

# SILVERLEAVES

## Coastal Processes Study Summary

Prepared for Department of Energy, Environment, and Climate Action  
July 2024

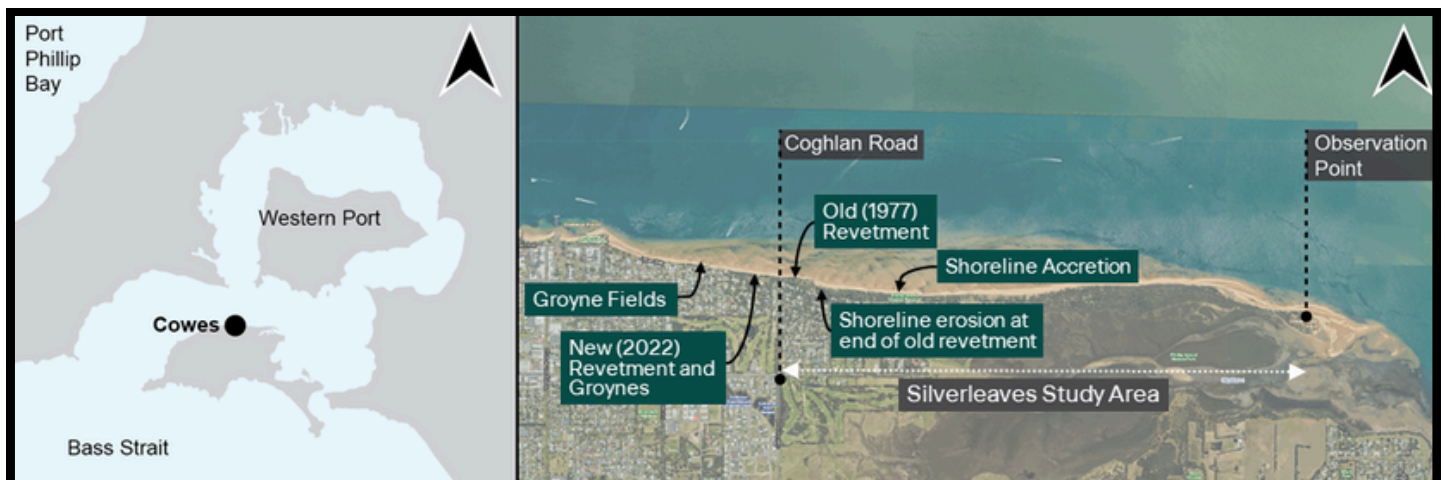
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Energy,  
Environment  
and Climate Action

# STUDY SUMMARY

The study investigates how waves, tides, and winds influence the Silverleaves coastline, with a focus on erosion, inundation, and sediment transport. Its goal is to comprehend the impacts of these processes, sand movement dynamics, and the impact of coastal protection structures along the coast.



This figure shows the location of the site in relation to Western Port (left), and the Silverleaves study area with key features outlined (right) (imagery and features sourced from CoastKit, 2024).

## Key components of the study include:

- **Community consultation:**  
Engaging with the local community and examining historical photographs and documents.
- **Review previous studies:**  
Collecting background information and examining historical trends.
- **Numerical modelling:**  
Simulating currents and waves to analyse sediment transport.
- **Survey data analysis:**  
Comparing survey data to evaluate changes in deposition and erosion patterns and rates.
- **Hazard assessments:**  
Identifying areas vulnerable to erosion and flooding.

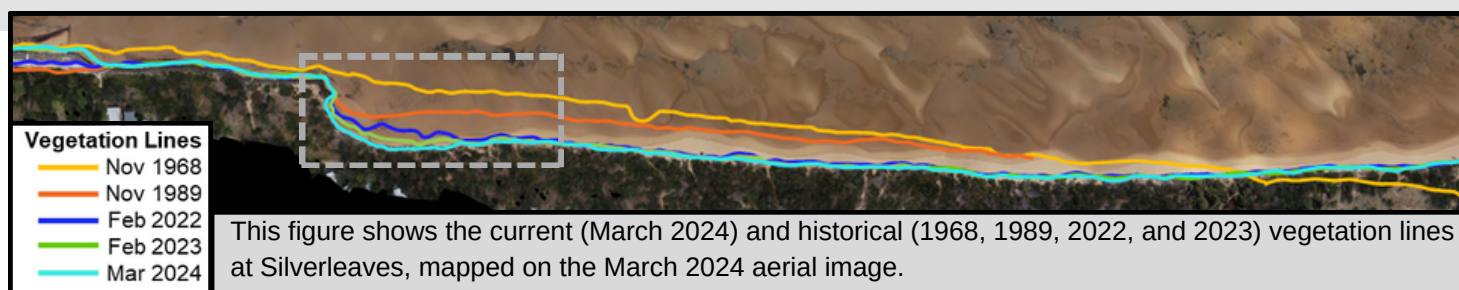


# EROSION HAZARDS

## Shoreline Changes at Silverleaves

Silverleaves has changed significantly over geological timescales and has been formed by successive spits and the natural filling in of the Silverleaves Bight. In recent history, the eastern shoreline has experienced accretion while the western shoreline has faced ongoing erosion, receding about 77 metres since 1953. This is mainly due to terminal erosion from a nearby revetment and reduced sand supply caused by natural factors and upstream human activities like groynes and revetments. Since 2022, terminal erosion has locally accelerated, with the shoreline retreating up to 16 metres in just two years.

| Timeframe    | Recession Rate    |
|--------------|-------------------|
| 1953 to 1974 | 0.15 m/year       |
| 1974 to 1987 | 2.15 m/year       |
| 1987 to 2018 | 0.9 m/year        |
| 2018 to 2022 | 1.8 m/year        |
| 2022 to 2024 | <b>6.0 m/year</b> |



This figure shows current and historical vegetation lines at Silverleaves erosion hotspot, highlighting accelerated erosion in recent years.

**Flow model results** show how the orientation of the eroded shoreline at Silverleaves affects tidal currents. As water flows past the end of the revetment, the flow separates, generating turbulence and forming an eddy, which under certain conditions can increase local scour. These mechanisms indicate low potential for natural recovery of this eroding shoreline.

**Wave model results** indicate relatively low wave energy at the site, which drives eastward longshore currents. Future sea levels will allow for larger waves to reach the shoreline, enhancing scour potential.

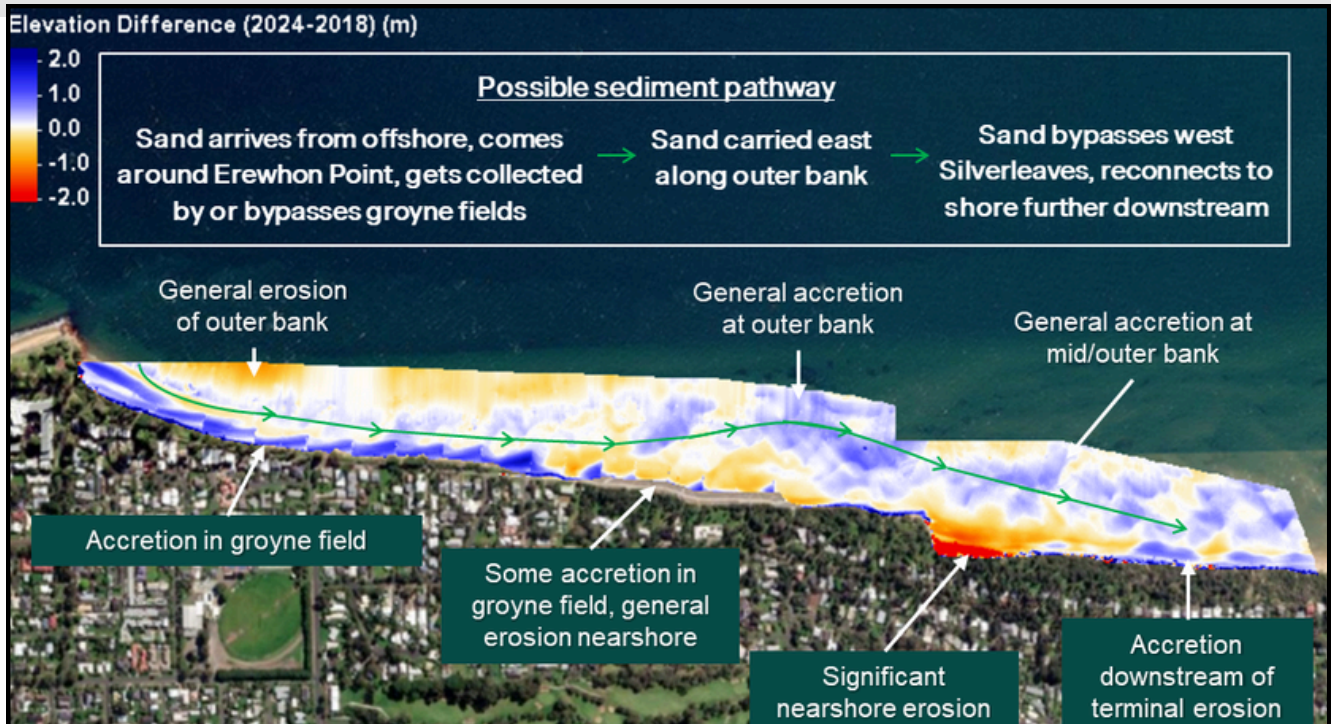


This figure shows flow model results near the Silverleaves erosion hotspot, illustrating the longshore currents that bypass the hotspot, as well as the eddy and flow separation in lieu of the revetment.

# EROSION HAZARDS

## Survey Analysis

Bathymetric surveys from the Victorian Coastal Monitoring Program were evaluated and compared over various timeframes (2018 to 2024 at 6 to 8 week intervals) to assess erosion/deposition patterns and to identify potential sediment pathways.



This figure shows survey comparison between 2018 and 2024, cool colors indicate accretion and warm colors indicate erosion. The figure illustrates a potential sediment pathway across Cowes East to Silverleaves.

## Hazard Lines

Erosion hazard lines for various timeframes were determined based on probabilistic analysis of key erosion factors including long term erosion trends, short term (storm driven) erosion, and shoreline recession due to sea level rise. Consistent setback distances were applied across Silverleaves coast due to the uncertainty surrounding future shoreline responses and reorientation.



This figure shows possible future shoreline setback extents for Silverleaves, assuming no intervention.



# INUNDATION HAZARDS

Previous inundation hazard studies have shown that a significant portion of Silverleaves is within the hazard zone for both permanent inundation (due to future sea level rise) as well as temporary inundation (during storm events). Much of the potential inundation hazard is likely to originate from Rhyll Inlet. Storm tides can propagate with minimal attenuation into Rhyll Inlet and along the low fingers of land, extending towards Silverleaves shoreline.

This mechanism of flooding from behind via Rhyll Inlet complicates hazard management, as this hazard cannot be managed through protection structures along the coast. Instead, a broader understanding and comprehensive management plan for the entire area are required to effectively address this issue.

