

Port Darlington Shoreline and Flood Damage Centre Study

Shore Protection Concepts

December 1, 2018

Outline

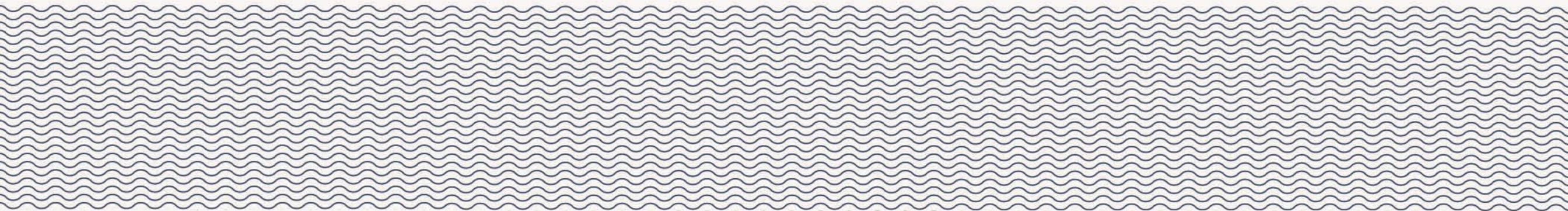
01 Coastal Conditions

02 Alternative Approaches to Shore Protection

03 Limitations of Erosion Protection Alternatives

04 Summary

Coastal Conditions



Site Conditions



Photo courtesy of SJL Engineering Inc.

B. | 515 | 8819



Site Conditions

B. | 519 | 8819

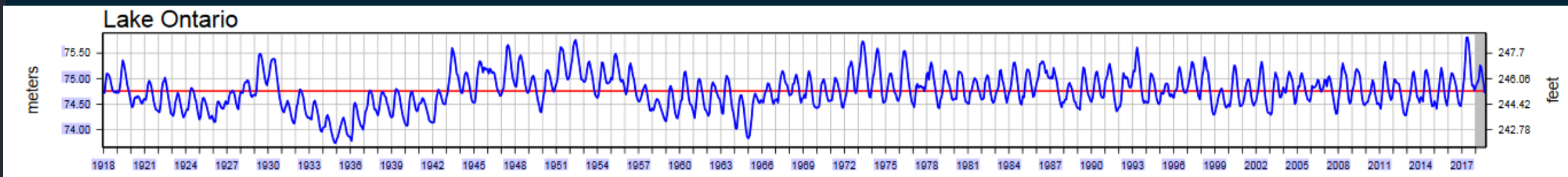
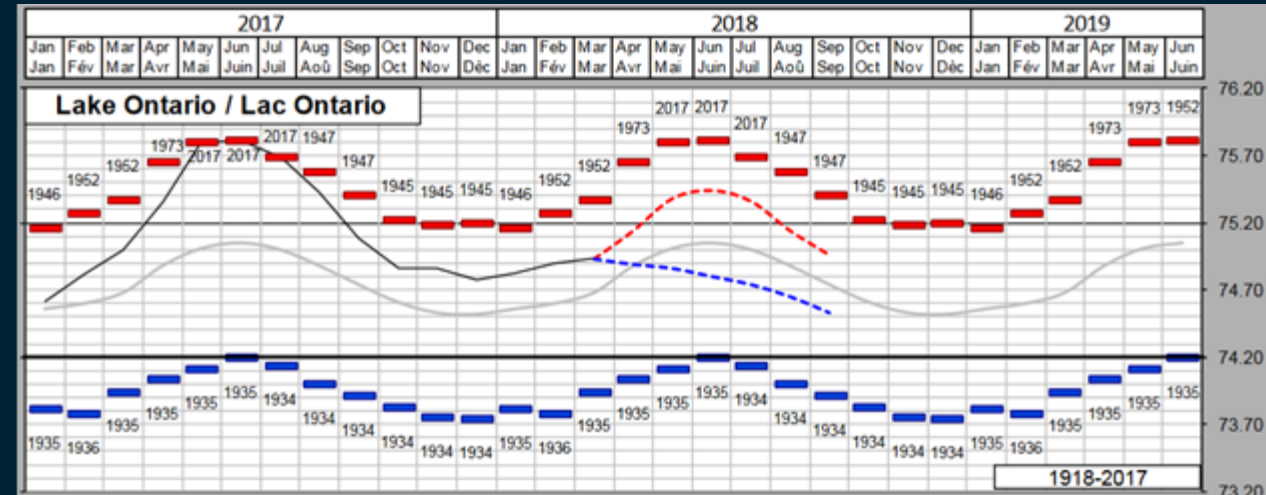
Bathymetry



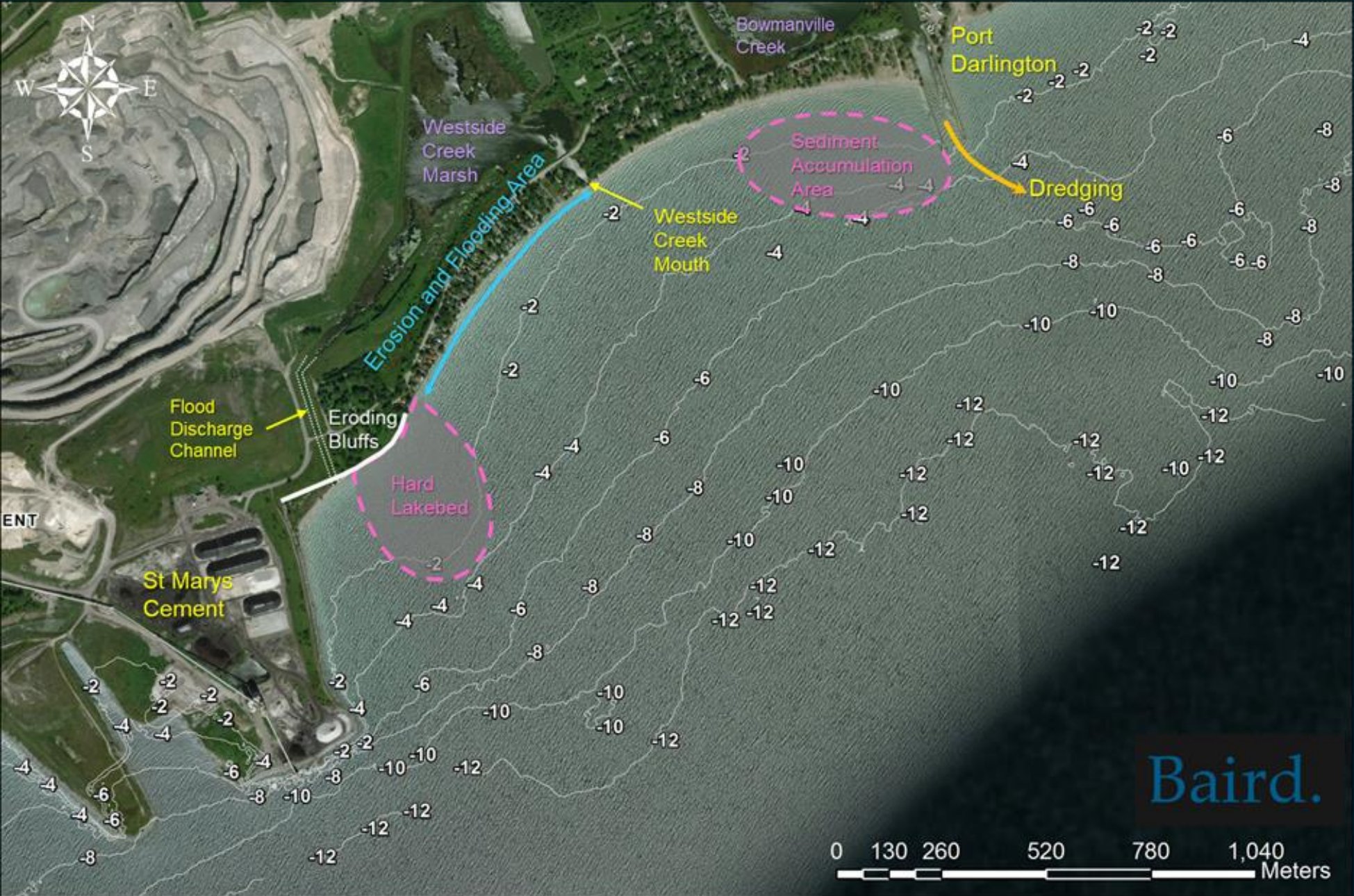
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Water Levels

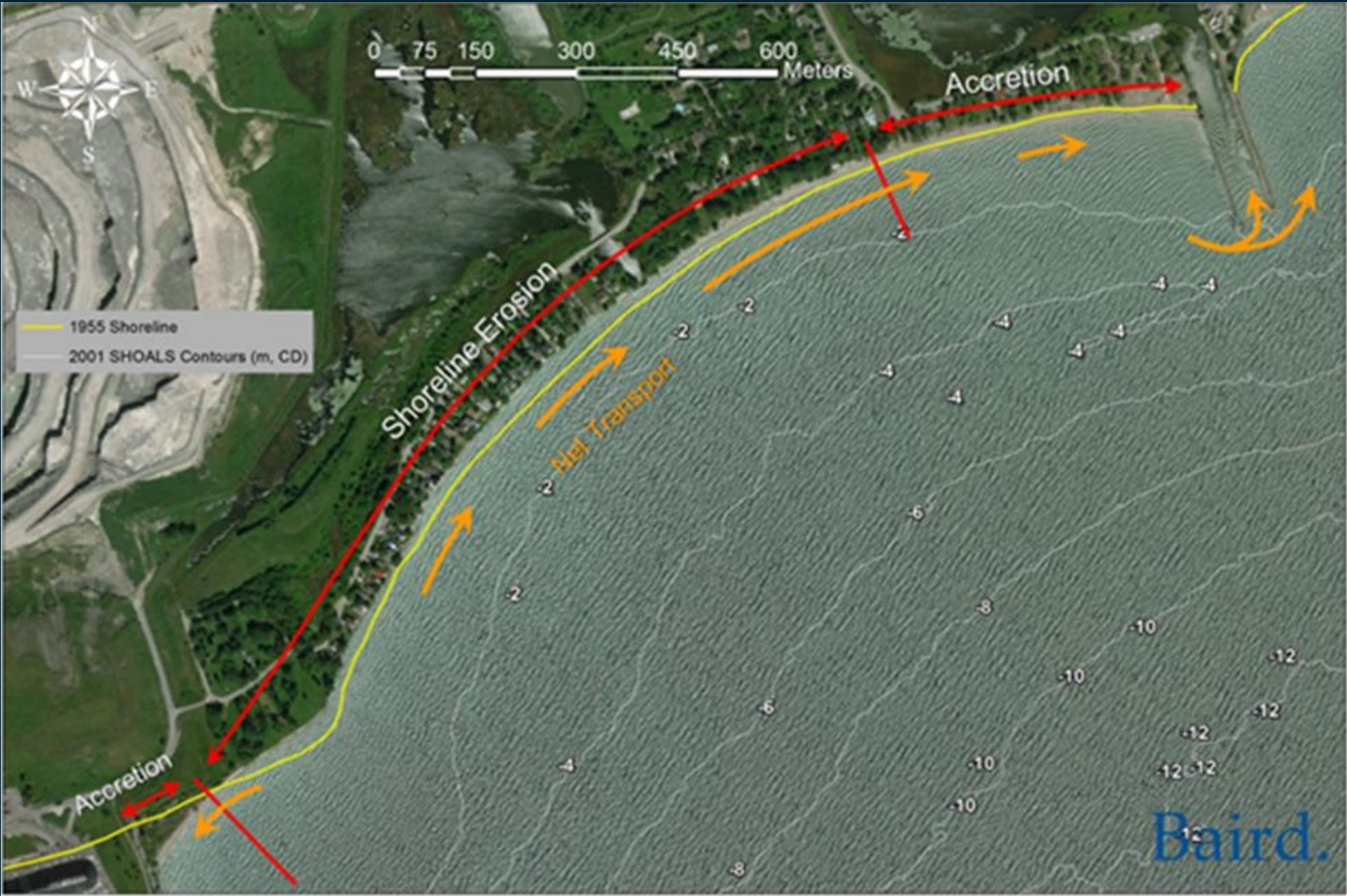
- Water levels on Lake Ontario vary seasonally and over the long term in response to climatic conditions
- Surge and wave uprush occur in response to storm events
- The site is also susceptible to flooding from Bowmanville Creek and Westside Creek



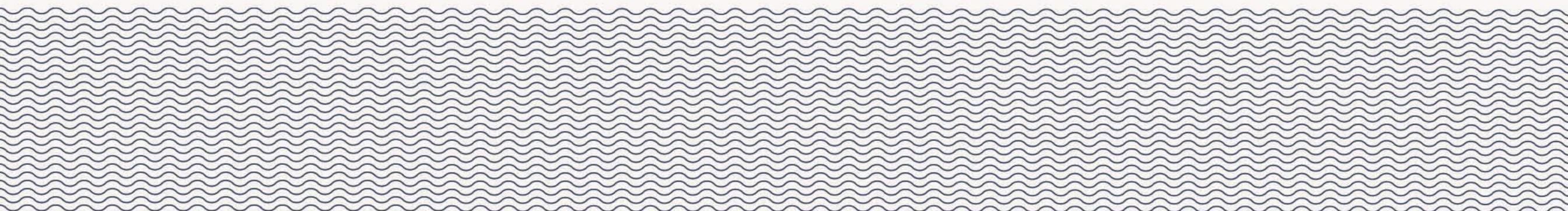
Sediment Processes



Sediment Processes

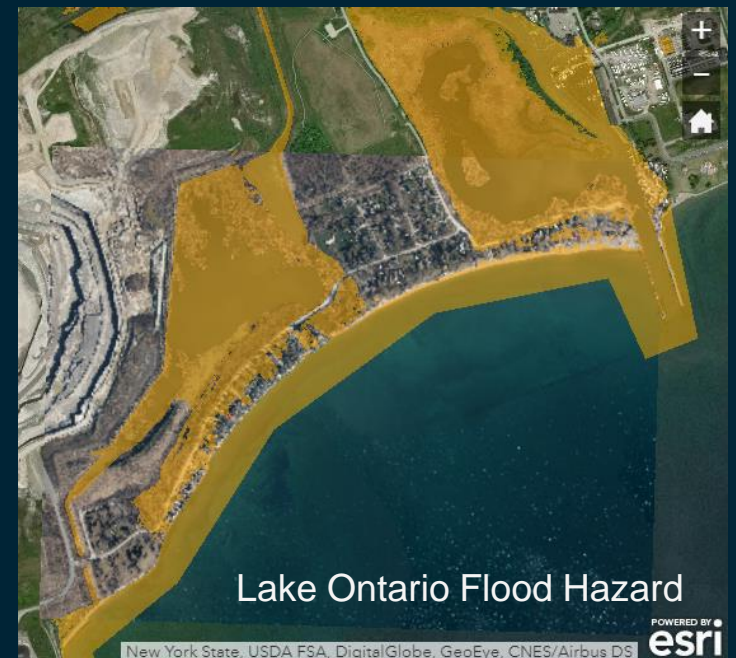
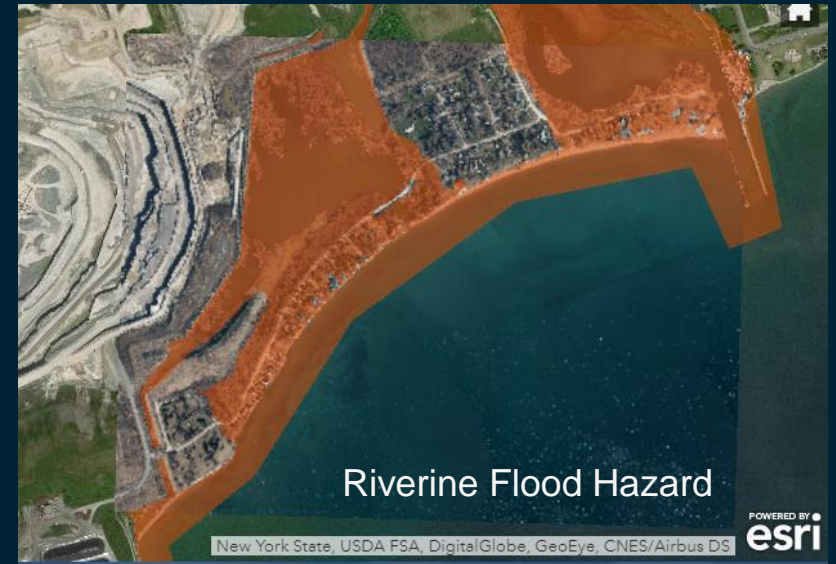


Alternative Approaches to Shore Protection



Design Basis

- Multiple hazards:
 - Lake Ontario Erosion Hazard
 - Lake Ontario Flood Hazard
 - Lake Ontario Dynamic Beach Hazard
 - Riverine Flood Hazard
- Development of erosion protection alternatives
- Alternatives do not address:
 - Lake Ontario Flood Hazard
 - Flooding from Westside Creek or Bowmanville Creek
- All shore protection works require some level of maintenance in perpetuity



Images courtesy CLOCA

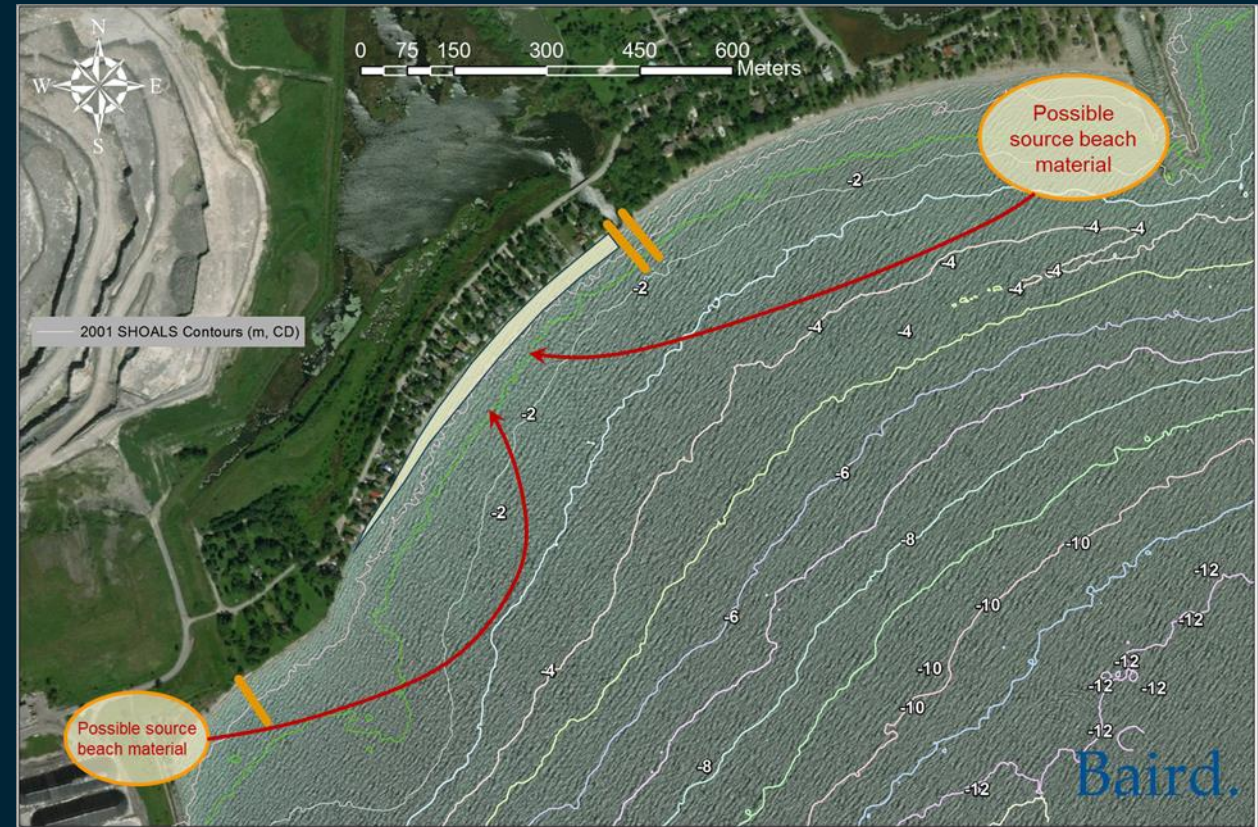
Overview of Concepts

- Four concepts developed to manage shoreline erosion
- Three integrated approaches that include beaches and improved flow at creeks
- One simple revetment alternative



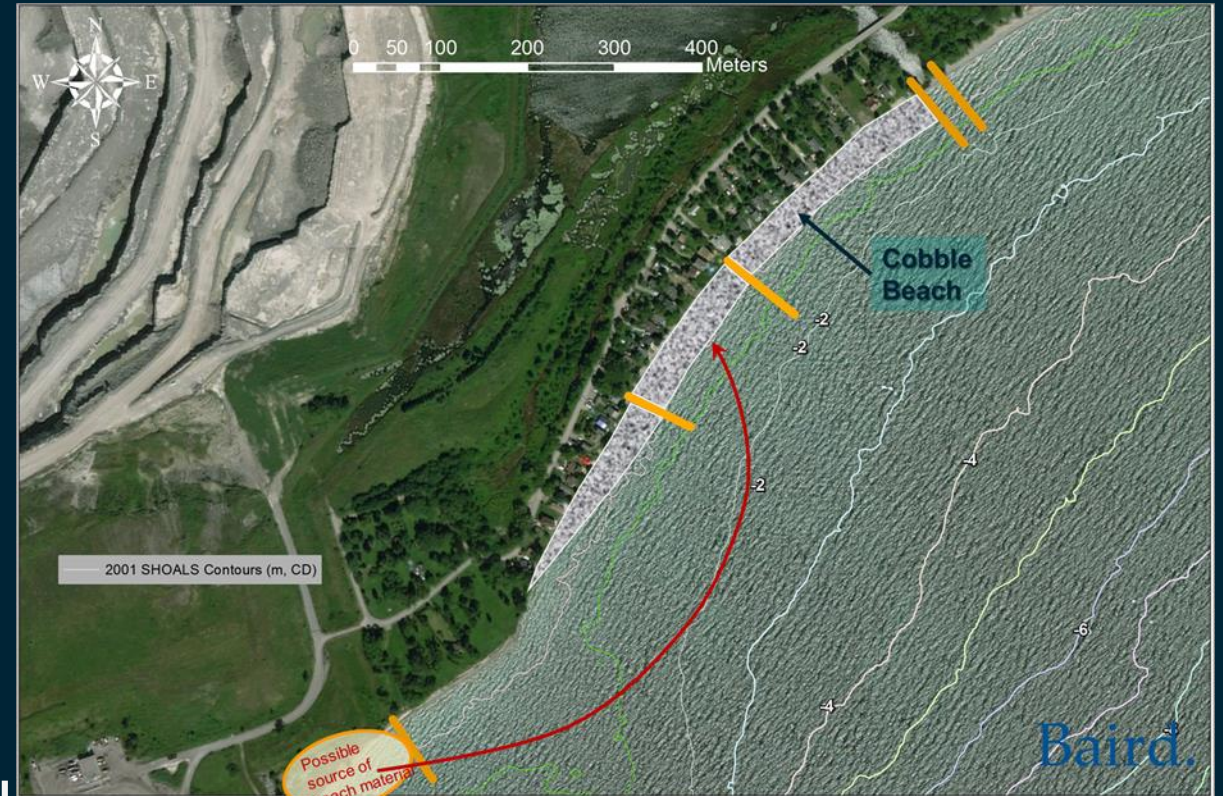
Concept 1: Sand and Cobble Beach

- Sand and cobble beach along Cedar Crest Beach Road
- Potential public amenity
- Jetties mitigate flooding from inland
- Erosion protection
- Reduces flooding from wave runup but does not fully address flooding during high water levels
- Beach nourishment required



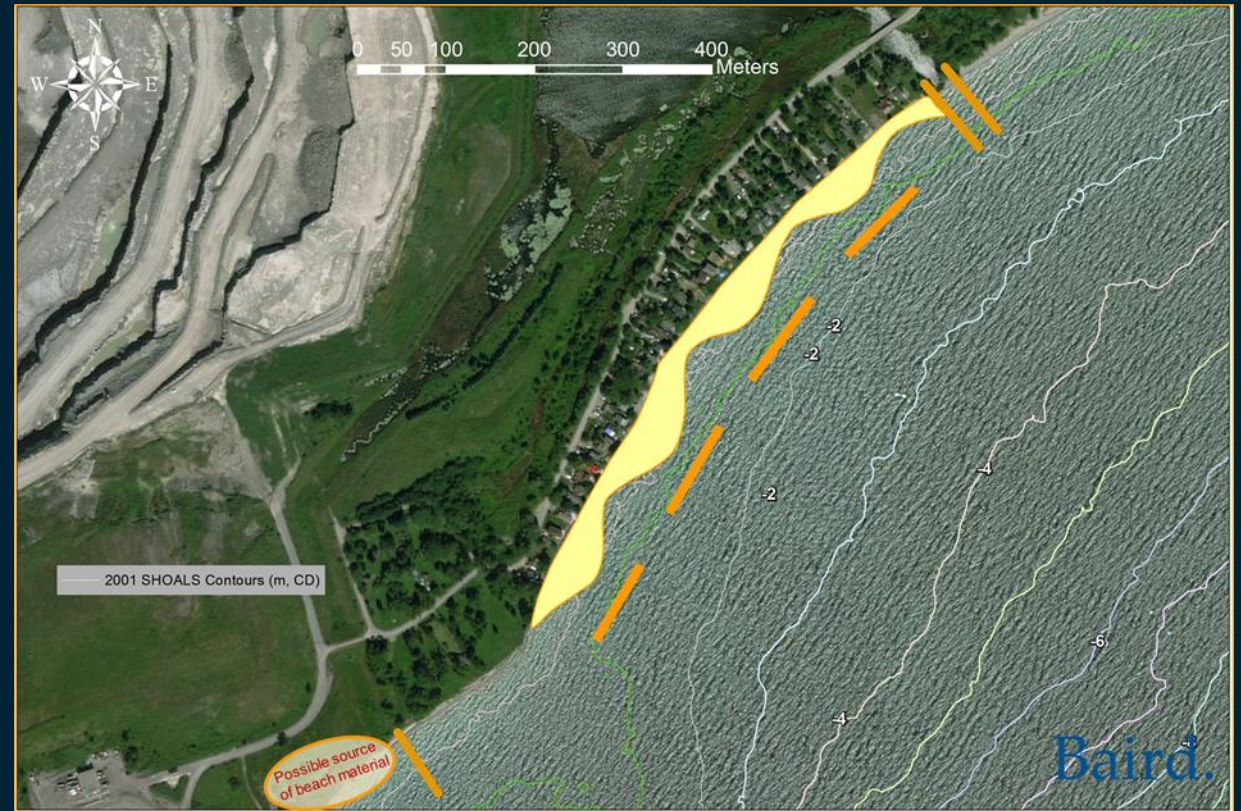
Concept 2: Cobble Beach

- Cobble beach along Cedar Crest Beach Road
- Potential public amenity but cobble may be difficult to walk on
- Erosion protection and mitigates flooding from wave uprush
- Jetties mitigate flooding from inland
- Groynes anchor and stabilize the beach
- Minimal beach nourishment required



Concept 3: Sand/Cobble Beach with Offshore Breakwaters

- Sand and cobble beach along Cedar Crest Beach Road
- Potential public amenity
- Erosion protection and mitigates flooding from wave uprush
- Jetties mitigate flooding from inland
- Offshore breakwaters anchor and stabilize the beach
- Minimal beach nourishment required



Concept 4 : Armourstone Revetment

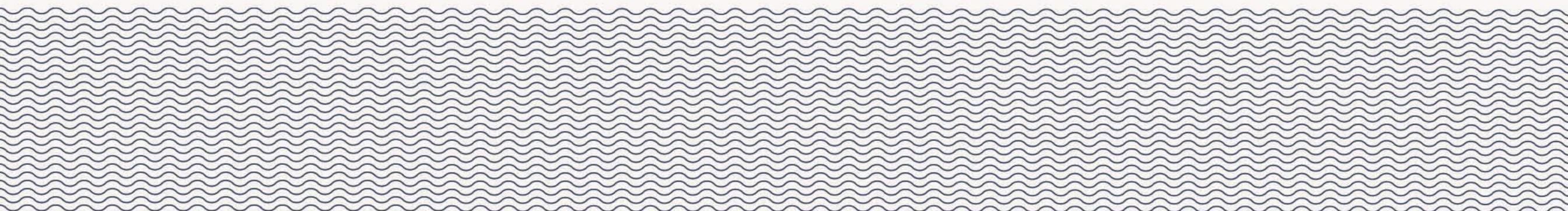
- Armourstone revetment along Cedar Crest Beach
- No public amenity
- Erosion protection
- No jetties to mitigate flooding from inland
- Limited protection against wave runup and overtopping



Opinion of Probable Cost (Concept Level)

Concepts	Cost (\$CND)	Length of Shoreline Protected (m)	Cost Per Metre of Shoreline Protected
Concept 1	\$4.3 million	650	\$6,600/m
Concept 2	\$10.4 million	700	\$14,900/m
Concept 3	\$16 million	750	\$21,300/m
Concept 4	\$3.7 million	650	\$5,700/m

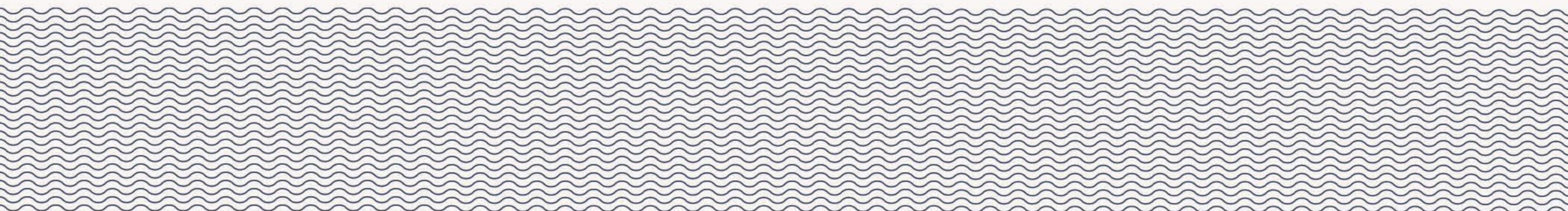
Limitations of Concepts Developed



Limitations of Concepts Developed

- Properties along Cedar Crest Beach are located in the Lake Ontario flood, erosion and dynamic beach hazard
- They are also in the Regulation Limit for flooding from Westside Creek and Bowmanville Creek
- Concepts have been developed for erosion protection
- Some concepts mitigate flooding due to wave uprush from Lake Ontario
- Concepts do not address the flood hazard from Westside Creek and Bowmanville Creek
- All shore protection requires some level of maintenance in perpetuity

Summary – Hazards, Risks and the People Impacted



Hazards, Risk and People Impacted

- This shoreline highlights some of the difficult issues that property owners, conservation authorities and municipalities deal with on a regular basis
- Properties were developed historically, within the hazard, prior to identification and delineation of hazards
- These properties are typically located on what appears to be desirable land, along the shorelines of the Great Lakes
- There is pressure from property owners to allow larger and more permanent housing – where simple cottages existed, there are now large houses, occupied year round
- Home owners wish to protect their investment, and are often unaware of the risks

Darlington Area in the News



Hazards, Risk and People Impacted

- Cost of protecting the shoreline can exceed \$20,000 per metre of shoreline
- In many cases, the cost of protecting exceeds the value of the property
- Some other options include:
 - Relocation
 - Acquisition

Thank you

Questions?

Baird.

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