

Sea Level Rise

Relative sea level (RSL) on the Atlantic coast is expected to rise 0.35 metres (1.15 feet) to 2.50 metres (8.20 feet) by the end of this century, according to a recent U.S. National Oceanic and Atmospheric Administration (NOAA) Technical Report. These most recent predictions significantly raise the stakes for the region by reflecting the impact of the newly discovered melting of the Antarctic ice shelf. Even under mid-range scenarios, it is now likely that effects we expected to encounter a generation from now, will arrive far sooner. It appears a potential battle between the built environment and the natural one is imminent. We can't help but wonder: how will the increased risk to waterfront property be mitigated...and priced?

Nova Scotia (Halifax)

We highlighted this issue in a TDP Newsletter from 2007, back when the sea was expected to rise an almost quaint 0.75 metres by 2100. Under the new projections published by NOAA, the worst scenarios will quickly exceed the safeguards Halifax adopted for its waterfront. The impact of storm surges would blow away even the most precautionary buffers discussed by the municipality when the bylaw was put in place.



Image Credit: Turner Drake and Partners Ltd.

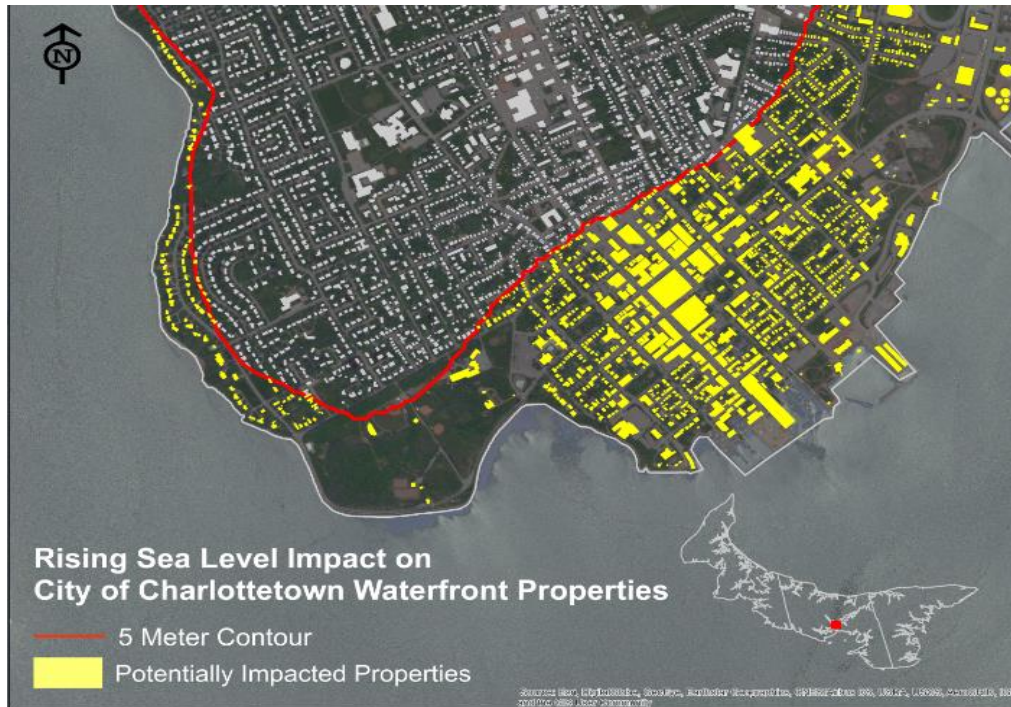
In the map above, we have identified the 5 metre contour and major developed properties within the influence zone. This potentially soaked swath is currently assessed at more than \$446 million. To private interests and the broader economy, the market value and implications of all land and infrastructure are many times higher. Those who finance development and hold mortgages seem to be largely unconcerned at this point. In part, this is due to the “availability heuristic”, causing investors to discount these risks due to the unimaginability of the severity and timeframes involved. However, under some of NOAAs scenarios, we may experience a “climate shock” during the amortization period of existing loans!

It is no revelation that Atlantic Canadian cities (not just Halifax) are vulnerable to the growing storm surge and rising RSL that accompanies climate change. It seems the increasingly dire predictions for the year 2100 do little to stir the blood; will the acceleration of effects focus some attention? Perhaps crossing RSL thresholds 50 years earlier than expected will be a wake up call. Only time will tell ... and there is possibly less of it than we think.

Prince Edward Island (Charlottetown)

Across Atlantic Canada, coastal cities are vulnerable to the effects of sea level rise, perhaps none more so than Charlottetown. Natural Resource Canada identifies Prince Edward Island as the most sensitive province in the Atlantic region, thanks to the highly erodible nature of its shore.

The island is an idyllic but fragile sandbar. Residing in the Gulf of St. Lawrence, the raw power of the Atlantic is somewhat mitigated. However, climate-change driven sea level rise and increasing storm-surge events pose a significant threat nonetheless. Islanders have responded in kind, employing a fleet of aerial drones with sensors precise enough (2cm resolution) to detect footprints in the sand! By measuring and predicting coastal changes, the UPEI Climate Lab's CLIVE project has helped islanders develop a sense of urgency around the issue, though (like Halifax), present mitigation measures may need revision in the face of new scientific research.



Source: Turner Drake & Partners Ltd.; Open Street Map

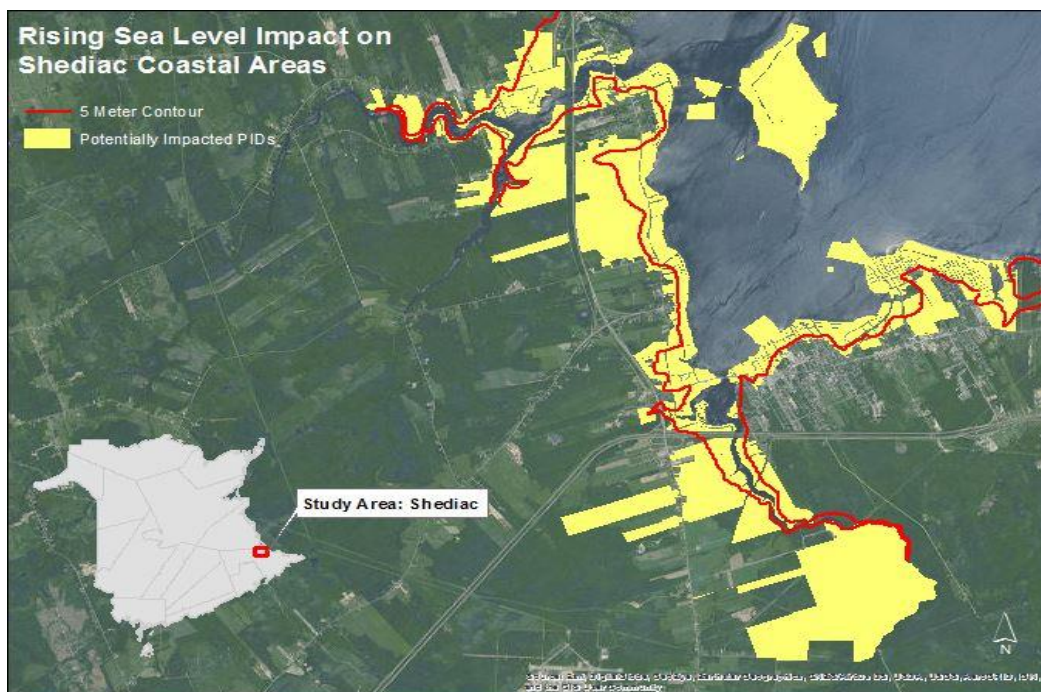
The maximum projected sea level rise scenario from a National Oceanic and Atmospheric Administration (NOAA) report published earlier this year came in at a whopping 2.5m (8.20 feet). Combined with more frequent and severe storm surge effects, the risk may warrant greater protection than the current development regulations set by Charlottetown provide. Using the 5m contour as the delineating boundary of potential impact, the map above shows that about a third of the buildings in the City may be at risk, including Province House itself.

Unlike most of Atlantic Canada, where owners of coastal real estate may sit in blissful ignorance atop their resilient granite perches, landowners on the Island already feel the sand shifting beneath their feet. According to the PEI Real Estate Association, brokers have noticed an increasing trend of consumer awareness for coastal vulnerability. Rising sea levels will “hammer the hell” out of PEI, as David Suzuki once said, and with the recent NOAA findings accelerating the timeline for potential impact, it is probable that even this degree of consumer concern falls short of the issue.

New Brunswick

In June 2017, United States' President Donald Trump announced his decision to pull out of the Paris Climate Agreement, barely five months after NOAA released its report escalating predicted relative sea level (RSL) rise. With Trump's promises to increase fossil fuel development in the U.S and undo Obama's major Clean Power Plan, their worst case scenarios predicting 2.5 m (8.0 feet) of RSL rise by century's end looks increasingly probable. What does this mean for coastal New Brunswick?

New Brunswick has approximately 5,500 km of coastline and it is well used; coastal areas are a focus of settlement and economic activity. Nearly 60% of the population lives within 50 km of the water's edge and with it comes infrastructure and capital improvements. All of this means a significant amount of real estate wealth is concentrated in vulnerable locations. According to a report published by Environment Canada (2006), the greatest impacts will be experienced along the Gulf of St. Lawrence coast when considering the combined effect of RSL rise, storm surge, erosion, and other climate-related effects. Over recent decades, residents in communities on the Strait have complained about a growing issue of property-damaging storm surge events. These claims have since been confirmed by scientists who've measured increasing trends in surge height and frequency for this flood sensitive region.



Source: Turner Drake & Partners Ltd, NB Open Data Catalogue

Mapped above, the Shediac area is a case study in coastal sensitivity. Combining RSL rise projections with 2.5 m storm surges that have already been observed in the area, 2,651 parcels in this growing community could be affected. Together, these properties have an assessed (for property tax) value of roughly \$228 million, a significant number when measured against the Town's \$655 million tax base. The market and economic value of these areas is likely several multiples higher.

As in other Atlantic provinces, municipal governments are considering climate vulnerability, but find themselves continually playing catch up with the science. Policy documents meant to guide mitigation and adaptation responses are barely in hand before they need to be revised in the face of worsening projections. Nevertheless, they are still ahead of the private real estate world where, with few exceptions, development, finance, and valuation continues as though each day will be the same as the last. As municipalities begin to adopt practices to indemnify themselves against liability for development in at-risk locations, it is increasingly important for private actors to take these trends into account or be left holding the bag.

Newfoundland (St. John's)

Comparatively speaking, The Rock has low coastal sensitivity compared to the remainder of Atlantic Canada; its dramatic sea cliffs form a defensive bulwark. That is not to say it is invulnerable. Jutting bravely into the North Atlantic, it is frequently lashed by storms bringing destructive rain and surf. As a result the Province restricts development in areas susceptible to overland or coastal flooding; using 1:20 year and 1:100 year floodplains to define the policy boundaries.

Using hydrology to shape policy is prudent, but it requires accurate hazard mapping and the original analyses did not take into account climate change. Updates are underway initiated by a 2010 paper from the Department of Natural Resources which warned that an anticipated 1 metre of relative sea level rise by century's end could create 'hundred year' coastal flooding every twenty. Faithful readers will know this expectation of RSL rise is increasingly optimistic. More recent research from NOAA suggests increases as high as 2.5 metres. Hopefully policy can catch up, but regardless, avoidance strategies are little help where buildings and infrastructure already exist. Spare a thought for poor Placentia.



Source: Turner Drake & Partners Ltd, Open Street Map

With over 400 years of settlement history, it's also a little late for avoidance in St. John's. Though its iconic topography quickly rises high above the water, some of its most culturally and financially significant real estate hugs the harbour. The map above identifies buildings below the 5m elevation, where sea level rise and storm surge could have an impact in the decades to come. Though small in area, in office space alone it represents nearly 65% of the downtown rental market and \$200,000,000 of the city's commercial assessment base. Property owners may be more concerned with current oil prices, but a potentially greater challenge looms on the horizon. A recent waterfront build perched its rentable floor area safely atop six storeys of parking, but for most, defensive options are limited. Water Street, it seems, is aptly named.