Cell 1 Regional Coastal Monitoring Programme
Update Report 10: 'Partial Measures' Survey 2018

North Tyneside Council

May 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).

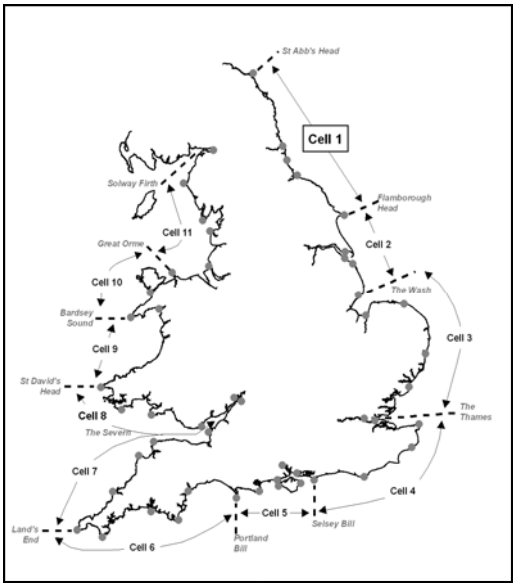


Figure 1 Sediment Cells in England and Wales

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 every year. Some of these surveys are then repeated the following spring as part of a 'Partial Measures' survey.

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	Mar 18	May 18 (*)	

(*) The present report is **Update Report 10** and provides an analysis of the 2018 Partial Measures survey for North Tyneside Council's frontage.

1. Introduction

1.1 Study Area

North Tyneside Council's frontage extends from Hartley (just south of Blyth) in the north to 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 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)

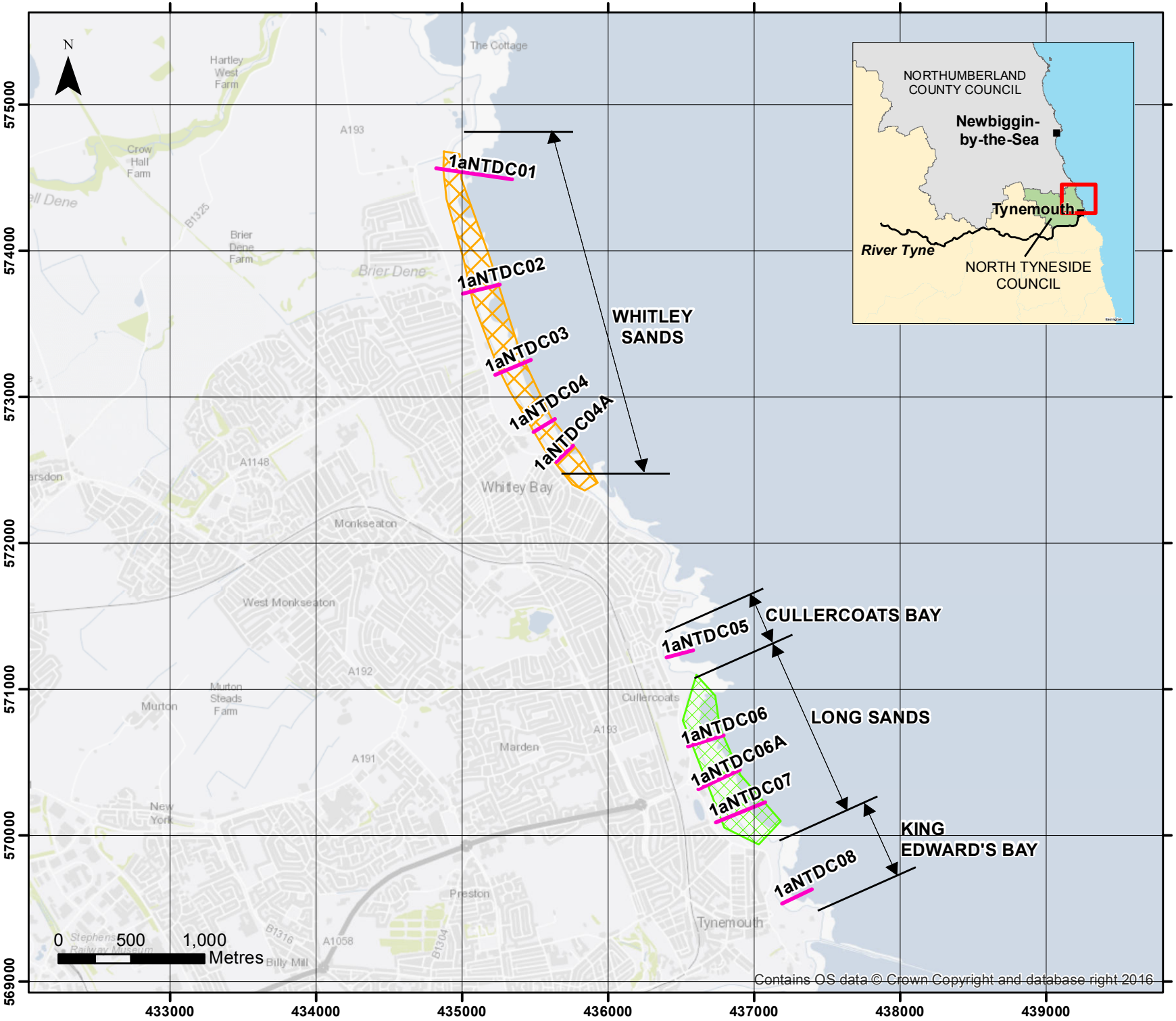
- Partial Measures survey annually each spring comprising:
    - Beach profile surveys along all ten transect lines (commenced 2010)

The location of these surveys is shown in Figure 2. The Partial Measures 2017 surveys were undertaken along this frontage on the 6th, 19th, and 29th March 2018. During this time weather conditions varied; refer to the survey reports for details of the weather conditions over this survey period.

The Update Report presents the following:

- 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.



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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
6th March 2018	**Beach Profiles:** Whitley Sands is covered by five beach profile lines for the Partial Measures survey (Appendix A). Four of these (1aNTDC01 to 1aNTDC04) were initially surveyed in April 2002 and were then re-surveyed annually to 2009 (Full Measures, autumn 2009) after which time they have been surveyed bi-annually. From March 2010 (Partial Measures, spring 2010) onwards, an additional beach profile line (NTDC04A) has been surveyed at the southern end of the frontage for the same time periods listed above. All profiles were last surveyed in September 2017 for the Full Measures survey. **1aNTDC01** is located in the north of Whitley Sands, along the undefended cliffs immediately south of Trinity Road car park. The profile shows no change in the position of the cliff since the previous survey. The upper and lower beach are dominated by erosion of up to 1.2m, whilst the middle beach shows very little change ±0.2m. Whilst the upper beach has flattened, the lower beach has steepened. Overall the profile is at a medium-low level compared to the range recorded from previous surveys, with the toe of the cliff and toe of the beach being particularly low. Profile **1aNTDC02** is located towards the north of Whitley Sands. From the sea wall as far as 125m chainage the elevation of the beach has decreased by up to 1.2m compared to the previous survey. From chainage 125m to 172m the beach levels have increased by up to 0.8m. Two small berms have formed at chainages 110m and 130m. Seawards of chainage 172m there has been small amount of erosion at the toe of the beach. The upper beach is at a relatively low level compared to the range recorded from previous surveys, with the section between chainage 60m and 110m being the lowest on record. The lower beach is relatively high with the section between chainages 145m and 155m being the highest on record. Profile **1aNTDC03** is located at the centre of Whitley Sands. Beach levels have dropped between the sea wall and 85m chainage, with the maximum decrease being 0.9m. Seawards of chainage 85m there has been accretion of up to 1.6m, forming a wide berm at chainage 105m. The upper beach is the lowest on record between the seawall and chainage 62m. The lower beach is the highest on record from	Since the last survey, beach levels at Whitley Sands beach levels have varied, with decreases on the upper beach and increases on the lower beach, attributable to redistribution of material through draw down. **Longer term trends:** The data show that profiles are mostly within the bounds of previous surveys, however the upper beach on most of the profiles is in places at its lowest recorded level, with correspondingly high lower beaches.

Survey Date	Description of Changes Since Last Survey	Interpretation
	chainage 102m. Photographic evidence following the March 2018 storms show the low beach levels with exposed glacial till (boulder clay). Profile **1aNDC04** is located to the south of Whitley Sands. There has been erosion of up to 0.7m on the upper beach from the base of the seawall up to chainage 97m, exposing areas of rock between chainage 65m and 70m. Seawards of chainage 97m the beach levels have increased by 0.9m compared to the previous survey. Overall the profile is at a low level compared to the range recorded from previous surveys, except for the lower beach which is relatively high with the section seawards of 125m being the highest on record. Profile **1aNTDC04a** is located to the south of Whitley Sands. Upper beach levels have fallen by up to 0.9m to chainage 60m. Seawards of chainage 60m there has been accretion of up to 1.0m, covering the previously exposed rocky shore platform from chainage 70m. The upper beach is relatively low compared to the range recorded from previous surveys, with the section between chainage 2m and 17m being the lowest on record. The lower beach is at a more medium-high level.	

2.2 Cullercoats Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
19th March 2018	**Beach Profiles:** Cullercoats Bay is covered by one beach profile line for the Partial Measures survey (Appendix A). This was surveyed annually each autumn between 2002 and 2009. From spring 2010 onwards, it has been surveyed bi-annually. The last survey was the September 2017 Full Measures survey. The cliff top position along **1aNTDC05** has remained constant since surveys began in April 2002, but there have been apparent changes on the cliff face. The cliff toe appears to have retreated by around 2m since the previous survey, which is not supported by the survey photographs. There has been slight accretion of 0.1m between cliff toe and chainage 45m. Between chainage 45m and 97m there has been erosion of up to 0.4m. Seawards of chainage 97m there has been accretion of up to 0.8m, pushing the toe of the beach seawards by around 15m. The overall effect has been to flatten the profile, particularly the lower beach. Overall the beach is at a medium level compared to the range recorded from previous surveys.	There has been some winter draw down of material from the upper to lower beach. **Longer term trends:** The beach levels observed are within the bounds of previous surveys, indicating generic behaviour with no clear trend.

2.3 Tynemouth Long Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
19th March 2018	**Beach Profiles:** Tynemouth Long Sands is covered by three beach profile lines for the Partial Measures survey (Appendix A). Profiles 1aNTDC06 and 1aNTDC07 were initially surveyed annually each autumn between 2002 and 2009. A third profile, 1aNTDC06A, was later added in the centre of the frontage. From spring 2010 (Partial Measures) onwards, they have been surveyed bi-annually. The last survey was the September 2017 Full Measures survey. **1aNTDC06** is located approximately 150m south of the access road/ramp towards the north of the bay. The profile for the dune-cliff face is limited due to a lack of data points in the profile plot; the survey report for this monitoring period and previous survey reports have noted ''*no access to middle of section 6 due to seed protection fences'*. There has been erosion from the toe of the dune-cliff to chainage 170m of up to 0.8m, removing the two berms at chainage 50m and 100m and creating a smoother concave profile. Seawards of chainage 170m there has been accretion of up to 0.6m. Overall the profile is at a low-medium level compared to the range recorded from previous surveys, with the section between chainage 75m and 120m being the lowest on record. The toe of the beach however is at a relatively high level compared to the range recorded from previous surveys. At profile **1aNTDC06A**, the profile for the dune-cliff face is a straight line; a result of a lack of data points in the profile plot; the survey report for this monitoring period and previous survey reports have noted '*no access to middle of section 6A due to seed protection fences*'. There has been limited change across the profile, up to ±0.2m, except for the removal of the two berms between chainages 110m and 130m and 180m and 250m where there has been erosion of up to 0.8m. This has resulted in a smoother concave profile. Overall the profile is at medium level compared to the range recorded from previous surveys. Profile **1aNTDC07** is located approximately 50m south of the access route through the dunes towards the southern end of the bay. As with the other profiles the dune-cliff face is a straight line; a result of a lack of data points in the profile plot. The survey report for this monitoring period and earlier reports note '*no access to middle of section 7 due to seed protection fences*'. The upper beach has seen very little change of ±0.1m from the toe of the dunes to chainage 195m, with the exception of chainage 120m to	At Tynemouth Long Sands, the dune-cliff face was not surveyed due to access constraints, but survey photographs suggest that wind-blown sand continues to accrete in the lee of the defences. Beach profile change has been relatively small over the winter/spring months and generally showing erosion of berms and creation of smoother concave profiles. **Longer term trends:** Overall, the beaches have retained a similar form and are within the bounds of previous surveys.

Survey Date	Description of Changes Since Last Survey	Interpretation
	160m where the berm has been removed by erosion of up to 0.6m. Between chainage 195m and 255m there has been erosion of up to 0.8m removing the larger berm recorded on the previous survey. Seawards of chainage 155m there has been accretion of up to 0.4m. The overall effect is a much smoother concave profile. Overall the beach is at a medium level compared to the range recorded from previous surveys	
29th March 2018	**Topographic Survey:** The first survey for Tynemouth Long Sands was undertaken for the Full Measures survey in October 2010. Data from the current topographic survey have been used to create a digital ground model (DGM) (Appendix B – Map 1a) using a Geographical Information System (GIS). A difference plot has also been produced by comparing the current DGM (Appendix B – Map 1b) with that produced from the last topographic survey (October 2017). The difference plot shows that erosion has dominated across the whole of the bay, with the greatest magnitude of change on the upper beach. There are small areas of accretion at the very top and toe of the beach in the north of the bay, and a few isolated patches on the upper beach in the south of the bay.	Since the last survey, the beach at Tynemouth Long Sands has been dominated by erosion.

2.4 King Edward's Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
19th March 2018	**Beach Profiles:** King Edward's 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. The last survey was the September 2017 Full Measures survey. At profile **1aNTDC08** there has been erosion across most of the profile of up to 0.7m, which has removed the berm previously recorded at chainage 115m. Seawards of chainage 165m however there has been accretion of up to 0.4m at the toe of the beach. The upper beach is the lowest on record between chainage 15m and 105m, whilst the lower beach is at a more medium level compared to the range recorded from previous surveys.	Since the last survey, the beach at King Edward's Bay beach has been subject to some notable changes, including the erosion of the berms in the middle beach and accretion at the beach toe. **Longer term trends:** Although significant changes have occurred since the last survey, they are within the range of historical beach levels.

3. Problems Encountered and Uncertainty Analysis

Individual Profiles

- At profile 1aNTDC03 the construction which was ongoing on the promenade during previous surveys restricting access to the start of the section was complete. The profile now shows the new promenade profile.
- Construction was however ongoing on the promenade at profile 1aNTDC04A.
- At profile 1aNTDC05 the cliff was not measured due to dangerous access. Access to this profile is noted to have been dangerous in the previous Partial Measures and Full Measures reports, and it is therefore recommended that the beach profile data should start at the cliff toe and the cliff position should be monitored from 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 seedling protection fences. This means it has not been possible to directly monitor the effectiveness of the dune stabilisation scheme, although observations have been made from the survey photographs.

Topographic Survey

- N/A

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

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

It is recommended that beach profile 1aNTDC04 should start at the cliff toe and any changes in cliff top position be monitored from the 2-yearly aerial survey data.

5. Conclusions and Areas of Concern

- The effects of the March 2018 storms have been quite dramatic. All of the beaches across the North Tyneside survey area have generally been dominated by erosion, with drawdown of material from the upper to lower foreshore. The result is that the North Tyneside beaches are generally at relatively low levels.
- At Whitley Sands, beach levels have generally shown decreases on the upper beach and increases on the lower beach, suggesting drawdown. For the most part, the beach is at a medium level or lower, with several sections of the upper beach being the lowest on record. Beach levels should continue to be monitored in the next survey to check for signs of recovery or further erosion.
- At Cullercoats Bay, at profile 1aNTDC05, there has been some drawdown of material from the upper to lower beach but there are no causes for concern.
- At Tynemouth Long Sands, the dune-cliff face was not surveyed due to access constraints, and beach profile change has been relatively small generally showing erosion of berms and the creation of smoother concave profiles. The topographic survey is dominated by erosion, with the greatest change on the upper beach. Overall the beach is at a medium-low level compared to the range recorded from previous surveys.
- At King Edward's Bay, the beach has changed notably, with the removal of the berm and accretion at the beach toe. The upper beach is currently at its lowest level on record, this should be monitored in the next survey to check for signs of recovery or further erosion.

Appendices

Appendix A

Beach Profiles

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

Code	Description
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

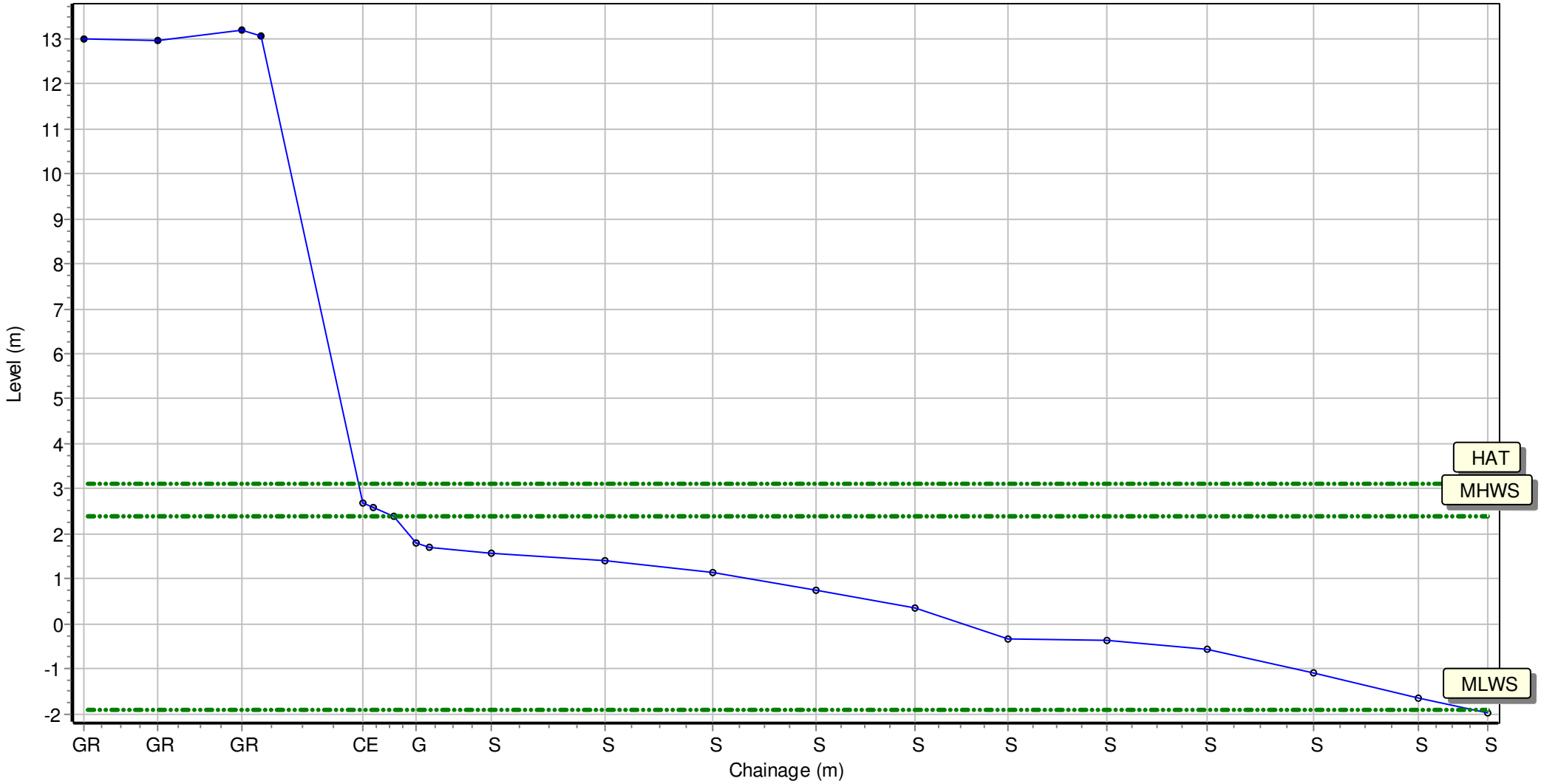
Location: **1aNTDC01**

Date: 06/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

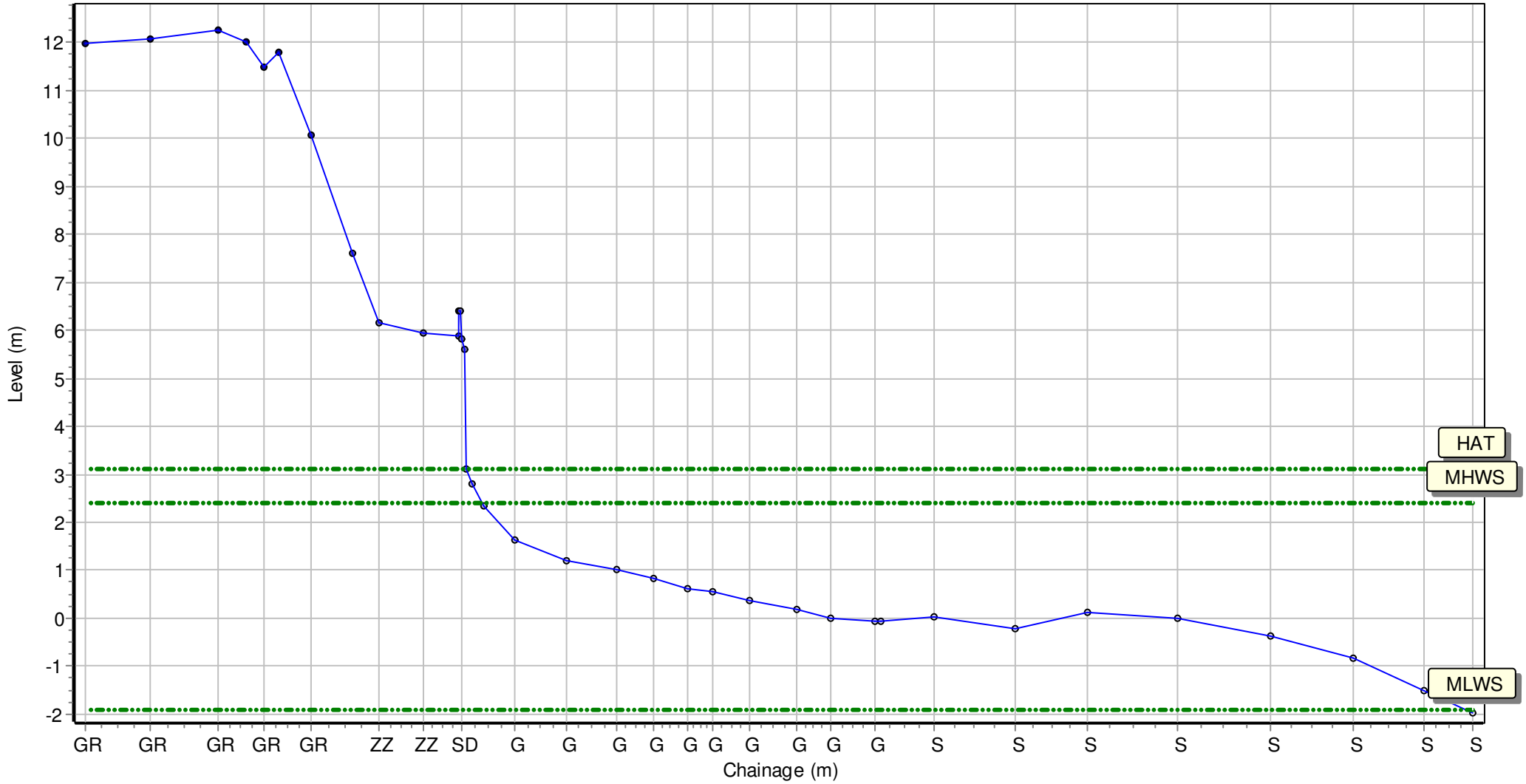
Location: **1aNTDC02**

Date: 06/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

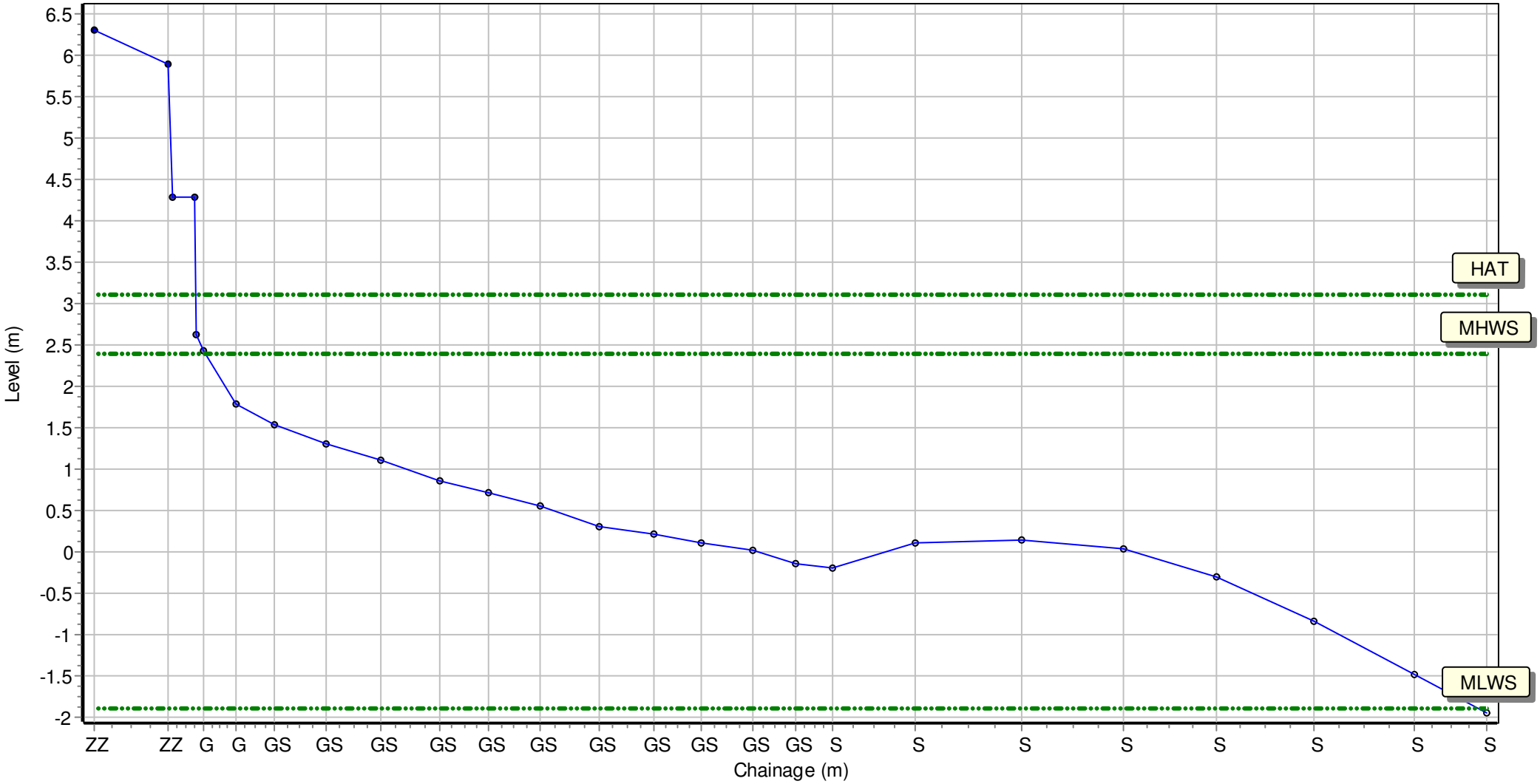
Location: **1aNTDC03**

Date: 06/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

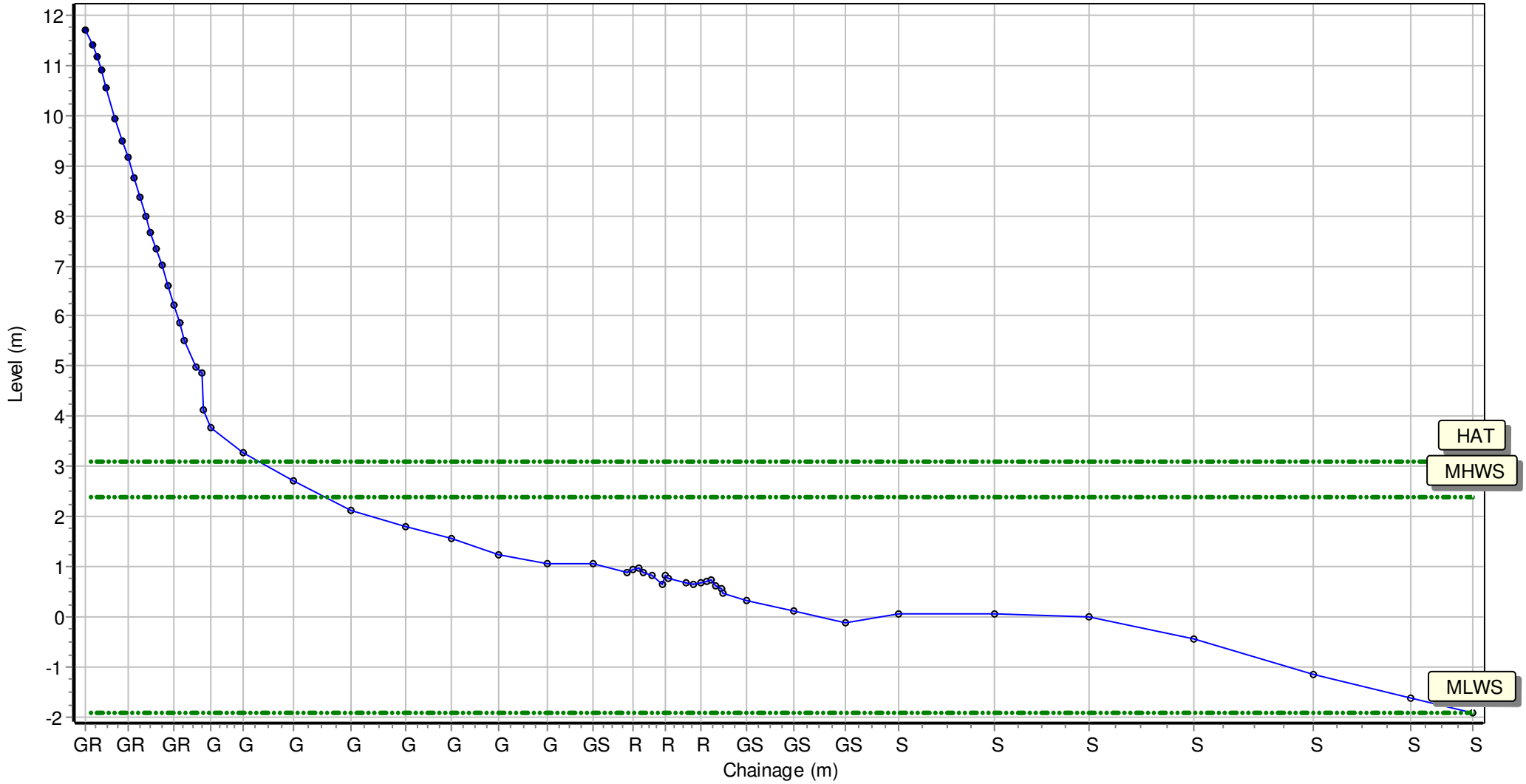
Location: **1aNTDC04**

Date: 06/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

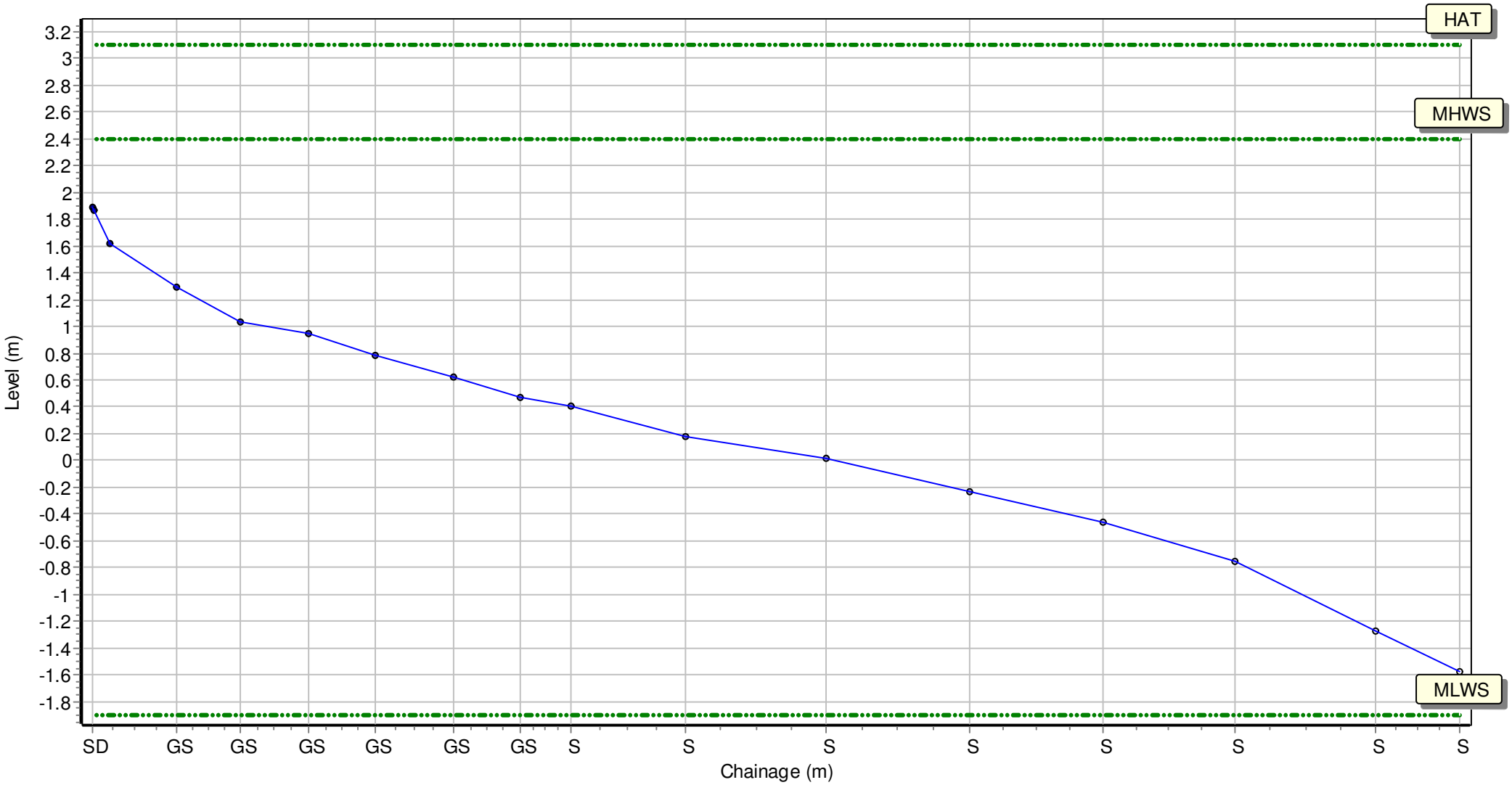
Location: **1aNTDC04A**

Date: 06/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

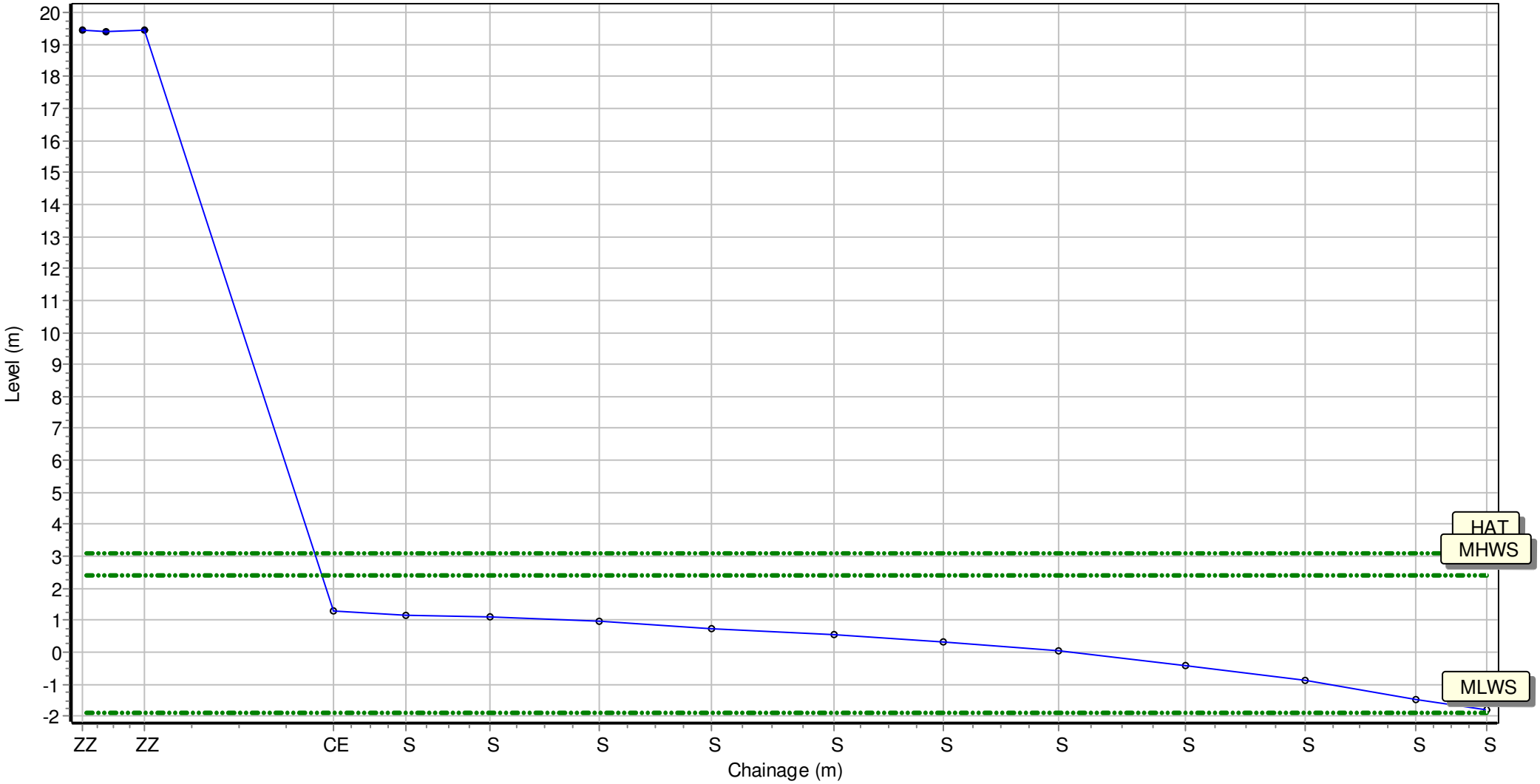
Location: **1aNTDC05**

Date: 19/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

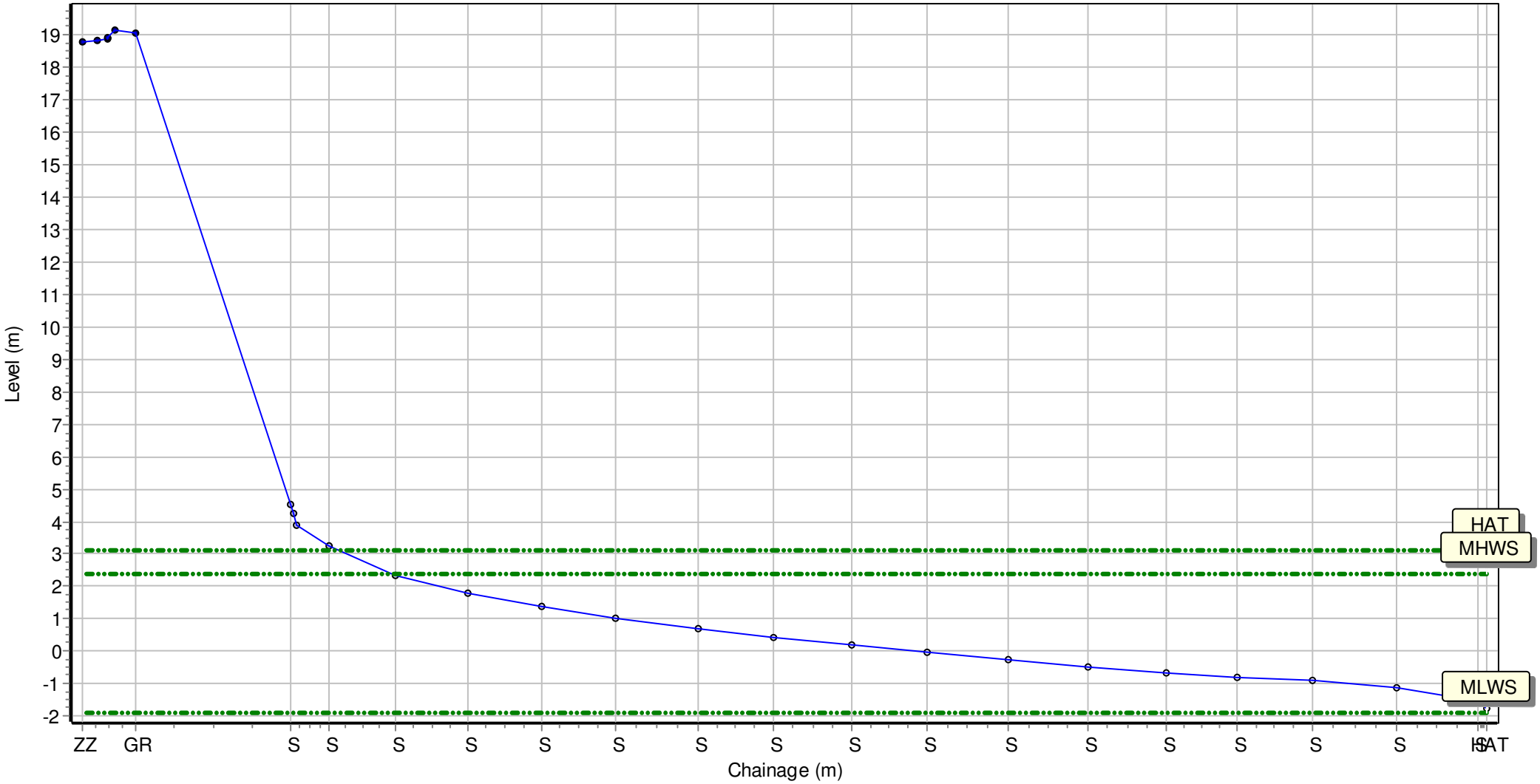
Location: **1aNTDC06**

Date: 19/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

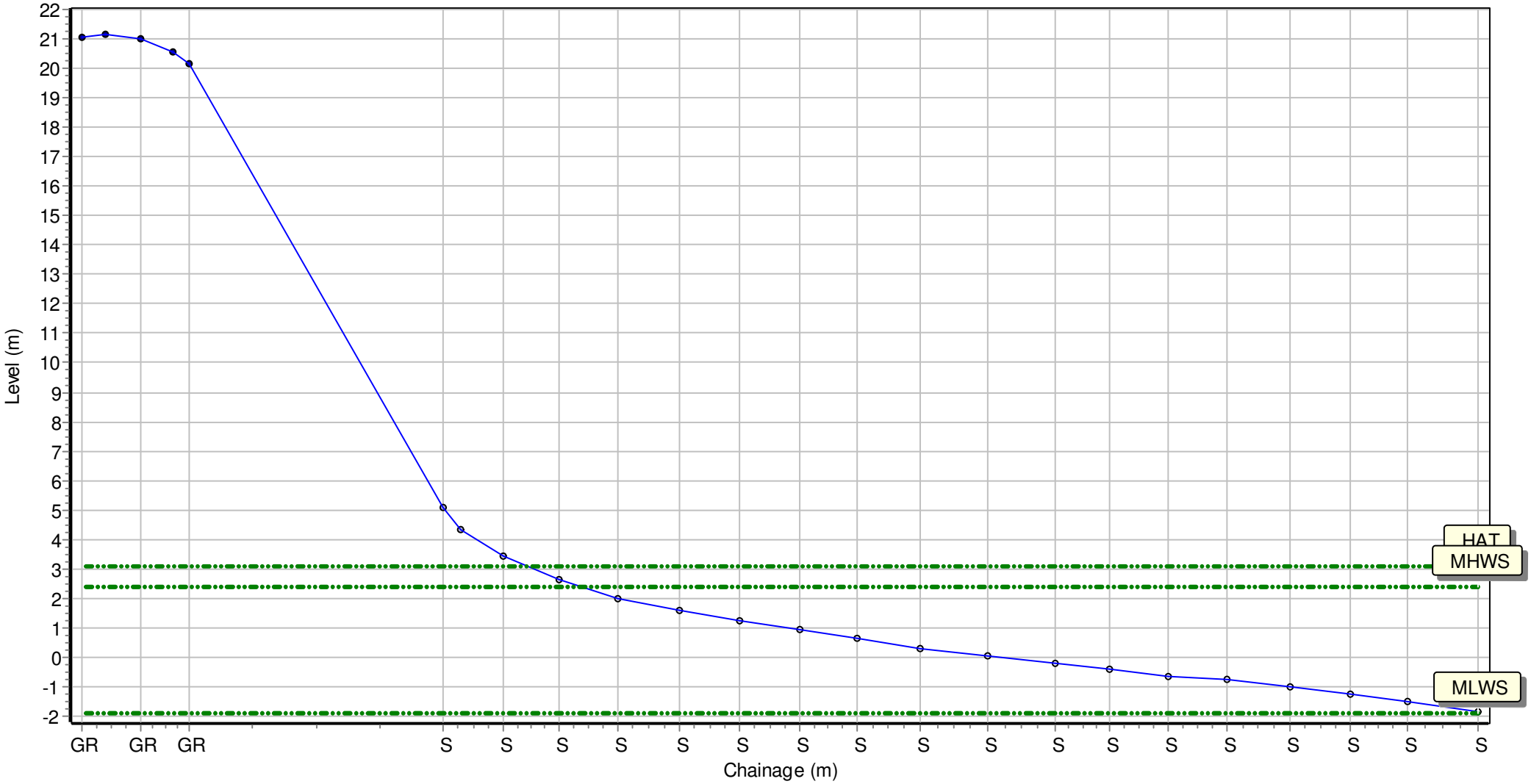
Location: **1aNTDC06A**

Date: 19/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

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



Beach Profile

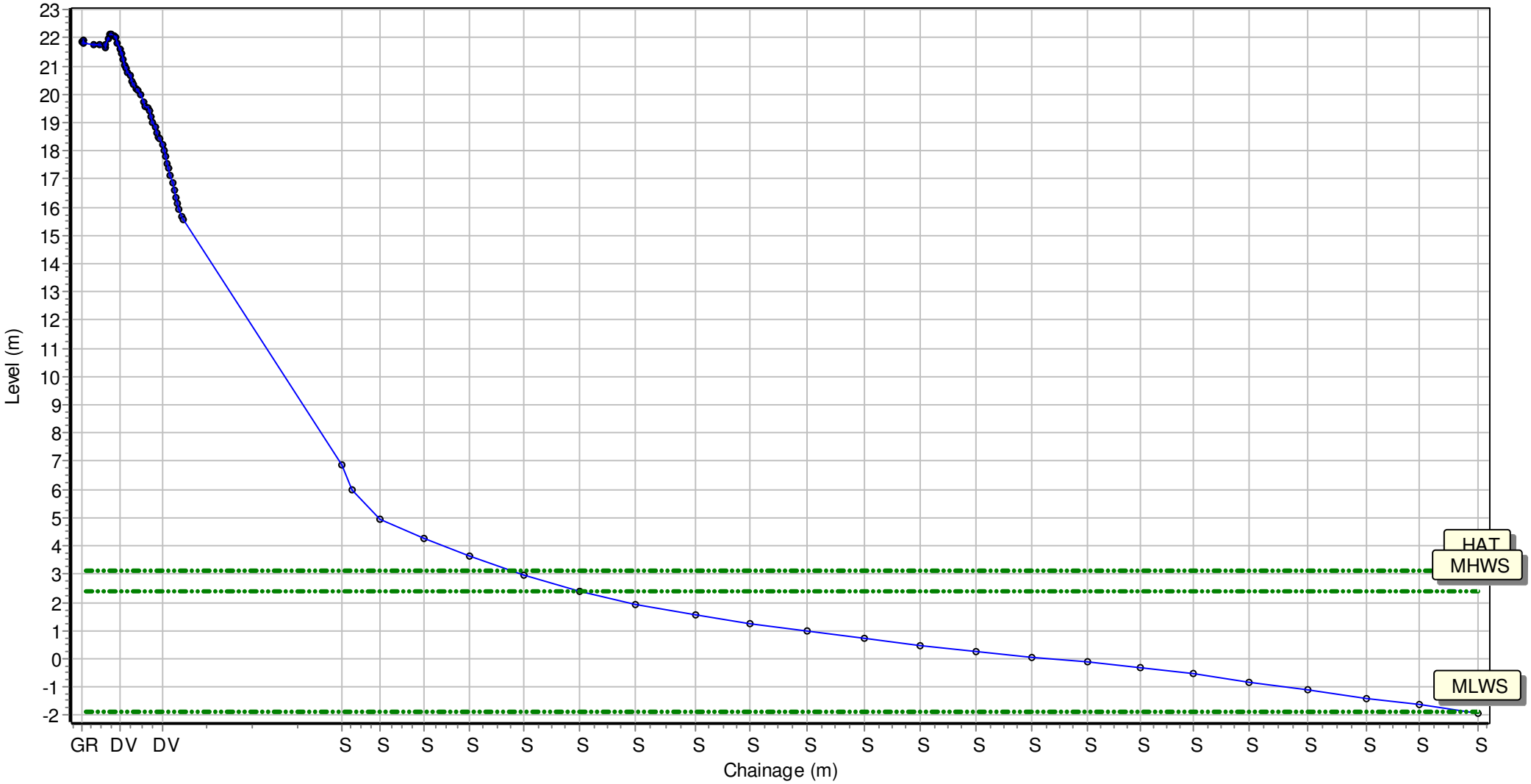
Location: **1aNTDC07**

Date: 19/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

Easting: 436742.221 **Northing:** 570082.97 **Profile Bearing:** 74 ° from North



Beach Profile

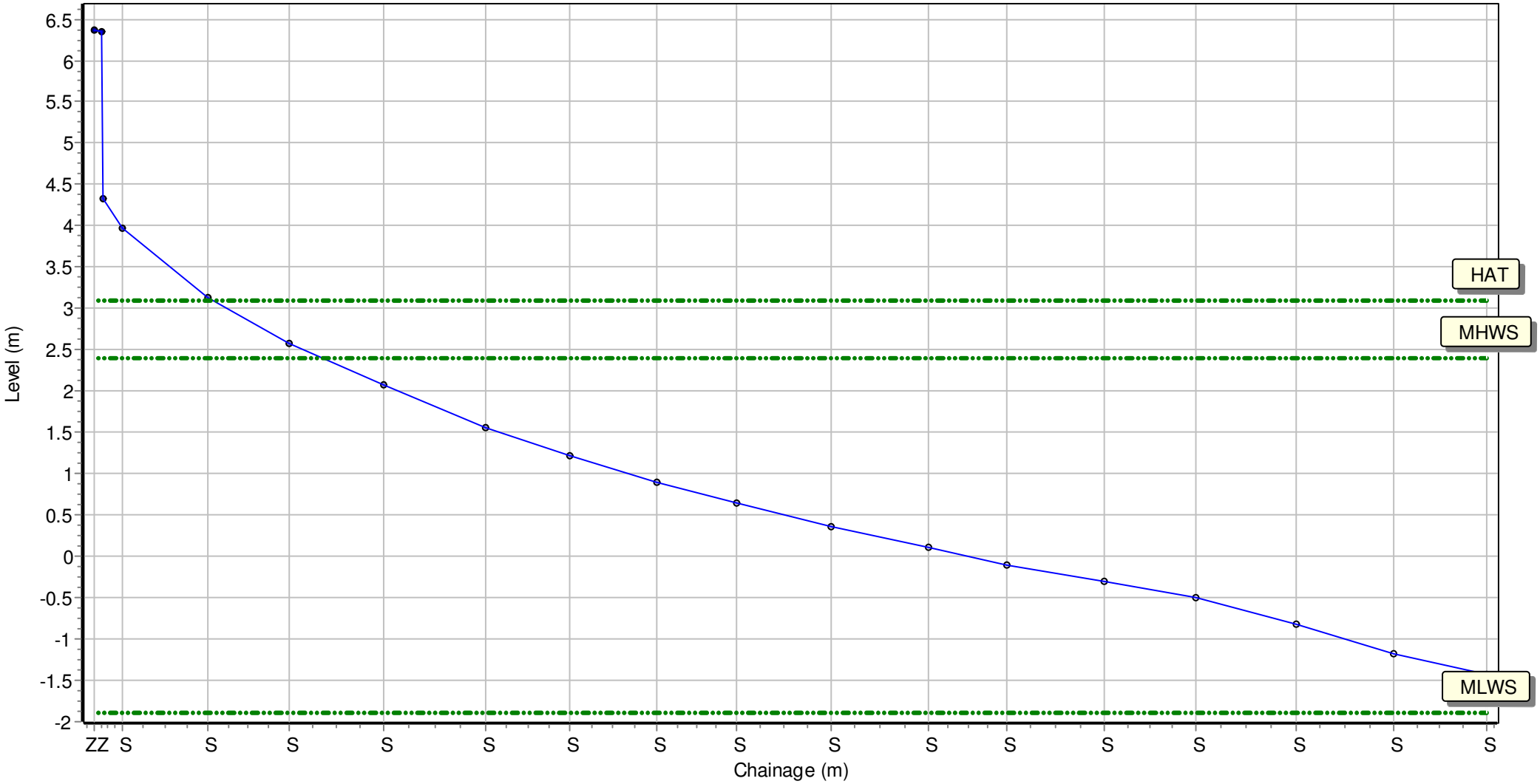
Location: **1aNTDC08**

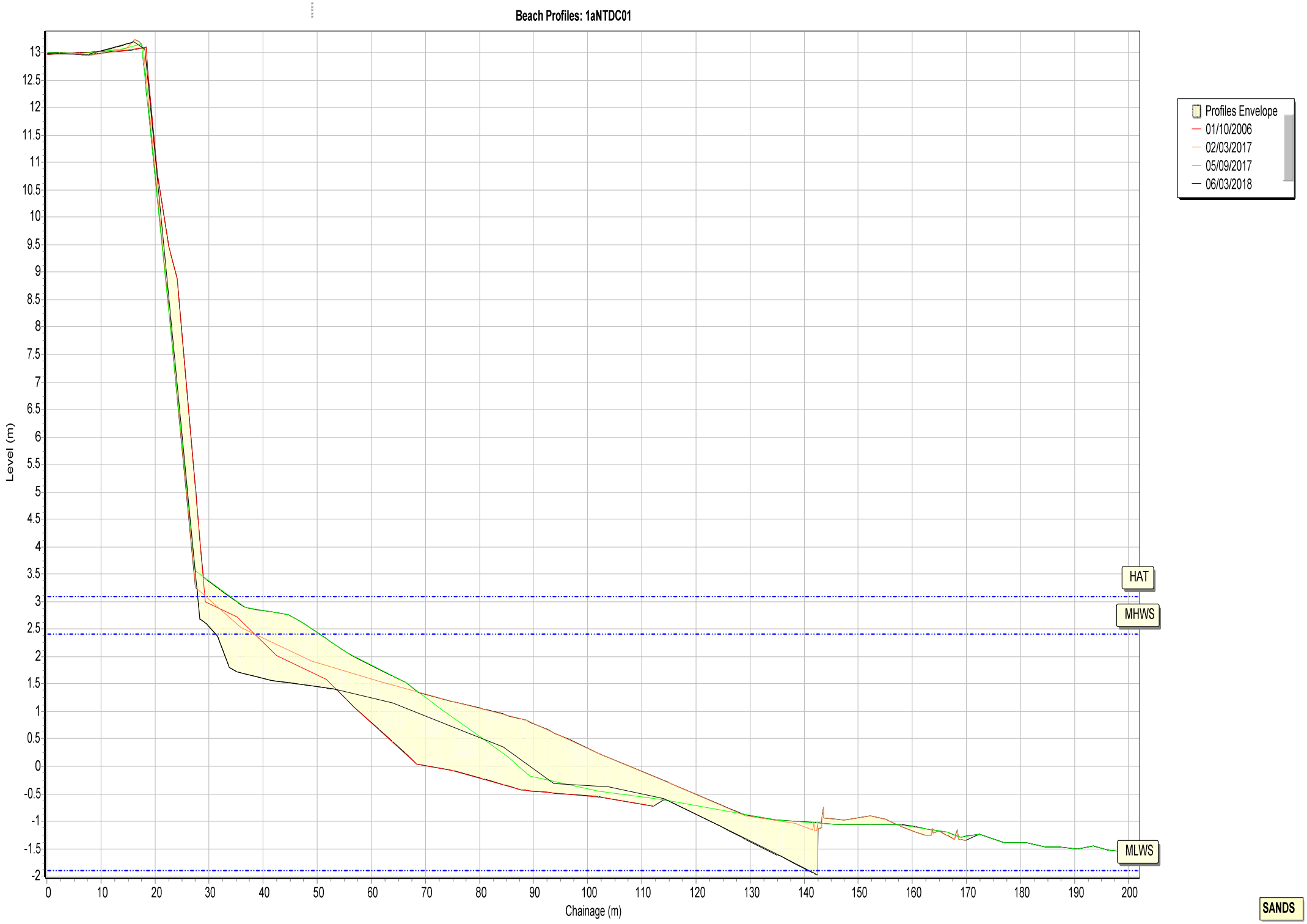
Date: 19/03/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Partial Measures Topo Survey

Easting: 437142.187 **Northing:** 569510.828 **Profile Bearing:** 67 ° from North

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05/09/2017
06/03/2018
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
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180
190
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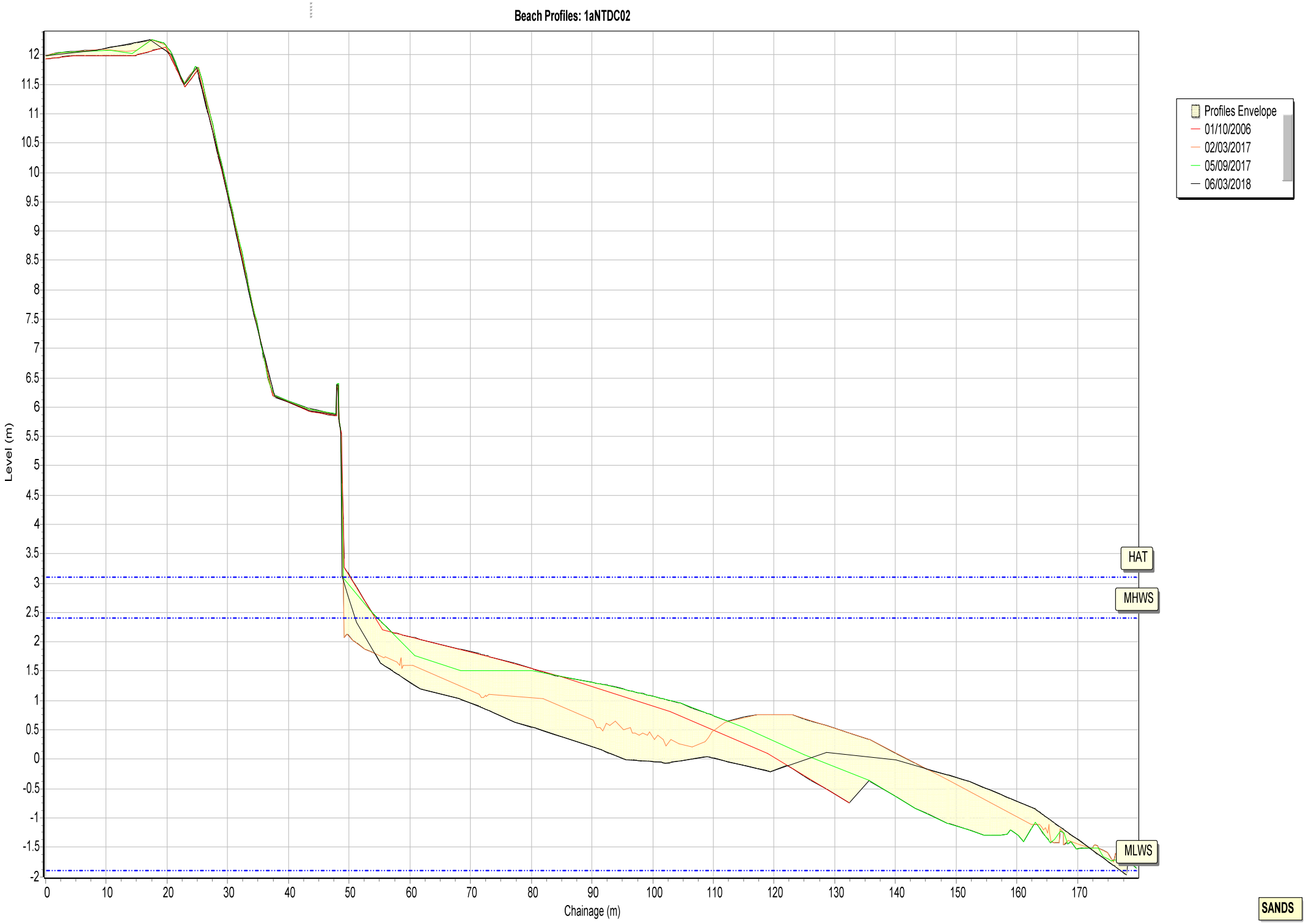
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02/03/2017
05/09/2017
06/03/2018
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MHWS
MLWS
SANDS
Level (m)
Chainage (m)
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
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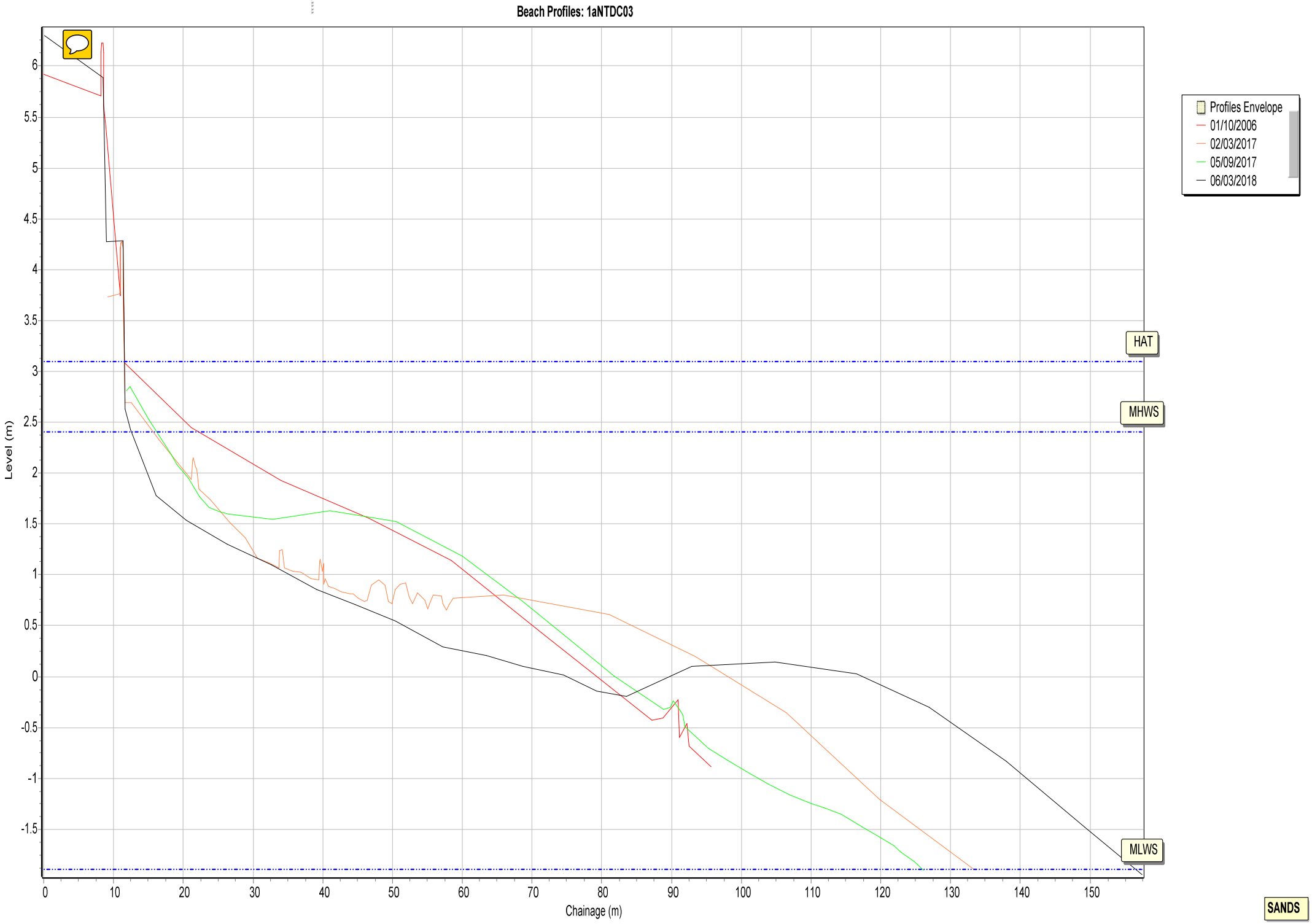
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Chainage (m)
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3.5
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100
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120
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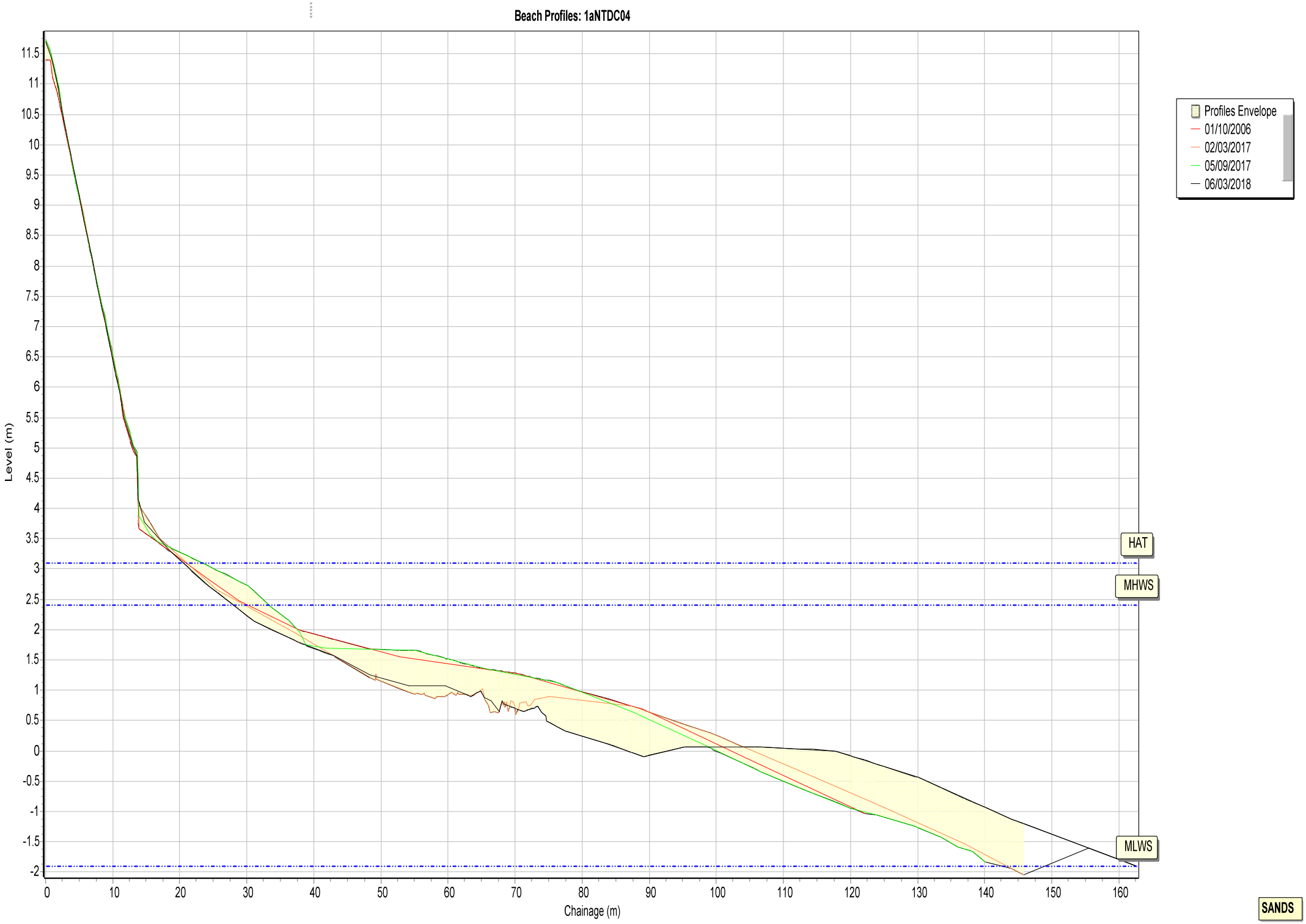
140
150
SANDS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MHWS
MLWS
SANDS
Level (m)
Chainage (m)
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
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4.5
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2.5
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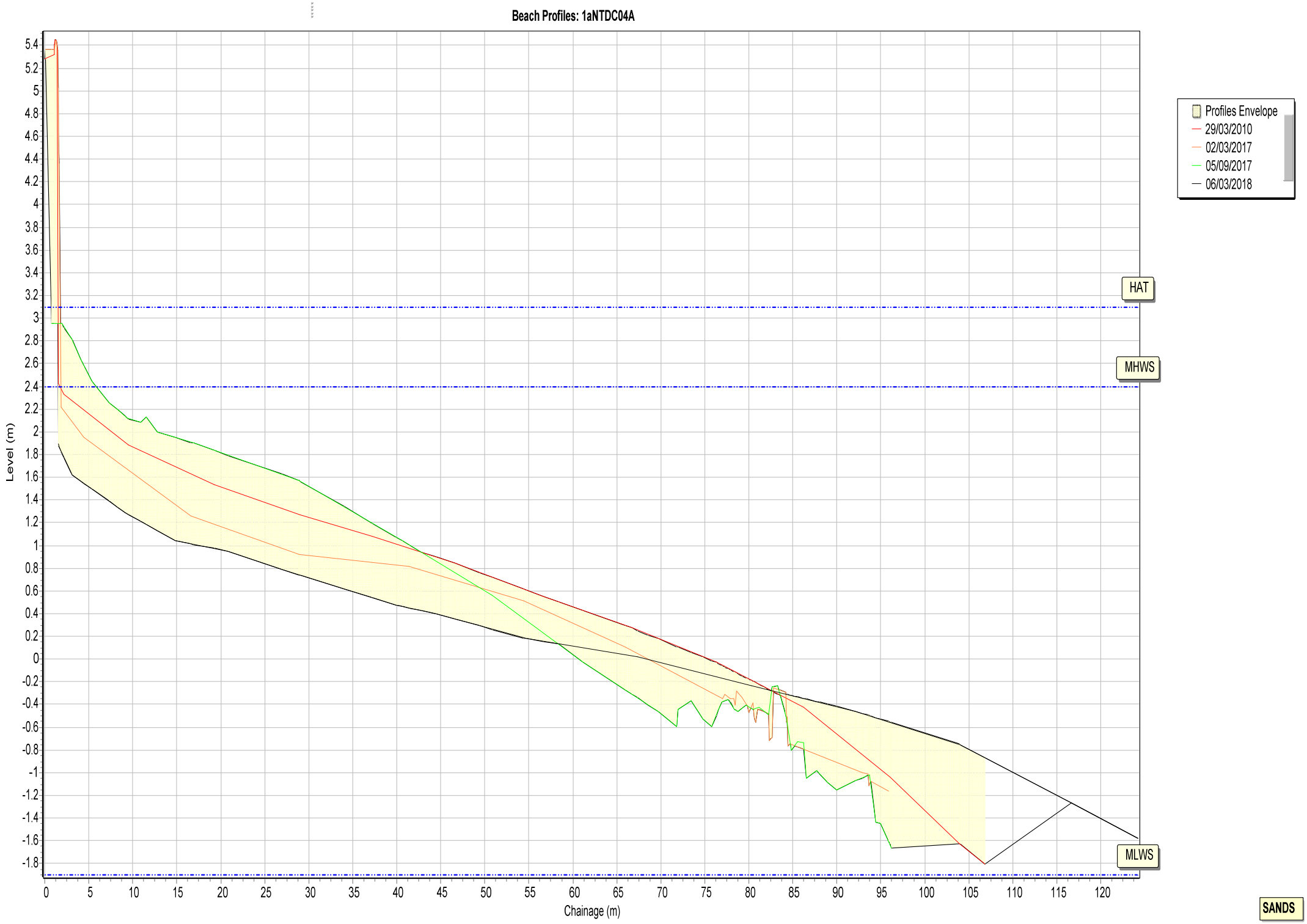
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Level (m)
Chainage (m)
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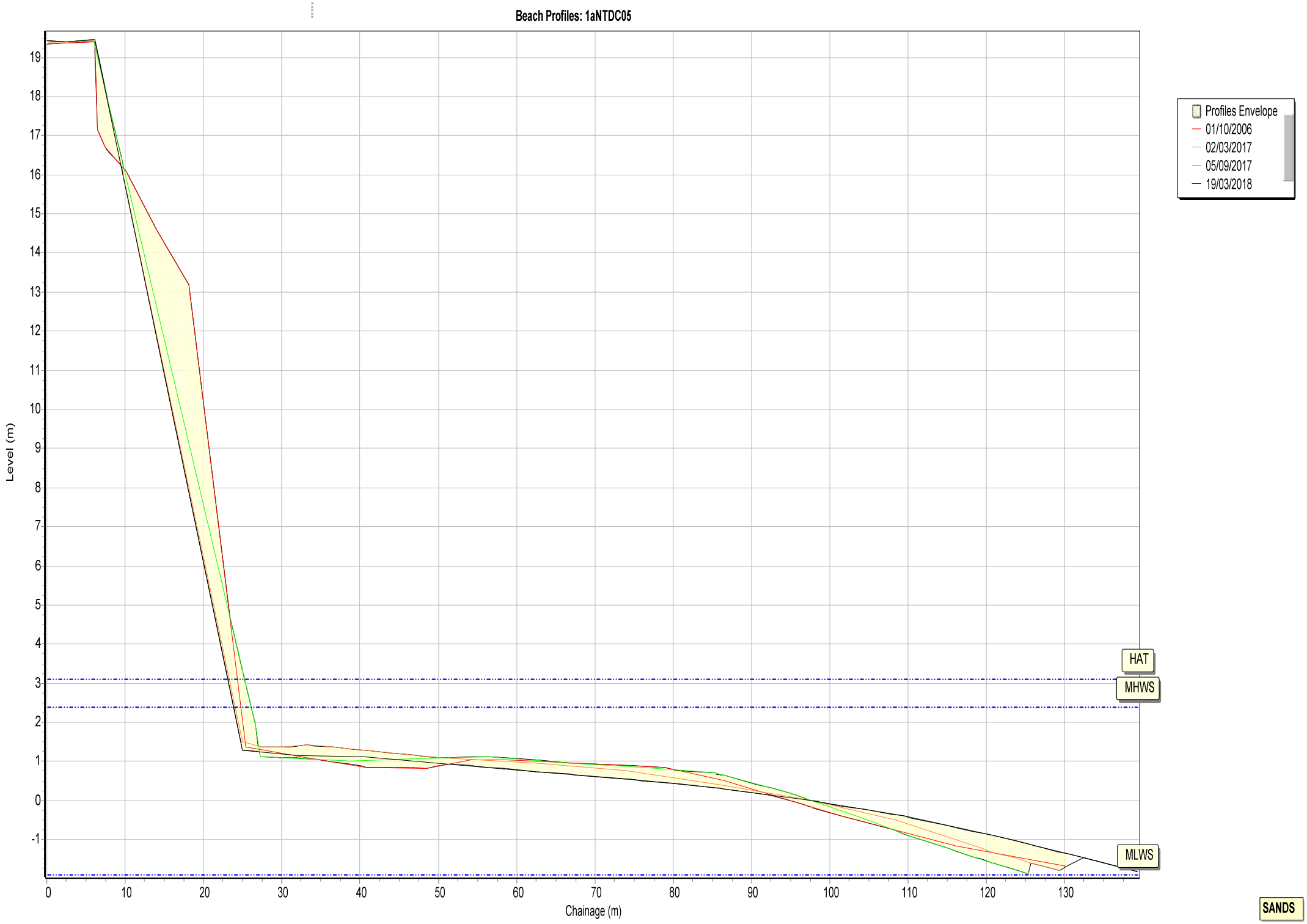
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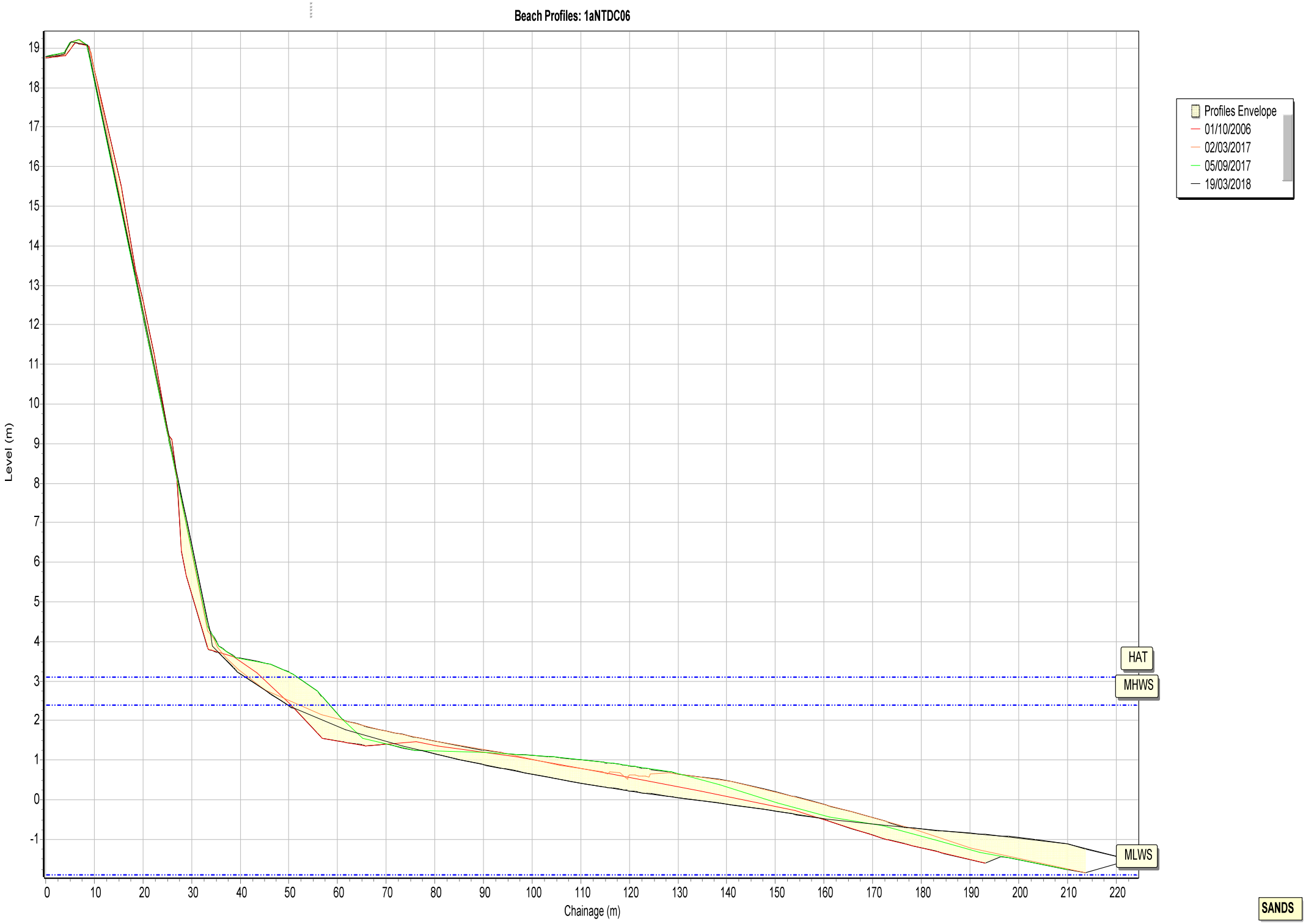
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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05/09/2017
19/03/2018
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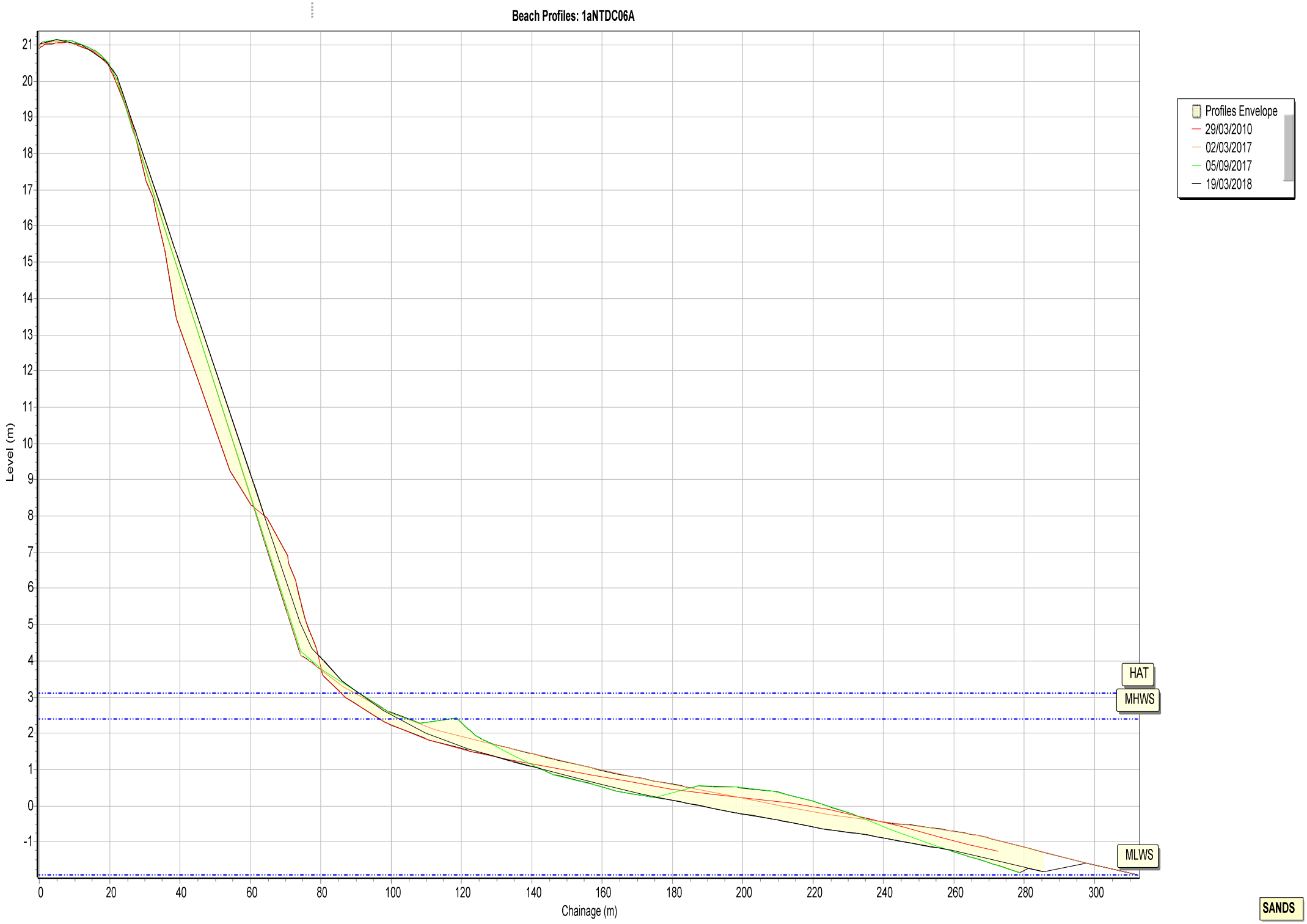
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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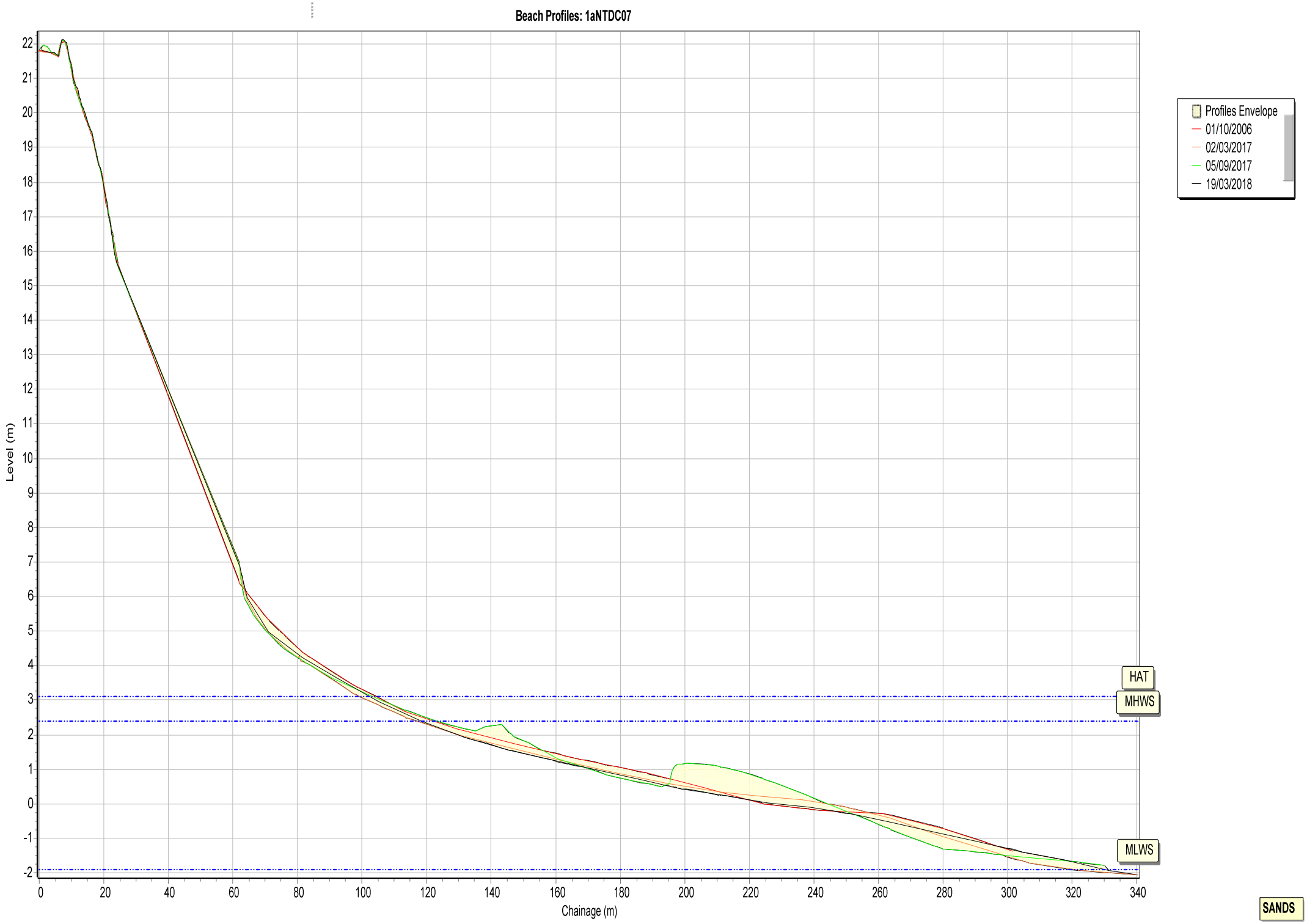
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19/03/2018
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MLWS
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Chainage (m)
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320
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SANDS


Beach Profiles: 1aNTDC08
Profiles Envelope
01/10/2006
02/03/2017
05/09/2017
19/03/2018
HAT
MHWS
MLWS
Level (m)
Chainage (m)
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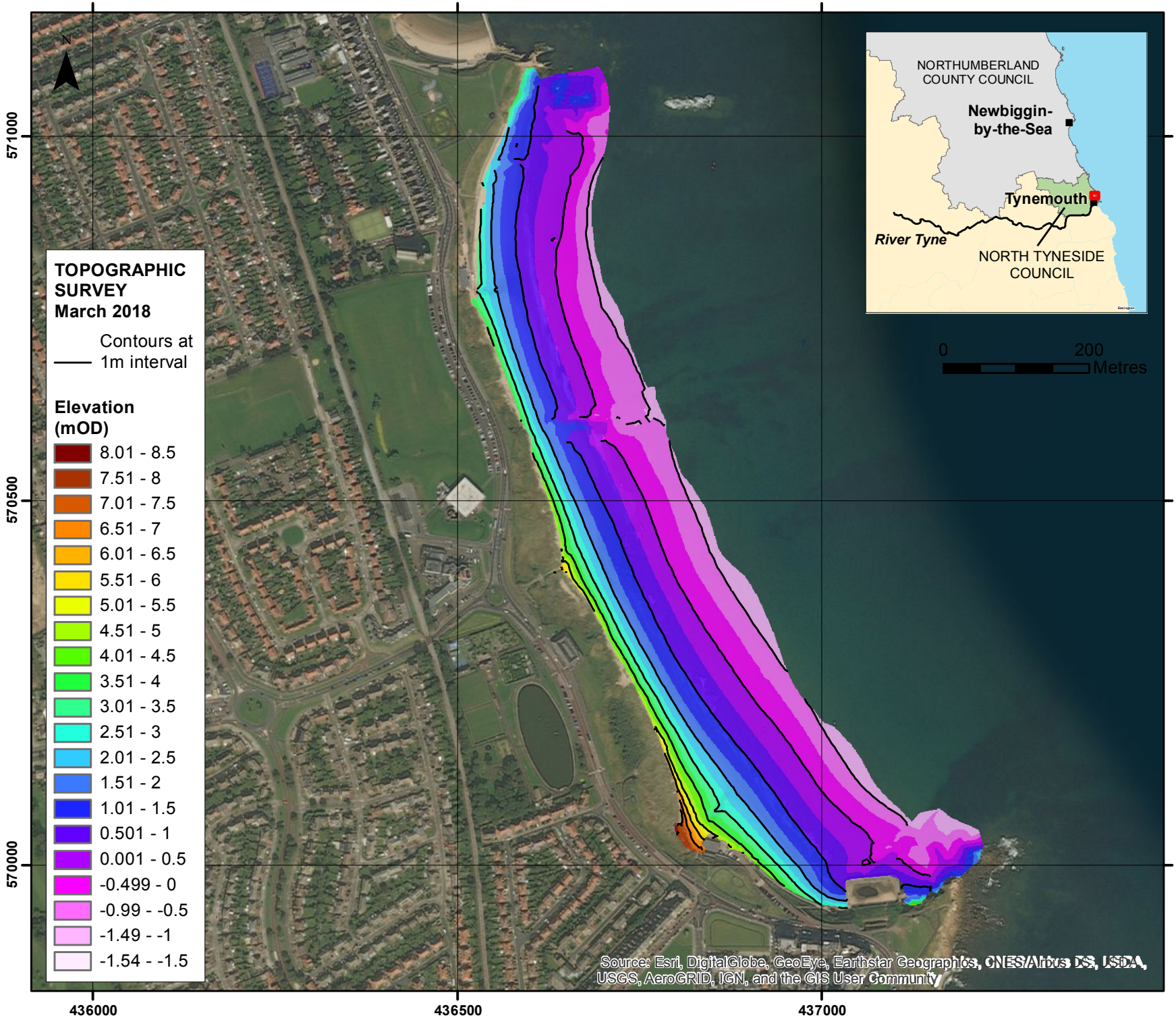
SANDS

Appendix B

Topographic Survey



Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 1

LONGSANDS

North Tyneside Council Frontage

Update Report
'Partial Measures' Survey 2018

Drawing Scale at A4 1:7,000

WATER
Royal HaskoningDHV
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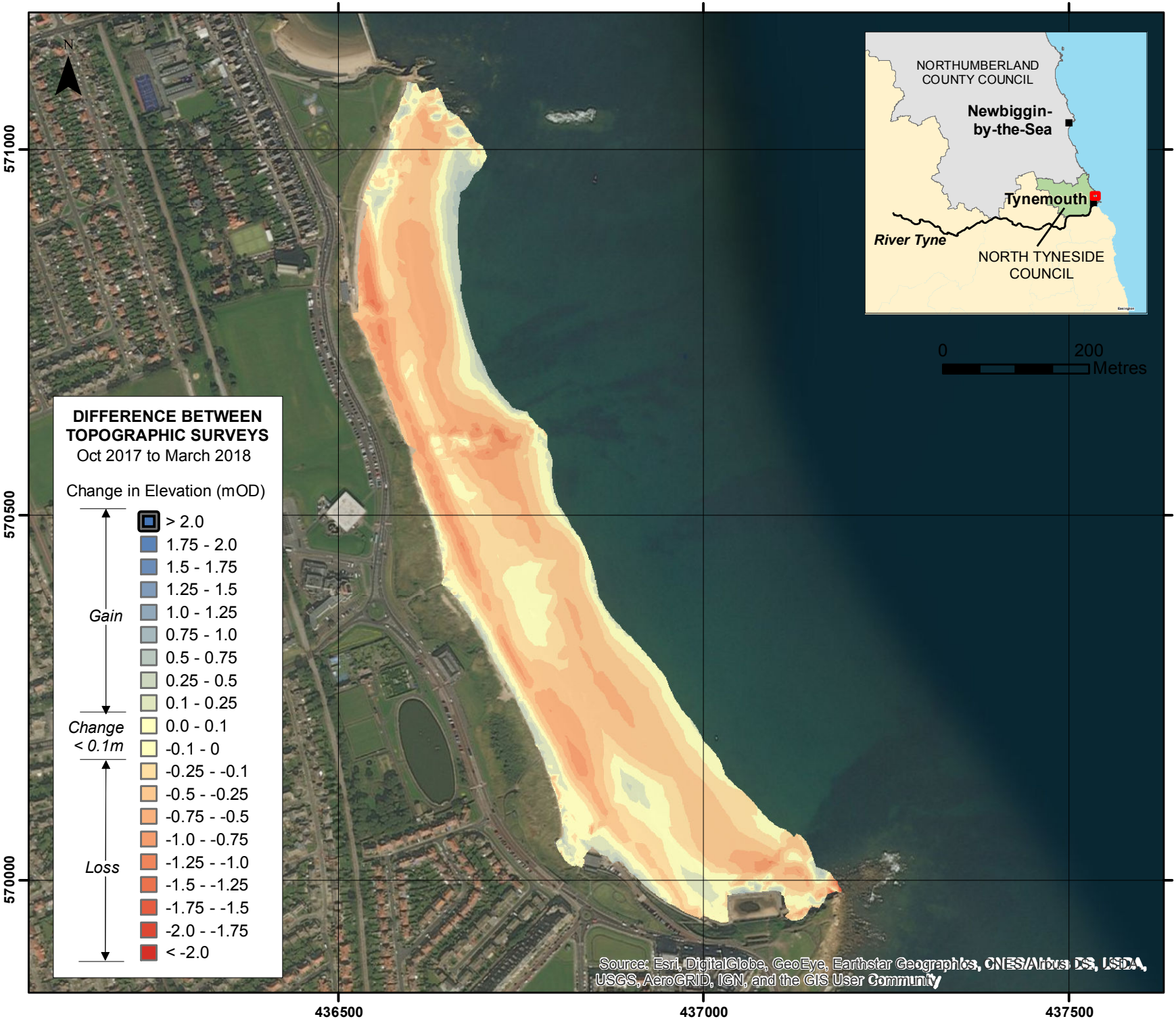
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

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

Royal HaskoningDHV
Enhancing Society Together



Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 2

LONGSANDS

North Tyneside Council Frontage

Update Report
'Partial Measures' Survey 2018

Drawing Scale at A4 1:7,000

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