North East Coastal Observatory

Royal HaskoningDHV
Enhancing Society Together

Cell 1 Regional Coastal Monitoring Programme Update Report 12: 'Partial Measures' Survey 2020

Northumberland County Council

Northumberland County Council

2020

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Authors	
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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) Berwick upon Tweed	Holy Island	North Sunderland
1 in 200 year	3.4	3.4	3.5
HAT	2.8	2.8	2.8
MHWS	2.2	2.4	2.4
MLWS	-1.9	-1.8	-1.7
Water Level Parameter	**Amble**	**Blyth**	**River Tyne**
1 in 200 year	3.5	3.6	3.7
HAT	3.1	3.1	3.1
MHWS	2.4	2.4	2.4
MLWS	-1.9	-1.8	-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).

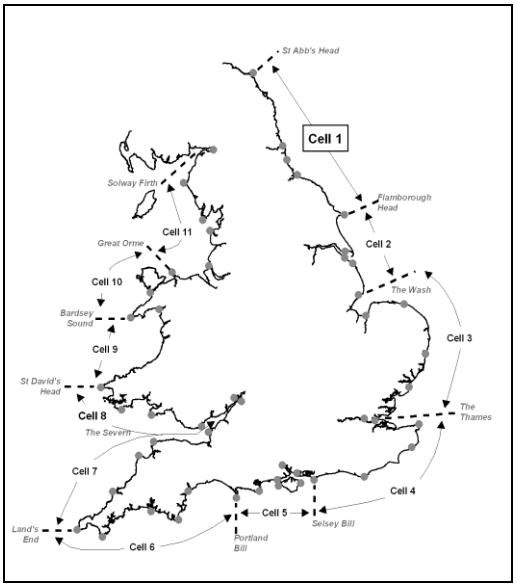


Figure 1 Sediment Cells in England and Wales

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
- LiDAR Surveys
- walk-over cliff and coastal defence asset 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	Sept-Dec 08	May 09	Mar-May 09		-
2	2009/10	Sept-Dec 09	Mar 10	Feb-Mar 10	Jul 10	-
3	2010/11	Aug-Nov 10	Feb 11	Feb-Apr 11	Aug 11	Sept 11
4	2011/12	Oct-Nov 11	Oct 12	Mar-May 12	Feb13	-
5	2012/13	Sept-Nov 12	Mar 13	Mar-Apr 13	Jun 13	-
6	2013/14	Sept-Oct 13	Feb 14	Mar-Apr 14	Jul 14	-
7	2014/15	Sept-Nov 14	Feb 15	Mar-Apr 15	Jul 15	-
8	2015/16	Sept-Dec 15	Feb 16	Mar-May 16	Jul 16	Jun 16
9	2016/17	Aug-Nov 16	Mar 17	Feb-Apr 17	Jul 17	
10	2017/18	Sep-Dec 17	Mar 18	Feb-Apr 18	Jul 18	
11	2018/19	Sep-Dec 18	Feb 19	Feb-Apr 19	Jul 19	
12	2019/20	Aug-Dec 19	Mar 20	Mar-May 20	Jun 20(*)	

(*) The present report is **Update Report 12** and provides an analysis of the 2020 Partial Measures survey for Northumberland County Council's frontage.

1. Introduction

1.1 Study Area

Northumberland County Council's frontage extends from the Scottish border in the north to Hartley, just south of Blyth, in the south. For the purposes of this report and for consistency with previous reporting, it has been sub-divided into 15 areas, namely:

- Sandstell Point (Spittal A)
- Spittal (Spittal B)
- Goswick Sands
- Holy Island
- Bamburgh
- Beadnell Village
- Beadnell Bay
- Embleton Bay
- Boulmer
- Alnmouth Bay
- High Hauxley and Druridge Bay
- Lynemouth Bay
- Newbiggin-by-the-Sea
- Cambois
- Blyth South Beach

1.2 Methodology

Along the Northumberland frontage, the following surveying is undertaken:

Full Measures survey annually each autumn comprising:

- Beach profile surveys along 78 transect lines (commenced 2002)
- Beach profile surveys along an additional ten transect lines (commenced 2007)
- Beach profile surveys along an additional 26 transect lines (commenced 2010)
- Topographic survey along Holy Island (commenced 2004)
- Topographic survey along Alnmouth Bay (commenced 2005)
- Topographic survey along Sandstell Point (commenced 2009)
- Topographic survey along Newbiggin Bay (commenced 2010)

Partial Measures survey annually each spring comprising:

- Beach profile surveys along 29 transect lines (commenced 2002)
- Beach profile surveys along an additional ten transect lines (commenced 2007)
- Beach profile surveys along an additional one transect line (commenced 2010)
- Beach profile surveys along an additional two transect lines (commenced 2011)
- Topographic survey along Alnmouth Bay (commenced 2005)
- Topographic survey along Sandstell Point (commenced 2009)
- Topographic survey along Newbiggin Bay (commenced 2010)

Cliff top survey (bi-annually) at:

- Cliff top survey at Lynemouth Bay (commenced 2008)
- Cliff top survey at Cambois Bay (Sandy Bay) (commenced 2008)
- Cliff top survey at Cambois Bay (Cambois) (commenced 2009)

Sand extent survey (bi-annually) at:

- Edge of sand survey at Newbiggin Bay, Spital Carrs, (commenced 2011 to determine potential adverse impact on foreshore SSSI of the Newbiggin beach recharge scheme)

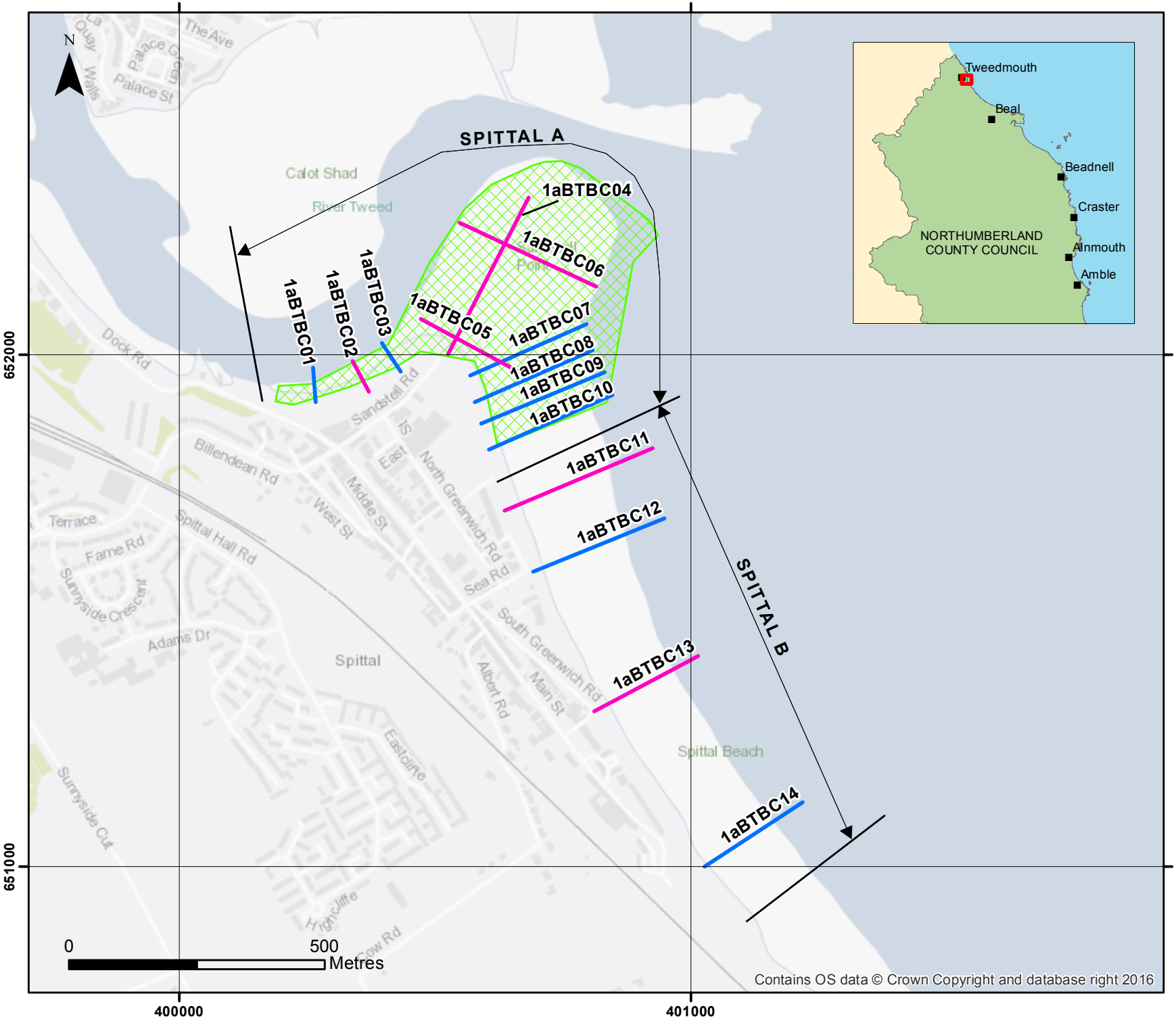
For all cliff-top surveys prior to Full Measures 2011, the data was previously saved in '.kmz' format for plotting and visual comparison in GoogleEarth. This data has been visualised in GIS, which revealed the quality was variable and reliable interpretations of short-term cliff change could not be made. For the present and future surveys, the data will be plotted in GIS and change will qualified along a series of pre-defined transect lines. The resulting data on amount and rate of change is presented in tables and the survey results are compared.

The location of these surveys is shown in Figure 2. The Partial Measures survey was undertaken along this frontage between 11th March 2020 to 08th May 2020. During this time weather conditions varied considerably; 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
- key conclusions and highlighting of 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

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:10,000

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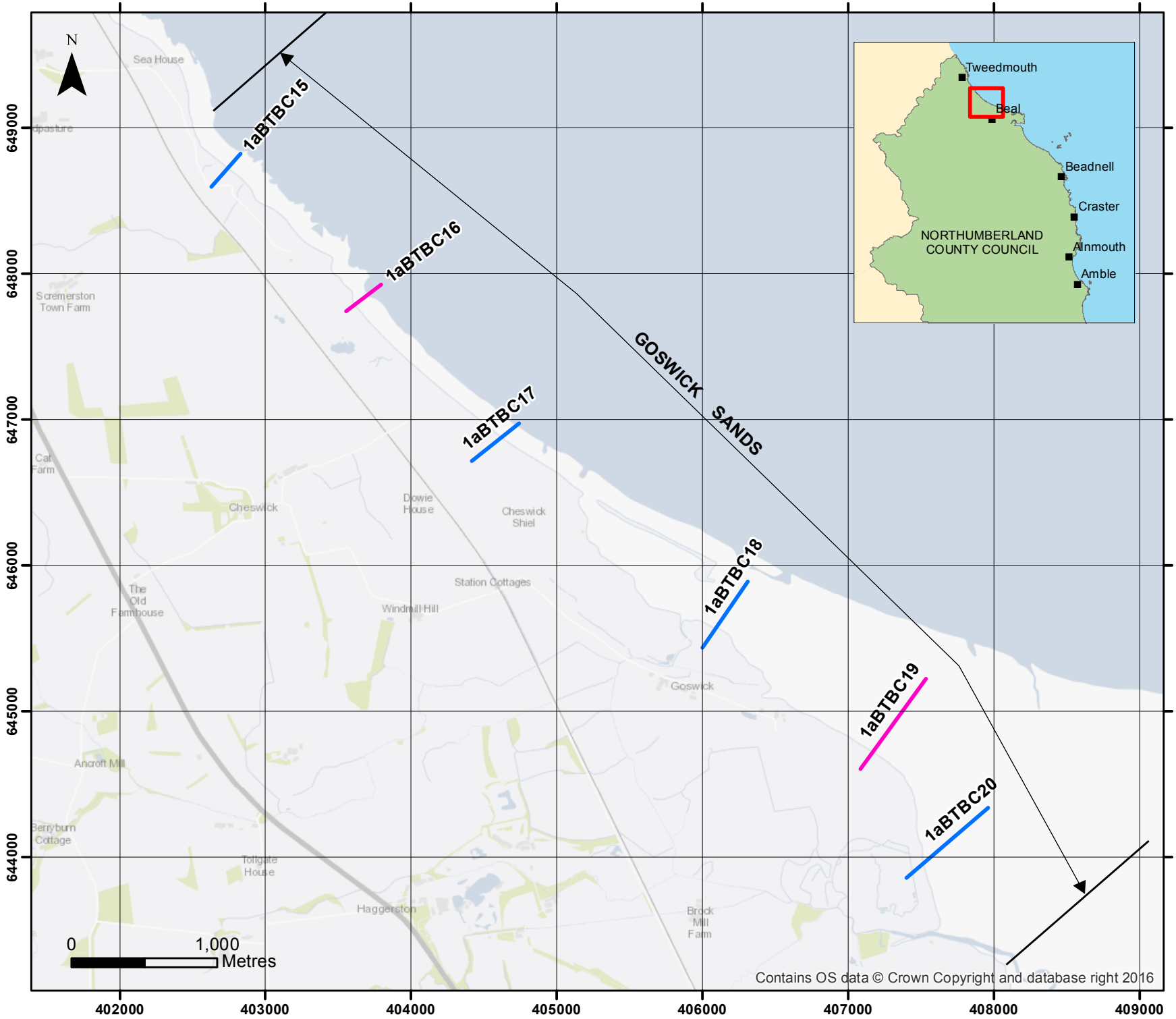

Key

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 2

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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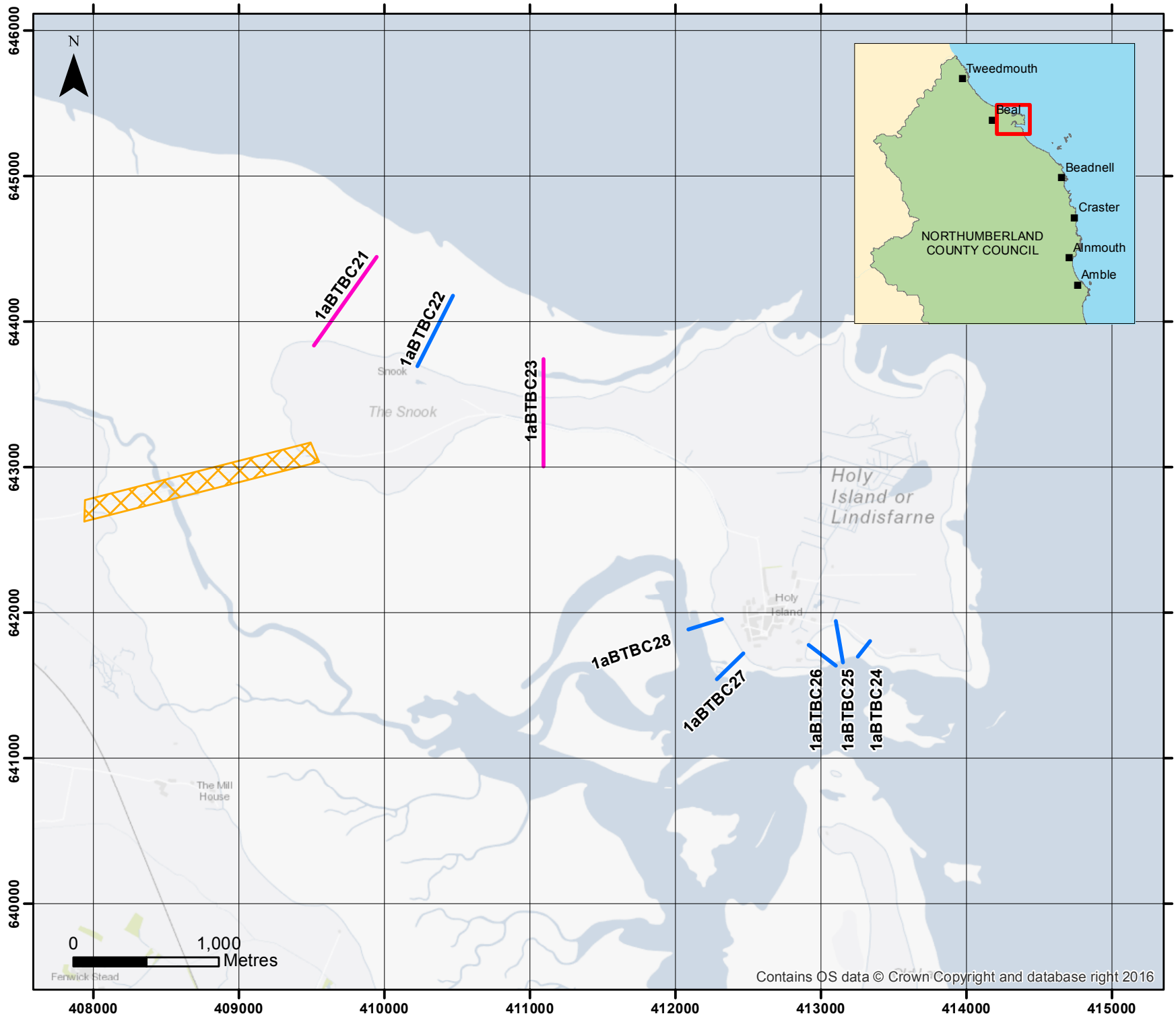

Key

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 3

Northumberland County Council Frontage

Analytical Report
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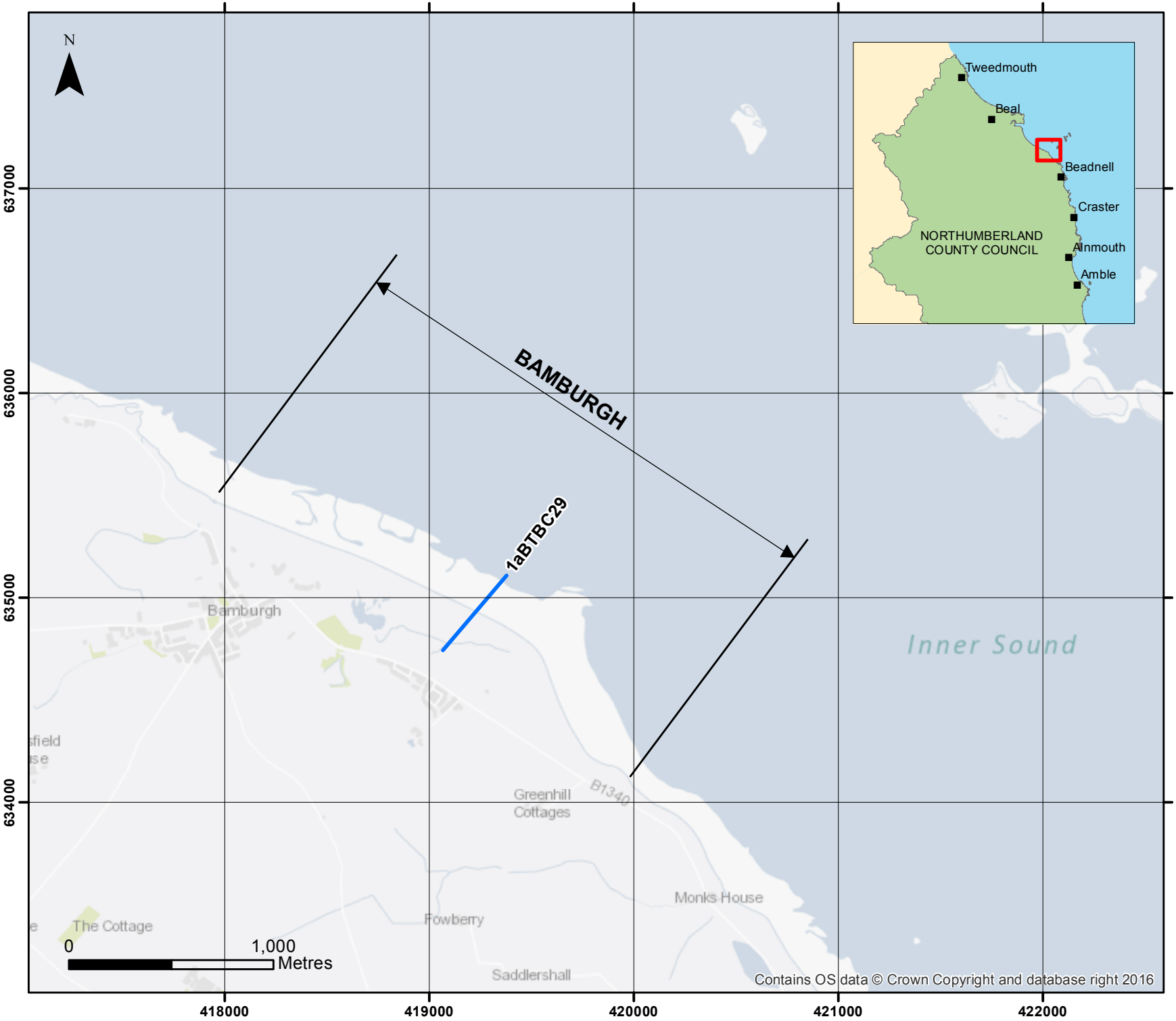

Key

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 4

Northumberland County Council Frontage

Analytical Report
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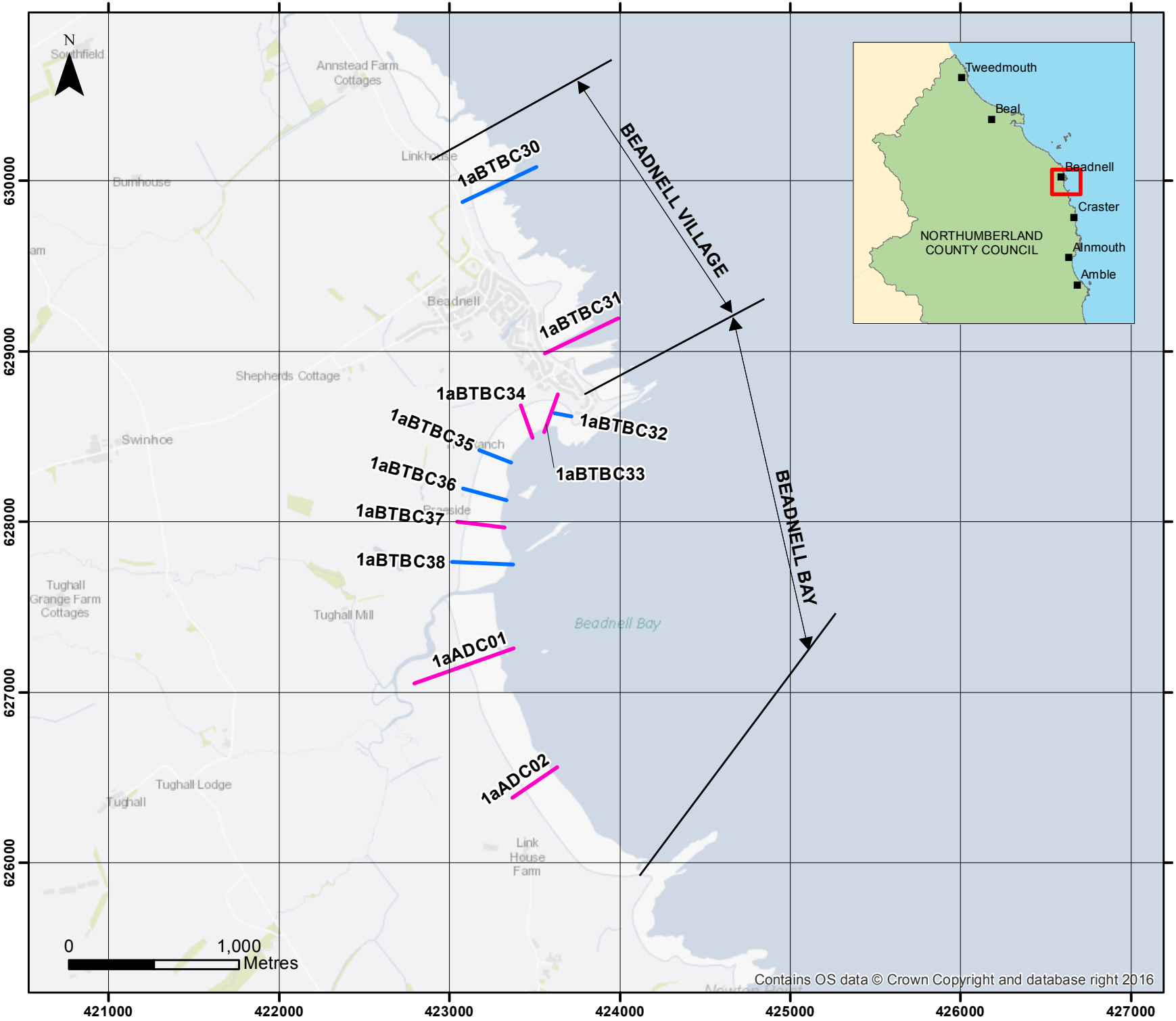

Key

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 5

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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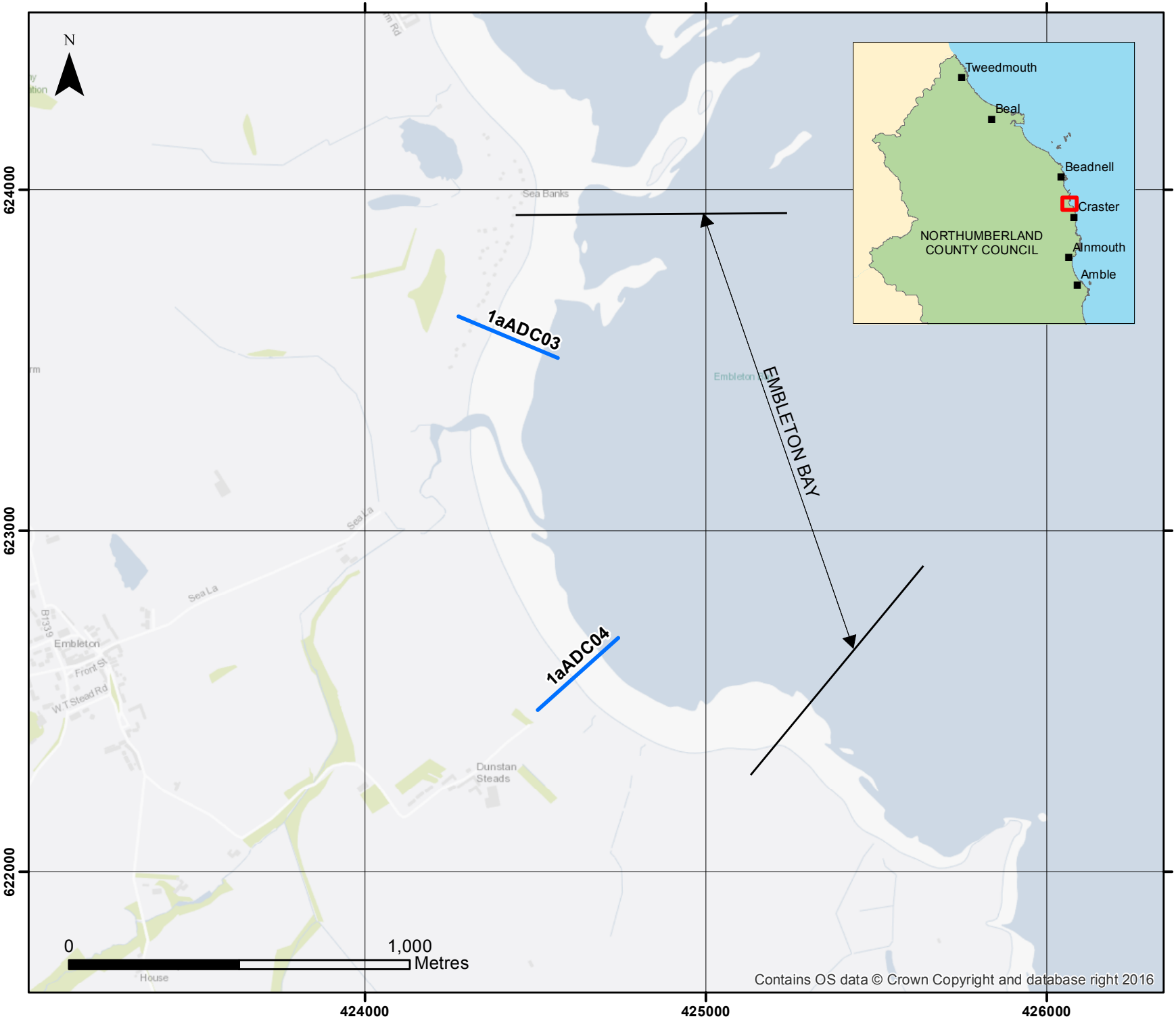

Key

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 6

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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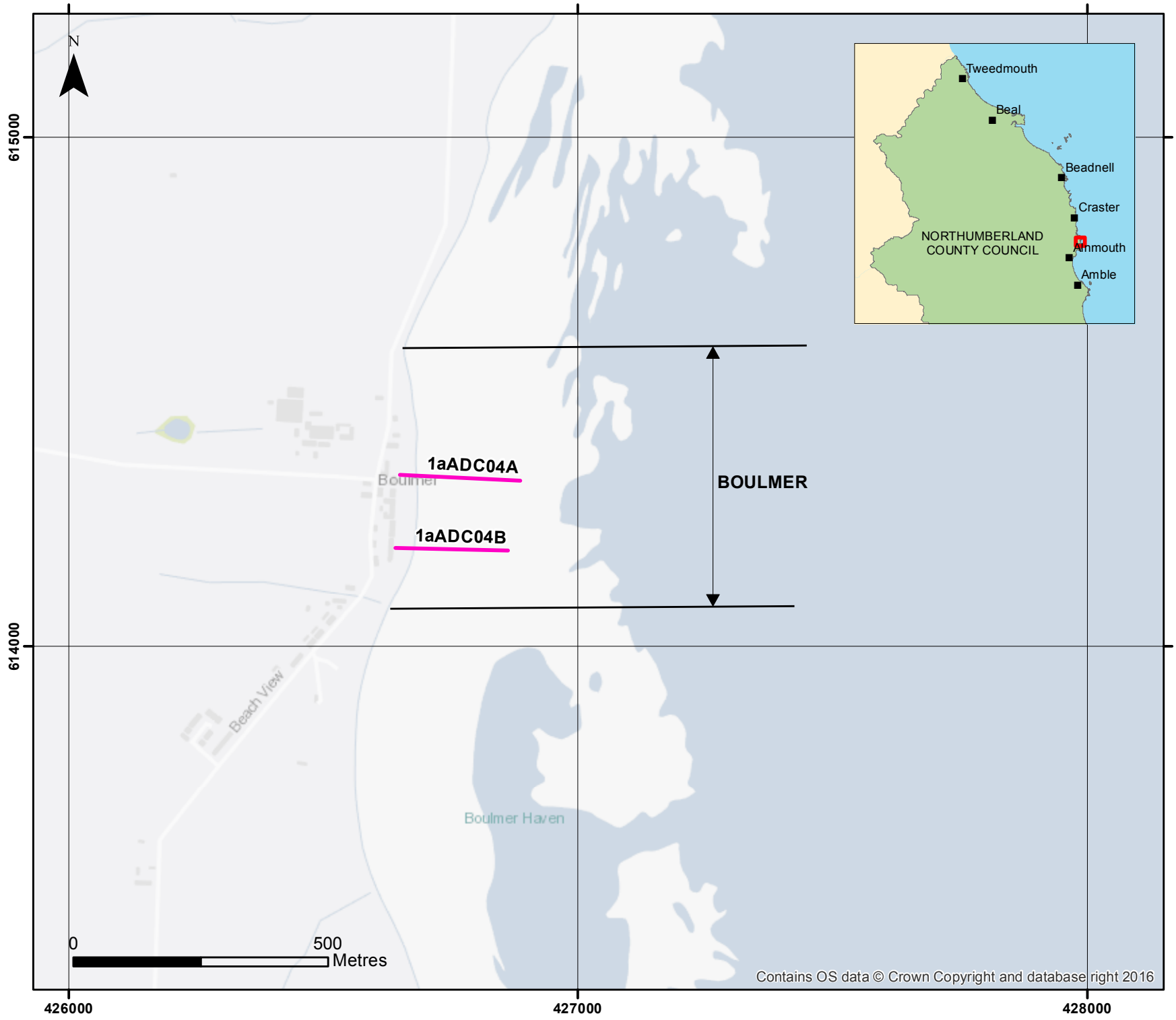

Key

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 7

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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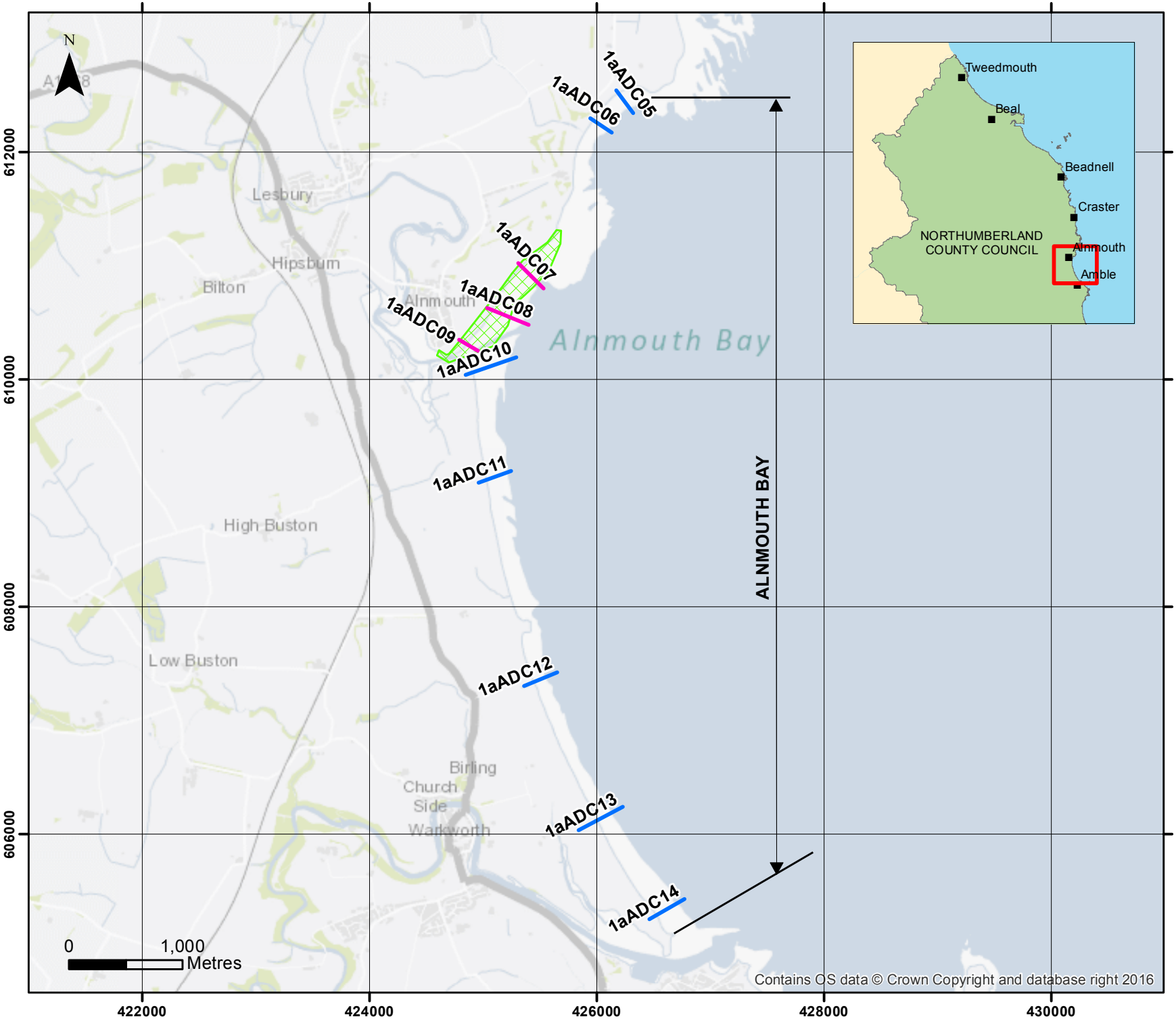

Key

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 8

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:45,000

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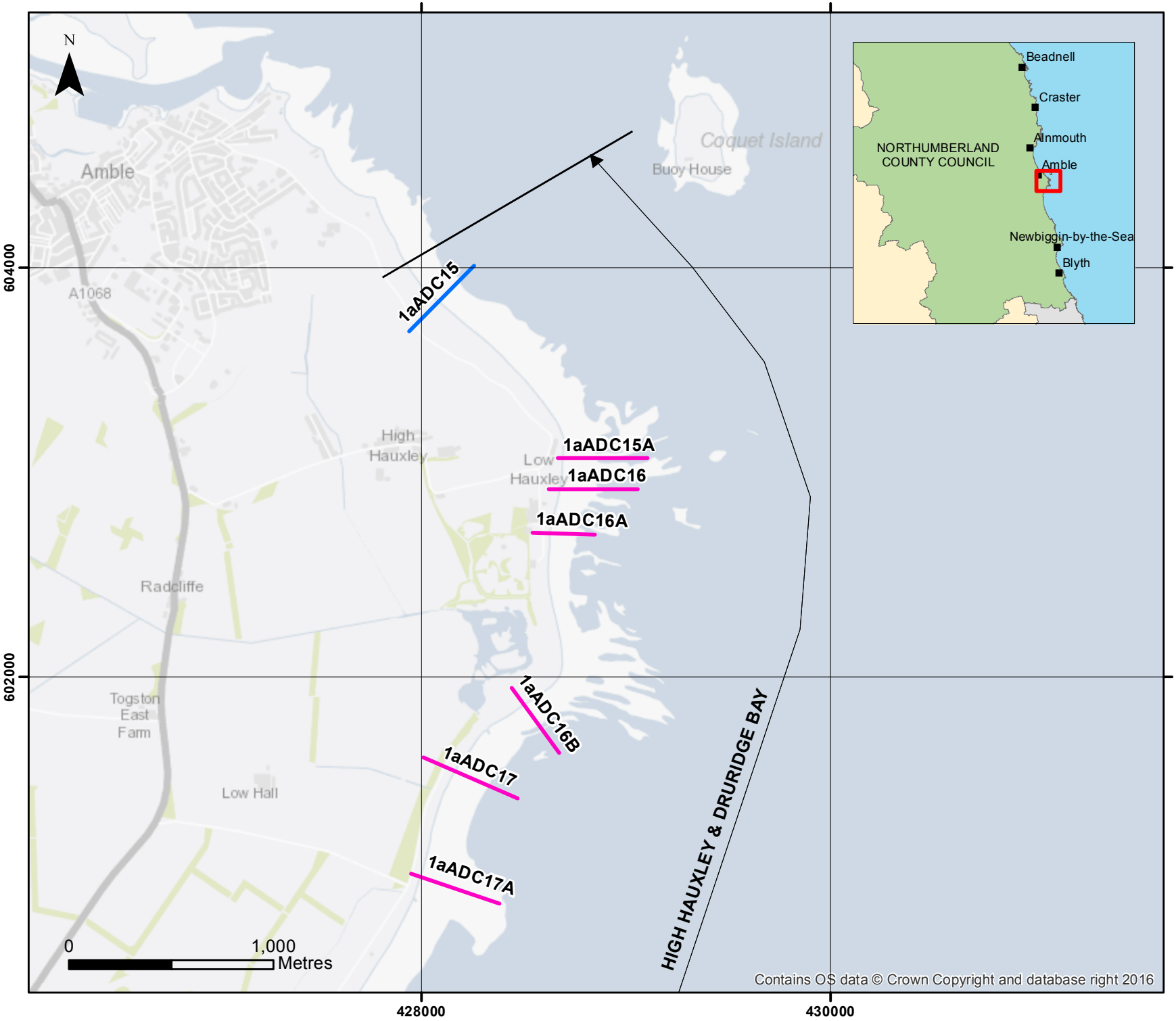

Key

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 9

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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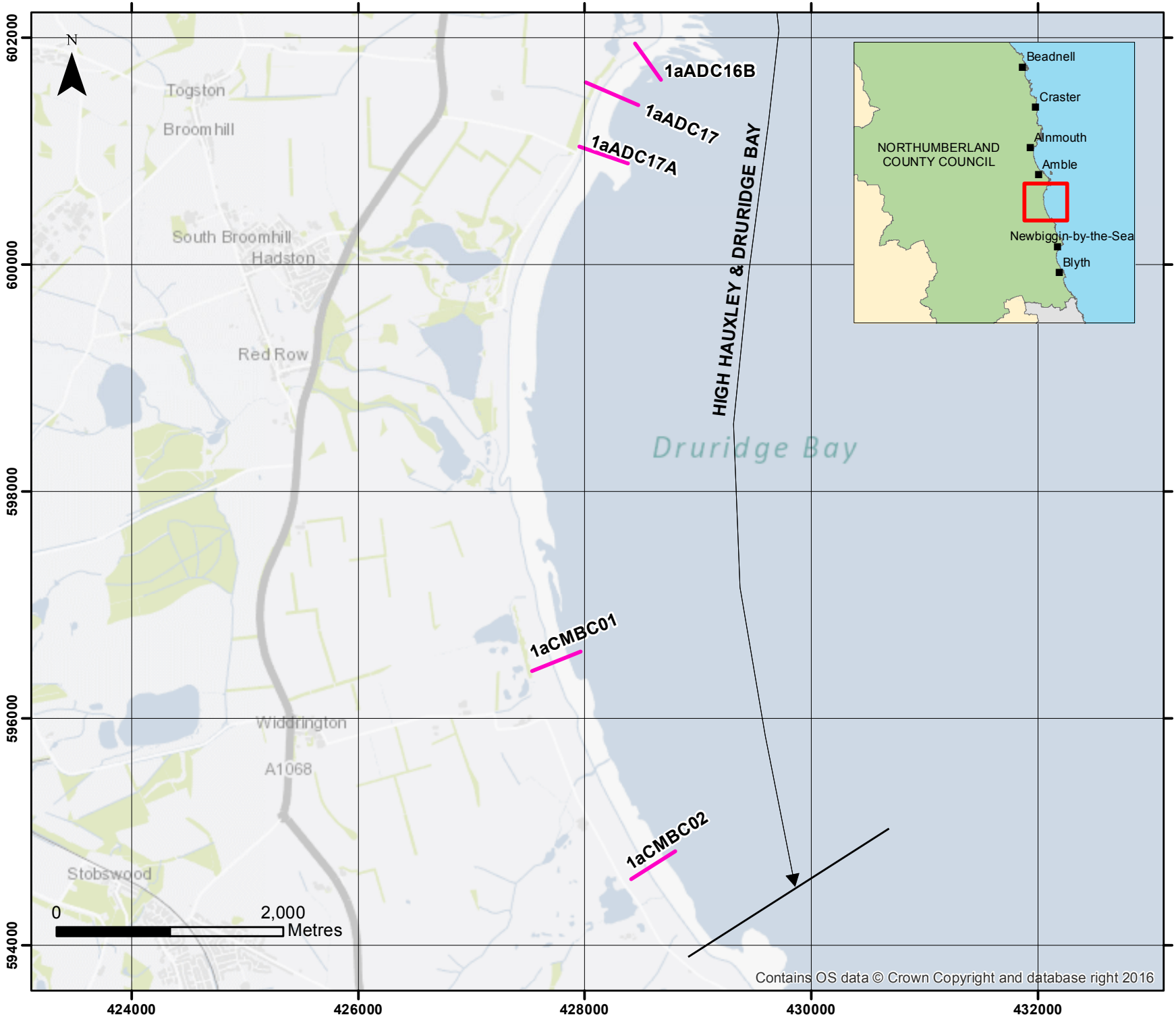

Key

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 10

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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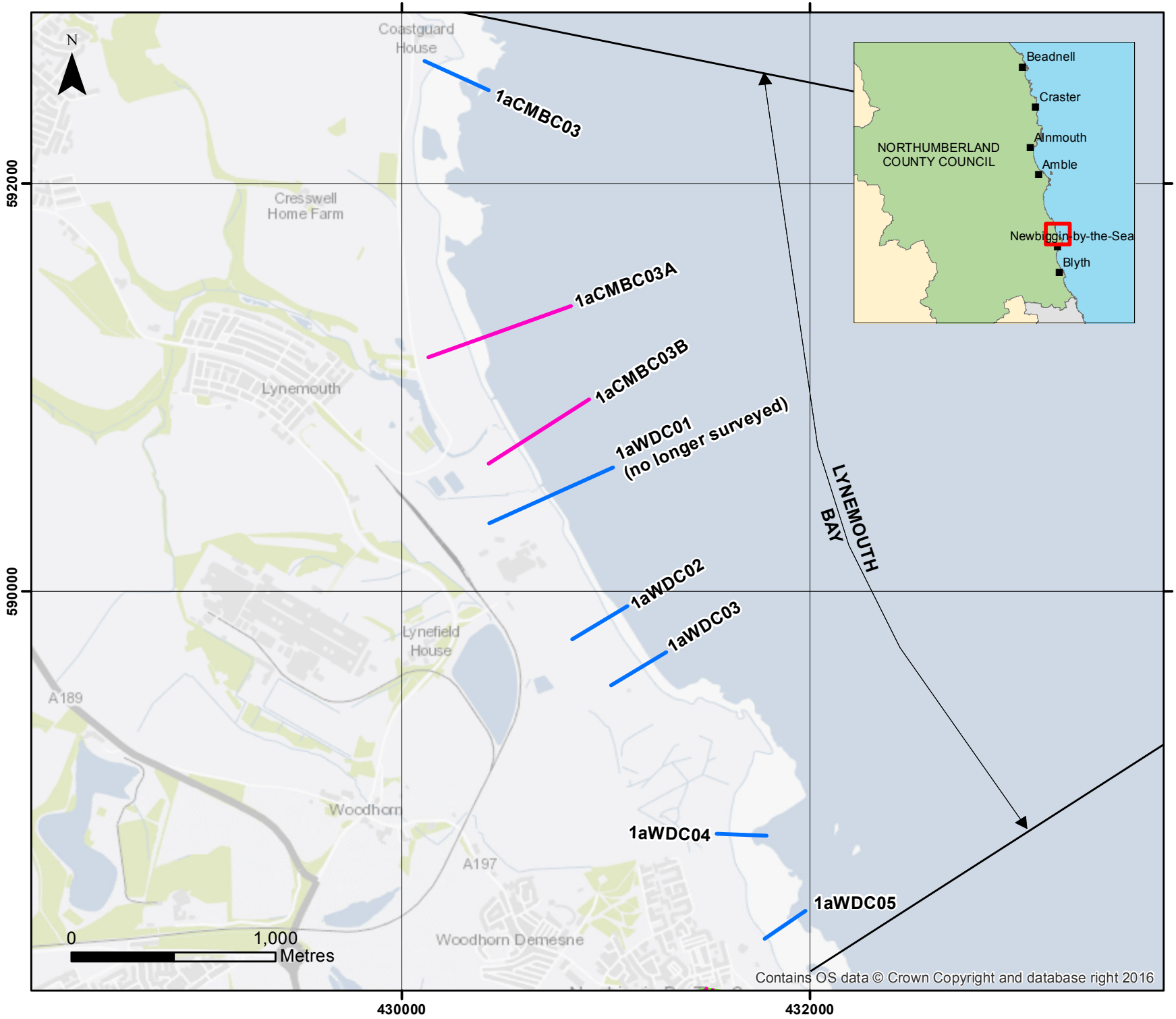

Key

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 11

Northumberland County Council Frontage

Analytical Report
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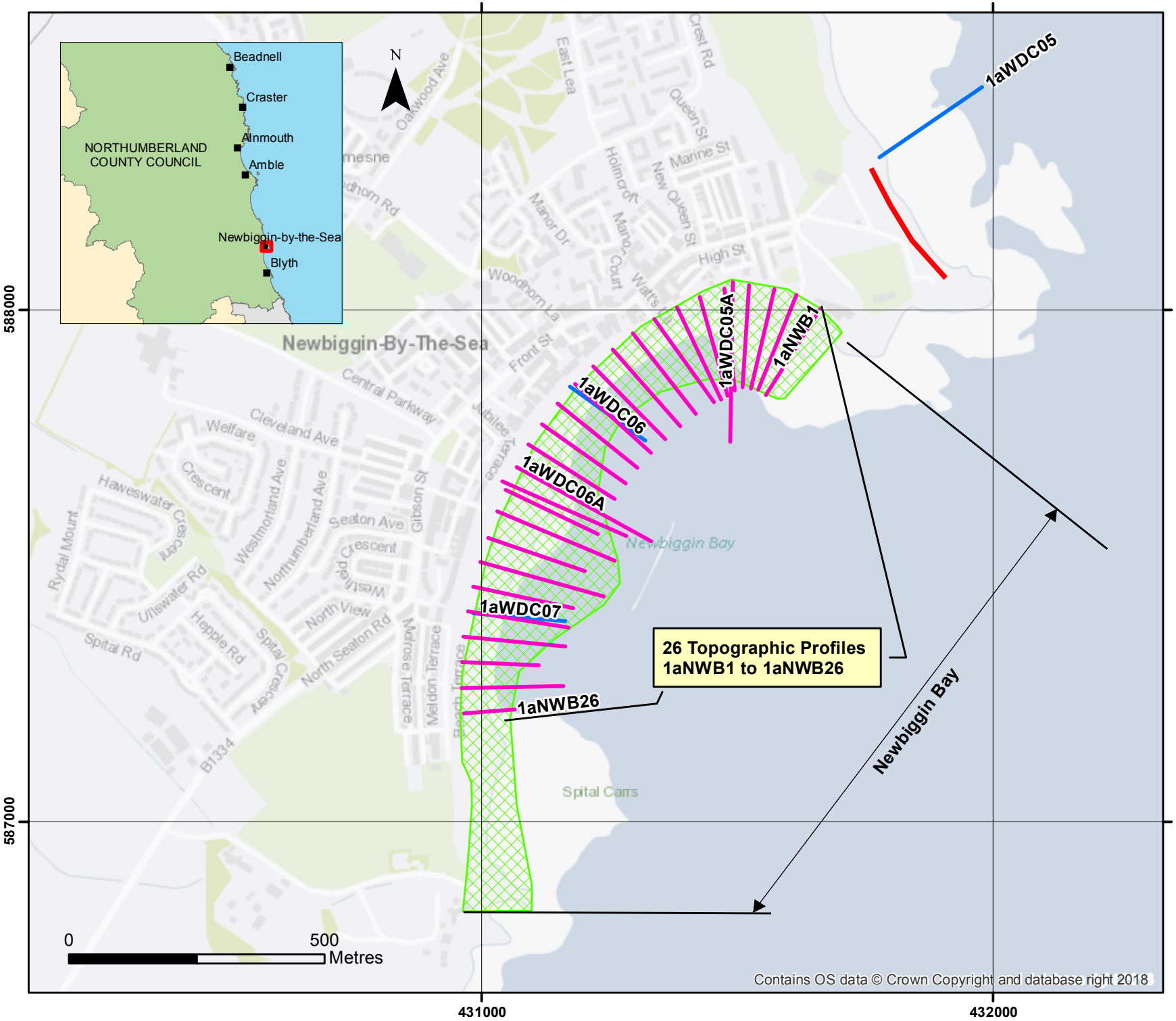

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly
- Cliff Top Edge Survey

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 12

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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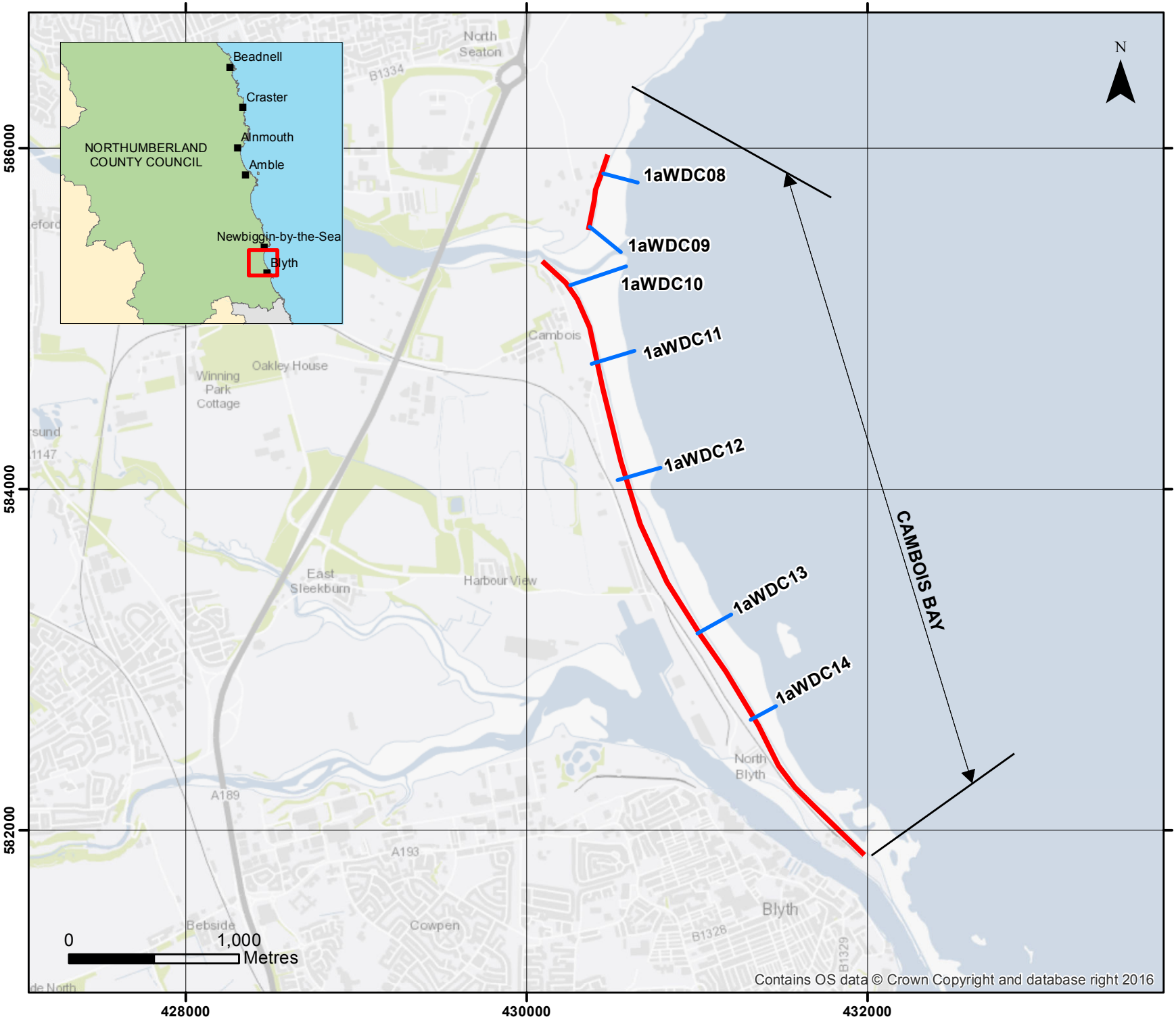

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual
- Cliff Top Edge Survey

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 13

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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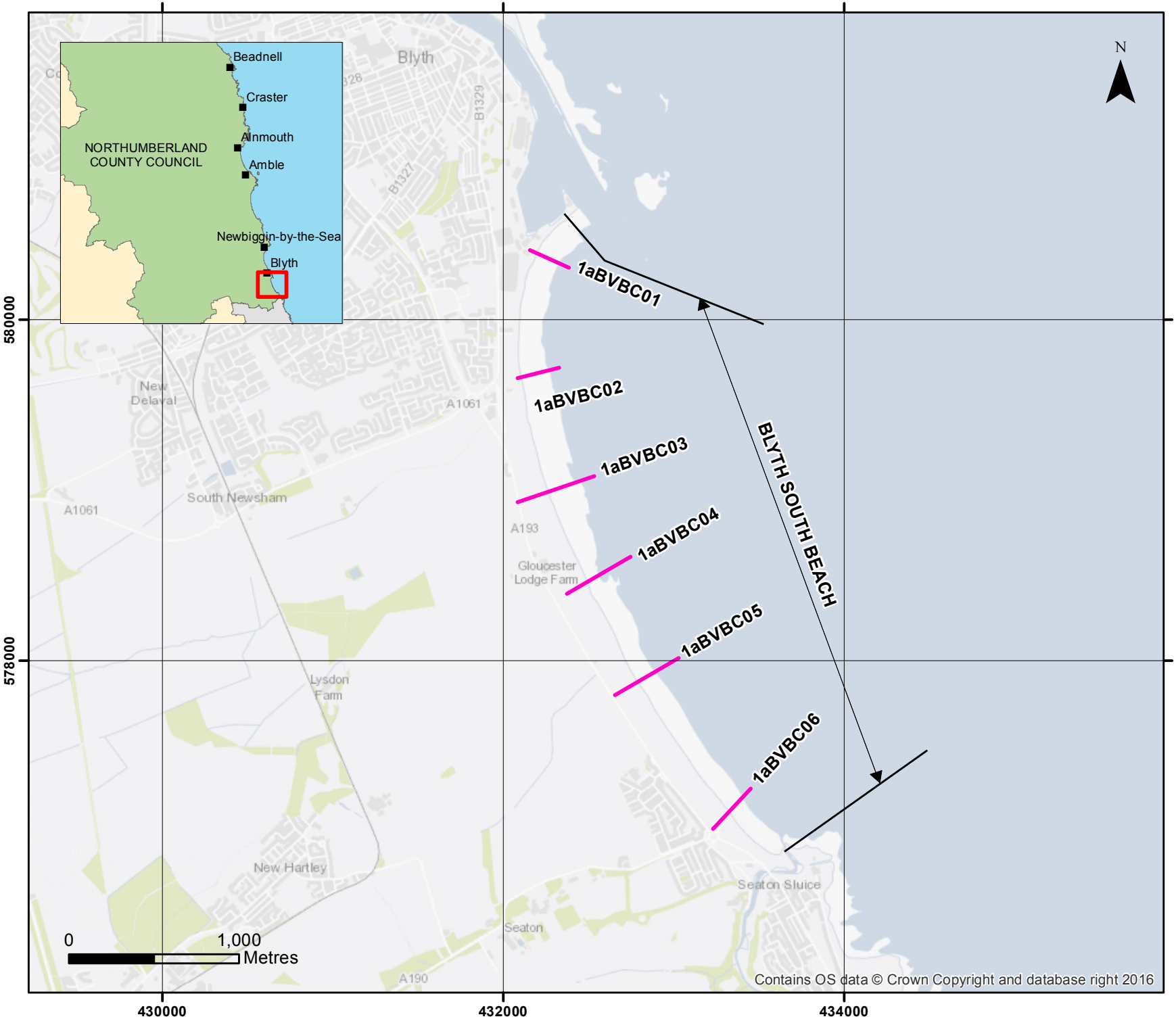

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual
- Cliff Top Edge Survey

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 14

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:30,000

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2. Analysis of Survey Data

2.1 Sandstell Point (Spittal A)

Survey Date	Description of Changes Since Last Survey	Interpretation
6th May 2020	**Beach Profiles:** Sandstell Point is covered by four beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2019. Profile **1aBTBC02** is located on the southern bank of the inner Tweed estuary. Between chainages 38 – 44m, the dunes have accreted by between 0.1 – 0.3m. There has been very little change in the beach levels seaward of chainage 44m, with change limited to ±0.1m. Overall the dunes are at a high level and the beach profile is at a medium level compared to the range recorded from previous surveys. Profiles **1aBTBC04** (longitudinal section) and **1aBTBC05** and **1aBTBC06** (both cross-sections) cover the spit at Sandstell Point. Profile **1aBTBC04** shows that the upper beach between chainages 20 – 110m has accreted by 0.1m, switching to erosion of up to 0.4m between chainages 110 – 187m. There has been accretion on the middle beach by up to 0.4m to chainage 280m. Seaward of chainage 308m, a berm has formed on the lower beach by up to 1.0m. Overall the profile is at a relatively medium level compared to the range recorded from previous surveys, with the end of the spit being relatively high. Profiles **1aBTBC05** and **1aBTBC06** are transects across the spit, with the open sea on the right-hand side of the plot and the river channel to the left. At **1aBTBC05**, the toe of the river side of the spit has moved seaward by c.2.0m. The crest of the river side, top of the spit and seaward crest of the spit has accreted by up to 0.2m. The upper slope of the spit on the seaward side has eroded by up to 0.6m, switching to accretion on the lower slope by up to 0.2m. Overall the profile has narrowed in profile and is within the middle of its range recorded from previous surveys, both in terms of height and position. At **1aBTBC06** the toe of the river side of the spit moves seaward by c.1.0m. The top of the spit on the river side shows erosion of up to 1.8m, flattening the overall profile. Between chainages 63-235m there has been accretion on the seaward side by up to 0.8m, with the formation of two berms at chainages	Since the last survey, the dunes along the south bank of the River Tweed have remained stable, experiencing accretion of up to 0.3m. There has been relatively little movement of the spit at the landward side, however profile 1aBTBC06 at the distal end of the spit has experienced slumping from the crest toward the open sea. **Longer term trends:** The small change in dune profile is within the bounds of previous surveys that indicate they have remained stable over the past 12 years. The beach profiles show that the form of the spit is generally within the range of past observations. The wide variation in profile forms over time is indicative of this being one of the most dynamic systems on the north east coast.

Survey Date	Description of Changes Since Last Survey	Interpretation
	20m and 140m. Overall the seaward side of the spit profile is at a low level and the river side of the spit profile is at a medium height compared to the range recorded from previous surveys. The combination of movement observed at 1aBTBC05 and 1aBTBC06 suggests the spit has remained relatively stable at the landward end of the spit, whilst the crest at the seaward end of the spit has slumped towards the open sea.	
May 2020	**Topographic Survey:** Due to the significant changes that have been observed from the beach profiles along the spit at Sandstell Point and the three-dimensional nature of these changes, a topographic survey was introduced to the monitoring programme in 2011. The previous survey was undertaken for the Full Measures survey in autumn 2019. Data from the most recent topographic survey (Partial Measures, spring 2020) have been used to create a digital ground model (DGM) (Appendix B – Map 1) using a Geographical Information System (GIS). A difference plot has also been produced using the DGM (Appendix B – Map 4) produced from the last produced topographic survey and the present survey. In particular, the difference plot shows: (i) little change / small scale erosion in the dunes on the south bank of the River Tweed; (ii) a decrease in the beach elevation caused by erosion along the northwest edge of the survey area just off the edge of the land; (iii) a narrow band of erosion across the spit running north-south parallel to the main coastline, with the highest rate of erosion at the distal end of the spit;(iv) a wider band of accretion running north-south parallel to the band of erosion in the east of the survey extent, widening out at the distal end of the spit towards the east; and (v) patches of erosion seaward of the band of accretion in the eastern most extent of the survey.	The findings of the topographic survey show similar trends to the profile survey. This appears to show migration of both the river channel and the spit in a clockwise direction around the headland, reversing the trend seen in the previous partial measures survey in 2019.

2.2 Spittal (Spittal B)

Survey Date	Description of Changes Since Last Survey	Interpretation
6th May 2020	**Beach Profiles:** Spittal B is covered by two beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2019. Profile **1aBTBC11** is located to the north of Spittal Beach and shows alternating sections of accretion and erosion. The dunes from chainage 0-20m have accreted by up to 0.2m. From the edge of the dunes at chainage 20m to chainage 52m there has been erosion of up to 0.5m. Between chainage 52m and 164m there has been alternating sections of accretion and erosion between 0.1-0.4m. Seawards of chainage 164m there has been accretion of up to 0.4m and an extension of the beach toe by 32m. Overall the dunes are at a high level, reaching their highest level recorded between chainages 9-19m. The rest of the beach profile is at a medium level compared to the range recorded from previous surveys. Profile **1aBTBC13** is located towards the centre of Spittal Beach. The upper beach to chainage 40m shows erosion of up to 0.3m, switching to accretion across the middle beach to chainage 151m by up to 0.2m. Seawards of chainage 151m there has been erosion of a lower beach berm by up to 0.5m with an extension of the beach toe by up to 20m. Overall the upper and middle beach profile is at a medium level compared to the range recorded from previous surveys, whilst the lower beach is at a relatively high level.	Since the last survey, the changes in beach level have been variable indicating a redistribution of sediment throughout the profiles. **Longer term trends:** At both profile locations along Spittal Beach, the changes observed from the present survey are generally within the bounds of previous surveys, except at the dunes at profile 1aBTBC11 between chainages 9-19m where the dunes are now at their highest level recorded.

2.3 Goswick Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
12th March 2020	**Beach Profiles:** Goswick Sands are covered by two beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2019. Profile **1aBTBC16** is located to the north of Goswick Sands, between Far Skerr and Cheswick Black Rocks. The dune has remained stable since the last survey, with little change in profile. Between the end of the dunes at chainage 51m and 121m, the beach level has risen by up to 0.6m, switching to erosion of up to 0.8m seaward of chainage 121m. Overall the profile is at a high level on the upper and middle beach, particularly between chainage 68-115m which is at its highest level recorded, whereas the lower beach is at a low level compared to the range recorded from previous surveys. Profile **1aBTBC19** is located to the south of Goswick Sands. The dunes have remained stable since the last survey, with changes restricted to ±0.1m. Beach levels show very little change to the end of the survey at chainage 285m.The present survey is c.91m shorter than the previous survey and ends at a drain. Beach levels are at a relatively medium level compared to the range recorded from previous surveys.	Upper and middle beach levels have undergone very little change since the previous survey. **Longer term trends:** Both profiles are within the range recorded from previous surveys. However, the range of variation on record is limited compared to beaches elsewhere along the north east coast.

2.4 Holy Island

Survey Date	Description of Changes Since Last Survey	Interpretation
12th March 2020	**Beach Profiles:** Holy Island is covered by two beach profile lines for the Partial Measures surveys (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2019. **1aBTBC21** and **1aBTBC23** are located on the north-west side of the island, along The Snook. At profile **1aBTBC21** the dunes have remained stable since the last survey, with small sections of erosion and accretion of up to 0.1m on the dunes and dune face to chainage 66m. There is a small section of erosion on the upper beach between chainages 66-87m by up to 0.1m. Beach levels have experienced accretion of up to 0.05m as far as the end of the survey at chainage 331m. The beach is at a relatively medium level compared to the range recorded from previous surveys. Profile **1aBTBC23** shows that the dunes and beach have remained stable since the last survey. The largest change in beach profile occurs on the northern side of the Snook with a small section of erosion of up to 0.4m between chainages 675-735m. Overall the beach levels are at a medium-high level compared to the range recorded from previous surveys.	The dunes, sandy foreshore and sand flats around The Snook have remained stable in both form and position since the last survey. **Longer term trends:** The minor changes observed since the last survey are within the bounds of previous surveys.

2.5 Beadnell Village

Survey Date	Description of Changes Since Last Survey	Interpretation
23rd April 2020	**Beach Profiles:** Beadnell Village is covered by one beach profile line for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2019. **1aBTBC31** is in Nacker Hole and extends across the promenade and seawall. Since the last survey, there has been an apparent accretion across the promenade of up to 0.1m. There has been alternating sections of erosion and accretion across the beach profile to chainage 43m, limited to ±0.2m. Seawards of chainage 43m, there has generally been accretion of up to 0.2m. Overall the profile is at a medium level on the upper and lower beach, whilst the middle beach is at a high level compared to the ranges recorded in previous surveys.	The beach to the south of Beadnell Village has generally remained stable. **Longer term trends:** The changes observed since the last survey are within the bounds of previous surveys.

2.6 Beadnell Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
23rd April 2020	**Beach Profiles:** Beadnell Bay is covered by five beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2019. Profiles **1aBTBC33** and **1aBTBC34** are located in Beadnell Harbour to the north of Beadnell Bay. Profile **1aBTBC37** is located further south towards the outfall of Brunton Burn/Long Nanny. At profile **1aBTBC33**, the survey report notes that the middle of the dunes was not surveyed due to access difficulties created by dense vegetation. However, the survey covers more of the dunes than the autumn 2019 survey, extending to approximately chainage 42m. There has been accretion at the toe of the dunes to chainage 142m by up to 0.3m. Seaward of chainage 142m there has been erosion of up to 0.1m. The dunes are at a relatively high level compared to the range recoded from previous surveys. The upper beach profile is at a relatively high level and the middle and lower beach are at a low level compared to the range recorded from previous surveys. At profile **1aBTBC34**, the dunes show erosion of up to 0.3m. Between the dune toe and chainage 103m, there has been accretion of up to 0.2m. Seaward of chainage 100m there has been erosion of up to 0.2m. The upper and middle beach is at a high level compared to the range recorded from previous surveys, particularly between chainages 20-102m which is at its highest level recorded. The lower beach is at a low level compared to the range recorded from previous surveys. At profile **1aBTBC37**, the dunes have remained mostly stable, with a section of accretion of up to 0.5m in the middle of the dune face since the last survey. From the toe of the dunes to the end of the survey there has been an accretion of up to 0.5m and an extension of the beach toe seaward by 28m.Overall the profile is at a high level compared to the range recorded from previous surveys, particularly between chainages 45-85m, 130-205m and 220-246m which are at their highest level recorded. Profiles **1aADC01** and **1aADC02** are located along the frontage to the south of the outfall of Brunton Burn/Long Nanny. The dunes at 1aADC01 and 1aADC02 have not changed form or position At profile **1aADC01** the dune has remained stable with some accretion of 0.3m on the landward side. There has been erosion on the seaward facing dunes of up to 0.3m to chainage 267m. From chainage	Along the length of Beadnell Bay, the dunes have remained largely stable since the last survey, with some signs of growth. In general, the profiles show accretion on the upper and middle beach and erosion on the lower beach, with the exception of profile 1aBTBC37 and 1aADC01 which show accretion across the whole beach. **Longer term trends:** Along the length of Beadnell Bay, the dunes are of a similar form to those observed in the past. The changes in beach profile form and position observed since the last survey are generally within the bounds of previous surveys, except at profiles 1aBTBC34, 1aBTBC37 and 1aADC01 which show several sections are at their highest levels recorded.

Survey Date	Description of Changes Since Last Survey	Interpretation
	267m to the end of the survey there has been accretion of up to 0.8m, leading to an overall steeper profile. Overall the profile is at a medium-high level on the upper beach compared to the range recorded from previous surveys, whilst the lower beach is at a high level, particularly between chainages 476m and the end of the survey which is at its highest level recorded. At profile **1aADC02** the dunes have not changed since the previous survey, with a minor amount of erosion on the landward side of up to 0.1m. There has been accretion of up to 0.3m from the dune toe to chainage 150m. Seaward of chainage 150m there has been low level accretion of up to 0.1m. Overall the profile is at a relatively high level compared to the range recorded from previous surveys.	

2.7 Boulmer

Survey Date	Description of Changes Since Last Survey	Interpretation
13th March 2020	**Beach Profiles:** Boulmer is covered by two beach profile lines for the Partial Measures survey (Appendix A). These were added to the programme in October 2007. The previous survey was undertaken for the Full Measures survey in autumn 2019. At profile **1aADC04A** , there has been accretion of up to 0.6m from the dune cliff to the exposed rocky outcrop at chainage 76m. Overall the profile is at a relatively high level compared to the range recorded from previous surveys, particularly between chainages 52-74m which is at its highest level recorded. At profile **1aADC04B** the backshore (now rock armour) has remained stable since the last survey. There has been erosion of up to 0.2m on the upper beach to chainage 59m. Between chainage 59m and 96m there has been accretion of up to 0.3m. There have been small changes across the rock platform, associated with the movement of rocks. The profile extends 14m seaward compared to the previous survey. The profile is at a low level on the upper beach, a medium level on the middle beach and a high level over the rest of the profile compared to the range recorded from previous surveys.	The dune cliff backshore at Boulmer is now fixed in position by the rock armour at both profiles. Beach levels at the northern profile in Boulmer have experienced accretion since the last survey. Towards the south of Boulmer at profile 1aADC04B there has mostly been erosion across the profile. **Longer term trends:** The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys. The rocky shore platform continues to be mainly exposed in the lower foreshore.

2.8 Alnmouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
13th March 2020	**Beach Profiles:** Alnmouth Bay is covered by three beach profile lines during the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2019. The three profiles are located to the north of Alnmouth Bay between Marden Rocks and the mouth of the River Aln Estuary. At profile **1aADC07** the overall position of the dunes has remained stable since the last survey. The beach level at the toe of the dunes has increased by 0.4m to chainage 48m. This is followed by a section of erosion of up to 0.3m to chainage 80m. The middle beach berm has migrated landward by 45m, and another small berm has formed on the lower beach at chainage 246m. The beach toe has extended seaward by 36m. The upper beach is at a high level compared to the range recorded from previous surveys, particularly between chainages 11-42m which is at its highest level recorded. The berms and lower beach are both at high levels compared to the range recorded from previous surveys. At profile **1aADC08** the dunes have remained largely stable since the last survey. From the toe of the dune to chainage 54m there has been accretion of up to 0.3m. Seaward of chainage 54m there has been erosion of up to 0.5m. The beach profile terminates at the river at chainage 174m, 193m shorter than the autumn 2019 survey due to quicksand. Overall the profile is generally at a low level compared to the range recorded from previous surveys. At profile **1aADC09** the dunes have remained stable since the last survey. There has been an accumulation of sediment at the toe of the dunes of up to 0.8m. Between chainages 30-80m the beach has lowered by up to 0.3m, before switching to accretion seaward of chainage 80m by up to 0.9m. The survey terminates at a river due to the river due to quicksand. Overall the profile is at a relatively medium level compared to the range recorded from previous surveys.	The dunes have remained largely stable since the last survey. There has generally been alternating patterns of accretion and erosion across the beach profile, with accretion generally on the upper and lower beach, whilst erosion is marginally more dominant in the middle beach. The continued migration of the river channel is the most notable change. **Longer term trends:** The dunes show long-term stability. The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys, although change in the position of the river channel has substantially curtailed profile 1aADC09 and therefore no information is available about beach elevations on the opposite bank of this channel along this profile alignment (this been the case since 2015).

Survey Date	Description of Changes Since Last Survey	Interpretation
May 2020	**Topographic Survey:** The northern part of Alnmouth Bay (to the north of the River Aln estuary) is covered by bi-annual topographic survey, which commenced in April 2005. Data from the most recent topographic survey (Partial Measures, spring 2020) have been used to create a DGM (Appendix B – Map 2) using a Geographical Information System (GIS). A difference plot has also been produced using the DGM (Appendix B – Map 5) produced from the last produced topographic survey (Full Measures, autumn 2019) and the present survey. The difference plot shows a mixed pattern of erosion and accretion. In the extreme south of the survey area, accretion is dominant in the area fronting the village of Alnmouth itself with small patches of erosion on the upper and lower beach. Moving northwards across the section of beach fronting the golf course erosion becomes the dominant process with some accretion noted directly adjacent the shore fronting the access road and car park at the northern extent of the car park. To the north of the car park area, the pattern is more scattered and less consistent. In general, there are alternating bands of accretion and erosion from the upper beach to the lower beach.	The findings of the topographic survey show a mixture of erosion and accretion, some resulting from winter erosion of the upper beach and consequent accretion in the lower beach (draw down), whereas other changes result from migration of the mouth of the River Aln across the beach.

2.9 High Hauxley & Druridge Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
22nd April 2020	**Beach Profiles:** High Hauxley to Druridge Bay is covered by eight beach profile lines during the Partial Measures survey (Appendix A). Four of these (with A or B suffixes) were added to the programme in October 2007. The previous survey was undertaken for the Full Measures survey in autumn 2019. **1aADC15A**, **1aADC16** and **1aADC16A** are located around Hauxley Haven. Dunes at these three profiles have remained stable since the last survey. At profile **1aADC15A**, there has been accretion of up to 0.6m from the toe of the dunes across the beach profile to chainage 179m where there is a small amount of erosion at the beach toe of up to 0.1m. The upper and middle beach profile is at a medium level relative to the range of previously recorded surveys, whilst the lower beach is at a low level. At profile **1aADC16** there has been erosion at the toe of the dunes to chainage 136m by up to 0.2m. Between chainage 136m – 178m erosion has been limited to less than 0.1m, however this increases up to 0.5m between chainage 178m and the end of the survey. Overall the beach is at a low level relative to the range recorded from previous surveys and the beach toe is at its most landward position recorded. The survey report notes '*gaps in section due to bushes and no access to resident's garden'* which appear to be in the dune part of the section. Profile **1aADC16A** shows erosion of up to 0.5m from the toe of the sea defences to chainage 151m. Between chainage 151m and 165m the profile has remained relatively stable. Seaward of this point there has been accretion of up to 0.1m and a seaward extension of the dune toe by approximately 26m. Overall the profile is at a medium level on the upper beach and a low level on the middle and lower beach relative to the range recorded from previous surveys. **1aADC16B**, **1aADC17** and **1aADC17A** are located to the north of Druridge Bay, between Bondi Carrs and Hadston Carrs and extend seawards from Togston Links. At profile **1aADC16B** there has been erosion of the dune vegetation at the cliff top and the cliff face of up to 0.1m. There has been relatively little change across the rock platform which remains wholly exposed, with change limited to ±0.1m. The beach toe has extended by 25m. Overall the beach remains	At Hauxley Haven, the dunes have remained stable since the last survey. Beach levels have varied and are generally at medium-low levels. Profiles largely remain within the bounds of previous surveys except the beach toe at 1aADC16 which is at its most landward position recorded. In most of Druridge Bay the dunes and low cliff at their toe, where present, have experienced little change. However, the beaches have varied with erosion tending to dominate (except at profile 1aCMBC01 which experienced accretion across the profile), however all profiles are largely at a medium-low level compared to the range recorded from previous surveys (except profile 1aCMBC01 which is at a high level). **Longer term trends:** At Hauxley Haven and Druridge Bay, the dunes have demonstrated a long-term trend of stability. The changes in beach profile form and position observed since the last survey are generally within the bounds of previous surveys.

Survey Date	Description of Changes Since Last Survey	Interpretation
	at a low level relative to the range recorded from previous surveys. At profile **1aADC17** between chainage 28m to 120m there has been minor losses of up to 0.1m. Seawards of this point until chainage 205m there has been accretion of up to 0.3m. Between chainage 205m and the end of the survey there has been erosion of up to 0.1m. Overall the profile is at a medium level on the upper and middle beach, whilst the lower beach is at a low level compared to the range of previously recorded results. At profile **1aADC17A** the dunes have remained stable. From the toe of the dunes to chainage to chainage 147m, the upper and middle beach shows erosion of up to 0.5m. Seaward of chainage 147m, there has been accretion of up to 0.6m across the lower beach. The survey extends seaward by 22m, showing the exposed rock platform. Overall the upper and middle beach profile is at a low level, particularly between chainages 77-97m where a hollow has formed and is now at its lowest level recorded. The lower beach is at a high level compared to the range of previously recorded results. **1aCMBC01** and **1aCMBC02** are located in the southern section of Druridge Bay. At profile **1aCMBC01**, the dunes appear to have remained stable, with minor amounts of accretion of up to 0.1m. There has been accretion on the upper beach of up to 1.2m between chainage 205-245m. Accretion seaward of 245m is limited to 0.3m. The beach toe has extended seaward by approximately 75m. Overall the beach is at a high level compared to the range of previously recorded surveys. At profile **1aCMBC02**, the dunes have remained stable. The upper beach has experienced up to 0.3m of erosion between the toe of the dunes at chainage 195m and chainage 208m. There has been erosion on the middle beach between chainages 235-285m by up to 0.6m, followed by a short section of limited accretion before erosion on the lower beach of up to 0.2m. Compared to the range recorded from previous surveys the profile is at a medium to low level.	

2.10 Lynemouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
21st April 2020	**Beach Profiles:** Lynemouth is covered by two beach profile lines during the Partial Measures survey (Appendix A). Profiles 1aCMBC03A and 1aCMBC03B were added to the programme in October 2007. The previous survey was undertaken for the Full Measures survey in autumn 2019. **1aCMBC03A** is located c.450m north of the mouth of the River Lyne and extends across the extensive slag banks before reaching the foreshore. The profile of the slag bank has not experienced any significant change since the last survey, with a small accumulation of sediment on the crest of the slag bank of up to 0.2m. At the toe of the slag bank there has been accretion of up to 0.3m to chainage 95m, switching to erosion across the middle beach by up to 0.2m. Seaward of chainage 118m there has been accretion of up to 0.7m and an extension of the beach toe by 26m. The beach levels are at a low level compared to the range recorded from previous surveys, particularly between chainages 95-118m which is at its lowest recorded level. **1aCMBC03B** is located to the north of Lynemouth Power Station and extends across the extensive slag banks before reaching the foreshore. The process of slag bank erosion has been progressing for some years. However, since the last survey the slag bank has not shown any movement. The toe of the small seaward facing cliff has eroded by 0.2m. The rest of the beach profile shows a decrease in levels of up to 0.9m. Overall the beach profile is low compared to earlier surveys, particularly at the beach toe which is at its most landward position recorded.	North of the mouth of the River Lyne, the slag bank has remained stable. The beach has experienced accretion on the upper and lower beach and is at a low level. To the north of the power station, the slag bank has remained stable. The beach has continued to erode across the majority of its length. **Longer term trends:** North of the mouth of the River Lyne, the slag bank has demonstrated a long-term trend of stability. To the north of the power station, the slag bank has continued to retreat, demonstrating parallel retreat of the artificial shoreline.
April 2020	**Cliff-top Survey:** Cliff top survey data collected for baseline survey (autumn, 2008), the previous Full Measures survey (autumn 2019) and the present Partial Measures survey (spring 2020) is presented in this report. The cliff top survey is carried out as a continuous cliff edge line survey at the Newbiggin Caravan Park at Newbiggin Point. The results from the cliff top monitoring are anticipated to have an accuracy of ±0.2m due to the technique used. Furthermore, problems in precisely locating the cliff top, due to	Since the last survey, there have been several small areas of erosion of up to 0.3m erosion, with one 4m section of erosion by up to 1.0m. **Longer term trends:** Since surveys began in October 2008, cliff movement has been greatest in the north of the survey area with up to 4.4m of cliff top retreat, whilst the central and southern parts of the survey

Survey Date	Description of Changes Since Last Survey	Interpretation
	vegetation growth or the indistinct form of the cliff top, have also affected the data quality. There have been numerous small areas of erosion of up to 0.3m along the survey length, with one 4.0m section of erosion of approximately 1.0m close to the north of the Caravan Park. However, the cliff has generally remained stable experiencing limited change since the previous survey.	area have shown less movement with retreat of up to 1.4m.

2.11 Newbiggin-by-the-Sea

Survey Date	Description of Changes Since Last Survey	Interpretation
14th March 2020	**Beach Profiles:** Newbiggin-by-the-Sea is covered by four beach profile lines during the Partial Measures survey (Appendix A). Two of these (with an 'A' suffix) were added to the programme in October 2007 specifically to help assess the performance of the capital scheme involving beach replenishment and construction of an offshore breakwater. It should be noted that an extended series of profiles and a topographic survey are also recorded via the Cell 1 Regional Coastal Monitoring Programme for purposes of post-project evaluation of this capital scheme. These profiles are not analysed here, however, the findings of the topographic survey are presented below. The previous survey was the Full Measures assessment undertaken in autumn 2019. Profile **1aWDC05A** is in the north of Newbiggin Bay. There has been accretion of up to 0.3m on the landward side of the seawall caused by the wash-over of sediment from the beach. At the toe of the seawall, there has been erosion of up to 0.8m. There has been very little change on the upper beach between chainages 14-42m. There has been erosion of up to 0.1m across the middle beach, switching to accretion on the lower beach by up to 0.2m to chainage 87m. There is an accumulation of sediment before the rock platform of up to 0.2m. The rock platform remains exposed at chainage 110m. The profile is at a low level at the toe of the seawall, a high level across the upper and middle beach and at a medium level on the lower beach. Profile **1aWDC06** is located in the centre of the northern part of Newbiggin Bay, between the two breakwaters. There has been accretion up to 0.1m of material at the base of the seawall. From chainage 14m to approximately 30m the beach profile erodes by approximately 0.1m, however, between chainages 30-105m there has been accretion of 0.1m on the middle beach and 0.5m on the lower beach. Seaward of chainage 105m, the trend switches to erosion at the beach toe by up to 0.3m. The beach toe has shortened by 12m.The beach profile is at a relatively medium level compared to the range recorded from previous surveys. Profile **1aWDC06A** is located in the centre of Newbiggin Bay, behind the offshore breakwater. There has been accretion of up to 0.1m between the seawall and the upper beach berm. The beach profile seawards of the berm has accreted by up to 0.4m, levelling off at the beach toe to similar levels as the	Since the last survey, the beach at Newbiggin-by-the-Sea generally shows accretion on the upper beach and lower beach, with erosion on the middle beach. The only exception is profile 1aWDC6A which shows accretion across the beach profile. The profiles range in level but are generally at a medium level except profile 1aWDC07 which is at its most landward position recorded. **Longer term trends:** Data collected since the start of monitoring in May 2002 reflects the change in beach width resulting from the beach nourishment scheme implemented at Newbiggin-by-the-Sea. This change is also reflected in the beach profile plot in Appendix A. The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys, except profile 1aWDC07 which is continuing to decrease in level.

Survey Date	Description of Changes Since Last Survey	Interpretation
	autumn 2019 survey. Overall the profile is at a medium-high level relative to the range recorded from previous surveys. **1aWDC07** is located towards the south of Newbiggin Bay. There has been accretion across the upper beach by up to 0.1m to chainage 20m. Between chainage 20-65m there has been erosion of up to 0.5m, switching to accretion seaward of chainage 65m by up to 0.4m, filling in a hollow on the lower beach. The beach toe has shortened by 15m. Overall the profile is at a low level throughout the profile, particularly between chainages 23-64m which is at its lowest, and most landward position recorded.	
May 2020	**Topographic Survey:** Newbiggin-by-the-Sea is covered by bi-annual topographic survey, which commenced in September 2010 to assess the performance of the capital scheme constructed in 2007. Prior to incorporation in the programme, these surveys were undertaken on occasions between 2007 and 2010 as part of the scheme development. The previous survey was the Full Measures assessment undertaken in autumn 2019. Data from the most recent topographic survey (Partial Measures, spring 2020) have been used to create a digital ground model (DGM) (Appendix B – Map 3) using a Geographical Information System (GIS). A difference plot has also been produced using the DGM (Appendix B – Map 6) produced from the previous and present surveys. The topographic survey shows patchy accretion and erosion. The tombolo behind the central breakwater shows accretion on top with erosion on both the north and sides. A wide, shore parallel band of accretion in the mid beach continues northwards. The mid beach to the south of the breakwater shows the largest and most continuous area of erosion. There is a patchy pattern of erosion and accretion on the lower beach in the south of the bay, with slightly more erosion than accretion. The survey report notes that; sand was covering most of the revetment rocks at the back of the beach and concrete steps were exposed for stretches at the back of the beach.	The topographic survey shows variable change across the bay, with most change occurring north of the tombolo behind the central breakwater. The southern end of the bay shows a much patchier distribution of change. This suggests there may have been movement away from the north of the bay towards the tombola.
April 2020	**Sand Extent Survey**: Spital Carrs is located to the south of Newbiggin Bay and is covered by a bi-annual sand extent survey, which commenced in 2011. The survey was designed to address concerns that the beach recharge	Since the last survey, there has been retreat of the edge of the sand across the survey area, except for a few isolated sections in the central survey area.

Survey Date	Description of Changes Since Last Survey	Interpretation
	scheme undertaken in Newbiggin Bay may impact on the Spital Carrs SSSI and SPA. The sand extent survey therefore identifies the boundary of the sand beach on the rock platform. Data from the most recent sand extent survey (Partial Measures, spring 2020) has been plotted onto aerial imagery (refer to Appendix C – Map 1). The plot shows some variation of the extent of sand between the autumn 2019 and the spring 2020 survey. In the north, there has been up to 8.5m of landward retreat of sand. Erosion of up to 5.0m dominates in the central survey area, however there are two short sections of accretion by up to 4.0m and 21.0m. In the south of the survey extent, erosion has occurred by up to 40m and in many areas is now at its most landward position recorded. The spring 2020 sand extent is generally within the range of changes seen in previous surveys, with the exception of the south of the survey extent where the sand extent is now in its most landward position.	**Longer term trends:** Sand extent surveys for the past 18 surveys shows oscillation of the edge of the beach with no net trend. Recent changes are within the range of changes seen previously.

2.12 Cambois Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
April 2020	**Cliff-top Survey:** Cliff top survey data collected for baseline survey (spring, 2009), the previous Full Measures survey (autumn 2019) and the present Partial Measures survey (spring 2020) is presented in this report. The cliff top survey is carried out as a continuous cliff edge line survey in two locations within Cambois Bay; at Sandy Bay Caravan Park to the north of the River Wansbeck estuary, and Cambois Bay from south of the River Wansbeck to the breakwater at the southern end of the bay. The results from the cliff top monitoring are anticipated to have an accuracy of ±0.2m due to the technique used. Furthermore, problems in precisely locating the cliff top, due to vegetation growth or the indistinct form of the cliff top, have also affected the data quality. Overall, there has been little change in the majority of the position of the cliff top at Sandy Bay Caravan Park since the previous survey in autumn 2019. However, three sections have slumped seawards since the previous survey as follows (north to south respectively): • A 21m long section slumped seaward by 5m; • A 7m long section slumped seaward by 2m; and • A 13m long section slump seaward by 5m. The dunes on the southern bank of the River Wansbeck show very little change since the previous survey in autumn 2019. There has been very little change along the survey length in Cambois Bay, with small isolated sections of retreat of typically less than 0.3m. There is one 8.5m section adjacent to Gray Street, North Blyth in the southern extent of the survey that retreated by approximately 2.6m.	Since the last survey in Autumn 2019, there has been relatively little change except for three sections of slumping of up to 5m along the Sandy Bay Caravan Park survey area. In Cambois Bay the erosion is generally localised small sections, with the most notable section of retreat in the south of the bay of up to 2.6m. **Longer term trends:** At Sandy Bay Caravan Park the cliff top retreat has been more significant in the southern part of the survey area with up to 10m of erosion since 2007, whilst the northern part has eroded by c.1-3m. In Cambois Bay, the area of greatest cliff top retreat since the surveys began in 2009 is in the centre of the bay opposite Ridley Terrace, Cambois, where up to 12m of erosion has occurred. The north and south of the bay have more typical retreats of c.3-7m.

2.13 Blyth South Beach

Survey Date	Description of Changes Since Last Survey	Interpretation
11th March 2020	**Beach Profiles:** Blyth South Beach is covered by six beach profile lines for the Partial Measures survey (Appendix A). The previous survey was the Full Measures assessment undertaken in autumn 2019. Profile **1aBVBC01** is located towards the north of South Beach, in front of the land owned by the Port of Blyth. The dunes have remained stable with some accretion of up to 0.1m on the most seaward dune. There has been up to 0.2m of erosion against the toe of the dunes from chainage 35m to 60m. In the middle beach, between chainage 60m and 137m, there has been accretion of 0.5m. The lower beach has eroded and steepened the overall profile by up to 0.6m, however the beach toe has accreted by 0.4m and extended seaward by 38m. Overall the dunes, upper and middle beach profile is at a high level compared to the range recorded from previous surveys, particularly between chainages 96-120m which is at its highest level recorded. The lower beach is at a low level, particularly between chainages 152-165m which is at its lowest level recorded. At profile **1aBVBC02**, accretion has dominated. On the upper beach from the base of the seawall at chainage 7m there has been accretion of up to 0.5m until chainage 52m. Between chainage 52m and 86m there is a short section of erosion by up to 0.3m. Across the lower beach between chainages 86m and 165m shows accretion of up to 0.2m. Seawards of this point, the beach toe has eroded by 0.1m and shortened by 27m in width. Overall the profile is at a high level on the upper and lower beach, particularly between 95-132m which is at its highest level recorded. The middle beach is on a low level compared to the range recorded from previous surveys. At profile **1aBVBC03**, there have been no significant changes to the position and form of the dune crests or the upper part of the dune front since the last survey, except for a few sections of minor erosion up to 0.1m. The lower part of seaward facing dune has retreated landward by 4m and the toe has eroded by 0.2m. On the upper beach there has been accretion of up to 1.2m between chainages 97m and 131m, forming a small berm. The rest of the beach profile has experienced alternating erosion and accretion of ±0.2m. The beach toe has migrated landwards by 17m. Overall the profile is at a high level compared to the range recorded from previous surveys, with the section between chainages 185m	Since the last survey, the dune crests at Blyth South Beach have remained stable, generally retaining the same form and position with some minor advances. There have been variable amounts of erosion and accretion across the profiles, with a general trend of accretion at the toe of the dunes. Generally, profiles are at a medium to high level, with several areas at their highest level recorded (96-120m at 1aBVBC01, 95-132m at profile 1aBVBC02, 185-230m at profile 1aBVBC03 and 88-115m at profile 1aBVBC06). **Longer term trends:** At Blyth South Beach, the dunes have generally demonstrated a long-term trend of stability. The profiles are mostly at a medium to high level.

Survey Date	Description of Changes Since Last Survey	Interpretation
	and 230m being the highest recorded beach level in this location. At profile **1aBVBC04**, up to 0.1m of accretion has taken place on the dune crest, and 0.2m accretion at the toe of the dune. Overall, the dunes have remained stable over the winter of 2019/20. The upper beach shows an accumulation of sediment of up to 0.8m, forming a small berm at chainage 54m. Between chainage 70m and 106m there has been erosion of up to 0.5m, switching to accretion of up to 0.2m between chainage 106m and 174m. Seaward of chainage 174m the beach level has lowered by up to 0.5m and the dune toe has migrated landward by 20m. Overall the profile is at a medium level compared to the range recorded from previous surveys. At profile **1aBVBC05**, the dunes have remained stable. There has been up to 0.5m of accretion against the toe of the dunes to chainage 75m. The upper beach berm has eroded by 0.2m and moved seaward by 14m. The rest of the beach profile has accreted evenly by 0.6m and the beach toe has extended seaward by 2m. Overall the dune toe is at a low level and the upper to lower beach profile is at a medium level compared to the range recorded from previous surveys. Profile **1aBVBC06** is located at the southern end of the beach, towards Seaton Sluice. The dunes have remained stable, with minor accretion advancing the dune toe face by around 5m. The upper beach has accreted by 0.3m to chainage 118m. Between chainage 118-162m there has been erosion of up to 0.6m. The hollow present during the autumn 2019 survey has been filled in with 0.4m. Seawards of 211m there has been erosion of 0.5m. The dune face and upper beach is at a high level, particularly between chainages 88-115m which is at its highest level recorded. The middle beach is at a medium level, whilst the lower beach is at a low level compared to the range recorded from previous surveys.	

3. Problems Encountered and Uncertainty in Analysis

Individual Profiles

- Profiles 1aBTBC19, 1aBTBC21, and 1aBTBC23 all end at drains.
- At profile 1aBTBC33, the middle of the dunes was not measured due to the presence of dense vegetation. Care is therefore needed when interpreting the interpolated data.
- At profiles 1aADC08 and 1aADC09, the profiles end at the River Aln channel due to quicksand.
- At profile 1aADC16 there are gaps in the section due to bushes, and no access to resident's gardens.
- Profile 1aADC16B now starts at the new fence.

Topographic Surveys

- At Newbiggin-by-the Sea, the topographic survey report notes that sand was covering most of the revetment rocks at the back of the beach, and that the concrete steps were exposed for long stretches at the back of the beach.

Cliff Top Surveys

Surveying any cliff top is difficult due to the need for a consistent interpretation of the cliff edge in successive surveys, which can be challenging, especially when vegetation is thick. For these reasons, it has been assumed that any changes of ±0.2m may be considered as being within the margins of error of the surveying technique, and that any indication of an advancing cliff line is error.

Surveying the cliff top along Cambois Bay is more difficult than the similar surveys at Newbiggin Caravan Park and Sandy Bay Caravan Park because the cliff edge is less distinct and hard to precisely define due to vegetation coverage and its smooth, degraded form.

The surveyors noted the following at Cambois:

- there was very thick dense vegetation at the north end of the cliff top which hindered the survey of the line;
- Three areas at Sandy Bay have slumped towards the sea; and
- A small section of the gabion baskets were displaced.

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

No changes to the monitoring programme are recommended at this time.

5. Conclusions and Areas of Concern

- At Sandstell Point (Spittal A), there has been relatively little movement of the spit at the landward side, however profile 1aBTBC06 at the distal end of the spit has experienced slumping from the crest toward the open sea. The recorded profiles and topographic survey present no causes for concern.
- At Spittal (Spittal B), the recorded profiles present no causes for concern, with the beach being at a medium-high level.
- At Goswick Sands, the recorded profiles present no causes for concern, with the beach generally being at a medium level.
- At Holy Island, the recorded profiles present no causes for concern, with the beach being at a medium-high level.
- At Beadnell Village, the recorded profiles present no causes for concern, with the beach being at a medium-high level.

- At Beadnell Bay, the recorded profiles present no causes for concern, with a general trend of accretion on the upper and middle beach and erosion on the lower beach except profiles 1aBTBC37 and 1aADC01 which shows accretion across the beach profile.
- At Boulmer the recorded profiles present no causes for concern, with the northern profile experiencing accretion and the southern profile experiencing erosion.
- At Alnmouth Bay, the recorded profiles and topographic surveys present no causes for concern, with alternating patterns of accretion and erosion across the beach profile.
- At High Hauxley & Druridge Bay, the beach levels are at a low to medium level.Generally, the profiles remain within the range recorded from previous surveys except the beach toe at 1aADC16 which is at its most landward position recorded.
- At Lynemouth Bay, to the north of the River Lyne (profile 1aCMBC03A) the beach levels are at a low level. To the north of the Power Station (profile 1aCMBC03B), the slag bank has remained stable and the the beach is at a low level, particularly at the beach toe which is at its most landward position recorded.
- At Newbiggin Bay, there is no cause for concern, with the upper and lower beach experiencing accretion and the middle beach experiencing more erosion. The profiles range in level, but are generally at a medium level except profile 1aWDC07 which is at its most landward position recorded
- At Cambois Bay, the cliff top survey shows localised small sections of erosion, with the most notable section of retreat in the south of the bay of up to 2.6m. At the Sandy Bay Caravan Park survey area, there has been relatively little change except for 3 short sections where slumping has occurred by up to 5m.
- At Blyth South Beach, there have been variable amounts of erosion and accretion across the profiles, with a general trend of accretion at the toe of the dunes. Beach levels are generally at medium to high levels compared to the range recorded from previous surveys, with several sections at their highest level recorded.
- Across the Northumberland County Council frontage beaches appears to have recovered from the effects of the March 2018 storm, known as the ‘Beast from the East’.

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

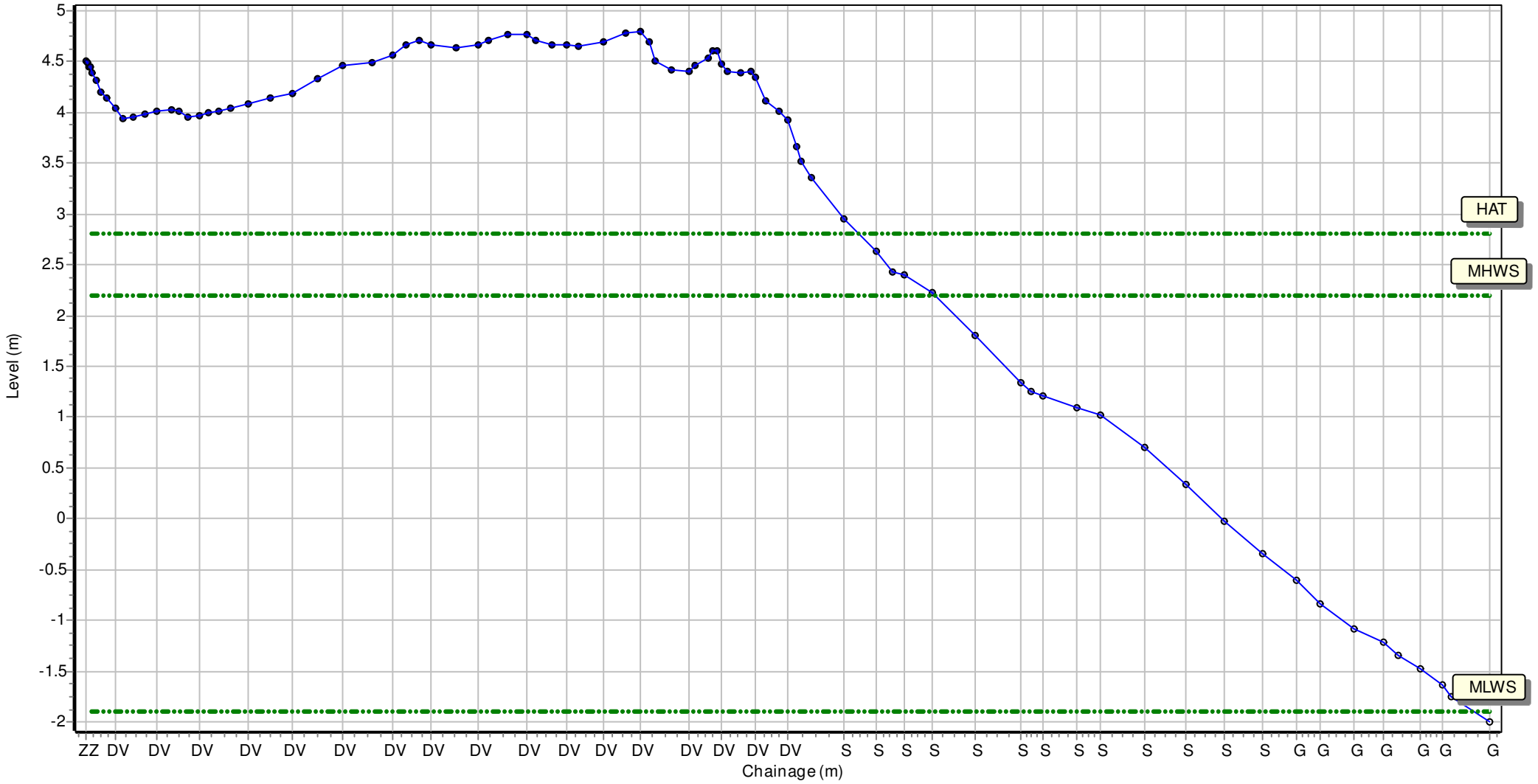
Location: **1aBTBC02**

Date: 06/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 400388.132 **Northing:** 651916.302 **Profile Bearing:** 334 ° from North



Beach Profile

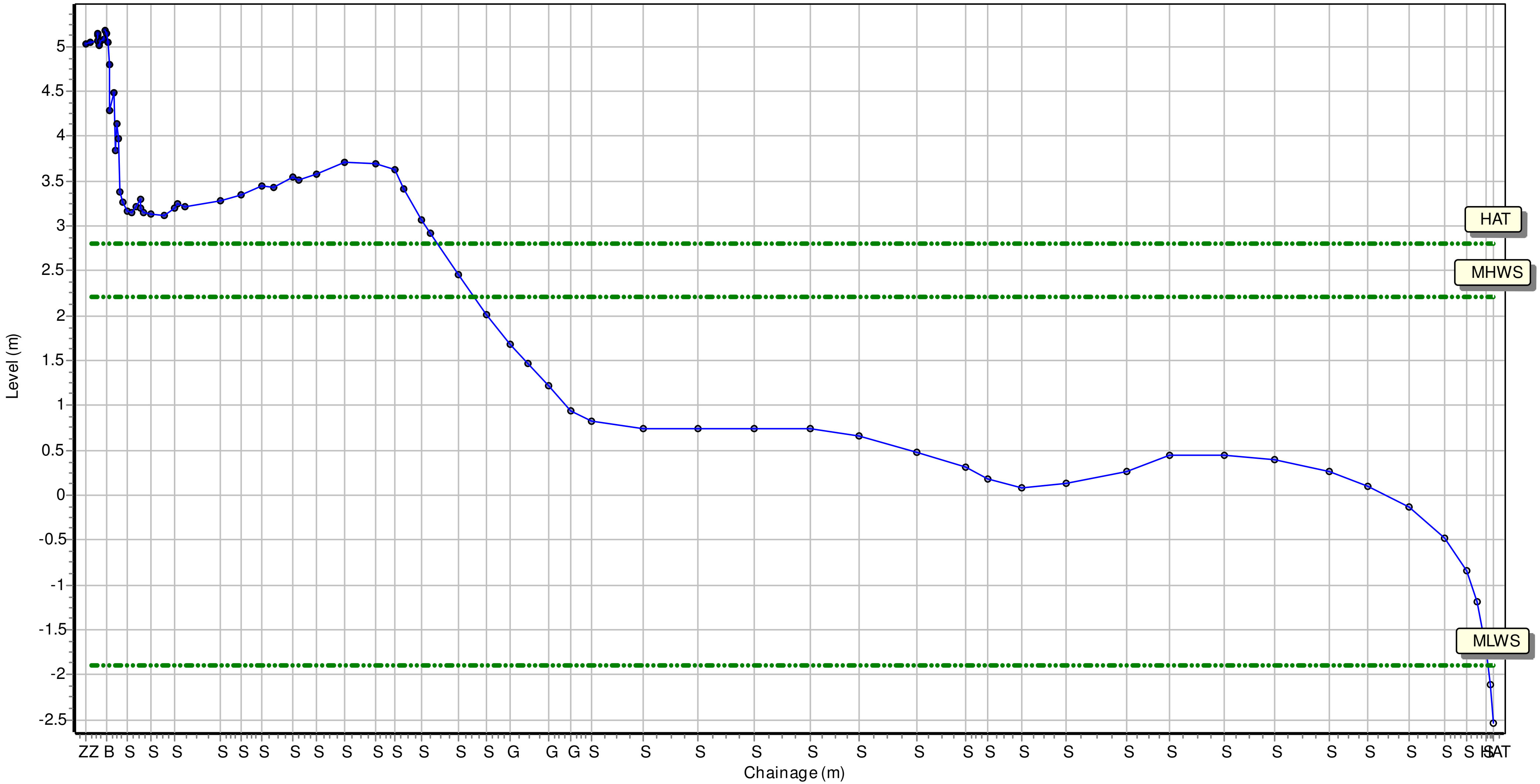
Location: 1aBTBC04

Date: 06/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 400531.615 **Northing:** 652001.966 **Profile Bearing:** 27 ° from North



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Beach Profile

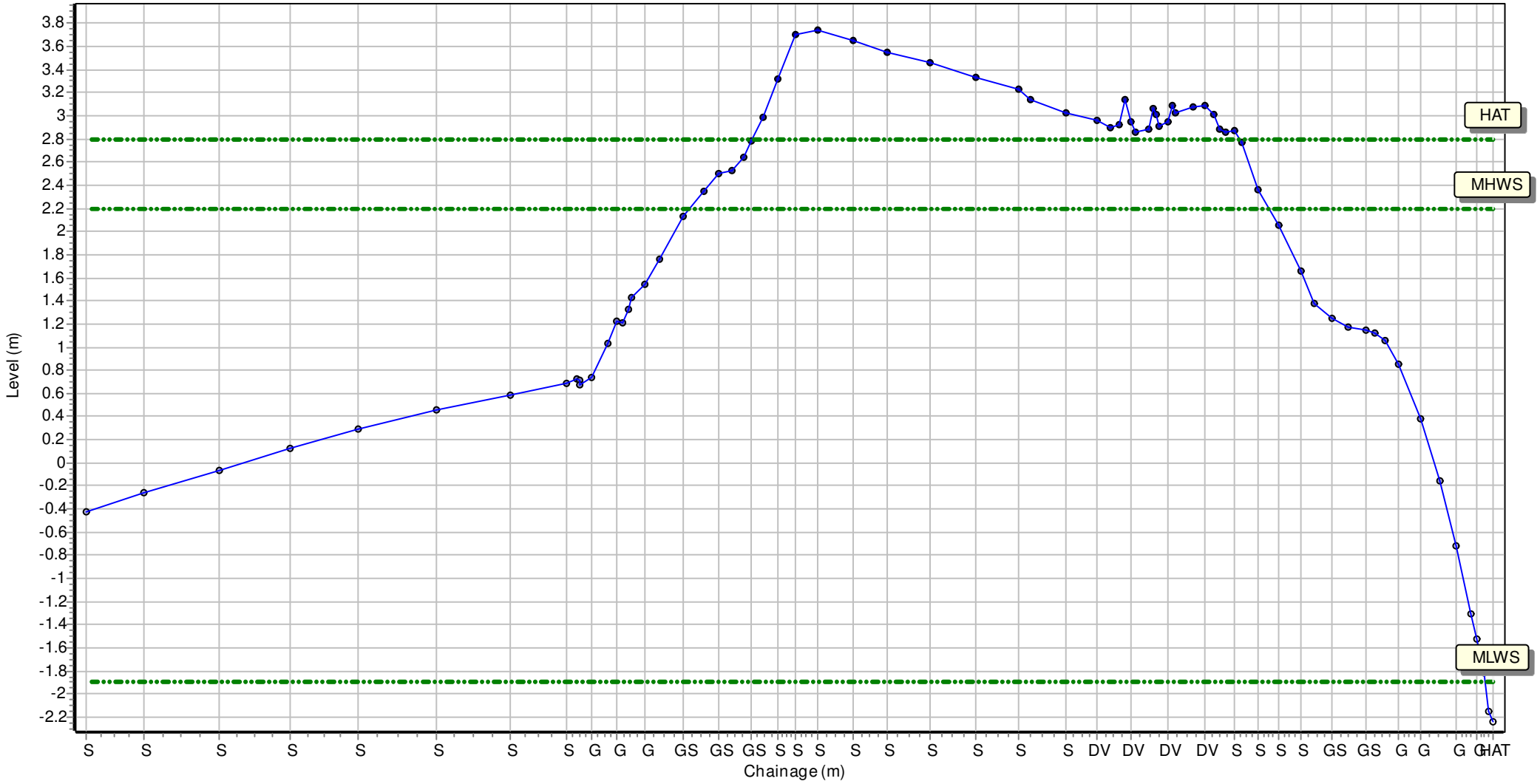
Location: **1aBTBC05**

Date: 06/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 400678.665 **Northing:** 651969.27 **Profile Bearing:** 298 ° from North



Beach Profile

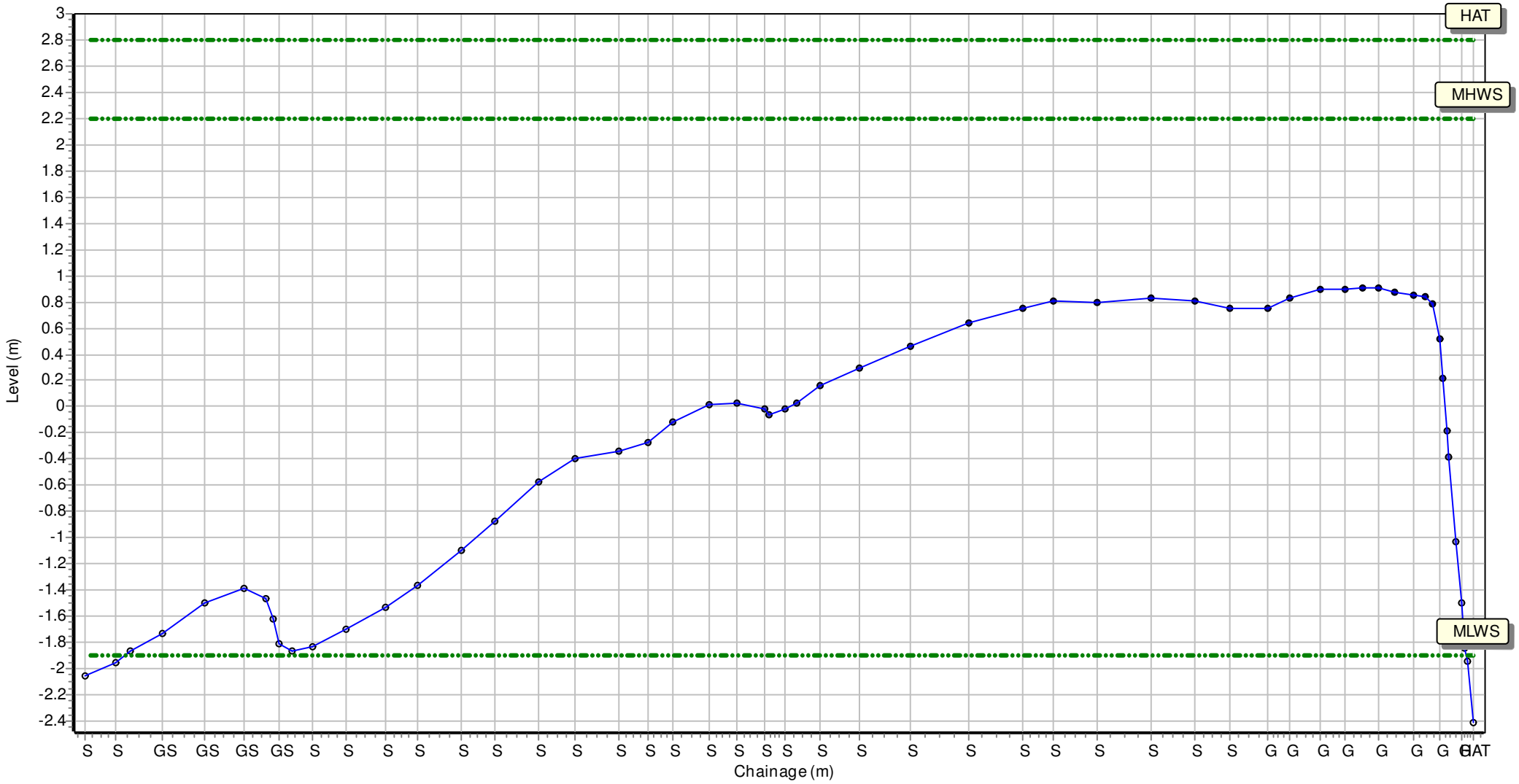
Location: **1aBTBC06**

Date: 06/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 400825.582 **Northing:** 652135.224 **Profile Bearing:** 295 ° from North



Beach Profile

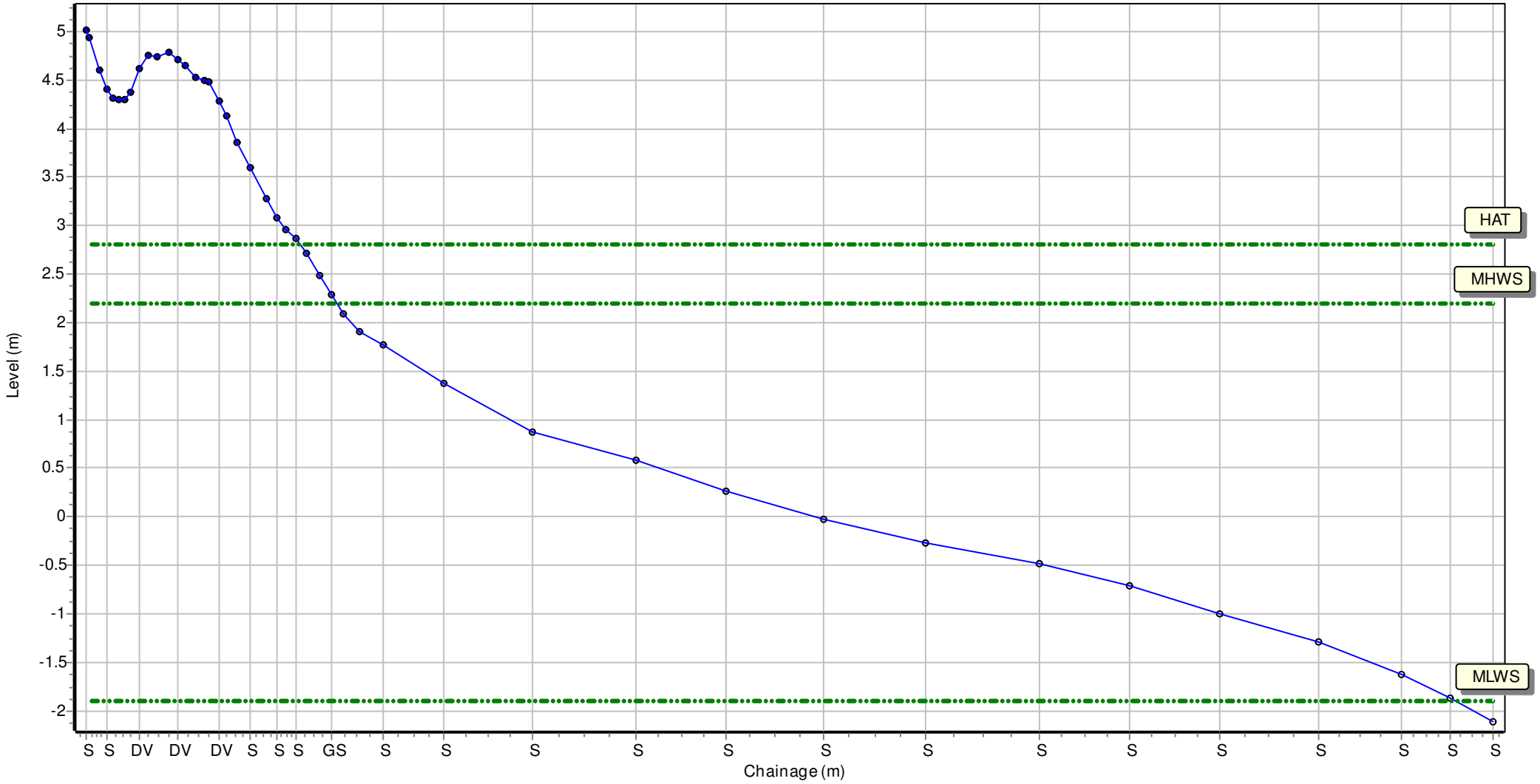
Location: **1aBTBC11**

Date: 06/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 400638.037 **Northing:** 651699.812 **Profile Bearing:** 66 ° from North



Beach Profile

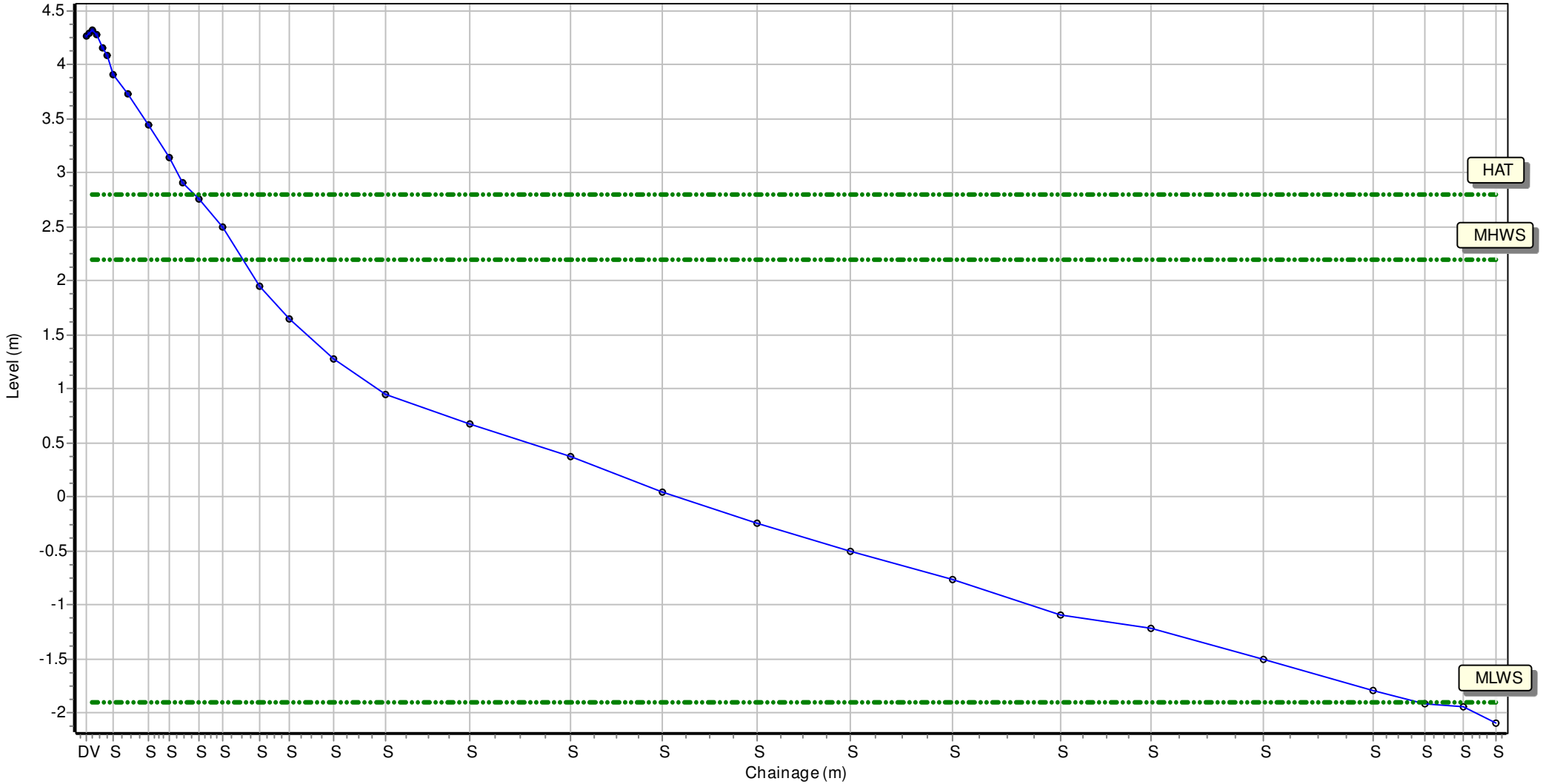
Location: **1aBTBC13**

Date: 06/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 400820.787 **Northing:** 651312.459 **Profile Bearing:** 65 ° from North



Beach Profile

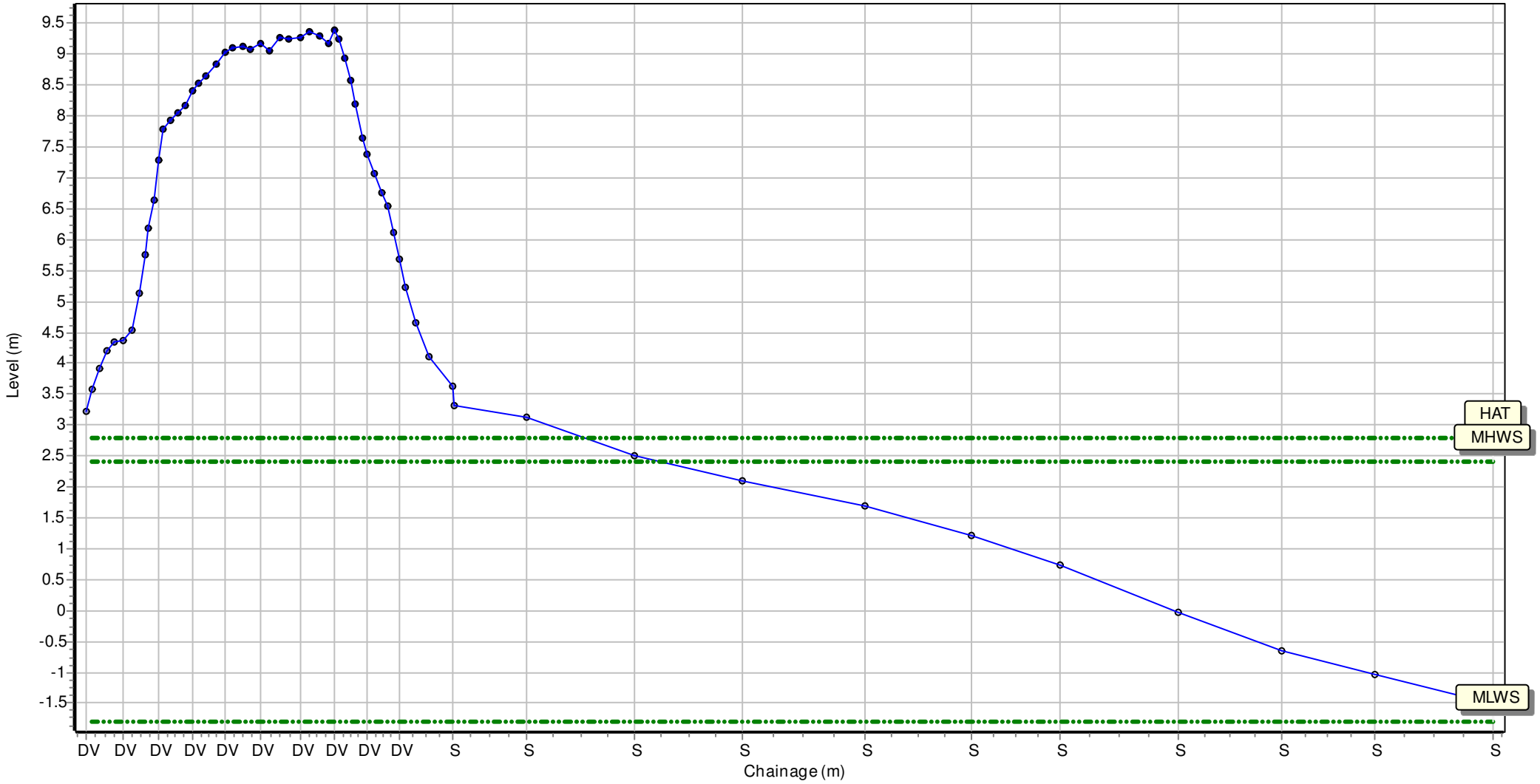
Location: **1aBTBC16**

Date: 12/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 403565.671 **Northing:** 647735.833 **Profile Bearing:** 53 ° from North



Beach Profile

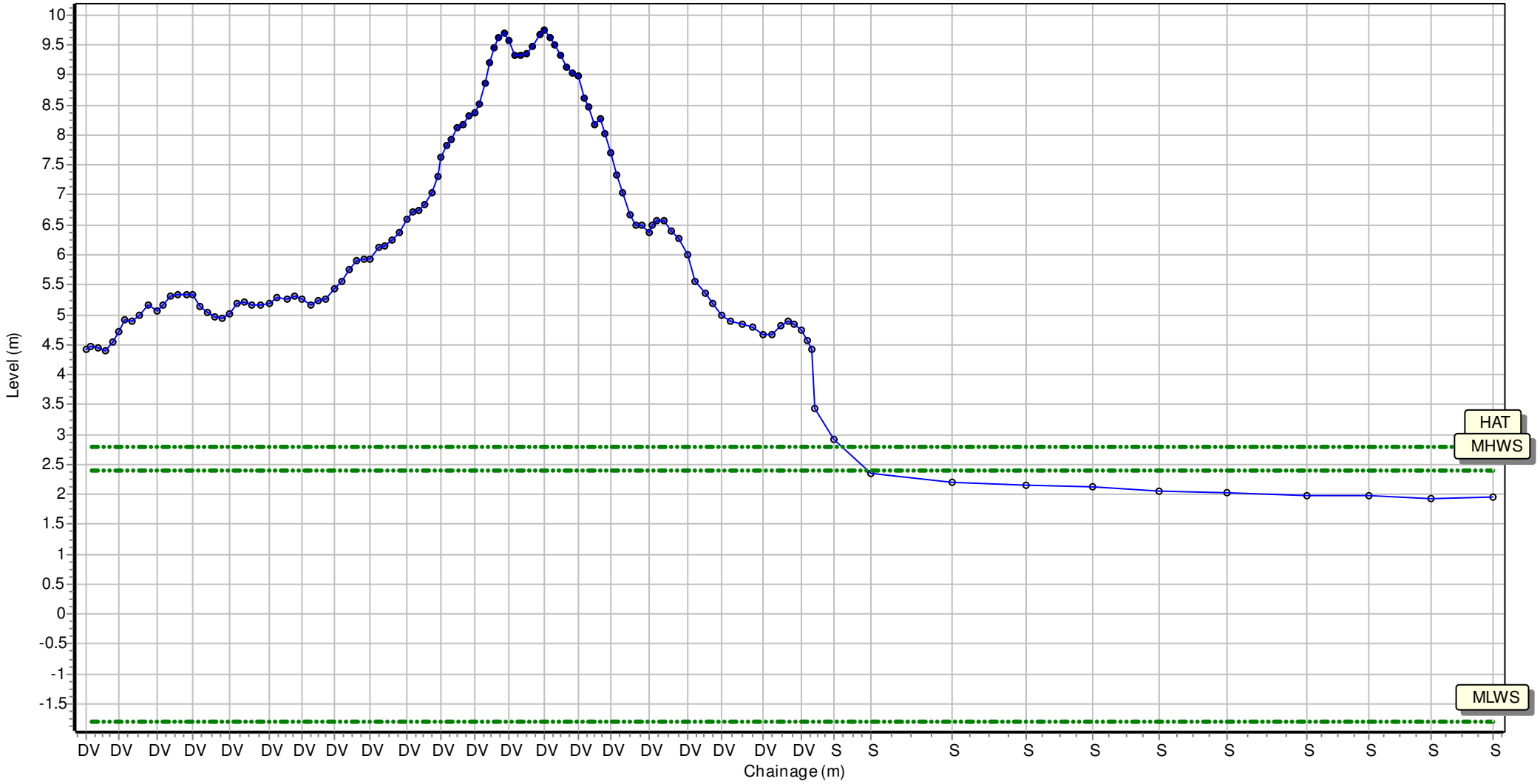
Location: **1aBTBC19**

Date: 12/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 407091.566 **Northing:** 644616.133 **Profile Bearing:** 34 ° from North



Beach Profile

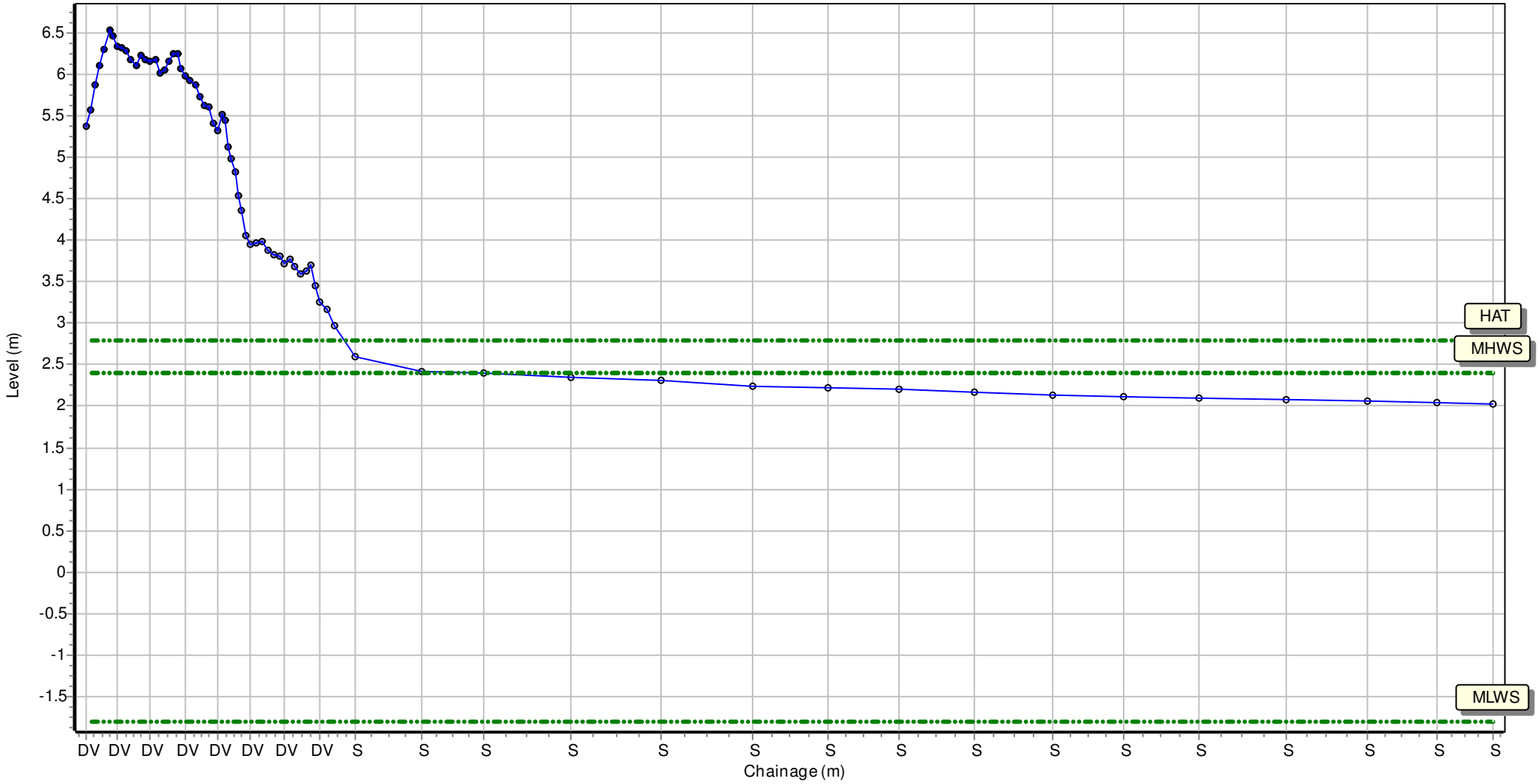
Location: **1aBTBC21**

Date: 12/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 409501.341 **Northing:** 643847.61 **Profile Bearing:** 33 ° from North



Beach Profile

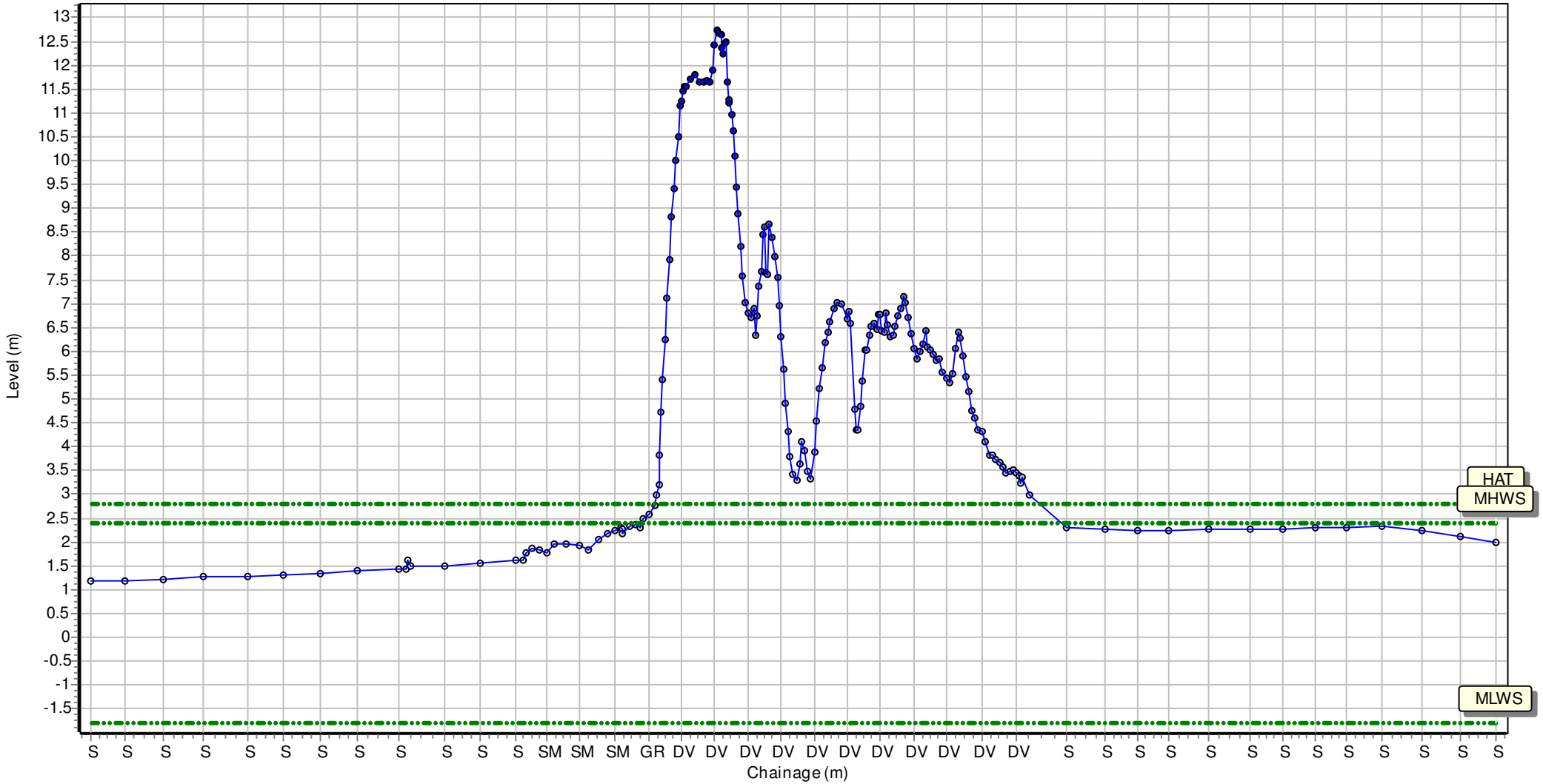
Location: **1aBTBC23**

Date: 12/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 411084.123 **Northing:** 643008.731 **Profile Bearing:** 0 ° from North



Beach Profile

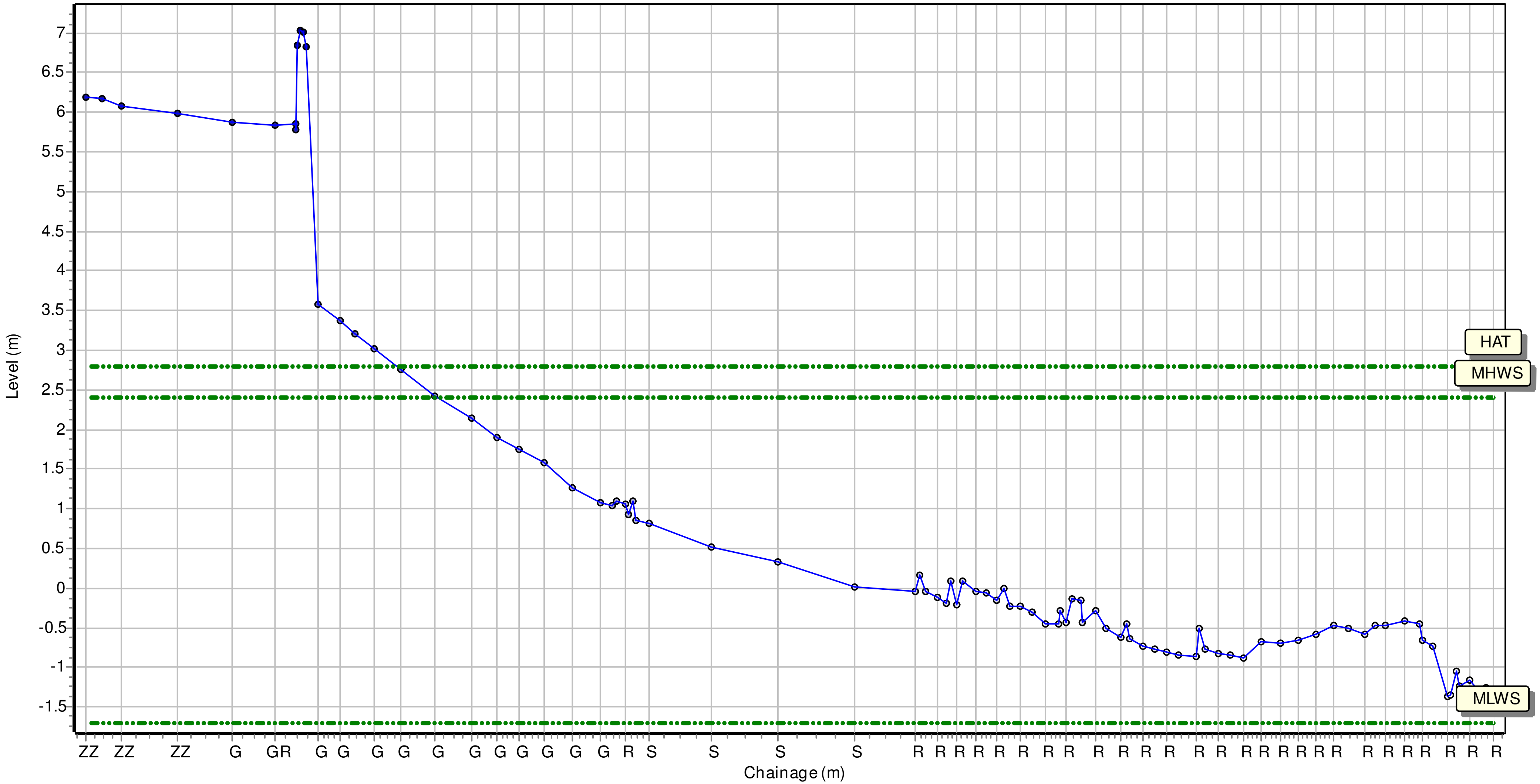
Location: 1aBTBC31

Date: 23/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 423579.204 **Northing:** 628973.295 **Profile Bearing:** 56 ° from North



Beach Profile

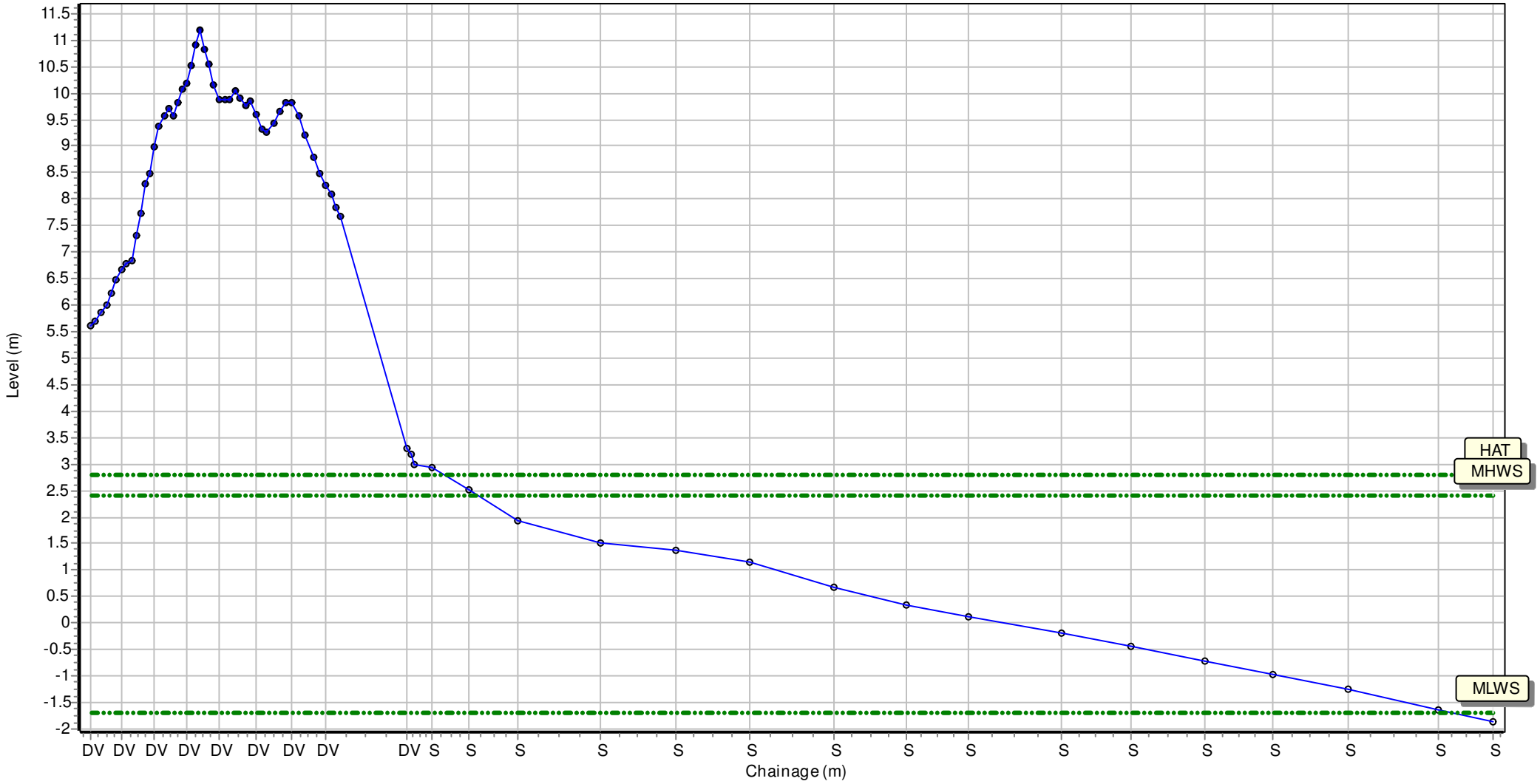
Location: **1aBTBC33**

Date: 23/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 423672.571 **Northing:** 628761.646 **Profile Bearing:** 204 ° from North



Beach Profile

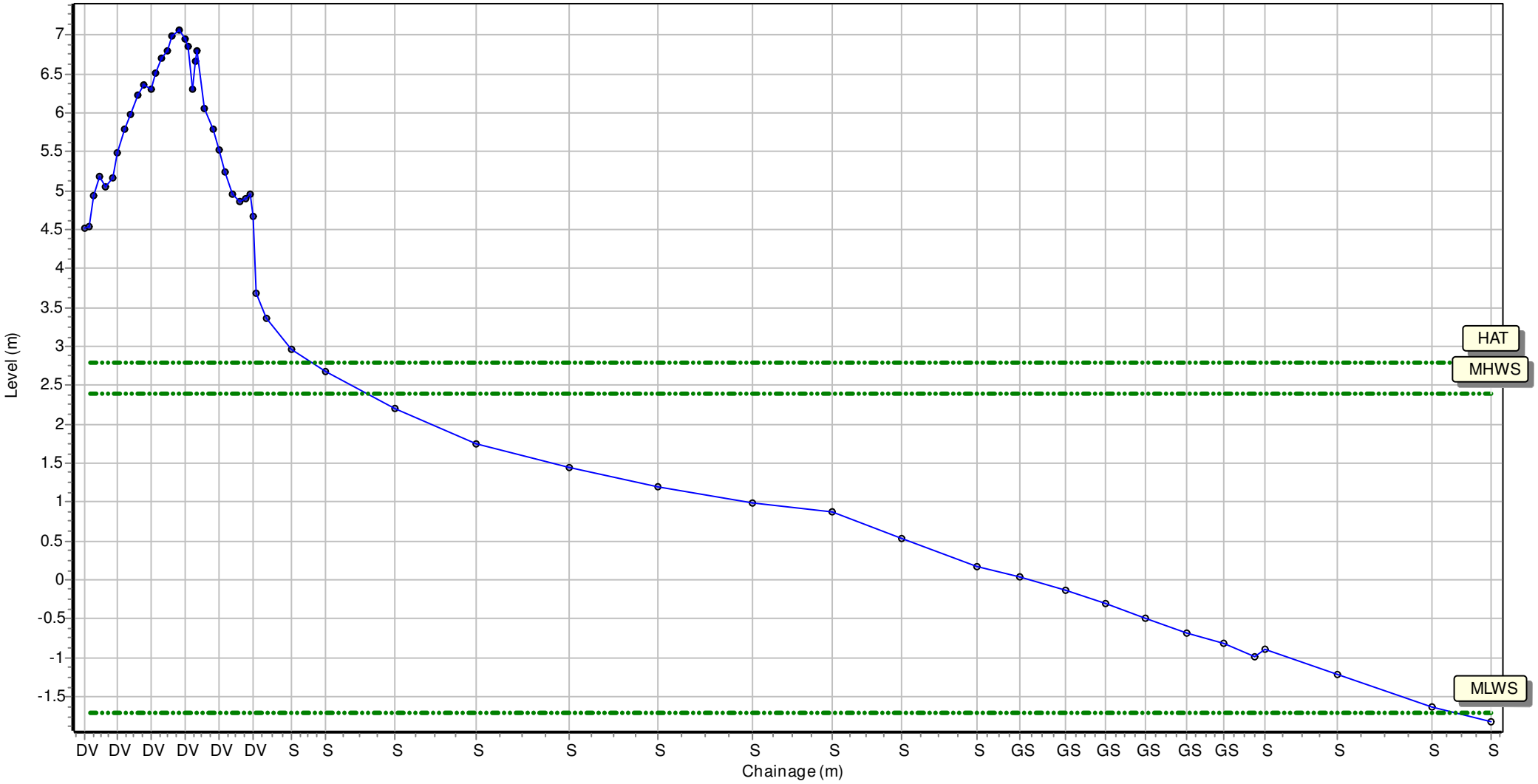
Location: **1aBTBC34**

Date: 23/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 423434.960 **Northing:** 628693.15 **Profile Bearing:** 160 ° from North



Beach Profile

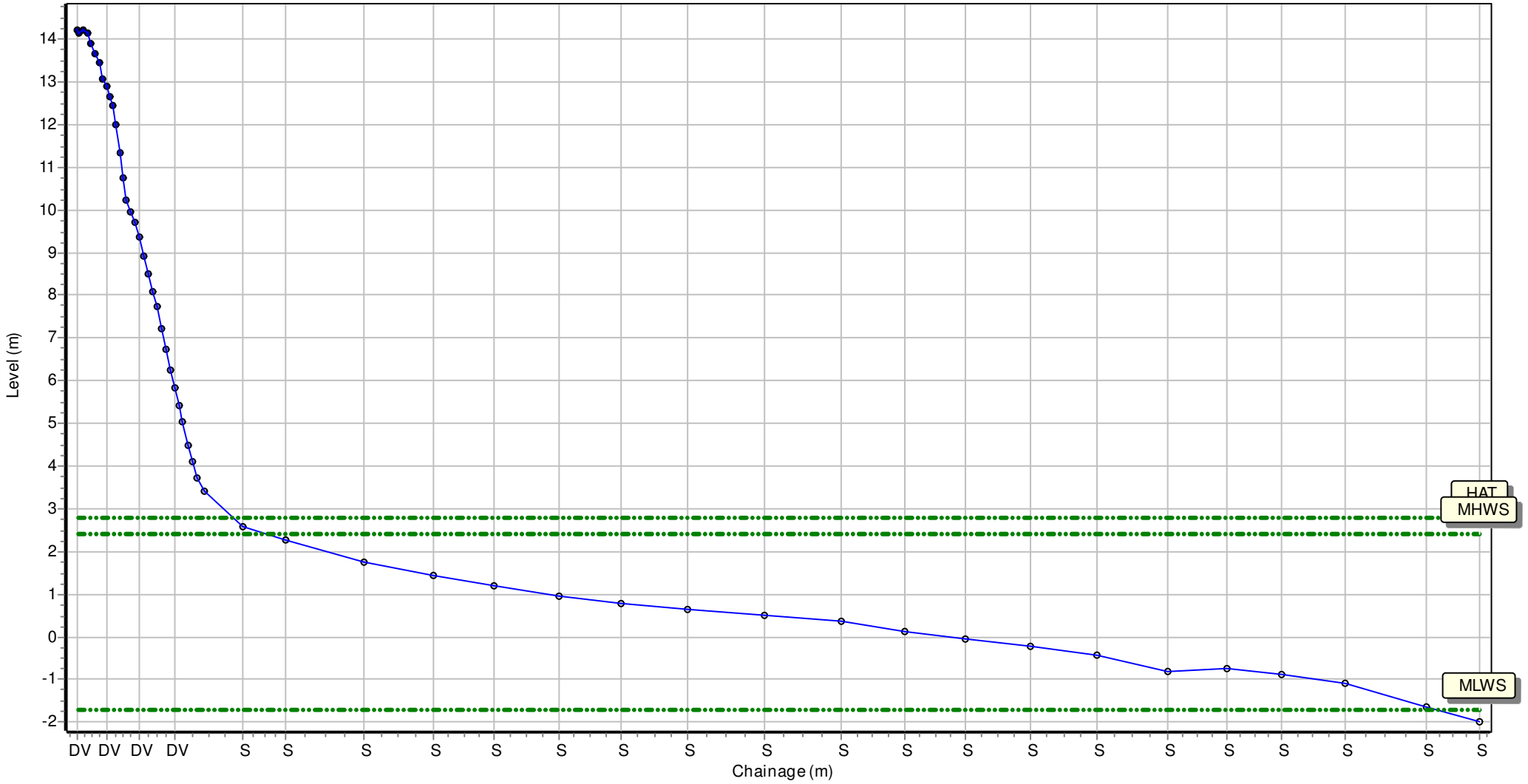
Location: **1aBTBC37**

Date: 23/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 423060.156 **Northing:** 628006.169 **Profile Bearing:** 96 ° from North



Beach Profile

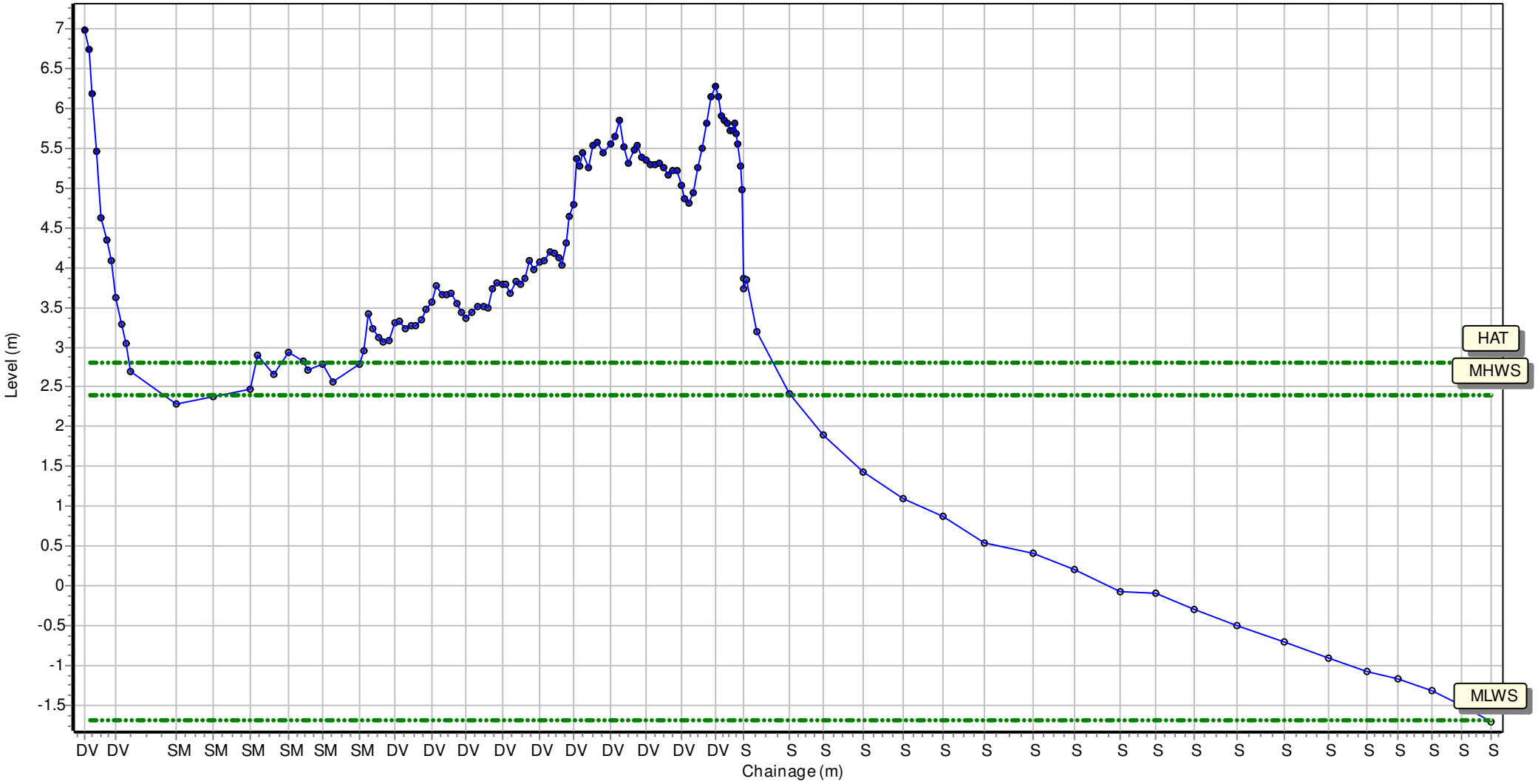
Location: **1aADC01**

Date: 23/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 422824.294 **Northing:** 627077.805 **Profile Bearing:** 77 ° from North



Beach Profile

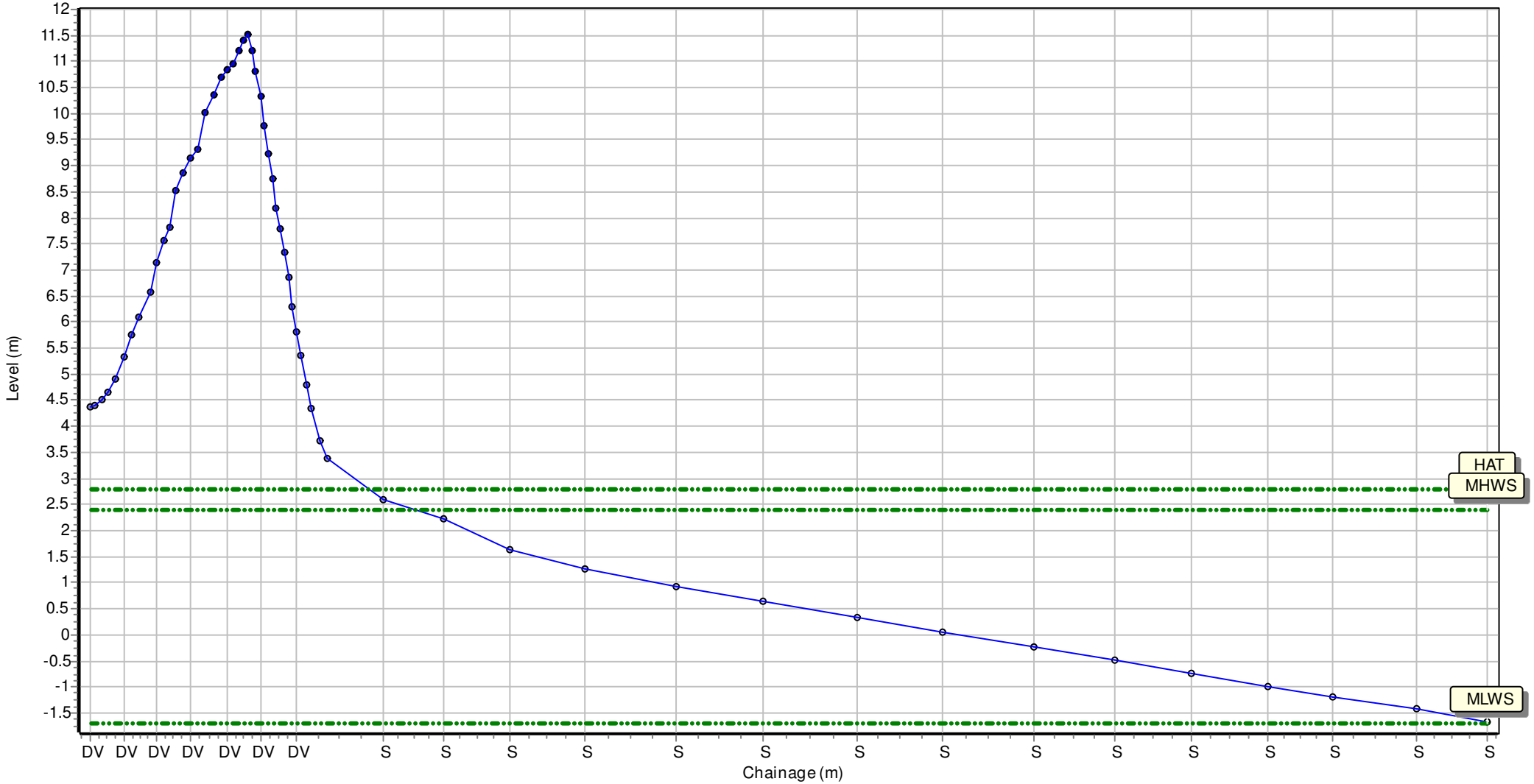
Location: **1aADC02**

Date: 23/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 423387.925 **Northing:** 626385.049 **Profile Bearing:** 56 ° from North



Beach Profile

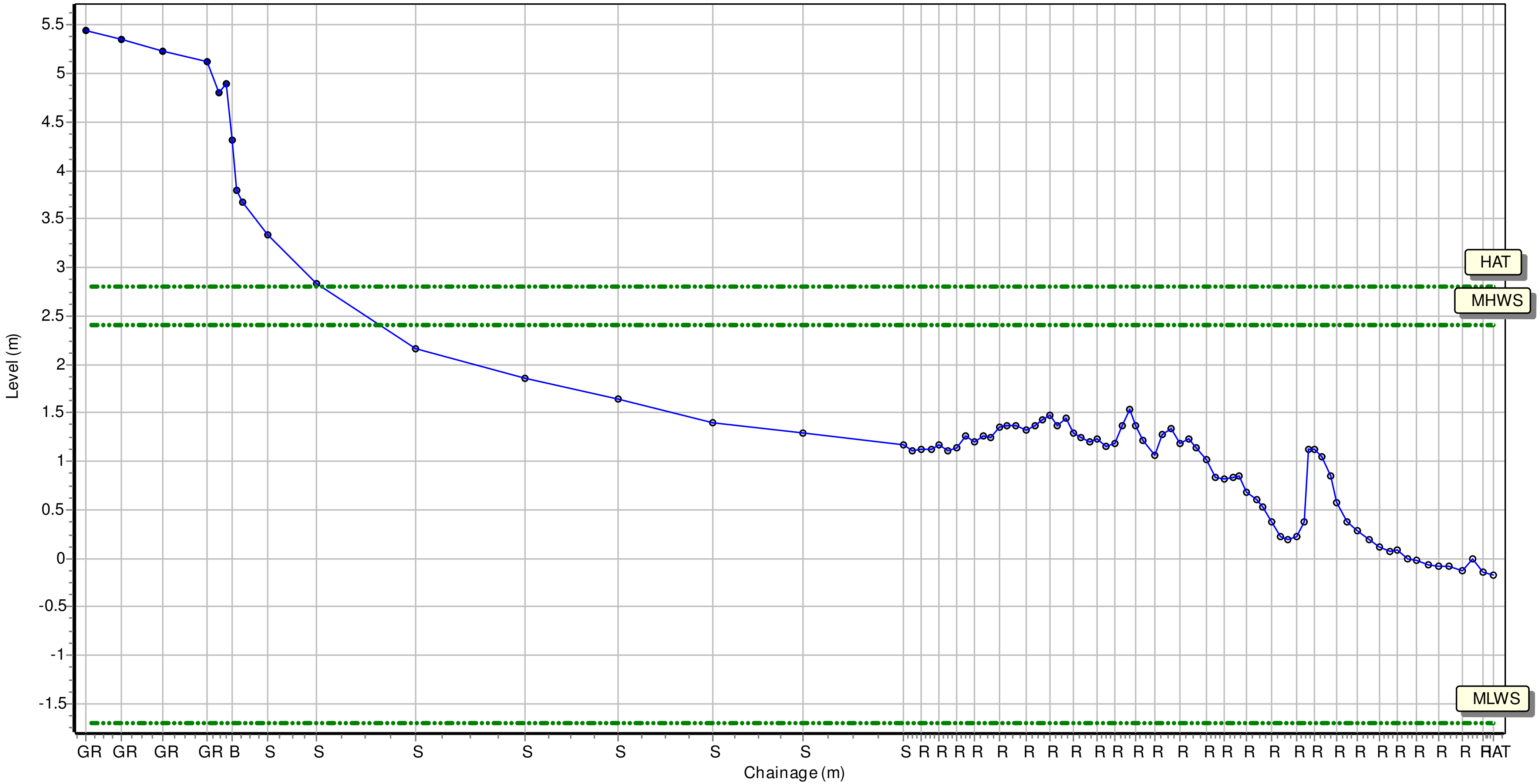
Location: 1aADC04A

Date: 13/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 426649.592 **Northing:** 614336.9 **Profile Bearing:** 93 ° from North



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Beach Profile

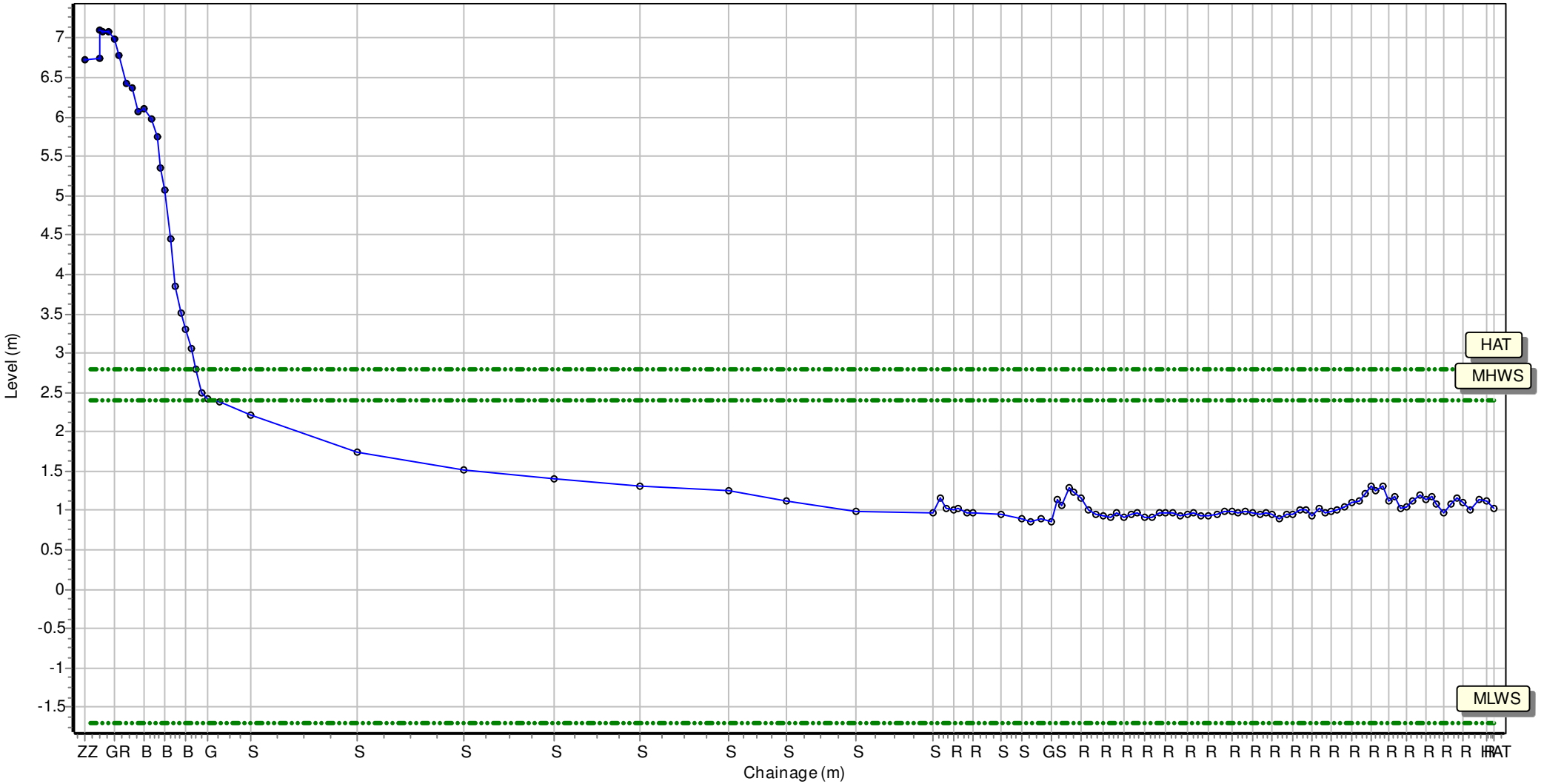
Location: **1aADC04B**

Date: 13/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 426641.642 **Northing:** 614193.793 **Profile Bearing:** 91 ° from North



Beach Profile

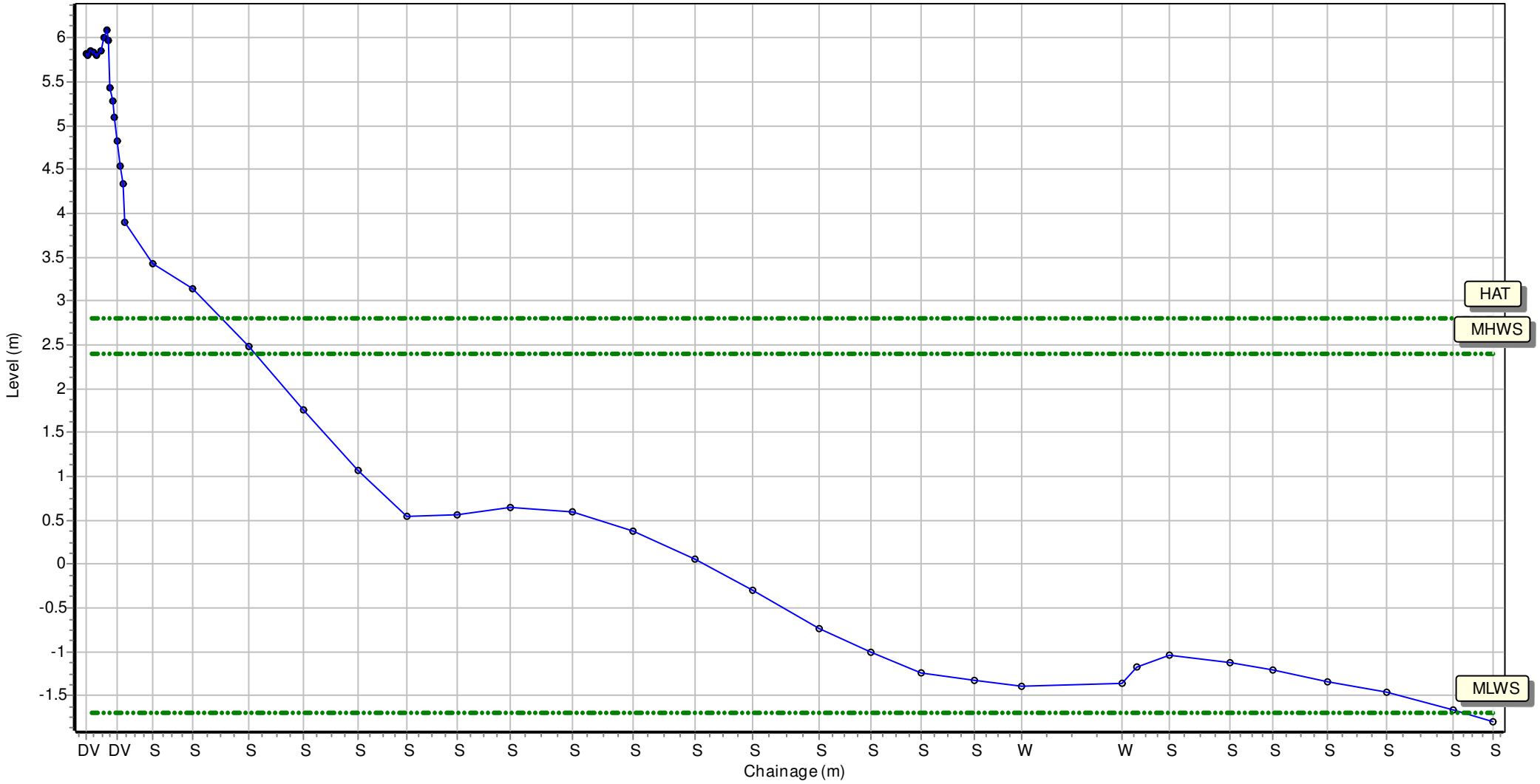
Location: **1aADC07**

Date: 13/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 425324.445 **Northing:** 611018.794 **Profile Bearing:** 134 ° from North



Beach Profile

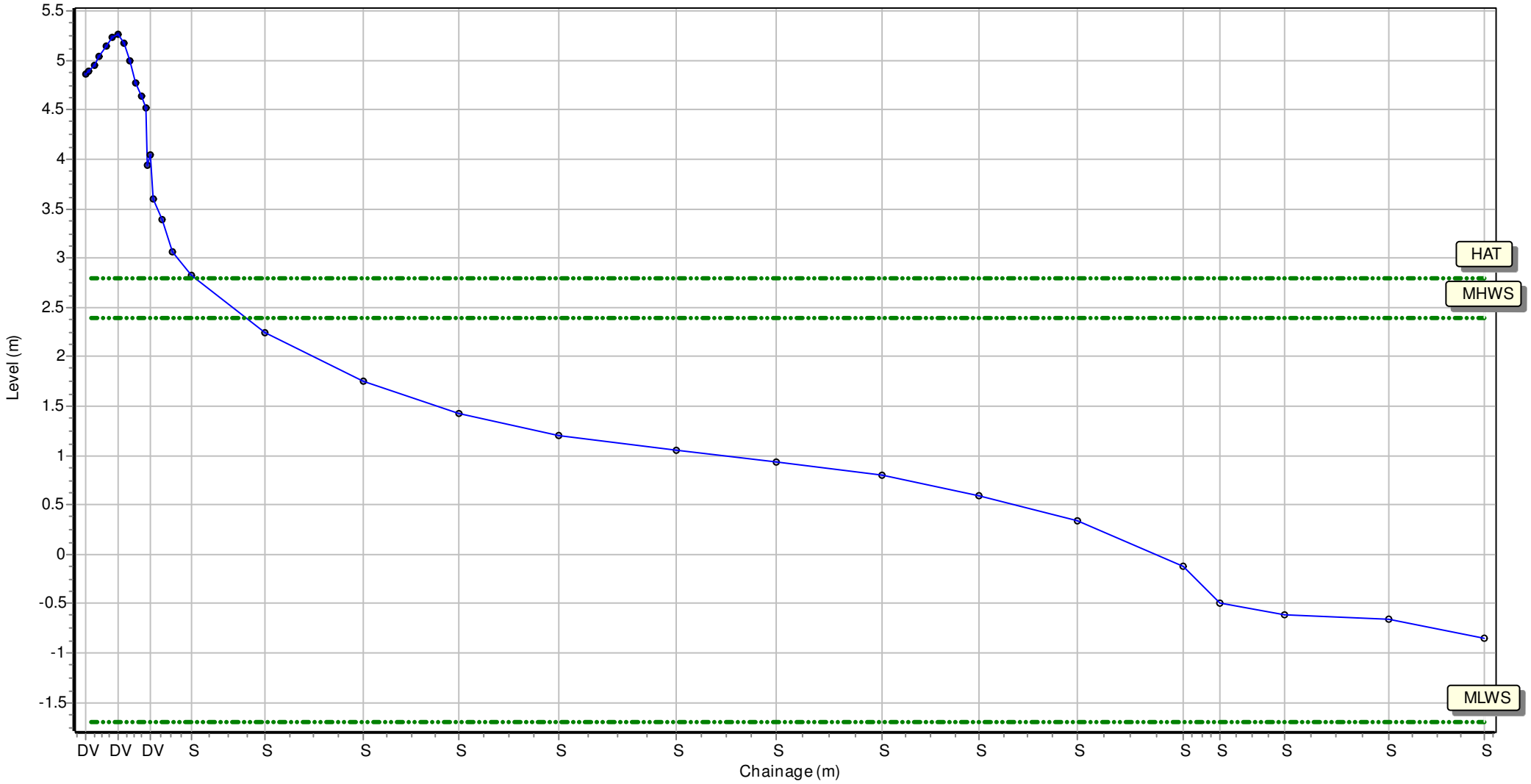
Location: **1aADC08**

Date: 13/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 425031.727 **Northing:** 610632.355 **Profile Bearing:** 112 ° from North



Beach Profile

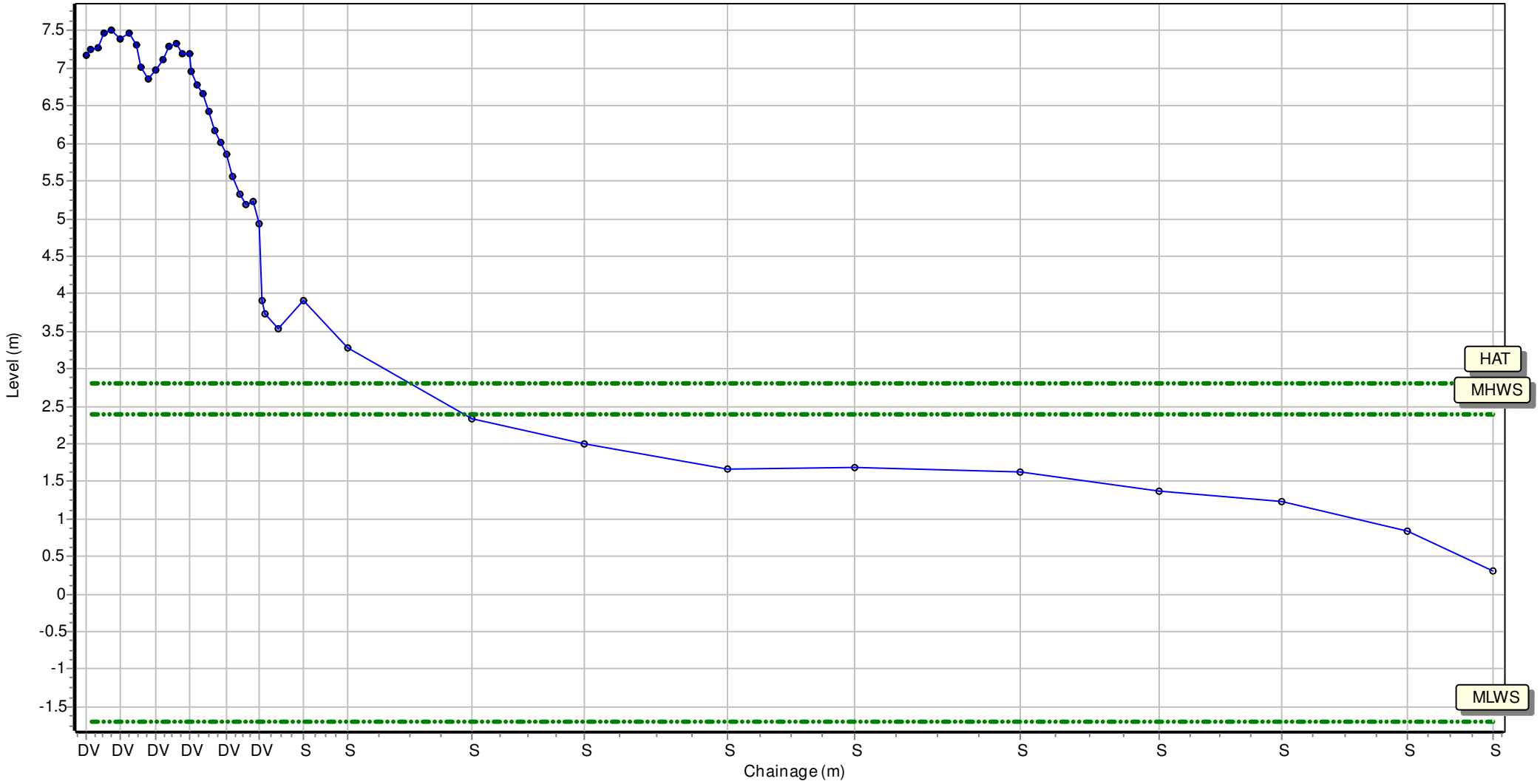
Location: **1aADC09**

Date: 13/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 424802.33 **Northing:** 610353.259 **Profile Bearing:** 120 ° from North



Beach Profile

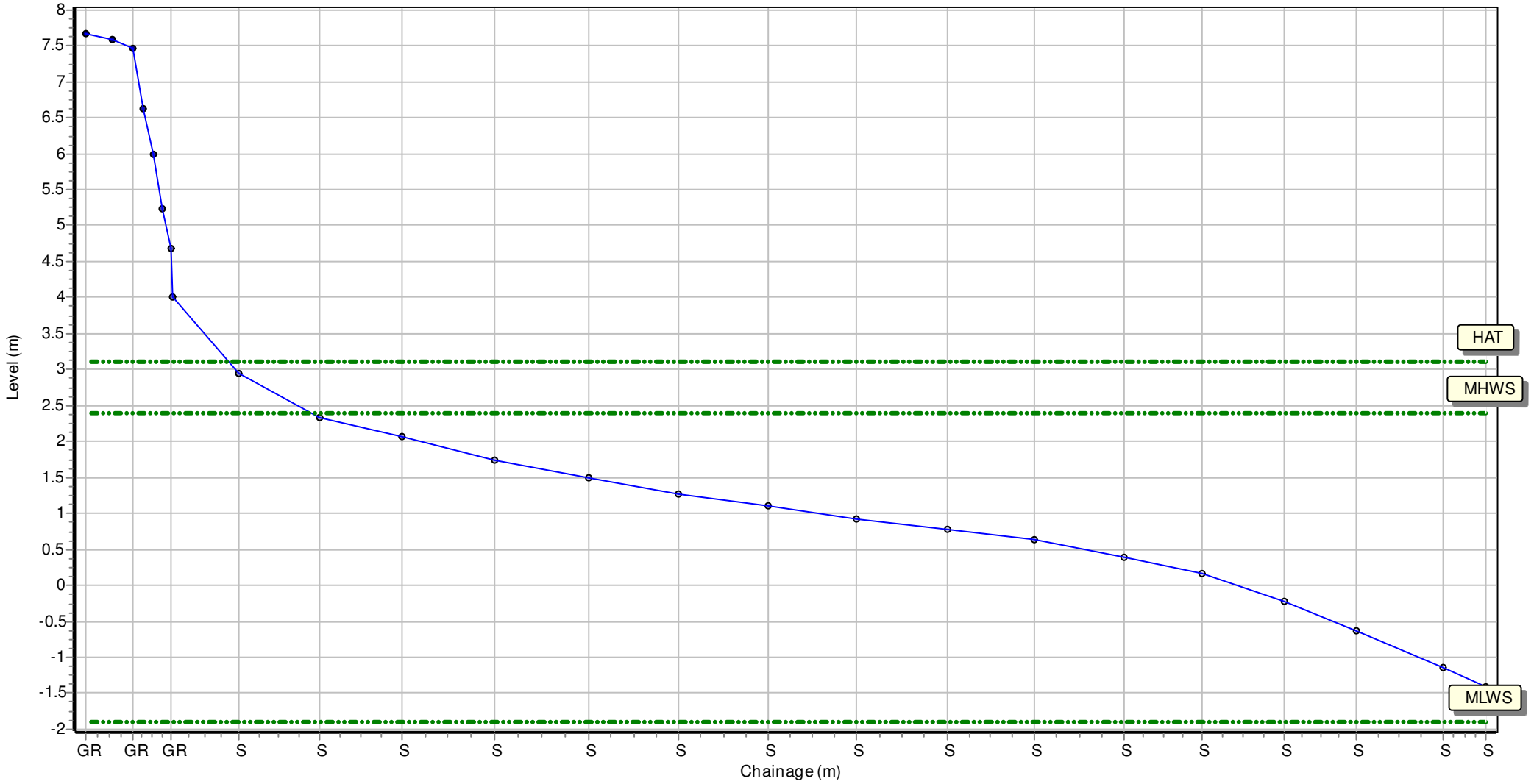
Location: **1aADC15A**

Date: 22/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 428642.365 **Northing:** 603069.145 **Profile Bearing:** 90 ° from North



Beach Profile

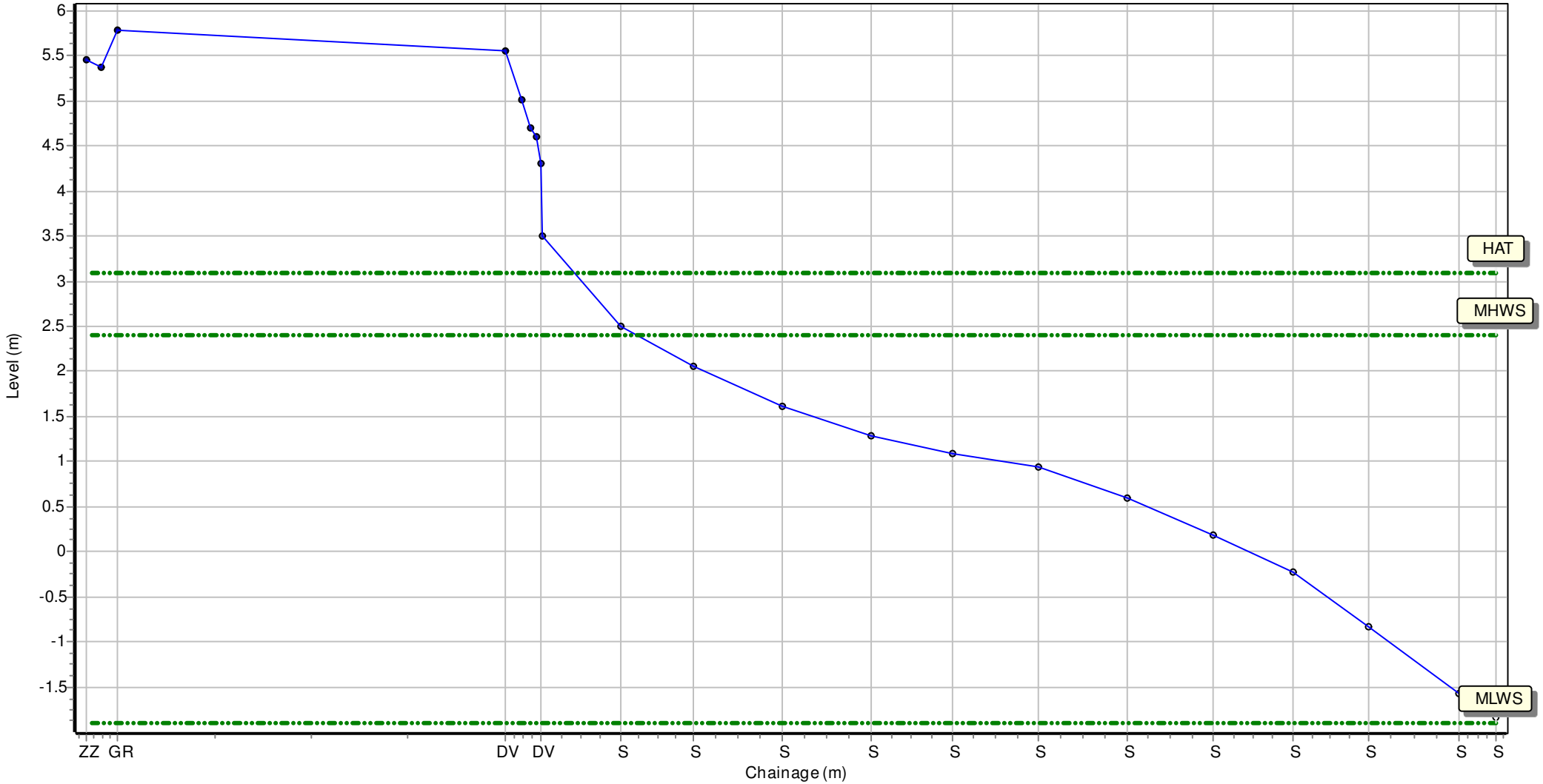
Location: **1aADC16**

Date: 22/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 428575.092 **Northing:** 602921.577 **Profile Bearing:** 93 ° from North



Beach Profile

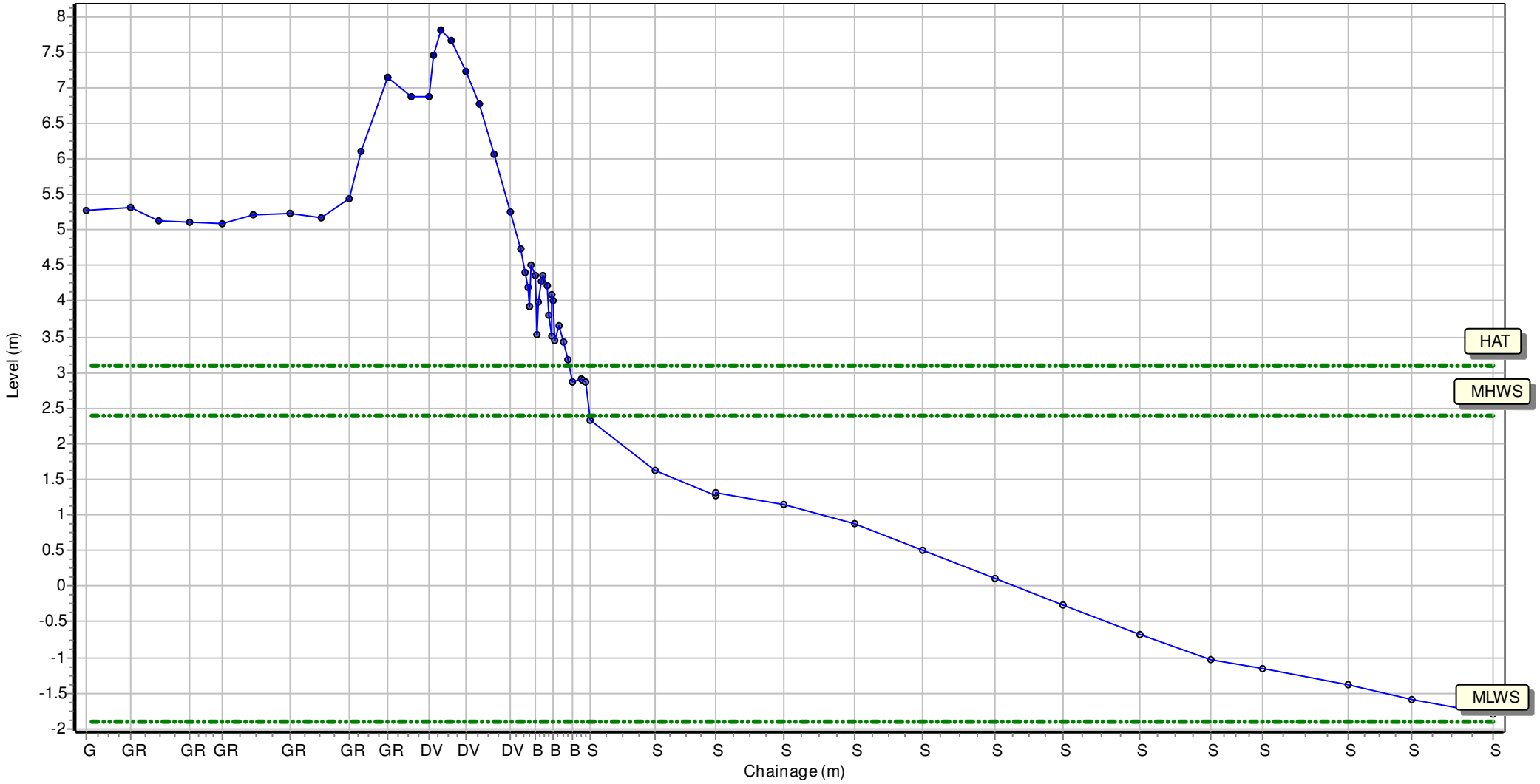
Location: **1aADC16A**

Date: 22/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 428543.525 **Northing:** 602704.175 **Profile Bearing:** 92 ° from North



Beach Profile

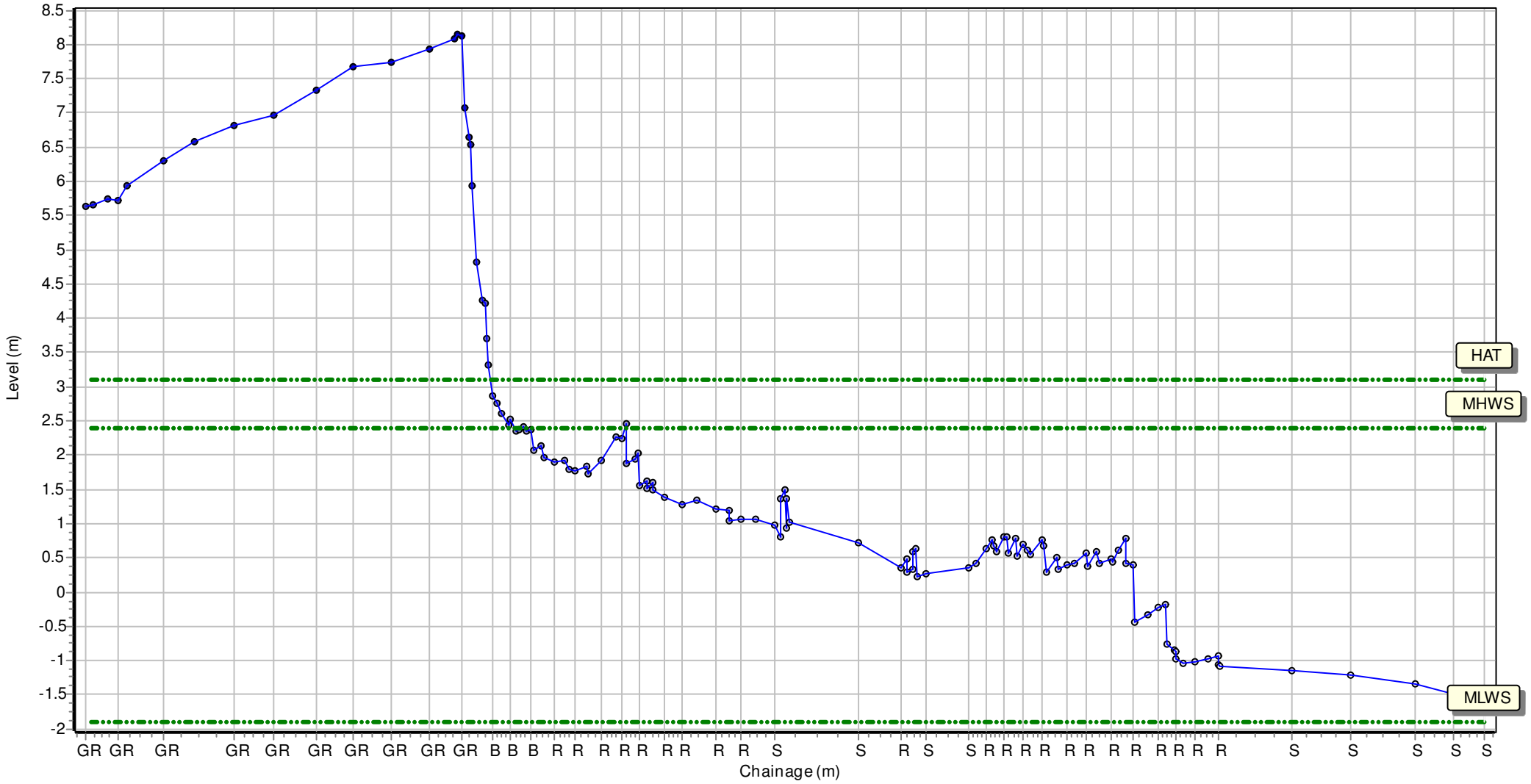
Location: **1aADC16B**

Date: 22/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 428440.457 **Northing:** 601948.341 **Profile Bearing:** 144 ° from North



Beach Profile

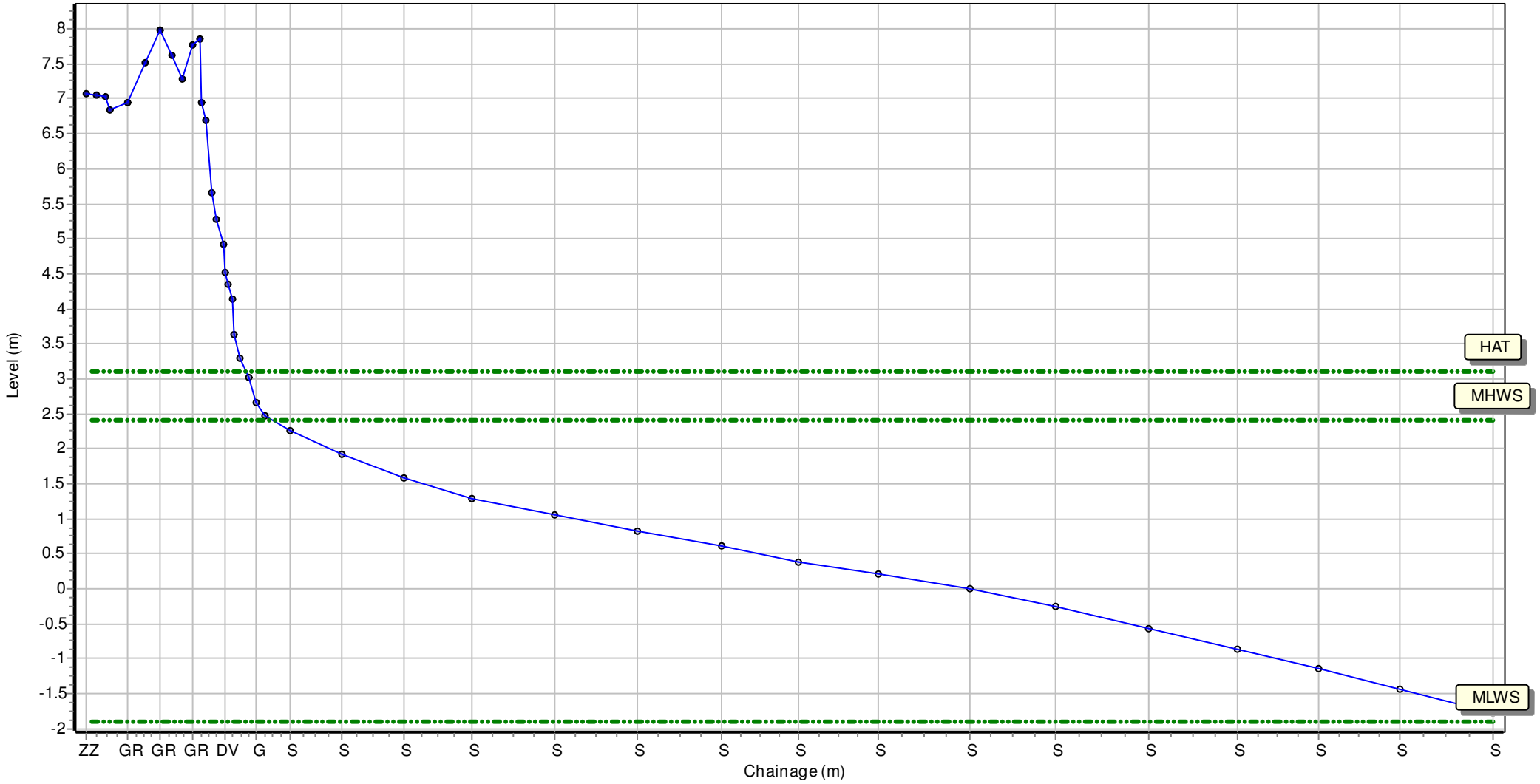
Location: **1aADC17**

Date: 22/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 428116.847 **Northing:** 601565.465 **Profile Bearing:** 114 ° from North



Beach Profile

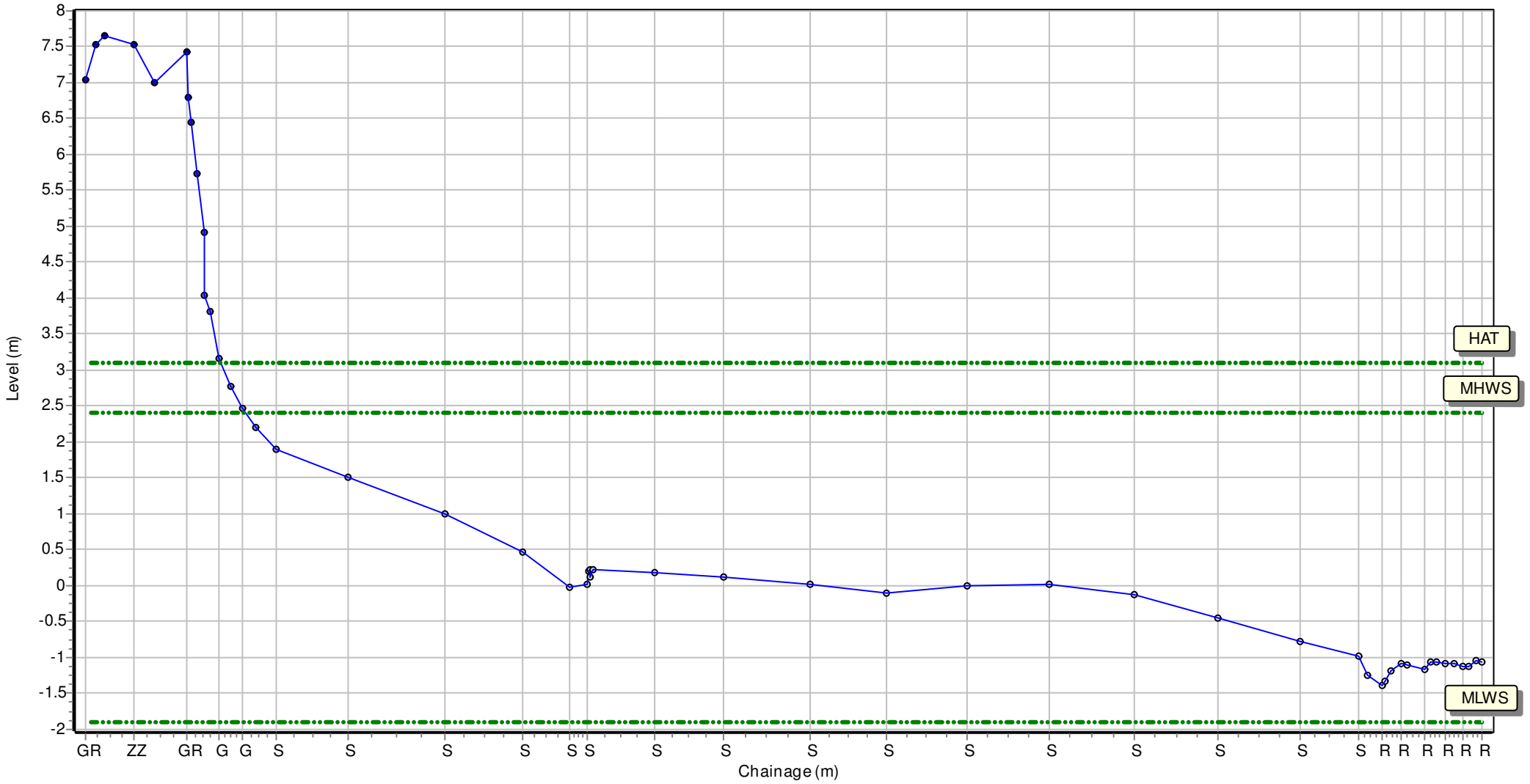
Location: **1aADC17A**

Date: 22/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 427947.662 **Northing:** 601040.259 **Profile Bearing:** 109 ° from North



Beach Profile

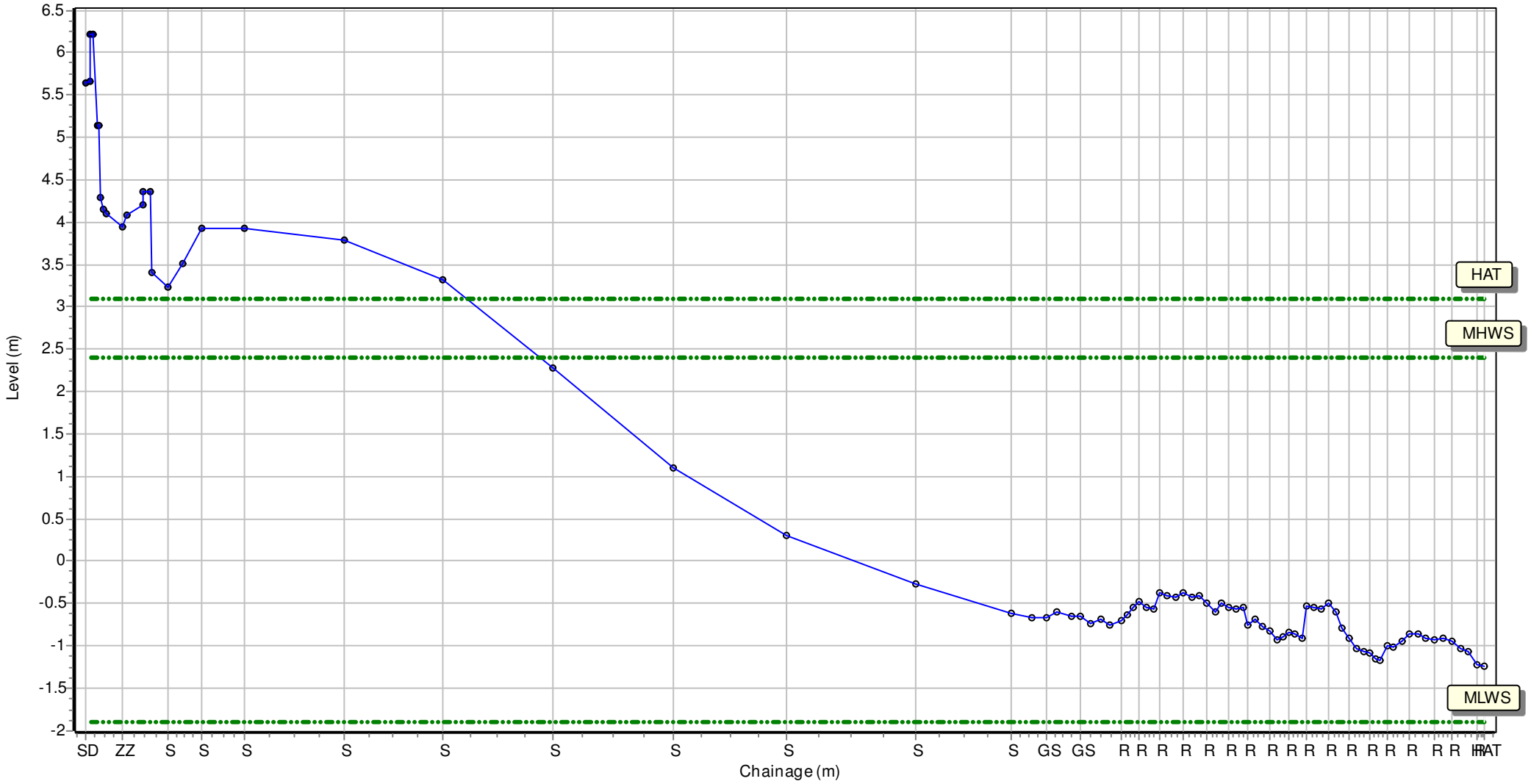
Location: **1aWDC05A**

Date: 14/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431490.829 **Northing:** 588054.668 **Profile Bearing:** 181 ° from North



Beach Profile

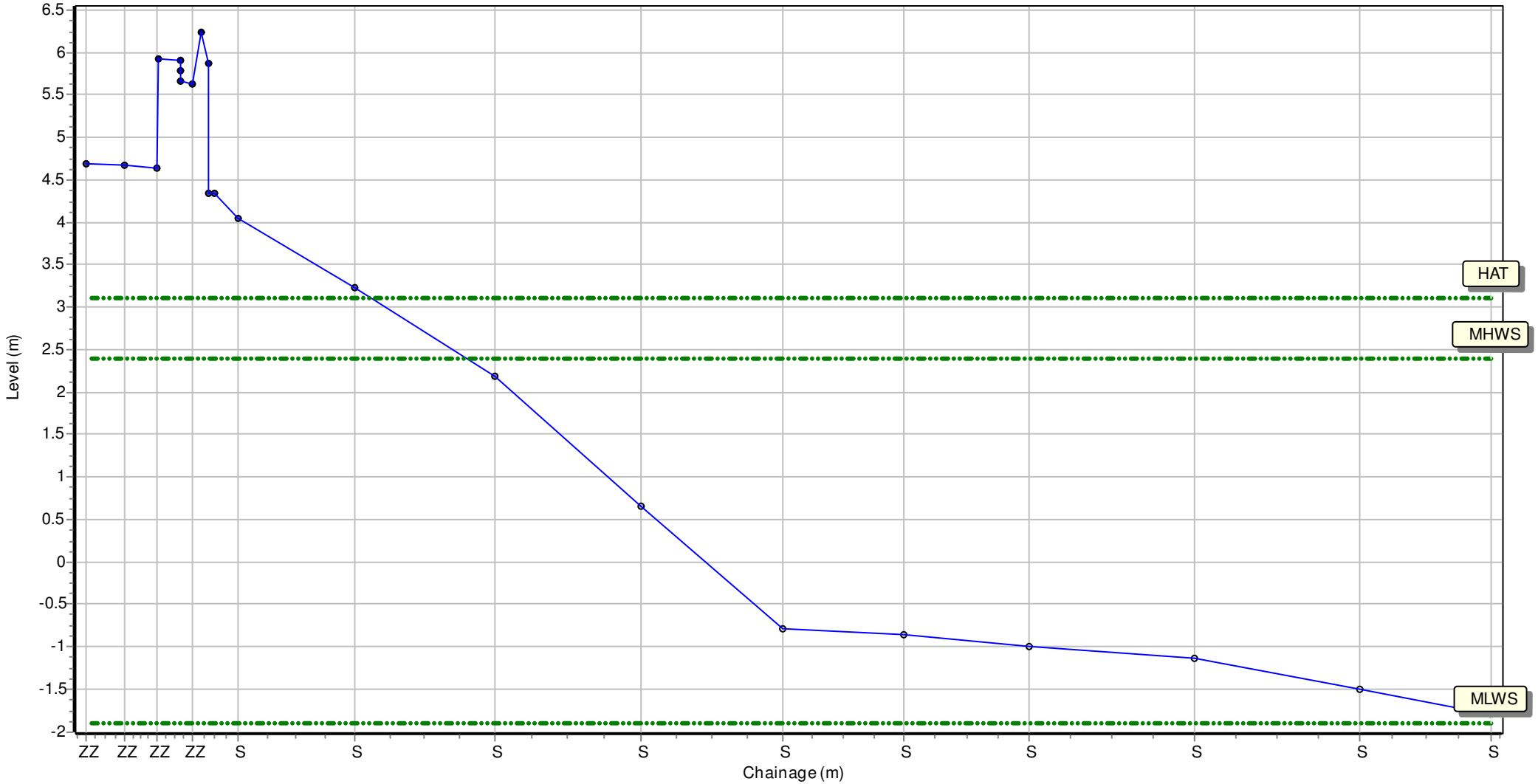
Location: **1aWDC06**

Date: 14/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431176.409 **Northing:** 587860.146 **Profile Bearing:** 125 ° from North



Beach Profile

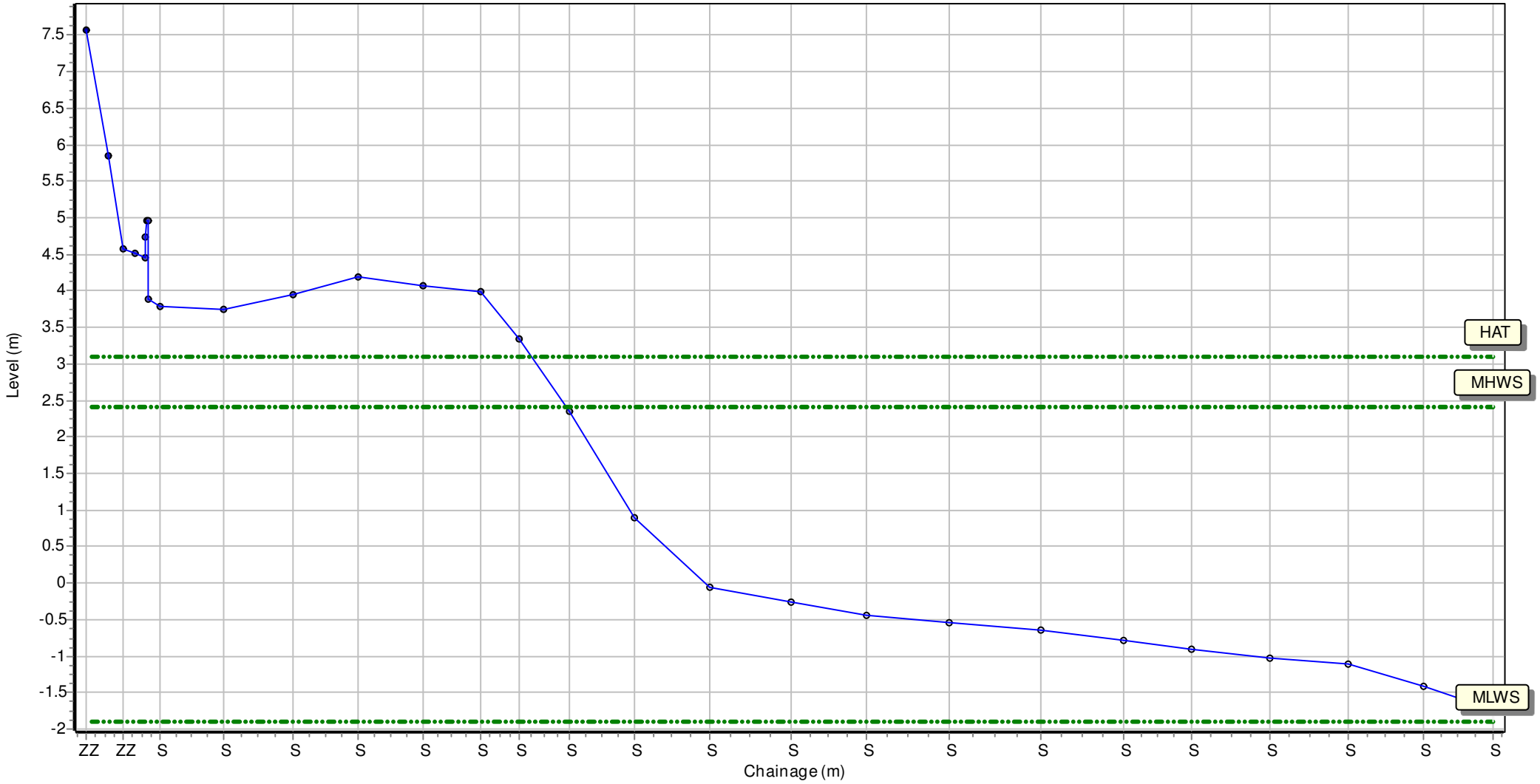
Location: **1aWDC06A**

Date: 14/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431040.809 **Northing:** 587666.014 **Profile Bearing:** 114 ° from North



Beach Profile

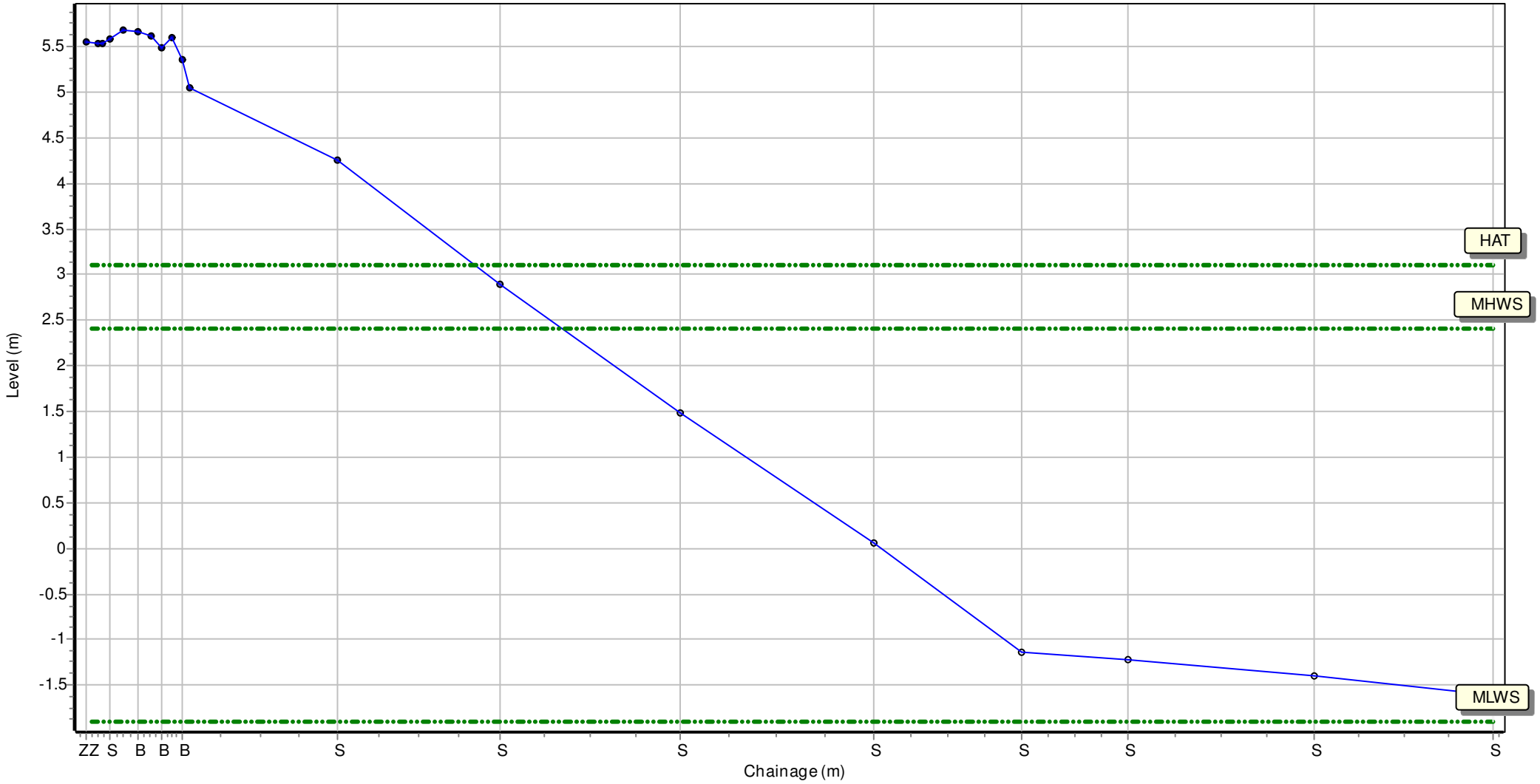
Location: **1aWDC07**

Date: 14/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430972.923 **Northing:** 587417.667 **Profile Bearing:** 103 ° from North



Beach Profile

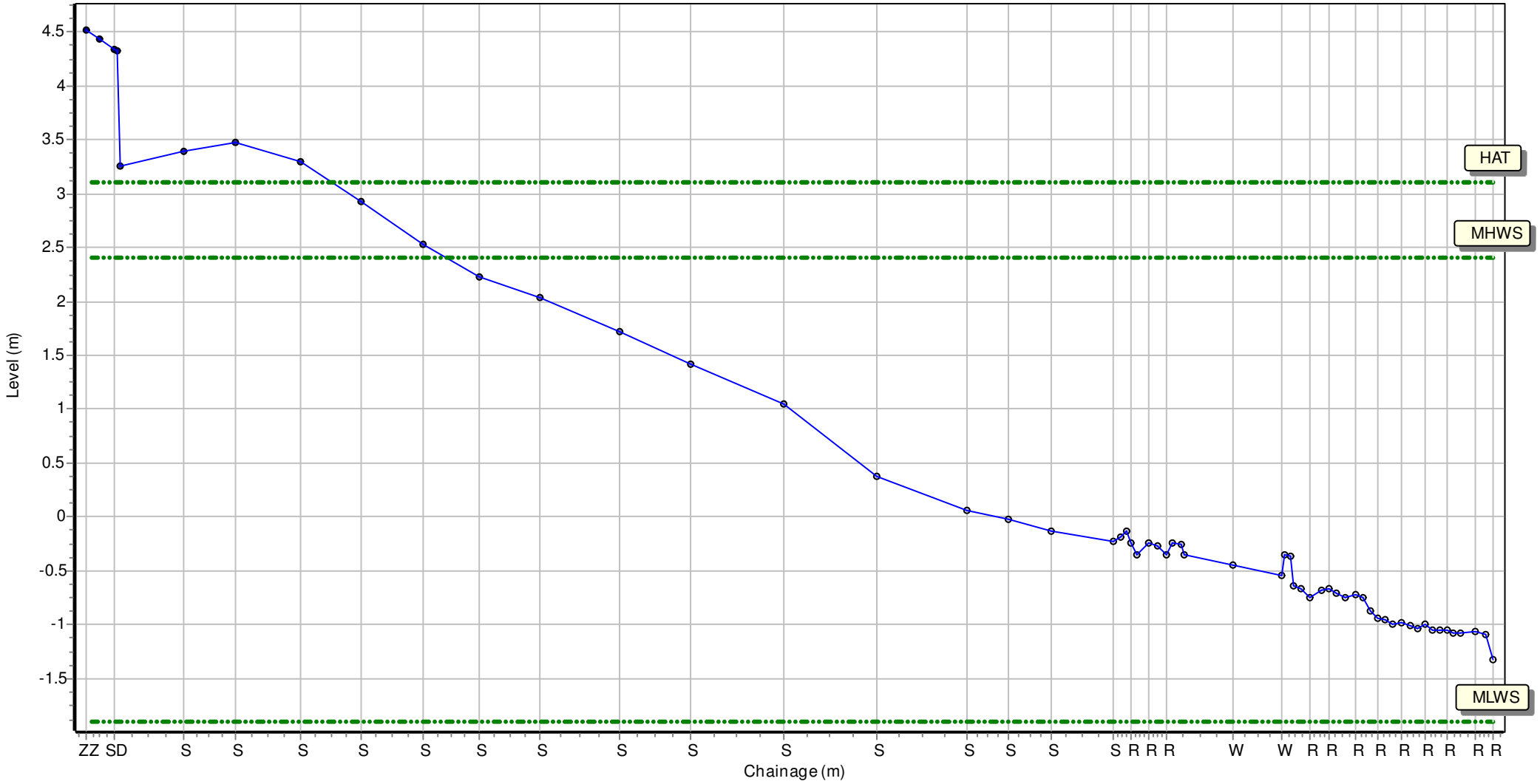
Location: **1aNWB1**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431665.429 **Northing:** 588007.636 **Profile Bearing:** 212 ° from North



Beach Profile

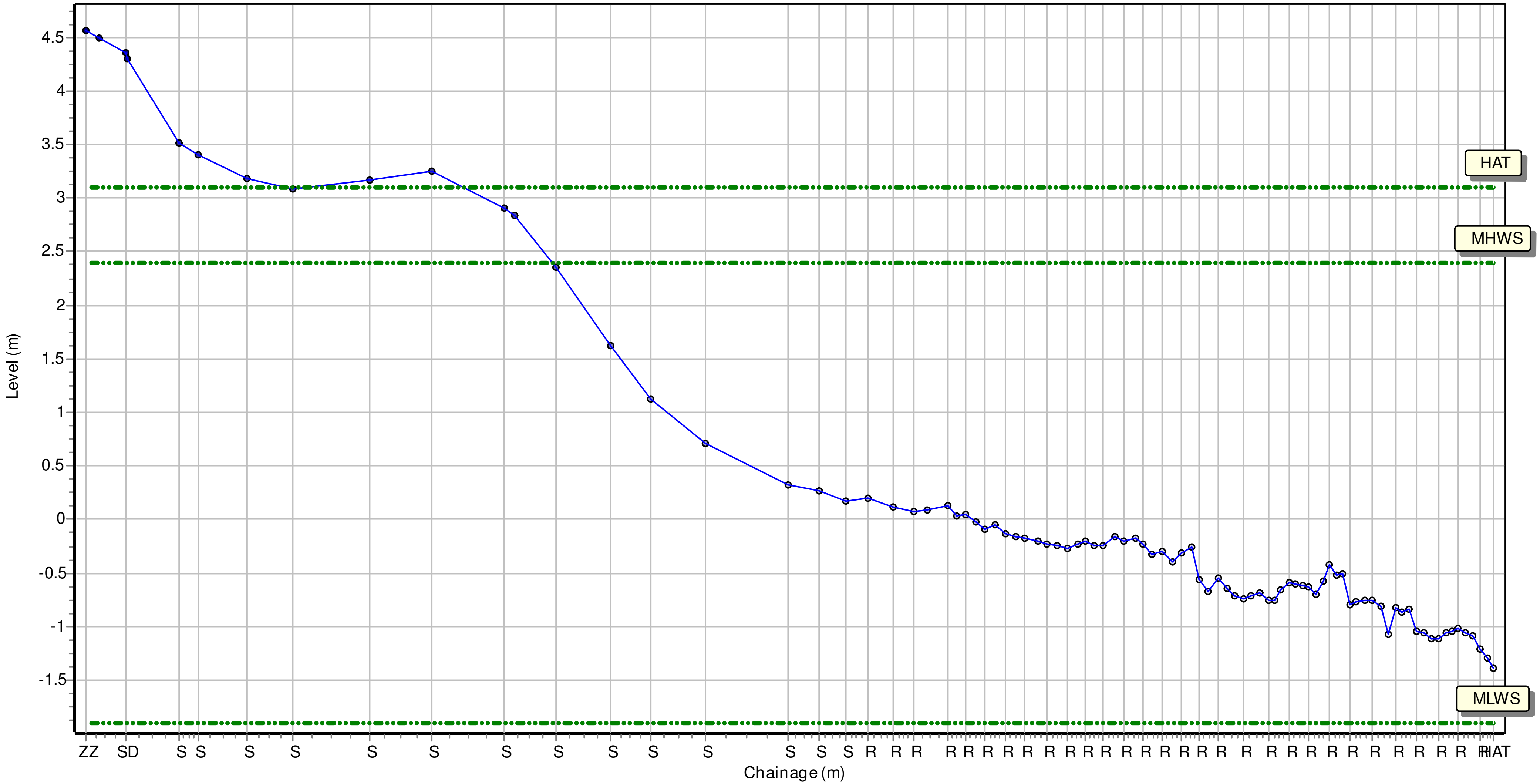
Location: **1aNWB2**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431618.236 **Northing:** 588035.356 **Profile Bearing:** 202 ° from North



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Beach Profile

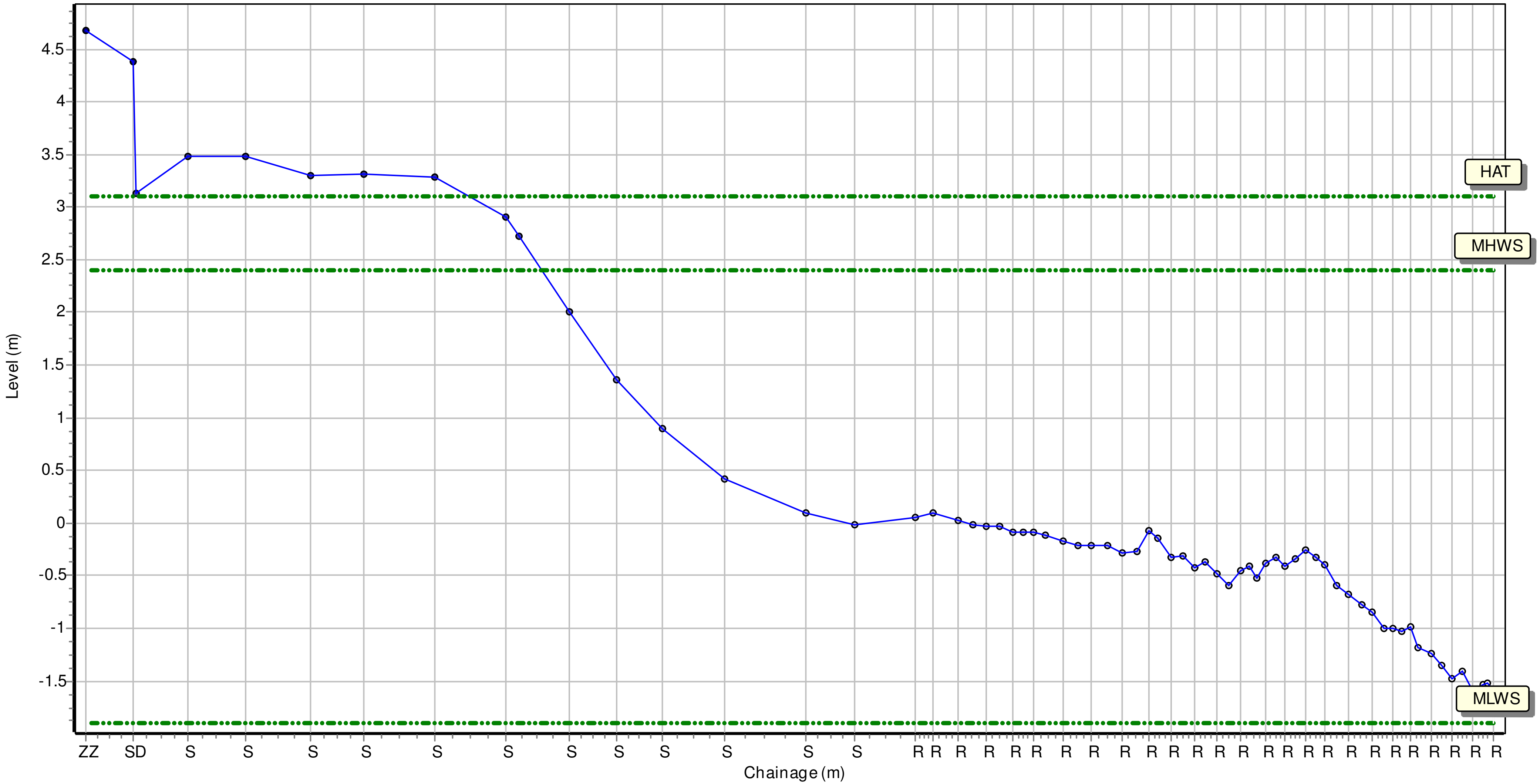
Location: **1aNWB3**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431573.455 **Northing:** 588049.149 **Profile Bearing:** 193 ° from North



Beach Profile

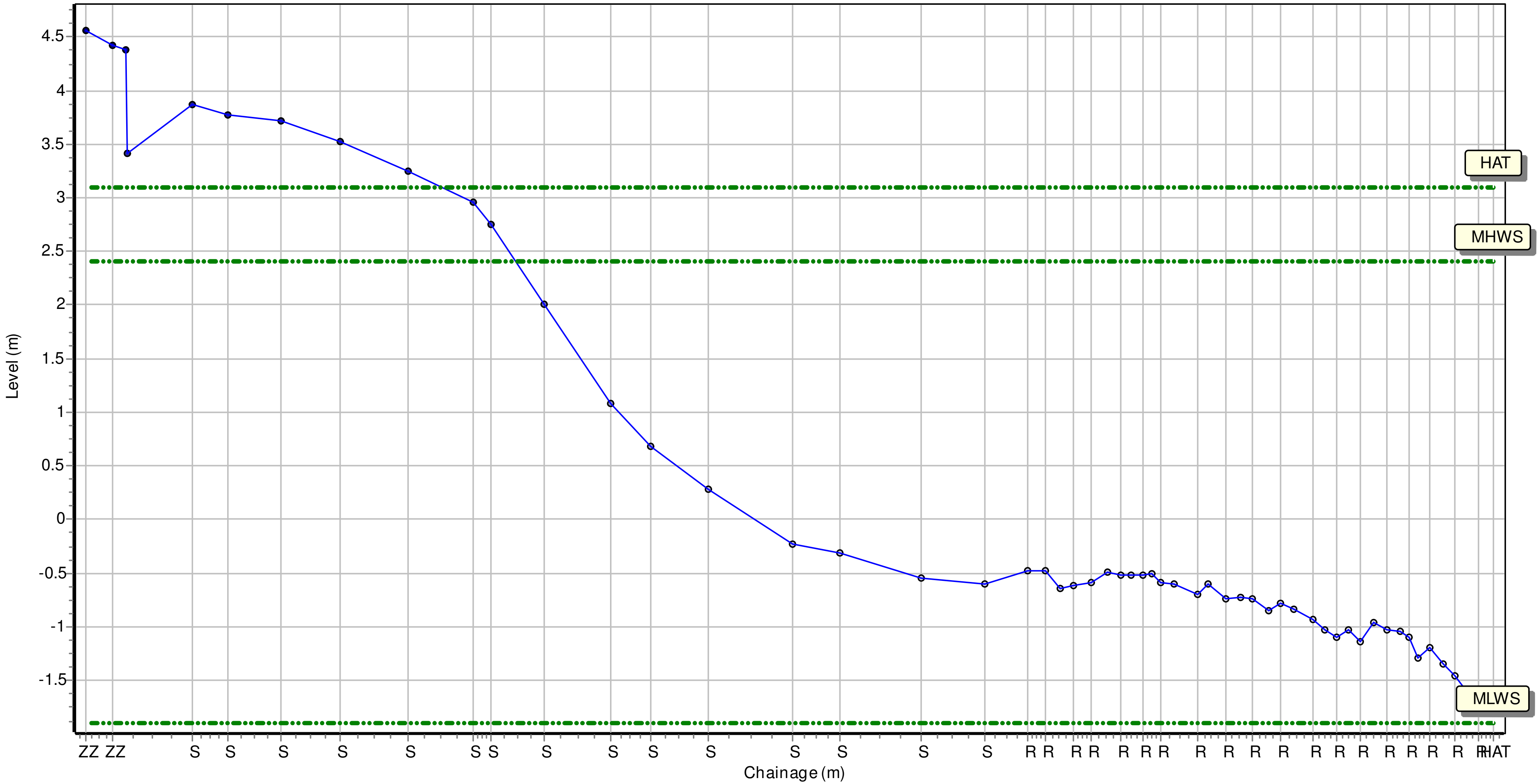
Location: **1aNWB4**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431523.116 **Northing:** 588054.727 **Profile Bearing:** 184 ° from North



Beach Profile

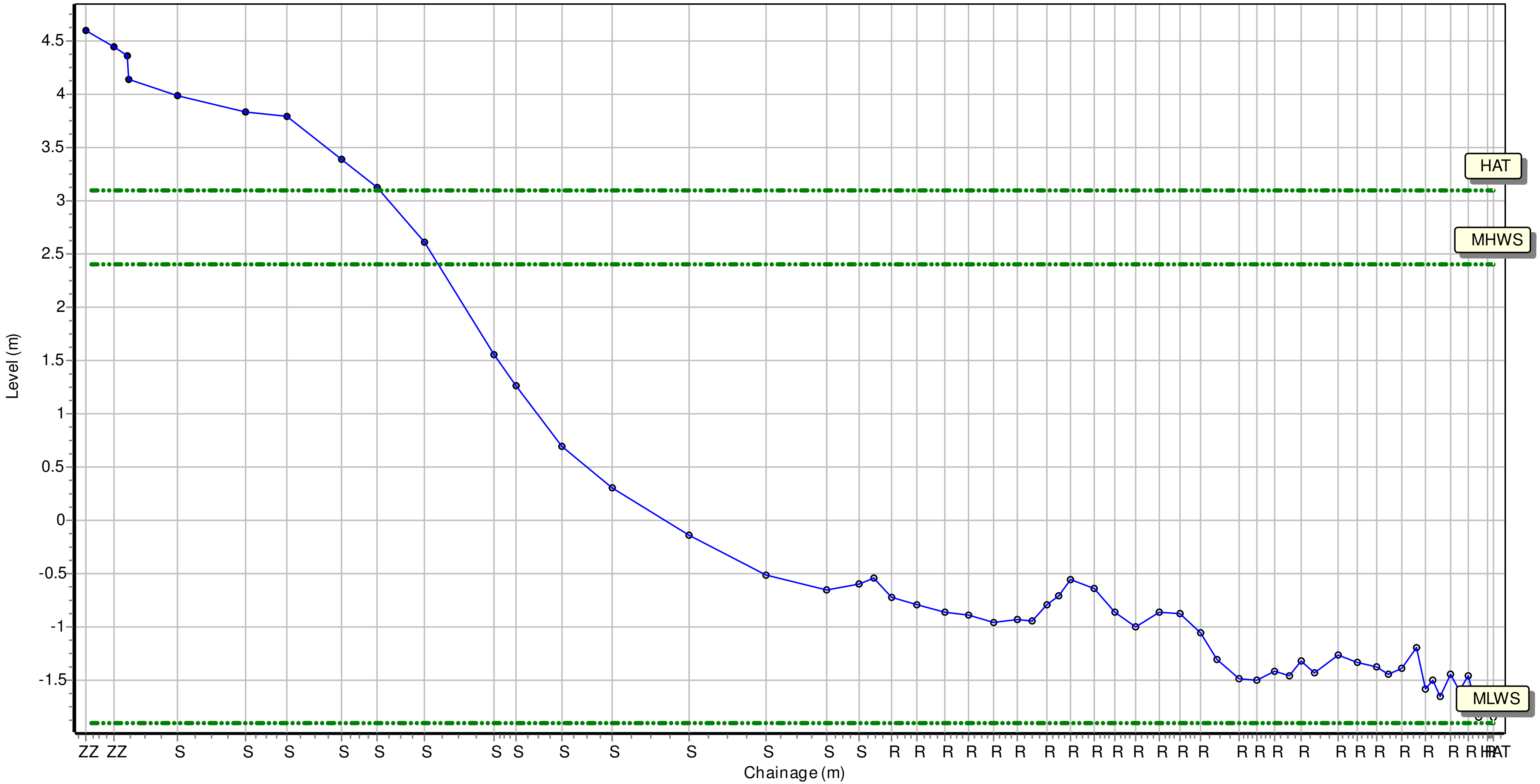
Location: **1aNWB5**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431473.586 **Northing:** 588048.504 **Profile Bearing:** 174 ° from North



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Beach Profile

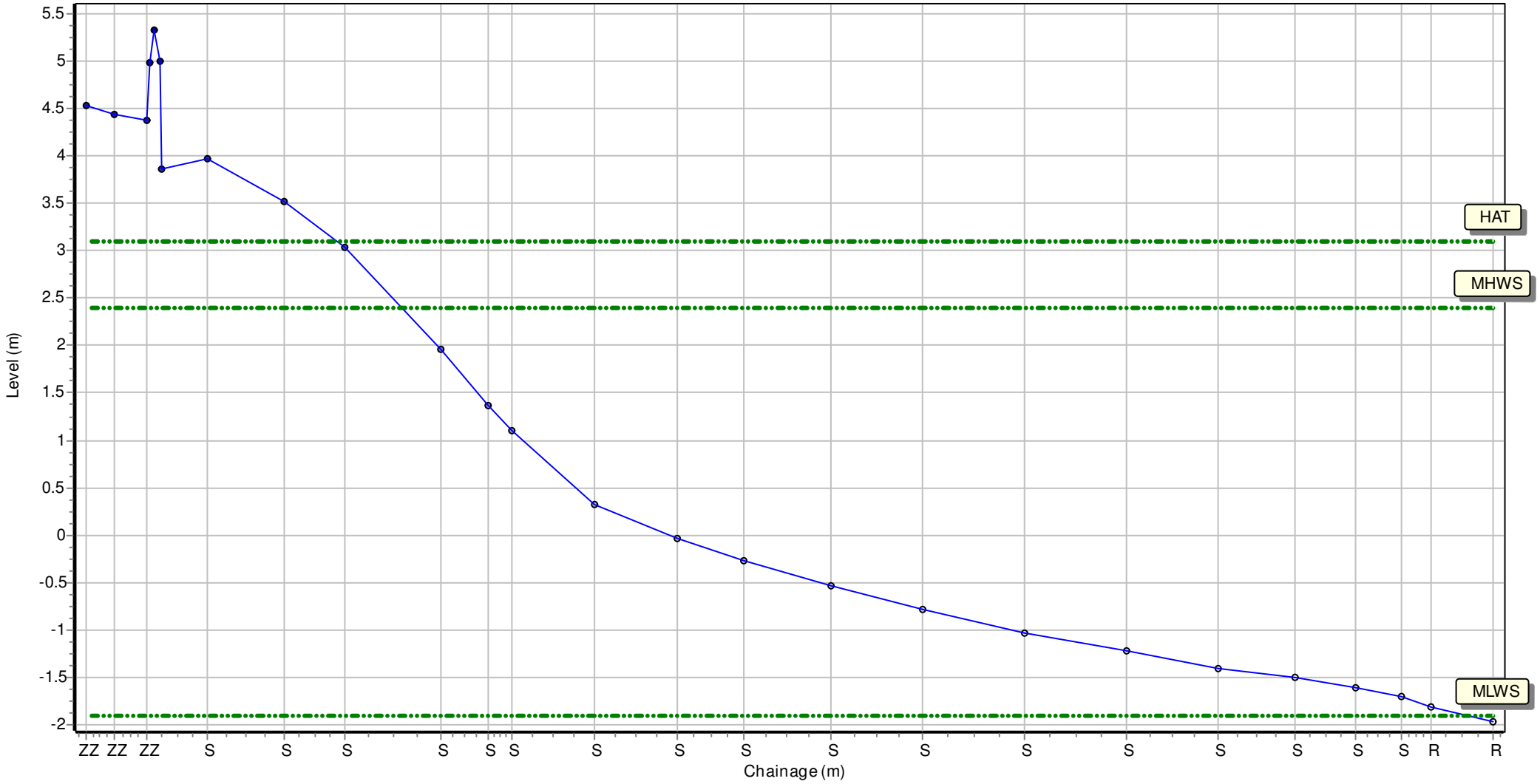
Location: **1aNWB6**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431424.56 **Northing:** 588032.268 **Profile Bearing:** 164 ° from North



Beach Profile

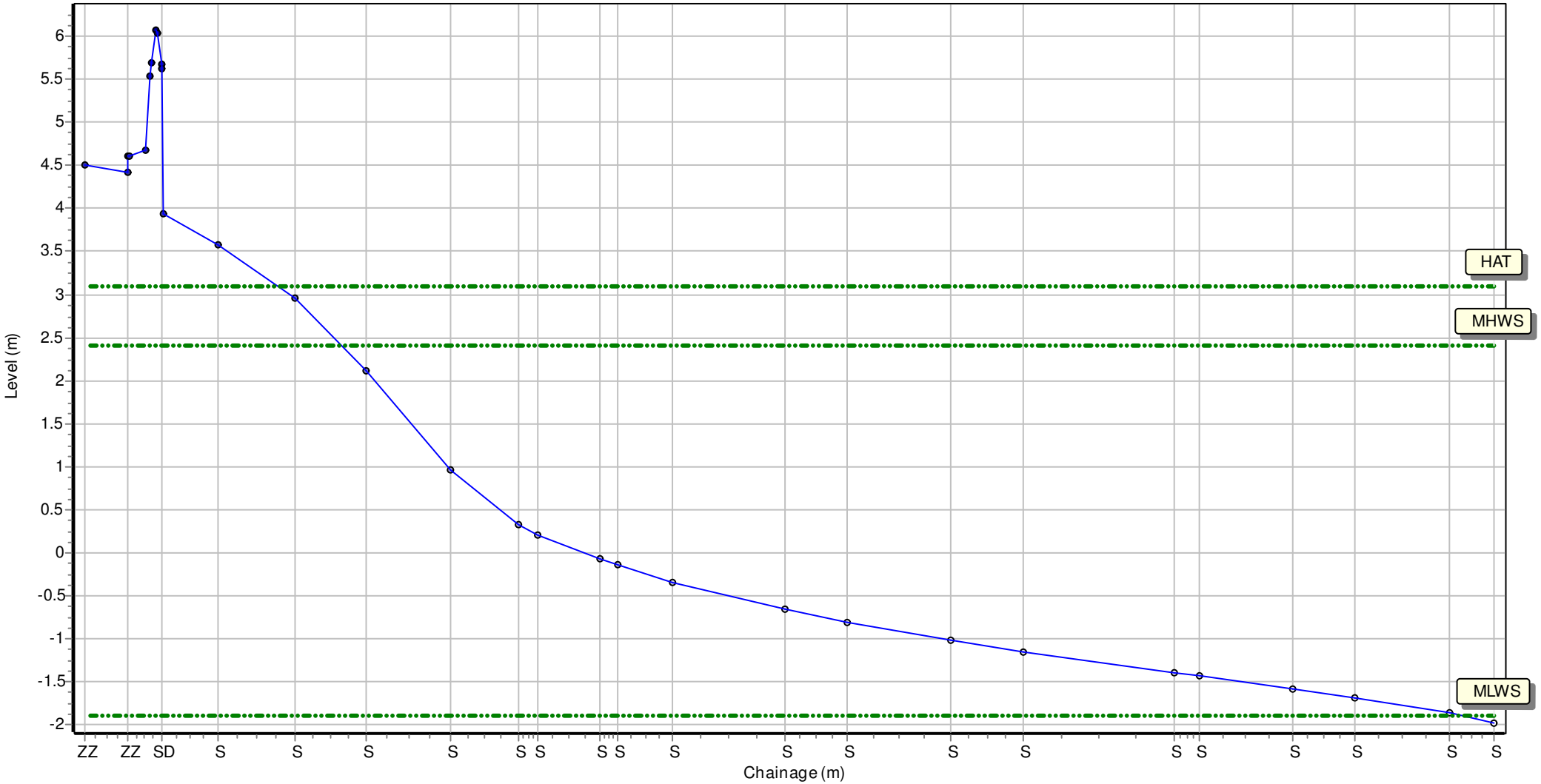
Location: **1aNWB7**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431379.622 **Northing:** 588011.712 **Profile Bearing:** 165 ° from North



Beach Profile

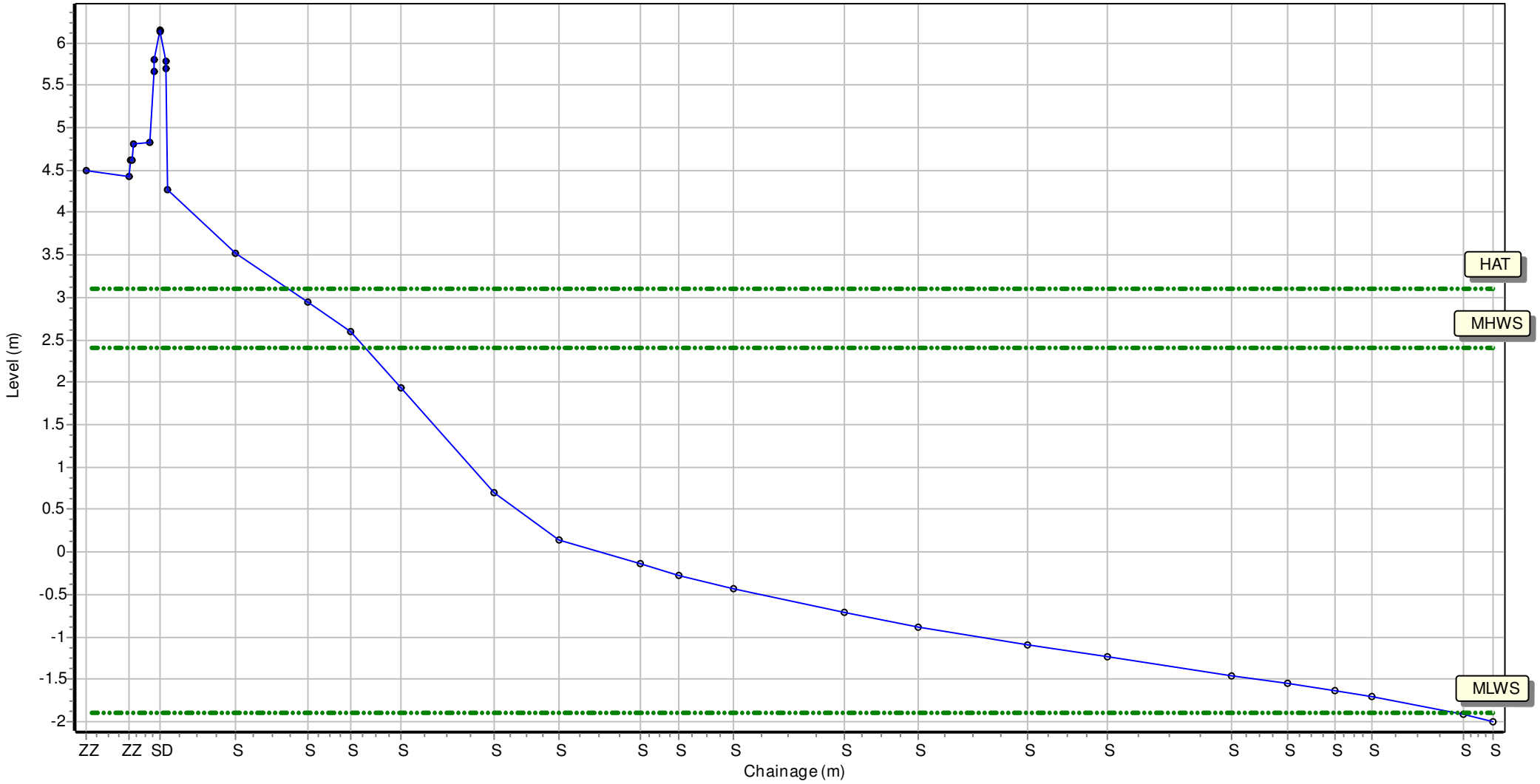
Location: **1aNWB8**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431332.62 **Northing:** 587988.039 **Profile Bearing:** 144 ° from North



Beach Profile

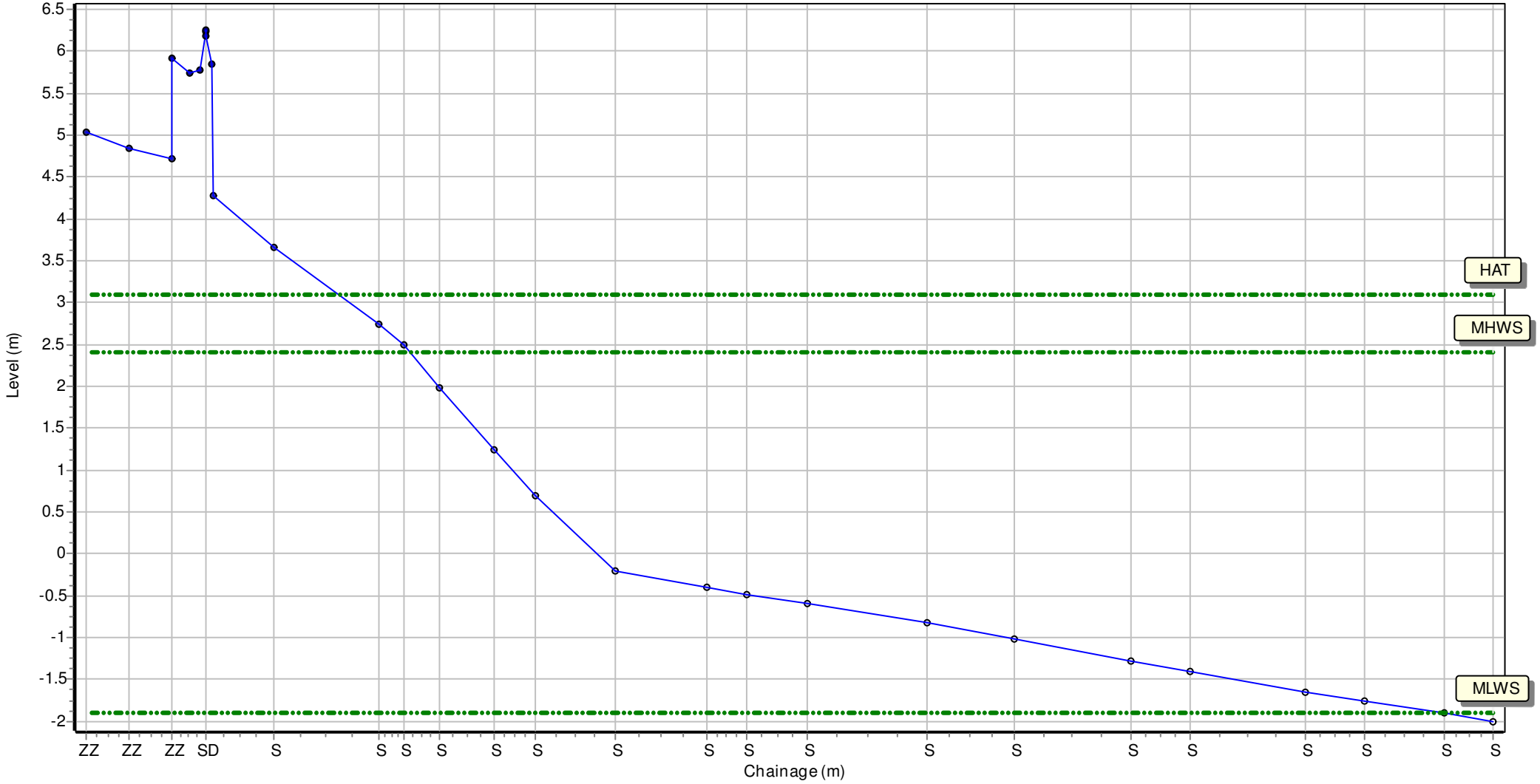
Location: **1aNWB9**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431288.421 **Northing:** 587963.979 **Profile Bearing:** 142 ° from North



Beach Profile

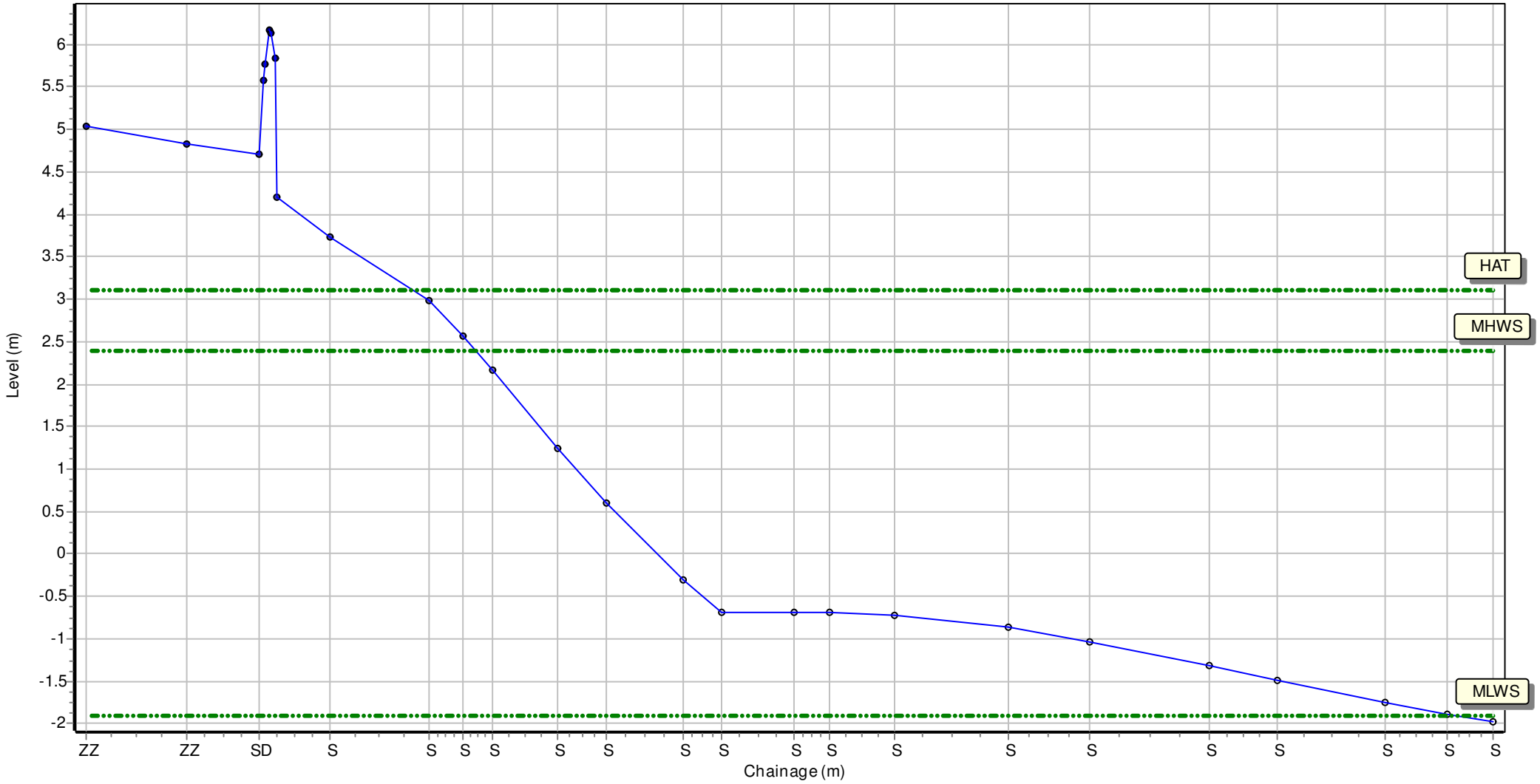
Location: **1aNWB10**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431244.074 **Northing:** 587936.575 **Profile Bearing:** 139 ° from North



Beach Profile

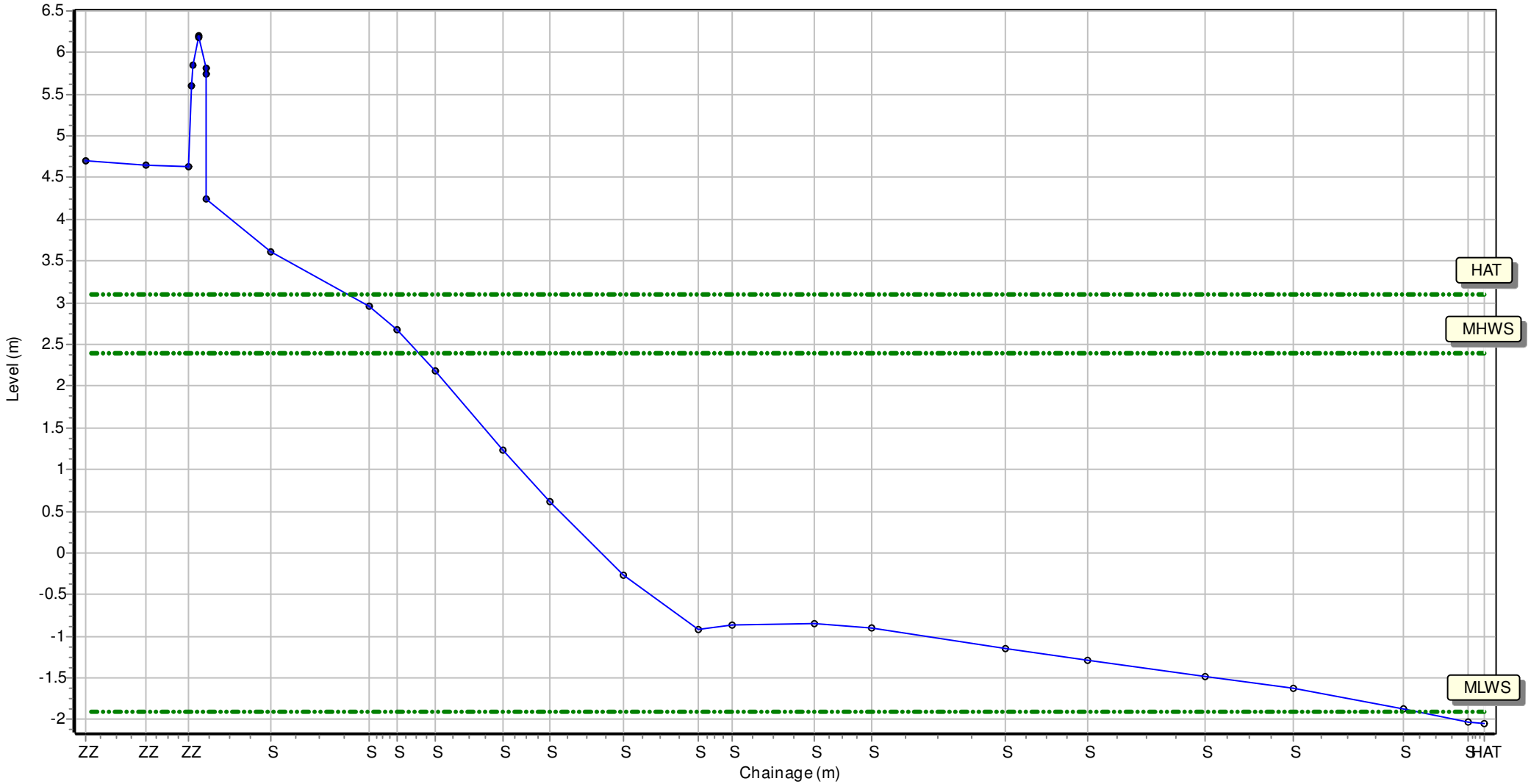
Location: **1aNWB11**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431211.343 **Northing:** 587896.891 **Profile Bearing:** 135 ° from North



Beach Profile

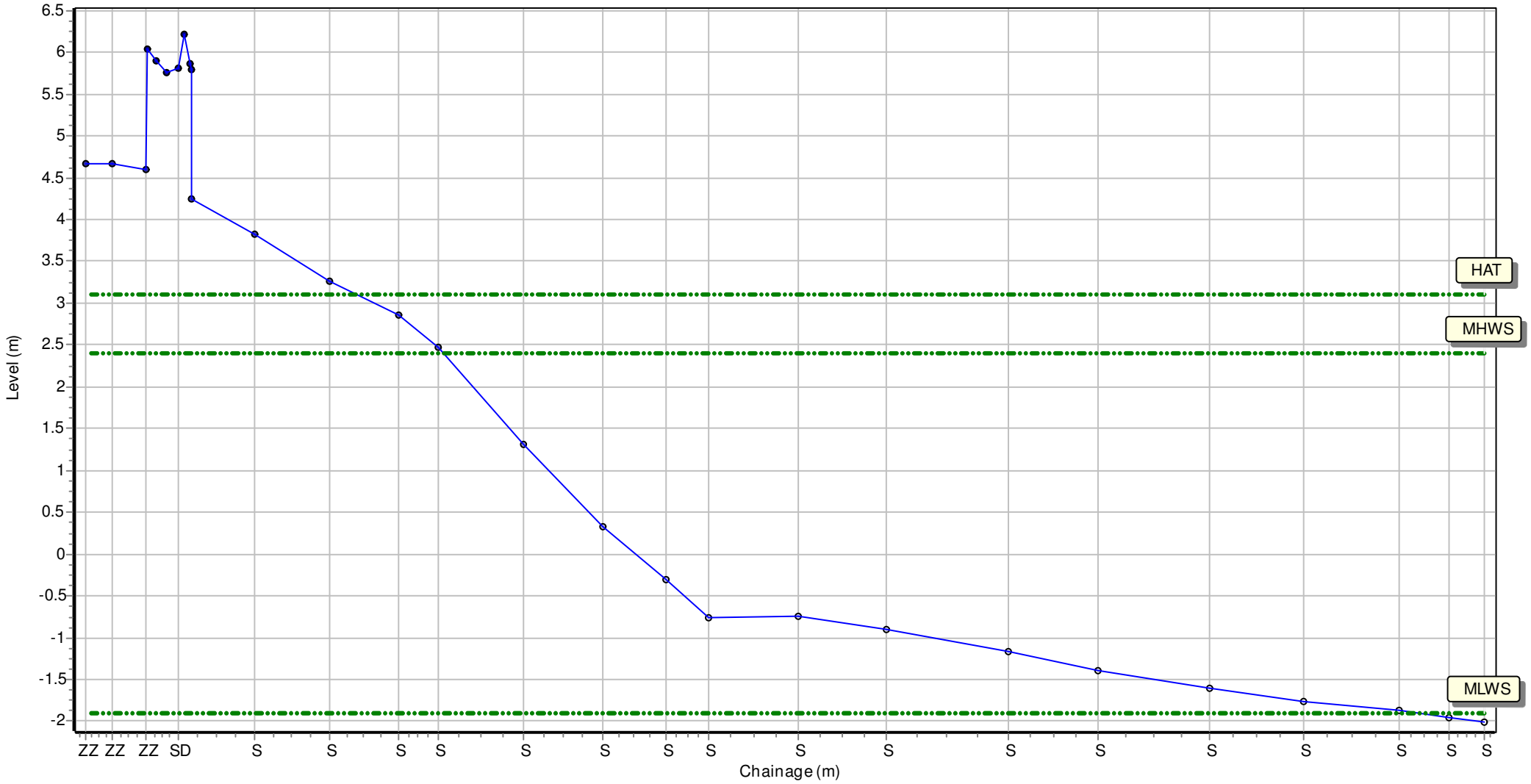
Location: **1aNWB12**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431176.844 **Northing:** 587860.651 **Profile Bearing:** 132 ° from North



Beach Profile

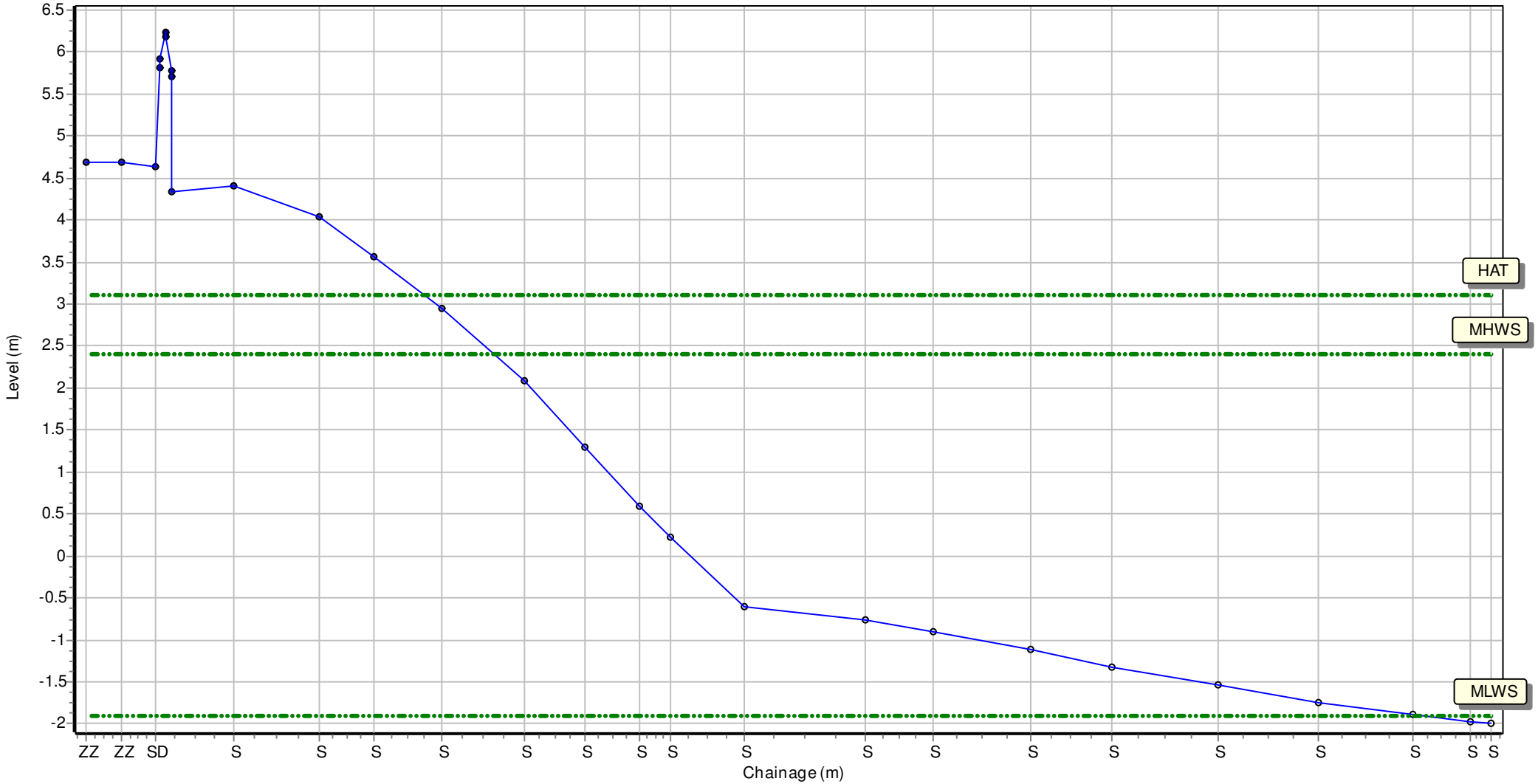
Location: **1aNWB13**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431143.784 **Northing:** 587821.594 **Profile Bearing:** 129 ° from North



Beach Profile

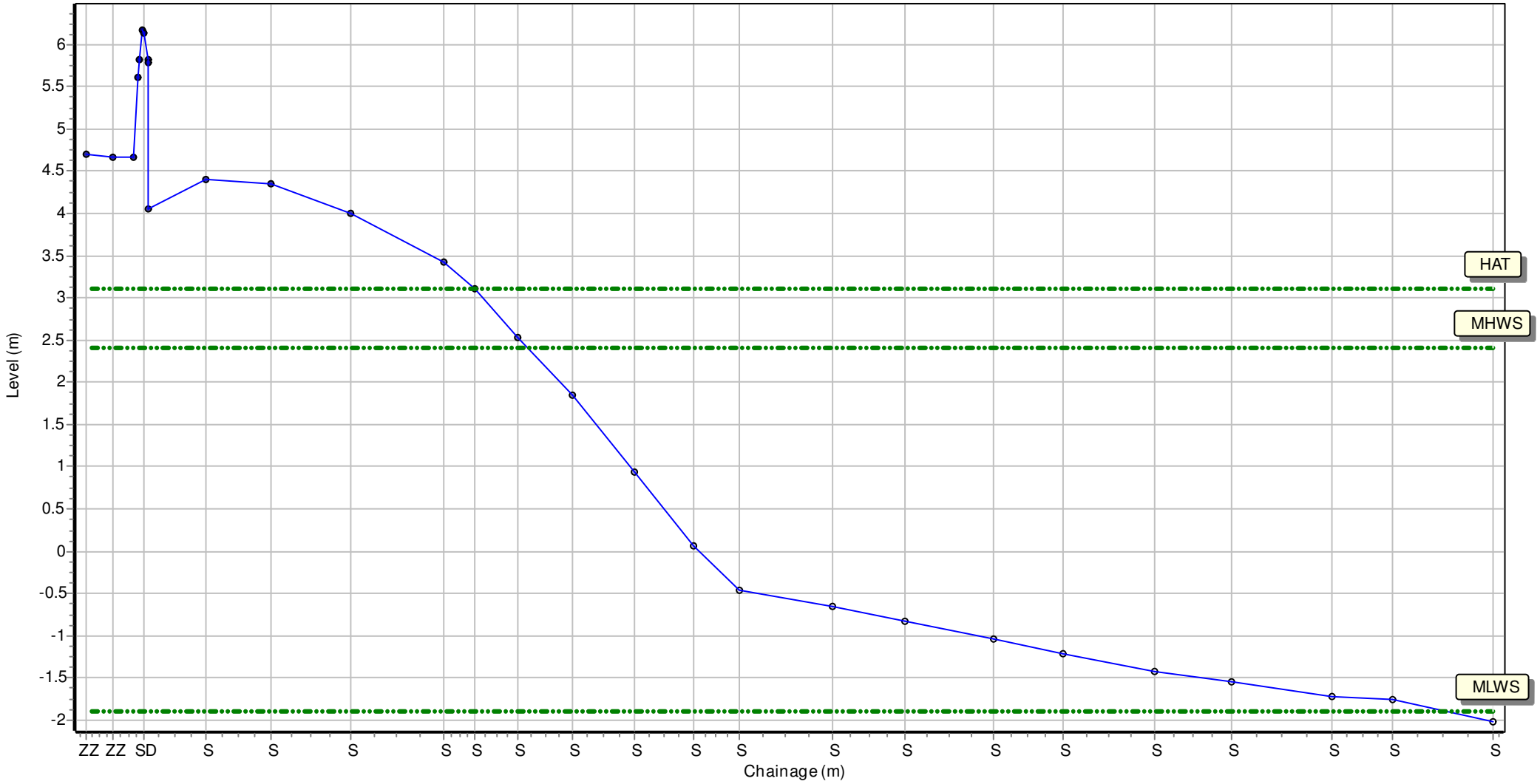
Location: **1aNWB14**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431113.86 **Northing:** 587780.727 **Profile Bearing:** 115 ° from North



Beach Profile

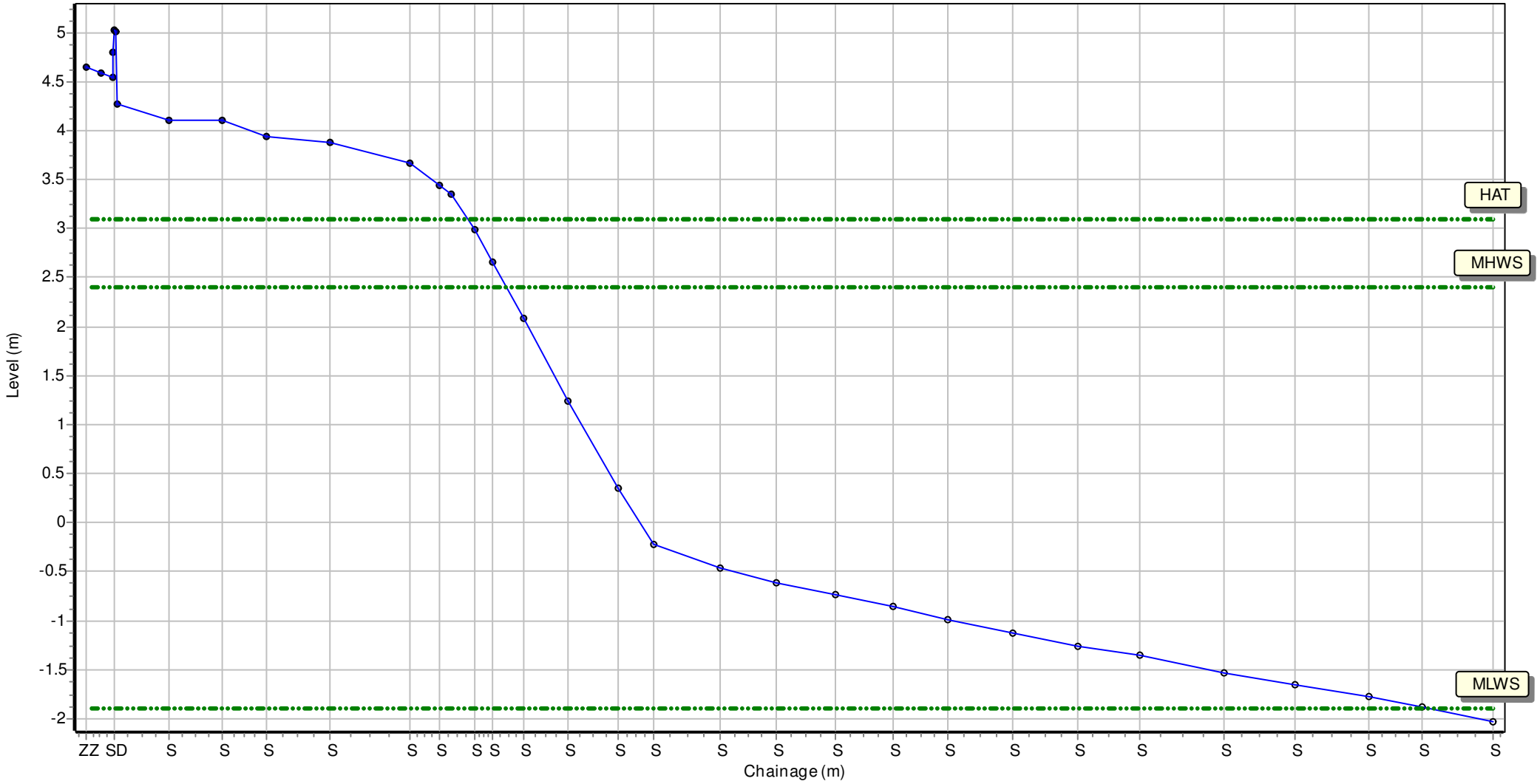
Location: **1aNWB15**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431088.458 **Northing:** 587739.577 **Profile Bearing:** 125 ° from North



Beach Profile

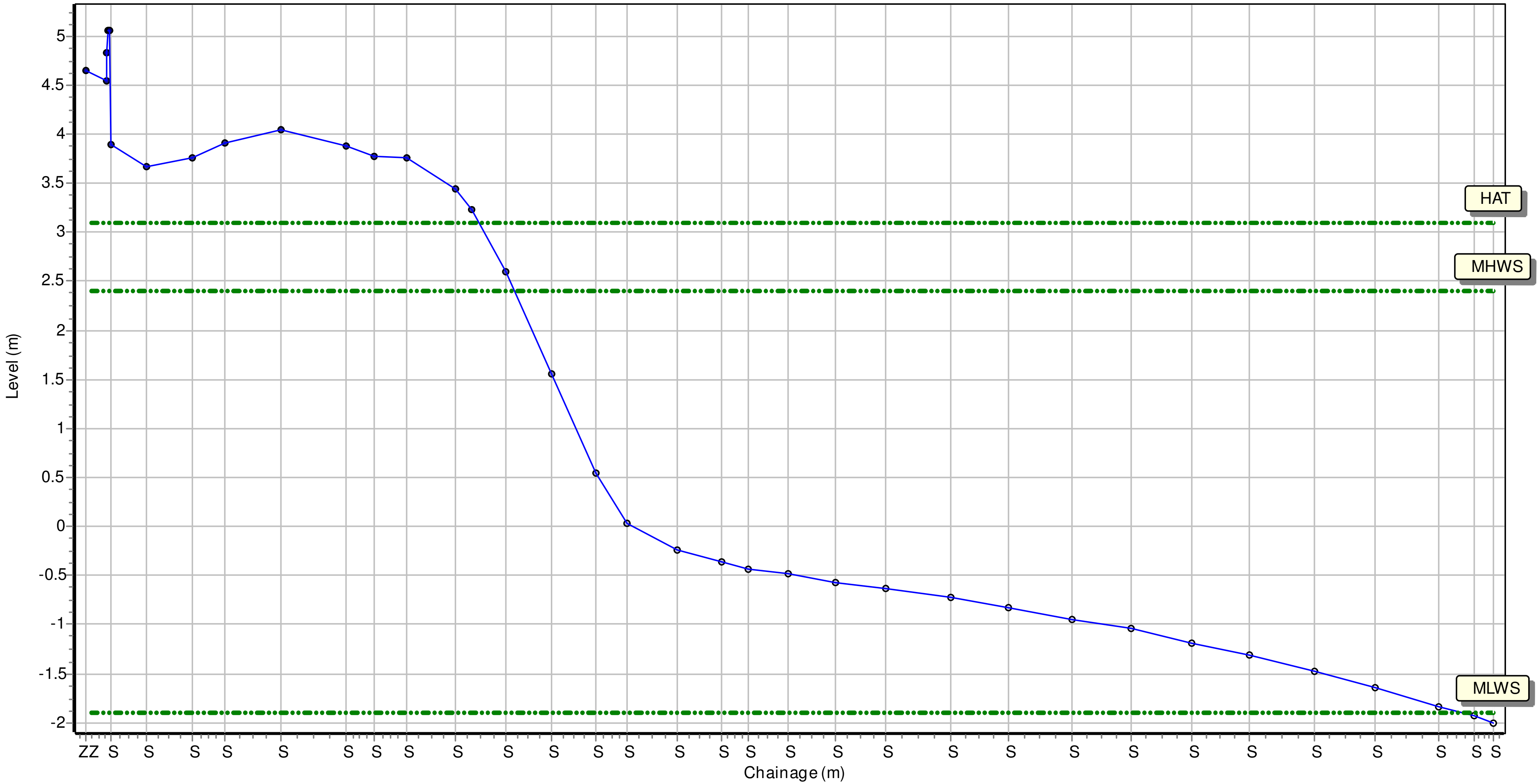
Location: 1aNWB16

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431063.789 **Northing:** 587695.893 **Profile Bearing:** 119 ° from North



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Beach Profile

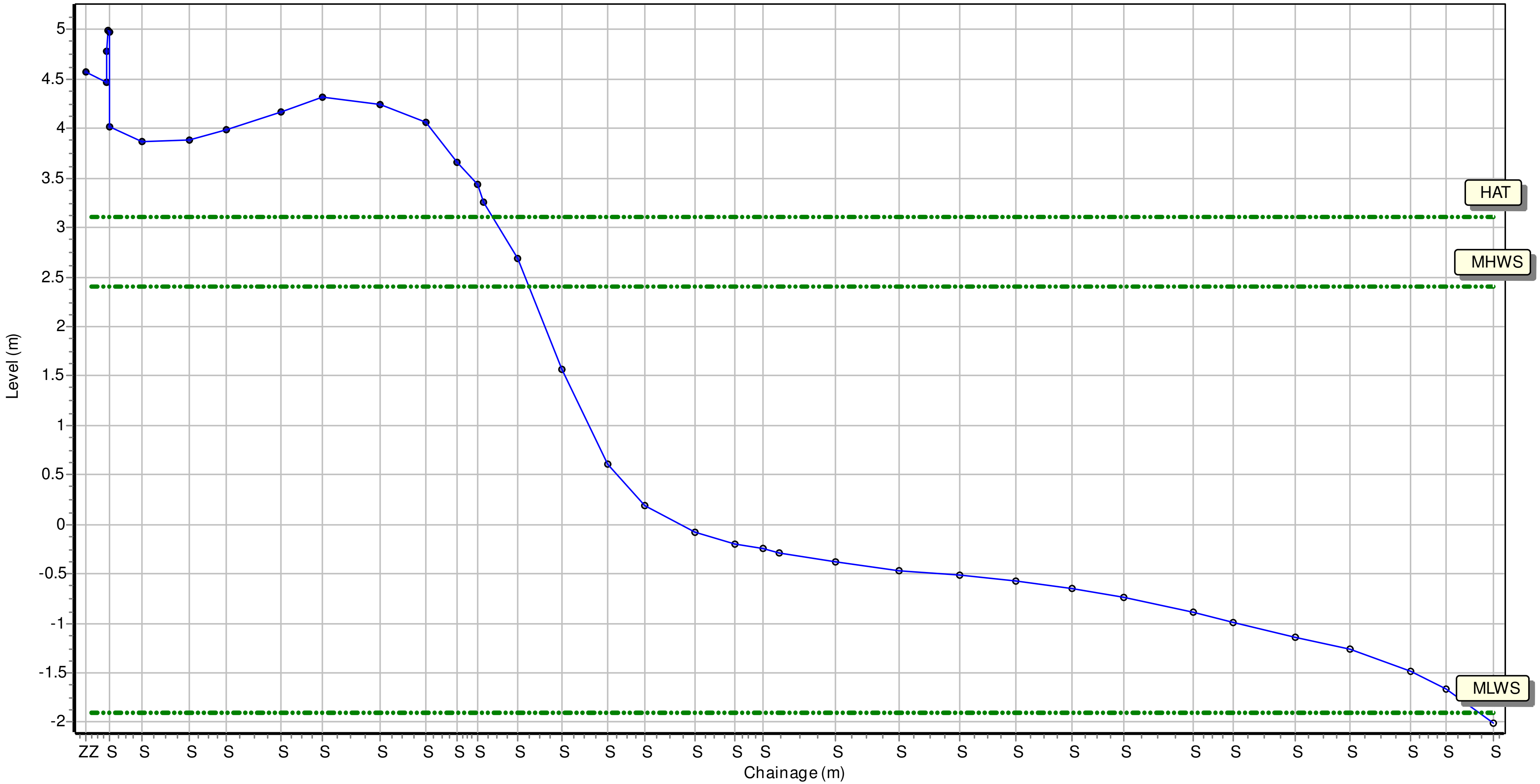
Location: 1aNWB17

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431042.191 **Northing:** 587650.627 **Profile Bearing:** 116 ° from North



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Beach Profile

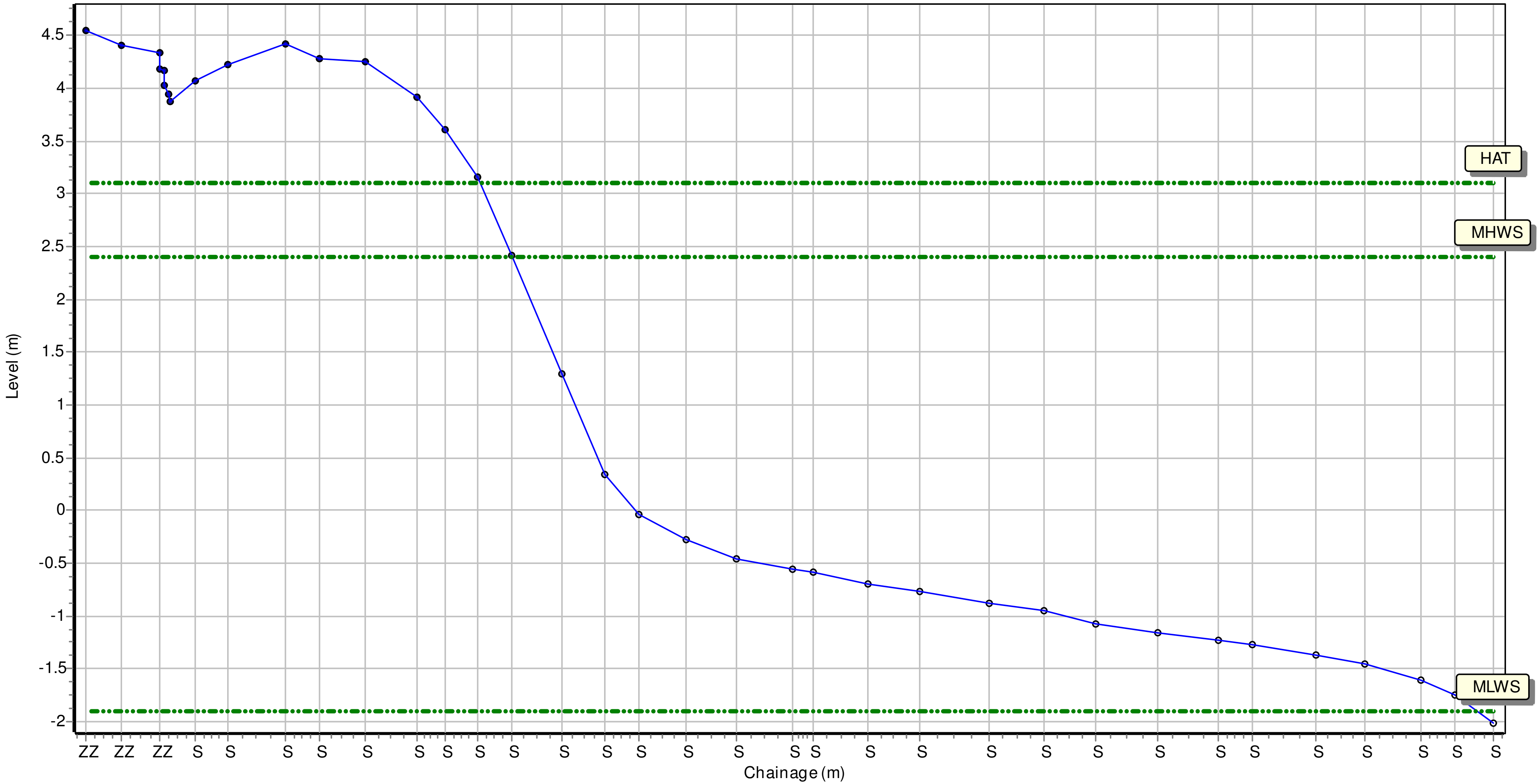
Location: 1aNWB18

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431024.999 **Northing:** 587608.929 **Profile Bearing:** 113 ° from North



Beach Profile

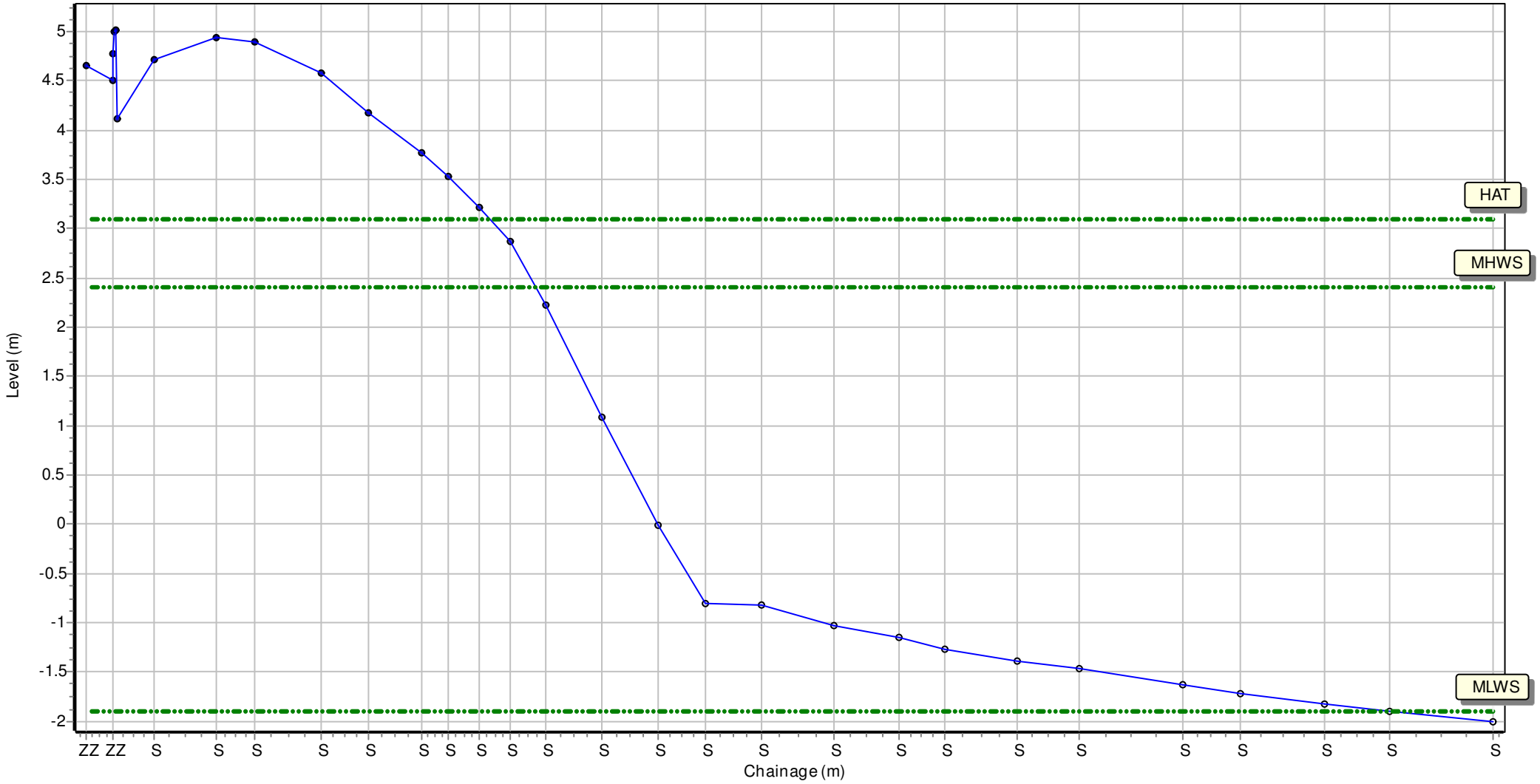
Location: **1aNWB19**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 431007.485 **Northing:** 587556.656 **Profile Bearing:** 109 ° from North



Beach Profile

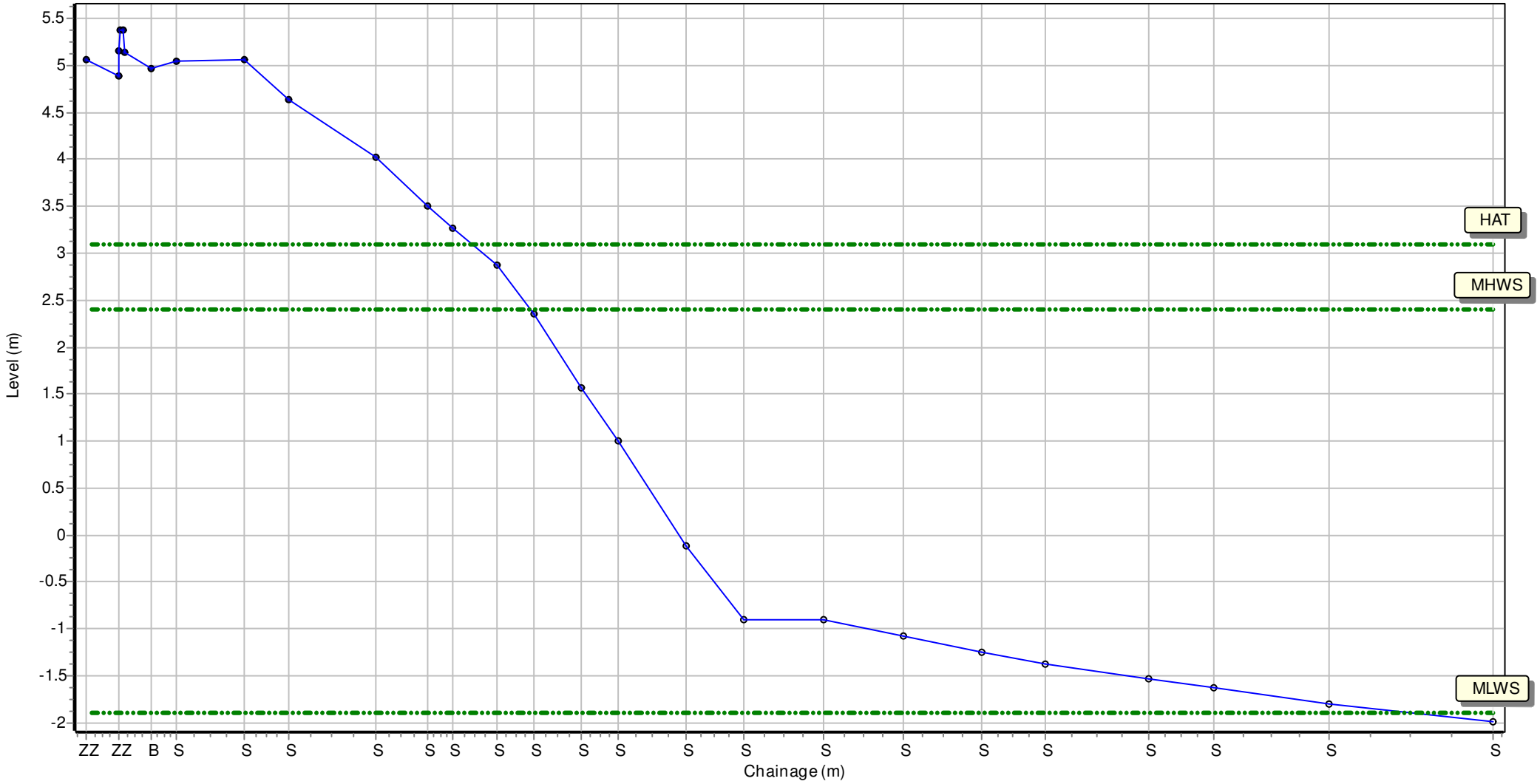
Location: **1aNWB20**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430992.437 **Northing:** 587508.87 **Profile Bearing:** 102 ° from North



Beach Profile

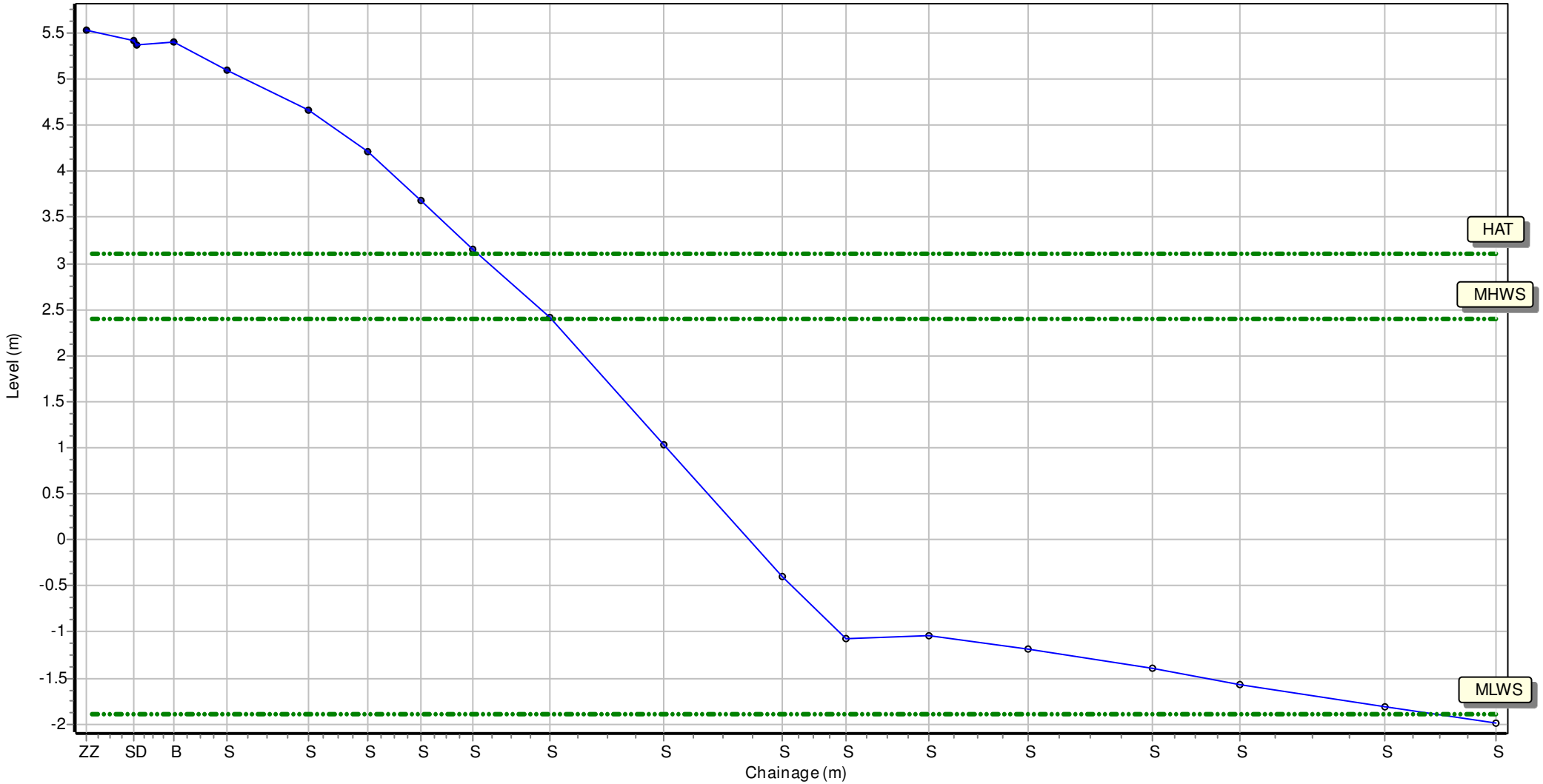
Location: **1aNWB21**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430978.85 **Northing:** 587460.577 **Profile Bearing:** 102 ° from North



Beach Profile

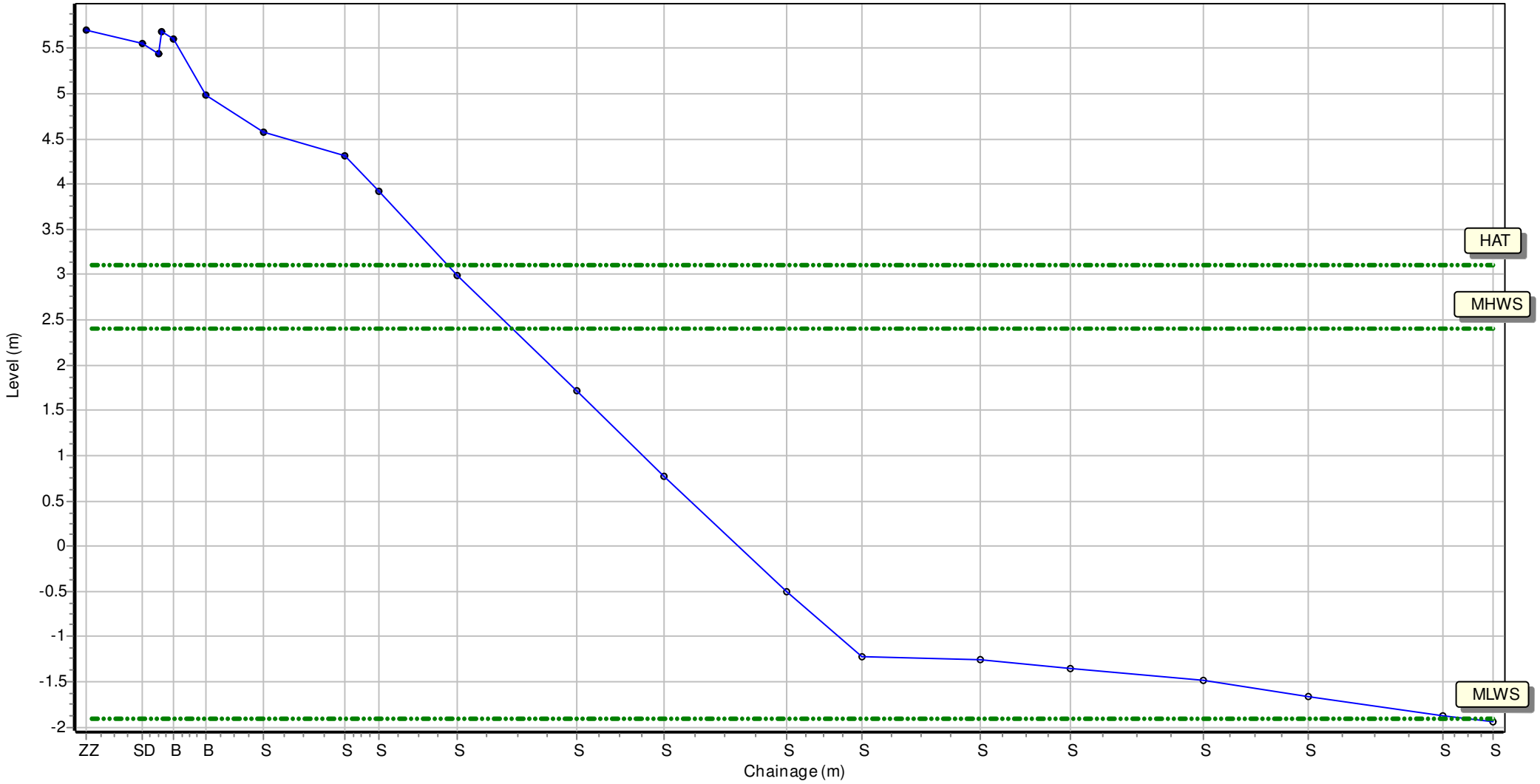
Location: **1aNWB22**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430967.686 **Northing:** 587411.684 **Profile Bearing:** 99 ° from North



Beach Profile

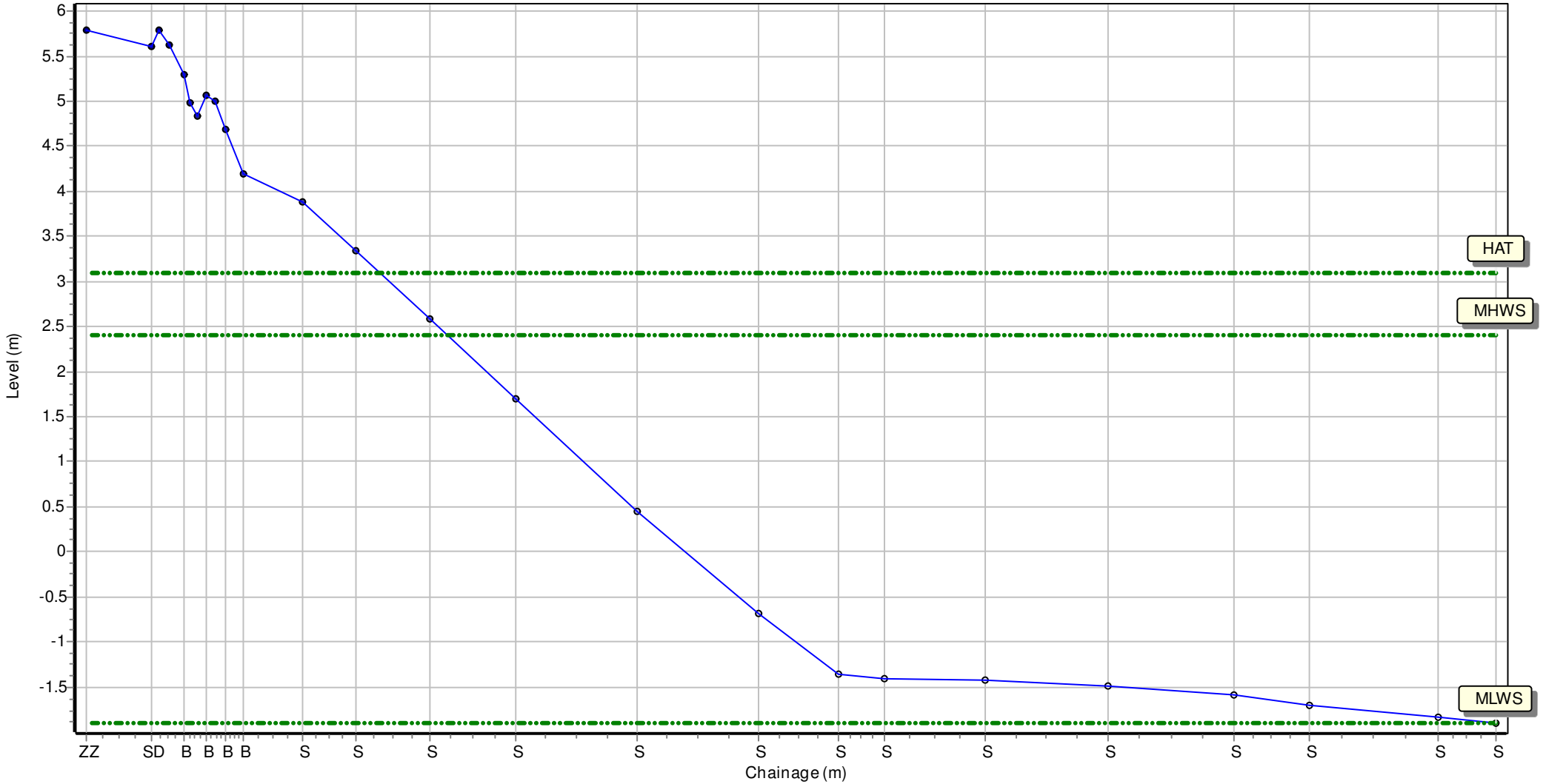
Location: **1aNWB23**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430959.877 **Northing:** 587362.168 **Profile Bearing:** 96 ° from North



Beach Profile

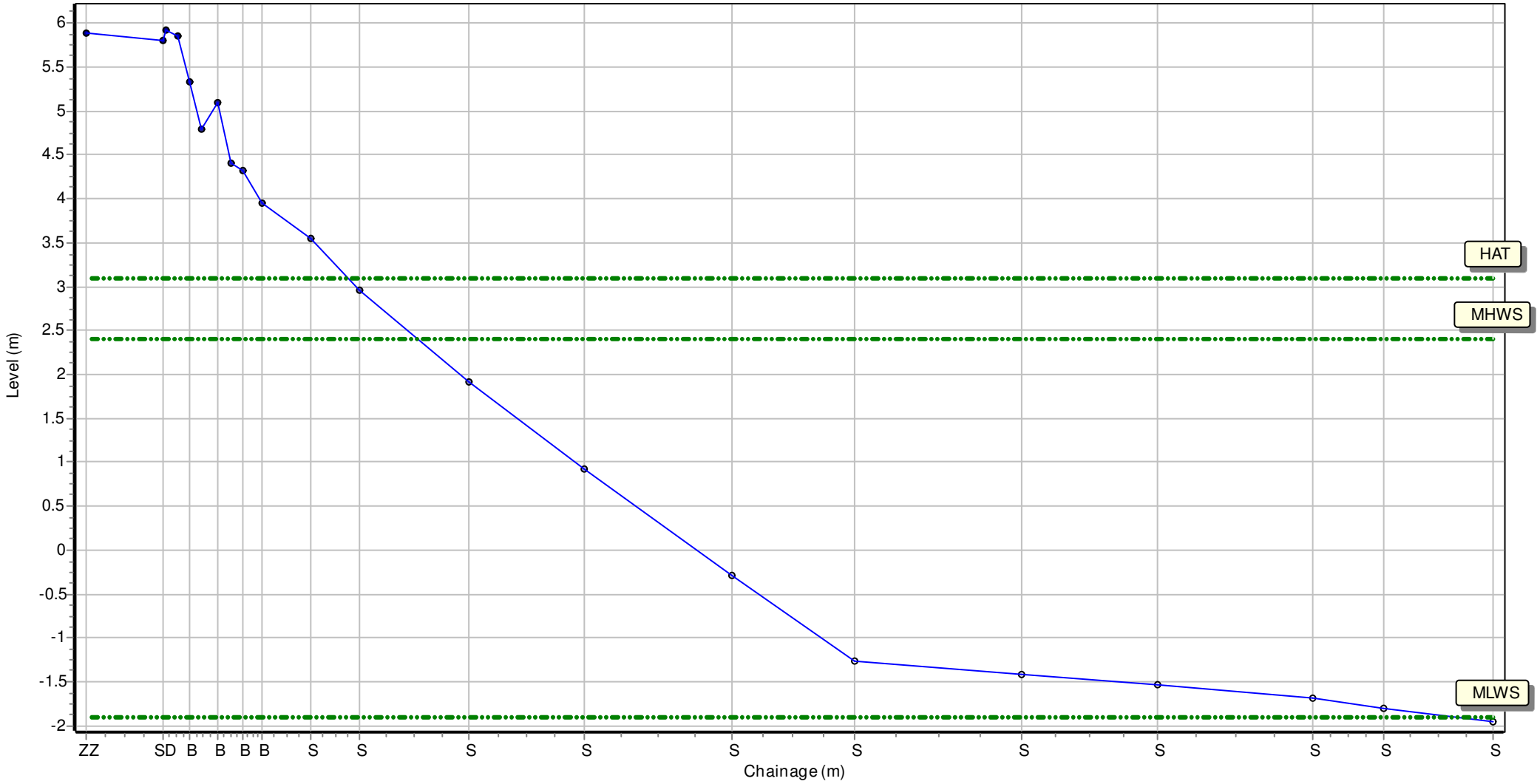
Location: **1aNWB24**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430956.511 **Northing:** 587312.153 **Profile Bearing:** 92 ° from North



Beach Profile

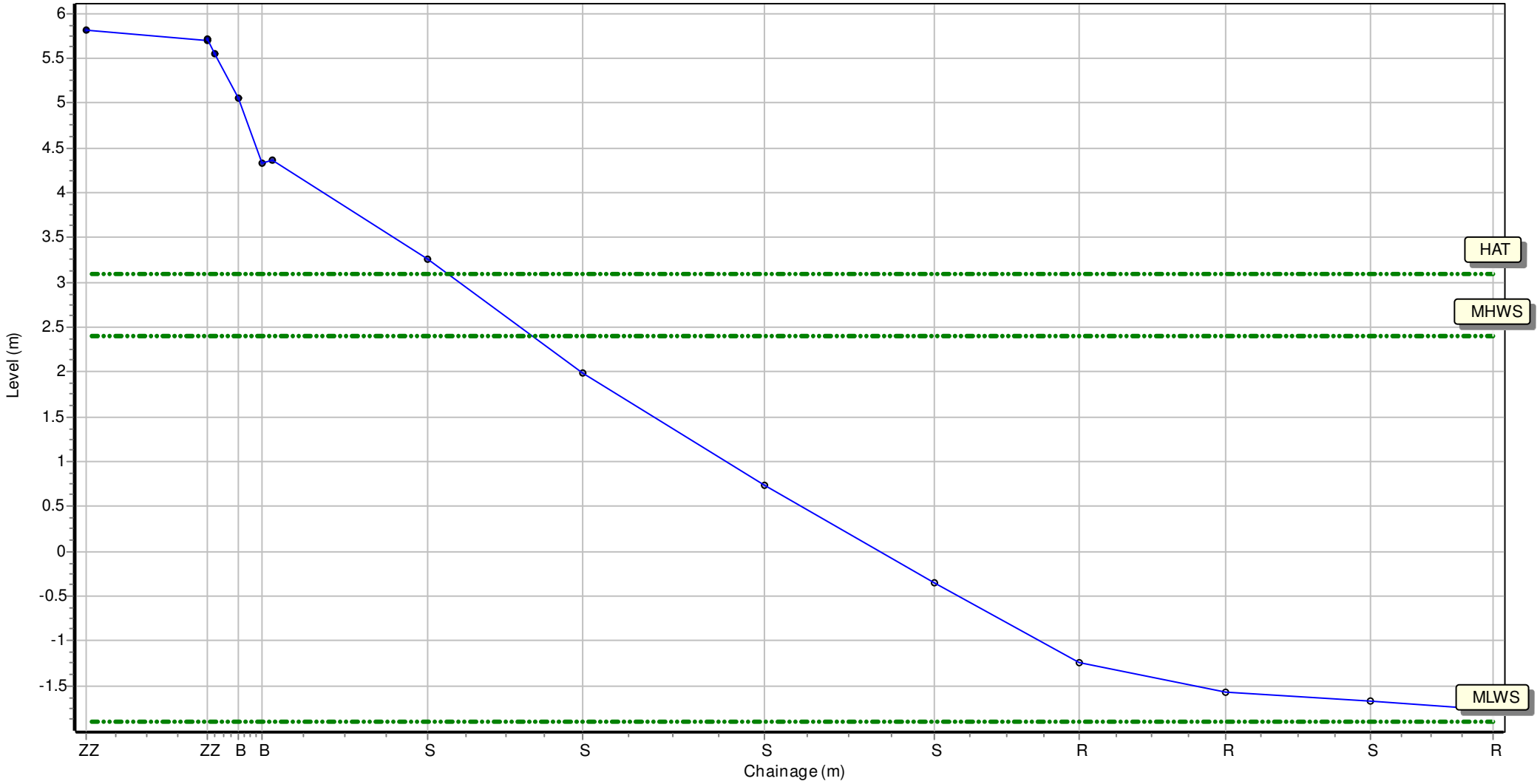
Location: **1aNWB25**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430953.984 **Northing:** 587261.982 **Profile Bearing:** 89 ° from North



Beach Profile

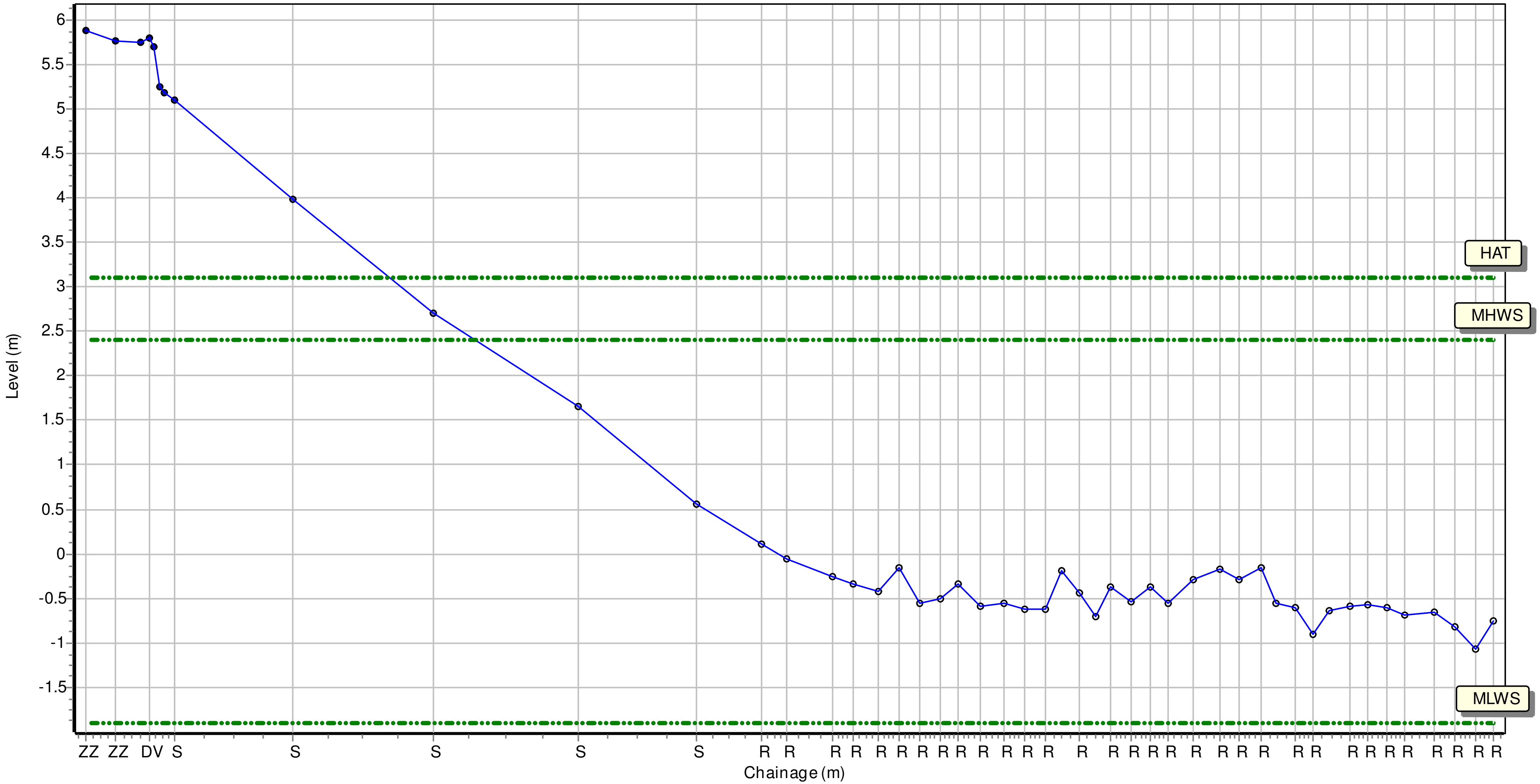
Location: **1aNWB26**

Date: 08/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430960.828 **Northing:** 587212.152 **Profile Bearing:** 86 ° from North



http://www.sandsuser.com

SANDS

Beach Profile

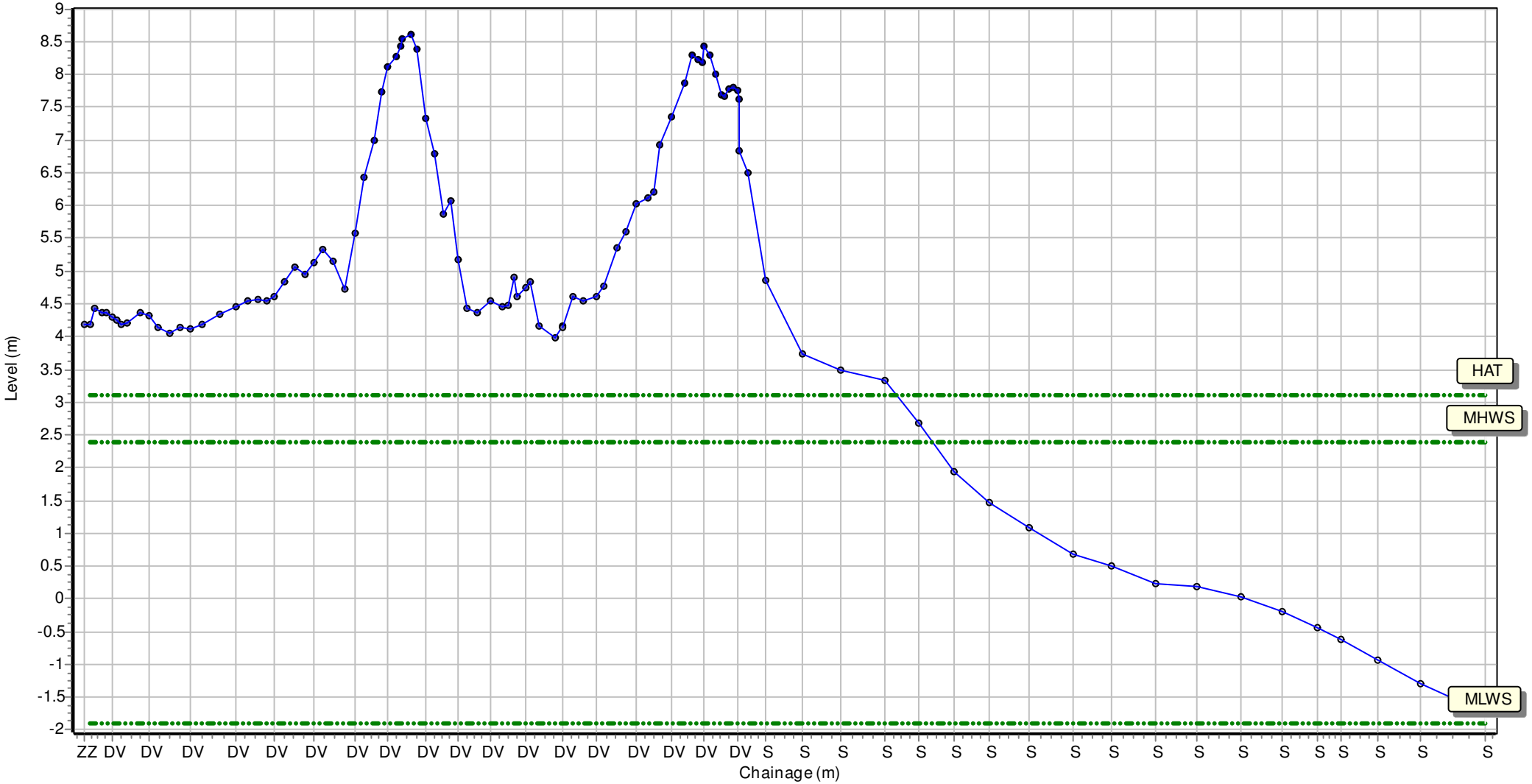
Location: **1aCMBC01**

Date: 21/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 427552.578 **Northing:** 596402.769 **Profile Bearing:** 59 ° from North



Beach Profile

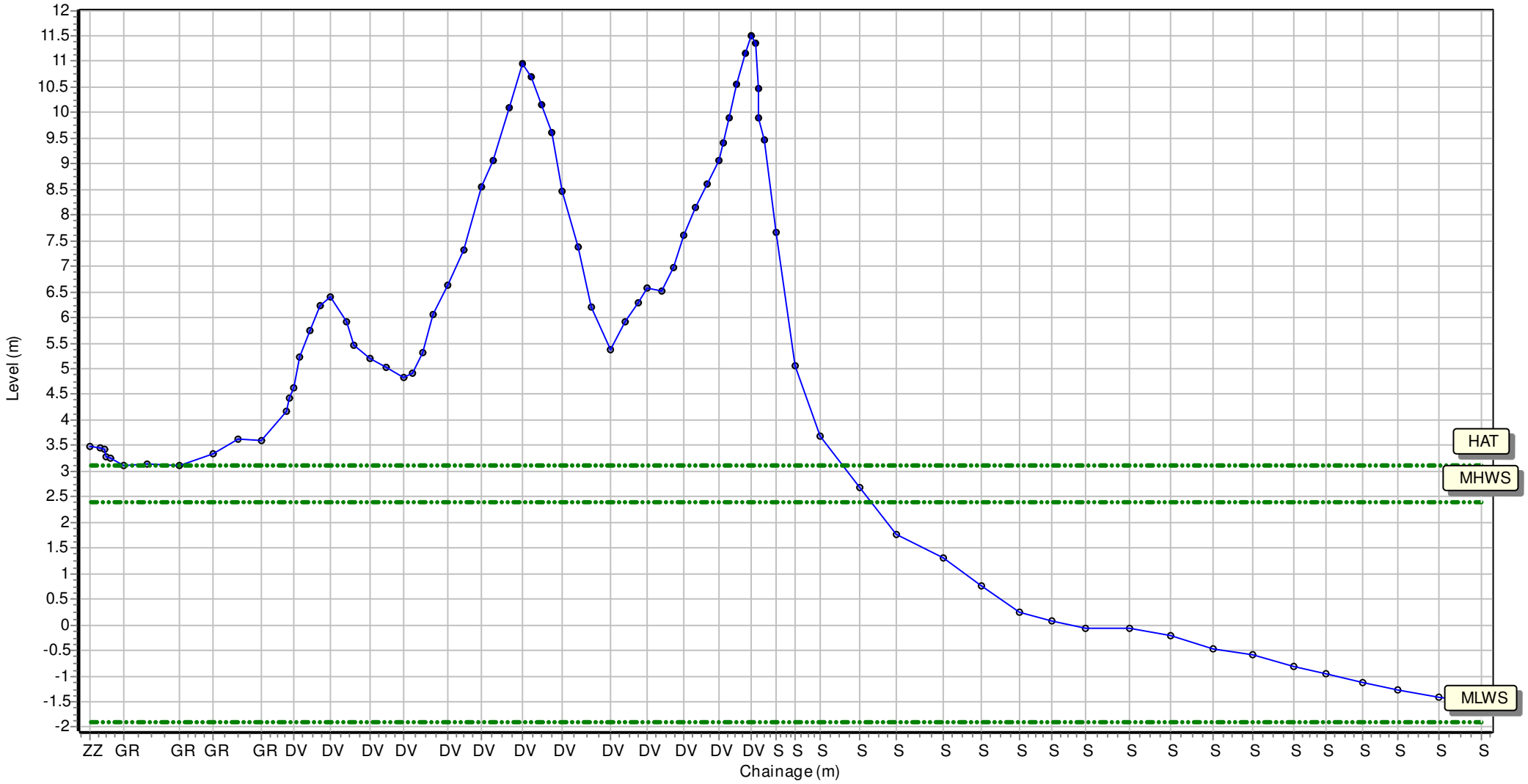
Location: **1aCMBC02**

Date: 21/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 428355.916 **Northing:** 594532.141 **Profile Bearing:** 56 ° from North



Beach Profile

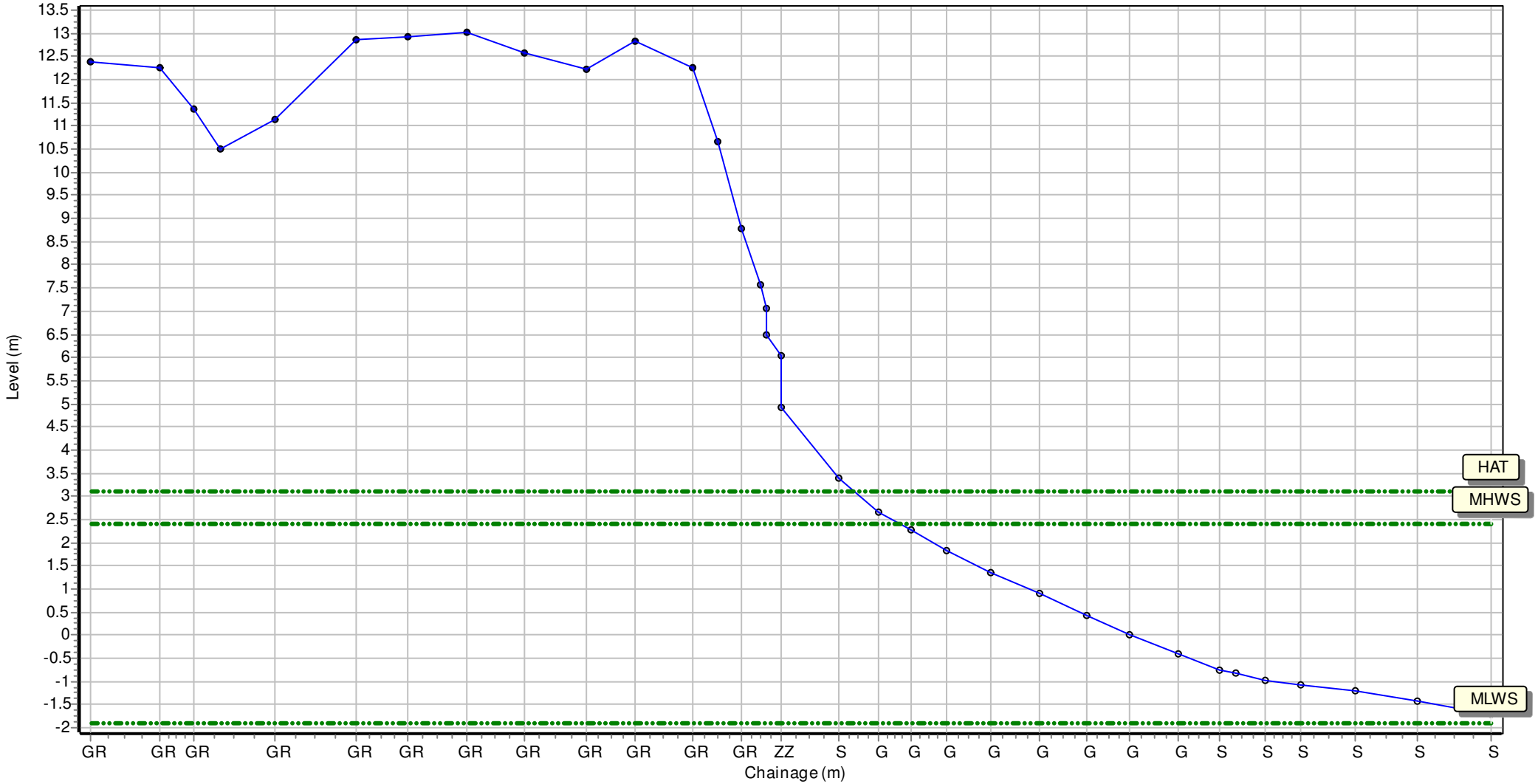
Location: **1aCMBC03A**

Date: 21/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430128.317 **Northing:** 591148.463 **Profile Bearing:** 70 ° from North



Beach Profile

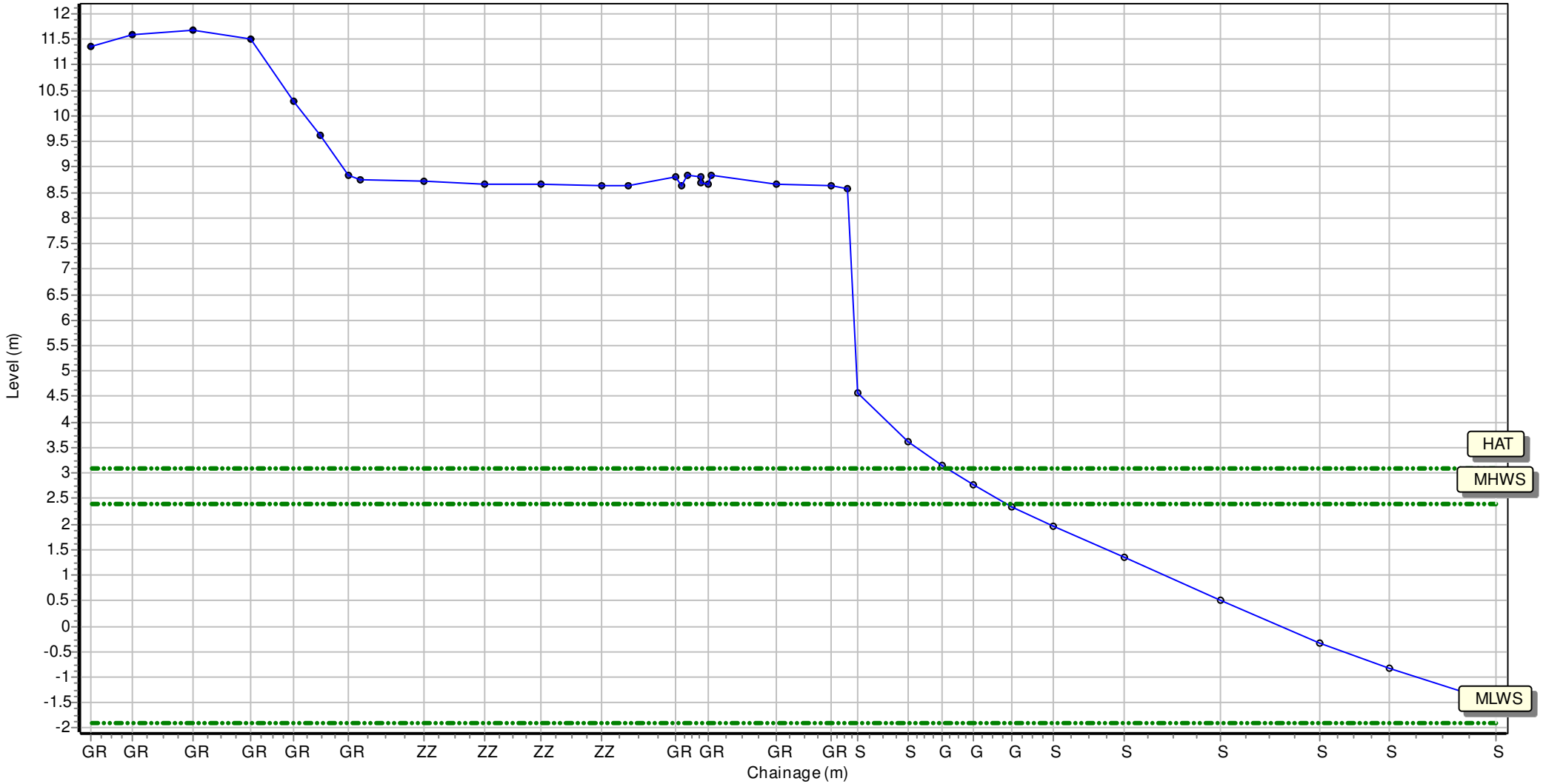
Location: **1aCMBC03B**

Date: 21/04/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 430478.518 **Northing:** 590661.474 **Profile Bearing:** 58 ° from North



Beach Profile

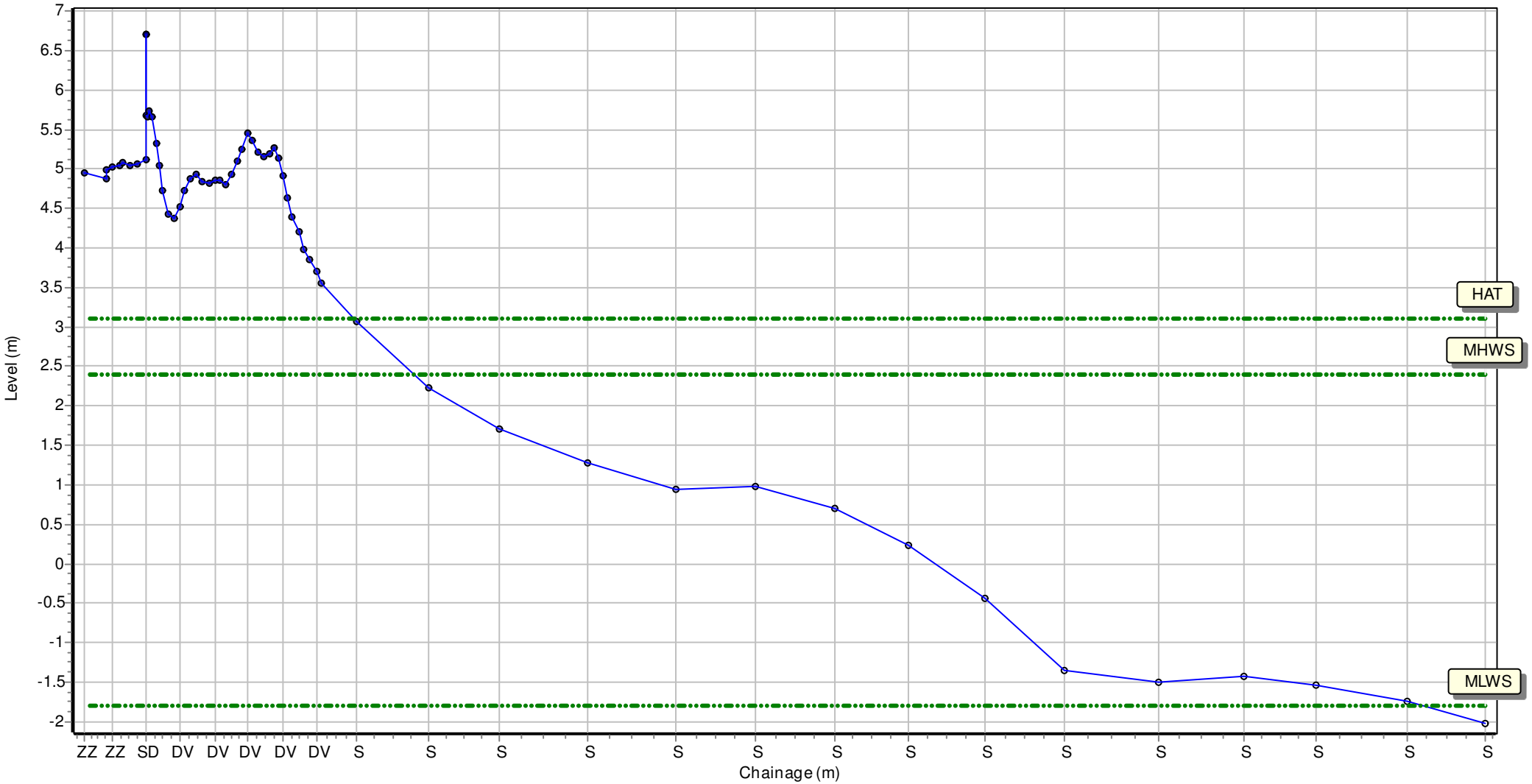
Location: **1aBVBC01**

Date: 11/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 432171.107 **Northing:** 580411.515 **Profile Bearing:** 113 ° from North



Beach Profile

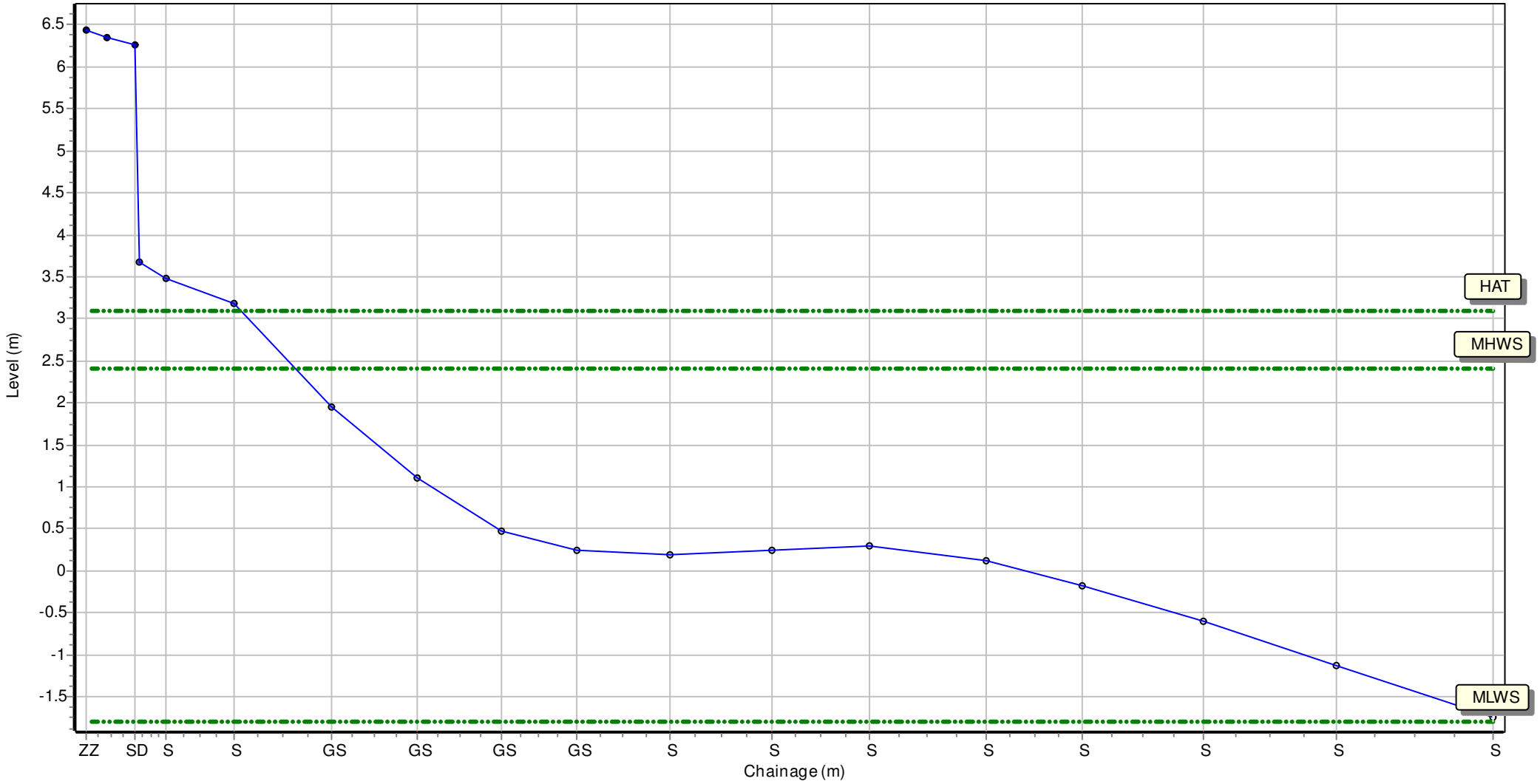
Location: **1aBVBC02**

Date: 11/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 432072.788 **Northing:** 579668.162 **Profile Bearing:** 77 ° from North



Beach Profile

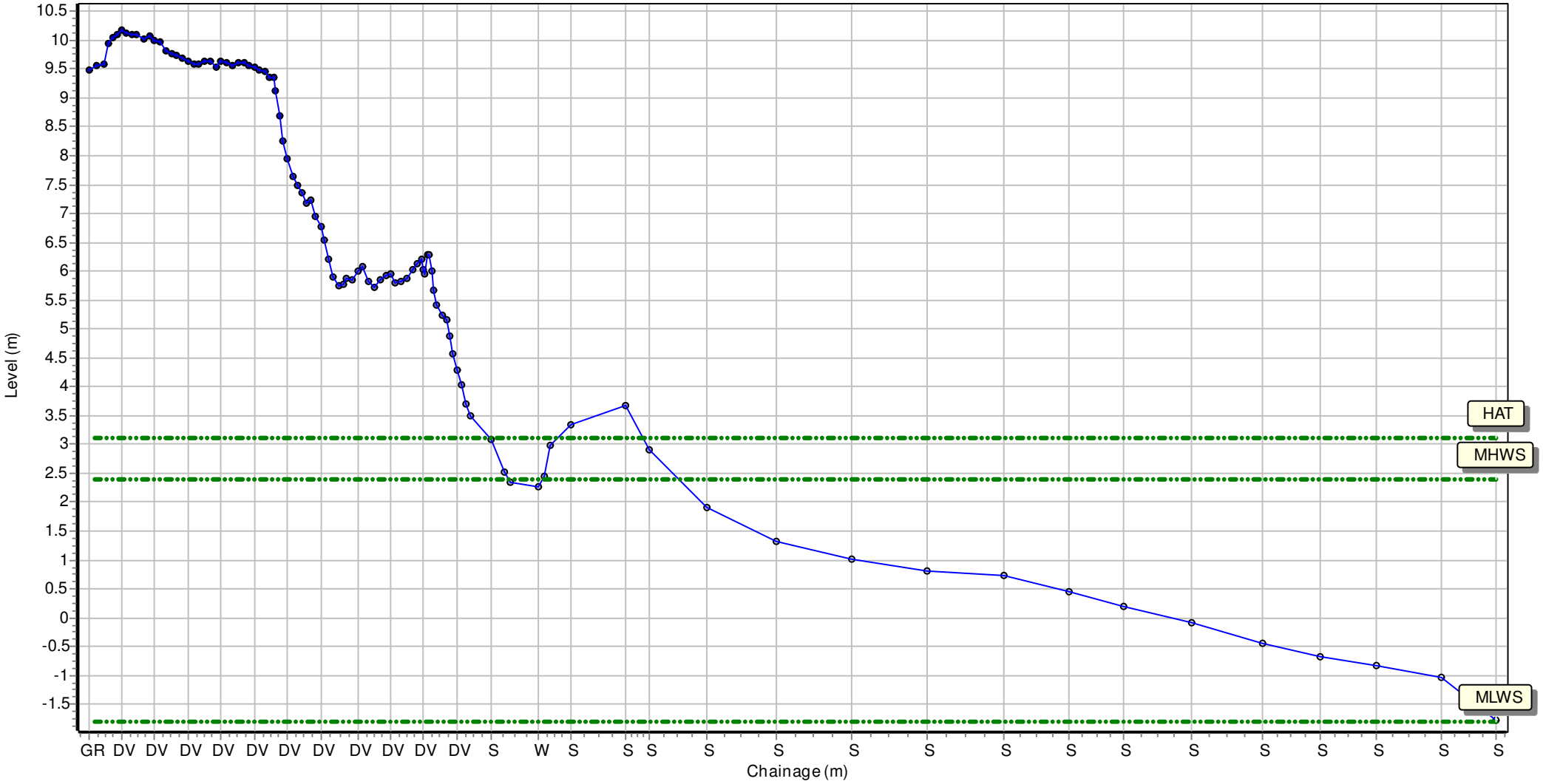
Location: **1aBVBC03**

Date: 11/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 432120.659 **Northing:** 578982.375 **Profile Bearing:** 71 ° from North



Beach Profile

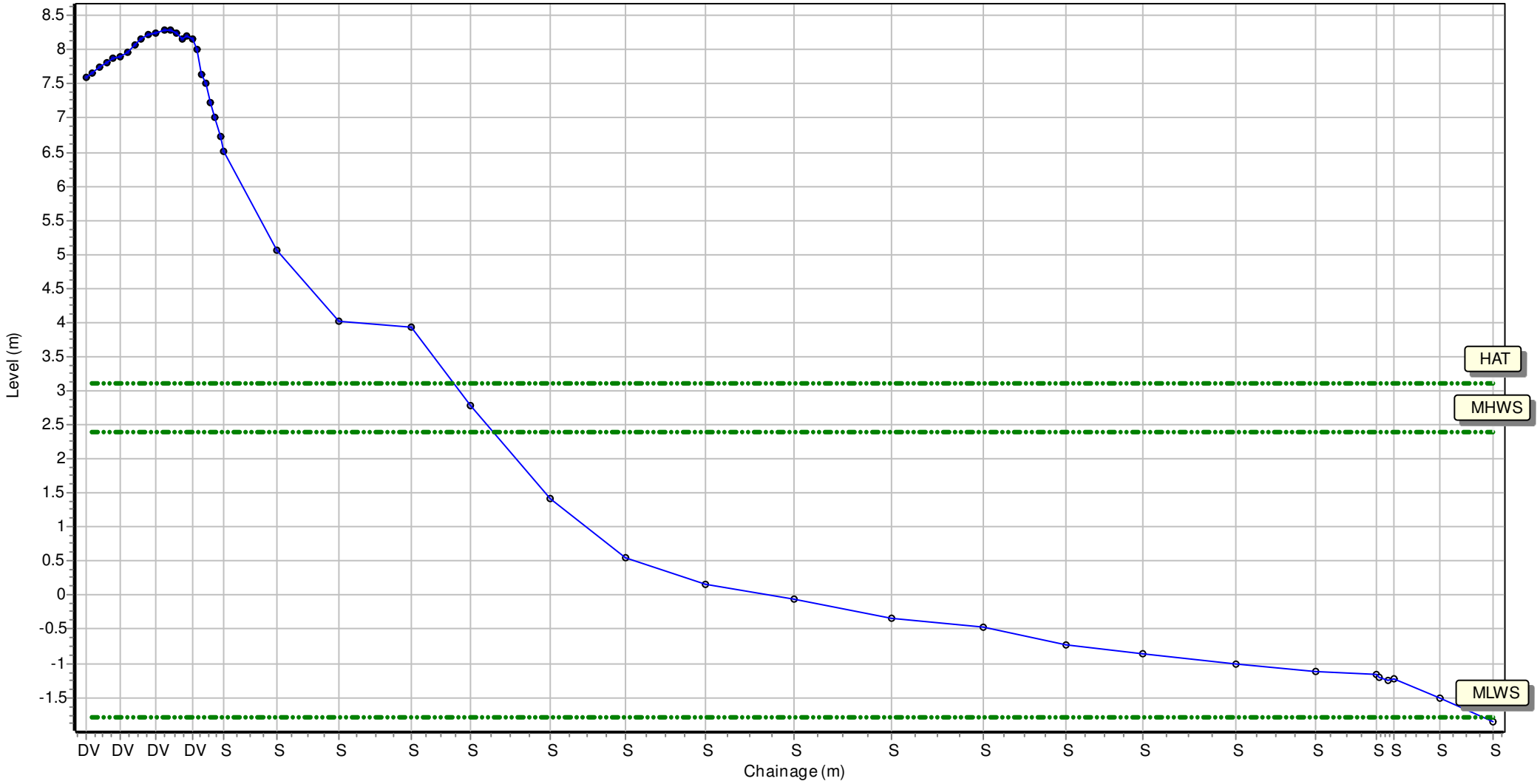
Location: **1aBVBC04**

Date: 11/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 432398.19 **Northing:** 578463.878 **Profile Bearing:** 60 ° from North



Beach Profile

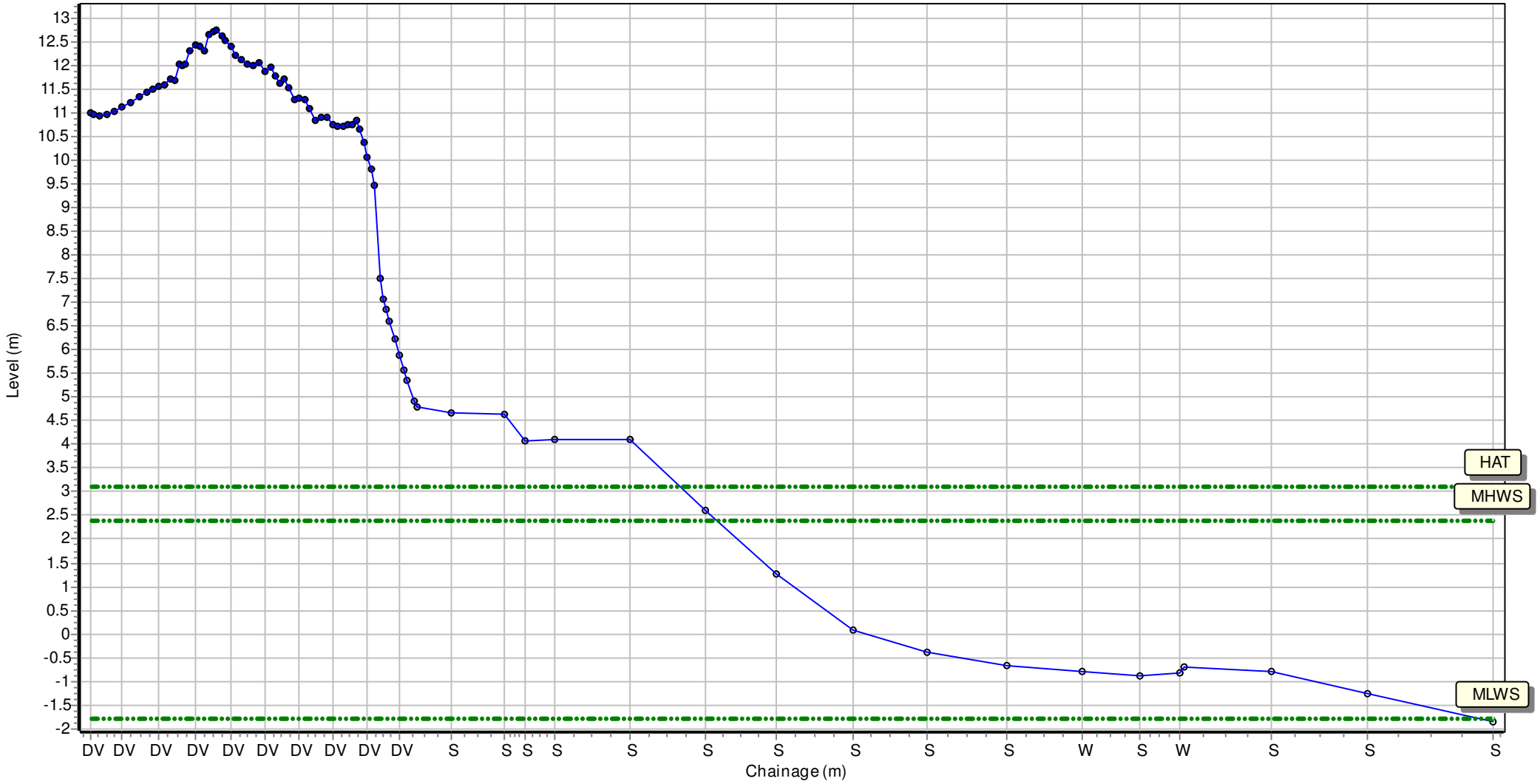
Location: **1aBVBC05**

Date: 11/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 432667.046 **Northing:** 577891.873 **Profile Bearing:** 60 ° from North



Beach Profile

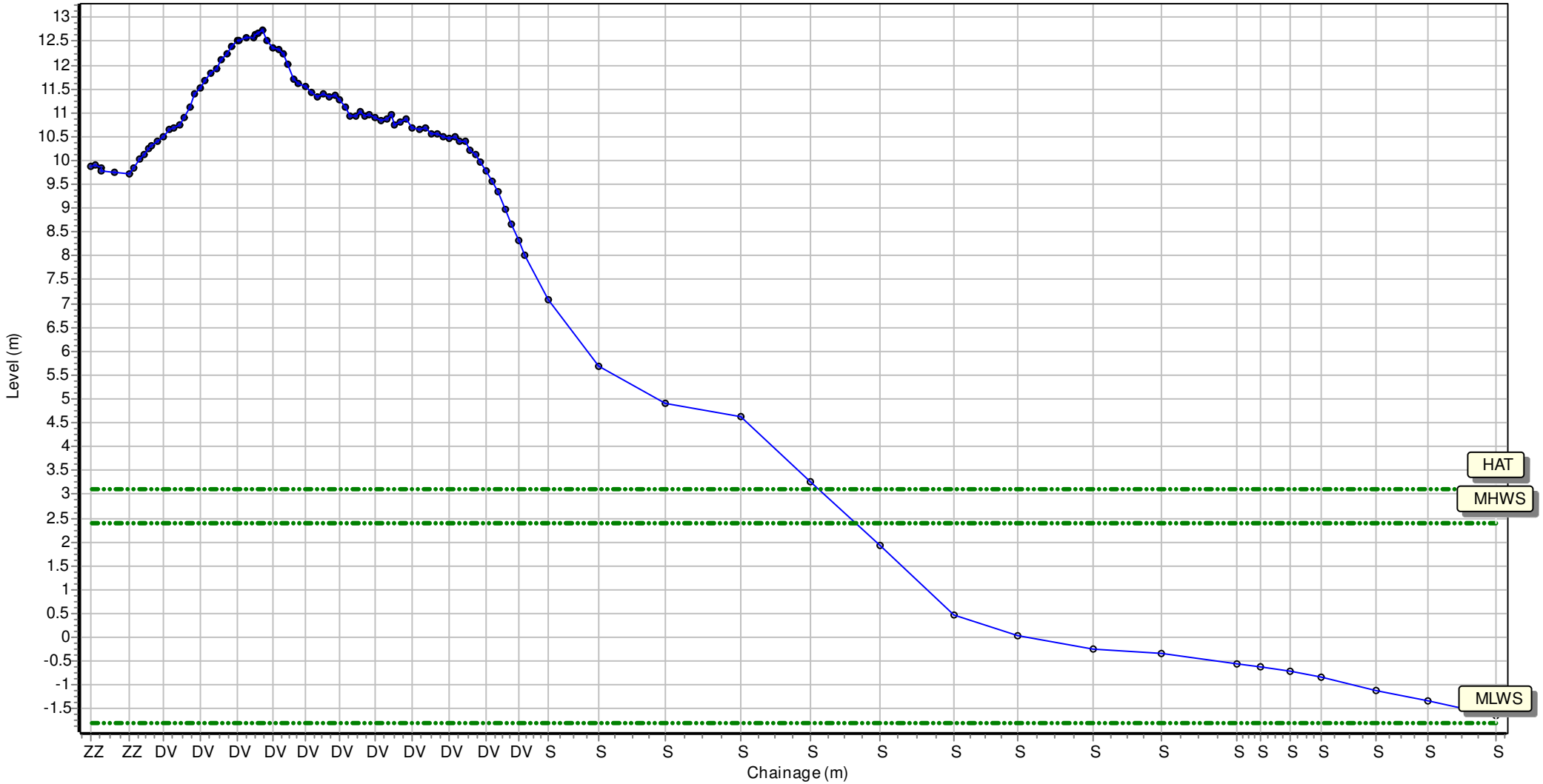
Location: **1aBVBC06**

Date: 11/03/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

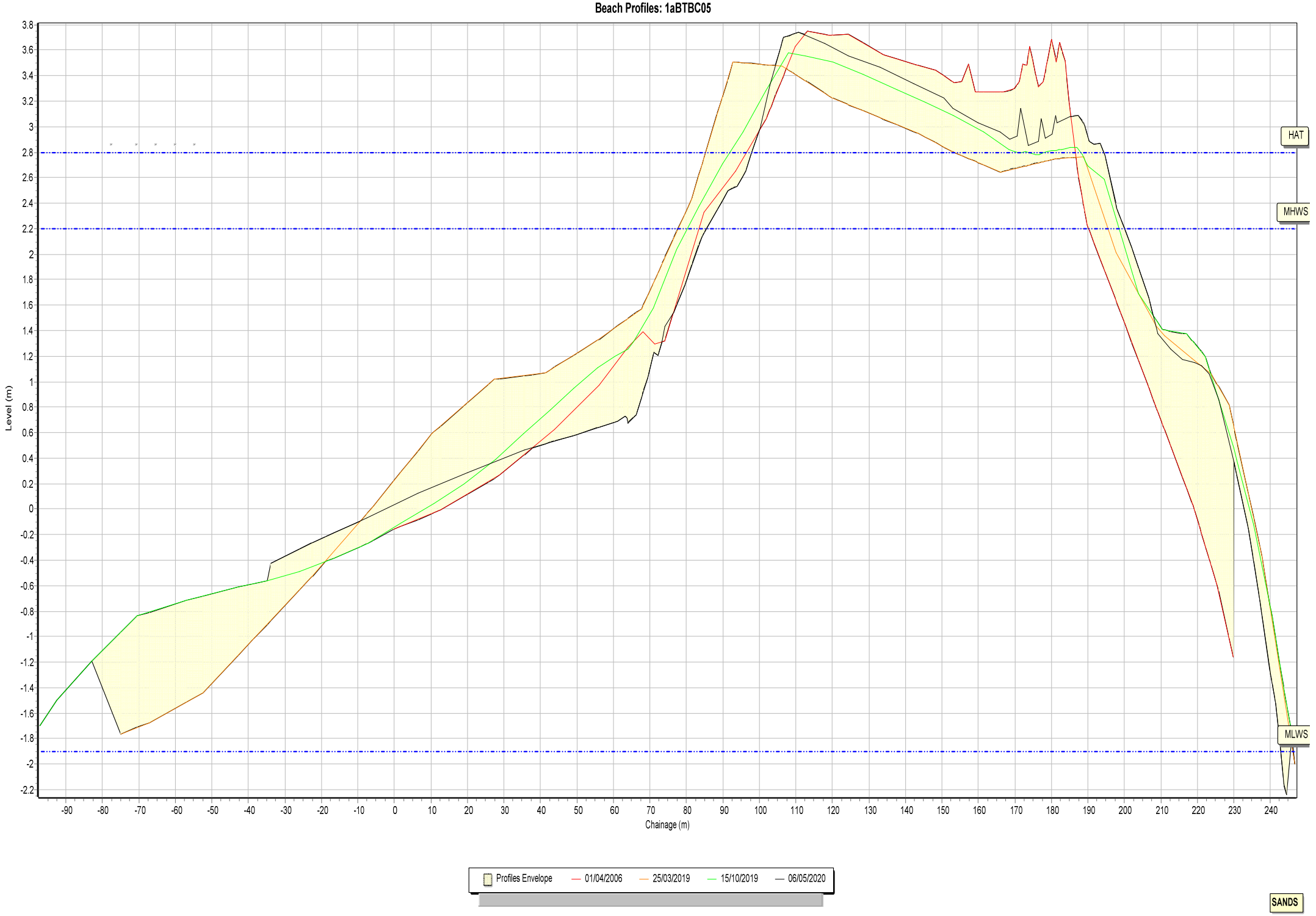
Summary: 2020 Partial Measures Topo Survey

Easting: 433247.516 **Northing:** 577032.054 **Profile Bearing:** 53 ° from North



Beach Profiles: 1aBTBC02


Beach Profiles: 1aBTBC04
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
25/03/2019
15/10/2019
06/05/2020
SANDS


Beach Profiles: 1aBTBC05
Level (m)
Chainage (m)
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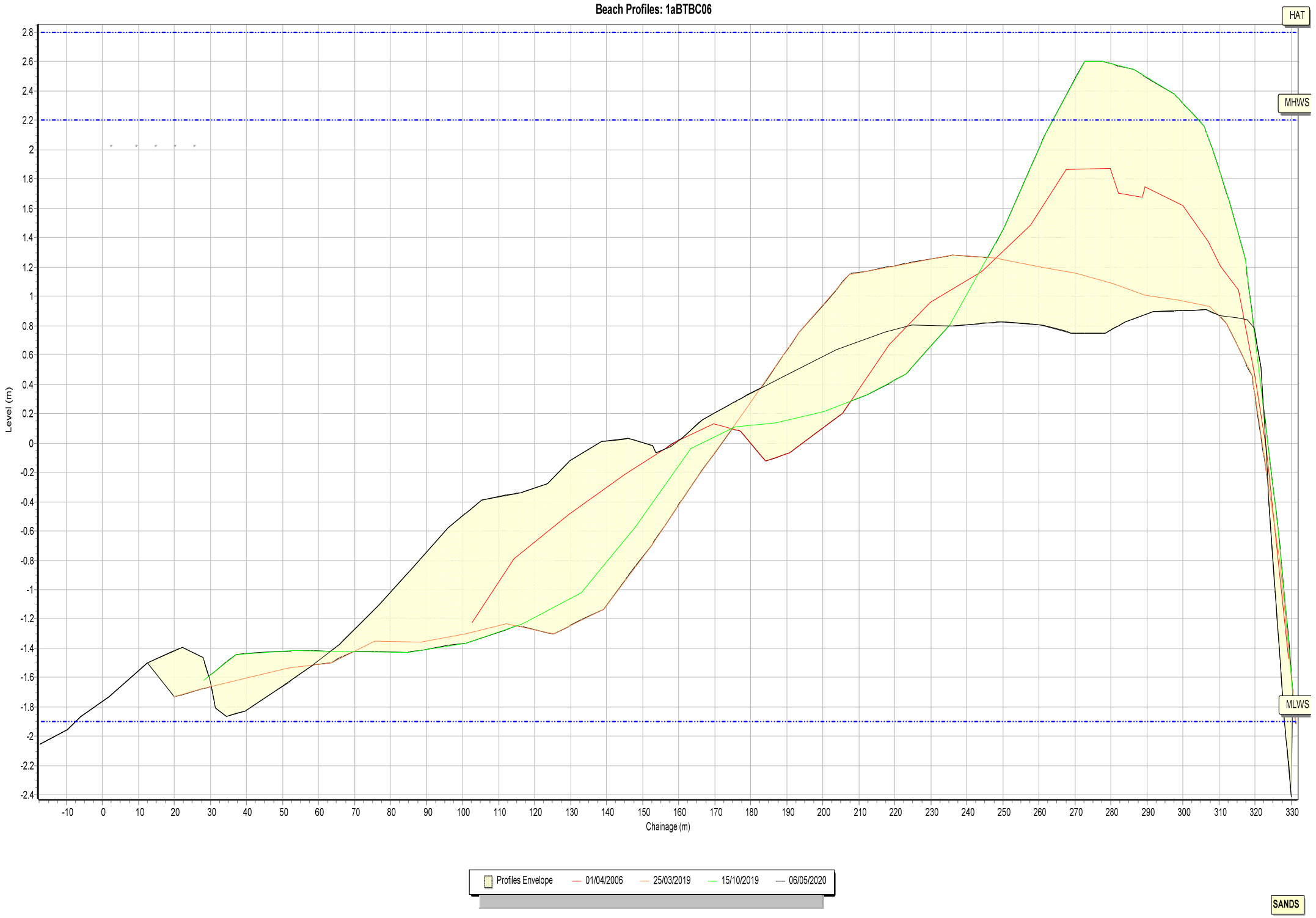
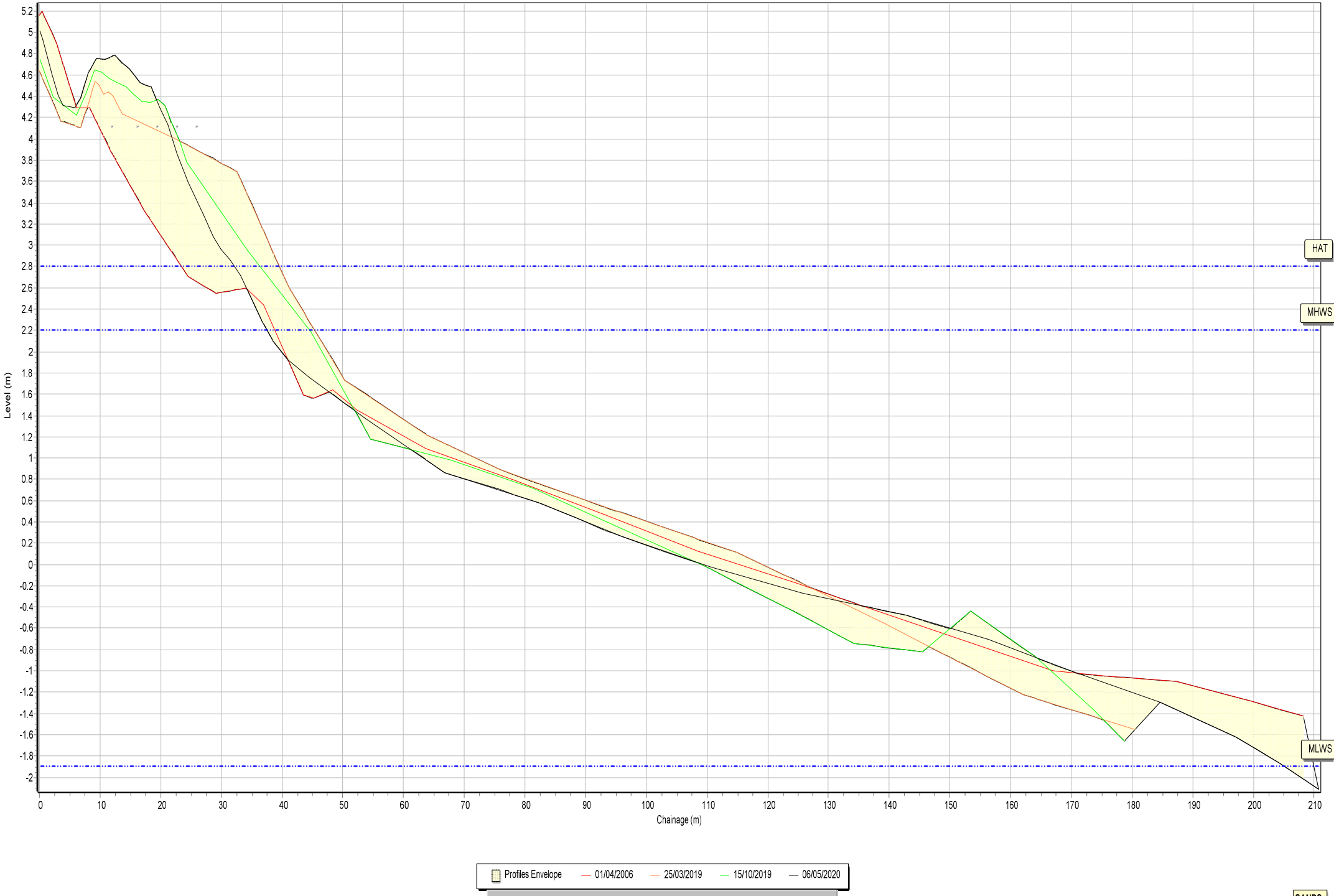
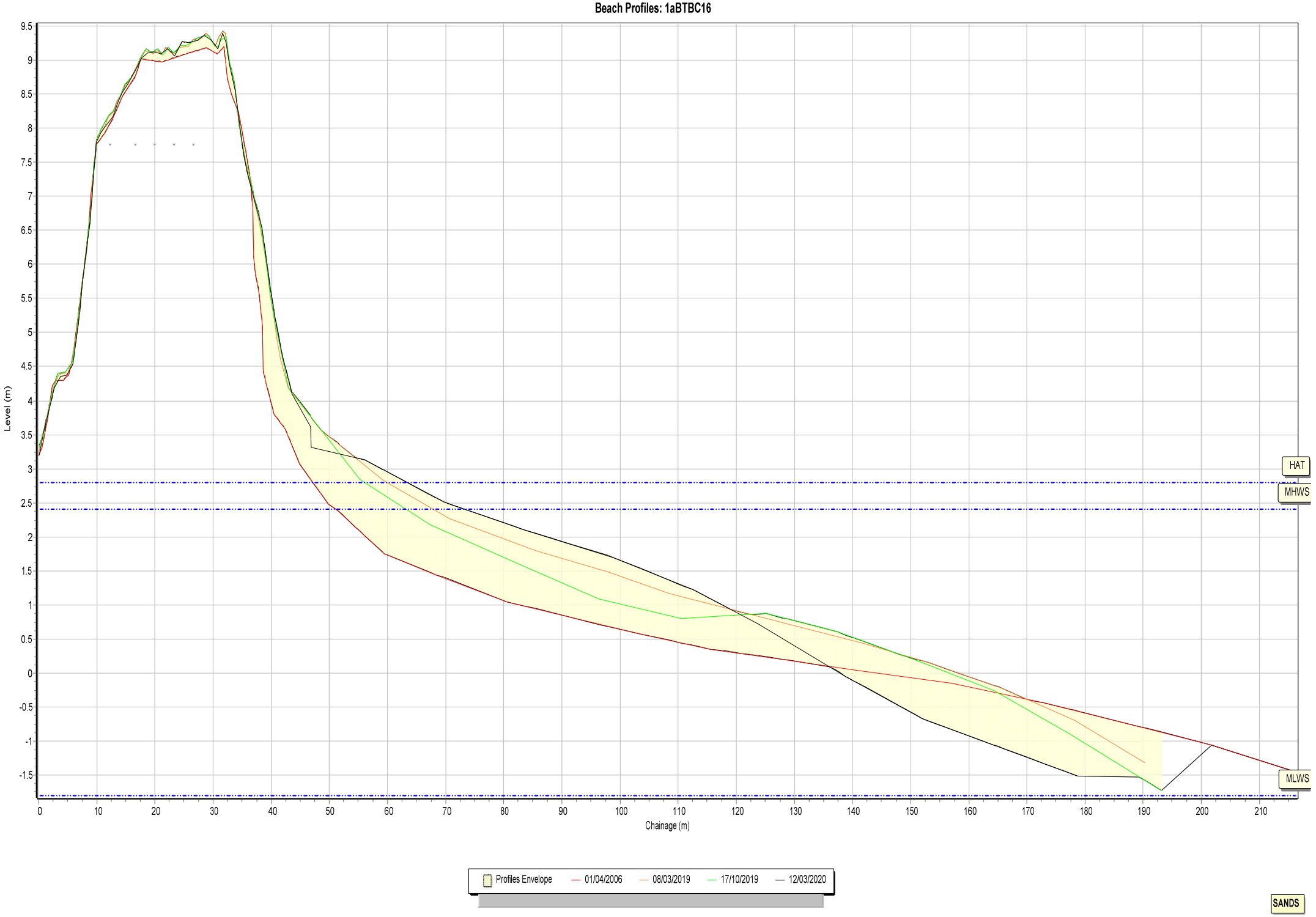
MHWS
MLWS
Profiles Envelope
01/04/2006
25/03/2019
15/10/2019
06/05/2020
SANDS


Beach Profiles: 1aBTBC06
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
Profiles Envelope
01/04/2006
25/03/2019
15/10/2019
06/05/2020

Beach Profiles: 1aBTBC11




Beach Profiles: 1aBTBC13
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
25/03/2019
15/10/2019
06/05/2020
SANDS


Beach Profiles: 1aBTBC16
Level (m)
9.5
9
8.5
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7.5
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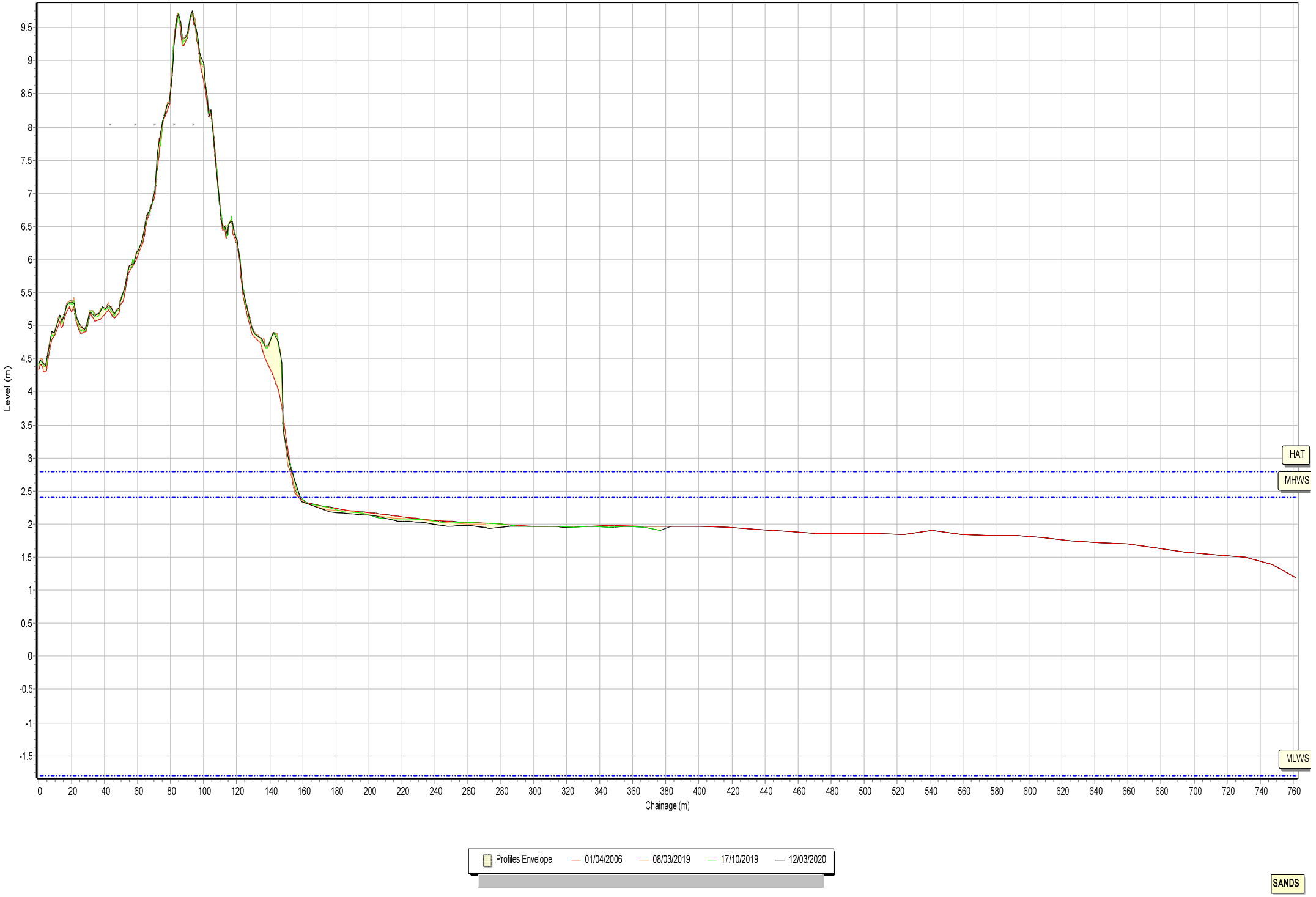
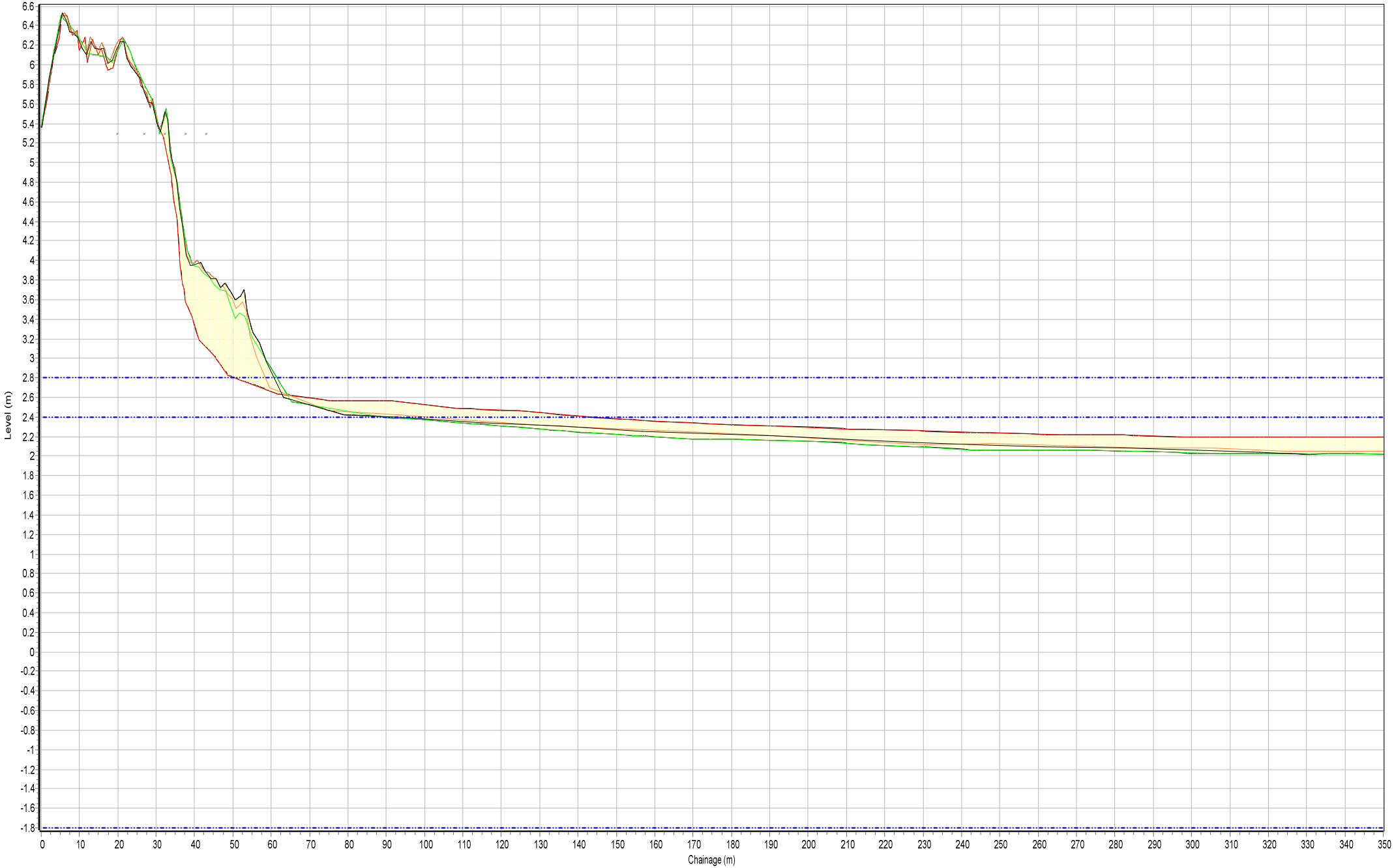
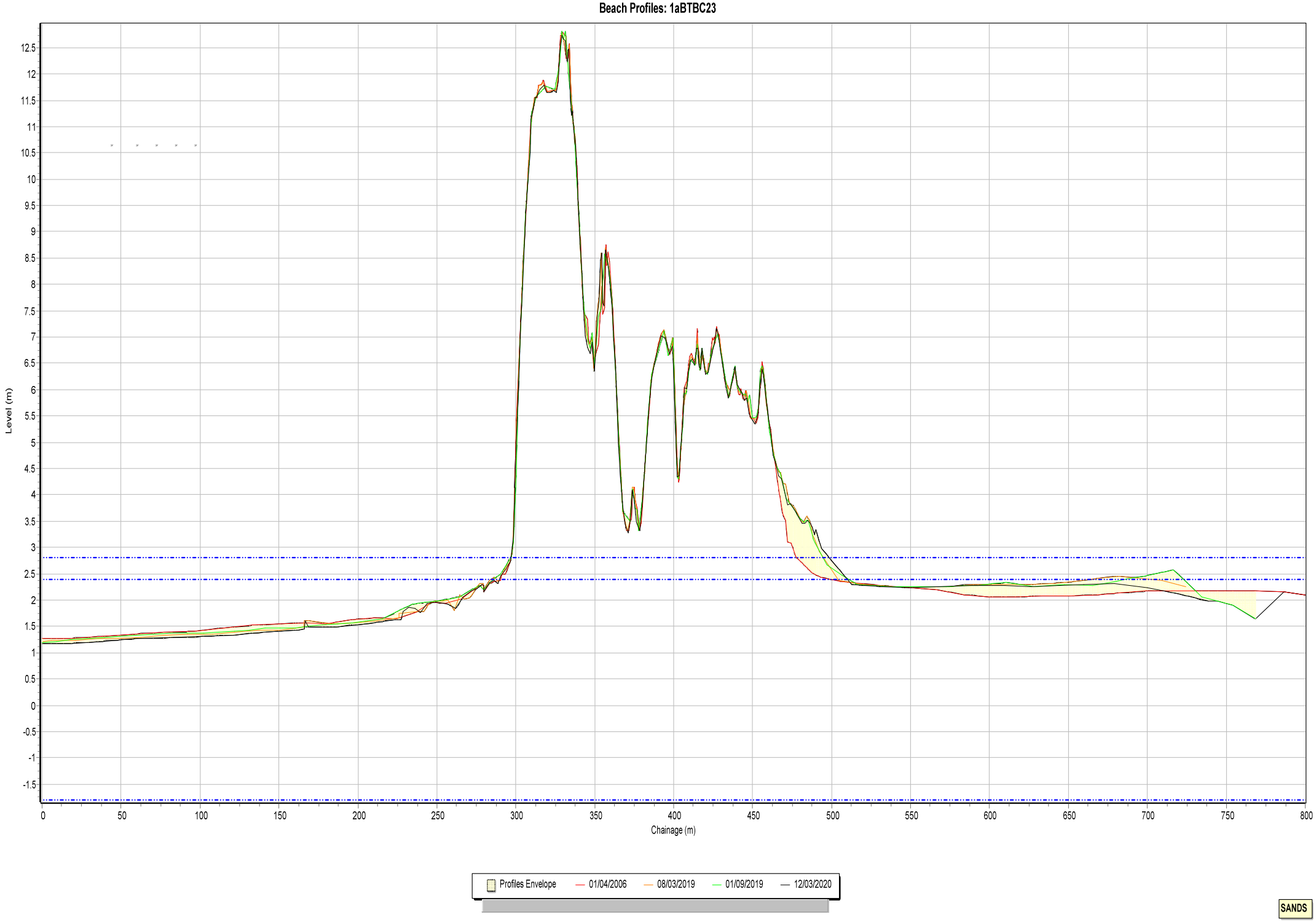
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
08/03/2019
17/10/2019
12/03/2020
SANDS

Beach Profiles: 1aBTBC19



Beach Profiles: 1aBTBC21




Beach Profiles: 1aBTBC23
Level (m)
12.5
12
11.5
11
10.5
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9.5
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8.5
8
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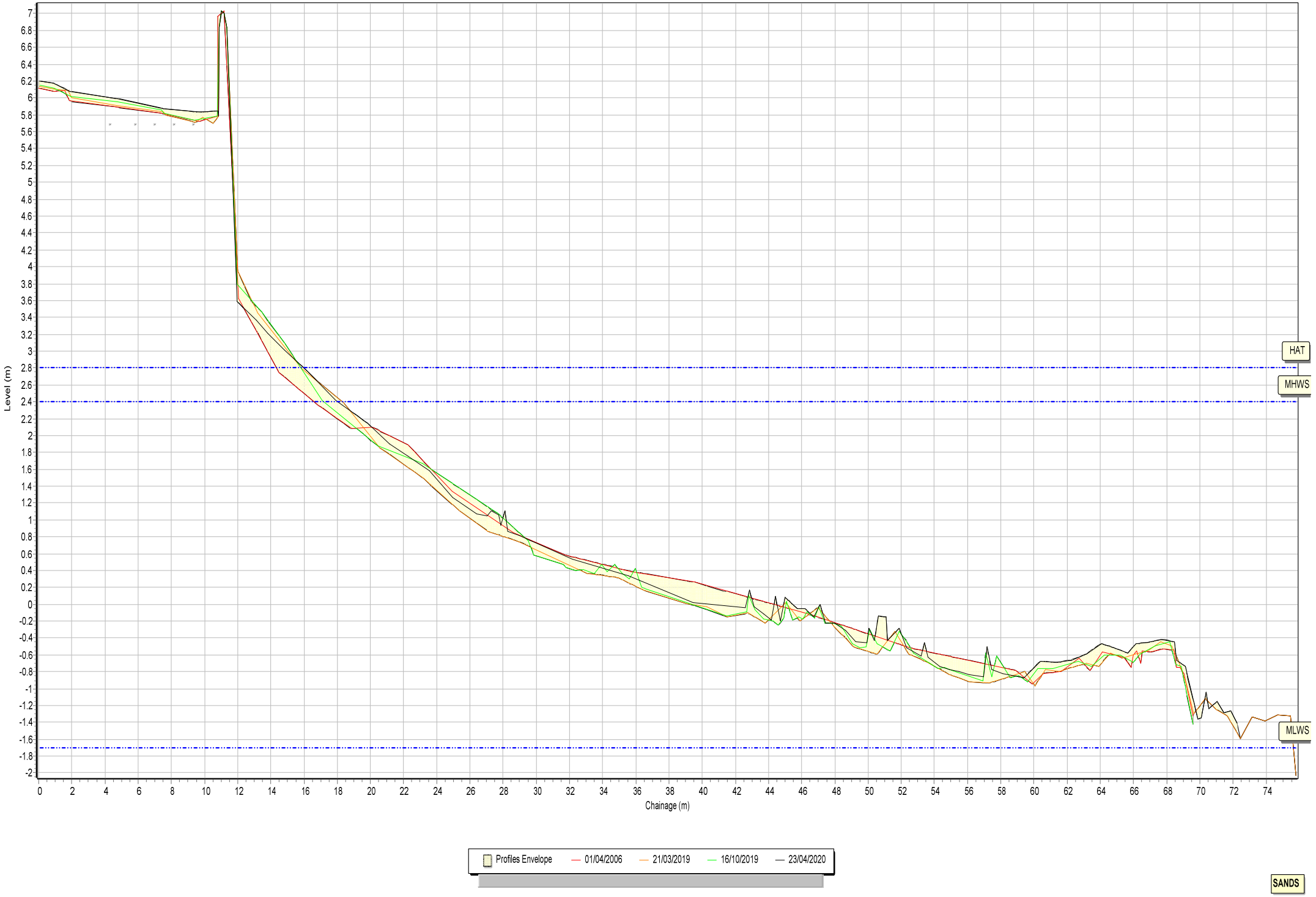
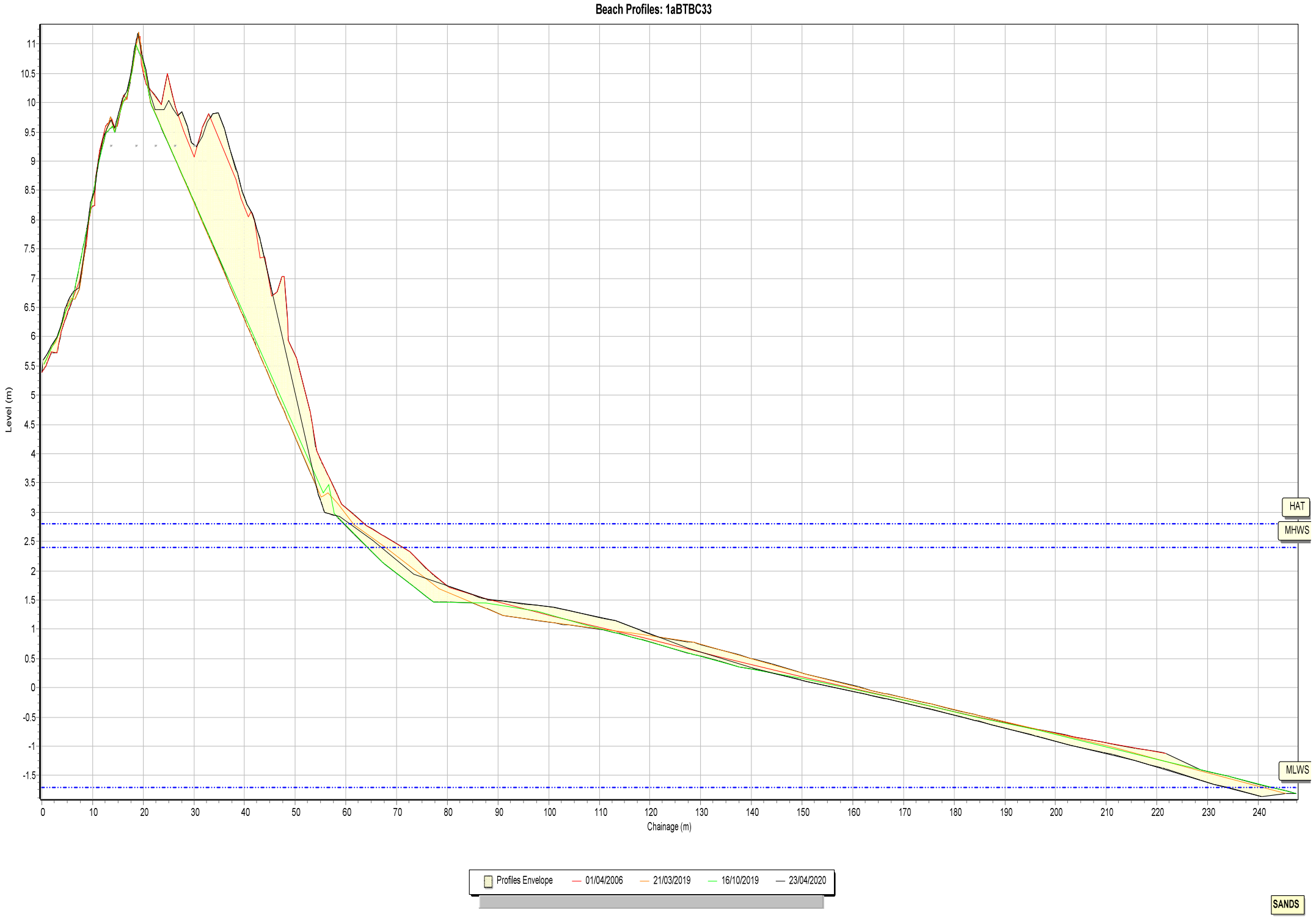
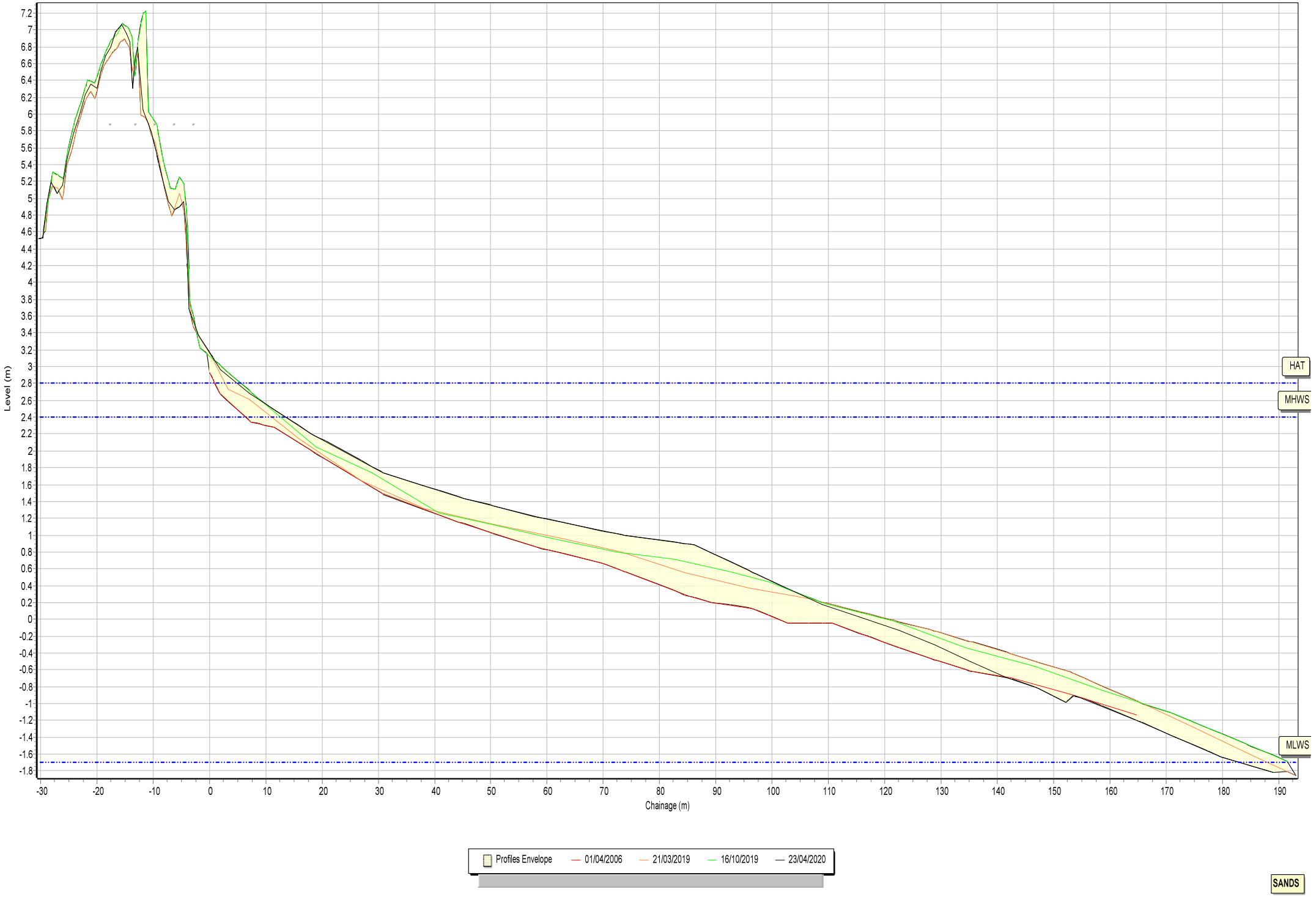
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
Chainage (m)
Profiles Envelope
01/04/2006
08/03/2019
01/09/2019
12/03/2020
SANDS

Beach Profiles: 1aBTBC31

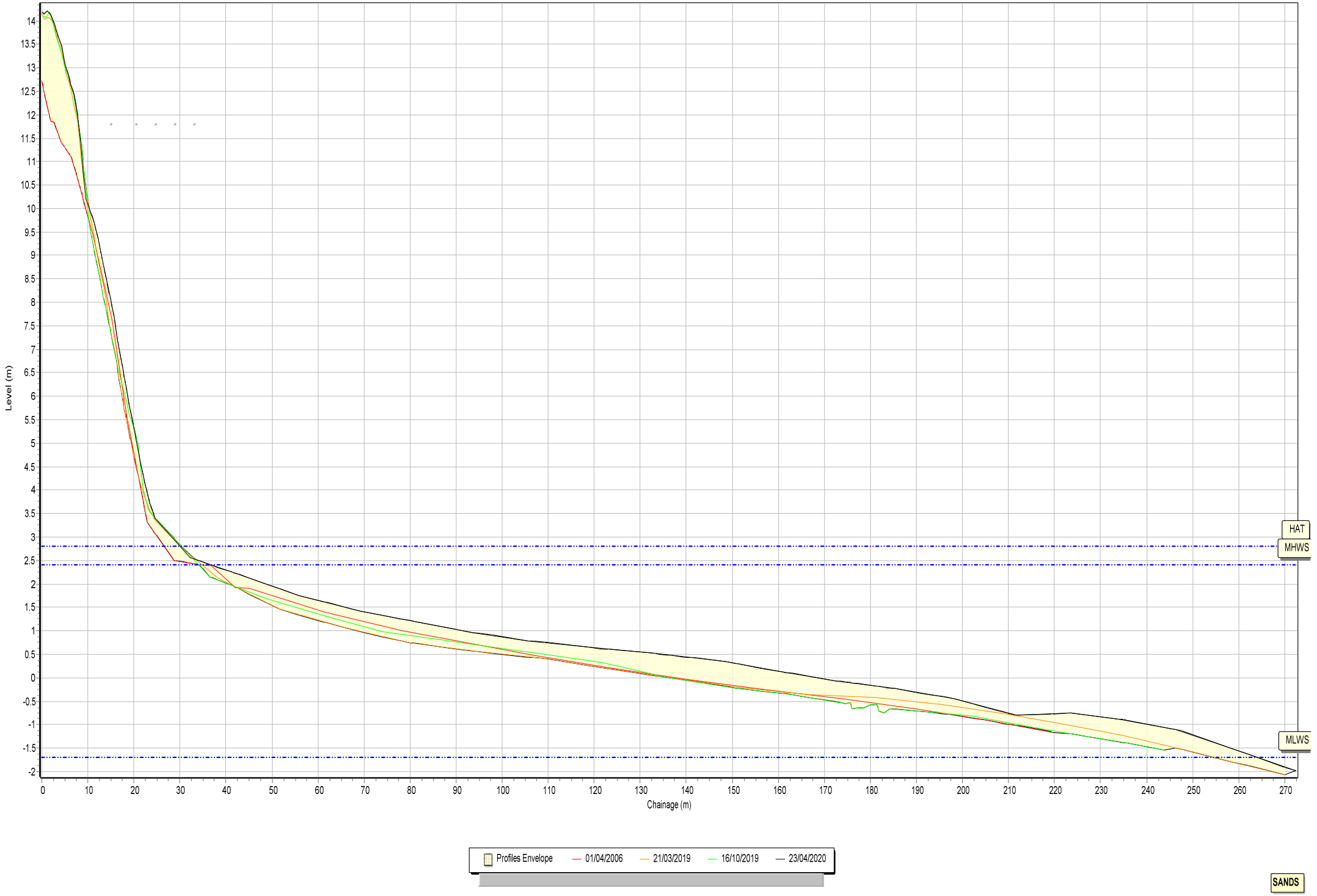



Beach Profiles: 1aBTBC33
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
21/03/2019
16/10/2019
23/04/2020
SANDS

Beach Profiles: 1aBTBC34

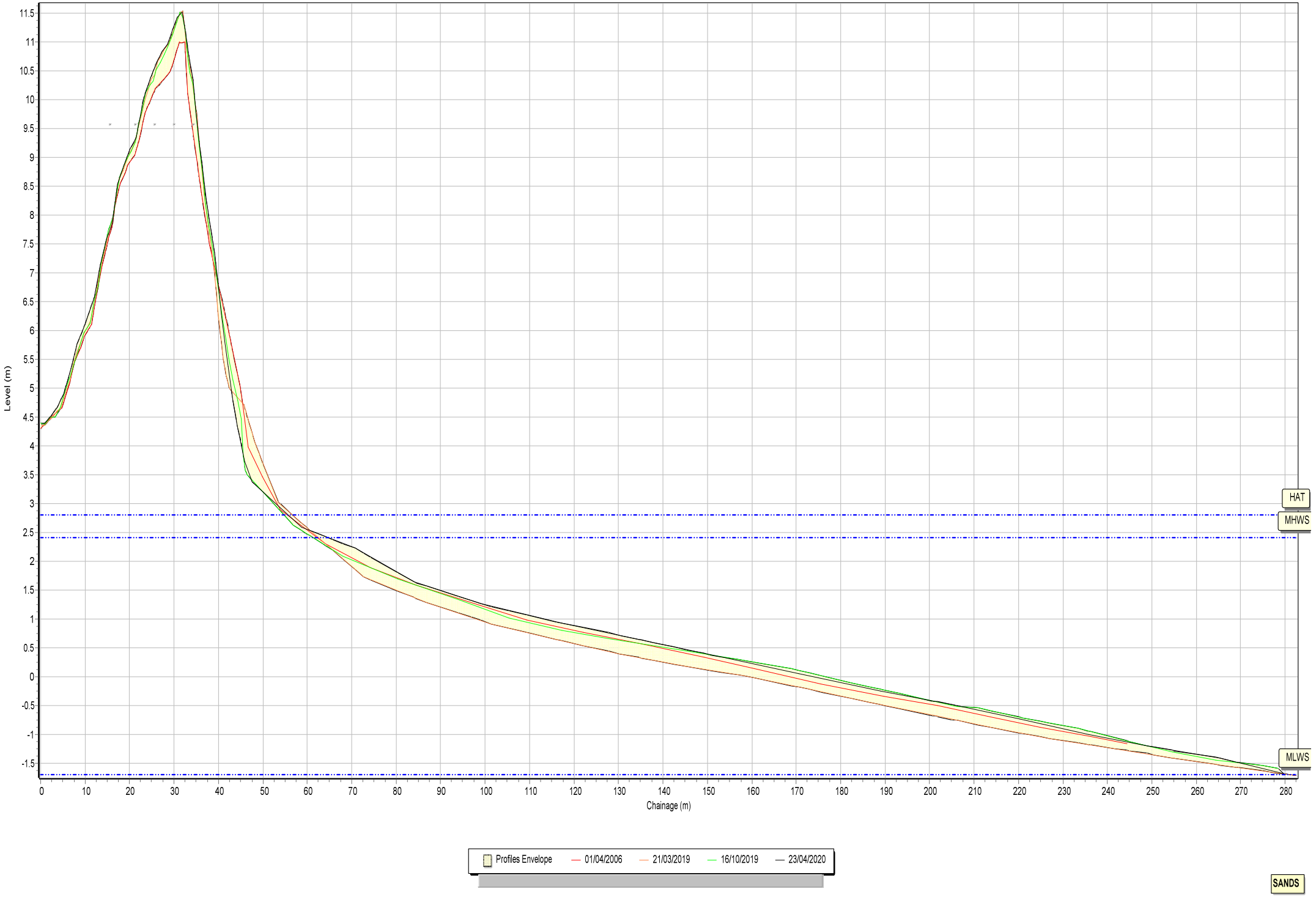


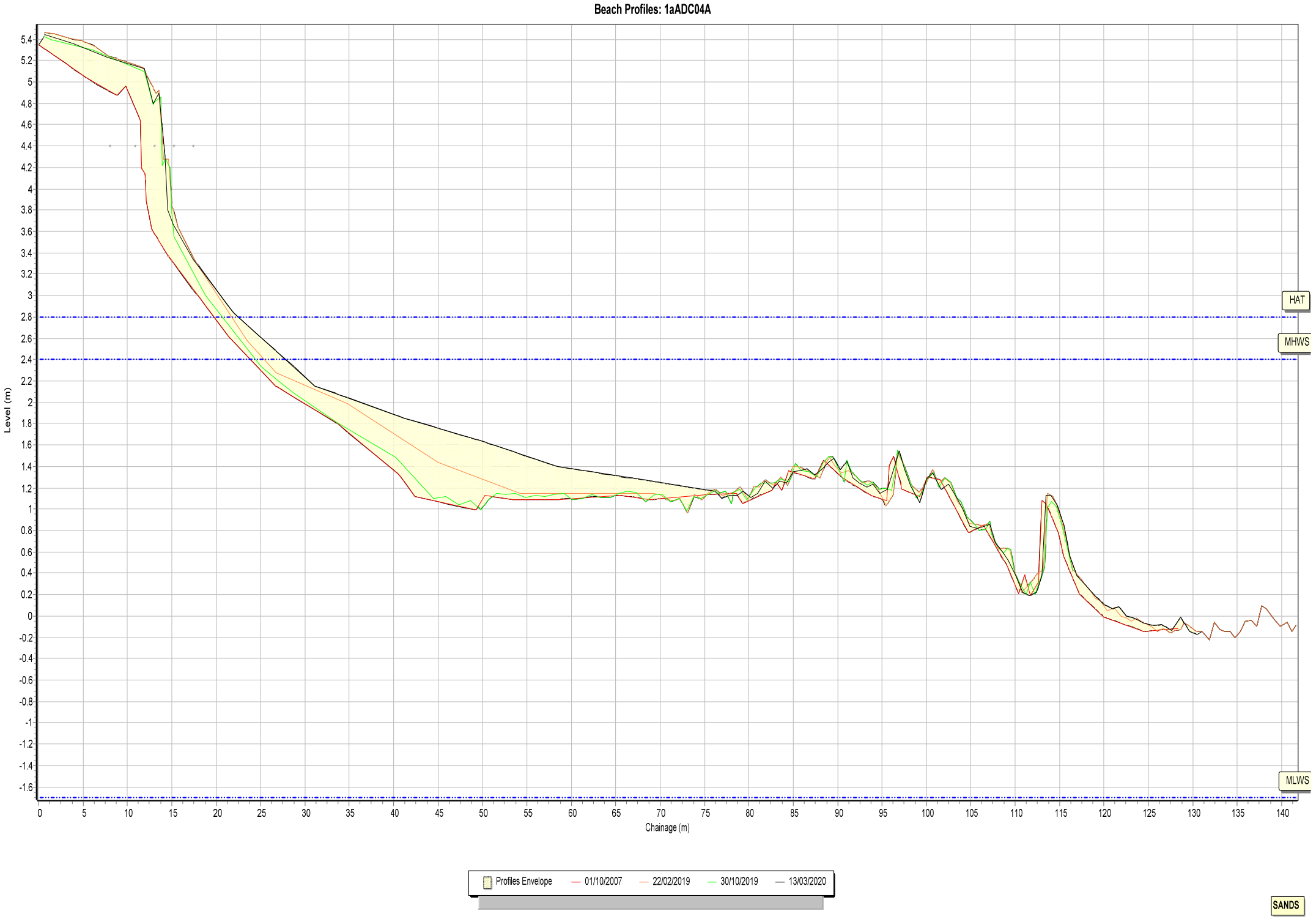
Beach Profiles: 1aBTBC37



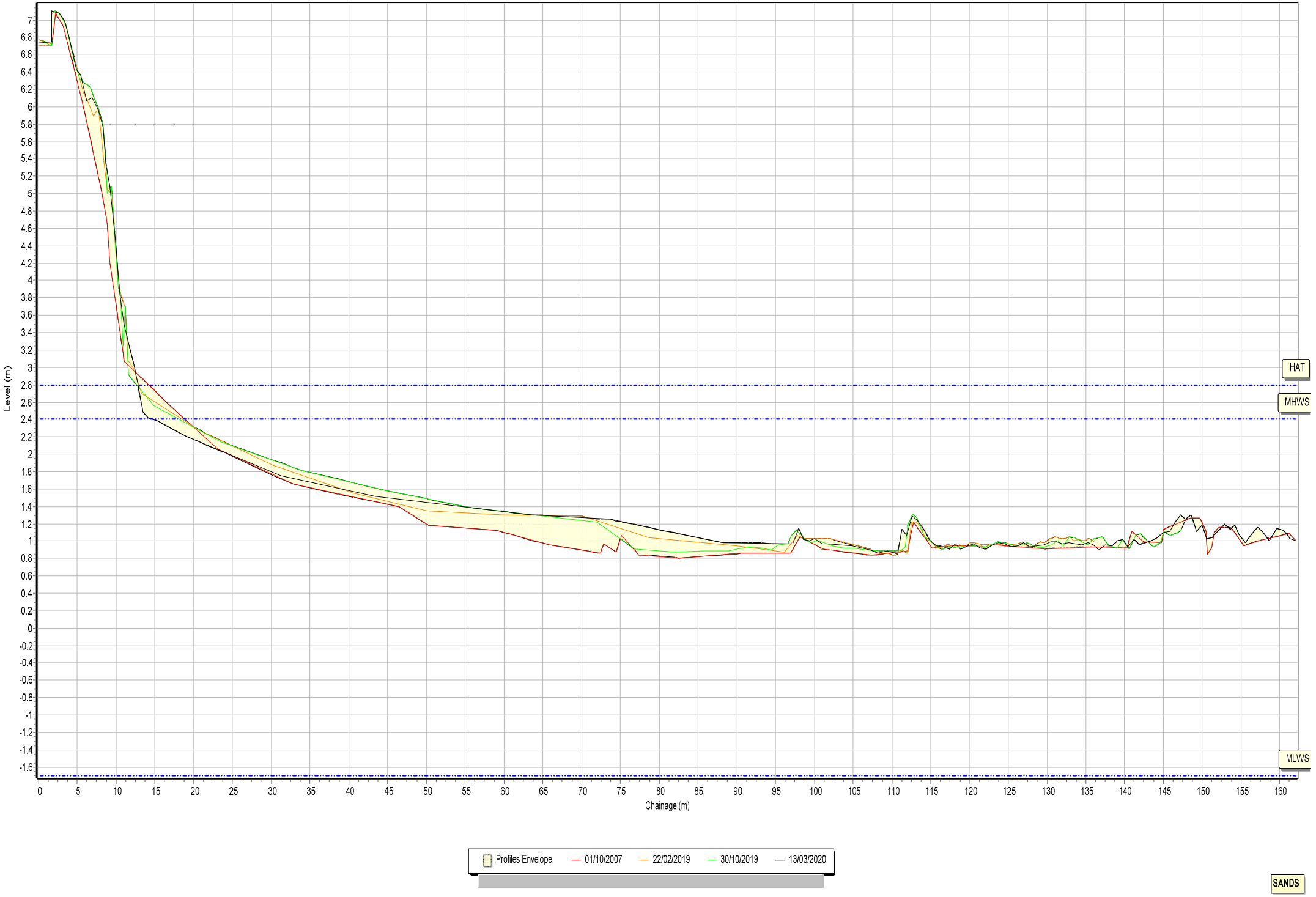

Beach Profiles: 1aADC01
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
21/03/2019
16/10/2019
23/04/2020
SANDS

Beach Profiles: 1aADC02

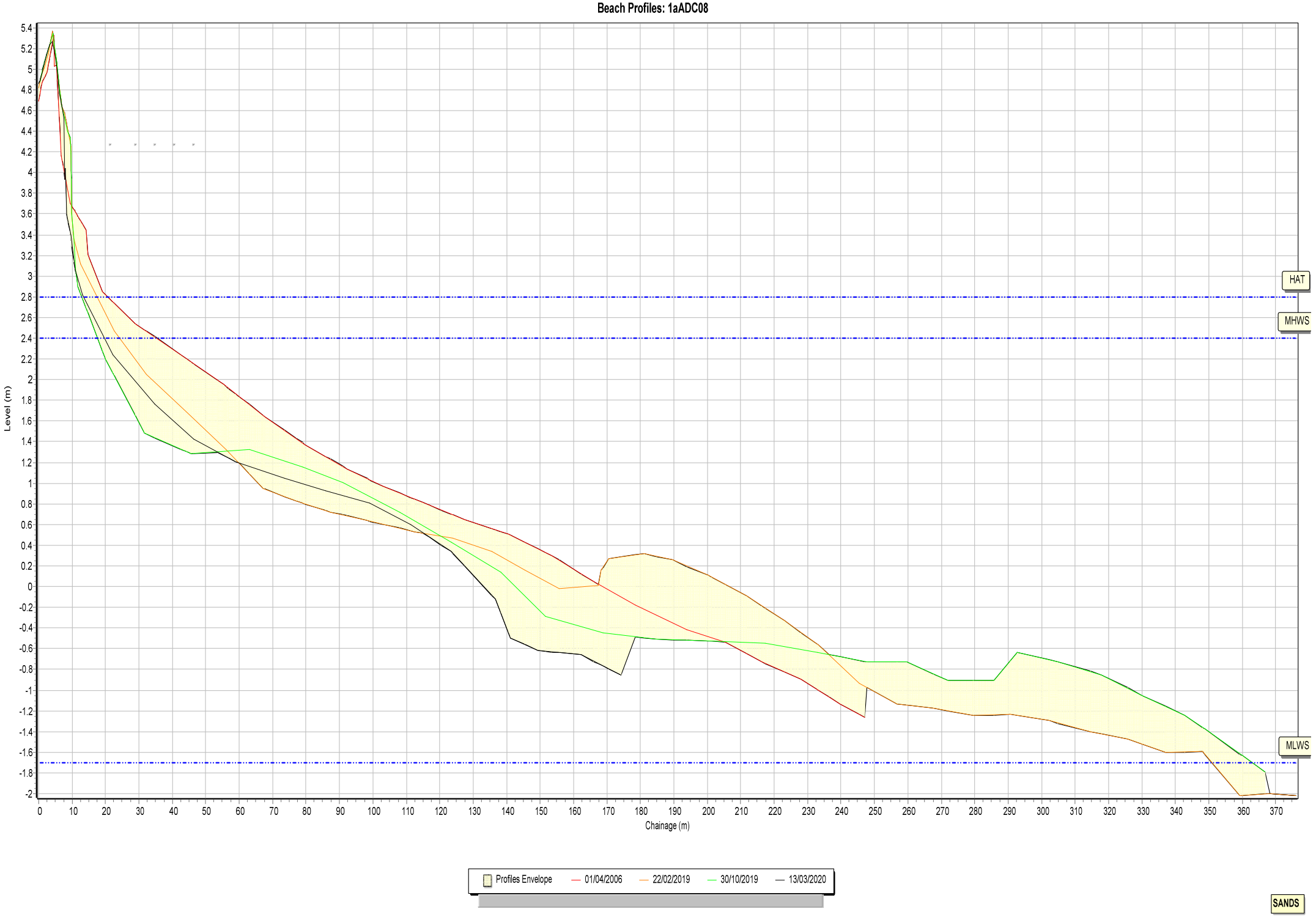



Beach Profiles: 1aADC04A
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2007
22/02/2019
30/10/2019
13/03/2020
SANDS

Beach Profiles: 1aADC04B



Beach Profiles: 1aADC07


Beach Profiles: 1aADC08
Level (m)
Chainage (m)
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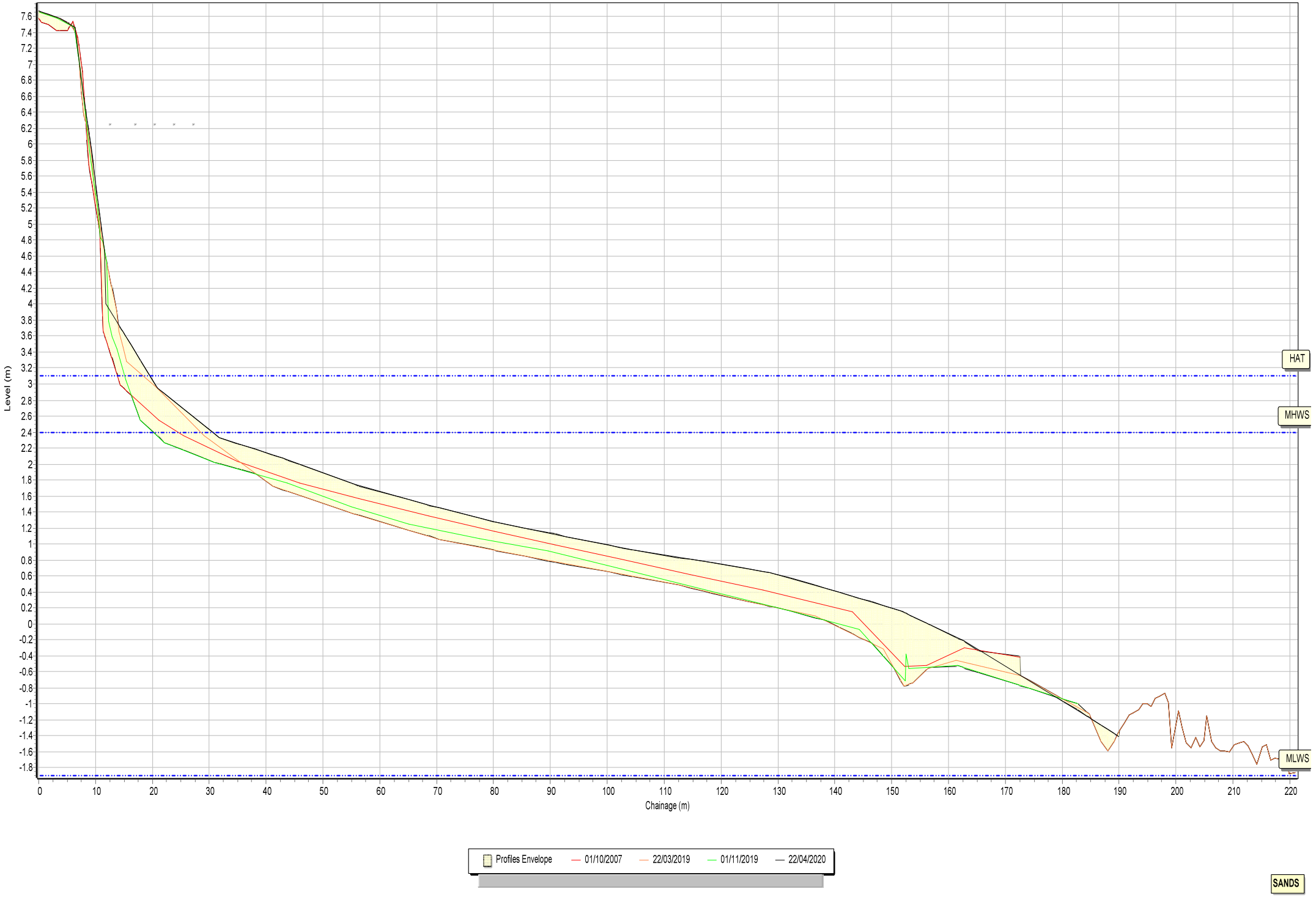
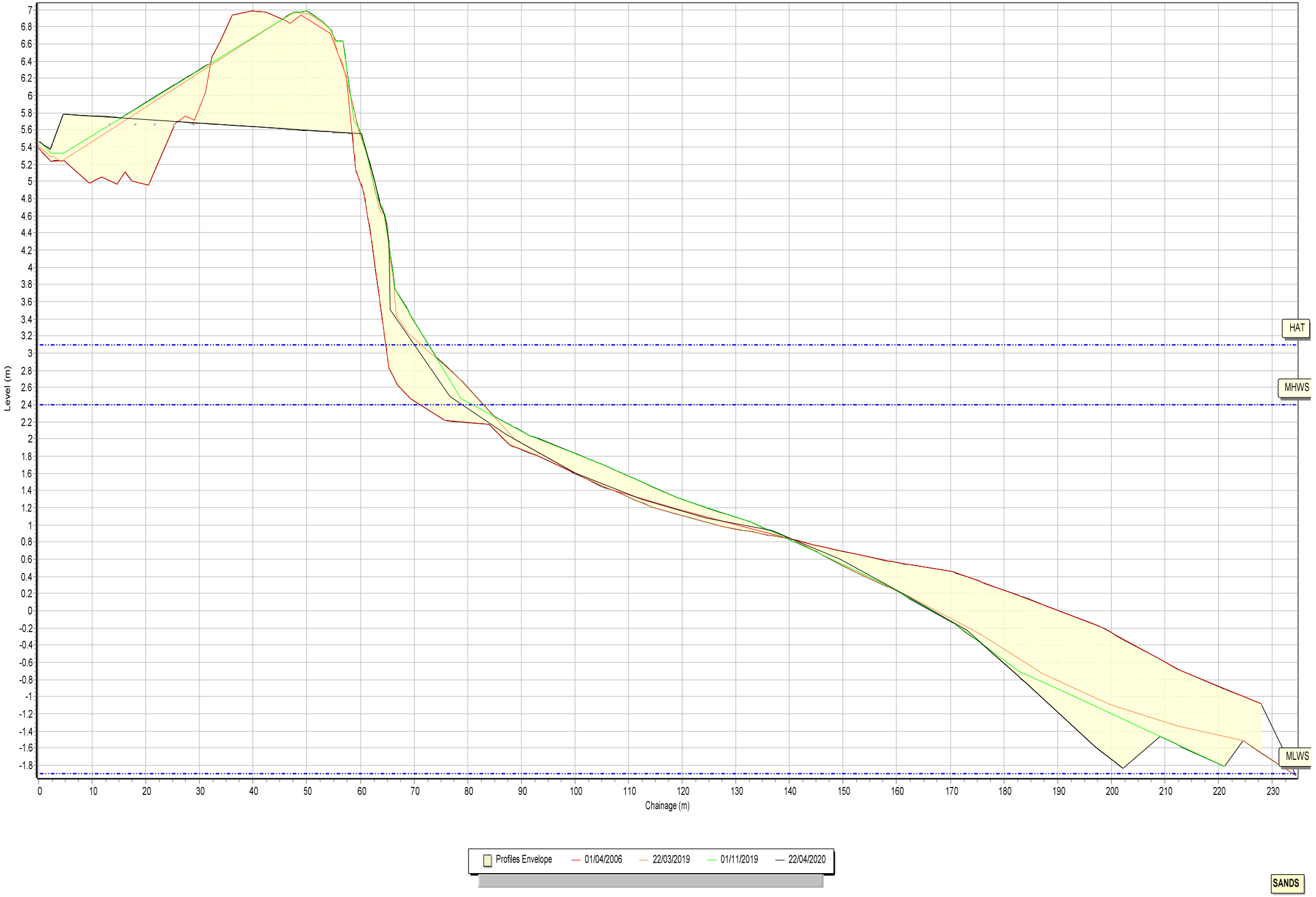
MHWS
MLWS
Profiles Envelope
01/04/2006
22/02/2019
30/10/2019
13/03/2020
SANDS

Beach Profiles: 1aADC09

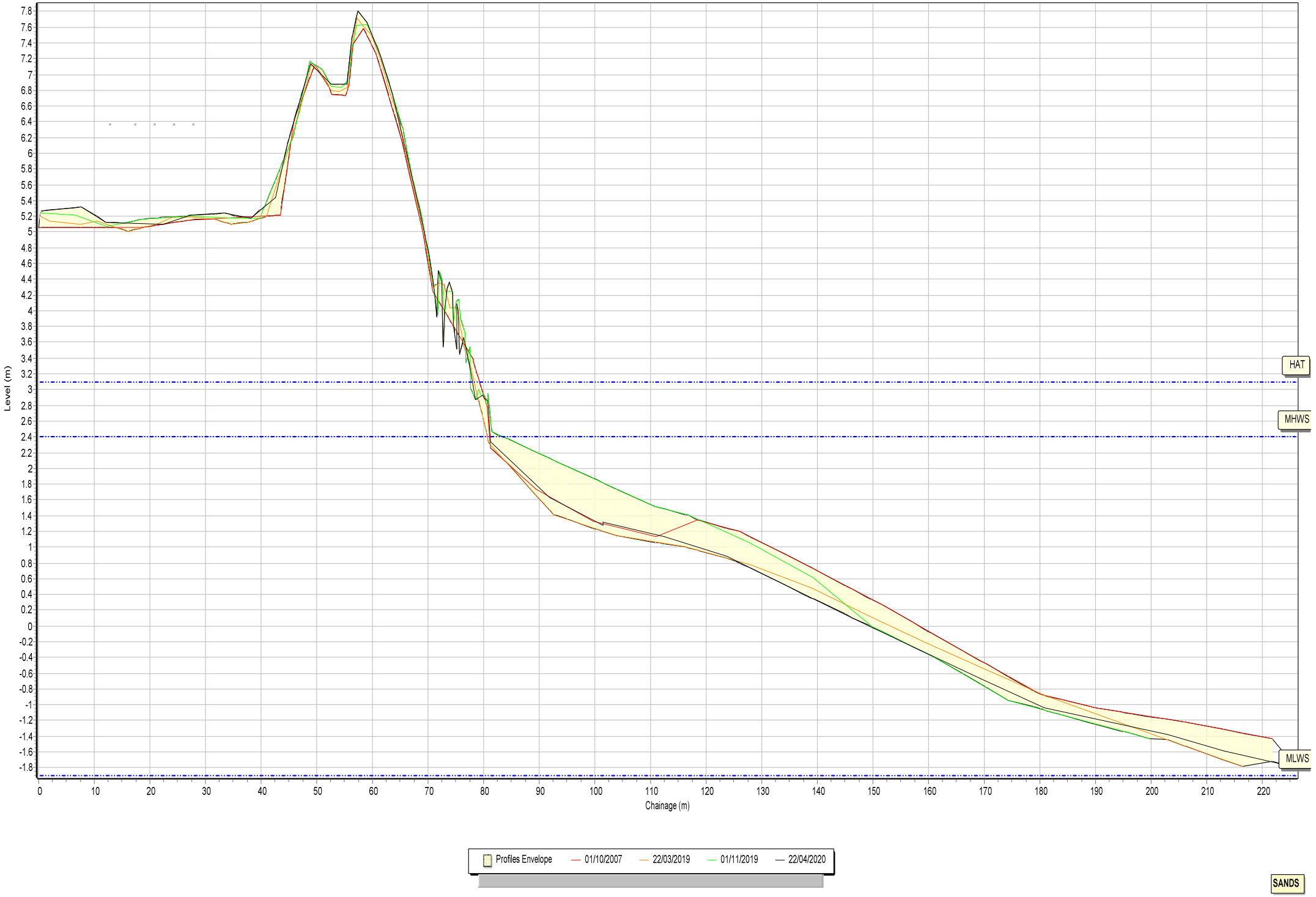
Beach Profiles: 1aADC15A



Beach Profiles: 1aADC16



Beach Profiles: 1aADC16A




Beach Profiles: 1aADC16B
Level (m)
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
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-2
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MHWS
MLWS
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220
230
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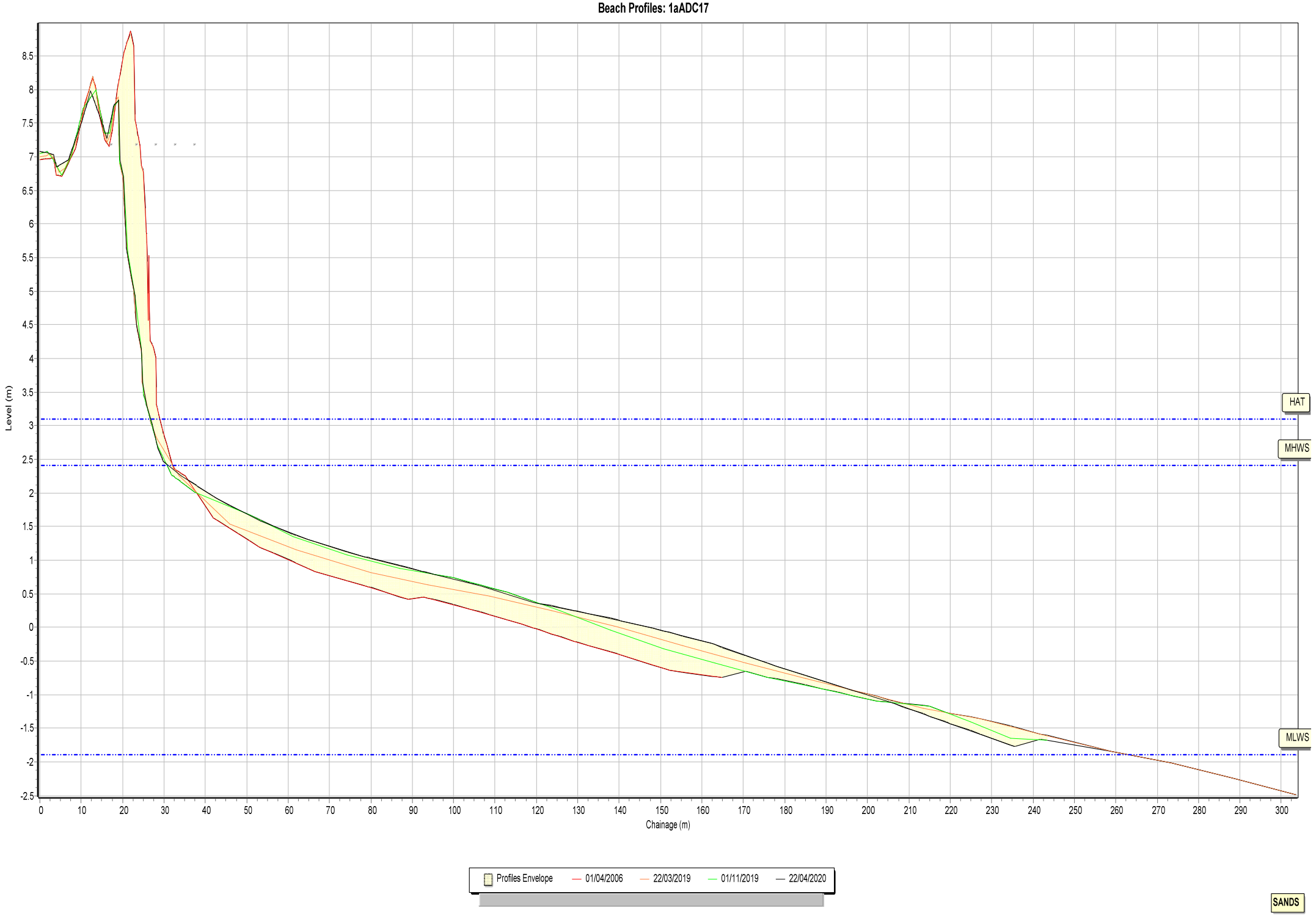
Chainage (m)
Profiles Envelope
01/10/2007
22/03/2019
01/11/2019
22/04/2020
SANDS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Level (m)
Chainage (m)
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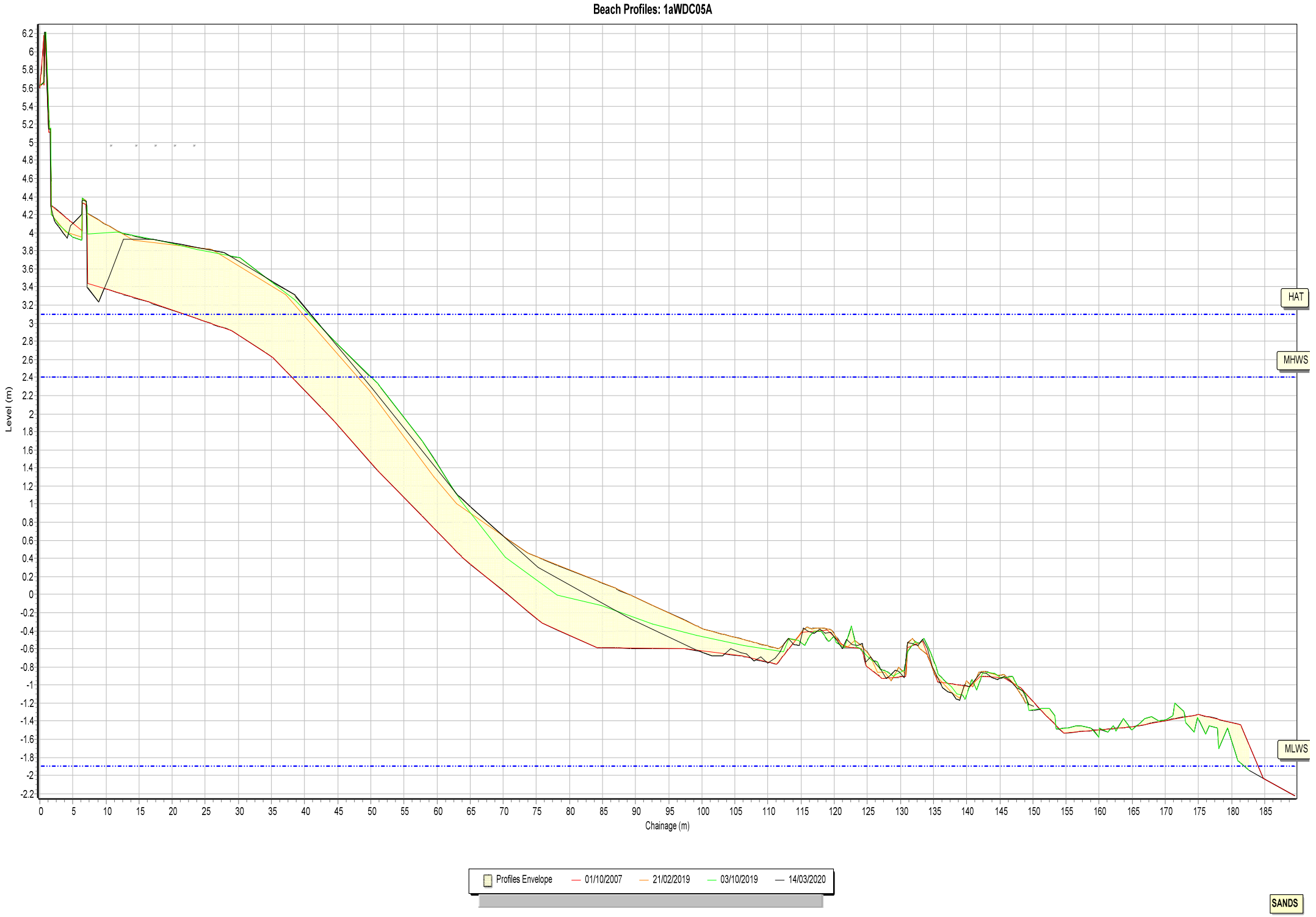
MHWS
MLWS
Profiles Envelope
01/04/2006
22/03/2019
01/11/2019
22/04/2020
SANDS

Beach Profiles: 1aADC17A

Beach Profiles: 1aWDC05A


Beach Profiles: 1aWDC05A
Level (m)
Chainage (m)
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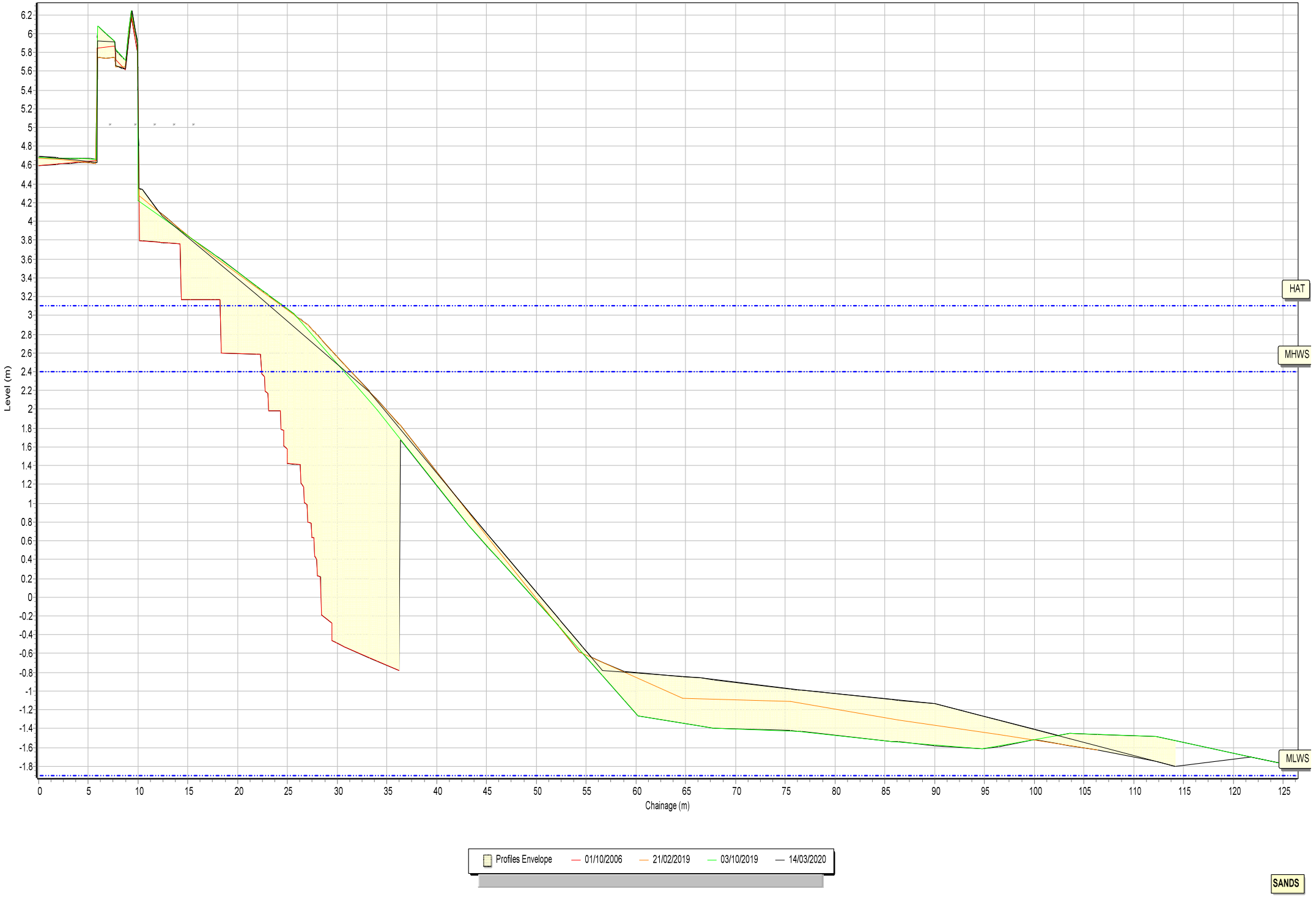
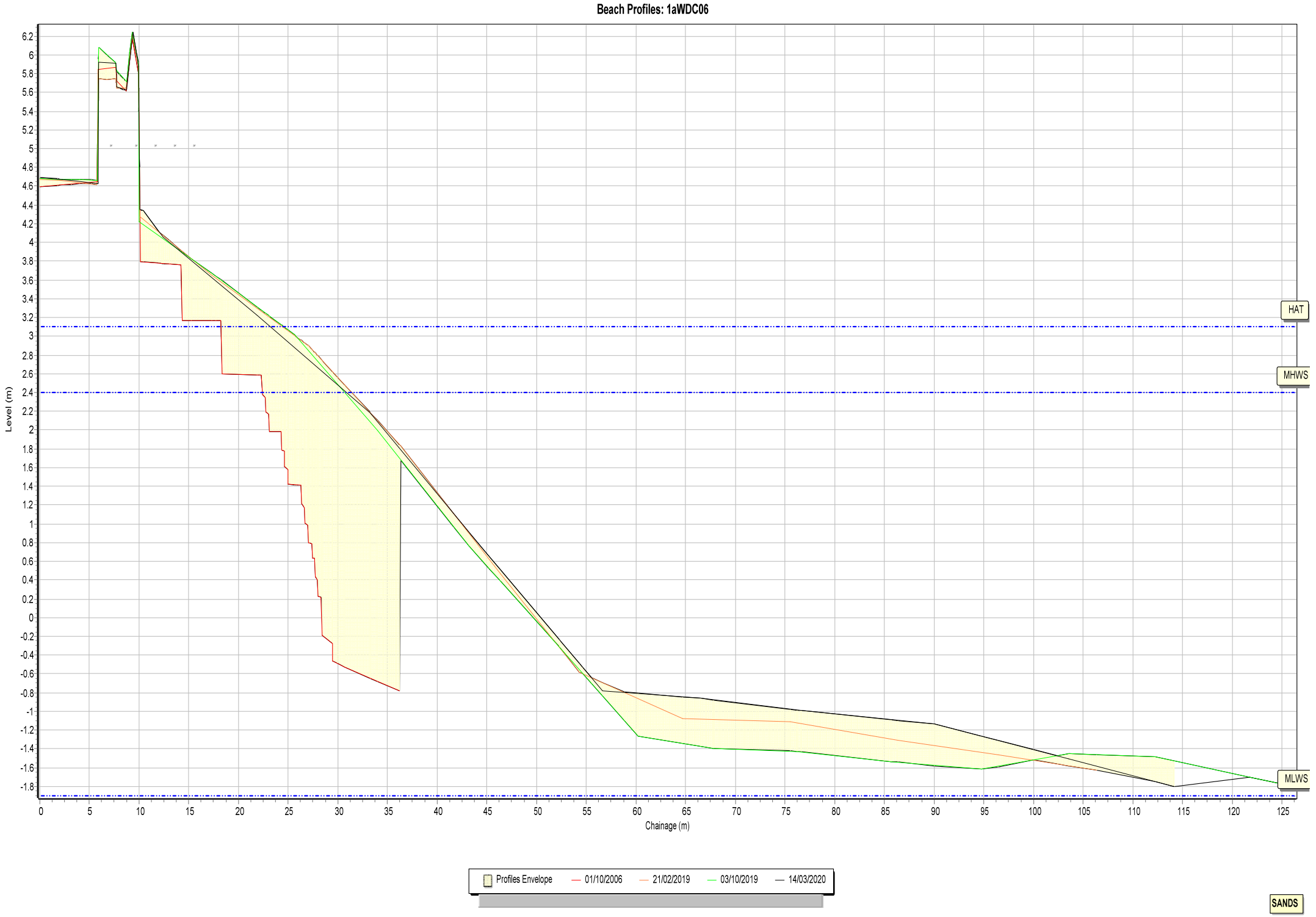
MHWS
MLWS
Profiles Envelope
01/10/2007
21/02/2019
03/10/2019
14/03/2020
SANDS

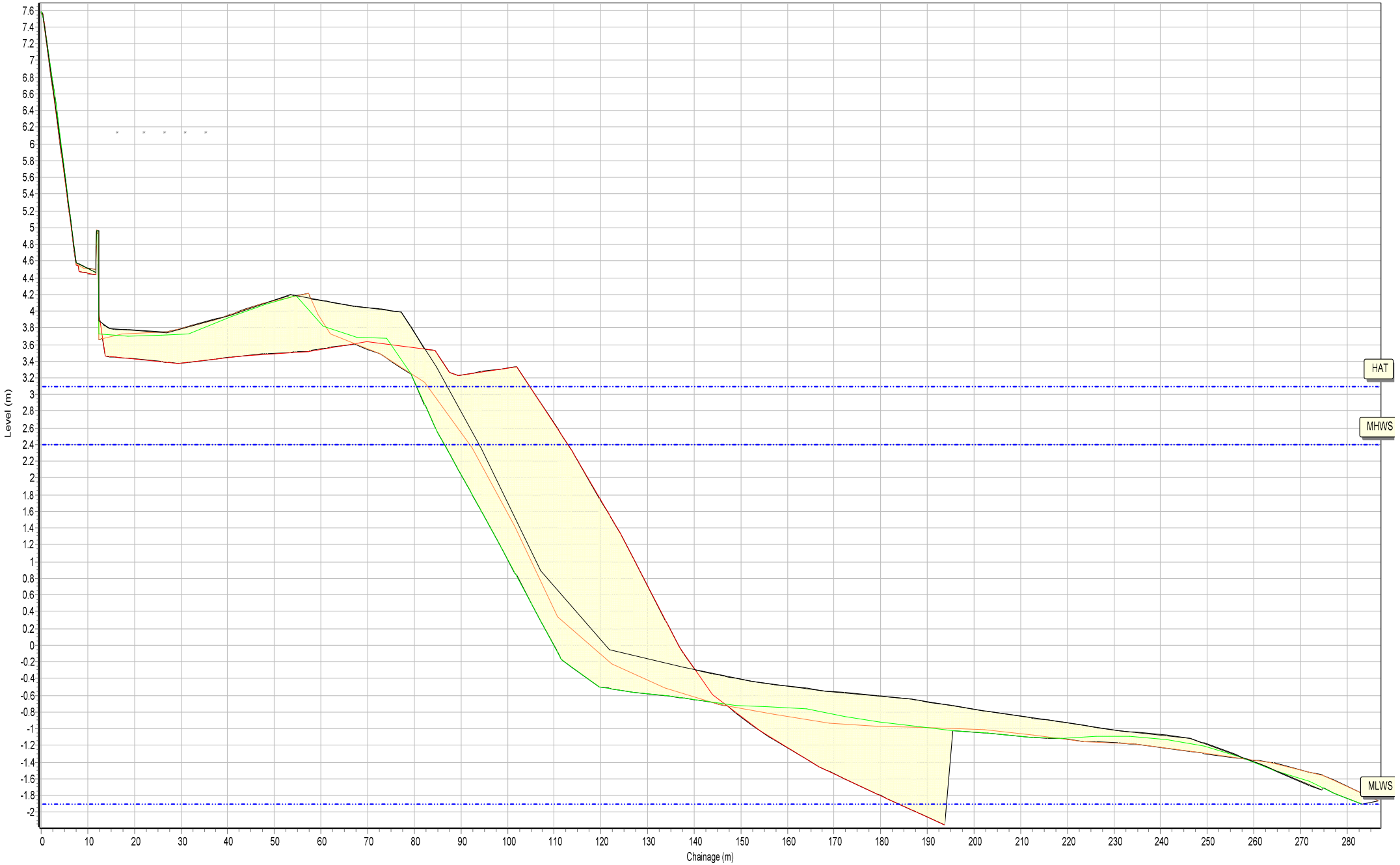
Beach Profiles: 1aWDC06

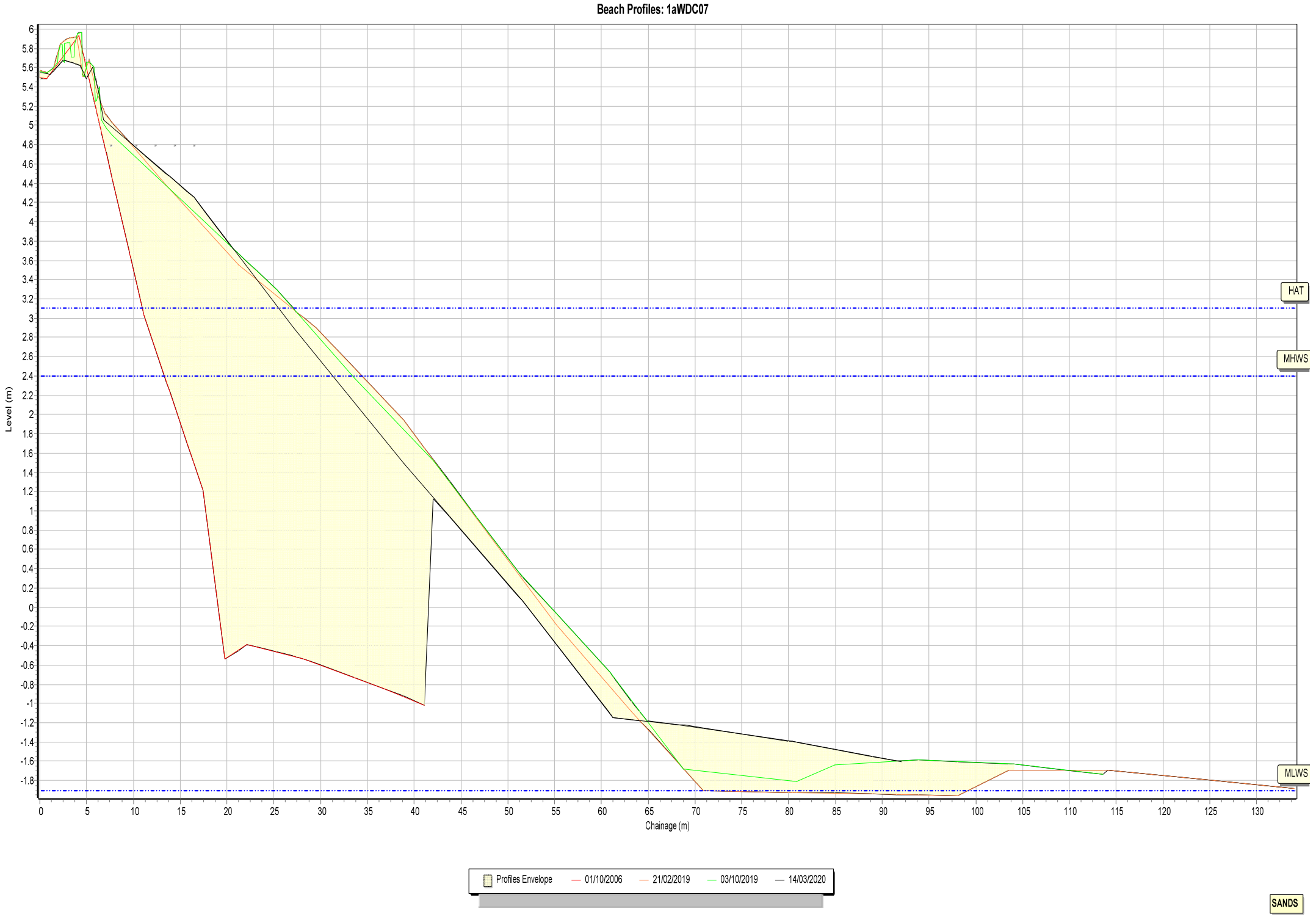



Beach Profiles: 1aWDC06
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
21/02/2019
03/10/2019
14/03/2020
SANDS


Beach Profiles: 1aWDC06A
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2007
21/02/2019
03/10/2019
14/03/2020
SANDS

Beach Profiles: 1aWDC06A




Beach Profiles: 1aWDC07
Level (m)
Chainage (m)
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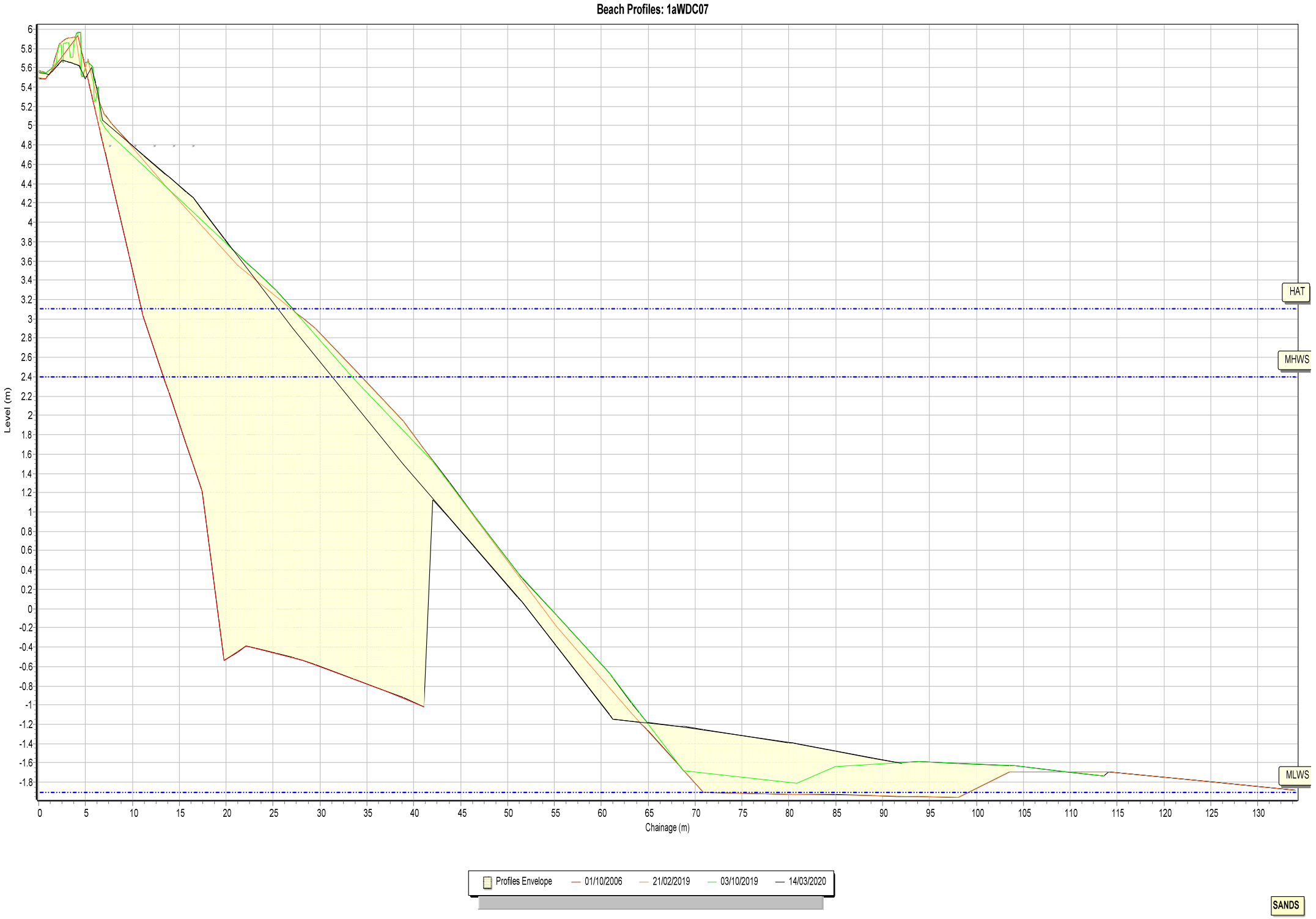
MHWS
MLWS
Profiles Envelope
01/10/2006
21/02/2019
03/10/2019
14/03/2020
SANDS


Beach Profiles: 1aWDC07
Level (m)
Chainage (m)
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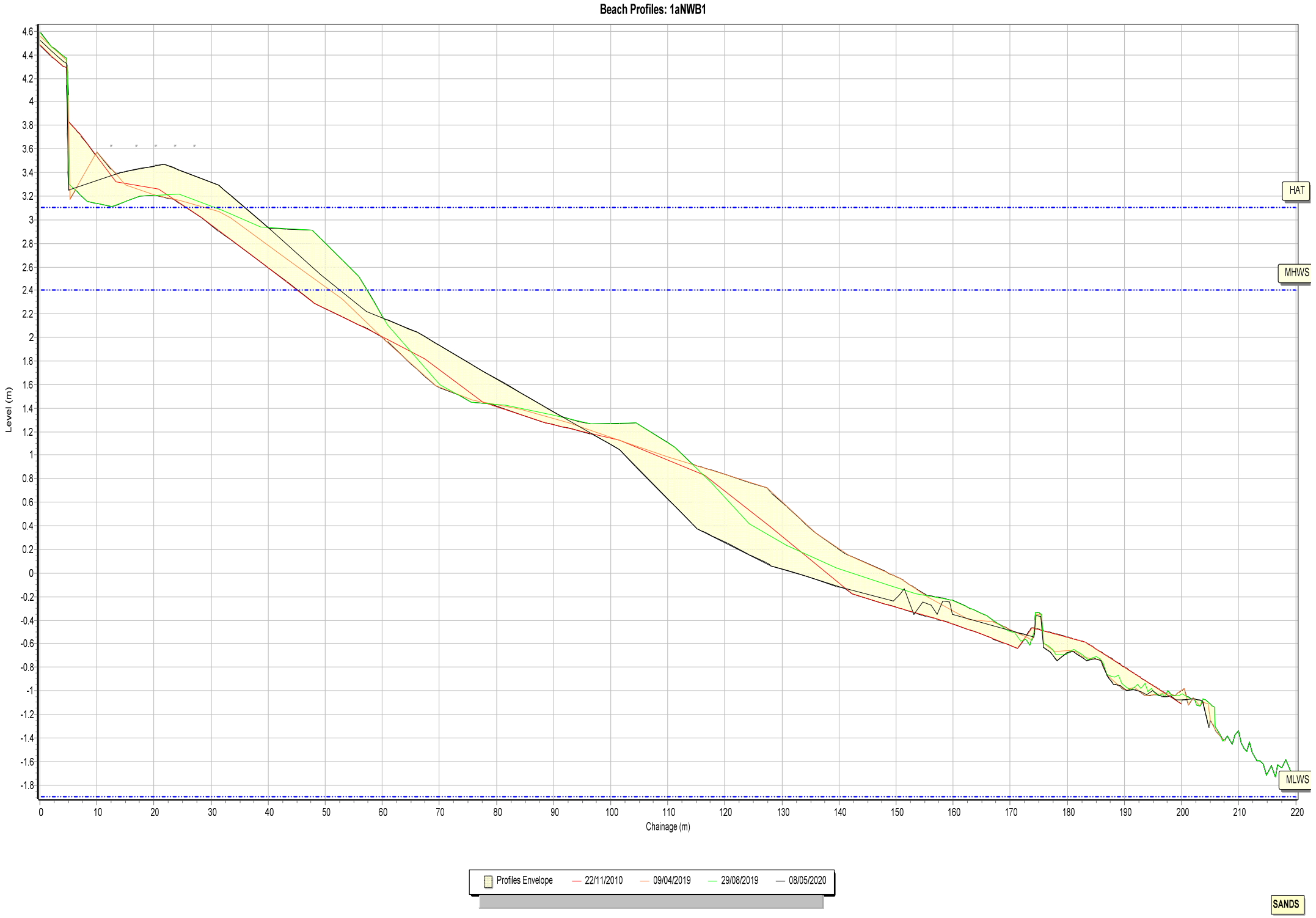
MHWS
MLWS
Profiles Envelope
01/10/2006
21/02/2019
03/10/2019
14/03/2020
SANDS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Chainage (m)
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MHWS
MLWS
Profiles Envelope
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09/04/2019
29/08/2019
08/05/2020
SANDS


Beach Profiles: 1aNWB2
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
09/04/2019
29/08/2019
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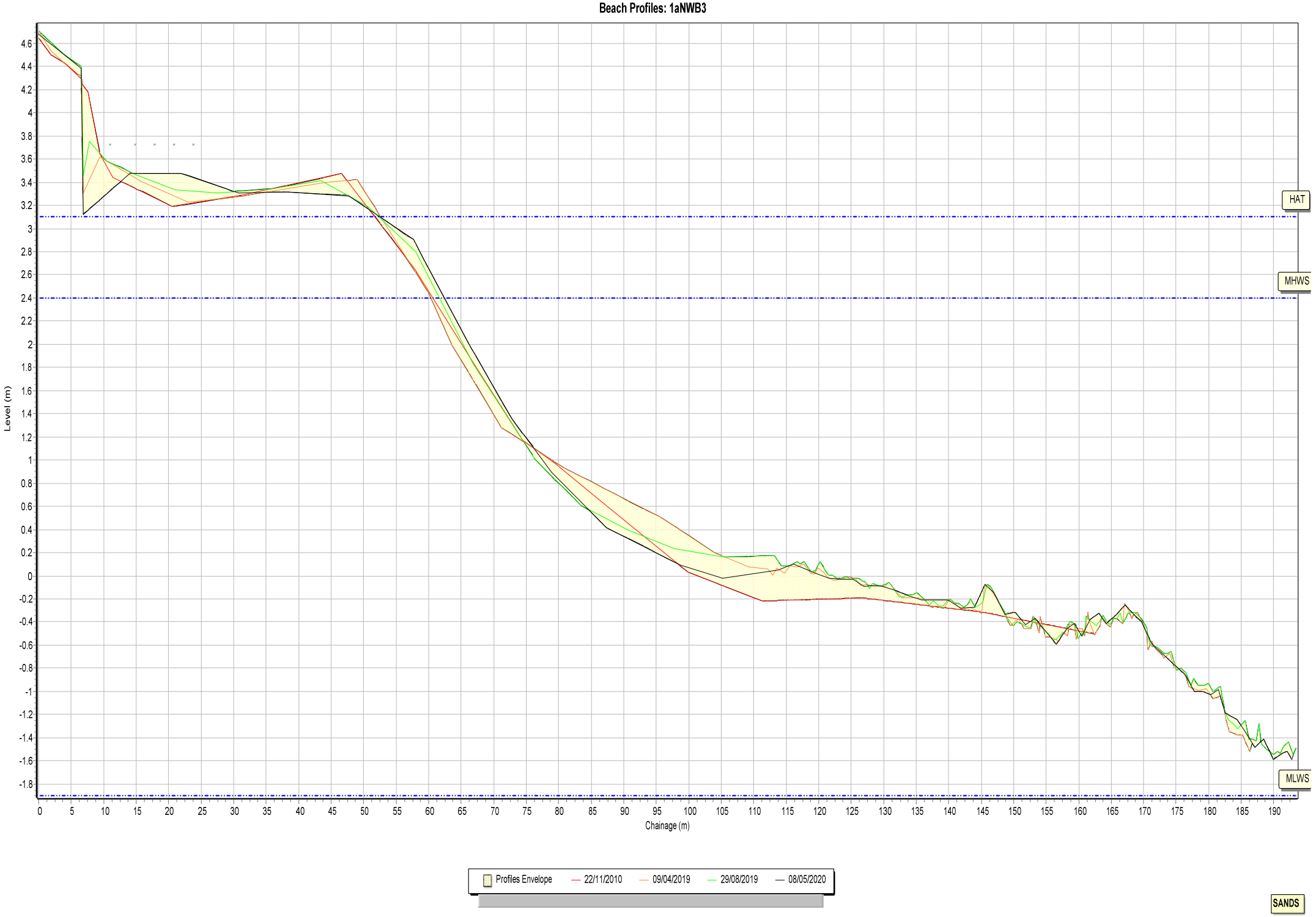
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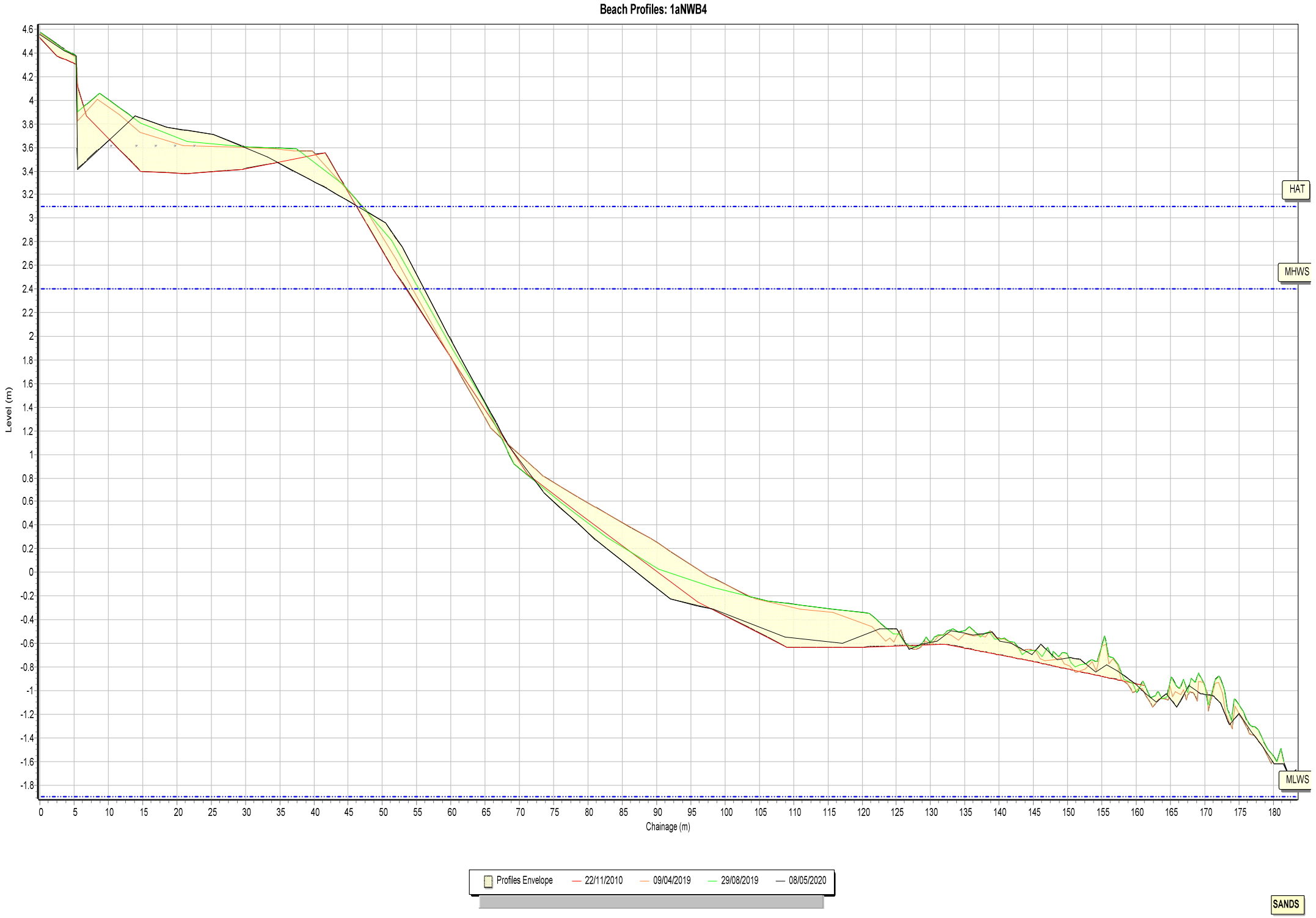
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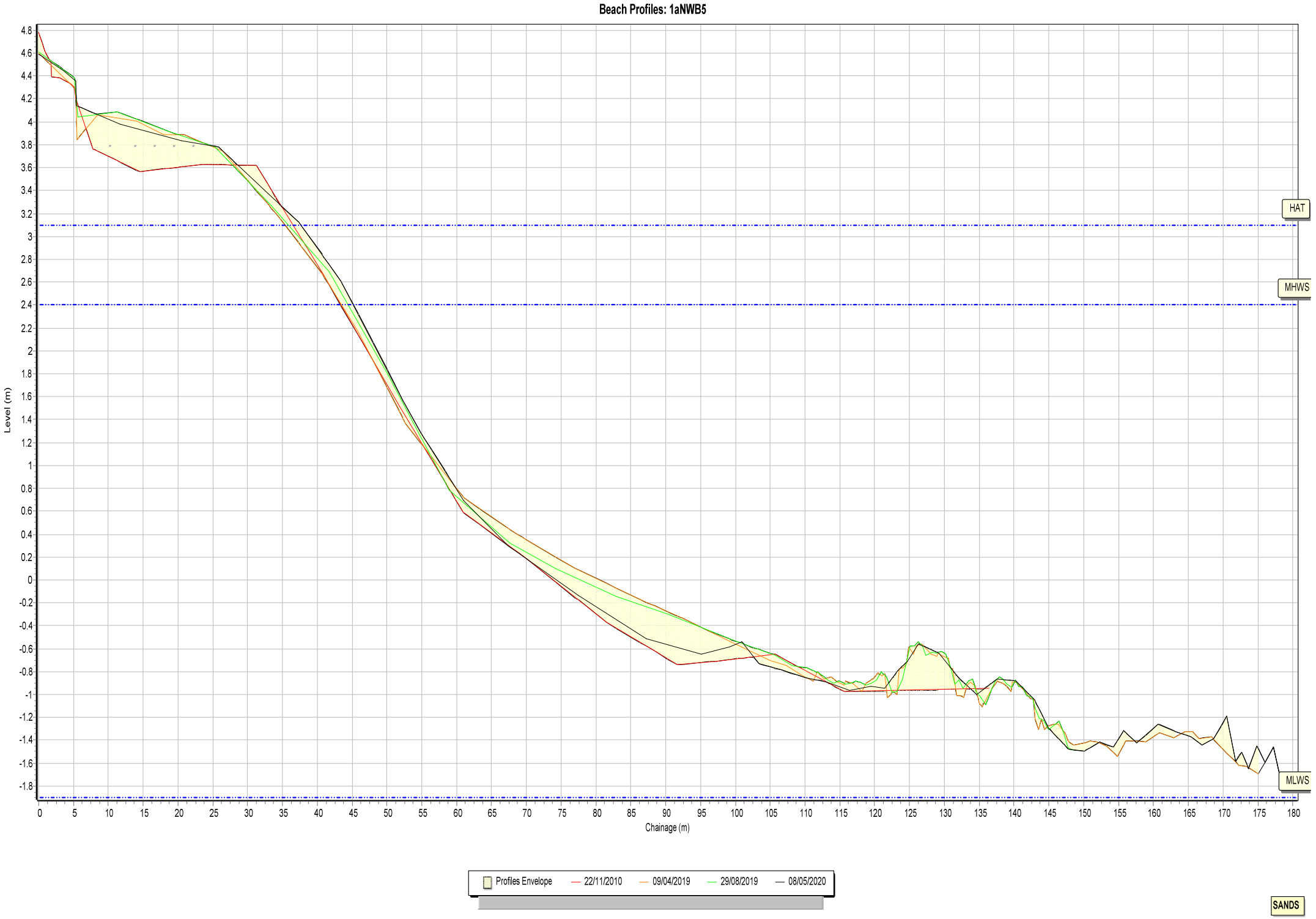
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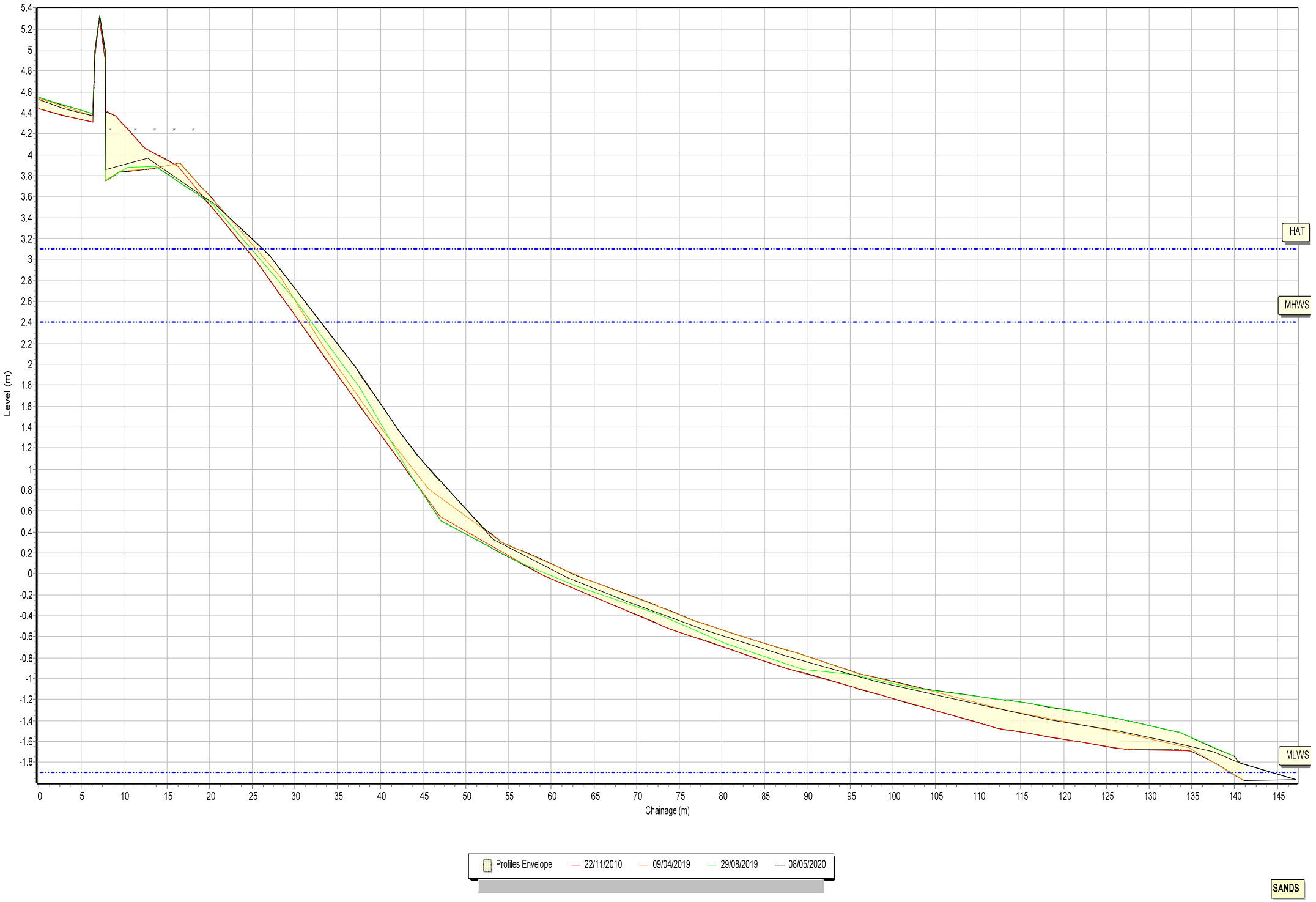

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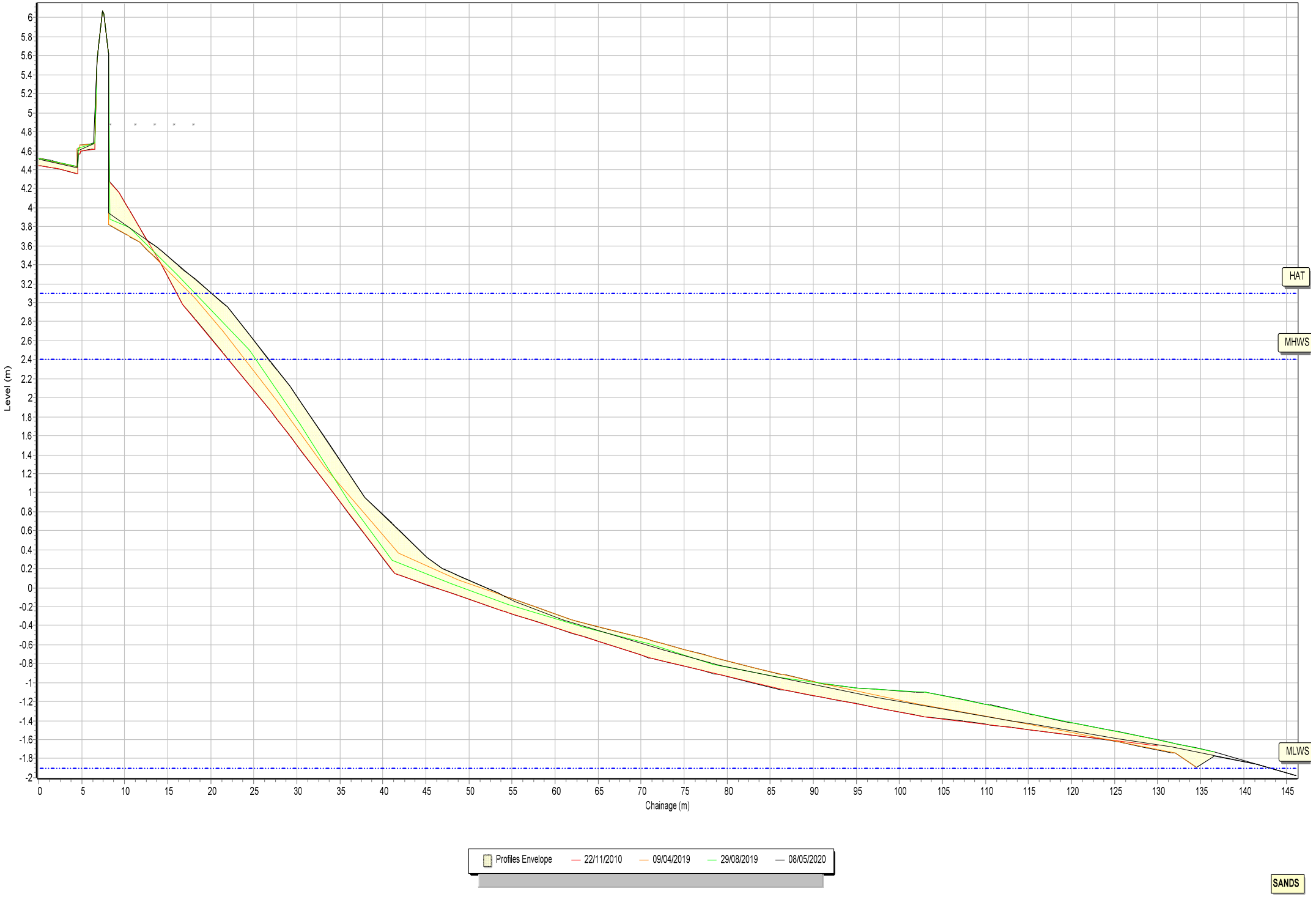

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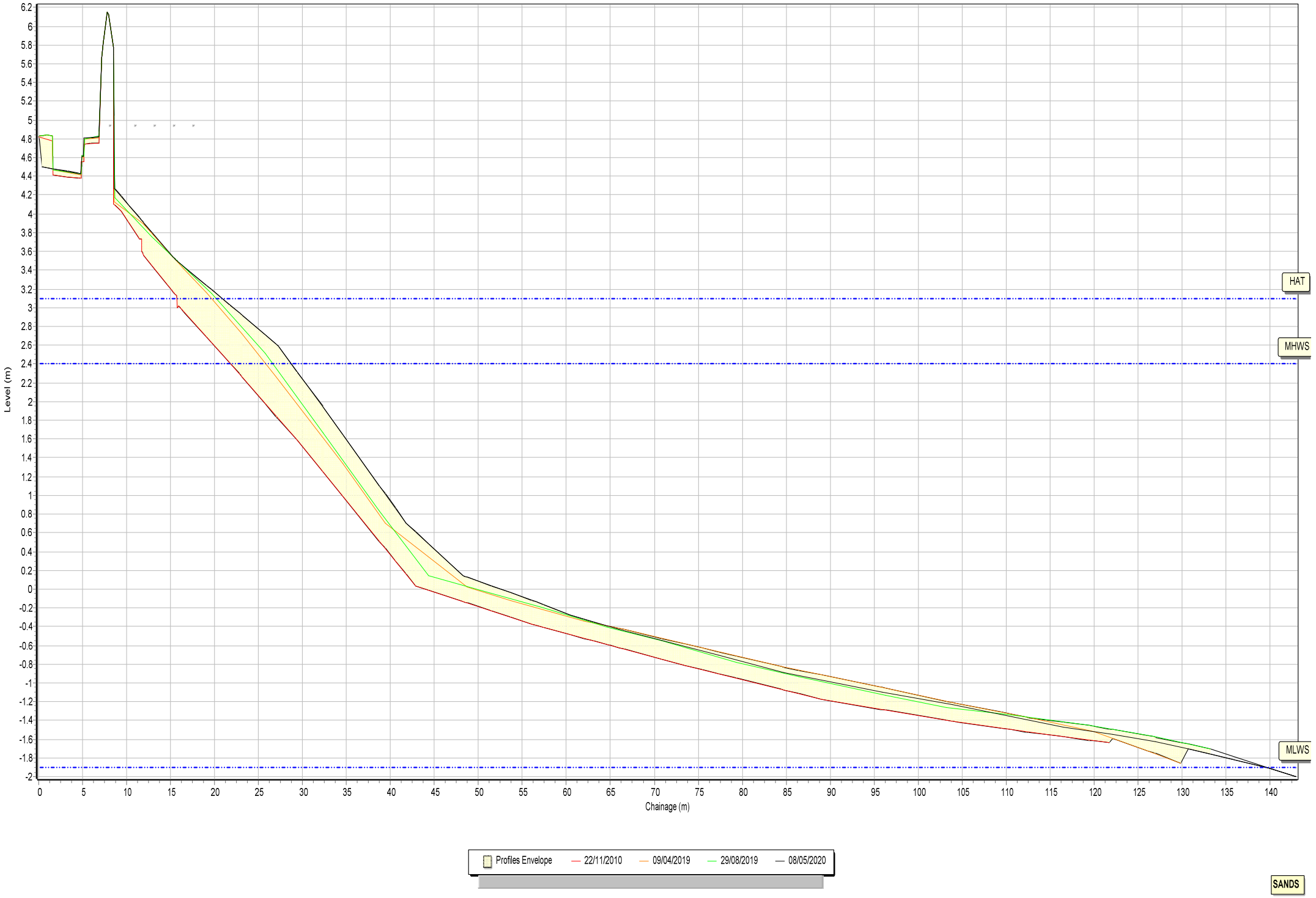

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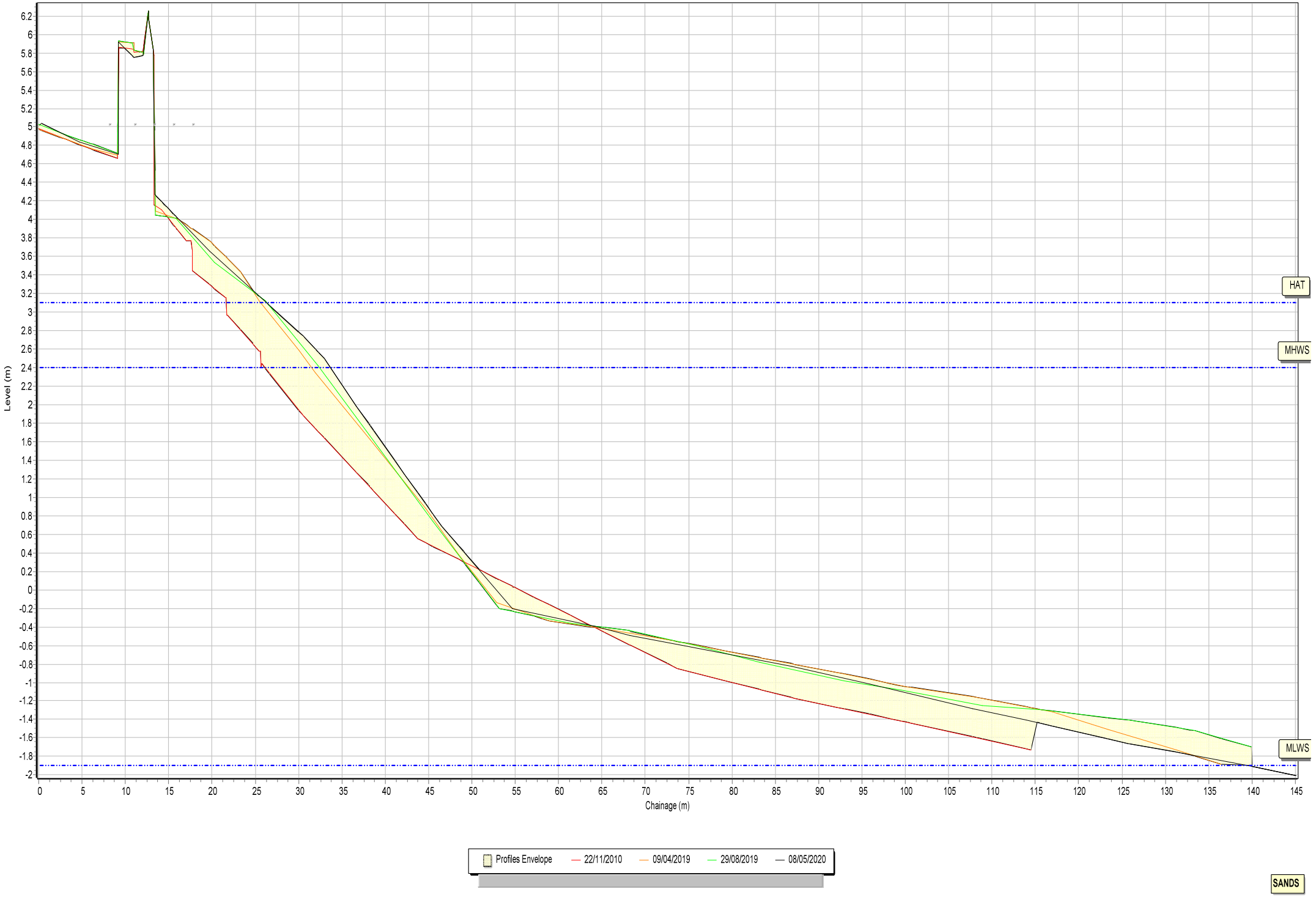

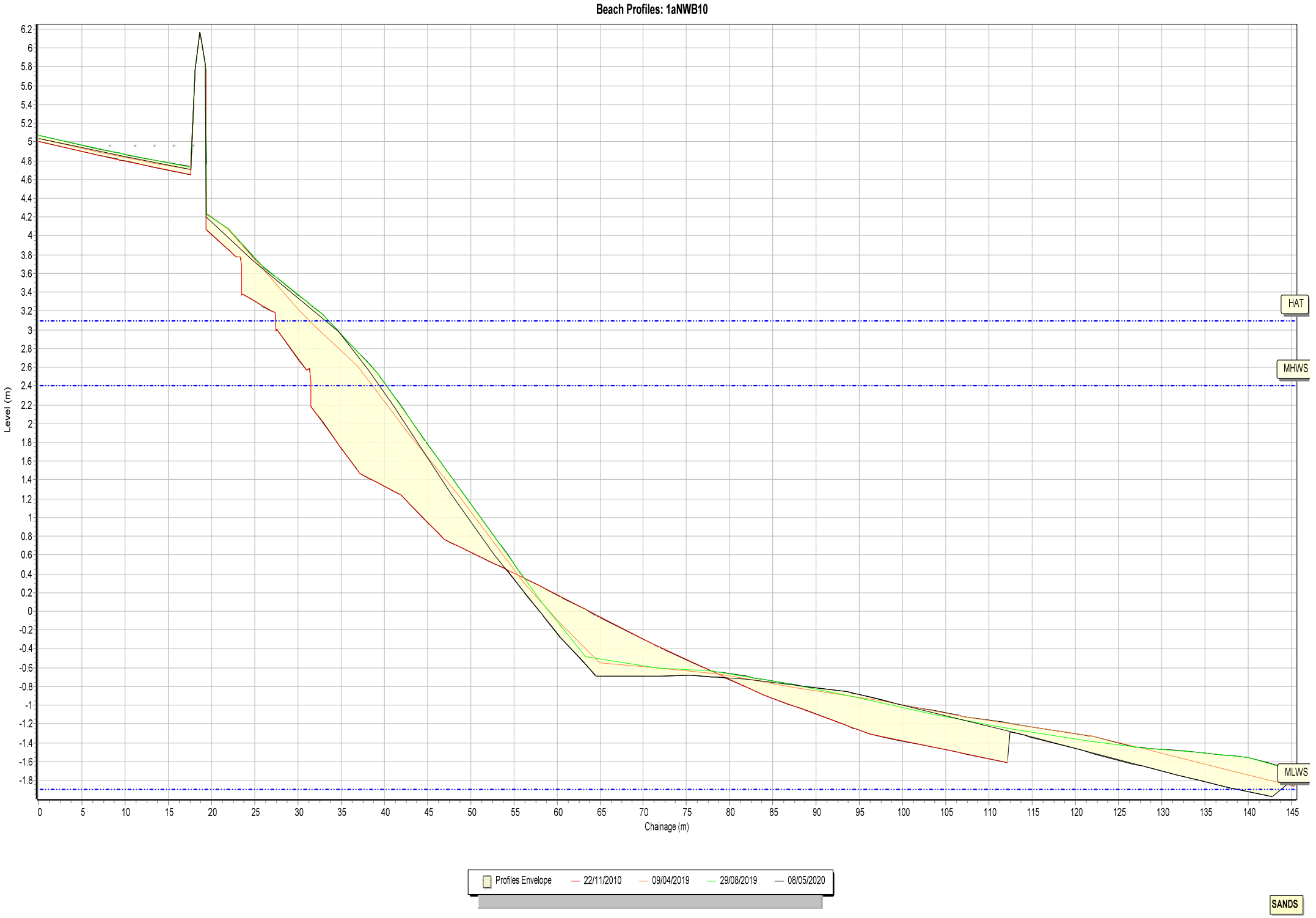
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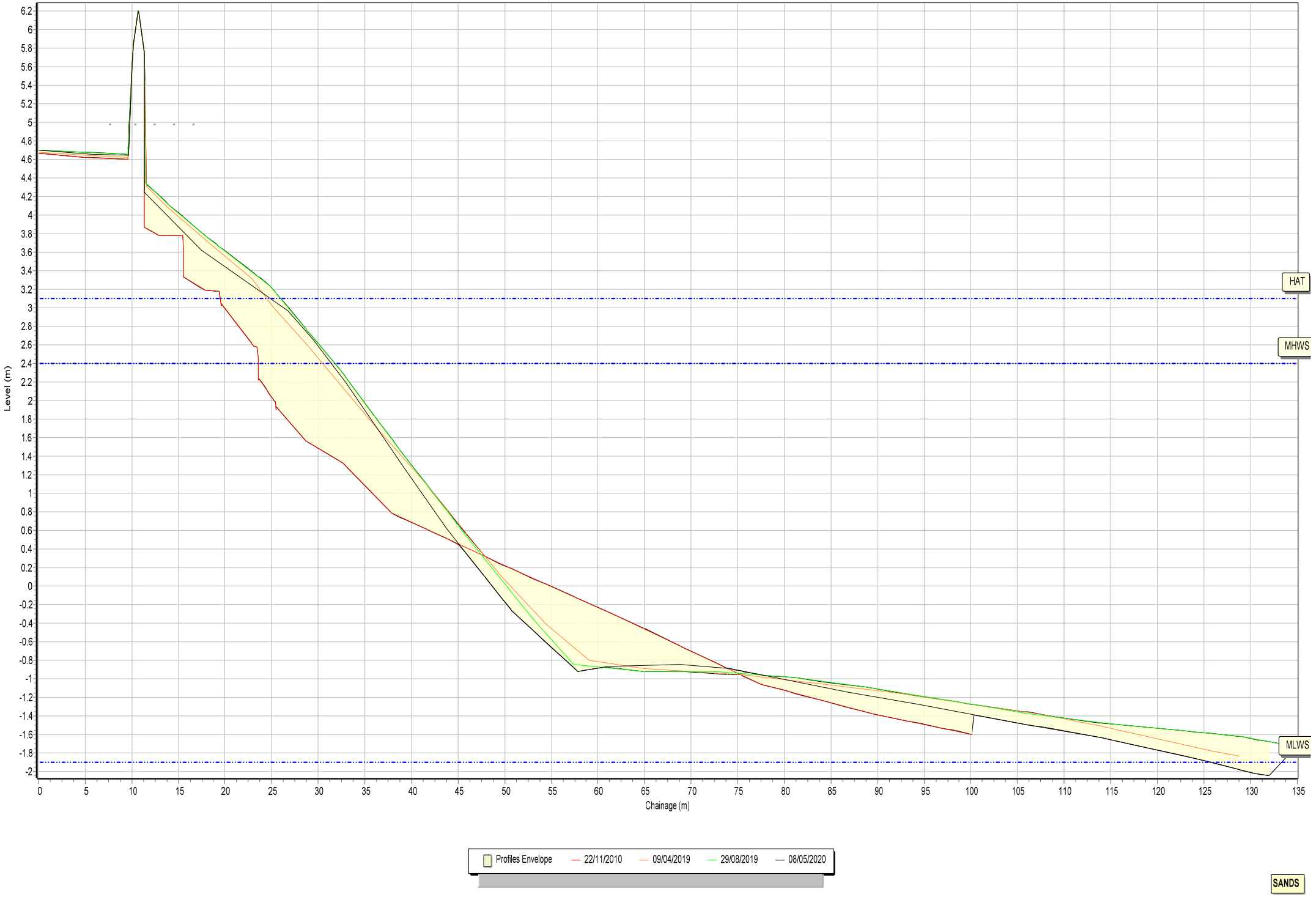

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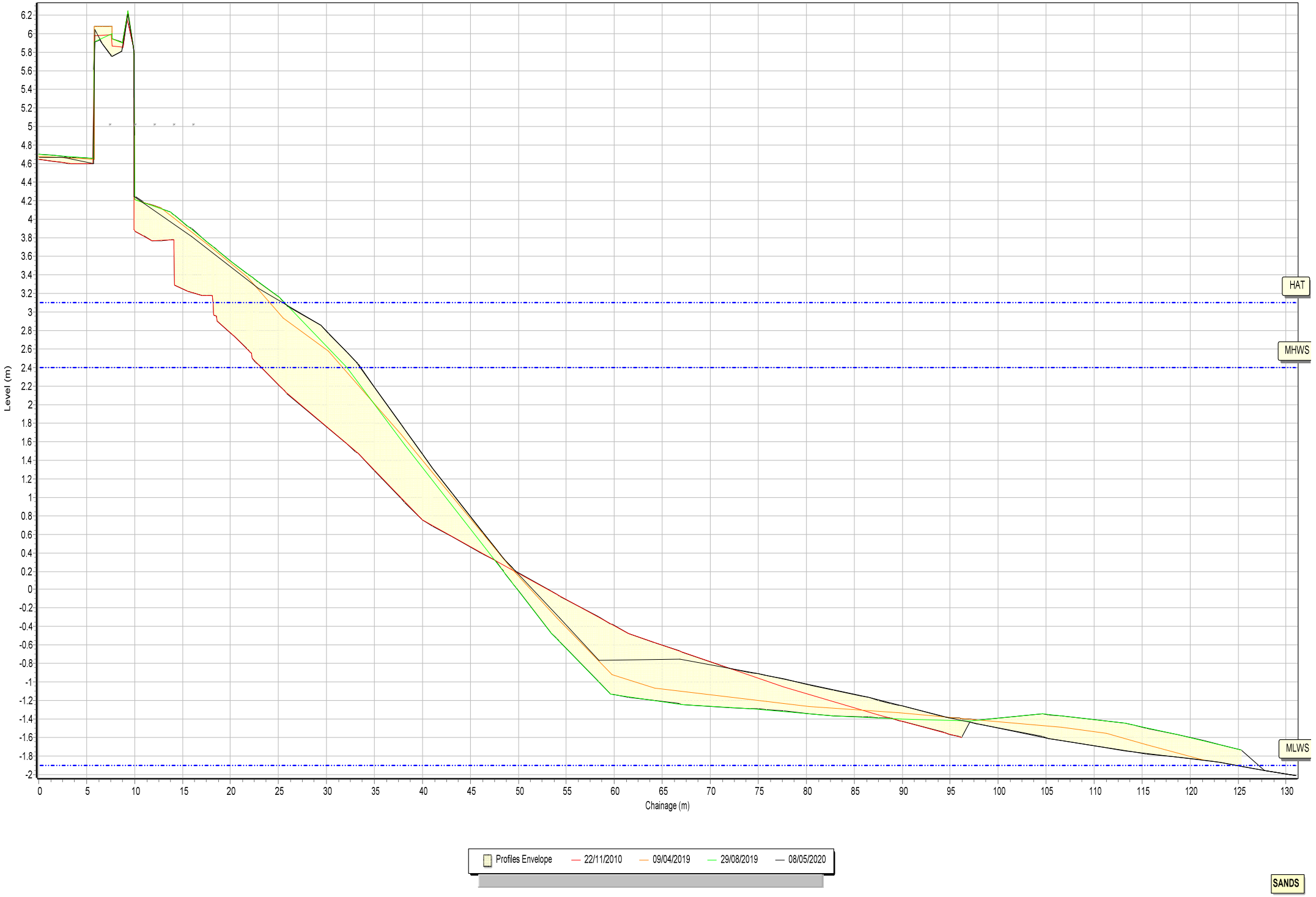

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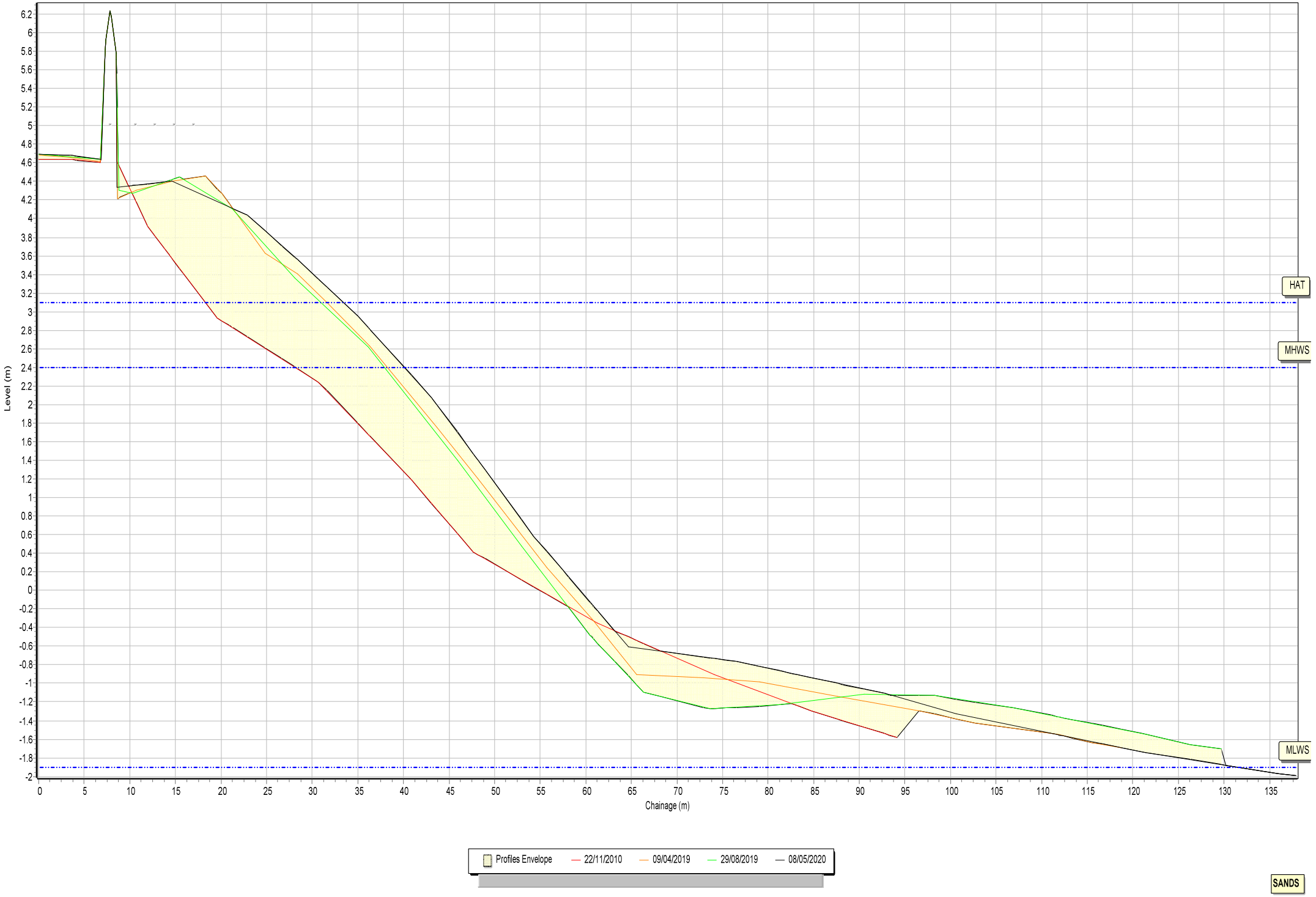

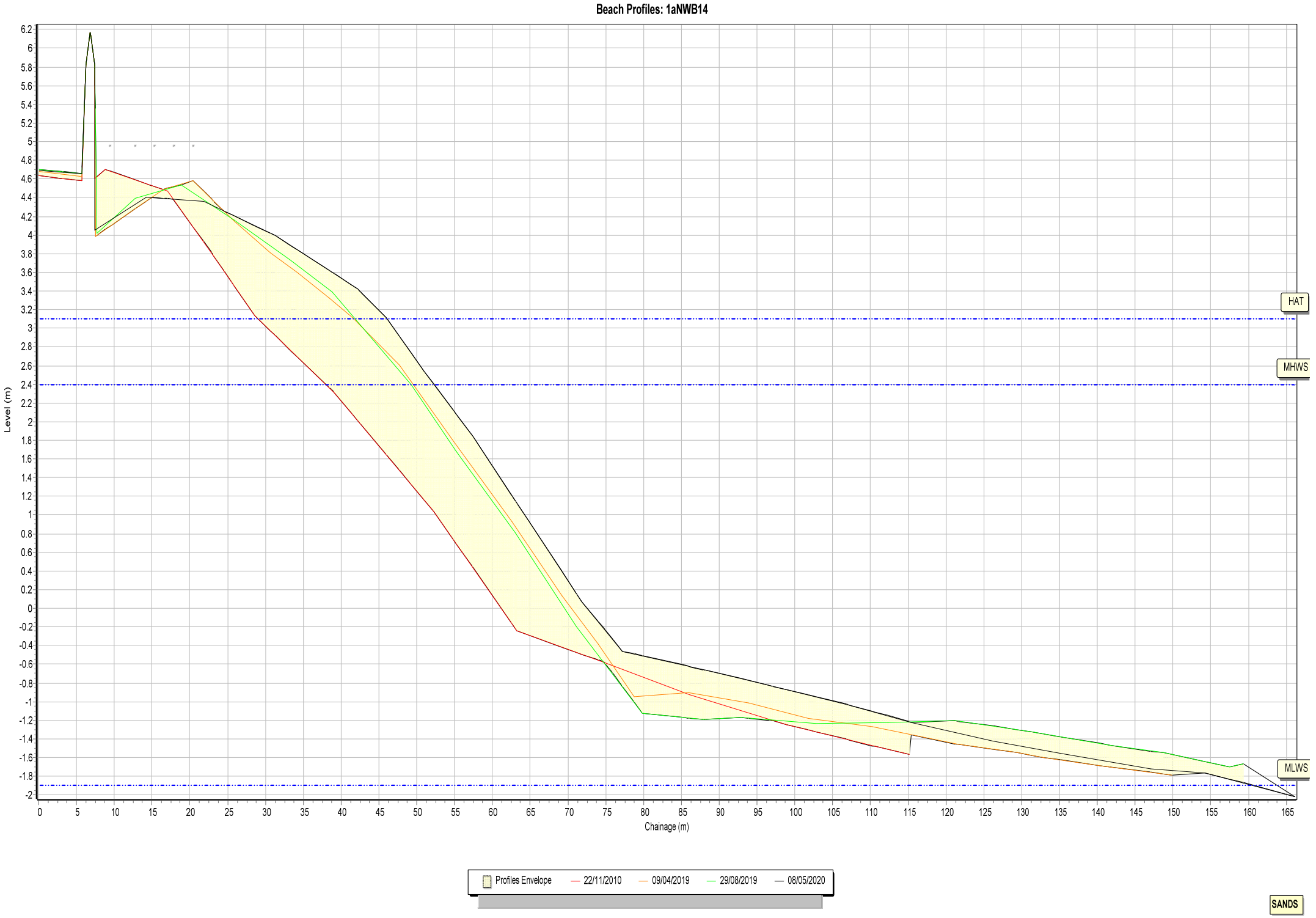
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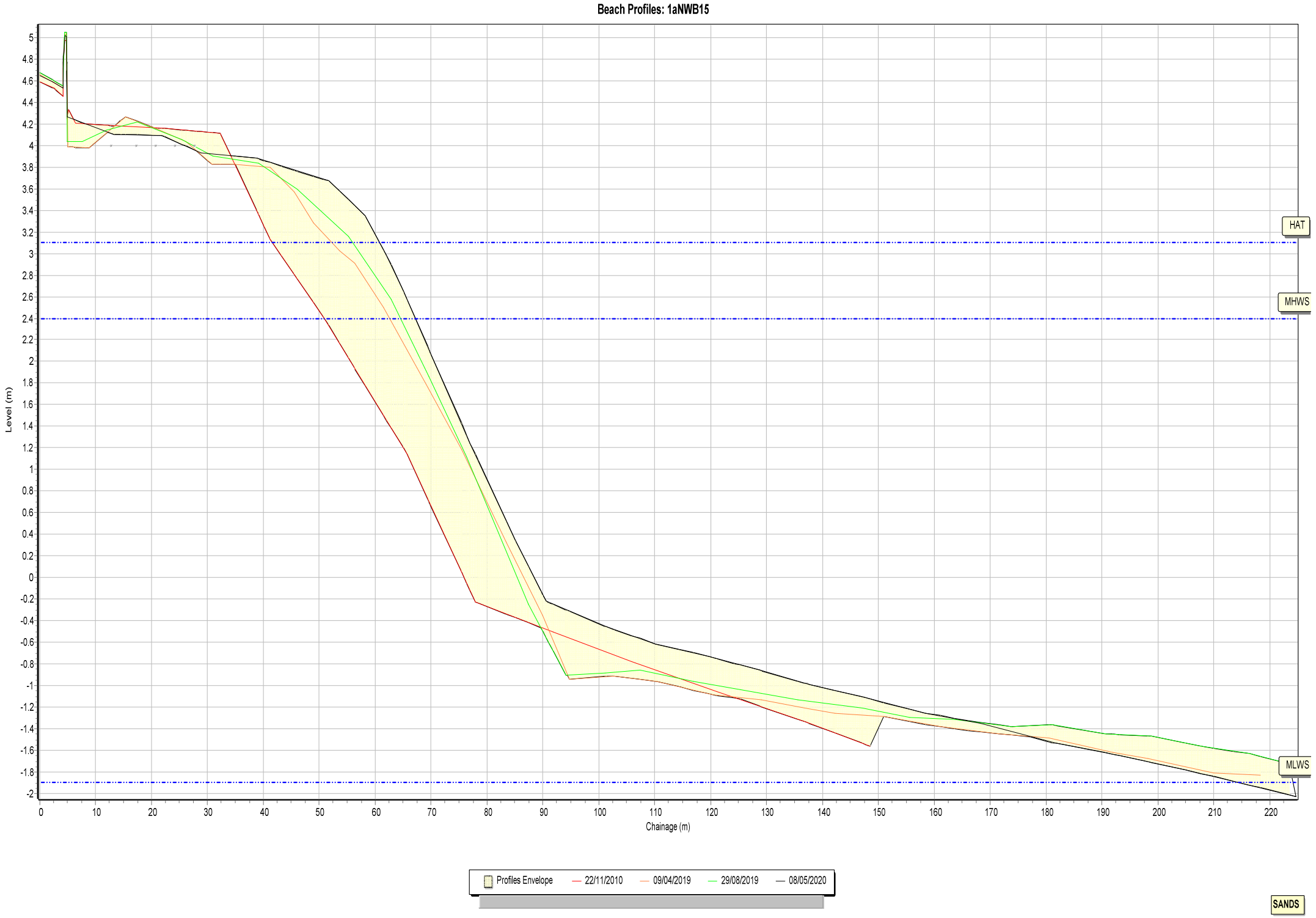
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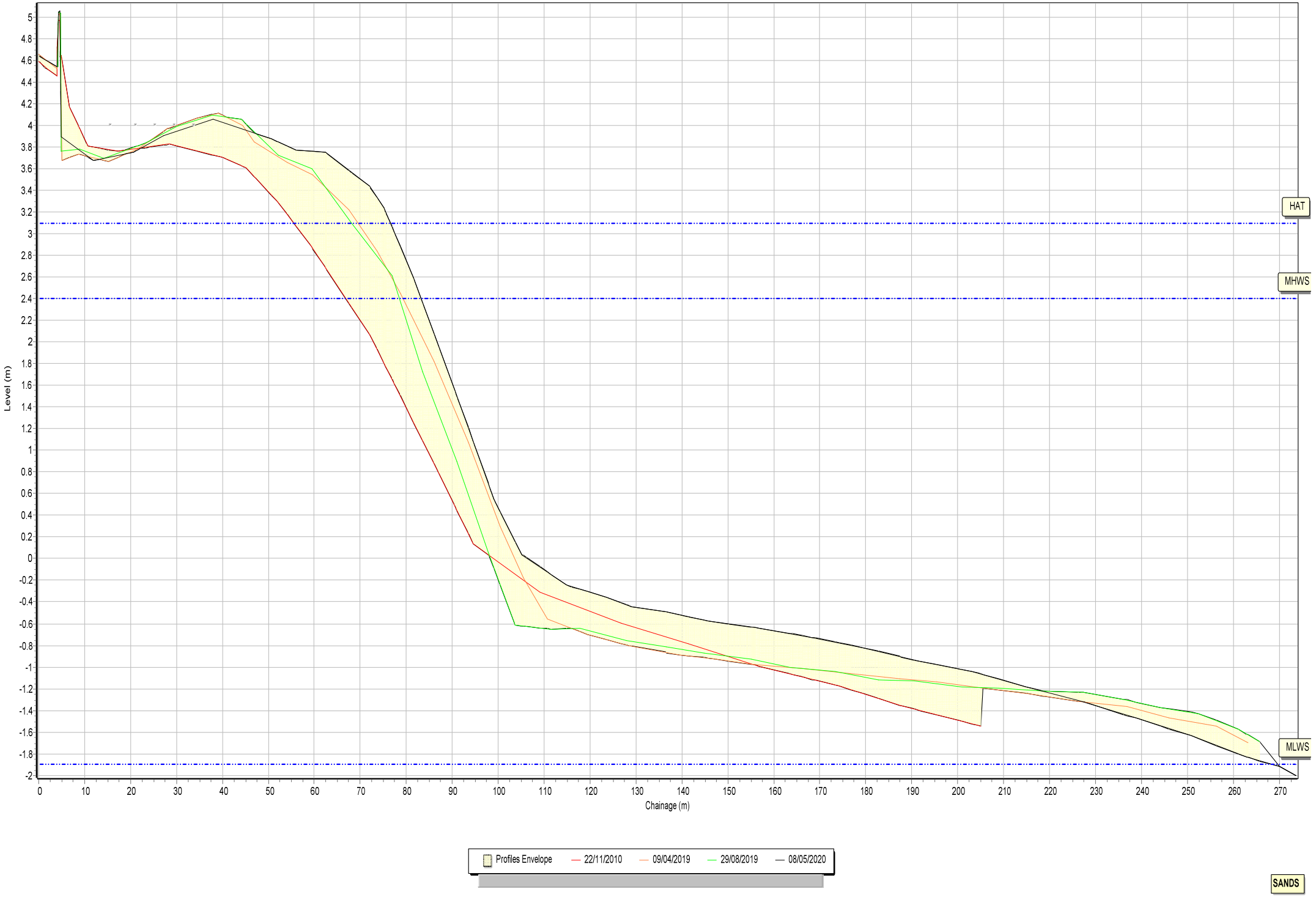

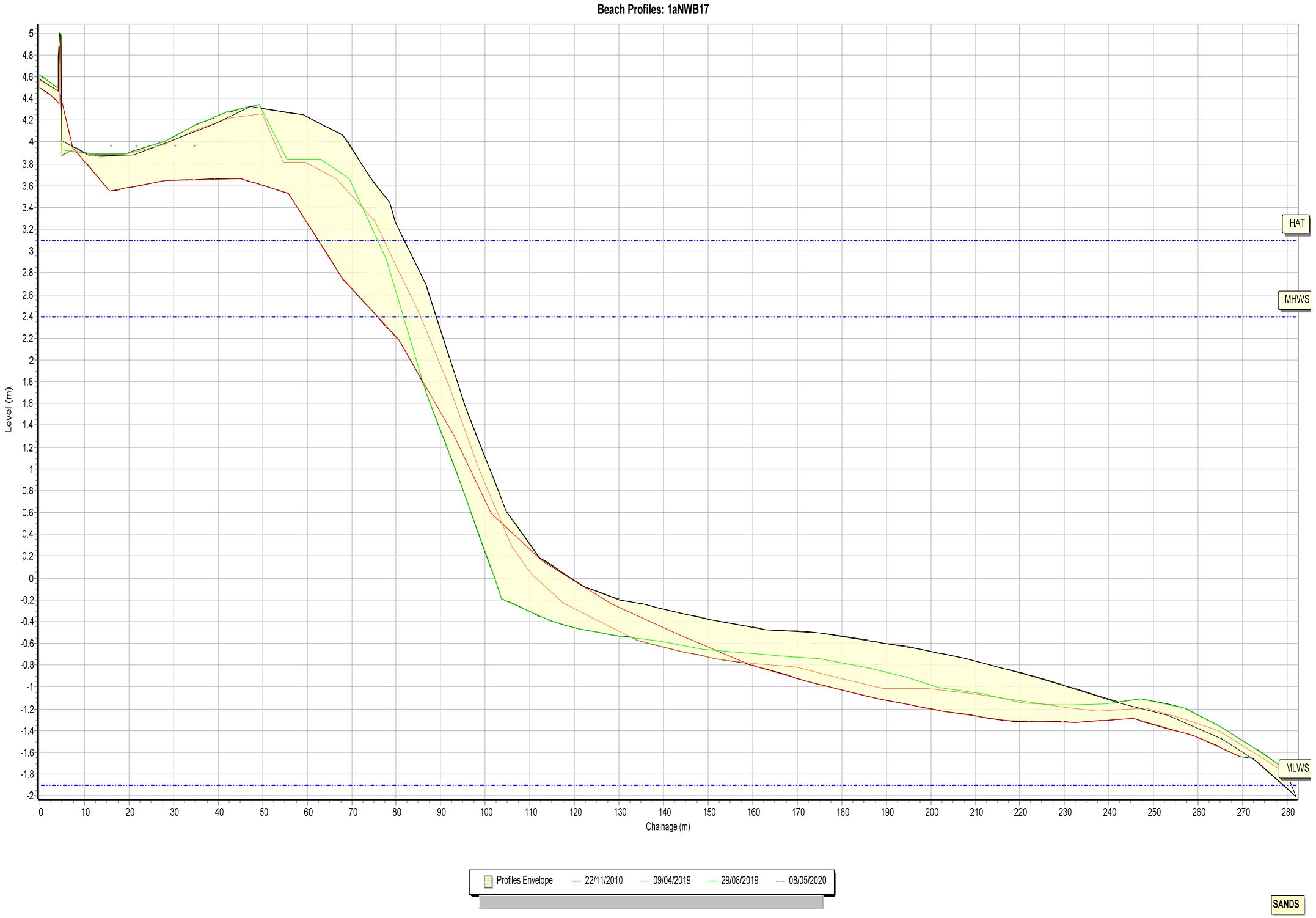
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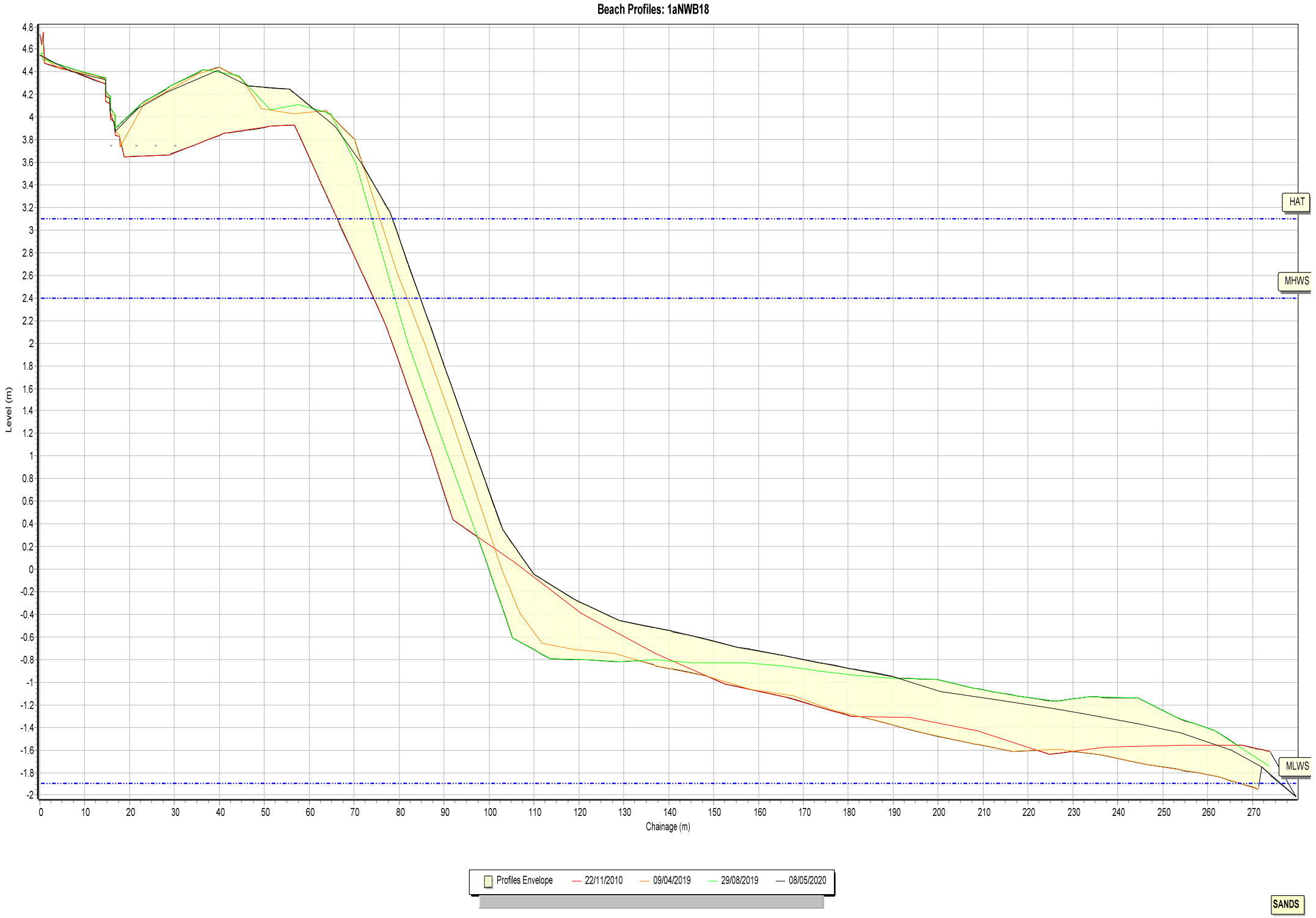
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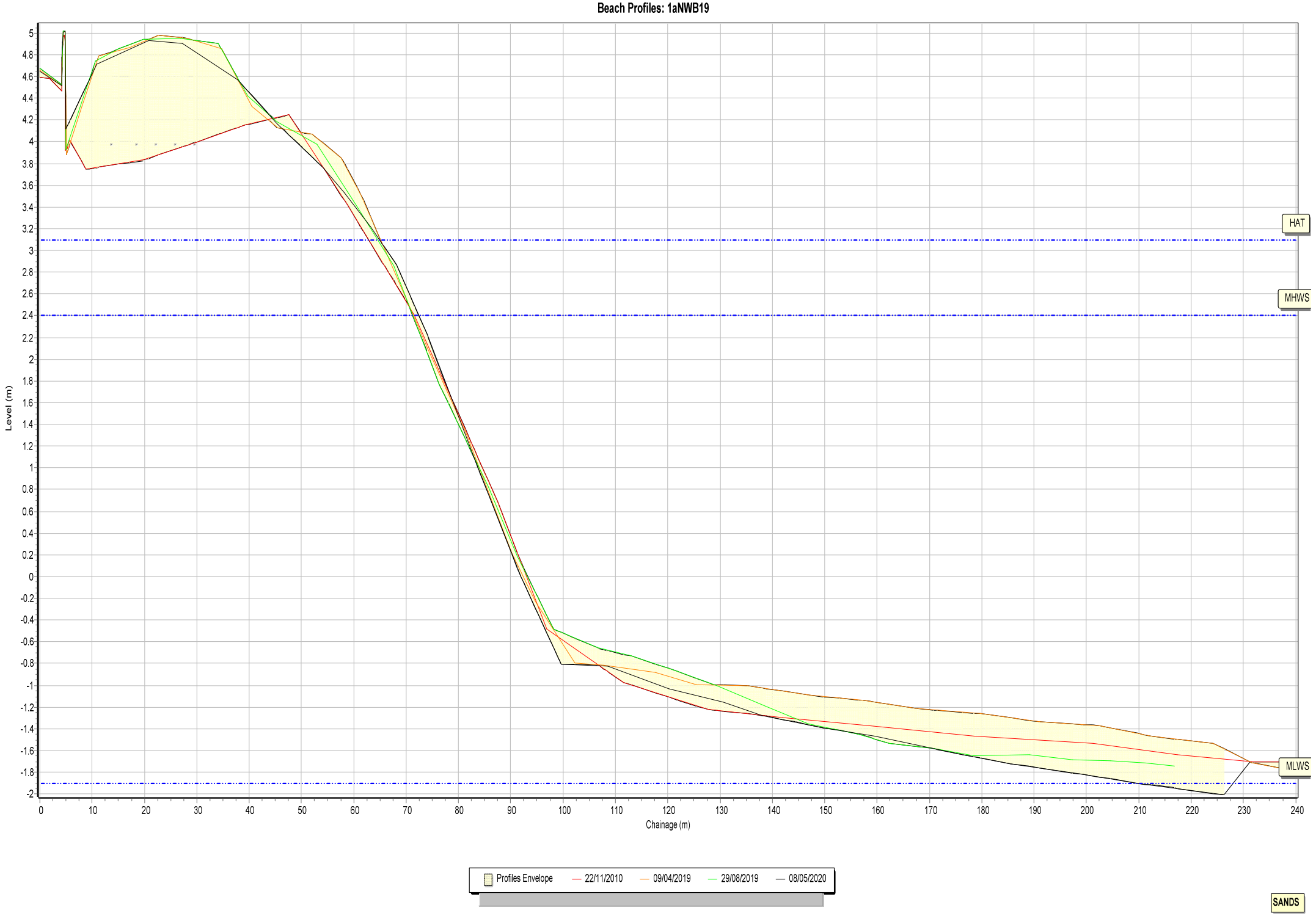
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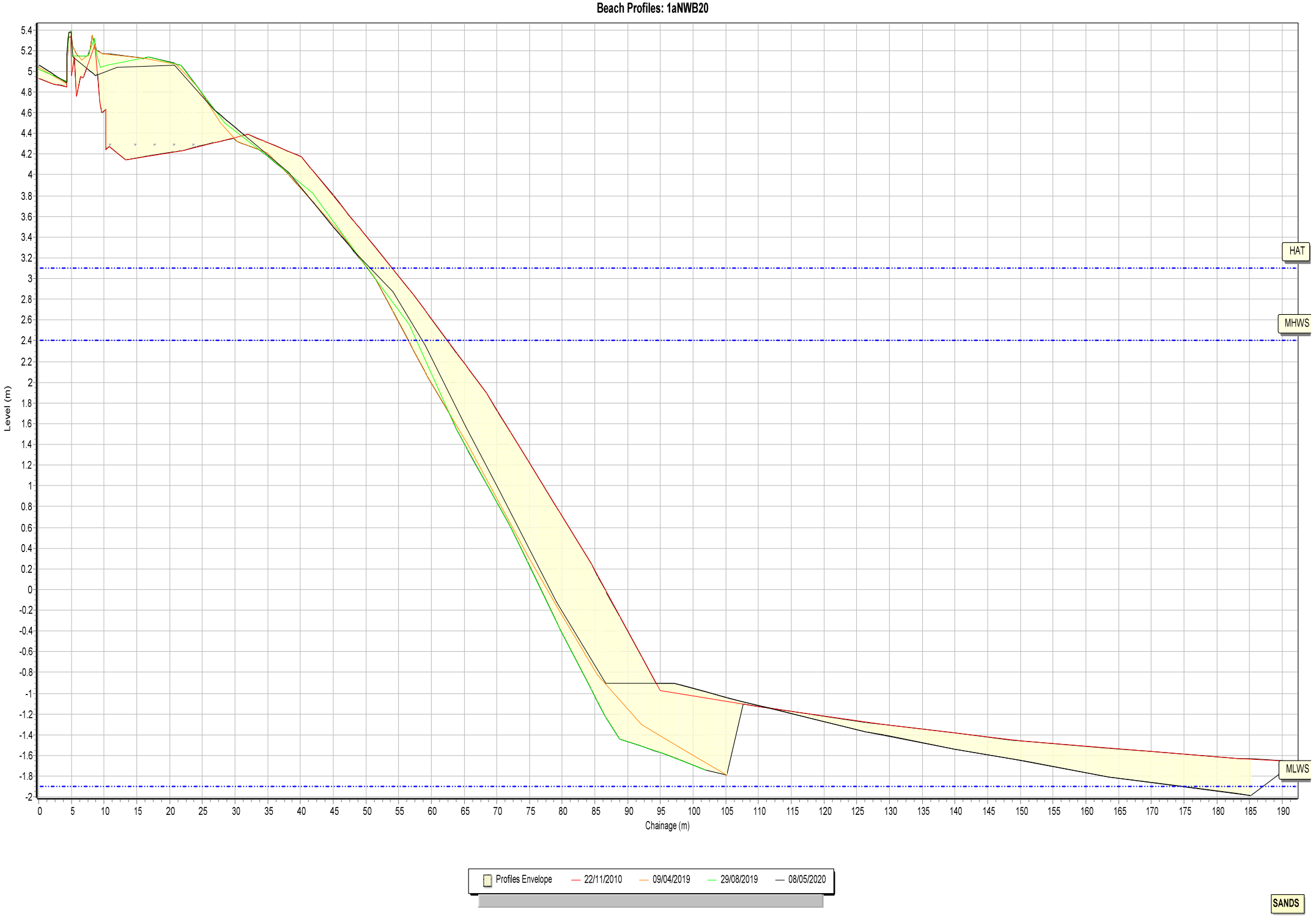
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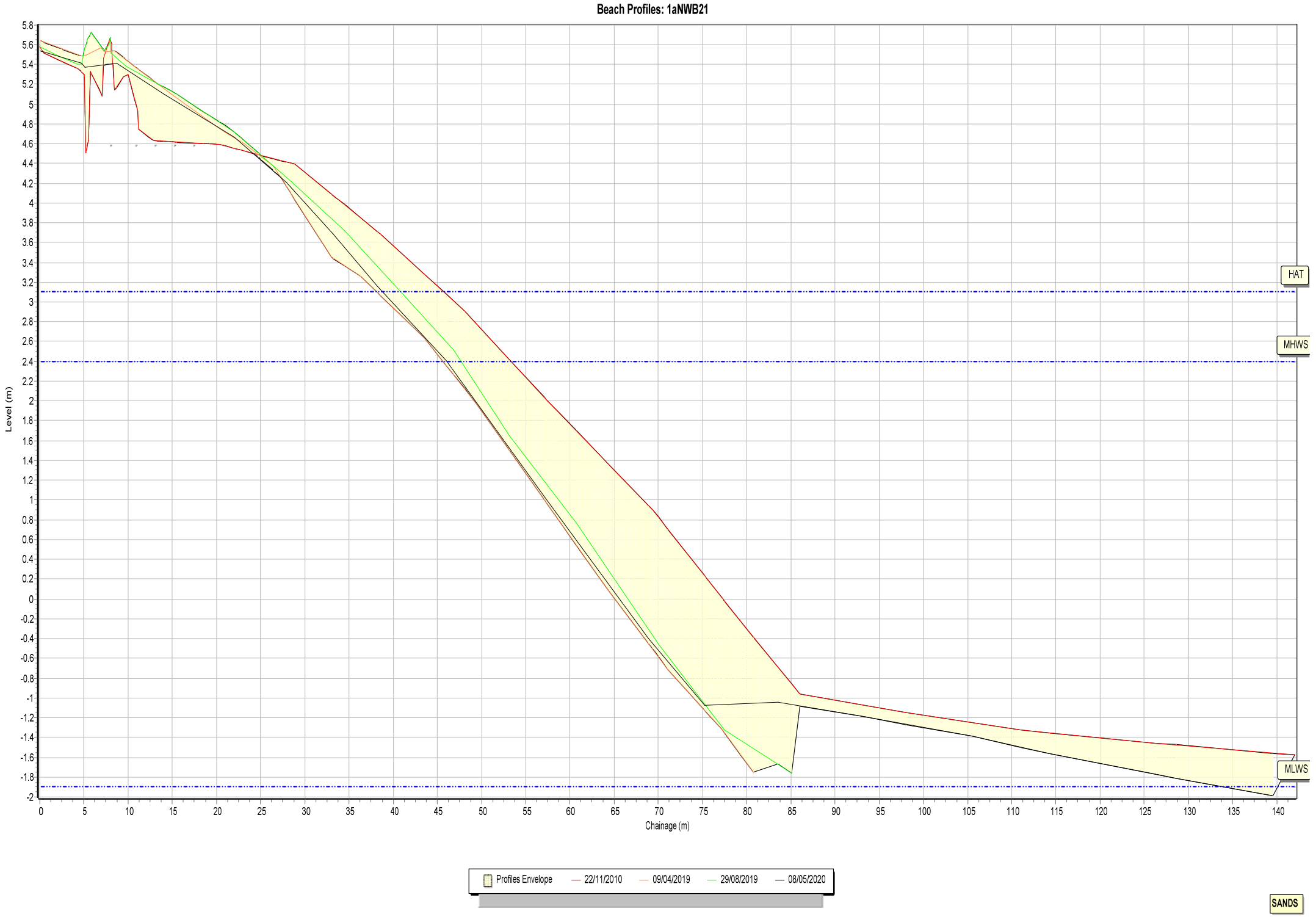
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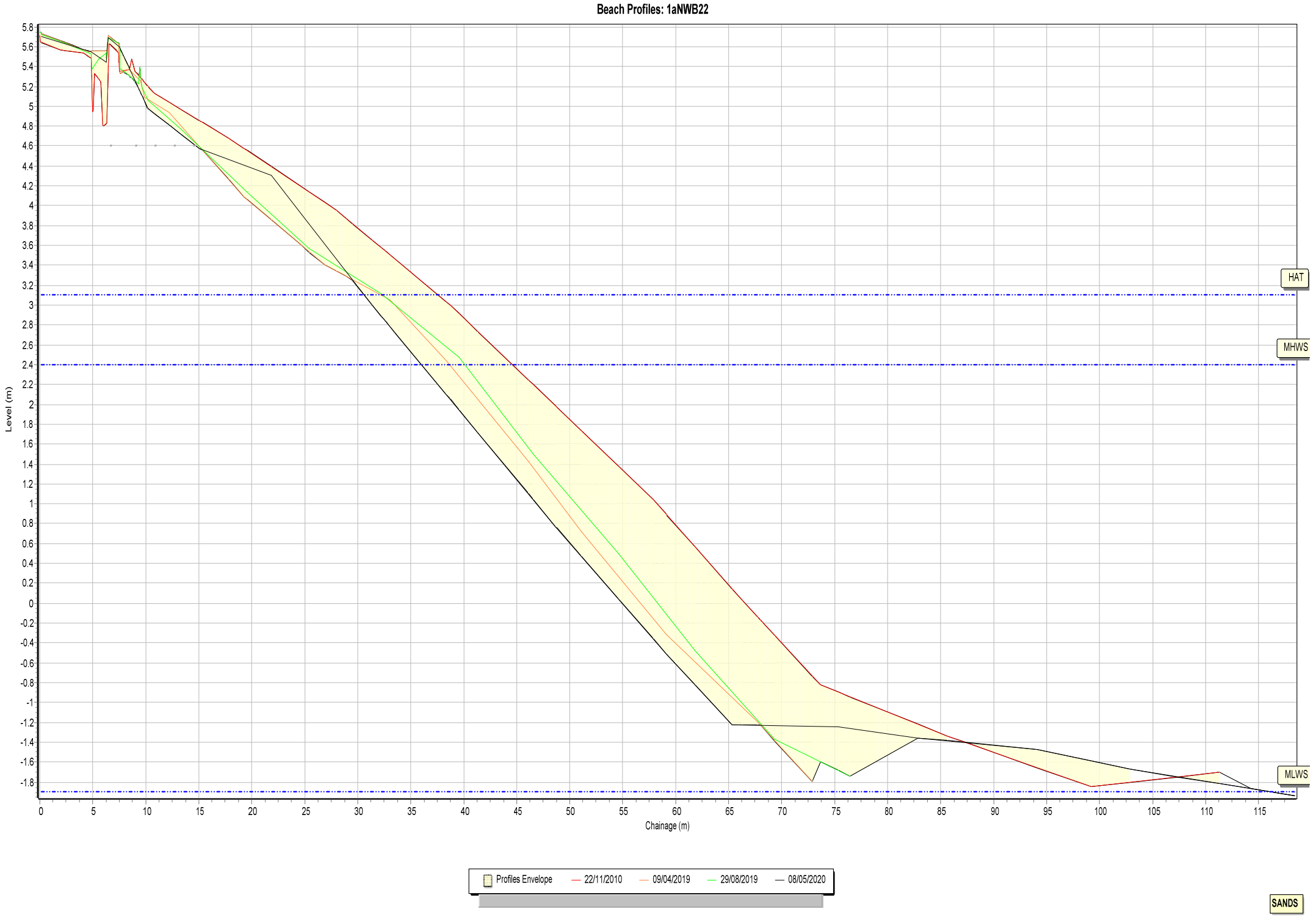
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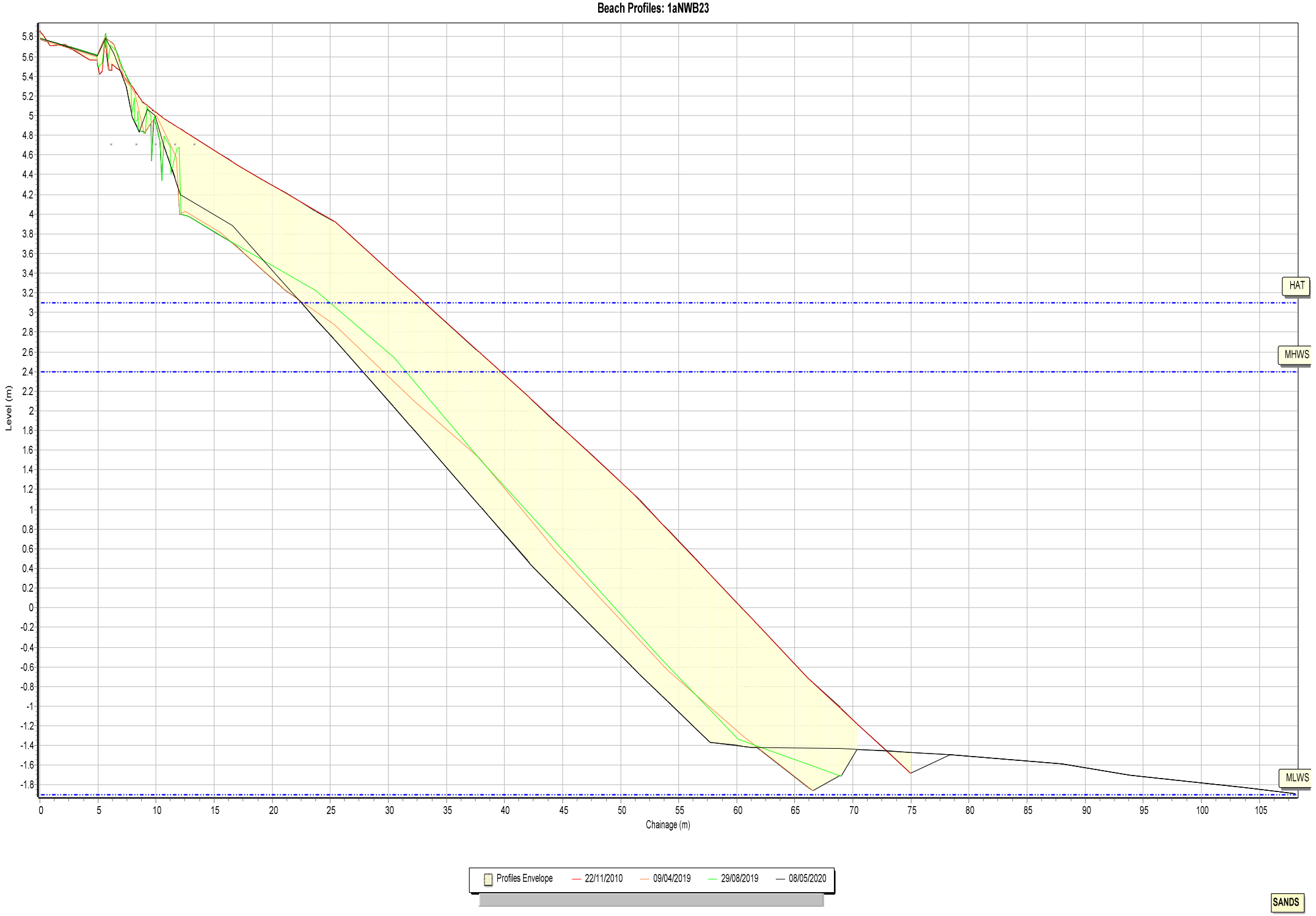
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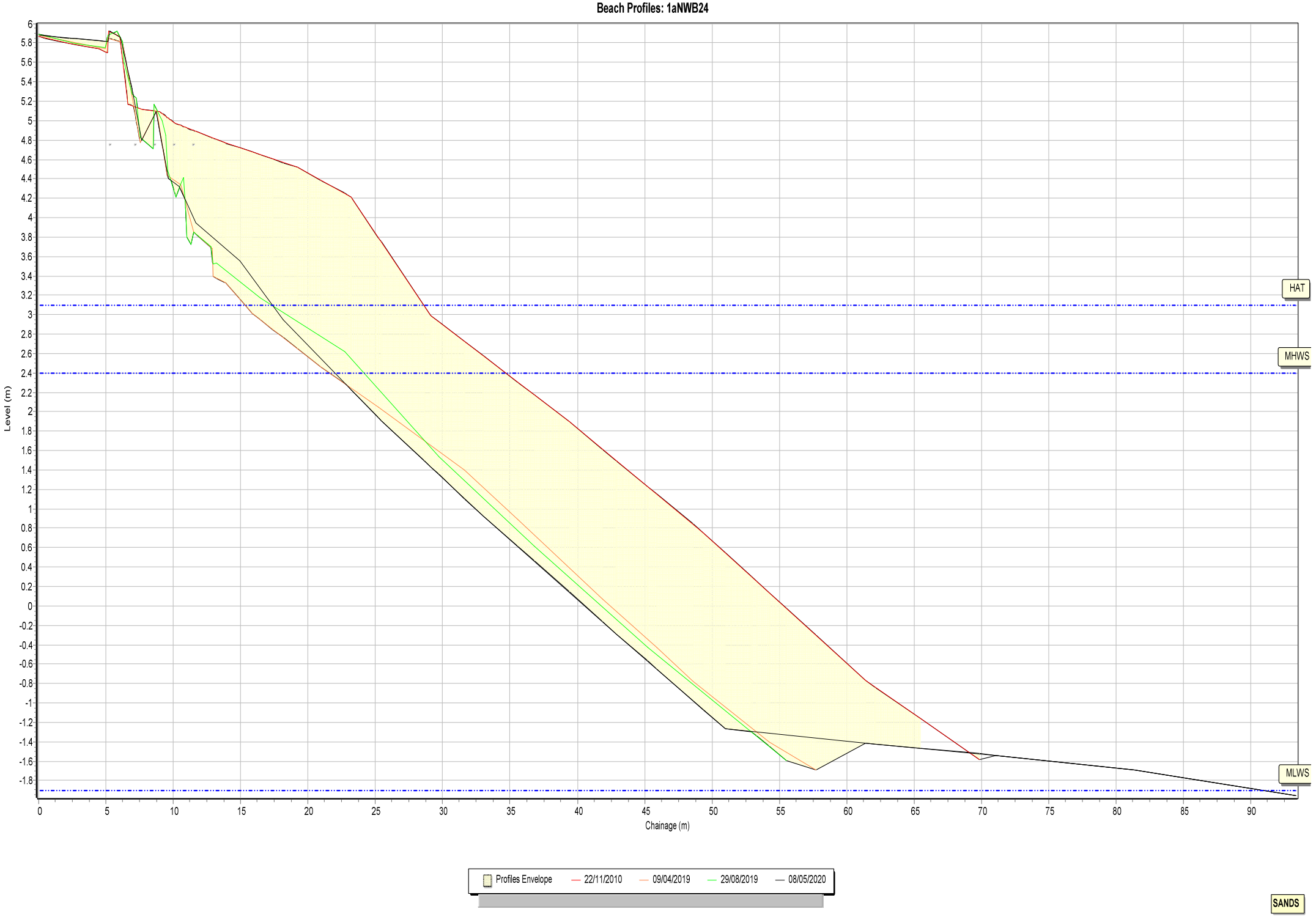
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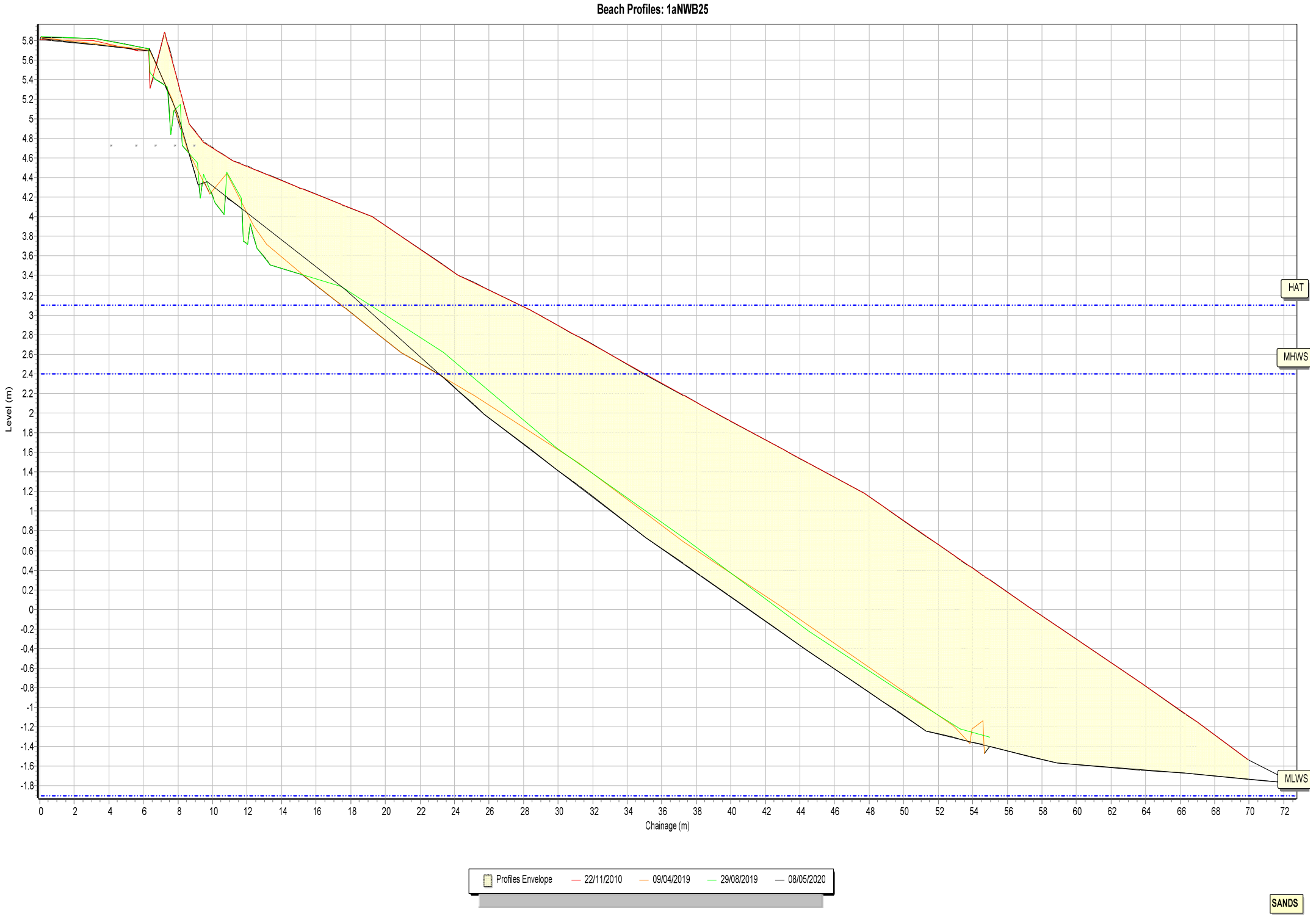
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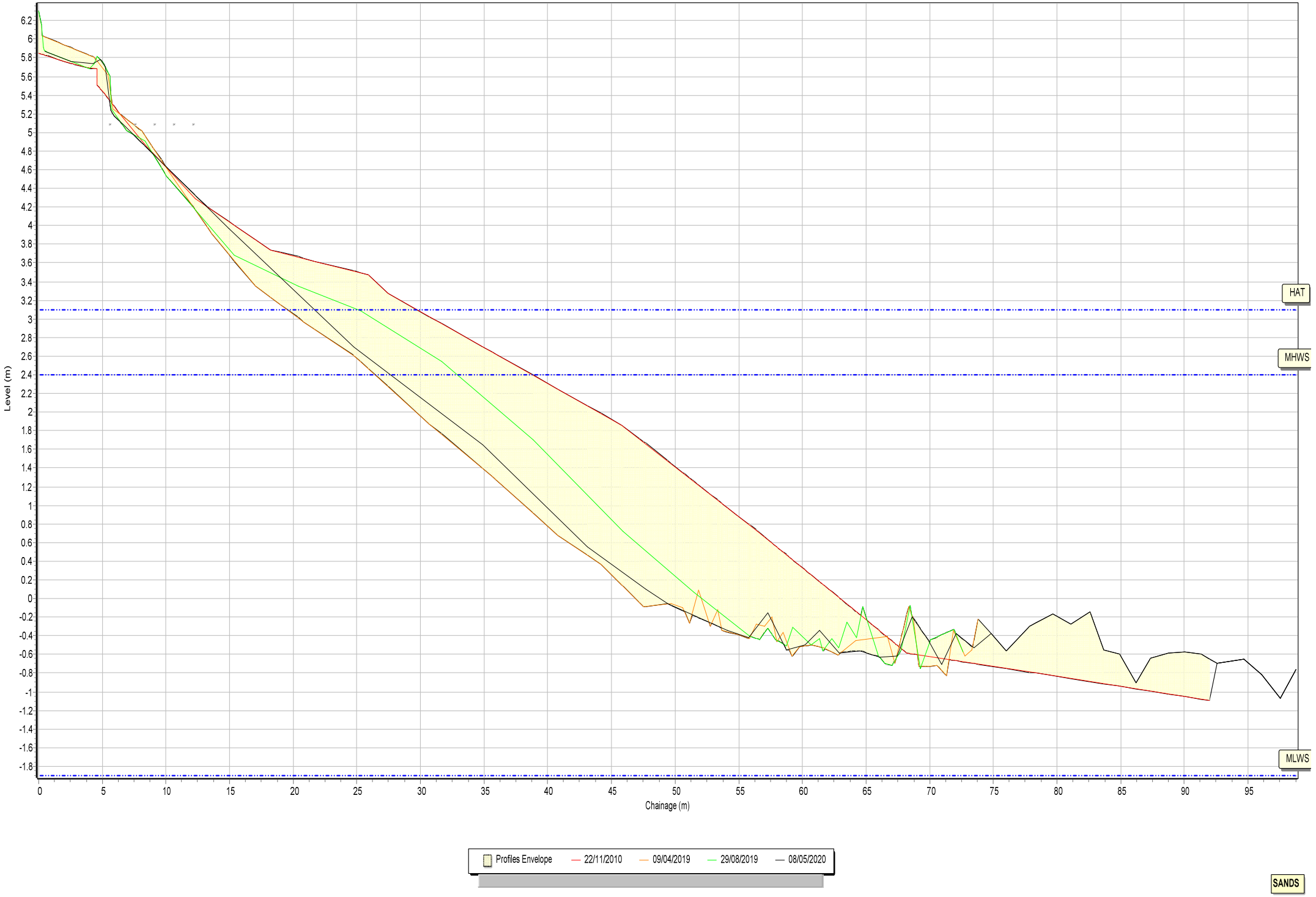

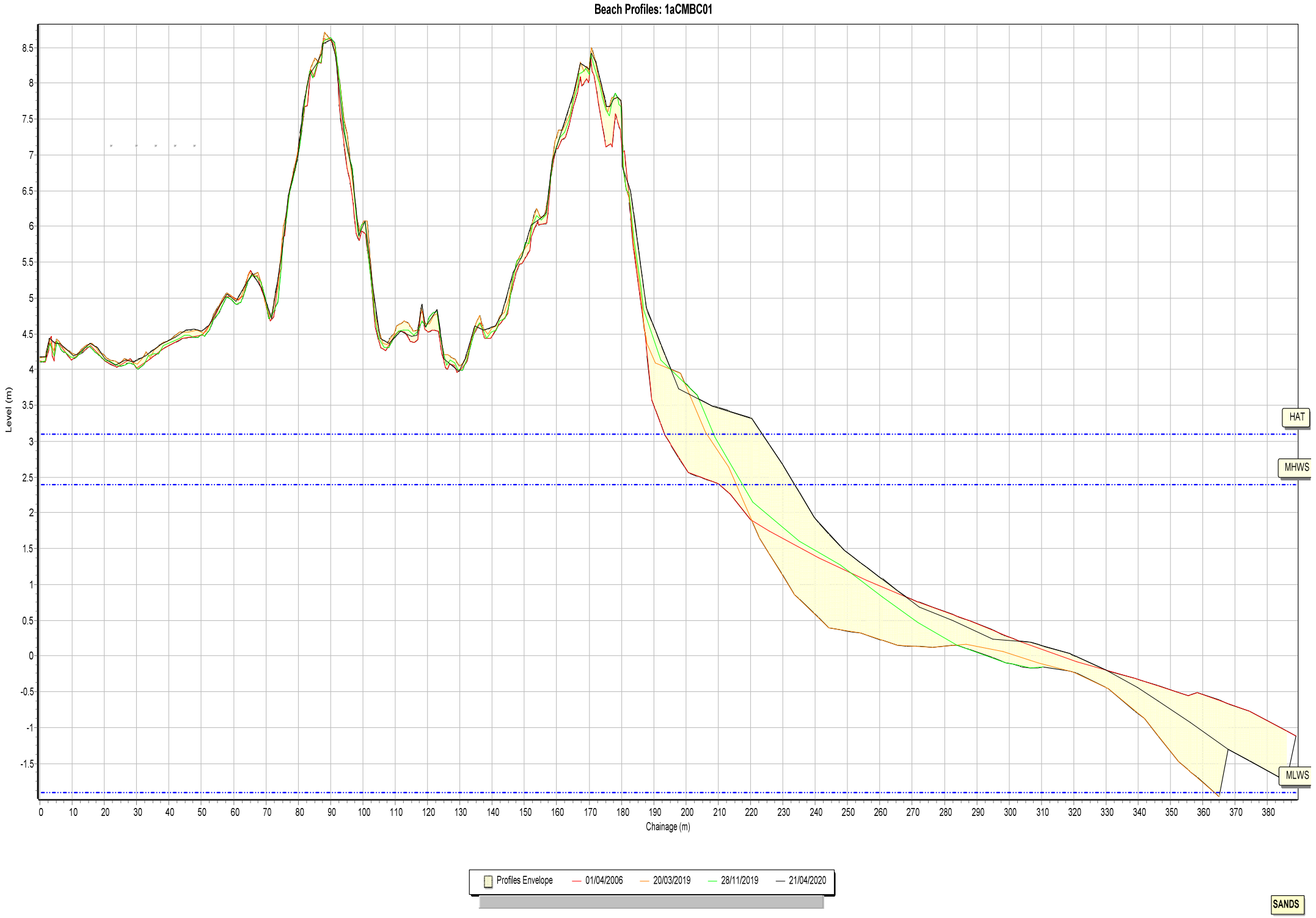
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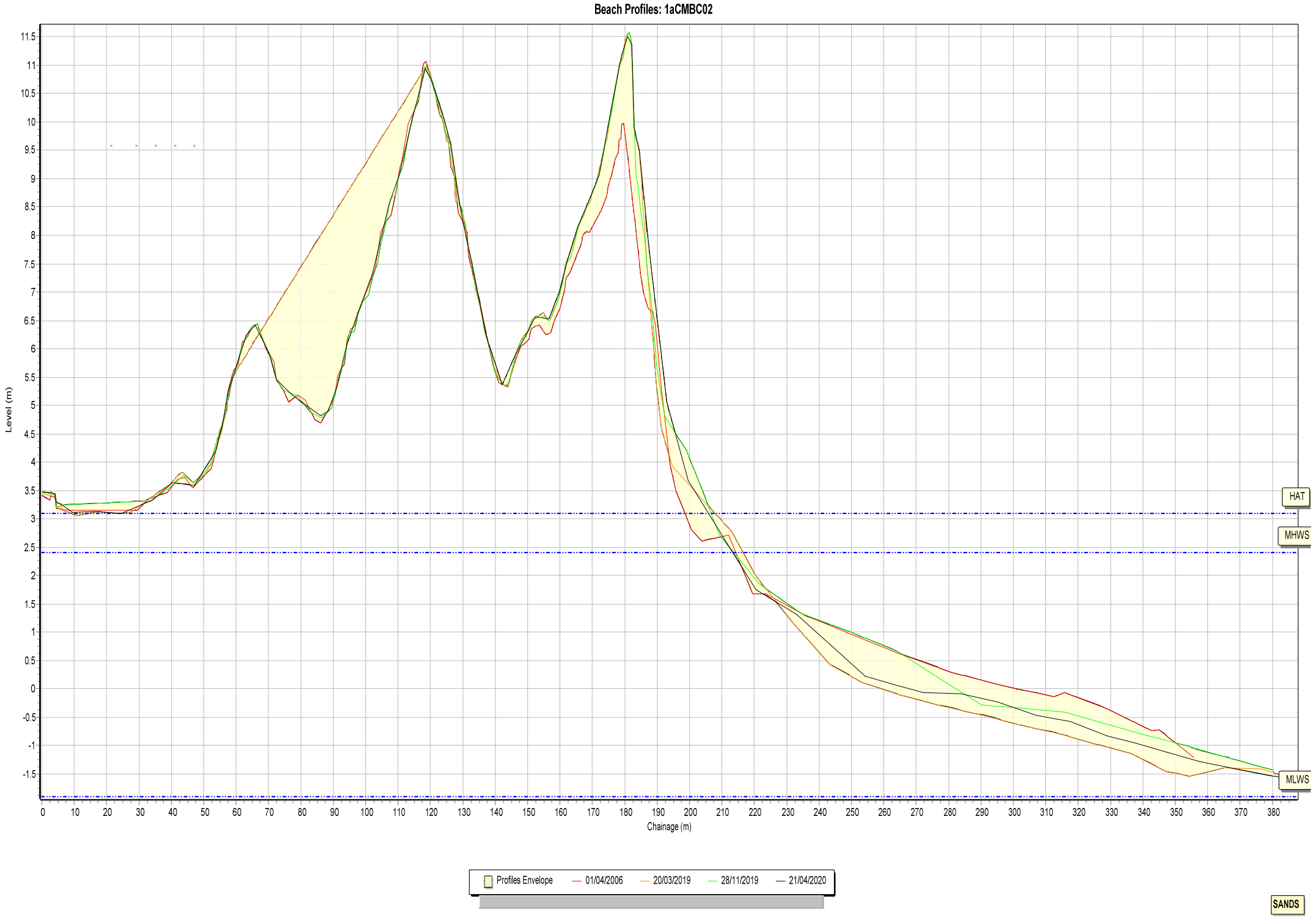
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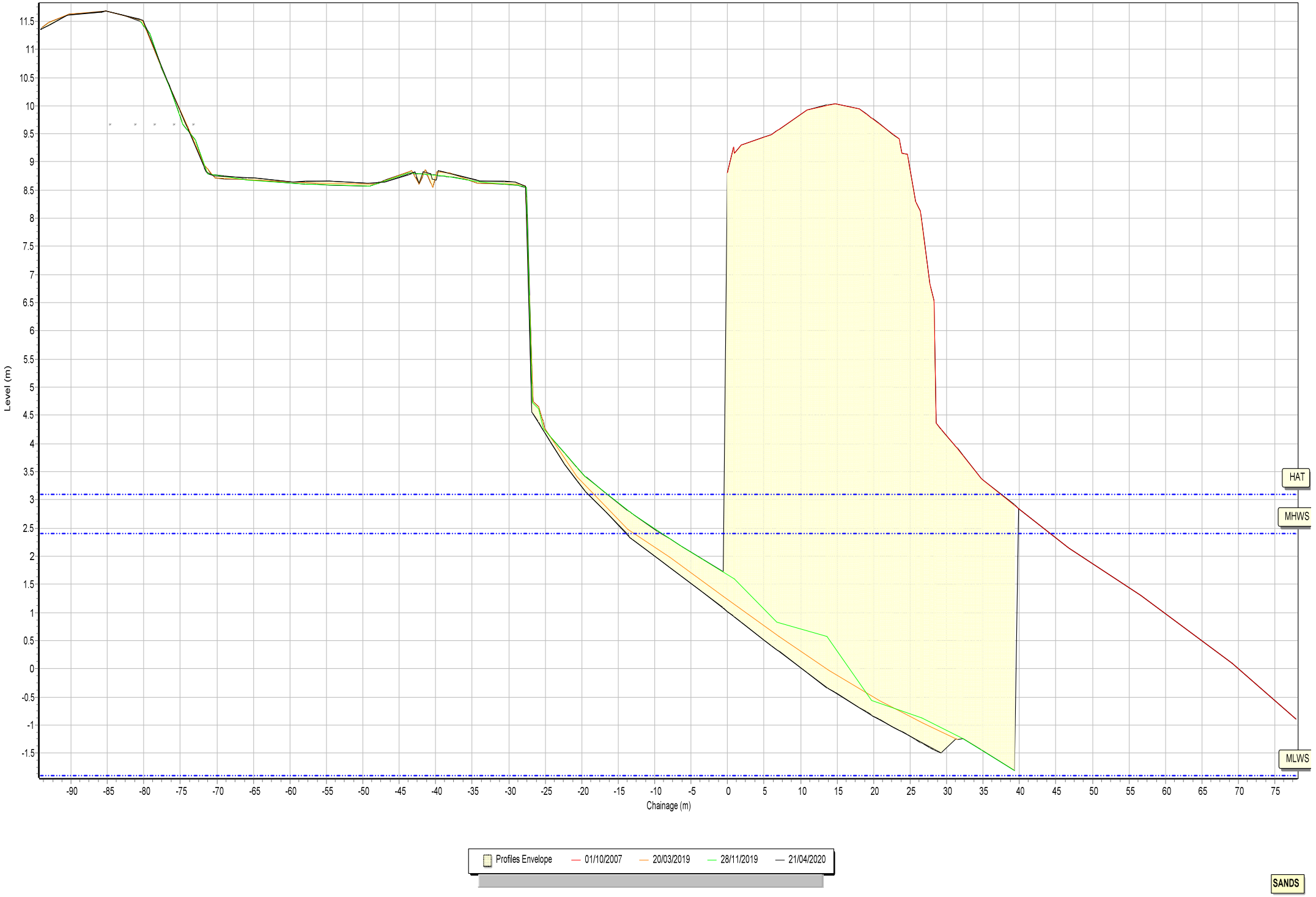

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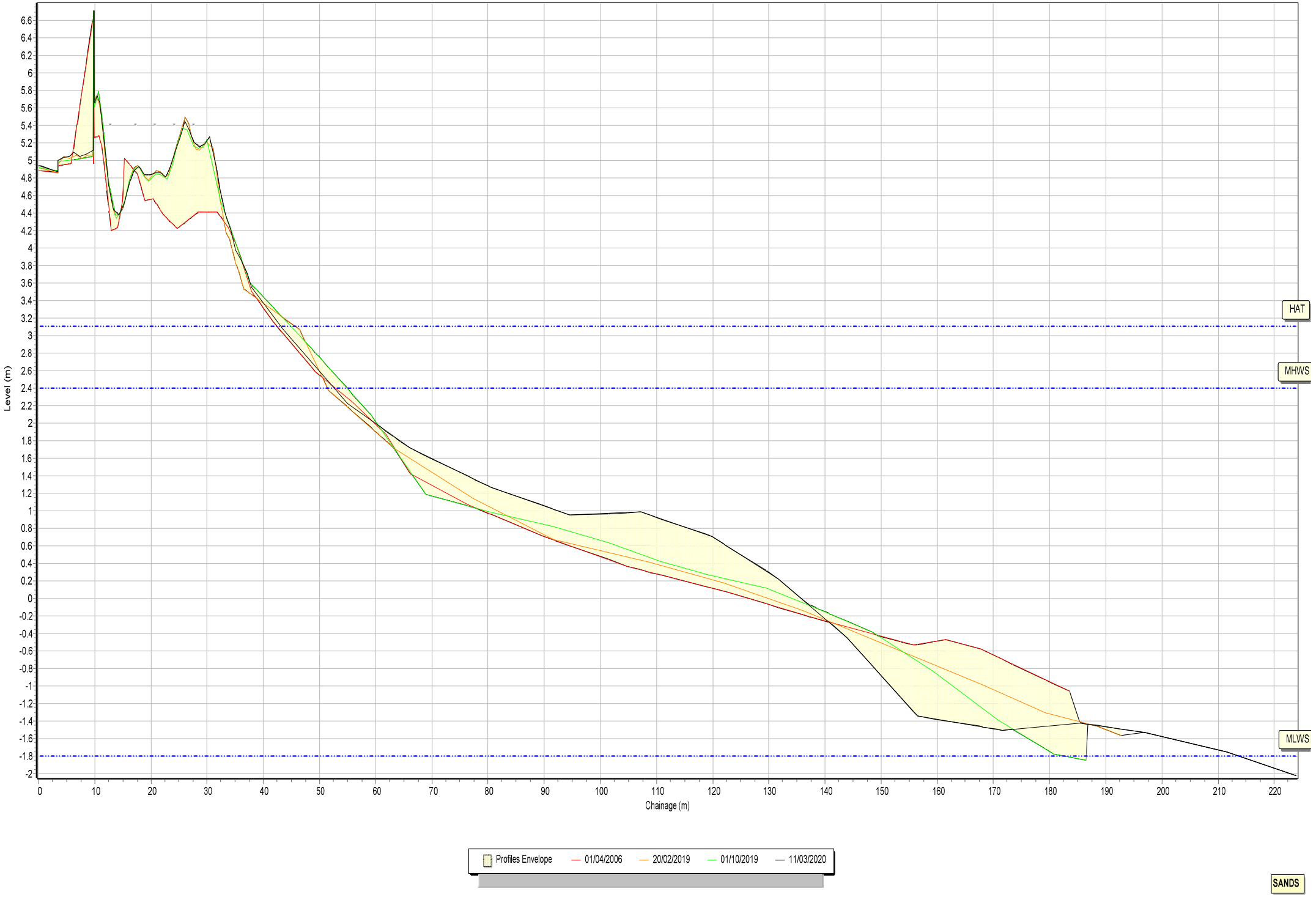

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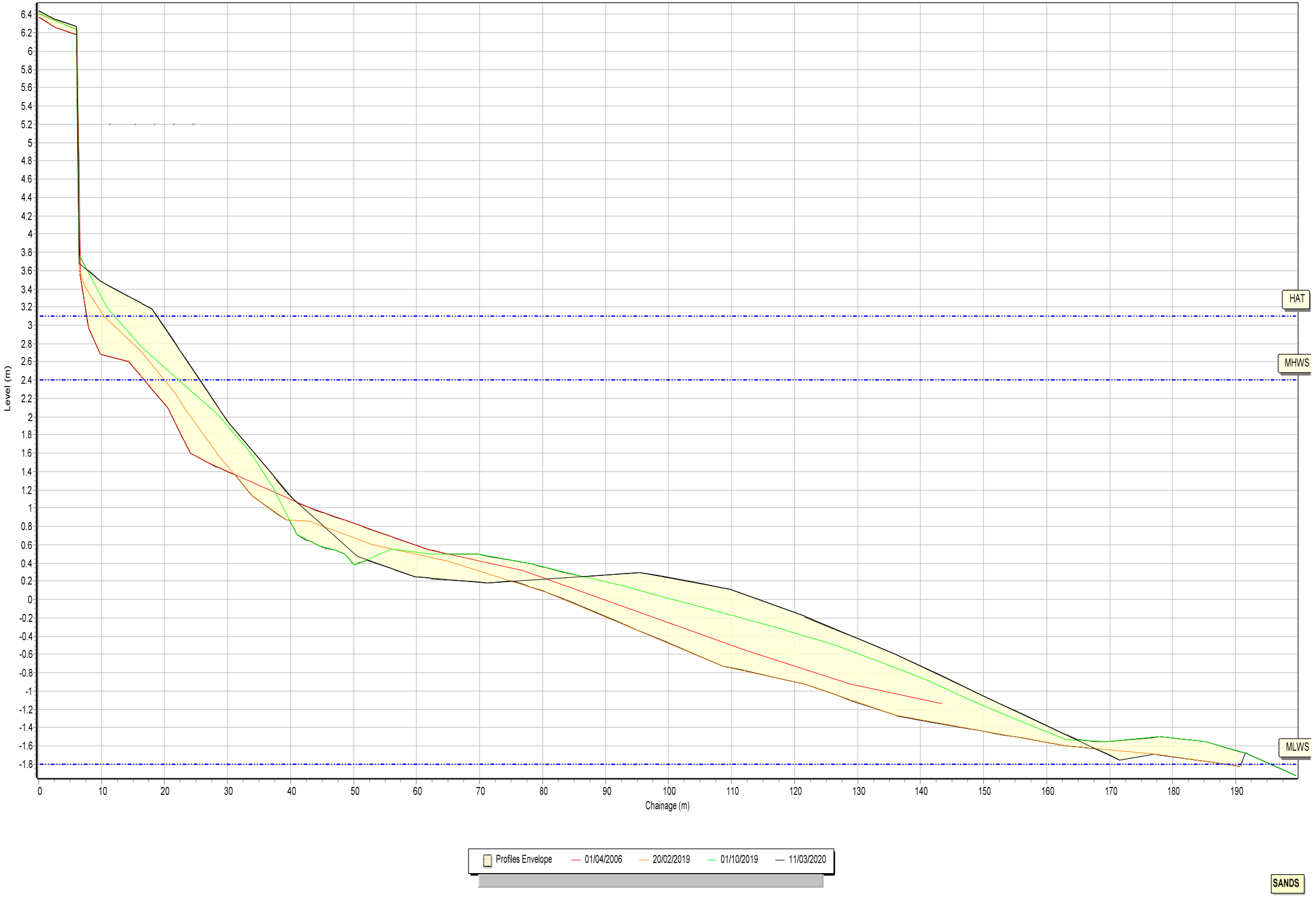

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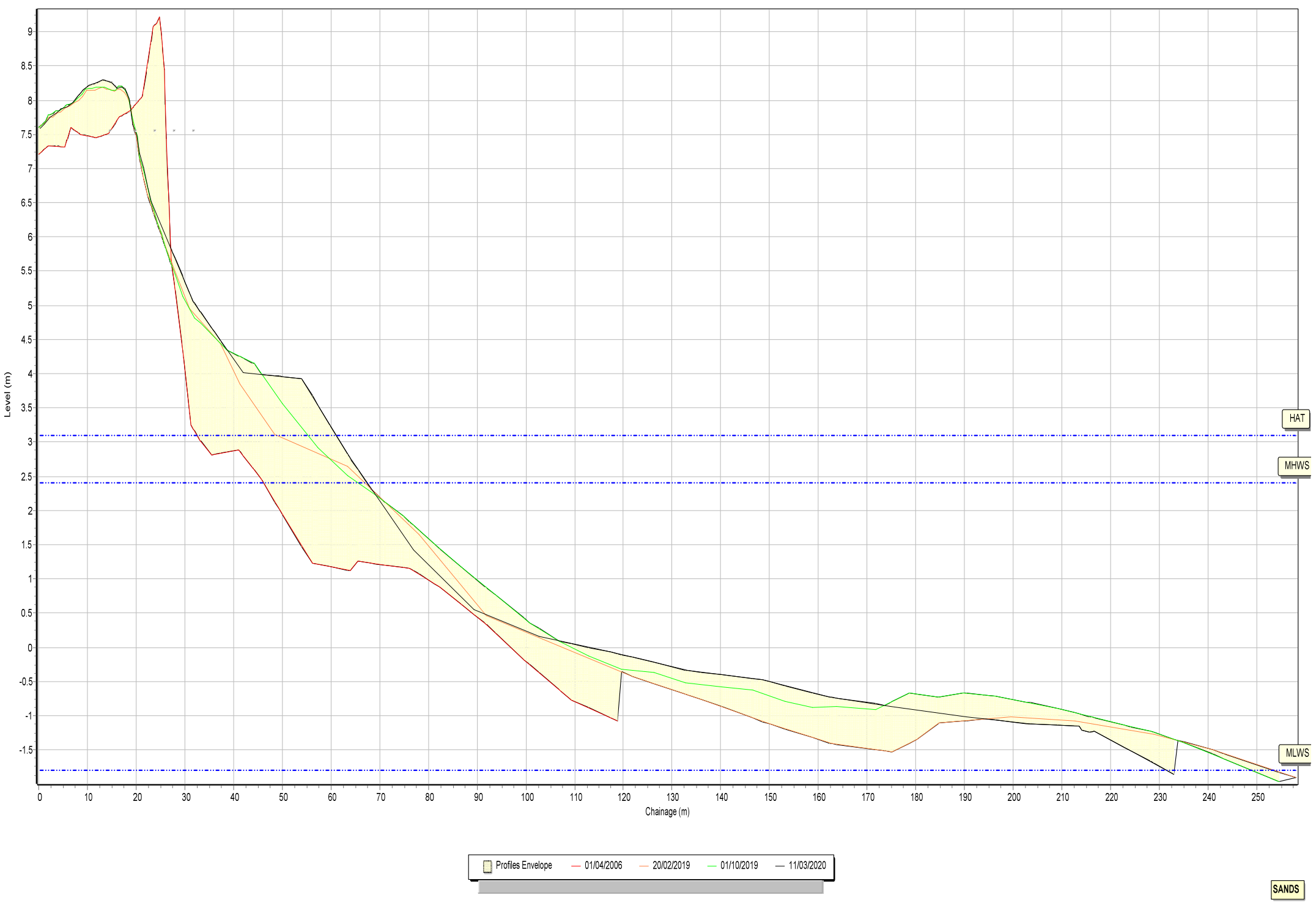
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11/03/2020
SANDS


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SANDS


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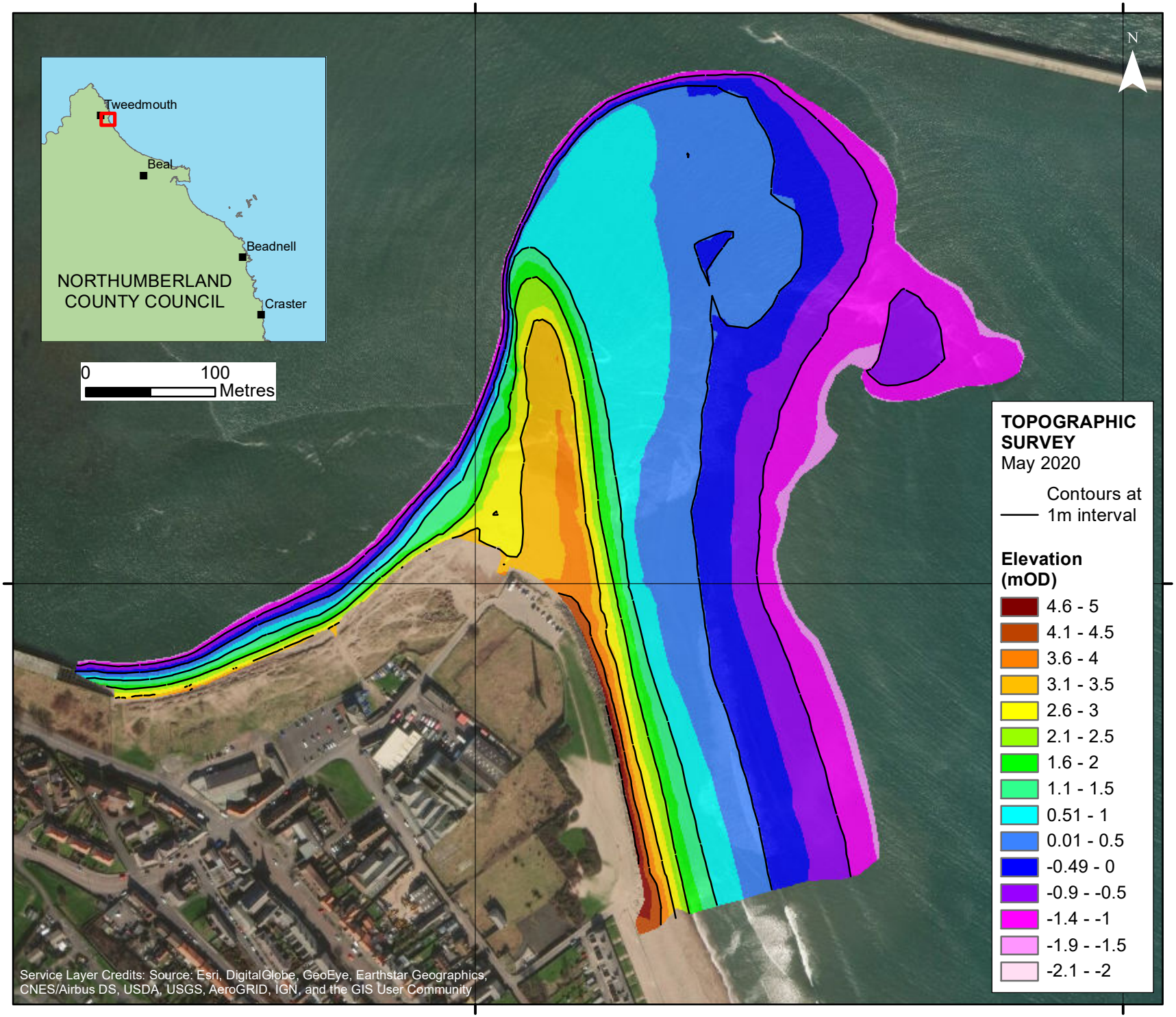
Appendix B

Topographic Survey



Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 1

BERWICK

Northumberland County Council Frontage

Update Report
'Partial Measures' Survey 2020

Drawing Scale at A4 1:4,000

WATER
Royal HaskoningDHV
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Fax: +44 (0)191 211 1313
www.royalhaskoningdhv.com

Royal HaskoningDHV
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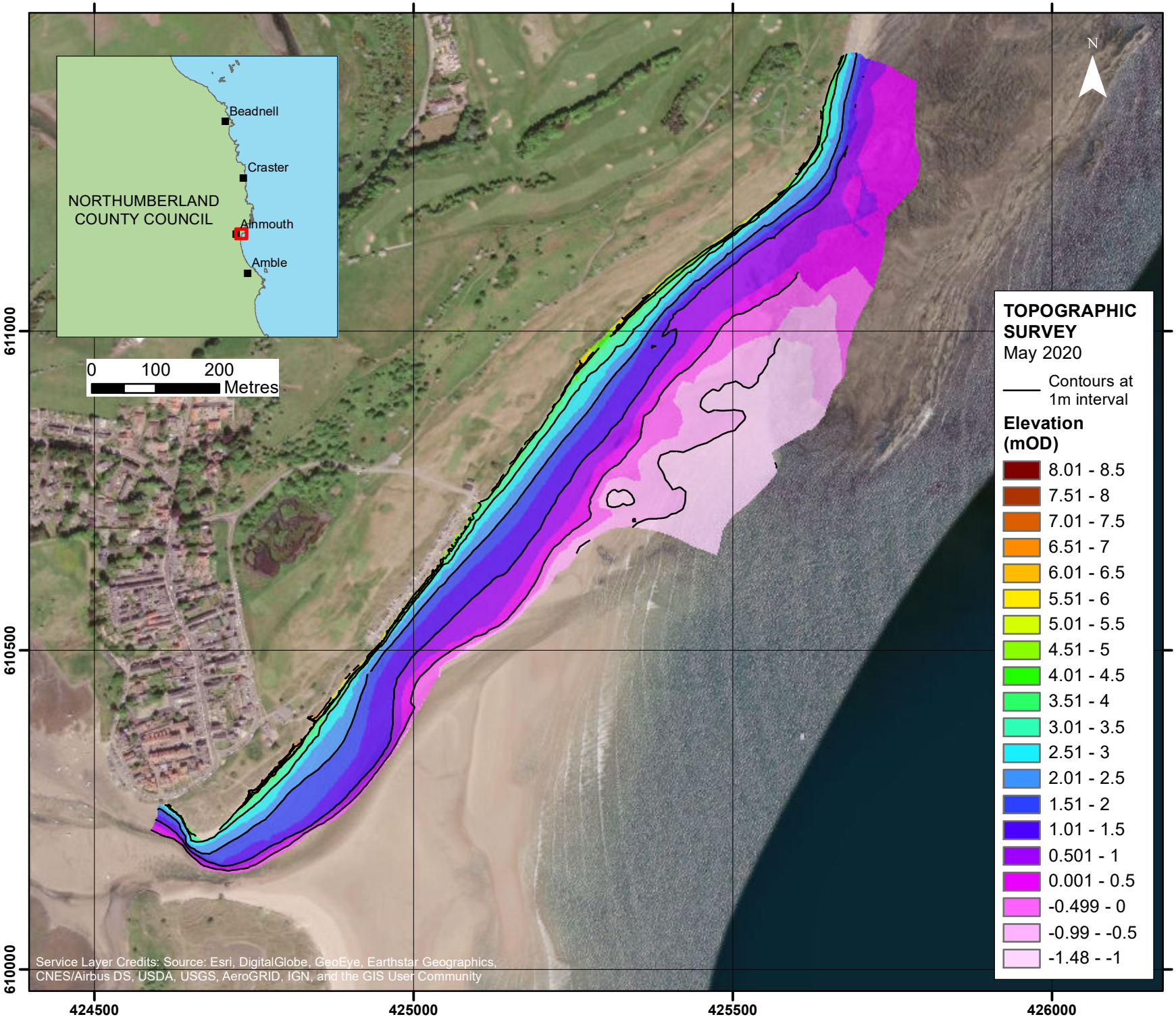

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 2

ALNMOUTH

Northumberland County Council Frontage

Update Report
'Partial Measures' Survey 2020

Drawing Scale at A4 1:8,000

WATER
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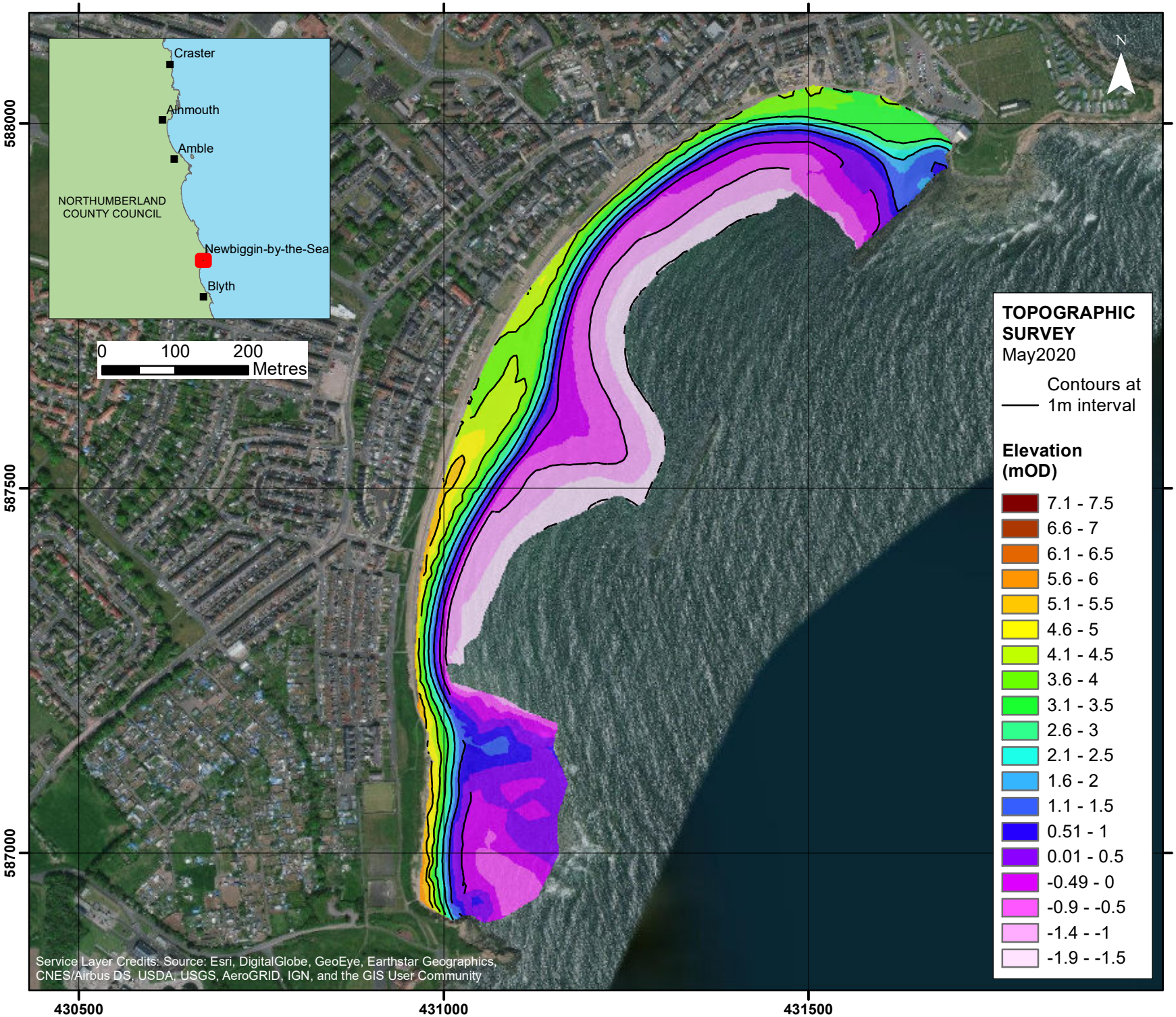

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 3

NEWBIGGIN-BY-THE-SEA

Northumberland County Council Frontage

Update Report
'Partial Measures' Survey 2020

Drawing Scale at A4 1:7,000

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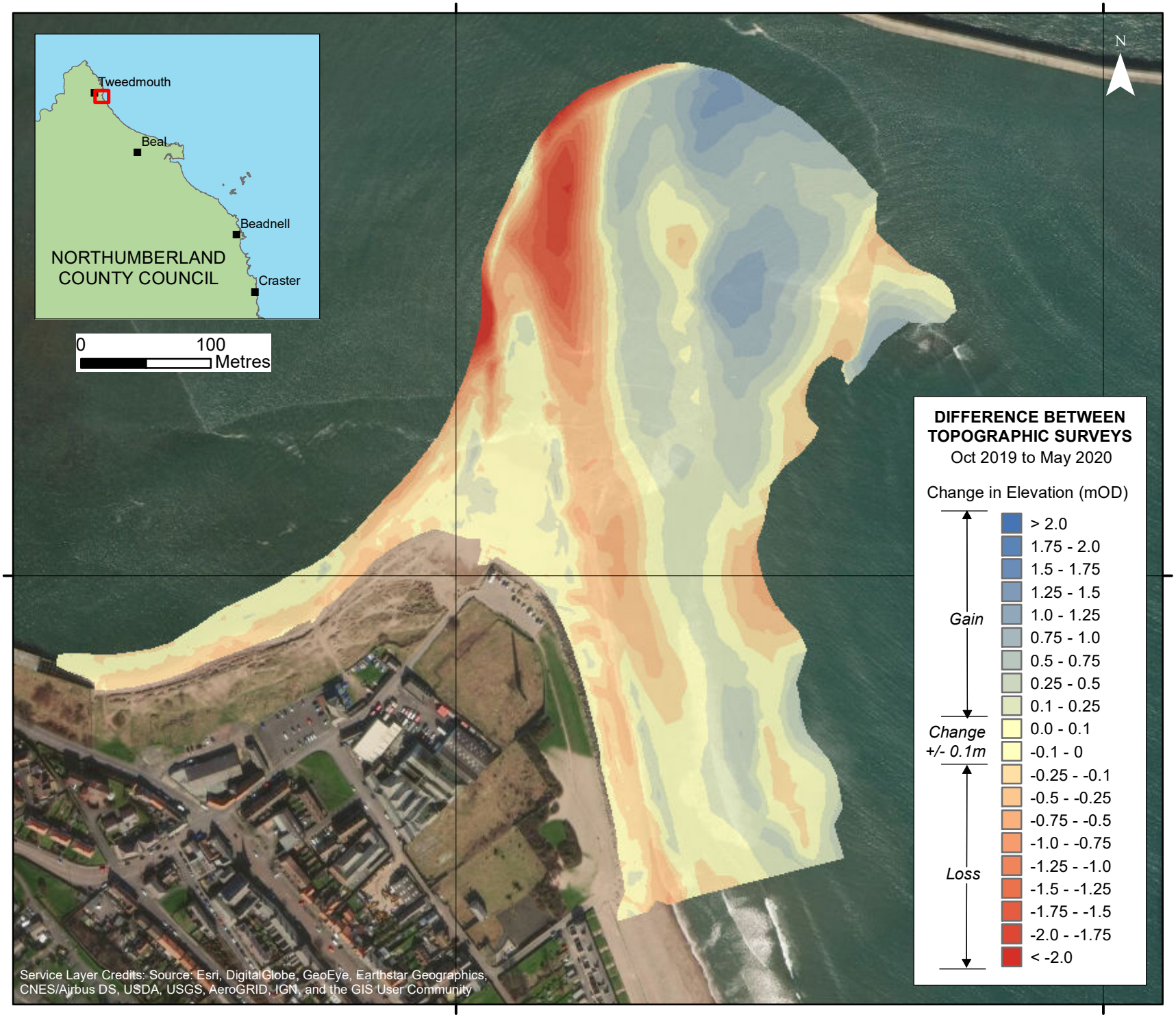

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 4

BERWICK

Northumberland County Council Frontage

Update Report
'Partial Measures' Survey 2020

Drawing Scale at A4 1:4,000

WATER
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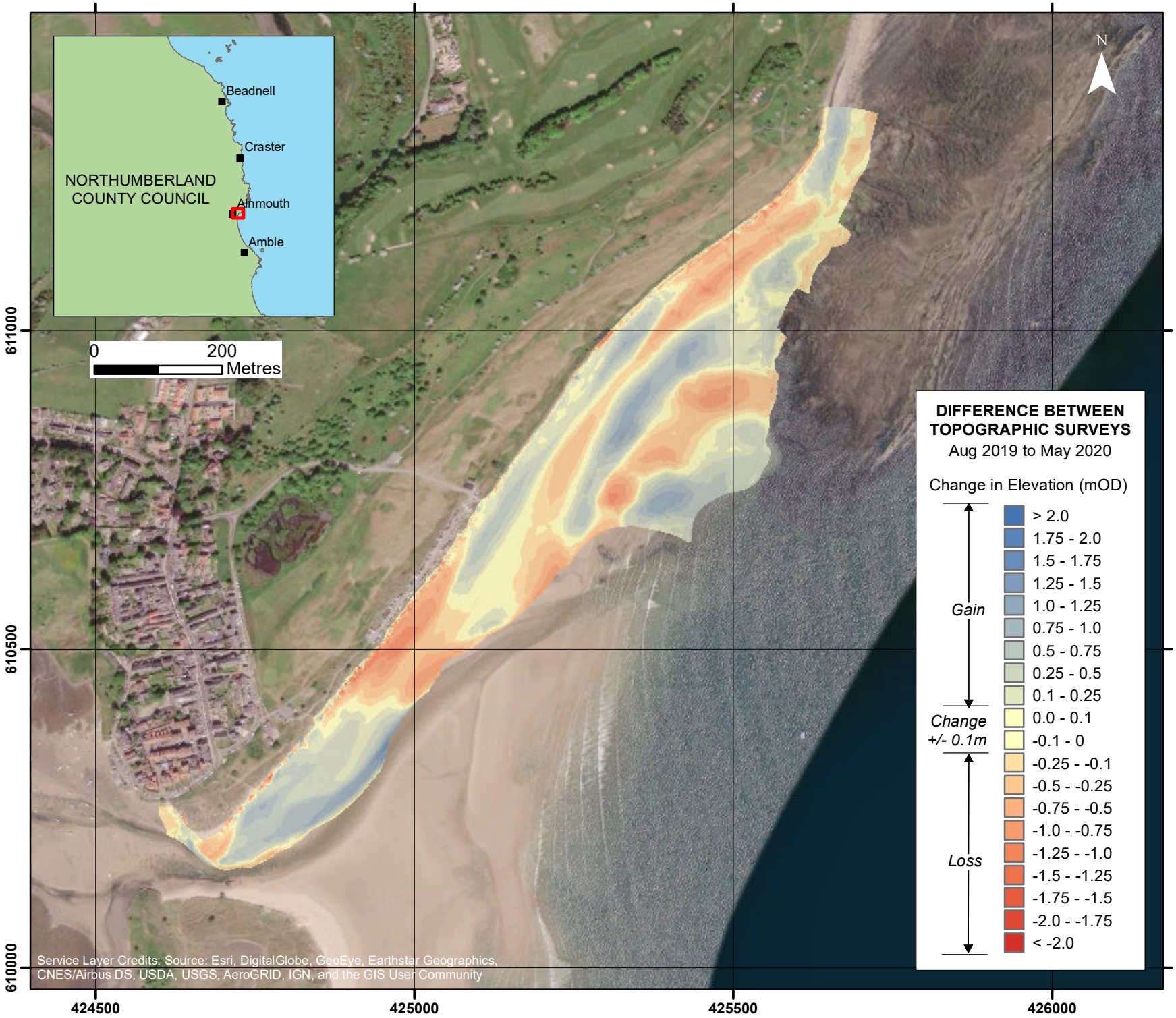

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 5

ALNMOUTH

Northumberland County Council Frontage

Update Report
'Partial Measures' Survey 2020

Drawing Scale at A4 1:8,000

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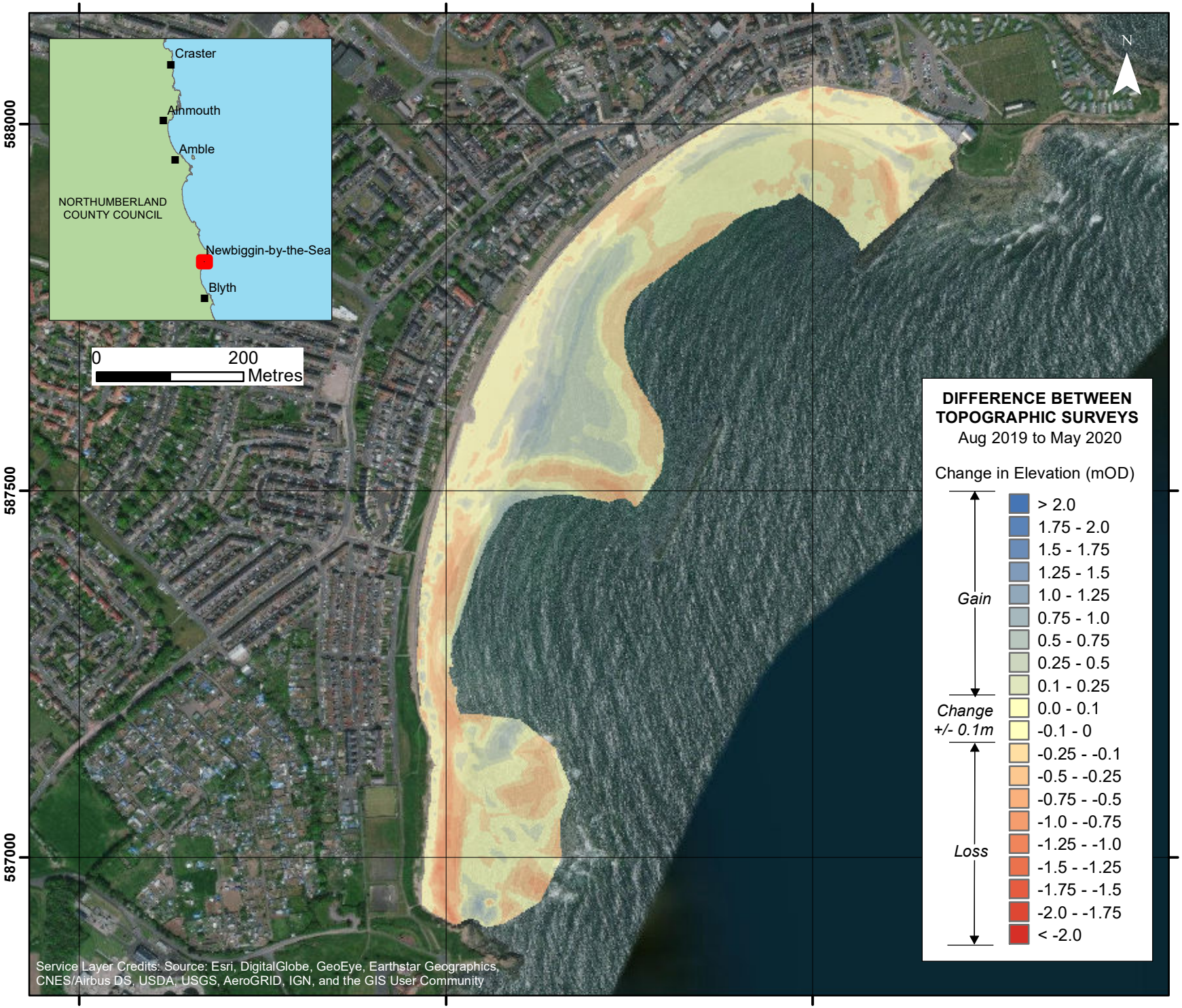

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 6

NEWBIGGIN-BY-THE-SEA

Northumberland County Council Frontage

Update Report
'Partial Measures' Survey 2020

Drawing Scale at A4 1:7,000

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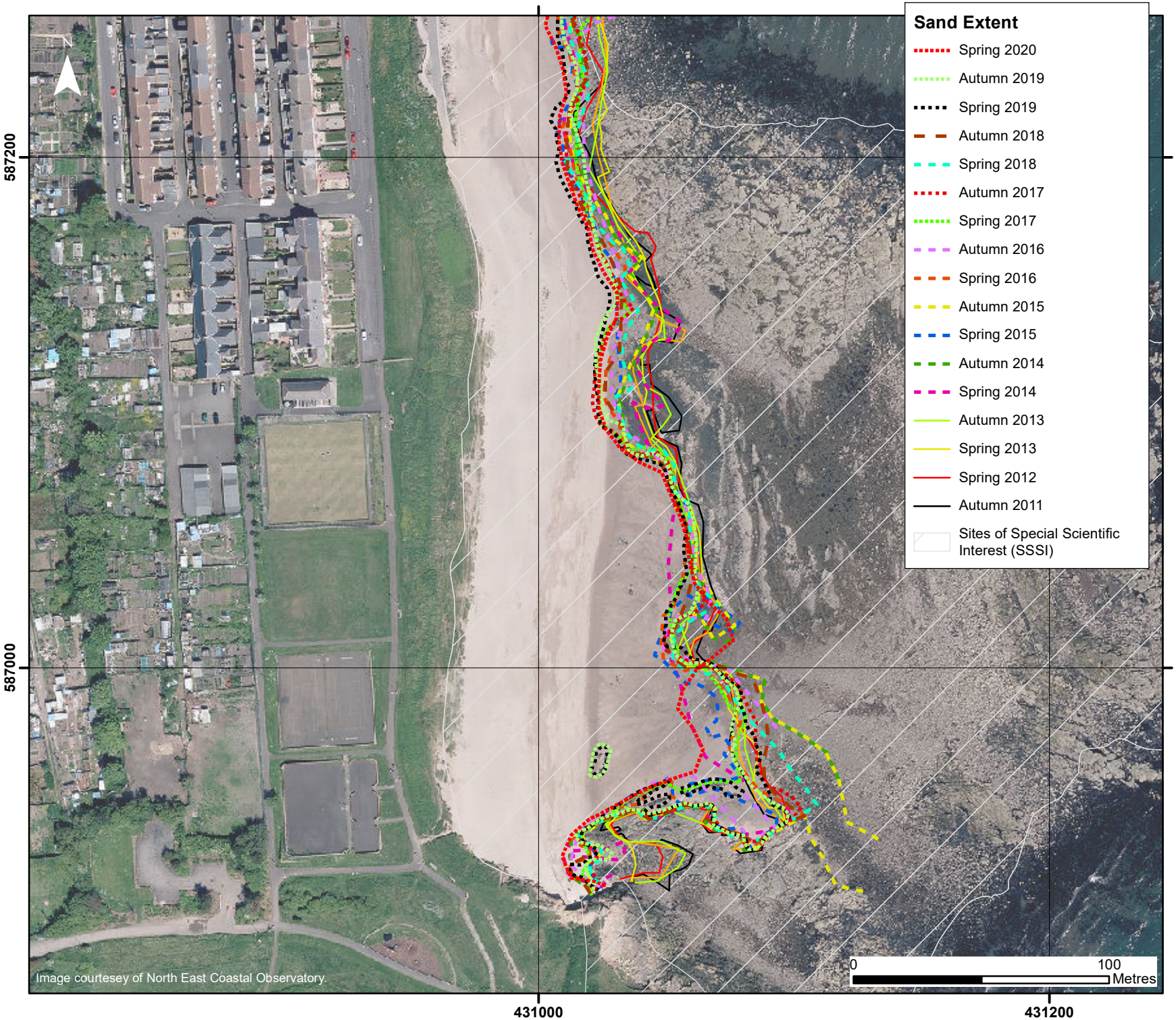
Appendix C

Sand Extent Survey



Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

NEWBIGGIN-BY-THE-SEA SAND EXTENT

Northumberland County Council Frontage

Update Report
'Partial Measures' Survey 2020

Drawing Scale at A4 1:2,000

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