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NOVA SCOTIA COASTAL HAZARD MAP USER GUIDE

Nova Scotia Environment and Climate Change

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INTRODUCTION:

Climate change is a global issue, requiring global action. In Nova Scotia, we are proud to be a leader in climate change action.

This Coastal Hazard Map is a new tool you can use to make informed decisions and support action.

The map shows the worst-case scenario: what sea level rise and storm surge could look like during a high tide in the year 2100. This information is currently shown up to 100 metres inland, along the province's coast. This is where impacts will be felt the most.

You can look at information in this tool in a variety of ways. You can look up a community, civic address or property identification number (PID) and move around the map, zooming in and out to see larger areas. If you look up a property and then click on it, you will see the number of metres of flooding that are projected in the year 2100, from highest tide, storm surge and sea level rise combined.

The Coastal Hazard Map also allows you to measure things, draw on the map, and print out copies of the map and your notes.

This guide will help you do all of these things.

If you have more questions about the Coastal Hazard Map or would like some help using it, please contact our Navigator at **coastalnavigator@novascotia.ca** or **1-888-570-4240**.

As you explore this tool, you may have some questions. Safeguarding Your Coastal Property: A Guide to Protecting Your Property and Promoting Healthy Coastlines in the Face of Climate Change **(novascotia.ca/coastal-climate-change)** is a new resource for coastal property owners that can help you address and adapt to coastal hazards.

As future phases of the Coastal Hazard Map roll-out, this guide will be updated.

Disclaimer:

The Coastal Hazard Map is intended for general informational purposes only. While every effort is made to make the information current, and mapping will be updated frequently, the information [by its nature] is subject to change. Conclusions drawn or decisions made, based on an interpretation of the data, are the responsibility of the user. Users with site specific questions or concerns are encouraged to consult with a competent professional. **The Province of Nova Scotia does not have any liability for any loss or damage of any kind incurred as a result of the use of the information in the Coastal Hazard Map.** By continuing to use this application, you agree to the terms of this disclaimer.

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Overview:

The Coastal Hazard Map (CHM) is an easy way to explore coastal hazards in Nova Scotia. **nsgi.novascotia.ca/chm**

The data projection of the map data is NAD83(CSRS98) / UTM Zone 20N.

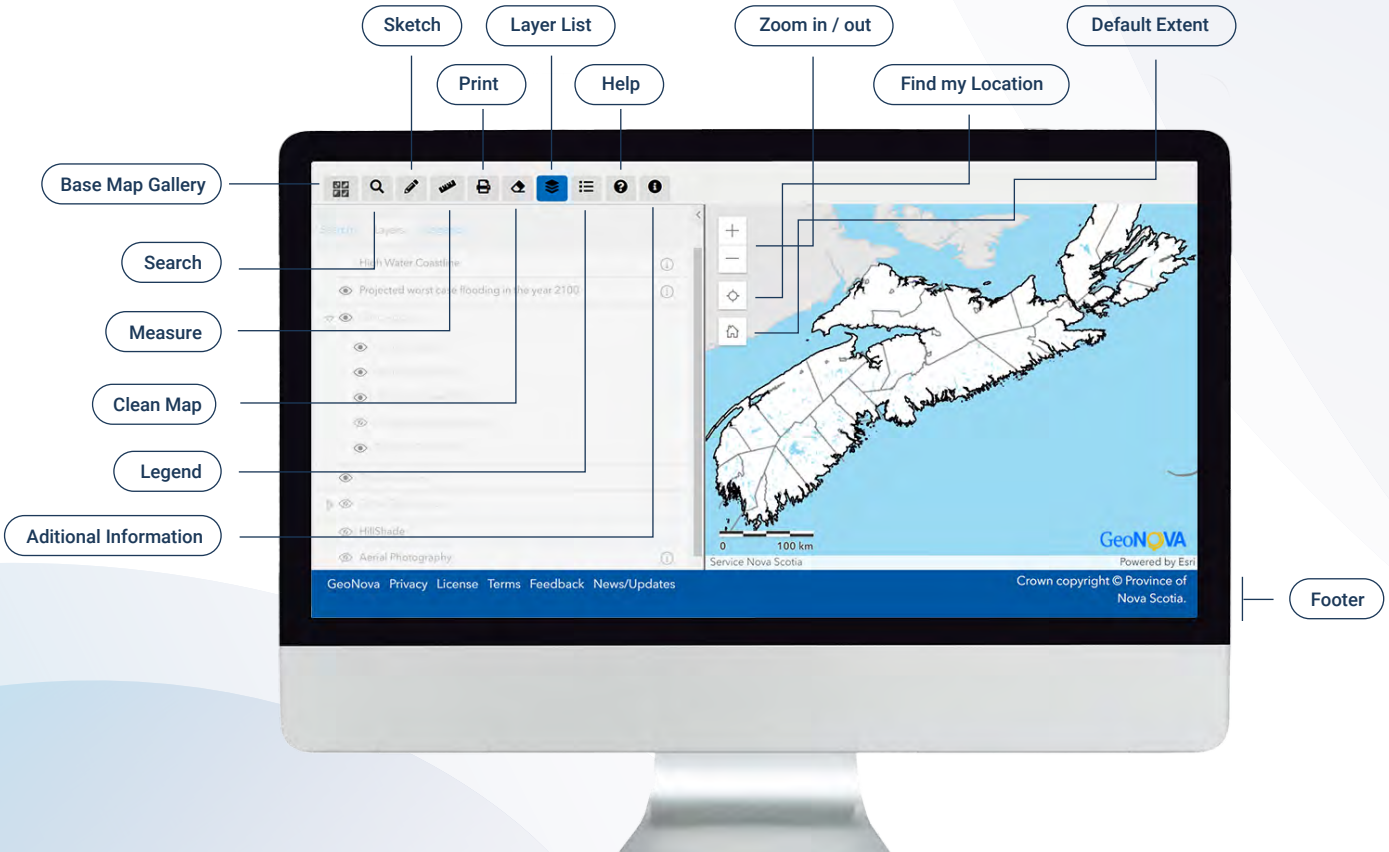
Questions and/or comments about the CHM may be submitted directly by clicking the Feedback link.

Responsiveness:

You can use the CHM map on a desktop or mobile device. On mobile, the application has been optimized for both portrait and landscape orientations. The left panel, containing the Search, Layer List, and Legend widgets, is only visible when in desktop. While using a mobile device, these widgets will be modular and appear over the map.

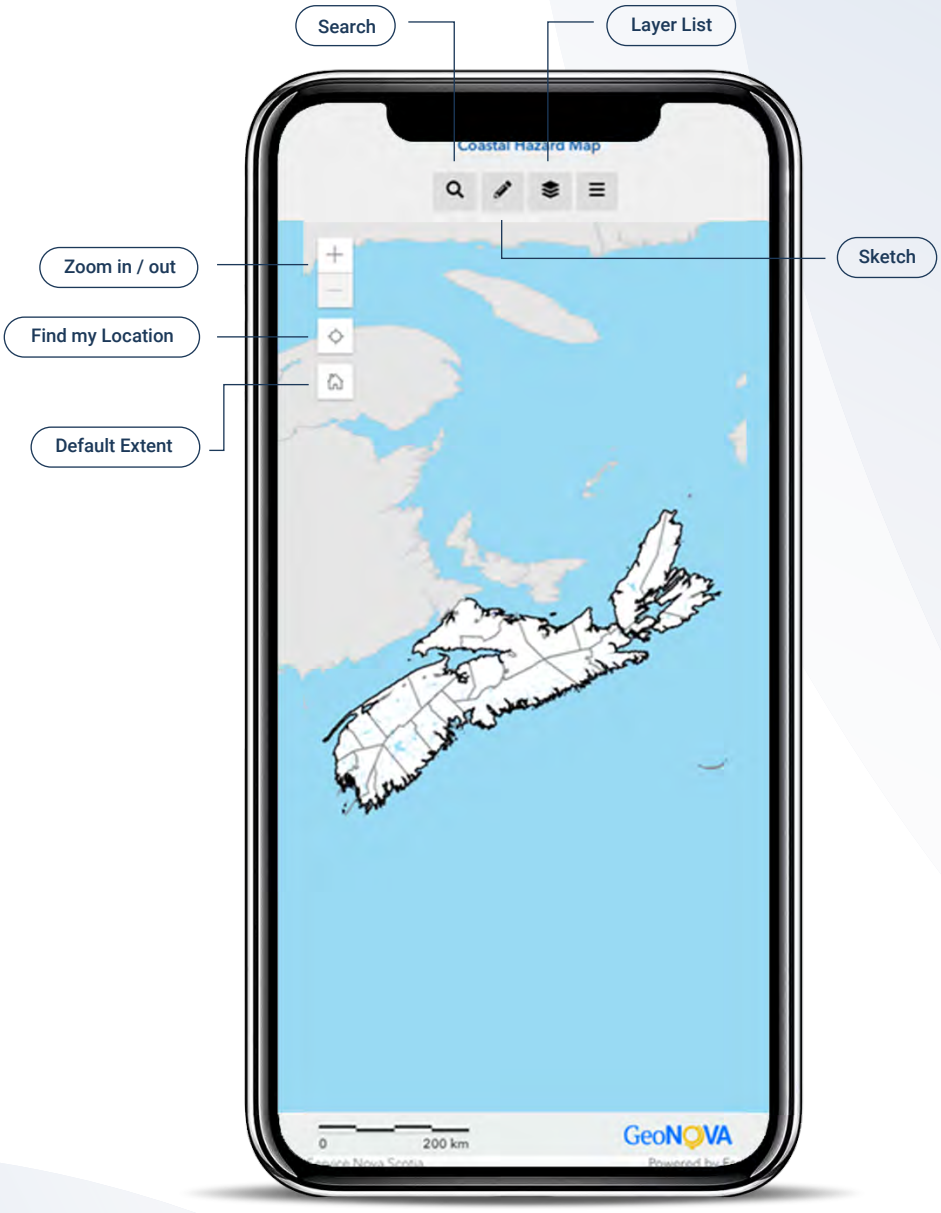
Desktop View:

These are the main components of the CHM, and the key functions and features available to you.



Mobile View:

These are the main components of the CHM for mobile (portrait orientation). You will find the buttons for the Basemap Gallery, Legend, Print, Measure, Clear Map, Help, and the footer links by clicking on the Options button. The exact layout of your screen may vary depending on the size of the device you are using.



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Navigation:

← Zoom In/Out will incrementally zoom the map in or out with each click.

← Find My Location will place a marker pin on the map at your current location. This functionality takes advantage of HTML5 Geolocation. When connected to the internet, this feature will use the network to determine the location. When connected to a cellular network, it will use the GPS receiver on the device to determine the location. The accuracy of the location varies based on the browser, device, and network.

← Default Extent returns the map to its original extent, a full, centred, map of Nova Scotia.

ON SCREEN NAVIGATION

Clicking the Zoom To in a popup window will zoom to and centre the item on the map.

Navigation Short Cuts

On desktop:
To pan the map: Click and hold the left mouse button and drag the map to a new location.

Zoom In: Shift + Click – Drag Allows you to draw a box, which will become the new extent.

Zoom Out: Ctrl + Shift + Click – Drag Allows you to draw a box and zoom out.

Mouse Wheel: Zooms in and out.

On mobile:
To pan the map: Put a finger on the map and drag to a new location.

Zoom In: Put two fingers on the map and pinch in.
Zoom Out: Put two fingers on the map and pinch out.

Application Tools:

Specialized widgets and tools are available along the top of the application and through specific popups.

Change Basemap:

 ← This widget allows you to choose between various basemaps which changes the colour of the map.

 ← **Topo White:** Map will be white. (Default)

 ← **Topo Colour:** Map will be colour.

 ← **Topo Grey:** Map will be greyscale.

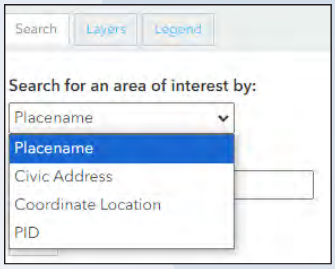
Search:

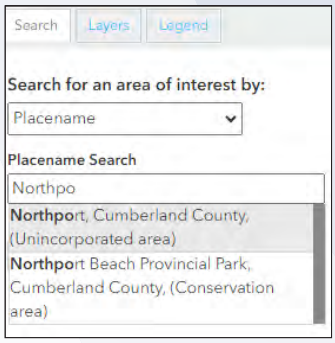
 ← The Search widget allows you to search for various types of data.

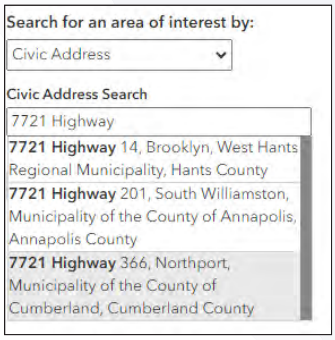
First, select a type of data to search for. The options are Placename, Civic Address, Coordinate Location, and PID.

Placename Search:

Allows you to type in a placename (example: Northport).
As you type, a dropdown of suggestions will appear in a drop-down menu. Select an option by clicking on it or by using the arrow and enter keys. The map will zoom to and centre at the selected placename.







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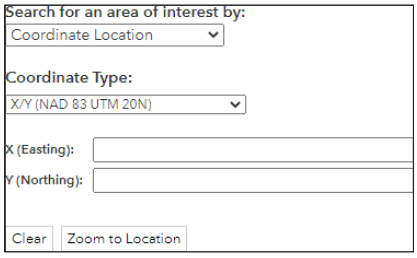
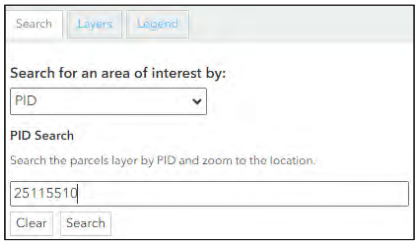


Coordinate Location Search:

You can input a pair of coordinate values to locate. You must select which coordinate type to search for; X/Y (NAD 83 UTM 20N), Decimal Degrees (WGS84), or Degrees Minutes Seconds (WGS84).



PID Search:

Type in a PID (Parcel ID) to locate (example: 25115510). Press the Search button and the map will zoom and centre at the selected parcel. If the Property layer is not visible, a disclaimer will be shown first, and if Accept is chosen, the layer will become visible.

Sketch:

The sketch tool allows you to add points, lines, polygons, and text graphics on the map.

A point can be added by clicking the button, and then the desired location on the map. Points can be moved by first clicking the desired point, and then clicking and dragging to the desired location.

A line can be added by clicking the button. Points can be added by clicking at two or more desired locations, and the line can be finished by double-clicking on the last location added. Lines can be moved by clicking on the desired line, and then clicking and dragging to the desired location. Additional points can be added or modified by clicking on the desired line, clicking again to change the modification mode to reshape, and then dragging the points to the desired locations.

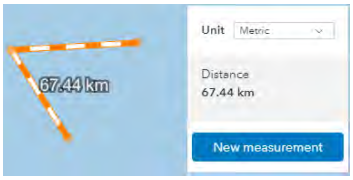
A shape can be added by clicking the button. Points can be added by clicking at three or more desired locations, and the shape can be finished by double-clicking at the last location added. Shapes can be moved by clicking on the shape, and then clicking and dragging to the desired location. Additional point can be added or modified by clicking on the desired shape, clicking again to change the modification mode to reshape, and then dragging the points to the desired locations.

All graphics can be cleared by clicking the button.

Measure:

The Measure widget allows you to draw on the map, to measure distances and areas.

When you open the widget, a dialog will appear and ask you to select distance, area, or location. Distance is selected by default.



Distance:

Draw a line by placing two or more points on the map. Double-click to stop drawing the line. The distance will be displayed in the dialog box. The units can be chosen from the drop-down menu.

Area:

Draw a shape by placing three or more points on the map. Double-click to stop drawing. The area and perimeter will be displayed in the dialog box. The units can be chosen from the drop-down menu.

Location:

By selecting XY on the drop-down menu, results will be displayed in WGS 84 (Decimal Degrees). By selecting BASEMAP, results will be displayed in NAD 83 UTM 20 N (Northing and Easting). By clicking on the button on the right, capture mode can be toggled. When this is enabled, you can select a point on the map and it will be saved – by clicking on the saved coordinates, the Copy button appears. When clicked, the Copy button will copy the coordinates to the clipboard.

Close:

This will close any active measure tools.

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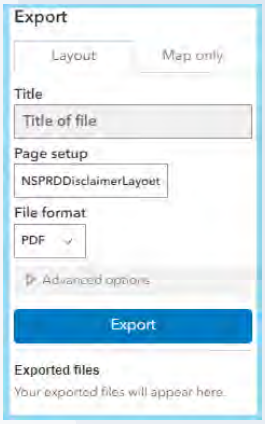
Print:

The Print widget allows you to export the current map view to an easily accessible format. You can then print your map and notes.

The file name, format, and page orientation can also be set.

Through Advanced options, additional options such as scale, author, copyright, DPI, and legend visibility can be set.

Once satisfied with the map and settings, click Export. Exported documents will appear at the bottom of the widget for download or printing.



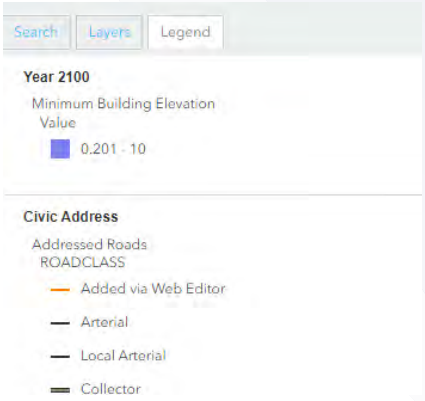
Clear Map:

The Clear Map button will clear any popup or graphics overlaying the map.

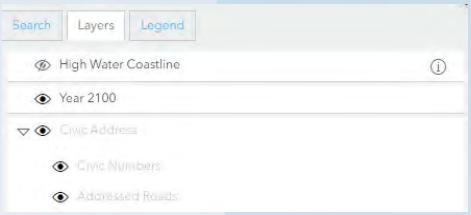
Legend:

The Legend widget describes what each symbol/colour on the map represents.

Some layers visibilities are scale dependent and will only be visible if you are zoomed in far enough. The legend only shows currently visible layers.



Layer List:



All layers are available for display. Click the eye visibility icon next to the layer you desire to see. Individual layers, or all layers in a layer group (such as Year 2100), can be turned on or off this way.

On the left are arrow buttons that collapse or expand the group of layers. Note: these do not affect the layer visibility but allow the widget contents to be simplified.

Some layers visibilities are scale dependent and will only be visible if you are zoomed in far enough. A layer's title will be black if visible and grey if not visible. For example, in the image above, Year 2100 is visible, and High Water Coastline is not.

Clicking the ⓘ button next to a layer will either open the layer information website or the information dialog.

Layer name	Description
High water coastline	A coastline derived from Higher High Water Large Tide information was applied to the coastline in 20 cm layers.
Projected worst case Flooding in the year 2100	Worst case scenario of what sea level rise and storm surge could look like during a high tide in the year 2100.
Civic address	Includes information from the civic address file: Civic Numbers points Addressed Roads Non-Addressed Roads Highway Distance Markers Community Boundaries Building outlines
Property lines	Land title parcels from the Land Registry
Hillshade	A shaded relief map: a hillshade simulates shadows cast from the direction of the Sun over a 3D elevation map.
Aerial photography	Images of the ground taken from an elevated position, typically from aircraft, providing a bird's-eye view of the landscape.

Help:

The Help button opens this user guide.

Additional Information:

The Additional Information button opens a resource document from the Department of Environment and Climate Change.

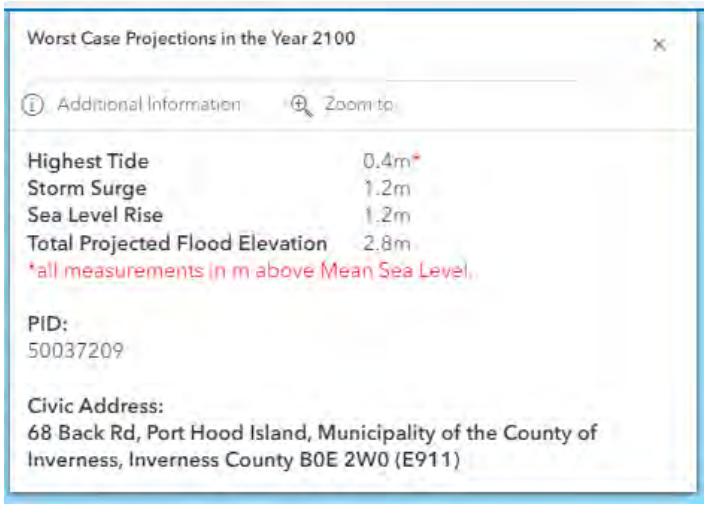
Popups:

When you click on any Civic Address feature, a popup will open, and you can view the feature's data.

It provides information on the projected flooding as well as the Property Identification number (PID) and the civic address.

The Additional Information button will open the coastal property owner's guide, Safeguarding Your Coastal Property: A guide to protecting your property and promoting healthy coastlines in the face of climate change.

The Zoom to button will make the map zoom to and centre at the selected feature.



Appendix A:

Data Sources for Coastal Hazard Map Layers

The Coastal Hazard Map currently includes two data layers:

1. **High Water Coastline:** Shows the highest high tide level along the coast of Nova Scotia, based on a 19-year average high tide.
2. **Projected Worst Case Flooding in Year 2100:** Building on the High Water Coast Line layer, this layer shows the projected worst-case flooding in the year 2100 within 100 m of the highest high tide line, incorporating 1-in-100- year storm surge and sea level rise.

High Water Coastline Layer

Tags
High Tide, Tide, Coastline

Summary
Polyline showing the Highest High Tide level along the coast of Nova Scotia, based on a 19-year average High tide.

Description
The High Water Coastline layer is derived from the Department of Fishery and Ocean (DFO). This dataset depicts the 19-year average highest high tide levels (called the Hydrographic vertical separation surfaces for Canadian waters or HyVSEPs). The highest high tide elevation at a 20 cm interval was used to get the corresponding contour from the provincial LiDAR divided Digital Elevation Model (DEM) depicting the highest high tide line along the coastline.

Co-ordinate System
NAD 1983 (CSRS) v6 UTM Zone 20N

Vertical Datum
CGVD2013 height

Credits

Highest High Tide
Canadian Hydrographic Service, part of the Department of Fisheries and Oceans. The data, known as Hydrological Vertical Separation Surfaces (HyVSEPs), is for use in geographic information systems (GIS) and describes tidal ranges at hundreds of points around the coast of Nova Scotia.

Projected Worst-Case Flooding in the Year 2100 Layer

Tags
Sea level rise, climate change, Coastal Flooding, Storm Surge

Summary
The projected worst-case flooding in the year 2100 shows the coastal flooding extent within 100m of the highest high tide line for the year 2100, incorporating 100-year projected sea level rise and storm surge.

Description
The worst-case flooding in the year 2100 value represents the elevation above mean sea level. This value is derived from the accumulative impact of the highest high tide, rising sea levels, and storm surge data. The sources of the dataset are listed below.

Highest High Tide
The High Water Coastline layer is derived from the Department of Fishery and Ocean (DFO). This dataset depicts the 19-year average highest high tide levels (derived from the Hydrographic vertical separation surfaces for Canadian waters or HyVSEPs). The highest high tide elevation at a 20 cm interval was used to get the corresponding contour from the provincial LiDAR divided Digital Elevation Model (DEM) depicting the highest high tide line along the coastline.

Sea-level Rise
Climate projections are based on climate modelling for the Intergovernmental Panel on Climate Change's Fifth Assessment Report (2013). This information has been further refined to Canadian conditions by the Geological Survey of Canada (James et al., 2021). The sea level rise information is based on Representative Concentration Pathway (RCP) 8.5, 95th percentile, which is the upper range of a high emissions greenhouse gas scenario.

Storm Surge
Storm surge estimates are based on research commissioned by the Atlantic Canada Adaptation Solutions Association (ACASA) in 2011, with funding and partnership support from all four Atlantic provinces and the federal government. The research was completed using a model to estimate storm surge developed by university researchers (Bernier, 2005).

The 2011 paper shows the modelled 1-in-100 year storm surge for NS, as well as the maximum recorded storm surge for a sub-set of sites. NS used the modelled values as an average of 1 in 100 year storm.

Co-ordinate System
NAD 1983 (CSRS) v6 UTM Zone 20N

Vertical Datum
CGVD2013 height

Credits

Storm Surge

Williams, R., and Daigle, D. 2011. Scenarios and Guidance for Adaptation to Climate Change and Sea Level Rise – NS and PEI Municipalities. Prepared for ACASA.

Bernier, N.B. 2006, Annual and Seasonal Extreme Sea Levels in the Northwest Atlantic: Hindcasts over the Last 40 Years and Projections for the Next Century. Dalhousie University Ph.D. Thesis. https://dalspace.library.dal.ca/handle/10222/54801

Bernier, N. B., and K. R. Thompson (2006), Predicting the frequency of storm surges and extreme sea levels in the northwest Atlantic, J. Geophys. Res., 111, C10009, doi:10.1029/2005JC003168
Predicting the frequency of storm surges and extreme sea levels in the northwest Atlantic (dal.ca)

Sea-level Rise

James, T.S., Robin, C., Henton, J.A., and Craymer, M., 2021. Relative sea-level projections for Canada based on the IPCC Fifth Assessment Report and the NAD83v70VG national crustal velocity model; Geological Survey of Canada, Open File 8764.
NS Sea Level Rise Projections (CMIP5) | Open Data | Nova Scotia
Sea-Level Change — Sea-Level Change — undefined (climatedata.ca)

Highest High Tide

Canadian Hydrographic Service, part of the Department of Fisheries and Oceans. The data, known as Hydrological Vertical Separation Surfaces (HyVSEPs), is for use in geographic information systems (GIS) and describes tidal ranges at hundreds of points around the coast of Nova Scotia.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