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Town Of New Glasgow

Schedule A-1

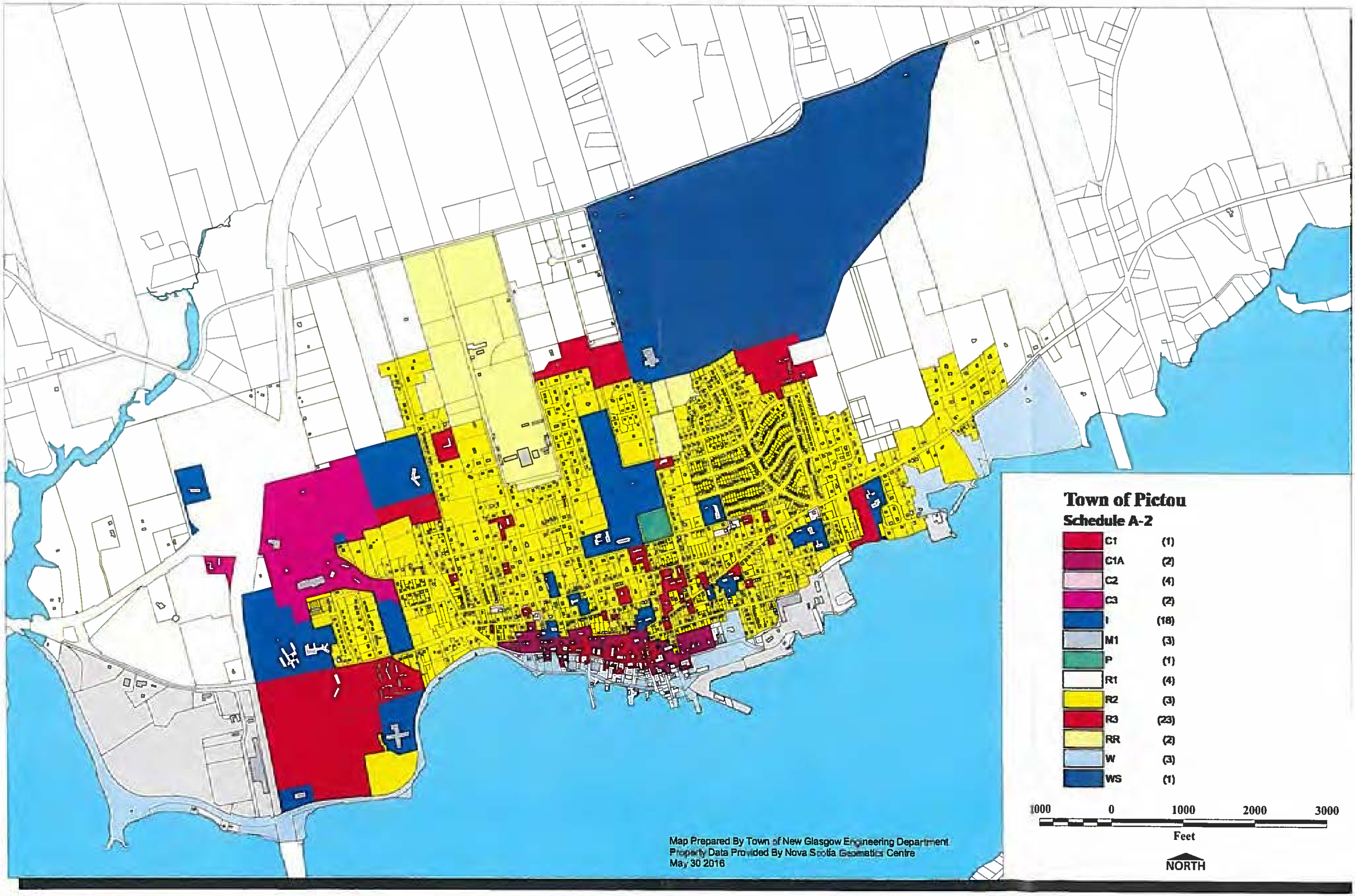
C1	(1)
C1A	(1)
C2	(16)
C3	(11)
C4	(2)
C5	(1)
F	(2)
FRA	(2)
I	(33)
M1	(8)
P	(11)
R1	(6)
R2	(21)
R3	(96)
R5	(2)

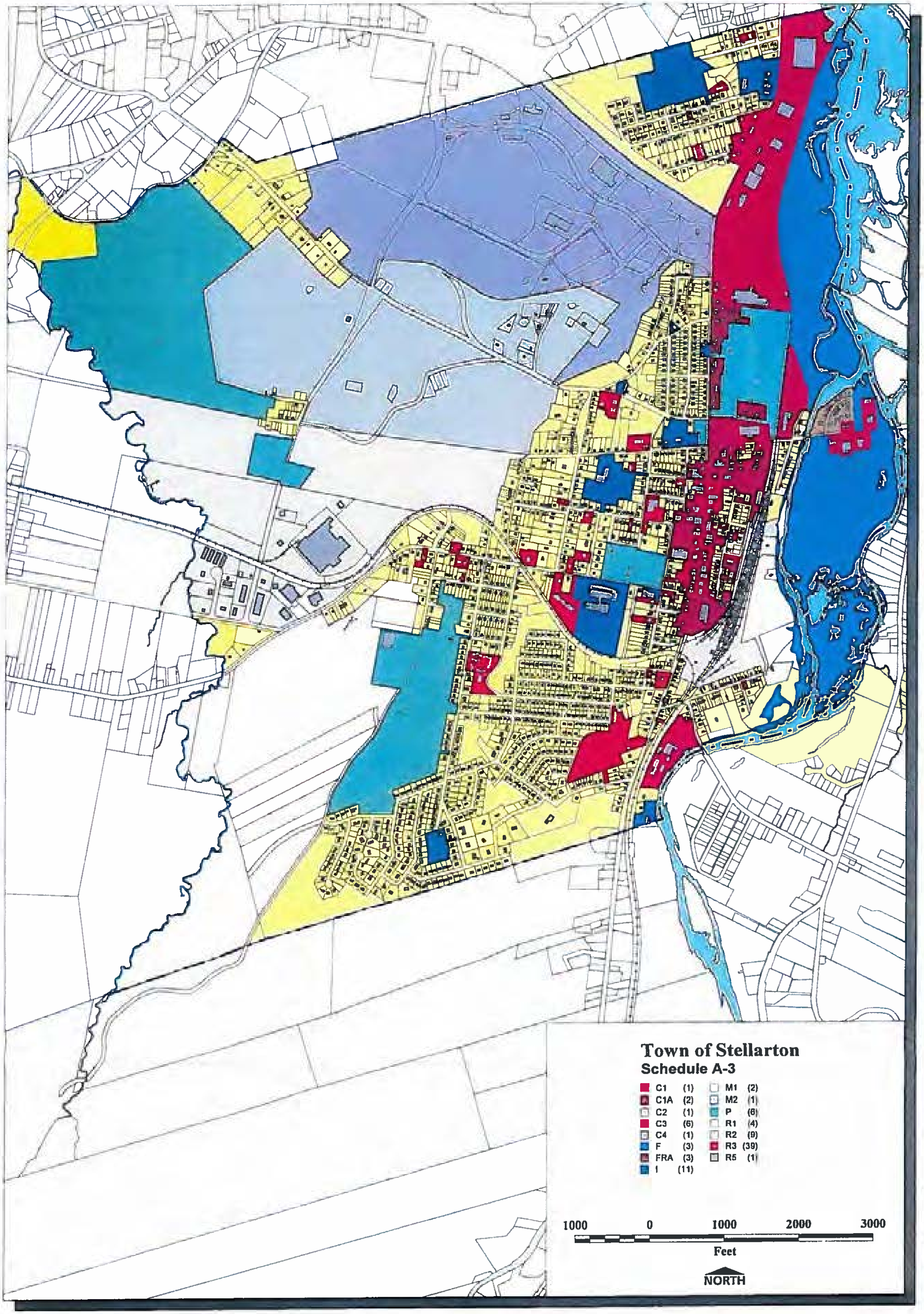
1000 0 1000 2000 3000

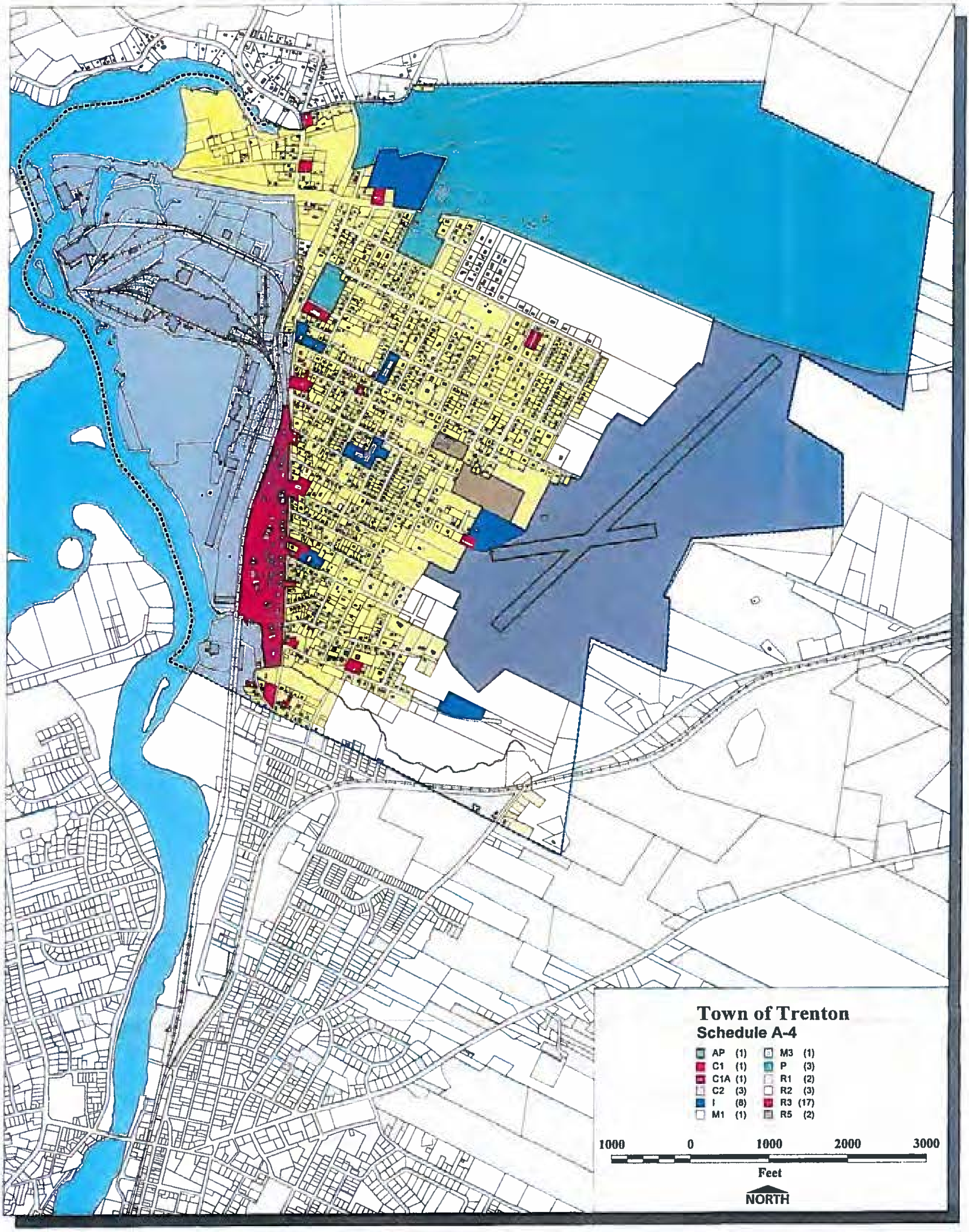
Feet

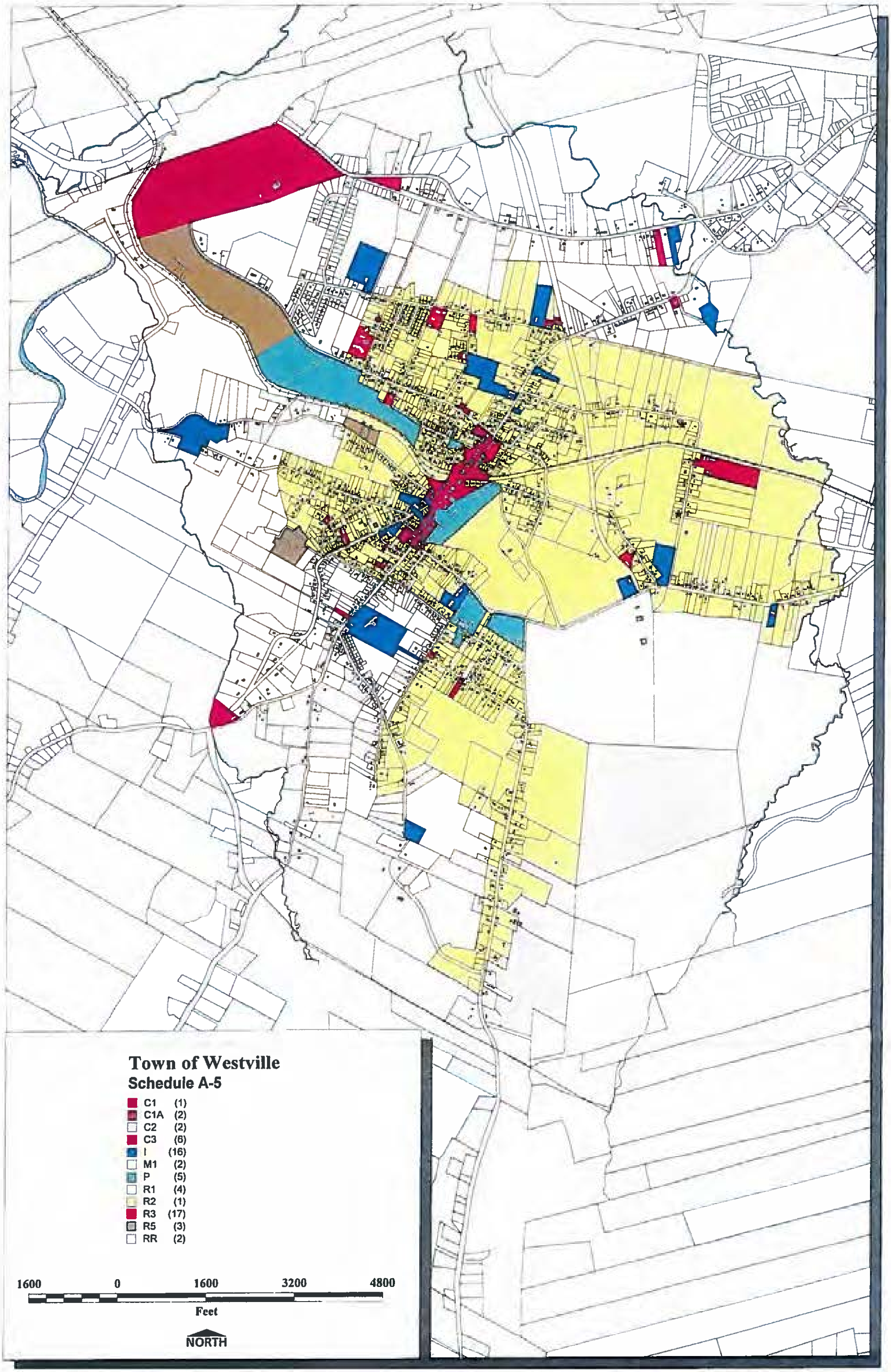
NORTH

Map Prepared By Town of New Glasgow Engineering Department
Property Data Provided By Nova Scotia Geomatics Centre
May 30 2016


Town of Pictou
Schedule A-2
C1 (1)
C1A (2)
C2 (4)
C3 (2)
I (18)
M1 (3)
P (1)
R1 (4)
R2 (3)
R3 (23)
RR (2)
W (3)
WS (1)
1000 0 1000 2000 3000
Feet
NORTH
Map Prepared By Town of New Glasgow Engineering Department
Property Data Provided By Nova Scotia Geomatics Centre
May 30 2016


Town of Stellarton
Schedule A-3
C1 (1)
C1A (2)
C2 (1)
C3 (5)
C4 (1)
F (3)
FRA (3)
I (11)
M1 (2)
M2 (1)
P (6)
R1 (4)
R2 (9)
R3 (39)
R5 (1)
1000 0 1000 2000 3000
Feet
NORTH


Town of Trenton
Schedule A-4
AP (1)
C1 (1)
C1A (1)
C2 (3)
I (8)
M1 (1)
M3 (1)
P (3)
R1 (2)
R2 (3)
R3 (17)
R5 (2)
1000 0 1000 2000 3000
Feet
NORTH


Town of Westville
Schedule A-5
C1 (1)
C1A (2)
C2 (2)
C3 (6)
I (16)
M1 (2)
P (5)
R1 (4)
R2 (1)
R3 (17)
R5 (3)
RR (2)
1600 0 1600 3200 4800
Feet
NORTH

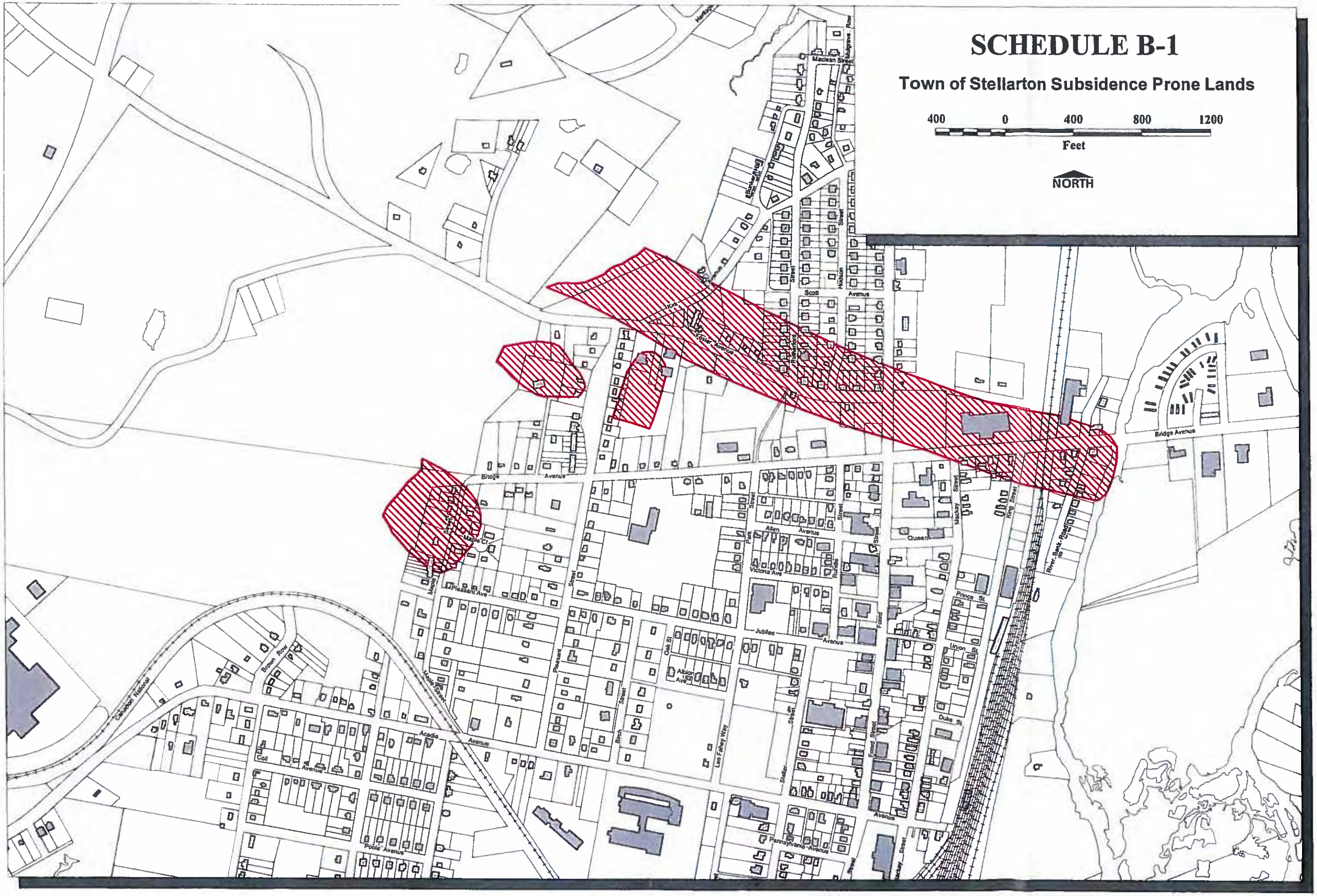
SCHEDULE B-1

Town of Stellarton Subsidence Prone Lands

400 0 400 800 1200

Feet

NORTH



SCHEDULE B-2

Town of Westville Subsidence Prone Lands

400 0 400 800 1200

Feet

NORTH

William St.
Pioneer St.
Mathes St.
Greenhithe St.
Elizabeth Street
Office Street
Spring Garden Road
Duggan St
Mackay Street
Duff Street
Acadia Ave.
Union Street
Office Street
Cowan Street
Muirs Lane
Foley Street
Black Diamond Street
Grant St.
Queen Street
Cowan Street
Old Cowan Rd.
West St.
West Street
Dufferin Street
CANADIAN NATIONAL
College Street
Duff Street
Fraser Street
Gregory St.
Union Street
Main Street
Hoyt Street
North Street
Prince Albert Street
Greenwood Street
Elmwood Street
Church Street
Muir Road
Wing Street
Court Street
South Main Street
Drummond Path
Dufferin Street
Campbell's Road
Acadia Street
Drummond Road
Ballar Street
MacQuarrie Avenue
Campbell's Road

Schedule B-3
Requirements for a Geotechnical Report

Mining Impact Assessment

Geotechnical Reports for lands impacted by abandoned underground coal mine workings must be prepared to include a mining site assessment. This typically is a desk study which includes a field visit with no intrusive site work. At a minimum, it should address the following:

- **Field Visit** – Visual inspection of the property (lands and structures) and adjacent lands.
- **Background Information** – Review relevant information on abandoned mine workings in that locality and appropriate technical reference information.
- **Mining Factor** – Describe strata section, mine workings details (seam by seam), mine water and potential development of surface subsidence.
- **Site Factor** – Outline site characteristics (i.e., site geology, topography, drainage).
- **Structure Factor** – Discuss the type and condition of existing and proposed structures and their expected response to potential mining subsidence.
- **Time Factor** – Discuss timing and duration of mine workings, any previous subsidence events, scheduling of proposed developments on the lands and any other relevant time information.
- **Qualitative Preliminary Risk Assessment** – Assessment of potential hazards (i.e., associated with both subsidence ground movement and possible release of mine water and/or gases); potential severity and probability of occurrence for sinkhole and sag subsidence for all workings; summarize risks.
- **Assessment of Mitigation Measures** – Summary of previous or existing mitigation measures and outcome; assess need for future mitigation, type and extent required to reduce subsidence to acceptable levels.
- **Summary & Findings** – Outline work done, principal conclusions and recommended way to proceed to incur least risk of potential abandoned mine subsidence effects with and without mitigation measures, further studies and design requirements.
- **Geotechnical Reports Recommendations** – The measures specified in a Geotechnical Report, can and will be taken to ensure the development and its associated land uses incur least risk of adverse effects and are able to safely withstand the hazard. As such, a Geotechnical Report should recommend how from a mining perspective the land may be used safely for the intended development over its projected life, taking into account adjacent land uses.
- **Approval of Development - Safety Matters** – Where a Geotechnical Report concludes that land subject to mine subsidence may be used safely for the use intended, development approval will be conditional on implementation of all conditions contained in the report respecting siting, structural design, maintenance or planting of vegetation, placement of fill, etc., and on the

landowner agreeing to covenant with the municipality, within the land title, to use the land only in the manner determined in the report.

Mine subsidence can cause conditions which are very hazardous. Consider signage noting dangers of entering any area that is suspicious or that has been designated or fenced off as a subsidence hazard area. If you suspect mine subsidence on your land please call your local planning office.

Development Permit Checklist Yes/No Comment

Is the proposed development located within an area in the Map attached to this schedule (or Integrated Land Use Zoning Map) designated by NSDNR as being mined by underground workings?

Has the property owner been notified of the potential underground mining?

Has a Geotechnical Report been conducted for this property?

Has a mining impact assessment been included in the Geotechnical Report?

Has the developer incorporated the recommendations of the Geotechnical Report into the plans for the development?

Is there any indication of previous ground movement on the property, either visual, anecdotal or in the Geotechnical Report?

Have potential mining subsidence effects been adequately dealt with in the application?

Suggested Prevention and Control Measures of Areas Deemed Prone to Mine Subsidence Damage to Structures

Additional aspects for engineers to consider in Geotechnical Reports relating to mitigation measures follow. These are only suggestions and are not intended to provide a complete engineering guideline (AECOM, 2011).

Design Philosophies

In general there are three main philosophies in design of structures to mitigate subsidence effects on structures in areas prone to coal mine subsidence, which include:
(1) building structures to resist subsidence ground movement effects, or
(2) building in flexibility to accommodate ground movement due to subsidence; or
(3) relocate the structure to a more stable area where there will be little or no subsidence impacts (Peng, 1992).

Specific Design Measures

In order to aid stakeholders in Nova Scotia in their professional consideration of abandoned coal mine subsidence, the following list of scientific references is offered as a guide on general philosophies pertaining to the design of structures in areas with potential for mine subsidence:

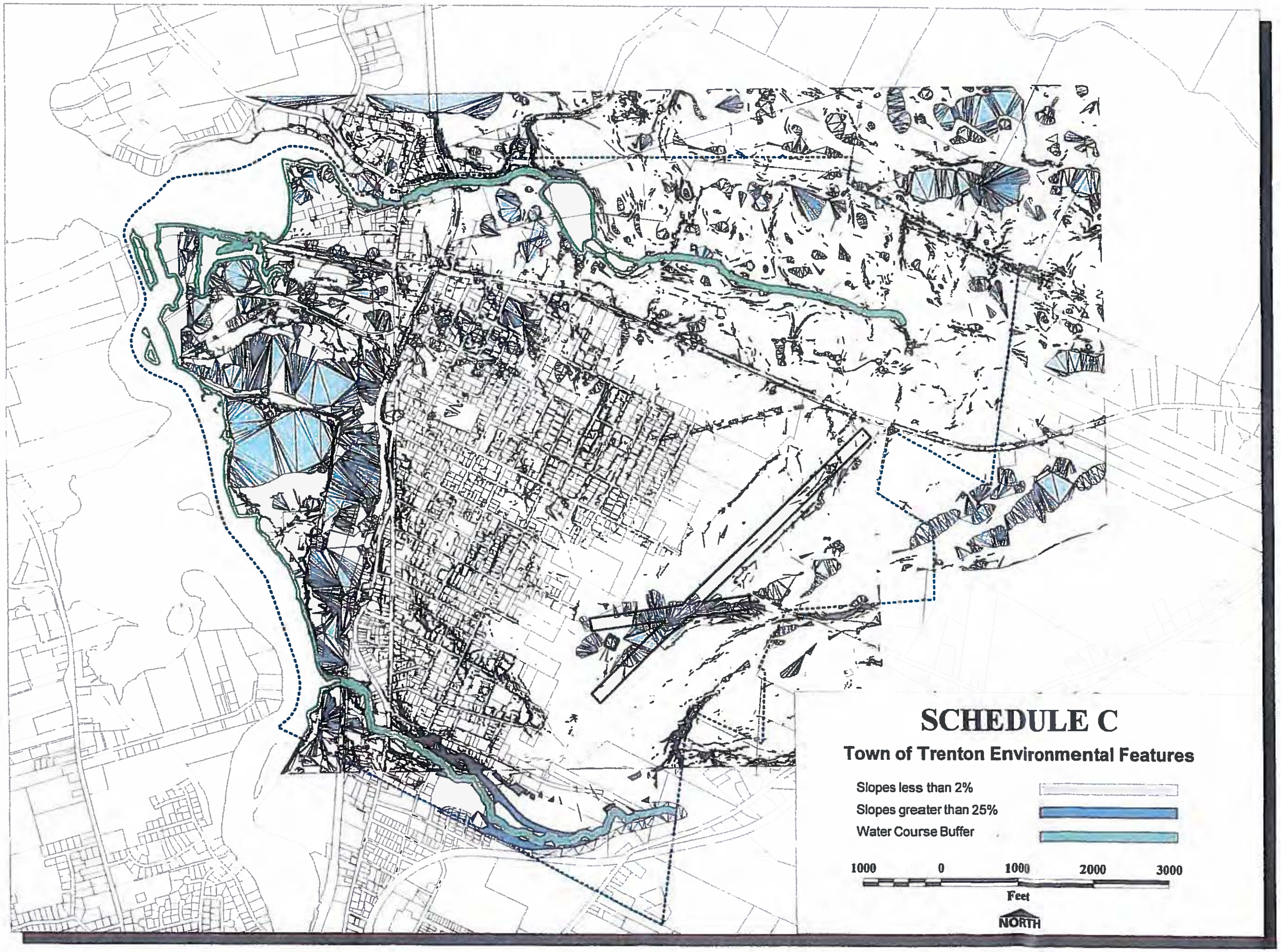
- **Fill shallow underground workings** with cement grout or backfill for local abatement of potential subsidence.
- **Place Structure on pile foundations** based on solid ground beneath the mine workings to avoid subsidence impacts.
- **Make Structure strong** to resist any subsidence effects.
- **Make the structure flexible** to accommodate subsidence effects with minimum damage.
- **Locate/relocate structure on solid pillars** of unworked coal to avoid/minimize subsidence risk.
- **Orientate the Structure** with respect to likely subsidence movements to minimize impact.
- **Use flexible joints** in pipes, cables, etc. to accommodate subsidence movement and avoid damage.
- **Make the structure relatively small,** less than 30m (98 ft) across, not more than three stories high and using a slab on-grade foundation.
- **Trenches filled with suitable compressible granular material** are installed outside the perimeter of concrete foundations to compensate and relieve compressive strain on foundation footing and walls. Properly designed exterior trenches are required for both the length and width of the structure.
- **Reinforced concrete anchoring slabs** installed on top of a flexible foundation in buildings subject to large horizontal strain (either along the short or long axis of the structure) resist failure because the strain is not transferred to the structure. The reinforced concrete slab (80 to 120 mm (30.15 in to 4.72 in) thick) with tension reinforcing bars placed on a layer of poly liner over 150 mm (5.9 in) of sand performs as a ridged structure and horizontal and vertical forces are dissipated in the flexible sand layer.
- **Slotting** should be made along the interior walls or along the lines where height or shape or both change. The height in each unit separated by the slot should be uniform. The idea is to divide a complex structure into separate independent sub-units. Temporary walls or posts should be erected on both sides of the slot.
- **Leveling by underpinning and pinning** is accomplished by installing and using hydraulic or screw jacks at strategic points around the base or foundation of a structure to be impacted by coal mining subsidence. These are then used to adjust and maintain the structure level as it subsides. It is especially useful when predicted subsidence exposes the structure to sloping and/or curvature impacts.
- **Leveling with springs** is utilized in order to keep houses level during underpinning. Springs are installed at the places where ground steps are likely to occur. Several groups of springs installed under the floor joist may be needed.

- **Reinforcing with tension rod or tension cable** can be used to tighten a house structure at the roof beam or floor joist levels. The tension rods and cables must be firmly tightened at the ends and supported at regular intervals. Steel tension rods and cables are designed to resist and compensate for the effects of curvature and tensile strain on the walls of a structure.

- **Wall shoring and internal bracing** is utilized as a method to prevent and compensate for toppling and collapse of or tilling of masonry walls. Interior wall bracing is designed to maintain the stability of the interior load bearing walls.

- **Reinforced concrete beams** when surface deformations are extreme. Reinforced concrete beams may be installed around the house structure at the basement level. Reinforced concrete beams are excellent for resisting horizontal strain and negative curvature, and if beams are installed at the floor joist or roof beam level, they can also cope with the problems associated with positive curvature.

- **Foundation bracing beams** can be installed to reduce the transversal moment of a longitudinal wall, especially if the building does not have transversal walls or the distance longitudinal walls are large. Transverse reinforced concrete bracing beams resist transversal moments due to subsidence.


SCHEDULE C
Town of Trenton Environmental Features
Slopes less than 2%
Slopes greater than 25%
Water Course Buffer
1000
0
1000
2000
3000
Feet
NORTH