

## Purpose of this document

This document provides a briefing on storm impacts along the shore at Golspie (Highland). This briefing note is for information and can be shared with partners and the public.

## Headlines

1. The town and links at Golspie have seen significant storm impacts due to large waves coinciding with high spring tides between Fri 9<sup>th</sup> and Mon 12<sup>th</sup> Feb 2024.
2. Storm impacts include:
  - a. substantial changes to the upper foreshore, removal and movement of sand and shingle (north of pier, golf course frontage above defences)
  - b. wave overtopping of structures and inundation of cobbles, shingle, sand and kelp (prom. and adjacent properties etc)
  - c. damage to shore-side assets (railings and walls) and possible undermining of sea wall (along the prom)
  - d. Exposure of buried infrastructure (200mm pipe exposed south of Church St)
  - e. Breach and inundation of caravan park, possible flooding of residential property.
  - f. Damage to informal defences at kart track, resulting in the release of waste tyres.
3. Clean-up efforts were rapidly undertaken within the town, golf course, caravan park and Kart Track.

## Context

Whilst not a named storm, large onshore waves were forecast to coincide with spring tides between Friday 9<sup>th</sup> to Monday 12<sup>th</sup> February. SEPA released a flood warning for the area wider shore, noting possible risks to coastal communities. Tides were expected to be high, peaking at 4.7 - 5.2mCD (levels calculated at Inverness).

The Golspie community is well aware of flood and erosion risks and has been actively considering how to address these. The Highland Council has undertaken a flood study and is awaiting the next round of Scottish Government funding to pursue preferred works. The community council have noted that this is the third time they have seen coastal flood impacts in four months.

Storm impacts were noted over this weekend including at Stonehaven, Leven, Arbroath, Montrose, Lossiemouth, Kingston, Boddam, Kirkcaldy, Churchill Barriers (Orkney).

Despite 10 named storms this winter, MetOffice [research](#) shows no statistical increase in storm frequency, in recent decades. Considering other storm components, rainfall totals and seasonality is increasing, though [wind speeds](#) are not increasing. Rising sea levels were found to be underlying increased [coastal flood frequency](#) and the increasing [extent of erosion](#) on Scotland's erodible coast. The Committee on Climate Change have repeatedly noted that coastal erosion and coastal flood risks remains one of the most significant risks for Scotland ([CCC 2022](#)).

## Methodology



A review of social media was combined with a walk-over survey and drone flight on Thursday 15<sup>th</sup> February (rising tide). A repeat walk over at low tide is recommended. A low spring tide topographic / drone survey would be worthwhile for comparative purposes.

## Results

Location	Storm impacts & observations
Golspie Prom.	Clear evidence of wave thrown debris and occasional damage to railings. By Thursday several clean-ups had taken place by Council and community. Small sink hole noted at Prom, which is indicative of undermining of sea wall – though uncertain of when this occurred. Flood gates appeared to offer reasonable protection.
Golspie beach (north of pier)	Removal of sand from upper beach, overwash of waves and storm debris within narrow corridor.
Pier to golf course	Uncertain of beach changes (tide in), but damage to railings in places and erosion of grassed areas above defences. Exposure of (presumed) 200mm water pipe.
Golf course	Erosion of land above defences, movement of rock armour, loss of path in places. Extensive areas of overwash and wave thrown debris. Club's volunteers arranged a very rapid and effective clean-up operation. Note <a href="#">Community Resilience</a> .
Caravan park	Erosion of the upper beach has resulted in a new breach of the dunes, allowing substantial overwash and wave action continuing to access the interior of the dunes and seaward of




	embankment. The mechanisms for inundation of the area landward of the embankment is not clear. This continues to be evident during rising tide on Thursday 15 <sup>th</sup> . This erosion-enhanced flooding was anticipated and has been the focus of discussions since at least <a href="#">2013</a> . Erosion and flood risk was explored in a <a href="#">2021 report</a> . Substantial overwash between the Caravan park and Kart Track has also been observed.
Kart Track	Overtopping and overwash evident. Unorthodox coastal defences have had a mixed performance. Southern sections have failed / been undermined. Interior fill of tyre bales have become loose (as predicted by NatureScot), with some now scattered within the NNR to the south.
Loch Fleet NNR	Gravel ridge has retreated landwards whilst maintaining its integrity, <u>in contrast with the damage to the frontal ridge in those sections of coast that include built defences</u> . Overwash is evident within lower parts of the NNR.

### Figures & Multimedia links




Caption, Grid Ref	Image
1. Sink hole within the prom, north of Campbell's Lane. Uncertain of when it was created. (283314, 899951)	
2. Some sand and kelp remain after cleanup at Campbell's Lane (to the right), looking towards Murdo's Lane. (283263, 899916)	



Version: Final

<p>3. Council staff continue to clean up at Murdo's Lane. Sediments are being returned to the shore. (283244, 899909)</p>	
<p>4. Video of storm impacts and flooding at Murdo's Lane. (283232, 899902) <a href="#">Video Facebook</a> ©Nicki Mackay. Overtopping at 3.7mOD</p>	
<p>5. Extensive evidence of wave thrown debris to south of Murdo's Lane. (283186, 89985). This bank (4.3mOD) was also overtopped.</p>	



<p>6. Damage to railing south of the pier, uncertain how many of the uneven paving slabs are from this event. (282846, 899586)</p>	
<p>7. Wave thrown debris over grassed area and erosion of grass above defences at Church St. (282804, 899564)</p>	
<p>8. The orientation of erosion and the position of debris (thrown to west) confirm easterly waves. Church St. (282778, 899545)</p>	



9. Exposure of 200mm pipe. Possibly a water pipe, though the main sewer is also within the vicinity here.  
(282762, 899536)



10. Erosion of land above damaged defences and damage to handrail. Debris extending inland. Note main sewer runs coast parallel here.  
(282762, 899536)



11. Re-exposure of vertical sleepers (former defences). Erosion above rock armour and loss of path, adjacent to the norther end of golf course.  
(282701,899474)





12. Re-exposure of vertical sleepers (former defences). Erosion above rock armour and loss of path, adjacent to the norther end of golf course. (282692, 899460)




13. Video of southern part of golf course  
[Video YouTube](#)  
(282277, 898328)



14. Waves overtopping at caravan park  
[Video Facebook](#)  
(282154, 897910)  
©Cathy Spearing





<p>15. Pre-storm picture of Caravan park dune &amp; defences <a href="#">Facebook</a> @GolspieVillage Facebook/Gordon.</p> <p>(Crest elevation prior to these works was ca 4mOD)</p>	 A wide-angle photograph showing a large, flat, brownish dune area in the foreground. In the middle ground, there are several white caravan units and a green excavator. The background features rolling hills under a cloudy sky.
<p>16. Drone video (Thursday 15<sup>th</sup> Feb) new breach at Caravan park. <a href="#">Video YouTube</a> (282204, 898086)</p> <p>Much of the flooded low-lying interior is ca 1.8mOD. Intact main crest elevation 4mOD MHWS is 1.97mOD.</p>	 A drone shot showing a coastal area with a new breach in the dune. Waves are crashing through the breach, flooding the low-lying interior. Several white caravan units are visible in the background.
<p>17. Post storm shingle built up at overwash point. Note fence post is a strainer, normally 1.3m above ground level. (282166, 897913)</p>	 A close-up photograph of a beach covered in a thick layer of smooth, rounded shingle stones. A wooden fence post is visible in the foreground, partially buried in the shingle.



18. Unorthodox coastal defences (bales of waste car tyres) exposed at kart track. Wire holding the bales together has rusted away. Note over-washed sediment on track. (282143, 897761)



19. Video of kart track  
[Video YouTube](#)



20. Southern extent of Kart Track defences washed out, exposing car tyres, which have been carried south into Loch Fleet NNR. Note erosional bight at southern end of Kart track caused by presence of defences (282111, 897668)





21. Wide shingle ridge retreating over into the NNR maintaining its integrity. Tyres are evident within the at least the first few hundred metres.  
(282094, 897630)



End.