

To: **Antigonish County Planning Advisory Committee
Antigonish County Council**

From: **Planning Staff (EDPC)**

Date: **October 6, 2025**

Reference: **Review of Flood Mapping within the West River Antigonish Harbour and
Central Antigonish Plan Areas**

Recommendations:

Planning Staff is recommending that the Planning Advisory Committee recommends that Antigonish County Council gives first reading to the proposed amendments to the West River Antigonish Harbour and Central Antigonish Plan Area Municipal Planning Strategies and Land Use By-laws, including amendments to the Generalized Future Land Use Maps and Zoning Maps, to include and update policies regarding a Floodplain designation and zone, to reflect the extent of the 1% AEP 2100 Time Horizon with Climate Change scenario in the 2023 Flood Line Mapping Study. Planning staff further recommends that Municipal Council schedules a Statutory Public Hearing for these proposed amendments.

Background:

Flooding has been a persistent and challenging issue within the West River Antigonish Harbour and Central Antigonish Plan Areas. The region is particularly vulnerable due to several major rivers that flow through both the Town and County of Antigonish, including the Rights River, West River, and Brierly Brook. While these rivers converge within the Town, their upstream and downstream impacts contribute to broader flood risks throughout the County. Combined with tidal influences from Antigonish Harbour, these waterways can result in joint flooding events. Additionally, coastal areas along St. George's Bay are susceptible to extreme water levels, wave run-up, and stream flooding at culverts and bridges. Historically, flooding has significantly affected residential areas, critical infrastructure, and transportation routes, creating ongoing challenges for land use planning and risk mitigation.

To better understand and address these challenges, the County of Antigonish-alongside the Town of Antigonish- undertook a comprehensive flood mapping initiative. The Eastern District Planning Commission (EDPC) retained CBCL Limited to carry out the South/West Primary Watershed Flood Mapping Study, supported by the provincial Department of Municipal Affairs and Housing (DMAH) under its Municipal Flood Line Mapping (MFLM) initiative. The primary goal of the study was to produce accurate flood extent and hazard maps for major rivers and coastal areas, accounting for both current conditions and future climate projections. Although

the study area includes portions of both the Town and County, this report pertains specifically to the Central Antigonish and West River Antigonish Harbour Plan Areas within the County.

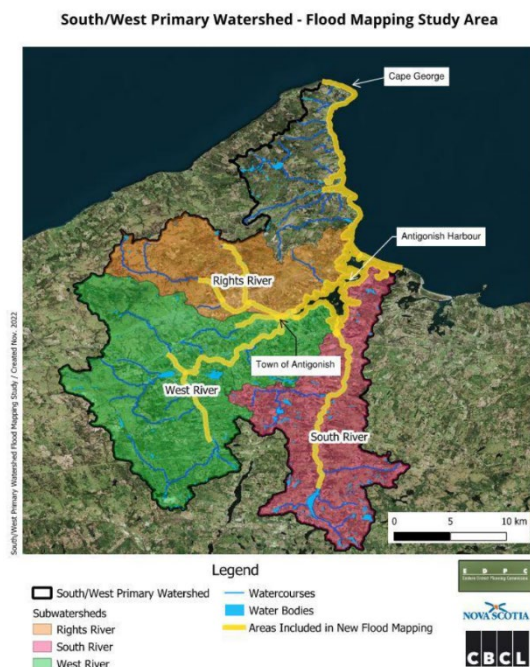
The study used advanced hydrodynamic modeling and climate projections for the years 2050 and 2100, resulting in flood maps covering approximately 100 km of river length and 120 km of coastline. These maps reflect six flood scenarios under both present and future conditions, offering critical data on flood extents, depths, velocities, and associated hazards.

Analysis:

Results of the Watershed Flood Mapping Study

The South/West Primary Watershed Flood Mapping Study addresses flood risks associated with the South River, West River, Rights River, Brierly Brook, and the coastal areas surrounding Antigonish Harbour and St. George's Bay. These areas are prone to frequent and severe flooding

due to complex hydrologic and coastal dynamics, including flat topography, tidal influences, storm surges, and river interactions. While the Rights River, West River, and Brierly Brook converge within the Town of Antigonish, their upstream and downstream impacts extend into the County, particularly affecting Lower South River and surrounding rural communities.



Flooding has been a persistent issue throughout the watershed. Although ice jamming along the Rights River and Brierly Brook has historically impacted the Town, similar flood risks extend to adjacent areas within the County, particularly during winter rainfall events and coastal storm surges. Previous studies in 1980, 2010, and 2019 primarily focused on flood risks within the Town's

urbanized areas. As part of the current study, a public questionnaire gathered local insights across the watershed. Respondents identified large rainstorms as the most common cause of flooding, with the Rights River reported as the most frequently affected.

The study produced flood maps for multiple scenarios, including the 5% Annual Exceedance Probability (AEP) (1-in-20-year event) and 1% AEP (1-in-100-year event) under both current and future climate projections for 2050 and 2100. Copies of these maps can be found in the attached report (Appendix E). Riverine scenarios accounted for rainfall-driven events, frozen ground conditions, and ice jamming, while coastal and estuarine scenarios incorporated tidal elevations,

storm surge, and projected sea level rise. The estuarine analysis was particularly relevant near river mouths and low-lying coastal zones.

Field data collection occurred from January to March 2022 and extended into summer to capture a range of conditions. Hydrometric monitoring and bathymetric surveying using GNSS and sonar equipment provided detailed measurements of water levels and riverbed profiles. Notable flood events, including post-tropical storm Fiona, were used to calibrate the models and validate scenario accuracy.

What is bathymetry?

Bathymetry is the study of the "beds" or "floors" of water bodies, including the ocean, rivers, streams, and lakes.

NOAA, National Ocean Service

<https://oceanservice.noaa.gov/facts/bathymetry.html>

Accessed September 26, 2025

The coastal water level assessment applied the RCP8.5 climate scenario, highlighting the significant impact of storm surge and sea level rise. The 2100 projections indicate an increased frequency and severity of flooding, especially in Antigonish Harbour and Lower South River. Precipitation analysis used historical data to create Intensity-Duration-Frequency (IDF) curves, incorporating climate change projections suggesting up to a 40% increase in rainfall intensity by 2100.

Hydrological modeling used PCSWMM software to simulate runoff and peak flows, while the HEC-RAS model assessed channel hydraulics and ice jamming potential. The study identified several vulnerable structures within the County that may be at risk of overtopping during extreme flood events. Ice jamming along the Rights River and Brierly Brook continues to pose a significant hazard, capable of drastically increasing water levels beyond normal flood conditions.

Why Recognize Floodplains?

- Life safety
- Protection of dwellings and other buildings, including important infrastructure
- Reducing liability for granting permission for construction of buildings in areas known to be a risk
- Protecting environmentally sensitive areas, either being in floodplains (e.g. wetlands), or along the watershed where they could be put at risk of flooding if the existing floodplains are filled or altered.

Proposed Changes to the Planning Documents

In Antigonish County, the flood study area falls within the boundaries of the West River Antigonish Harbour and Central Antigonish plan areas. Both plan areas will require amendments to include additional policies and amend their mapping to reflect the results of the study.

West River Antigonish Harbour Plan Area

The West River Antigonish Harbour MPS does already contain policies with respect to establishing a floodplain designation and zone, with mapping that depicts the areas identified in previous studies subject to the designation/zone. The document also contains policies regarding coastal development, providing minimum coastal elevation and setback requirements for all new dwellings and accessory buildings in the Rural General (RG-1), Rural Residential (RR-1), and Tourist Commercial (TC-1) zones.

Staff is recommending that the GFLUM in the MPS be amended to expand the area to which the Floodplain designation applies, as shown on the maps in Appendices “A and B”, to reflect the extent of the 1% AEP 2100 Time Horizon with Climate Change scenario in the 2023 Flood Line Mapping Study. A similar amendment is proposed to the zoning maps in the Land Use By-law for this plan area, to expand the Floodplain Zone to the extent of the recommendations in the study.

Central Antigonish Plan Area

Currently, the Municipal Planning Strategy (MPS) does not contain any flood-specific policies, although it does address minimum coastal elevation and minimum setback requirements for all new dwellings and accessory buildings in the Rural Development and Tourist Commercial zones. Based on the results of the study and discussions with CBCL, staff is recommending an amendment to the Central Plan Area MPS to include the following new policies:

1. Policy L-5.1 It shall be the policy of Council to designate lands that are prone to flooding as “Floodplain” as shown on the Generalized Future Land Use Map.
2. Policy L-5.2 It shall be the policy of Council to establish a Floodplain (F-1) zone in the Land Use By-law that shall apply to all lands shown as F-1 on the Zoning Map. The following uses shall be permitted in the Floodplain (F-1) zone: water and sewer utilities except for treatment facilities, public works associated with flood control; temporary structures associated with recreational and agricultural uses; recreational, agricultural and conservation related uses that do not require a permanent structure; and existing single detached dwellings that are engineered to be more flood resistant according to the flood-proofing measures as described in the Land Use By-law.
3. Policy L-5.3 It shall be the policy of Council to amend the floodplain mapping as shown in Schedule “A” of the Land Use By-law should the need arise in the future, or upon the completion of a more comprehensive floodplain study.
4. Policy L-5.4 It is the intention of Council to prohibit the placement of fill or the altering of the grade in the Floodplain (F-1) zone except where the objective is to provide a dwelling with appropriate flood-proofing provisions. Policy L-5.5 Within the Floodplain (F-1) zone

it is the intention of Council to set out flood-proofing requirements in the Land Use By-law for permanent structures.

Accompanying these text updates will be an update to the Generalized Future Land Use Map (GFLUM), to add a Floodplain designation reflecting the extent of the 1% AEP 2100 Time Horizon with Climate Change scenario in the 2023 Flood Line Mapping Study, as shown in the amending document (Appendix C).

The Central Plan Area Land Use By-law currently has language that speaks to lot sizes and separation distances from watercourses (6.A.36), minimum yard setback where a water feature constitutes a natural hazard (6.A.37), as well as a minimum elevation and setback from coastal features or bodies of water (6.A.36). An amendment to this document is proposed to add a Floodplain Zone. The proposed amending document, found in Appendix “D”, outlines the list of uses permitted in this zone and depicts the area to which this zoning would be applied.

Conclusion:

The Watershed Flood Line Mapping Study identified areas along the watercourses in the watersheds analysed as being at risk of flooding in specific storm scenarios (1:20 year and 1:100 year storms). Staff is recommending updates to the West River Antigonish Harbour and Central Antigonish Plan Area Municipal Planning Strategies and their Generalized Future Land Use Maps, as well as the West River Antigonish Harbour and Central Antigonish Plan Area Land Use By-laws and Zoning Maps, to align with the findings and recommendations outlined in the Study.

Appendices:

- Appendix A: Proposed Amendment to the West River Antigonish Harbour Municipal Planning Strategy
- Appendix B: Proposed Amendment to the West River Antigonish Harbour Land Use By-law
- Appendix C: Proposed Amendment to the Central Antigonish Municipal Planning Strategy
- Appendix D: Proposed Amendment to the Central Antigonish Land Use By-law
- Appendix E: South/West Primary Watershed Flood Line Mapping Study

MUNICIPALITY OF THE COUNTY OF
ANTIGONISH

**Amending the West River Antigonish Harbour Plan Area
Municipal Planning Strategy**

Whereas Section 205 of the Municipal Government Act provides that a Municipality may make amendments to municipal planning strategies, the Council of the Municipality of the County of Antigonish enacts as follows:

A Municipal Planning Strategy for the Municipality of the County of Antigonish, for the **West River Antigonish Harbour Plan Area**, is hereby amended as follows:

- 1) Adding the following provision under Section 22.5:
 1. “No development permit shall be issued for the development of a structure in the Floodplain (F-1) zone, as indicated on the Zoning Map, unless it is flood-proofed to an elevation of 0.1 above the elevation shown on the 2023 Flood Line Mapping Study within the 1% AEP 2100 Time Horizon with Climate Change scenario.”
- 2) On the Generalized Future Land Use Map, re-designating lands from various designations to the Floodplain Designation to reflect the extent of the 1% AEP 2100 Time Horizon with Climate Change scenario in the 2023 Flood Line Mapping Study, as shown in Appendices A and B to this By-law.

READ a first time this
_____ day of _____, 2025
(Min#2025-XXX).

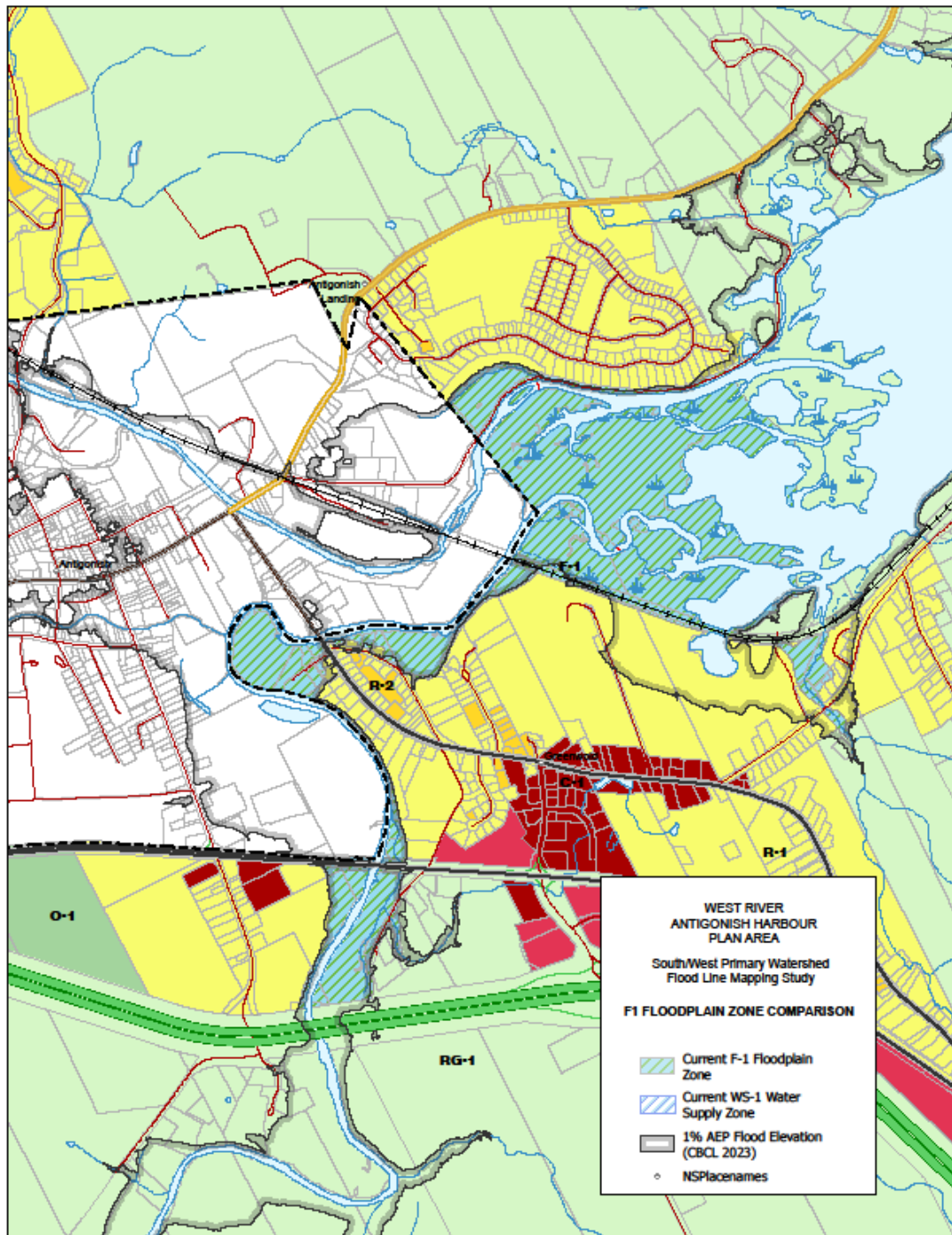
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Nicholas MacInnis, Warden

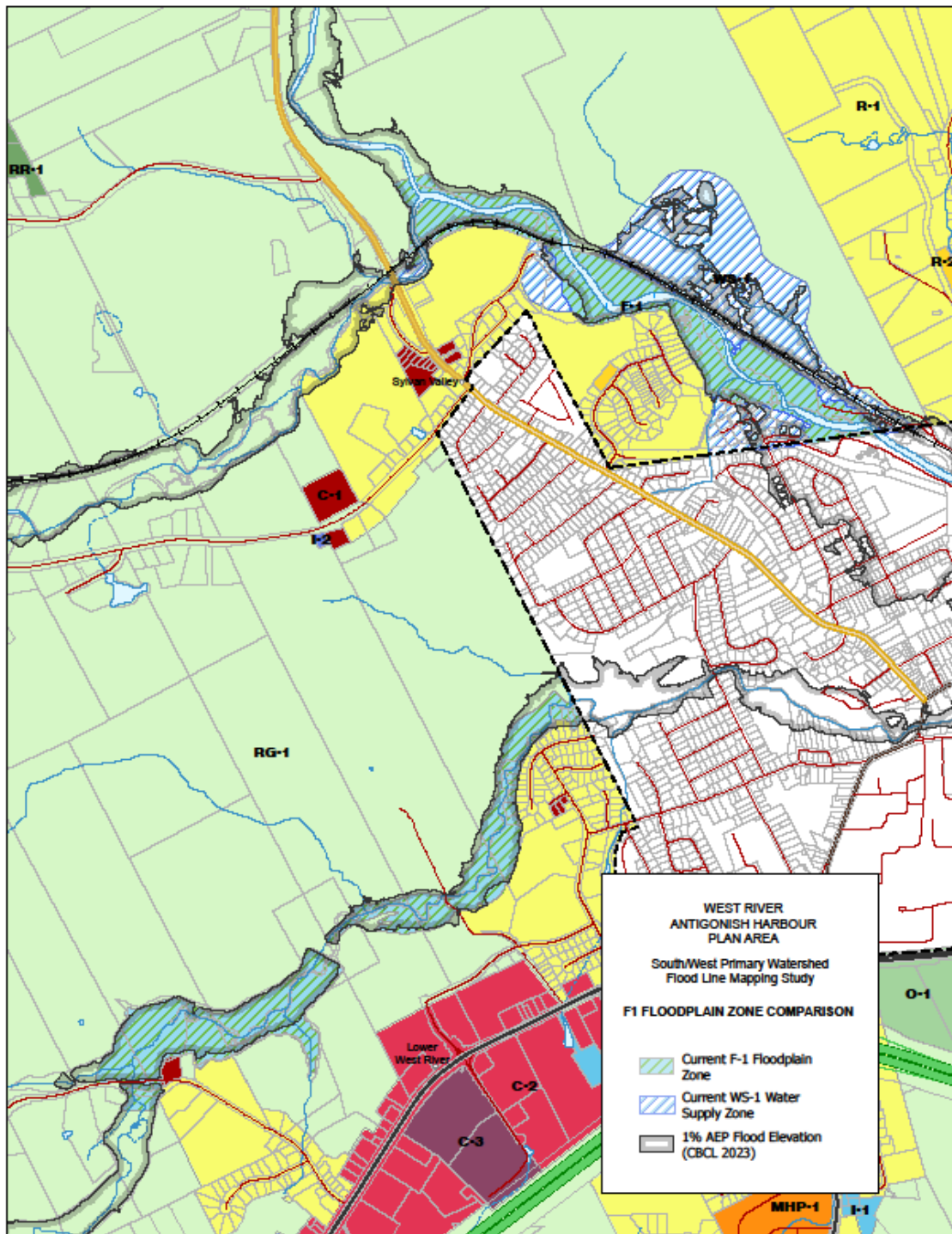
Shirlyn Donovan, CAO

Notice of Approval Published (date) and (date)

Appendix "A"



Appendix "B"



MUNICIPALITY OF THE COUNTY OF
ANTIGONISH

**Amending the West River Antigonish Harbour Plan Area
Land Use By-law**

WHEREAS Section 210 of the Municipal Government Act provides that a Municipality may make amendments to land use by-laws, the Council of the Municipality of the County of Antigonish enacts as follows:

The Land Use By-law for the Municipality of the County of Antigonish, for the **West River Antigonish Harbour Plan Area**, is hereby amended as follows:

- 1) On the Zoning map, rezoning several properties from various zones to the F-1 Zone to reflect the 1% AEP 2100 Time Horizon with Climate Change scenario in the 2023 Flood Line Mapping Study, as shown in Appendices A and B to this By-law.

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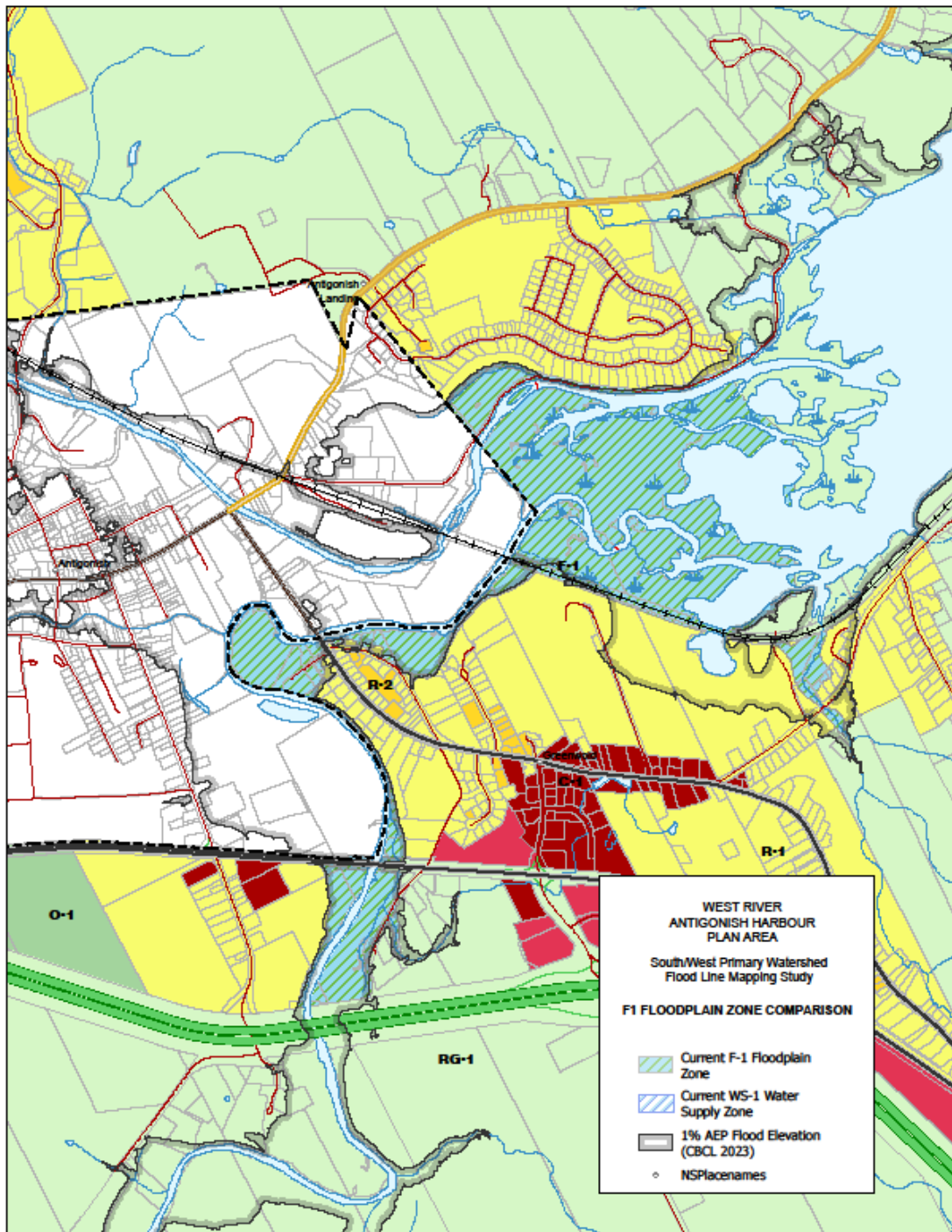
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Nicholas MacInnis, Warden

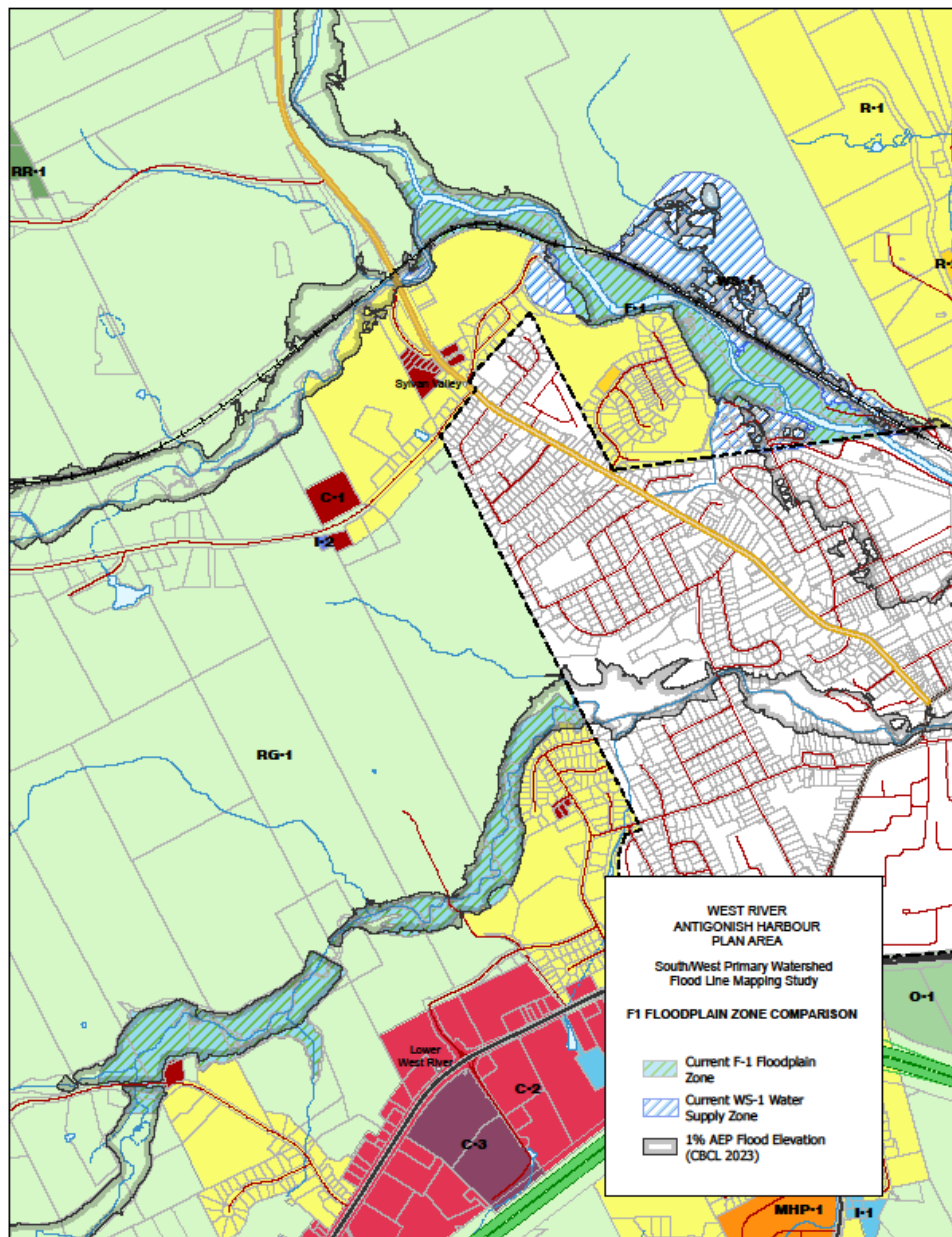
Shirlyn Donovan, CAO

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Appendix A



Appendix B



**Amending the Central Plan Area
Municipal Planning Strategy**

Whereas Section 205 of the Municipal Government Act provides that a Municipality may make amendments to municipal planning strategies, the Council of the Municipality of the County of Antigonish enacts as follows:

A Municipal Planning Strategy for the Municipality of the County of Antigonish, for the **Central Plan Area**, is hereby amended as follows:

- 1) Adding the following new policies to Section 3.1.4 immediately following Policy 5.1 of the strategy:

Policy L-5.2 It shall be the policy of Council to designate lands that are prone to flooding as “Floodplain” as shown on the Generalized Future Land Use Map.

Policy L-5.3 It shall be the policy of Council to establish a Floodplain (F-1) zone in the Land Use By-law that shall apply to all lands shown as F-1 on the Zoning Map. The following uses shall be permitted in the Floodplain (F-1) zone: water and sewer utilities except for treatment facilities, public works associated with flood control; temporary structures associated with recreational and agricultural uses; recreational, agricultural and conservation related uses that do not require a permanent structure; and existing single detached dwellings that are engineered to be more flood resistant according to the flood-proofing measures as described in the Land Use By-law.

Policy L-5.4 It shall be the policy of Council to amend the floodplain mapping as shown in Schedule “A” of the Land Use By-law should the need arise in the future, or upon the completion of a more comprehensive floodplain study.

Policy L-5.5 It is the intention of Council to prohibit the placement of fill or the altering of the grade in the Floodplain (F-1) zone except where the objective is to provide a dwelling with appropriate flood-proofing provisions. Policy L-5.5 Within the Floodplain (F-1) zone it is the intention of Council to set out flood-proofing requirements in the Land Use By-law for permanent structures.

- 2) On the Generalized Future Land Use Map, re-designating lands from various designations to the Floodplain Designation to reflect the extent of the 1% AEP 2100

Time Horizon with Climate Change scenario in the 2023 Flood Line Mapping Study, as shown in Appendices A and B to this By-law.

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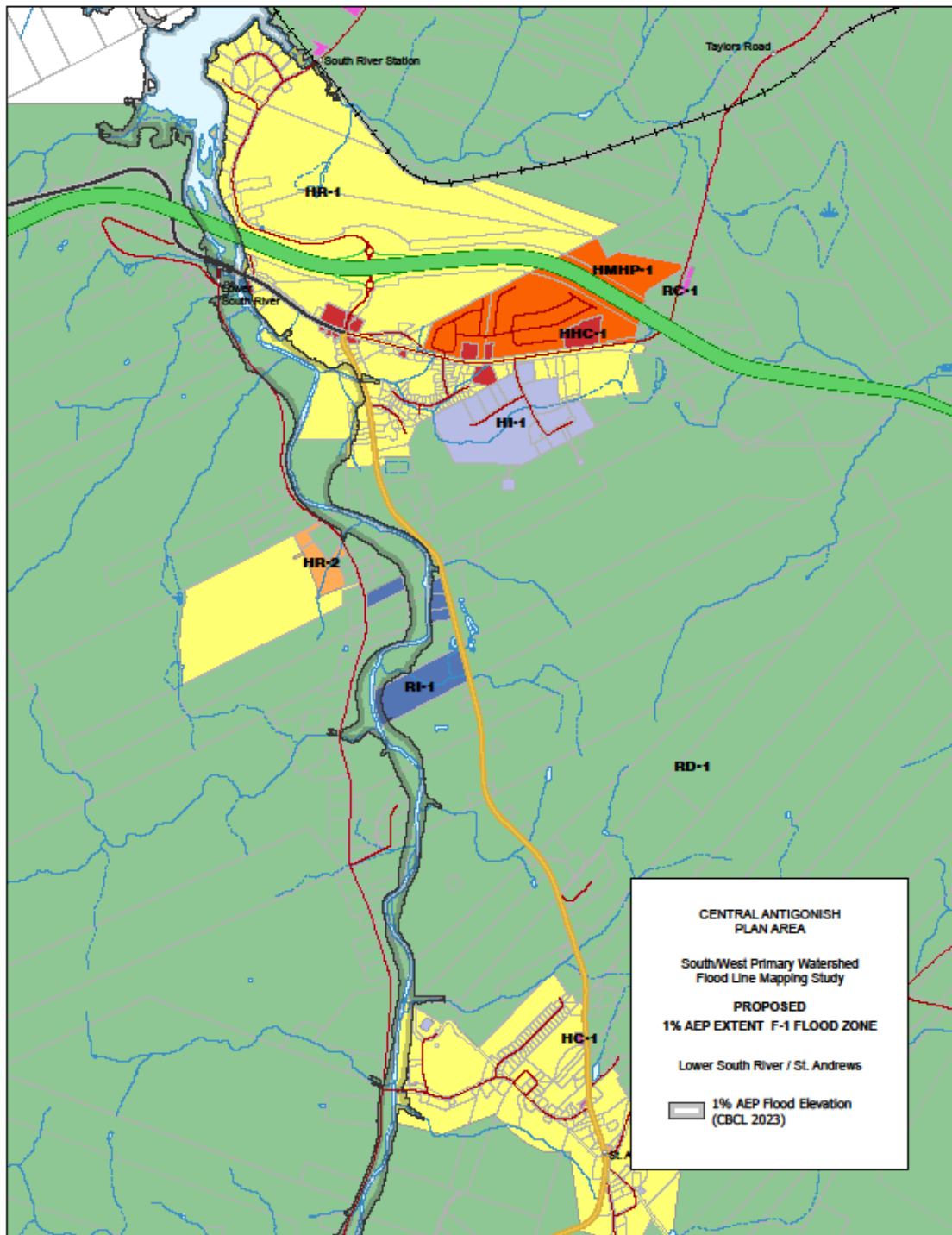
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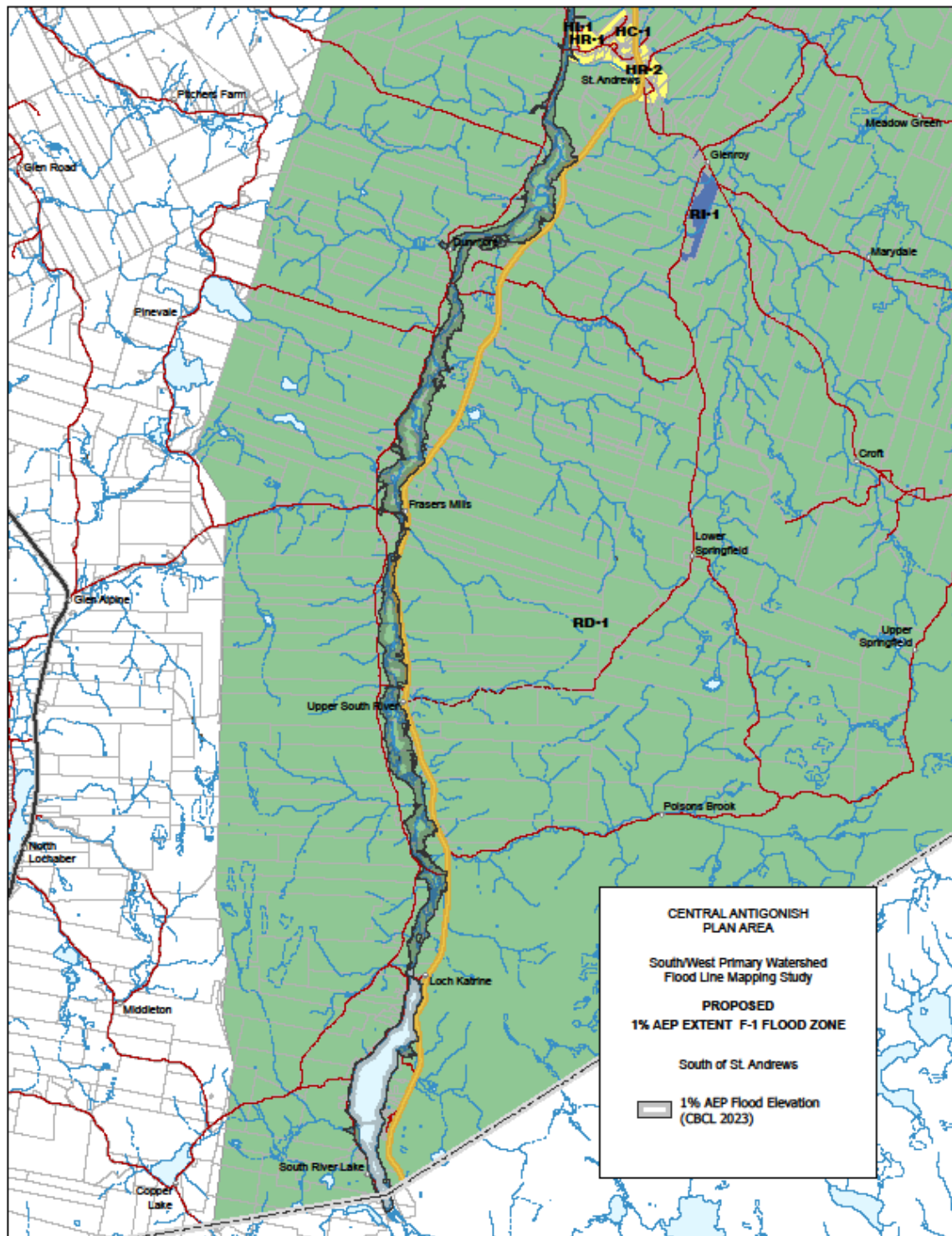
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Appendix A



Appendix B



MUNICIPALITY OF THE COUNTY OF
ANTIGONISH

**Amending the Central Plan Area
Land Use By-law**

WHEREAS Section 210 of the Municipal Government Act provides that a Municipality may make amendments to land use by-laws, the Council of the Municipality of the County of Antigonish enacts as follows:

The Land Use By-law for the Municipality of the County of Antigonish, for the **Central Plan Area**, is hereby amended as follows:

- 1) Adding the following section to the by-law immediately following Part 18:

Part 19: Floodplain (F-1) Zone

F-1 Uses Permitted

19.1 No development permit shall be issued in a Floodplain (F-1) zone except for one or more of the following uses:

- a. Agricultural uses that do not require a permanent structure.
- b. Conservation related projects that do not require a permanent structure.
- c. Open air structures and uses.
- d. Public works associated with flood control.
- e. Recreational uses that do not require a permanent structure.
- f. Existing single detached dwellings, subject to flood-proofing requirements.
- g. Temporary structures associated with recreational and agricultural uses placed on the floodplain during summer months after the danger of spring flooding has passed.
- h. Water and Sewage utilities except for treatment facilities.

- 2) Renumbering Part 19: Definitions to now read Part 20: Definitions.
- 3) On the Zoning map, rezoning several properties from various zones to the F-1 Zone to reflect the 1% AEP 2100 Time Horizon with Climate Change scenario in the 2023 Flood Line Mapping Study, as shown in Appendices A and B to this By-law.

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(Min#2025-XXX).

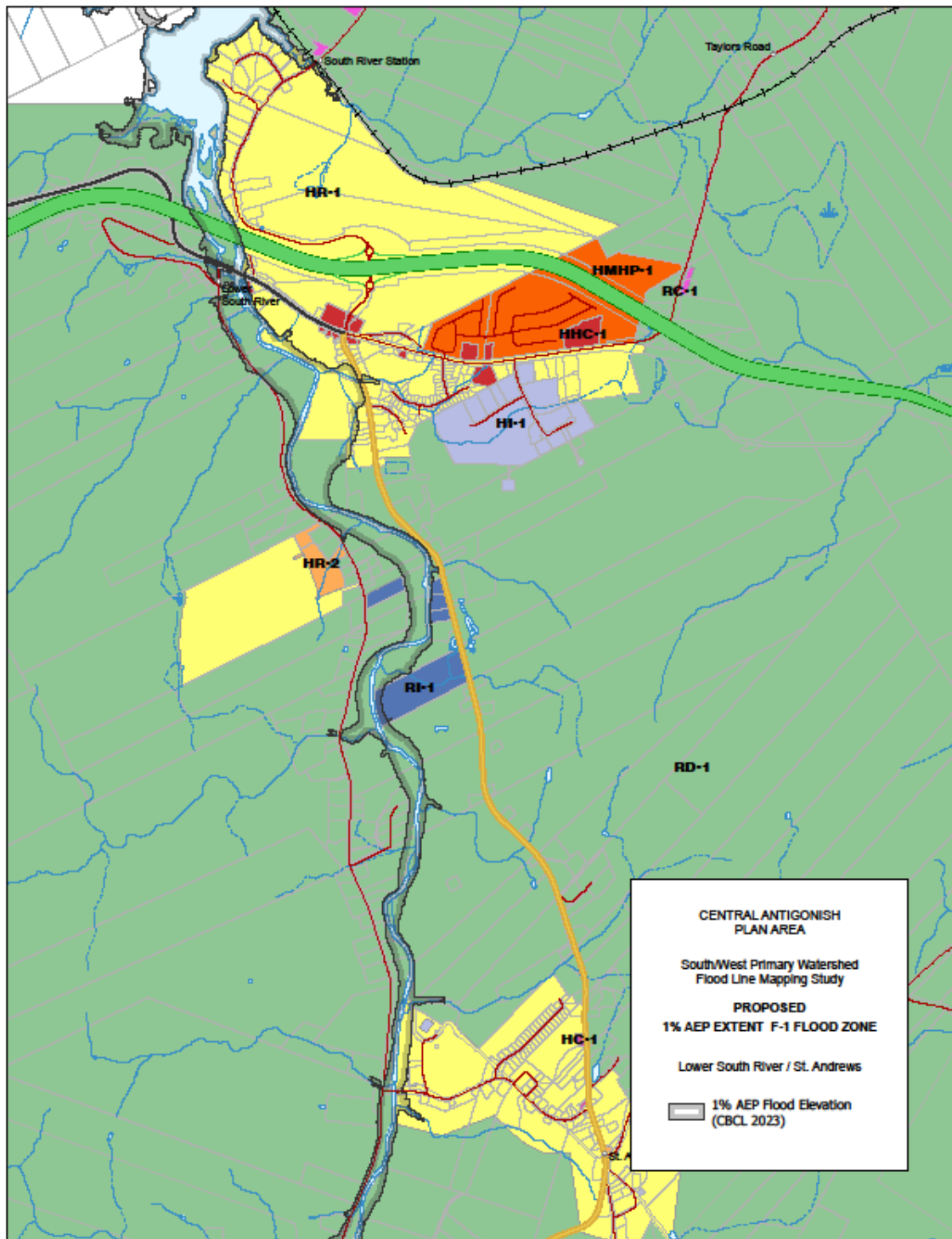
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Appendix A



Appendix B

