



# **Cell 1 Regional Coastal Monitoring Programme Analytical Report 10: 'Full Measures' Survey 2017**

**North Tyneside Council**



**February 2018**

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## Abbreviations and Acronyms

Acronym / Abbreviation	Definition
AONB	Area of Outstanding Natural Beauty
DGM	Digital Ground Model
HAT	Highest Astronomical Tide
LAT	Lowest Astronomical Tide
MHWN	Mean High Water Neap
MHWS	Mean High Water spring
MLWS	Mean Low Water Neap
MLWS	Mean Low Water spring
m	metres
ODN	Ordnance Datum Newlyn

## Water Levels Used in Interpretation of Changes

Water Level Parameter	Water Level (m AOD)
	River Tyne
1 in 200 year	3.7
HAT	3.1
MHWS	2.4
MLWS	-1.9

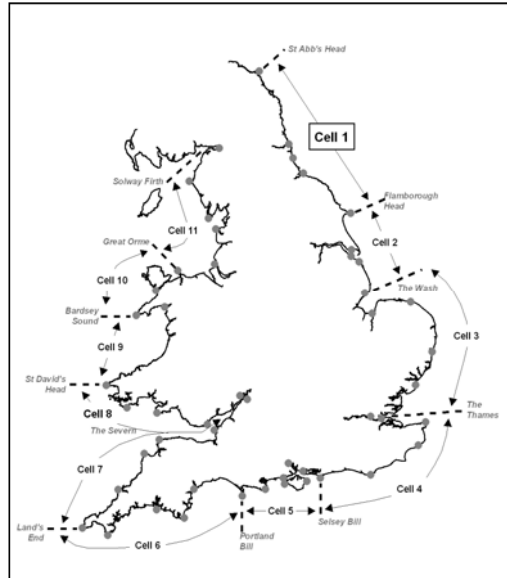
**Source:** *Scottish Border to River Tyne Shoreline Management Plan 2*.  
Royal Haskoning, May 2009.

## Glossary of Terms

Term	Definition
Beach nourishment	Artificial process of replenishing a beach with material from another source.
Berm crest	Ridge of sand or gravel deposited by wave action on the shore just above the normal high water mark.
Breaker zone	Area in the sea where the waves break.
Coastal squeeze	The reduction in habitat area which can arise if the natural landward migration of a habitat under sea level rise is prevented by the fixing of the high water mark, e.g. a sea wall.
Downdrift	Direction of alongshore movement of beach materials.
Ebb-tide	The falling tide, part of the tidal cycle between high water and the next low water.
Fetch	Length of water over which a given wind has blown that determines the size of the waves produced.
Flood-tide	Rising tide, part of the tidal cycle between low water and the next high water.
Foreshore	Zone between the high water and low water marks, also known as the intertidal zone.
Geomorphology	The branch of physical geography/geology which deals with the form of the Earth, the general configuration of its surface, the distribution of the land, water, etc.
Groyne	Shore protection structure built perpendicular to the shore; designed to trap sediment.
Mean High Water (MHW)	The average of all high waters observed over a sufficiently long period.
Mean Low Water (MLW)	The average of all low waters observed over a sufficiently long period.
Mean Sea Level (MSL)	Average height of the sea surface over a 19-year period.
Offshore zone	Extends from the low water mark to a water depth of about 15 m and is permanently covered with water.
Storm surge	A rise in the sea surface on an open coast, resulting from a storm.
Swell	Waves that have travelled out of the area in which they were generated.
Tidal prism	The volume of water within the estuary between the level of high and low tide, typically taken for mean spring tides.
Tide	Periodic rising and falling of large bodies of water resulting from the gravitational attraction of the moon and sun acting on the rotating earth.
Topography	Configuration of a surface including its relief and the position of its natural and man-made features.
Transgression	The landward movement of the shoreline in response to a rise in relative sea level.
Updrift	Direction opposite to the predominant movement of longshore transport.
Wave direction	Direction from which a wave approaches.
Wave refraction	Process by which the direction of approach of a wave changes as it moves into shallow water.

## Preamble

The Cell 1 Regional Coastal Monitoring Programme covers approximately 300km of the north east coastline, from the Scottish Border (just south of St. Abb's Head) to Flamborough Head in East Yorkshire. This coastline is often referred to as 'Coastal Sediment Cell 1' in England and Wales (Figure 1). Within this frontage the coastal landforms vary considerably, comprising low-lying tidal flats with fringing salt marshes, hard rock cliffs that are mantled with glacial sediment to varying thicknesses, softer rock cliffs and extensive landslide complexes.



**Figure 1 Sediment Cells in England and Wales**

The work commenced with a three-year monitoring programme in September 2008 that was managed by Scarborough Borough Council on behalf of the North East Coastal Group. This initial phase has been followed by a five-year programme of work, which started in October 2011. The work is funded by the Environment Agency, working in partnership with the following organisations:



The main elements of the Cell 1 Regional Coastal Monitoring Programme involve:

- beach profile surveys
- topographic surveys
- cliff top recession surveys
- real-time wave data collection
- bathymetric and sea bed characterisation surveys
- aerial photography
- walk-over surveys

The beach profile surveys, topographic surveys and cliff top recession surveys are undertaken as a 'Full Measures' survey in autumn/early winter every year. Some of these surveys are then repeated the following spring as part of a 'Partial Measures' survey.

Each year, an Analytical Report is produced for each individual authority, providing a detailed analysis and interpretation of the 'Full Measures' surveys. This is followed by a brief Update Report for each individual authority, providing ongoing findings from the 'Partial Measures' surveys.

Annually, a Cell 1 Overview Report is also produced. This provides a region-wide summary of the main findings relating to trends and interactions along the entire Cell 1 frontage.

To date the following reports have been produced:

**Table 1 Analytical, Update and Overview Reports Produced to Date**

Year		Full Measures		Partial Measures		Cell 1 Overview Report
		Survey	Analytical Report	Survey	Update Report	
1	2008/09	Sep-Dec 08	May 09	Mar-May 09	Jun 09	
2	2009/10	Sep-Dec 09	Mar 10	Feb-Mar 10	Jul 10	
3	2010/11	Aug-Nov 10	Feb 11	Feb-Apr 11	Aug 11	Sep 11
4	2011/12	Oct-Nov 11	Oct 12	Mar-May 12	Feb 13	
5	2012/13	Sep-Oct 12	Mar 13	Mar-Apr 13	Jun 13	
6	2013/14	Sep-Oct 13	Feb 14	Mar-Apr 14	Jul 14	
7	2014/15	Oct-Nov 14	Feb 15	Mar 15	Jul 15	
8	2015/16	Oct-Nov 15	Feb 16	Mar 16	Jul 16	Jun 16
9	2016/17	Sep 16	Feb 17	Mar 17	Jul 17	
10	2017/18	Sep-Oct 17	Feb 18 (*)			

(\*) The present report is **Analytical Report 10** and provides an analysis of the 2017 Full Measures survey for North Tyneside Council's frontage.

In addition, separate reports are produced for other elements of the programme as and when specific components are undertaken, such as wave data collection, bathymetric and sea bed sediment data collection, aerial photography, and walk-over visual inspections.

For purposes of analysis, the Cell 1 frontage has been split into the sub-sections listed in the Table 2.

**Table 2 Sub-divisions of the Cell 1 Coastline**

<b>Authority</b>	<b>Zone</b>
Northumberland County Council	Spittal A
	Spittal B
	Goswick Sands
	Holy Island
	Bamburgh
	Beadnell Village
	Beadnell Bay
	Embelton Bay
	Boulmer
	Alnmouth Bay
	High Hauxley and Druridge Bay
	Lynemouth Bay
	Newbiggin Bay
	Cambois Bay
Blyth South Beach	
North Tyneside Council	Whitley Sands
	Cullercoats Bay
	Tynemouth Long Sands
	King Edward's Bay
South Tyneside Council	Littehaven Beach
	Herd Sands
	Trow Quarry (incl. Frenchman's Bay)
	Marsden Bay
Sunderland Council	Whitburn Bay
	Harbour and Docks
	Hendon to Ryhope (incl. Halliwell Banks)
Durham County Council	Featherbed Rocks
	Seaham
	Blast Beach
	Hawthorn Hive
	Blackhall Colliery
Hartlepool Borough Council	North Sands
	Headland
	Middleton
	Hartlepool Bay
Redcar & Cleveland Borough Council	Coatham Sands
	Redcar Sands
	Marske Sands
	Saltburn Sands
	Cattersty Sands (Skinningrove)
	Staithes
Scarborough Borough Council	Staithes
	Runswick Bay
	Sandsend Beach, Uppgang Beach and Whitby Sands
	Robin Hood's Bay
	Scarborough North Bay
	Scarborough South Bay
	Cayton Bay
	Filey Bay



## 1. Introduction

### 1.1 Study Area

North Tyneside Council's frontage extends from Hartley (just south of Blyth) in the north, to the River Tyne in the south. For the purposes of this report and for consistency with previous reporting, it has been sub-divided into four areas, namely:

- Whitley Sands
- Cullercoats Bay
- Tynemouth Long Sands
- King Edward's Bay

### 1.2 Methodology

Along North Tyneside Council's frontage, the following surveying is undertaken:

- Full Measures survey annually each autumn/early winter comprising:
  - Beach profile surveys along eight transect lines (commenced 2002)
  - Beach profile surveys along an additional two transects (commenced 2010)
  - Topographic survey along Whitley Sands (commenced 2010)
  - Topographic survey along Tynemouth Long Sands (commenced 2011)
- Partial Measures survey annually each spring comprising:
  - Beach profile surveys along all ten transect lines (commenced 2010)

The location of these surveys is shown in Figure 1. The beach profiles and topographic surveys were undertaken between the 4<sup>th</sup> and 5<sup>th</sup> September, and 23<sup>rd</sup> and 24<sup>th</sup> October 2017. The weather conditions varied throughout the survey, details can be found in the surveyor's reports.

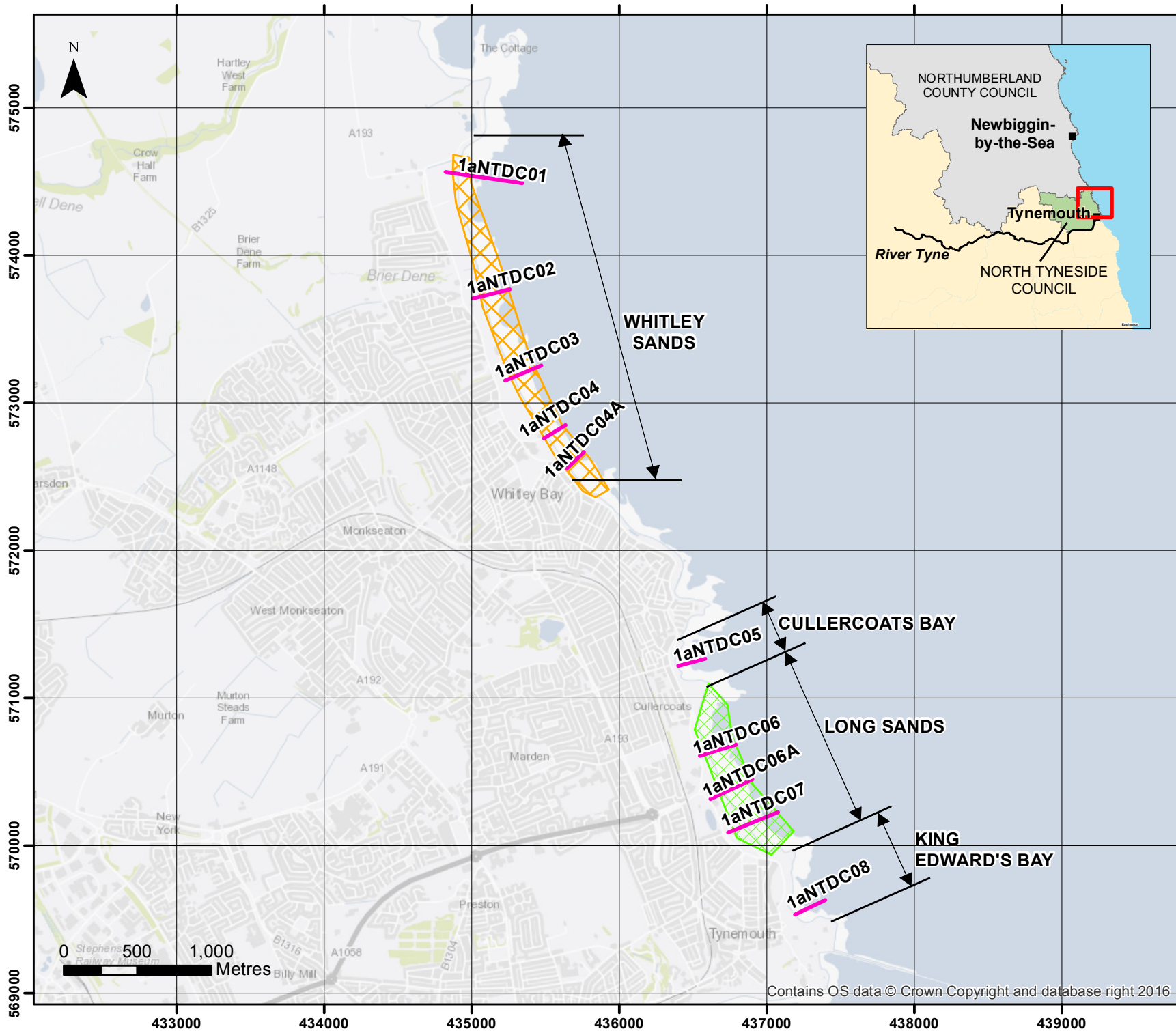
All data have been captured in a manner commensurate with the principles of the Environment Agency's *National Standard Contract and Specification for Surveying Services* and stored in a file format compatible with the software systems being used for the data analysis, namely SANDS and ArcGIS. This data collection approach and file format is comparable to that being used on other regional coastal monitoring programmes, such as in the South East and South West of England.

Upon receipt of the data from the survey team, they are quality assured and then uploaded onto the programme's website for storage and availability to others and also input to SANDS and GIS for subsequent analysis.

The Analytical Report is then produced following a standard structure for each authority. This involves:

- description of the changes observed since the previous survey and an interpretation of the drivers of these changes (Section 2);
- documentation of any problems encountered during surveying or uncertainties inherent in the analysis (Section 3);
- recommendations for 'fine-tuning' the programme to enhance its outputs (Section 4); and
- providing key conclusions and highlighting any areas of concern (Section 5).

Data from the present survey are presented in a processed form in the Appendices.



Key

**SURVEY LOCATIONS**

**Topographic Profiles**

- Annual
- Bi-Annual

**Topographic Surveys**

- 6 monthly
- yearly
- 5 yearly

*(Indicative Survey Extents shown)*

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

**Figure 2 - Map 1**

**North Tyneside Council Frontage**

Analytical Report  
Topo Surveys

Drawing Scale at A4 1:35,000

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## 2. Analysis of Survey Data

### 2.1 Whitley Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
5 <sup>th</sup> September 2017	<p><b>Beach Profiles:</b></p> <p>Whitley Sands is covered by five beach profile lines for the Full Measures survey (Appendix A). Four of these (1aNTDC01 to 1aNTDC04) were initially surveyed in April 2002 and were surveyed annually to 2009 (Full Measures, autumn 2009) and bi-annually thereafter. From March 2010 (Partial Measures, spring 2010) onwards, an additional beach profile line (NTDC04A) has been surveyed at the southern end of the frontage. All profiles were last surveyed in March 2017 for the Partial Measures survey.</p> <p><b>1aNTDC01</b> is located in the north of Whitley Sands, along the undefended cliffs immediately south of Trinity Road car park. There has been little change in the position of the cliff. Beach levels at the toe of cliff to chainage 70m have increased by up to 0.6m since the March 2017 survey, forming a small berm at chainage 45m. Between chainage 70m and 130m there has been erosion of up to 1.0m. Seawards of 130m chainage there has been little change. Overall the profile is at a relatively medium level compared to the range recorded from previous surveys.</p> <p>Profile <b>1aNTDC02</b> is located in the northern part of Whitley Sands. A seawall is present at the back of the beach. There has been significant accretion at the base of the seawall of 1.0m. Accretion, more typically up to 0.6m, has occurred between the seawall (chainage 50m) and chainage 112m. There has been erosion of up to 0.7m between chainage 112m and 165m, and the rock is exposed from 160m seawards. The profile is relatively medium- high on the upper and mid beach but low on the lower beach compared with the range recorded from previous surveys, resulting in a relatively steep profile.</p> <p>Profile <b>1aNTDC03</b> is located at the centre of Whitley Sands. There has been very little change from at the bottom of the seawall up to chainage 25m. Accretion of up to 0.8m has occurred between chainage 25m and 68m, covering up the previously exposed patches of boulders and forming a wide berm. From chainage 68m seawards there has been erosion of up to 0.8m, exposing a small section of rock at chainage 90m. The September 2017 profile is relatively low in the upper beach compared</p>	<p>Since the last survey, there has generally been accretion across the upper beach and erosion on the mid-lower beach.</p> <p><b>Longer term trends:</b> Beach levels are within the range seen in earlier surveys.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>to the range recorded from previous surveys, relatively high in the mid beach, and at a medium level in the lower beach.</p> <p>Profile <b>1aNDC04</b> is located in the southern part of Whitley Sands. There has been a small amount of erosion at the toe of the seawall (15m) of 0.2m. Between chainage 18m and 85m there has been varying amounts of accretion of up to 0.6m, covering up the previously exposed rocks. Seaward of 85m chainage there has been erosion of 0.2m. Overall the profile is in the middle of the range recorded from previous surveys.</p> <p>Profile <b>1aNDC04a</b> is located towards the southern end of Whitley Sands. There has been accretion at the toe of the seawall and to chainage 50m of up to 0.7m. From chainage 50m seawards there has been erosion of up to 0.4m. The rock platform is exposed from chainage 70m. Overall the profile is a medium level compared to the range recorded from previous surveys, though it is relatively low towards the toe of the beach.</p>	
<p><b>23<sup>rd</sup> October 2017</b></p>	<p><b>Topographic Survey:</b></p> <p>Whitley Sands is covered by an annual topographic survey, which commenced in October 2010.</p> <p>Data from the most recent topographic survey (Full Measures, autumn 2017) have been used to create a digital ground model (DGM) (Appendix B – Map 1) using a GIS. A difference plot has also been produced using the DGM (Appendix B – Map 3) produced from the last produced topographic survey (Full Measures, autumn 2016) and the present survey.</p> <p>The difference plot shows generally shore parallel changes. Overall accretion dominates the southern end and centre of the bay, with erosion being slightly more predominant in the north of the bay. The beach in the north shows erosion across the upper and mid beach, with little change on the lower beach. The centre of the bay shows erosion in the upper beach but accretion across the mid and lower beach. The beach at the southern end of the bay shows erosion on the upper beach, accretion in the mid beach, and patchy erosion on the lower beach.</p> <p>This is a comparison of annual surveys, rather than a biannual comparison like the beach profiles, and therefore the changes observed in the detailed profiles differ from this pattern of change in the bay as whole, indicating that much of this change is likely to have happened in the first six months since the previous survey.</p>	<p>The topographic survey indicates there to have been a movement of sediment towards the southern end of the bay. This is similar to the pattern recorded in the Autumn 2016 survey. In the autumn 2014 Full Measures survey there was a northerly movement of sediment recorded, suggesting the beach responds to storm directions that dominate over the monitoring period.</p>

## 2.2 Cullercoats Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
5 <sup>th</sup> Septemebr 2017	<p><b>Beach Profiles:</b></p> <p>Cullercoats Bay is covered by one beach profile line for the Full Measures survey (Appendix A). This was surveyed annually each autumn between 2002 and 2009. From spring 2010 onwards, it has been surveyed bi-annually.</p> <p>At profile 1aNTDC05 the survey report notes '<i>cliff not measured at section 5 due to dangerous access</i>' as it has done in previous surveys. There has been erosion of up to 0.3m at the toe of the cliff to chainage 50m. Between chainage 50m and 98m there has been accretion typically less than 0.2m. Seawards of chainage 98m there has been erosion of up to 0.3m. The September 2017 profile is at a medium level on the upper beach compared to the range recorded from previous surveys, the highest on record in the middle beach (chainage 80m to 95m) and at a relatively low level at the toe of the beach.</p>	<p>As in previous surveys access to the cliff has not been possible.</p> <p>The data shows only limited change, less than <math>\pm 0.3\text{m}</math>, related to short-term patterns of sediment movement.</p> <p><b>Longer term trends:</b> The amount of change is low and the profile is within the past range. The upper beach is currently high, whereas the lower beach is at its lowest level and a bar seen in earlier surveys is absent.</p>

## 2.3 Tynemouth Long Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
5 <sup>th</sup> September 2017	<p><b>Beach Profiles:</b></p> <p>Tynemouth Long Sands is covered by three beach profile lines for the Full Measures survey (Appendix A). Profiles 1aNTDC06 and 1aNTDC07 were initially surveyed annually each autumn between 2002 and 2009. A third profile, 1aNTDC06A, was then added in the centre of the frontage. From spring 2010 (Partial Measures) onwards, all profiles have been surveyed bi-annually.</p> <p><b>1aNTDC06</b> is located approximately 150m south of the access ramp towards the north of the bay. The top of the cliff has not changed since the last survey, however, the remainder of the cliff profile cannot be reviewed due to lack of data points in the profile plot as the survey report notes '<i>no access to middle of section 6 due to seed protection fences</i>'. The beach profile starts at c.35m chainage and shows accretion over the upper beach of up to 0.6m. From chainage 60m to 95m this changes to erosion of up to 0.3m, before reverting to accretion of 0.2m from chainage 95m to 130m. The end of the profile from 130m to 210m shows erosion of &lt;0.2m. Overall the profile is generally at a medium level compared to the range recorded from previous surveys, with the exception of chainage 65m to 85m (area of upper beach erosion) where the levels are the lowest on record.</p> <p>At profile <b>1aNTDC06A</b>, the dune-cliff face has not significantly changed in form or position. As with section 6, the survey report notes '<i>no access to middle of section 6a due to seed protection fences</i>'. There has been very little change from the toe of the dunes at chainage 80m to chainage 110m. Between chainage 110m to 130m a small berm has formed through the accretion of 0.4m. The middle beach has been eroded by up to 0.5m between chainage 130m and 185m. A second wider berm has formed between chainage 175m and 230m through accretion of 0.4m. The lower beach seawards of chainage 235m has eroded by up to 0.7m. Overall the September 2017 profile is at a relatively medium level compared to the range recorded from the previous surveys, with the exception of the two berms which show the highest recorded levels in those areas.</p> <p>Profile <b>1aNTDC07</b> is located approximately 50m south of the access route through the dunes towards the southern end of the bay. The dune-cliff has not significantly changed in form or position since the last survey. As with section 6 and 6a, the survey report notes '<i>no access to middle of section 7 due to seed protection fences</i>'. The profile shows a similar pattern to profile <b>1aNTDC06A</b> with variable accretion and erosion and the formation of two berms. There has been a small amount of accretion</p>	<p>Since the last survey the dunes have retained the same form and position. The profiles generally show alternating sections of accretion and erosion, with the formation of berms in the upper and mid beach with some erosion in the mid beach as well as the lower beach.</p> <p><b>Longer term trends:</b> Overall, the beaches have retained a similar form but are towards the upper bound of the range of previous surveys, particularly in the foreshore.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>on the upper beach of less than 0.2m, with the formation of a small berm at chainage 145m through the accretion of 0.6m. There has been small amount of erosion of less than 0.1m between chainage 160m and 195m. A second wider berm has formed between chainage 195m and 245m through the accretion of 0.7m. Between chainage 245m and 300m there has been erosion of up to 0.4m. At the toe of the beach, seawards of chainage 300m there has been accretion of 0.2m.. Overall the September 2017 profile is at a relatively medium level compared to the range recorded from the previous surveys, except for the two berms which show the highest recorded levels in those areas.</p>	
<p><b>24<sup>th</sup> October 2017</b></p>	<p><b>Topographic Survey:</b></p> <p>The first survey was undertaken for the Full Measures survey in October 2010.</p> <p>Data from the current topographic survey have been used to create a digital ground model (DGM) (Appendix B – Map 2) using a Geographical Information System (GIS). A difference plot has also been produced by comparing the current DGM (Appendix B – Map 4) with that produced from the last topographic survey in March 2017.</p> <p>The difference plot shows that change since the last survey (Partial Measures, spring 2017) is patchy. The bay has clearly been dominated by accretion, particularly on the upper and mid beach, since the previous survey. The lower beach shows a thin band of erosion around most of the bay, with the greatest magnitude in the northern part of the bay. There are some patches of minor erosion in the mid beach, which ties up with what is seen in the profiles. The magnitude of change is relatively small for both the accretion and erosion across most of the bay with most of it less than <math>\pm 0.75\text{m}</math>.</p>	<p>The pattern shown in the difference plot corroborates the patterns identified in the profiles.</p>

## 2.4 King Edward's Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
5 <sup>th</sup> September 2017	<p><b>Beach Profiles:</b></p> <p>King Edward's Bay is monitored by one beach profile line for the Full Measures survey (Appendix A). This was surveyed annually between 2002 and 2009. From spring 2010 onwards, it has been surveyed bi-annually.</p> <p>At profile <b>1aNTDC08</b> there has been alternating sections of accretion and erosion. The upper beach up to chainage 70m has accreted with the formation by up to 0.2m. Between chainage 70m and 110m erosion of 0.4m has occurred. Between chainage 110m and 170m there has been the formation of a berm through the accretion of up to 0.4m. The toe of the beach seawards of 170m has eroded by up to 0.3m. Overall the profile is at a medium-low level compared to the range recorded from previous surveys, with the exception of the berm between chainages 110m and 145m which has the highest recorded levels in that area.</p>	<p>Since the last survey, the beach at King Edward's Bay has steepened since the March 2017 survey with material appearing to be moved up the beach.</p> <p><b>Longer term trends:</b> The profile is within the range of previously observed profiles at this location.</p>



### **3. Problems Encountered and Uncertainty in Analysis**

#### **Individual Profiles**

- The surveyor noted that there was construction ongoing on the promenade at profiles 1aNTDC03 and 1aNTDC04A.
- At profile 1aNTDC05 the cliff was not measured due to access problems. Access to this profile is noted to have been dangerous in previous Partial Measures and Full Measures reports, and it is recommended that the beach profile should start at the cliff toe and that the cliff be monitored using the aerial survey data.
- At Tynemouth Long Sands (profiles 1aNTDC06, 1aNTDC06A and 1aNTDC07) there was no access to the dunes in the middle of the profile due to seed protection fences. This means it has not yet been possible to monitor the effectiveness of the dune stabilisation scheme

### **4. Recommendations for 'Fine-tuning' the Monitoring Programme**

It is recommended that the beach profile at 1aNTDC05 in Cullercoats Bay should start at the cliff toe and that the cliff be monitored using the aerial survey data.

It is recommended that access to the stabilised dunes at Tynemouth Long Sands be attempted in future surveys to monitor the effectiveness of the stabilisation fences.

### **5. Conclusions and Areas of Concern**

- At Whitley Sands there has generally been accretion in the upper beach and erosion in the mid-lower beach. For the most part, the beach is at a medium level in the range recorded from previous surveys. There are no causes for concern.
- The topographic survey indicates that sediment movements in Whitley Bay have, in general terms, 'reverted to type' with apparent sediment movement being towards the southern end of the bay.
- At Cullercoats Bay, at profile 1aNTDC05, there has been little change and there are no causes for concern.
- At Tynemouth Long Sands, the recorded profiles are within the previously recorded range with berm building processes dominating and present no cause for concern. The topographic survey is dominated by accretion, particularly in the upper and mid beach, with erosion at the toe of the beach.
- At King Edward's Bay, there appears to have been movement of sediment up the beach in berms. There are no causes for concern.



## **Appendices**



**Appendix A**  
**Beach Profiles**

The following sediment feature codes are used on some profile plots:

<b>Code</b>	<b>Description</b>
S	Sand
M	Mud
G	Gravel
GS	Gravel & Sand
MS	Mud & Sand
B	Boulders
R	Rock
SD	Sea Defence
SM	Saltmarsh
W	Water Body
GM	Gravel & Mud
GR	Grass
D	Dune (non-vegetated)
DV	Dune (vegetated)
F	Forested
X	Mixture
FB	Obstruction
CT	Cliff Top
CE	Cliff Edge
CF	Cliff Face
SH	Shell
ZZ	Unknown

# Beach Profile

Location: 1aNTDC01

Date: 05/09/2017

Inspector: AG

Low Tide:

Low Tide Time:

Wind

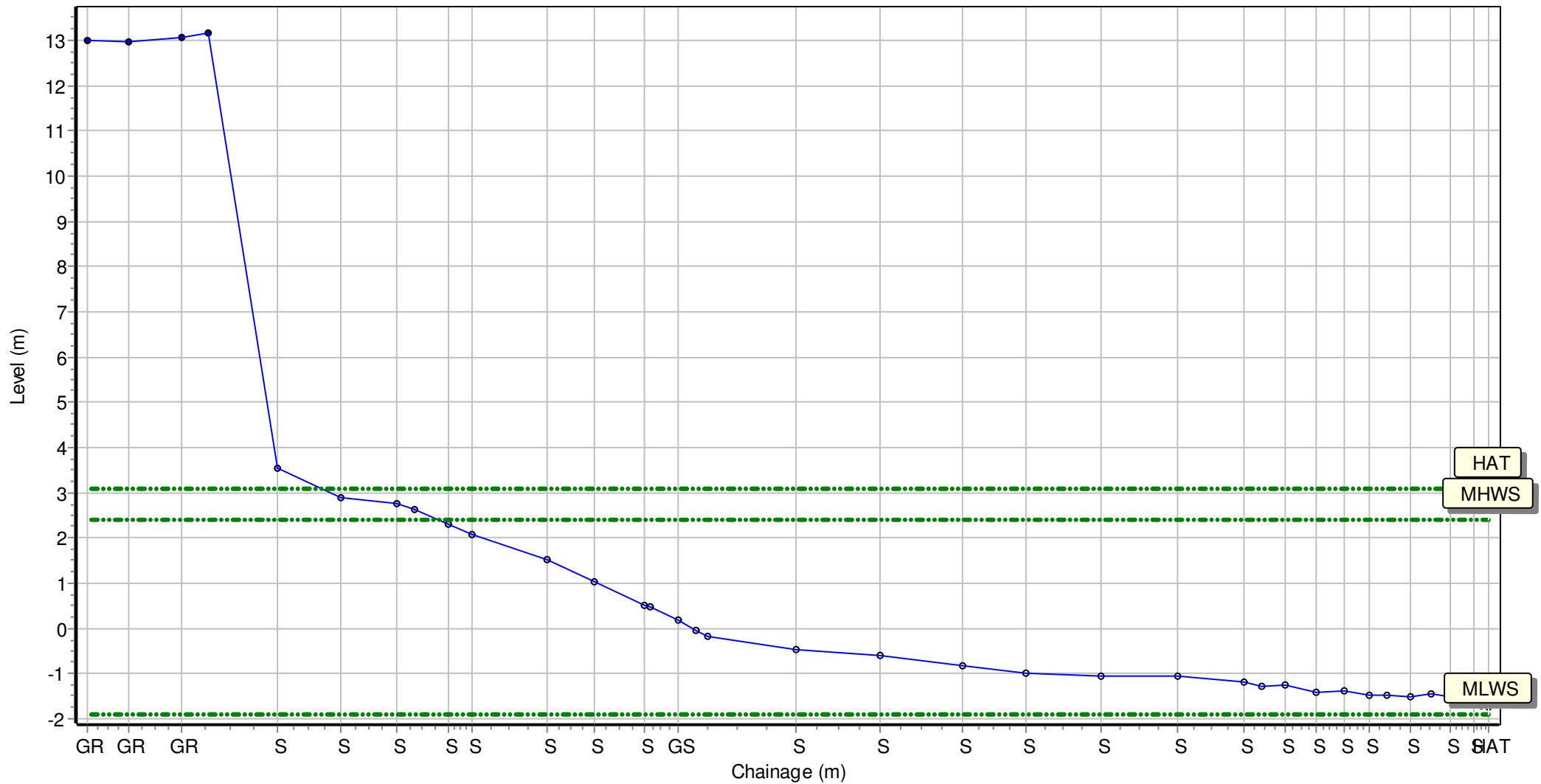
Sea State:

Visibility:

Rain:

Summary: 2017 Full Measures Topo Survey

Easting: 434851.079 Northing: 574565.379 Profile Bearing: 99 ° from North



# Beach Profile

Location: 1aNTDC02

Date: 05/09/2017

Inspector: AG

Low Tide:

Low Tide Time:

Wind

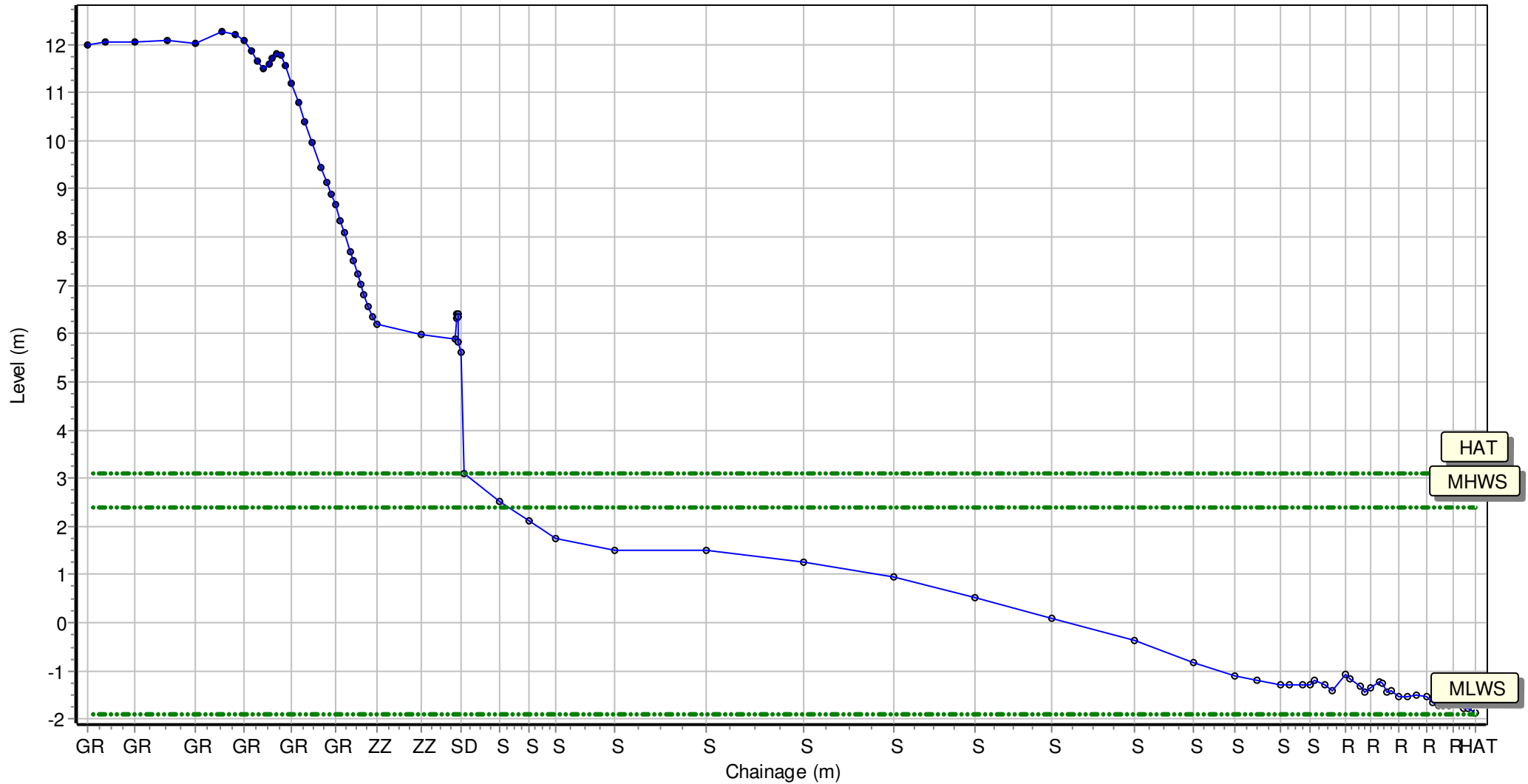
Sea State:

Visibility:

Rain:

Summary: 2017 Full Measures Topo Survey

Easting: 435030.395 Northing: 573704.317 Profile Bearing: 76 ° from North





# Beach Profile

Location: 1aNTDC03

Date: 05/09/2017

Inspector: AG

Low Tide:

Low Tide Time:

Wind

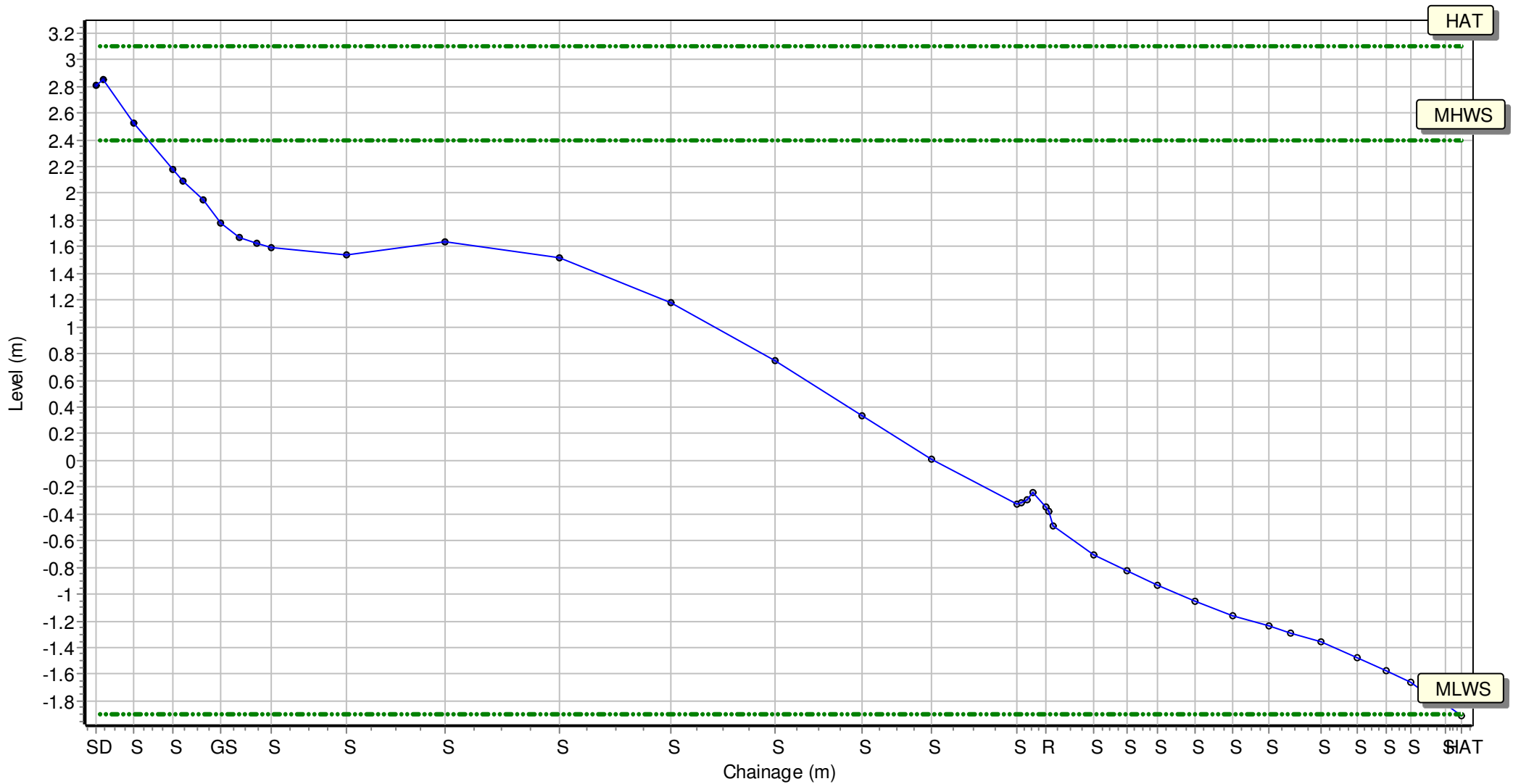
Sea State:

Visibility:

Rain:

Summary: 2017 Full Measures Topo Survey

Easting: 435270.865 Northing: 573151.795 Profile Bearing: 70 ° from North



# Beach Profile

Location: 1aNTDC04

Date: 05/09/2017

Inspector: AG

Low Tide:

Low Tide Time:

Wind

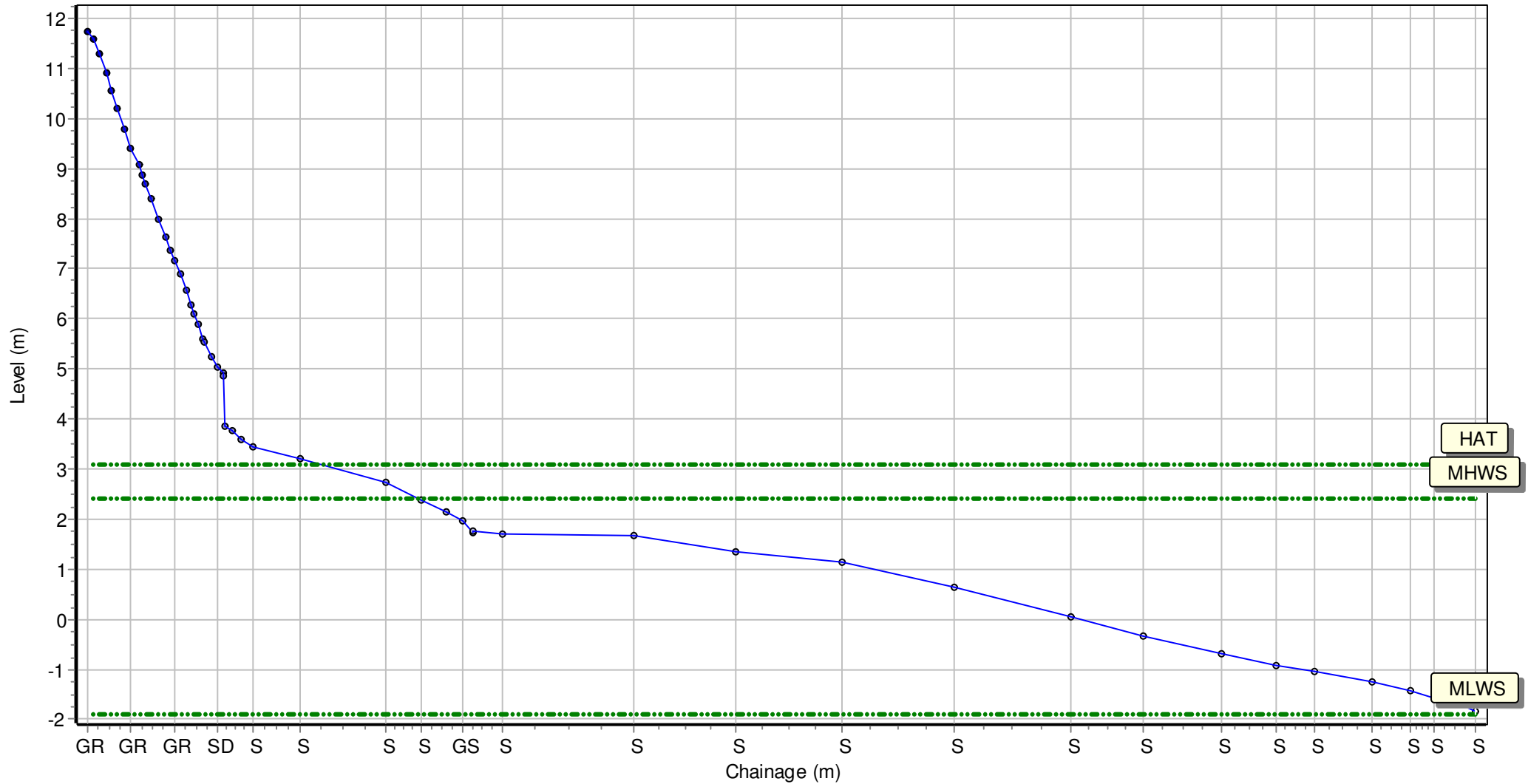
Sea State:

Visibility:

Rain:

Summary: 2017 Full Measures Topo Survey

Easting: 435490.594 Northing: 572746.234 Profile Bearing: 60 ° from North



# Beach Profile

Location: 1aNTDC04A

Date: 05/09/2017 Inspector: AG

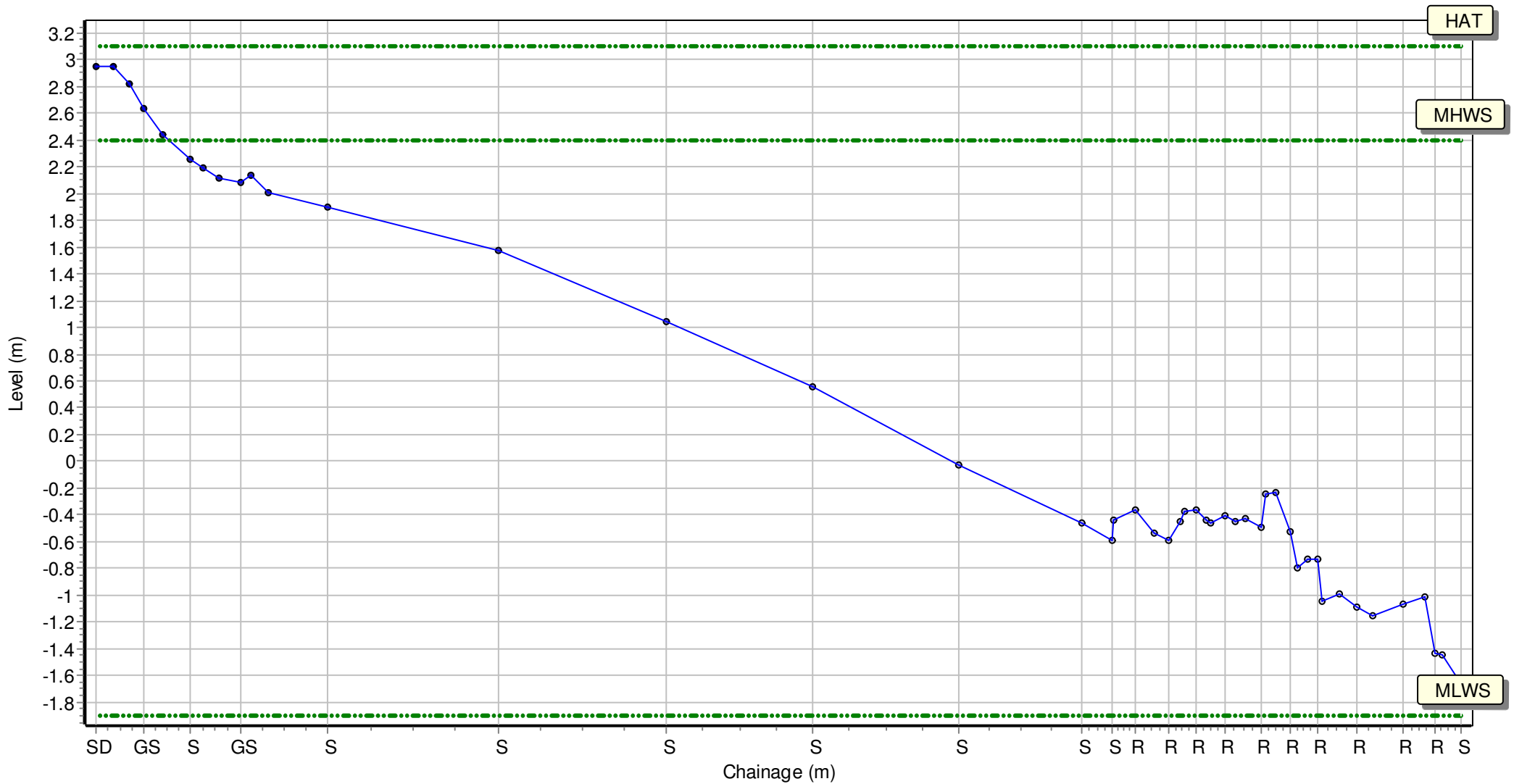
Low Tide: Low Tide Time:

Wind Sea State:

Visibility: Rain:

Summary: 2017 Full Measures Topo Survey

Easting: 435645.554 Northing: 572557.615 Profile Bearing: 46 ° from North



# Beach Profile

Location: 1aNTDC05

Date: 05/09/2017

Inspector: AG

Low Tide:

Low Tide Time:

Wind

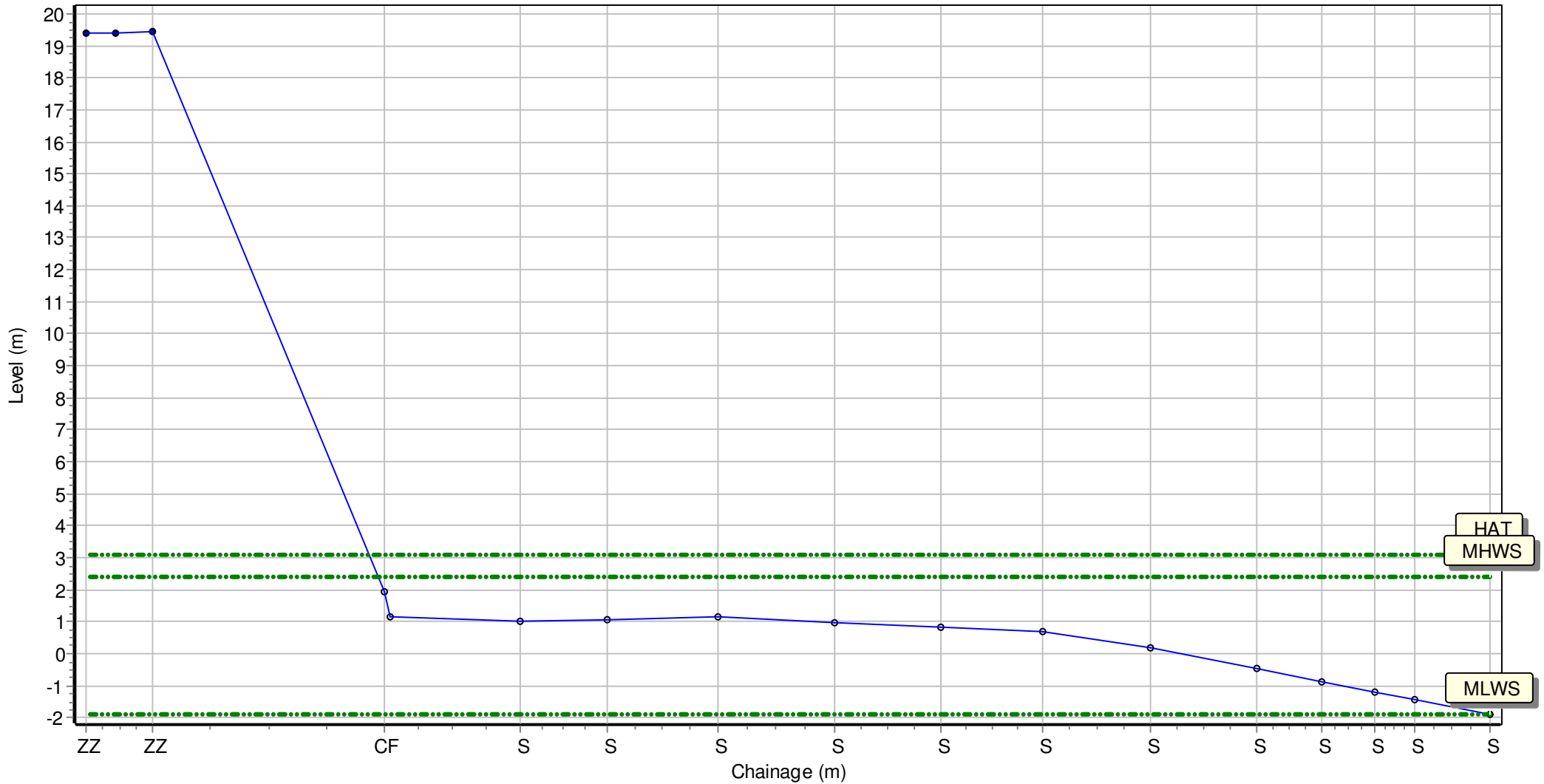
Sea State:

Visibility:

Rain:

Summary: 2017 Full Measures Topo Survey

Easting: 436365.005 Northing: 571217.518 Profile Bearing: 77 ° from North



# Beach Profile

Location: 1aNTDC06

Date: 05/09/2017

Inspector: AG

Low Tide:

Low Tide Time:

Wind

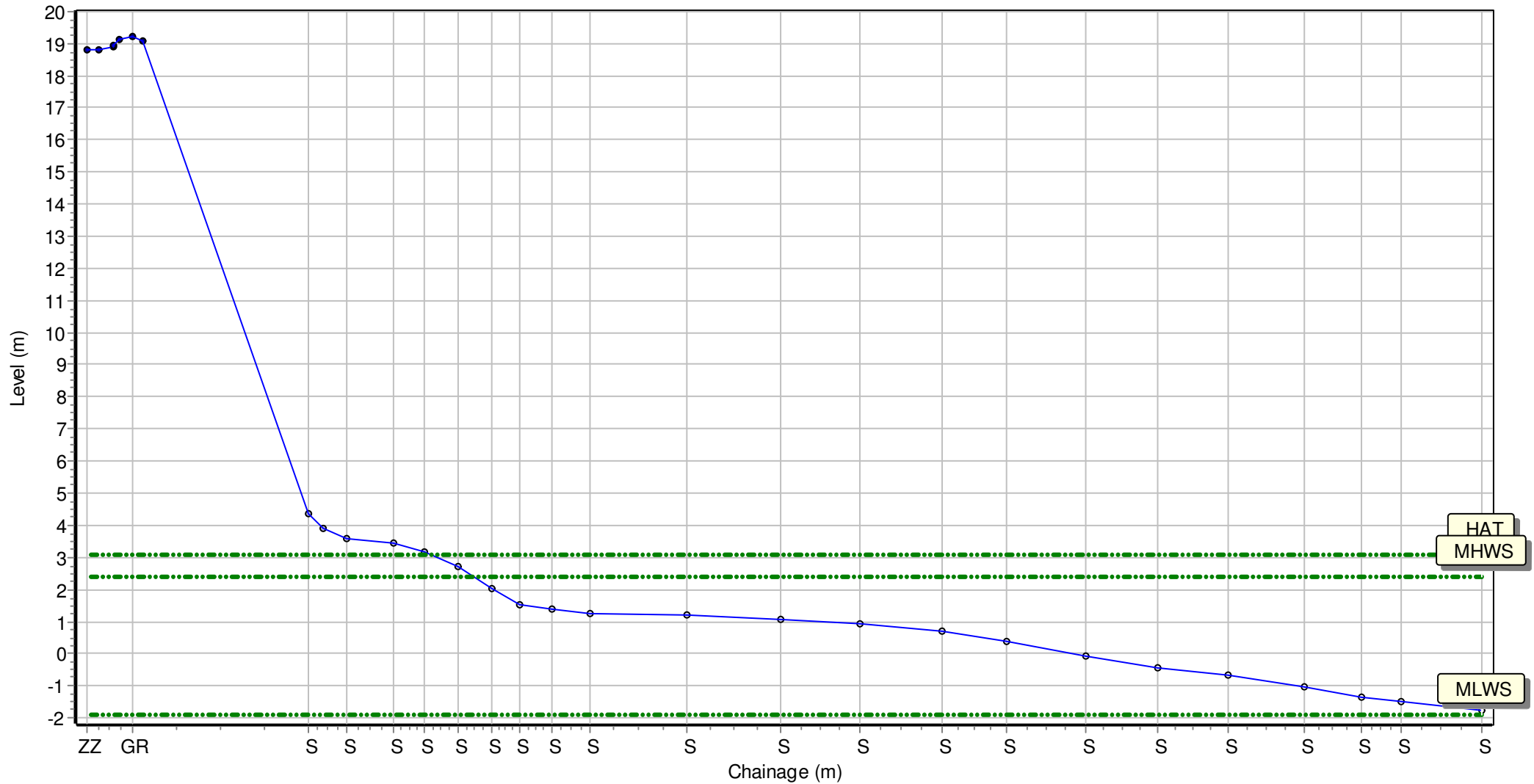
Sea State:

Visibility:

Rain:

Summary: 2017 Full Measures Topo Survey

Easting: 436550.6 Northing: 570613.529 Profile Bearing: 77 ° from North



# Beach Profile

Location: 1aNTDC06A

Date: 05/09/2017 Inspector: AG

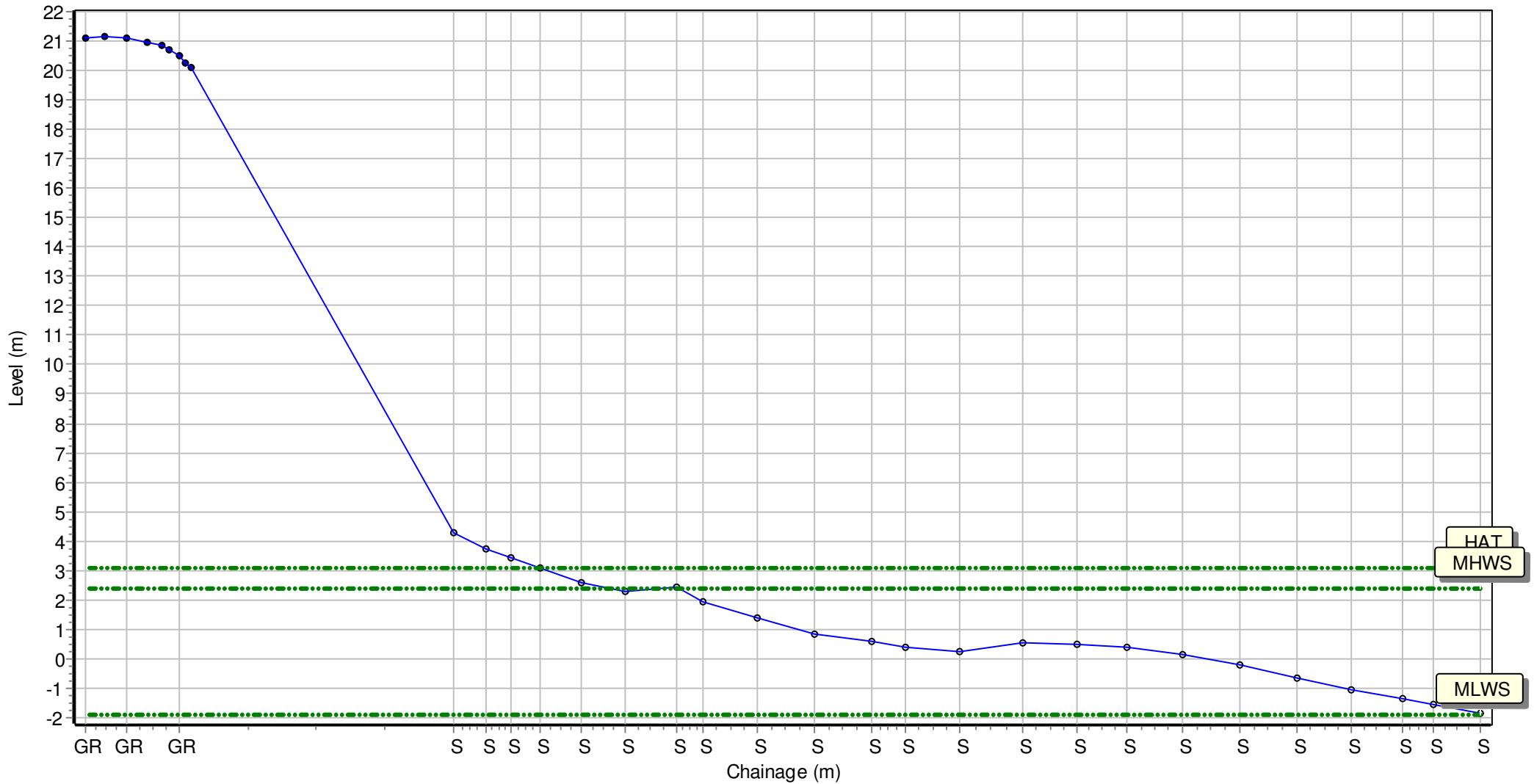
Low Tide: Low Tide Time:

Wind Sea State:

Visibility: Rain:

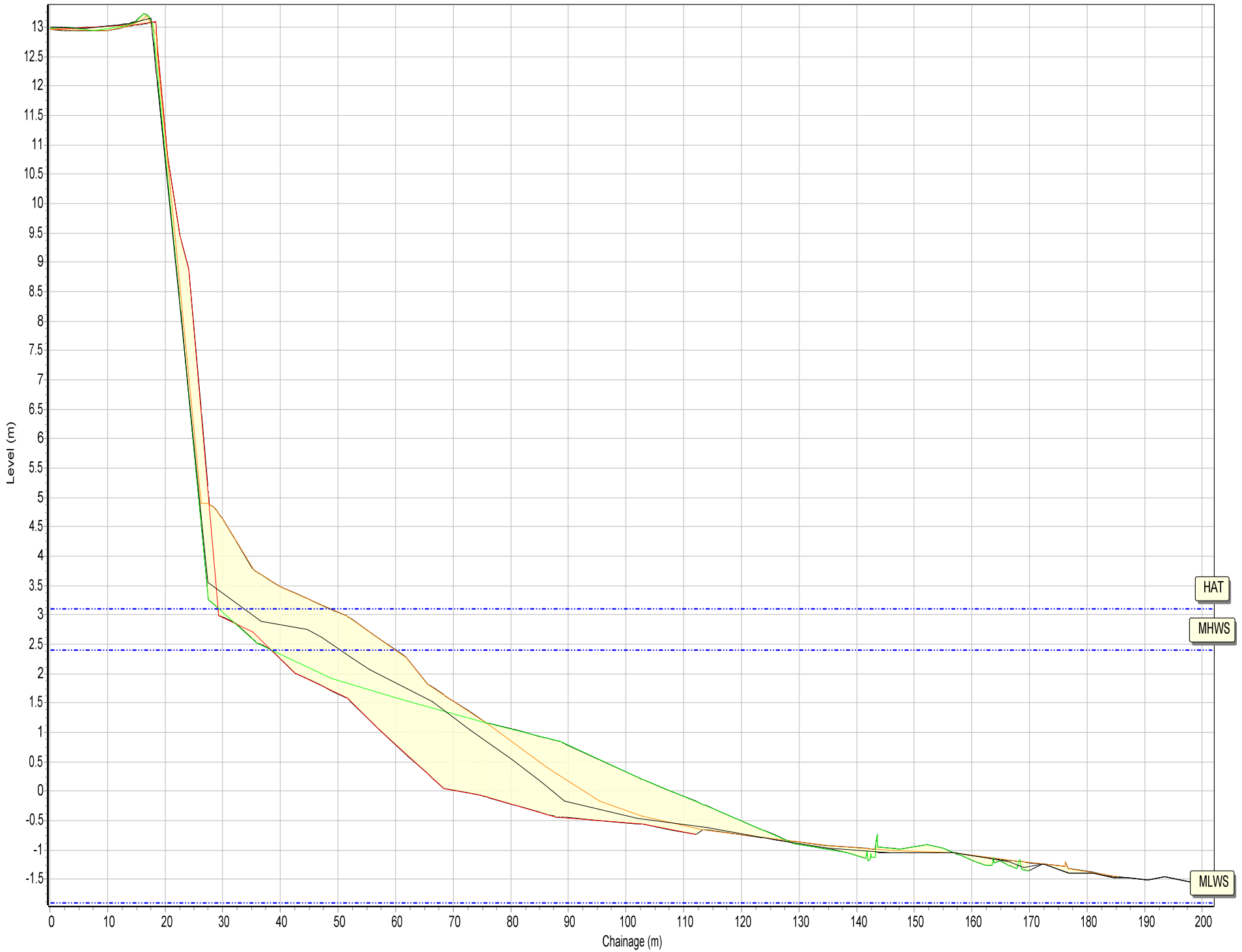
Summary: 2017 Full Measures Topo Survey

Easting: 436620.512 Northing: 570317.533 Profile Bearing: 65 ° from North





Beach Profiles: 1aNTDC01



Profiles Envelope  
01/10/2006  
14/09/2016  
02/03/2017  
05/09/2017

HAT

MHWS

MLWS

SANDS



Beach Profiles: 1aNTDC02



SANDS

Beach Profiles: 1aNTDC03



- Profiles Envelope
- 01/10/2006
- 14/09/2016
- 02/03/2017
- 05/09/2017

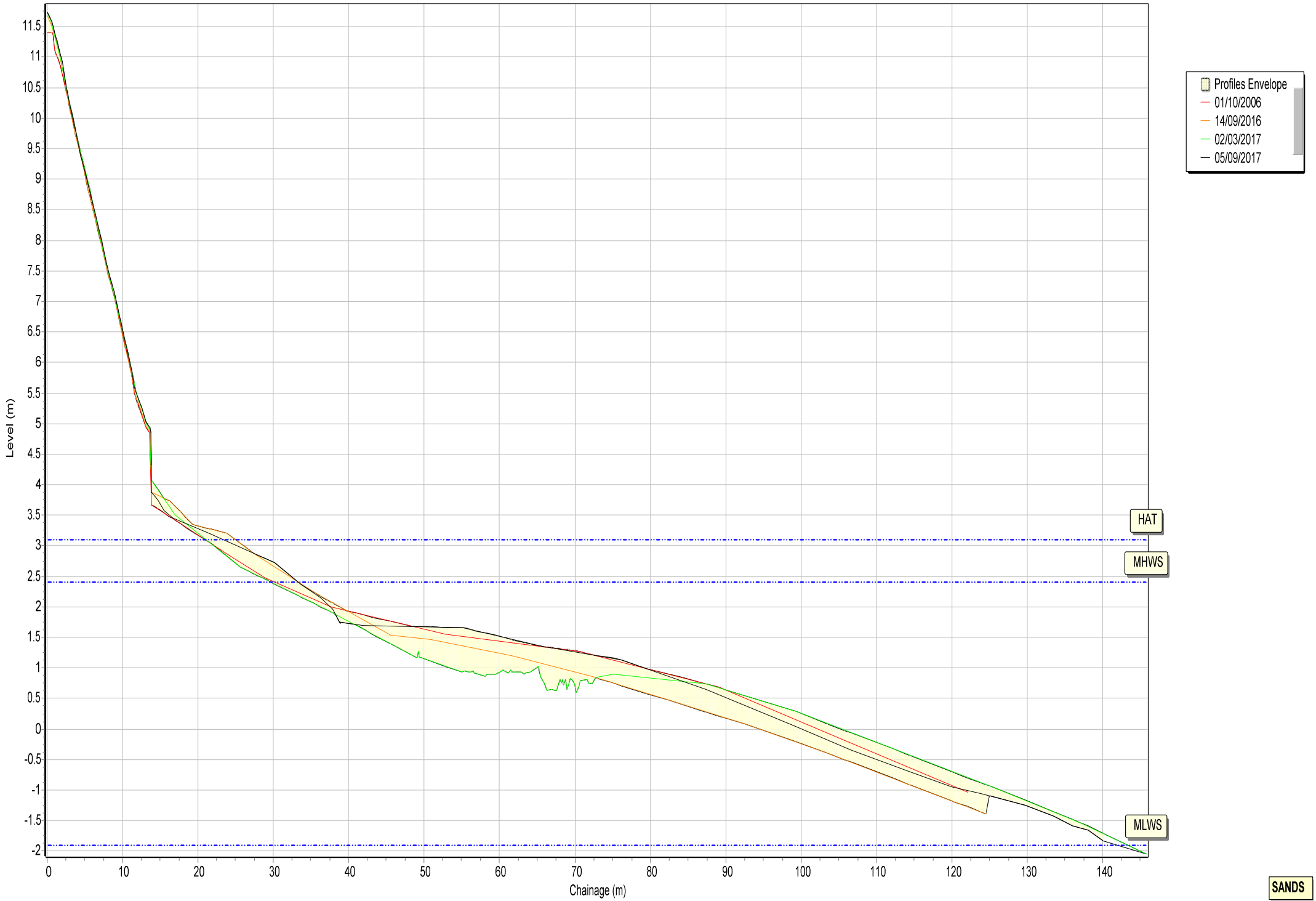
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1aNTDC04



SANDS

Beach Profiles: 1aNTDC04A



Profiles Envelope  
29/03/2010  
14/09/2016  
02/03/2017  
05/09/2017

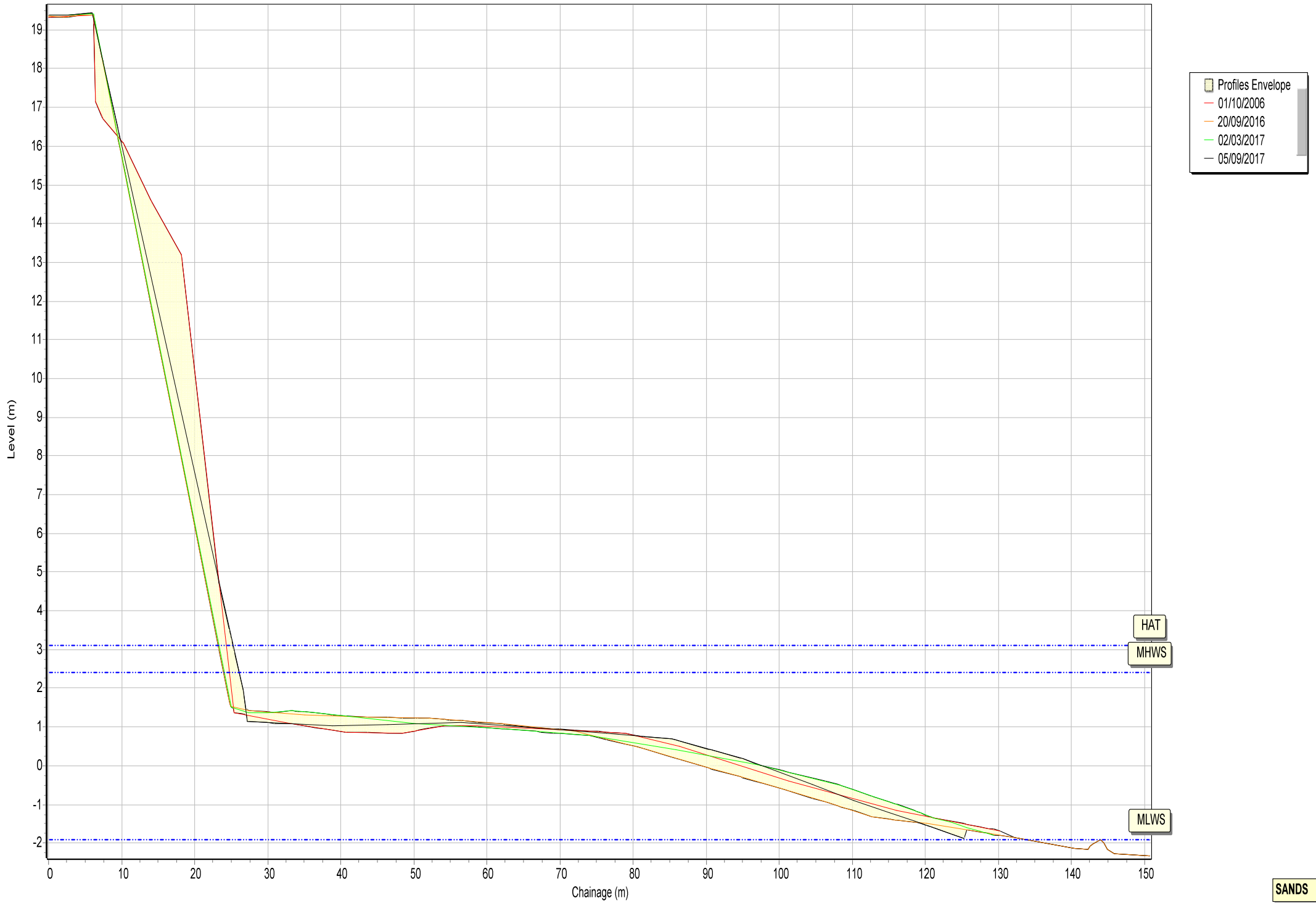
HAT

MLWS

MLWS

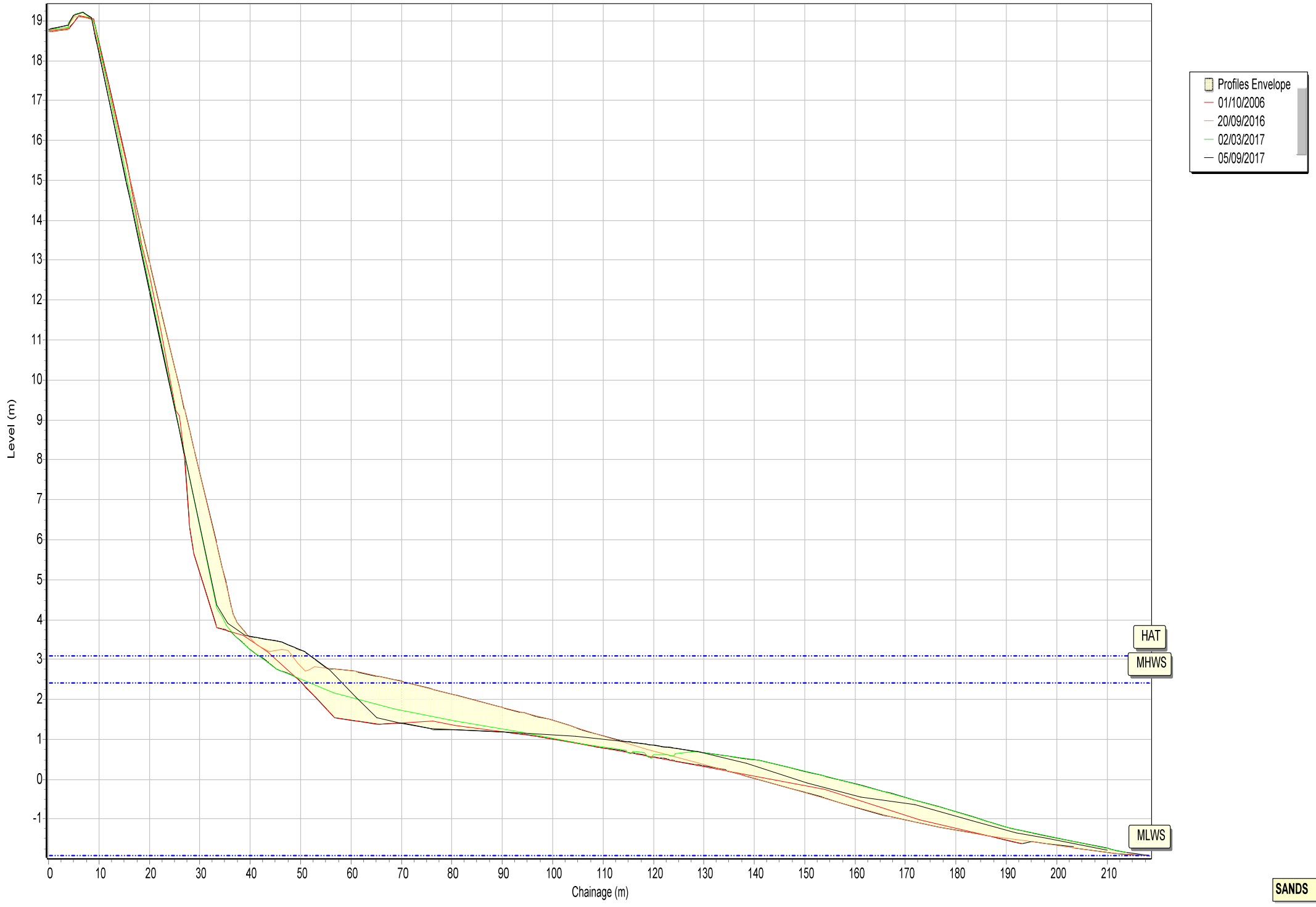
SANDS

Beach Profiles: 1aNTDC05



SANDS

Beach Profiles: 1aNTDC06



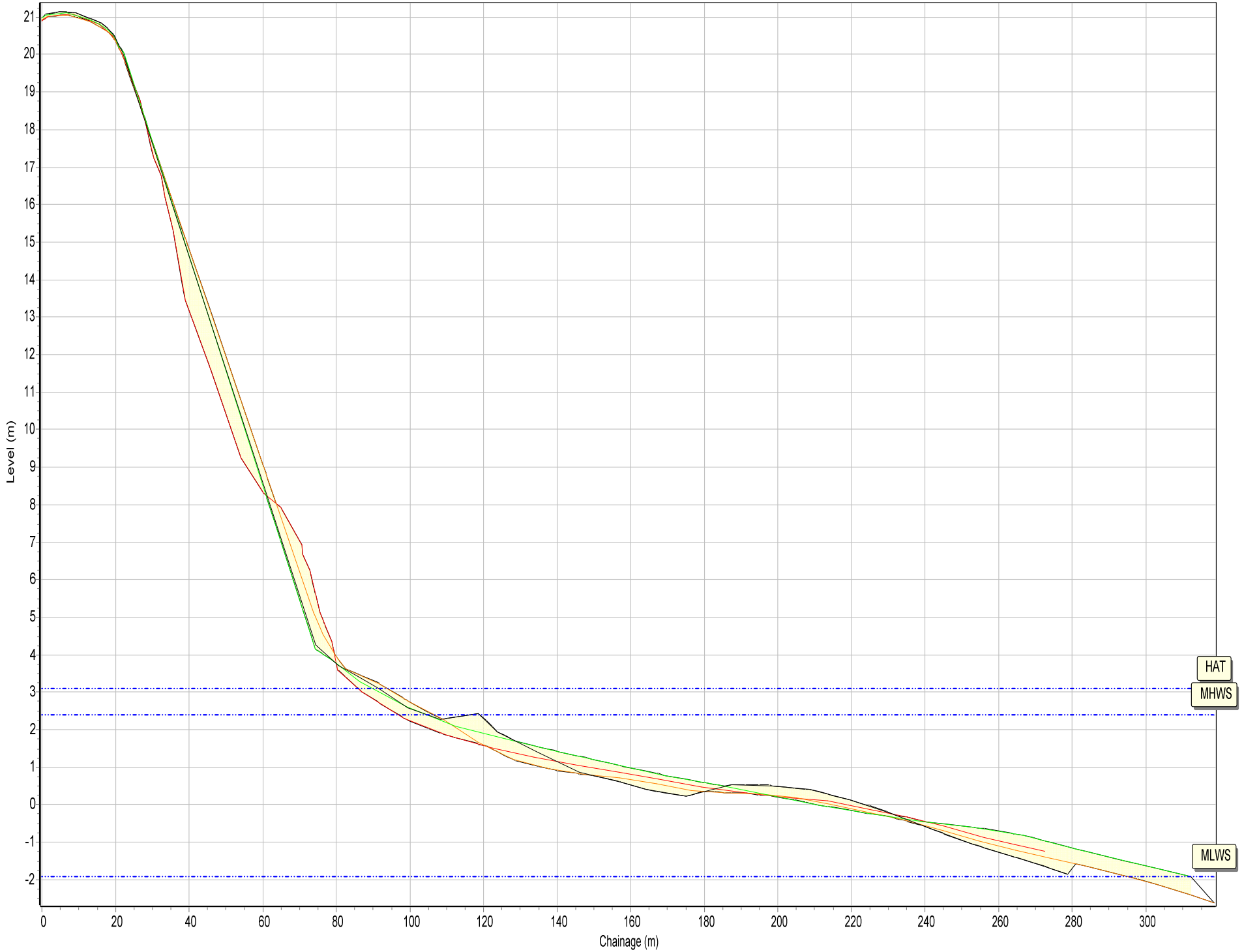
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1aNTDC06A



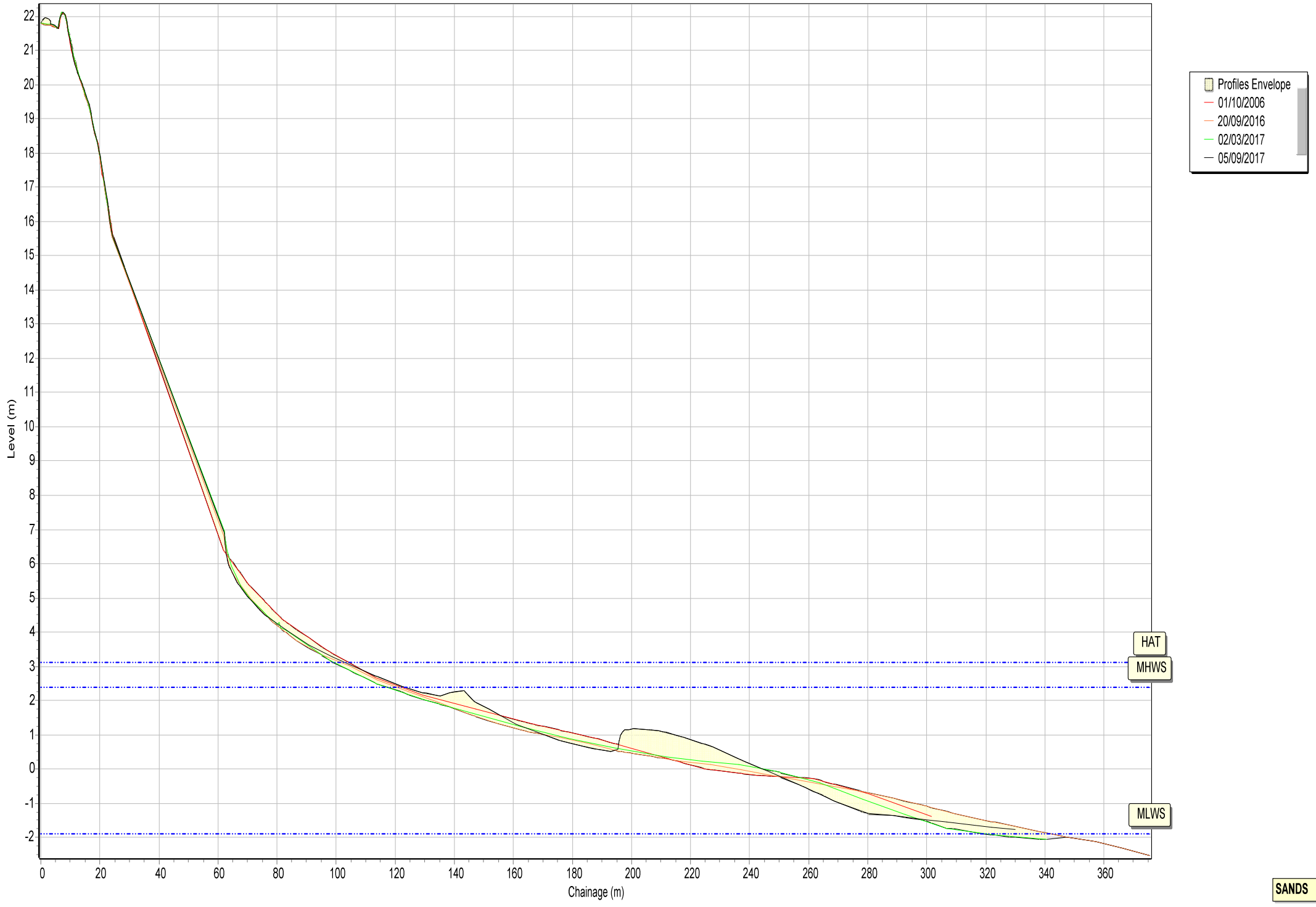
Profiles Envelope  
29/03/2010  
20/09/2016  
02/03/2017  
05/09/2017

HAT  
MHWS

MLWS

SANDS

Beach Profiles: 1aNTDC07



SANDS

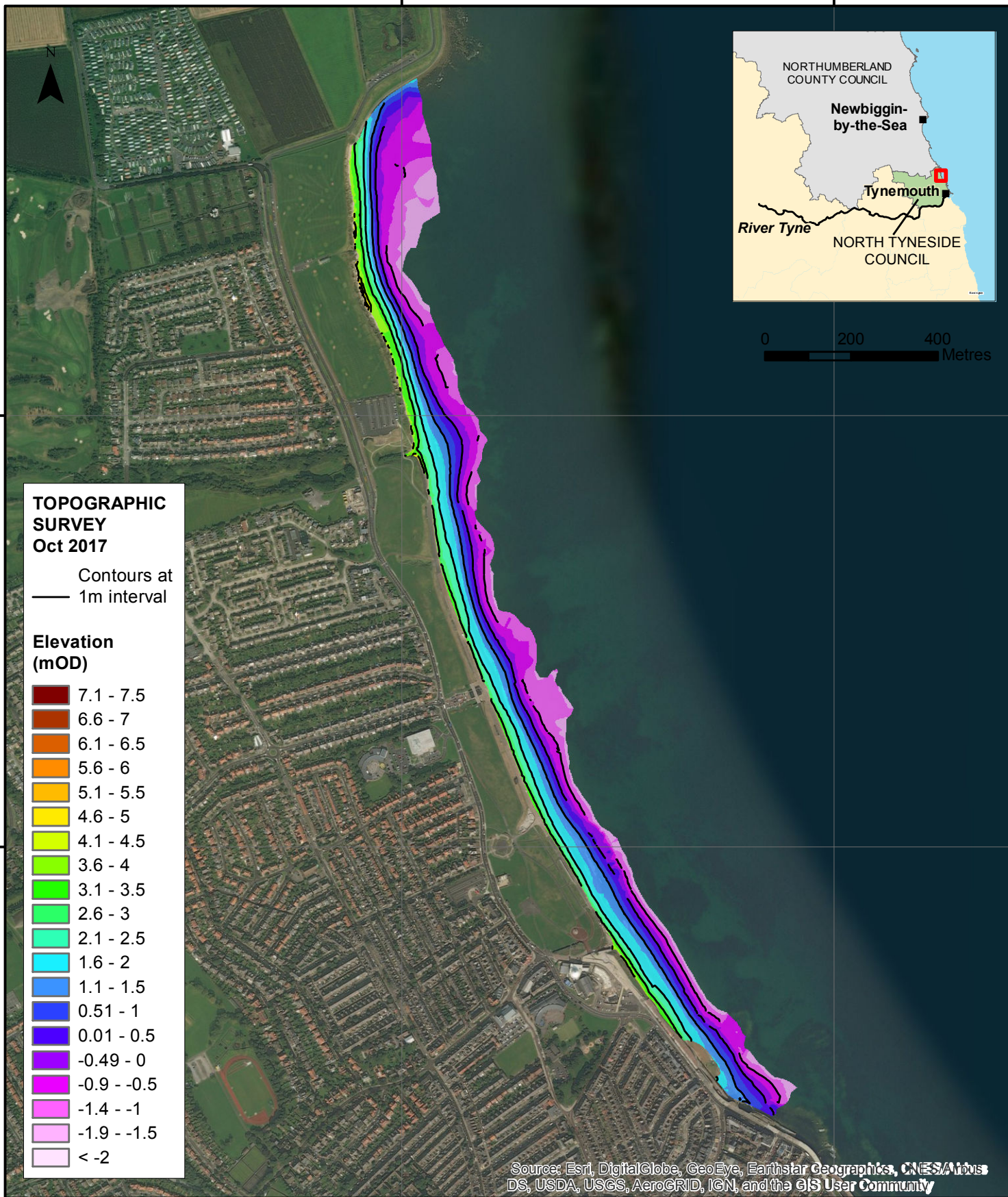


**Appendix B**  
**Topographic Survey**



435000

436000



574000

573000

**Appendix B - Map 1**

**WHITLEY SANDS**

**North Tyneside Council Frontage**

Analytical Report  
'Full Measures' Survey 2017

Drawing Scale at A4 1:12,000

Client:  
North East Coastal Group

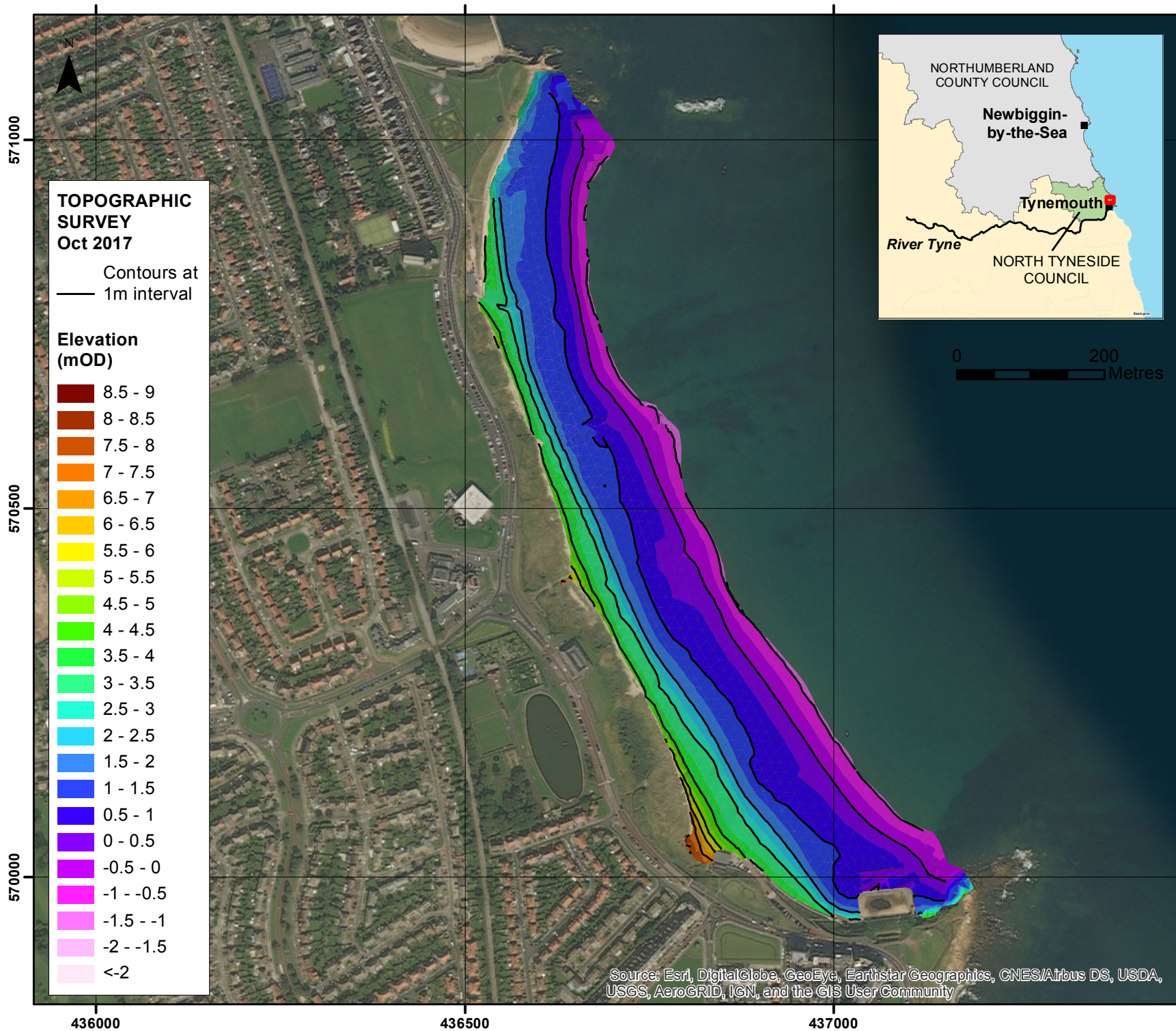
Project:  
Cell 1 Regional Coastal Monitoring Programme

**WATER**  
Royal HaskoningDHV  
Marlborough House  
Marlborough Crescent  
Newcastle upon Tyne  
NE1 4EE

Tel: +44 (0)191 211 1300  
Fax: +44 (0)191 211 1313  
www.royalhaskoningdhv.com







Client: North East Coastal Group  
Project: Cell 1 Regional Coastal Monitoring Programme

**Appendix B - Map 2**  
**LONGSANDS**  
**North Tyneside Council Frontage**  
Analytical Report  
'Full Measures' Survey 2017

Drawing Scale at A4 1:7,000

**WATER**  
Royal HaskoningDHV  
Marlborough House  
Marlborough Crescent  
Newcastle upon Tyne  
NE1 4EE

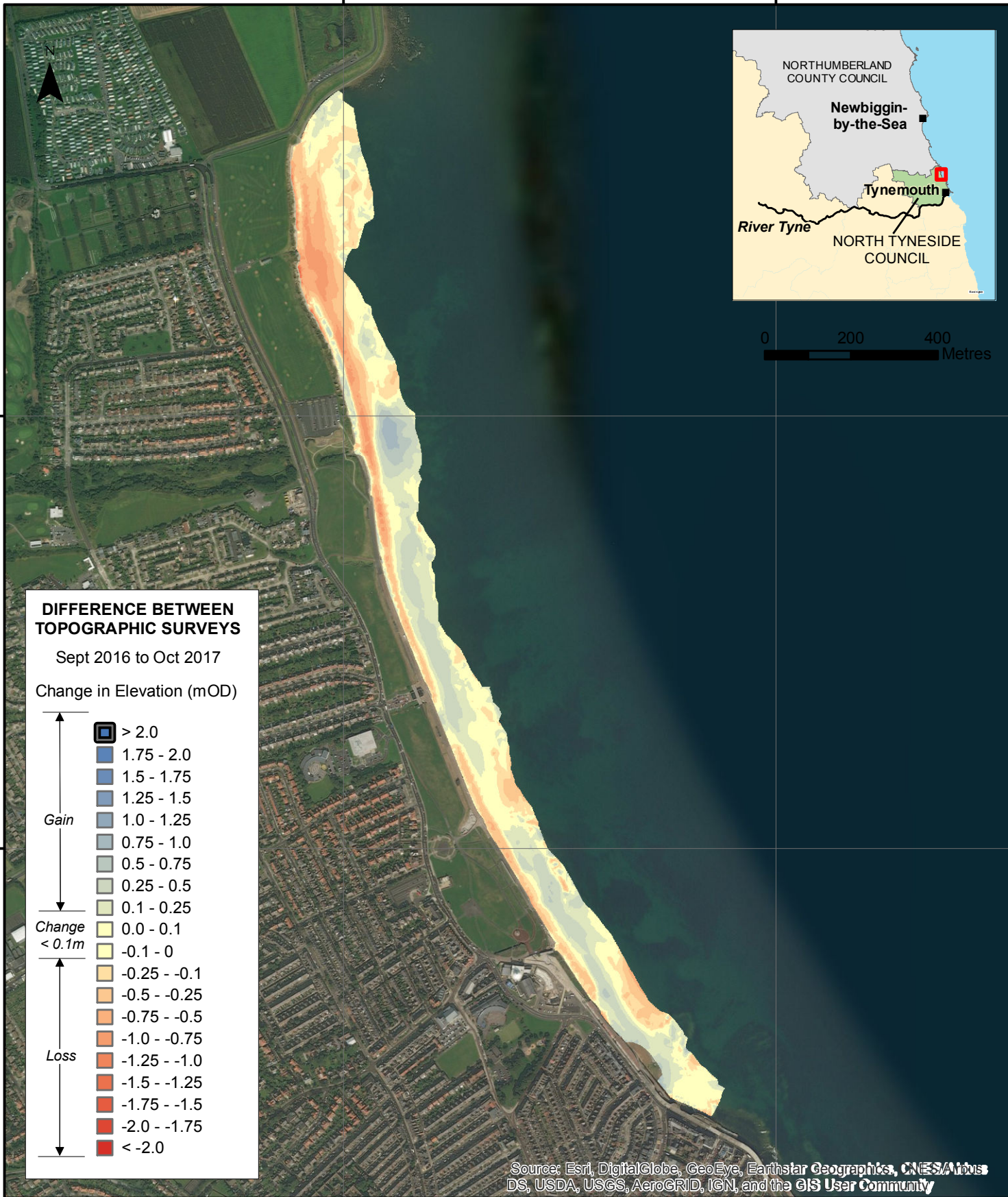
Tel: +44 (0)191 211 1300  
Fax: +44 (0)191 211 1313  
www.royalhaskoningdhv.com

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435000

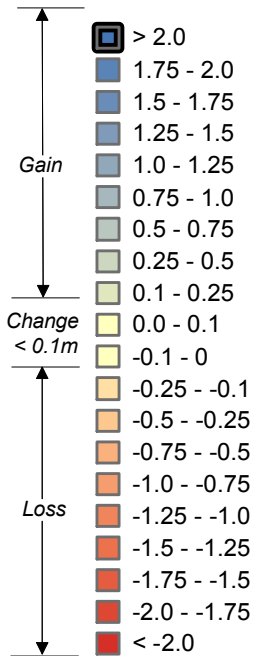
436000



**DIFFERENCE BETWEEN TOPOGRAPHIC SURVEYS**

Sept 2016 to Oct 2017

Change in Elevation (mOD)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Appendix B - Map 3**

**WHITLEY SANDS**

**North Tyneside Council Frontage**

Analytical Report  
'Full Measures' Survey 2017

Drawing Scale at A4 1:12,000

Client:  
North East Coastal Group

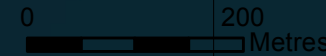
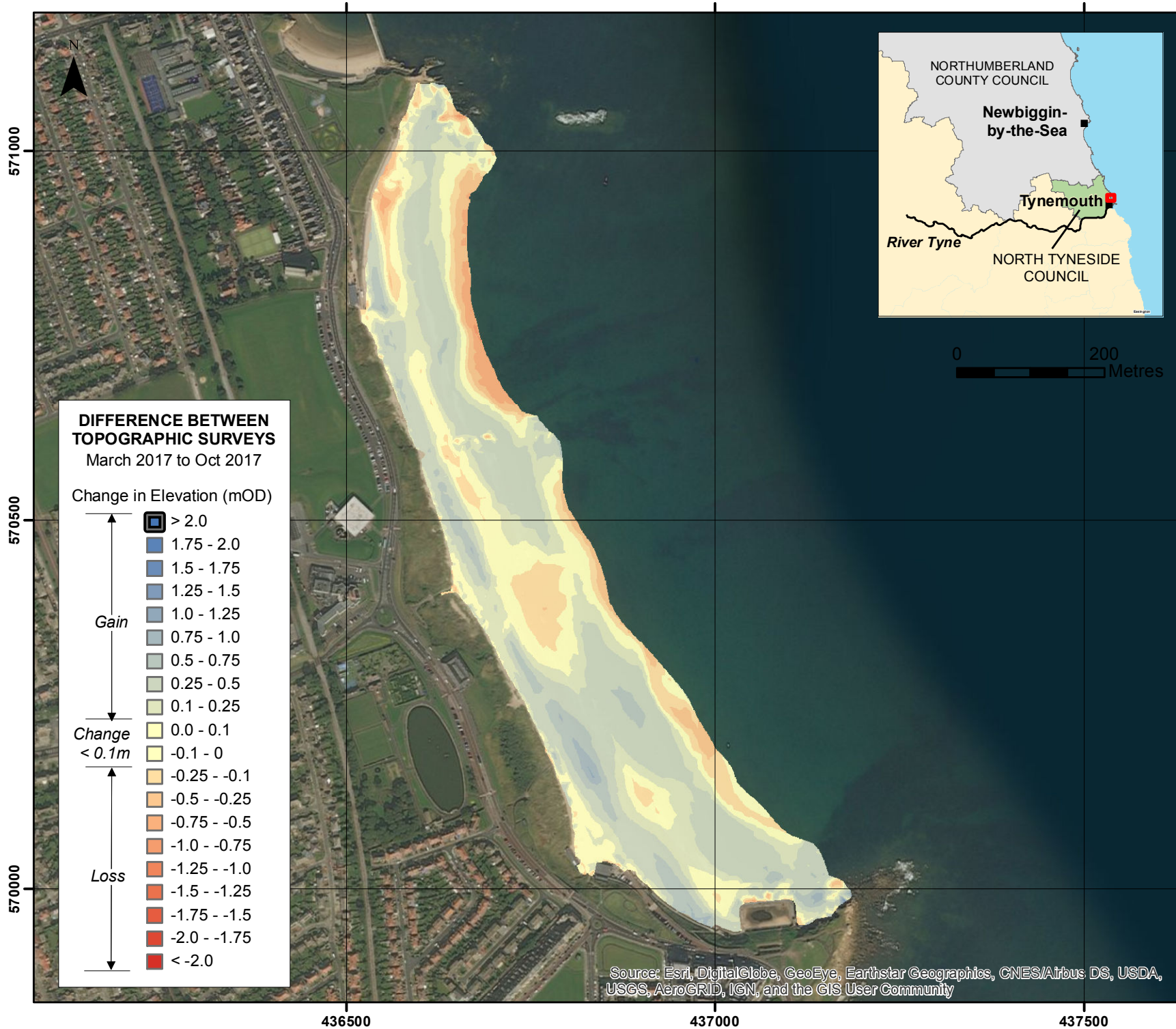
Project:  
Cell 1 Regional Coastal Monitoring Programme

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www.royalhaskoningdhv.com







Client: North East Coastal Group  
Project: Cell 1 Regional Coastal Monitoring Programme

**Appendix B - Map 4**

**LONGSANDS**

**North Tyneside Council Frontage**

Analytical Report  
'Full Measures' Survey 2017

Drawing Scale at A4 1:7,000

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