

WORKINGTON TO MARYPORT**Baseline Information****Start co-ordinate:** 298315, 529573 **Finish co-ordinate:** 302966, 536857**Total length:** 8.8km **Defended length:** 2.8km**Sea Wall:** 1.4km **Rock Armour:** 1.4km**Artificial cliff:** 6.0km**Environmental designations:**

- None

Monitoring carried out:

- 28 beach profiles
- Coastal defence inspection

Site overview:

This section of the Allerdale frontage sits between the harbours of Workington and Maryport. The first shipments from Workington occurred in the early 17th century. At the beginning of the 19th century the size of the harbour was increased. In 1856 Workington Haematite Iron Company began producing pig iron from locally sourced haematite ore using a blast furnace at Oldside. In the 1970 iron ore imports to Workington ended and the harbour went into decline. In the late 20th and early 21st century activity at the harbour has increased.

The Cumbrian coast railway runs close to the shoreline in this section. The railway line was opened in 1844 and was defended by vertical masonry walls.

As with the section to the south, the coastline to the north of Workington harbour has been reclaimed by tipping of waste material in the late 19th early 20th century. This tipping moved the shoreline seaward by 100-200m, with some erosion occurring more recently. Between Risehow and Maryport the shoreline has advanced by tipping and from the drift of material from the south. The breakwater on the south side of Maryport harbour acts as a barrier to the northerly drift of sediment. This has led to the shoreline advancing by 400m seaward from its location in the 1850s.

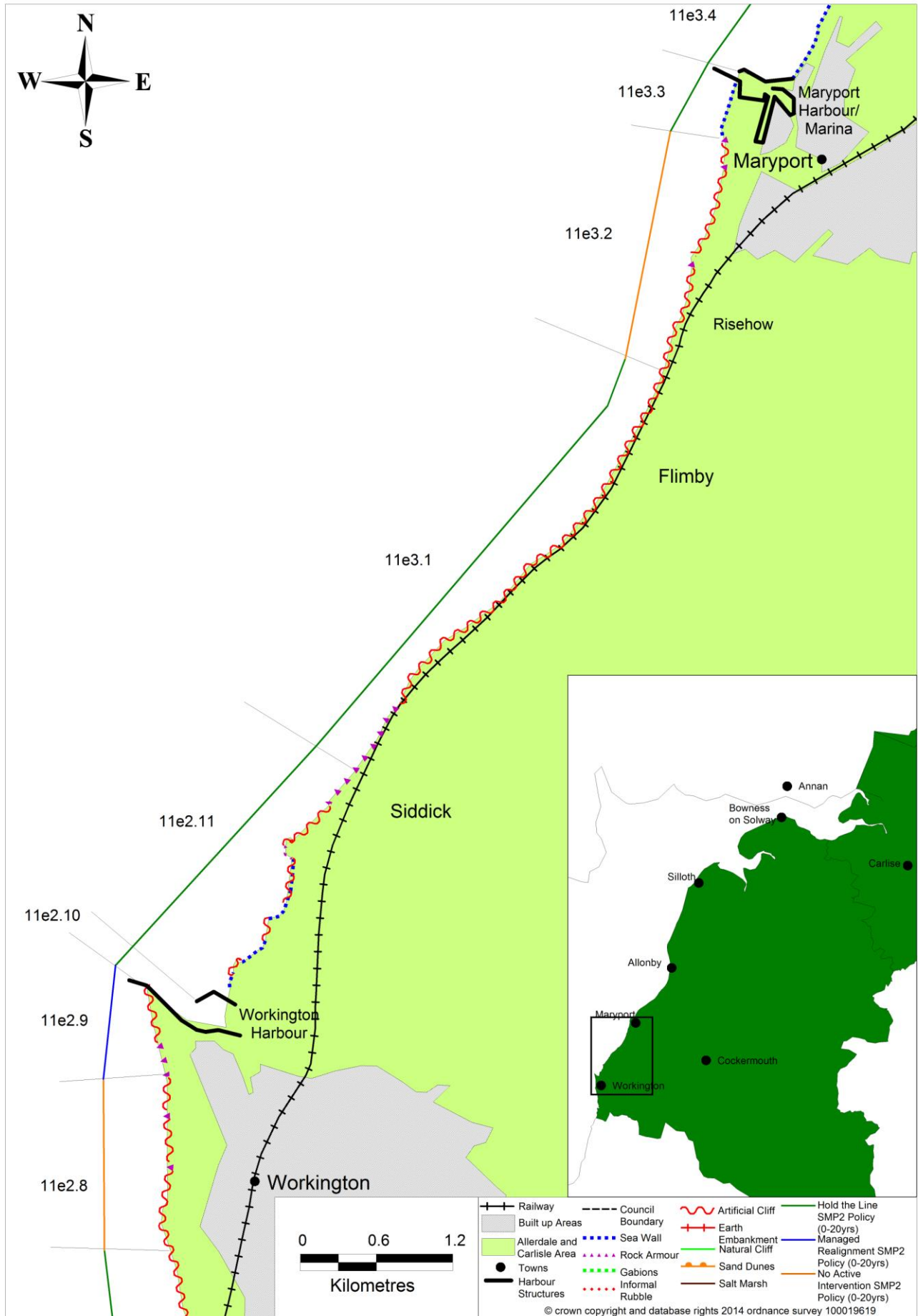
Approximately a third of this frontage is currently undefended with the majority of these sections comprising artificial tipped deposits e.g. slag waste and colliery spoil. Intermittent concrete defences have been constructed between Workington and Siddick. At Seaton, the original railway defences from the 19th century have been reinforced with rock armour in the past 20 years. Between Seaton and Flimby the railway is fronted by a mixture of tipped waste deposits from industrial workings and natural material that is heavily vegetated. A low boundary wall demarcates the seaward side of the railway here. At Flimby the original revetment protecting the railway is largely buried behind shingle and dune deposits. The remainder of the frontage consists of artificial slag banks intermittently defended by rock armour, apart from at the northern end of this frontage, where the shoreline and Maryport marina is defended by a large masonry faced embankment, constructed in 1860. Fairytale

The seawall to the north of Workington harbour is fair condition. Some of the precast slabs on the defences north of Workington harbour have broken away. At Seaton the cliffs have eroded behind the gabion defences, leaving the gabions separated and unsupported causing them to collapse. At Siddick Ponds the defences are in fair condition, with damage to the southern end.

The Current (SMP2) Policy:

- **Workington Harbour:** Hold the Line in the short term (0-20yrs), medium term (20-50yrs) and long term (50-100yrs);
- **Workington Harbour to Siddick:** Hold the Line in the short term (0-20yrs), Managed Realignment in medium term (20-50yrs) and long term (50-100yrs);
- **Siddick to Risehow:** Hold the Line in the short term (0-20yrs), medium term (20-50yrs) and long term (50-100yrs);
- **Risehow to Maryport Marina:** No Active Intervention (0-20yrs), medium term (20-50yrs) and long term (50-100yrs); and
- **Maryport Harbour/Marina:** Hold the Line in the short term (0-20yrs), medium term (20-50yrs) and long term (50-100yrs).

The plan overleaf summaries the above information graphically:



Summary of behaviour

In this section waves generally approach the shoreline obliquely, driving sediment northwards, although the highest waves approach closer to normal. The pattern of drift is affected by the variable susceptibility to erosion of the shoreline features, particularly of the artificial deposits.

Sediment feed into this section is interrupted by the breakwaters of Workington harbour. However, the artificial cliffs between Siddick and Flimby and to a lesser extent between Flimby and Maryport provide a source of material to the bay. The railway has been artificially defended in places. These defences provide protection to infrastructure but also prevent natural rollback of the shoreline.

The following key points arise from analysis of the contemporary monitoring data:

Offshore Wave Climate:

Historic wave data from the Met Office (St Bees):

- Approximately 70% of waves are < 1 metres high and approximately 1.5% of waves are > 3 metre high.

Wind Climate:

Historic wind data from the Met Office (St Bees) identifies:

- 40-45% of winds are greater than 9 metres per second (Force 5 and above) & 45% of wind comes from offshore directions (SW to N).

Sea Levels:

- Maximum tide level recorded at Workington in the last 20 years = +5.76 (m ODN) in February 1997, which equates to approximately a 1 in 50 return period; and
- The following predicted extreme tide levels apply (m ODN):

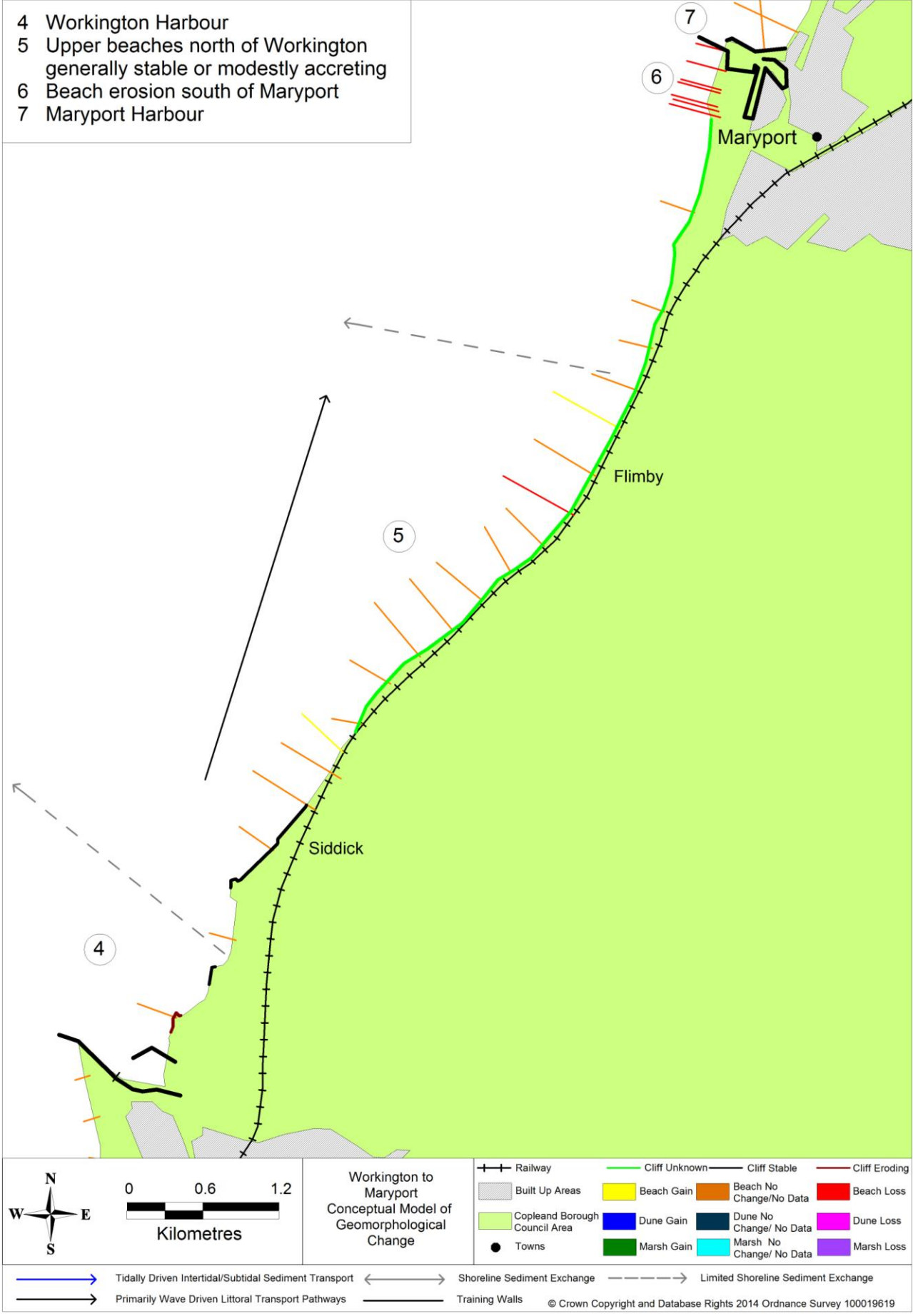
Return Period (years)	Workington	Flimby	Maryport
10	5.49	5.56	5.62
100	5.84	5.91	5.97
1000	6.18	6.26	6.31

Foreshore & Shoreline Changes:

- Beach generally stable between Workington and Flimby. Profile change: 33% – accretion, 17% – erosion, 50% – no change; and
- Erosion south of Maryport. Profile change: 10% – accretion, 80% – erosion, 10% – no change.

This behaviour is illustrated graphically on the plan overleaf.

Note: Where profile change is shown for individual profiles on the pictorial summaries, beach gain or loss is identified, where the magnitude of change in cross sectional area is greater than 2%. Where the magnitude of change is less than or equal to 2% this is denoted as no change.



Risk Assessment

The primary risks arising from the behaviour of coastal forcing processes (wind, waves and tides) and the reaction of the shoreline (beach and cliff changes, artificial defence conditions) across this frontage are:

- Overtopping of artificial defences causing flooding of the hinterland;
- Breaching of artificial coastal defences, causing erosion of the shoreline; and
- Erosion of man made cliffs.

The primary consequences of this behaviour are:

- Damage to and/or loss of infrastructure and potentially property

The table below shows the overall risk rating(s) that apply within this section of frontage. Overall risk is defined from the probability of conditions/behaviour occurring and the consequences the conditions/behaviour would have.

Workington to Maryport Overall Risk Rating					
Policy Unit (11e)	Section of Frontage	Exposure	Probability Index	Consequence Index	Overall Risk Rating
2.11	Workington Harbour	High	Low	Medium High	Medium
3.1	Workington Harbour to Siddick	High	Medium	Medium High	Medium
3.2	Siddick to Risehow	High	Medium	Medium High	Medium
3.3	Risehow to Maryport Marina	High	Low	Medium	Low
3.4	Maryport Harbour/Marina	High	Medium	Medium High	Medium

Current Behaviour

Analysis of the monitoring data collected in 2013 provides the following key points:

Offshore Wave Climate:

- No new data available for analysis

Wind Climate:

- No new data available for analysis

Sea Levels:

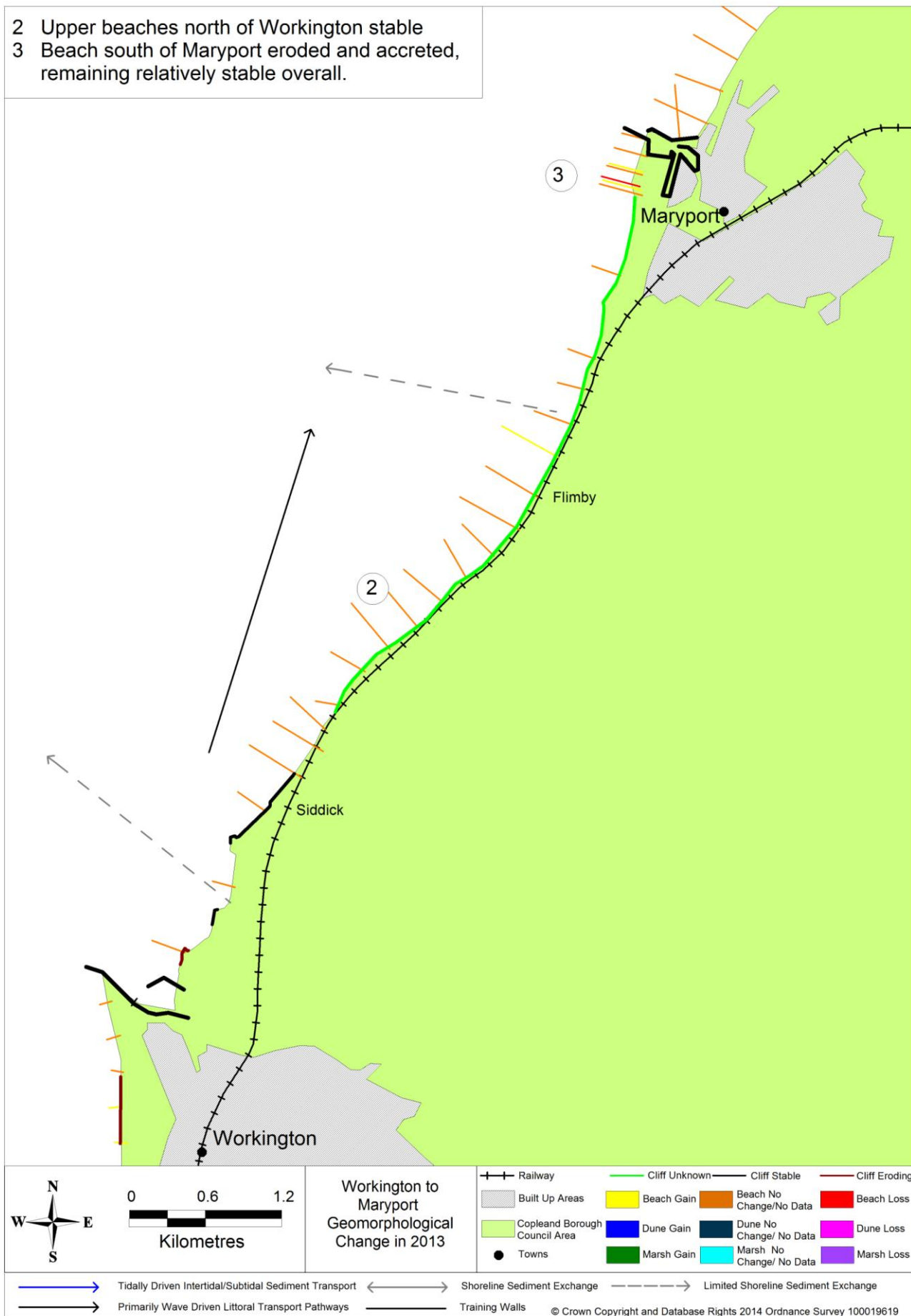
- Maximum tide level recorded on Workington tide gauge = +4.808m (m ODN), this level would be expected to be exceeded at least once a year.

Beach Changes:

- Only 16 out of 28 profiles recorded;
- Little overall change in beach cross sectional areas between Workington & Flimby. Profile change: 17% – accretion, 0% – erosion, 83% – no change; and
- Little overall change in beach cross sectional areas south of Maryport. Profile change: 30% – accretion, 10% – erosion, 60% – no change

Note: Where profile change is shown for individual profiles on the pictorial summaries, beach gain or loss is identified, where the magnitude of change in cross sectional area is greater than 2%. Where the magnitude of change is less than or equal to 2% this is denoted as no change.

The plot overleaf summarises the results from the monitoring data analysis for this section in 2013.



Uncertainties & Issues

The following uncertainties have arisen from the data monitoring programme and analysis of the data collected:

- Quantities of sediment arriving on the beach from offshore;
- Wave conditions occurring directly in front of shore currently unknown;
- Definition of flood risk; and
- Cliff erosion rates.

Future Management Actions

The following monitoring and management actions are recommended:

- Continue current monitoring regime;
- Improve additional remote sensing e.g. LiDAR;
- On-going monitoring of condition of artificial defence structures; and
- Carry out remedial works to maintain integrity of defences, as required.

Linkage(s) to Decision Making

The monitoring provides information to support:

- Implementation of SMP2 policies, particularly; identification of timing for future capital works or capital maintenance works for artificial defences;
- Continued maintenance and operation of railway; and
- Decision making process in relation to development planning control.