce around the edges followed by Red Maples. Some of the mature stems that are still standing

Sub-CB #4, PID #919662 – Stands 3 & 4



will provide a good seed source for future growth. Younger immature stems within this stand, which have been released because of the change in canopy structure, will mature nicely. There will be a mix of Red Maple, White Spruce, White Birch, and Yellow Birch that will benefit from this canopy release. This stand is also within the riparian area for the watercourse and is likely breeding bird habitat. The forest floor within this stand is mostly flat and was possibly farmed at

Sub-CB #4, PID #996595 & #1103381 – Stands 5 & 6



one time as the adjacent stream appears to have been plowed under pre-1935. This area appears to be reverting to forest cover in the 1935 aerial photos.

Due to the proximity to the headwaters of the stream, management in this area needs careful consideration. Access to this stand is less difficult as there is no indicated parking area but the ability to park off the road exists.

Stand 5: This stand is the remnant of an old agriculture hedgerow. There is some regenerating European Mountain Ash within this area as well as some mature American Beech trees. Mature stems are of poor form but have proven wind resistance. There was some individual tree damage from Fiona which were mostly old field White Spruce.

There is a trail adjacent to this stand, however adequate parking for accessing this area is difficult reducing the trail to local use. The most notable discussion for this stand is the encroachment of yard areas.

Stand 6: This stand had a few older trees (80 - 100+ years of age) in the center of the stand, the older trees in this stand experienced the most damage from Fiona. This is likely due to further fragmentation of the older stand as the area around this stand developed. This stand has been succeeding northwest for several years and was likely further fragmented when this trail was cut out of the older section within this stand. However, much of the existing stand is immature Large-Toothed Aspen, Red Maple, and White Spruce. Large-Toothed Aspen accounts for about 65% of the stand. There are approximately 987 stems per hectare with a basal area of 32.19 meters² per hectare and an average stand DBH of 25.6 centimeters with tree heights of 19.5 meters tall.

Stand 7: Has a mix of growth with mature White Spruce, Red Maple, Balsam Fire, and some Yellow Birch. This stand is only 0.27 hectares and is adjacent to a larger forested area for this sub-catchment. This adjacent forested area has potential habitat identified for Eastern Wood Pewee so this small area should be left alone to minimize changes around the identified area.

Sub-CB #4, Forest Stands Treatments:

Stand 1: Work should be limited in this stand until the late fall and winter except for Diversity Plantings. Due to the ecological sensitivity of riparian areas, work should be limited to small patches created over several years to minimize overall disturbances. Four small stand improvement patches of about a 20 meter diameter could be created. Within these stand improvement patches immature stems in poor form and undesired species such as European Mountain Ash should be removed. Spacing of residual regenerating stems should be between 1 and 2 meters apart. Mature stems that are crowded could have the odd single stem in poor form removed to increase growing space but never more than 40% of the mature stems removed from a Stand Improvement Patch. Only mature stems of poor quality that are suppressing the regenerating understory should be removed and consideration should be given to the potential for the undesired mature stem to become a viable snag/wildlife tree if girdled at the base. This could be followed by a light Diversity Planting of longer-lived trees like White Ash, Northern Red Oak, White Pine, Red Spruce, Sugar Maple, and Yellow Birch. There could be some Serviceberry and Hobblebush planted to replace the European Mountain Ash as a food source for wildlife. Patch cuts can be done in series of 4 patches throughout the stand every 3-8 years slowly transitioning the stand to longer-lived species.

Stand 2: This stand requires a clearly defined boundary line to ensure that local residential encroachment stops. A boundary line could be planted with White Spruce and a small Diversity Planting of longer-lived species such as White Ash, Yellow Birch, White Pine, and Northern Red Oak should be completed.

Stand 3: This area should be replanted as soon as possible. There is a lack of remaining woody debris around the watercourse. Replanted species should be a mix of White Spruce, White Pine, Red Maple, White Ash, Yellow Birch, Northern Red Oak, and some Eastern Larch.

The remaining section of White Spruce that is still standing could have a light Commercial Thinning done in which about 15% is removed. Material that is removed from this area should be used to replace the woody debris that was taken from the watercourse during the post-Fiona clean up. There could be a Diversity Planting of Eastern Hemlock, Yellow Birch, Red Maple, and Sugar Maple completed throughout the Commercially Thinned space.

Stand 4: Since this stand is located around the headwaters of the stream and is an overall small area, consideration should be given to letting this area naturally decompose the windfallen trees. An effort could be made to help accelerate this process by simply cutting and limbing any windfallen trees so that they touch the ground. The woody debris will provide habitat for amphibians and

other wildlife as it decomposes. Helping the woody debris to the ground and limbing the stems will also increase the available planting area to add some longer-lived species such as White Ash, Sugar Maple, Yellow Birch, Red Spruce, Eastern Larch, and Eastern Hemlock.

Stand 5: Since this stand is an older hedgerow, mature stems should be left standing. European Mountain Ash could be reduced in density across the stand but not fully removed. It is suggested that a boundary line of these properties is established with planted White Spruce to stop the encroachment of lawns into this property. White Spruce could then be planted to fill gaps between the property's boundary lines and the older hedgerow. A small Diversity Planting of White Ash, Red Maple, Sugar Maple, White Pine, Yellow Birch, and Northern Red Oak should happen where European Mountain Ash has been reduced in density should happen.

Stand 6: This stand is optimally stocked for its current growing conditions. However, due to the small size of this stand, some stand improvements could be considered. A single 16 meter Stand Improvement Patch could be completed to reduce the amount of dominant or regenerating Large-Toothed Aspen by 60%. Several of the dominant Aspen should be girdled versus removed to create larger wildlife trees within the stand. The stand could then have a Diversity Planting done of longer-lived species such as Yellow Birch, Sugar Maple, White Ash, White Pine, and Northern Red Oak.

Stand 7: There is little that should be done in this stand. It is suggested to leave it as a small natural area with no further uses planned. A small section of unmanaged forest within the municipality would be beneficial to urban wildlife. If the adjacent forested properties were to be acquired, then this area should be included in a management plan for the entire forest stand. The adjacent

Sub-CB #4, PID #942086 & #1160589 – Stand 7



forested area to the southeast has been identified as suitable habitat for Eastern Wood Pewee which is listed as a species of Special Concern. Therefore, both encroachment and management should be carefully considered.

Sub-CB #4, Non-Forested Properties:

- Sub-CB #4, PID #482455 has the area for 625 saplings to be planted.
- Sub-CB #4, PID #996595 is three small parcels identified under the same PID #. These parcels have the available area for 125 saplings to be planted but also have a small, forested stand.
- Sub-CB #4, PID #1103381 is again three small parcels identified under the same PID #. These parcels have the available area for 625 saplings to be planted but also have small, forested stands 5 and 6.
- Sub-CB #4, PID #919662 has the area to plant 450 saplings and contains forest stands 3 and 4.
- Sub-CB #4, PID #1103225 has the area available to plant 500 saplings and falls between sub-catchment basins #4 and #9.
- Sub-CB #4, PID #738799 has the area available to plant 250 saplings.
- Sub-CB #4, PID #299982 has the area available to plant 1,750 saplings.
- Sub-CB #4, PID #329193 has the area available to plant 3,000 saplings and contains forest stands 1 and 2.
- Sub-CB #4, PID #731463 has the area available to plant 250 saplings.

Sub-CB #4, Wetland Discussion:

Since there are a couple of stream impoundments used to create large ponds as well as an instream man-made pond throughout this sub-catchment basin, a wetland discussion is warranted.

Small instream ponds or impoundments are often sources of greenhouse gasses and not carbon sinks. The excess nutrients and organic matter from surrounding land tend to settle in ponds through precipitation events and decompose into methane and carbon dioxide which are released into the atmosphere. This release is increased in sub-catchments basins where erosion is an issue as more organic material is entering the watercourse. Erosion combined with nutrient loading from hydro-seeding recent developments and the orientation of stormwater management systems or drainage ditches can cause a further increase in the release of greenhouse gasses from ponds or freshwater impoundments. Placement of impoundments is often an issue as the areas they are often constructed in were flood plains or salt marshes, of which both areas had the ability to sequester more carbon naturally before being converted to impoundments.

Jordon's Pond is created by a man-made impoundment and covers 2.6 hectares of area. The impoundment structure is laid across the estuary changing this area's natural function. This body of water appears shallow and was experiencing a bit of algae growth when visited during the summer of 2022. This man made ecosystem is not functioning as well as if this area was left in its natural state. The capacity for this area

to sequester carbon is likely very limited. It would initially sequester some atmospheric carbon but would release it very shortly after as conditions in this body of water would change with nutrient loading, seasonal temperature changes, and an influx of sedimentation during the year. This area would likely sequester more carbon annually if returned to a natural state. If the Town of Stratford is hoping to maximize its carbon sequestration potential, then consideration should be given to rehabilitating this area into a functioning saltmarsh.

Understandably, this area likely has some recreational value to some of the community, however without an area to launch a watercraft or even park and to access the impoundment, then the use is likely very limited. There is a right of way for the community to use this area, but this right of way is inconvenient to use as it is along a private residence and only allows access to the outflow of the pond, not the actual larger body water and appears as if trespassing on private property. Since the recreational area likely benefits very few residents in the community, consideration should be given to removing this impoundment and naturalizing this area as a salt marsh to benefit all residents of the community by returning its ability to sequester and store more atmospheric carbon as a natural salt marsh area.

The next impoundment for discussion is the Hatchery Pond at Pondsides Park. This impoundment likely has frequent local use as parking is convenient. Thick mats of *Cladophora* algae were noticed during summer along the pond surface. This alga

could indicate that there is possibly nutrient rich surface water runoff entering the watercourse and causing this growth. The mats of algae are filtering this nutrient load as the water flow slows down in the pond. As these mats grow, they are sequestering atmospheric carbon but as these mats grow too large, they also shade out the pond bottom and stop the photosynthesis process for other aquatic plants. Dissolved oxygen levels can fluctuate in bodies of water that are overburdened by this growth. As the alga produces oxygen during the day but consumes it during night, if the mats are large enough to smother other aquatic plants, low oxygen events can occur over night leading to the die off of some vegetation and even possibly aquatic organisms in the watercourse.

The third small man-made pond at the headwaters to the northeast branch should serve as an example of the need for an avoidance policy for these catchment channels in future development. Of the overall wet area about one third would be considered functional wetland. The remaining functional area is heavily encroached upon.

The fourth more recently installed impoundment is located by the headwaters along the southern branch. This pond was installed just outside the 15 meter buffer of the watercourse but due to the input from ephemeral flows (and possibly some groundwater discharge) is now a part of the watercourse and should be considered as an area to have a buffer zone planted. This man-made pond could potentially have a localized warming effect to stream temperatures.

Sub-CB #4, Discussion:

This sub-catchment has little area left to consider for afforestation. The remaining undeveloped property south of the golf course is heading towards development. This is the last area within this sub-catchment where a seasonal wetland could be created. Forest connectivity is unlikely to be achieved within this sub-catchment with normal afforestation efforts. This sub-catchment will likely need to have an urban forest plan associated with designing a planting program that will help establish criteria for reforesting private spaces such as the boundary line of yards.

There is also the consideration that land conversions in this sub-catchment have drastically changed the function of this sub-catchment. With only 8% of the land use identified as forest cover, and which is still diminishing in size, the potential carbon sequestration by forest cover is very limited. As the larger remaining forest cover is a mature mixed stand, the sequestration of atmospheric carbon is likely limited or has slowed down with the stands age. With limited carbon sequestration and a few impoundments that are possibly producing greenhouse gases this sub-catchment basin needs an urban forest document to help residents afforest their properties. Though this sub-catchment basin has a large amount of area for outdoor recreational purposes, this form of land conversion could be hindering the potential for carbon sequestration and storage within this sub-catchment basin.

Sub-CB #4, Property Arrangement



SUB-CATCHMENT BASIN #5:

Sub-Catchment Basin #5 (Sub-CB #5) encompasses 87 hectares of land and has 6 Town of Stratford owned properties equaling approximately 1.8 hectares of land.

Type of Land Use	Area in Hectares
Agriculture	2.2
Forest	6
Roads	4.3
Urban Area	74.7
Wetlands	0

Sub-CB #5 has no mapped wetlands or watercourses that have been identified. It is unlikely that a sub-catchment basin would have developed with absolutely no streams, creeks, or wetlands found within its boundary. It would be safe to assume that they have been removed from the area by past land use. There was some surface water runoff and ephemeral pooling found within the catchment channel.

Sub-CB #5 is also heavily sub-divided and developed across the catchment basin and lacks larger un-subdivided parcels of land. There were 74.7 hectares or 86% of the land use type identified as Urban area. The total paved area is estimated to be about 17.6 hectares or 20% of the land use.

It is also interesting that a somewhat substantial amount of 6 hectares or 7% of the land use type identified was Forest in this smaller and heavily developed sub-catchment basin.

Sub-CB #5, Forest Cover



Re-establishing forest connectivity throughout this sub-catchment basin would be difficult due to the design of the subdivisions. The forest stands within this sub-catchment are too heavily fragmented by property boundary lines to be successfully managed as larger connected forest areas.

Sub-CB #5, Property Descriptions:

With limited municipal property in this sub-catchment there are only a couple of areas available to increase forest cover. There is a grassed area known as Kenny Park which has some individual tree cover and a small, forested northwest corner. There are two other small, grassed areas locally known as parks in this sub-catchment basin. One is called Ferguson or Zakem Park and the other is known as Partridge Park. These areas are maintained grassed areas that have a positive carbon footprint with the association with the consumption of fossil fuels for their maintenance.

Sub-CB #5, Forest Stand Descriptions:

Stand 1: This stand encompassed 0.36 hectares of area. This stand was completely removed during the Fiona cleanup. There are a few residual immature stems that were left standing, but most have some form of damage that will limit their longevity. It was again noted that parking for access to this area was limited; suggesting that this area will likely only see localized use.

Sub-CB #5, Forest Stand Treatments:

Stand 1 will need a replacement planting of 950 saplings. Since this stand will be starting primary succession over again the suggested species for planting are White Spruce and White Pine with a few Red Maple, Northern Red Oak, and White Birch. It would be worth considering planting the remaining grassed area of these properties. There could be an additional 1,000 saplings planted throughout the grassed area.

Sub-CB #5, PID #624403 – Stand 1



Sub-CB #5, Non-Forested Properties:

- Sub-CB #5, PID #624403 has the area available to plant 1,000 saplings and contains forest stand 1.
- Sub-CB #5, PID #881268 has the available area to plant 75 saplings.
- Sub-CB #5, PID #457887 has the available area to plant 250 saplings.
- Sub-CB #5, PID #399295 has the available area to plant 875 saplings.

Sub-CB #5, Discussion:

This sub-catchment basin is unique because of the larger patches of urban forest cover. This sub-catchment basin could have an urban forest management document created to establish connectivity through private properties. With a lack of larger municipally owned properties where afforestation could occur, efforts should be concentrated on forest cover on privately owned parcels. Efforts could be made to establish private property boundary lines along the edges of the sub-catchment basin first and then eventually planting property boundary lines towards the center of the sub-catchment basin.



Sub-CB #5, Property Arrangement



SUB-CATCHMENT BASIN #6:

Sub-Catchment #6 (Sub-CB #6) encompasses 254.2 hectares of land in which the Town of Stratford owns 14 properties equaling a sum of approximately 12.4 hectares of land. This sub-catchment basin is three small individual watersheds combined. Two of the small watersheds are more heavily forested than the other but all three watercourses have similar issues with development around the headwaters and catchment channels to the watercourses.

Type of Land Use	Area in Hectares
Agriculture	14.0
Hedgerows	0.5
Forest	32.2
Non-evident	41.7
Residential	62.6
Roads	8.8
Urban Area	91.8
Wetlands	1.0
Recreational	1.6

There is a small wetland found in the northwest of Sub-CB #6 equal to about 1 hectare in size. This wetland could potentially be expanded slightly. There are 91.8 hectares that are identified as Urban land use or 36% and 62.6 hectares that are identified as Residential land use or 25% both categories equaling a total of 61% of the land use within the sub-catchment basin. The total estimated paved area is equal to about 26.2 hectares or 10% of the land use.

Sub-CB #6, Forest Cover



Sub-CB #6 has retained some forest cover as it developed over the years. Two town-owned properties have maintained some form of forest cover since at least 1935. There were 32.2 hectares or about 13% of the area identified as Forest land use. There also remains the potential to afforest land within the sub-catchment basin, however overall forest connectivity would be difficult to establish to other sub-catchment basins due to the landscape layout of development across the headwaters. However, forest connectivity could be established across

this sub-catchment basin between the three watercourses. There are larger undeveloped forested sections of the riparian area along one of the watercourses within this sub-catchment basin. There is also less development towards the shoreline in this sub-catchment basin, which helps with potential coastal afforestation. There is also quite a bit of urban forest cover that is not identified as Forest land use. This urban forest cover has several areas of priority forest cover identified for Eastern Wood Pewee habitat.

During winter, parking was not a problem for Stand 1 but was difficult for the remaining stands that were found along the Keppoch Road.

Sub-CB #6, Property Descriptions:

The municipally owned properties in this sub-catchment basin are predominantly for recreational uses. Sub-CB #6, PID #681403 is known as the Keppoch Soccer Field and has four small forest stands associated with the property as well as a playground for children. Most of the remaining town-owned properties within this sub-catchment basin are connected to the Tuckers Way hiking trail. Some properties along the trail system could be afforested to increase the potential for carbon sequestration across this sub-catchment basin.

Sub-CB #6, Forest Stand Descriptions:

Stand 1: This stand encompasses 0.7 hectares of area and is about 35 years of age. Stand 1 is mostly comprised of White Birch, Trembling Aspen, White Spruce and some Red Maple. Post tropical storm Fiona caused damage to about 30% of this stand. Trees with broken

Sub-CB #6, PID #3681403, Stands – 1, 2, 3 & 4



tops will become viable snag trees for future wildlife use.

Most of the White Birch stems are in poor form. There were approximately 955 stems per hectare with a basal area of 27.45 meters² per hectare with an average stand DBH of 12.7 centimeters pre-Fiona. Approximately 700 stems per hectare post-Fiona remain standing. Stand 1 shows evidence of ephemerally flooded areas along the northern boundary line, suggesting that there is the

possibility of creating some small, treed ephemerally flooded wet areas within the stand. This forest stand was used by residents during every site visit. There were several tree stems leaning and a few broken off treetops that were hanging during the last site visit which could pose a risk to recreational users of this area.

There is a short trail loop within stand 1 that could eventually be connected to Stands 2, 3 and 4.

Stand 2: This stand encompasses 0.3 hectares of area and could be considered an unhealthy stand with an average age of 34 years old. The composition of mature stems in this stand is a White Birch and a Pin Cherry mix which is dying out. Pre-Fiona this stand had approximately 467 stems per hectare with a basal area of 17.66 meters², an average DBH of 22.7 cm and an average stand height of 11.4 meters tall. This stand has experienced about 30% windfall damage from Fiona which resulted in about 322 stems per hectare post-Fiona. This windfall has created some larger gaps in the stand canopy for a diversity planting to happen. The forest floor throughout this stand could be classified as a forested floodplain. The forest floor of this stand has potential to attempt a Black Ash planting as the site characteristics would likely be supportive to its species-specific needs. There is the opportunity to create some larger and deeper ephemerally flooded pools throughout this forested floodplain without damaging the existing stand. The catchment channel is evident across the landscape in the 1968 aerial photography which suggests that the forest floor of Stand 2 likely had some ground water seepage.

The potential for creating an ephemerally flooded wetland area within Stand 2 could potentially be quite unique. Treed wetlands are often by far the hardest to recreate due to the tree component requiring the needed time to grow and having the trees adapt to the sudden stresses of the higher water levels. With proper planning Stand 2 could become a unique forested wet area within the municipality. Due to the potential for this stand to also serve as a planned Black Ash stand, there exists an opportunity to partner in management of this area with the local indigenous community. This partnership could possibly help with some funding to create the ephemerally flooded pools. Due to this stand's proximity to the park, this stand could eventually serve as a natural play area with some educational opportunities for day users.

Stand 3: This stand is immature and is regenerating. This stand encompasses 0.11 hectares of area and is in early primary succession. This stand is adequately stocked but does have some undesirable species such as Scotch Pine growing within the stand.

Stand 4: This stand encompasses 0.57 hectares in area. The mature trees in this stand are of poor form and predominantly Large-Toothed Aspen, which is surprising as this area appears to have been forested since the 1935 imagery. Some of the large old field White Spruce have aged out and died off over the last 10 years, possibly even falling during Hurricane Dorian in 2019. The large stems of the dead spruce will provide habitat for several types of wildlife as they decompose. There are several larger Large-Toothed Aspen that are windfallen because of Fiona. Stand 4 has a European Mountain Ash dominant

understory which has diminished the amount of naturally regenerating stem diversity within the stand.

It was also noticed that there appears to have been large amounts of soil pushed into this forested area over the years from all sides. Unfortunately, the areas where the soil has been pushed into are where the groundwater for the stream is emerging. One source is made evident when looking at 1935 aerial photos, when there was an agriculture field at the headwaters and some soil was likely pushed in from north of the watercourse to make flat land. The next source of soil was likely from the establishment of Keppoch Road along the southern property boundary as ephemeral seepage flows west along the road. The third source of soil is likely from the establishment of the subdivision to the east.

There was no other form of local use identified within this stand.

Stand 5: This stand encompasses 1.9 hectares and has mostly maintained forest cover since before 1935. There are some trees in this stand that were 100+ years of age that were windfallen by the strong gusts of Fiona. This stand was Red Maple and Yellow Birch dominant with some White Spruce, Sugar Maple, American Beach, Balsam Fir, and Large-Toothed Aspen mixed throughout the stand. Pre-Fiona there were approximately 941 stems per hectare with a basal area of 32.60 meters² and with an average stand DBH of 20.9 cm. Fiona resulted in about 45% windfall damage to this stand. Windfall came across the stand diagonally from the northwest, affecting the longest portion of

Sub-CB #6, PID #681411 & #1052034 – Stands 5 & 6



this stand. The remaining unaffected areas of the stand have a larger component of softwood stems in the understory or are along the steep riparian banks. There are several immature Yellow Birch in excellent form that have been released as the trees around them have been windfallen. There was also a small area identified as priority habitat for Eastern Wood Pewee along the northern boundary of the stand.

Stand 6: This stand is around a stream and makes up the riparian area for this watercourse. This stand was mature to over mature with about 50% White Spruce component pre-Fiona of which experienced the most windfall throughout the stand. Only about 15% of the stand was damaged because of Fiona. Post-Fiona there are an estimated 820 remaining stems per hectare. An area of windfall was cleaned up around the headwaters to the watercourse as well as behind one of the private properties. Pre-Fiona there were approximately 980 stems per hectare with an average stand DBH of 20.4 centimeters that had an estimated basal area of 36.10-meters² per hectare. There are several mature hardwoods still standing throughout this stand, some however are leaning now. Some of the mature stems along the watercourse have reached heights of 20 meters tall. The steep slopes of the riparian area make these trees appear less tall than they are.

There also was a priority area identified within this stand for the Eastern Wood Pewee. This area was where a component of softwood had been windfallen.

Stand 7: This stand encompasses 0.36 hectares of area and is immature with an approximate age of 29 years old. This stand was dominated by Trembling Aspen growth with a mix of White Birch, Red Maple, and White Spruce. Fiona resulted in about 36% windfall throughout Stand 7. This stand had an average height of 11 meters tall and pre-Fiona had approximately 1078 stems per hectare with a basal area of 32.35 meters² per hectare and an average stem DBH of 24 centimeters. Post-Fiona this stand has about 686 stems per hectare of which most are found around the edges of the stand. However, there are

Sub-CB #6, PID #804252 & #835660 – Stands 7, 8 & 9



several good quality regenerating Yellow Birch stems that will now benefit from the canopy release resulting from Fiona blowdowns. The windfallen trees have created several small diverse dense patches of various aged regenerating stems that should now grow vigorously and provide beneficial habitat due to different age structures and diversity.

There is a small pad with a gravel surface built in the southwest corner of the stand. There are several mature Red Maple and White Spruce around the edge of this pad.

Stand 8: This stand encompasses 0.28 hectares of area and is immature and dominated by White Birch and Gray Birch growth with some Trembling Aspen and White Spruce. Stand 8 has approximately 1,163 stems per hectare with a basal area of 27.66 meters² per hectare and an average DBH of 17.4 cm with a stand height of 12.6 meters tall. This stand is overstocked but has no resulting damage from Fiona. The grassed area in the center of this stand would make a good day use parking area as access is difficult from the two designated paths to this area. However, access from the road was easy but requires maintenance for vehicle use.

Stand 9: This stand is mostly comprised of older Yellow Birch in the 80+ age class with a mix of Red Maple, White Birch, and Pin Cherry growth. A good portion of the remaining stand is within the riparian area of a small stream. This is predominantly where the mature Yellow Birch growth is located. Pre-Fiona, roughly 43% of the stand area was comprised of immature Pin Cherry growth with a few mature White Birch and Red Maple. There are almost no other species regenerating within this blowdown patch. There are a few salvageable mature hardwood stems from Fiona blowdowns; one mature windfallen Yellow Birch had a DBH of 50.3 centimeters with another mature windfallen White Birch with a 37.5 cm DBH. Both were good saw log pieces and converting these into a final product is a form of carbon storage (for the life of the product). Windfallen stems such as these could be salvaged for use within the municipality.

Forest Stands 5, 6, 7, 8, and 9, Discussion:

The area around these stands merits discussion. There exists great potential to create a day use area in the green space around these properties. There is an old access road that could provide adequate parking in stand 8 for public day use. There also exists an abandoned pad, which provides a flat open area for things such as a gazebo, look off point, educational signage, picnic area, event location, etc. There are also adjacent forest stands that the town could acquire to increase public green space and the trail network within this area. Stands 5 and 6 had evidence of frequent local use and stands 7, 8, and 9 showed no sign of local use except a trail along the watercourse. Public access from the south into this area is inaccessible and from both the east and south access and gives a sensation of trespassing on private property.

A section of the Tuckers Way Trail system runs throughout the municipal properties in this sub-catchment basin. The use of this area could make an excellent beginning to the trail system for non-local residents and non-residents alike.

Sub-CB #6, Forest Stand Treatments:

Stand 1: This stand is currently understocked but could have a Manual Maintenance completed where the suppression of undesirable stems is completed and windfallen stems are brought to the ground. Some mature Trembling Aspen could be girdled to create wildlife snag trees within the stand. This could be followed by a Diversity Planting of

longer-lived species such as Red Maple, Sugar Maple, Yellow Birch, Northern Red Oak, White Ash, White Pine, and Red Spruce to increase diversity throughout the stand.

Stand 2: The only suggested treatment for this stand is Diversity Planting. The species planted should be longer-lived hardwoods like American Elm, Red Maple, White Ash, Yellow Birch, and Black Ash. A few longer-lived softwoods such as Eastern Hemlock, Red Spruce, and Eastern Larch could also be planted throughout this stand.

An attempt could be made to excavate a few small depressions throughout the forest floor to create ephemerally flooded pools. If this is attempted, it should occur before the Diversity Planting and only require the removal of Pin Cherry tree growth. Areas around the root wads of wind fallen mature trees could be a good place to attempt these pools. There could be several such pools created throughout the stand while maintaining forest cover.

Since Stand 2 has the characteristics of a forested floodplain, leaving the windfallen tree stems spread across the forest floor will provide habitat for wildlife like salamanders.

Stand 3: This stand simply should have the Scotch Pine removed for the time being. Within the next ten years a small Stand Improvement Patch could be completed where undesirable stems are removed, followed by a Diversity Planting of longer-lived species like White Ash, Red Maple, Sugar Maple, and White Pine. This stand will also be fine to mature over the next 25 years if left to its own natural succession.

Stand 4: There are a couple options for this stand. The first could be to do very little here except a Diversity Planting across the stand and let this area remain overall undisturbed to grow naturally as it appears to have little local use and is not an unhealthy stand.

This stand could have a few larger Stand Improvement Patch Cuts created. In these patches regenerating stems could be thinned and European Mountain Ash could be removed. Mature stems in the Stand Improvement Patches could be thinned out if desired or some could be girdled to become wildlife snag trees. Since this area has so little local use most of the undesirable stems should end up as snags. This would be followed by Diversity Planting the established Stand Improvement Patch Cuts. A Diversity Planting should then happen in the Patch Cuts and some saplings could also be planted throughout the untouched area within the stand. Species such as White Spruce, Eastern Larch, White Pine, Red Maple, Yellow Birch, White Birch, Sugar Maple, Northern Red Oak, and White Ash could be planted.

Stand 5: Work in this stand needs careful consideration as there is potential for Eastern Wood Pewee to be utilizing this stand for habitat. Therefore, any work should be carried out in the late fall and winter. Some of the windfallen stems within this stand could be salvaged if desired with a few windfallen stems being quality saw logs. Since this stand has experienced so much windfall of mature stems a salvage operation could be considered. Though the area is 1.9 hectares, the riparian area within the stand limits management options. This stand could also have Manual Maintenance to reduce the

amount of leaning and tangled trees. If some of the quality logs were wanted, they could be easily salvaged. Some of the undesired windfallen stems could be cleaned and bucked into smaller sections and then be used to create Artificial Brush Cover Piles and Nesting Areas. Regenerating stems that are undesirable could be thinned to allow for better growth of residual regenerating stems. This area could then have a Diversity Planting of some Northern Red Oak, White Ash, White Pine, and Eastern Larch completed. This stand will regenerate naturally also.

Stand 6: Since this stand is within the riparian area, work should be limited to fall and winter since it is likely important breeding bird habitat and disturbance should be limited. Management of this stand should be minimal due to this stand being in the riparian area. This stand will do fine if left alone.

This stand could also have a small Select Tree Harvest of about 15% of the remaining mature stems. This would only target mature stems that are of poor form and occupy some of the co-dominant canopy space. Stems could also be girdled versus removed. Girdling will have a similar effect as the removal by opening some of the forest canopy. Some of the leaning stems from Fiona winds could also be removed or dropped if they are leaning at more than a 70° angle from the forest floor. The areas of windfallen softwood could be cleaned and bucked into smaller sections to be used to create Artificial Brush Cover Piles and Nesting Areas.

Stand 7: For a prescribed treatment Stand 7 should have a Manual Maintenance and Cleaning of windfallen stems to reduce additional losses and stress on regenerating trees. Windfallen stems should be dropped to the ground to decompose or bucked into 1 meter sections and used to create Artificial Brush Cover Piles and Nesting Areas. A light Pre-Commercial Thinning could happen around ten years after the cleaning to remove some of the regenerating stems that are in poor form. This would provide space for a Diversity Planting of longer-lived species like Sugar Maple, White Ash, Northern Red Oak, Eastern Hemlock, White Pine, and Red Spruce at that time. There is a good seed source for Yellow Birch along the watercourse.

Stand 8: For a treatment this stand could be Commercially Thinned in which 30% of the codominant stems are removed from the canopy structure. Removed stems should be bucked and left on site to decompose. This could be followed by a light Diversity Planting of longer-lived species like Red Maple, Sugar Maple, Northern Red Oak, White Pine, and White Ash.

Stand 9: The suggested prescribed treatment in this stand is a Manual Cleaning of the windfallen patch where all windfallen stems are cut to the ground and bucked. This should be followed by an extensive Diversity Planting of the area with species such as White Spruce, White Pine, Eastern Larch, Red Maple, Northern Red Oak, and White Ash. There are a couple mature stems that could be salvaged around the edges of the stand.

Sub-CB #6, Non-Forested Properties:

- Sub-CB #6, PID #909374 and #802272 have the available area to plant 3,500 saplings.
- Sub-CB #6, PID #681403 has the available area for 2,125 saplings and contains forest stands 1, 2, and 3.
- Sub-CB #6, PID #1052026 has the available area for 2,250 saplings to be planted.
- Sub-CB #6, PID #884908 has the available area to plant 25 saplings.

Sub-CB #6, Forest Connectivity:

There is potential to have some forest connectivity across urban forest and forest cover. With afforestation efforts of municipal properties and the reforestation of the remaining catchment channels there could be approximately 25,750 saplings planted. If this strategy was combined with an urban forest management plan, then forest connectivity, with shorter distances between interruptions, would be very possible to have across the landscape within this sub-catchment basin.

Sub-CB #6, Connectivity Afforestation and Existing Forest Cover



Sub-CB #6, Discussion:

This sub-catchment basin has the potential to create a larger day use area within the landscape. If a day use area was designed across the landscape to link the watercourses together with a trail and forest connectivity, this would increase access to forested areas for residents of this sub-catchment basin.

There is also the potential to create some ephemerally flooded habitat, but this would need to be completed on privately owned land along two watercourses.

It is evident in the 1935 aerial imagery that two watercourses in the western half of this sub-catchment basin were heavily encroached upon for agriculture use. In 1935 the most northern watercourse was almost nonexistent except for the saltmarsh where surface water runoff would discharge.

The middle watercourse was also plowed over in 1935. The affected area still exists today but has been encroached upon by some development into the catchment channel. However, as this area currently is, there exists the potential for some ephemeral pools to be created. Afforestation of this area would also be beneficial. This area could eventually resemble Stand 2 as a forested floodplain for surface water runoff.

Sub-CB #6, Property Arrangement



SUB-CATCHMENT BASIN #7:

Sub-Catchment Basin #7 (Sub-CB #7) falls partially across the municipality and is about 172 hectares in size. Within this sub-catchment basin, the Town of Stratford owns a large portion of the land.

Type of Land Use	Area in Hectares
Agriculture	62.2
Hedgerows	2.2
Forest	30.3
Non-evident	11.2
Residential	13.6
Roads	3.9
Urban Area	20.5
Wetlands	0.5
Commercial	13.9
Recreational	9.1
Industrial	4.5

The dominant land use for Sub-CB #7 is Agriculture with 62.2 hectares identified equaling about 36% of the sub-catchment area within the municipality boundary. Forest cover was identified as the second most common land use type with 30.3 hectares being identified at 18% of the land use. Sub-CB #7 has had the same area forested since the 1935 aerial photos with encroachment happening from time to time. There was also the potential for small wetland creation around the headwaters and throughout the catchment channels to the stream. This area started being developed after this document

Sub-CB #7, Forest Cover



began and will possibly be revisited after the development is completed so a management strategy for the remaining forested area around the headwaters may be added to this document later.

The forested area around the sustainable community established along the roads Hollis Avenue and Balderston Court was assessed and some conclusions about conservation within an urban setting and forested communities of this type were drawn. The design or layout of this type

of residential area would work effectively with afforestation applied to grow into a sustainable forest. However, integrating this layout or design of a residential area into an existing forest stand will prove difficult. It is recommended that in the future before this type of development occurs that there is an environmental assessment and forest management document drafted prior to development that outlines where impacts may occur to the forest stand or structure because of this type of encroachment into a natural area. The potential to displace species from the area also exists if forest conservation or sustainability is the afterthought of the development. A better understanding of the forested area under consideration for development will result in a more sustainably forested area for the community to enjoy.



SUB-CATCHMENT BASIN #8:

Type of Land Use	Area in Hectares
Agriculture	174.8
Hedgerows	8.2
Farmsteads	8.8
Forest	70.6
Non-evident	30.3
Residential	39.3
Roads	6.5
Urban Area	12.7
Wetlands	23.9
Institutions	1.4
Recreational	6.5

Sub-catchment basin #8 (Sub-CB #8) encompasses 382.9 hectares in which the town owns eight properties equaling the sum of 62.6 hectares.

Agriculture is the dominant land use type identified in the sub-catchment basin, with 174.8 hectares or 46% of the landscape. There were 12.7 hectares or 3% of the area identified as Urban land use and 39.3 hectares or 10% of the area identified as Residential land use. When combined, the two land use types equal about 14% of the area. This sub-catchment basin has a total estimated paved area of about 18.6 hectares or 5% of the land use. There was 70.6 hectares or 18% of the area identified as Forest land use.

Sub-CB #8, Forest Cover



When comparing Sub-CB #8 to the other sub-catchment basins discussed, it is unique as there is relatively little development spread across the headwaters or upper catchment channels. This sub-catchment basin has the best potential for re-establishing forest connectivity and ephemeral flooded wetlands where they can have the greatest environmental impacts. This sub-catchment basin is still predominantly agriculture so there exists a potential to work with private landowners to purchase or acquire more land along the catchment channels to improve the connectivity across the landscape.

Purchasing the land that is identified as catchment channels could potentially cost less if compared to buying larger agriculture fields that will likely be developed as urban encroachment happens. Targeting areas of interest, while still possible, should be awarded the highest priority in the attempt to re-establish forest connectivity across the landscape of this sub-catchment basin.

This sub-catchment basin provides the opportunity for the Town of Stratford to demonstrate how a municipality can still develop quickly while improving on the benefits of natural resources in the interest of its residents and the environment. The opportunity in this sub-catchment basin could align with the provincial 2040 Net Zero Framework, Pillar 4 – Goal 4.1 A: Maintain the amount of forest cover in the sub-catchment basin, Goal 4.1 B: Sustainable Forest management and Goal 4.2 A: Grow PEI's forested lands (Increase Forest cover to 30% within sub-catchment basins).

There was a trailside survey done with 50 users of the Fullerton's Creek area. This survey was about which method of salvage or cleanup they would like to see happen in the wind affected forest stands around the walking trail. They were given three scenarios to choose from and asked which they preferred. If they would like to see the area cleaned up by machinery, or if they would prefer hand tools to be used, or if they preferred nothing at all happen?

Most respondents were happy at the idea of a cleanup with about 50% in favor of using hand tools and 50% machinery, various reasons were given for their choice. Seven respondents didn't have a preference over

how it was cleaned up but felt that it was needed (these individuals were counted as okay with machinery cleanup), and two respondents felt that the areas did not need to be cleaned and should be left alone. Almost all respondents had comments about concerns over the potential for a forest fire to occur from the blowdowns.

There were a few drainage ditches installed across the properties of the Fullerton's Creek area. These ditches were installed pre-1935. Two small ones exist under the hedge rows on the south half of the property. Most of these ditches appear to only drain surface water runoff, and are more of an old furrow than a ditch, but provide the same function for directing surface water runoff. There could be some potential to create a few ephemerally flooded pools along these ditches. There is another drainage ditch that was installed along the eastern boundary of Stand 6 and was installed to drain a treed swamp. The area where the third ditch drains is still forested and ephemerally flooded with evidence of a wet forest floor in this area.

There are a few areas within this sub-catchment basin where wet or ephemerally flooded land was converted to agricultural fields pre-1935. There is another small open water marsh wetland created with the use of an impoundment at the headwaters of the stream in this system.

Sub-CB #8, Property Descriptions:

Most of the municipally owned land in this sub-catchment basin falls within the Fullerton's Creek Day Use area. This area is heavily used by residents with some using the area during all-weather events. There is good parking and the potential for non-residents to come into the community and use this area and the trail system that has been installed. The properties that make up the day use area have been the same since at least 1935. The forested areas have maintained forest cover since 1935 with some harvesting done throughout various stands. There are a couple of areas that have reverted to forest cover after a couple agricultural fields were abandoned. There are large, grassed areas (recently abandoned agriculture fields) that have some natural forest succession starting to happen. These areas could be planted to have a good species composition with potential to be managed into multiple aged forest stands in the future with some longer-lived species being introduced in the succession process now to sequester atmospheric carbon now and hopefully hold on to it for longer with management.

The other forested property has an impoundment surrounded by a young multi-species plantation. This area also has a small trail loop known as the Clearview Estates trail system which is installed around the man-made wetland.

Both the forested properties in this sub-catchment basin are heavily used as recreational areas with well-established trails and evidence of frequent use.

Sub-CB #8, Forest Stand Descriptions:

Stand 1: This stand is a younger plantation that was planted in 2011 making this stand 12 years of age. This stand appears to be doing well with limited natural competition happening from within the stand. This stand is White Spruce dominant with an Eastern Larch mix. There are a few Northern Red Oak, Red Maple, Sugar Maple, Yellow Birch, White Pine, and White Ash planted as well. This plantation was densely planted at about a 1.5 meter spacing. The average DBH is 10.3 centimeters for the stand with varying codominant heights from 2.5 to 4 meters. There are several gaps or areas where tree planting was unsuccessful throughout the plantation that could be Fill Planted.

There are also a few mature White Spruce over the existing headwaters to the spring. A few of these mature White Spruce have fallen because of Fiona. They are leaning on planted trees and causing stress. This area could have some additional hardwoods planted that are more tolerant of wet areas.

Along the residential southern boundaries, it was noticed that in the southeast there was some encroachment from residential lawn mowing and some residential yard waste dumping along the southwestern boundary.

A stormwater catchment pond that is installed above the groundwater discharge within the plantation area merits discussion. The catchment pond is installed to catch surface water runoff from the development and has a ditch installed to direct surface water runoff from the sloping hill in the west around the stormwater catchment pond (this ditch would possibly be a good spot to establish some Black Ash).

Sub-CB #8, PID #1081876 – Stand 1



The storm water catchment pond's depth is controlled by a culvert leveling device. There is some downstream erosion evident from the merging surface water runoff at this location. There is a stormwater catchment area that is storing some surface water runoff to create a form of large open water ephemeral pool. This area was noted to have a heavy sediment load suspended in the surface water runoff during both moderate and heavy precipitation events. This sediment is being transported by stormwater drainage

to this catchment pond. This stormwater catchment pond appears to be collecting coarser-grained particles while allowing finer suspended solids like clay to still enter the watercourse in some precipitation events. There exists the potential to create a series of smaller ephemerally flooded shallow depressions below the storm water catchment pond where the two drainage patterns are merging. This could help potentially trap some of the finer sediments and reduce some erosion happening in this area. The catchment channel could be planted with more flood tolerant species also.

Stand 2: This stand is a White Spruce plantation from 1985 and is 38 years old with a naturalized edge along the northern stand boundary. There are approximately 1479 stems per hectare with an estimated basal area of 34.67 meters² and an average stem DBH of 18.8 cm. Some of this stand was damaged by the strong winds of Fiona. However, damage was mostly concentrated along the northern boundary of the stand, outside the plantation where a mix of deciduous trees exists. There are a couple of mature Northern Red Oak and a mix of Trembling Aspen and White Birch. About 10% of the White spruce plantation experienced damage from Fiona, including a narrow strip of windfallen stems in the center and a few broken tops throughout the plantation. There is, however, a lack of diversity in the codominant canopy and no regeneration within the understory of the plantation area. There is also evidence that surface water runs across the forest floor of this stand from west to east. The surface water flow through the stand was about 3 meters wide and had moved the duff layer of the forest floor. There was no evidence of local use within this stand.

Sub-CB #8, PID #1055136 & #1055151 – Stand 2 & 3



Stand 3: This stand has mixed growth which was dominated by over mature Eastern Larch equaling about 40% of the stand. There was heavy individual tree loss across this stand because of Fiona resulting in about a 65% loss of mature stems. This stand had approximately 657 stems per hectare with a basal area of 25.51 meters² and an average stem DBH of 27.8 cm. This stand has many characteristics that benefit wildlife such as several Common Wild Apple trees and small dense immature patches of White Spruce with some Fleshy

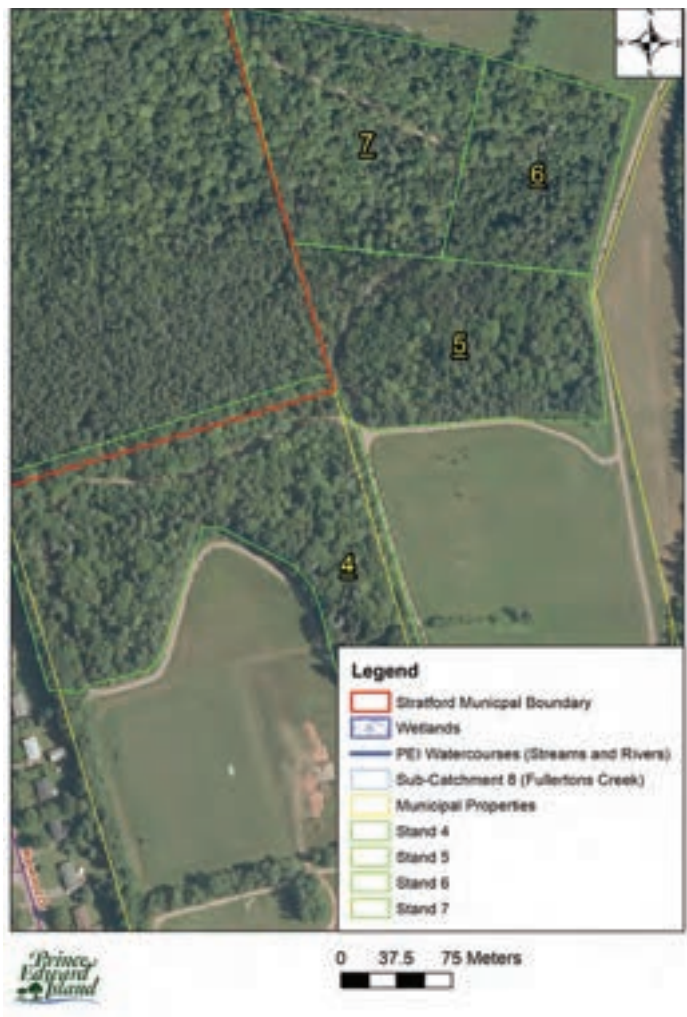
Hawthorn and Serviceberry shrubs. Also, it appears to have no potential for wildlife disturbance from local use. There was about 20% of the stand that was mature Large-Toothed Aspen of which almost all is windfallen. There are several age classes of regenerating Northern Red Oaks along the western half of this stand and continuing along the stream. Areas of the forest floor were wet and have the potential for small ephemeral pools. This wet area had been converted into a farm field prior to 1935. There are several areas with Common Spike-Rush growing in wet patches or Sensitive Fern growing in forested areas with a wet forest floor. There has also been a small Diversity Planting that has happened within the last few years of White Pine within Stand 3.

This stand is bordered by streams, one is the main branch of the stream on the western boundary of the stand and the other is a small 1st order tributary on the eastern boundary of the stand. Flows in the eastern tributary vary seasonally and are barely a trickle in summer.

Stand 4: This stand was a Red Maple and White Birch dominant stand mixed with White Spruce, Large-Toothed Aspen, and Balsam Fir. This stand encompasses an area of 3.05 hectares. There was an average age of 68 years to this stand. This area has remained forested since before 1935.

There was about 60% of this stand that was damaged because of the strong winds during Fiona. Pre-Fiona there were approximately 1,358 stems per hectare with a basal area of 37.09 meters² and an average stem DBH of 20.6 centimeters. Post-Fiona there are approximately 540 stems per hectare

Sub-CB #8, PID #1055136 & #1055128 – Stands 4, 5, 6 & 7



standing (excluding the White Spruce that has been planted as the stand boundary line along the southern trail). There is a higher softwood component to the understory of the areas of this stand that appear to show less of an impact from Fiona. The immature understory of Red Maple, White Birch, Balsam Fir, and White Spruce has been released because of the canopy gaps created by the windfallen mature stems. Some of these

immature Red Maples are up to 35 years of age and will benefit from the newly available sunlight. In its current state this stand still has several leaning trees (less than 70° angle from the forest floor). Some of these trees that are leaning have tangled branches with the tops of still standing stems. As the stems with tangled tops are brought down, they will likely cause some residual damage to the remaining standing trees. There are also several trees that have broken their tops off or have broken their stems, leaving behind many viable snag trees throughout Stand 4 which will become beneficial to wildlife.

Stand 5: This stand has also maintained forest cover since at least 1935, with a partial harvest of the drained area pre-1968. This stand was over mature and dominated by large coppice Red Maple, Large-Toothed Aspen, and White Spruce with a mix of White Birch, Balsam Fir, and Eastern Larch. This stand has experienced about 65% windfall from the strong winds of Fiona. Pre-Fiona there were approximately 1,495 stems per hectare with a basal area of 37.26 meters² and an average DBH of 17.6 centimeters at an average height of 18.5 meters. This stand had an average age of 55 years of age. There is a large component of a Balsam Fir that is still standing post-Fiona. Most of these Balsam Fir stems have very little live crown ratios, less than 20%. Very few of these stems will respond well to being released but will make great wildlife snag trees. There are several larger DBH stems within this stand, including a couple of White Spruce with a DBH of about 45 centimeters and 19 meters height that are windfallen. There was a belt of over mature White Spruce and Eastern Larch along the northern stand boundary.

In this stand there are signs of ephemeral flooding, even seasonal groundwater discharge in the northeast corner of this stand. The surface water flow runs through the stand to a location that appears to have been excavated as a drainage ditch at the northeastern corner of this stand. This drainage ditch appears to have been installed pre-1935 and was likely installed to attempt a land conversion to agriculture. This drainage ditch flows to the north along the eastern edge of Stand 6. This ditch would have changed the dynamics of Stand 5 by decreasing the amount of forest floor area that historically would be seasonally flooded or held surface water runoff. The older Red Maple in the ephemerally flooded area may even show when exactly the ditch was installed using dendrochronology. There are several Large-Toothed Aspen that are windfallen in the ephemerally wet area as well as some mature Red Maple. These large windfallen stems have pulled up large root wads leaving behind depressions that have filled with water. These root wad pools should eventually become beneficial amphibian habitat. There could be work done to slowly increase the area that is ephemerally flooded over time, thus reducing stress from increased water depth.

There is an old forest road along the western boundary of Stands 5 and 7. Permission should be requested to utilize this forest road for stand management. Opening the old forest road would also add a small degree of forest fire protection to Stand 7.

Stand 6: This stand regenerated naturally from the field shown in the 1935 imagery. Due to the surrounding forest stands, there were seed sources for good White Spruce, Red Maple, and some White Birch. This stand had a Red Maple, Large Toothed Aspen dominant canopy with a mix of mature White Spruce, White Birch, and Eastern Larch. The mature stems that were dominant in the canopy experienced the greatest windfall in this stand. There are patches of Balsam Fir that were dominating the understory of this stand that will self-thin with the newly opened canopy. Pre-Fiona there were approximately 983 stems per hectare with an estimated basal area of 32.05 meters² and an average stand DBH of 20.6 centimeters with an average height of 16.8 meters. There was about a 20% loss to this stand from damage related to Fiona leaving approximately 798 stems per hectare. There was a lack of older stem decomposition across the floor of this stand from an old farm field, which is evident in the 1935 aerial photograph. There is an installed drainage ditch that runs along the eastern boundary to this stand that drains the wet forest floor from Stand 5. There was no evidence that Stand 6 had any wet features to its forest floor. This likely means that this ditch was installed as an attempt to drain the forested wet area in Stand 5, in the hopes of a field conversion. This drainage ditch was one of the two locations where Willow was found growing on this group of properties.

Stand 7: This is an over mature mixed stand that has remained forested since before 1935. There is a dominant Red Maple, White Spruce, and White Birch canopy with a mix of Large-Toothed Aspen, Balsam Fir, Black

Sub-CB #8, PID #1055128 – Stand 8



Spruce, and Eastern Larch. There are various areas within the stand that have a dense Balsam Fir understory. The mature stems that compose the canopy had an average age of 77 years old. Pre-Fiona this stand had approximately 1358 stems per hectare with an estimated basal area of 35.61 meters² with an average stand DBH of 18.3 centimeters at an average height of 18.2 meters tall. This stand has experienced about a 20% loss as

well from Fiona with approximately 1,086 stems per hectare remaining, though some areas of the stand were impacted worse than others. However, individual tree loss was concentrated mostly along the southern stand boundary and western stand boundary around the mature softwood component to the stand. There was some loss of the mature Red Maple, White Birch, and Large-Toothed Aspen along the northern stand boundary and throughout the stand. Overall, this stand proved windfirm from its lifetime of exposure to strong northerly gusts. There is a small patch of Black Spruce and Eastern Larch along the western boundary that has completely collapsed. There is a thick Balsam Fir understory to most of this stand that will fill in the canopy gaps.

Stand 8: This Stand has remained forested since at least 1935. There was about a third of this stand that appeared to be reverting to forest, possibly from an abandoned section of field in the 1935 imagery. This stand experienced a large amount of individual tree loss from Fiona, about 65% of the stand is windfallen. The formation of the wetland edge appears to have funneled the strong winds of Fiona into the center of the stand where most of the tree loss occurred.

Pre-Fiona there were approximately 1,002 stems per hectare with a basal area of 31.28 meters² and an average stand DBH of 20.3 centimeters at an average height of 16.8 meters. Post-Fiona there is an estimated

440 stems per hectare. There is a portion of this stand that is wet and will need special consideration for salvaging. Due to the large wetland at the northern boundary of this stand there exists a 15 meter buffer where any work would also require a permit.

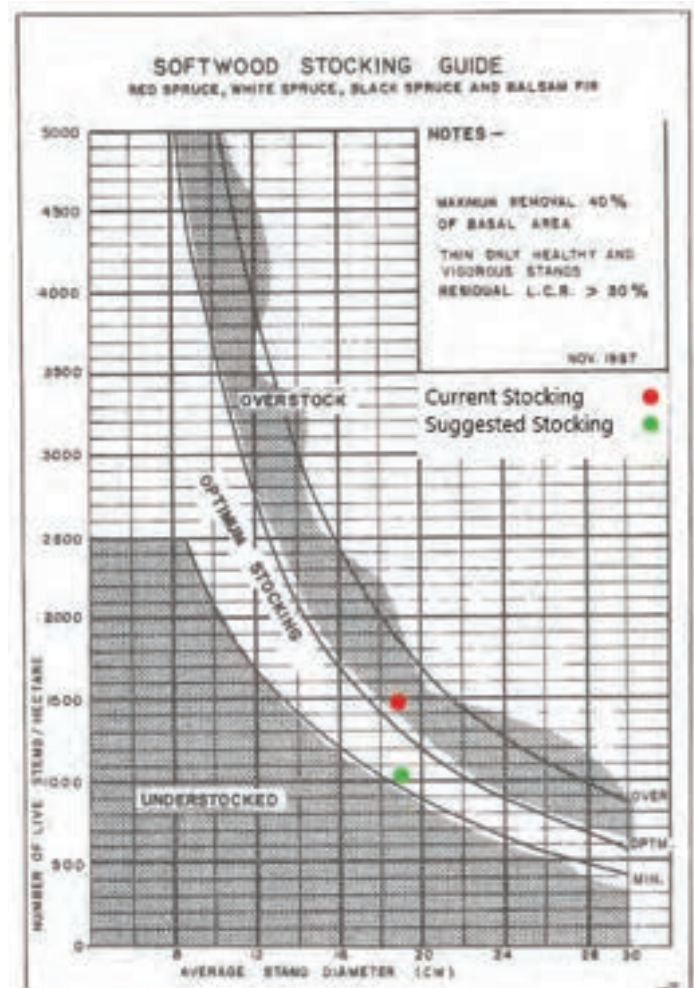
Some windfallen stems are attached to large pulled up root wads and there are quite a few that had their remaining depressions fill with water. These newly created pools from Fiona blowdowns will be beneficial to wildlife. There was evidence of several game trails throughout the northwestern half of this stand. This is likely due to being connected to the larger forested area sitting outside the municipal boundary.

There is also the potential for the creation of a larger ephemerally flooded pool in the grassed area between the trail and Stand 7 along the southwestern boundary. There was evidence of Common Spike-Rush and Sensitive Fern throughout the forest floor just north of this grassed area with evidence of ephemeral pooling. Due to the location of the trail and the grassed area, if a larger ephemerally flooded pool was created here, it would create a good opportunity for education as well as potential wildlife sightings.

Sub-CB #8, Forest Stand Treatments:

Stand 1: This plantation is healthy overall, however due to the areas with low survival rates the density is irregular. This stand could use a Diversity Planting throughout the failed areas within the plantation. Species planted should be longer-lived such as White Ash, Sugar Maple, Red Maple, and Yellow Birch. There could also be a White Spruce boundary line established along the southeastern corner of the property where encroachment is happening with private yard maintenance. This stand will eventually (5 - 10 years) need a Commercial Plantation Thinning in overstocked areas where higher survival rates were achieved (mostly adjacent to the impoundment where the denser number of stems may also offer beneficial habitat to wetland birds). However, a Commercial Plantation Thinning will help free some of the better-quality planted stems from competing against planted stems that are in poor form.

Stand 2: This plantation is overstocked with an average DBH of 18.8 centimeters. This stand could have a Commercial Thinning completed to reduce the number of stems competing for space. About 30% of this stand could be thinned. Some of the stems could be girdled to create wildlife trees. Some of the stems to be thinned could also be laid across the forest floor where the surface water runoff happens. These stems should be laid perpendicular to the surface water runoff or catchment channel west to east across the plantation.



The mixed growth along the northern stand boundary could be cleaned up and spaced out with every other stem removed, thus releasing some of the natural succeeding Northern Red Oak. Leaning trees should also be brought to the ground.

Stand 3: This stand could have a salvage of the over mature Eastern Larch completed. This should be completed when a good frost is in the ground as there is a wet area associated with the Eastern Larch stand. The windfallen Large-Toothed Aspen should be left on site to decompose slowly. Some stems are leaning or tangled in other treetops, these stems should be brought to the ground.

The part of this stand that falls under the riparian area buffer zone could have a few Stand Improvement Patches completed. These could be established around both the mature and regenerating Northern Red Oak to provide the best growing conditions for the remaining stems by removing competing problem stems. Woody material along the riparian area could be left as beneficial ground cover.

Stand 4: This stand should be salvaged as there are some quality stems that were windfallen; as many of the remaining healthy stems should be left as possible. The regenerating dense patches of Balsam Fir growth should be left for wildlife cover as the stand regrows. The immature Balsam Fir with less than 30% live crown ratios should be harvested with some left standing for wildlife trees. The salvage operation should be followed by the Diversity Planting of longer-lived species.

Stand 5: This stand should be salvaged as there are some quality stems that were windfallen. The residual stems should be left to regrow the stand and should be avoided if possible. The exception would be immature Balsam Fir with less than 30% live crown ratios. However, some Balsam Fir snags with

a DBH around 15 centimeters should be left standing for wildlife use. The windfallen Large-Toothed Aspen that have pulled up large root wads should be left intact to decompose so that the created depressions don't end up filled in when the root wad is released from the stems. Consideration should be given to completing the salvage operation during the winter with good frost in the ground. This will help minimize rutting in the ephemerally flooded area. This should be followed by a Diversity Planting throughout the stand. After salvaging has been completed an attempt could be made to slowly increase the area that is ephemerally flooded in this stand, by adding some rock dams to the drainage ditch the ephemerally flooded area shouldn't change drastically. Detritus will eventually get caught up in the rock dams and slowly flood the forest stand, hopefully reducing stress from the changing depth.

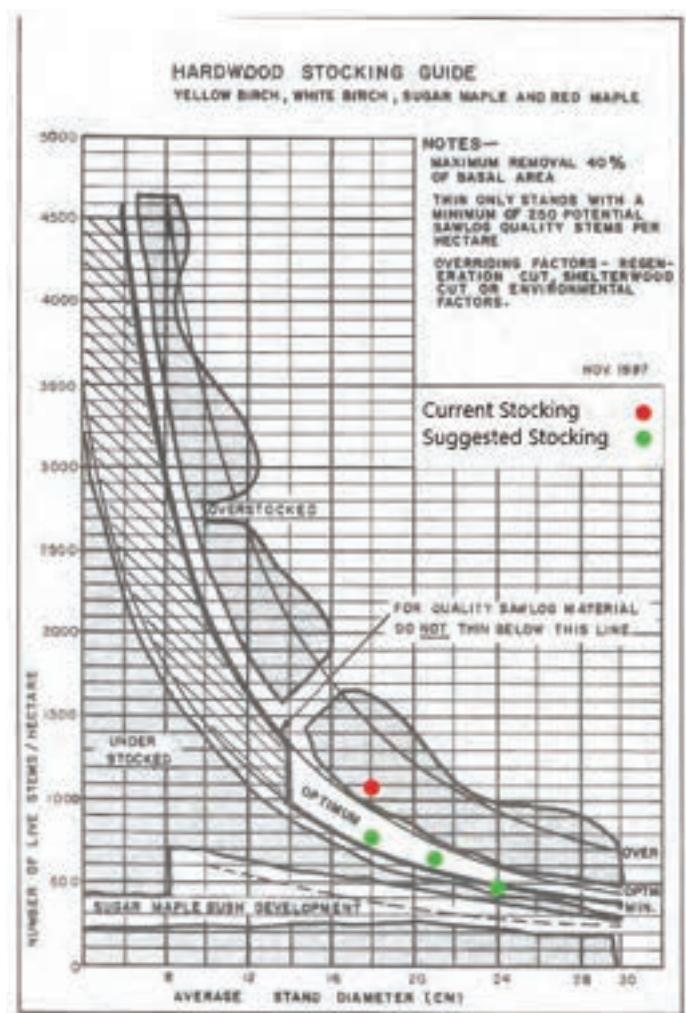
Stand 6: This stand has a few nice stems that are wind fallen but does not need to be salvaged. Some of the leaning trees could be felled. This area will likely see some growth established by the created canopy gaps over the next ten years at which point this stand could have a Pre-Commercial Thinning done to achieve the best potential growth. This stand could eventually be managed into Stand 7's prescribed harvest regime. There is area available currently within the stand for a light diversity planting of longer-lived species.

Stand 7: This stand could have a Uniform Shelter Wood Harvest started. This will change the age class of the stand over several harvests which should increase the carbon sequestration within the stand.

The initial preparation cut should see a 30% removal of the stand, with the mature White Birch and Large-Toothed Aspen predominantly removed along with some Red Maple and White Spruce in poor form. This should be followed by a Diversity Planting of longer-lived species such as White Ash, Northern Red Oak, Sugar Maple, White Pine, and Yellow Birch. A light thinning of some of the regenerating understory within the stand should happen 2 - 10 years after the preparation cut to help maintain desirable trees and could happen before the Diversity Planting.

The seed cut should happen 10 - 15 years after the preparation cut. This will remove an additional 20% of the mature stems that have less than desirable stems or canopies with low live crown ratios. After the seed cut about 50% of the original canopy will have been removed. The cut could be followed by an additional Diversity Planting of longer-lived species. This stand could then also have a light thinning of the regenerating understory 2 - 10 years after the seed cut.

The first removal cut will happen 20 - 30 years after the preparation cut and will be when some of the desired crop trees are harvested. Between 30 to 50% of the remaining mature trees will be harvested to create partial lighting conditions to the understory. This availability of increased light will help regenerating stems grow into the immature age class. This again could be followed by a Diversity Planting of longer-lived species. This could have a light thinning of the regenerating understory 2 - 10 years after the first removal cut.



This last treatment would be the final removal of the remaining over mature stems. This should be done when it is determined that the regenerating stand will benefit from this final removal of mature stems. The regenerated stand should be transitioning to an immature tolerant hardwood mix by this time.

If possible, the area with the windfallen Black Spruce and Eastern Larch along the western boundary should be salvaged with the other stands if possible.

Stand 8: This stand should be salvaged during cold weather where the ground is well frozen. The forest floor throughout this stand is wet. Stems that are still standing should be left standing to provide partial shade and seed sources for stand regeneration. Several windfallen stems have lifted large root-wads that have left large depressions that are holding water. Some of these stems should be left attached to the root structure so these pools will not become filled in when the stem is released. This area should be salvaged as most of the windfallen stems are of good quality. As much biomass as possible should be left onsite in this stand. The Large-Toothed Aspen that will be cleaned up could be left as woody debris for wildlife use. A few stems that remained standing but have low live crown ratios could be girdled to create wildlife trees.

Part of Stand 8 along the western stand boundary has less windfallen stems where about 0.9 hectares of area is still standing. This part of the stand could have a Commercial Thinning where no more than 30% of the standing stems are removed.

Sub-CB #8, Forest Connectivity:

Re-establishing forest connectivity across this sub-catchment basin is a real possibility and poses a fantastic opportunity for the Town of Stratford, its residents, urban wildlife, and the environment. Utilizing the drainage or catchment channels to achieve the management goals to reforest these areas would greatly increase the potential of the established larger trail network and day use area. Most of the primary catchment channels within the sub-catchment basin could be

Sub-CB #8, Connectivity Reforested Catchment Channels



naturalized with the lack of subdivision encroachment. There are only a couple identified areas where work has permanently altered the drainage pattern away from naturalization.

With less road infrastructure across the sub-catchment basin there is the opportunity to design road networks around these drainage areas. This would greatly increase the functionality of the catchment channels as connective corridors for wildlife. Culverts can create bottlenecks for wildlife, which in turn leads to the need to cross roadways and increased vehicular strikes.

If the Town of Stratford was to acquire the sum of the catchment channel areas and reforest them throughout this sub-catchment basin, it would drastically improve the connectivity across the sub-catchment area as well as increase the potential to access green space equally, for all residents within the sub-catchment basin. If the twelve suggested areas were acquired, there would be an additional 37.7 hectares of green space within this sub-catchment basin and afforestation efforts would see an additional 94,250 saplings planted. Not all existing forest stands within this sub-catchment basin will connect to the minimum area acquired, however most of the forested stands will be connected and the few that are not would be much closer to connecting than they currently are. If re-establishing forest connectivity across this sub-catchment basin was completed, it would be the first form of forest connectivity across the landscape since before 1935.

There is also the consideration that these catchment channels would reconnect to

Sub-CB #8, Connectivity Afforestation and Existing Forest Cover



areas that have priority habitat identified for some species of Special Concern.

If these catchment channels were planted with 90% softwood species like White Spruce, White Pine, and Eastern Larch and 10% diversity like White Ash, Red Maple, Yellow Birch, Sugar Maple, and Northern Red Oak, succession of the catchment channels would be evident within ten years. Benefits to the watercourse could even be seen in that time frame. These areas would sequester carbon for the next 15 - 20 years before needing consideration.

Sub-CB #8, Non-Forested Properties:

- Sub-CB #8, PID #1055128 has the available area for 26,175 saplings and contains forest stands 5, 6 and 7.
- Sub-CB #8, PID #1055136 has the available area for 15,775 saplings to be planted and contains forest stands 2 and 4.
- Sub-CB #8, PID #1055151 has the available area for 3,000 saplings to be planted and contains forest stand 3 and has a watercourse running through the parcel.
- Sub-CB #8, PID #299701 has the available area for 2,250 saplings to be planted.

Sub-CB #8, Ephemeraally Flooded Areas:

Stand 5 within this Sub-catchment basin has the potential to increase the amount of area that is seasonally flooded. There is a large depression within this stand that was historically drained (pre-1935). This is potentially an inexpensive project which could create a treed swamp which is very difficult to replace once lost. If the amount of flooded area was to slowly increase in size and depth it should hopefully give the mature and regenerating trees time to adjust to the added stress from the increase in flooded area. The existing field to the west of the drainage ditch could also become a seasonal flooded meadow with a small increase in flooded area. Rock dams could be strategically placed along the drainage ditch to create larger ephemeraally flooded areas.

Sub-CB #8, PID #1055128 – Ephemeraally Flooded Stand 5



Sub-CB #8, PID #1055136, #1055128 & #1055151 – Potential to Expanded Ephemeraally Flooded Areas



There also exists the potential to excavate shallow depressions or create small barriers to surface water flow throughout areas within this sub-catchment basin that have large amounts of seasonal surface water runoff within their catchment channels. Along the highway within Sub-CB #8, PID #1055136, a larger upland ephemerally flooded area of 0.7 hectares could be created before the surface water discharges into Stand 2.

Sub-CB #8, Discussion:

The Fullerton's Creek area should become fully forested to achieve the municipal goals of maximizing carbon sequestration. This is the largest amount of municipally owned land that could be afforested. Since acquiring the catchment channels will take time, the afforestation of this day use area is the fastest and easiest way to increase the amount of carbon sequestration happening in the municipality currently. There could be several areas along the trail network planted as an edible landscape with berry patches and

Sub-CB #8, Property Arrangement



fruit trees randomly planted along the trail network. This would benefit both users and wildlife.

If the suggested catchment channels were planted a larger trail network could be installed across the sub-catchment basin.

There are several opportunities to increase ephemerally flooded areas across this sub-catchment basin just on the municipally owned parcels of land.

Conservation work with private landowners should be done to educate them about the potential habitat for species of Special Concern that have been identified on their properties. Acquisition of these areas for conservation purposes should be considered. These privately owned forested areas are the existing forest stands that this plan is attempting to establish forest connectivity to.



SUB-CATCHMENT BASIN #9:

Sub-Catchment Basin #9 (Sub-CB #9) encompasses 405.8 hectares of land in which the Town of Stratford owns 16 properties equaling a sum of 24.3 hectares. This sub-catchment area also contains two small water courses that discharge into the same small coastal area.

Type of Land Use	Area in Hectares
Agriculture	129.5
Hedgerows	5.1
Farmsteads	5.1
Forest	65.8
Non-evident	20.7
Residential	38.3
Roads	10.7
Urban Area	121.7
Wetlands	5.7
Industrial	3.1

For this sub-catchment basin Agriculture was the dominant land use type with 129.5 hectares or 32% of land identified as such. There were 121.7 hectares or 30% of the area that was identified as Urban area. The Urban area land use will likely become the dominant category type in this sub-catchment basin. There was also 38.3 hectares or 9% of the area identified as Residential area and a total estimated paved area of 35.3 hectares or 9% of the land use. A total area of 65.8 hectares or 16% of the land use was identified as Forest.

Sub-CB #9, Forest Cover



Development accounts for about half of the land-use in Sub-CB #9 but has remained away from the headwaters to the watercourses. The headwaters are however surrounded by agriculture fields and have very little forested area at the top end of the watercourses. When comparing Sub-CB #9 to the other sub-catchment basins discussed, similar to Sub-CB #8, this sub-catchment basin is unique as there is relatively little development spread across the headwaters. This sub-catchment basin has the potential

for re-establishing forest connectivity and ephemerally flooded areas as well. Sub-CB #9 is still predominantly agriculture so there exists the potential to work with private landowners to purchase or acquire land along the catchment channels to improve connectivity. Targeting these areas of interest while still possible should be awarded the highest priority in the attempt to re-establish forest connectivity across the landscape of the sub-catchment basin.

The watercourse to the west of Sub-CB #9 has little existing forest cover while the watercourse to the east of the sub-catchment basin has several forested parcels of land around the lower end of the watercourse.

This sub-catchment also provides the opportunity for the Town of Stratford to demonstrate how a municipality can help achieve the provincial 2040 Net Zero Framework, Pillar 4 – Goal 4.1 A: Maintain the amount of forest cover in the sub-catchment basin, Goal 4.1 B: Sustainable Forest management and Goal 4.2 A: Grow PEI's forested lands (Increase Forest cover to 30% within sub-catchment basins).

Sub-CB #9, Property Descriptions:

The forested municipal properties found in this sub-catchment are predominantly along watercourses and make up the riparian areas of the east side of the stream and saltmarsh. There are trails installed throughout every forested property within this sub-catchment basin. However, the trail network across this sub-catchment lacks adequate parking for non-local use.

Sub-CB #9, Municipal Properties



There are some older individual trees along the water course and on the municipal property PID #1034693.

One forested municipally owned property within this sub-catchment, PID #719385, should serve as an example of what planted or afforested areas will look like in 30 years. A similar forest structure could be achieved across the suggested connective corridors of the catchment channels.

Even with a trail network throughout this sub-catchment basin there appears to be limited use of these municipally owned areas with only a couple individuals seen during several site visits. This is likely attributed to the sub-catchment basin having less development than others.

Sub-CB #9, Forest Stand Descriptions:

Stand 1: Consists of a variety of hardwood species but has several large dominant American Beech in this small stand that encompasses 0.37 hectares of area. This parcel has maintained some form of forest cover since before 1935 based on provincial aerial photography. Some legacy Sugar Maple and Yellow Birch are found around the property, giving the stand a good seed source for natural regeneration of longer-lived hardwood species. European Mountain Ash has entered the stand and established in a few larger densely stocked patches around the edges of this stand. This stand has an average height of 16.6 meters tall with about 900 mature stems per hectare with an average basal area of 29.08 meters² and an average stand DBH of 19.4 centimeters.

Sub-CB #9, PID #1034693 – Stand 1



Fiona caused damage to approximately 2.5% of this stand, causing a few immature Red Maple to fall and open a small canopy gap.

There is some encroachment from residential properties into this stand with about 0.08 hectares maintained as yard. The mowed areas could have approximately 200 saplings planted, and the unmaintained area could have approximately 325 saplings planted. This area could have up to 525 additional saplings. Establishing a boundary line could be completed with a White Spruce planting.

Stand 2: This stand encompasses 4.1 hectares of area and consists of three softwood plantations, two of which were established in 1991 and the other established in 1989. Stand 2 should serve as an example of what the Town of Stratford could achieve with any afforestation efforts over the next 30 - 35 years in the recommended areas.

Fiona damaged roughly 10% of Stand 2 with most of the windfall occurring along the northern boundary and in the northwest corner. There was also some White Pine Blister Rust noticed occasionally throughout this stand. However, there are several White Pine in good form that should be left to continue sequestering carbon.

Even though Stand 2 consists of three different plantations it will be considered as one larger stand due to the similarities in species composition and even age structure between plantations. Stand 2 has approximately 1,657 stems per hectare with an estimated basal area of 35.29 meters² and an average stand DBH of 15.6 centimeters. There are some trees with snapped tops from strong wind gusts. Within Stand 2 roughly 3% of the standing stems are dead standing timber or snag trees (not included in stocking count and which should be left for wildlife use as habitat and cavity nesting sites).

There are a variety of products that this stand could be potentially utilized for as it currently sits. For example, the Black Spruce of poor form could be utilized to create small snake rail fences around the start of the many trails or around parking areas vs steel fencing which has a larger carbon footprint. This stand could become a model for the wise use of municipal

Sub-CB #9, PID #719385 – Stands 2 & 3



natural resources. Demonstrating how, with forested area maintenance, planning, and time, sequestered carbon can be harvested with a product purpose in mind like aesthetically pleasing fencing as carbon storage (lifetime of product) while providing space for people and wildlife to utilize. Stand 2 demonstrates so well what planted areas would look like in a few decades and the many possible uses for municipal natural resources with more of these areas.

As for wildlife within the stand there was a Barred Owl spotted on one site visit and this stand was the only small forest stand on the south side of the municipality where Snowshoe Hare tracks were spotted in winter, as well as disturbing a Ruffed Grouse one visit along the stream.

Stand 3: Stand 3 encompasses the riparian area of a small stream. This area has a mix of mature growth with about 20% that is windfallen because of Fiona. There is about 50% of this stand that is part of the plantation from Stand 2 and 50% that is a deciduous mix of Red Maple, Trembling Aspen, White Birch, and Yellow Birch. This is a narrow stand with steep banks to the stream, a small floodplain along the stream, and the appearance of some bank instability around the old stream crossing. This section of stream has a large variability of flow between precipitation events, from a gentle flow during drier periods to rushing silt-red water in spring melts, and heavy rains where surface water runoff is laden with heavy sediment loads.

Stand 4: This stand encompasses roughly 0.5 hectares and is the riparian area to a small northbound creek. Roughly 5% of this stand was damaged by Fiona. This stand has a variety of age classes throughout it. Several legacy trees in this stand are 100+ years of age. This area was heavily encroached upon in the past where a small number of mature trees were kept around the stream resulting in the uneven age structure of the stand. However, there are few legacy trees left within the stand and the younger stems in the understory have developed a lean to the west as they compete for light against the larger canopies resulting in poor quality stems. The regenerating stems are

Sub-CB #9, PID #1025865 – Stands 4, 5 & 6



primary succession species such as White Birch, Trembling Aspen, White Spruce, and some European Mountain Ash. A few planted saplings were also seen in this stand. Riparian areas tend to grow quickly and should be maintained with forest cover for the carbon sequestration benefits of these areas. Though there has been a treed area within this stand for a while, the amount of forest cover has been quite limited as there is still some encroachment happening along this stand with municipal property being maintained as mowed grass for personal use.

A tree planting has taken place between stands 4 and 5. This planted area is still quite young but appears to have a good survival rate and should connect the two mature stands nicely.

Stand 5: This stand encompasses roughly 0.4 hectares and is mostly Sugar Maple, Red Maple and Pin Cherry with some European Mountain Ash and a few White Spruce. There is a ditch adjacent to Stand 5 which was a small spring in 1968 aerial imagery. The stocking, age, and quality of stems differs throughout this small stand.

Stand 6: This stand encompasses 0.16 hectares of area and consists of a White Spruce plantation and is about 33 years old. Damage from Fiona was limited to about 5% of the stand. This stand is currently overstocked with some of the stems in the stand having low live crown ratios, essentially thinning itself out. This stand has roughly 2,325 stems per hectare with an average stem DBH of 17.2 centimeters and average basal area of 56.25 meters² per hectare. There is a very small trail loop within the stand that shows it is locally utilized regardless of its size. This stand should serve as an example of why afforestation of all small maintained grassed municipal properties will have not only carbon sequestration benefits, but also local community use as a green space. There were however no regenerating stems within the understory of this stand due to the density of the plantation.

Sub-CD #9, PID #299958 – Stand 7

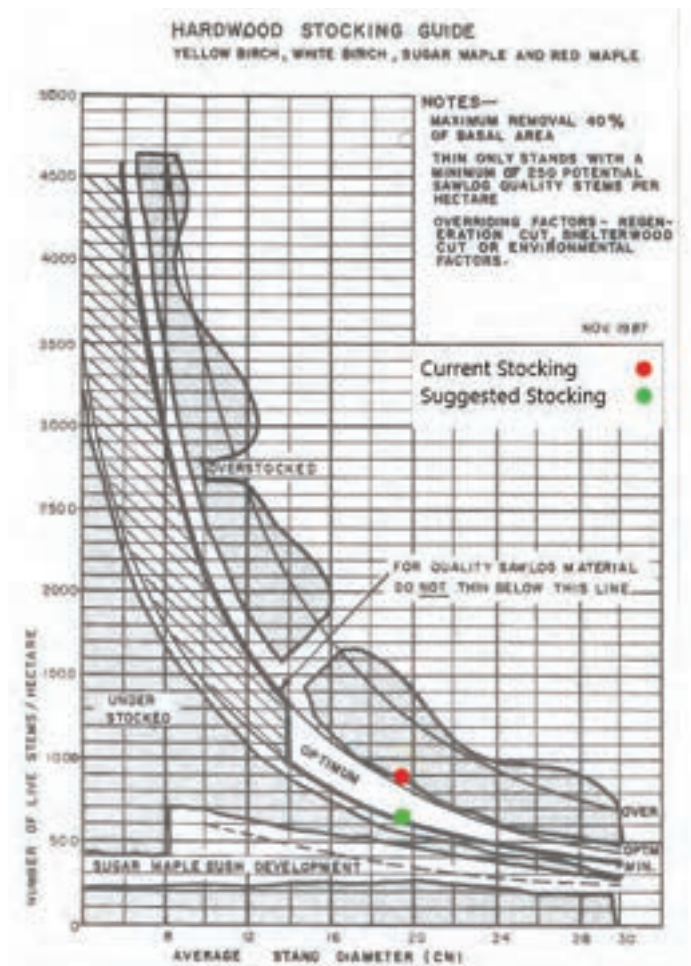


Stand 7: This stand encompasses 1.45 hectares of area and experienced >75% damage from Fiona. Cleanup of individually lost trees was underway during multiple site visits.

Sub-CB #9, Forest Stand Treatments:

Stand 1: This stand is slightly overstocked with mature stems. Over the next ten years an effort could be made to remove European Mountain Ash from the edges and understory of this stand as well as reducing the number of mature stems by about 30% to around 630 stems per hectare. This would place this stand within the optimum stocking density. This should be followed by enrichment planting species like White Ash, White Pine, Sugar Maple, and Northern Red Oak. There is a lack of natural softwood stock in this stand so attempts should be made to plant a few White Spruce during enrichment planting. There are older stems that should be retained as legacy or wildlife trees. The priority to complete this work is low.

Since this stand is small and exposed on all sides. It is likely to experience some collapse because of windfall once work is completed. However, the older trees within this stand have proven wind firmness and may offer enough shelter.

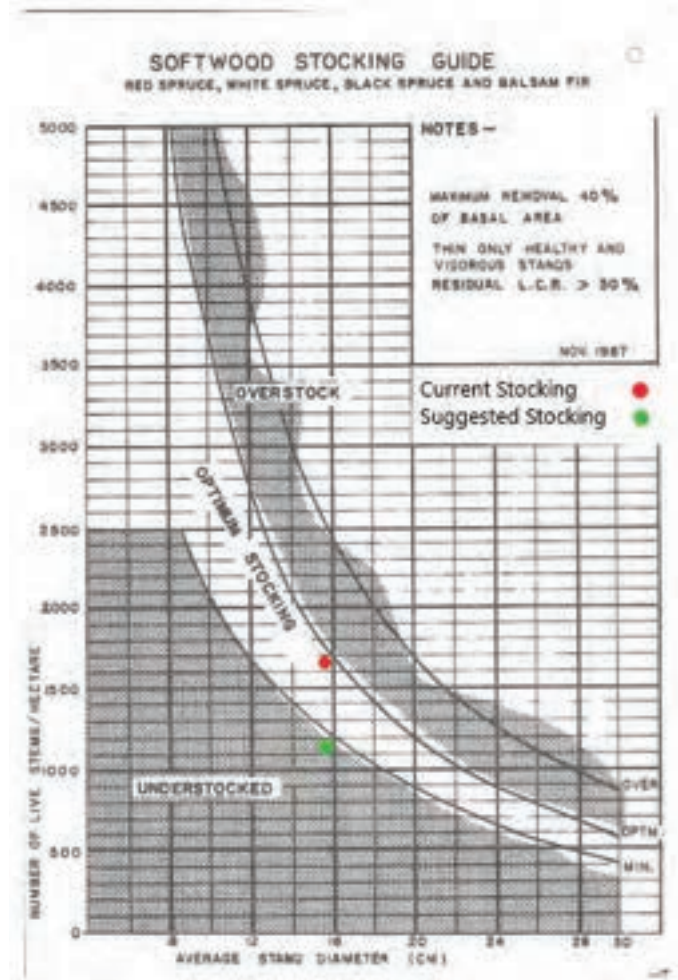


Stand 2: For prescribed treatments within this stand, the first thing to consider should be to open the old roadway that runs west to east so that any following work in the stand can be easily accessed and accomplished. This will help to best manage and utilize the resources within the stand.

There are a couple of treatment options for this stand and though both will be beneficial to the stand in the long term, the first suggested will likely be easiest to achieve.

The first suggested treatment would be the removal of about 33% of the stand through Commercial Softwood Thinning. This treatment would have every 3rd row removed from the stand and a few other stems of poor form. This treatment would reduce the stem count from 1,633 stems per hectare to about 1,088 per hectare. This reduction in density would allow the stand to grow vigorously until an average DBH of 22 cm is reached. PEI's provincial Forest Enhancement Program (FEP) may provide incentives for managing these plantations since they came from one of the provincial tree planting programs.

Since White Pine Blister Rust was noted within the stand, the Commercial Thinning would reduce the potential for it to continue spreading throughout White Pine in the stand, by helping to improve airflow across the understory. However, after the Commercial Thinning is completed there should also be a White Pine pruning done. Any White Pine that will produce a quality log of at least 8 feet should be pruned to the maximum straight log length possible, but never pruning a stem to less than a 35% live crown ratio. Stems around desirable White Pine with blister rust



could be removed if the fungus persists after the thinning.

Based on the goals set out by the municipality for this project and the wildlife conscientious management set as a goal for the sub-catchment basin, efforts could also be made to maintain undisturbed areas of Stand 2. Since there was evidence of an increase in wildlife use within this stand, it would stand to reason that wildlife use of this stand (by Snowshoe Hare, Barred Owl, and Ruffed Grouse) could likely be attributed to the current density of the stand.

A wildlife buffer of 15 meters could be left around the edge of the stand for continued wildlife use while stand maintenance happens.

There could be a Diversity Planting of longer-lived hardwoods such as Red Maple, Sugar Maple, Yellow Birch, White Ash, and some Northern Red Oak throughout the stand. There could also be an edible landscape created along the entrance to Stand 2 and around the old forest road.

The Commercial Softwood Thinning should be completed within the next 15 years. The commercially thinned material could be used as fence rails on a town property or along the town trail system. Even several unique bridge structures, such as the Da Vinci bridge design, could be built from this material.

Stand 3: Work should be limited within this area until late fall or winter as this stand encompasses the riparian area of a small stream and is likely an important breeding bird habitat. There is mixed growth throughout this stand. Some of the stands are softwood dominant while the other is hardwood dominant with a mix for the remaining area. There was about a 20% collapse of this stand resulting from Fiona. Predominantly softwood was wind felled because of the strong winds. The windfallen softwood could be utilized as in-stream materials by the local watershed group. A small enrichment planting of Sugar Maple, White Ash, Yellow Birch, Red Spruce, and a few Eastern Hemlock could be completed. This stand is otherwise healthy overall and should be left to natural succession after the enrichment planting. The exception would be

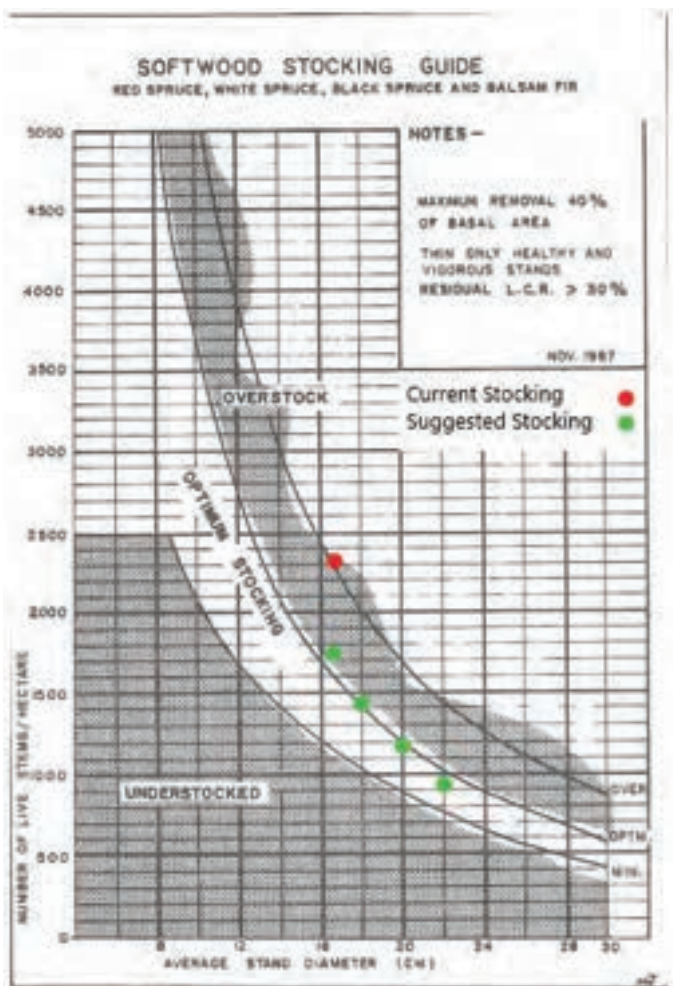
the occasional girdling of a mature stem in poor form to reduce competition within the canopy.

Stand 4: Work should be limited in this area until late fall or winter due to the sensitivity of the area for breeding birds. The removal of every other stem in poor form is all that is required in this stand until about 20% of the area is removed. This would allow healthier trees in better form to grow more vigorously while allowing the regenerating understory some extra light. This could be followed by a Diversity Planting. There are good seed sources from legacy trees within the stand and some natural regeneration of longer-lived species is expected to occur.

There should be a boundary line planted with White Spruce along this property. This will help clearly define the area that is town-owned and provide additional space for planting and expanding the riparian habitat.

Stand 5: The best prescribed treatment for this stand is selective removal of undesirable stems. A few mature stems in poor form should be removed but only after efforts have been focused on removing European Mountain Ash and some Pin Cherry followed by a Diversity Planting of White Birch, White Spruce, White Ash, and Red Maple from within the stand, out into the ditched area south of the stand.

Stand 6: This stand needs a Commercial Softwood Thinning. Due to the die back in live crown ratio and stocking density, it is suggested to begin to remove about 35% of the stems. However, removal should be carefully considered as opening this stand



will increase its sensitivity to wind disturbances for some time. Therefore it is suggested that stand maintenance is performed on the southern section first, leaving a small wind buffer along the northern boundary. Leaving the trees around the perimeter of the stand untouched will also reduce wind penetration into the stand. There should be an initial thinning of about 20%. Thinning will remove stems in poor health followed by a Diversity Planting of longer-lived species. If this stand was given

a period of rest of 5 - 8 years after the first thinning the remaining crop trees will start to develop some added wind firmness as well as show which individual trees have responded well to the initial thinning. After around 5 - 8 years a second thinning of a further 15 - 20% of the whole stand could be completed. This should be followed by another Diversity Planting. After a further period of 5 - 8 years a third Thinning of 20% from the northern half of the plantation could be completed followed by a Diversity Planting of this area. When the third thinning is completed, it should allow this stand to grow for an additional 15 - 20 years before consideration of a partial harvest is needed.

Having these stems removed or thinned out will benefit the overall stand health by limiting stress on crop trees and allowing a diversely planted understory to develop within the stand.

Stand 7: The only suggested treatment for this stand is a replanting of species like White Spruce, White Pine, Northern Red Oak, Yellow Birch, and White Ash. There are seed sources around the area for longer lived hardwood species such as maples to move into the area naturally.

Sub-CB #9, Non-Forested Properties:

- Sub-CB #9, PID #1034693 could have 200 saplings planted where residential encroachment is happening.
- Sub-CB #9, PID #1025865 could have 1,450 saplings planted where mowed grass is including residential encroachment.

- Sub-CB #9, PID #1045178 could have 1,750 saplings planted where mowed grass is maintained.
- Sub-CB #9, PID #1045194 could have 625 saplings planted where mowed grass is maintained.
- Sub-CB #9, PID #1045186 could have 500 saplings planted where mowed grass is maintained.
- Sub-CB #9, PID #603274 could have 1,000 saplings planted where mowed grass is maintained.

If areas that were maintained as mowed grass were planted there would be an increase of 3,875 planted saplings across the sub-catchment basin or about 1.5 hectares of increased forest area.

Sub-CB #9, Forest Connectivity:

Re-establishing forest connectivity across this sub-catchment basin is a possibility. By acquiring the areas that would be considered drainage channels or catchment channels, the Town of Stratford would be achieving the goals established for this project by both the municipality and its residents. The minimum area that should be purchased around the catchment channels would be the same as the 15 meter buffer given watercourses (15 meters on each side from the center of the channel). However, if maximizing the potential for carbon sequestration within the municipality is the goal, then consideration should be given to setting a minimum distance of 45 meters each way from the center of a catchment channel for a green

Sub-CB #9, Connectivity Reforested Catchment Channels



space. The larger these areas are the greater the potential for the Town of Stratford to maximize carbon sequestration. If the Town of Stratford was to acquire the sum of the catchment channel areas (with 45 meter buffers from the center of the channel) and reforest them throughout this sub-catchment basin, it would drastically improve the connectivity across the sub-catchment area as well as increase the potential to access green space equally for all residents

Sub-CB #9, Connectivity – Afforestation and Existing Forest Cover



within the sub-catchment basin. However, it would only increase forest cover by about 4% across the entire Town of Stratford area. If the suggested areas were acquired there would be an additional 31.1 hectares of green space within this sub-catchment basin and afforestation efforts would see an additional 77,750 saplings planted. Not all existing forest stands within this sub-catchment basin will connect to the suggested areas, however most of the forested stands will be connected and the few that are not would be much closer to connecting than they currently are. If re-establishing forest connectivity across

this sub-catchment basin was completed, it would be the first form of forest connectivity across the landscape since before 1935.

There is also the consideration that afforestation of these catchment channels will connect additional forest cover to the priority areas identified for the species of Special Concern.

Sub-CB #9, Non-Forested Properties:

- Sub-CB #9, PID #1045186 has the available area for 500 saplings to be planted.
- Sub-CB #9, PID #1045194 has the available area for 650 saplings to be planted.
- Sub-CB #9, PID #1045178 has the available area for 1,725 saplings to be planted.
- Sub-CB, PID #1025865 has a partially forested riparian area and has the available area for 3,000 saplings to be planted.
- Sub-CB, PID #1070085 is mostly forested but has available area for 125 saplings to be planted.
- Sub-CB #9, PID #1034693 contains forest stand 1 but also has the available area for 625 saplings to be planted.

Sub-CB #9, Discussion:

This sub-catchment basin has overall little forest cover remaining with only 16% identified. Though there is little remaining forest cover it is predominantly found in one area along the watercourse. It is noteworthy that there is a considerable amount of suitable habitat identified for Eastern Wood Pewee as well within this larger forested area.

The municipally owned properties are part of the Kinlock Creek Trail system. This trail system could be expanded in this sub-catchment to connect with some of the suggested afforestation areas quite easily, however consideration should be given to providing a parking area for use of the trail system.

Since a Barred Owl, Snowshoe Hare, and a Ruffed Grouse were all seen within Stand 2 of this sub-catchment basin, these sightings should serve as evidence to how the suggested afforestation areas will eventually provide expanded habitat for wildlife by connecting to the remaining larger forested area and how these remaining larger forested areas provide suitable habitat for wildlife.

Sub-CB #9, Property Arrangement and Identified Areas for Species of Special Concern



SUB-CATCHMENT BASIN #12:

Sub-Catchment Basin #12 (Sub-CB #12) is split into two small sections that fall within the Town of Stratford's municipal boundary and is about 128.8 hectares in size. The Town of Stratford owns two properties totaling 7.1 hectares in size.

Type of Land Use	Area in Hectares
Agriculture	23.6
Hedgerows	2.0
Farmsteads	1.7
Forest	30.9
Non-evident	8.8
Residential	23.6
Roads	3.8
Urban Area	11.4
Wetlands	2.7
Recreational	20.3

The Forest land use type is the dominant category in the sub-catchment basin area that falls within the municipality. There are 30.9 hectares or 24% of the area identified as the Forest land use type. The total estimated paved area within the municipal part of the sub-catchment basin is 9.4 hectares or about 7% of the land use.

There is no watercourse within the area of the sub-catchment basin that falls inside the municipal boundary. However,

Sub-CB #12, Forest Cover



the headwaters of the sub-catchment watercourse are within a forested area that is inside the municipal boundary. This area should be considered for conservation purposes.

Sub-CB #12, Forest Stand Descriptions:

Stand 1: This stand encompasses 0.43 hectares of area and consists of a 35-year-old Balsam Fir plantation. There are approximately 1,575 stems per hectare with a 16.6 centimeter average DBH and an average height of 9.94 meters. There has been some defoliation from a forest pest that has resulted in about 15% stand mortality. Roughly 53% of the live stems in this stand were of good quality.

Stand 2: This stand encompasses 0.7 hectares of area and consists mostly of old field White Spruce that was planted as a hedge row. The White Spruce are all in poor form from being planted so densely. There are some Common Wild Apple trees throughout the hedgerow and along a ditch that runs between Stand 1 and Stand 2. The ditch appears to have been installed sometime in the 1960s and was possibly installed to drain a couple of wet areas. Stand 2 is overstocked and is unlikely to respond well to any larger amount of removal. Removal of some White Spruce stems that are within a 10 meter proximity to the Common Wild Apple trees could happen. This should help some sunlight reach the Common Wild Apple trees.

Stand 3: Has multiple age classes with the oldest section being the old field?? White Spruce along the entrance. Roughly 40% of the mature Trembling Aspen and White Birch stems were damaged during Fiona. Overall, the mature White Birches are in poor

Sub-CB #12, PID #3603275 – Stands 1, 2 & 3



form and have coppice growth with several competing stems on the same stump. There was Sensitive Fern noted across the forest floor in this stand which indicates the likely presence of surface water from ephemeral flooding.

Sub-CB #12, Forest Stand Treatments:

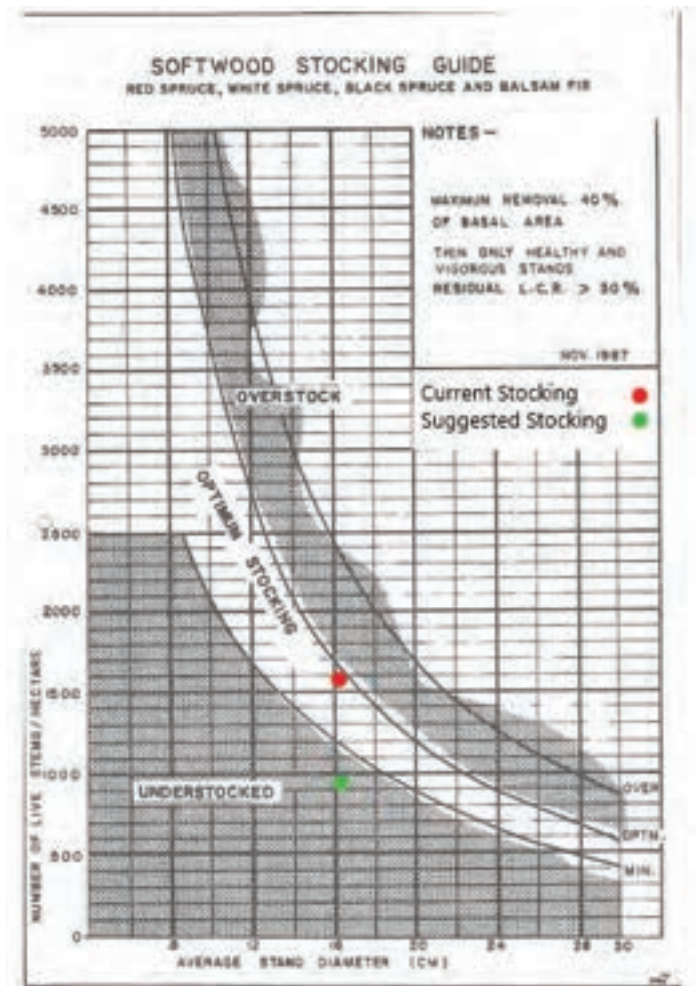
Stand 1: A couple options are available for this stand. This is, overall, a small area and could result in a higher cost to have work completed due to the overall low volume of wood.

The first option for this stand and most viable would be to have it harvested while there is still viable product to be salvaged from dying stems. This could be then followed by a replanting allowing younger stems to replace the stand.

The second option would be to have about a 40% removal of the stand. This should reduce individual tree stress and hopefully reduce the pest activity within the stand. This would be followed by a Diversity Planting to add various age classes and species to the stand.

With the location of Stand 1 being within proximity to the shoreline and the existing living shoreline work that has happened adjacent the area, some of the biomass could be used in conjunction with this shoreline project.

Stand 2: Since this stand is essentially a hedge row, management could prove difficult. Throughout this hedge row, the stems are very densely planted, each tree's branches are individually tangled or intertwined with the adjacent stem's branches. However, an effort should be made to remove some White Spruce in poor form where Common Wild Apple trees are located (along the drainage ditch between



Stands 1 and 2). About a 10 meter gap could be created in the hedge row around the Common Wild Apple trees. A few trees could be girdled to create snag or wildlife trees.

Sub-CB #12, Non-Forested Properties:

- Sub-CB #12, PID #603274 has the available area for 5,750 saplings to be planted.

Sub-CB #12, Discussion:

Throughout this sub-catchment basin there exists the opportunity to protect the forested headwaters that fall within the Town of Stratford's municipal boundary in the northeast as well as the potential to increase a small portion of the ephemerally flooded area in Stand 3. There is also the possibility to achieve 30% forest cover across the sub-catchment basin that falls within the municipal boundary. Since some of the privately owned parcels are larger or un-subdivided there is the possibility to install hedgerows along these properties (with the landowner's permission) which could help to achieve forest connectivity as well as increase potential carbon sequestration across the sub-catchment basin that falls within the municipality.

Sub-CB #12, Drainage Ditch Pre-1968 Installation



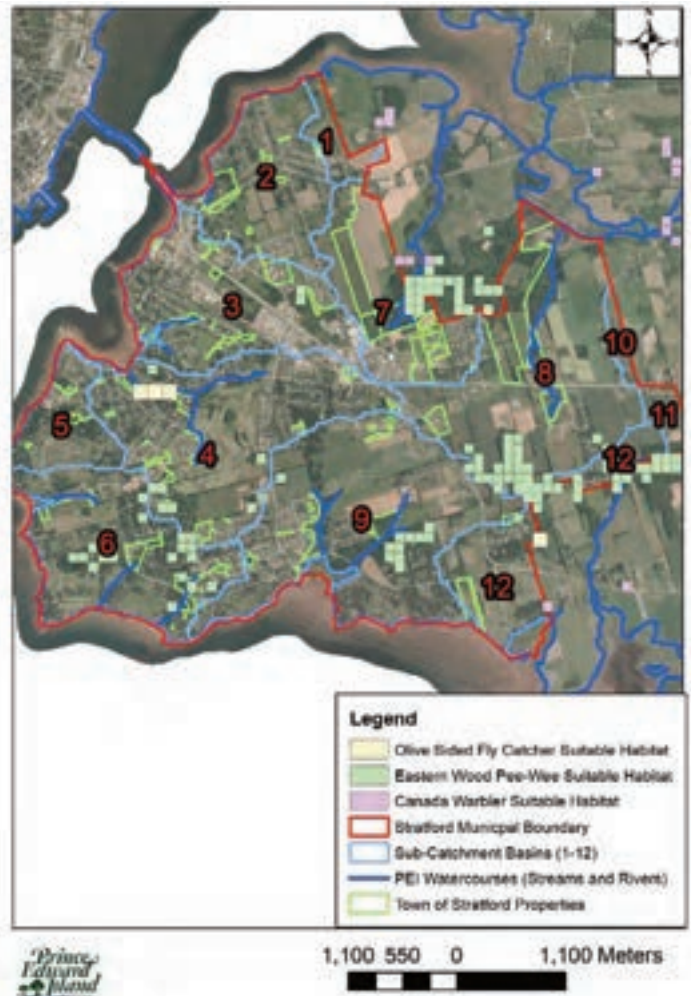
SUB-CATCHMENT CONSIDERATIONS:

Encroachment into wetlands, forested areas and ecologically sensitive areas appears to be a continuing trend throughout the municipality over the decades. Since less than 30% of each sub-catchment basin is identified as having forest cover, prioritizing reforestation or afforestation efforts in areas that are currently under an alternate land use throughout each sub-catchment basin should be considered. If afforestation efforts are made, and they should be, the increase in forest cover across the sub-catchments that fall within the municipality will still not achieve the suggested minimum 30% forest cover set by the PEI 2040 Net Zero Framework (Pillar 4, Goal 4.2). However, sub-catchments #8 and #9 would both come close to 25% forest cover with the suggested afforestation of the catchment channel areas. As sub-catchments #8 and #9 are developed there should be an additional forest connectivity or green space plan drafted to further increase forest cover and carbon sequestration potential within the development plans as well as residential property line establishment with hedgerows planted.

For the remaining sub-catchments that are more heavily developed there should be consideration given to creating a residential tree management program which could help with the establishment of residential boundary line plantings and management of mature urban trees and their replacement as they age out.

Since there is currently less than the minimum 30% forest cover goal set by the province for the 2040 Net Zero Framework in each sub-catchment basin discussed within the municipality there needs to be more

Suitable Habitat For Bird Species At Risk



discussion around developing an avoidance policy for developing the remaining forested and or wet areas found within the municipality. The loss of any of the existing forested areas found within the municipality would have the opposite outcome of the suggested goals for this project as well as the goals set by the province of PEI's 2040 Net Zero Framework. Decreasing forested area through land conversion to encroaching development will not help with achieving the project's goals.

ENVIRONMENTAL CONSIDERATIONS FOR SPECIES OF SPECIAL CONCERN:

The Atlantic Canada Conservation Data Centre (ACCDC) created some Species Distribution Models for the Canada Warbler, Olive-sided Flycatcher, and the Eastern Wood Pewee to best indicate where the most suitable habitat may be for these species of Special Concern in PEI. Success of conservation efforts in these areas could be measured by the 2030 and 2040 provincial corporate land use inventory. It should be expected that with the knowledge of the ecologically sensitive areas identified, combined with afforestation efforts, that there should be an increase in forest area or at least a reduction in encroachment around the identified areas of suitable habitat.

There is a larger privately owned forested area between sub-catchment basins #8 and #9 that should be considered for acquisition for conservation as almost the entire forested

area has been identified as suitable habitat for the Eastern Wood Pewee. This larger forested area would also be the main connection point between the two sub-catchment basins if afforestation of the suggested catchment channels was to happen. Afforestation efforts could be started between the two forested areas in sub-catchments #8 and #9 so that the two larger forested areas are connected. This a relatively small area as well to begin with and should require less effort and investment but will also have a fairly large impact on forest connectivity between two of the larger forested areas within the municipality that are also identified as large areas considered to be suitable habitat for Eastern Wood Pewee.



DISCUSSION:

Throughout most of the Town of Stratford re-establishing forest connectivity is unlikely, if not impossible, due to the layout and design of subdivisions throughout the headwaters and upper catchment channels of the discussed sub-catchment basins. The distance between the many fragmented forest stands and patches could however be reduced by afforestation efforts both across the suggested surface water catchment channels as well as the maintained grassed areas on municipal properties.

Afforestation efforts in sub-catchment basins #8 and #9 should start from different lenses to help focus the initial plantings where they should initially have the greatest impacts. Within sub-catchment #8 afforestation efforts could be started from the Fullerton's Creek area with the goal of expanding the available green space for recreational use. Throughout sub-catchment basin #9 initial afforestation efforts should be made to first increase the forest connectivity between the two larger forested areas that have been identified as a suitable habitat for the Eastern Wood Pewee with the goal being to limit encroachment and increase the forest area around this suitable habitat. Increasing urban and residential tree cover would also drastically improve overall forest connectivity and carbon sequestration within the municipality. An additional urban forest management document is likely needed if the municipality wishes to achieve the goal of maximizing carbon sequestration. This urban forest management document should also consider the benefits of property boundary line planting to help achieve forest connectivity across privately owned land as well as individual urban tree management to help achieve continuous growth for maximizing carbon sequestration.

It is highly recommended that a forest and wetland avoidance policy is considered for the Town of Stratford. It appears necessary for the municipality to have a strong policy of avoidance, as wetlands and forests have continued to be encroached upon and removed from the municipal landscape. This practice of forest land conversion and wetland removal has been happening for several hundred years now with just a few remnant forest patches and very few if any un-encroached upon natural upland wetlands existing within the Town of Stratford. It is likely too late for an avoidance policy to have much benefit as most of the remaining wetlands found throughout the municipal area that were discussed have already been removed or encroached upon.

There are several man-made watercourse impoundments created within the municipality that could likely also prove to be sources of greenhouse gasses and should not be considered as functional wetlands for the discussion of carbon storage. The remaining fragmented landscape within some sub-catchment basins makes remediation efforts to replace the lost function of these wetland areas very difficult. Consideration of potential investment or partnerships on private lands within the municipality to create or expand potentially functional wetlands is needed. With a lack of natural wetlands across the municipality increasing forest cover through afforestation is the best option for quickly increasing the potential for carbon sequestration across the municipality. The single most important wetland conservation effort that is evident as having the potential to increase carbon sequestration within the municipality would be the removal of the

man-made impoundment creating Jordon's Pond. There could be a significant change in the carbon sequestration potential if the area was allowed to return to its natural state as a functioning saltmarsh. This would be a drastic change in wetland function from potential greenhouse gas production to carbon sequestration as blue carbon.

Afforestation of managed grassed areas and the remaining available catchment channels throughout the municipality would result in a substantial increase of forest area. However, it is worth noting that if all the suggested areas were planted that forest cover would still account for less than 30% of the land use throughout the Town of Stratford. However, Sub-CB #8 and Sub-CB #9 present an opportunity to not only improve forest connectivity throughout their respective catchment basins if afforested, but also would provide connectivity between the two catchment basins for the first time in over 100 years. This in itself would be a massive accomplishment for the Town of Stratford.

SITE PRIORITIZING:

Overall forest maintenance activities across the Town of Stratford are of low priority. The areas that sustained damage from Fiona and are still forested will eventually grow into multi-aged class stands if the area is replanted or, left to natural succession, the existing understory will grow and fill in the created gaps. The forested stands in the Fullerton's Creek area hold the most weight for management as there exists the potential to enhance the function of some ephemerally flooded areas, most importantly the potential to rehabilitate a treed swamp as well as area to afforest or plant 41,500 saplings. Though forested stands will see an increase

Potential Forest Connectivity Across Sub-Catchment Basins



in the potential for carbon sequestration with stand management, if the overall municipal goal is to maximize carbon sequestration, resources should be directed at afforestation as the increase in young forest area will increase the potential for carbon sequestration across the municipality in conjunction with the existing forest stands. These forested areas will continue sequestering atmospheric carbon if left to run their natural courses. A goal of afforestation of the catchment channels at minimum, would have the largest carbon

capture potential as well as provide forest connectivity the most effectively. Afforestation would also have several associated benefits to the streams or watercourses by reducing land use issues that pollute these areas with heavy sediment loads.

Options for the catchment channels throughout Sub-CB #8 and Sub-CB #9 should be discussed immediately as encroachment upon these areas is ever approaching. When these areas are lost as they are throughout the remaining sub-catchment basins, they are non-replaceable. Furthermore, once they become engineered stormwater management infrastructure the catchment channel's ability to sequester atmospheric carbon will be limited. The Town of Stratford should begin conversations with private landowners about conservation easements for the time being with eventual purchase of these areas as public space when funding has been secured. The Protecting Habitat – A Guide for Municipalities of Prince Edward Island document is an excellent resource for municipalities to utilize to help with this process. This will eventually help achieve the best management practice of land use within the municipal boundaries.

A schedule of sorts will help this project achieve its goals in order of importance. However, any treatment could be completed at any time over the next 15 year period. Due to the amount of small, forested areas within the municipality, management treatments will be grouped by how many years can pass before the work would optimally be done, then prioritized, and listed by the Sub-CB #, PID # and associated Stand #.

Year 1, Sub-Catchment Basin Connectivity:

Afforestation of sub-catchment channels should be given the highest priority based on the goals of this project. Finding a way to replant and establish forest cover over 95 hectares would effectively connect most of the remaining forest cover on not one but two sub-catchment basins. If 237,000 saplings were planted across the landscape within these sub-catchment basins, two of the listed municipal goals of this management plan would be completed, re-establishing forest connectivity and maximizing carbon sequestration. Since natural connectivity is an impossible goal across the remaining sub-catchment basins within the rest of the municipality, it should stress the importance of completing work where possible in the last two under-developed sub-catchment basins which will achieve this goal.

Year 1 - 5, Forest Stand Treatments:

Forested stands requiring maintenance for stand health or to improve carbon sequestration:

- Sub-CB #8, PID #1055136, PID #1055128, and PID #1055136, Stands 2, 3, 4, 5, 6, 7 and 8 will benefit from the suggested forest stand treatments within this time frame.
- Sub-CB #9, PID #719385, Stand 2 would benefit the most from stand maintenance within this timeframe. Reducing the density of the stand would improve overall growing conditions for the remaining trees and should also reduce the potential for White Pine Blister rust to continue to establish within the stand reducing stress on a longer-lived tree species. The

increase in tree growth and improved conditions would be maximizing the potential of the stand to sequester atmospheric carbon over time while improving stand health. The increased area of this forested stand and diversity within the plantation structure give it a higher priority.

- Sub-CB #9, PID #1025865, Stand 6 would also benefit from maintenance within this timeframe. Reducing the stand density would improve overall growing conditions for the remainder of the trees. The stand would also benefit from the Diversity Planting as some longer-lived species would be planted. This forest stand is quite small in area but does appear to have a high amount of local use as a green space.
- Sub-CB #12, PID #603274, Stand 1 would also benefit from maintenance within this timeframe. Reducing the stand density would improve overall growing conditions for the remainder of the trees. The stand would also benefit from the Diversity Planting as some longer-lived species would be planted. It is important to complete the maintenance on this stand within this time frame as the stand will likely collapse due to the pest infestation.
- Sub-CB #2, PID #860379, Stand 3, would also benefit from maintenance within this timeframe. Reducing the stand density would improve overall growing conditions for the remainder of the trees. The existing Diversity Planting of longer-lived species directly benefits from the reduced density of mature trees. This stand is quite small and has little overall benefits when compared to larger stands.

- Sub-CB #6, PID #681411, Stand 5 should have the required maintenance completed in this time frame.

Year 1 - 5, Sub-Catchment Treatments:

Though connectivity is unachievable throughout most of the sub-catchment basins there is still the potential to increase forest cover and carbon sequestration across each sub-catchment basin's landscape. Afforestation or planting of the suggested areas for each sub-catchment basin is critical for the Town of Stratford to achieve its goal of maximizing carbon sequestration on town-owned parcels of land.

Year 5 - 10, Forest Stand Treatments:

Forested stands requiring maintenance within the next ten years for stand health:

- Sub-CB #1, PID #1068410, Stands 1 and 2 should have the suggested treatments completed within this time frame.
- Sub-CB #2, PID #860379, Stands 1, 2, 4, 5, 6, and 7 should all have the suggested treatments completed within this time frame.
- Sub-CB #4, All stands within this sub-catchment should have the suggested treatment completed within this ten-year period.
- Sub-CB #6, Stands 1, 2, 3, 4, 6, 7, 8, and 9 could all have the suggested treatments completed within this time frame.
- Sub-CB #8, Stand 1 could see the suggested treatment completed within this time frame.

- Sub-CB #9, Stands 1, 3, 4, and 5 could have the suggested treatments completed within this time frame.
- Sub-CB #12, Stand 2 and 3 could also have the suggested treatments completed within this time frame.

EPHEMERALLY FLOODED AREAS:

Creating ephemerally flooded areas can have unexpected results. Often the outcome results in the creation of a large body of water that resembles open water marshes. The idea when creating ephemerally flooded areas is to simply increase the potential for surface water runoff to be stored temporarily. Some areas are more suitable for a larger capacity of storage in large shallow ephemeral pools and others suitable for smaller yet deeper pools. It is important that the clay layer within the soil structure is not removed or penetrated as the clay layer creates a sort of pond liner and is needed for a functional ephemeral pool. Sub-CB #8, PIDs #1055136 and #1055128 have the most potential to increase the amount of ephemerally flooded area with overall little effort required to complete these goals.

FUNDING:

There is potential to access some funding to help achieve the goals for this project. There are potential opportunities with the Forested Landscape Priority Places for Species at Risk that could possibly help with funding when considering areas for management within the municipality around ecologically significant areas.

There is also the 2 Billion Tree Planting Program that could potentially help with the allotment of saplings to be planted. There is the Forest Enhancement Program which could help the municipality manage some of their larger forested areas with the use of the program and silviculture workers that are associated with the program. Sub-CB #8, Stands 1, 2, 3, 4, 5, 6, 7, and 8 could all be eligible under this program as well as the plantations found in Sub-CB #9, Stand 2, if the program allows municipal participation.

There is also the Wetland Compensation Fund which could be applied to for financial help in re-establishing the ephemerally flooded stand and catchment channels in the Fullerton's Creek area and also could possibly help with the deconstruction of the impoundment that creates Jordon's Pond.

2020-2030 MUNICIPAL LAND USE COMPARISONS:

A land use comparison should be completed to determine the estimated amount of forest cover and identify if there has been an increase or decrease in the area. This will also help to identify where the last potential areas for afforestation efforts would be located after 2030.

MEASURES OF SUCCESS:

Since the Town of Stratford has listed the goals of maximizing potential carbon sequestration as well as forest connectivity, success of the two goals should be measured separately. An increase in potential carbon sequestration could be measured by the increase in newly forested areas throughout the municipality as well as identifying which forest stands have had the suggested maintenance completed. This should be easily identified by mapping the newly planted areas as planting is completed. Potential forest carbon sequestration could

be assumed by stand age classification. Any younger stands would be sequestering more atmospheric carbon, where older mature stands will have more atmospheric carbon sequestered.

An increase in connectivity should only be measured by a decrease in the distance between identified forested areas and should also determine any additional encroachment into the identified forested areas.



OVERALL CONSIDERATIONS:

The combination of forest structures across the Town of Stratford owned properties have the potential to not only sequester atmospheric carbon but also offset some local emissions if the natural resources were used for biomass or wood heat in a few homes. If some stems were converted to construction lumber or even used as natural landscaping and natural playground features these uses would also be a form of carbon storage. Though there currently is a small amount of forested area with limited undamaged forest cover from Fiona across the municipality the use of some of the natural resources to offset some carbon emission during cold weather events should be considered. The same could be considered as well with the eventual partial harvests of afforested catchment channels. Even residential tree management could see the stem utilized to offset emissions with uses such as biomass use in shoreline management to create a living shoreline. There is a wide range of uses that the natural resources found within the municipal properties could potentially provide from building materials for local woodworkers, pieces for carving for community artists, and even opportunities for consumptive users like mushroom pickers or other foraging activities like making Christmas decorations. Management of these municipal properties could see carbon stored for longer periods of time with the goal of managing the stand for a product. Adding this goal into the management of these stands should in no way compromise the umbrella of goals established for the larger goal of forest connectivity and overall carbon sequestration.

When discussing carbon sequestration within forest stands it is important to consider that mature stems have more atmospheric carbon stored than a younger stem could ever sequester annually. It is also important to understand that carbon sequestration slows down as the stand reaches the mature to over matured age class. Therefore it is crucial that when managing a mature forest stand, we consider the potential for younger regenerating growth to increase the ability to sequester more atmospheric carbon alongside mature stems which have more carbon stored. It is also important to consider that local forest stands have several potential uses within the community which could again lengthen the amount of time that carbon is stored.

Though a large amount of tree loss was associated with post tropical storm Fiona the importance of this form of natural disturbance for habitat creation and forest age diversity from falling trees is part of the regime to building Prince Edwards Island's forests. The forest floor eventually becomes heavily undulated from thousands of years of trees undergoing this cycle.

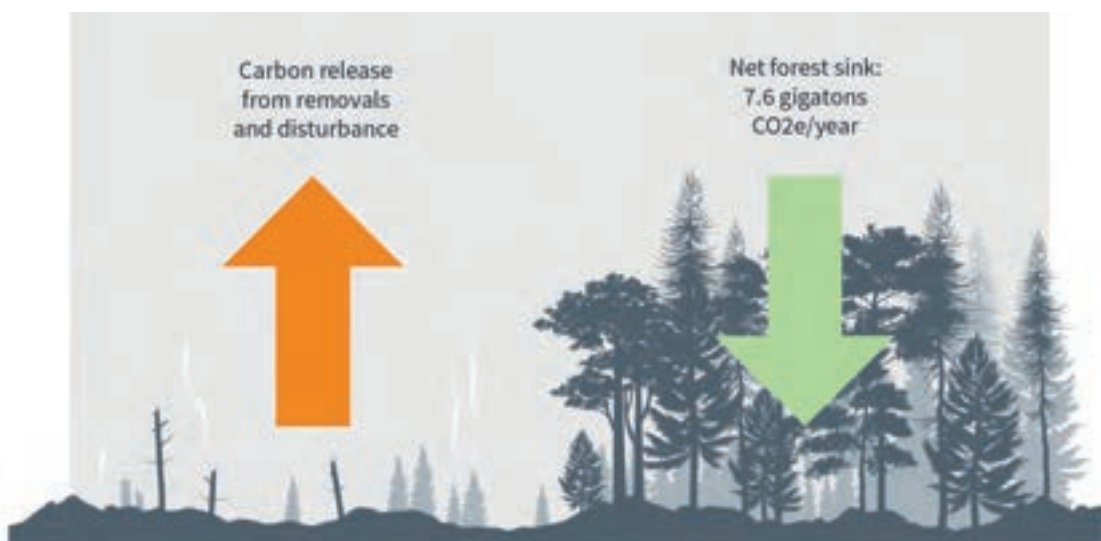
Another consideration is that areas where forest cover has been maintained since at least 1935 should be given special consideration before any form of development happens. Also, within any sub-catchment basins that have less than 30% forest cover, special consideration is needed before land conversion is permitted. When a sub-catchment basin has less than 30% forest cover it also very likely has poor forest connectivity.

When deforestation occurs for land conversion there can also be impacts on some species that are becoming locally extirpated or endangered. Within some of the privately owned forest stands, there are several forested areas that have been identified as suitable habitat for some wildlife species that have been listed as species of Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Areas that are identified as suitable habitat should be given consideration for a conservation buffer to limit types of future land use.

The Town of Stratford should also develop a goal to use its own natural resources for projects within the community. An example would be something such as the occasional construction of a shed for the town's use or for a sale or even a contest prize. The construction and sale of a shed could help fund further stand maintenance or afforestation efforts while improving current growing conditions.

Other considerations for forest stand management would be the importance to maintain some of the natural functions within the forested areas. Within a forest stand, woody material grows, sheds its leaves, needles, and branches before eventually dying where it may remain standing or will fall to the forest floor where it decomposes. It would be optimal if there was a minimum of 200 pieces of coarse woody debris per hectare left on site that are greater than 7.5 cm diameter and at least 2 meters long to maintain a minimum amount of this nutrient recycling. This excess of woody debris can have negative aesthetic results for a few years but is necessary when managing forested areas.

The final consideration worth discussing is the potential for job creation within the municipality through management of the suggested areas. There could be a tree planting program for youth to connect with nature through the labor of restoration. This could give several youth needed work experience and spur on a desire to work in the environmental fields.



DEFINITIONS:

Afforestation:

The establishment of planted forest stands (forestation) where there has not been forest cover for at least 50 years. Often a term used when discussing the creation of forests to increase carbon sequestration.

Sub-Catchment Basin:

A water catchment area (watershed) can be divided into smaller areas known as sub-catchments where surface water from precipitation such as rain or melting snow will always travel to a specific location.

Ephemeral Flooding:

Where surface water exists for a short period of time or seasonally throughout the year. These areas can include small creeks and wetlands.

Impoundment:

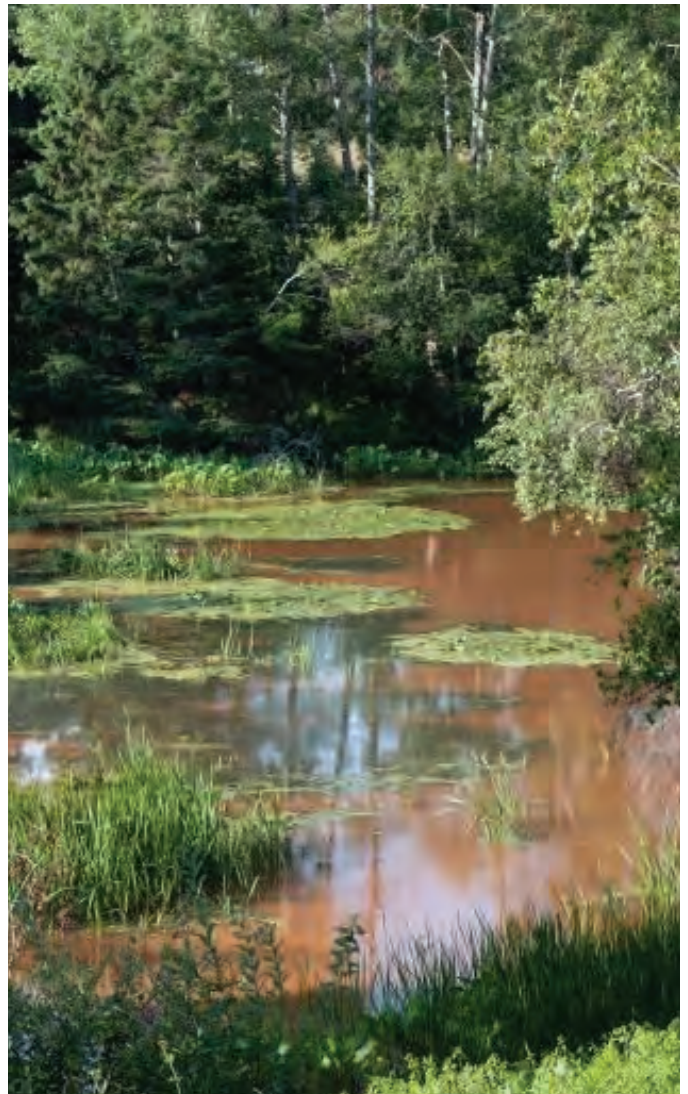
The result of a damming structure to create a larger body of water.

Carbon Sequestration:

The process of capturing and storing atmospheric carbon dioxide.

Carbon Storage:

Is the capture of carbon dioxide in a form that will store the carbon for a longer period.



FLORA AND FAUNA DISCUSSED:

Tree Species:

Black Ash (*Fraxinus nigra*)
White Ash (*Fraxinus americana*)
Black Spruce (*Picea mariana*)
Red Spruce (*Picea rubens*)
White Spruce (*Picea glauca*)
Eastern White Pine (*Pinus strobus*)
Scotch Pine (*Pinus sylvestris*)
Eastern Larch/Tamarack (*Larix laricina*)
Balsam Fir (*Abies balsamea*)
Eastern Hemlock (*Tsuga canadensis*)
Red Maple (*Acer rubrum*)
Sugar Maple (*Acer saccharum*)
White Birch/Paper Birch (*Betula papyrifera*)
Yellow Birch (*Betula alleghaniensis*)
Northern Red Oak (*Quercus rubra*)
Black Locust (*Robinia pseudoacacia*)
English Oak (*Quercus robur*)
Large-Toothed Aspen (*Populus grandidentata*)
Trembling Aspen (*Populus tremuloides*)
Gray Birch (*Betula populifolia*)
American Beech (*Fagus grandifolia*)

Shrub Species:

European Mountain Ash (*Sorbus aucuparia*)
Hobblebush (*Viburnum lantanoides*)
Service Berry (*Amelanchier* sp.)

Wildlife Species:

Barred Owl (*Strix varia*)
Snowshoe Hare (*Lepus americanus*)
Ruffed Grouse (*Bonasa umbellus*)
Eastern Wood Pewee (*Contopus virens*)



RESOURCES:

Mapping layers were provided by the Prince Edward Islands, Resource and Inventory Modelling Section of the Forest Fish and Wildlife division.

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