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Dynamic Coast – Scotland's National Coastal Change Assessment

Site Summary

Caerlaverock (Site 94)

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Scottish Natural Heritage
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Disclaimer

The evidence presented within the National Coastal Change Assessment (NCCA) must not be used for property level of scale investigations. Given the precision of the underlying data (including house location and roads etc.) the NCCA cannot be used to infer precise extents or timings of future erosion.

The likelihood of erosion occurring is difficult to predict given the probabilistic nature of storm events and their impact. The average erosion rates used in NCCA contain very slow periods of limited change followed by large adjustments during storms. Together with other local uncertainties, not captured by the national level data used in NCCA, detailed local assessments are unreliable unless supported by supplementary detailed investigations.

The NCCA has used broad patterns to infer indicative regional and national level assessments to inform policy and guide follow-up investigations. Use of these data beyond national or regional levels is not advised and the Scottish Government cannot be held responsible for misuse of the data.

Caerlaverock (Site 94)

Historical Change: Substantial changes to the salt marshes areas at Caerlaverock have occurred between 1898 and 1956, indeed moving east from the mouth of the River Nith there are very few areas which have not changed (Figure Figure 7.1). In general, between 1898 and 1956 there has been gain of area in the west and loss of area in the east. From the west, 4 km of coast has advanced up to 490 m seawards (12 m/yr) resulting in the gain of 170 ha. This area of advance petered out and was replaced by stability south of Caerlaverock Castle for 800m before erosion dominated the main section of the eastern marsh for around 4 km. Along this stretch, MHWS retreated up to 340 m between 1898 and 1956 (5.6 m/yr), resulting in the loss of 85 ha. The losses reduce gradually and changed to gains towards the mouth of the Lochar Water, where MHWS moved seawards by up to 590 m in the 60 years (9 m/yr), producing 43 ha of salt marsh in the 60 years preceding 1958. In total, in the 60 years between 1898 and 1958, based on the movement of MHWS, there has been a net gain of around 128 ha (2 ha/yr), with losses within the central section and accretion to the west and the eastern extremities. Caerlaverock Castle is a Scheduled Monument and the marshes form part of the Upper Solway Flats and Marshes Special Protection Area, Site of Special Scientific Interest and the Solway Firth Special Area of Conservation.

Between 1956 and 2015, the changes at Caerlaverock have been equally impressive. Historic gains in the west have been replaced by 330 m of loss up until 2015 (5 m/yr), although MHWS still lies seaward of its 1989 position (Figure 7.1). These losses stretch over 2 km eastwards of Caerlaverock Castle and consumed saltmarsh that existed before 1898 so that about 200 ha of salt marsh have been lost over the 57 years (4 ha/yr) in its western extent. In the eastern part of Caerlaverock, the trend has been predominantly an accretional one, with the 2015 shoreline reoccupying that of the position in the 1898 maps. In some places the gains are up to 200 m (3 m/yr). Further eastwards however, the accretional gains reduce and are replaced by retreat in and around the mouth of the Lochar Water, where up to 60 m have been lost (1 m/yr).

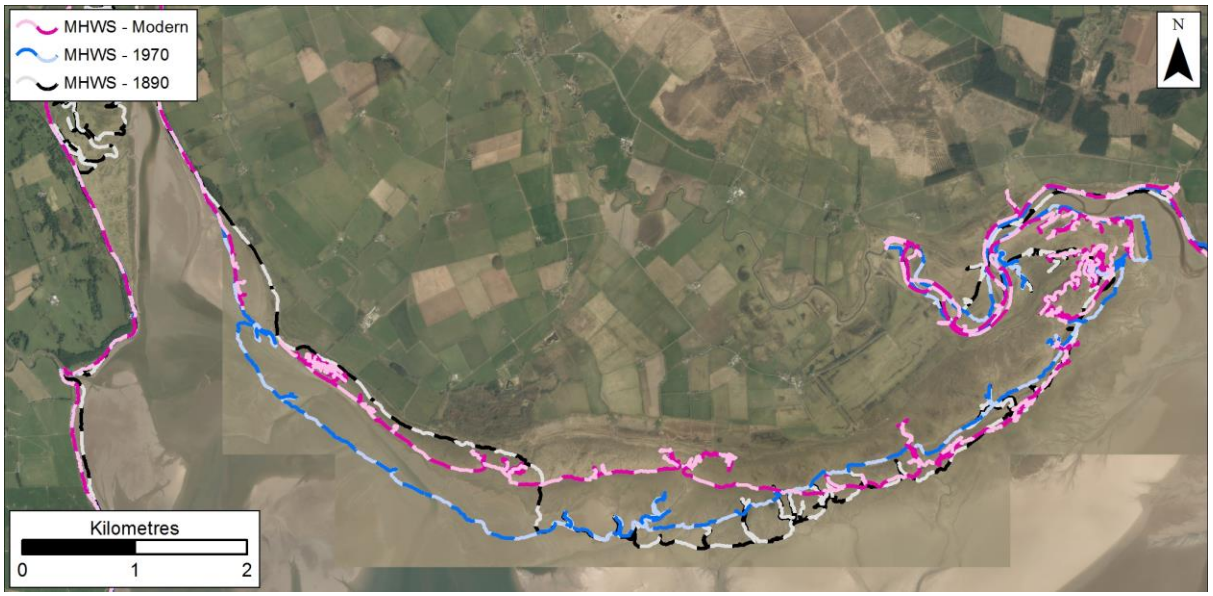

Figure 7.1: MHWS position in 1890, 1970s, and Modern datasets at Caerlaverock. Getmapping are our current providers of Scotland-wide digital aerial imagery© Getmapping plc.

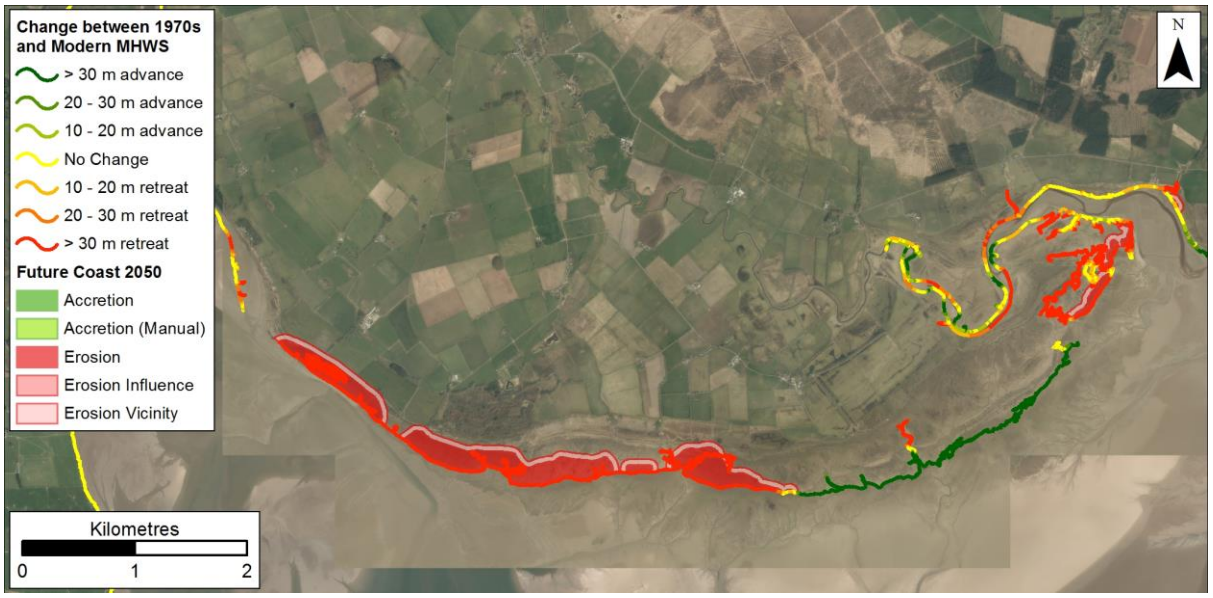

Figure 7.2: Possible future coastline position in 2050 based on rates between 1970 and Modern MHWS data at Caerlaverlock. Getmapping are our current providers of Scotland-wide digital aerial imagery© Getmapping plc.

Future Vulnerability: Projecting the recent rates (1956 to 2015) forwards, the anticipated position of MHWS in 2050 would lie up to 200 m inland of its current position in the western third, and up to 300 m inland in the central section of Caerlaverock (Figure Figure 7.2). Over substantial stretches of the western half of the marsh this simply reoccupies the approximate 1898 position. Assuming uniform rates, by 2050 the coastal road would be within 30 m of MHWS. If the recent rates continue then these losses would reduce the area of salt marsh by 57 ha by 2050 (1.6 ha/yr). Within the vicinity of the Lochar Water, a further 3 ha of salt marsh is expected to be lost by 2050, based on the continuation of uniform recent rates. Excluding the coastal road, the other notable assets are the designated Solway Firth saltmarsh sites but there are no fixed industrial, housing or transport assets.

References

This is an extract from:

Rennie, A.F., Hansom, J.D., and Fitton, J.M. (2017) Dynamic Coast - National Coastal Change Assessment: Cell 6 - Mull of Kintyre to the Mull of Galloway, CRW2014/2.The full version of this report and others are available at:

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