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INTRODUCTION

This brief report summarizes the suitability of Spryfield, Nova Scotia for community agriculture. The report's shows various areas in Spryfield that are potentially suitable for food gardening, community gardens, and allotments. This report is supplemental to 'Putting Spryfield on the Map: A Healthy Housing, Healthy Community Project' by Hailey Steiger & Guan Yue.

ArcMap 10, a geographic information system was used to carry out the analysis. Data was retrieved through internet sources, and by Dalhousie University's GIS centre. No ground truthing (on the ground verification) of the data was undertaken; therefore results of this study have an unknown degree of error. The scoring type of suitability used a Boolean method. The Boolean method divides areas into two classes: suitable or unsuitable.

CONTEXT

The Nova Scotia community counts boundary used in 'Putting Spryfield on the Map' was used for the study area boundary. This common extent facilitates comparison of results between the two reports. The map backgrounds include lakes and streams and roads to aid readers in locating features on the map.

MAP 1

Spryfield: Elevation

Generated by: Jared Dalziel // Dalhousie University // March 2, 2012
CONSTRANTS ANALYSIS

Not all pieces of land are the same: some areas are more suitable to some activities compared to others. In examining land, constraints can be seen as factors limiting a certain use or activity, where opportunities have positive features. Land constraints for this report are areas where food growing is impractical. Five main constraints are examined in this section, including current restrictive land uses, soil type, land slope, access to sunlight, and sensitive use buffers from streams, lakes, and roads.

RESTRICTIVE LAND USES

Some land uses are incompatible with urban food production. Saturated land, such as swamps and wetlands is one form of land which restricts garden development. The Halifax Regional Municipality has designated a number of sites that are generally incompatible with many other land uses within their geographic information. These areas are visible below on Map 2. Swamps are included twice because there is variation between provincial forestry data, and Halifax Regional Municipality’s dataset. ‘Unverified Swamps’ indicates swamps delineated by Nova Scotia Department of Natural Resources Forestry Database as:

- Wetlands General
- Treed Bogs
- Lake Wetland
- No Beaver Flowage or Open Bogs were included in the area because none are represented in the data for the area.
Spryfield: Conflicting / Restrictive Land Uses

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Unverified Swamps Designated Areas
- Cemetery
- Golf Course
- Landfill Site / Land Reclamation
- Pit (Mining)
- Racetrack
- Swamp

Data Source:
- Halifax Regional Municipality Geodatabase (April 2011), Halifax, NS
- Nova Scotia Community Counts [Shapellte] Boundary Shapellte for Spryfield
- Nova Scotia Forestry Database (Cycle 2.3 and Currents, [Shapellte], 2012), Nova Scotia: Nova Scotia Department of Natural Resources
- gis/forestry.asp
- [Accessed March 1, 2012]
Using the Soil Survey of Halifax County (MacDougall, Cann & Hilchey, 1963) and federal soil data, suitability for growing vegetables was determined. All of the study area’s soils excluding lakes and their beaches are classified as type 7 in the Canada Land Inventory, having “No Capability for arable culture or permanent pasture” (Agriculture and Agri-Food Canada, 2008). This suggests that raised beds, or a significant addition of purchased soil may be needed to create productive vegetable gardens. The main constraint in the area is stoniness. There is also a significant portion of the area with shallow soils with little depth to bedrock, this is ‘Rockland’ visible on Map 3.

There are four main soil types within the study area. Gibralter, Halifax, and Wolfville soils are composed of moderately coarse material, while Wolfville soils are moderately fine grained. Their general characteristics seen on Map 3 are outlined below:

**Bayswater:** Imperfect Drainage. Stoniness renders these soils unusable for agriculture.

**Gibralter:** Good Drainage. Stoniness tends to render areas unsuitable for agriculture; however some areas have been farmed for blueberry crops.

**Halifax:** Good Drainage. Stoniness tends to render areas unsuitable for agriculture. These soils also have low fertility and experience droughts. In areas that are used for agriculture, applications of organic matter help retain moisture, while fertilizer is needed with lime to balance soil acidity.

**Wolfville:** Good Drainage. High crop yields require lime, fertilizer, and organic matter to be added to the soils.

Since the soil is universally poor in the community, soil type was excluded as a hard constraint. However, the presence of soil stoniness should not be ignored. Rockland in particular must been seen as a constraining feature, since bedrock is exposed in at least sixty percent of its area. Of the study area’s soils, Wolfville soils can generally be seen as the most suitable for growing vegetables, followed by Halifax soils. This conclusion is drawn from MacDougall, Cann & Hilchey’s general conclusions surrounding soils in areas with more favourable soil classifications (1963).
Spryfield: Soil Type

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LAND SLOPE

Gardens in steep areas can create soil erosion and drainage problems. Townsend (2011) selected for gardens with a 0-8% slope in her analysis of community gardens on Halifax peninsula as favourable. This report has deemed slopes in excess of 8% as unsuitable for garden development based off of this criteria. These areas may still be used for gardens, however garden terracing should be used in these situations. Additionally, due to Spryfield’s stony soils, the costs involved in constructing terraces may be prohibitive because soil would have to be brought in.
Spryfield: Slope
Generated by: Jared Dalziel // Dalhousie University // March 2, 2012
SUN EXPOSURE

Plants require light to grow; proper illumination is critical in growing vegetables. For most vegetables, a minimum of six hours of sunlight is required to attain proper yields (Taber, Jauron & Nelson, 2009). Map 5 demonstrates areas in Spryfield having more than 6 hours of sunlight. Sunlight data was retrieved from Raymond Jahncke at the Dalhousie GIS centre who has conducted a shadow modelling study for June 21st (2012, February 1). June 21st is the summer solstice, the sunniest day of the year. For the purposes of determining access to sunlight in Spryfield, this data can be seen as optimal conditions. In other words, the map has a bias in favour of selecting sites as somewhat sunnier than they may be normally. The study data for the model was retrieved using digital light detection and ranging (LiDAR) data, a very accurate form of remote sensing. This high resolution causes a very detailed map product, as seen on Map 5.
Spryfield: Sun Exposure
Generated by: Jared Dalziel // Dalhousie University // March 2, 2012

Streams
Spryfield Boundary
Insufficient Data
Lake
Road
Building Footprint

Sun Exposure on July 21st
- Less than 6 Hours
- > 6 Hours

Data Source:
Halifax Regional Municipality (Geodatabase, GeoSpatial) (April 2011), Halifax, NS:
Halifax Regional Municipality.
Unpublished internal document.
Geographic Information Science Centre.
Dalhousie University.
Nova Scotia Community Counts
[Shapefile] Boundary Shapefile for Spryfield
Gardens adjacent to streams and lakes can have runoff that negatively affects water quality. This can include soil sediment, fertilizers, and pesticides (Relf, 2009). Due to these environmental constraints, land within 5 metres of lakes and streams is deemed to be unsuitable for garden development.

To account for pollutants of roadside runoff, land within 5 metres of roads was deemed unsuitable for vegetable gardens. This is a very rough value, because literature from this climate is scarce. Map 6 shows all of these buffers.
Spryfield: Streams, Lakes and Road Buffers

Generated by: Jared Dalziel // Dalhousie University // March 2, 2012

Data Source:
Halifax Regional Municipality Geodatabase
[Geodatabase] (April 2011). Halifax, NS
Halifax Regional Municipality
Nova Scotia Community Carts
[Shapefile] Boundary
Shapefile for Spryfield
SUITABILITY ANALYSIS

Using the compiled datasets, land deemed unsuitable within Spryfield was mapped. Table 1 below shows the criteria used to determine unsuitability. The general results showed that approximately 45% of Spryfield would be suitable for garden development, assuming soil is brought in (see Table 2). Assuming that gardening is going to take place without transported soil, this value would be solely the Halifax and Wolfville formation soils meeting suitability criteria. The Halifax and Wolfville formation soils meeting these requirements are approximately 82 and 220 acres respectively, about 9% of the study area (see Table 3). The distribution of these soils can be seen on Map 7.

When data from Map 7 is further reduced by parcels with government ownership, there is approximately 143 acres of useable land. These parcels are visible on Map 8, and these locations with large areas meeting suitability criteria would make good potential community gardens. Lands zoned parks and institutional are mapped versus suitability on Map 9.

**TABLE 1: UNSUITABLE CRITERIA SUMMARY**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflicting Land Use</td>
<td>Swamps data from the provincial forest inventory with a FORNON code of 70 – 75 &amp; Designated Areas from the HRM Dataset</td>
</tr>
<tr>
<td>Slope</td>
<td>HRM’s Contour1000 layer was created into a slope raster. Values over 8% were deemed unsuitable.</td>
</tr>
<tr>
<td>Sun Exposure</td>
<td>Data from Jahncke (2012) having a number of sunlight minutes under 360 was deemed unsuitable.</td>
</tr>
<tr>
<td>Runoff Prevention</td>
<td>5m buffer applied to streams, lakes and roads.</td>
</tr>
<tr>
<td>Note: Building footprints were also deemed unsuitable for garden development.</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2: POTENTIAL SUITABLE LAND SUMMARY TABLE**

<table>
<thead>
<tr>
<th>Suitability</th>
<th>Approximate Area (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsuitable</td>
<td>1912</td>
</tr>
<tr>
<td>Unknown / Insufficient Data Coverage</td>
<td>133</td>
</tr>
<tr>
<td>Total Study Area</td>
<td>3461</td>
</tr>
<tr>
<td>Amount Potentially Suitable</td>
<td>1549</td>
</tr>
</tbody>
</table>

**TABLE 3: SUMMARY OF GARDEN SUITABILITY BY SOIL TYPE**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Approximate Area (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayswater</td>
<td>286</td>
</tr>
<tr>
<td>Gibraltar</td>
<td>401</td>
</tr>
<tr>
<td>Halifax</td>
<td>82</td>
</tr>
<tr>
<td>Rockland</td>
<td>555</td>
</tr>
<tr>
<td>Wolfville</td>
<td>220</td>
</tr>
</tbody>
</table>
Potential Suitable Garden Land by Soil Type

Generated by: Jared Dalziel // Dalhousie University // March 2, 2012

MAP 7

Stream
Lake
Insufficient Data
Road
Building Footprint

Suitable Land by Soil Type
- Bayswater
- Gibraltar
- Halifax
- Rockland
- Wolfville
- Water / Shoreline

Data Sources:
- Digital Geologic Data, Geoscience Atlantic, 2015
- Halifax Regional Municipality, 2015
- Department of Natural Resources, Nova Scotia, 2015

Note: This map is a representation of potential suitable garden land by soil type in the Dalhousie area. The data sources listed are used to create the map and ensure its accuracy.
Public Owned Potentially Suitable Garden Land

Generated by: Jared Dalziel // Dalhosue University // March 2, 2012
Potentially Suitable Garden Land Zoned P

Generated by: Jared Dalziel // Dalhousie University // March 2, 2012

MAP 9

Spryfield Boundary
Insufficient Data
Lake
Stream
Road
Building Footprint
Suitable Land Zoned Park and Institutional
SUMMARY

In general, Spryfield is poorly suited for agricultural gardening. The best soils for vegetable agriculture are likely Halifax and Wolfville soils, with cultivation in Rockland being next to impossible. The primary rationale for Spryfield’s low agricultural land classification of 7 is due to excessive stoniness. To mitigate stoniness, household composting could be carried out. Where available, soil could also be brought in from off-site. Poor soil quality makes raised garden beds an attractive option for community gardens.

Remember: Geographic data is frequently incorrect, so perform a site check before a major project. This report’s findings are for potentially suitable farming locations.

NEXT STEPS

Using a GPS with Community Consultation, a number of avenues for future exploration can be considered for the project:

- Mapping of desired community garden locations, and comparing it to the suitability maps.

- Mapping of community food gathering sites: fishing spots, berry and apple picking sites.

- Mapping of current food-producing gardens.

- Mapping of seasonal food distributors, such as Farmer’s markets.

- Assessing community accessibility to community food shares.
  - Are these alternative outlets known?

- Mapping potential sources of free or cheap soil and compost.

REFERENCES


*GIS Data sources are listed with the corresponding maps.