



## TOWN OF SIDNEY

### Report to Council

**TO:** Mayor and Council  
**FROM:** Alison Verhagen, Manager of Planning  
**DATE:** July 7, 2015 File No. 0400-50  
**SUBJECT:** Update on Sea Level Rise and Proposed Provincial Amendments to BC Flood Hazard Area Land Use Management Guidelines

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#### PURPOSE:

The purpose of this report is to provide Council with an update on communication from the CRD regarding sea level rise and the proposed amendments to the Province of BC Flood Hazard area Land Use Management Guidelines.

#### BACKGROUND:

On January 26, 2015, Council made the following resolution regarding planning for sea level rise and the proposed Provincial Amendments to the Flood Hazard Area Land Use Management Guidelines:

*That the Capital Regional District be requested to coordinate detailed wave impact mapping analysis for the region, with each member municipality participating in funding the exercise.*

Staff sent a letter to the CRD as per Council's resolution, and a response was received in February (See appendix A).

#### DISCUSSION:

Since January 2015, CRD staff have finalized a regional inundation study completed with Natural Resources Canada funding and support from City of Victoria, District of Saanich and Tides Canada Foundation. The information was distributed to local governments in the region via the Climate Action Inter-Municipal Working Group meeting in February. The information shows potential affected areas in the years 2050, 2100, and 2200 given expected sea level rise, a higher high tide event, storm surge, (see Appendix B – Summary of AECOM CRD Coastal Sea Level Rise Risk Assessment). It is important to note that the areas shown as affected on the maps that include "1.3 Metre Storm Surge" in the legend would not be regularly inundated with sea water at every high tide, but rather during storm events. Provincial guidelines indicate that wave effect and freeboard have to be considered when preparing mapping to determine a Flood Construction Level (FCL), using a simplified methodology, which would increase water levels above what the maps contained in Appendix B show.

CRD staff conducted a workshop in late June with Town staff from Engineering, Public Works, Corporate Services and Development Services departments to work through a proposed methodology for sea level rise planning and adaptation for Sidney. Staff discussed various aspects of adaptation such as assessing vulnerabilities of land uses and key assets in focus areas within the Town (those most affected by sea level rise and climate change) and other shoreline areas; evaluating the suitability of different adaptation measures; evaluating municipal capacity to implement adaptation measures; identifying opportunities and gaps to prioritize future work; and generating a list of desired short-term actions.

The exercise was valuable as it assisted staff in gaining a greater level of understanding on how to prepare for sea level rise and adapt current practices and physical places for climate change. However, the process of developing a plan to address sea level rise and adapt infrastructure, utilities and land uses for climate change will take time and is nowhere near complete. Staff will continue to work with the CRD

and other partnering agencies on this process over time. CRD staff indicated that they are conducting a number of these workshops with other municipalities in the region, and once the workshops are complete the data collected will be summarized and distributed through the Climate Action Inter-Municipal Working Group.

A staff report received by Council in January discussed proposed amendments to the Provincial Flood Hazard Area Land Use Management Guidelines. These amendments have not yet been adopted by the Province. Sidney staff have participated in a Technical Working Group (TWG) comprised of representatives from various local governments and regional districts and formed by the Province to provide input on the proposed amendments and the review process. In the most recent discussions of the TWG, it was clear that there is a desire from many local governments for the Province to provide further support with communication to property owners around the Flood Hazard guidelines and the new amendments. Provincial support with defining sea level rise planning areas and developing land use planning strategies integrating flood protection and flood hazard management tools would also be of significant benefit to local governments.

The Local Government Act for BC states that each local government can determine whether they want to adopt a Flood Plain Bylaw. If they do, then they must consider the Provincial flood hazard guidelines. Staff are not aware of any upcoming changes to this legislation.

Staff are of the opinion that sea level rise and adaptation for climate change should be considered in reviewing and drafting new planning documents and studies for the Town, such as the Infrastructure Replacement Plan, Official Community Plan, and the Parks Master Plan. Considering these future impacts on infrastructure and land use now will assist in the formulation of an Adaptation Plan in the future.

The previous staff report also included a discussion on the potential for undertaking more detailed mapping of wave effects. CRD staff have indicated that doing additional wave impact mapping at a regional scale would be expensive and would potentially have a limited impact on affecting the estimated Flood Construction Level (FCL). It is important to note that even if more detailed wave impact mapping is done, it will not result in the same FCL for all municipalities due to geographic differences around the region. The most effective aspect of undertaking further studies would be for all municipalities to use the same methodology (Provincial guidelines consider two methodologies, which would result in different outcomes). Staff recognize that further studies would have to be done to comply with Provincial guidelines, and will continue to report to Council with updates from the CRD and Province when more information is available.

**RECOMMENDATION:**

**That this report be received for information.**

Respectfully submitted,

I concur,

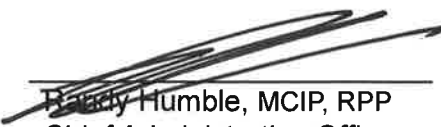
I concur,

  
Alison Verhagen, MCIP, RPP  
Manager of Planning

  
Marlaina Elliott, MCIP, RPP  
Director of Development Services

  
Tim Tanton, MPA, P.Eng  
Director of Engineering and Works

I concur,

  
Randy Humble, MCIP, RPP  
Chief Administrative Officer

Attachments: Appendix A: Capital Regional District Response to Town of Sidney letter  
Appendix B: Summary of AECOM CRD Coastal Sea Level Rise Risk Assessment



**Capital Regional District**  
625 Fisgard Street, PO Box 1000  
Victoria, BC, Canada V8W 2S6

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February 17, 2015

File: 5220-20  
Sea Level Rise Project

Mr. Randy Humble  
Chief Administrative Officer  
Town of Sidney  
2440 Sidney Avenue  
Sidney, BC V8L 1Y7

Dear Mr. Humble:

**RE: SEA LEVEL RISE AND CAPITAL REGIONAL DISTRICT COORDINATED DETAILED WAVE IMPACT MAPPING ANALYSIS**

Thank you for your letter of January 28, 2015. Our Climate Action Program continues to work on climate action priorities for the municipalities and, specifically, sea level rise concerns.

This past year, the Capital Regional District (CRD) provided comments on the draft provincial amendments to the Flood Hazard Area Land Use Management Guidelines, which would incorporate sea level rise considerations into local planning. Regional and municipal representation is established on the provincial technical working group. Consultation is still underway and the final guidelines have not been released. The guidelines will require further review and analysis.

The proposed detailed wave impact analysis is one aspect and may, or may not, be an appropriate next step for sea level rise planning. That depends upon the final guidelines, the support and resources provided to local governments by the Province and a review of research priorities.

Concurrent with the provincial flood plain guidelines process, the CRD is now finalizing the regional inundation study completed with Natural Resources Canada funding and support from City of Victoria, District of Saanich and Tides Canada Foundation. This will be disseminated to municipalities through the Climate Action Inter-Municipal Working Group. The next step of the project will be to develop a tool kit for local government for sea level rise adaptation planning. This phase will be completed over the next five months.

The CRD will continue to work with municipalities and electoral areas to understand the provincial guidelines. This includes determining what research will be most relevant to reduce uncertainty and provide support for implementing the guidelines, and developing communication tools and content to support an open public process for understanding the implications of sea level rise in the capital region. These items, including consideration of a detailed wave impact analysis, will be discussed at the next inter-municipal working group meeting, as well as the next steering committee meeting, which consists of elected politicians from each municipality.

In the meantime, if you have any questions or concerns, please contact Dr. Glenn Harris, Senior Manager, CRD Environmental Protection Division, at 250-360-3090 or [gharris@crd.bc.ca](mailto:gharris@crd.bc.ca).

Yours truly,



**Robert Lapham, MCIP, RPP**  
**Chief Administrative Officer**

cc: **Rob Buchan, Chief Administrative Officer, District of North Saanich**  
**Patrick Robins, Chief Administrative Officer, District of Central Saanich**  
**Larisa Hutcheson, General Manager, CRD Parks & Environmental Services**  
**Glenn Harris, Senior Manager, CRD Environmental Protection**

Town of Sidney  
February 17, 2015

### Summary of AECOM CRD Coastal Sea Level Rise Risk Assessment Nikki Elliott, CRD Climate Action Program

This document is intended to briefly summarize the results of the Capital Region District's Coastal Sea Level Rise Risk Assessment completed by AECOM (January 2015) and describe the potential next steps. The detailed methodology and results can be found in the final report.

#### Purpose

The CRD Coastal Sea Level Rise Risk Assessment project was undertaken as a first step to understand sea level rise (SLR) implications within the capital region. The primary task of this project was to identify and map areas that are potentially vulnerable to SLR; the secondary was to understand the potential economic consequences of SLR. The overall purpose of the project was to inform future analysis and support appropriate policy responses for SLR within the capital region.

#### Methodology

Mapping was based on the Province of BC's *Coastal Floodplain Mapping - Guidelines and Specifications Report* (June 2011). Analysis focused on 24 areas that were selected because of the relatively high levels of expected future inundation and / or the key community assets that are present.

Factors that will influence future sea levels were layered over a digital elevation model to give an estimation of the future shoreline in the years 2050, 2100 and 2200. These factors include: projections for static sea level rise, highest high water large tide (HHWLT) values collected from hydrological monitoring at over 30 sites across the region, vertical land movement figures which address seismic activity, and a relatively extreme 1 in 500 year storm surge projection.

*Note - Two criteria, as described in the provincial methodology were not included in the AECOM analysis: wave effects (requires site specific analysis) and freeboard (a buffer value provided in the guideline). The provincial guidance prescribes an approach which aggregates all of the SLR criteria to determine potential SLR inundation, creating a very conservative estimate.*

Using the mapping results, the project aimed to describe: the types of land use, key assets, services, the physical shoreline and indicative economic values that exist within the areas of inundation risk. Three high-level case studies were also developed to help identify the potential service disruption effects that could occur under sea level rise and storm surge conditions.

#### Limitations

This project is the very first step to assess how the region's shoreline may look 35, 85 and 185 years in the future. While land may be depicted within an inundation zone, this does not necessarily mean these areas will experience flooding due to sea level rise and storm surge in the future.

Inundated water surface mapping was done by extending the tidal water surface at the shoreline over the inland topography. Mapping represents a generalized estimate of the inland inundated water surface. It does not take into account the associated physics of overland flow, wave dissipation, levee overtopping, or potential shoreline erosion associated with extreme water levels and waves. Also, inundation risk that could occur from the flooding of drainage and other water systems was not reviewed. A more sophisticated modelling effort would be required to consider these criteria.

Additionally, scientific projections on future sea level rise are changing as climate change impacts are increasing in intensity and severity. The BC Ministry of Environment has indicated they will regularly review their guidelines and policy to ensure it corresponds to the most recent science.

See *Section 2.2.4.4* on page 11 of the report for additional mapping caveats.

Town of Sidney  
February 17, 2015

### Results – Region

At least one area for all municipalities and electoral areas were mapped, apart from the City of Langford and the District of Highlands. Results show that any significant impacts from sea level rise will not be felt until 2050 or beyond so advanced planning should be applied to help avoid or manage such impacts before they are realised.

For the 24 focus areas, the total valuation of land and improvements (as defined by BC Assessment) within the year 2100 + 500-year storm surge inundation line ranged from \$330 million (for the Oak Bay Windsor Park SLR focus area) to \$3.4 million (Albert Head SLR Focus Area). These are total asset values based on market valuation and do not infer expected losses that would occur from periodic inundation. Additionally, the service disruption case studies found a potential economic impact of \$90,000 to \$400,000 per day due to disruption from inundation.

### Results – Town of Sidney

There were two focus areas within the Town of Sidney analyzed by AECOM:

| Focus Area Name         | 1m SLR Year 2100 + 1:500 year storm surge | Economic Valuation Results |
|-------------------------|---|----------------------------|
| South Sidney            | 3.79m                                     | \$93,646,052               |
| Tsehum Harbour - Sidney |   | \$76,829,883               |

### Next Steps – Sea Level Rise Planning Approaches Project

As part of our funding agreement with Natural Resources Canada, the CRD and partners are engaging in a second phase of this project to collect, evaluate and share existing planning, regulatory and structural approaches to address sea level rise. Over the next five months, the CRD Climate Action Program and local municipal representatives will lead this project to engage local and regional government staff and ultimately recommend relevant tools for our region.

### Next Steps - Detailed Analysis

To date, there are no plans to undertake more detailed analysis at a regional scale. The CRD Climate Action Program will endeavour to understand data and resource requirements if this were to be identified as a need in the future.

### Questions

Please direct inquiries regarding this project to:

Nikki Elliott, CRD Climate Action Program Coordinator  
Tel: 250 360 3048  
Email: nellott@crd.bc.ca

Town of Sidney  
February 17, 2015

Appendix A –

**Estimated Flood Construction Level (FCL) and Inundation + Storm Surge in Year 2100 Map**

Below is a map specific to your municipality showing the results of the AECOM report and the results of the CRD in-house mapping that was undertaken to support the review of the Province of BC's *proposed* Flood Hazard Land Use Management Guideline amendments (previously sent to Climate Action IMWG members on November 21, 2014).

Please see the *February 2015 CRD Methodology and FAQ Document* for further information on the CRD in-house mapping.

**Criteria included in the map:**

**AECOM Report results (purple colours) = Year 2100 SLR + HHWLT + vertical land movement + 1:500 storm surge scenario = 3.79m total**

**CRD In-house Flood Construction Level Review (orange/brown colours) = AECOM results + Wave Effects [estimated value from Provincial guidance documents of 0.65m] + freeboard [estimated value from Provincial guidance documents of 0.6m] = 5.04m total**



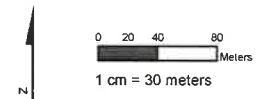
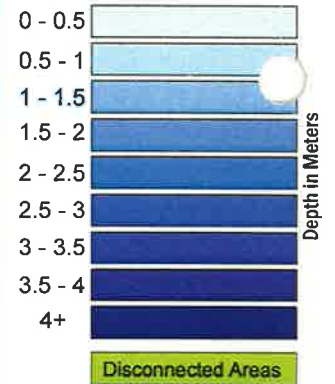


# CRD Inundation Mapping South Sidney

Year 2050

Shoreline

HHWLT + 0.5m SEA LEVEL RISE



**AECOM**

Projection:  
UTM Zone 18N, North American Datum 1983  
Vertical Datum:  
CGVD88

Date: 9/25/2014



Important: This map has been prepared for information purposes. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy, currency or completeness of this map or the suitability of the map for any purpose. The CRD disclaims all warranties in connection with the map or suitability of the map for any purpose. The CRD will not be liable and has no obligation for any damage, loss or injury resulting from the use of the map or information on the map.

For more context about the maps and analysis, including a description of the data and methods used, please see the Capital Regional District Coastal Sea Level Rise Risk Assessment Report (2014).

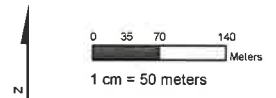
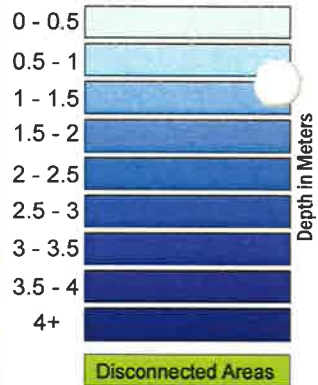




**CRD Inundation Mapping**  
**Tsehum Harbour**  
**Year 2050** **Sidney**

Shoreline \_\_\_\_\_

HHWLT + 0.5m SEA LEVEL RISE



Projection: UTM Zone 10N, North American Datum 1983  
 Vertical Datum: CGVD98  
 Date: 8/21/2014



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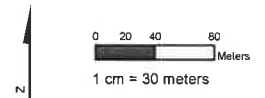
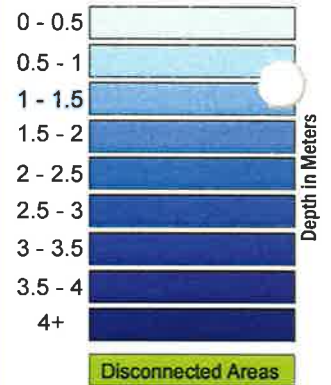


# CRD Inundation Mapping South Sidney

Year 2100

Shoreline \_\_\_\_\_

HHWLT + 1.0m SEA LEVEL RISE



Projection: UTM Zone 10N, North American Datum 1983  
Vertical Datum: CGVD28 Date: 5/24/2014



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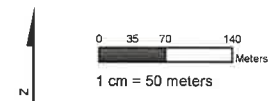
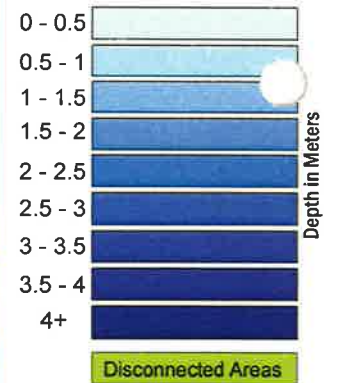


**CRD Inundation Mapping**  
**Tsehum Harbour**  
**Sidney**

Year 2100

Shoreline \_\_\_\_\_

HHWLT + 1.0m SEA LEVEL RISE



**AECOM**

Projection:  
 UTM Zone 18N, North American Datum 1983  
 Vertical Datum:  
 CGVD28

Date: 5/24/2014



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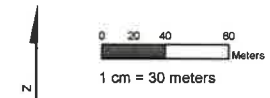
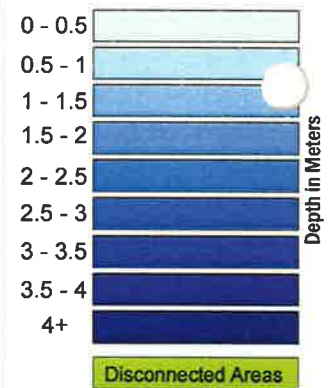


# CRD Inundation Mapping South Sidney

Year 2200

Shoreline \_\_\_\_\_

HHWLT + 2.0m SEA LEVEL RISE



Projection: UTM Zone 18N, North American Datum 1983  
Vertical Datum: CGVD88  
Date: 8/22/2014



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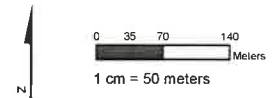
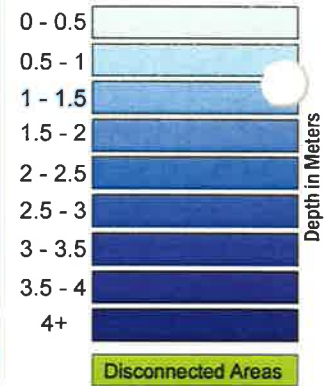




**CRD Inundation Mapping**  
**Tsehum Harbour**  
*Year 2200* **Sidney**

Shoreline \_\_\_\_\_

**HHWLT + 2.0m SEA LEVEL RISE**



Projection: UTM Zone 18N, North American Datum 1983  
 Vertical Datum: CGVD98  
 Date: 10/21/2014



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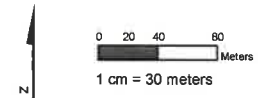
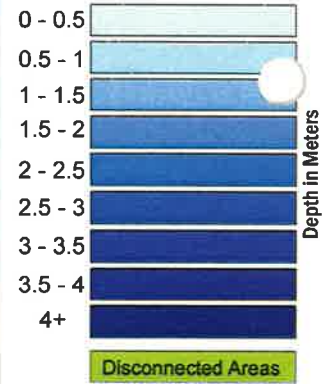


# CRD Inundation Mapping South Sidney

Year 2050

Shoreline \_\_\_\_\_

HHWLT + 0.5m SEA LEVEL RISE  
+ 1.3m STORM SURGE



Projection: UTM Zone 10N, North American Datum 1983  
Vertical Datum: CGVD28  
Date: 9/21/2014



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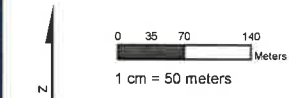
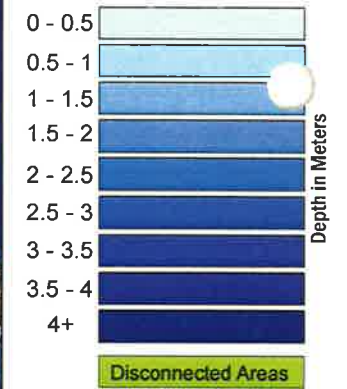
For more context about the maps and analysis, including a description of the data and methods used, please see the Capital Regional District Coastal Sea Level Rise Risk Assessment Report (2014).





**CRD Inundation Mapping**  
**Tsehum Harbour**  
*Year 2050* **Sidney**  
 Shoreline \_\_\_\_\_

HHWLT + 0.5m SEA LEVEL RISE  
 + 1.3m STORM SURGE



Project Name: STM Zone IPR, North American Drive 1883  
 National District: COV028  
 Date: 8/22/2014



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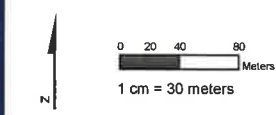
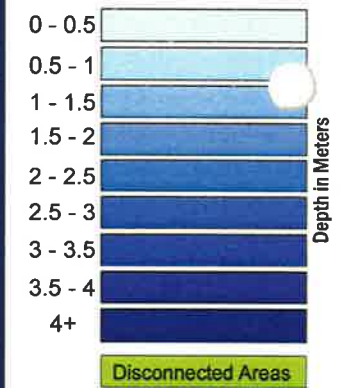


# CRD Inundation Mapping South Sidney

Year 2100  
Shoreline

Economic Impact  
Analysis Area

HHWLT + 1.0m SEA LEVEL RISE  
+ 1.3m STORM SURGE



Projection:  
UTM Zone 10N, North American Datum: 1983  
Vertical Datum:  
CGVD08  
Date: 9/21/2014



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**Note:** Financial valuation analysis was conducted on the inundation properties located within the economic impact analysis for the HHWLT + 1.0m Sea Level Rise + 1.3m storm surge scenario. Properties located outside of the inundation area, and properties that are inundated, but outside of the economic impact analysis are not included within the financial valuation analysis contained within the Capital Regional District Coastal Sea Level Rise Risk Assessment Report (2014).

For a description of data and methods used, please see the Capital Regional District Coastal Sea Level Rise Risk Assessment Report (2014).

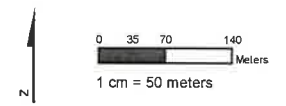
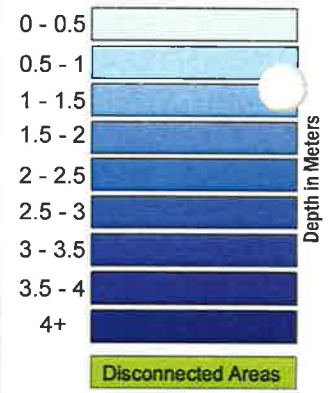




**CRD Inundation Mapping**  
**Tsehum Harbour**  
**Year 2100**  
**Shoreline**  
**Sidney**

Economic Impact Analysis Area 

**HHWLT + 1.0m SEA LEVEL RISE**  
**+ 1.3m STORM SURGE**



**AECOM**

Projection: UTM Zone 10N, North American Datum 1983  
 Vertical Datum: CGVD88  
 Date: 09/17/2018

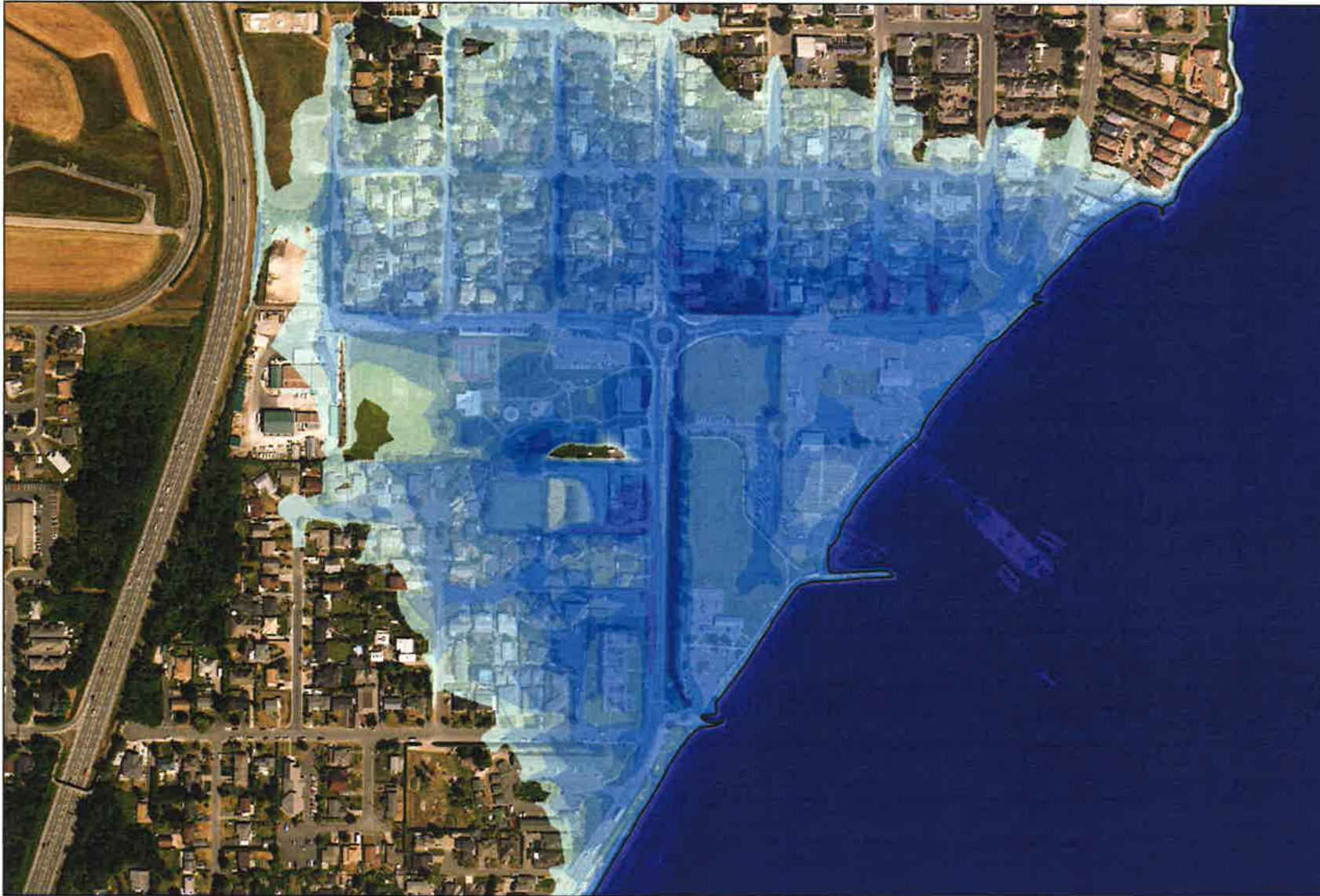


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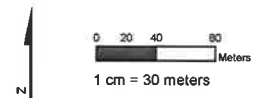
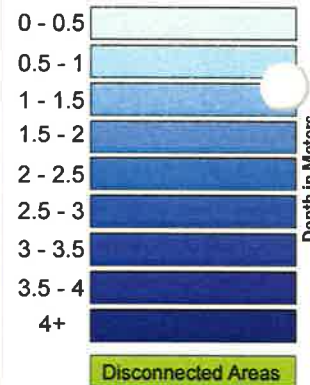


# CRD Inundation Mapping South Sidney

Year 2200

Shoreline \_\_\_\_\_

HHWLT + 2.0m SEA LEVEL RISE  
+ 1.3m STORM SURGE



Projection: UTM Zone 18N, North American Datum 1983  
Vertical Datum: CGVD28  
Date: 8/21/2014



Important: This map has been prepared for information purposes. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy, currency or completeness of this map or the suitability of the map for any purpose. The CRD disclaims all warranties in connection with the map or suitability of the map for any purpose. The CRD will not be liable and has no obligation for any damage, loss or injury resulting from the use of the map or information on the map.

For more context about the maps and analysis, including a description of the data and methods used, please see the Capital Regional District Coastal Sea Level Rise Risk Assessment Report (2014).



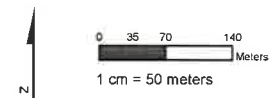
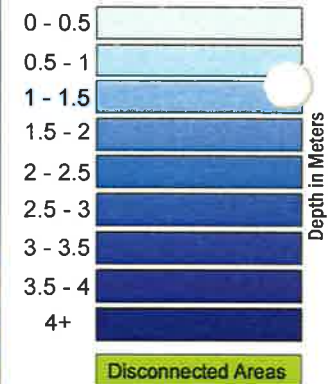


**CRD Inundation Mapping**  
**Tsehum Harbour**  
**Sidney**

Year 2200

Shoreline

HHWLT + 2.0m SEA LEVEL RISE  
 + 1.3m STORM SURGE



**AECOM**

Projection: UTM Zone 18N, North American Datum 1983  
 Vertical Datum: CGVD88  
 Date: 8/22/2014



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