Cell 1 Regional Coastal Monitoring Programme Analytical Report 11: 'Full Measures' Survey 2018

Northumberland County Council

February 2019

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Authors	
Alix Scullion	Royal HaskoningDHV
Dr Nick Cooper – Review & Approval	Royal HaskoningDHV

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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	**Water Level (m AOD) 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). Within this frontage, the coastal landforms vary considerably, comprising low-lying tidal flats with fringing salt marshes, hard rock cliffs that are mantled with glacial sediment to varying thicknesses, softer rock cliffs and extensive landslide complexes.

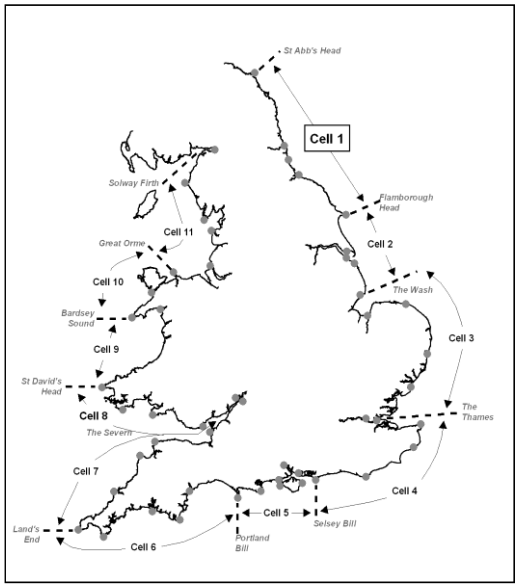


Figure 1 Sediment Cells in England and Wales

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

Northumberland County Council
Northumberland Coast AONB
North Tyneside Council
South Tyneside Council
Sunderland City Council
Durham County Council
Redcar & Cleveland Borough Council
Hartlepool Borough Council
Scarborough Borough Council — A great place to live, work & play
East Riding of Yorkshire Council
Environment Agency
Natural England
The National Trust

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

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

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

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

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

Table 1 Analytical, Update and Overview Reports Produced to Date

Year		Full Measures		Partial Measures		Cell 1 Overview Report
		Survey	Analytical Report	Survey	Update Report	
1	2008/09	Sep-Dec 08	May 09	Mar-May 09		-
2	2009/10	Sep-Dec 09	Mar 10	Feb-Mar 10	Jul 10	-
3	2010/11	Aug-Nov 10	Feb 11	Feb-Apr 11	Aug 11	Sep 11
4	2011/12	Oct-Nov 11	Oct 12	Mar-May 12	Feb13	-
5	2012/13	Sep-Nov 12	Mar 13	Mar-Apr 13	Jun 13	
6	2013/2014	Sep-Oct 13	Feb 14	Mar-Apr 14	Jul 14	
7	2014/2015	Sep-Nov 14	Feb 15	Mar – Apr 15	Jul 15	
8	2015/2016	Sep–Dec 15	Feb 16	Mar-May 16	Jul 16	Jun 16
9	2016/2017	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 (*)			

(*) The present report is **Analytical Report 11** and provides an analysis of the 2018 Full Measures survey for Northumberland County Council's frontage.

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

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

Table 2 Sub-divisions of the Cell 1 Coastline

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

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)

In addition to the above, laserscan surveys of the cliffs in Lynemouth have been undertaken on several occasions. These are reported separately to Northumberland County Council.

For all cliff-top surveys prior to Full Measures 2011, the data was previously saved in '.kmz' format for plotting and visual comparison in Google Earth. 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 Full Measures survey was undertaken on various dates along this frontage between 4th September and 10th December 2018. During this time, weather conditions varied considerably; refer to the survey reports for details of the weather conditions over this survey period.

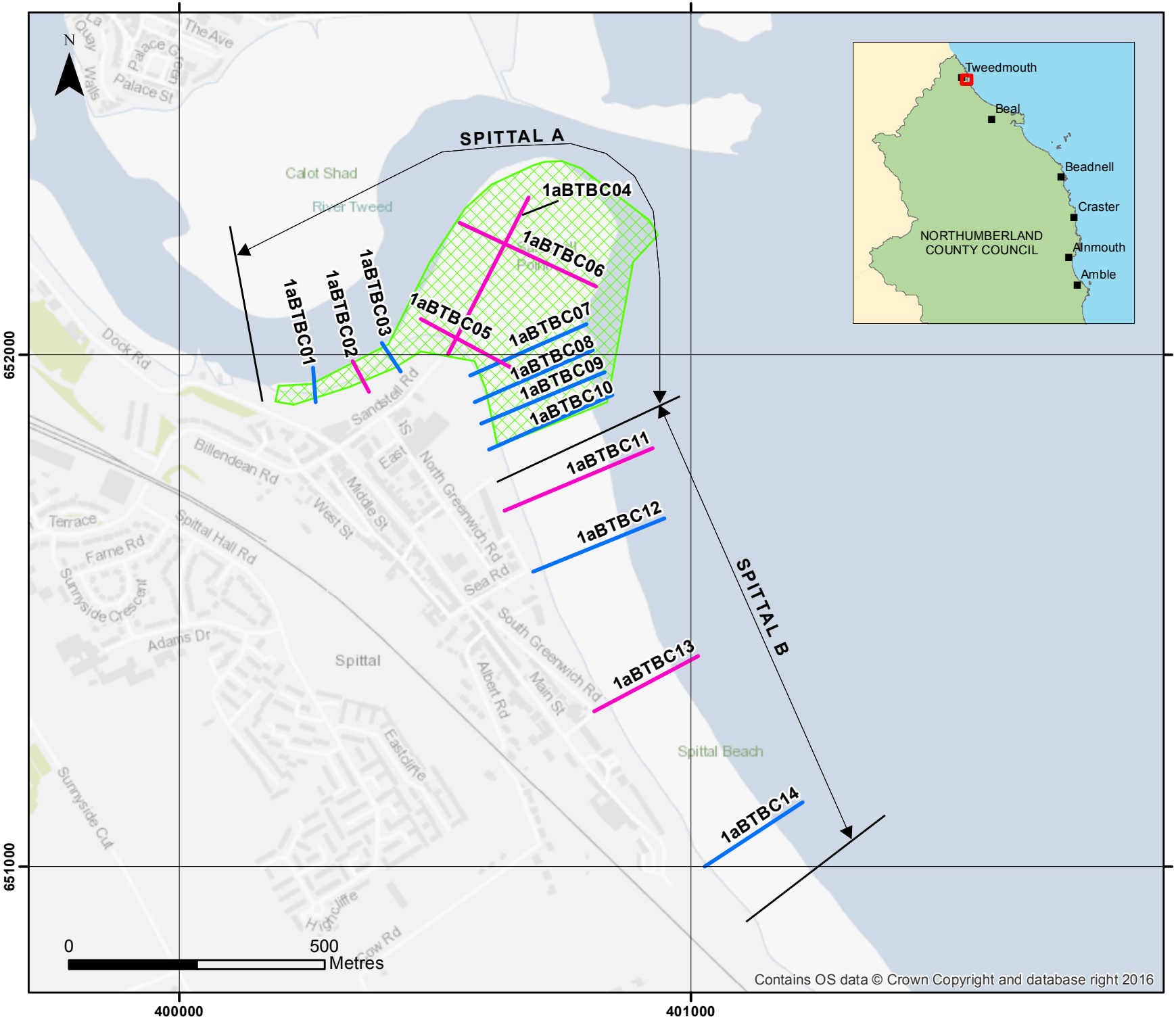
All data have been captured in a manner commensurate with the principles of the Environment Agency's *National Standard Contract and Specification for Surveying Services* and stored in a file format compatible with the software systems being used for the data analysis, namely SANDS and ArcGIS. This data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

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

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

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

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



Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 1

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:10,000

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

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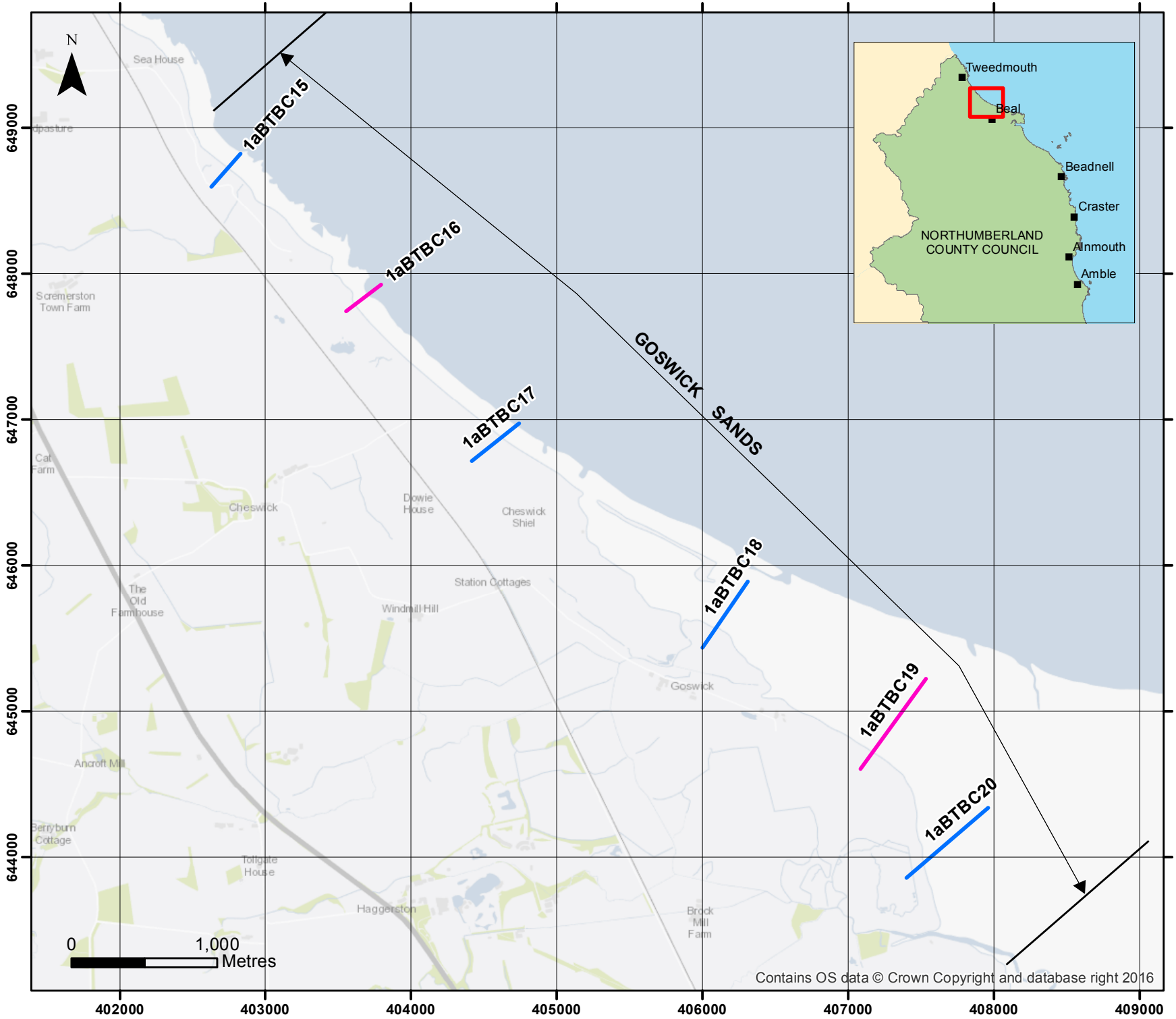

Key

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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Marlborough Crescent
Newcastle upon Tyne
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Fax: +44 (0)191 211 1313
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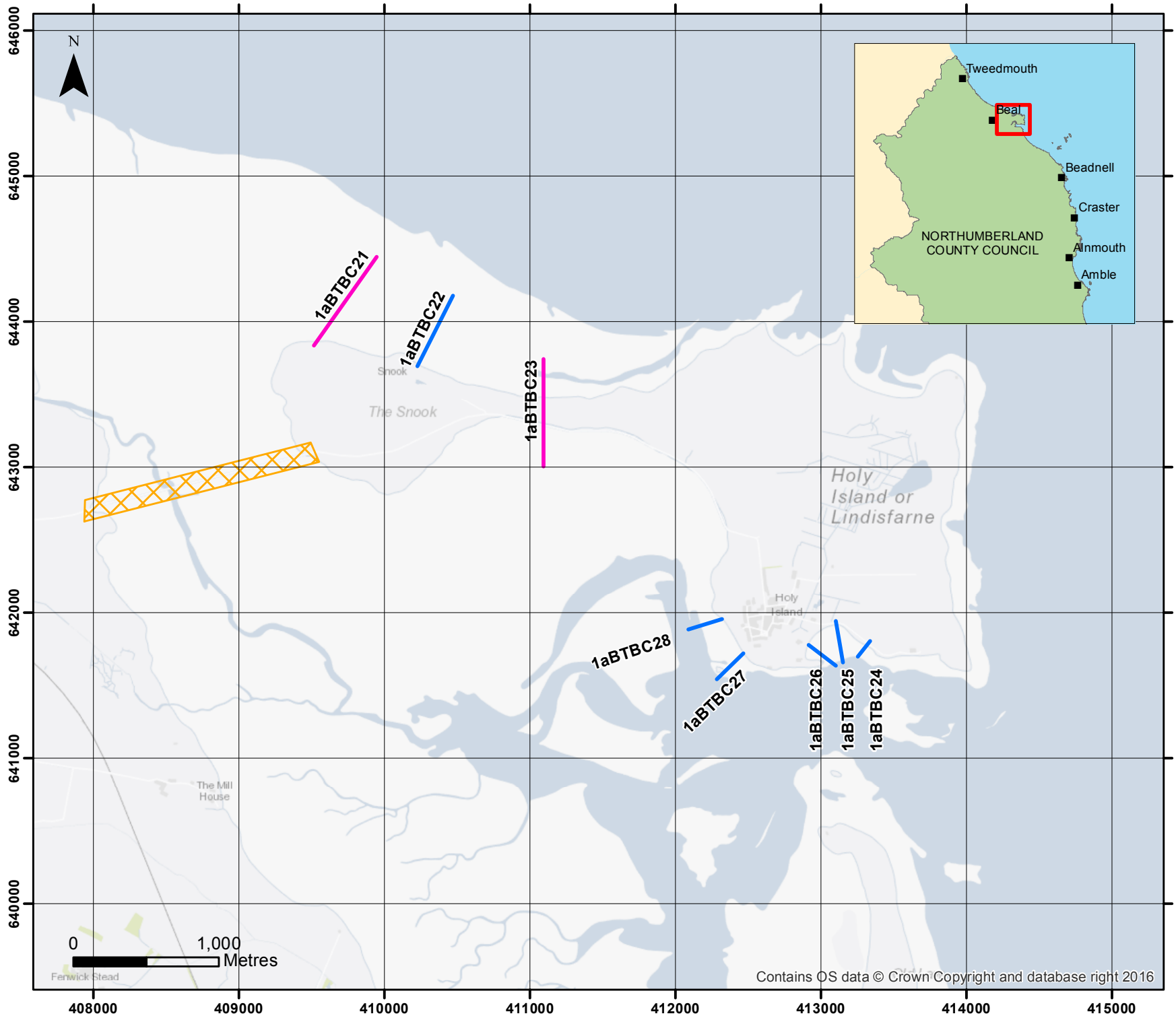

Key

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
Topo Surveys

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Marlborough House
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

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Fax: +44 (0)191 211 1313
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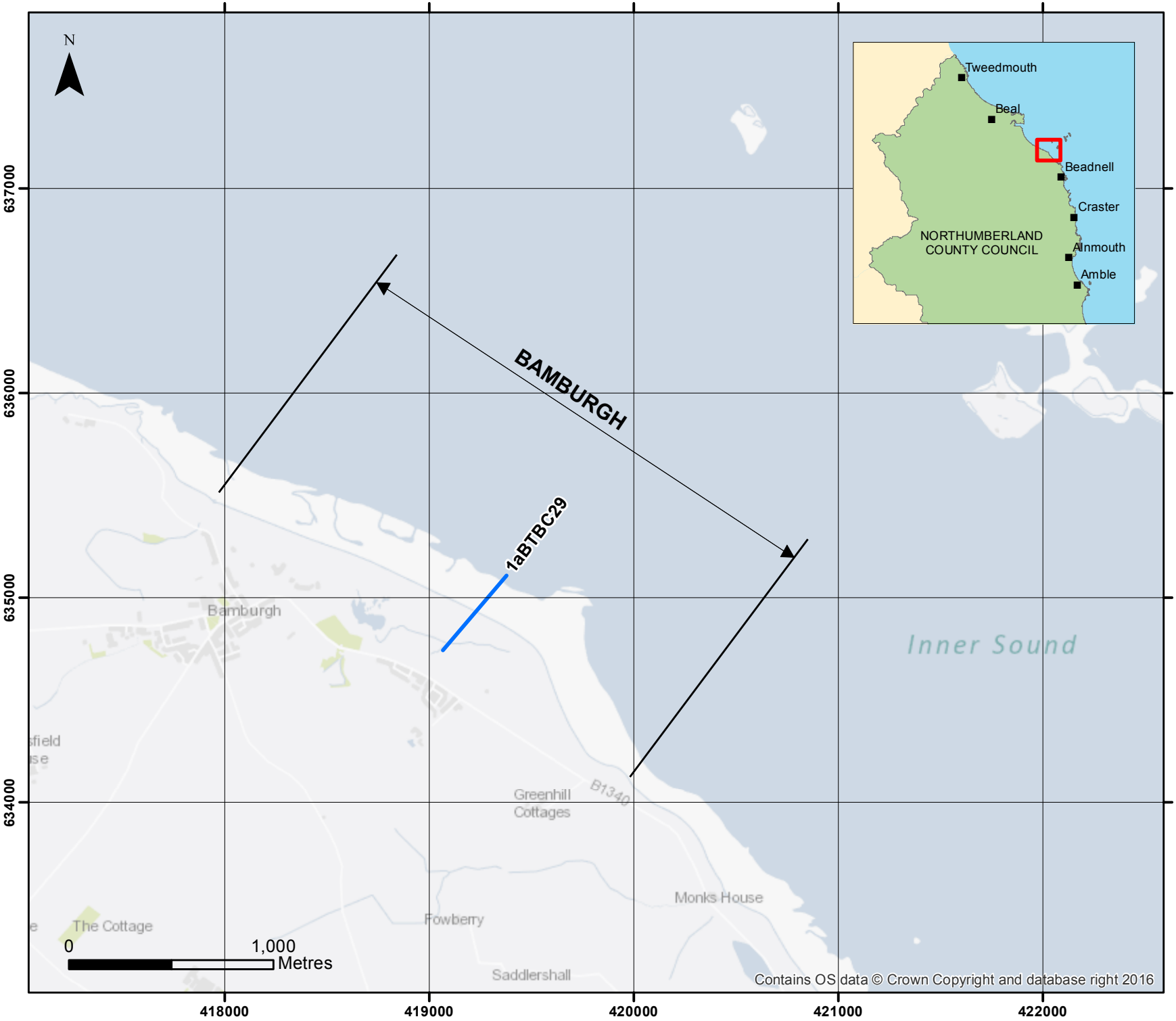

Key

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
Topo Surveys

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Marlborough Crescent
Newcastle upon Tyne
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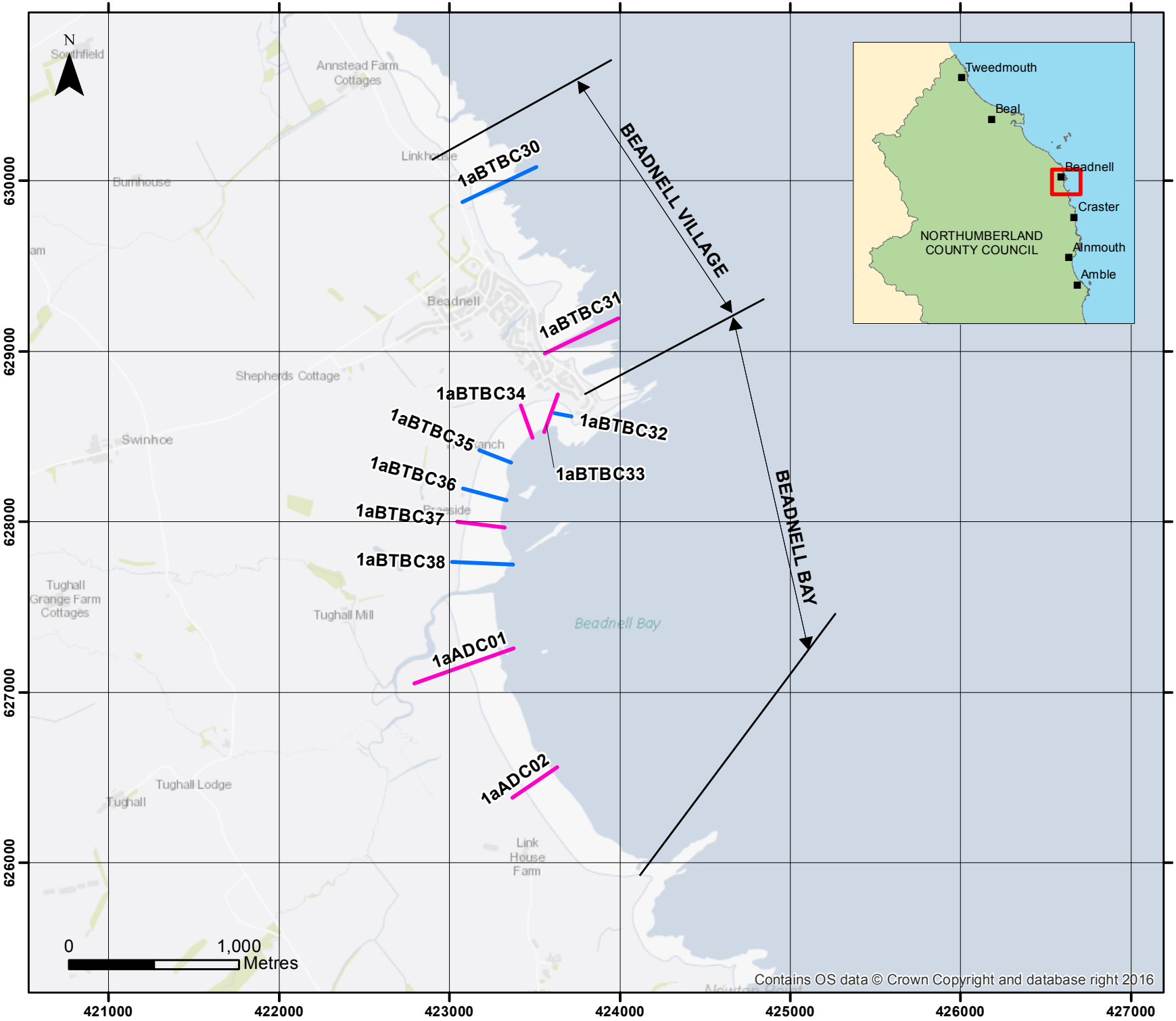

Key

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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Marlborough Crescent
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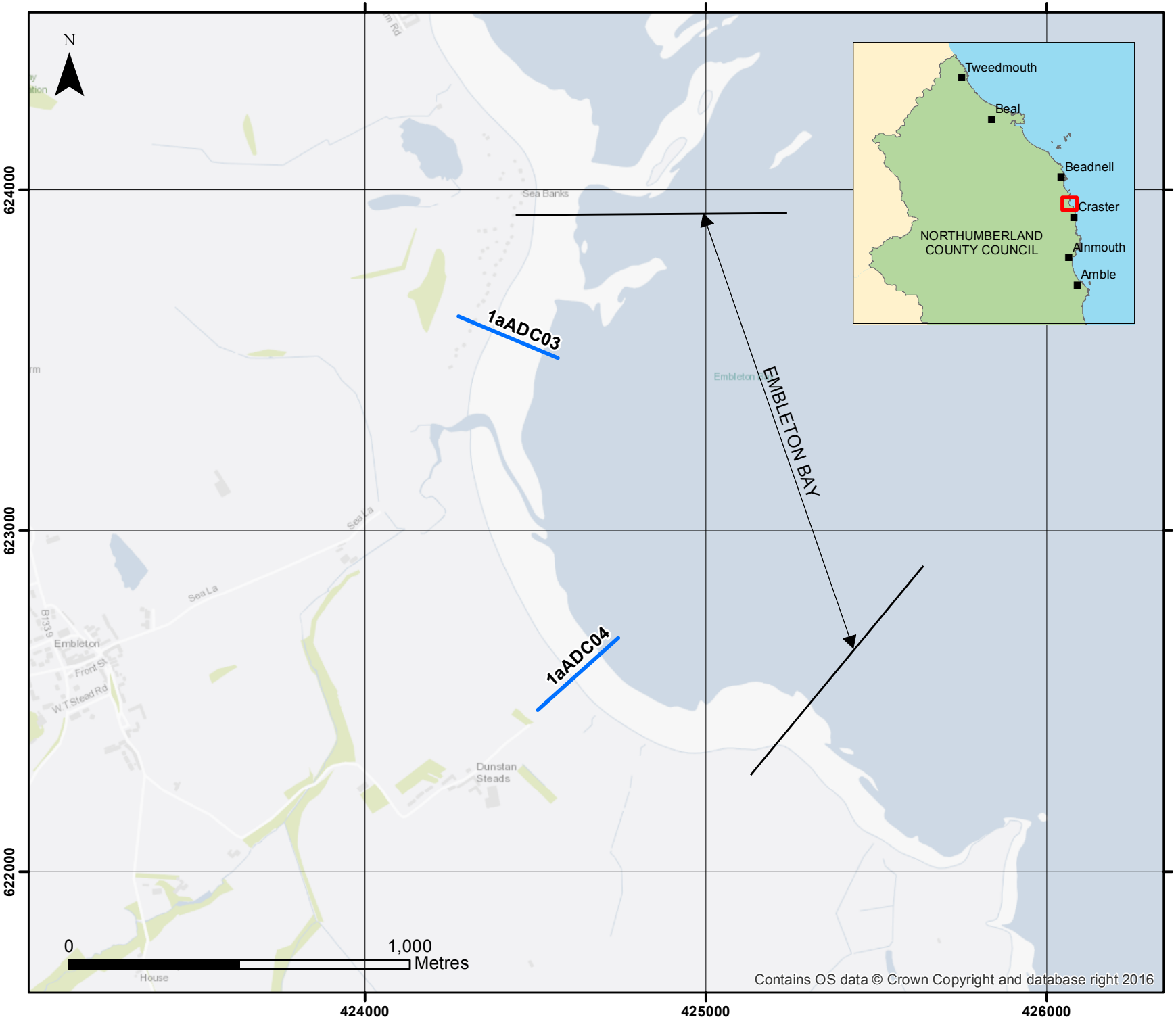

Key

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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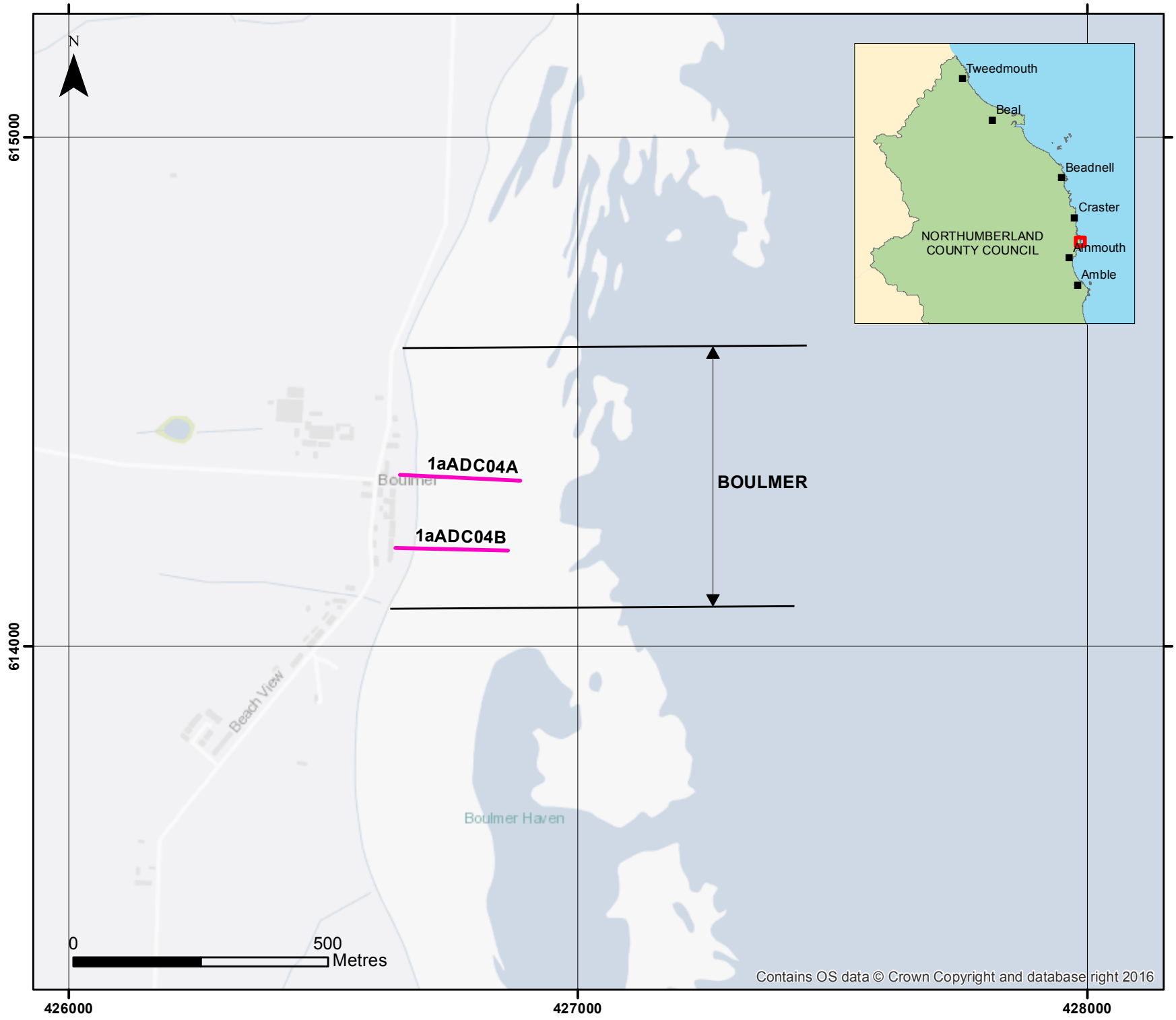

Key

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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Marlborough House
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

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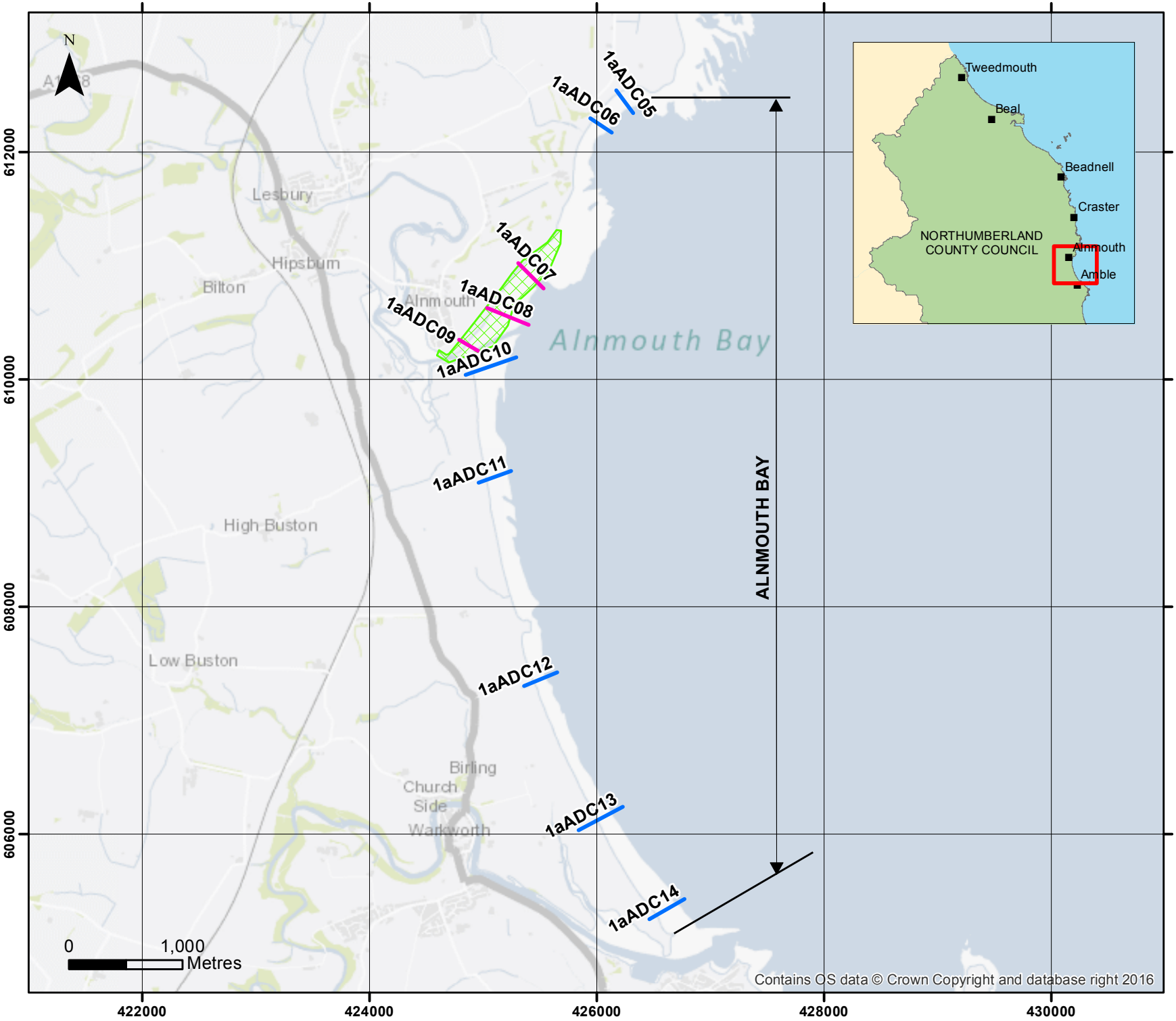

Key

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

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Marlborough House
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

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Fax: +44 (0)191 211 1313
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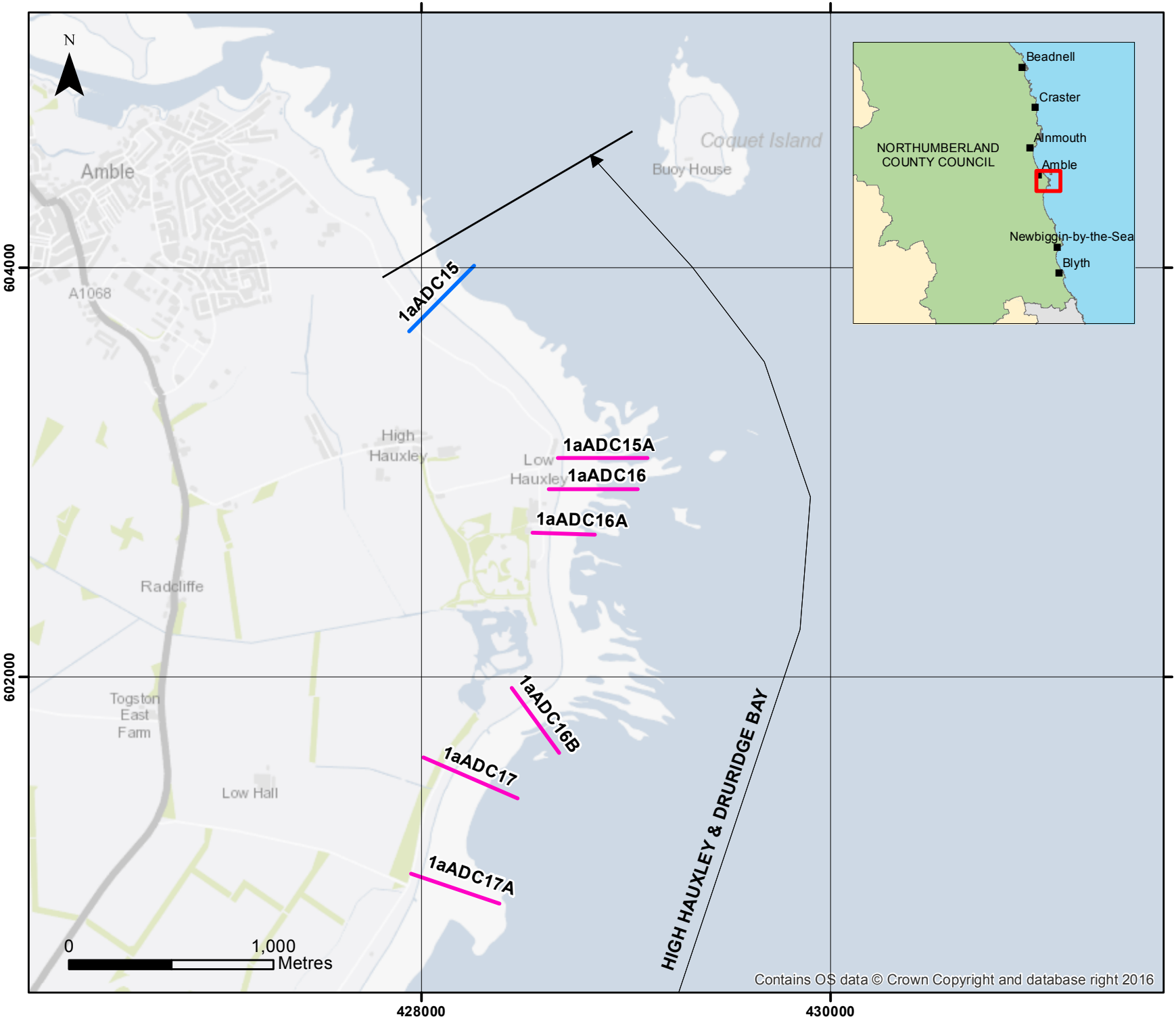

Key

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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Fax: +44 (0)191 211 1313
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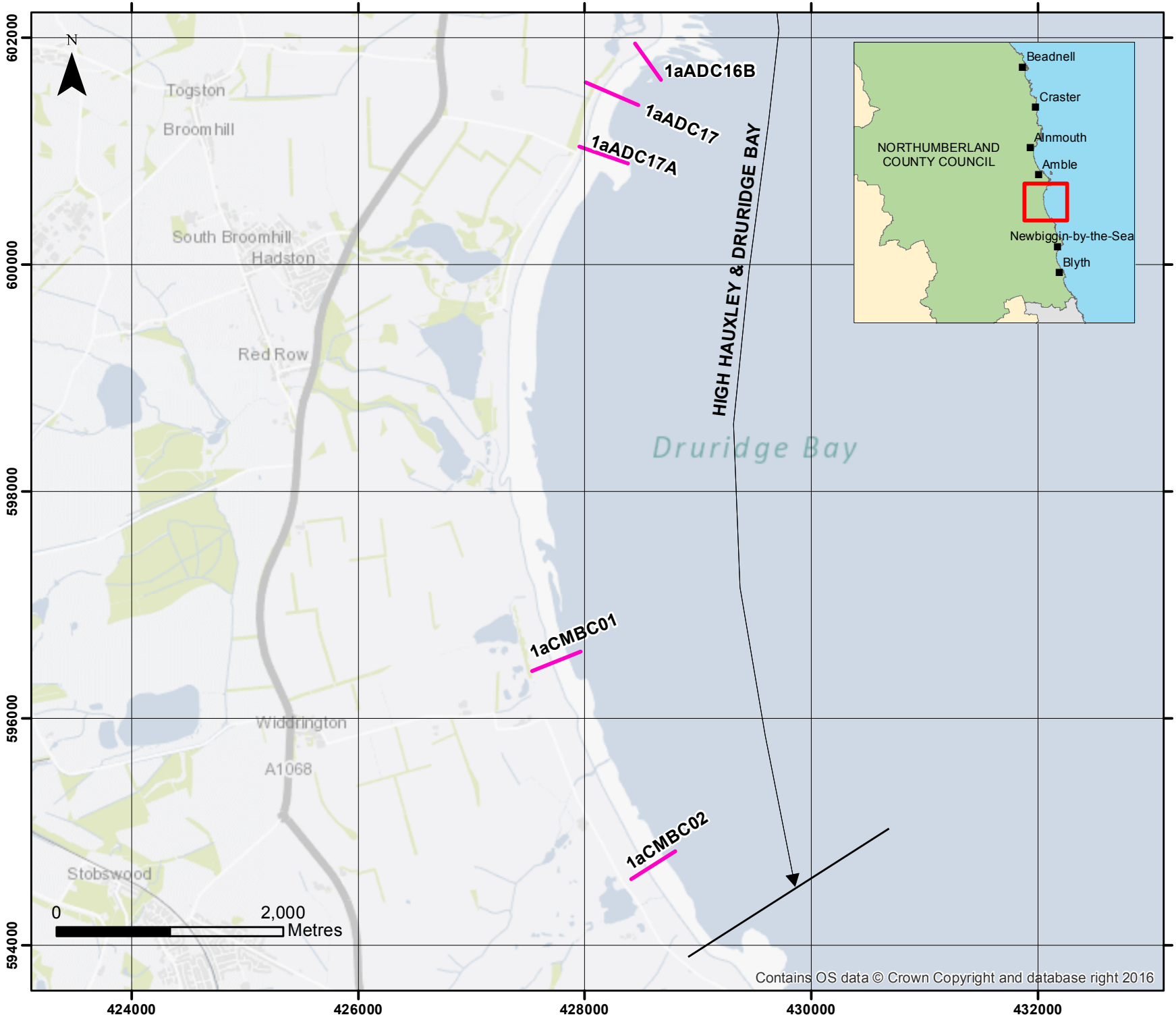

Key

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

Drawing Scale at A4 1:45,000

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Royal HaskoningDHV
Marlborough House
Marlborough Crescent
Newcastle upon Tyne
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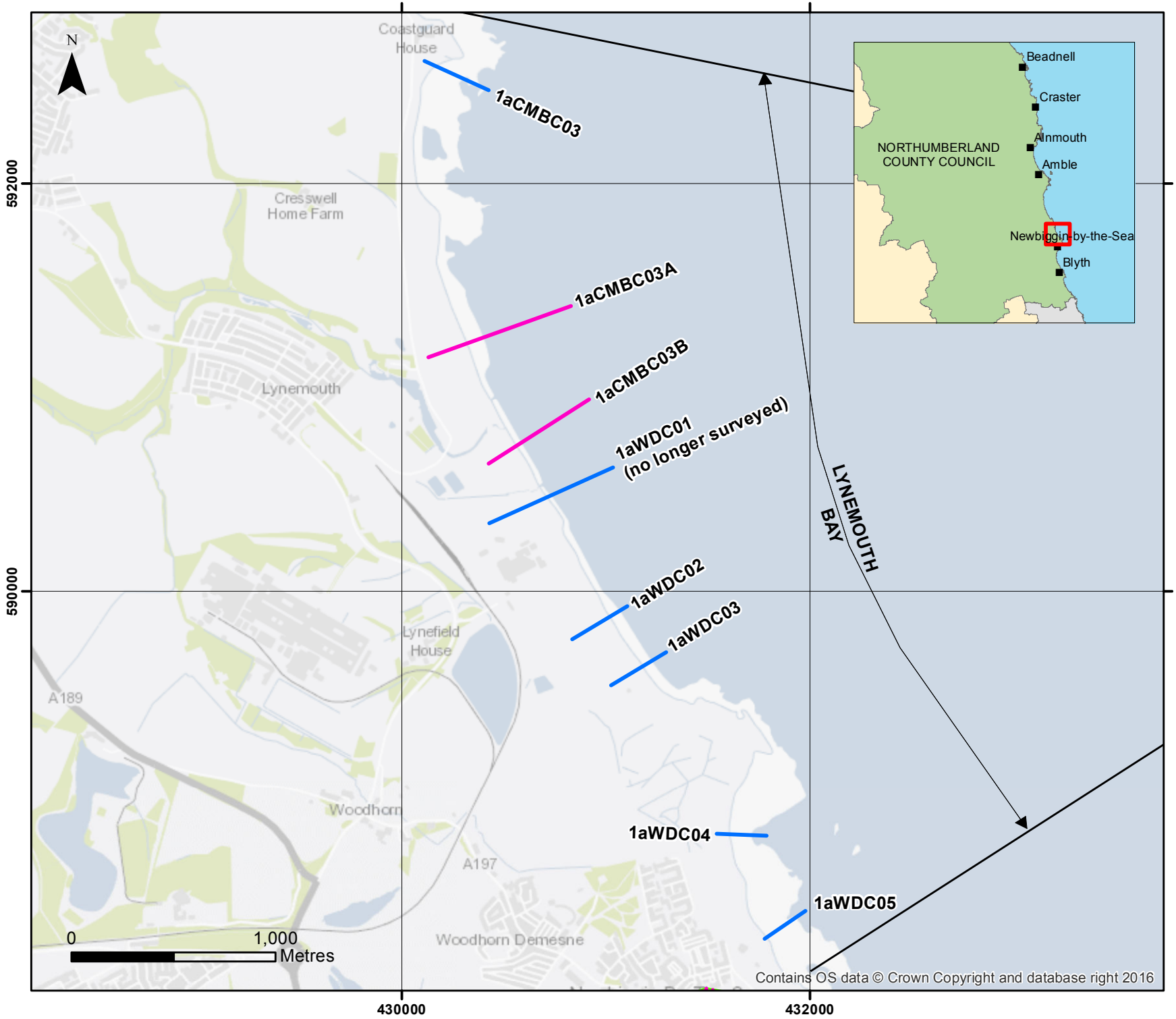

Key

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
Topo Surveys

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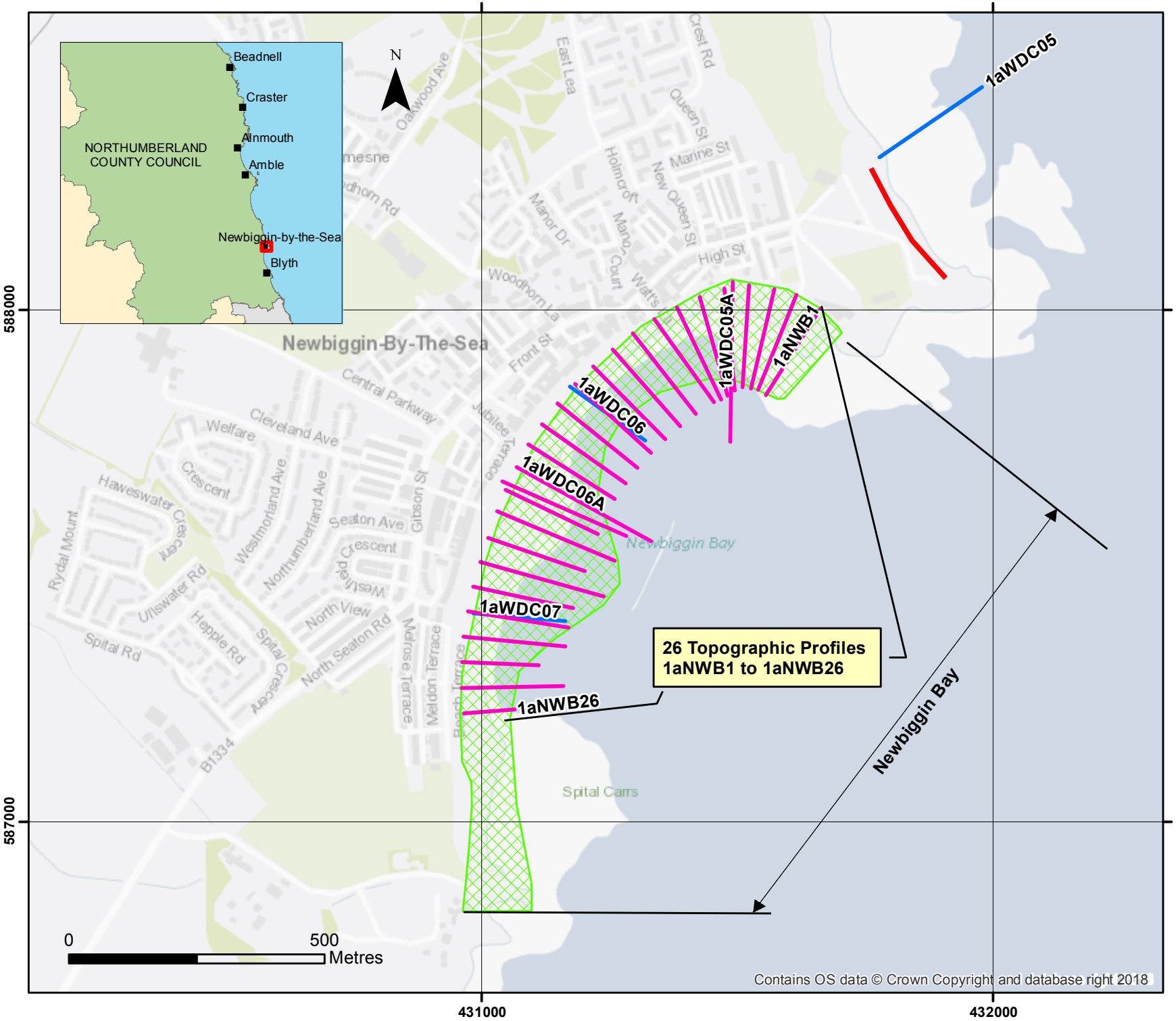

Key

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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Marlborough House
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

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

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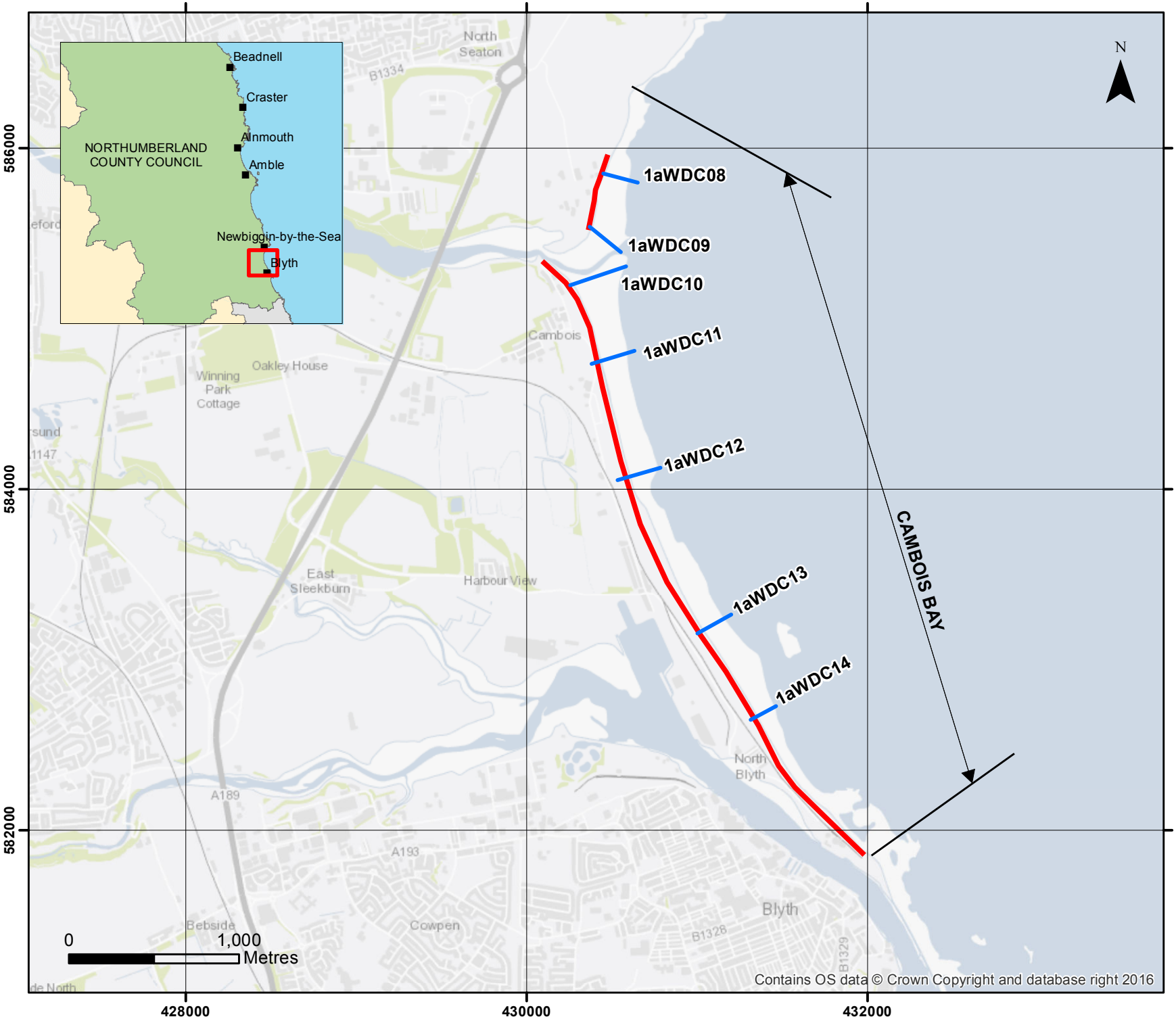

Key

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

Drawing Scale at A4 1:30,000

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

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

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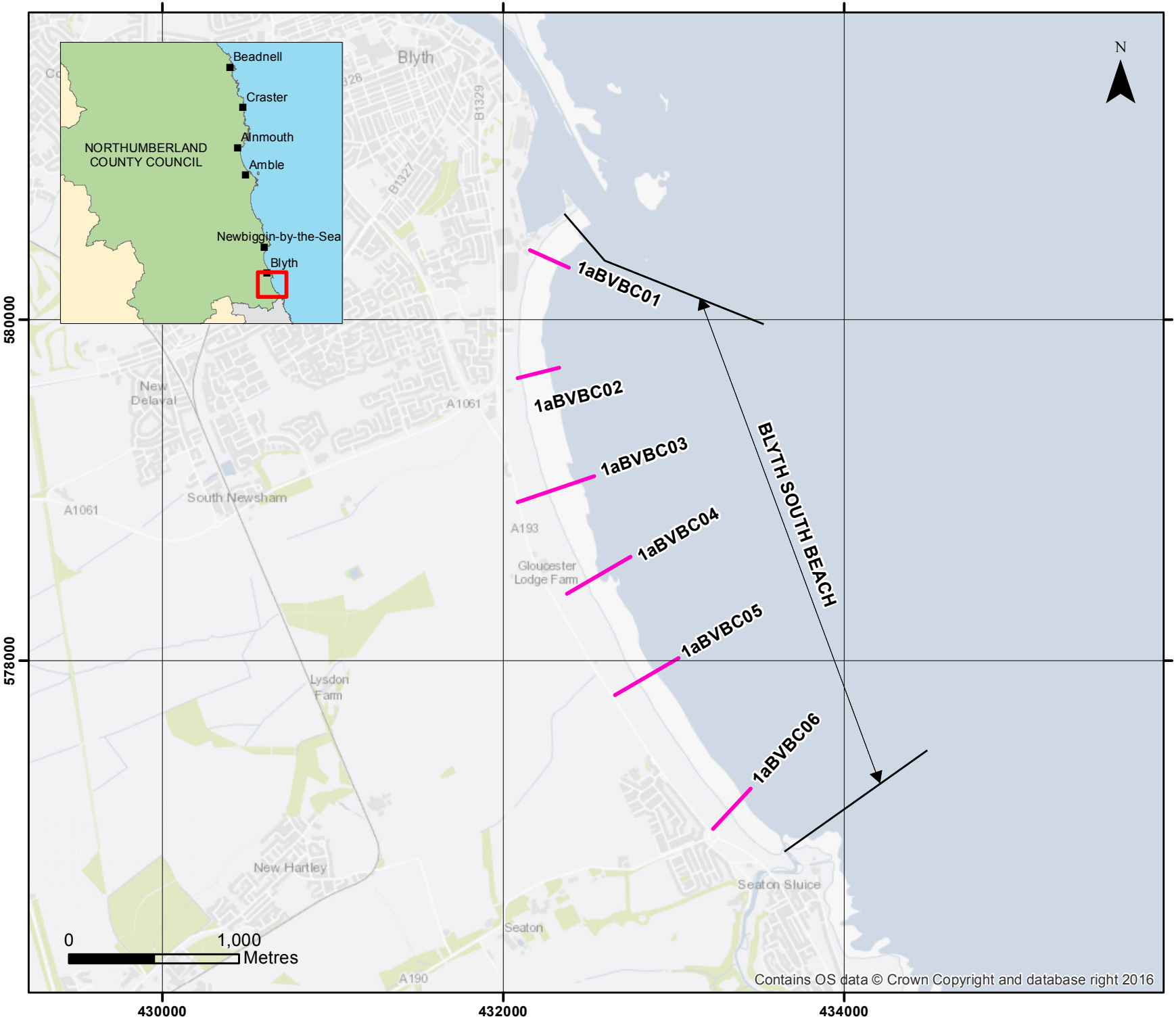

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Client: North East Coastal Group

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

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

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

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2. Analysis of Survey Data

2.1 Sandstell Point (Spittal A)

Survey Date	Description of Changes Since Last Survey	Interpretation
27th November 2018	**Beach Profiles:** Sandstell Point is covered by ten beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC02, 1aBTBC04, 1aBTBC05, and 1aBTBC06 were last surveyed during the Partial Measures Spring survey, 2018. Profiles 1aBTBC01, 1aBTBC03, and 1aBTBC7 to 10 were last surveyed during the Full Measures autumn survey 2017. Profiles **1aBTBC01** to **1aBTBC03** are located on the southern bank of the River Tweed in front of the dunes. At **1aBTBC01,** the dunes have remained mostly stable. From chainage 51m to the end of the survey there has been minor erosion of up to 0.1m. Overall, the profile is at a medium level compared to the range recorded from previous surveys. At profile, **1aBTBC02** there has been little change in the dunes with accretion or erosion ≤0.1m. On the middle to upper beach between chainages 41m and 63m, there has been accretion of up to 0.25m, smoothening out the profile. There is negligible change from chainage 63m to the end of the survey, however, the toe of the beach has moved landward by approximately 1.0m. The upper beach is at a medium level compared to the range recorded from previous surveys, however the lower beach is at a relatively low level. At profile **1aBTBC03,** the seaward face of the dunes between 59m and 68m chainage has accreted by up to 0.3m since the previous survey, and they have advanced by around 2.0m. The beach levels along the rest of the profile have decreased by up to 0.8m, steepening the beach profile. Overall, the dunes are at a high level compared to the range recorded from previous surveys, particularly between chainages 18 – 25m and 59 – 68m where they reach their highest level recorded. The rest of the 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.	Since the last survey, the dunes on south bank of River Tweed have remained unchanged, except at profile 1aBTBC03 where the dune front has advanced to its most seaward position. The beach sections of the profile generally show negligible change / minor accretion and are generally at medium levels. There has been alternating sections of erosion and accretion across the spit which has resulted in a narrower profile closer to the land and a flatter smoother profile at the distal end of the spit. Changes are similar to those seen between September 2017 and April 2018, although they are lower in magnitude. The pattern in the profiles along the open coast are all generally similar, showing accretion at the toe of the rock revetment, erosion of the upper to middle beach and the formation of a berm along the lower beach, suggesting a movement of material offshore. **Longer term trends:** The dunes have remained stable over the past 12 years, and along the south bank of the River Tweed the seaward face of the dunes are the highest since surveys began (April 2002).

Survey Date	Description of Changes Since Last Survey	Interpretation
	At profile **1aBTBC04**, there has been erosion of 0.15m at the toe of the rock armour (chainage 10 – 16m). Between chainage 16m and 350m there has been accretion of up to 0.6m, forming a berm at chainage 105m. Between chainages 350m and 411m, there has been erosion of up to 0.4m. The toe of the spit seaward of chainage 411m has prograded by 4.0m. The most landward portion of the profile is at a relatively high level compared to the range recorded from previous surveys, but the central portion and beach toe between chainage 110m and 431m is at a medium level. 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 spit has increased in height by up to 0.4m, creating a narrower cross-sectional profile. A berm has formed on the riverside of the spit at chainage -20m, and there are alternating bands of erosion and accretion on the seaward facing side of the spit. Overall the profile is within the middle of its range recorded from previous surveys, both in terms of height and position, except between chainages -45 and -15m where the riverside berm is at its highest level recorded since 2002. At profile **1aBTBC06**, the entire spit structure has flattened since the previous spring 2018 survey. The riverside toe of the spit has migrated seaward by 90m and the runnel at chainage 160m has been infilled with sediment by up to 0.8m until chainage 230m, where the secondary berm crest has lowered by 0.5m and migrated seaward by approximately 25m. The seaward toe of the spit has also migrated by up to 10m. Overall the berm is at a medium level compared to the range recorded by previous surveys and is in a relatively seawards position, particularly on the river side where the toe has reached its most seaward position since surveys began in 2002. Profiles **1aBTBC07** to **1aBTBC10** are located along the open coast, at the intersection of the southern side of the spit at Sandstell Point and northern end of Spittal Beach. At profile **1aBTBC07**, between the rock revetment and 48m chainage, beach levels have increased by up to 1.2m. Between chainages 48m and 146m, the beach profile has lowered by up to 1.8m, removing the berm present during the previous Full Measures survey in 2017. From chainage 146m to the end of the profile the toe of the beach has accreted by up to 0.8m. Overall, the upper beach is at a relatively high level compared to the range recorded on previous surveys whilst the lower beach is at a relatively medium level. At profile **1aBTBC08**, a similar pattern is observed with an increase in beach levels by up to 1.0m between 30m (toe of the rock revetment) and 43m chainage, erosion of 1.6m seaward to chainage	Changes in beach levels are generally within the bounds of previous surveys.

Survey Date	Description of Changes Since Last Survey	Interpretation
	128m and accretion of up to 1.0m from this point to the end of the profile. Overall, the upper beach is at a relatively high level compared to the range recorded on previous surveys whilst the lower beach is at a relatively medium level. Profile **1aBTBC09** again shows a similar pattern, with an increase in beach levels of up to 0.8m in front of the rock revetment as far as 36m chainage, erosion of up to 1.6m seaward to chainage 110m and accretion of up to 1.6m from this point to chainage 189m From chainage 189m to the end of the survey at 206m there has been erosion of up to 0.4m.Overall, the upper and toe of the beach are at a relatively high level compared to the range recorded on previous surveys whilst the mid beach is at a relatively medium level. Profile **1aBTBC10** again shows a similar pattern, with an increase in beach levels of up to 0.7m in front of the rock revetment as far as 35m chainage, erosion of up to 0.6m between 35and 115m chainage and accretion of up to 1.0m between 115m and 176m. From 176m seaward there is erosion of up to 0.6m. Overall, the upper and toe of the beach are at a relatively high level compared to the range recorded on previous surveys whilst the middle beach is at a relatively medium level.	
November 2018	**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 November 2011. The previous survey was undertaken for the Partial Measures survey in spring 2018. Data from the most recent topographic survey (Full Measures, autumn 2018) 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 5) produced from the last topographic survey and the present survey. The difference plot for this survey shows a continuation of the pattern observed over the last 6 months, however the changes are lower in magnitude. In particular, the difference plot shows: (i) little change in the dunes on the south bank of the River Tweed; (ii) a decrease in the beach elevation along the northwest edge of the survey area just off the edge of the land; and (iii) three wide bands of	The findings of the topographic survey show similar trends to the profile survey. Findings mirror those observed over the last 6 months, but at a lower magnitude.

Survey Date	Description of Changes Since Last Survey	Interpretation
	alternating accretion and erosion across the spit running north-south parallel to the main coastline, with accretion closest to the coastline.	

2.2 Spittal (Spittal B)

Survey Date	Description of Changes Since Last Survey	Interpretation
27th November 2018	**Beach Profiles:** Spittal B is covered by four beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC11 and 1aBTBC13 were last surveyed during the Partial Measures spring survey, 2018. Profiles 1aBTBC12 and 1aBTBC14 were last surveyed during the Full Measures autumn survey 2017. Profile **1aBTBC11** is located to the north of Spittal Beach. The upper beach shows erosion at the toe of the seawall to chainage 16m of up to 0.25m, switching to accretion on the upper beach of up to 0.4m until chainage 33m. From chainage 33m to 61m there has been erosion of up to 0.6m, which once again switches to accretion of up to 0.2m until chainage 78m. Seawards of chainage 78m, the beach has lowered by up to 0.6m and the beach toe has migrated landward by around 29m. Overall, the profile is at a high level on the upper and middle beach compared to the range recorded from previous surveys, whilst the lower beach is at a low level compared to the range recorded from previous surveys. Profile **1aBTBC12** shows erosion of 0.8m immediately at the toe of the seawall, but accretion of up to 1.1m across the upper beach between chainage 5m and 72m, forming a berm at chainage 18m. Seawards of chainage 72mthe beach levels have decreased by up to 0.8m. Overall, the profile is at a medium-high level on the upper beach compared with the range recorded from previous surveys, but at a medium-low level on the middle to lower beach. Profile **1aBTBC13** shows an increase in levels of 0.6m at the toe of the seawall to chainage 43m. There has been erosion of up to 0.6m between chainage 43m and 91m. Between chainage 91m and 122m there is negligible change in beach level. Seawards of here, the toe of the beach has eroded by c.0.4m. Overall, the profile is at a medium-low level compared with the range recorded from previous surveys. At profile **1aBTBC14**, there has been erosion across the entire beach profile. At the toe of the seawall, beach levels have decreased to their lowest level recorded by up to 1.6m exposing a boulder patch. From chainage 27m to 80m, beach levels have decreased by approximately 0.4m exposing a second boulder patch around chainages 75 – 83m. Seaward of this, beach levels have decreased by up to 0.6m, and the beach toe has moved landward by c.47m. Overall, the profile is at a low level	Since the last survey, beach levels along Spittal have fluctuated, generally showing a decrease immediately at the toe of the seawall with erosion through the mid beach and at the toe of the beach. Overall, all the profiles show the beach is at a roughly medium-low level compared to previous surveys, with the uppermost beach at 1aBTBC14 at its lowest level since April 2002. **Longer term trends:** At all profile locations along Spittal Beach, the changes observed from the present survey are within the bounds of previous surveys, with the exception of the uppermost beach at profile 1aBTBC14 which is at its lowest level recorded.

Survey Date	Description of Changes Since Last Survey	Interpretation
	compared to the range recorded from previous surveys; from the toe of the seawall to chainage 13m the profile is the lowest recorded.	

2.3 Goswick Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
27th November 2018	**Beach Profiles:** Goswick Sands are covered by six beach profile lines for the Full Measures survey (Appendix A. Profiles 1aBTBC16 and 1aBTBC19 were last surveyed during the partial measures spring survey, 2018. Profiles 1aBTBC15, 1aBTBC17 to 1aBTBC18, and 1aBTBC20 were last surveyed during the full measures autumn survey, 2017. The profiles along this frontage extend from **1aBTBC15** to **1aBTBC20** in a north to south direction. The seaward face of the dunes along the northern and central area of Goswick Sands (profiles 1aBTBC15 to 1aBTBC18) have advanced seaward by c.0.2m, with minor accretion to the top of the dunes. At profile 1aBTBC15, the toe of the dunes has prograded by approximately 2m. At profile **1aBTBC15**, On the upper and middle beach, there has been erosion of up to 0.2m, switching to accretion on the lower foreshore from chainage 242m of up to 0.4m, moving the toe of the beach landwards by around 17m. Overall, the profile is at a medium to high level compared to the range recorded from previous surveys, with the section at the toe of the dunes from chainage 96m to 101m being the highest recorded. At profile **1aBTBC16,** the top of the dunes have accreted by up to 0.1m, with an accretion on the seaward facing dunes of c.0.2m. From the toe of the dunes to chainage 157m there has been accretion of up to 0.3m. Seawards of chainage 157m there has been erosion of the lower beach berm of up to 1.0m, moving the toe of the beach landwards by around 17m. Comparing the profile to the range recorded from previous surveys shows that the seaward facing dunes are at their most seawards position, and the rest of the profile is at a medium to high level compared to the range recorded from previous surveys. At profile **1aBTBC17,** there has been accretion on the dunes of up to 0.2m, with the seaward facing dunes reaching their most seaward position since surveys began in 2002. At the toe of the dunes, a small berm has formed, with the accretion of up to 0.8m. At chainage 281m, beach levels show erosion of up to 1.0m, moving the beach toe landward by 132m. The dunes are at their most seaward position since records began and the upper and middle beach are at a medium-high level compared	Beach level change has varied along the length of Goswick Sands since the last survey. Greater movement appears to have occurred in the north of the area, with accretion dominating in the upper and middle beach and erosion dominating at the toe of the beach, with the toe at profile 1aBTBC17 reaching its most landward position since records began. At the southern end of Goswick Sands, the beach has remained stable with no discernible change to the profile form or position. One notable exception is the formation of the barrier feature in the seaward end of profile 1aBTBC18. **Longer term trends:** The majority of change is a continuation of seasonal behaviour. The notable barrier feature developed further seaward in profile 1aBTBC18 in autumn 2015 had not attained its current height since 2003. Subsequent surveys show a gradual reduction in the feature's height and ongoing landward migration until the most recent survey in autumn 2018, which has shown an increase in height, forming in the same area as its 2016 position.

Survey Date	Description of Changes Since Last Survey	Interpretation
	to the range recorded from previous surveys. The beach toe is at its lowest level, reaching its most landward position since records began. At profile **1aBTBC18,** there has been accretion on the most seaward dunes of up to 0.2m on the dune crest, with minor accretion on the dune face of up to 0.1m, where the dune face has reached its most seaward position since records began. Beach levels have increased by up to 0.1m as far as 424m chainage, with the two small island dunes at chainage 320m, 340m and 370m increasing in height, with infilling of sediment between of up to 0.1m. The barrier feature at chainage 500m, eroded during the spring 2018 has formed again with the accretion of 0.7m of sediment. From chainage 524m to 600m, beach level has decreased by 0.3m, switching to accretion of up to 0.6m seaward of chainage 600m, forming a berm on the lower foreshore. The beach toe seaward of chainage 668m has eroded by up to 0.9m. Overall, the seaward dune face is at its most seaward position recorded, the upper and middle beach and barrier feature profile is at a high level compared to the range recorded from previous surveys (with the island dune at chainage 320m reaching its highest position recorded), whilst the lower beach is at a low level compared to the range recorded from previous surveys. At profile **1aBTBC19** there has been very little change across the full profile, limited to ±0.1m. Overall, the beach is at a medium level compared to the range recorded from previous surveys. At **1aBTBC20,** the beach has generally remained stable since the last survey, with accretion / erosion of 0.1m or less. Overall, the beach is at a medium-high level across most of its length compared to the range recorded from previous surveys, particularly between chainages 440m and 470m where the beach has reached its highest position recorded	

2.4 Holy Island

Survey Date	Description of Changes Since Last Survey	Interpretation
25th November 2018	**Beach Profiles:** Holy Island is covered by eight beach profile lines for the Full Measures surveys (Appendix A). Profiles 1aBTBC21 and 1aBTBC23 were last surveyed during the Partial Measures spring survey, 2018. Profiles 1aBTBC22, 1aBTBC24 to 1aBTBC28 were last surveyed during the Full Measures autumn survey, 2017. **1aBTBC21** to **1aBTBC23** are located on the northwest side of the island, along The Snook. **1aBTBC24** to **1aBTBC28** are located on the south side of the island in the vicinity of the castle and priory. **1aBTBC27** extends out to and across the small island upon which the remains of a chapel stand. At all profiles on the north side of the island, the dunes have not changed in form or position since the last survey. On the whole, beach levels have also remained largely the same since the last survey with only minor erosion / accretion in beach level observed (<±0.1m). Overall, the profiles are at low-medium level compared to the range recorded from previous surveys. On the south of the island, profiles show very little change since the previous survey, with only minor erosion in beach level observed (<0.1m). Overall, the profiles are at a medium-low level compared to the range recorded from previous surveys.	The dunes, sandy foreshore and sand flats around The Snook on Holy Island have remained stable in both form and position since the last survey. On the south side of the island, the backshore and beach have remained stable since the last survey. **Longer term trends:** Generally, the trends observed in the present survey are a continuation of those observed in the past, with the dunes and beach retaining the same form and position. The exception to this is at profile 1aBTBC21, where the dune front and toe have advanced by c.20m through the accumulation of nearly 2m of sand since 2002, and 1aBTBC22 and 1aBTBC23, where the advance of the dune toe is similar but less pronounced.
November 2018	**Topographic Survey:** Holy Island causeway and the adjacent sand flats are covered by an annual topographic survey, which commenced in October 2004. The purpose of this survey was to determine whether raising the level of the causeway had any adverse impacts on the adjacent sand flats. Data from the most recent topographic survey (Full Measures, autumn 2018) 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 6) produced from the last produced topographic survey (Full Measures, autumn 2017) and the present survey.	The topographic survey shows that the causeway has remained stable since the last survey.

Survey Date	Description of Changes Since Last Survey	Interpretation
	The difference plot shows overall stability with pockets of elevation change in the order of +/-0.5m. There are more patches of minor erosion than accretion, and the main area of change is in the vicinity of the South Low channel.	

2.6 Bamburgh

Survey Date	Description of Changes Since Last Survey	Interpretation
10th December 2018	**Beach Profiles:** Bamburgh is covered by one beach profile line for the Full Measures survey (Appendix A). Profile 1aBTBC29 was last surveyed during the Full Measures autumn survey, 2017. Profile **1aBTBC29** is located approximately 750m south-east of the castle. There have been no changes to the dunes. Beach levels have eroded across the profile by up to 0.5m. At the toe of the beach, between chainages 541m and 554m there is a small section of accretion of 0.05m. Overall, the dunes are at a medium level, whilst the rest of the beach is at a low level compared to the range recorded from previous surveys.	The dunes at Bamburgh have remained stable, and the beach shows a lowering across the profile. It is worth noting that this pattern has occurred previously and recovered over the next few years. **Longer term trends:** The 2016 profile shows that the seaward face of the dune is still near its most eroded position since 2004. The beach is at a low level compared to earlier surveys.

2.7 Beadnell Village

Survey Date	Description of Changes Since Last Survey	Interpretation
10th December 2018	**Beach Profiles:** Beadnell Village is covered by two beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC31 was last surveyed during the Partial Measures spring survey, 2018. Profile 1aBTBC30 was last surveyed during the Full Measures autumn survey, 2017. **1aBTBC30** is around 300m to the north of the village. The top of the dunes has accreted by up to 0.1m, whilst the seaward dune face has remained stable since the last survey. From the toe of the dunes at chainage 39m to chainage 50m, there has been accretion of 0.1m. There has been little change along most of the beach profile, with changes limited to ±0.1m. Overall, the profile is at a relatively low level compared to the range recorded from previous surveys. **1aBTBC31** is in Nacker Hole and extends across the promenade and seawall. Since the last survey, there has been very little change in beach levels, restricted to ±0.1m change. Overall, the profile is at a medium level compared to the range recorded from previous surveys.	The dunes and beach to the south of Beadnell Village have generally remained stable. **Longer term trends:** The changes observed since the last survey are within the bounds of previous surveys albeit at relatively low levels.

2.8 Beadnell Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
7th December 2018	**Beach Profiles:** Beadnell Bay is covered by nine beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC33 to 1aBTBC34, 1aBTBC37 and 1aADC01 to 1aDC02 were last surveyed during the Partial Measures spring survey, 2018. Profiles 1aBTBC32, 1aBTBC35 to 1aBTBC36 and 1aBTBC38 were last surveyed during the Full Measures autumn survey, 2017. **1aBTBC32** to **1aBTBC34** are located at the northern end of Beadnell Bay, in Beadnell Harbour. At profile **1aBTBC32**, the dune ridge has accreted since the last survey by 0.1m. The raised feature at chainage 10 appears to be a boulder from the survey photos. The majority of the beach profile has undergone accretion of 0.4m, with the exception of chainage 30m to 44m which shows accretion of 0.1m. Overall, the profile is at a low-medium level compared with the range recorded from previous surveys, except at the lower foreshore from chainage 51m seawards showing the highest recorded levels. At profile **1aBTBC33**, the back of the dunes has remained stable since the last survey. The survey report notes '*middle of dunes missing due to dense vegetation*', as it did in the previous surveys, so the profile for the dune face has not been analysed any further. The beach has remained stable across the profile, with changes limited to ±0.2m, except at the toe of the beach seawards of chainage 230m which has eroded by up to 0.4m. Overall, the profile is at a medium level compared with the range recorded from previous surveys, except from chainages 120m to 199m which has the highest recorded levels since records began in spring 2002. At profile **1aBTBC34**, the dune has undergone sections of erosion and accretion, limited to ±0.2m. The upper and mid beach has seen accretion of up to 0.3m, covering the previously exposed boulder patches. The lower beach from chainage 159m has seen erosion of up to 0.4m, moving the toe of the beach landward by 30m Overall, the profile is at a medium-high level compared with the range recorded from previous surveys, with the section between -25m and -13m reaching their highest levels since records began in spring 2002	Along the length of Beadnell Bay, the dunes have remained stable. Beach levels generally remained stable throughout the bay with minor fluctuations indicating cross shore movement of sediment. **Longer term trends:** Along the length of Beadnell Bay, the majority of the dune and beach form are similar to those observed in the past and the profile form and position is generally within the bounds of previous surveys. However, there are several sections along the north of the bay which exhibit their highest level recorded (1aBTBC32, 1aBTBC33, 1aBTBC34, 1aBTBC35 and 1aBTBC38) and lowest levels in the south of the bay (1aADC02).

Survey Date	Description of Changes Since Last Survey	Interpretation
	1aBTBC35 to **1aBTBC38** are located between Burn Carrs and the outfall of Brunton Burn/Long Nanny. The dunes along this northern section of coast have remained stable since the last survey. At profile **1aBTBC35**, the dunes from chainage -13m to 10m have accreted, up to 0.2m, infilling depressions. At the toe of the dunes, there has been accretion up to 0.4m until chainage 10m. From chainages 10m to 145m, the upper and middle beach erodes by up to 0.2m, switching to accretion on the lower beach by up to 0.5m. Overall, the profile is at a medium level compared with the range recorded from previous surveys, with the areas between chainages 3m and 6m, and 145m to the end of the survey being the highest levels on record. At profile **1aBTBC36**, the dunes have predominantly accreted by 0.1m. From chainages 31m to 230m, erosion is the dominant process across most of the profile, reaching 0.3m. The toe of the beach has accreted by up to 0.5m, resulting in the toe moving seawards by around 30m. Overall, the profile is at a medium-high level compared with the range recorded from previous surveys. At profile **1aBTBC37**, the dunes have remained generally stable since the last survey, however the toe of the dunes has moved landward by approximately 2m. The beach has seen very little change limited to ±0.2m, except between chainages 177m to 252m, which has eroded by 0.3m. The toe of the beach seaward of chainage 252m has accreted by up to 0.2m, moving the toe seawards by 12m. Overall the profile is at a medium-high level compared with the range recorded from previous surveys. At profile **1aBTBC38**, there has been erosion of up to 0.2m on the upper beach from chainage 10m to 37m, and up to 0.7m on the middle beach from chainage 80m to 160m. The lower beach has seen accretion of up to 0.3m between chainage 160m to the end of the survey. The upper beach and middle beach are at a low level compared with the range recorded from previous surveys, particularly between chainages 16m and 29m and 100m and 137m which are at their lowest level recorded, whilst the lower beach is at a medium-high level, reaching its highest level recorded at the toe of the beach seawards of chainage 305m. **1aADC01** and **1aADC02** are located south of the outfall of Brunton Burn/Long Nanny. The dunes have not changed form or position. At profile **1aADC01**, there has been sections of small amounts of erosion / accretion, typically less than 0.2m, except at the dips at chainages 100m and 200m where an accretion of 0.5m has occurred. The rest of the dunes have remained stable in height and position. The upper beach at the toe of the	

Survey Date	Description of Changes Since Last Survey	Interpretation
	dunes to chainage 330m has eroded by up to 0.6m. The rest of the profile has accreted by up to 0.2m. The upper beach and toe are at a relatively low level compared with the range recorded from previous surveys, whilst the mid and lower beach is at a medium level. At profile **1aADC02**, there has been a small amount of accretion at the back of the dunes of 0.2m, whilst the crest of the dunes has eroded between chainages 22m and 35m by up to 0.6m. There has been accretion at the toe of the dunes to chainage 65m of up to 0.4m. From chainages 65m to 105m, the change is negligible. There has been erosion of 0.4m between chainages 105m and 134m, reaching its lowest level recorded. This switches to accretion to chainage 224m by up to 0.3m. The lower beach seawards of chainage 224m has eroded by up to 0.3m. Overall, the profile is at a medium level compared with the range recorded from previous surveys, except for the section of erosion between 105m and 134m which is at its lowest recorded level.	

2.9 Embleton Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
28th October 2018	**Beach Profiles:** Embleton Bay is covered by two beach profile lines for the Full Measures survey (Appendix A). Profiles 1aADC03 and 1aADC04 were last surveyed during the Full Measures autumn survey, 2017. **1aADC03** is located towards the north of the bay, north of Embleton Burn mouth. **1aADC04** is located towards the south of the bay. At profile **1aADC03,** the dunes have remained stable. There has been erosion of a berm from the toe of the dunes to chainage 107m of up to 0.8m, and erosion in the middle beach between chainages 115m to 170m of up to 0.4m. The toe of the beach seaward of chainage 190m has eroded by up to 0.3m, resulting in the movement of the toe landwards by 14m. Overall, the profile is at a medium-low level compared with the range recorded from previous surveys. At profile **1aADC04**, there has been some erosion / accretion of up to 0.2m on the front face of the dune since the previous survey. There has been erosion of up to 0.6m at the toe of the dunes to chainage 173m, and up to 0.3m on the lower beach between chainages 210m to 298m. There is a section of accretion along the berm at chainage 182m by up to 0.3m. Overall, the profile is at a medium-low level compared with the range recorded from previous surveys.	The dunes at Embleton Bay are generally stable, with small amount of erosion on the lower dune face. The beach levels have generally decreased slightly with the exception being the section of accretion on the middle beach at profile 1aADC04 which shows accretion, possibly as a result of sediment being redistributed across the shoreline. **Longer term trends:** The dunes have remained stable over the longer term and beach levels are within the range of those surveyed since 2002. The beach levels remain at medium-low level.

2.10 Boulmer

Survey Date	Description of Changes Since Last Survey	Interpretation
28th September 2018	**Beach Profiles:** Boulmer is covered by two beach profile lines for the Full Measures survey (Appendix A). These were added to the programme in October 2007. Profiles 1aADC04A to 1aADC04B were last surveyed during the Partial Measures spring survey, 2018. At profile **1aADC04A**, erosion has dominated across the beach. Between the rock armour and chainage 46m there has been erosion of up to 0.2m. Between chainage 46m and 51m there has been accretion of up to 0.1m. The rock platform remains exposed from chainage 51m and changes in level are most likely related to variations in survey points. The autumn 2018 survey continues seaward along the rock platform to chainage 116m. Overall the profile is at a medium-high level on the upper beach and at a medium-low level on the middle beach compared to the range recorded from previous surveys. At profile **1aADC04B** the pattern is similar to the previous profile, with erosion dominating across the majority of the profile. The upper beach between chainage 19m and 47m lowers by 0.2m, whilst erosion across the rest of the profile is limited to less than 0.1m. There is a small amount of accretion from the toe of the rock armour to chainage 19m of less than 0.1m. The rock platform remains exposed from chainage 75m. Overall, the profile is at a high level on the upper beach compared to the range recorded from previous surveys, with the section between chainage 11m and 19m being the highest on record, whilst the rest of the profile is medium-low level compared to the range recorded from previous surveys	The changes to beach profile are minimal, predominantly showing erosion. Beach levels are at a medium-high level on the upper beach and at a medium-low level on the lower beach compared to the range recorded from previous surveys. **Longer term trends:** Beach elevations are generally medium in comparison to the long-term record of surveys.

2.11 Alnmouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
22nd September & 28th September 2018	**Beach Profiles:** Alnmouth Bay is covered by ten beach profile lines for the Full Measures survey (Appendix A). Profiles 1aADC07 to 1aADC09 were last surveyed during the Partial Measures spring survey, 2018. Profiles 1aADC05, 1aADC06 and 1aADC10 to 1aADC14 were last surveyed during the Full Measures autumn survey, 2017. **1aADC05** and **1aADC06** are located in the small pocket beach that is situated between the rock outcrops of Seaton Point and Marden Rocks. At profile **1aADC05**, the cliffs have remained stable since the last survey. There has been erosion of up to 0.4m between the cliff toe and chainage 115m. From chainage 115m to 168mthere has been accretion of up to 0.3m. From chainage 168m to 182m there has been erosion of up to 0.3m. At the toe of the beach, there has been accretion of 0.1m. Overall the beach is at a low level on the upper and lower beach, reaching its lowest level recorded between chainages 30m to 60m and 205m to 226m, whilst the middle beach is at a medium to high level compared to the range recorded from previous surveys. At profile **1aADC06**, there has been accretion from the toe of the dune to chainage 27m of 0.2m, switching to erosion across the upper foreshore to chainage 108m of up to 0.6m, removing a berm present during the previous survey. The middle beach between chainage 108m and 150m shows accretion of up to 0.2m. The lower beach from chainage 150m shows erosion of up to 0.4m. The upper and lower beach is at a low level, particularly between chainages 32m to 58m which is at its lowest recorded level. The middle beach is at a medium to high level compared to the range recorded from previous surveys. **1aADC07**, **1aADC08** and **1aADC09** are located to the north of Alnmouth Bay between Marden Rocks and the mouth of the River Aln Estuary. At profile **1aADC07**, the dunes have remained stable since the last survey. The upper beach has increased in level by 0.4m from the dunes to chainage 50m, switching to erosion between chainage 50m and 118m of up to 0.3m. There has been negligible change in beach level between chainage	To the north of Alnmouth Bay, the dune cliffs and beach levels have remained relatively stable with a limited amount of sediment redistributed across the beach. Two sections at profile 1aADC05 have reached their lowest level recorded, between chainages 30-60m and 205-226m. At the centre of bay, north of the mouth of the River Aln Estuary, the dunes have remained stable since the last survey. Since the last survey, the beach has shown some mobility with the movement of the bar in the lower foreshore at 1aADC07. Beach levels between chainages 132m and 158m at profile 1aADC08, and between chainages 23m and 79m at profile 1aADC09 have reached their lowest levels recorded. Immediately south of the mouth of the River Aln, there has predominantly been erosion across the beach profiles, particularly on the upper foreshore. Several sections have reached their lowest levels recorded; profile 1aADC12 between chainages 32m and 36m, and 66m and 86m and profile 1aADC13 between chainages 191m and 216m.The berm on the lower foreshore at profile 1aADC10 and 1aADC11 has reached its highest level since records began. Varying levels of erosion across the beach profiles has resulted in a series of undulating profiles.

Survey Date	Description of Changes Since Last Survey	Interpretation
	118m and 195m, with erosion / accretion limited to ±0.1m. The toe of the beach has lowered by 0.3m since the previous survey, continuing to chainage 334m where the berm from the previous survey has migrated to chainage 270m.The profile is at a medium level throughout the beach profile At profile **1aADC08,** the dunes have remained stable since the previous survey and there has been varying amounts of accretion and erosion across the profile. There has been accretion of 0.8m from the dunes to chainage 35m and between chainage 158m and 222m, with more accretion on the lower beach of up to 0.2m seawards of chainage 292m. There has been erosion of up to 0.6m between chainage 35m and 158m, although it is more in the region of 0.2m. There is further erosion between chainages 222m and 292m of up to 0.2m. Overall, the profile is at a medium-low level on the upper and middle beach compared to the range recorded from previous surveys, particularly between chainages 132m and 158m which has reached its lowest level recorded. The lower beach is at a medium to high level compared to the range recorded from previous surveys, At profile **1aADC09**, the dunes have remained stable since the previous survey. Between the dunes and chainage 90m there has been significant erosion of up to 0.8m. Seaward of 90m chainage, the profile descends into the Aln channel, where accretion has occurred between chainages 90m and 110m of up to 0.3m. Seaward of chainage 110m, the channel profile has lowered by up to 0.4m, creating an undulating profile. Overall, the profile is at a low level compared to the range recorded from previous surveys, reaching its lowest level between chainages 23m and 79m. The Aln channel remains at a relatively landward position. **1aADC10** to **1aADC14** are located between the south bank of the River Aln Estuary and the north breakwater of Warkworth Harbour at the mouth of the estuary of the River Coquet. At profile **1aADC10**, the upper beach profile has eroded by up to 0.3m to chainage 85m. The lower beach berm has moved seawards by around 60m to chainage 200m. The second lower beach berm at chainage 300m has been removed, lowering the beach toe by 0.8m and moving it landward by 15m Overall the profile is at a medium level compared to the range recorded from previous surveys, although the berm at chainage 200m is at a high level. At profile **1aADC11**, there has been accretion at the toe of the dunes of up to 0.2m to chainage 65m. The dunes themselves have remained stable, with one section of erosion at the seaward dune crest of up to 0.3m. The upper beach to chainage 110m is dominated by erosion of up to 0.4m. A berm has formed in the mid beach between chainage 125m and 170m, with accretion of 0.3m. A small	**Longer term trends:** The cliffs in the far north of the bay have retreated slowly since 2002, by around 1m in total. The dunes have generally demonstrated long-term stability. Changes in beach profile form and position observed since the last survey are generally within the bounds of previous surveys, with the majority of profiles being at a medium- level, although several profiles exhibit sections of record highs (berm on lower foreshore in the north of the bay) and record lows (varying locations).

Survey Date	Description of Changes Since Last Survey	Interpretation
	depression between a second lower beach berm has formed with the erosion of less than 0.2m between chainages 170m and 198mA second lower beach berm has formed between chainages 198m and 232m, with the accretion of up to less than 0.2m. Seawards of chainage 232m the beach toe has eroded by 0.2m. The overall effect has created an undulating profile compared to the smooth profile of the previous survey in autumn 2017. Overall the profile is at a medium-high level compared to the range recorded from previous surveys with the berm between chainage 200m and 230m being the highest level on record. At profile **1aADC12**, the dune face has remained stable since the previous survey. There has been erosion from the toe of the dunes to chainage 48m of up to 1.0m. The rest of the profile has eroded, by up to 0.8m in the upper beach and by 0.4m in the lower beach, with negligible erosion in the middle beach. Overall, the upper beach profile is at a low level compared to the range recorded from previous surveys, particularly between chainage 32m and 36m, and 66m and 86m which have the lowest levels on record. The middle to lower beach is at a medium to high level compared to the range recorded from previous surveys. At profile **1aADC13**, the dunes and dune face have remained stable since the last survey. The dune toe has eroded by up to 1.0m. From the dune toe (147m) to chainage 239m there has been erosion of up to 0.8m. Seaward of chainage 239m there has been accretion of up to 0.2m. Overall the profile is at a medium-low level compared to the range recorded from previous surveys, particularly between chainages 191m and 216m which is at its lowest level recorded. At profile **1aADC14**, there has been a small amount of accretion on the crest of the foredune of up to 0.2m. There has been erosion from the toe of the dunes across the upper beach to chainage 200m of up to 0.7m. From chainage 200m seawards there has been accretion of up to 0.2m. The crest of the foredunes are at their highest recorded levels, whilst the rest of the beach profile is at a medium-low level compared to the range recorded from previous surveys.	
March – September 2018	**Topographic Survey:** The northern part of Alnmouth Bay (to the north of the River Aln Estuary) is covered by a bi-annual topographic survey, which commenced in April 2005. Data from the most recent topographic survey (Full Measures, autumn 2018) have been used to create a DGM (Appendix B – Map 3) using GIS. A	The findings of the topographic survey show patchy areas of accretion and erosion, with little discernible pattern.

Survey Date	Description of Changes Since Last Survey	Interpretation
	difference plot has also been produced using the DGM (Appendix B – Map 7) comparing the last produced topographic survey (Partial Measures, Spring 2018) with the present survey. The difference plot shows patchy areas of accretion and erosion, with little discernible pattern. The centre of the bay is dominated by low magnitude erosion, as is the beach opposite the village. The northern edge of the Aln channel shows the greatest magnitude of change, with erosion being dominant.	

2.12 High Hauxley & Druridge Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
24th November & 6th December 2018	**Beach Profiles:** High Hauxley to Druridge Bay is covered by nine beach profile lines for the Full Measures survey (Appendix A). Four of these (with 'A' or 'B' suffixes) were added to the programme in October 2007. All except 1aADC15 are resurveyed every 6-months. Profile **1aADC15** extends across the extensive dunes at Amble Links and foreshore. There has been some minor accretion on top of the dunes of up to 0.2m, whilst the dune face between chainages 84m and 94m has moved landward by up to 0.5m since the last survey (Full Measures, autumn 2017). There has been accretion at the berm at the toe of the dunes of up to 0.2m. Between the berm at chainage 110m and 160m there has been a small amount of change of up to ±0.1m. Seawards of chainage 160m there has been accretion of up to 0.4m, extending the toe of the beach seaward by 17m Overall, the profile is at a medium level on the upper and middle beach and at a high level on the lower beach compared to the range recorded from previous surveys. **1aADC15A**, **1aADC16** and **1aADC16A** are located around Hauxley Haven. At all locations, the dunes have remained stable since the last survey (Partial Measures, Spring 2018). At profile **1aADC15A**, there has been varying levels of accretion across the beach profile of up to 0.2m between the toe of the dune and chainage 40m.Between chainage 40m and 90m there has been very little change, limited to ±0.1m. Seawards of chainage 90m there has been accretion of up to 0.2m. Overall, the profile is at a medium-low level compared to the range recorded from previous surveys. At profile **1aADC16**, the start of the survey is missing due to access restrictions. Accretion has occurred on the upper beach between chainages 66m and 92m, with up to 0.3m of accretion. Between chainage 92m and 210m, there has been negligible change in beach level, restricted to ±0.1m. The toe of the beach seaward of chainage 210m has accreted by up to 0.3m, moving the toe seaward by 10m. The upper beach is at a relatively high level compared to the range recorded from previous surveys, whilst the profile from chainage 90m seawards is at a medium-low level. At profile **1aADC16A**, the start of the survey is missing due to dense vegetation. There has been erosion at the toe of the rock revetment to chainage 91m of 0.2m. There has been accretion of up to	At High Hauxley (profile 1aADC15), the dune has undergone some minor accretion on the top, with a landward migration of the dune face by up to 0.5m. There has been some accretion of the beach toe. At Hauxley Haven (profiles 1aADC15A to 1aADC16A), the dunes have remained stable since the last survey. Overall, beach levels generally show accretion of up to 0.4m. In Druridge Bay, changes in beach levels in the north were generally limited and are at a medium level compared to the range recorded from previous surveys, except for the lower beach at profile 1aADC17 between chainage 215m and 259m, which has the highest recorded levels since surveys began. In the south of the bay, there has generally been accretion across the profiles, except at the toe of 1aCMBC02 which has migrated landward by approximately 20m. **Longer term trends:** At High Hauxley, Hauxley Haven and north and south Druridge Bay, the dunes have remained stable except for limited changes at the dune toe. The beach levels are mostly within the bounds of previous surveys.

Survey Date	Description of Changes Since Last Survey	Interpretation
	0.4m between chainage 91m and 122m.There has been erosion of a berm at chainage 222m by up to 0.2m. Seawards of chainage 159m there has been negligible change in beach level. The profile is at a medium level compared 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 all locations, the dunes have remained stable since the last survey (Partial Measures, spring 2018). At profile **1aADC16B**, there has been varying sections of minor erosion / accretion of up to 0.1m between some of the rock exposures. A rock that was present at chainage 125m is no longer present. Overall, the profile is at a medium level compared to the range recorded from previous surveys. At profile **1aADC17**, there has been accretion of up to 0.2m at the toe of the dunes to chainage 33m. Seaward of chainage 33m, there has been negligible change in beach level, limited to ±0.1m. Overall, the profile is at a medium level compared to the range recorded from previous surveys, except for the lower beach between chainage 215m and 259m which has the highest recorded levels. At profile **1aADC17A**, the majority of the profile is dominated by erosion of up to 0.2m on the upper and middle beach and 0.6m on the lower beach with the exception of chainage 125m to 139m which shows accretion of up to 0.1m. Overall, the profile is at a medium-low level compared to the range recorded from previous surveys. **1aCMBC01** and **1aCMBC02** are located in the southern section of Druridge Bay. At profile **1aCMBC01**, the dunes appear to have experienced minor erosion / accretion of 0.1m. At the toe of the dunes to chainage 214m, there has been accretion of up to 0.4m. Between chainage 214m and 235m, there has been negligible change in beach level. Between chainage 235m and 249m there has been erosion of up to 0.2m. Seawards of chainage 2499m there has been accretion of up to 0.6m, moving the toe of the beach seawards by around 13m. The upper beach is relatively medium compared to the range recorded from previous surveys. At profile **1aCMBC02**, the dune has remained stable since the previous survey. There has been accretion across the upper beach to chainage 250m of up to 0.6m. Seawards of 250m there has been erosion of up to 0.5m, moving the beach toe landwards by approximately 20m. Overall, the profile is at a medium-low level compared to the range recorded from previous surveys.	

2.13 Lynemouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
8th September & 26th November 2018	**Beach Profiles:** Lynemouth Bay is covered by six beach profile lines for the Full Measures survey (Appendix A). Profiles CMBC03A and CMBC03B were added to the programme in October 2007. Profiles 1aCMBC03a to 1aWDC01were last surveyed during the Partial Measures spring survey, 2018. Profiles 1aCMBC01 and 1aWDC02 to 1aWDC05 were last surveyed during the Full Measures autumn survey, 2017. **1aCMBC03** is located just to the south of Snab Point. The profile extends across the cliff and the rock platform below. The profile has not changed since the last survey indicating a stable cliff and rocky foreshore. **1aCMBC03A** is located opposite Lynemouth and extends across the extensive slag banks before reaching the foreshore. The slag bank has not experienced any change since the last survey (Partial Measures, spring 2018) and changes to the beach level are minimal, limited to ±0.2m, except at the toe of the beach seaward of chainage 118m which has eroded by up to 0.6m and is now at its lowest level since records began The upper beach to chainage 106m and the mid-lower foreshore between chainages 120m to 136m have experienced accretion, whilst the mid-upper foreshore has experienced erosion between chainages 106m and 117m. Overall, most of the profile is at a low level compared to the range recorded from previous surveys, with chainages 106m to 117m and 118m to 150m being the lowest recorded level for those sections. **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 progressively ongoing for some years. Since the last survey, the top of the slag bank has retreated by up to 1.0m, reaching its most landward position since records began. There has been accretion on the upper beach to chainage -9.0m of 0.2m. Seawards of chainage -9m there has been erosion of up to 0.4m. Overall, the profile is at a relatively low level compared to the range recorded from previous surveys, whilst the berm on the lower foreshore is at its highest level and most seaward position recorded	To the south of Snab Point, the shoreline has not changed in form or position since the last survey. Opposite Lynemouth, the slag bank has remained stable, with erosion in the mid-upper beach and beach toe dropping it to their lowest recorded level. To the north of the power station, the slag bank has remained largely stable at the points of profile measurement (being protected by the froting spoil beach). At these locations, the beach has generally undergone erosion of up to 0.4m and is at a relatively low level, whilst the lower beach berm has moved seaward and is at its highest level recorded. It has been observed that between profile 1aCMBC03A and the River Lyne, and also along the river banks around the mouth of the river, the slag bank has eroded, exposing a considerable quantity of waste material, including rubber tubing, plastics, construction waste and the like. This material has always been known to be present, but recently appears more exposed in the face of the slag banks at these locations. To the south of the power station, between Lyne Sands and Beacon Point, 1aWDC02 has accreted whilst 1aWDC03 has eroded indicating a possible northwards movement of sediment. Between Beacon Point and Newbiggin Point there has generally been erosion across the profiles, with

Survey Date	Description of Changes Since Last Survey	Interpretation
	Profile **1aWDC01** extends from seaward of the rock revetment down to low water across the extensive slag banks. This profile is no longer measured. **1aWDC02** is located to the south of the Power Station. The beach face has advanced seawards by around 1m, however the lower foreshore seaward of chainage 188m has eroded by up to 0.4m and the crest has retreated landwards by around 16m. There is some minor accretion on the landward side of the beach crest, limited to 0.1m. The profile of the beach face is at a relatively low level compared to the range recorded from previous surveys, with the beach crest at its lowest and most landward position and the section between chainages 193m and 222m at its lowest level since surveys began **1aWDC03** is located to the south of the Power Station and to the north of Beacon Point. There has been sections of minor accretion and erosion on the landward side of the berm limited to 0.1m. The seaward face of the berm has moved landwards by around 11m, with beach levels dropping by up to 1.2m. The berm remains in roughly the same position as the previous three surveys, the last change in form being between the Full Measures 2012 and Full Measures 2013 survey. The landward crest of the berm is at the highest recorded level, whilst the seawards face is at its most landward position compared to the range recorded from previous surveys. **1aWDC04** and **1aWDC05** are located between Beacon Point and Newbiggin Point. At profile **1aWDC04**, the dunes have remained generally stable, with small sections of minor erosion limited to less than 0.1m. The profile shows the dune face remains steep. There has been erosion at the toe of the dunes with the loss of up to 0.3m, to chainage 44m. There has been negligible change between chainage 42m and 54m. Between chainage 54m and the rock platform at chainage 145m, there has been erosion of up to 0.4m. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys. At **1aWDC05**, the cliffed section has remained stable. The r beach profile between chainage 10m and 38m has eroded by up to 0.8m, with the section between 13m and 23m reaching its lowest level recorded. Seaward of chainage 38m the rock platform remains unchanged. Overall, the profile is at a low level compared to the range recorded from previous surveys, with the section between 13m and 23m reaching its lowest level recorded	the majority of profile 1aWDC05 reaching its lowest level since records began. **Longer term trends:** To the south of Snab Point, the changes observed from the present beach profiles are within the bounds of previous surveys, except at the toe of the beach seaward of chainage 118m and at the section between 106m and 118m which is now at its lowest level since. Opposite Lynemouth, the slag bank has 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, however the sections between 106m to 117m and 118m to 150m are at their lowest level recorded since surveys began To the north of the power station, the slag bank has continued to erode and the middle and lower beach level has also fallen, indicating that this section of shoreline has returned to its normal trend of progressive erosion of the slag bank cliff and beach. To the south of the power station, the prominent berm crest has maintained a similar height, but has migrated landward by 11m, with beach levels dropping by up to 1.2m. At the southern end of the bay, between Beacon Point and Newbiggin Point, the changes in beach profile form and position observed place the current

Survey Date	Description of Changes Since Last Survey	Interpretation
		beach levels at medium-low levels relative to earlier surveys dating back to 2002.
September - October 2018	**Cliff-top Survey:** Cliff top survey data collected for baseline survey (autumn, 2008), the previous Partial Measures survey (spring 2018) and the present Full Measures survey (autumn, 2018) 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 vegetation growth or the indistinct form of the cliff top, have also affected the data quality. There has been very little change in the position of the cliff top since the previous survey in Spring 2018 and the present Full Measures survey in Autumn 2017.	Since the last survey there has been no significant movement recorded. **Longer term trends:** Since surveys began in October 2008, cliff movement has been greatest in the north of the survey area with up to 2.7m of cliff top retreat, whilst the central and southern parts of the survey area have shown less movement with retreat of less than 1m.

2.14 Newbiggin-by-the-Sea

Survey Date	Description of Changes Since Last Survey	Interpretation
25th October 2018	**Beach Profiles:** Newbiggin-by-the-Sea is covered by four beach profile lines for the Full Measures survey (Appendix A). Two of these, profiles WDC05A and WDC06A, 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. Profiles 1aWDC05A and 1aWDC06A were last surveyed during the Partial Measures spring survey, 2018. Profiles 1aWDC06 and 1aWDC07 were last surveyed during the Full Measures autumn survey, 2018. In addition, a further 26 profiles (1aNWB1 to 1aNWB26) have been surveyed since September 2010 as part of a topographic survey of Newbiggin Bay. These profiles are not individually described. Beach profiling works were completed here in September 2012. Four areas were re-profiled; 2 sections to the east of profile **1aWDC05A**, one section at **1aWDC06A** and a narrow section at the top of **1aWDC07.** **1aWDC05A** is in the north of Newbiggin Bay. There has been erosion at the toe of the seawall to chainage 11m of 0.5m. Seaward of chainage 11m there has been negligible change in beach level, limited to ±0.1m. There is limited change across the exposed rock at chainage 110m, with minor erosion / accretion of 0.1m. An additional 27m of exposed rock is exposed at the end of the survey from chainage 153m to 180m. The beach profile is at a high level compared to the range recorded from previous surveys, particularly between chainages 12m to 19m and 71m to 107m, which are at their highest level recorded. **1aWDC06** is located in the centre of the northern part of Newbiggin Bay, between the two breakwaters. There has been accretion from the toe of the seawall to chainage 40m of up to 0.7m, forming a small berm at chainage 25m. Seawards of chainage 40m, the middle and lower beach has eroded since the previous survey by up to 0.6m, resulting in a steeper beach profile. Towards the toe of the beach, erosion is less severe and is in the order of 0.1m. Overall, the profile is at a medium level compared to the range recorded from the previous surveys.	Since the last survey, the beach at Newbiggin-by-the-Sea has remained generally stable in the north and centre of the bay, whilst the southern profile 1aWDC07a has eroded since the last survey (however it remains at a medium-high level compared to the range recorded from previous surveys). The sections between 12-17m and 71-107m at profile 1aWDC05A have reached their highest levels recorded. **Longer term trends:** Data since monitoring began 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. Compared to the record of earlier surveys, the beaches are at medium/high levels, with the upper beach being particularly high, indicating that there is a net transfer of sediment towards the back of the beach.

Survey Date	Description of Changes Since Last Survey	Interpretation
	1aWDC06A is located in the centre of Newbiggin Bay, behind the offshore breakwater. There has been very little change from the seawall to the berm at chainage 60m. The seaward face of the berm (chainage 70m to 115m) has accreted by up to 0.5m, moving seawards by around 8m. Changes between chainage 115m and 187m are limited to less than ±0.2m. Seawards of chainage 187m there has been accretion of up to 0.4m, forming a lower beach berm at chainage 275m. Overall the profile is at a medium-high level compared to the range recorded from previous surveys. **1aWDC07** is located towards the south of Newbiggin Bay. There has been erosion across the beach profile of up to 0.4m on the upper beach, 0.2m on the middle beach and 0.6m on the lower beach. The beach toe has migrated landward by 12m.Overall, the profile is at a medium-high level compared to the range recorded from previous.	
April - October 2018	**Topographic Survey:** Newbiggin-by-the-Sea is covered by bi-annual topographic survey, which commenced in September 2010. The surveys are planned to help assess the performance of a capital scheme constructed in 2007, which involved beach replenishment and construction of an offshore breakwater. Prior to incorporation in the programme, these surveys were undertaken on occasions between 2007 and 2010 as part of the scheme development. Data from the most recent topographic survey (Full Measures, autumn 2018) have been used to create a DGM (Appendix B – Map 4) using a GIS. A difference plot has also been produced using the DGM (Appendix B – Map 8) produced from the last produced topographic survey (Partial Measures, spring 2018) and the present survey. The topographic survey shows patchy areas of both gain and loss across the beach; however, the magnitude of the changes is generally low. Overall accretion is more dominant than erosion, particularly in the north and centre. The largest area of accretion is in the lee of the central breakwater, whilst the largest area of erosion occurs to the south of the breakwater Changes at Spital Carrs in the south is patchy, with no discernible pattern.	The topographic survey shows areas of both gain and loss across the beach of generally low magnitude. Overall there are more areas of accretion than erosion.
25th October 2018	**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 2012. The survey was designed to address concerns that the beach	Since the last survey, there has been some movement of the sand extent in the south. Since 2014, there has been a trend in the south of the survey area for advance in the summer as shown in

Survey Date	Description of Changes Since Last Survey	Interpretation
	recharge scheme undertaken in the Newbiggin Bay may have impacts on the Spital Carrs SSSI and SPA if sand from the recharge scheme moves to the south. The sand extent survey therefore identifies the boundary of the sand beach on the rock platform. Data from the most recent sand extent survey (Full Measures, autumn 2018) has been plotted onto aerial imagery (refer to Appendix C – Map 1). The plot shows that there is variable advance and retreat of the limit of sand cover between the spring 2018 and the autumn 2018 survey. There has been very limited advance in the north and centre, with slightly more pronounced advance in the south relative to the spring 2018 survey.	the autumn survey, which is then removed by winter storms, as shown by the spring surveys. **Longer term trends:** Review of the sand extent surveys shows the sand front has oscillated by a small amount with no net trend.

2.15 Cambois Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
5th December 2018	**Beach Profiles:** Cambois Bay is covered by seven beach profile lines for the Full Measures survey (Appendix A). Profiles. All profiles are resurveyed every 12-months. **1aWDC08** and **1aWDC09** are located to the north of the River Wansbeck estuary in front of Sandy Bay Caravan Park. **1aWDC08** extends from the cliff across the rock revetment onto the foreshore. There has been erosion of a berm at the toe of the revetment by 1.0m, exposing more of the revetment. Between chainage 84m and 117m there has been accretion of up to 0.4m, switching back to erosion seaward of chainage 117m by up to 0.8m. The toe of the beach has moved landward by 45m.Overall, the profile is at a low level on the upper beach compared to the previous surveys, with the middle and lower foreshore at a medium level compared to the range recorded from previous surveys. **1aWDC09** extends from the cliffs at the very southern end of the Caravan Park. The cliff top has retreated by up to 1.5m since the previous survey. There has been 0.3m of erosion between the toe of the cliff and the exposure of boulders and chainage 30m, exposing more boulders. There has been erosion of the two small berms present in the profile at chainages 50m and 160m by up to 0.9m. Seaward of chainage 199m, there has been accretion of the toe of the beach by up to 0.8m. Overall, the cliff top has reached its most landward position and the cliff toe is at its lowest recorded level since surveys began in spring 2002. The upper beach profile is at a low level, whilst the middle and lower foreshore are at a medium-high level compared to the range recorded from previous surveys. Profiles **1aWDC10** to **1aWDC14** are all located along Cambois Bay, between the River Wansbeck and River Blyth estuaries. **1aWDC10** is located on the southern side of the Wansbeck Estuary, just to the south of Cambois House. There appears to have been some minor movement on the cliff face, though it has not affected the position of the cliff edge. The majority of the beach profile has eroded by up to 0.8m, removing both berms from the previous survey. . The toe of the beach seawards of chainage 179m	To the north of the River Wansbeck, the cliff top has receded by 1.5m and reached its most landward position at profile 1aWDC09. Overall, beach levels have lowered since the previous survey, reaching low levels on the upper beach and medium levels on the middle and lower foreshore compared to earlier surveys. To the south of the Wansbeck Estuary, there has been some minor movements on the face of the dune cliffs. Beach levels have generally lowered, removing middle and lower foreshore berms from the previous survey. Beach levels remain at a medium-high level compared to earlier surveys. At the centre of Cambois Bay, the cliff top has lowered and moved landward by 1.0m and beach level has generally lowered to a medium-low level compared to the range recorded from previous surveys. At the southern extent of Cambois Bay, beach levels have generally dropped, leaving profiles at a relatively low level. The cliff toe at profiles 1aWDC13 and 1aWDC14 are at their lowest levels recorded. **Longer term trends:** Beach profiles in the north of the survey area are at higher levels compared to those in the south, suggesting a north-south movement of sediment or a greater input of sediment (possibly from the River Wansbeck) in the north of

Survey Date	Description of Changes Since Last Survey	Interpretation
	shows accretion of 0.3m. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys. **1aWDC11** extends across the rock revetment fronting the now disused foundry. There has been erosion across the entire beach profile of up to 0.4m from the foot of the revetment to chainage 80m, up to 0.5m between chainage 90m and 165m and up to 0.7m at the toe of the beach seaward of chainage 165m. The profile is at aa medium level over the upper and middle beach and a high level on the lower beach compared to the range recorded from previous surveys. **1aWDC12** is situated approximately mid-way along Cambois Bay. Since the last survey (Full Measures, autumn 2017), the cliff edge position has lowered by 0.15m and moved landward by approximately 1.0m. The upper beach has been eroded by up to 0.4m from the dunes to chainage 60m. There has been a small area of 0.3m of accretion between chainage 60m and 70m. Seaward of chainage 70m there has been erosion of up to 1.2m, moving the toe of the beach landward by 65m. Overall, the profile is at a medium-low level compared to the range recorded from previous surveys. At **1aWDC13** is located to the centre-south of Cambois Bay. There has been no change to the dune cliff face. Between the toe of the dunes and chainage 90m there has been erosion of 0.7m, reaching its lowest level recorded since spring 2002. Between chainages 90m and 146m, there has been accretion of up to 0.4m, whilst the toe of the beach has eroded by up to 0.7m and is now at its most landward position recorded. The entire beach profile is at a low level compared to the range recorded from previous surveys, particularly the sections between the toe of the dunes and chainage 90m and the toe of the beach which are at their lowest levels recorded. **1aWDC14** is located to the south of Cambois Bay, at North Blyth. There has been erosion at the toe of the cliff face to chainage 18m by up to 0.4m. There has been negligible change across the rest of the beach profile, with erosion / accretion limited to 0.1m, revealing / covering rock/boulders beneath the sand. Overall, the profile is at a low level compared to the range recorded from previous surveys, particularly at the toe of the cliff which is at its lowest level recorded since surveys began in spring 2002.	the survey area. The till and dune cliffs show progressive erosion.

Survey Date	Description of Changes Since Last Survey	Interpretation
October 2018	**Cliff-top Survey:**Cliff top survey data collected for baseline survey (spring, 2009), the previous Partial Measures survey (Spring 2018) and the present Full Measures survey (autumn, 2018) 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. There has been very little change in the position of the cliff top at Sandy Bay Caravan Park since the previous survey in Spring 2018 along the majority of the survey length. There appears to have been a small amount of erosion of around 1.0m along a short section (<5m) of cliff halfway between the northern end of the survey limit and the slipway in the middle of the caravan park. A c.10m length of cliff in the centre of the survey area (south of the most southerly perpendicular access road within the caravan park) appears to have retreated by up to 1.5m. There is another c.6m section of cliff which shows retreat of up to 1.5m, which is located to the north of the turning circle at the end of the access road in the caravan park, this section of cliff also showed retreat in the 2018 Partial Measures survey. There are numerous small areas (<10m) of retreat around all of the Cambois Bay frontage of up to 1.5m. The 665m section of cliff behind the rock armour at the disused foundry site in the north shows very little change from the previous survey. The undefended frontage from the beach access point opposite the roundabout at the start of the spit feature at the tidal basin of the River Blyth, southwards for around 250m shows sections of retreat of 0.5m to 1.5m, with retreat of up to 3m either side of the entrance immediately adjacent to the beach access point at Ridley Terrace.	Since the last survey in spring 2018, there has been very little change in cliff top position recorded for Sandy Bay Caravan Park. Cambois Bay appears to have been relatively active along its full frontage with numerous small areas of retreat of up to 1m, with several longer sections showing consistent erosion of up to 3m. **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 the centre of the bay opposite Ridley Terrace, Cambois, where up to 17m of erosion has occurred. The north and south of the bay have retreat more typically c.1-5m.

2.16 Blyth South Beach

Survey Date	Description of Changes Since Last Survey	Interpretation
12th September 2018	**Beach Profiles:** Blyth South Beach is covered by six beach profile lines for the Full Measures survey (Appendix A). All profiles are resurveyed every 6-months. **1aBVBC01** is located towards the north of South Beach, in front of the area of land owned by Port of Blyth. There have been no significant changes to the position and form of the dunes since the last survey (Partial Measures, spring 2018). At the toe of the dunes to chainage 41m, there has been erosion of up to 0.2m. Four small berms have formed across the upper, middle and lower foreshore at chainages 45m, 123m, 173m and 225m, with an accretion of up to 0.3m. Between chainages 63m and 115m, the beach has eroded by up to 0.4m. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys, with the section between 191m and 245m being the highest level on record. There has been varying amounts of erosion and accretion across the profile at **1aBVBC02.** The upper beach has accreted by up to 0.8m from the seawall to chainage 32m. There has been erosion of up to 0.6m between chainage 32m and 98m. Between chainages 98 and 115m there has been negligible change in beach level, limited to ±0.1m. Seaward of chainage 115m there has been accretion up to 0.3m. Overall, the profile is generally at a high level on the upper beach and low on the middle and lower beach compared to the range recorded from previous surveys, particularly between chainages 41m and 74m where it is at its lowest level recorded. At **1aBVBC03** there have been no significant changes to the position and form of the dunes since the last survey (Partial Measures, spring 2018), which remain at their most landward extent since 2002. There has been erosion of 0.6m on the upper beach between chainage 80m and 160m. Seawards of chainage 160m there has been accretion of 0.5m, forming a berm on the lower foreshore at chainage 310m. Overall, the upper beach is at a medium-low level compared to the range recorded from previous surveys, reaching its lowest level recorded between chainages 105m and 124m. The lower beach is relatively high.	Since the last survey, the dunes and dune face at Blyth South Beach have remained largely stable, retaining the same form and position, except at profile 1aBVBC05**,** where there has been a significant landward movement of the toe of the dunes since the last survey (Partial Measures, spring 2018) by up to 10m, which is now at its most landward position since records began in spring 2002. Beach profiles have changed, there has been variable accretion and erosion, with a general trend for accretion on the upper and lower beach, with erosion across the middle beach. The profiles are all generally at a relatively medium-low level, with several sections reaching their lowest levels since records began. **Longer term trends:** At Blyth South Beach, the dunes have generally demonstrated a long-term trend of stability. The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys, however several sections along the bay are at their lowest level recorded, including the middle beach at profile 1aBVBC04 and the upper beach and dune toe at profile 1aBVBC05 which are now at their lowest / most landward position since records began.

Survey Date	Description of Changes Since Last Survey	Interpretation
	At **1aBVBC04,** there have been no significant changes to the position and form of the dunes since the last survey (Partial Measures, spring 2018). A berm has formed in the upper beach with an accretion of up to 1.6m. The berm, previously at chainage 60m in the autumn 2017 survey, has migrated seaward by 20m and decreased in height by 0.6m. A wide depression has formed between chainages 111m and 202m m, through the erosion of up to 1.6m. Seaward of chainage 202m, a beach has formed on the lower foreshore at chainage 230m. Overall, the upper beach profile is at medium-high level compared to the range recorded from previous surveys, with the upper beach berm at its most seaward position since records began in spring 2002. The middle beach is at a low level, with the depression being one of the lowest levels recorded. The lower beach is at a relatively high level compared to the range recorded from previous surveys. At **1aBVBC05,** there has been a significant landward movement of the toe of the dunes since the last survey (Partial Measures, spring 2018) by up to 10m, which is now at its most landward position since records began in spring 2002. There has been accretion at the toe of the dunes to chainage 84m of 0.4m. From chainage 84m to 158m, there has been erosion of up to 0.6m across the middle beach. Seawards of chainage 158m there has been accretion of up to 0.9m. The upper beach is at a low level compared to the range recorded from previous surveys, being the lowest on record between chainages 84m and 116m, whilst the middle and lower beach is at a more medium level. At profile **1aBVBC06,** there has been no significant change to the position or form of the dunes since the last survey (Partial Measures, Spring 2018). There has been accretion of up to 1.4m at the toe of the dunes, forming a berm at chainage 113m. Seawards of chainage 131m there has been erosion of up to 0.4m. The upper beach is at a relatively low level compared to the range recorded from previous surveys. The autumn 2018 survey terminates at the rocks at chainage 170m.	

4. Problems Encountered and Uncertainty in Analysis

Individual Profiles

- At profile BTBC07 and BTBC08, the survey report indicates that the offshore extent of the profiles ends at a lagoon, but the survey photographs indicate they end at open sea. This is possibly a note retained from earlier reports.
- At profiles BTBC19 and BTBC20, the survey report states that the offshore extent of the survey is limited by a drain. This drain is likely a runnel which separates the barrier feature in the lower foreshore from the rest of the beach.
- At profile BTBC33, there are gaps in the section (at the location of the middle of dunes) due to dense vegetation. This needs to be taken into account when assessing the profile data as the levels in these measurement gaps will not be reliable.
- At profile ADC05 there was unsafe loose material which prevented the survey of the cliff face.
- At profile ADC08 and ADC09, the profile ends at the river.
- At profile ADC16, the surveyors noted that they were unable to survey the start of the section as access was denied by the homeowner.
- At profile ADC16A, there are gaps in section due to vegetation cover. This needs to be taken into account when assessing the profile data as the levels in these measurement gaps will not be reliable.
- At profile ADC16B, the section starts at new fence.
- Profile WDC01 is no longer measured.
- At profile WDC09, there was unsafe loose material which prevented the survey of the cliff face.
- Profiles WDC09 and WDC10 terminate at a river.

Additionally, beach recycling / beach combing was ongoing at Newbiggin (26/11/18) and Blyth (12/09/18) at the time of the survey.

Topographic Survey

No issues reported.

Cliff Top Surveys

Cambois, Newbiggin, and Sandy Bay cliff tops have now been combined into one survey area.

At Cambois Bay, the surveyors noted that very thick dense vegetation at north end of the cliffs hindered surveying. This was also noted in all previous reports.

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

No changes are recommended at the present time.

6. Conclusions and Areas of Concern

- At Sandstell Point (Spittal A), the recorded profiles and topographic survey present no causes for concern.
- At Spittal (Spittal B), the recorded profiles present no causes for concern.
- At Goswick Sands, the recorded profiles present no causes for concern. The barrier feature in the seaward end of profile 1aBTBC18 shows movement and is likely to be a cyclical feature.
- At Holy Island, the recorded profiles and topographic survey present no causes for concern.
- At Bamburgh, the recorded profiles present no causes for concern.
- At Beadnell Village, the recorded profiles present no causes for concern.

- At Beadnell Bay, the recorded profiles present no causes for concern.
- At Embleton Bay, the recorded profiles present no cause for concern
- At Boulmer, the recorded profiles present no cause for concern.
- At Alnmouth Bay, the northern profiles show a general pattern of low levels on the upper and lower foreshore, with medium levels on the middle beach. Towards the centre of the bay, profiles generally exhibit medium to high levels across the beach, whilst to the south, profiles are at a medium-low level compared to previous surveys. The recorded profiles present no cause for concern.
- At High Hauxley & Druridge Bay, the Hauxley Haven profiles have generally shown accretion since the previous survey and are at medium-low levels. The recorded profiles present no cause for concern. The profiles in Druridge Bay present no cause for concern.
- At Lynemouth Bay, the recorded profiles and cliff top survey present no causes for concern. However, site observations show that between profile 1aCMBC03A and the River Lyne, and also along the river banks around the mouth of the river, the face of the slag bank has eroded, exposing a considerable quantity of waste material, including rubber tubing, plastics, construction waste and the like. This material has always been known to be present (and visible), but recently appears more exposed in the face of the slag banks at these locations
- At Newbiggin-by-the-Sea, profile remain at medium-high levels and there have been no adverse impacts on the SSSI at Spital Carrs.
- At Cambois Bay, the beach and cliffs have been relatively active, however there are no causes for concern at present but this issue should be reviewed in the next report.
- At Blyth South Beach, the profiles are generally at a medium-low level. The dune toe at profile 1aBVBC05 continues to migrate landward and this issue should be reviewed in the next report. The remaining recorded profiles present no causes for concern.

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

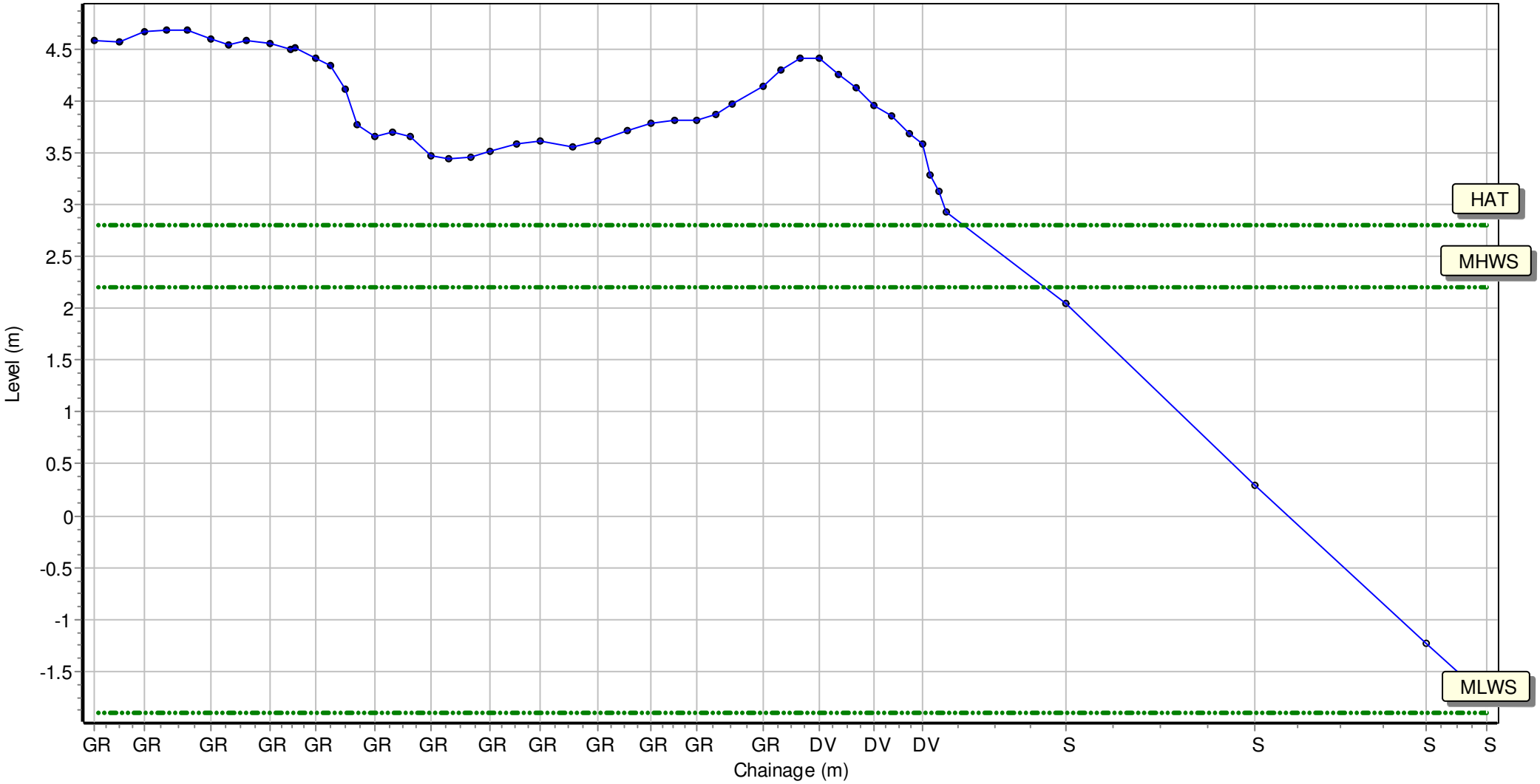
Location: **1aBTBC01**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 400275.192 **Northing:** 651875.262 **Profile Bearing:** 347 ° from North



Beach Profile

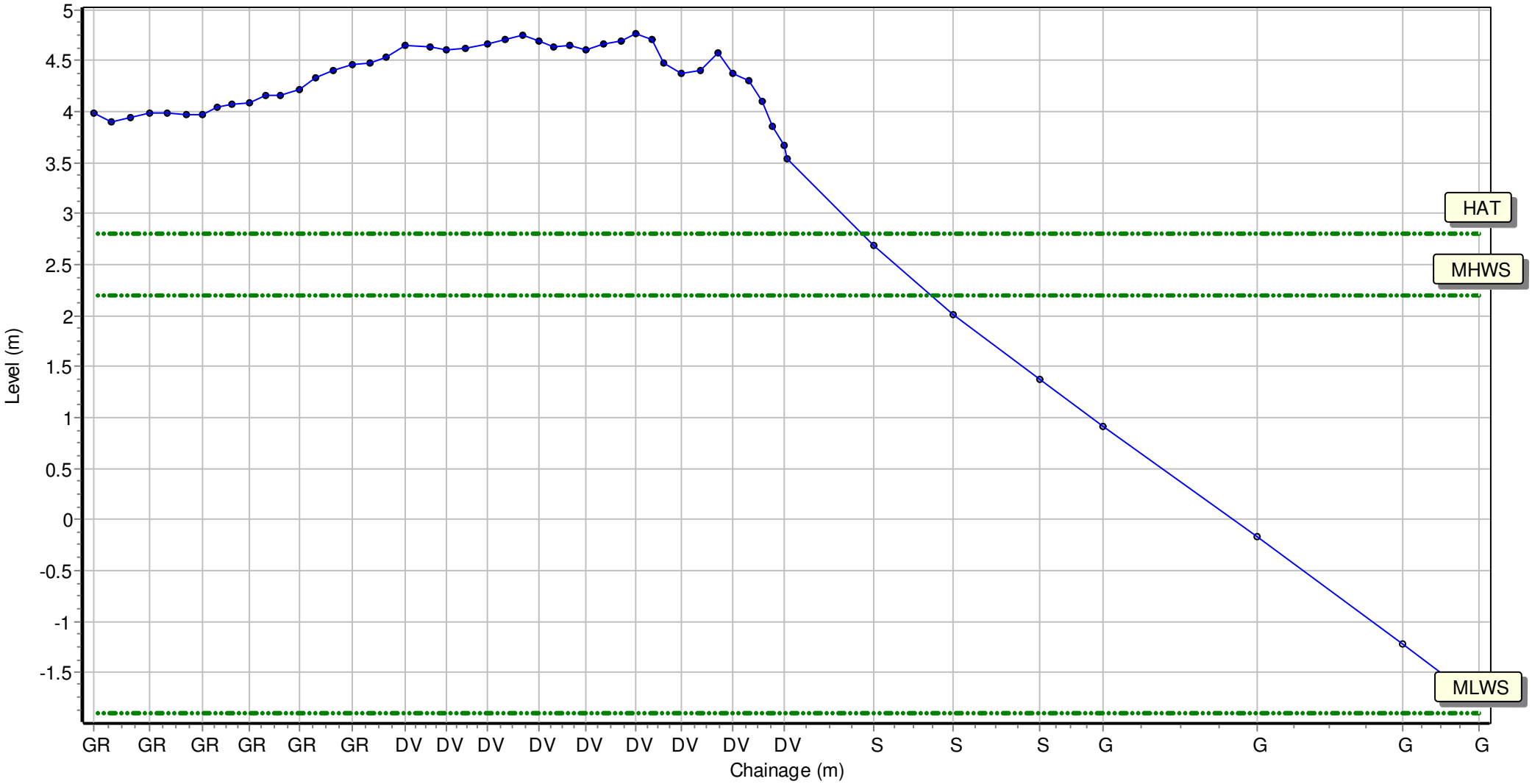
Location: **1aBTBC02**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

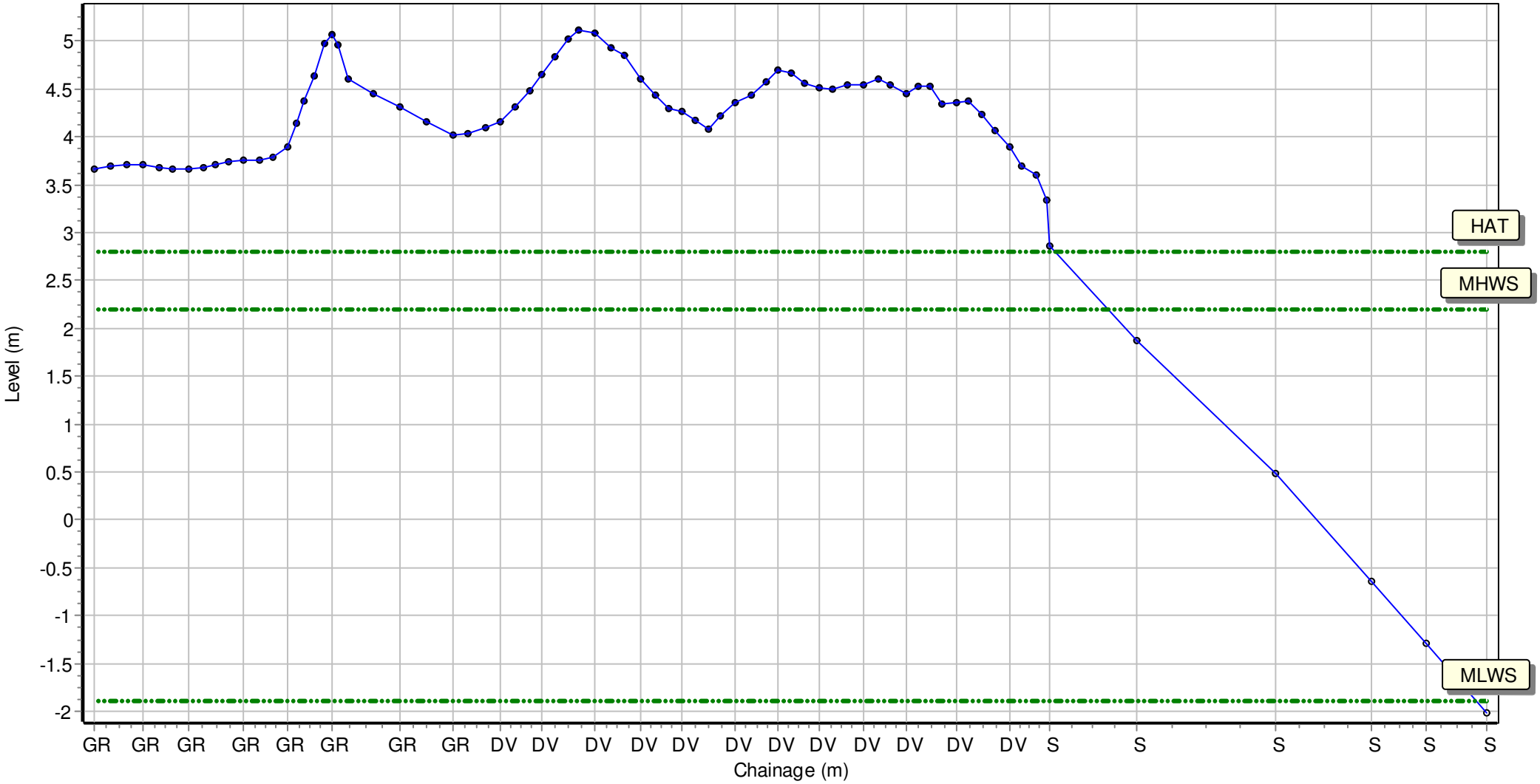
Location: **1aBTBC03**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 400455.187 **Northing:** 651937.742 **Profile Bearing:** 330 ° from North



Beach Profile

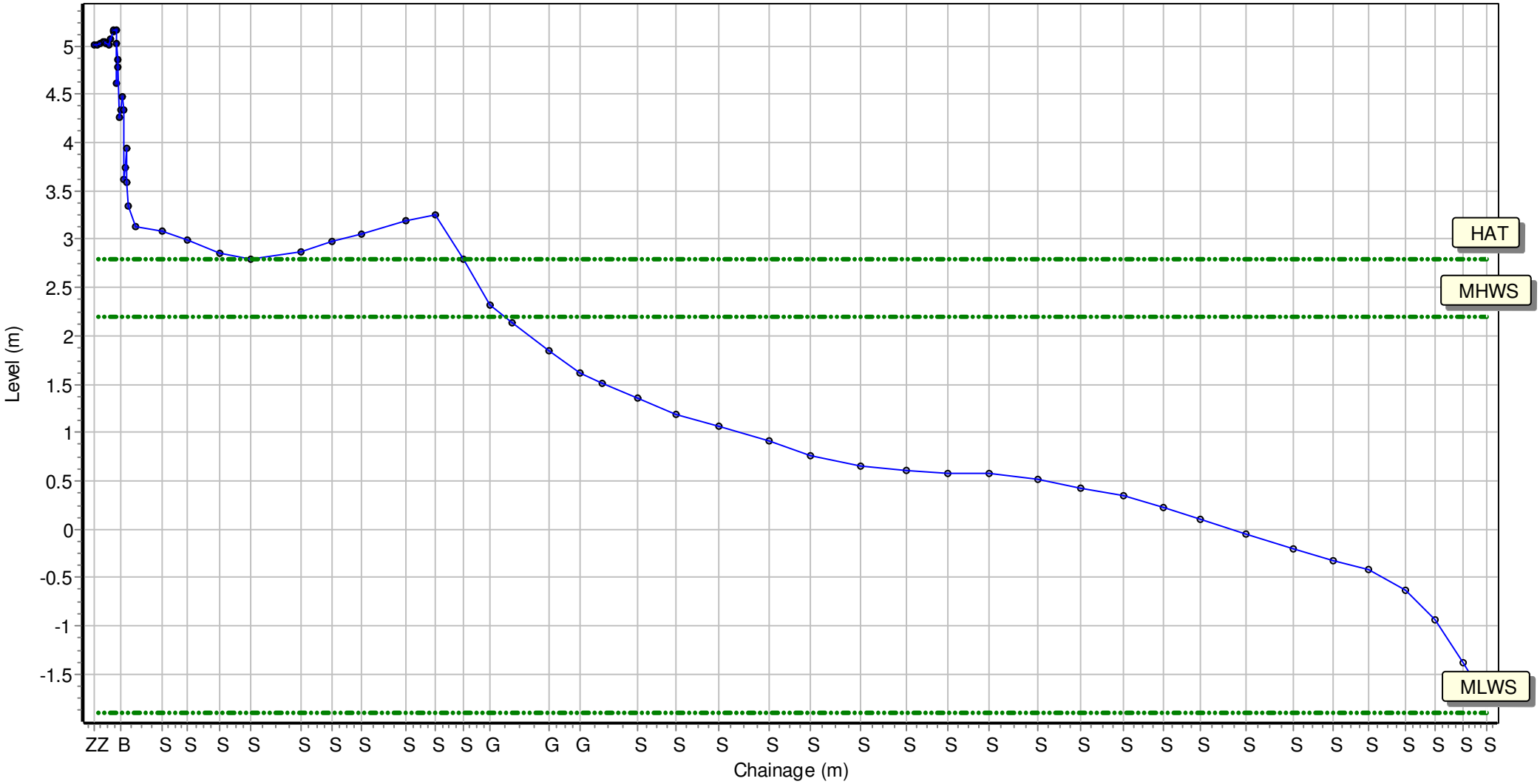
Location: **1aBTBC04**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

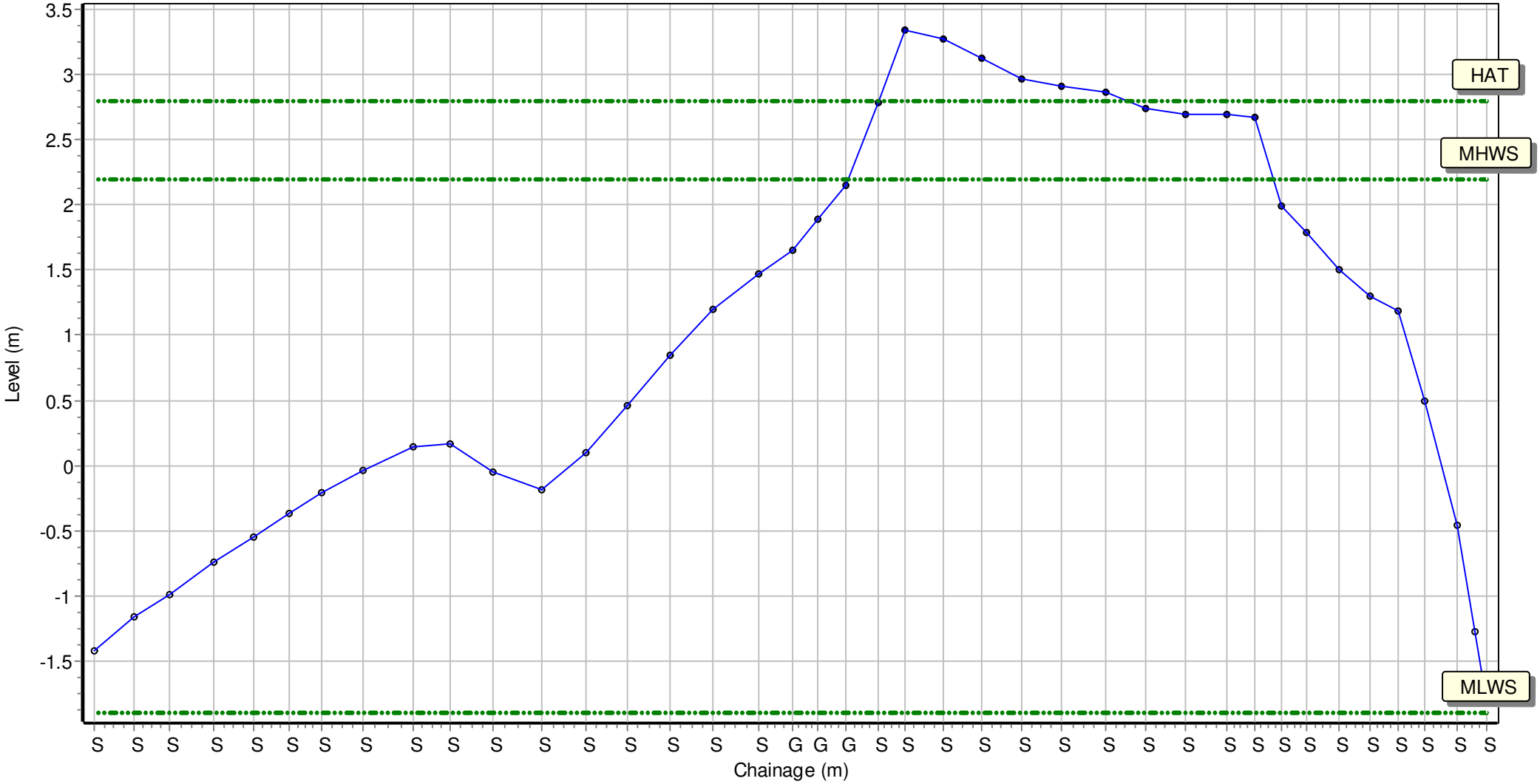
Location: **1aBTBC05**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

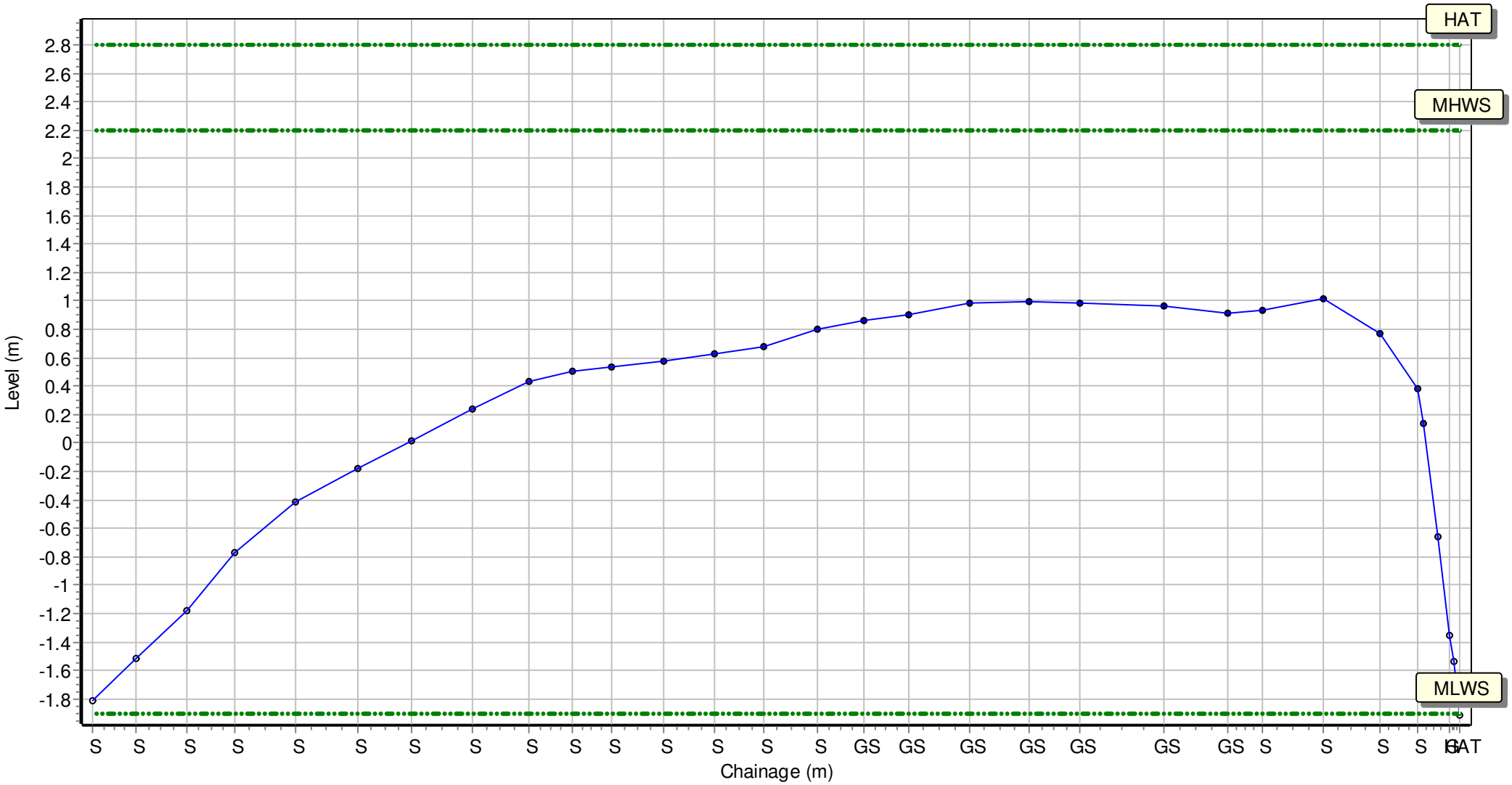
Location: **1aBTBC06**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

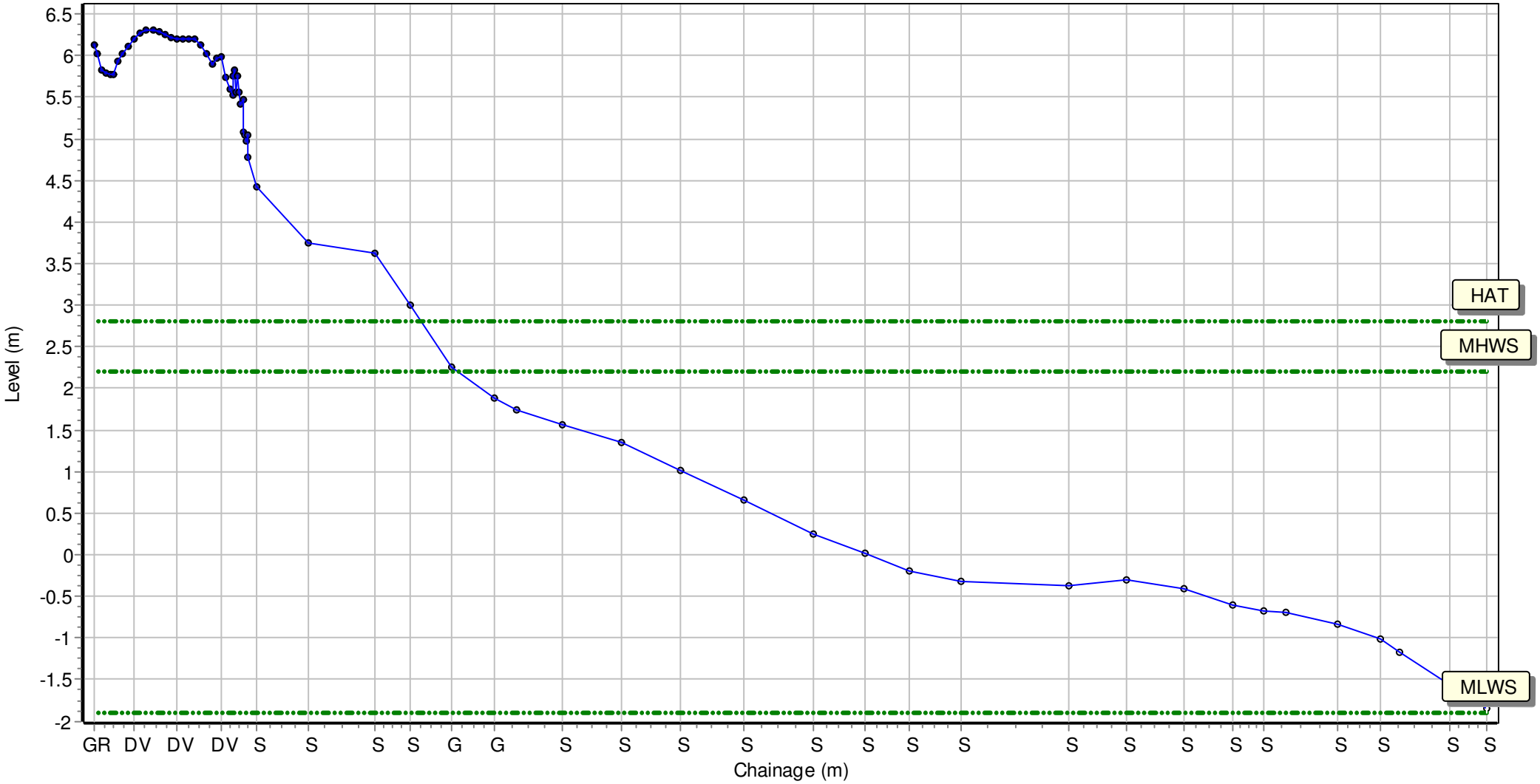
Location: **1aBTBC07**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 400559.428 **Northing:** 651953.804 **Profile Bearing:** 67 ° from North



Beach Profile

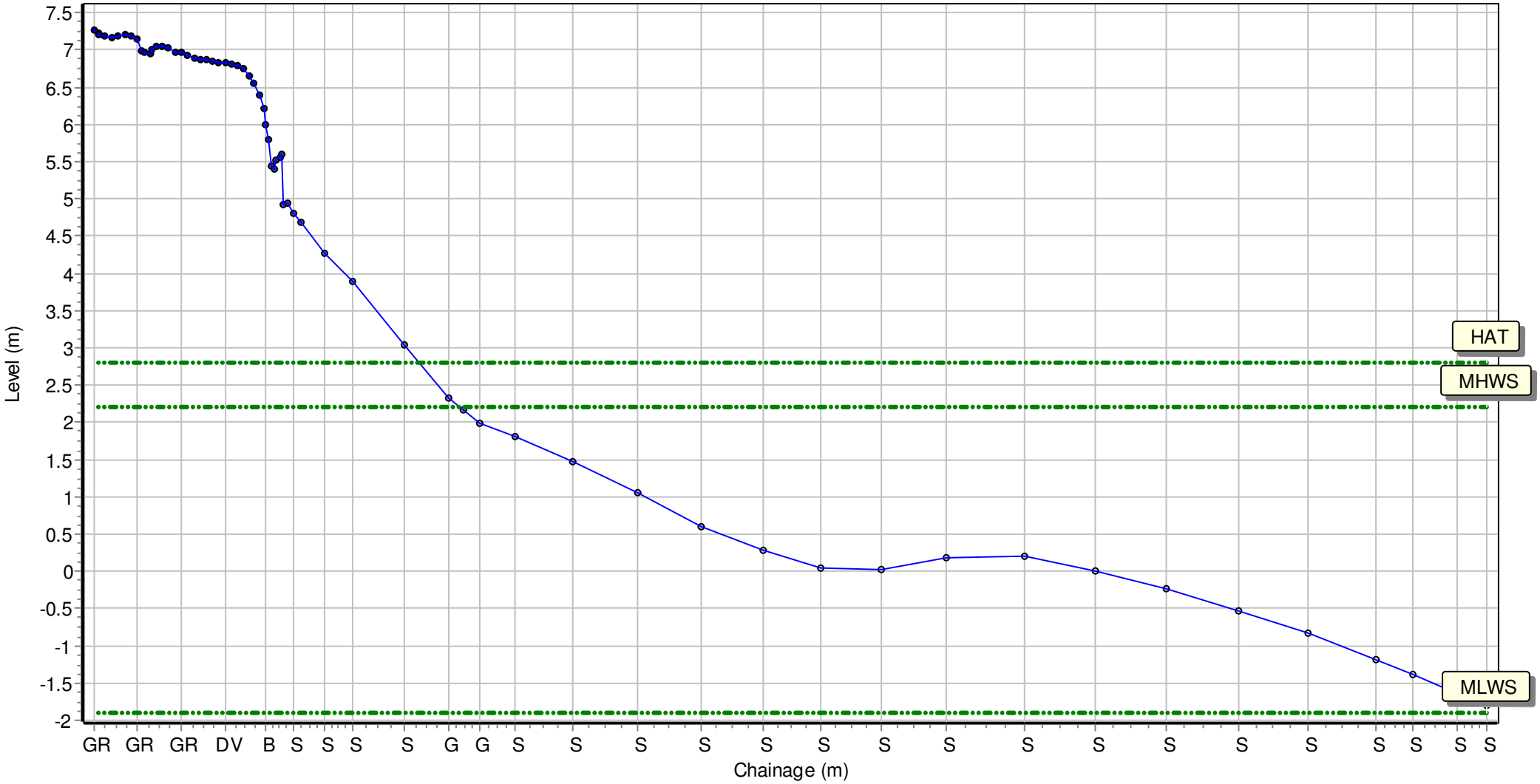
Location: **1aBTBC08**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 400568.995 **Northing:** 651908.786 **Profile Bearing:** 68 ° from North



Beach Profile

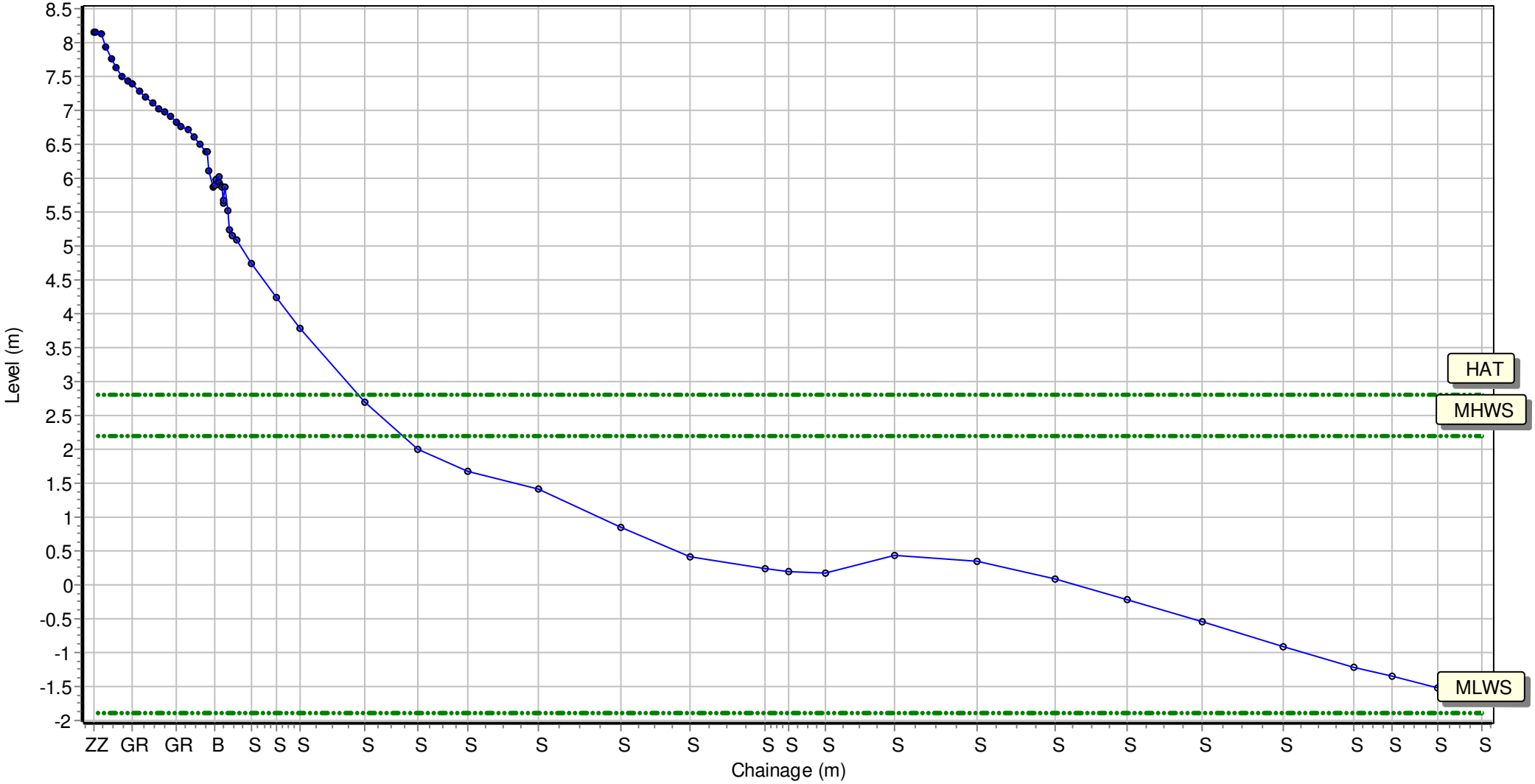
Location: **1aBTBC09**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 400587.135 **Northing:** 651868.576 **Profile Bearing:** 70 ° from North



Beach Profile

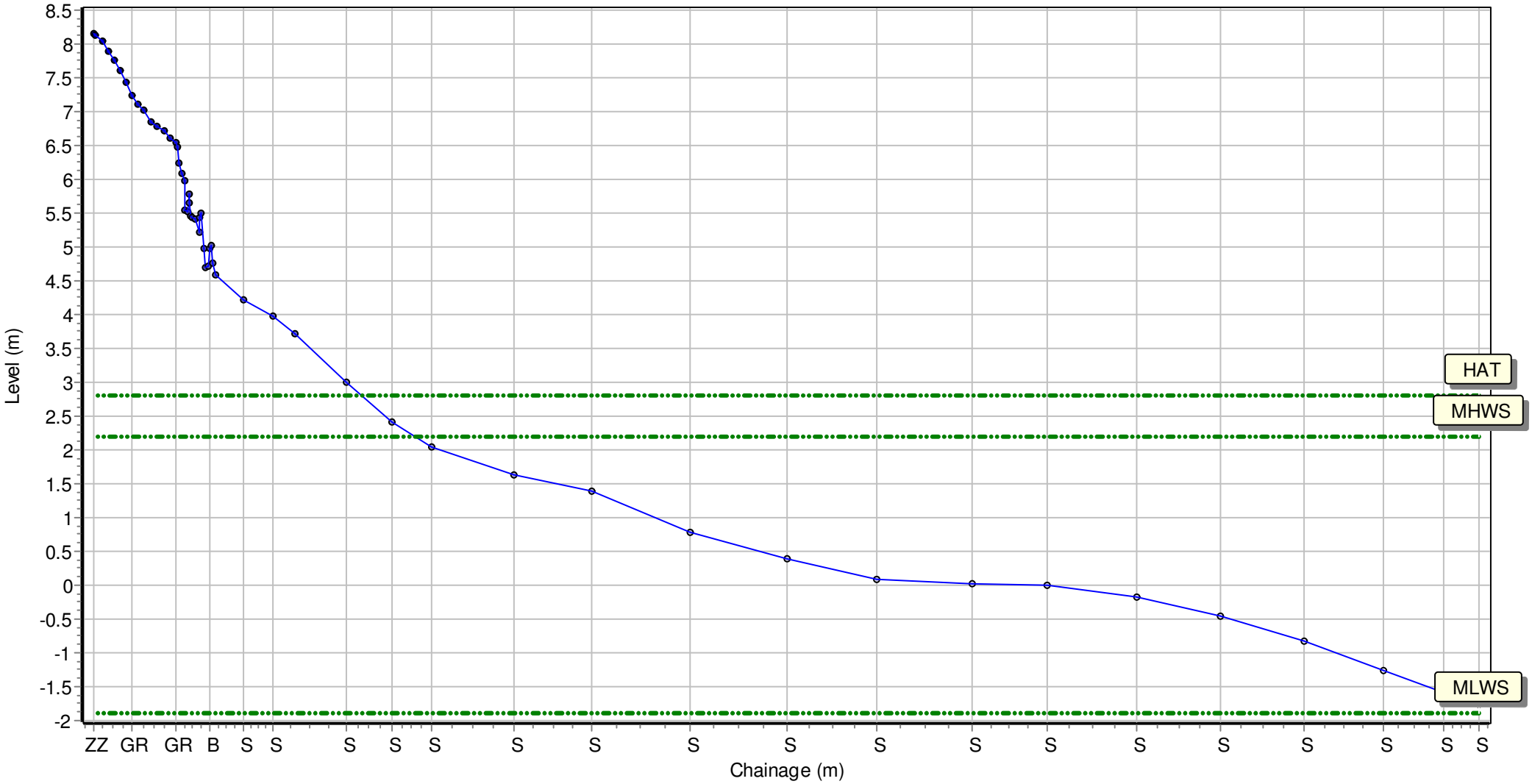
Location: **1aBTBC10**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 400603.233 **Northing:** 651816.609 **Profile Bearing:** 69 ° from North



Beach Profile

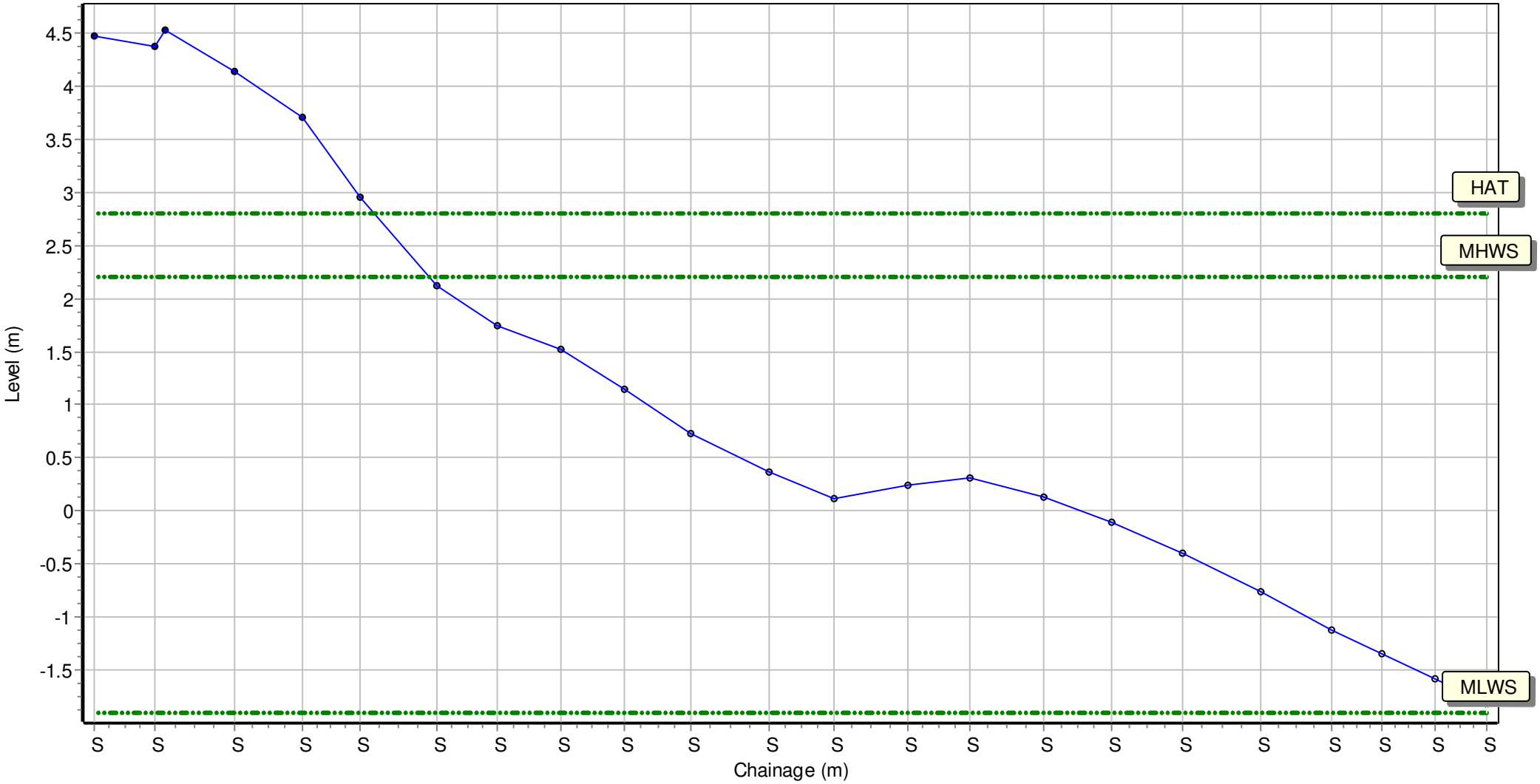
Location: **1aBTBC11**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

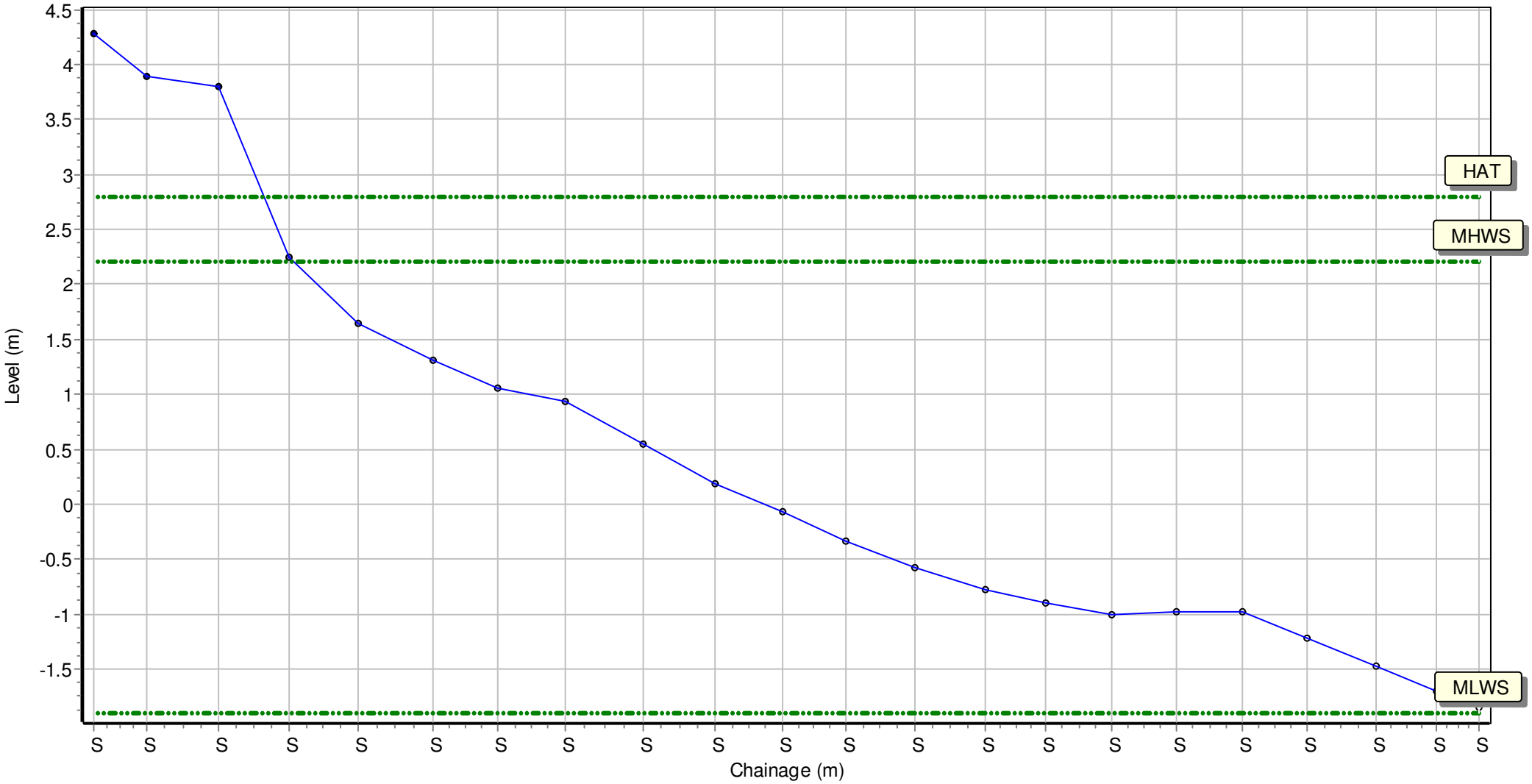
Location: **1aBTBC12**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 400693.518 **Northing:** 651579.795 **Profile Bearing:** 63 ° from North



Beach Profile

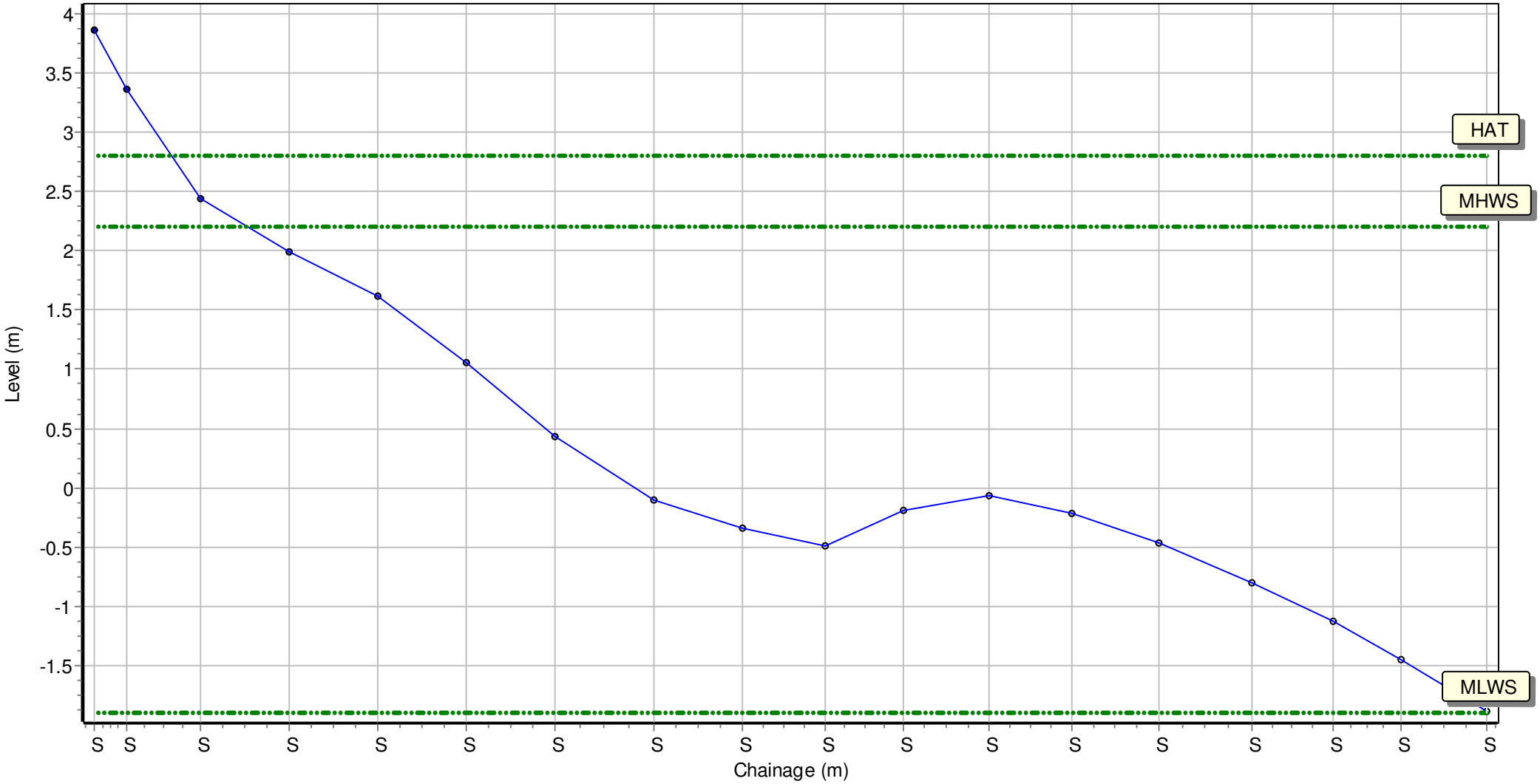
Location: **1aBTBC13**

Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

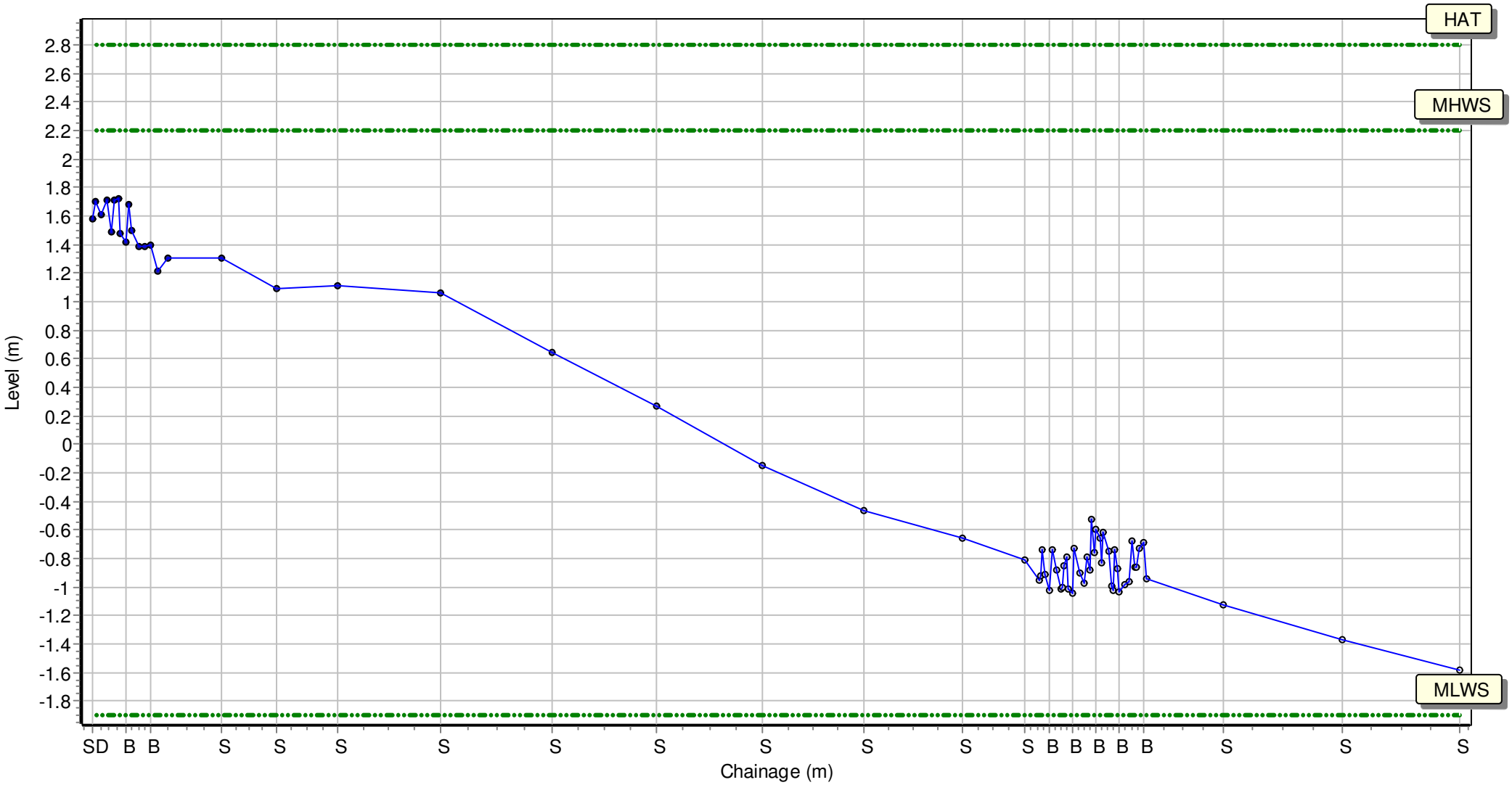
Location: **1aBTBC14**

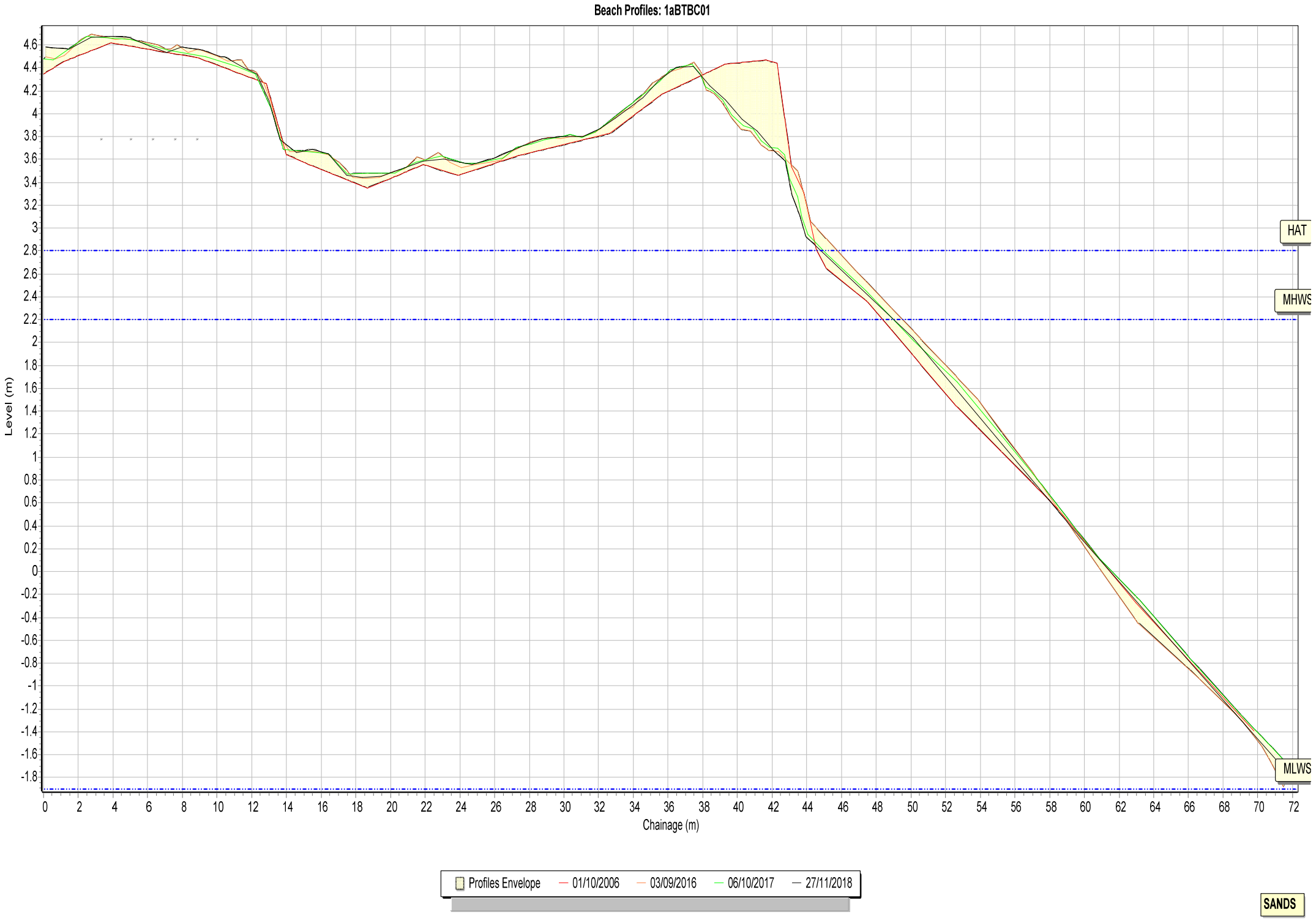
Date: 27/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

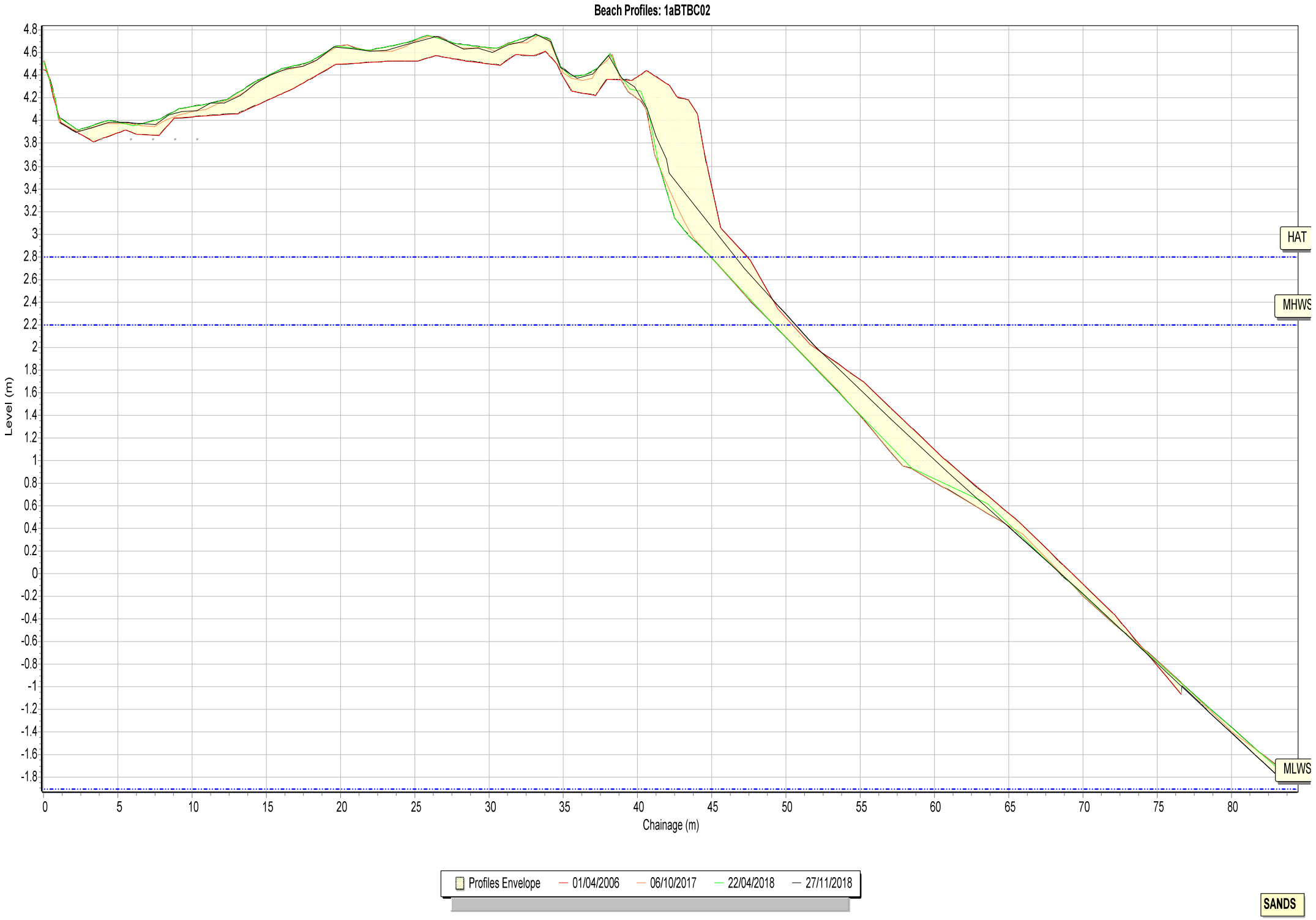
Wind **Sea State:** **Visibility:** **Rain:**

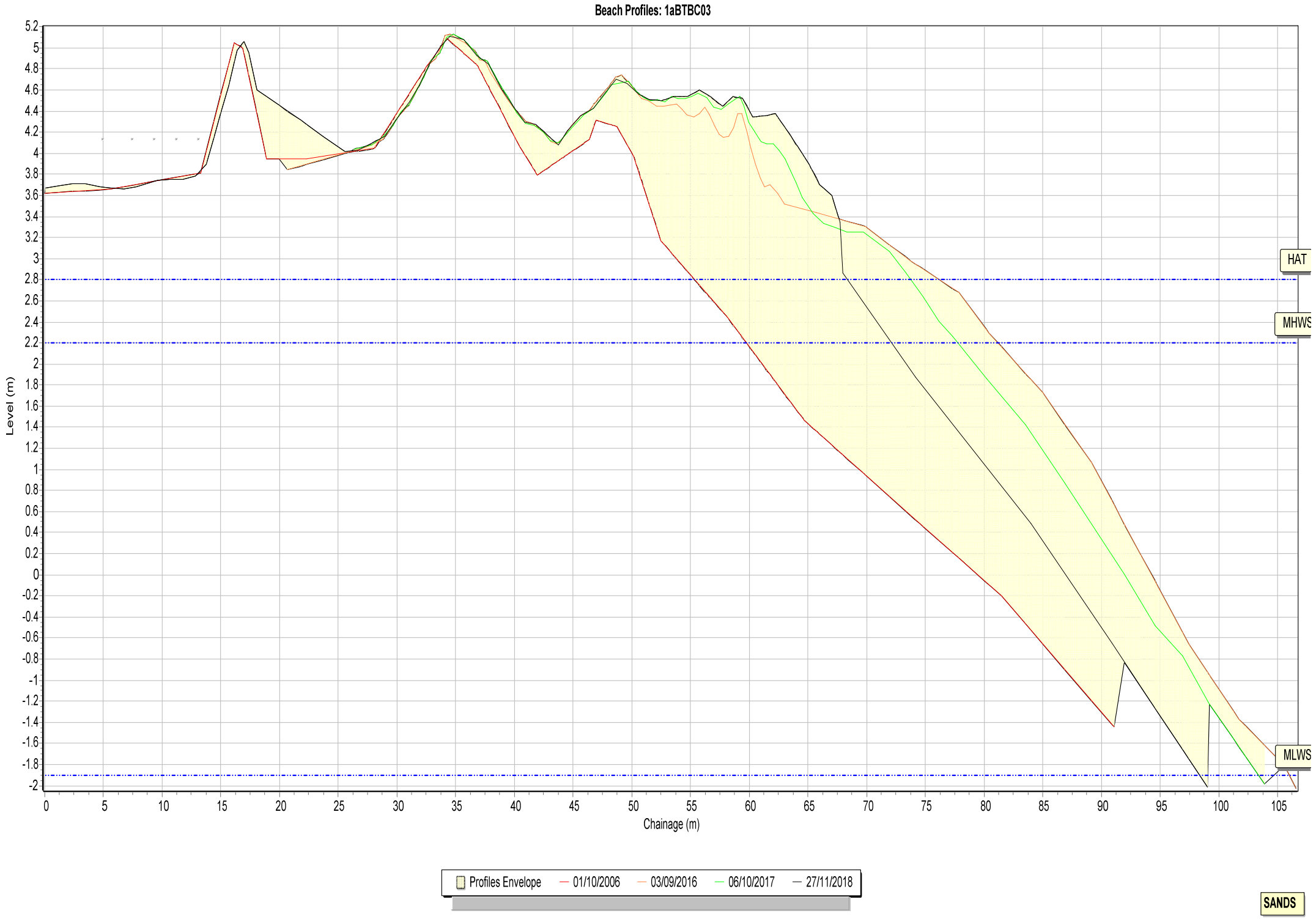
Summary: 2018 Full Measures Topo Survey

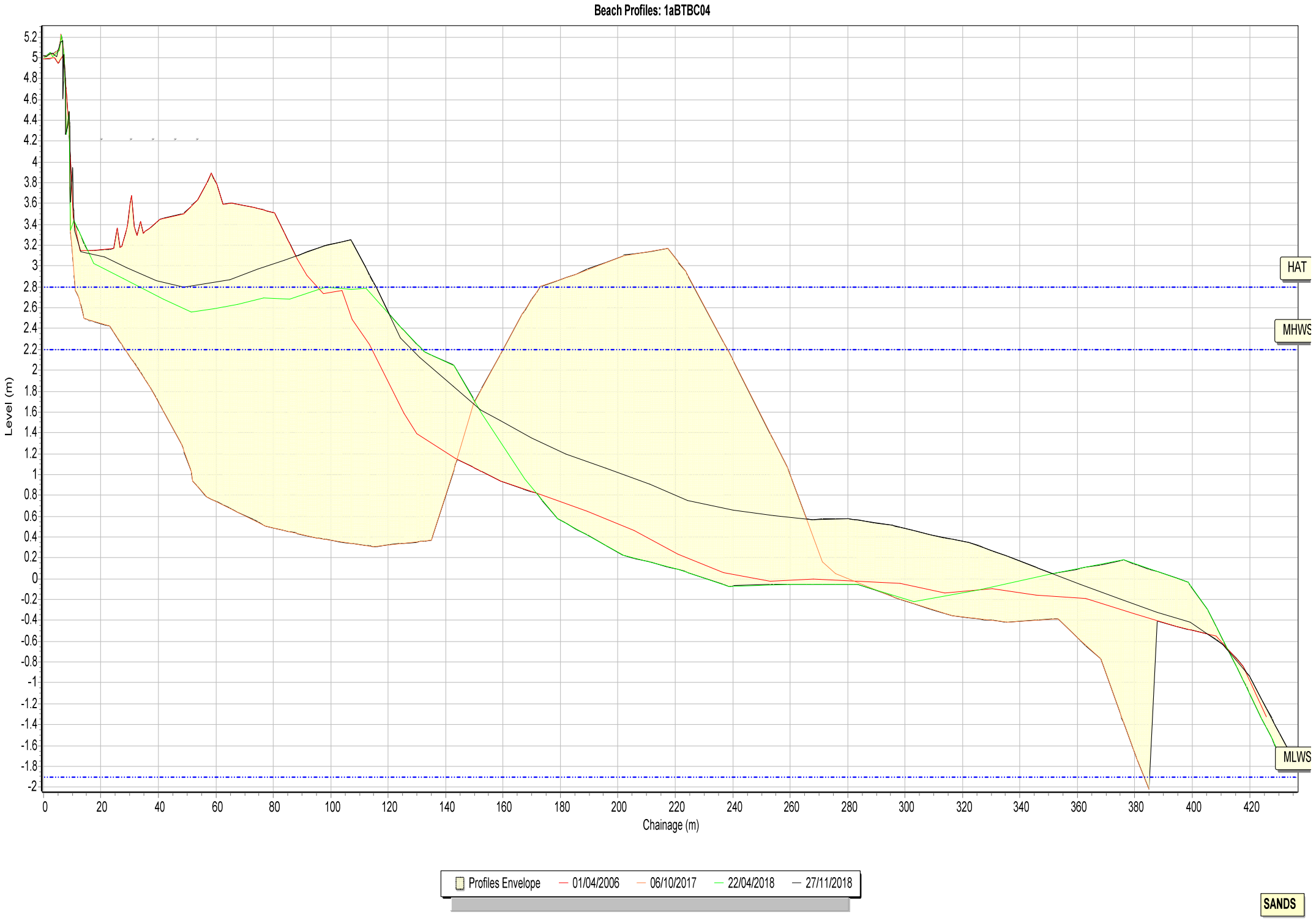
Easting: 401030.513 **Northing:** 651003.409 **Profile Bearing:** 60 ° from North

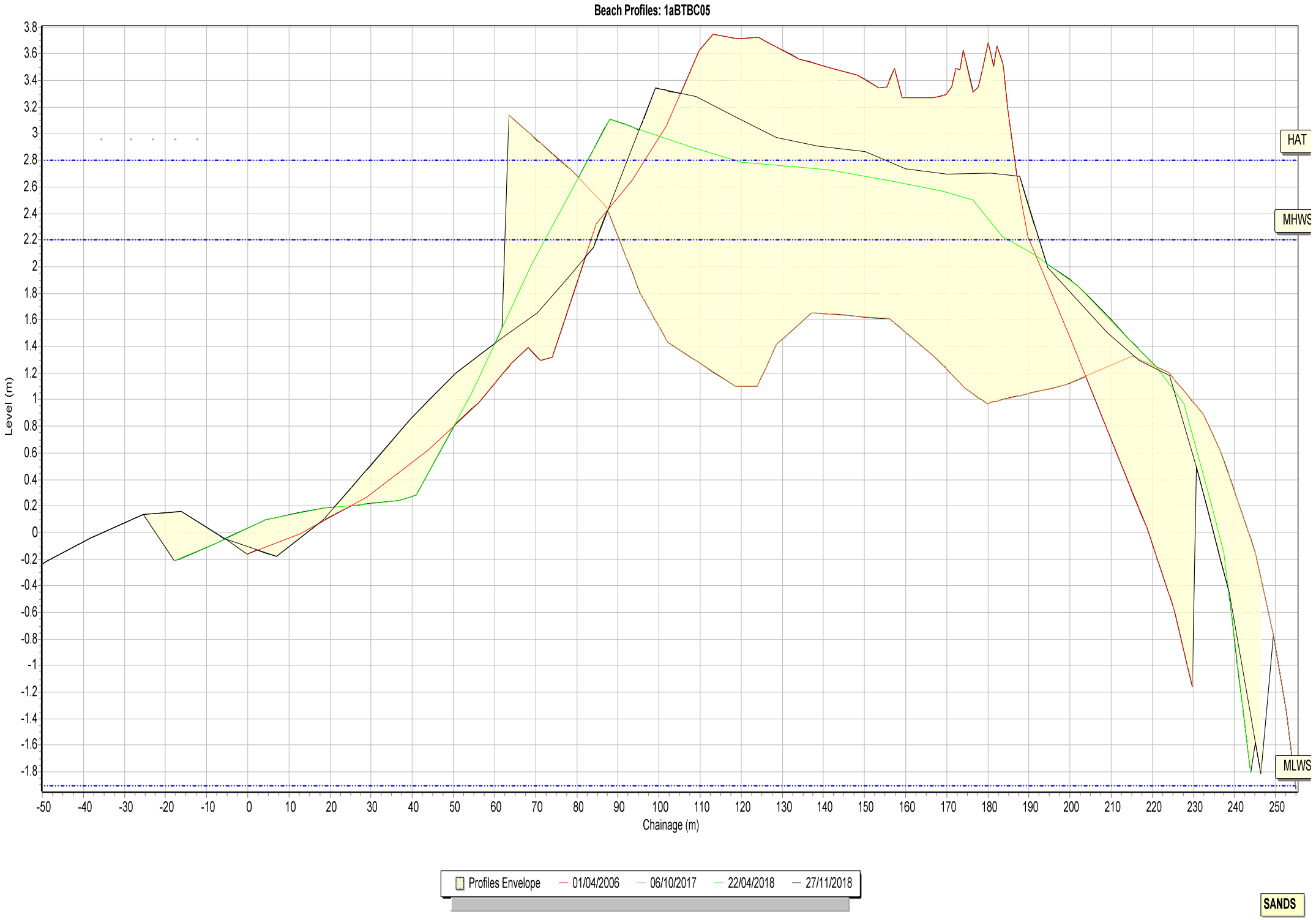



Beach Profiles: 1aBTBC01
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS

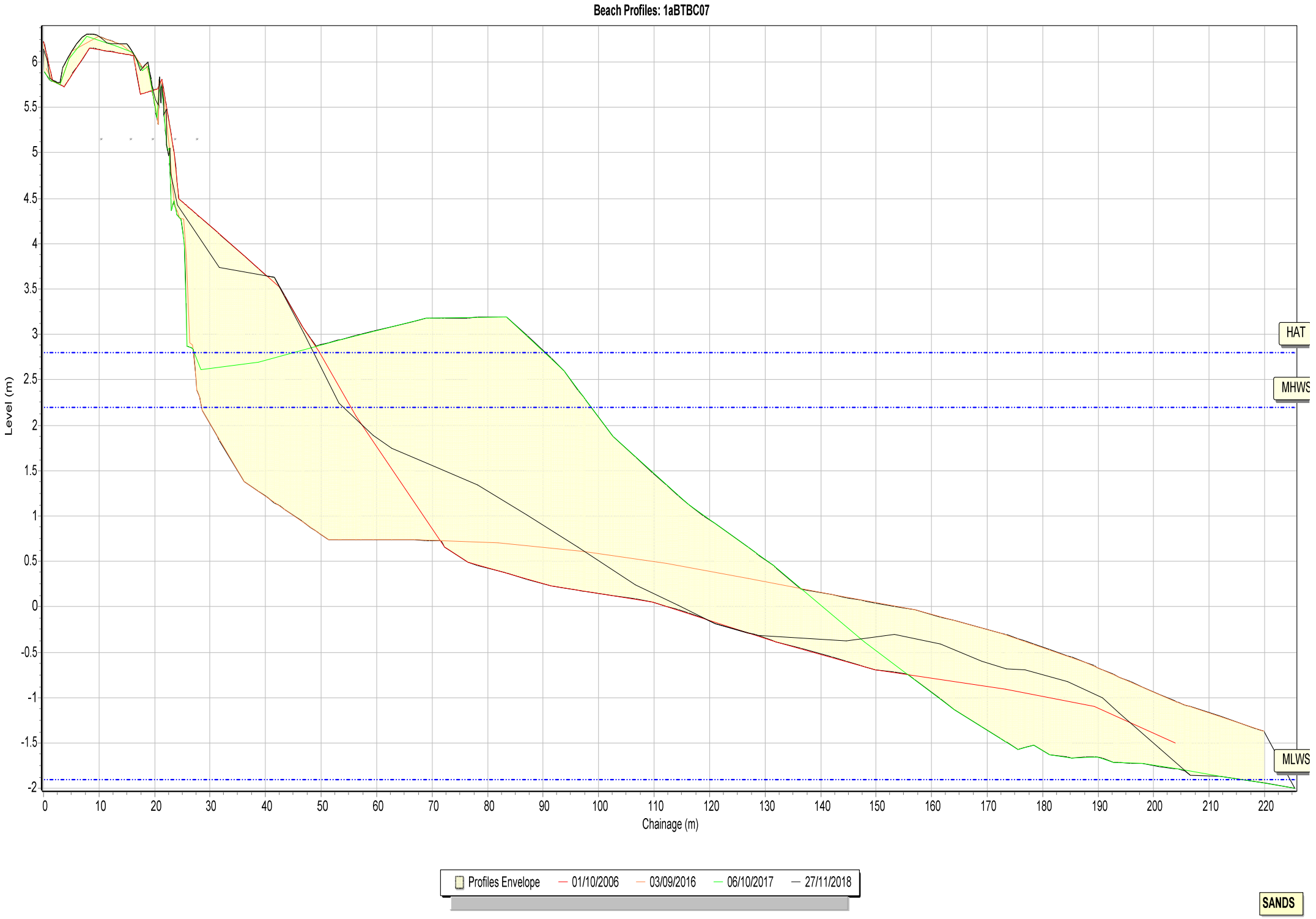

Beach Profiles: 1aBTBC02
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/10/2017
22/04/2018
27/11/2018
SANDS

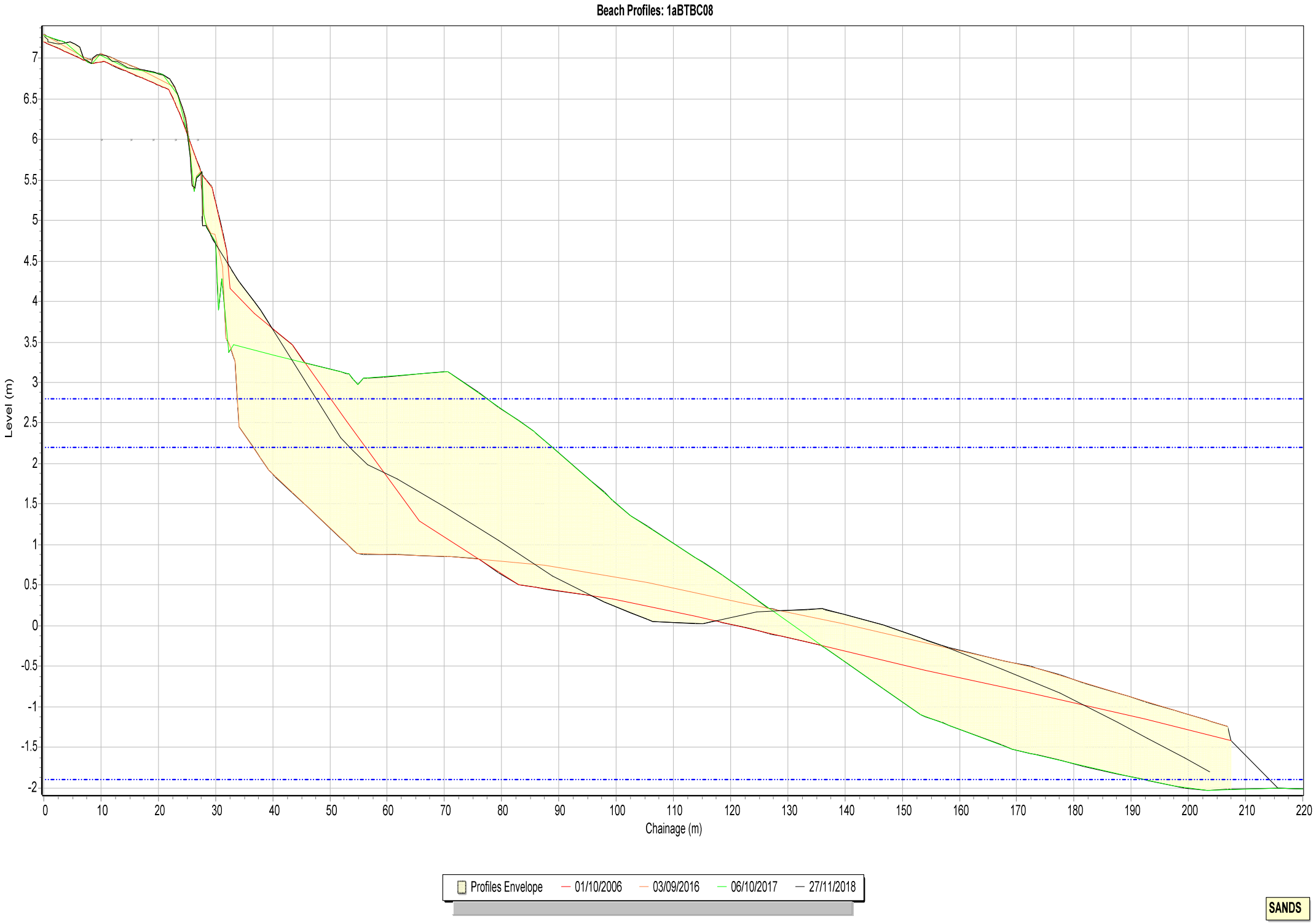

Beach Profiles: 1aBTBC03
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS

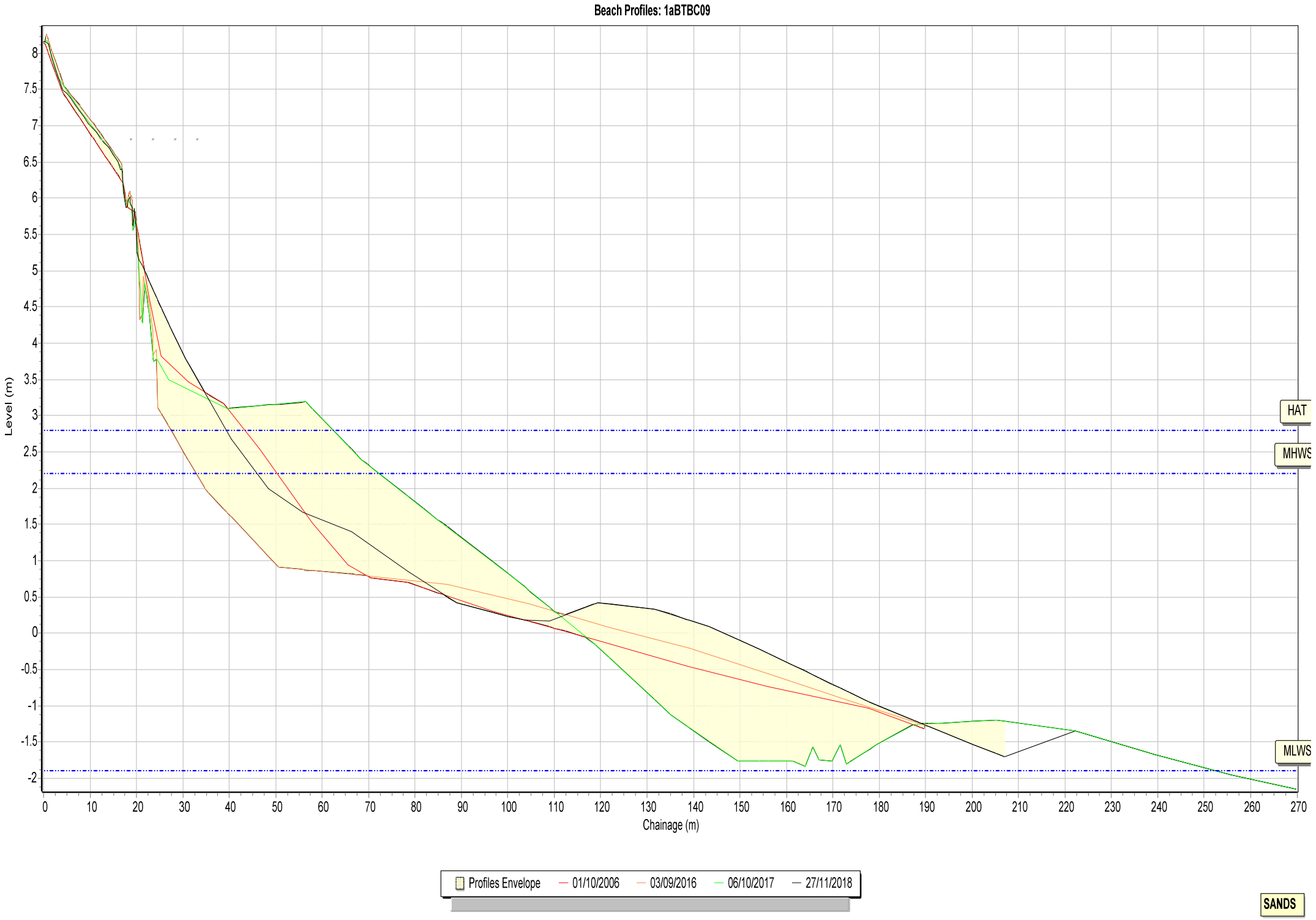

Beach Profiles: 1aBTBC04
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/10/2017
22/04/2018
27/11/2018
SANDS

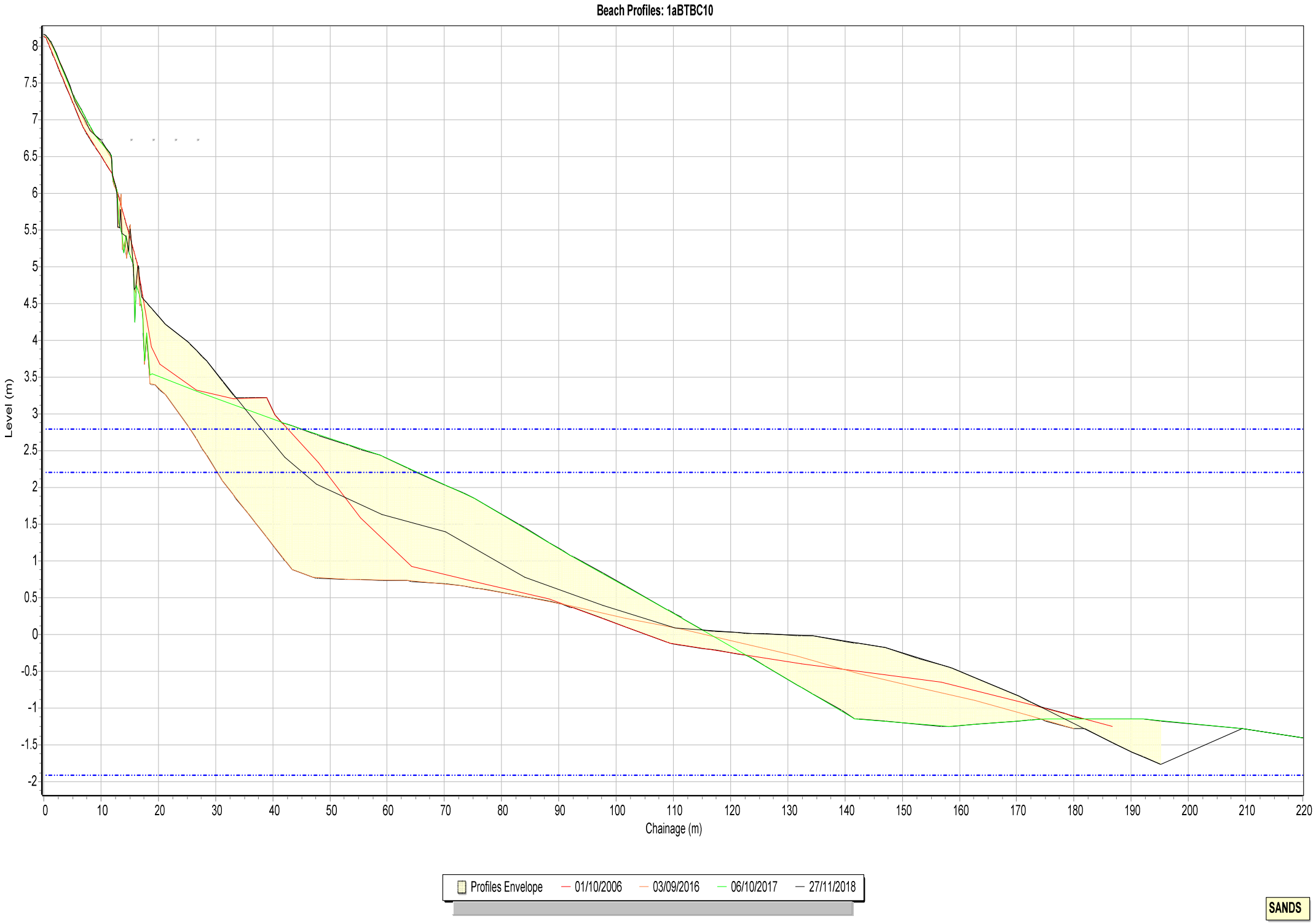

Beach Profiles: 1aBTBC05
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/10/2017
22/04/2018
27/11/2018
SANDS

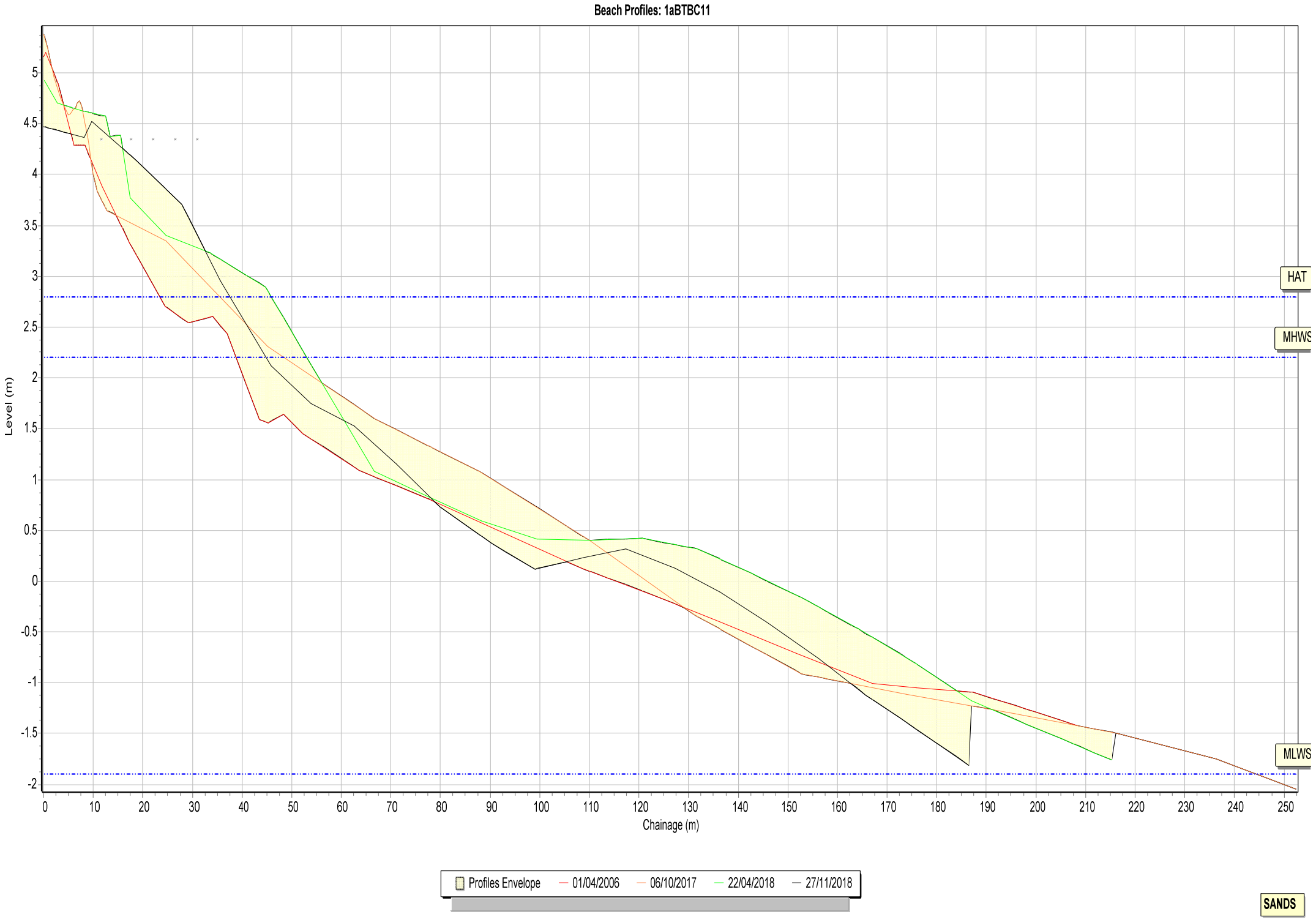

Beach Profiles: 1aBTBC06
HAT
MHWS
MLWS
Level (m)
Chainage (m)
Profiles Envelope
01/04/2006
06/10/2017
22/04/2018
27/11/2018
SANDS

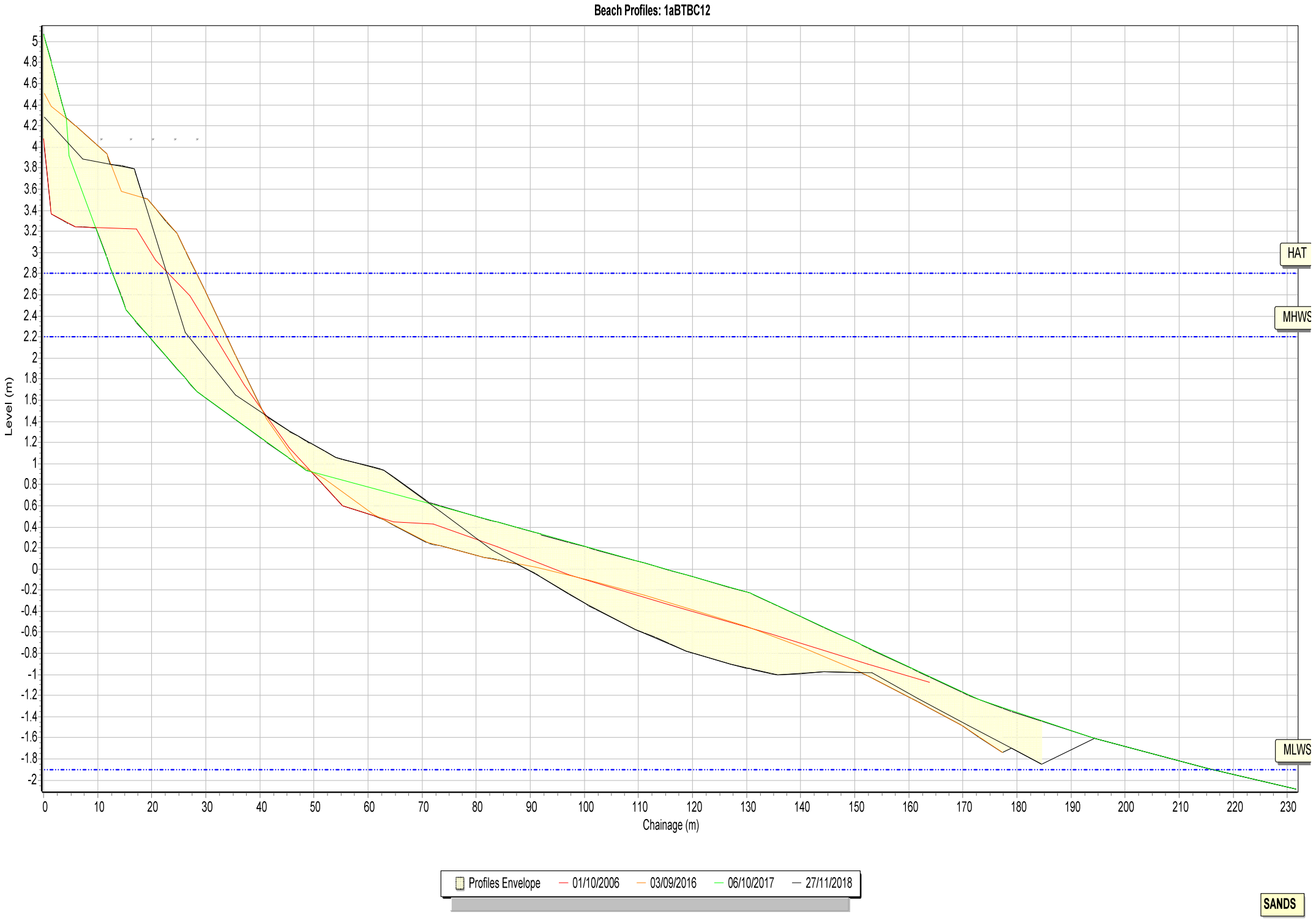

Beach Profiles: 1aBTBC07
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS

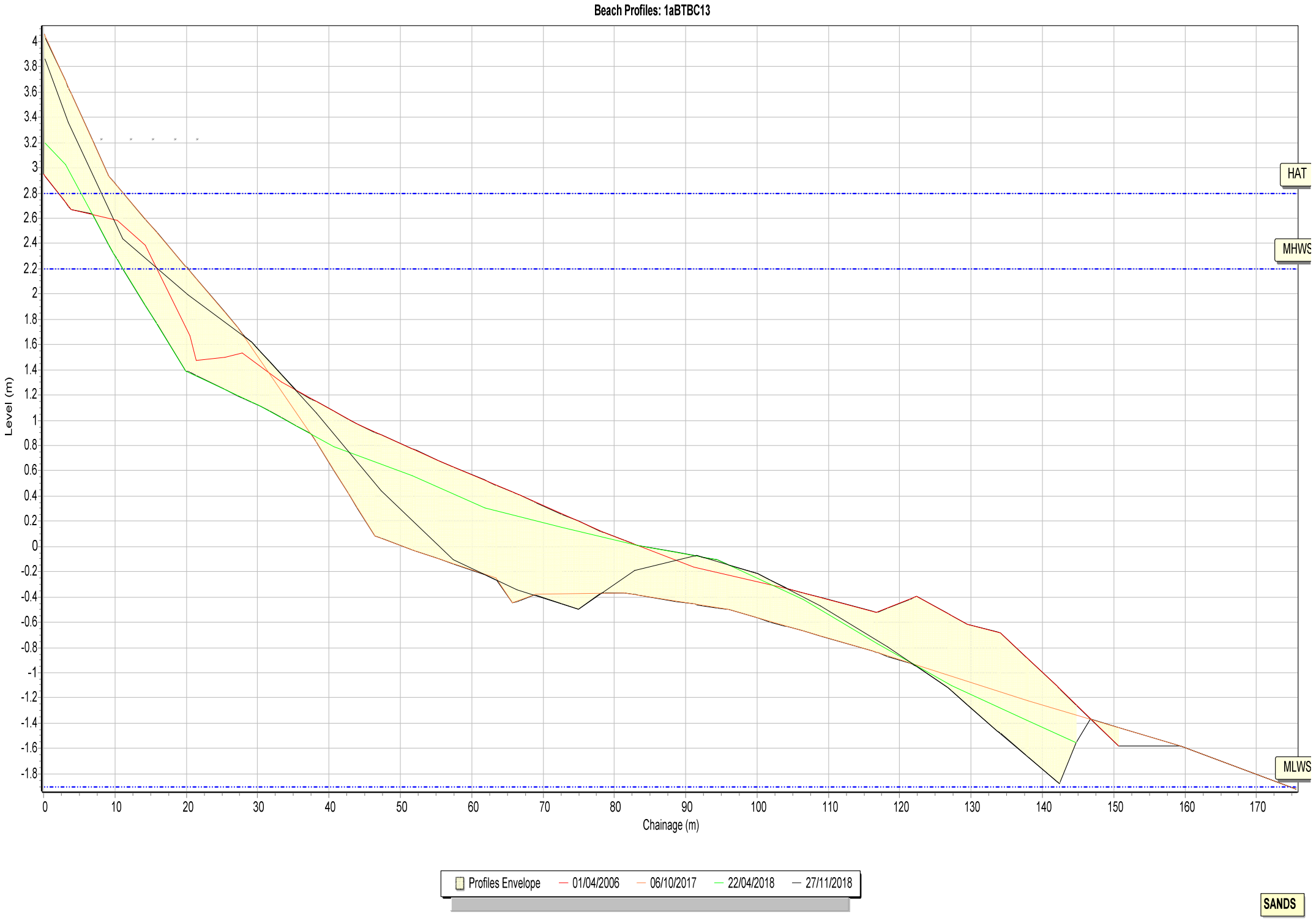

Beach Profiles: 1aBTBC08
Level (m)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
Chainage (m)
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS

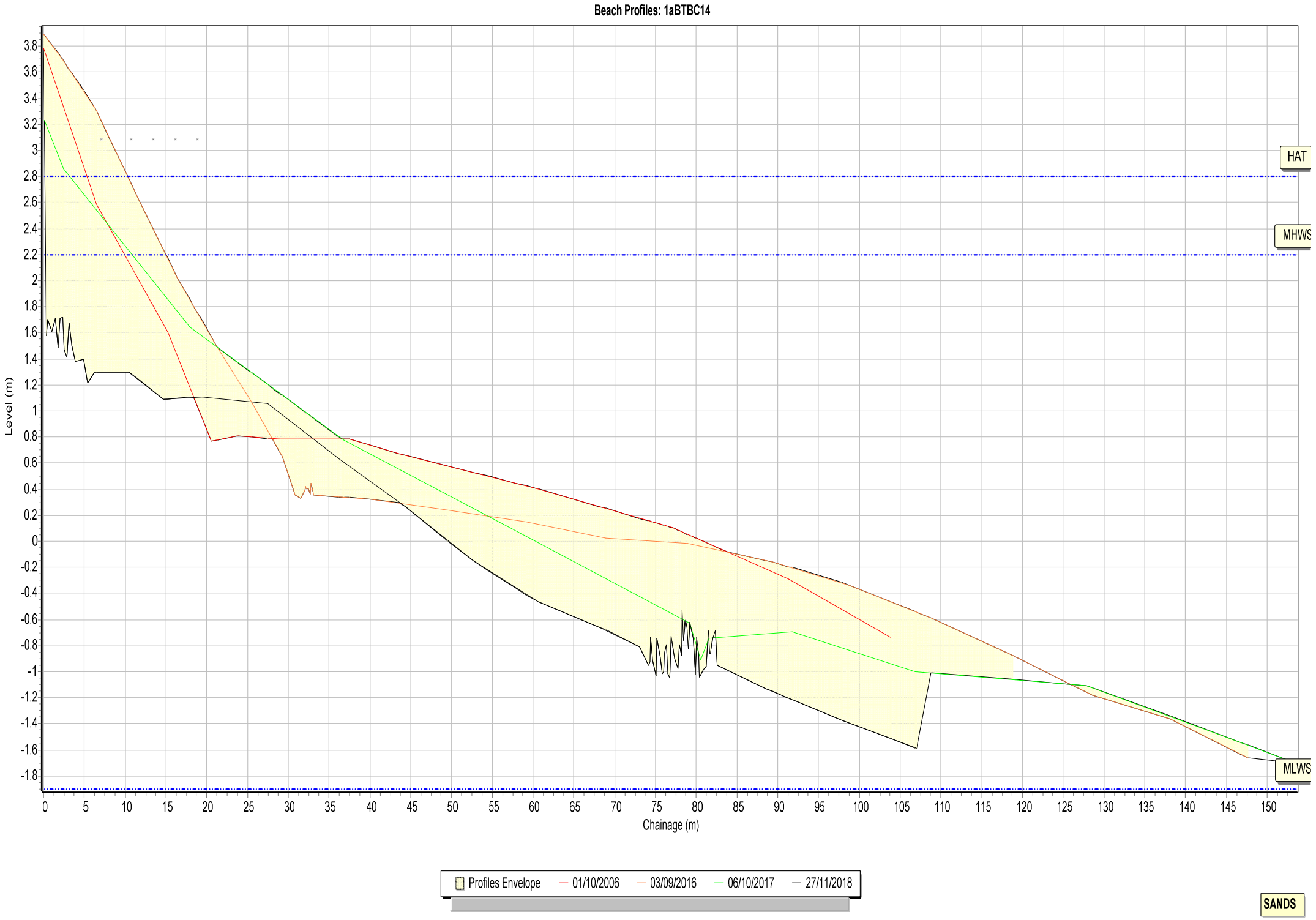

Beach Profiles: 1aBTBC09
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS


Beach Profiles: 1aBTBC10
Level (m)
8
7.5
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
-2
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
Chainage (m)
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS


Beach Profiles: 1aBTBC11
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/10/2017
22/04/2018
27/11/2018
SANDS


Beach Profiles: 1aBTBC12
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS


Beach Profiles: 1aBTBC13
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/10/2017
22/04/2018
27/11/2018
SANDS


Beach Profiles: 1aBTBC14
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
03/09/2016
06/10/2017
27/11/2018
SANDS

Beach Profile

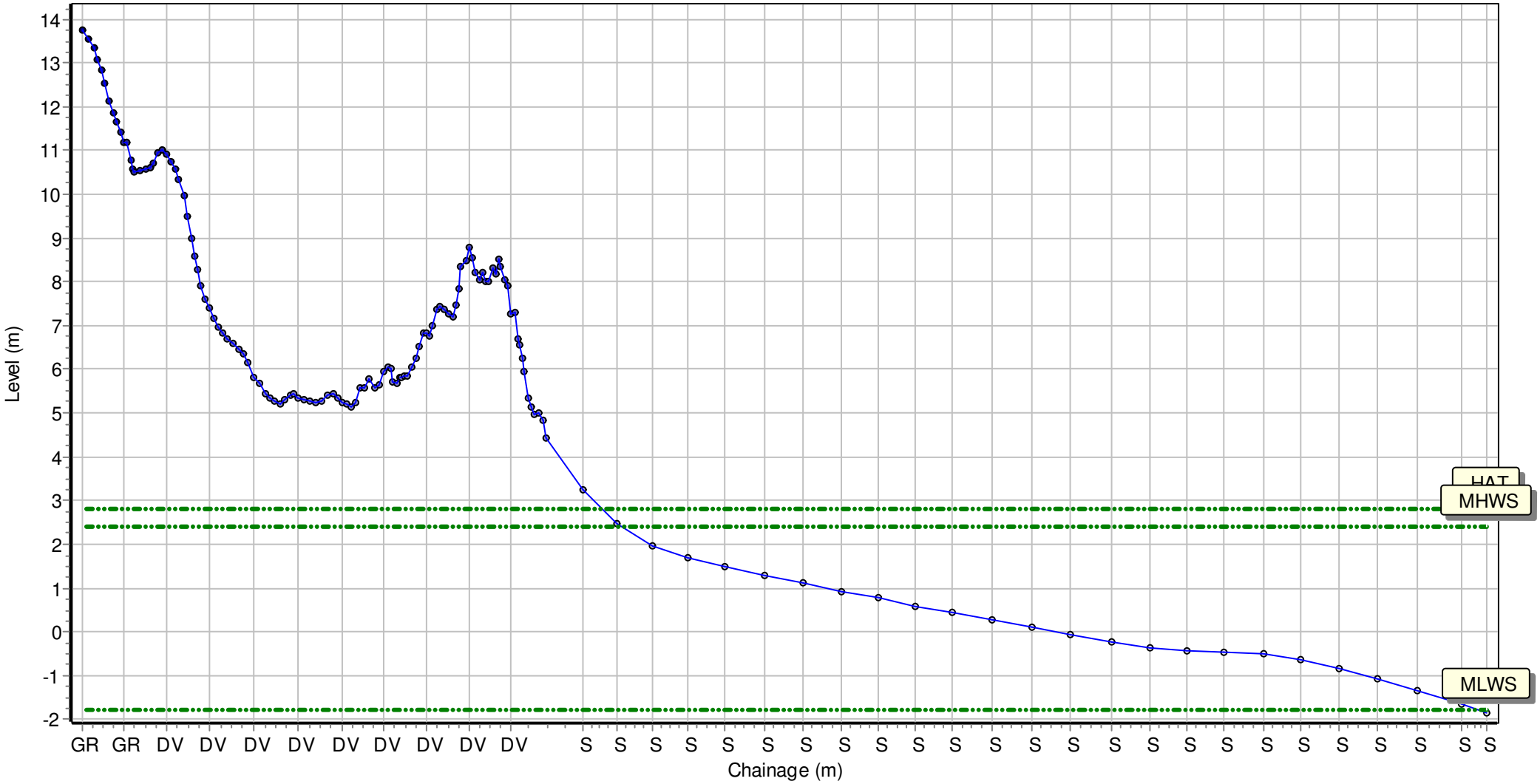
Location: **1aBTBC15**

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 402663.736 **Northing:** 648593.739 **Profile Bearing:** 40 ° from North



Beach Profile

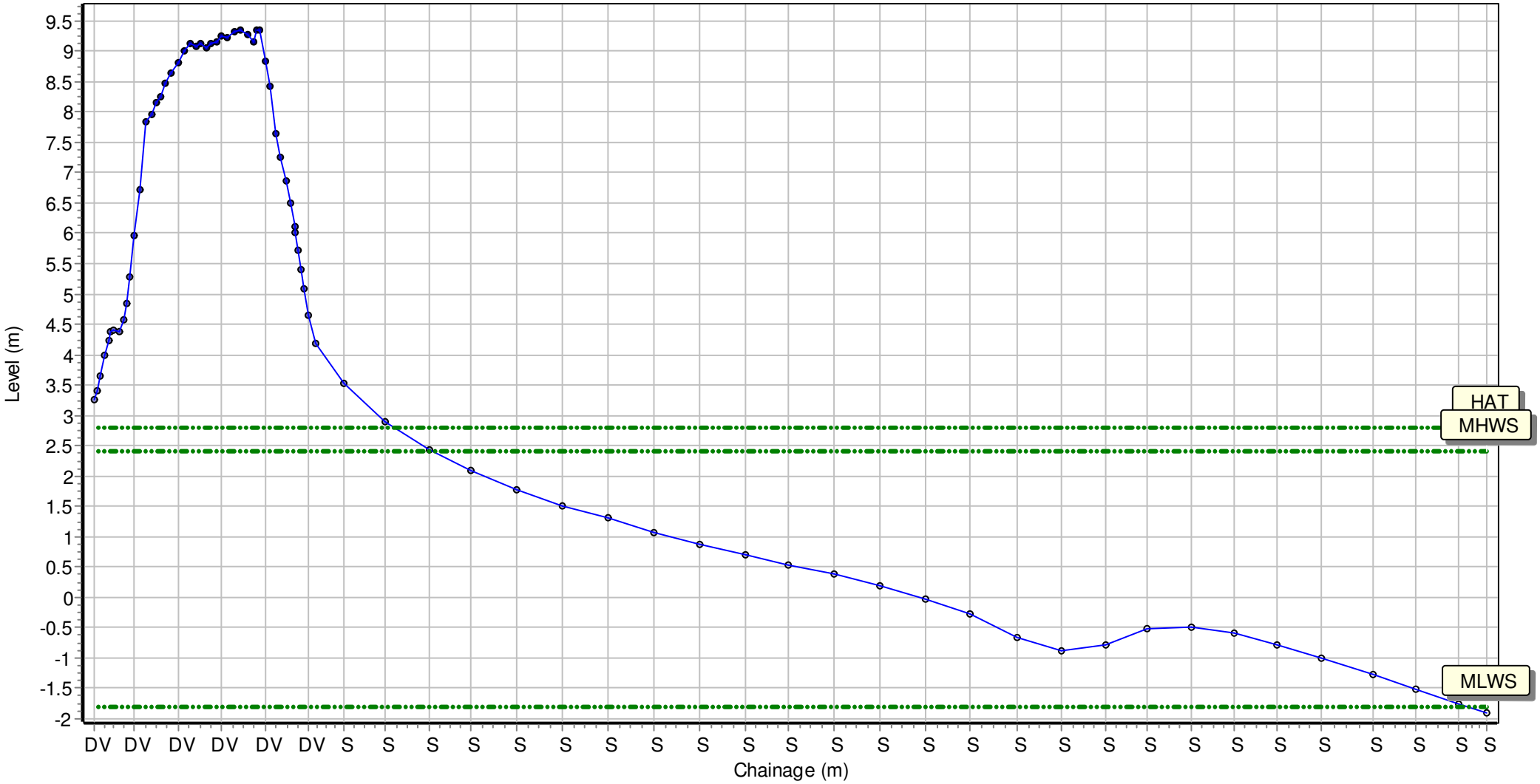
Location: **1aBTBC16**

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

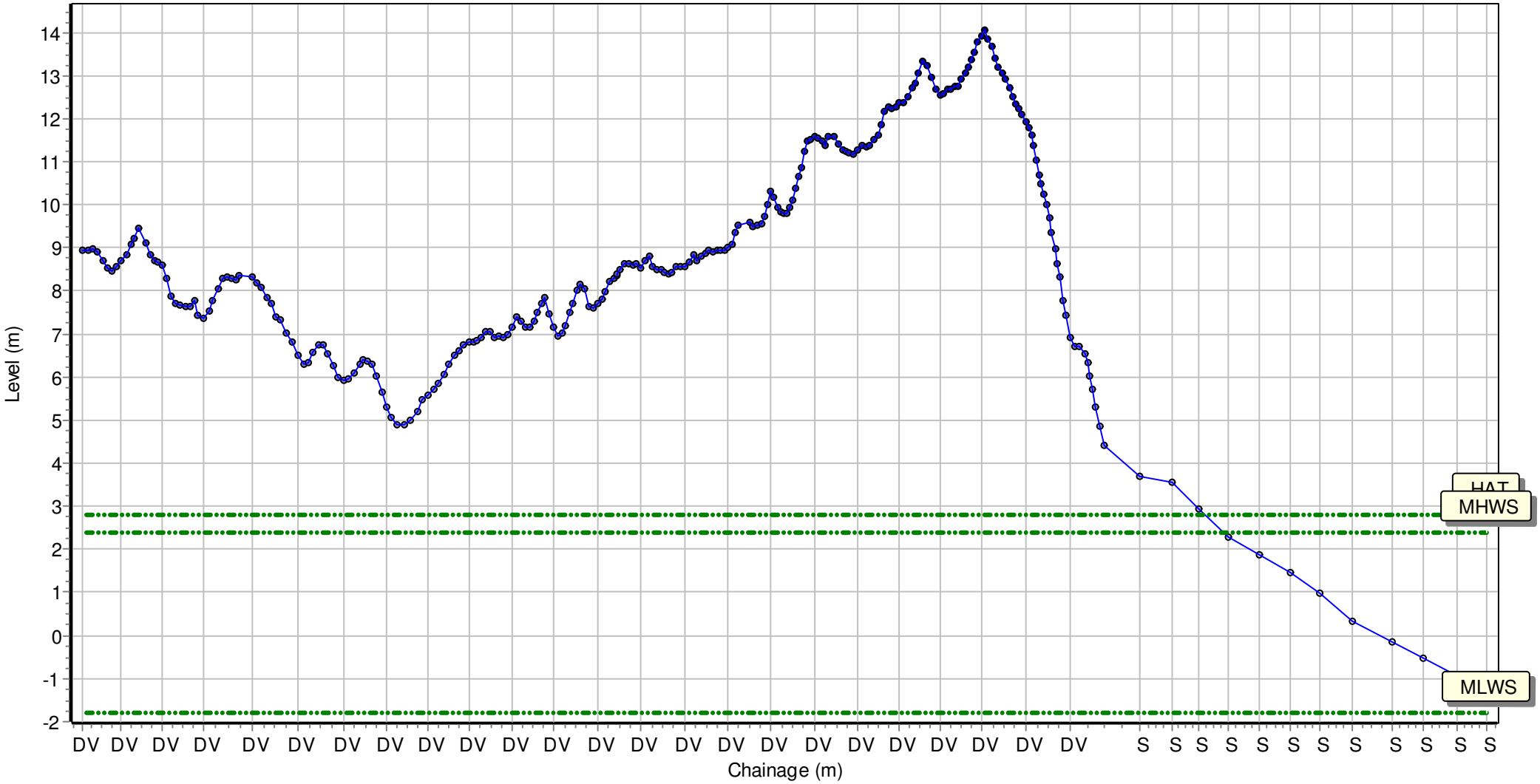
Location: **1aBTBC17**

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 404433.939 **Northing:** 646713.965 **Profile Bearing:** 51 ° from North



Beach Profile

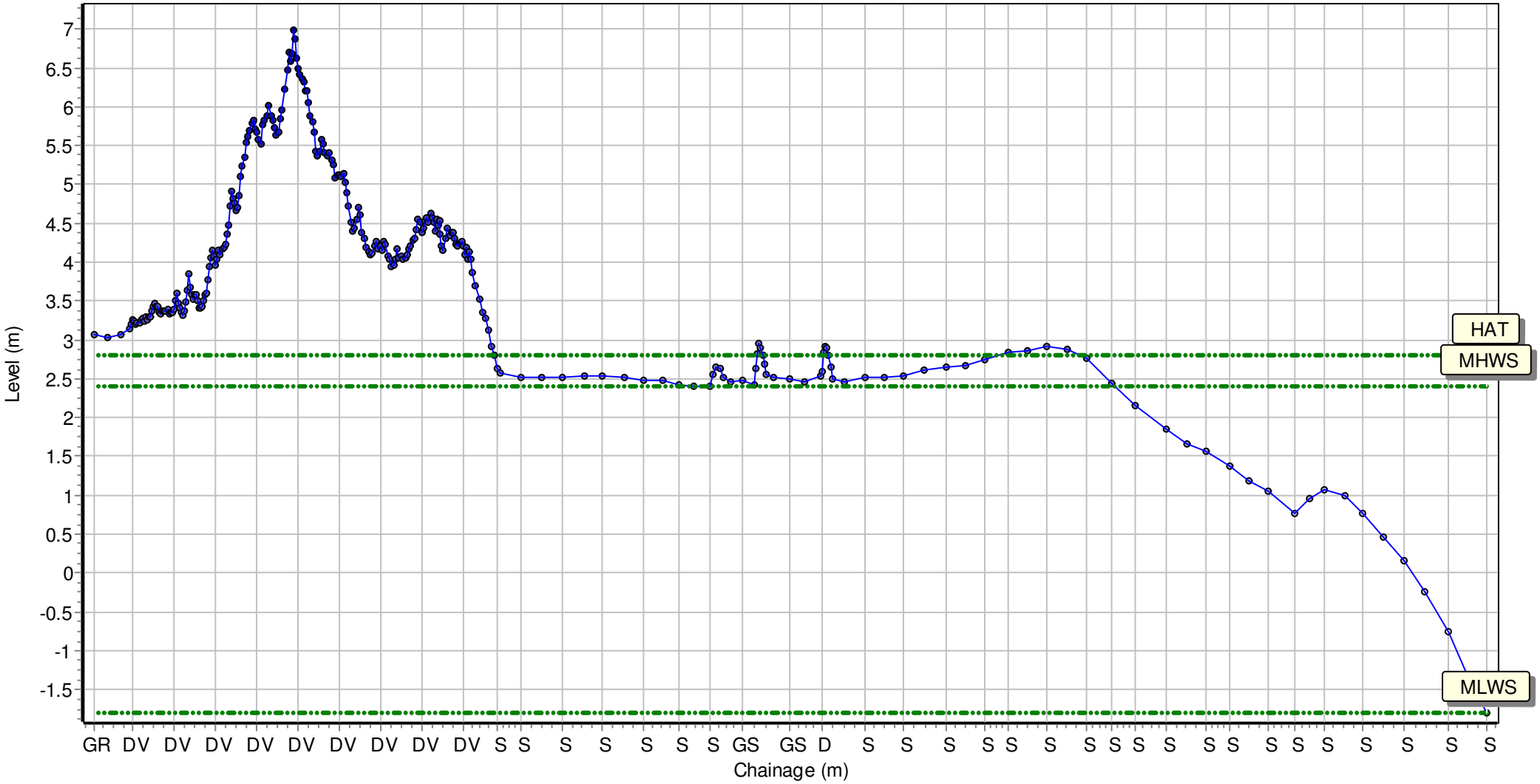
Location: **1aBTBC18**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 405985.759 **Northing:** 645466.297 **Profile Bearing:** 38 ° from North



Beach Profile

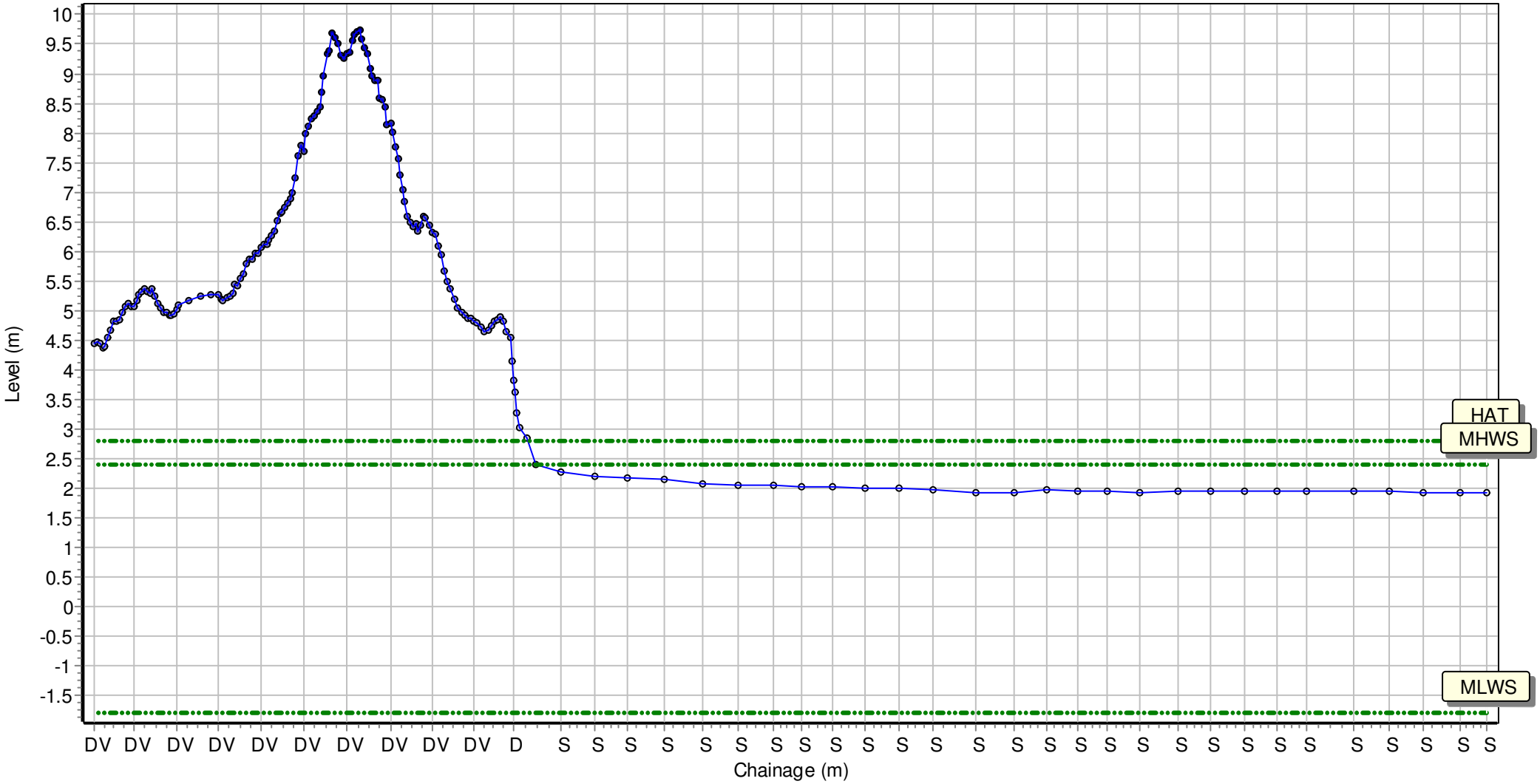
Location: **1aBTBC19**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

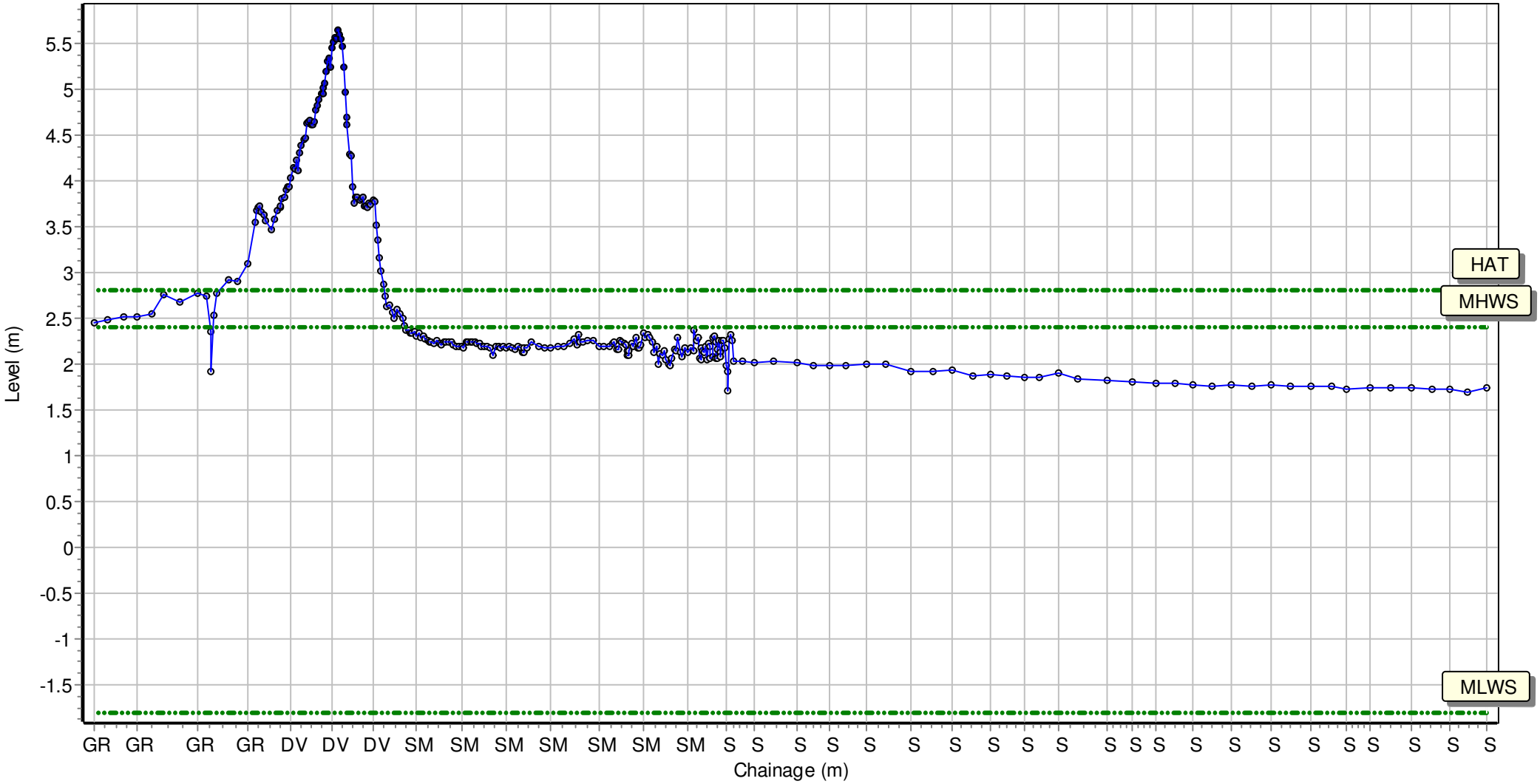
Location: **1aBTBC20**

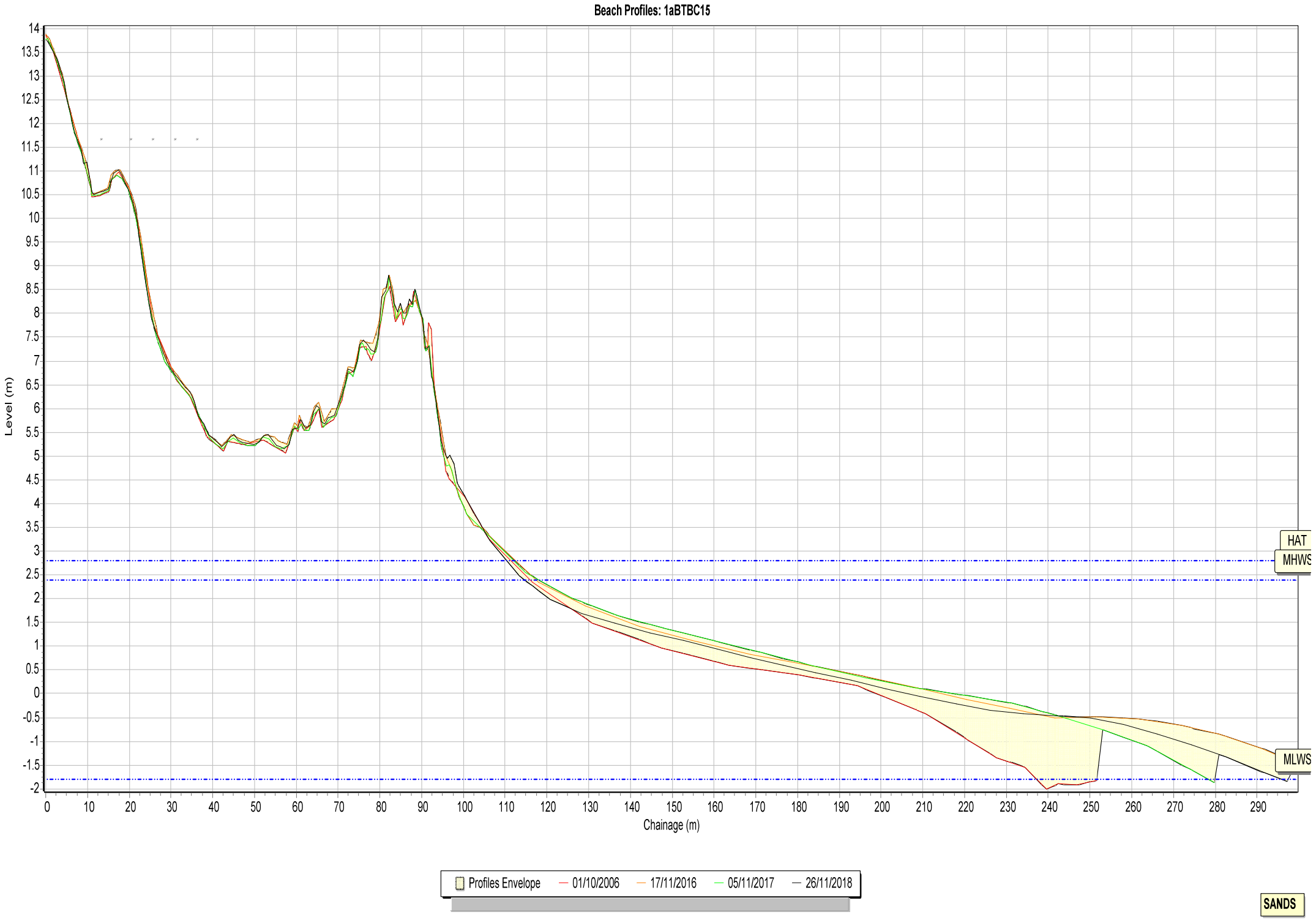
Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

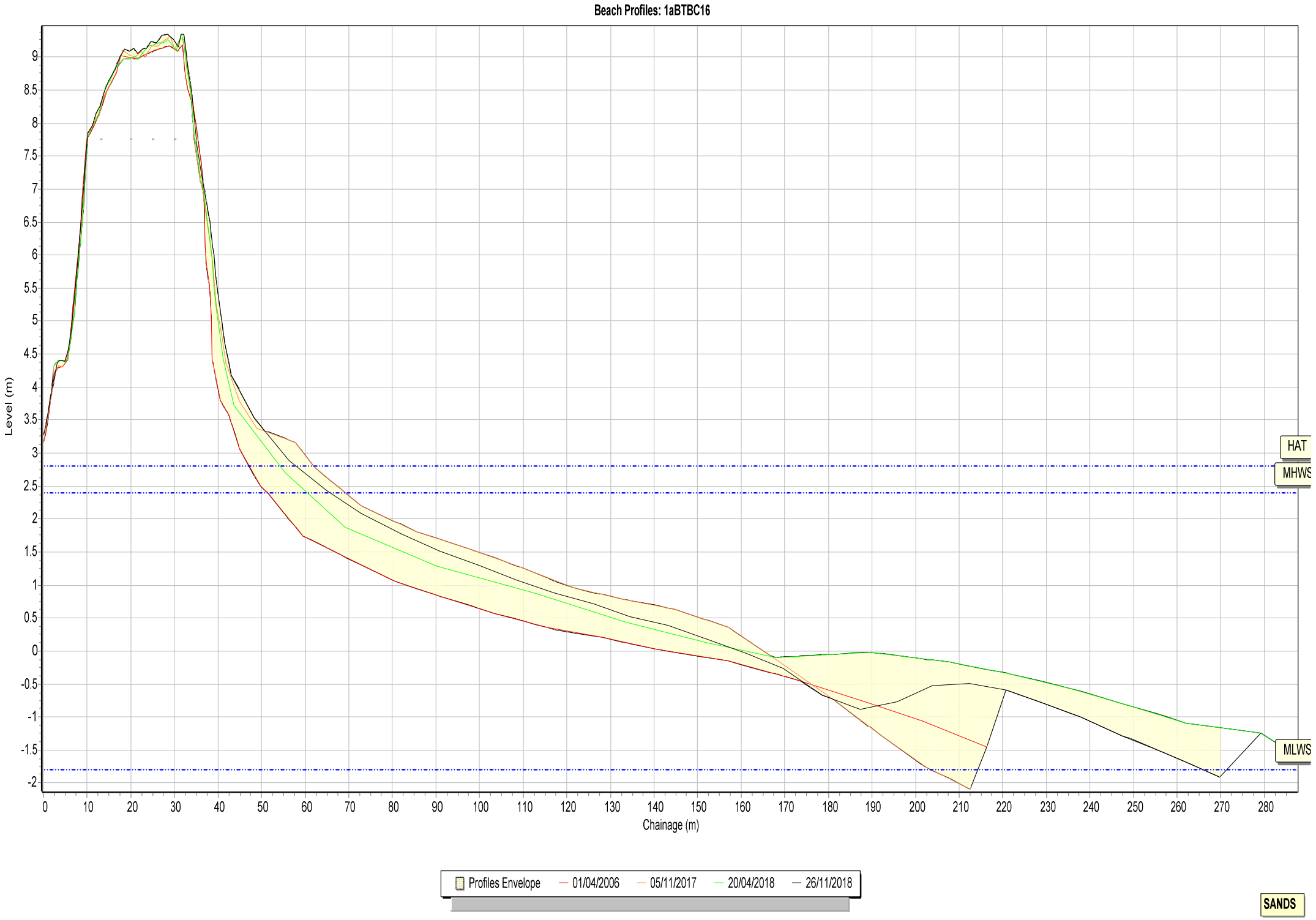
Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2018 Full Measures Topo Survey

Easting: 407390.255 **Northing:** 643841.768 **Profile Bearing:** 45 ° from North

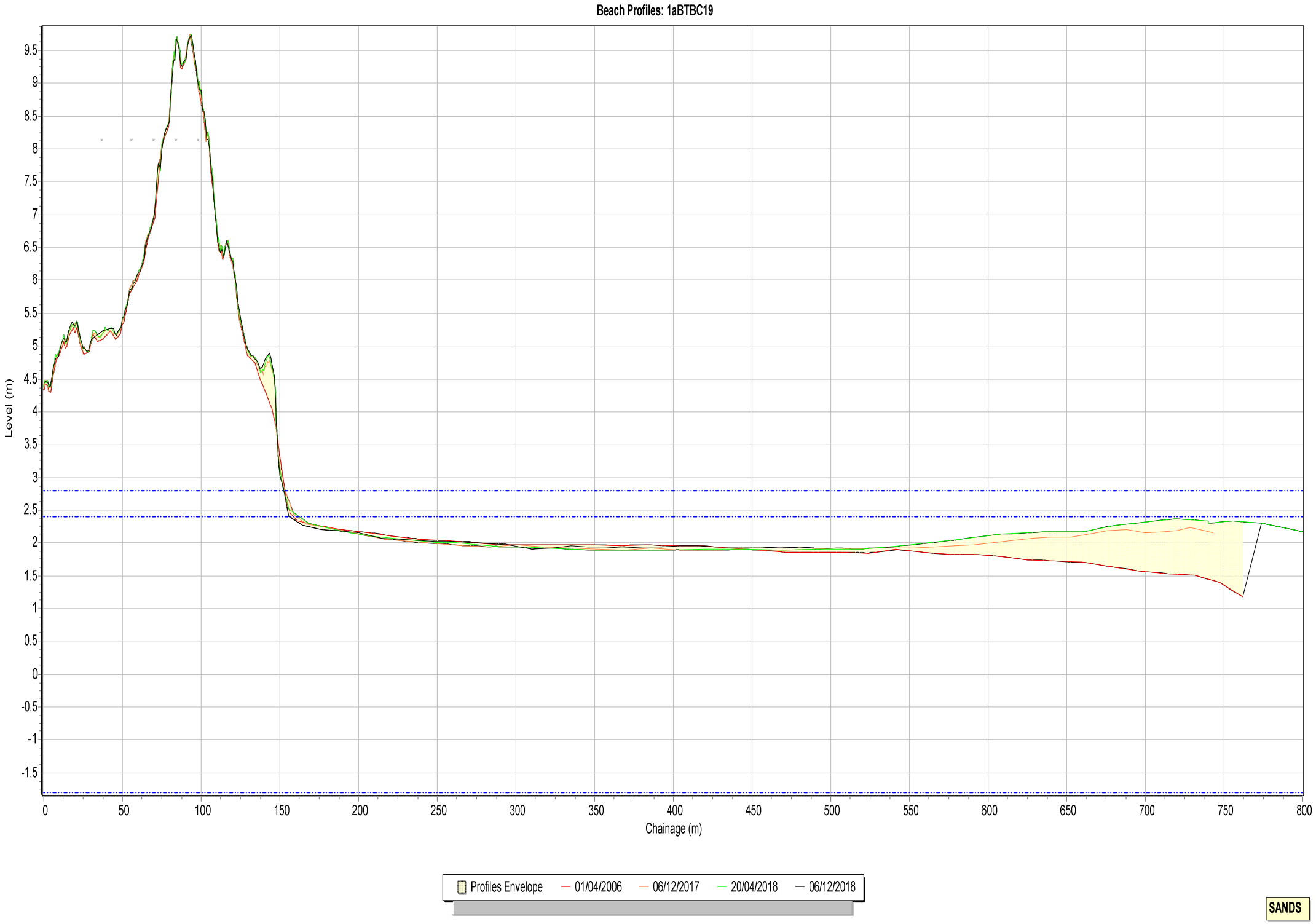


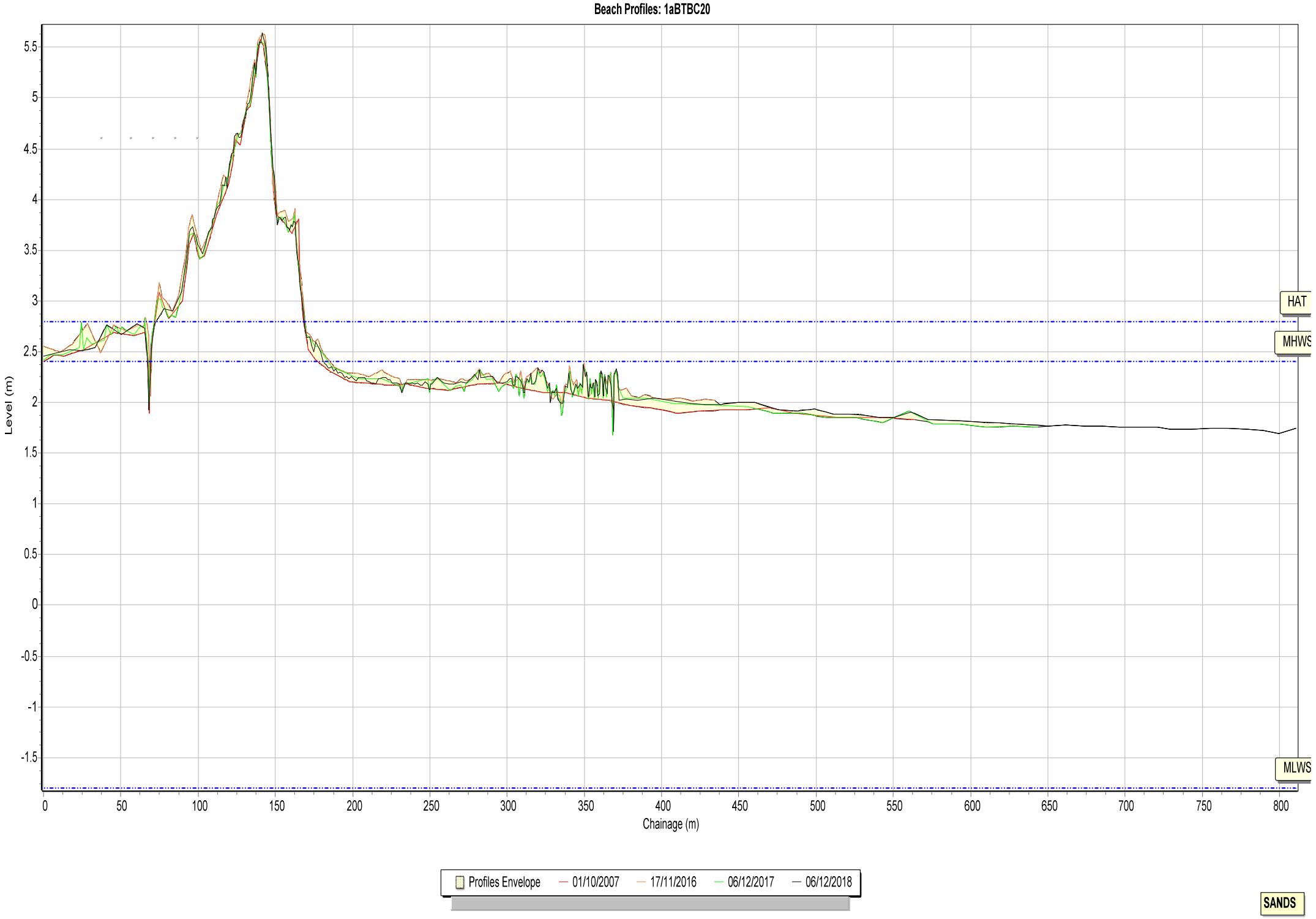

Beach Profiles: 1aBTBC15
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
17/11/2016
05/11/2017
26/11/2018
SANDS


Beach Profiles: 1aBTBC16
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
05/11/2017
20/04/2018
26/11/2018
SANDS


Beach Profiles: 1aBTBC17
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
17/11/2016
05/11/2017
26/11/2018
SANDS


Beach Profiles: 1aBTBC18
Level (m)
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
HAT
MHWS
MLWS
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
Chainage (m)
Profiles Envelope
01/10/2006
17/11/2016
05/11/2017
06/12/2018
SANDS


Beach Profiles: 1aBTBC19
Level (m)
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
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
06/12/2017
20/04/2018
06/12/2018
SANDS


Beach Profiles: 1aBTBC20
Level (m)
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
HAT
MHWS
MLWS
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
Chainage (m)
Profiles Envelope
01/10/2007
17/11/2016
06/12/2017
06/12/2018
SANDS

Beach Profile

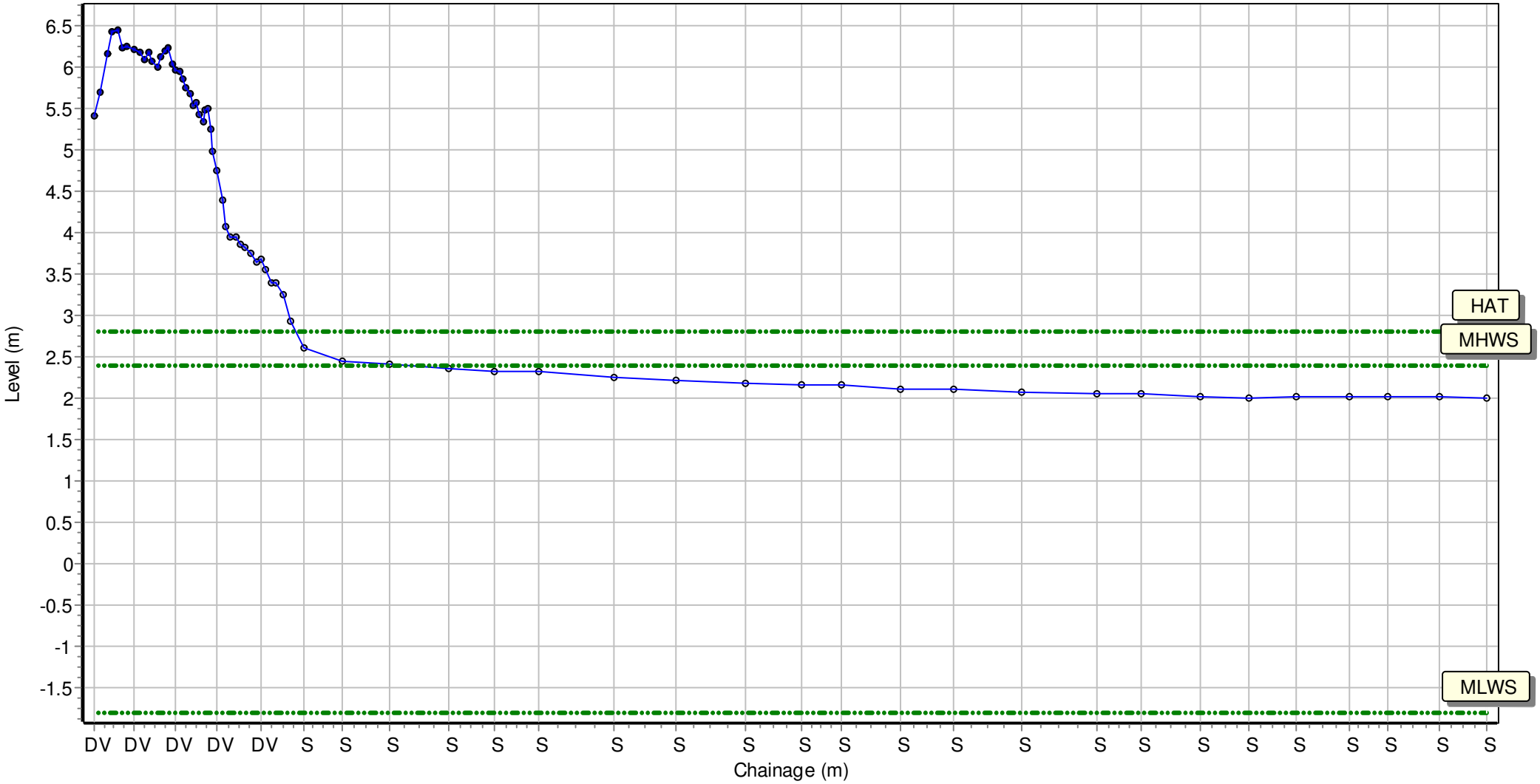
Location: **1aBTBC21**

Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

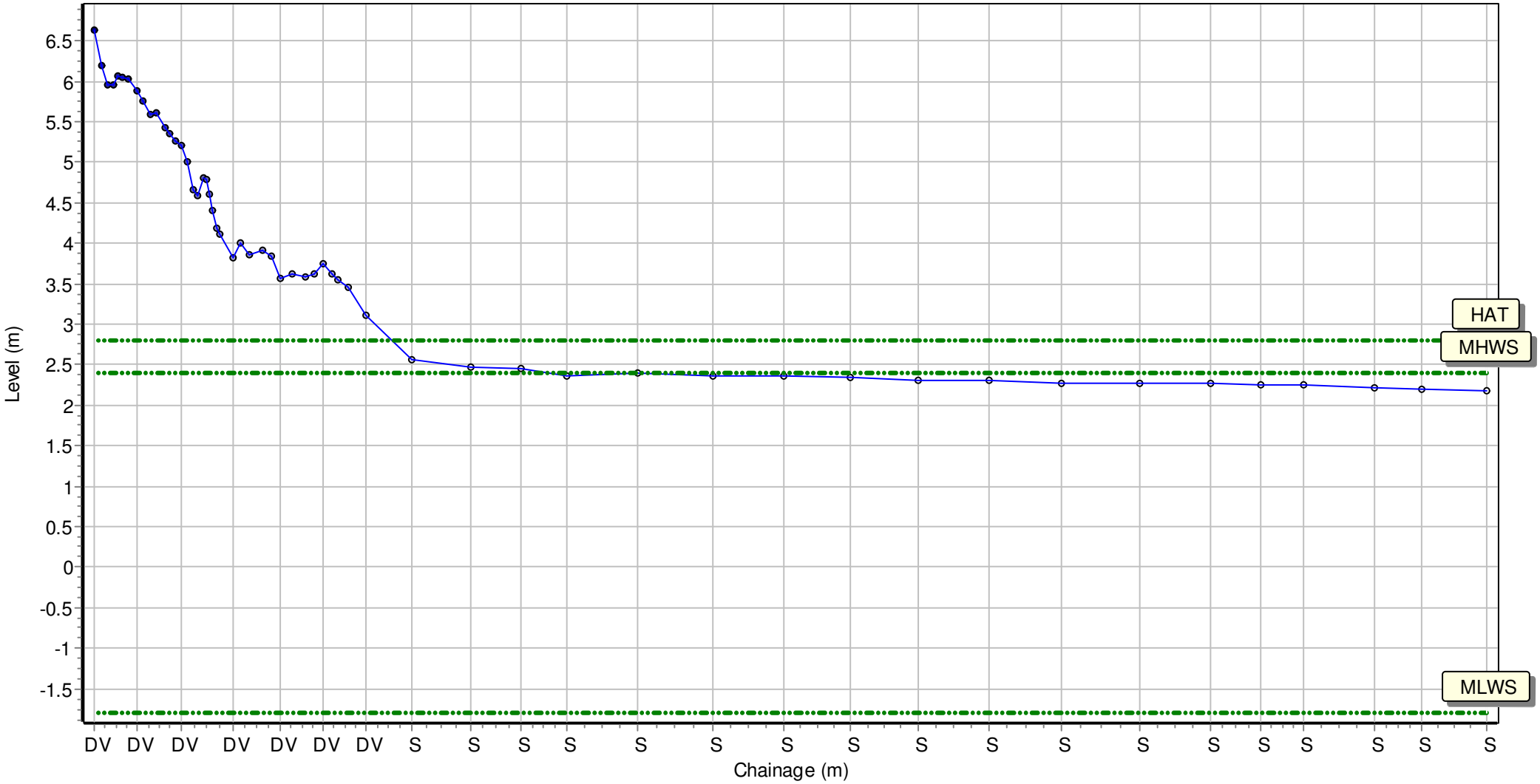
Location: **1aBTBC22**

Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 410213.981 **Northing:** 643697.867 **Profile Bearing:** 27 ° from North



Beach Profile

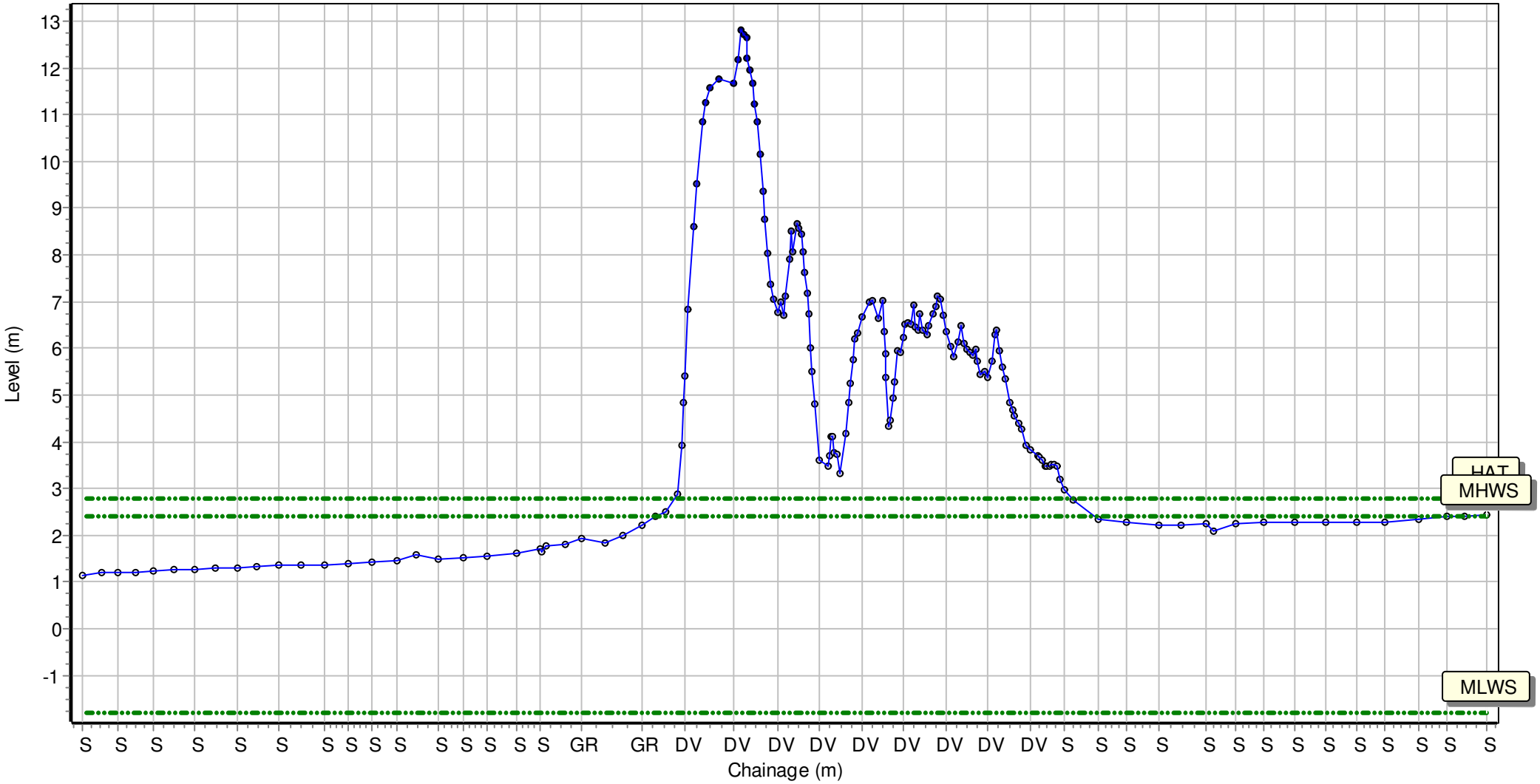
Location: **1aBTBC23**

Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

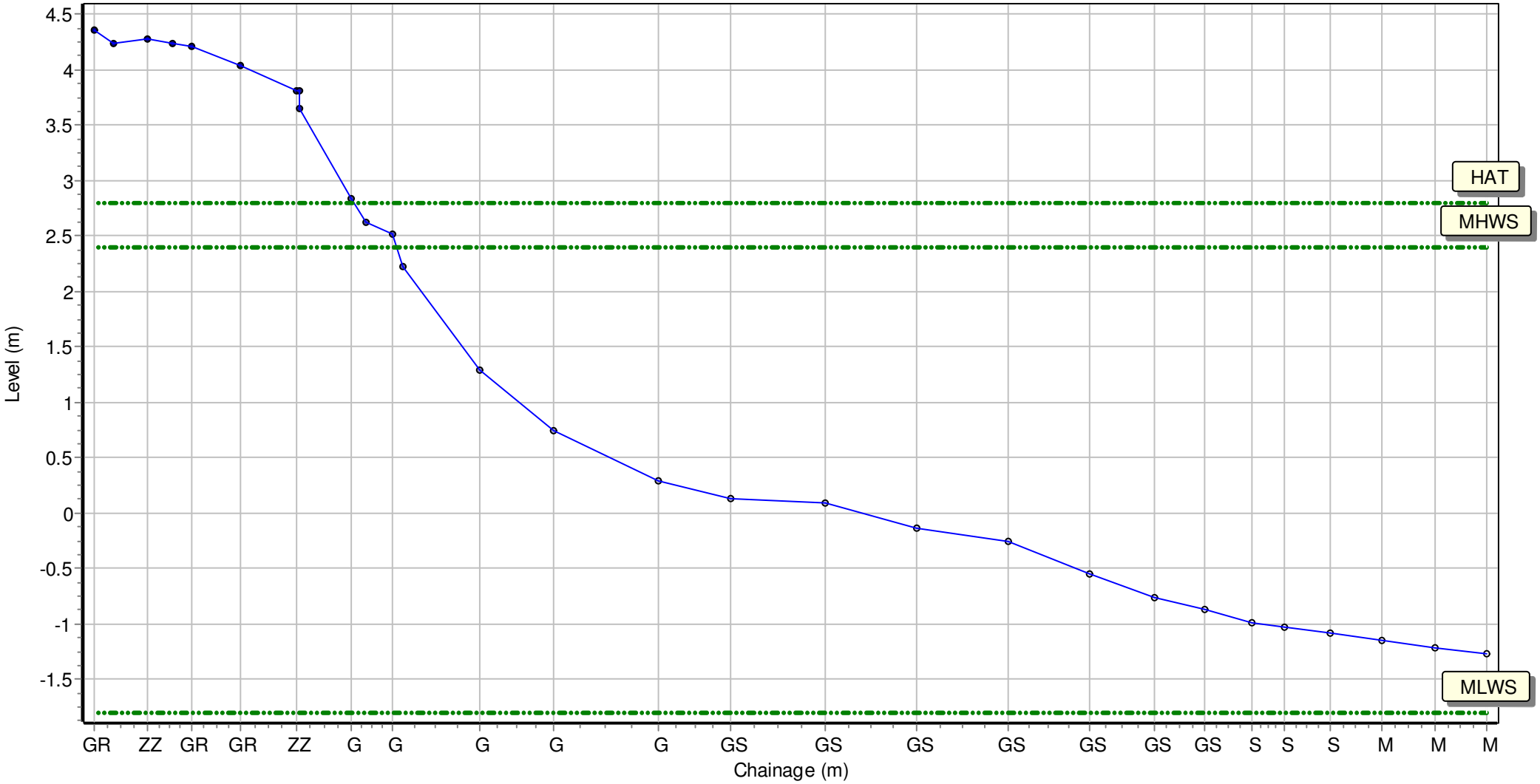
Location: **1aBTBC24**

Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 413330.108 **Northing:** 641794.909 **Profile Bearing:** 227 ° from North



Beach Profile

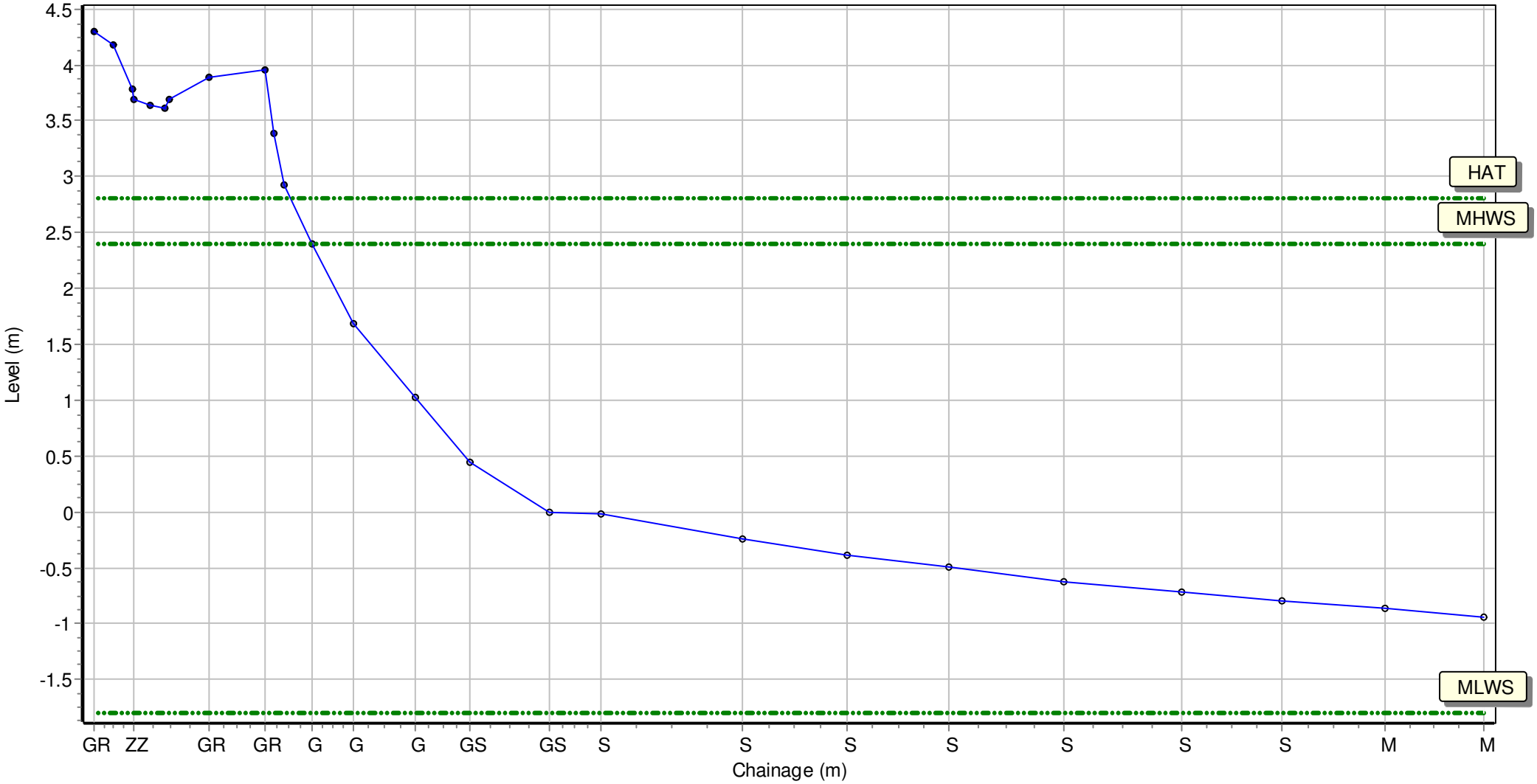
Location: **1aBTBC25**

Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 413102.684 **Northing:** 641936.754 **Profile Bearing:** 173 ° from North



Beach Profile

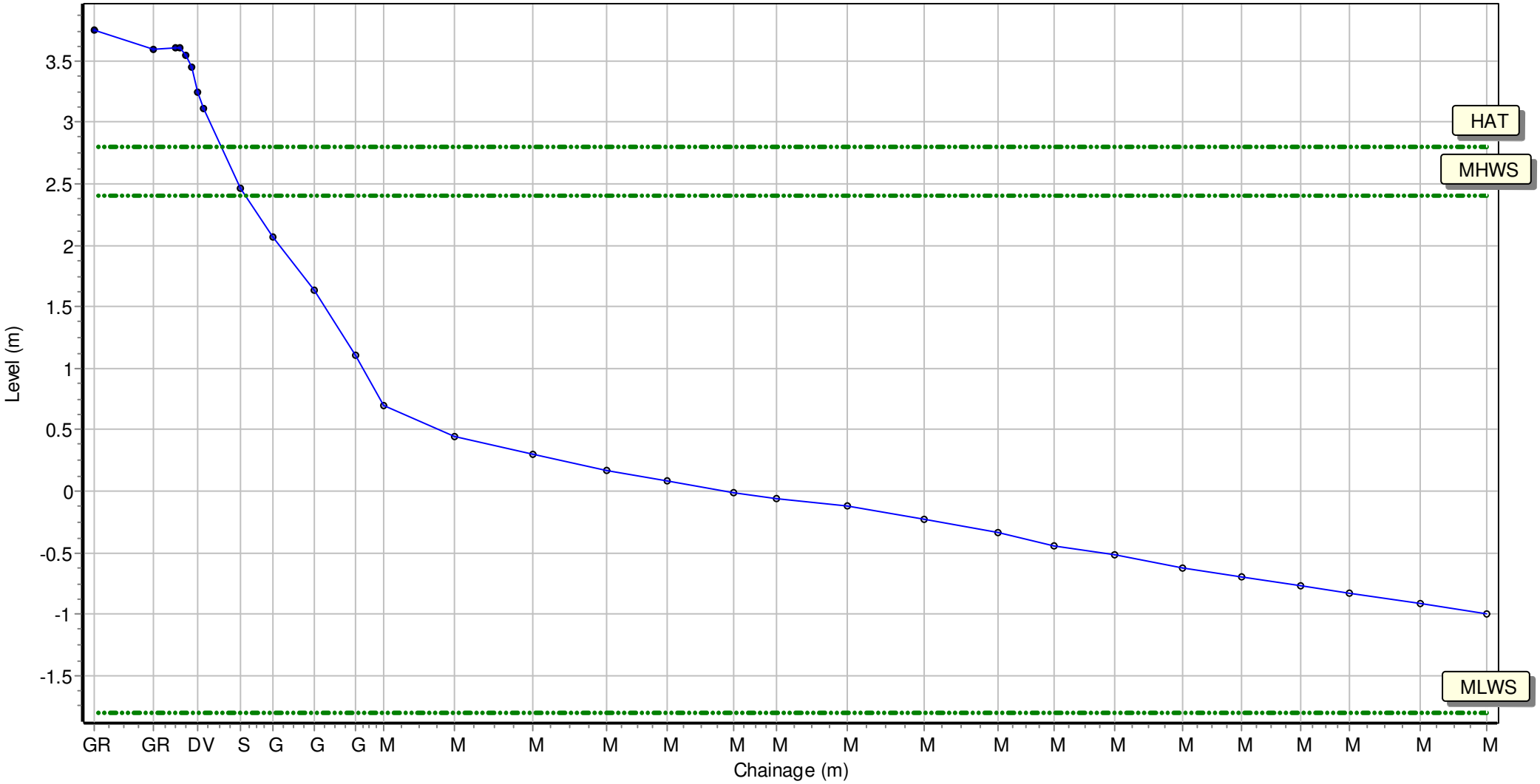
Location: **1aBTBC26**

Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 412895.322 **Northing:** 641784.343 **Profile Bearing:** 122 ° from North



Beach Profile

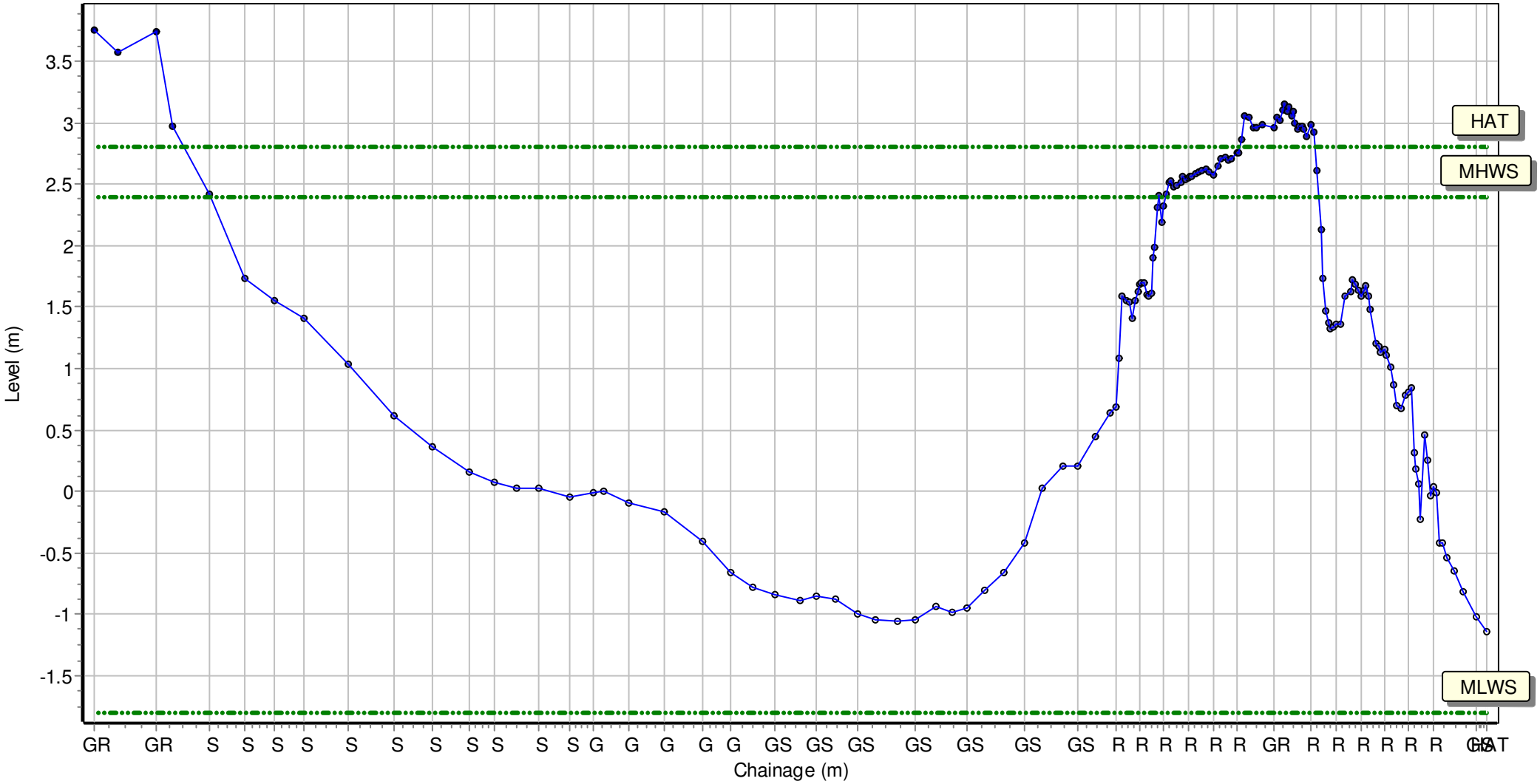
Location: **1aBTBC27**

Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 412475.398 **Northing:** 641733.834 **Profile Bearing:** 227 ° from North



Beach Profile

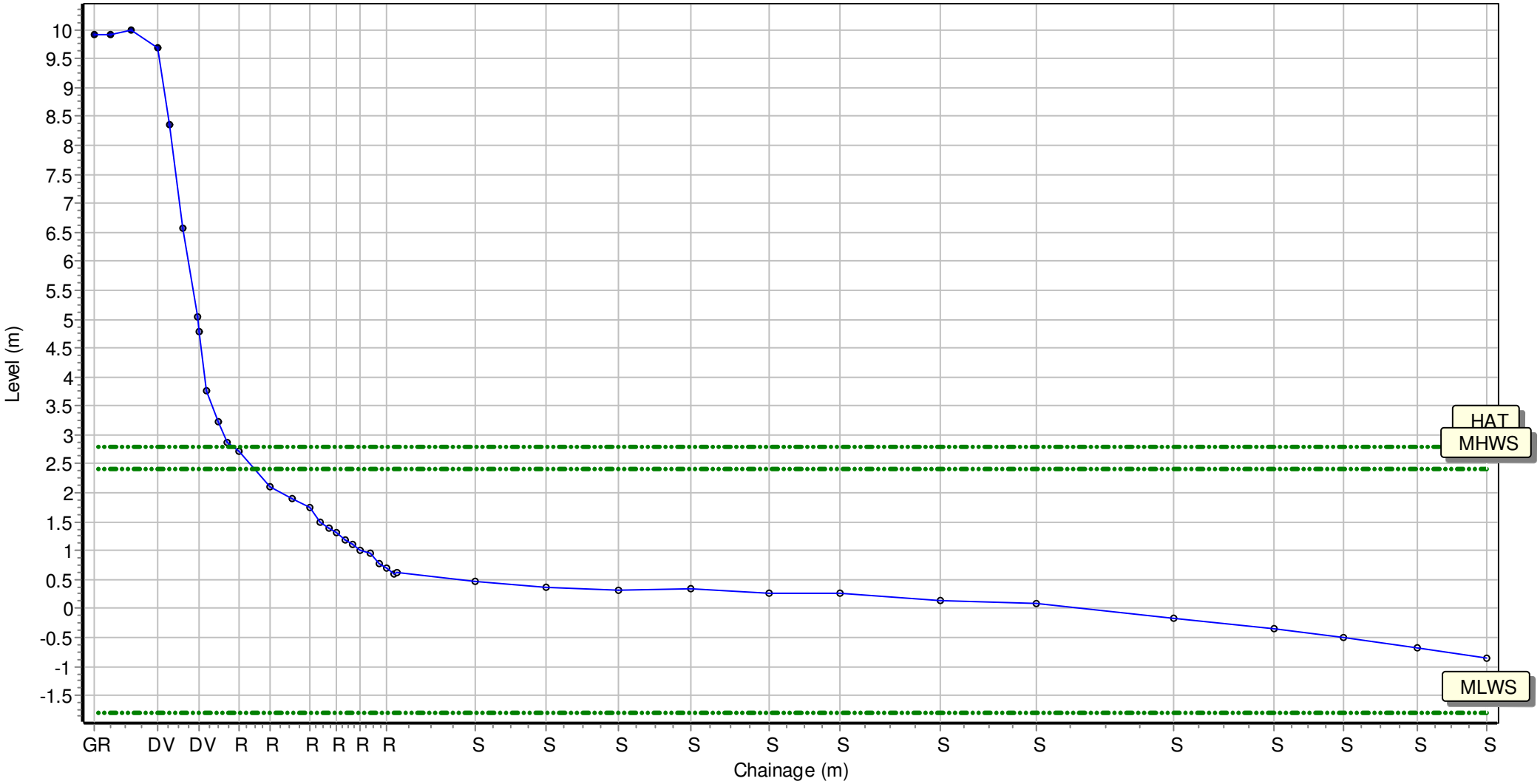
Location: **1aBTBC28**

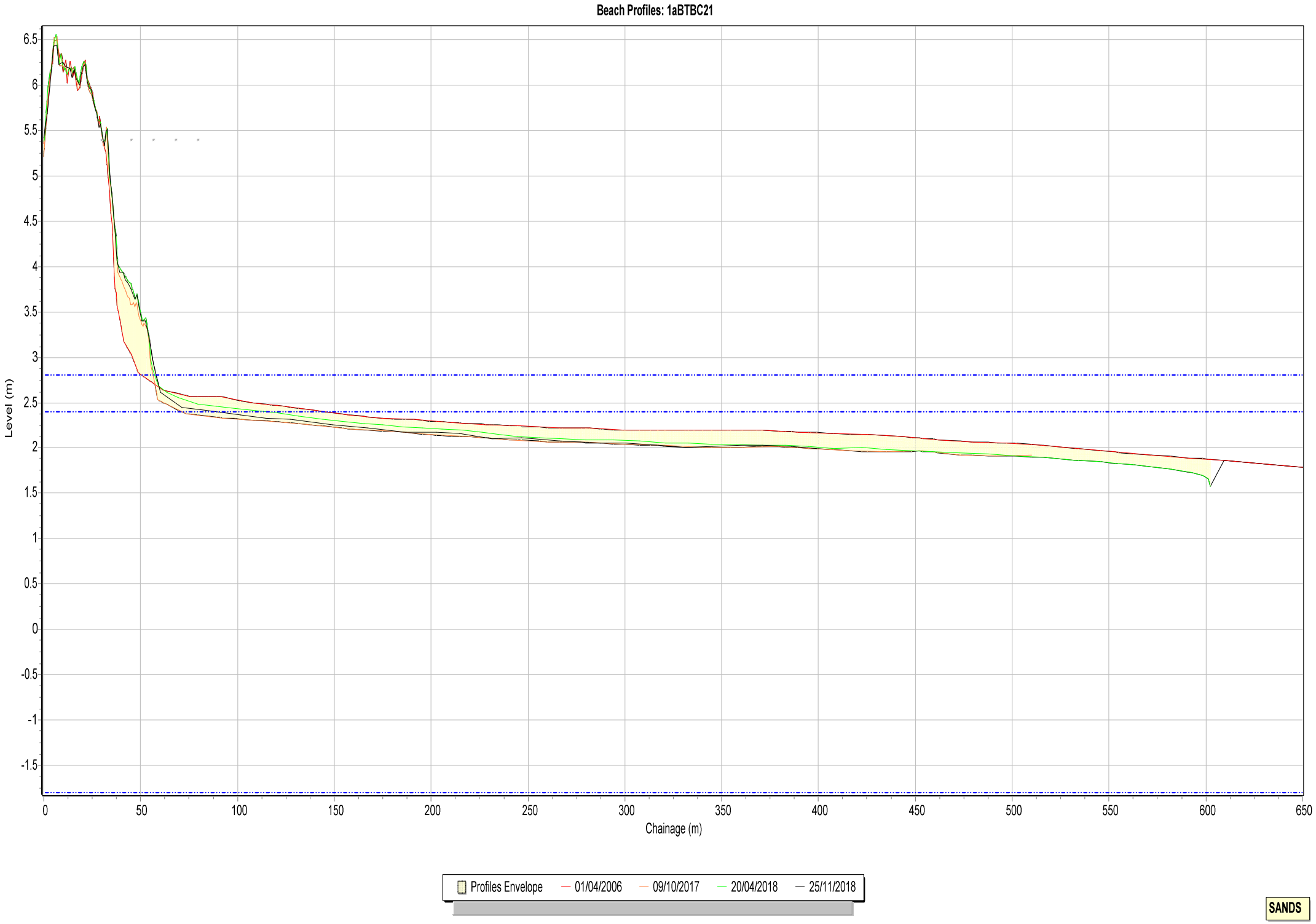
Date: 25/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

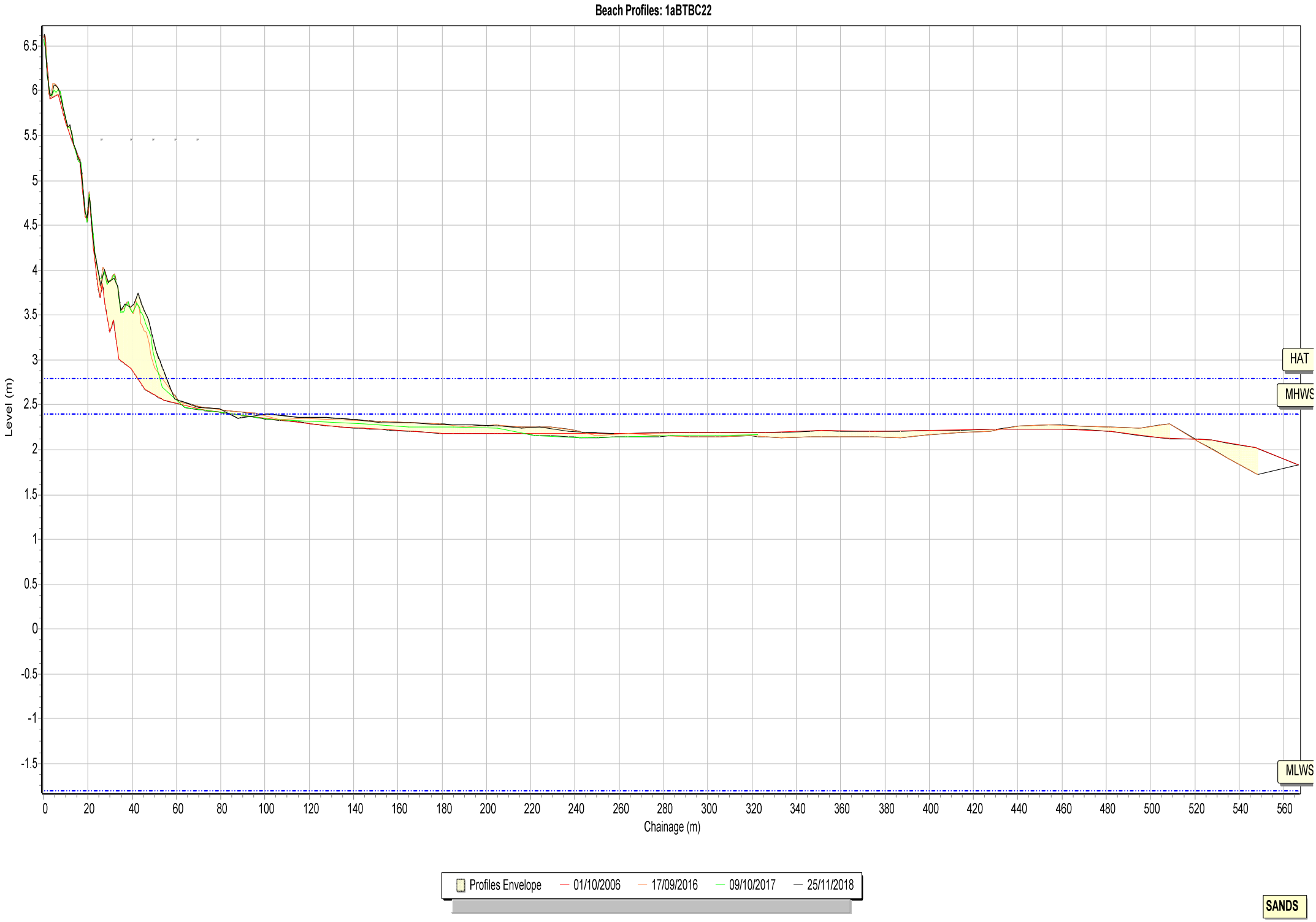
Wind **Sea State:** **Visibility:** **Rain:**

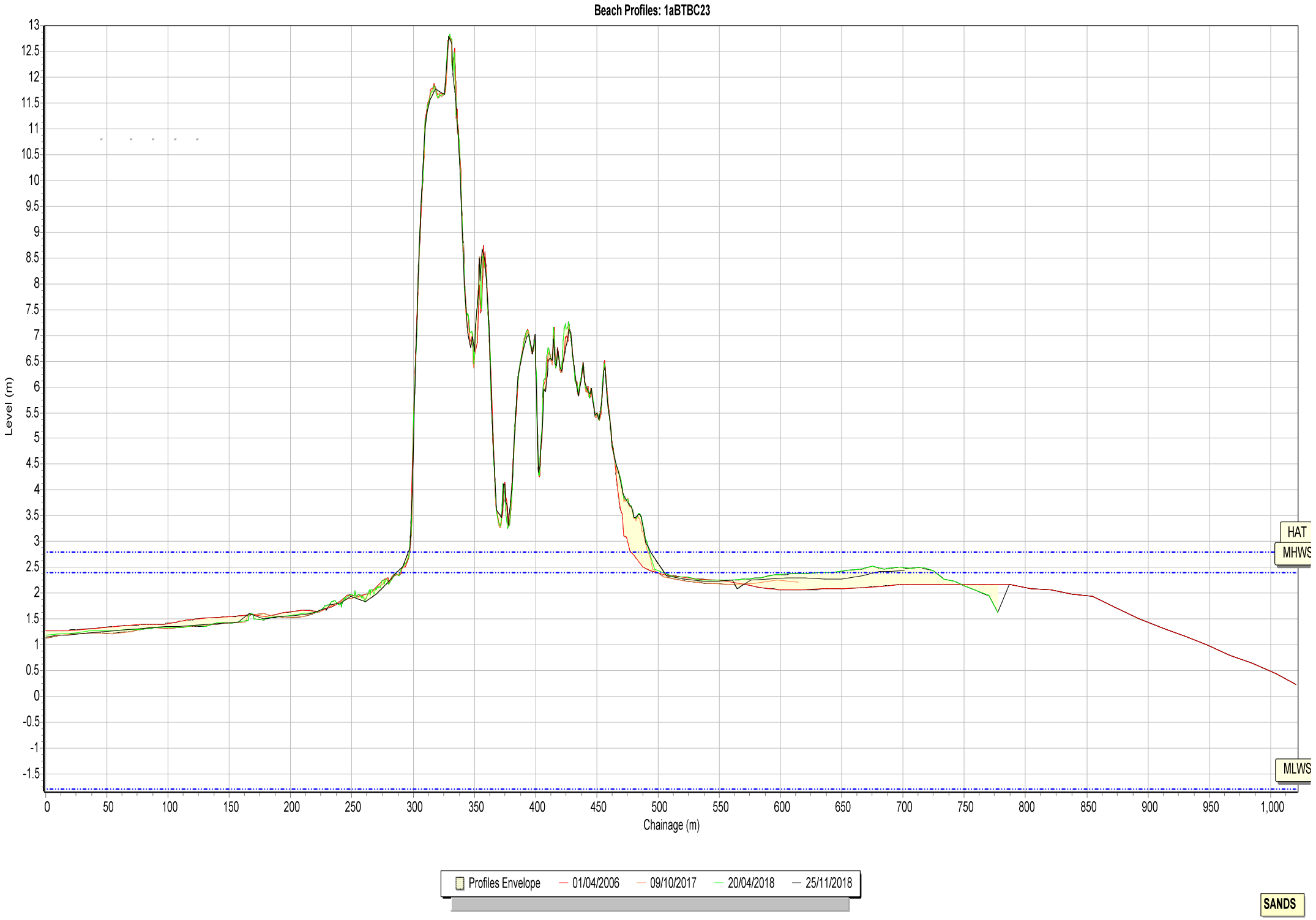
Summary: 2018 Full Measures Topo Survey

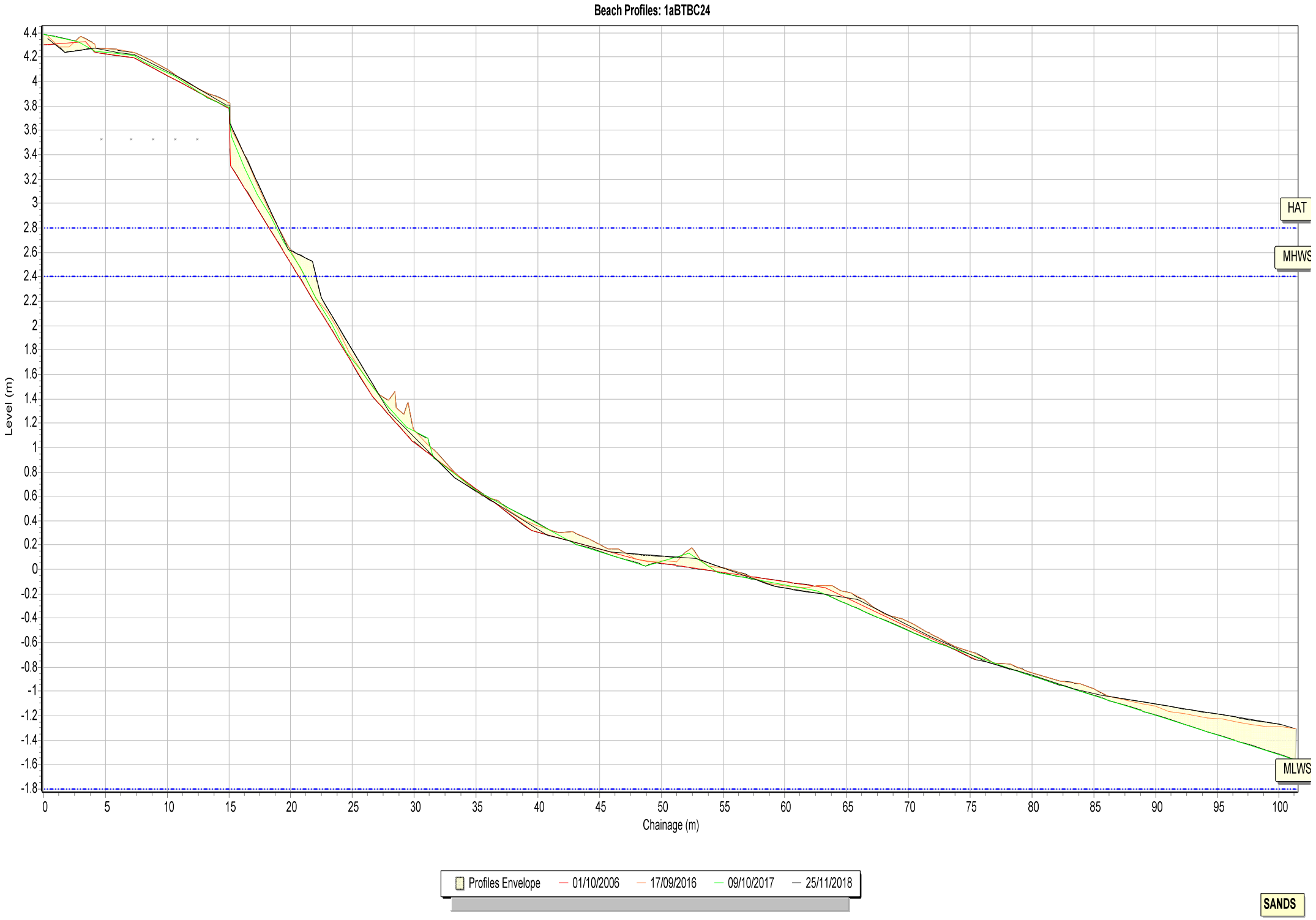
Easting: 412324.036 **Northing:** 641984.353 **Profile Bearing:** 245 ° from North

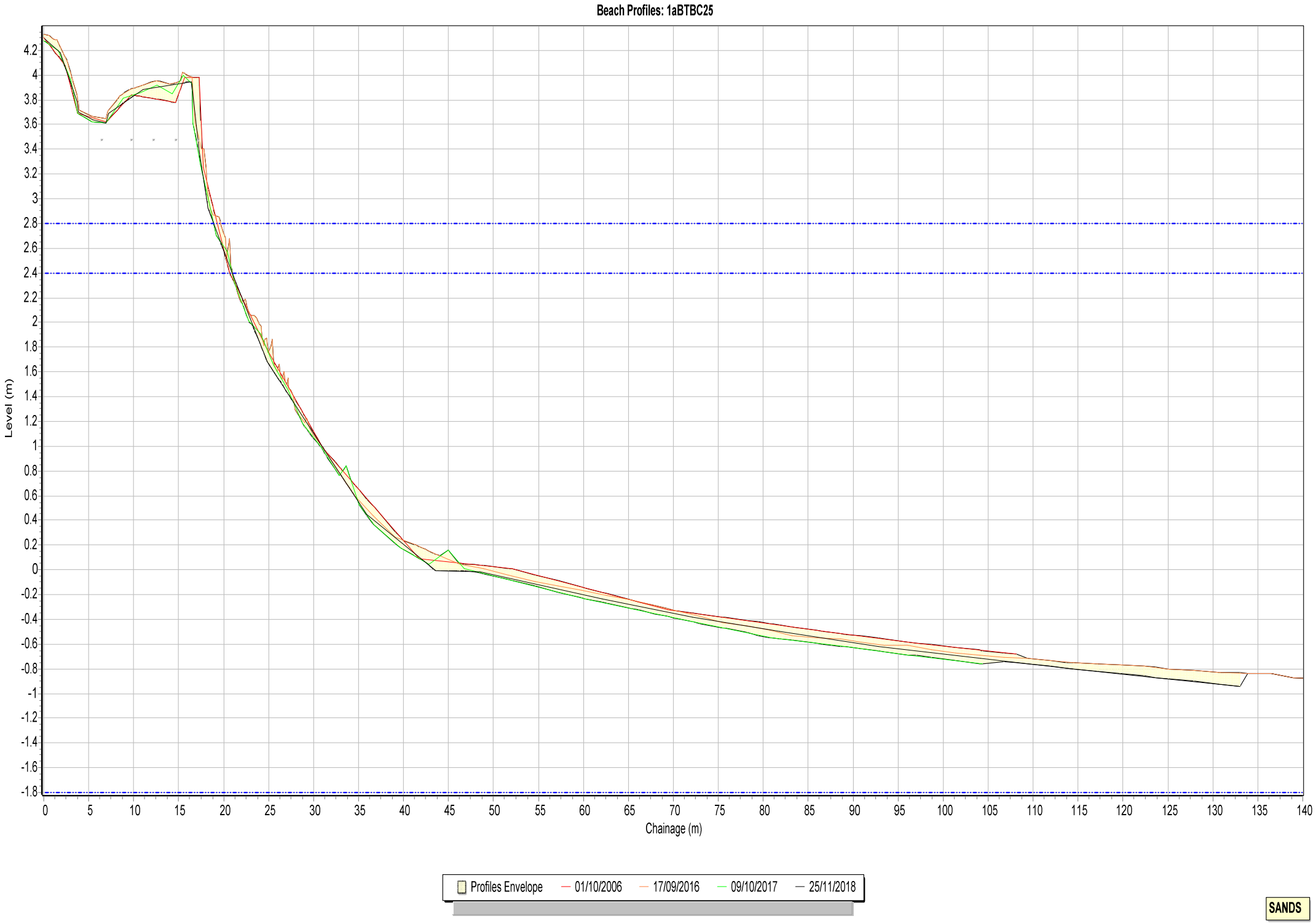


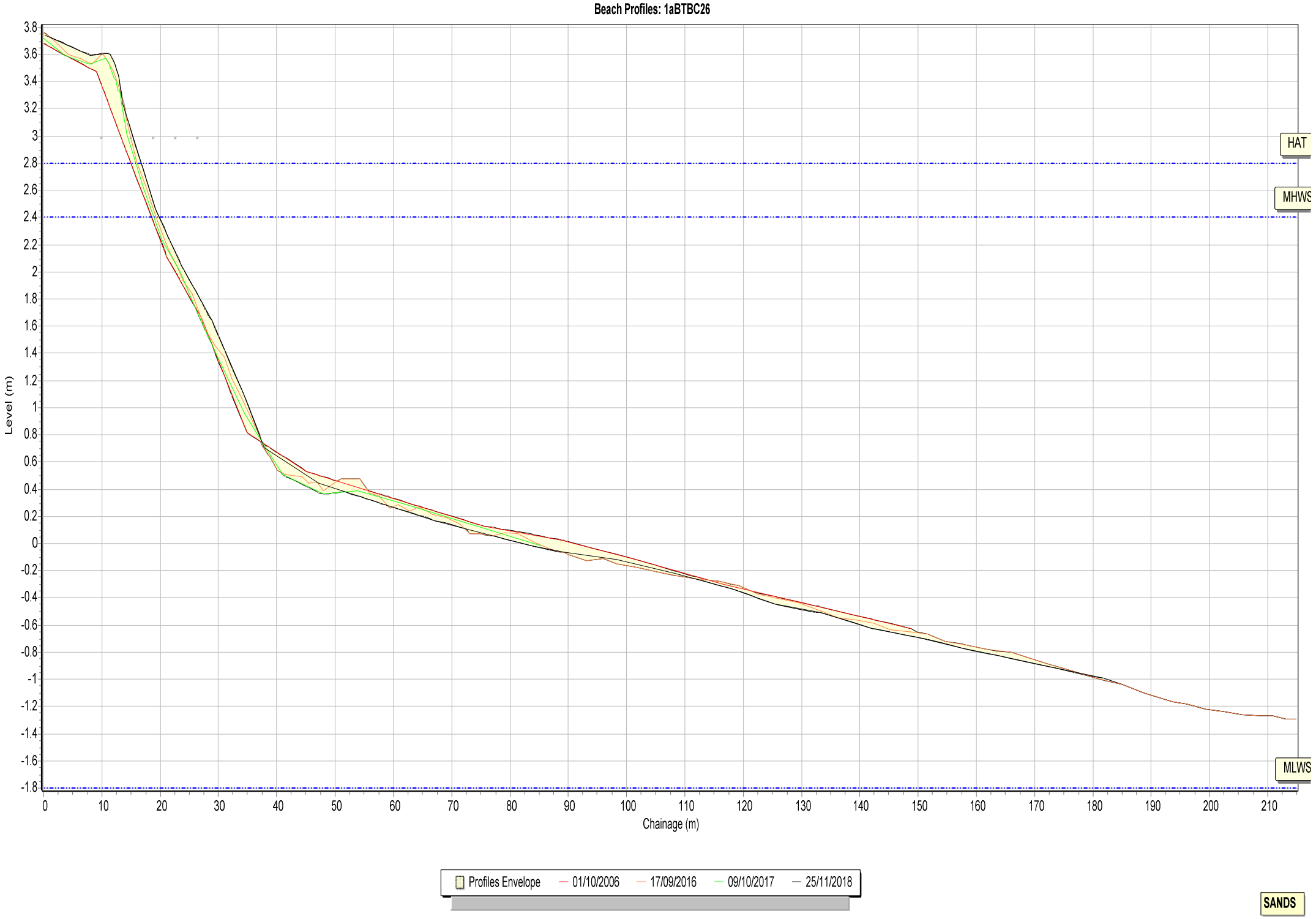

Beach Profiles: 1aBTBC21
Level (m)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
50
100
150
200
250
300
350
400
450
500
550
600
650
Chainage (m)
Profiles Envelope
01/04/2006
09/10/2017
20/04/2018
25/11/2018
SANDS

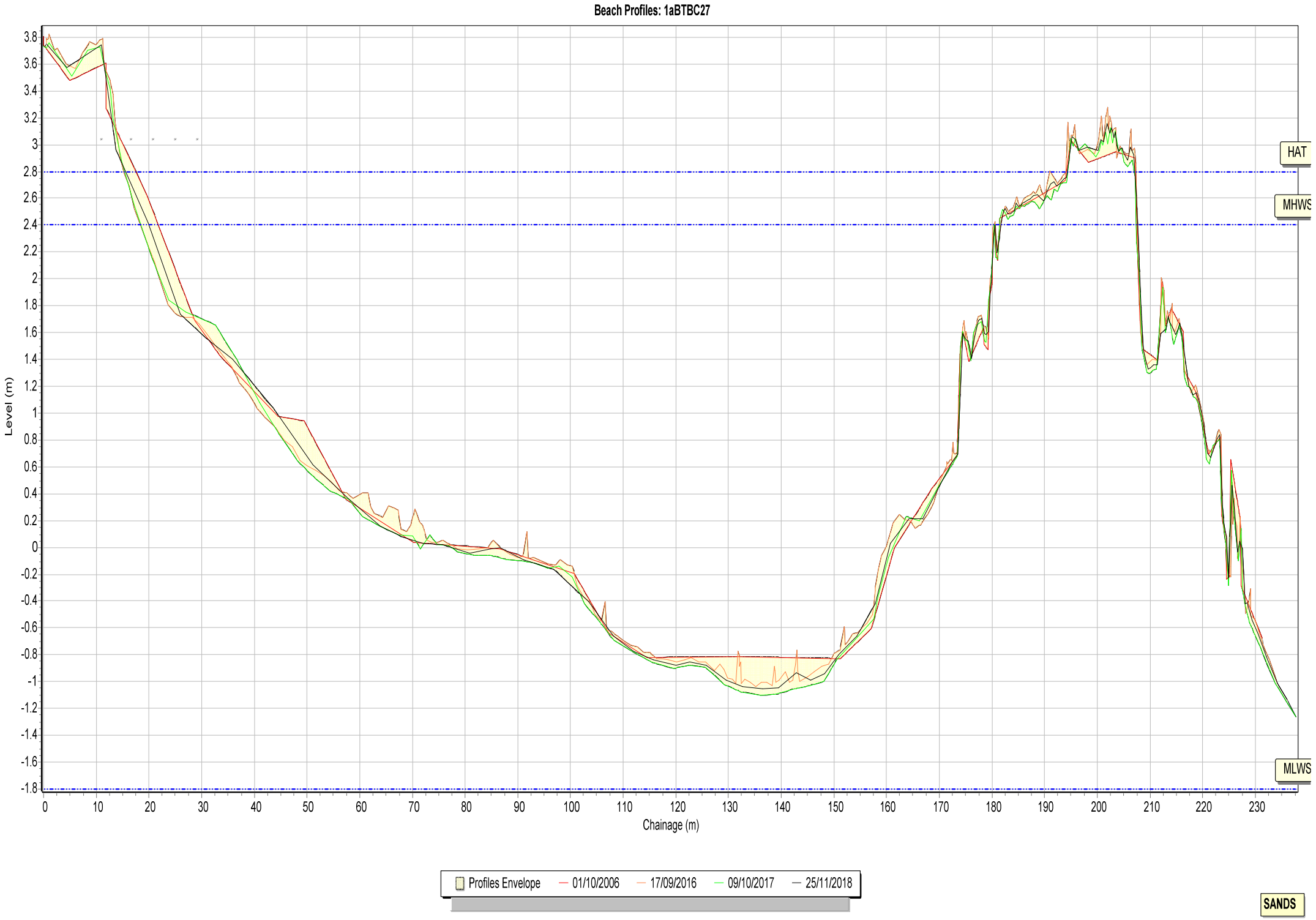

Beach Profiles: 1aBTBC22
Level (m)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
HAT
MHWS
MLWS
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
Chainage (m)
Profiles Envelope
01/10/2006
17/09/2016
09/10/2017
25/11/2018
SANDS

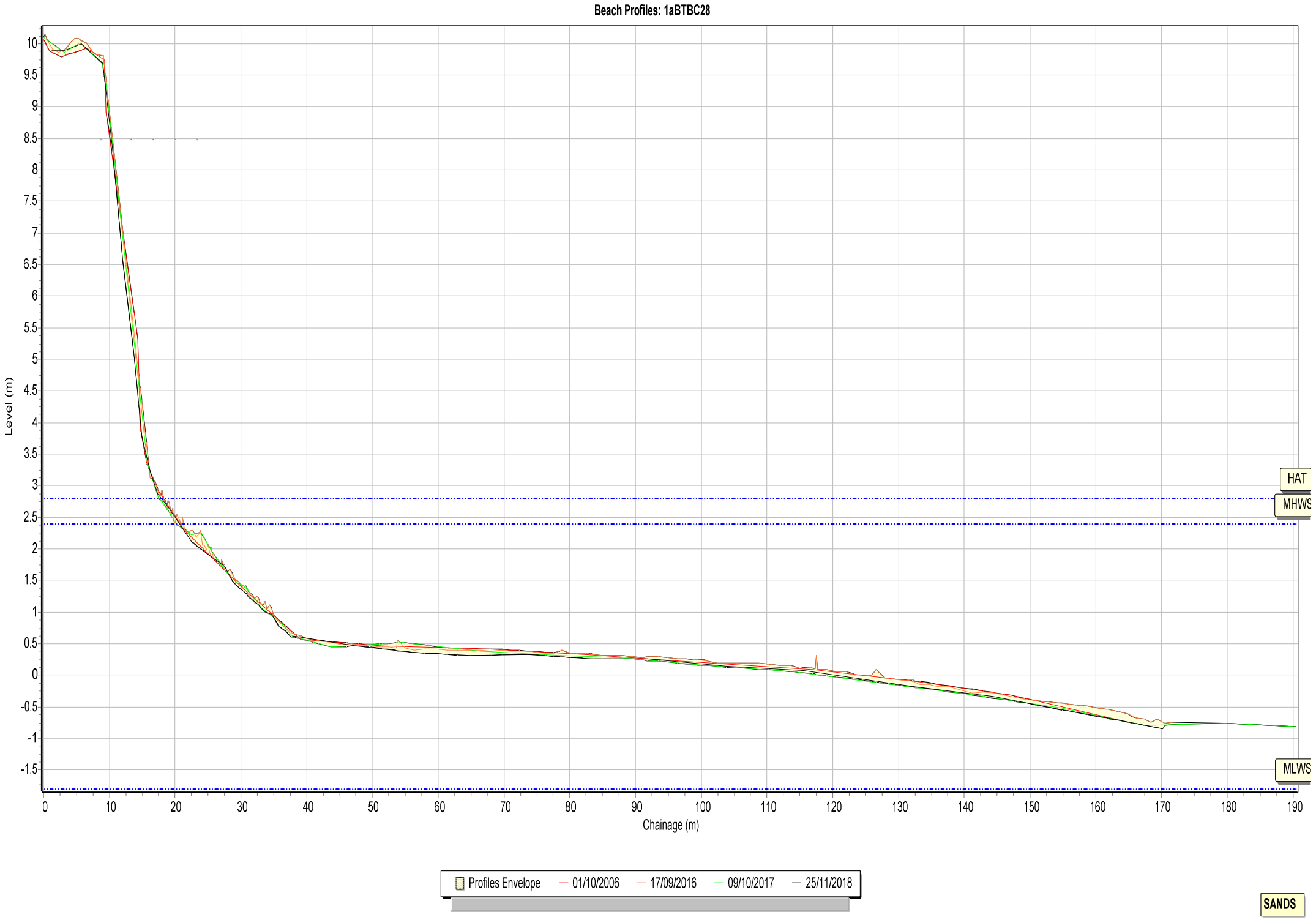

Beach Profiles: 1aBTBC23
Level (m)
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1,000
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
09/10/2017
20/04/2018
25/11/2018
SANDS


Beach Profiles: 1aBTBC24
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
17/09/2016
09/10/2017
25/11/2018
SANDS


Beach Profiles: 1aBTBC25
Level (m)
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
Chainage (m)
Profiles Envelope
01/10/2006
17/09/2016
09/10/2017
25/11/2018
SANDS


Beach Profiles: 1aBTBC26
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
17/09/2016
09/10/2017
25/11/2018
SANDS


Beach Profiles: 1aBTBC27
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
17/09/2016
09/10/2017
25/11/2018
SANDS


Beach Profiles: 1aBTBC28
Level (m)
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
Chainage (m)
Profiles Envelope
01/10/2006
17/09/2016
09/10/2017
25/11/2018
SANDS

Beach Profile

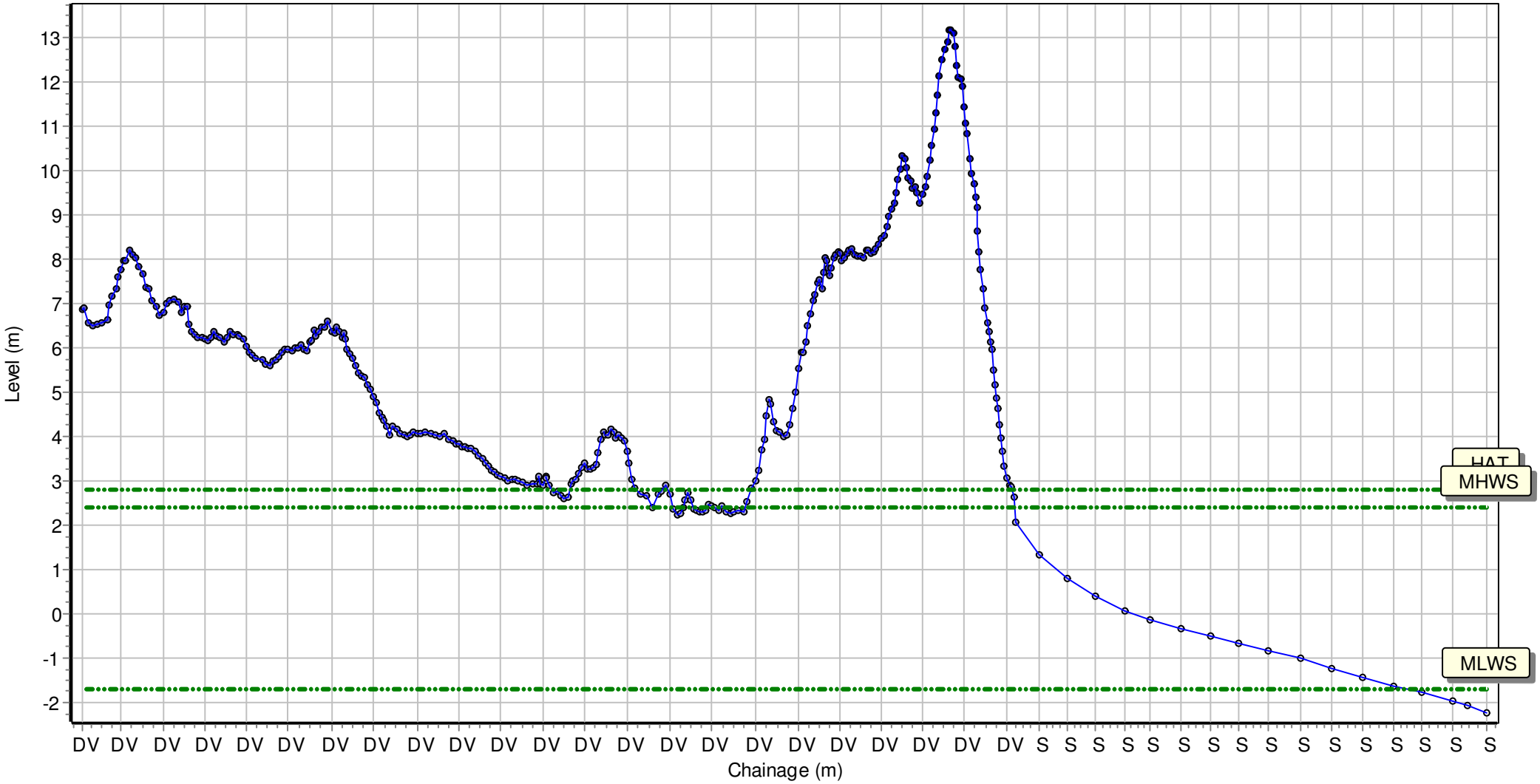
Location: **1aBTBC29**

Date: 10/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 418972.296 **Northing:** 634628.46 **Profile Bearing:** 31 ° from North



Beach Profile

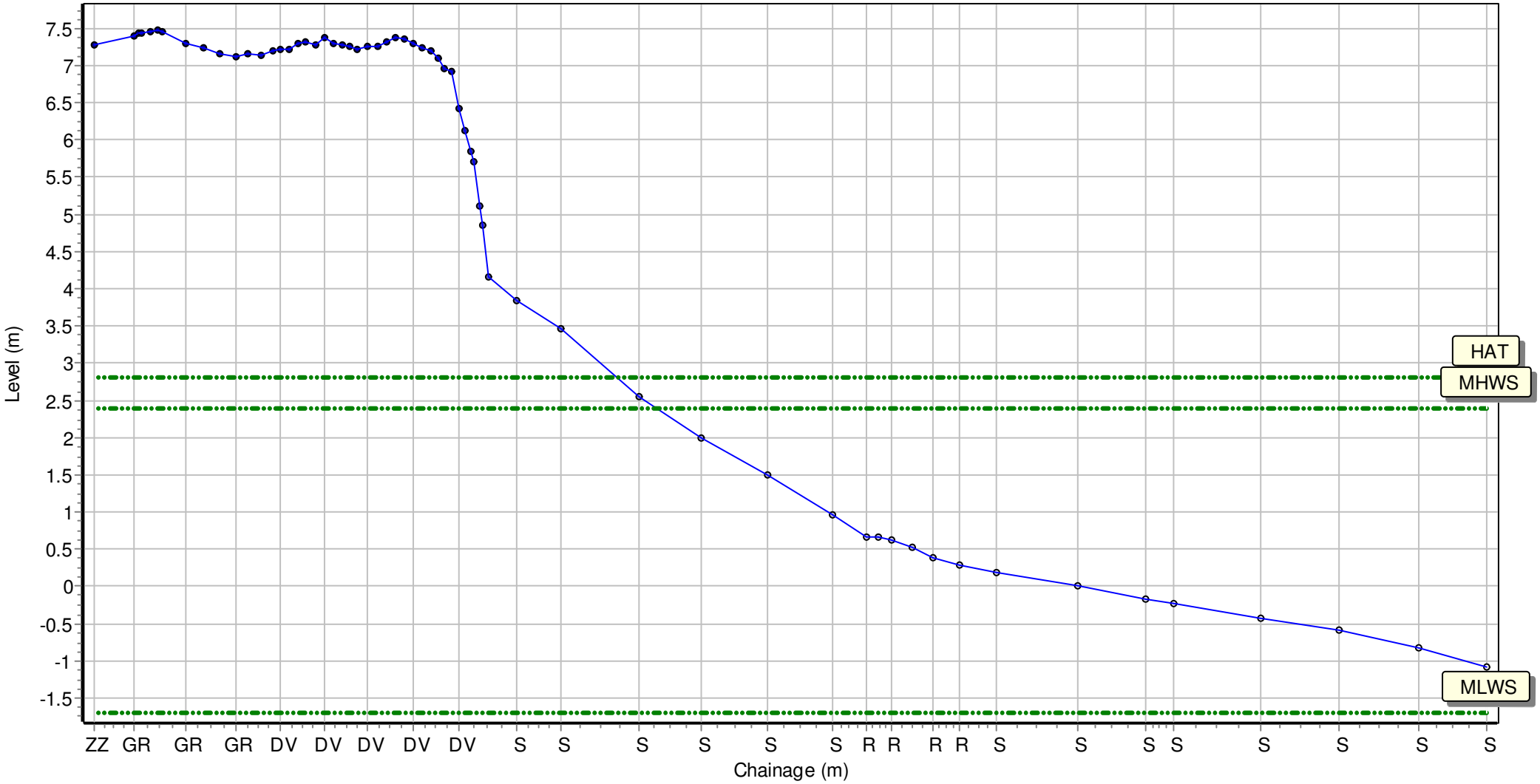
Location: **1aBTBC30**

Date: 10/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 423056.791 **Northing:** 629887.437 **Profile Bearing:** 71 ° from North



Beach Profile

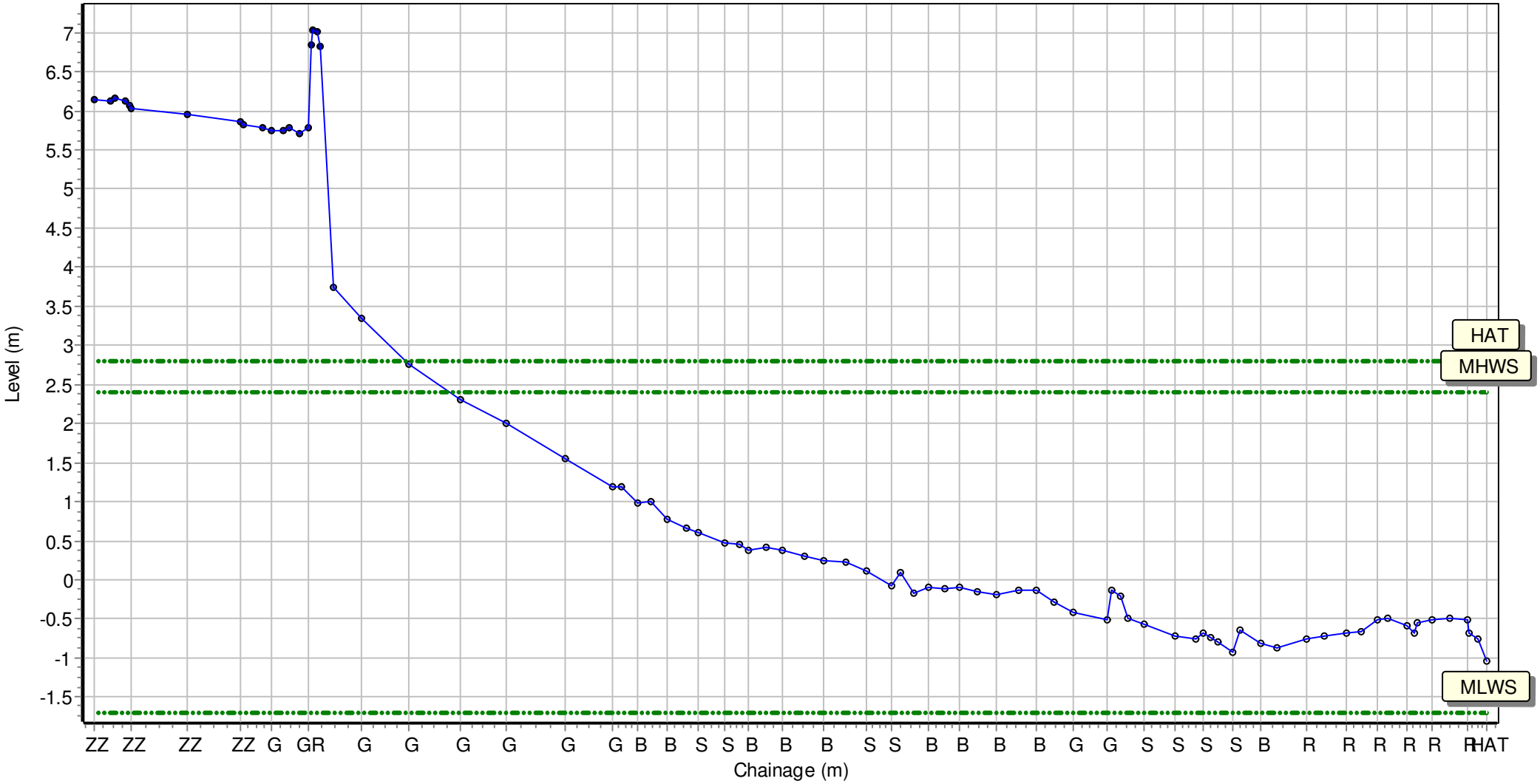
Location: **1aBTBC31**

Date: 10/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

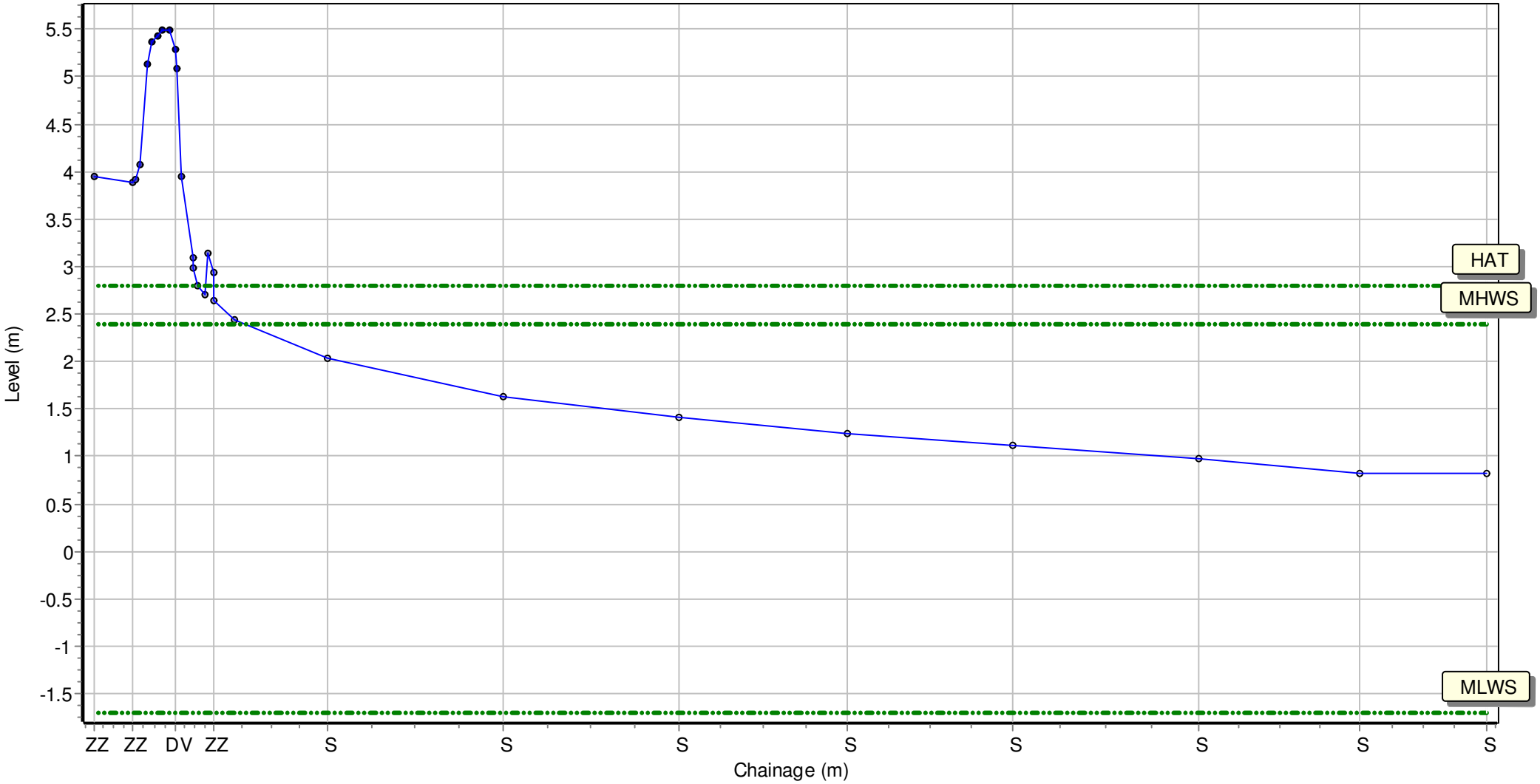
Location: **1aBTBC32**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 423738.386 **Northing:** 628624.99 **Profile Bearing:** 279 ° from North



Beach Profile

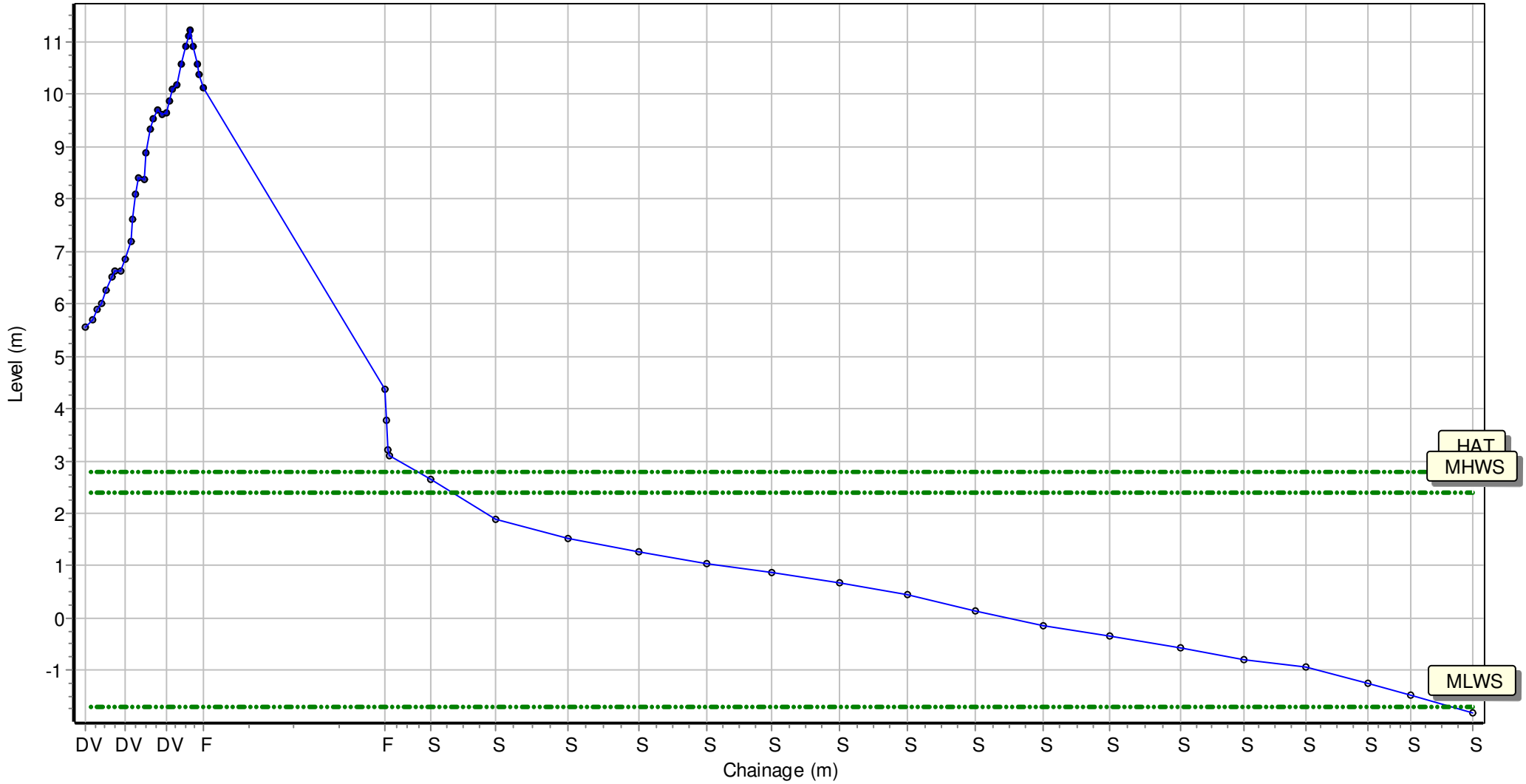
Location: **1aBTBC33**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

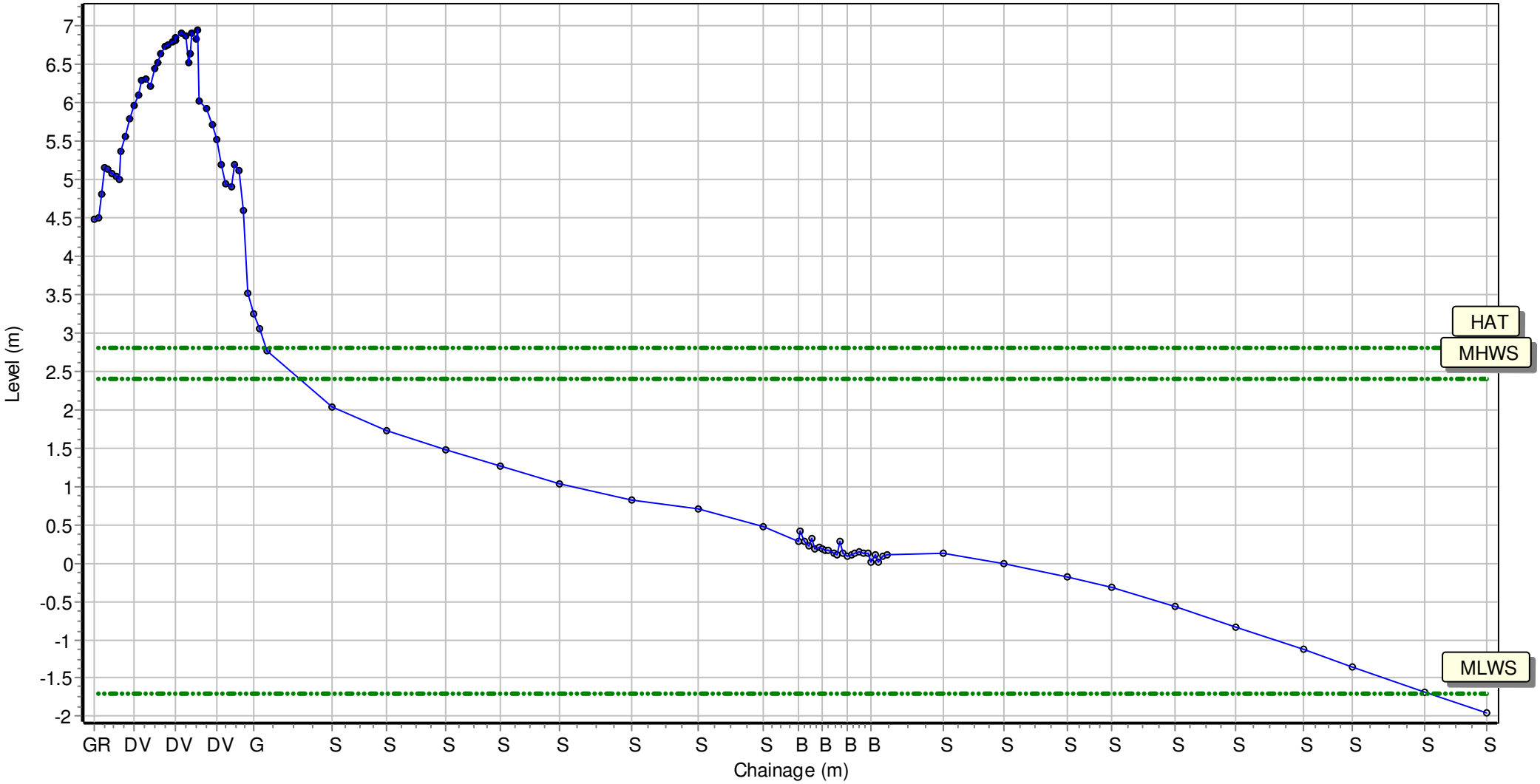
Location: **1aBTBC34**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

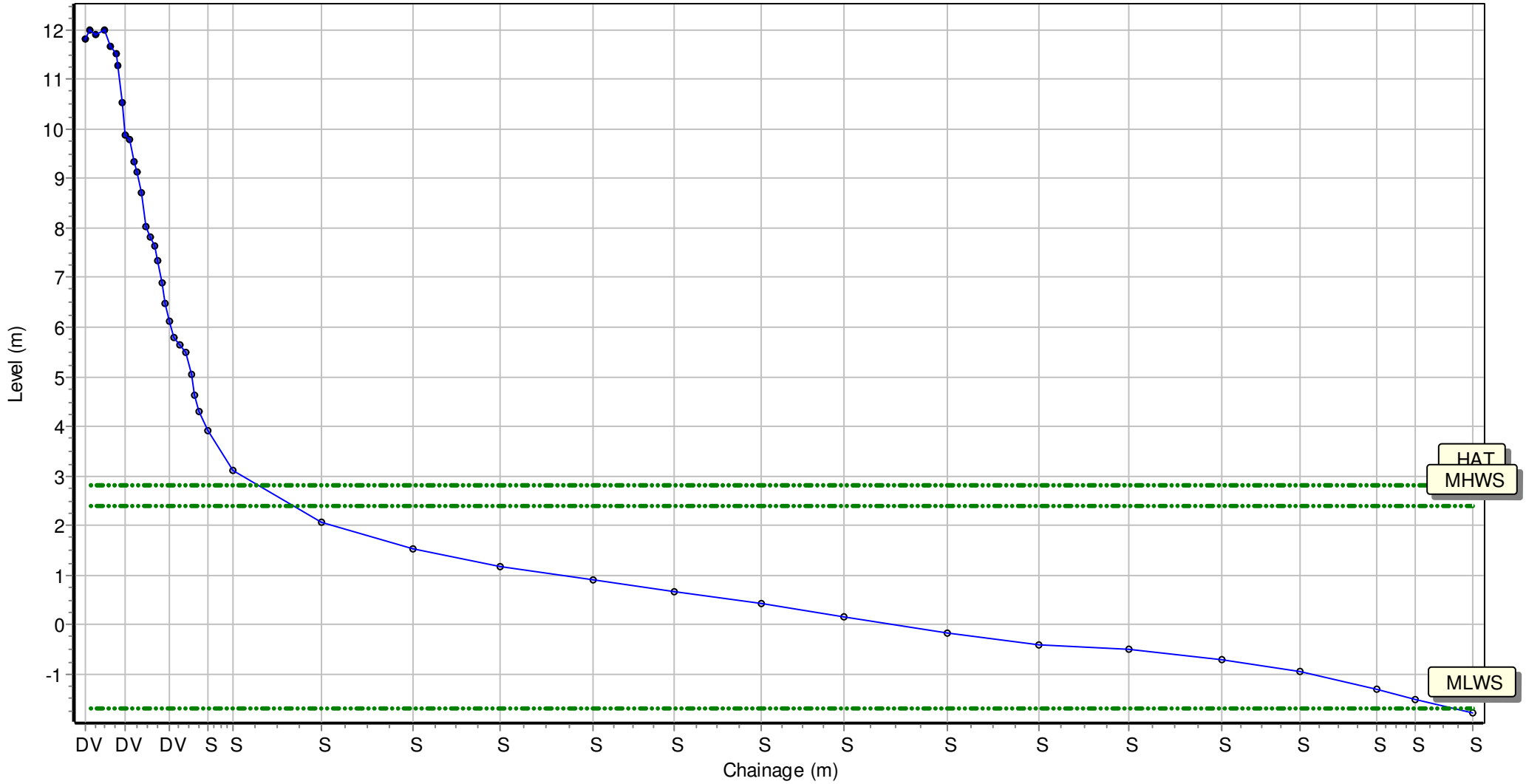
Location: **1aBTBC35**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 423171.083 **Northing:** 628414.273 **Profile Bearing:** 105 ° from North



Beach Profile

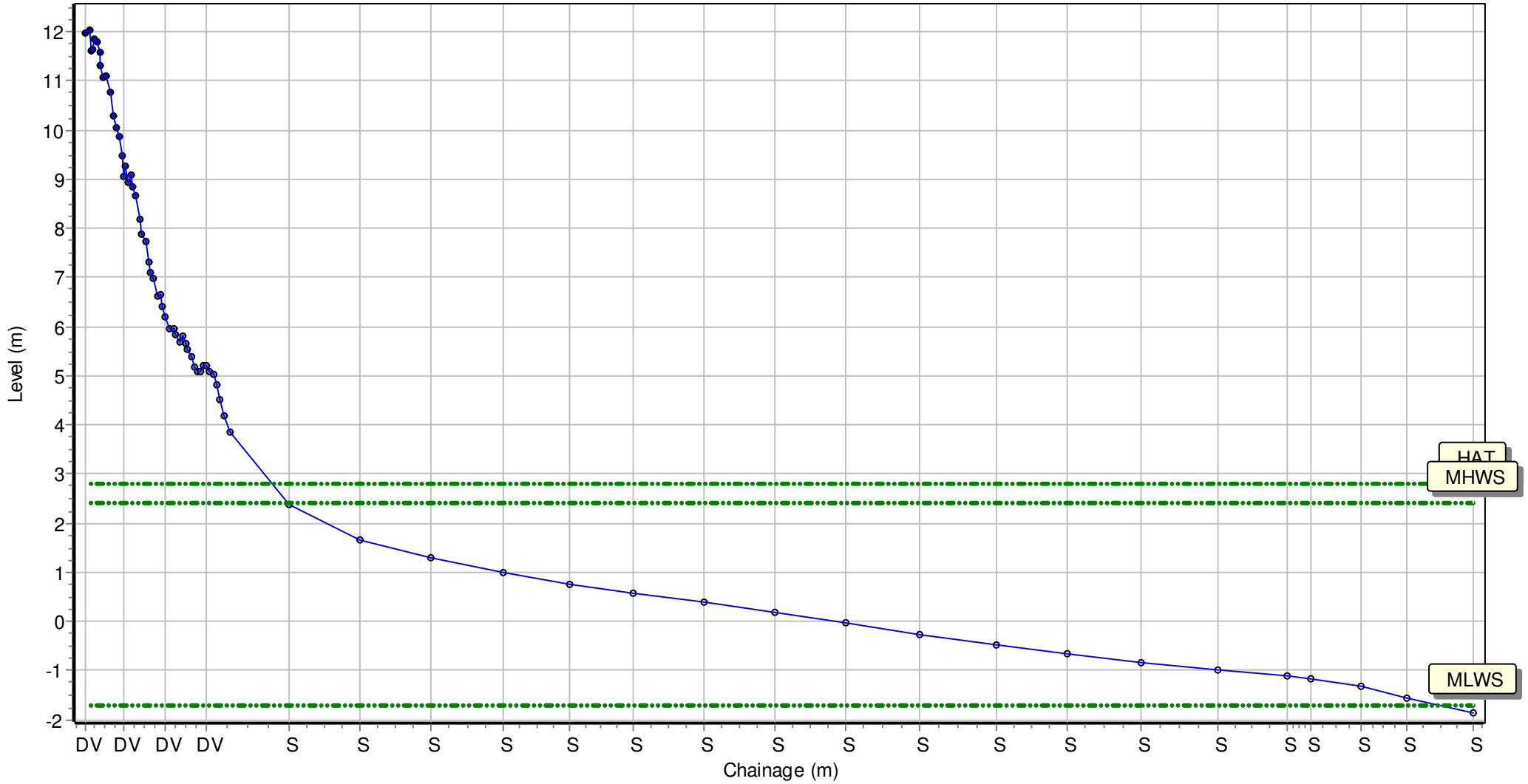
Location: **1aBTBC36**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 423094.516 **Northing:** 628204.644 **Profile Bearing:** 106 ° from North



Beach Profile

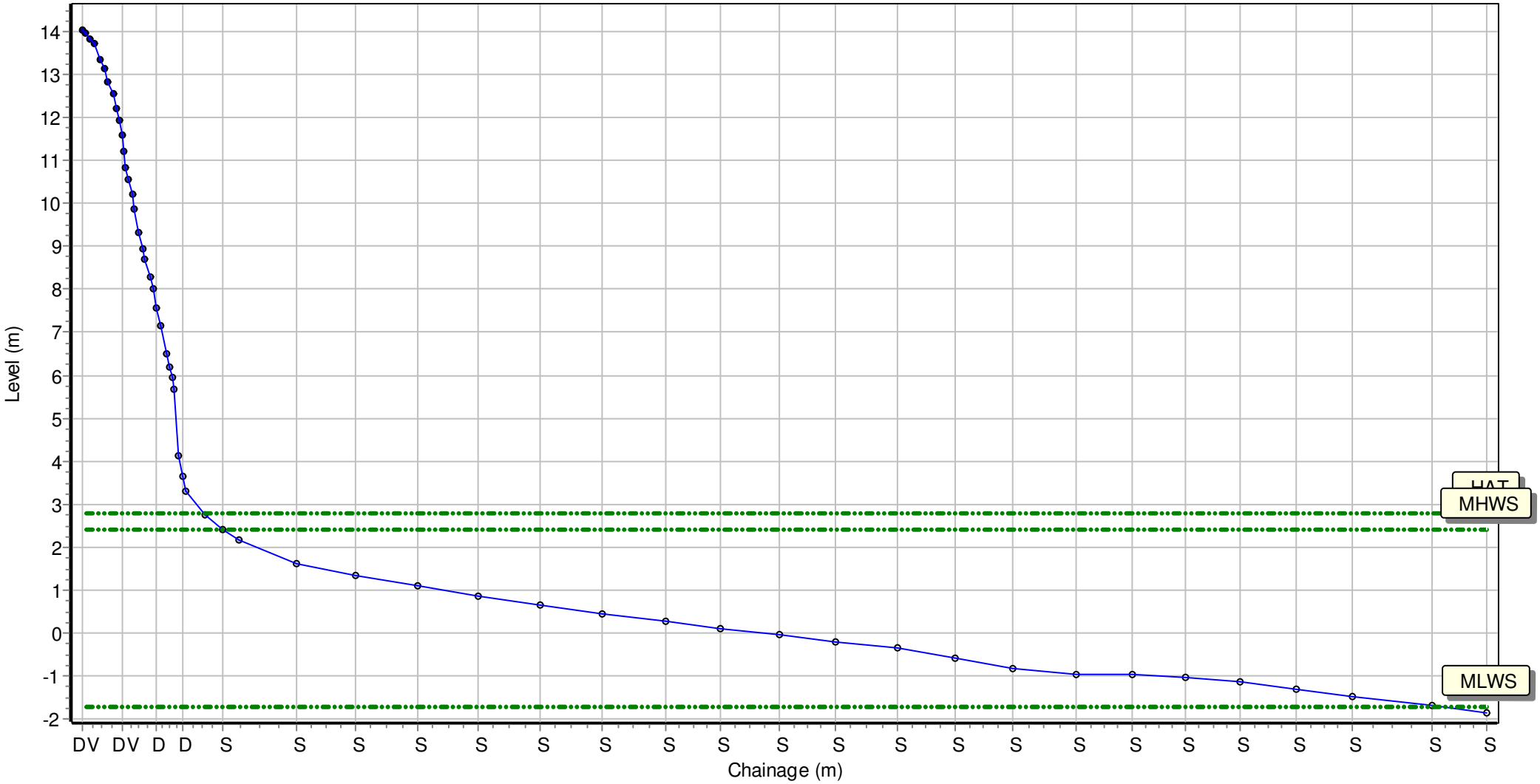
Location: **1aBTBC37**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

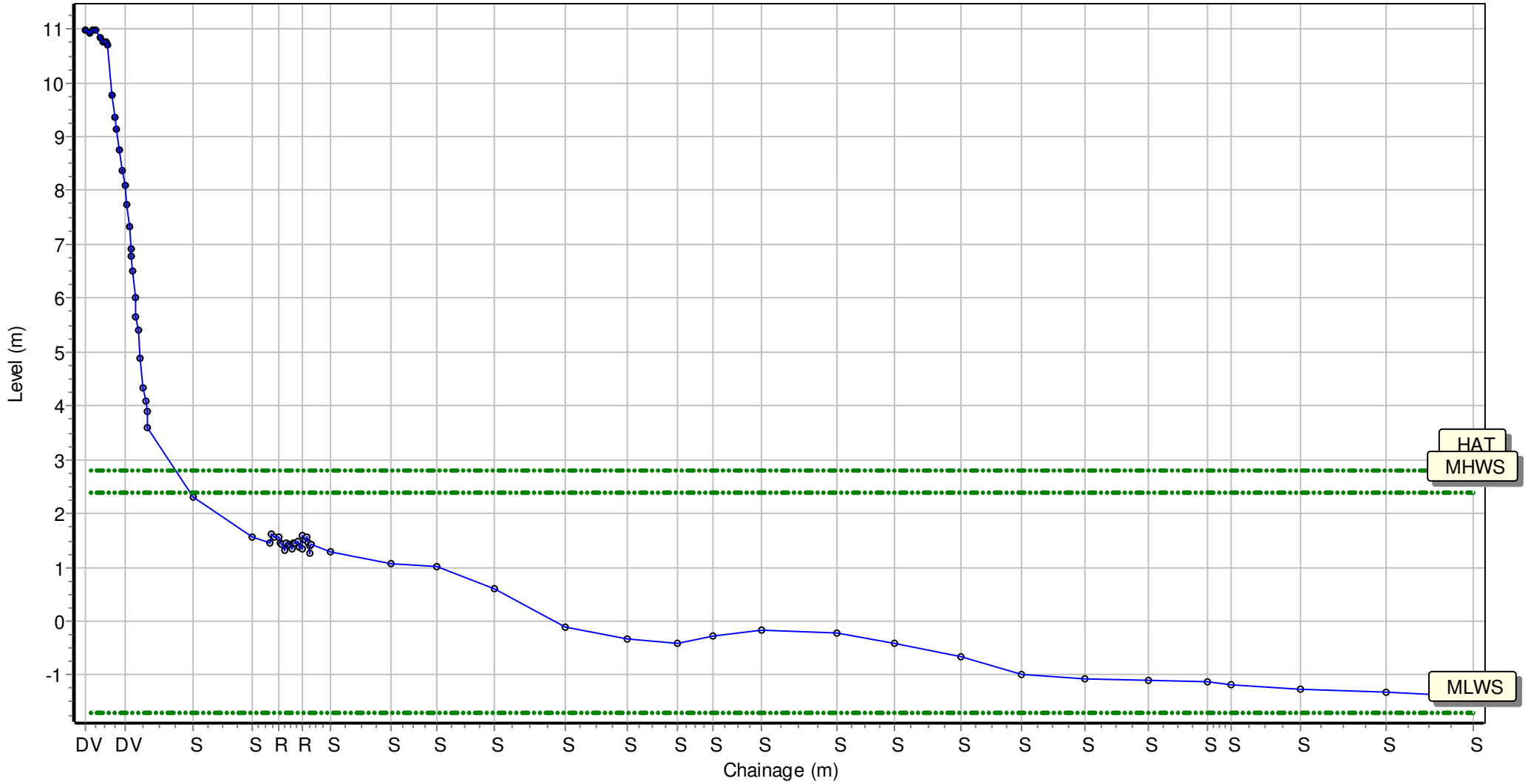
Location: **1aBTBC38**

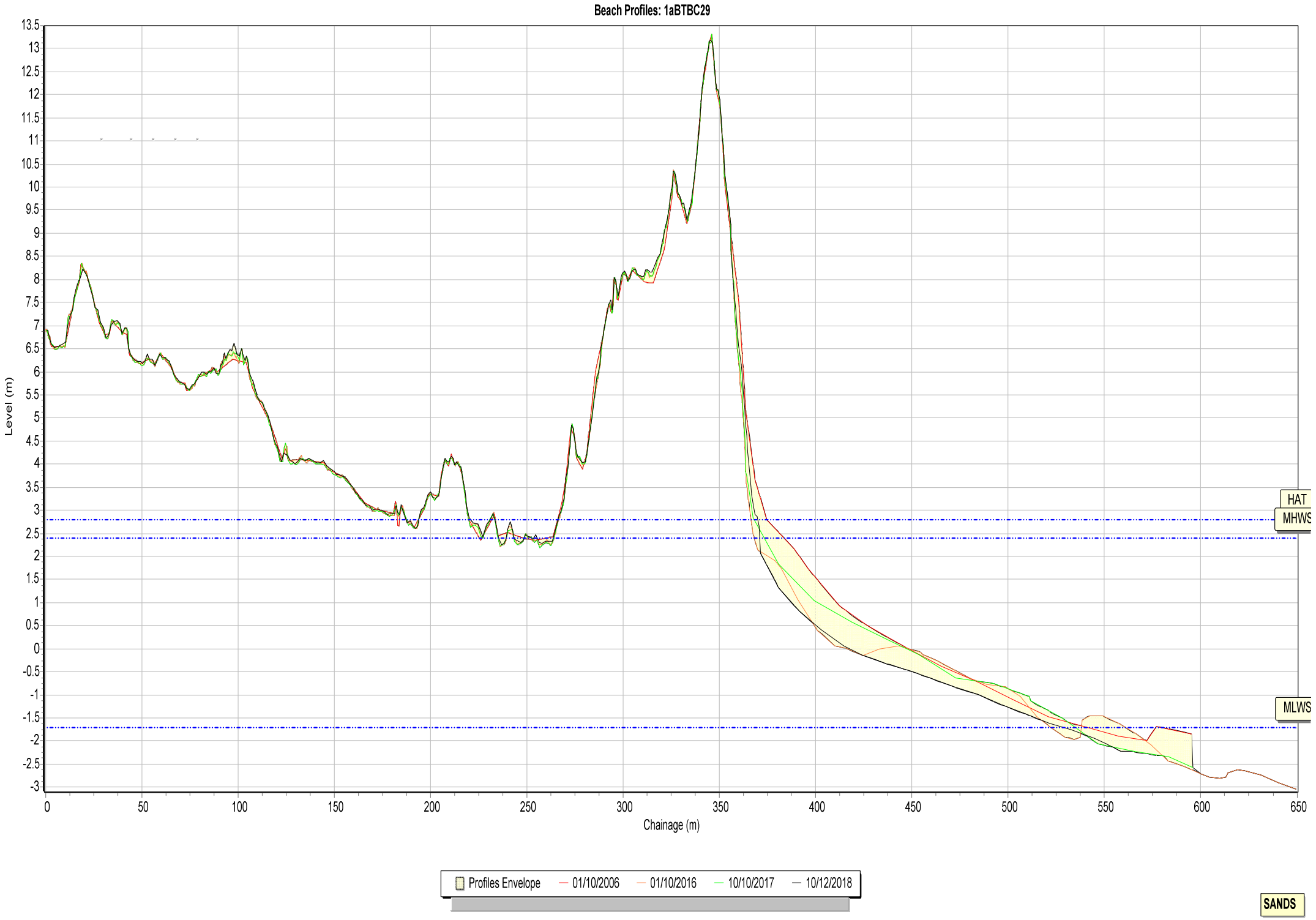
Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

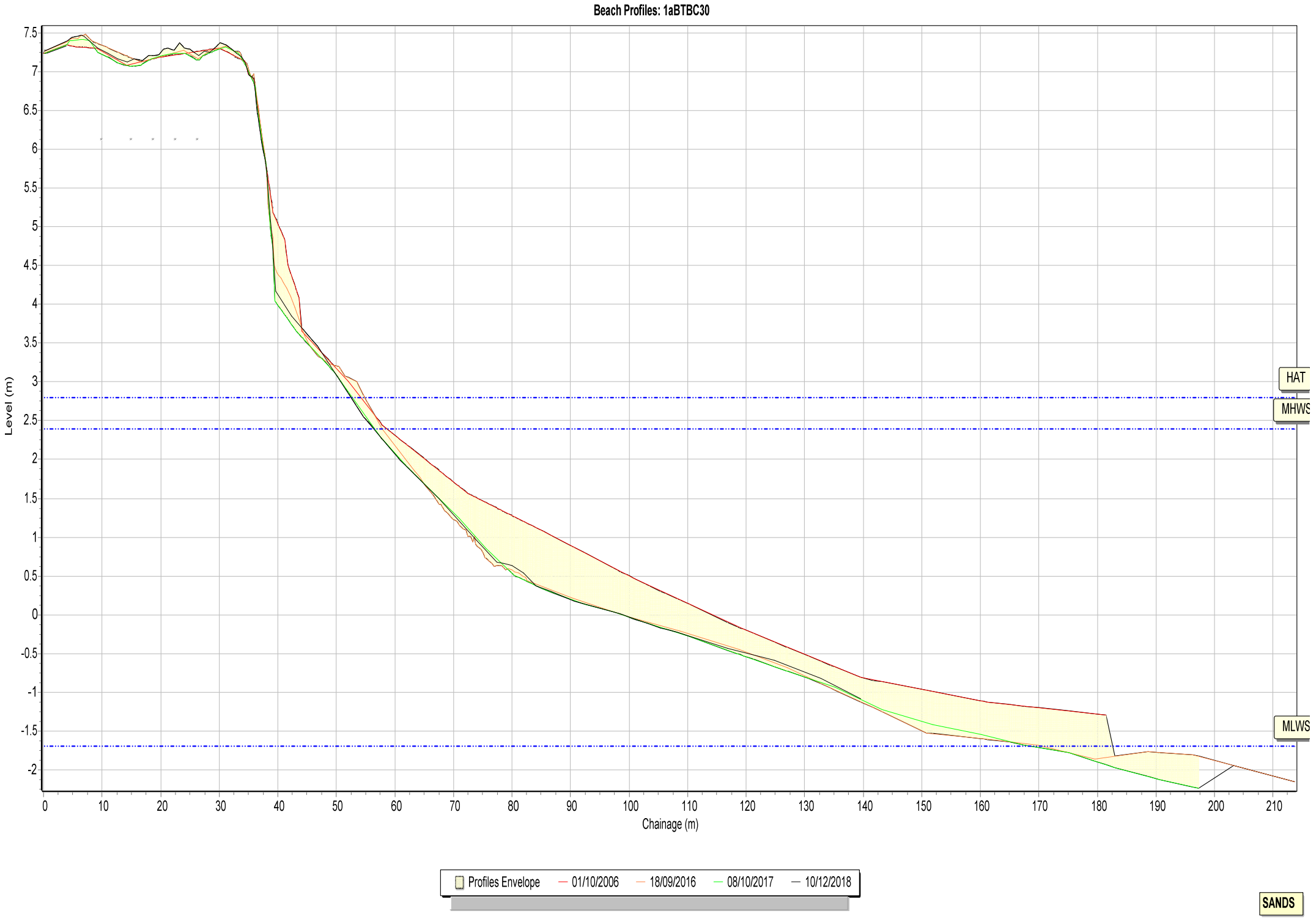
Wind **Sea State:** **Visibility:** **Rain:**

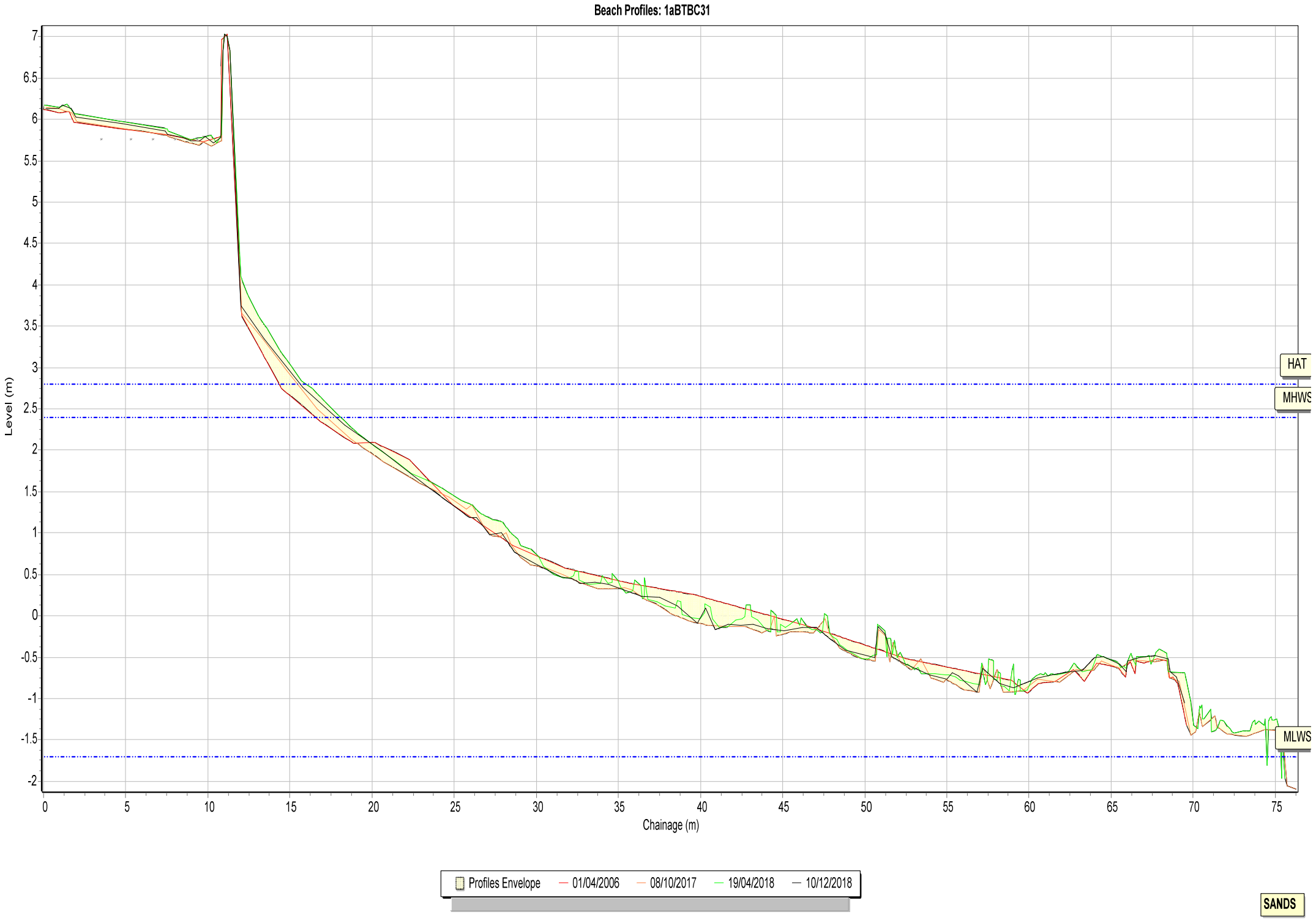
Summary: 2018 Full Measures Topo Survey

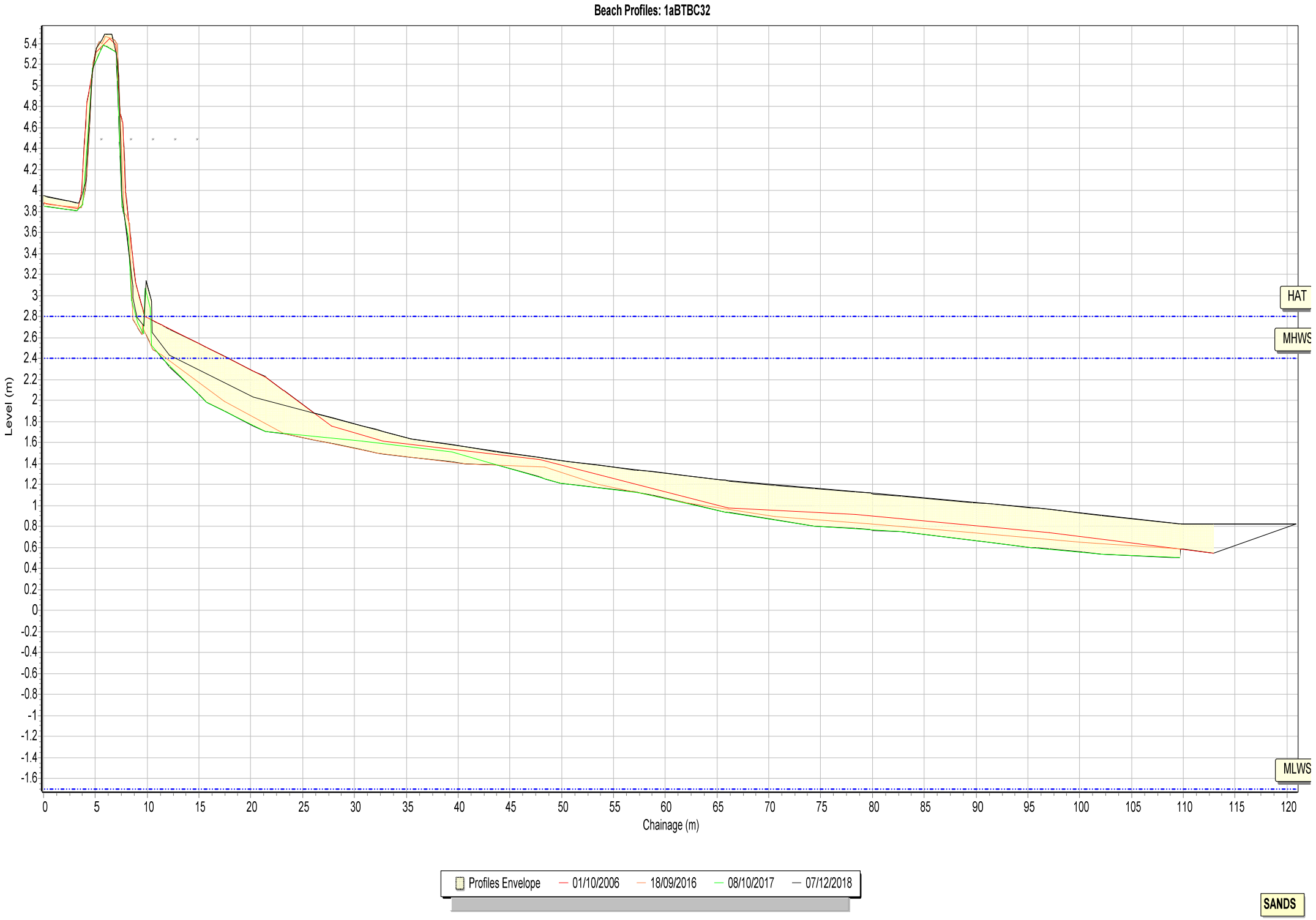
Easting: 423022.073 **Northing:** 627769.195 **Profile Bearing:** 92 ° from North

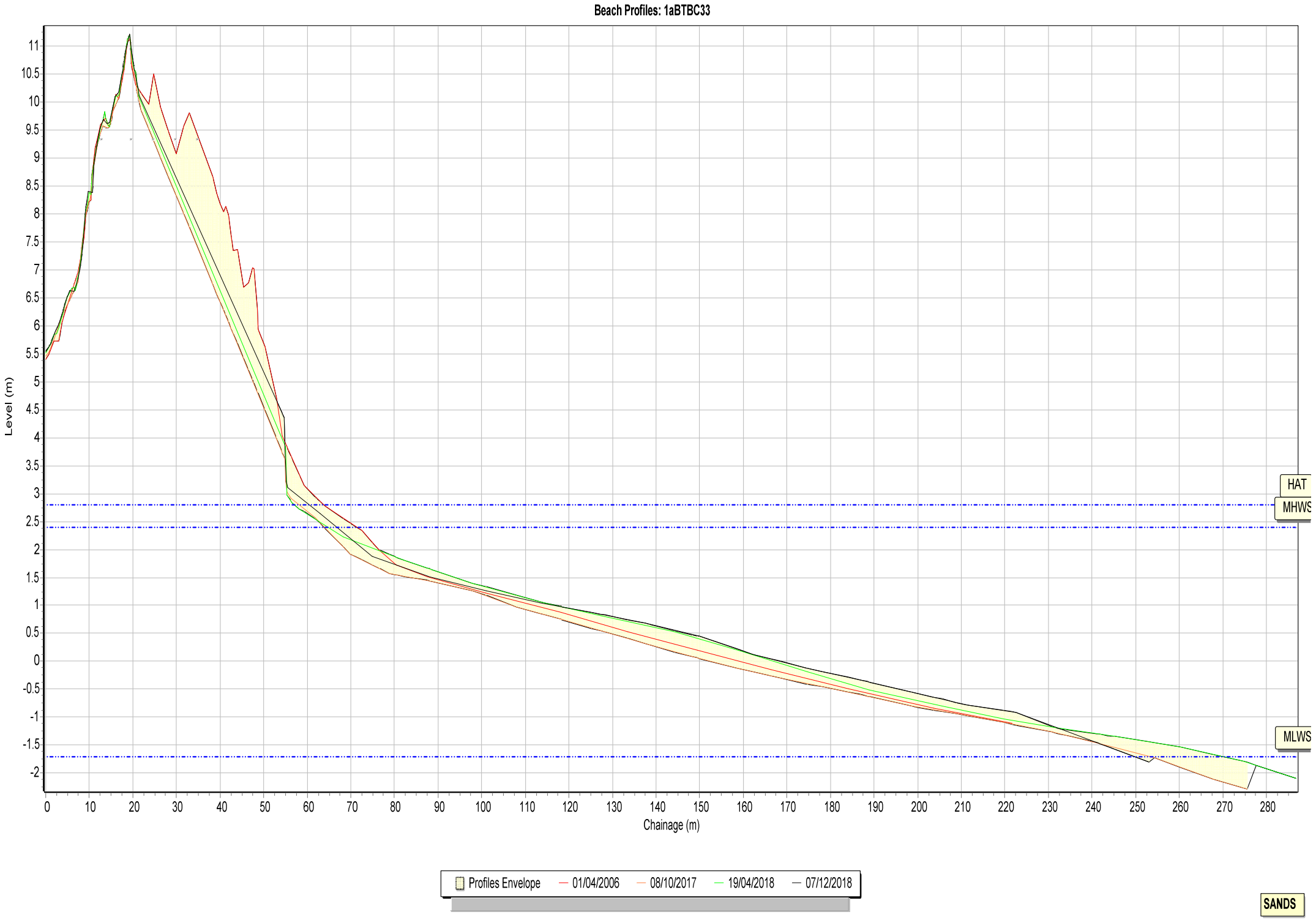


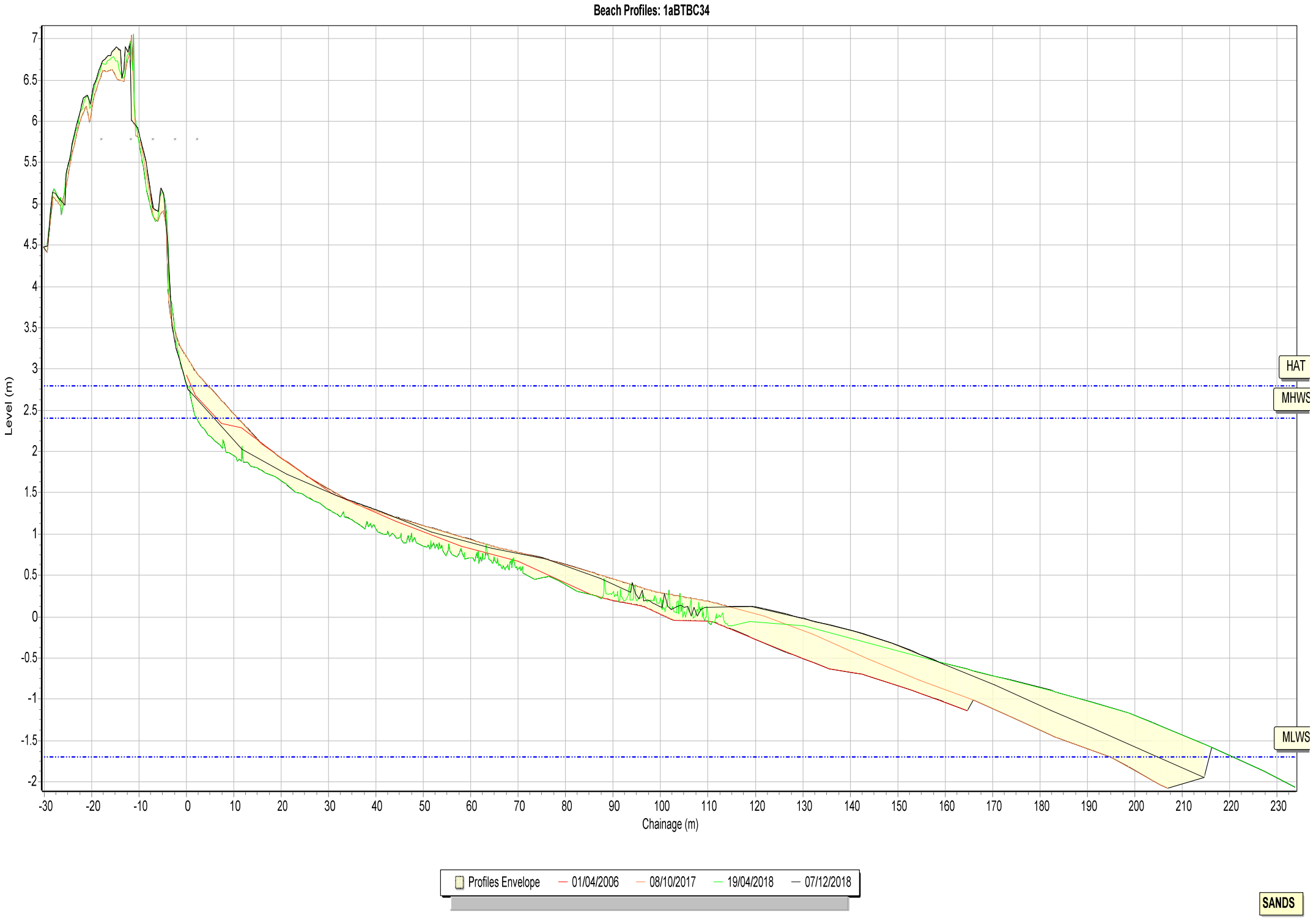

Beach Profiles: 1aBTBC29
Level (m)
13.5
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
50
100
150
200
250
300
350
400
450
500
550
600
650
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
01/10/2016
10/10/2017
10/12/2018
SANDS

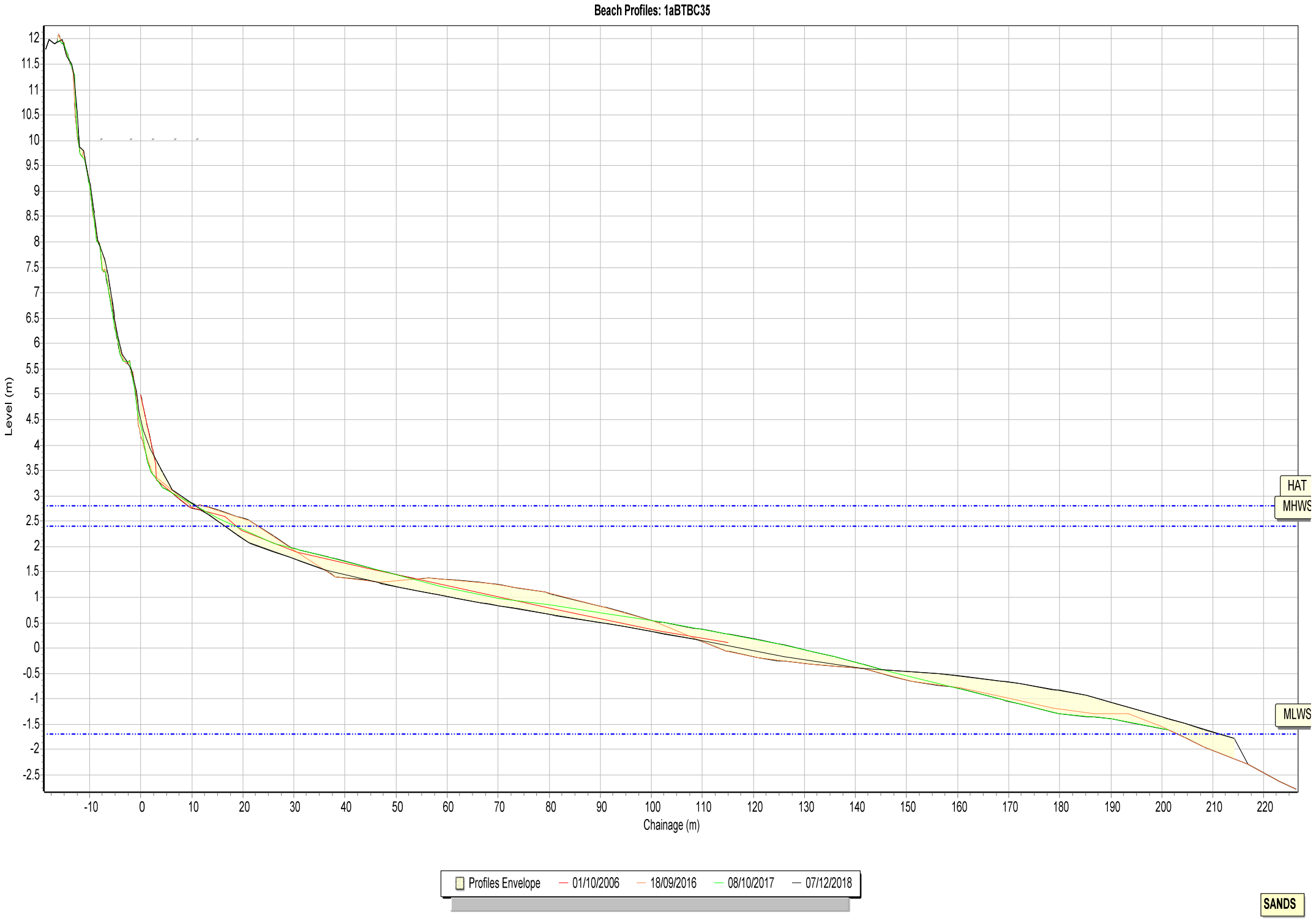

Beach Profiles: 1aBTBC30
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
18/09/2016
08/10/2017
10/12/2018
SANDS

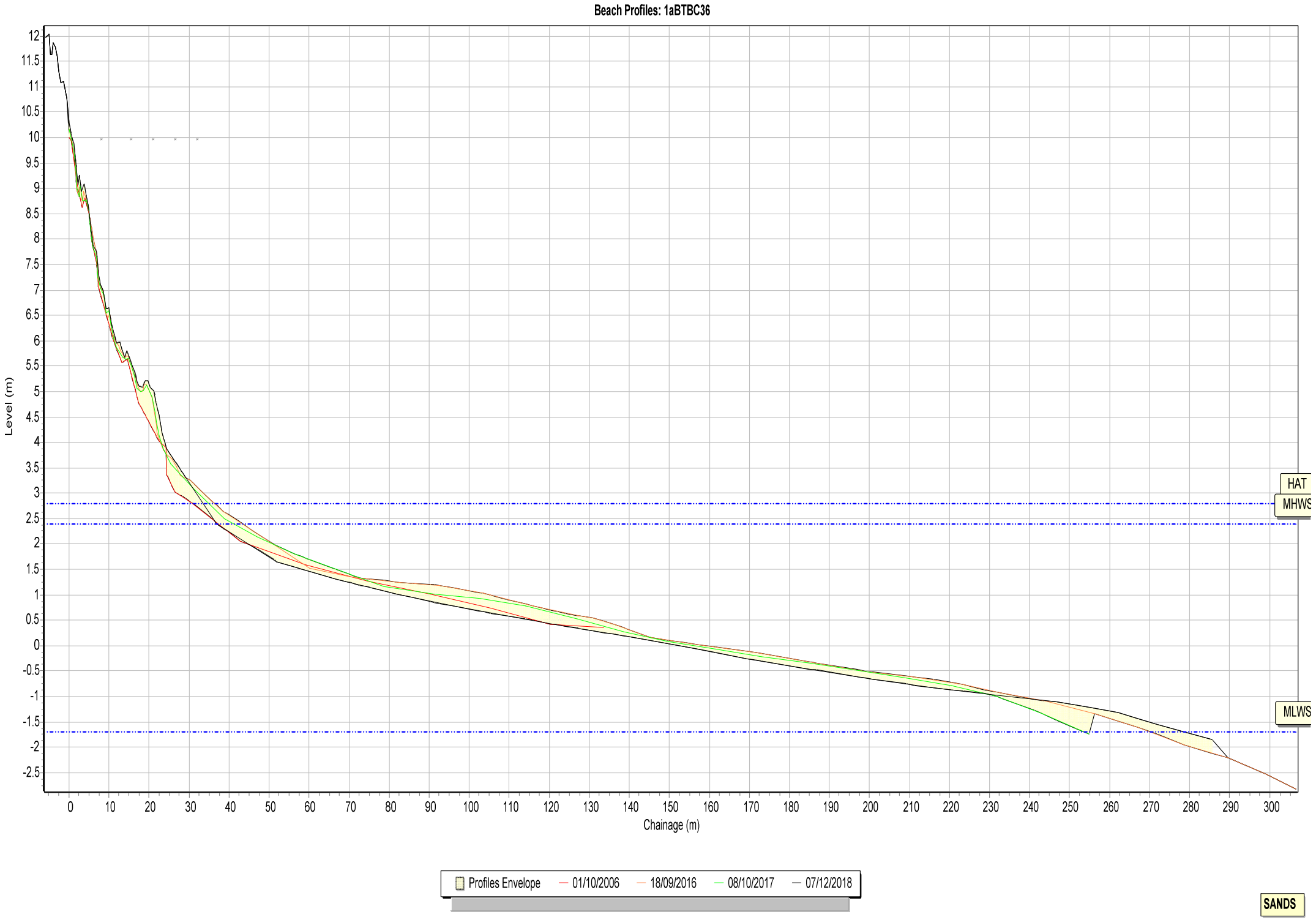

Beach Profiles: 1aBTBC31
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
08/10/2017
19/04/2018
10/12/2018
SANDS

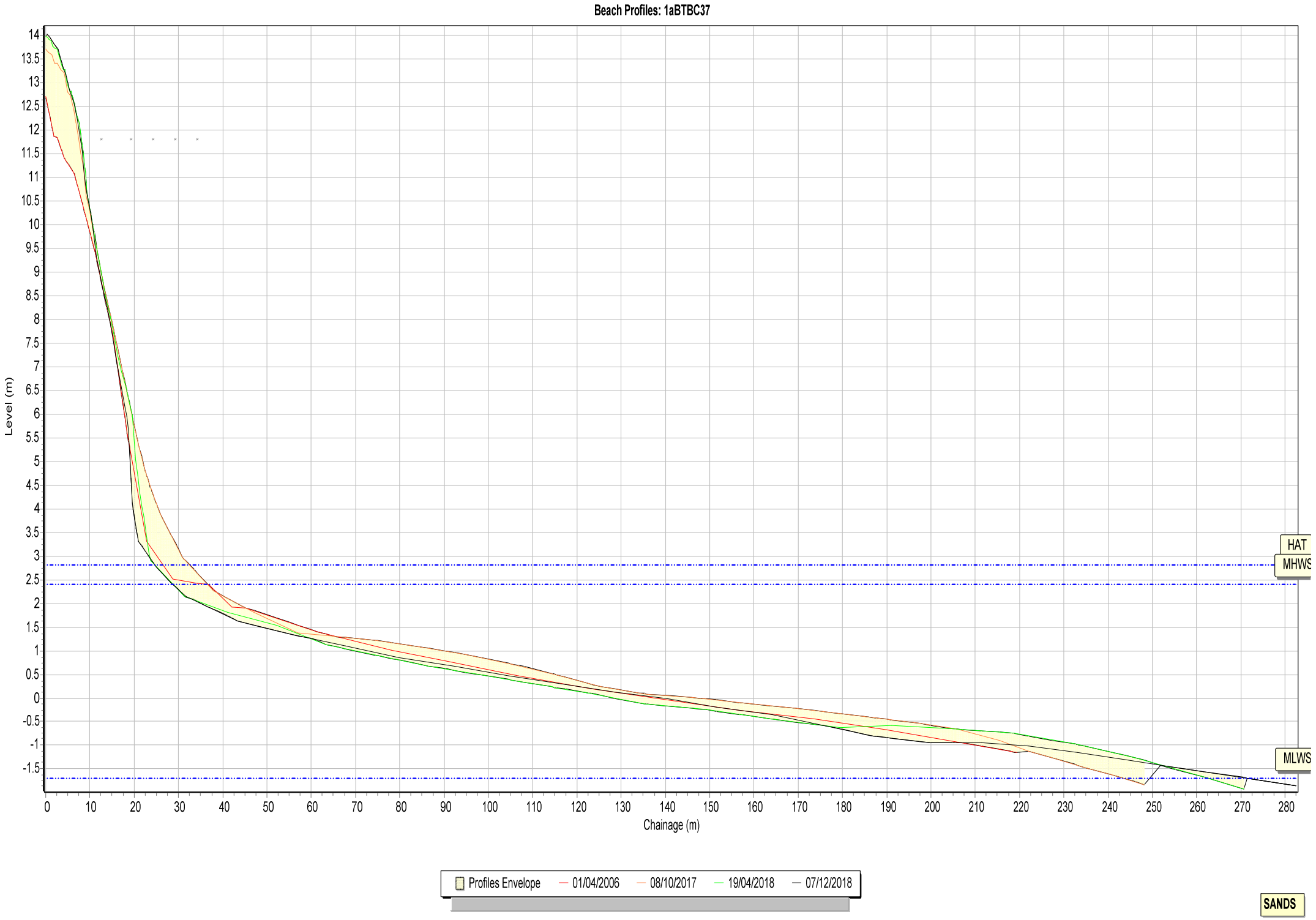

Beach Profiles: 1aBTBC32
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
18/09/2016
08/10/2017
07/12/2018
SANDS

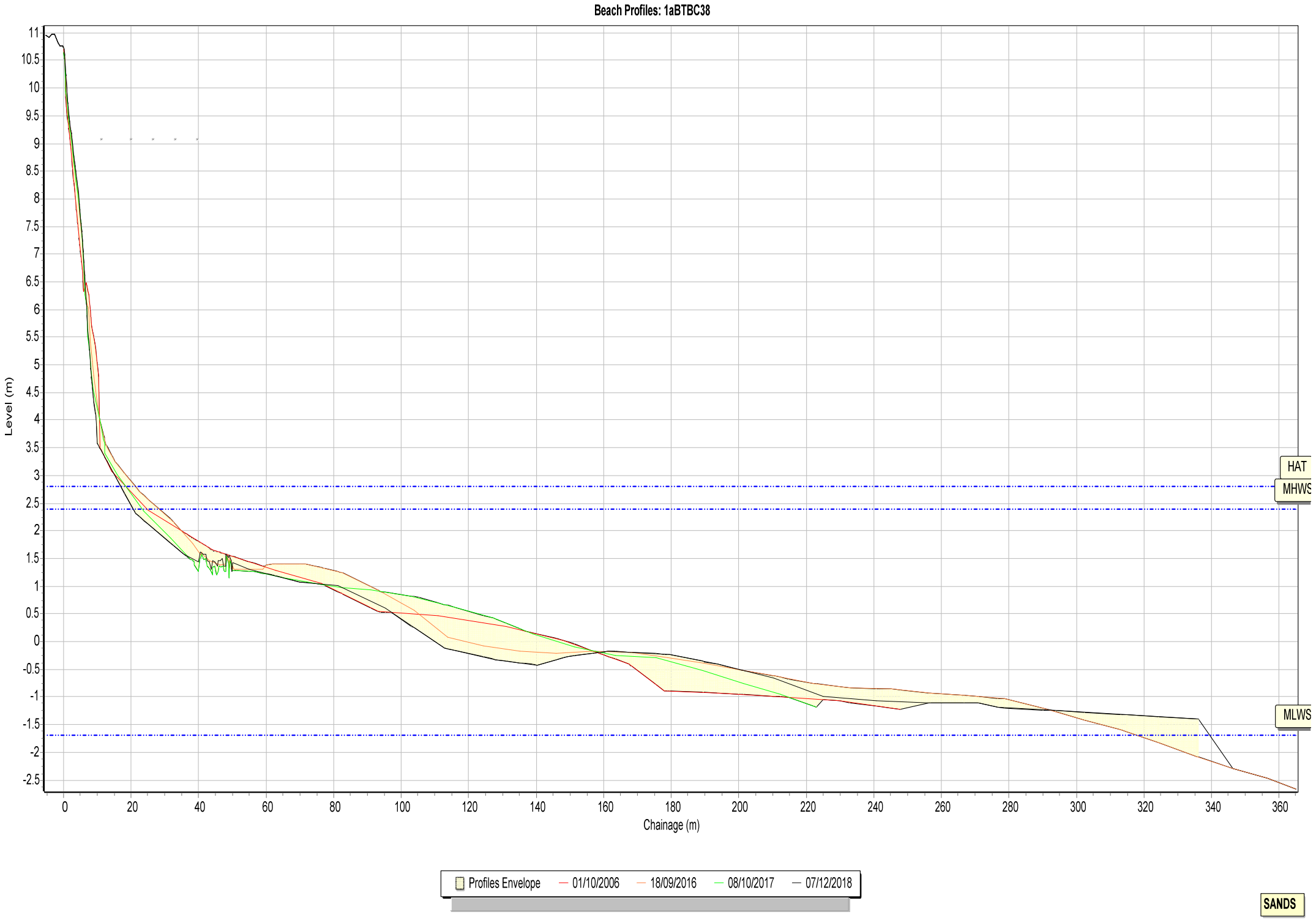

Beach Profiles: 1aBTBC33
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
08/10/2017
19/04/2018
07/12/2018
SANDS


Beach Profiles: 1aBTBC34
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
08/10/2017
19/04/2018
07/12/2018
SANDS


Beach Profiles: 1aBTBC35
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
18/09/2016
08/10/2017
07/12/2018
SANDS


Beach Profiles: 1aBTBC36
Level (m)
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
18/09/2016
08/10/2017
07/12/2018
SANDS


Beach Profiles: 1aBTBC37
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
08/10/2017
19/04/2018
07/12/2018
SANDS


Beach Profiles: 1aBTBC38
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
18/09/2016
08/10/2017
07/12/2018
SANDS

Beach Profile

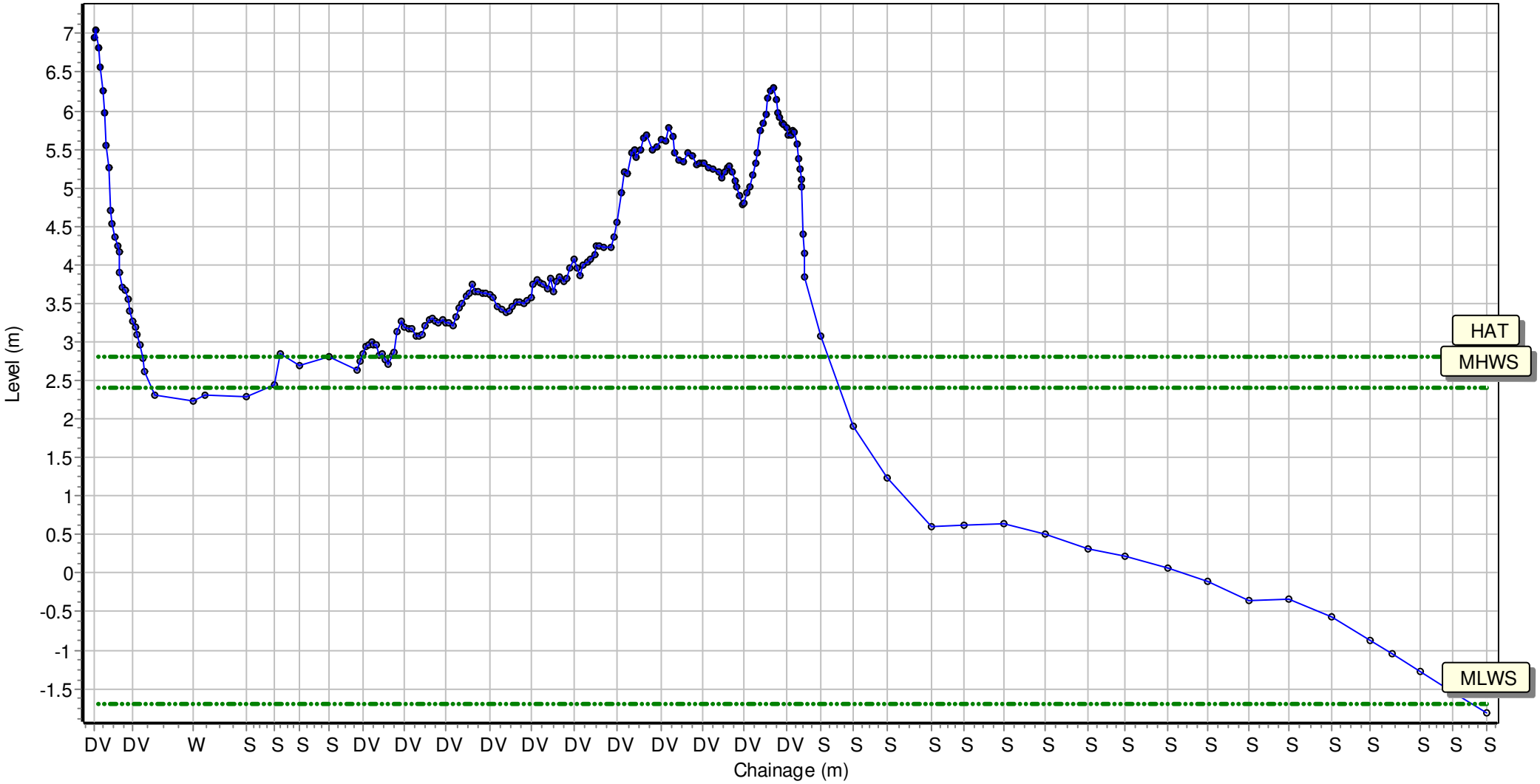
Location: **1aADC01**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

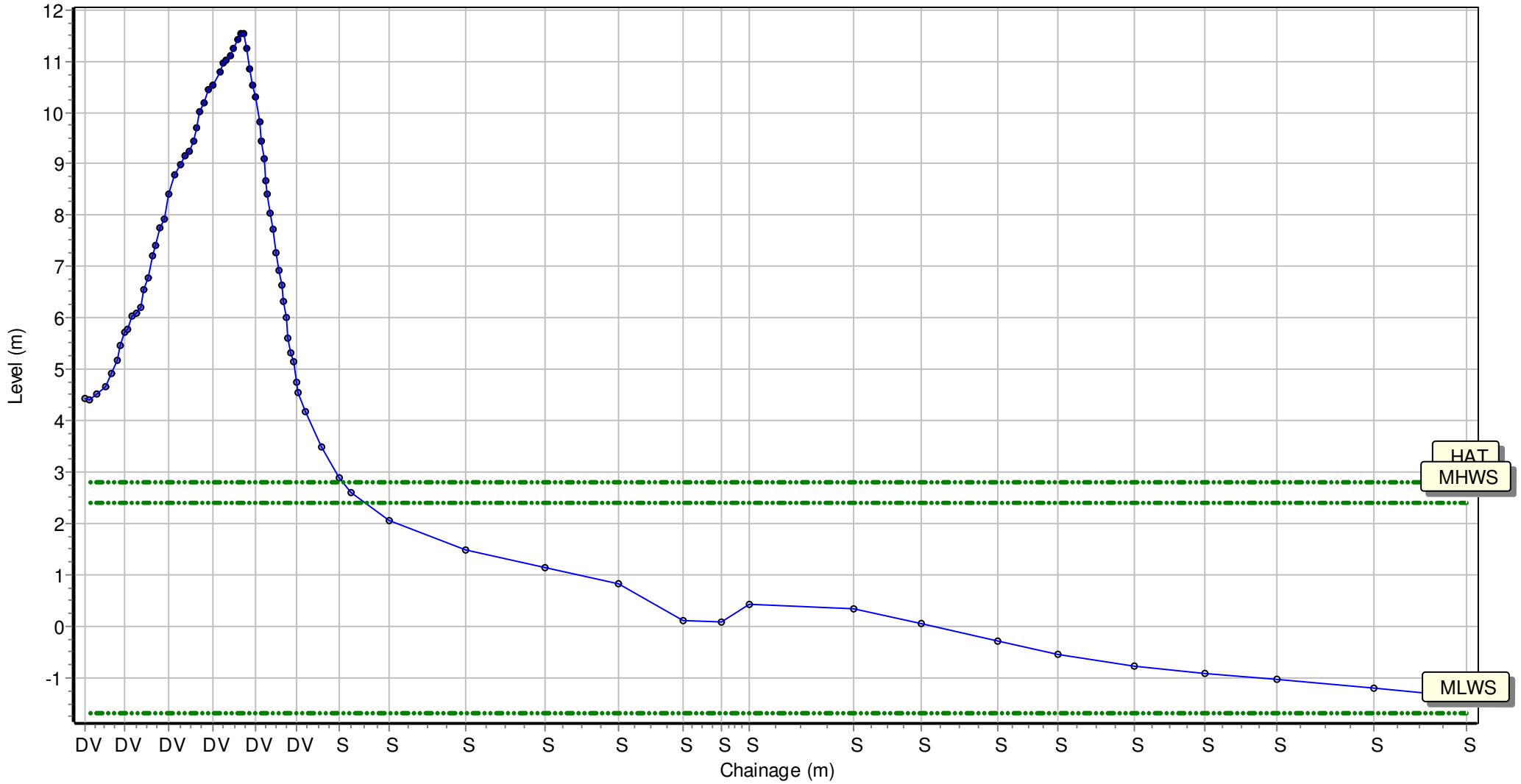
Location: **1aADC02**

Date: 07/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

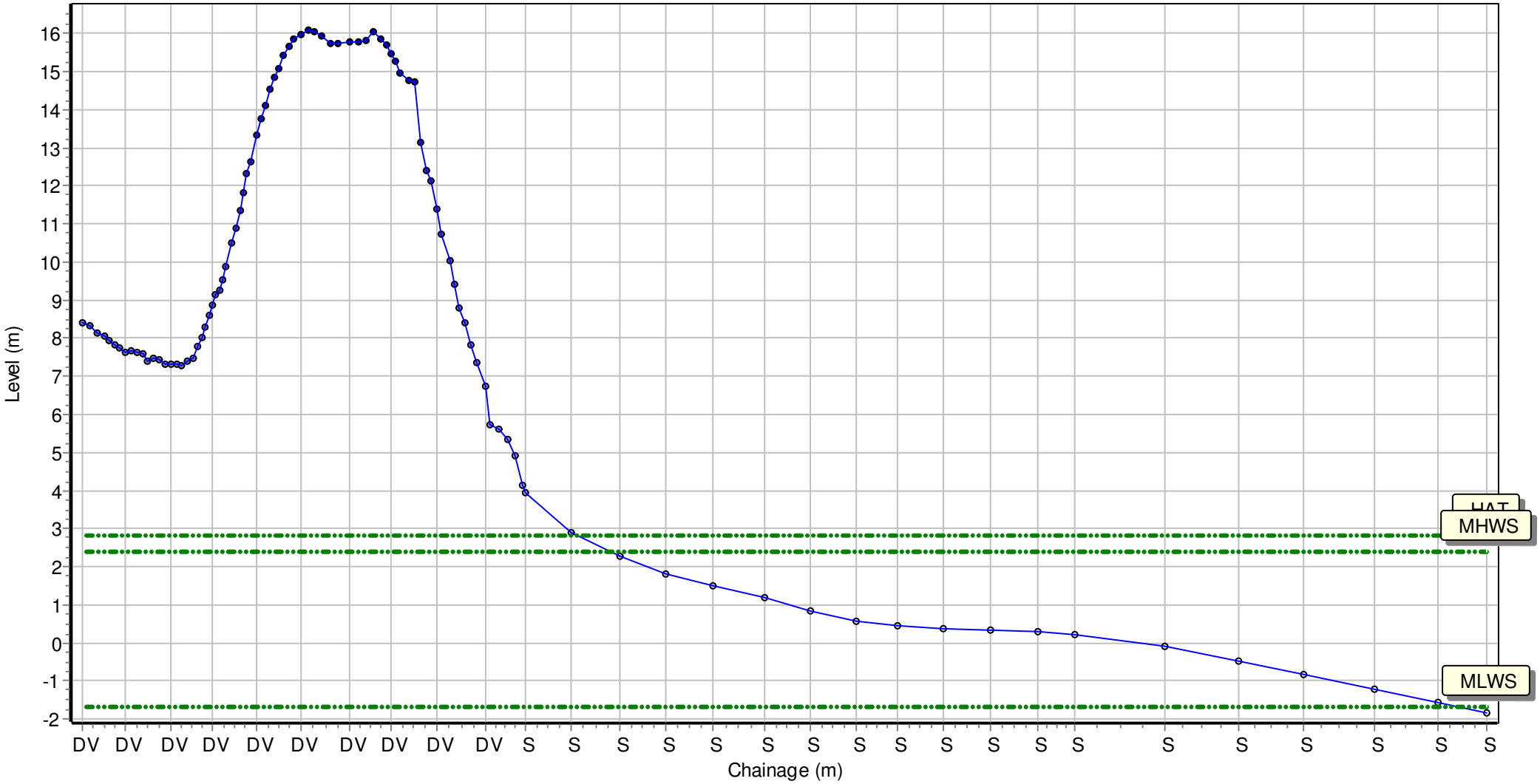
Location: **1aADC03**

Date: 28/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 424282.669 **Northing:** 623628.714 **Profile Bearing:** 112 ° from North



Beach Profile

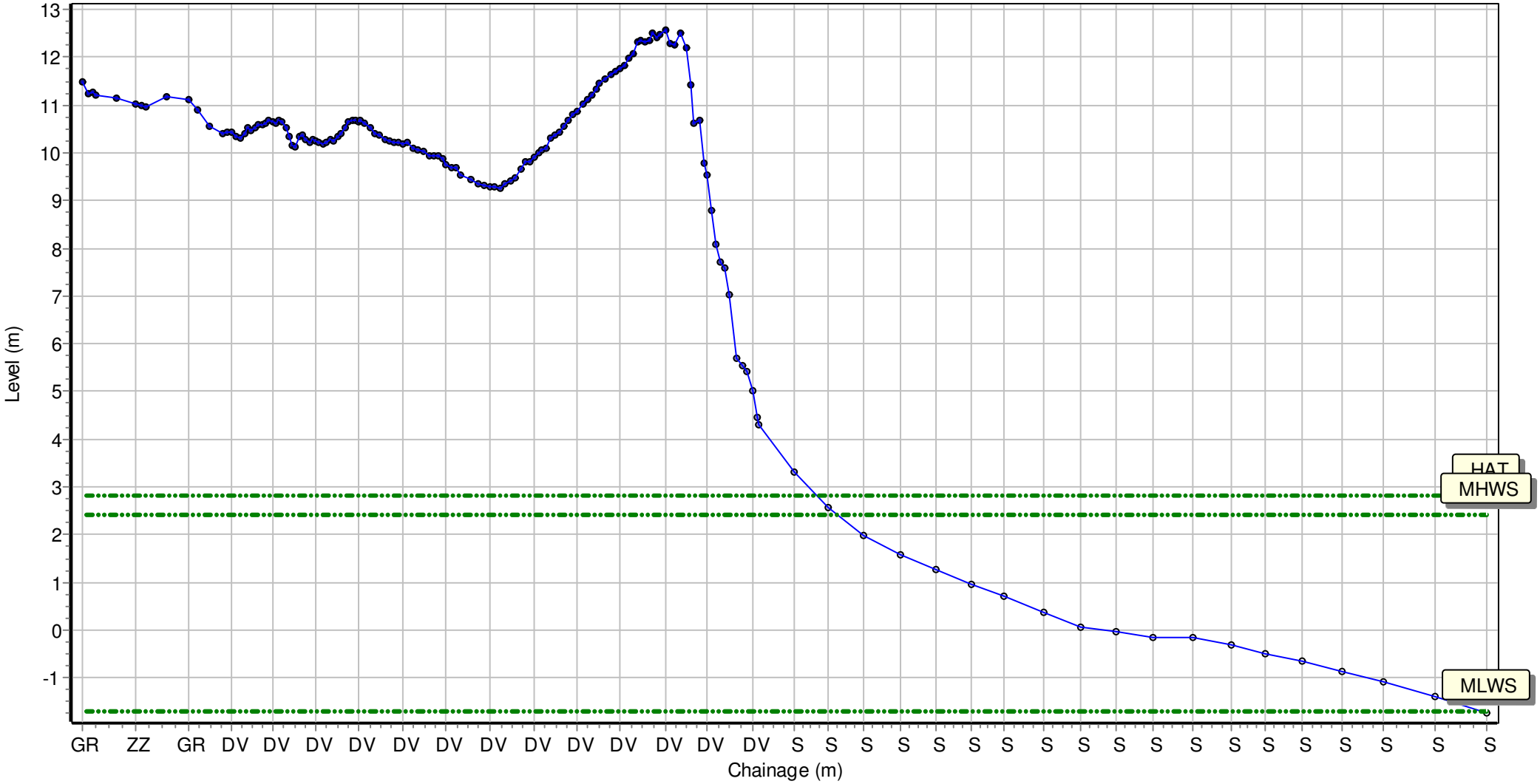
Location: **1aADC04**

Date: 28/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 424479.626 **Northing:** 622434.173 **Profile Bearing:** 50 ° from North



Beach Profile

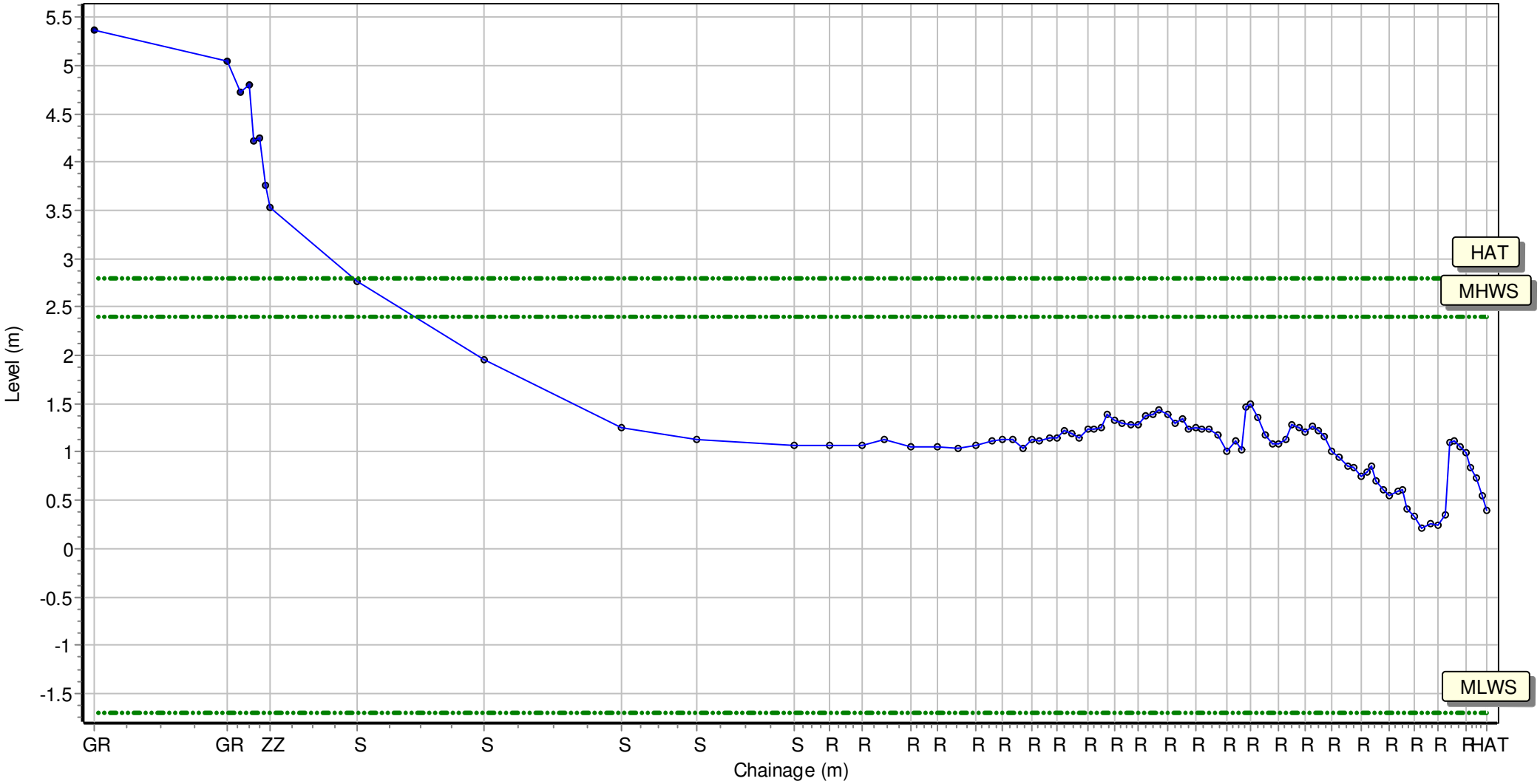
Location: **1aADC04A**

Date: 28/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

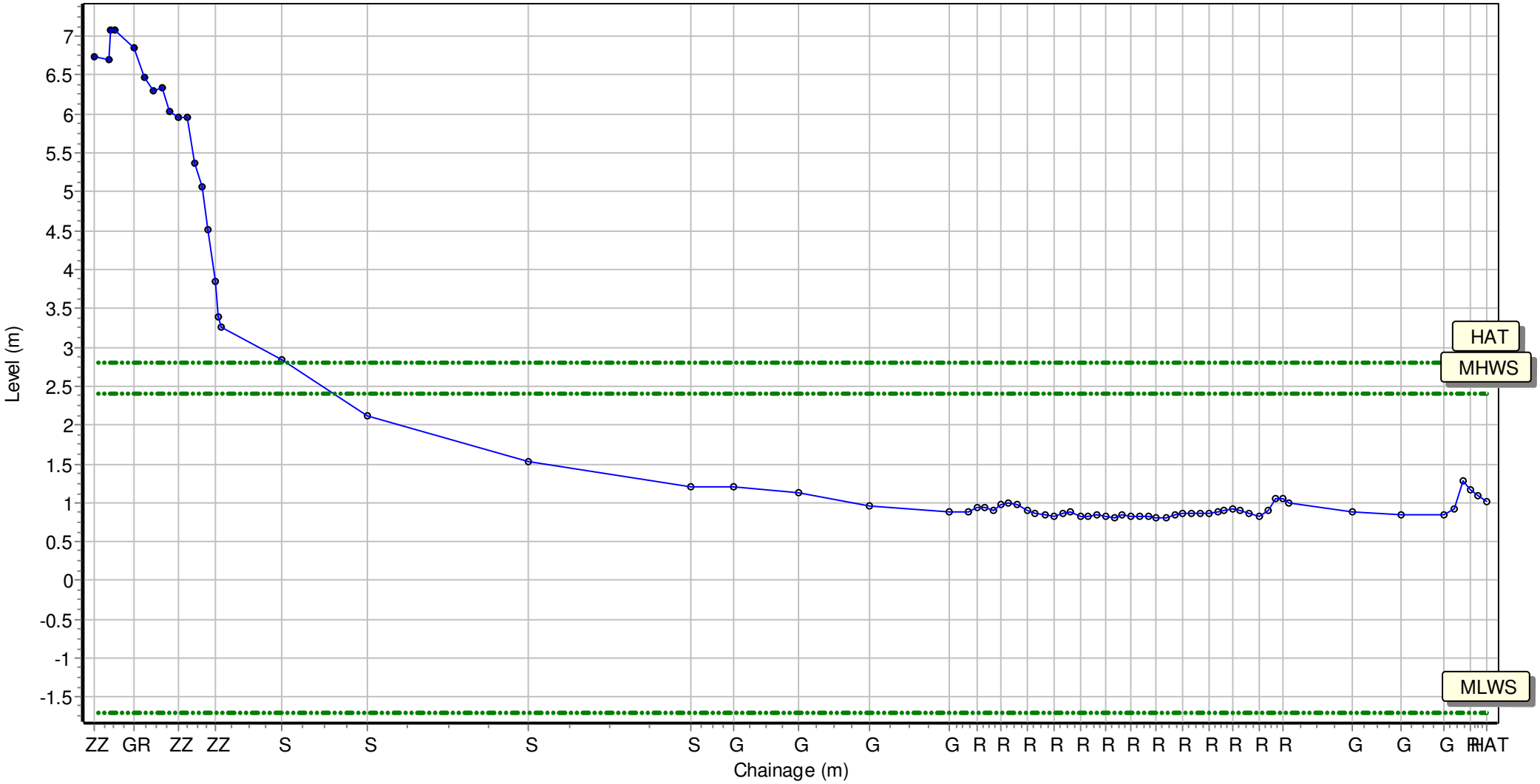
Location: **1aADC04B**

Date: 28/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

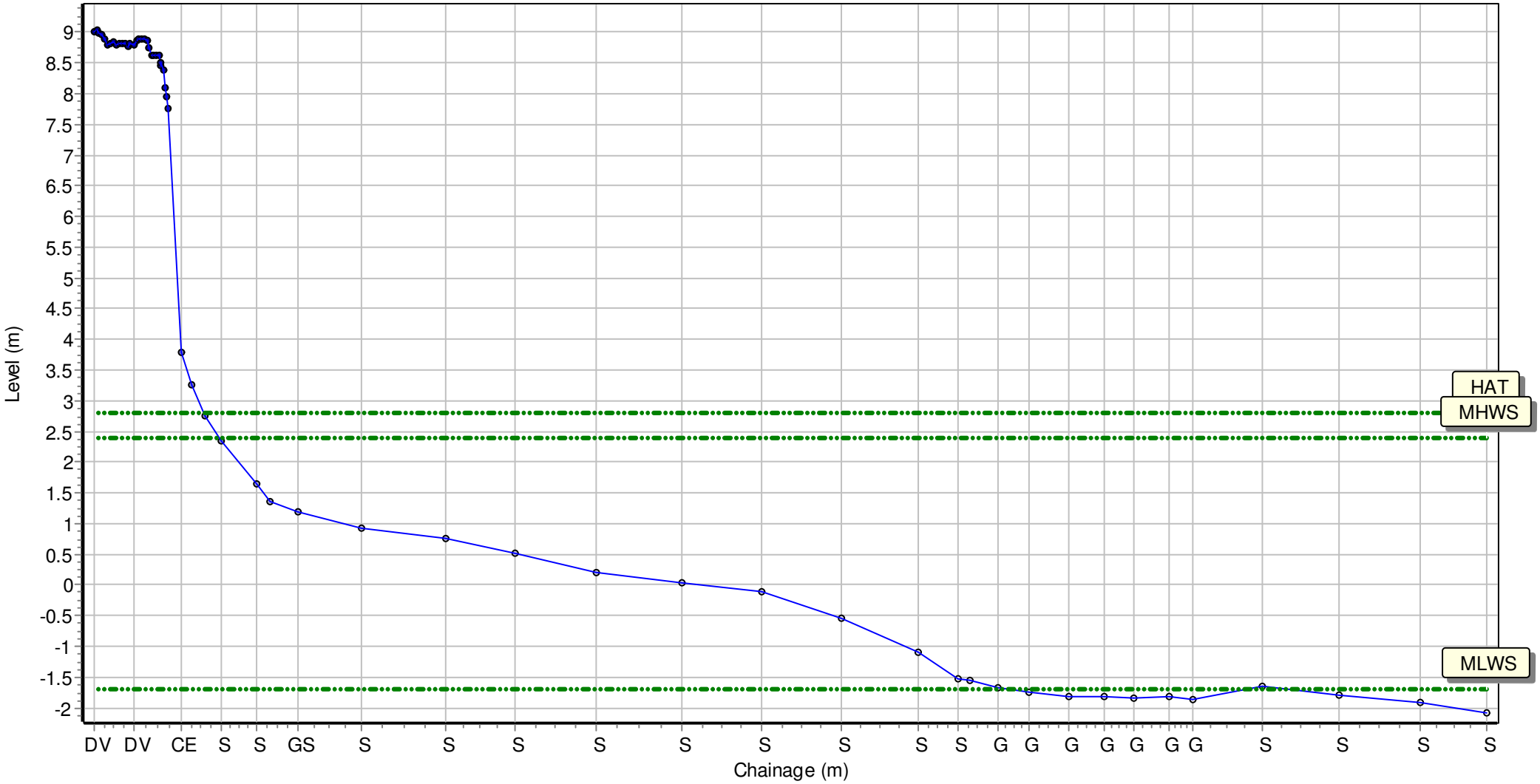
Location: **1aADC05**

Date: 28/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 426185.186 **Northing:** 612543.216 **Profile Bearing:** 142 ° from North



Beach Profile

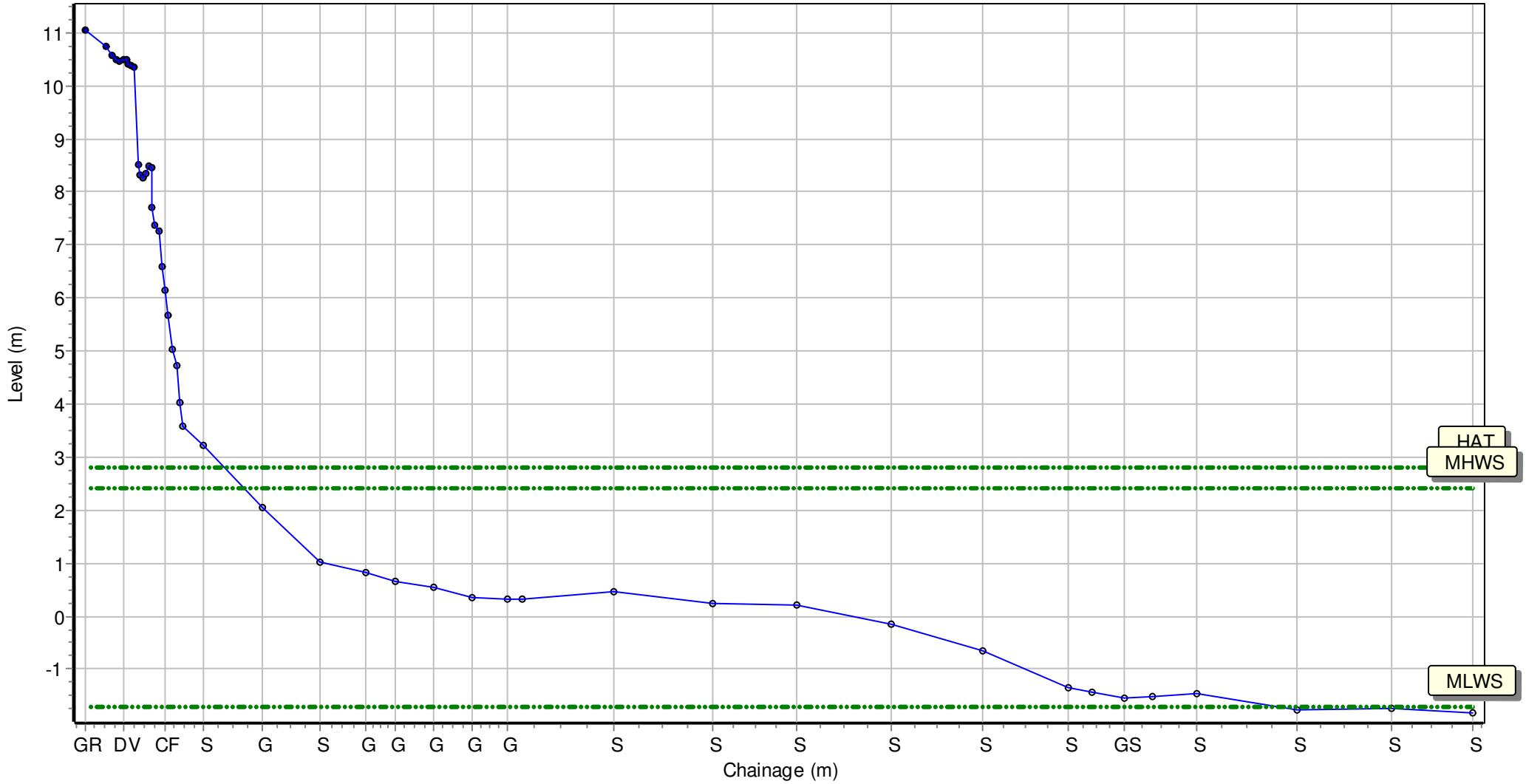
Location: **1aADC06**

Date: 28/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 425950.4 **Northing:** 612302.499 **Profile Bearing:** 122 ° from North



Beach Profile

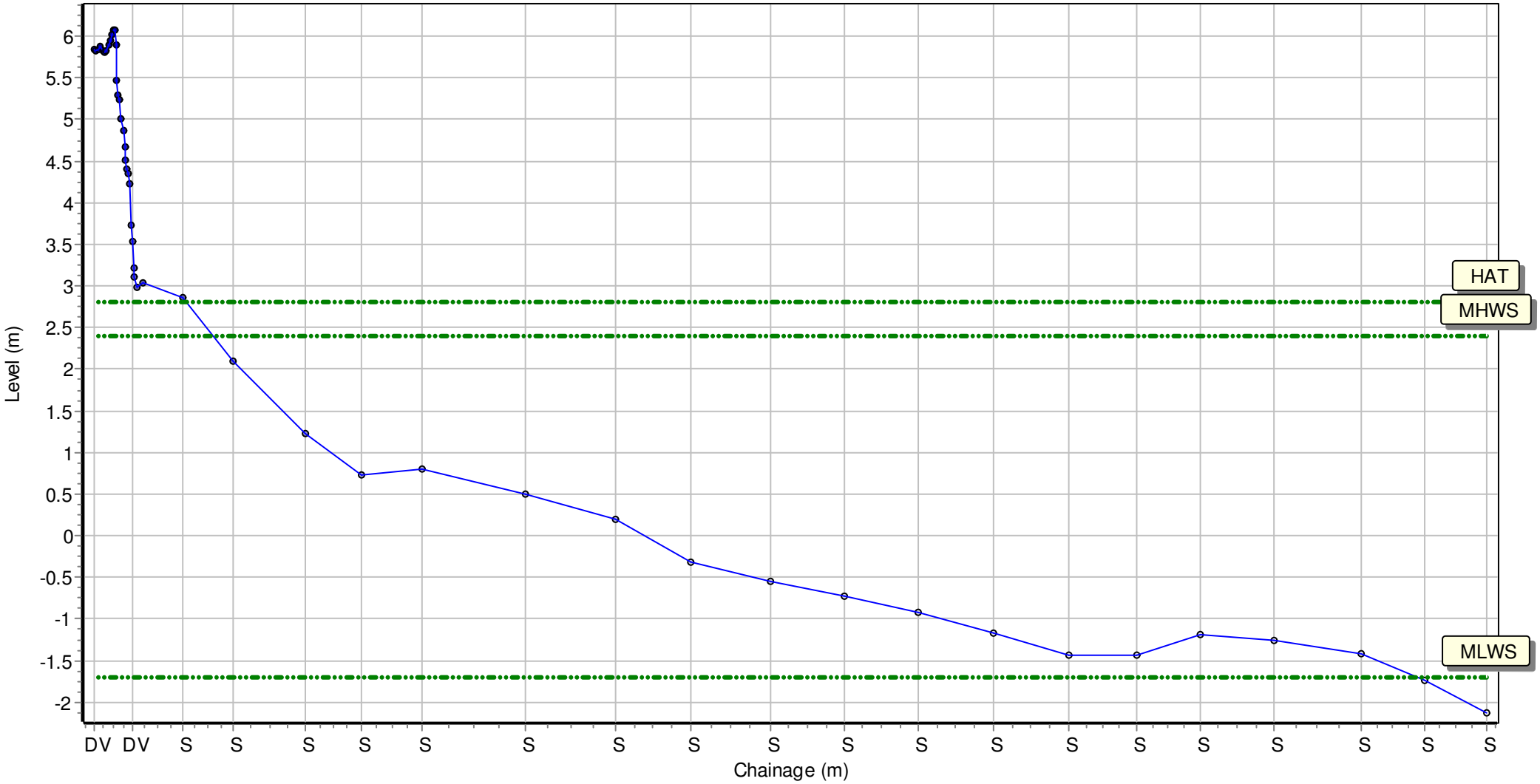
Location: **1aADC07**

Date: 28/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

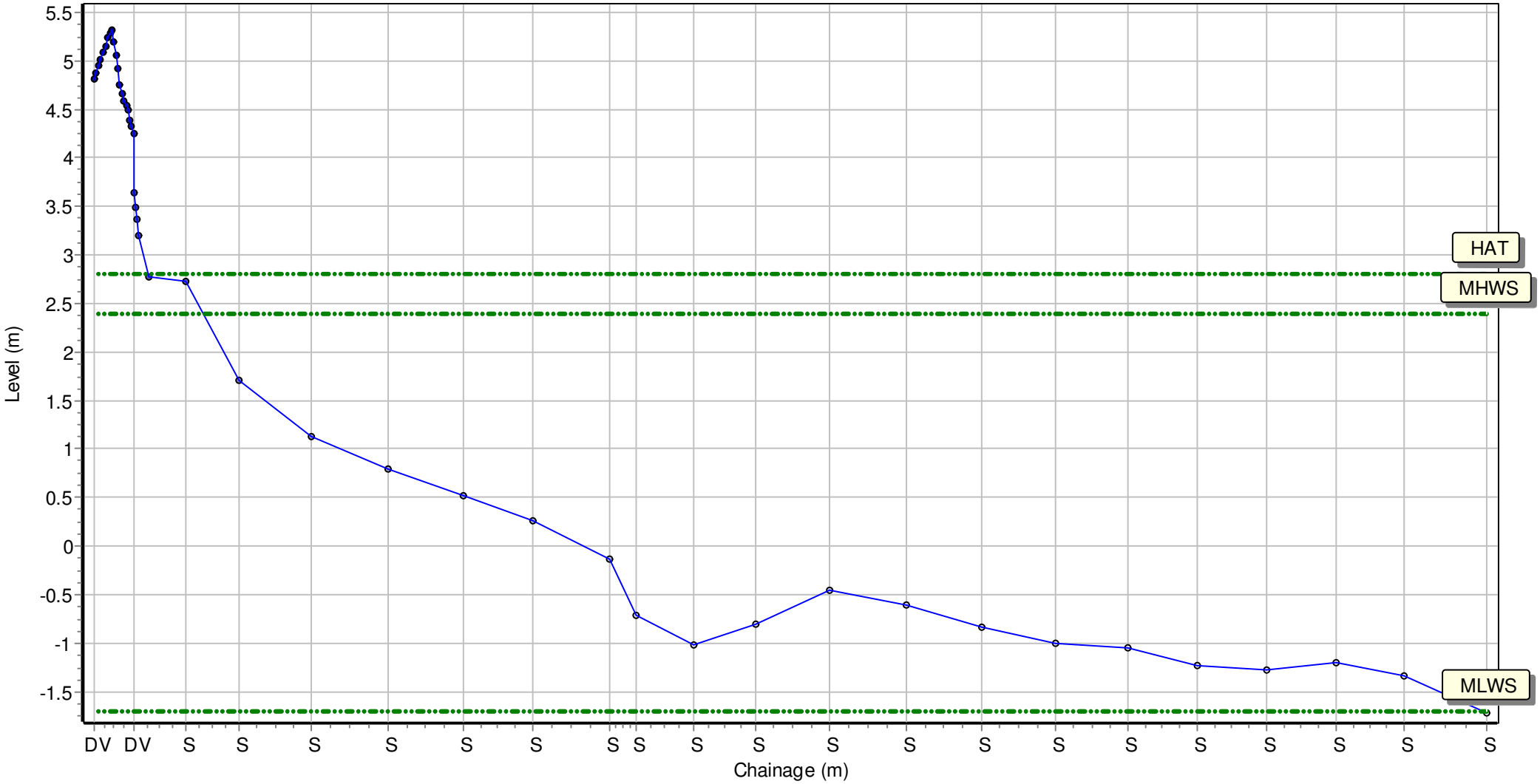
Location: **1aADC08**

Date: 28/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

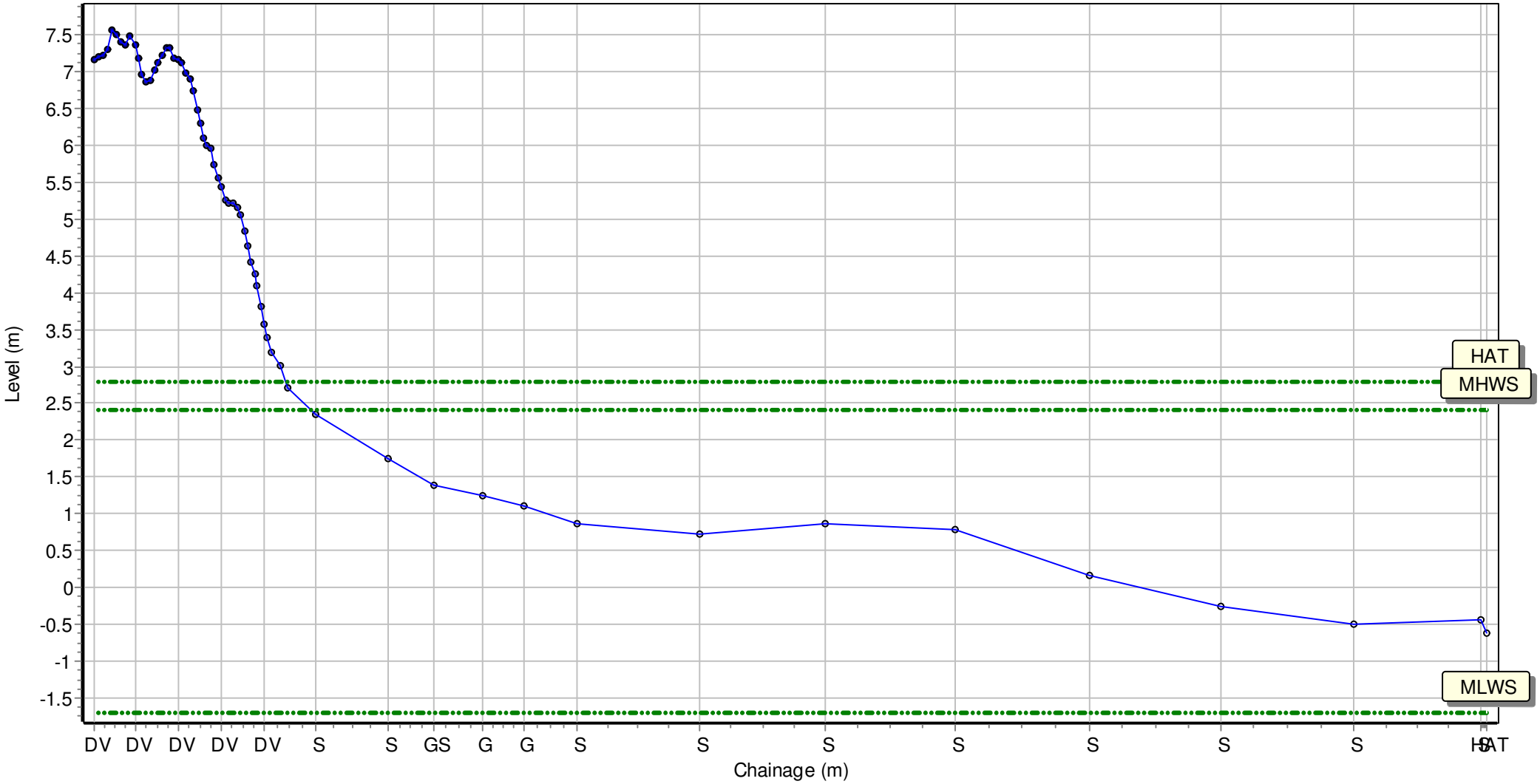
Location: **1aADC09**

Date: 28/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

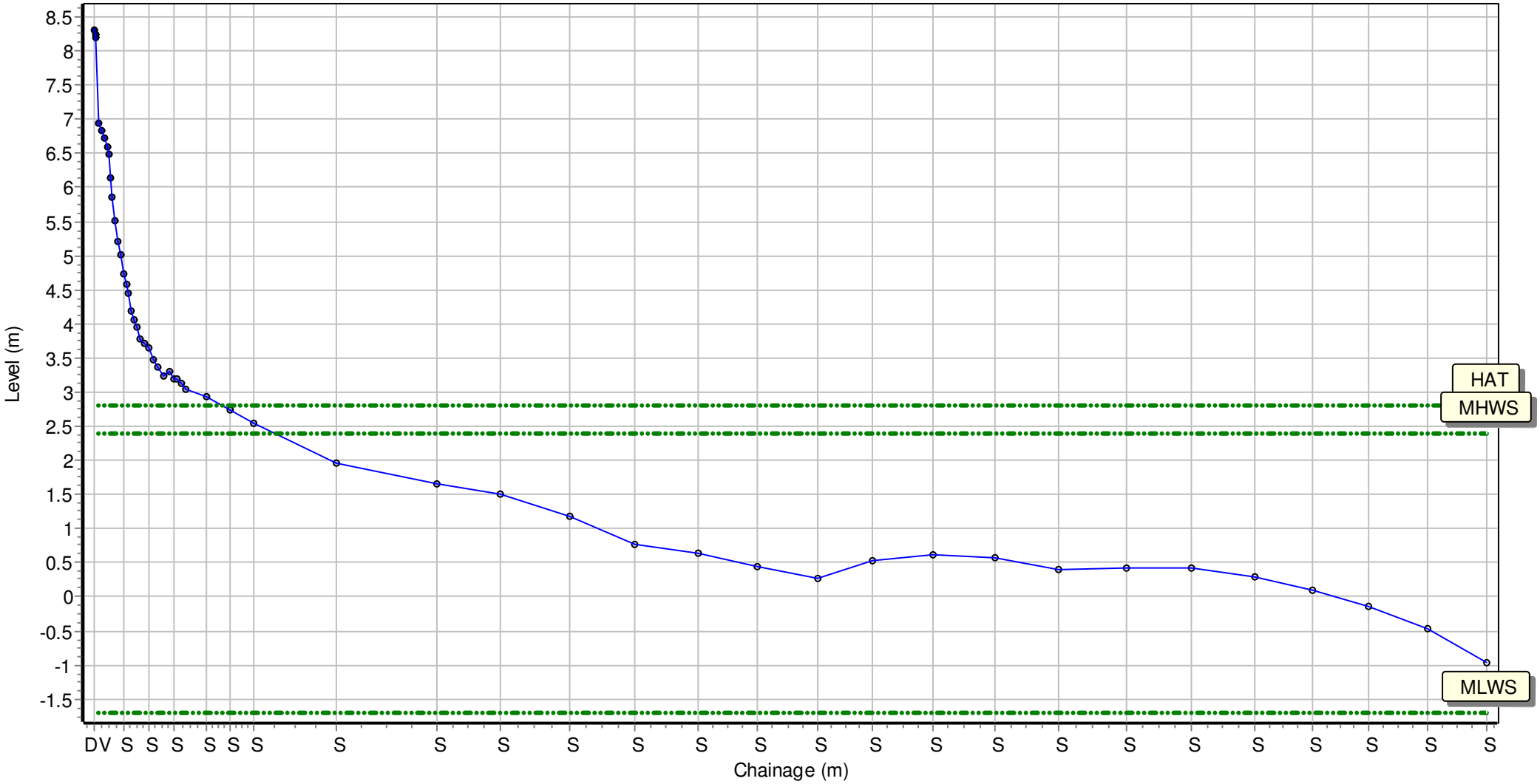
Location: **1aADC10**

Date: 22/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 424845.495 **Northing:** 610035.618 **Profile Bearing:** 70 ° from North



Beach Profile

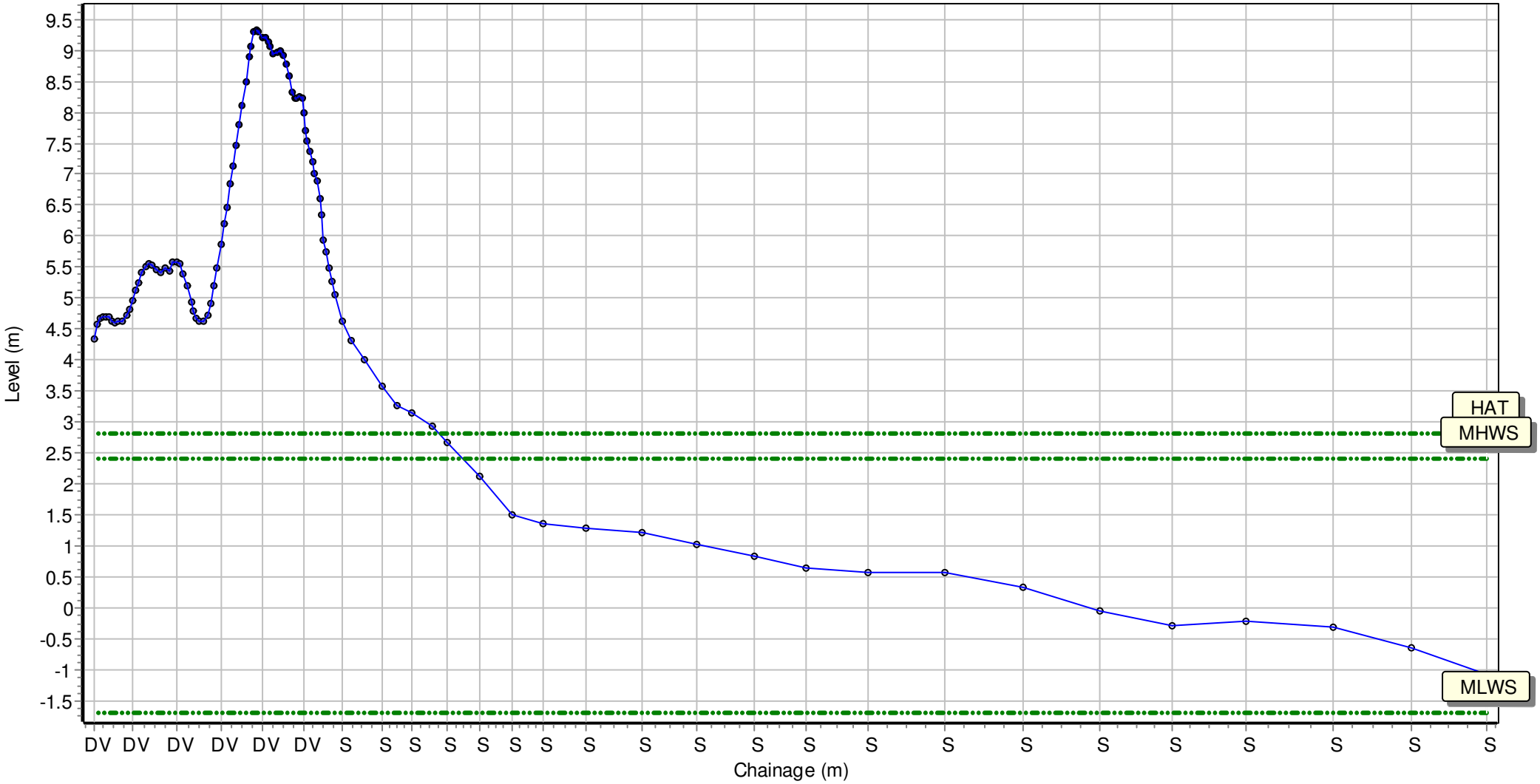
Location: **1aADC11**

Date: 22/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 424966.878 **Northing:** 609097.685 **Profile Bearing:** 71 ° from North



Beach Profile

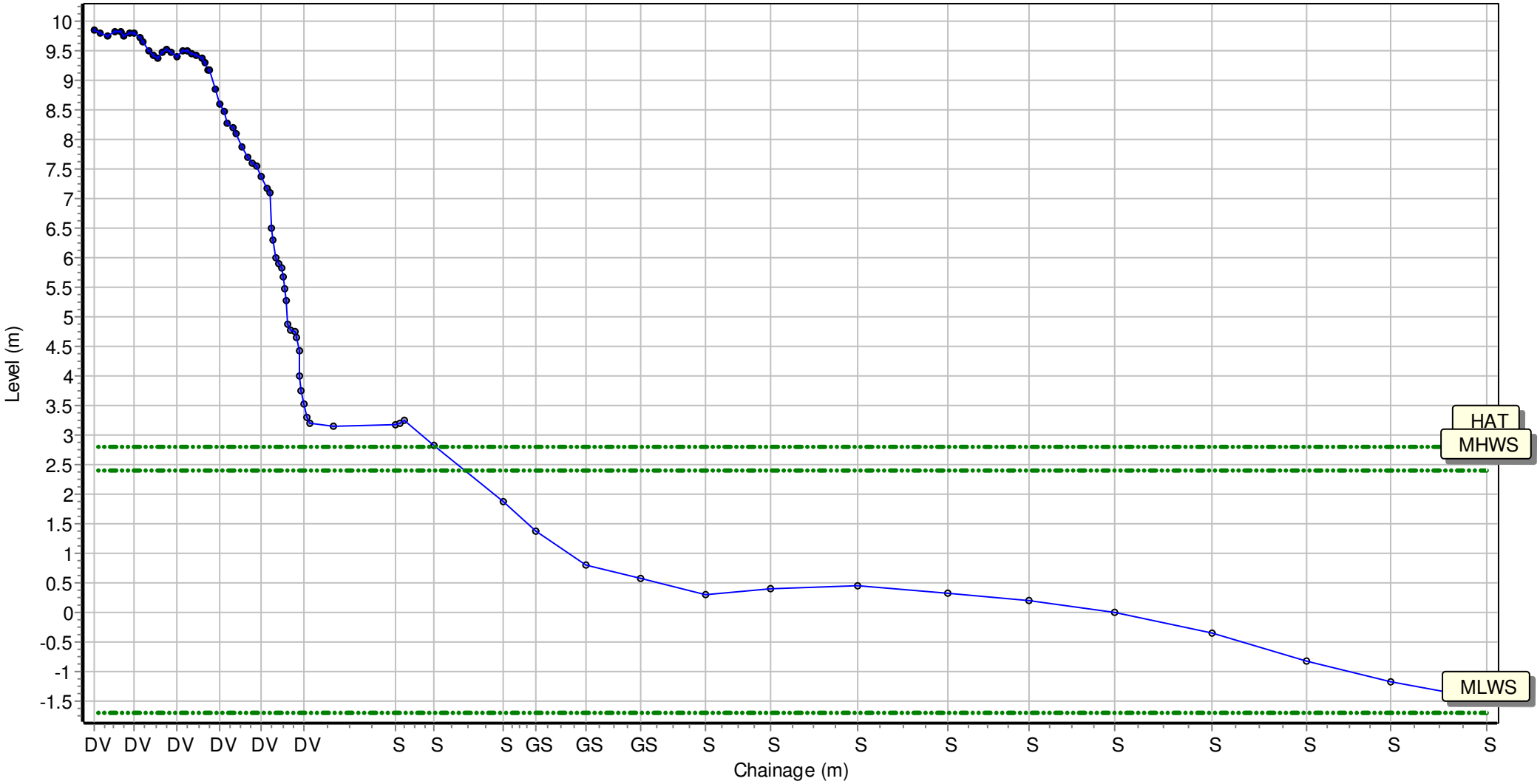
Location: **1aADC12**

Date: 22/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 425376.479 **Northing:** 607303.998 **Profile Bearing:** 67 ° from North



Beach Profile

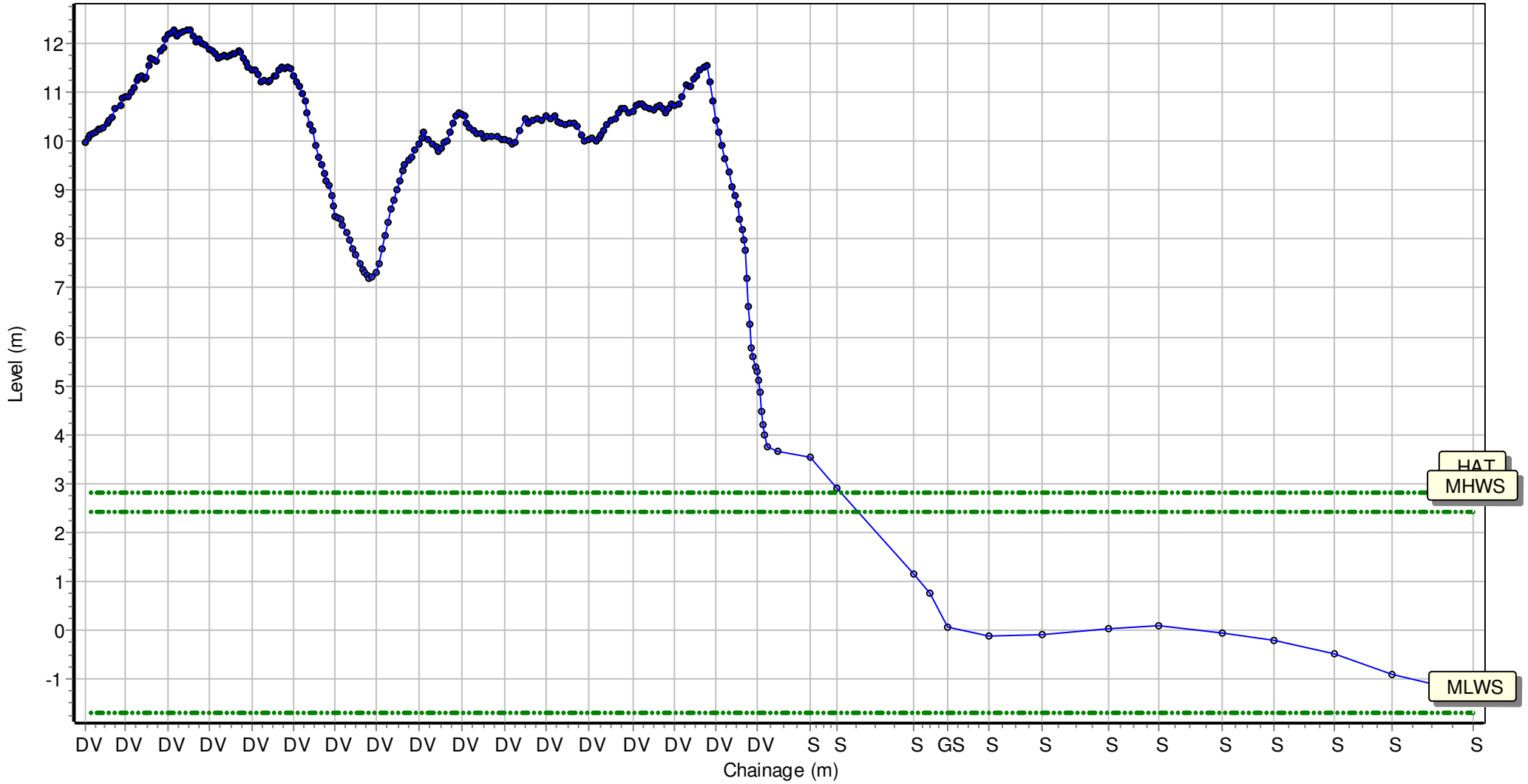
Location: **1aADC13**

Date: 22/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 425859.769 **Northing:** 606033.935 **Profile Bearing:** 63 ° from North



Beach Profile

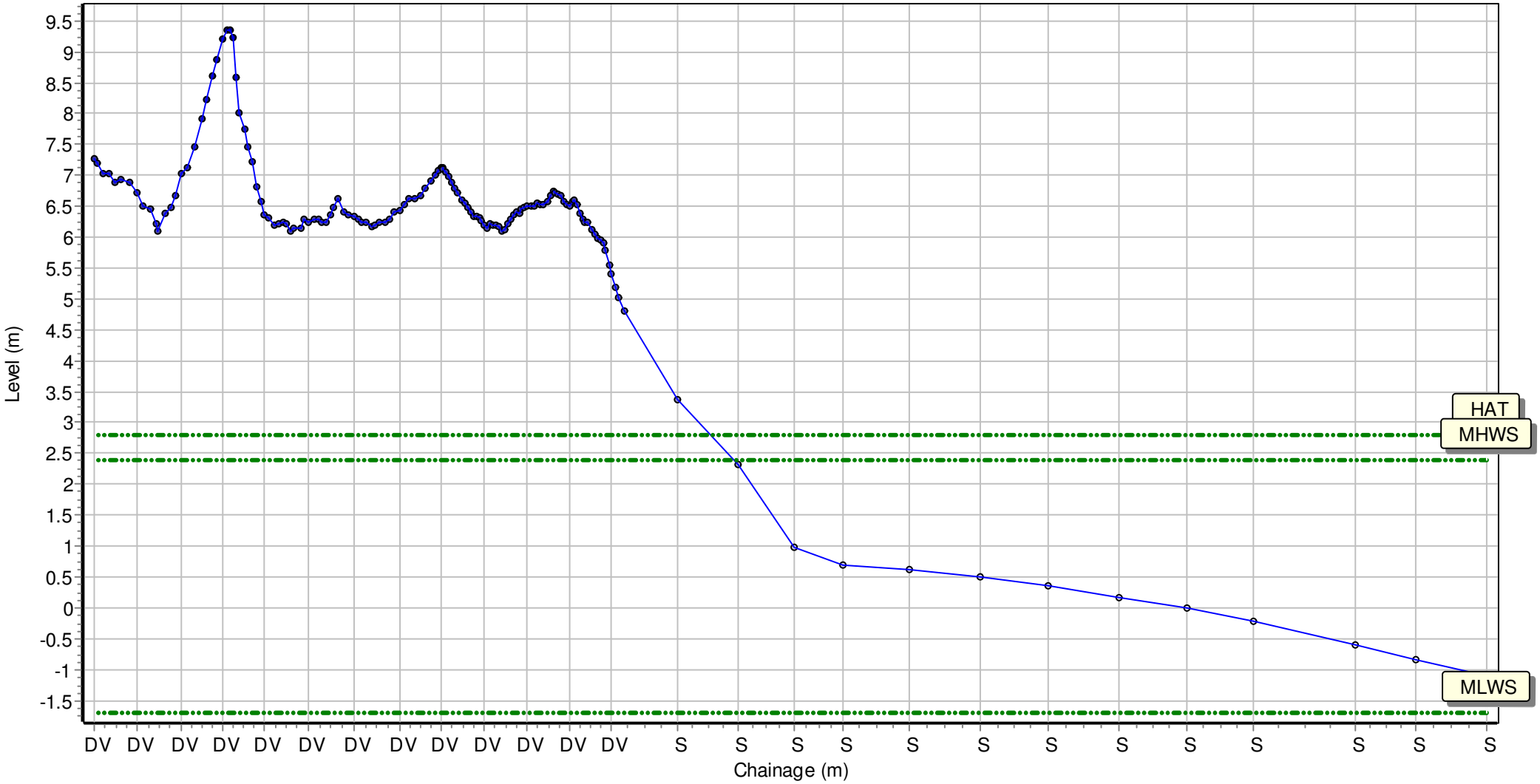
Location: **1aADC14**

Date: 22/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 426469.136 **Northing:** 605263.954 **Profile Bearing:** 59 ° from North



Beach Profile

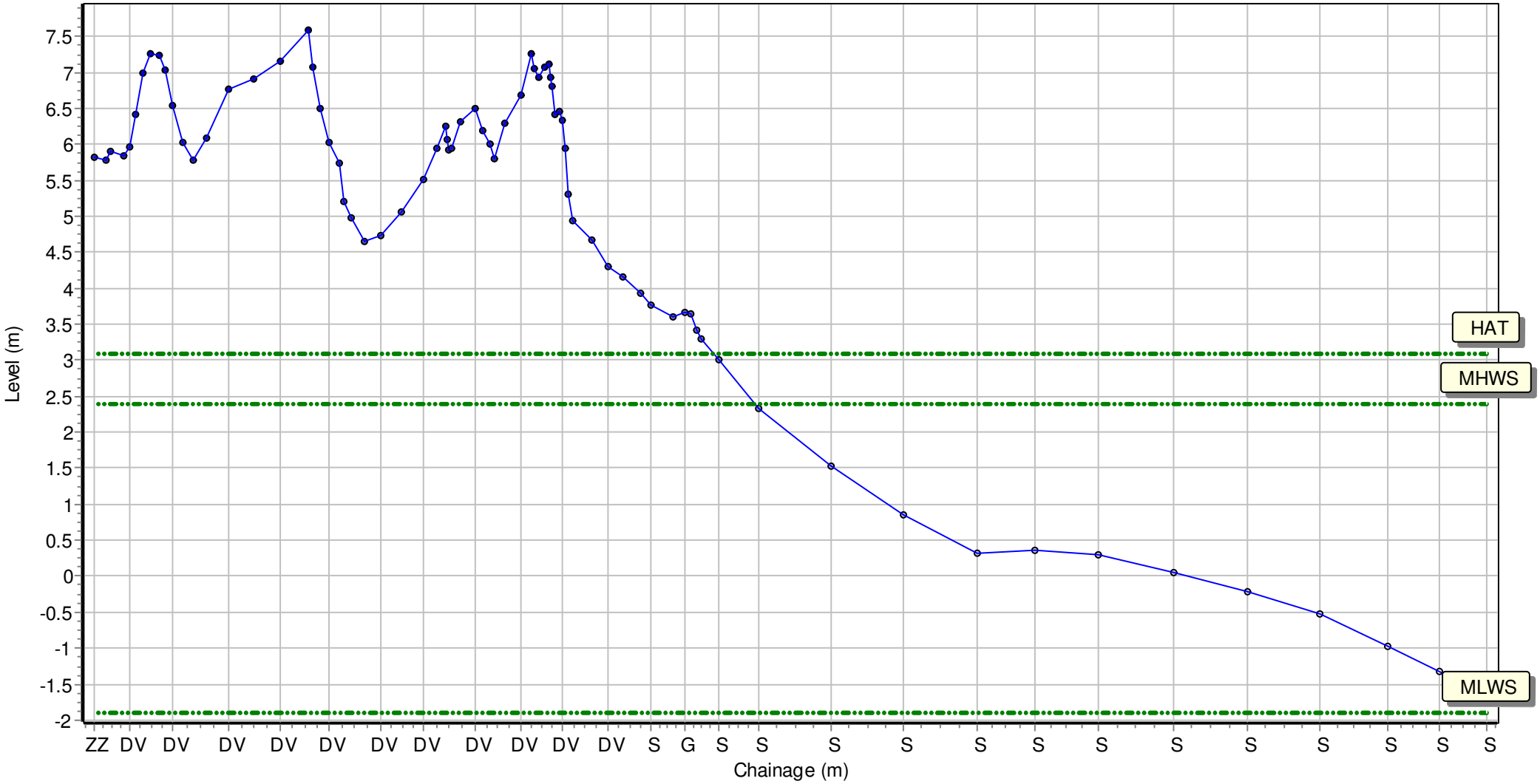
Location: **1aADC15**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 427956.742 **Northing:** 603743.758 **Profile Bearing:** 46 ° from North



Beach Profile

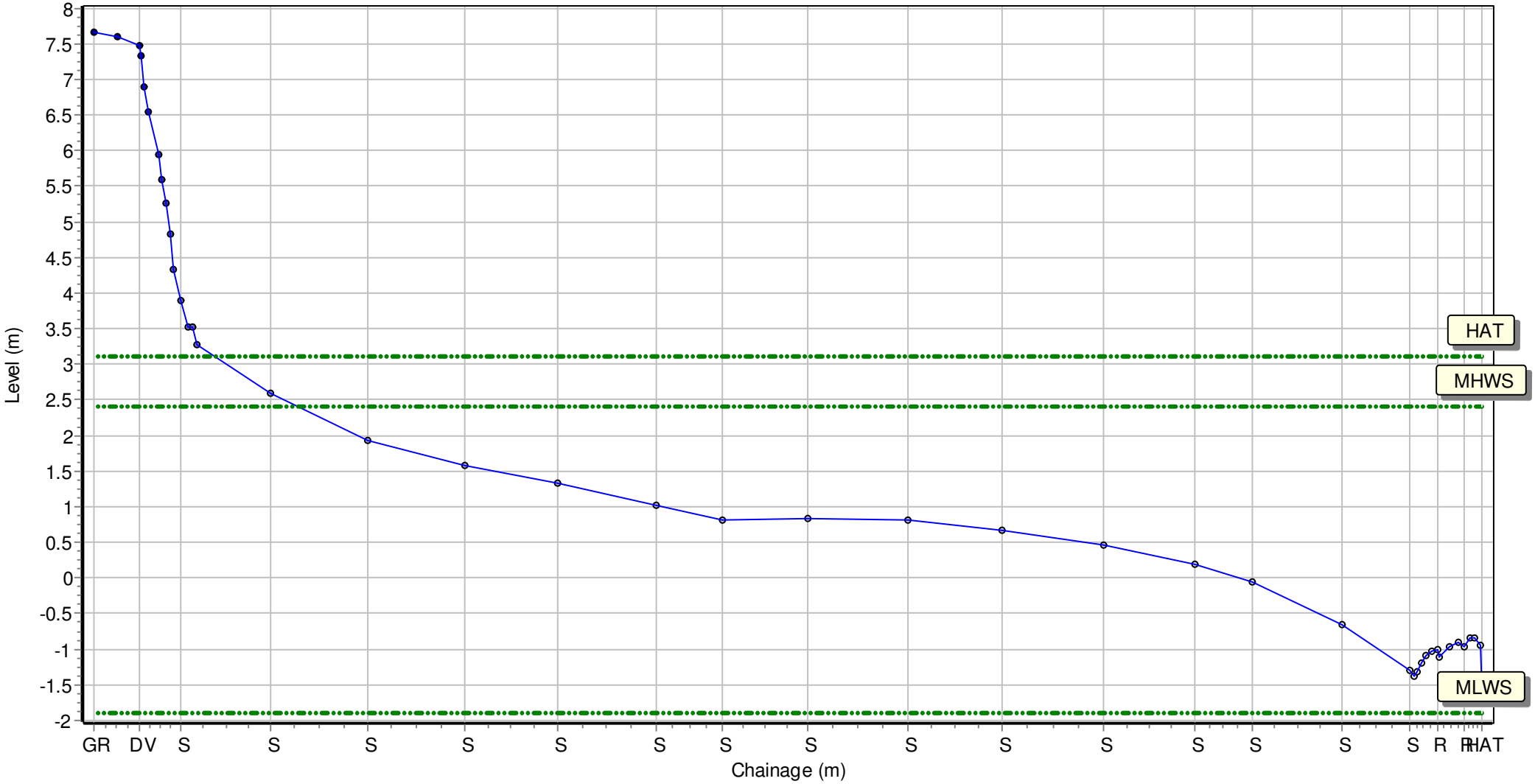
Location: **1aADC15A**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

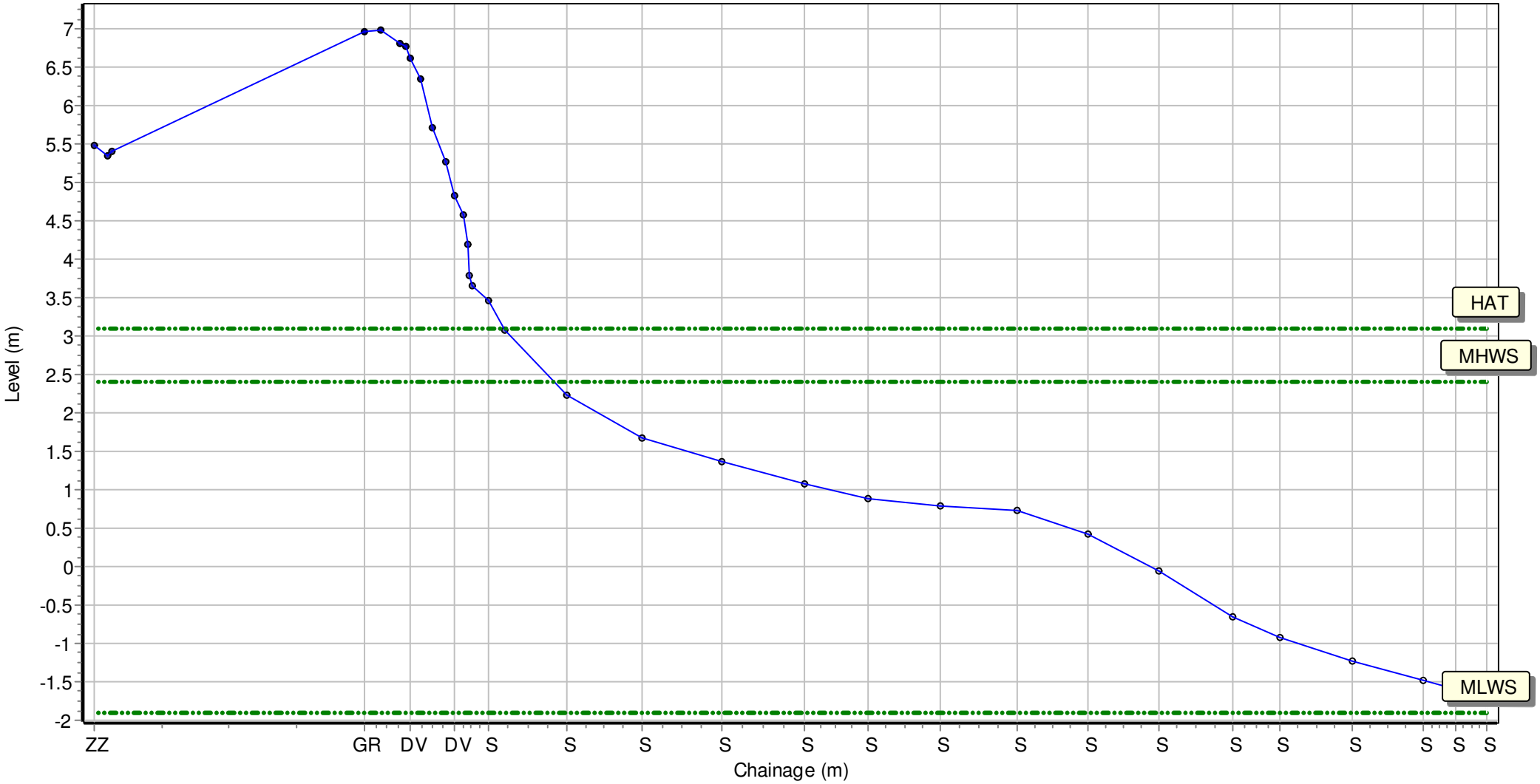
Location: **1aADC16**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

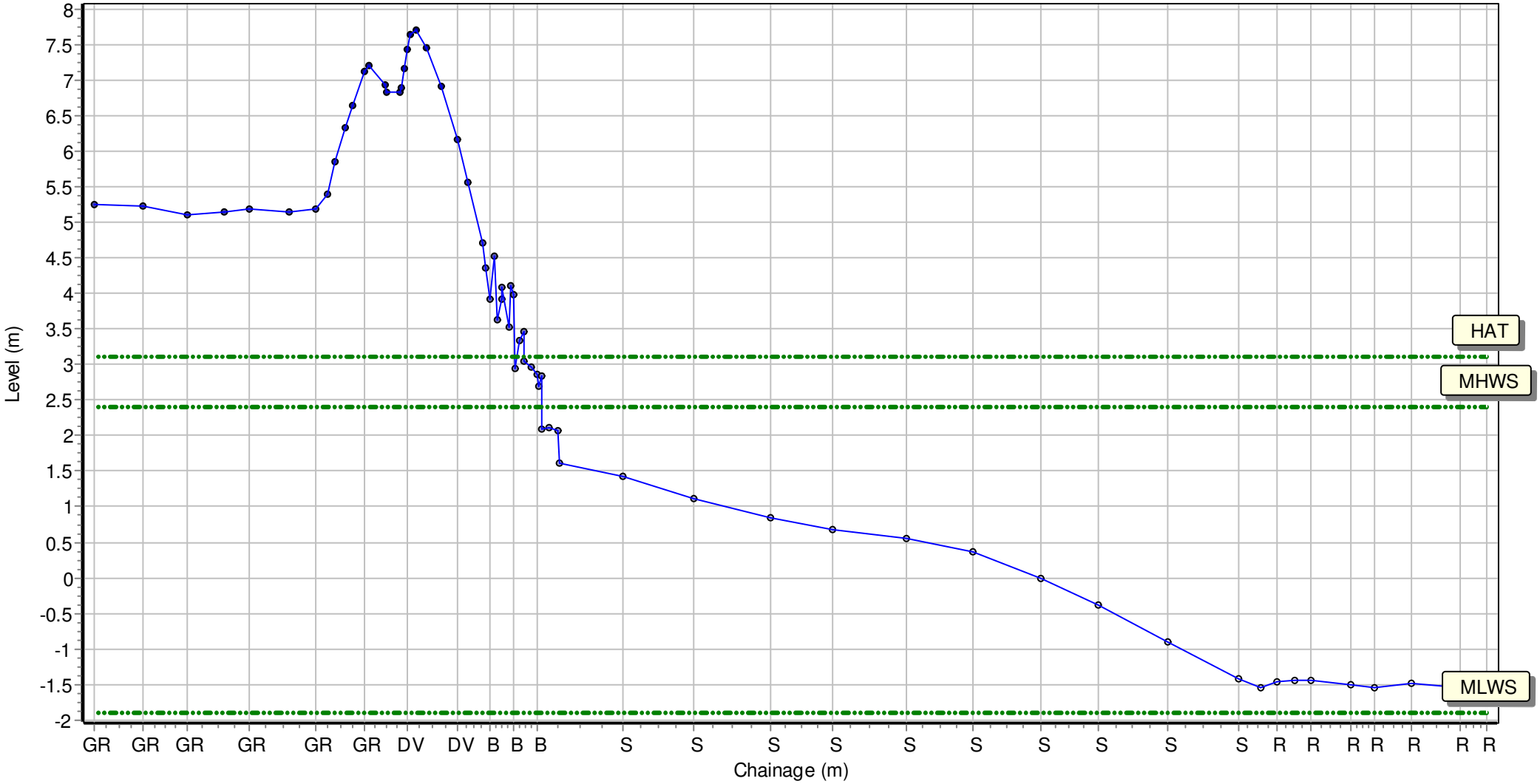
Location: **1aADC16A**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

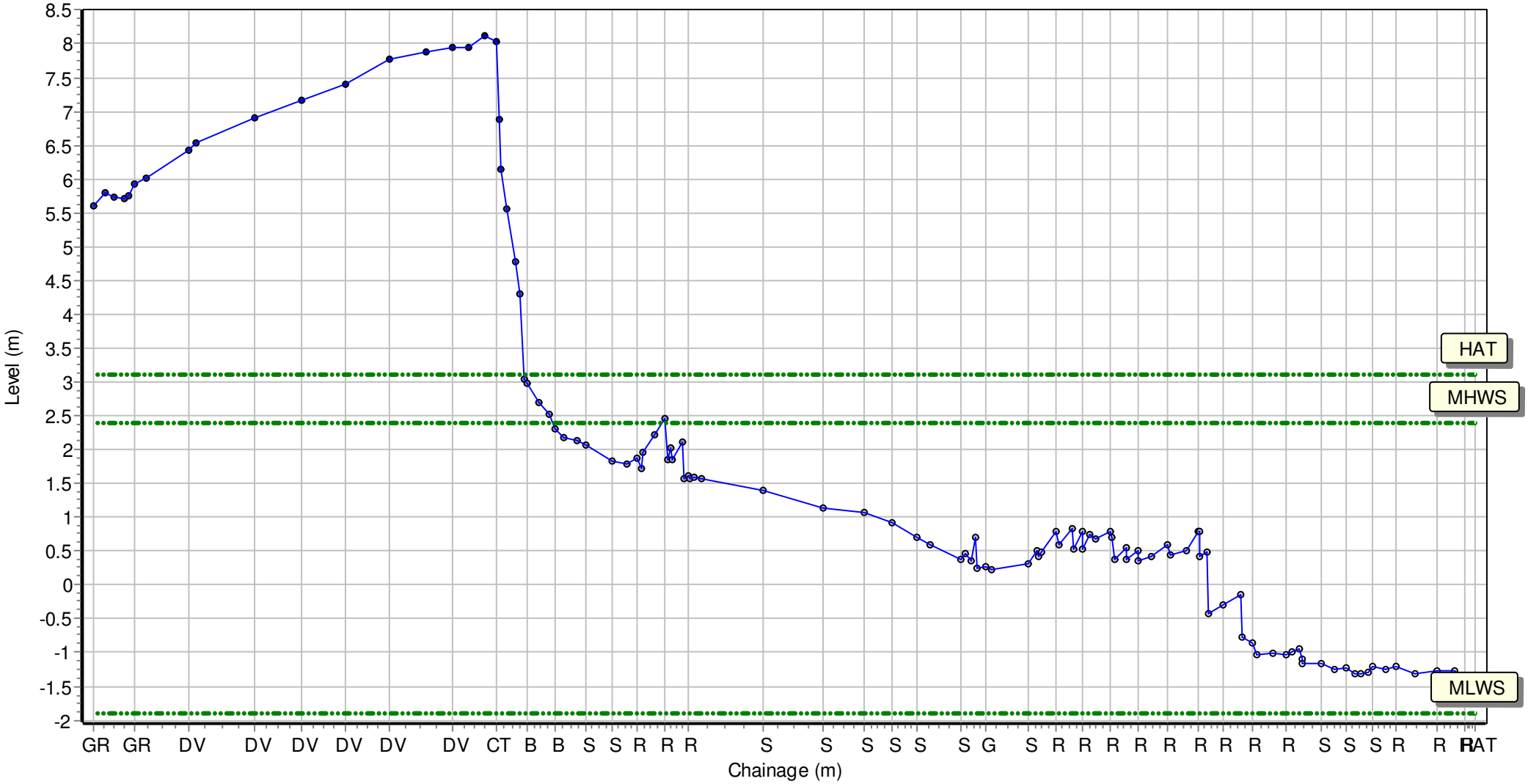
Location: **1aADC16B**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

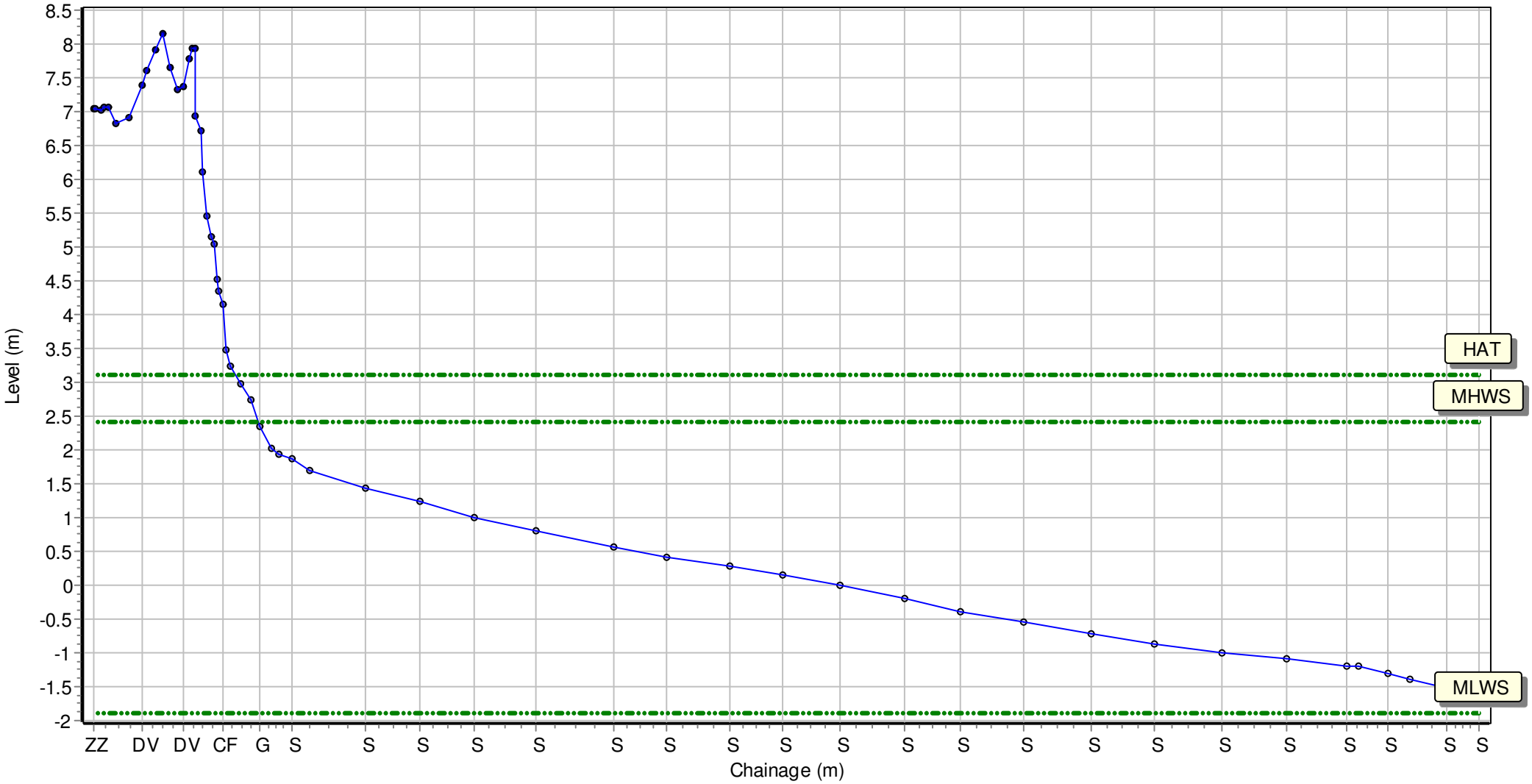
Location: **1aADC17**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

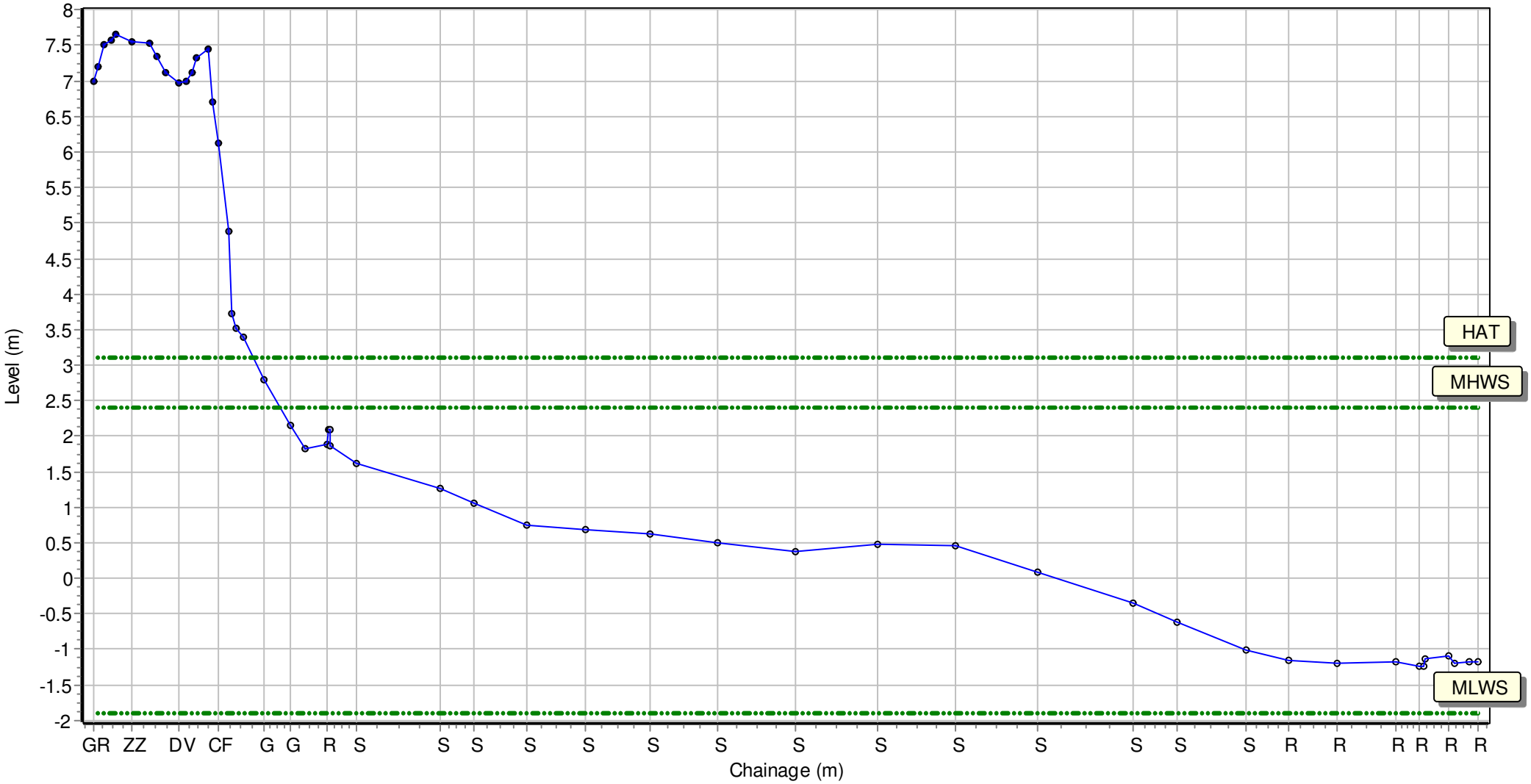
Location: **1aADC17A**

Date: 06/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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




Beach Profiles: 1aADC01
Level (m)
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6.5
6
5.5
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4.5
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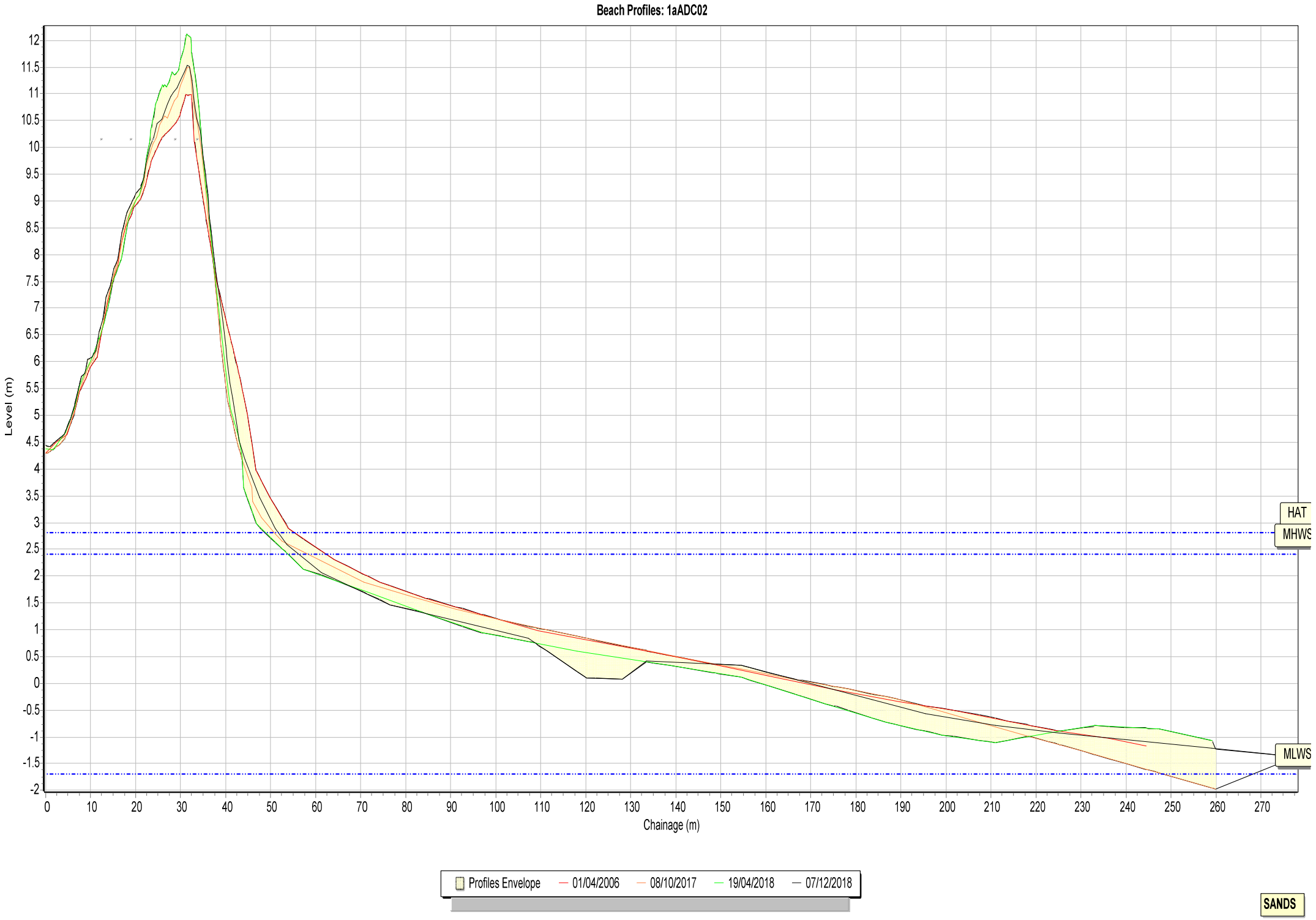
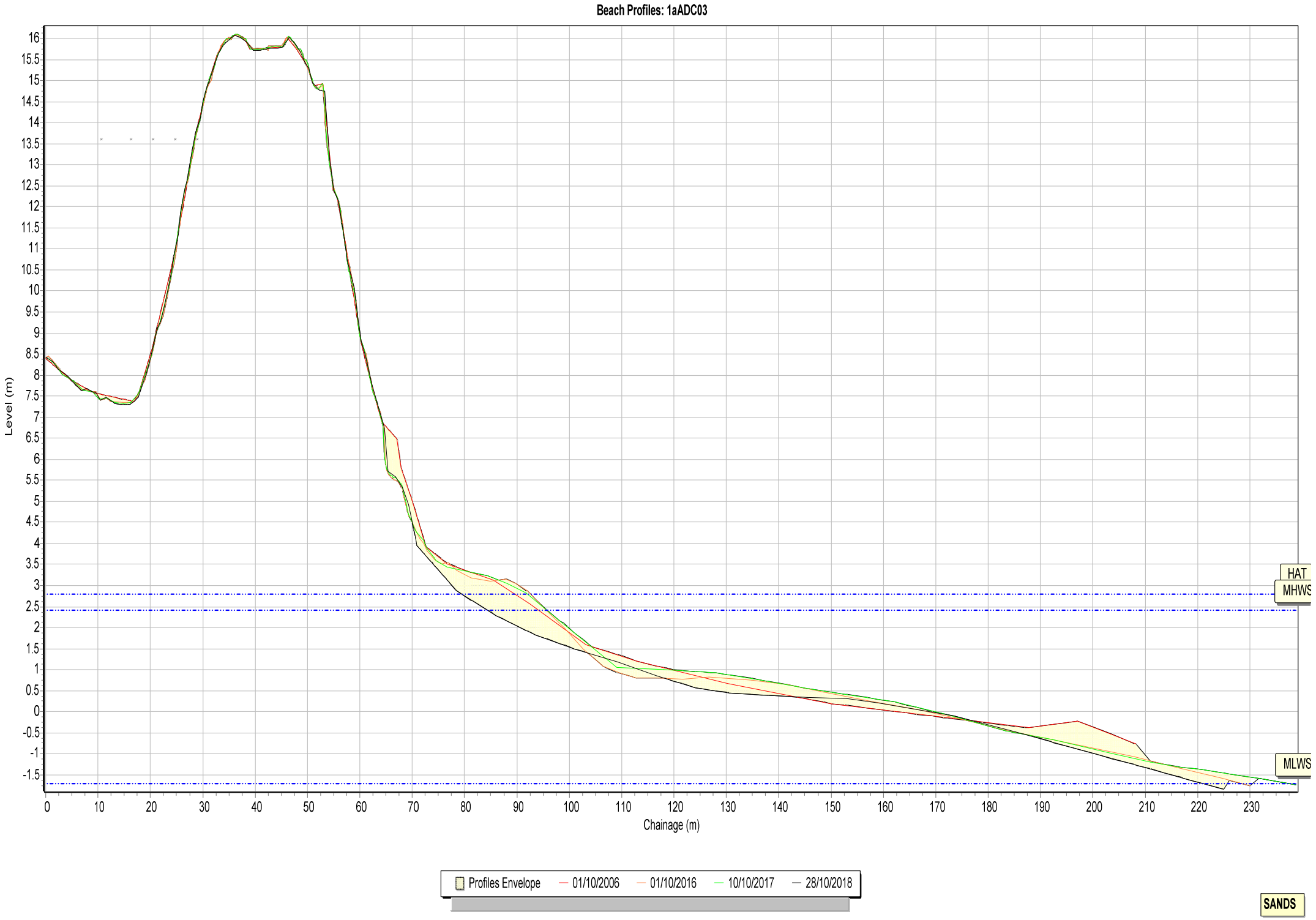
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
08/10/2017
19/04/2018
07/12/2018
SANDS


Beach Profiles: 1aADC02
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
08/10/2017
19/04/2018
07/12/2018
SANDS


Beach Profiles: 1aADC03
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
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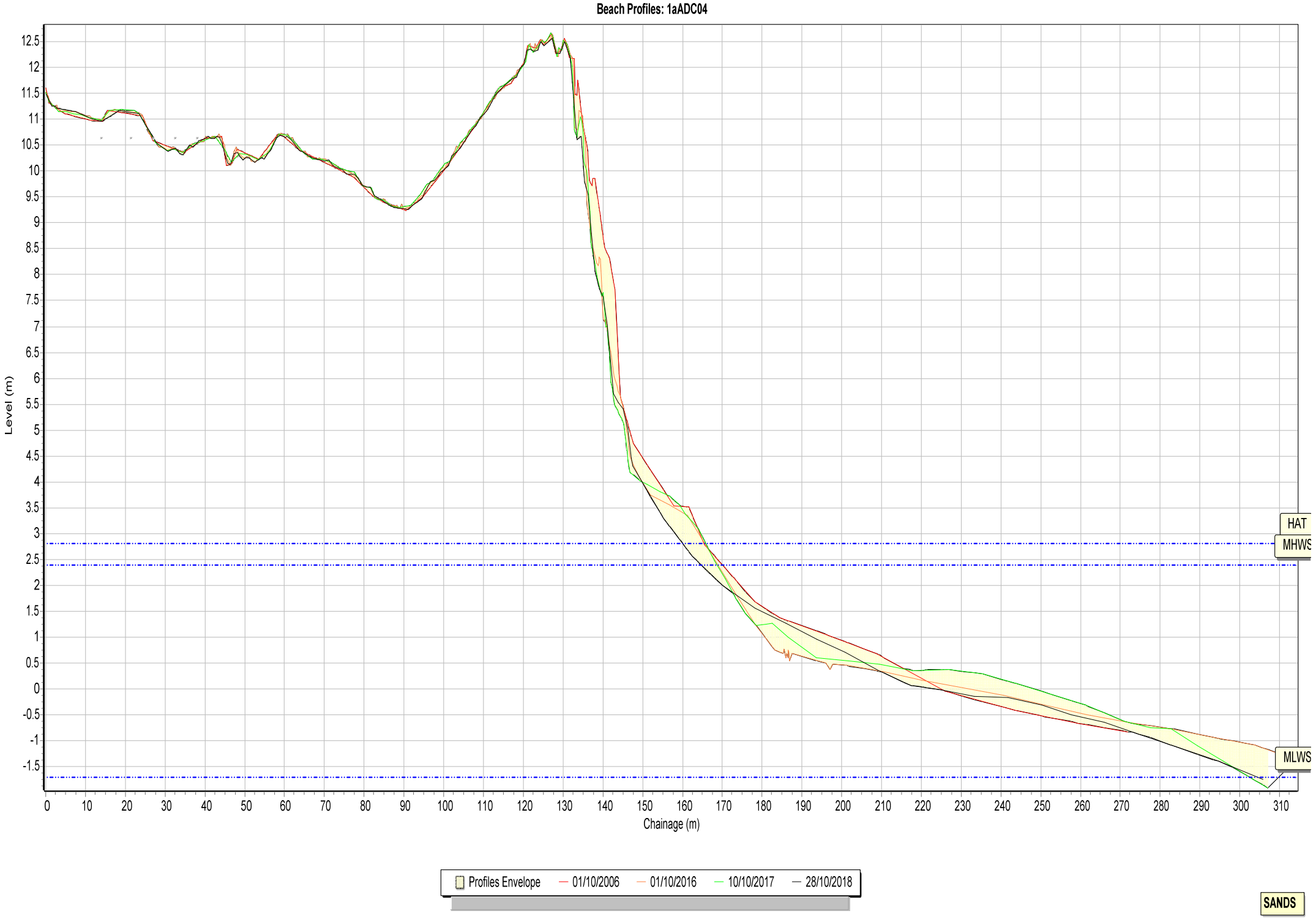
01/10/2016
10/10/2017
28/10/2018
SANDS


Beach Profiles: 1aADC04
Level (m)
Chainage (m)
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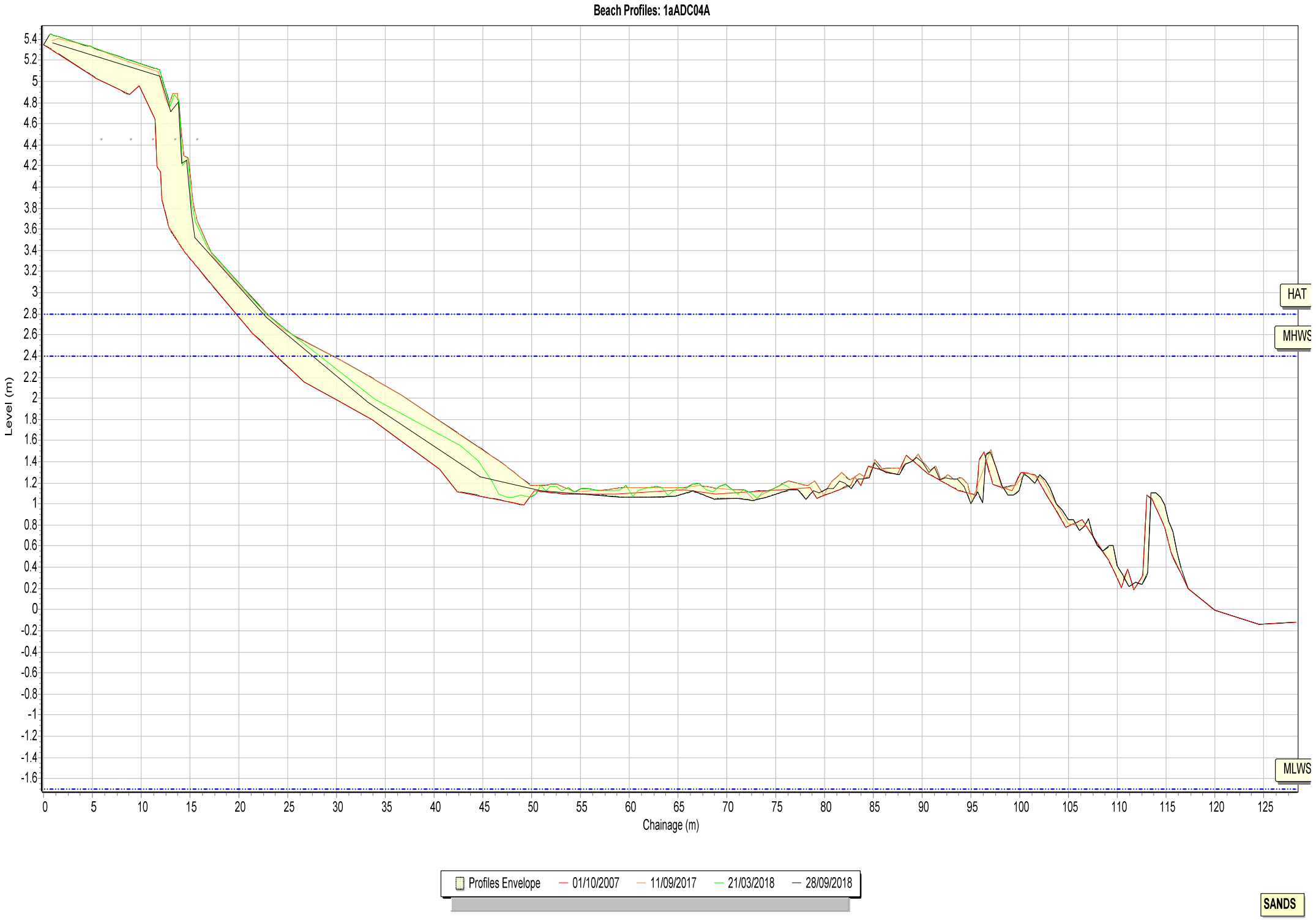
MHWS
MLWS
Profiles Envelope
01/10/2006
01/10/2016
10/10/2017
28/10/2018
SANDS


Beach Profiles: 1aADC04A
Level (m)
Chainage (m)
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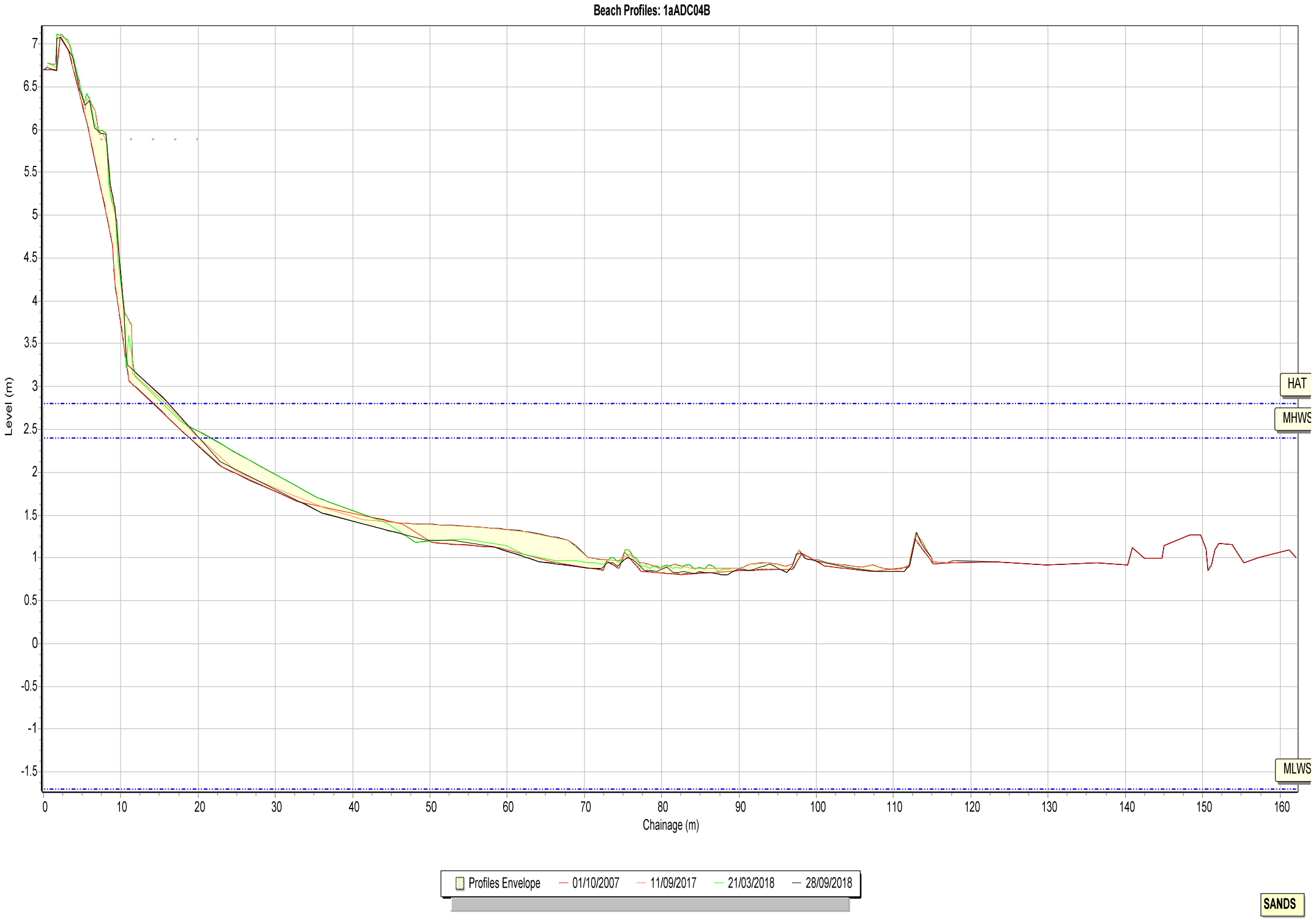
MHWS
MLWS
Profiles Envelope
01/10/2007
11/09/2017
21/03/2018
28/09/2018
SANDS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5.5
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0.5
0
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-1
-1.5
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
90
100
110
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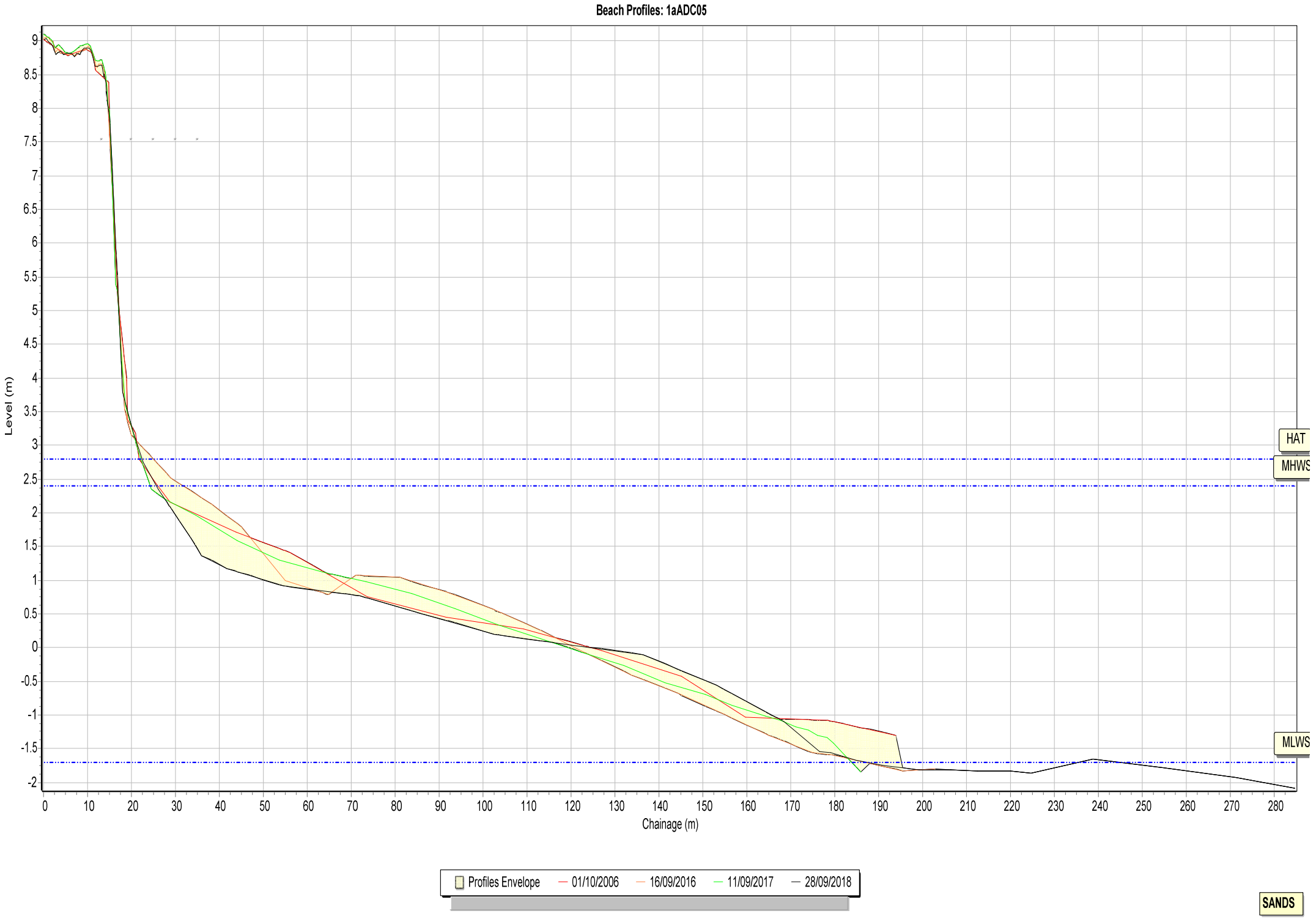
Chainage (m)
Profiles Envelope
01/10/2007
11/09/2017
21/03/2018
28/09/2018
SANDS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Chainage (m)
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MHWS
MLWS
Profiles Envelope
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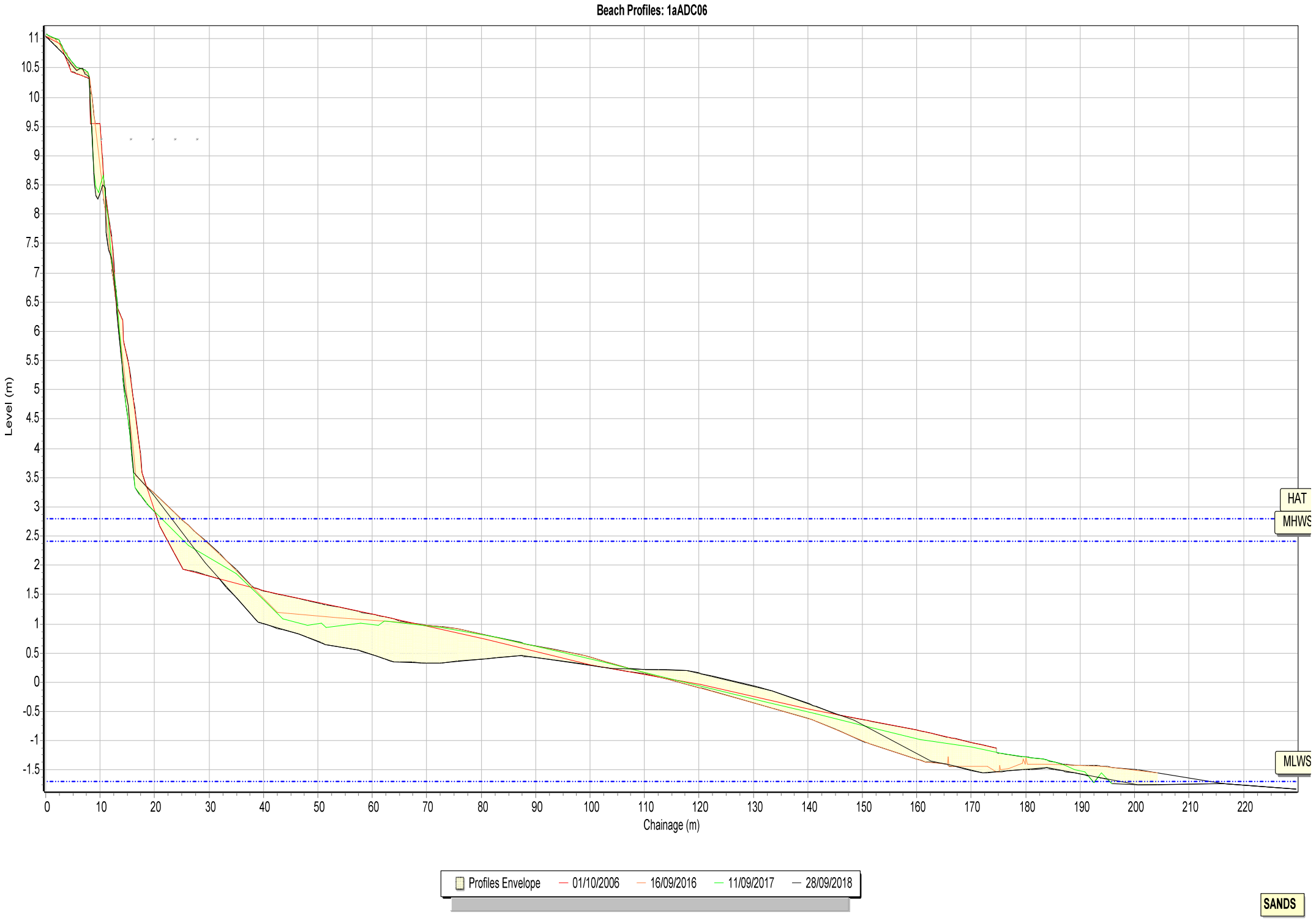
16/09/2016
11/09/2017
28/09/2018
SANDS


Beach Profiles: 1aADC06
Level (m)
Chainage (m)
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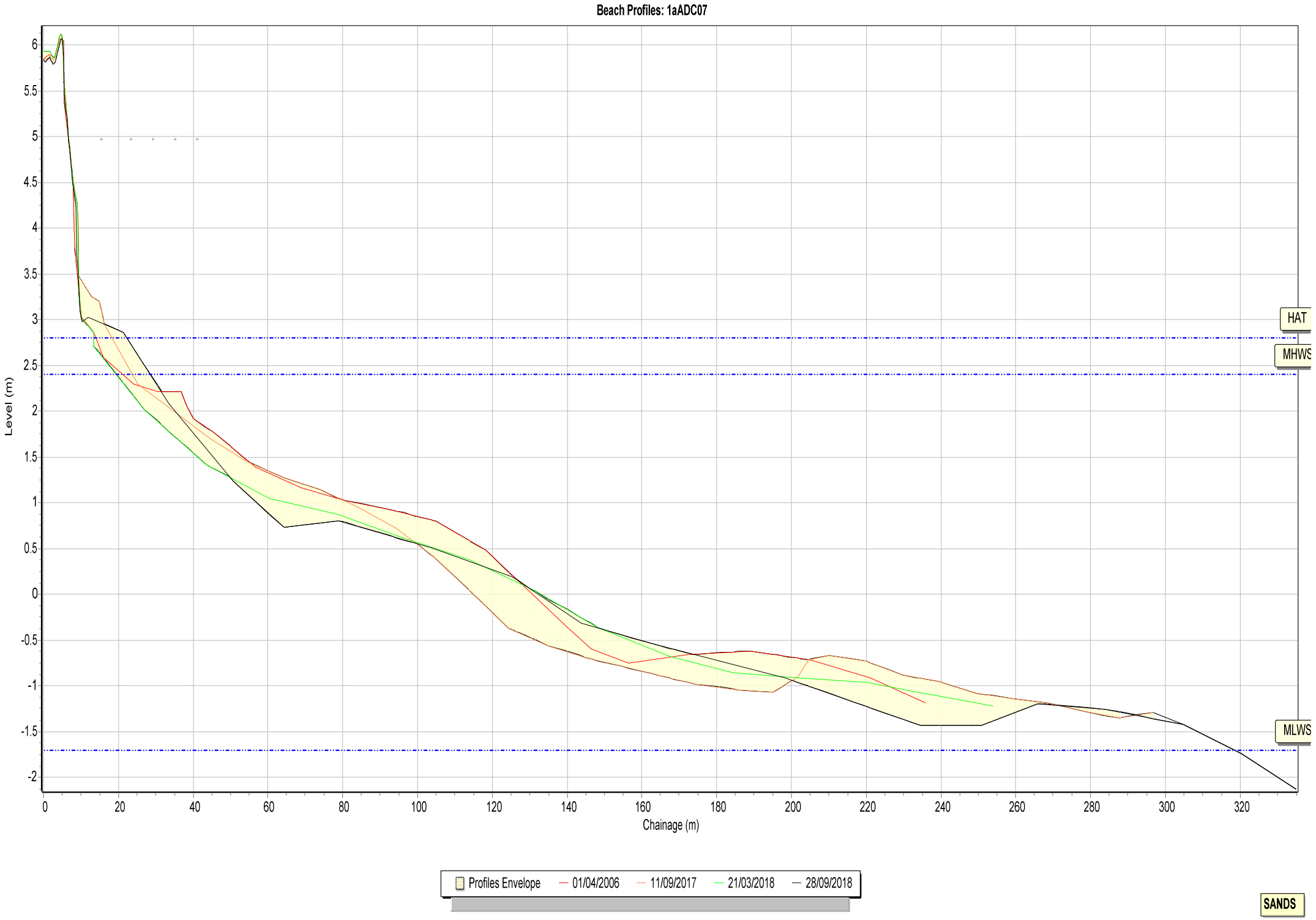
MHWS
MLWS
Profiles Envelope
01/10/2006
16/09/2016
11/09/2017
28/09/2018
SANDS


Beach Profiles: 1aADC07
Level (m)
Chainage (m)
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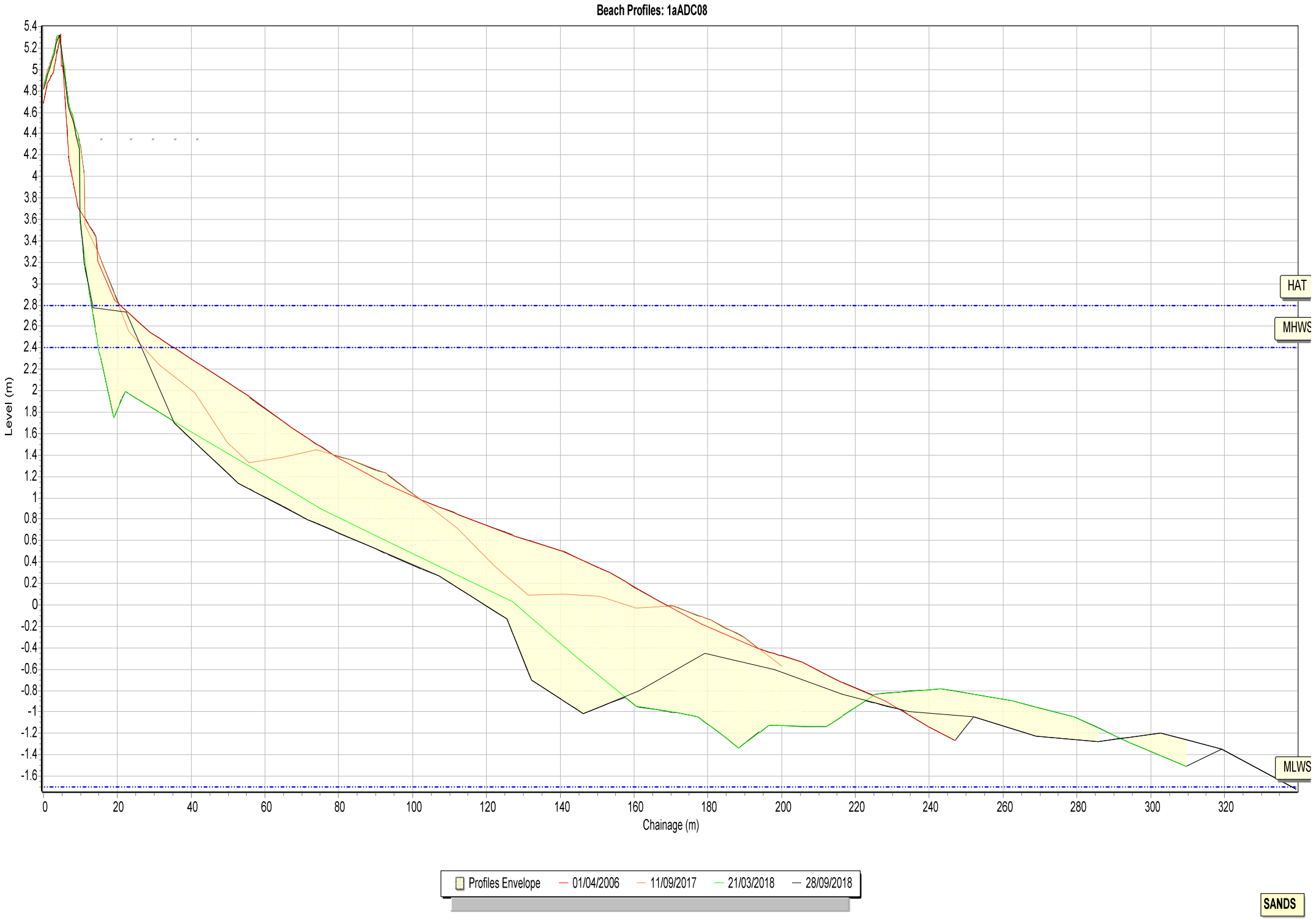
MHWS
MLWS
Profiles Envelope
01/04/2006
11/09/2017
21/03/2018
28/09/2018
SANDS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Level (m)
Chainage (m)
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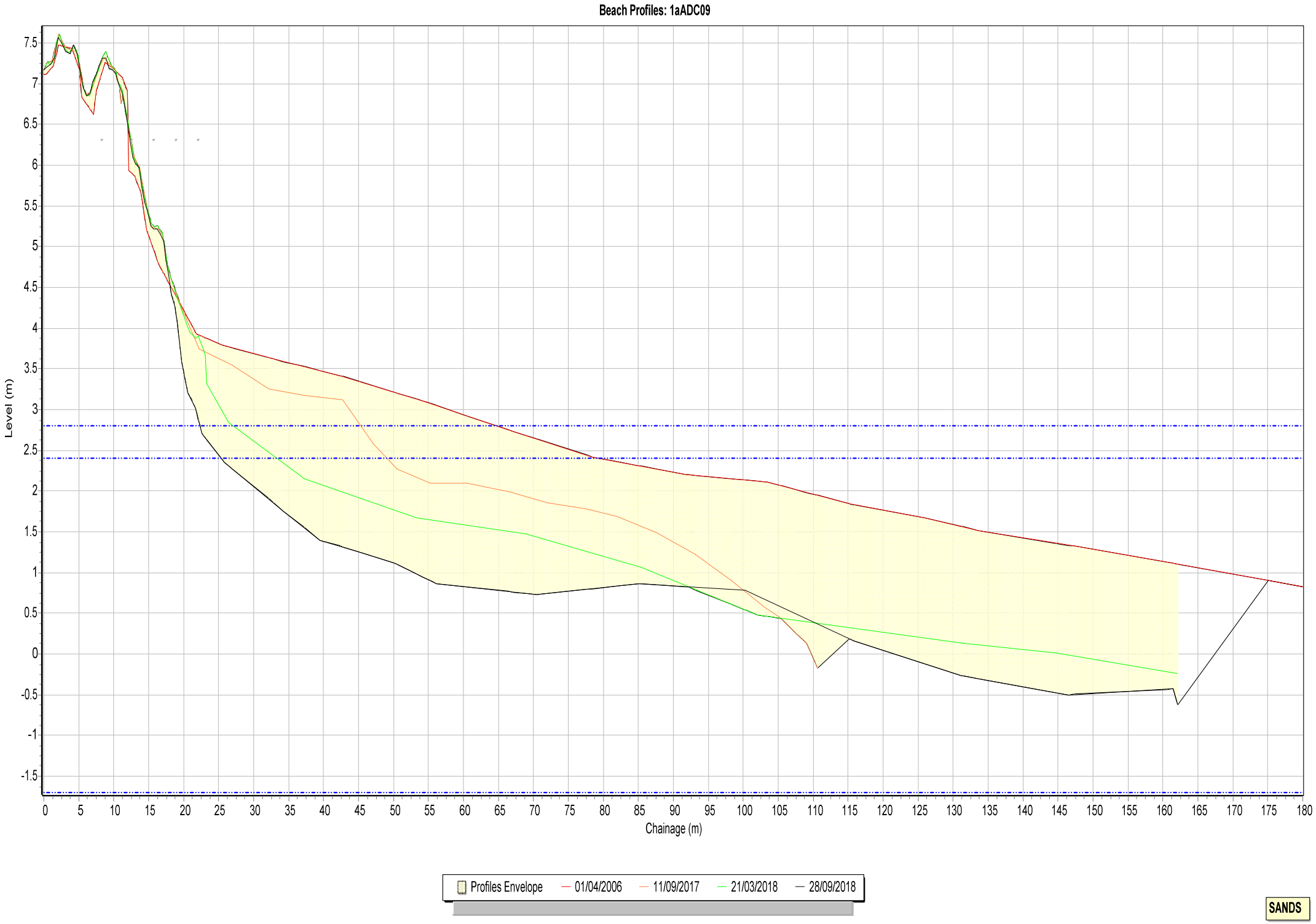
MHWS
MLWS
Profiles Envelope
01/04/2006
11/09/2017
21/03/2018
28/09/2018
SANDS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5.5
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1.5
1
0.5
0
-0.5
-1
-1.5
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180
Chainage (m)
Profiles Envelope
01/04/2006
11/09/2017
21/03/2018
28/09/2018
SANDS


Beach Profiles: 1aADC10
Level (m)
8
7.5
7
6.5
6
5.5
5
4.5
4
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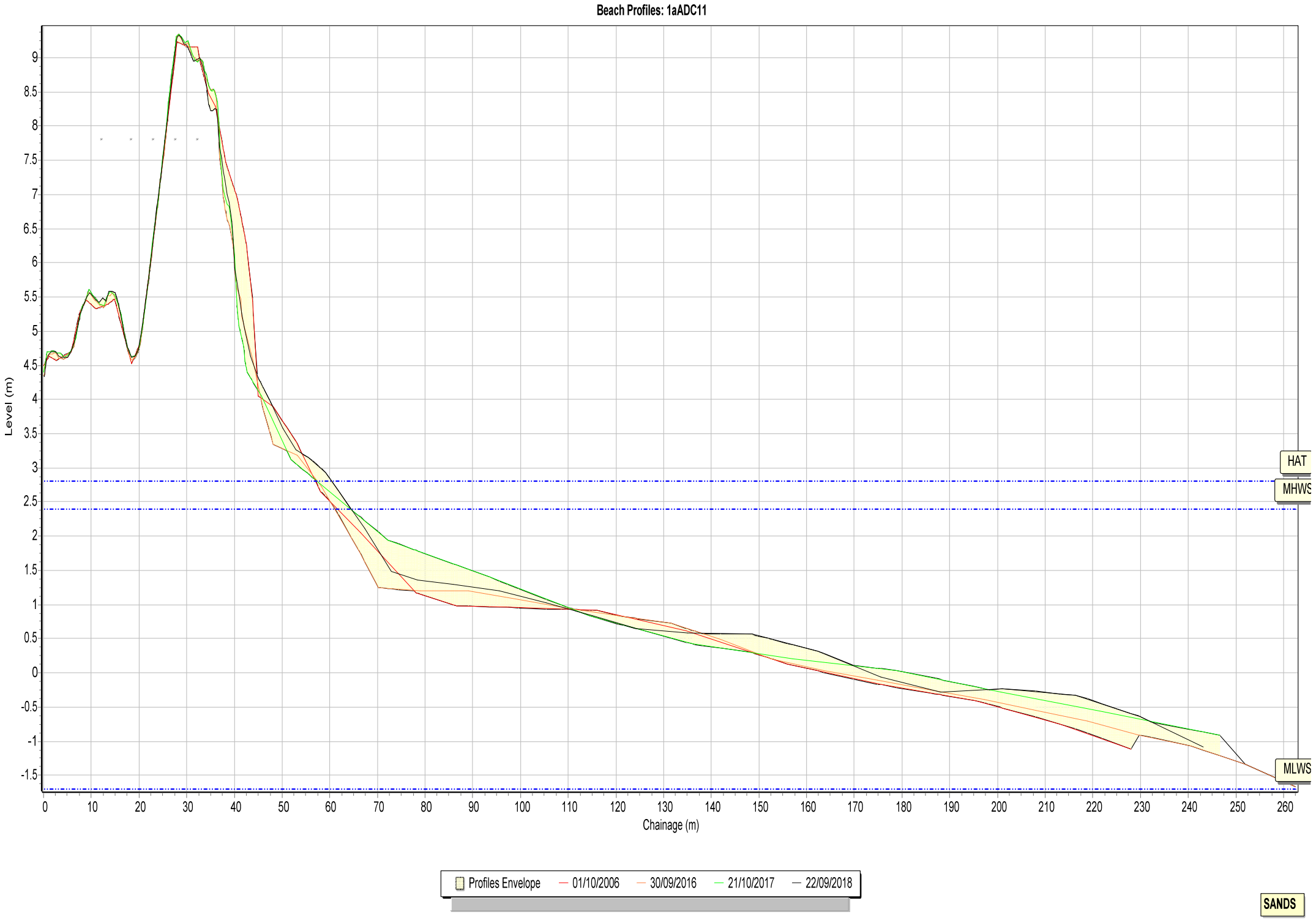
MLWS
Profiles Envelope
01/10/2006
30/09/2016
21/10/2017
22/09/2018
SANDS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Chainage (m)
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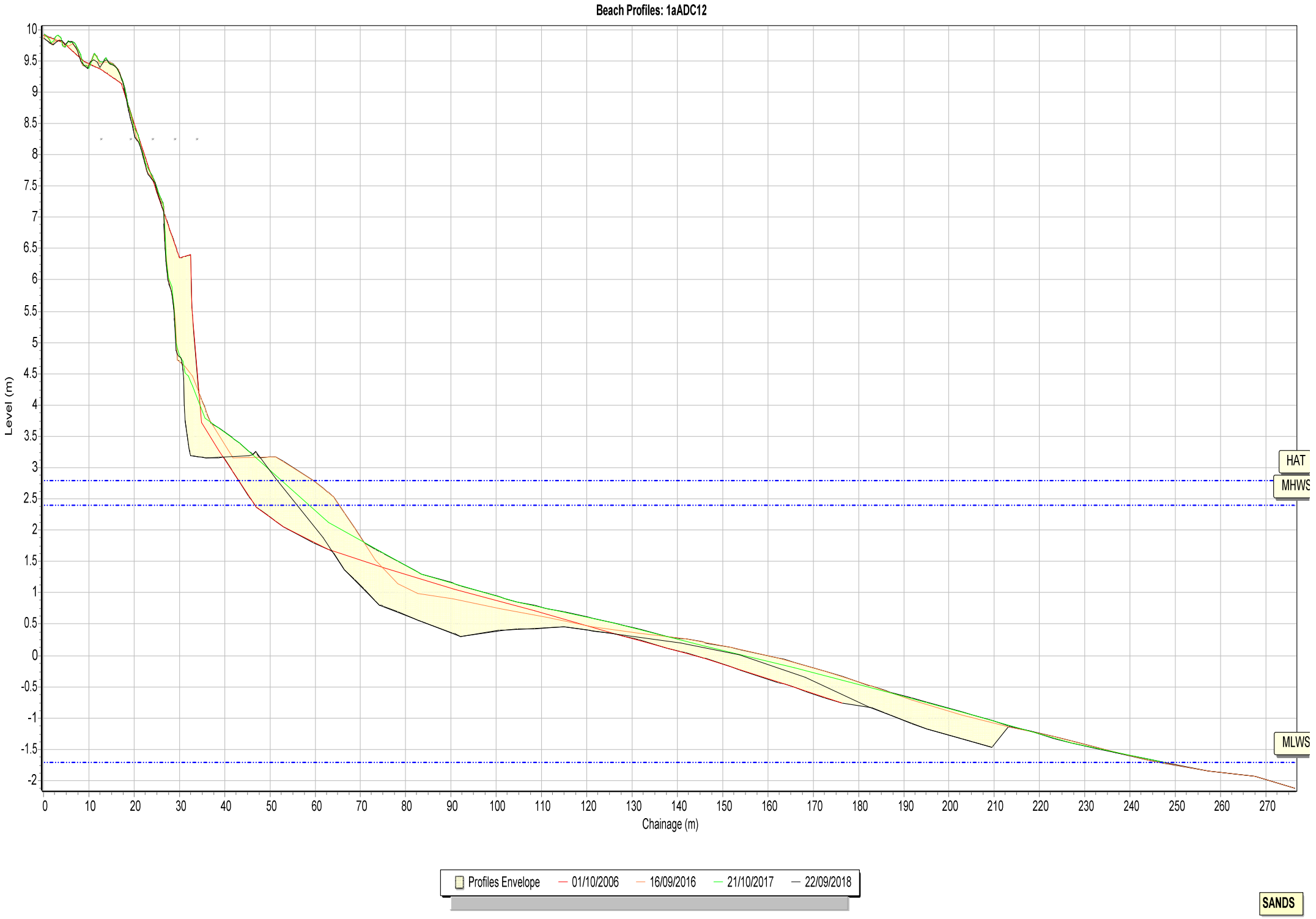
MHWS
MLWS
Profiles Envelope
01/10/2006
30/09/2016
21/10/2017
22/09/2018
SANDS


Beach Profiles: 1aADC12
Level (m)
Chainage (m)
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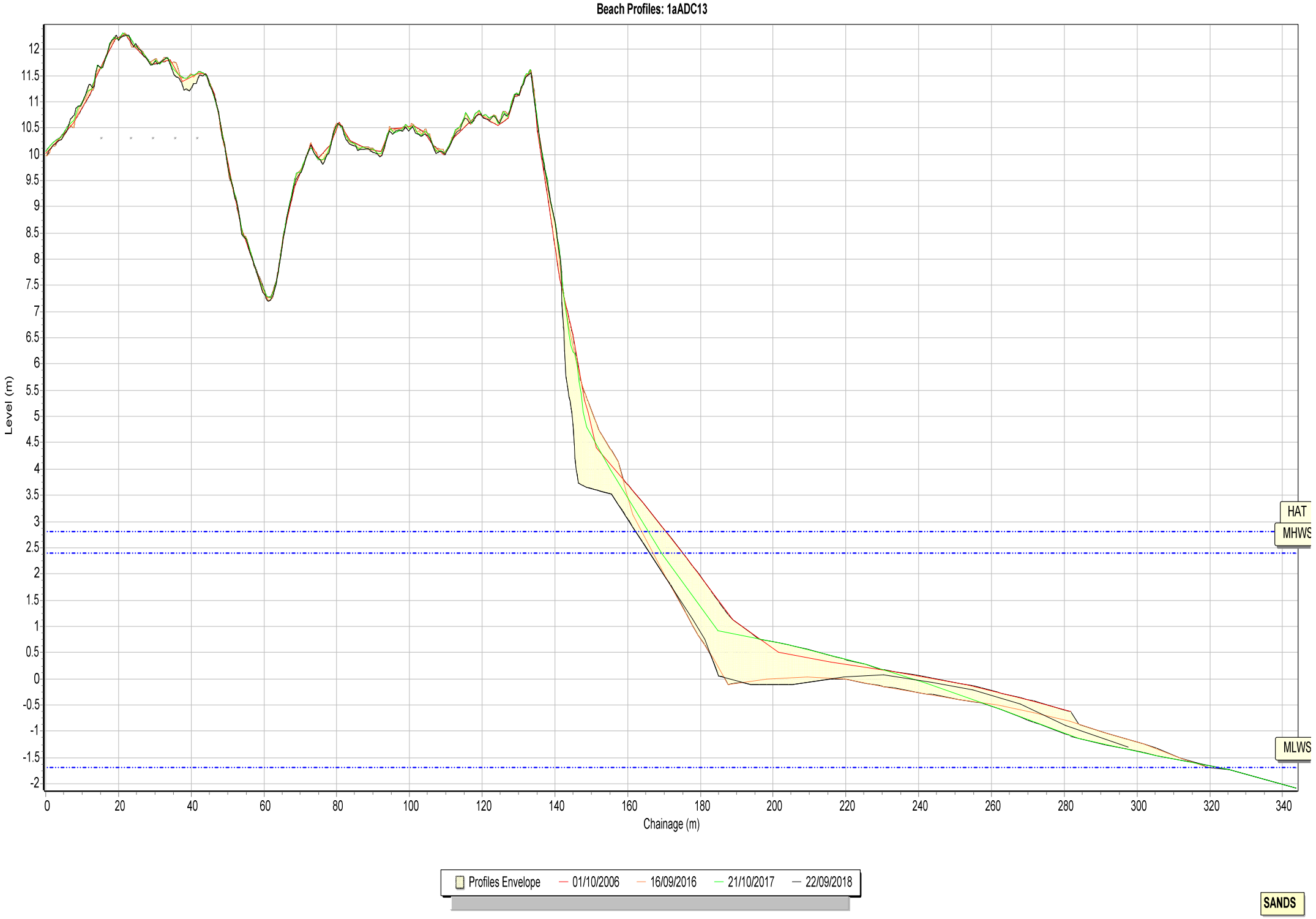
MHWS
MLWS
Profiles Envelope
01/10/2006
16/09/2016
21/10/2017
22/09/2018
SANDS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Level (m)
Chainage (m)
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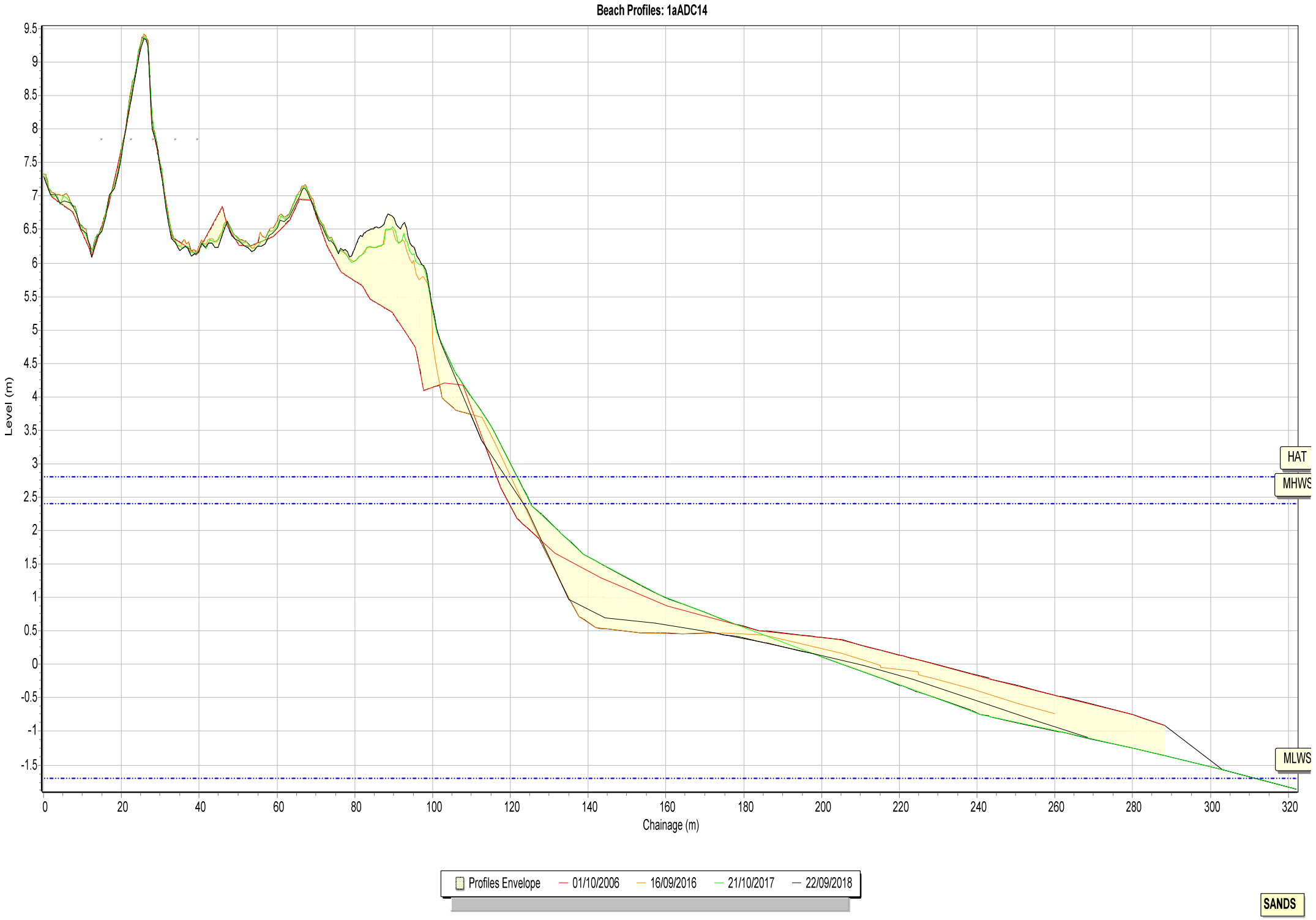
MHWS
MLWS
Profiles Envelope
01/10/2006
16/09/2016
21/10/2017
22/09/2018
SANDS


Beach Profiles: 1aADC14
Level (m)
9.5
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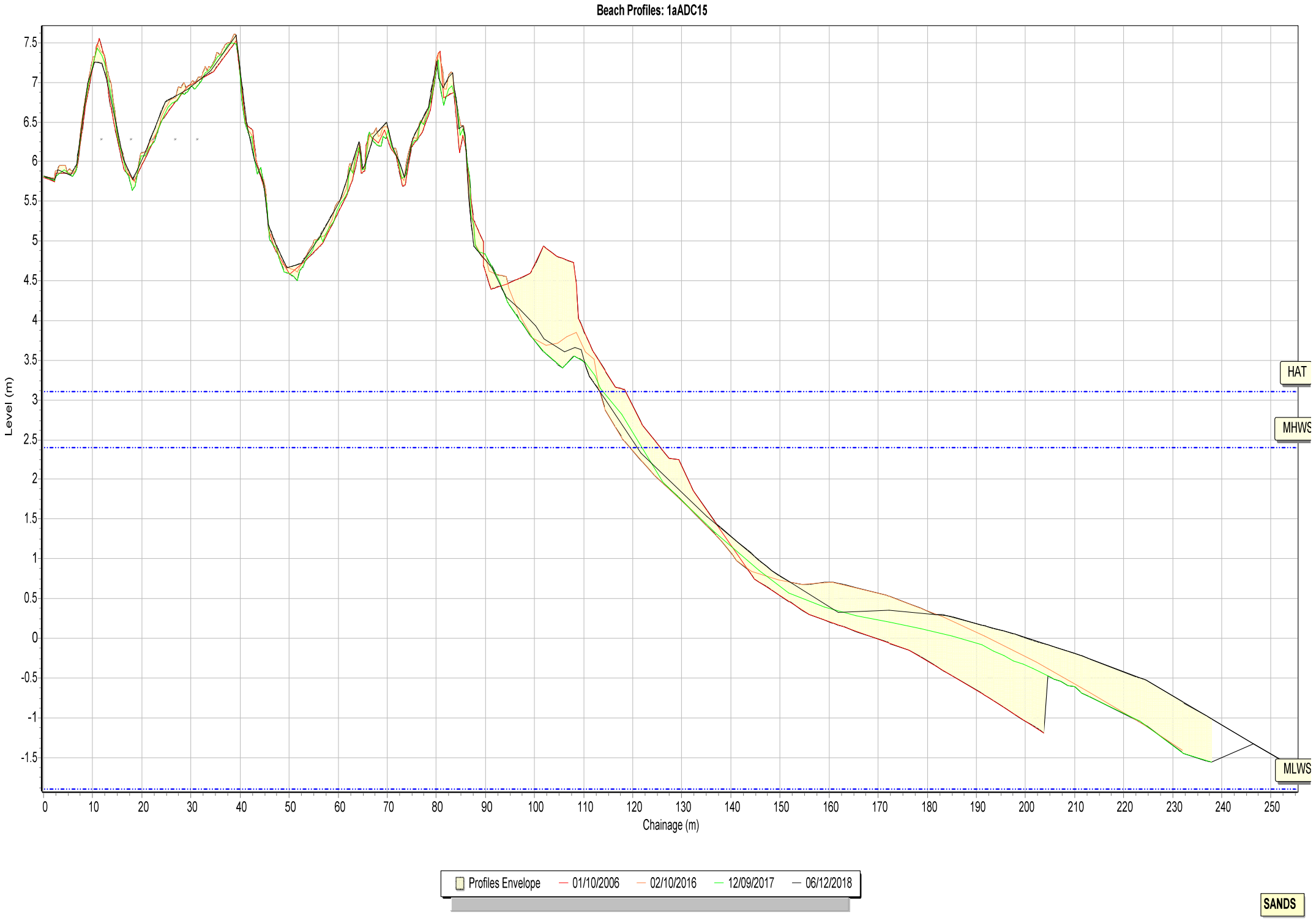
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
16/09/2016
21/10/2017
22/09/2018
SANDS


Beach Profiles: 1aADC15
Level (m)
Chainage (m)
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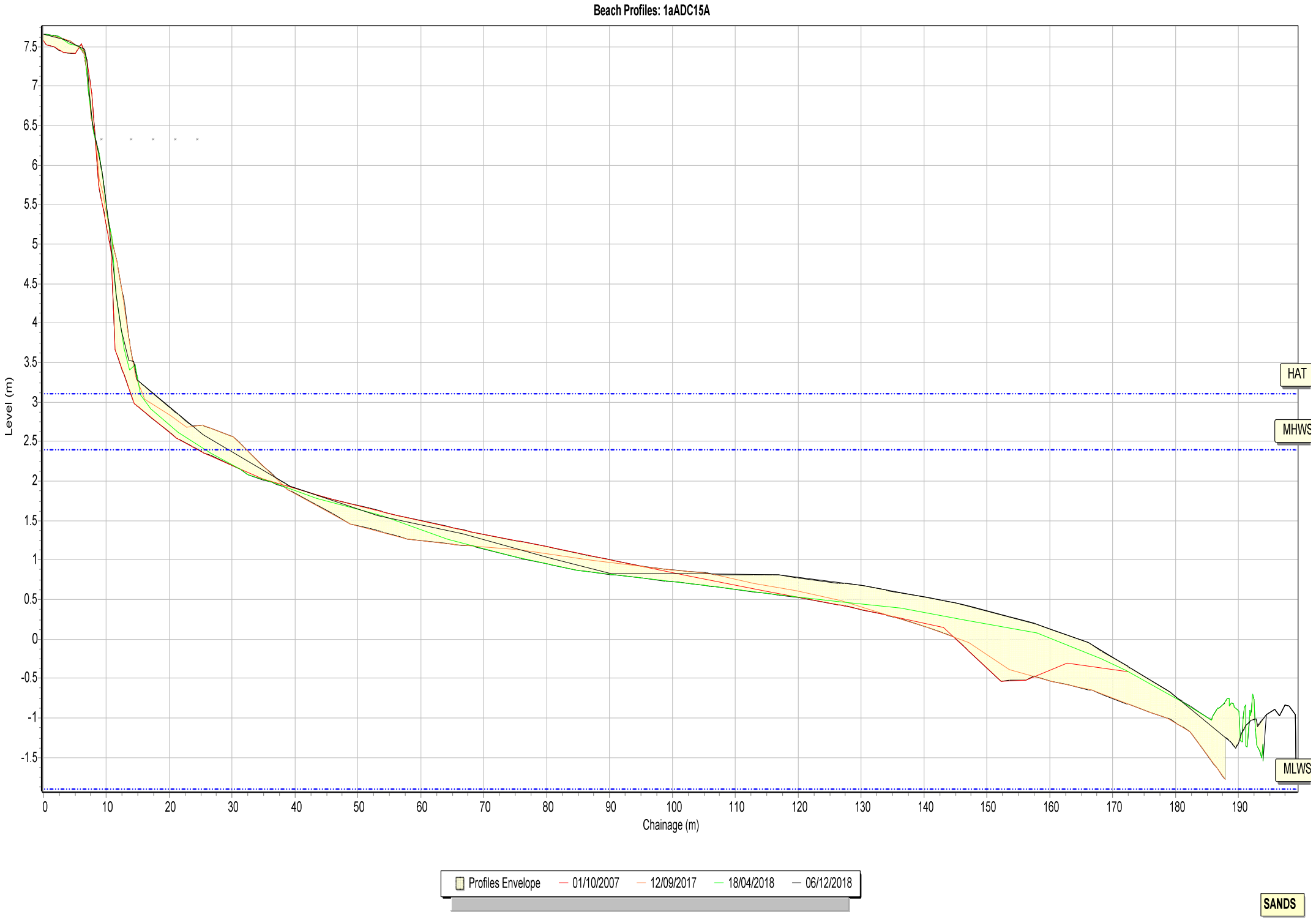
MHWS
MLWS
Profiles Envelope
01/10/2006
02/10/2016
12/09/2017
06/12/2018
SANDS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2
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HAT
MHWS
MLWS
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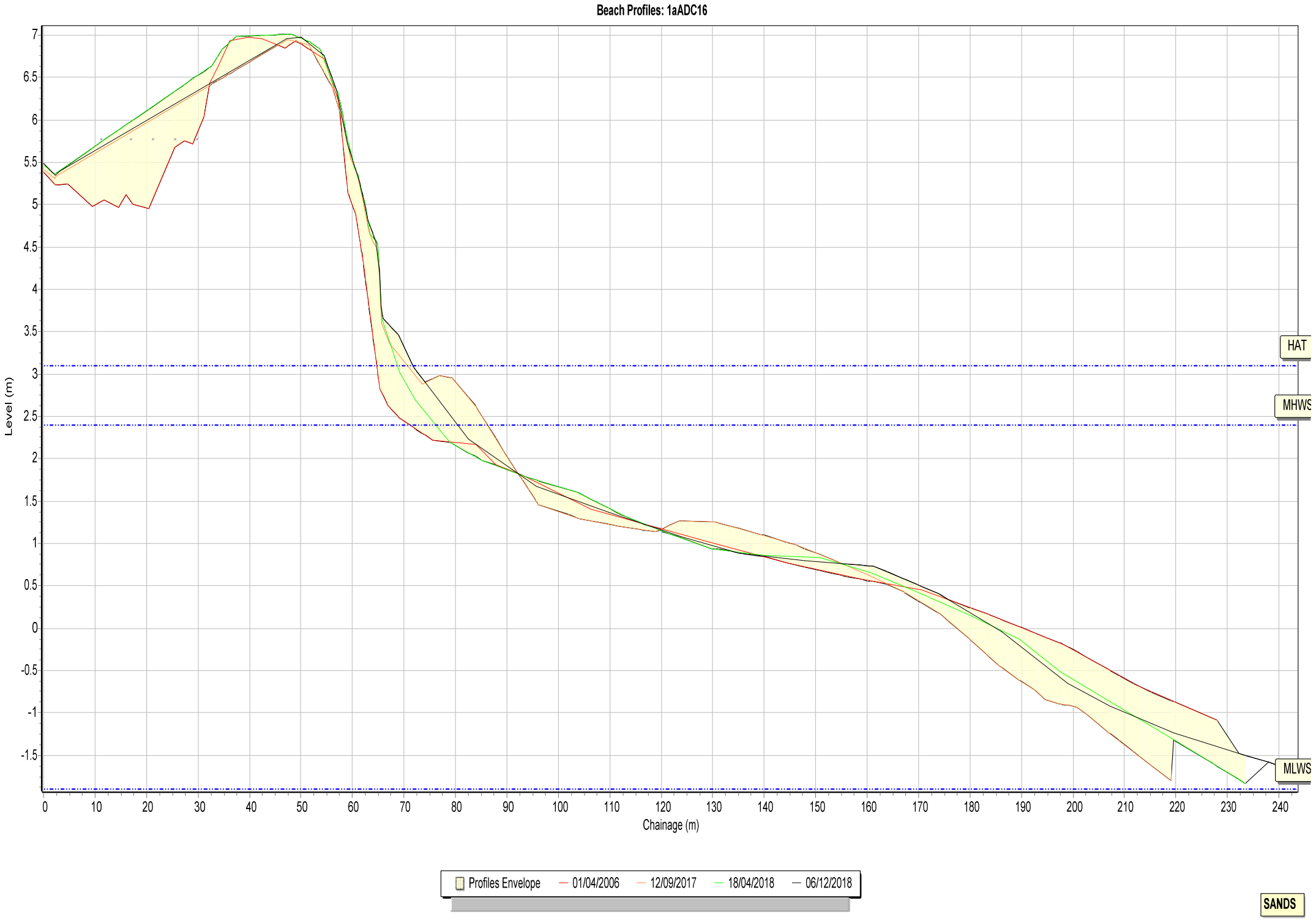
Chainage (m)
Profiles Envelope
01/10/2007
12/09/2017
18/04/2018
06/12/2018
SANDS


Beach Profiles: 1aADC16
Level (m)
Chainage (m)
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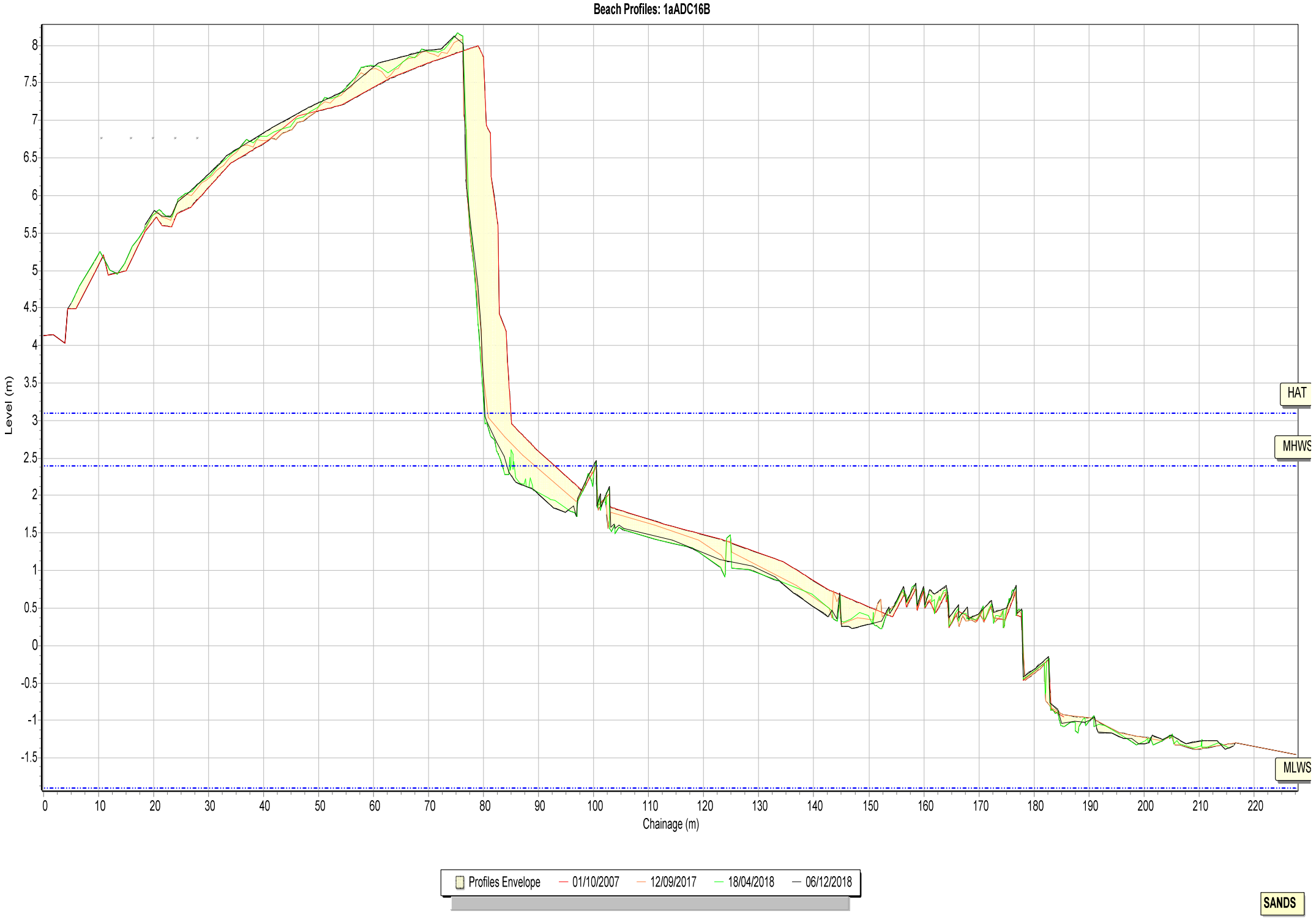
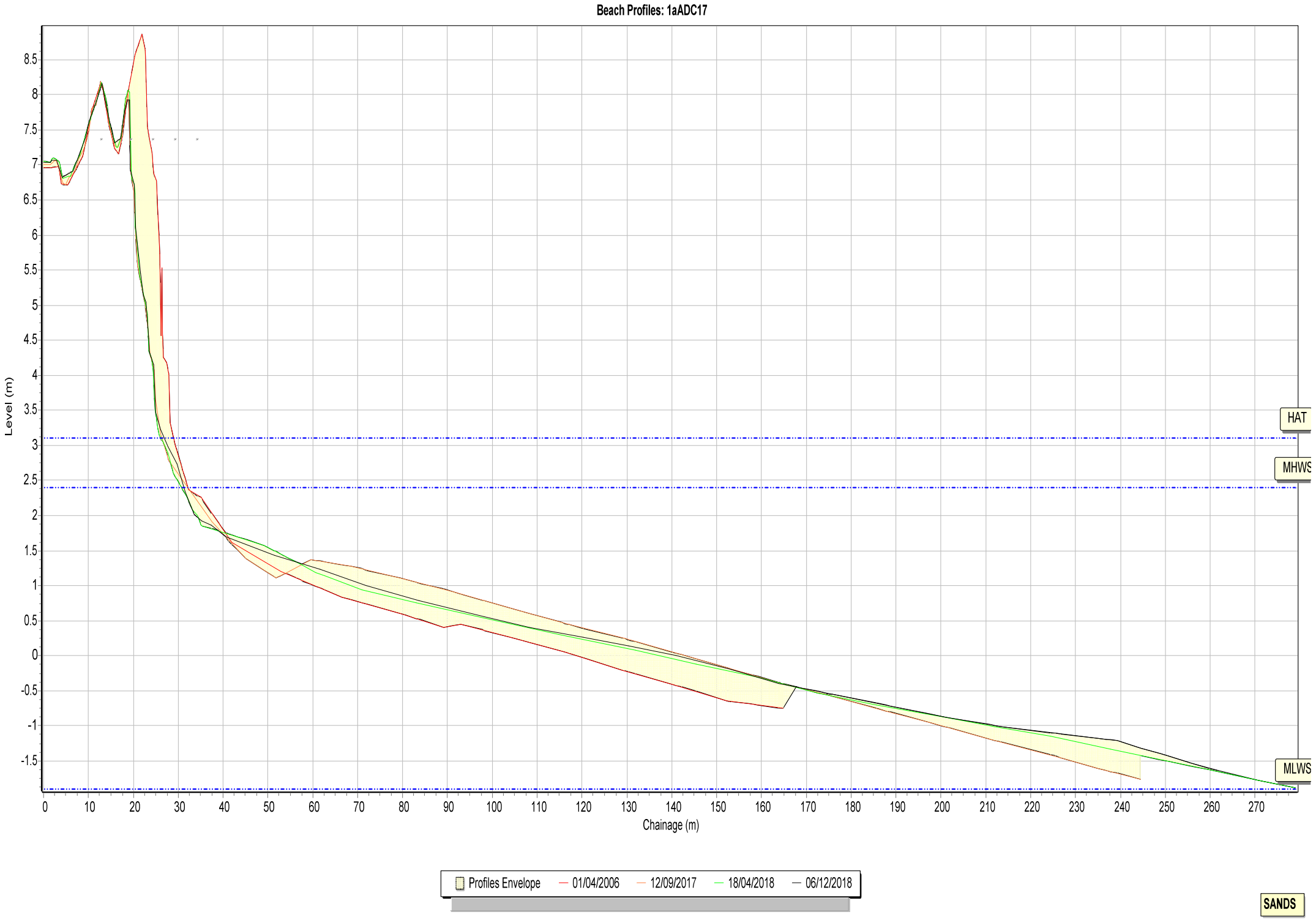
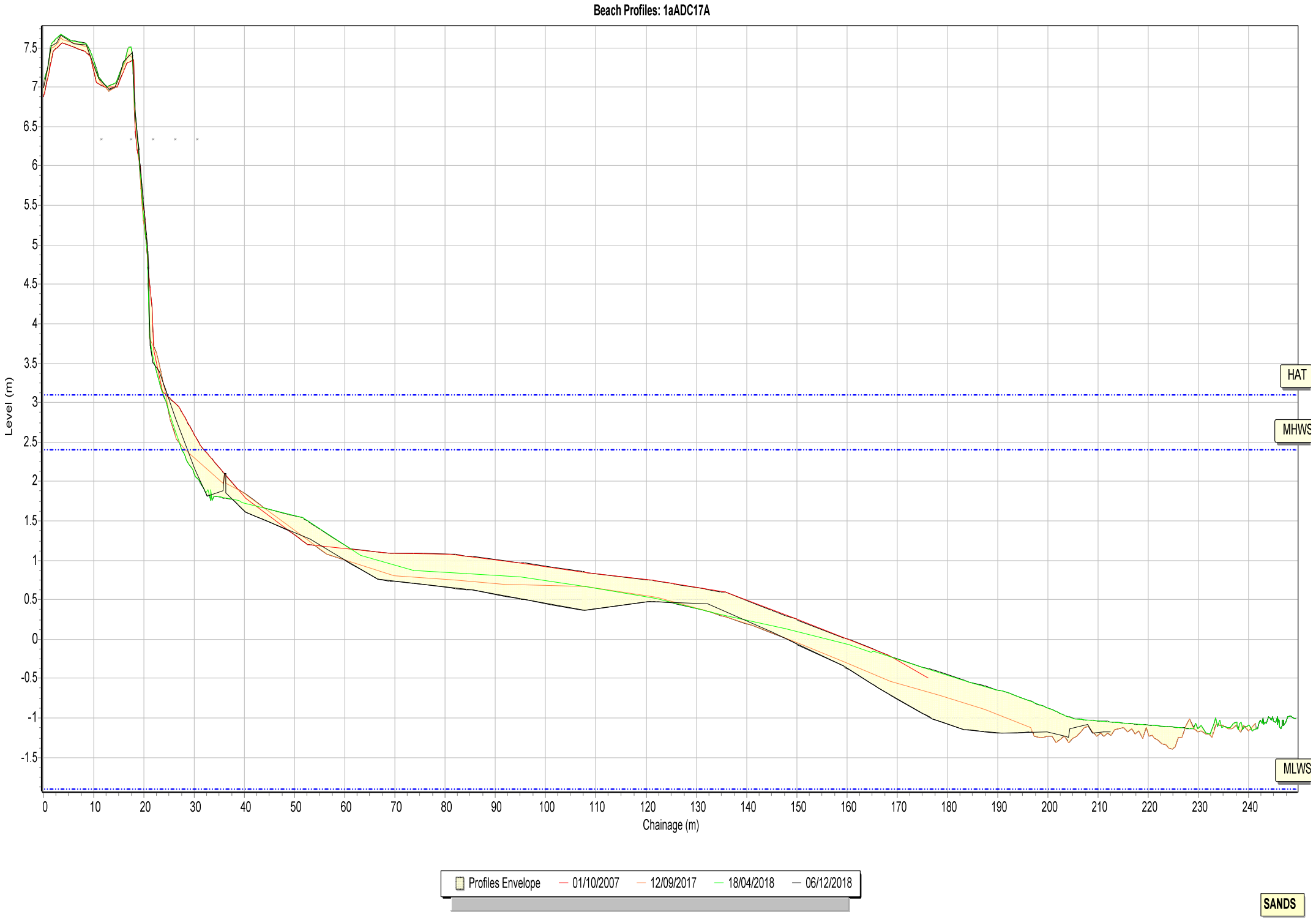
MHWS
MLWS
Profiles Envelope
01/04/2006
12/09/2017
18/04/2018
06/12/2018
SANDS


Beach Profiles: 1aADC16A
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2007
12/09/2017
18/04/2018
06/12/2018
SANDS


Beach Profiles: 1aADC16B
Level (m)
8
7.5
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
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
Chainage (m)
Profiles Envelope
01/10/2007
12/09/2017
18/04/2018
06/12/2018
SANDS


Beach Profiles: 1aADC17
Level (m)
8.5
8
7.5
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
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
Chainage (m)
Profiles Envelope
01/04/2006
12/09/2017
18/04/2018
06/12/2018
SANDS


Beach Profiles: 1aADC17A
Level (m)
7.5
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
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
Chainage (m)
Profiles Envelope
01/10/2007
12/09/2017
18/04/2018
06/12/2018
SANDS

Beach Profile

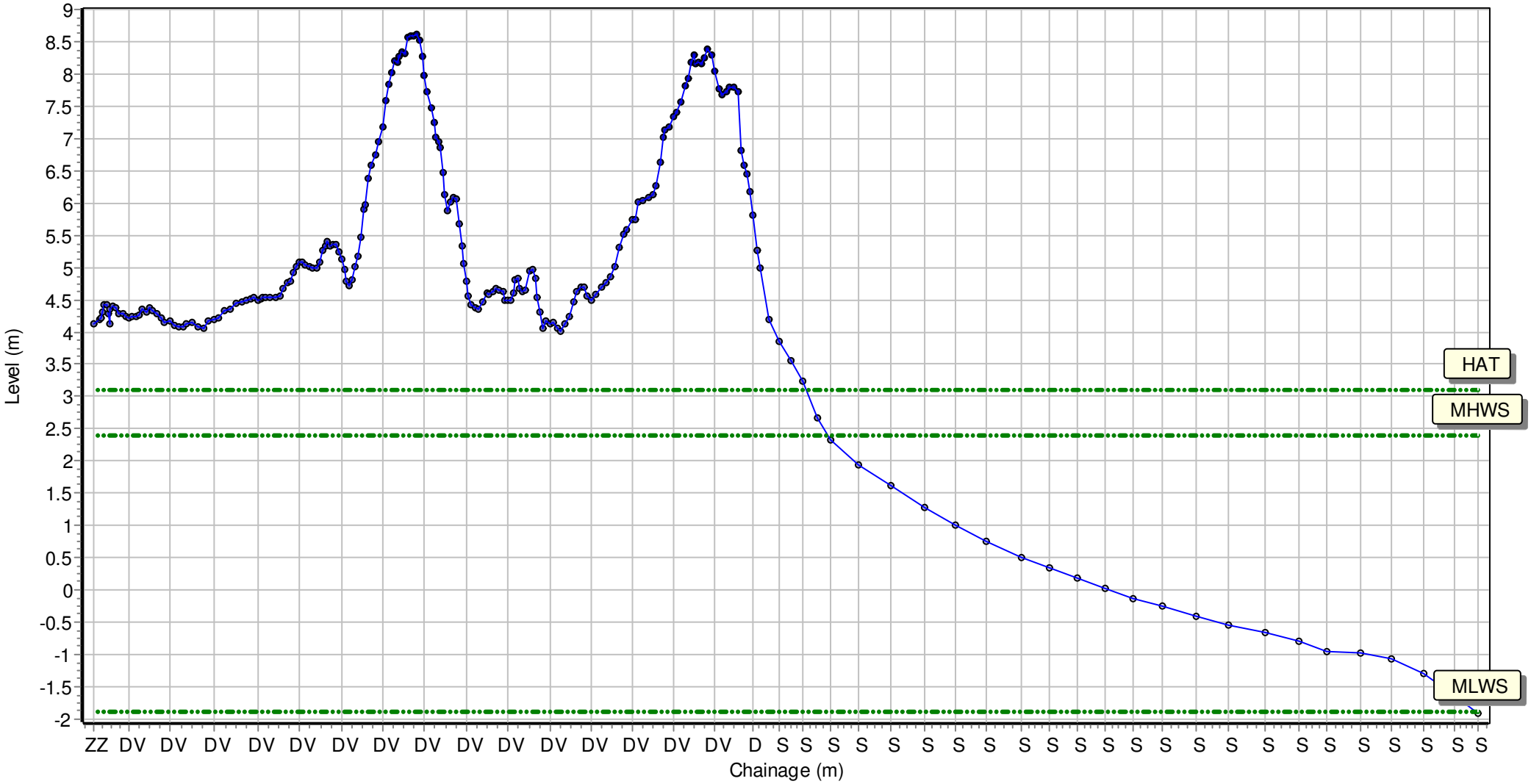
Location: **1aCMBC01**

Date: 24/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

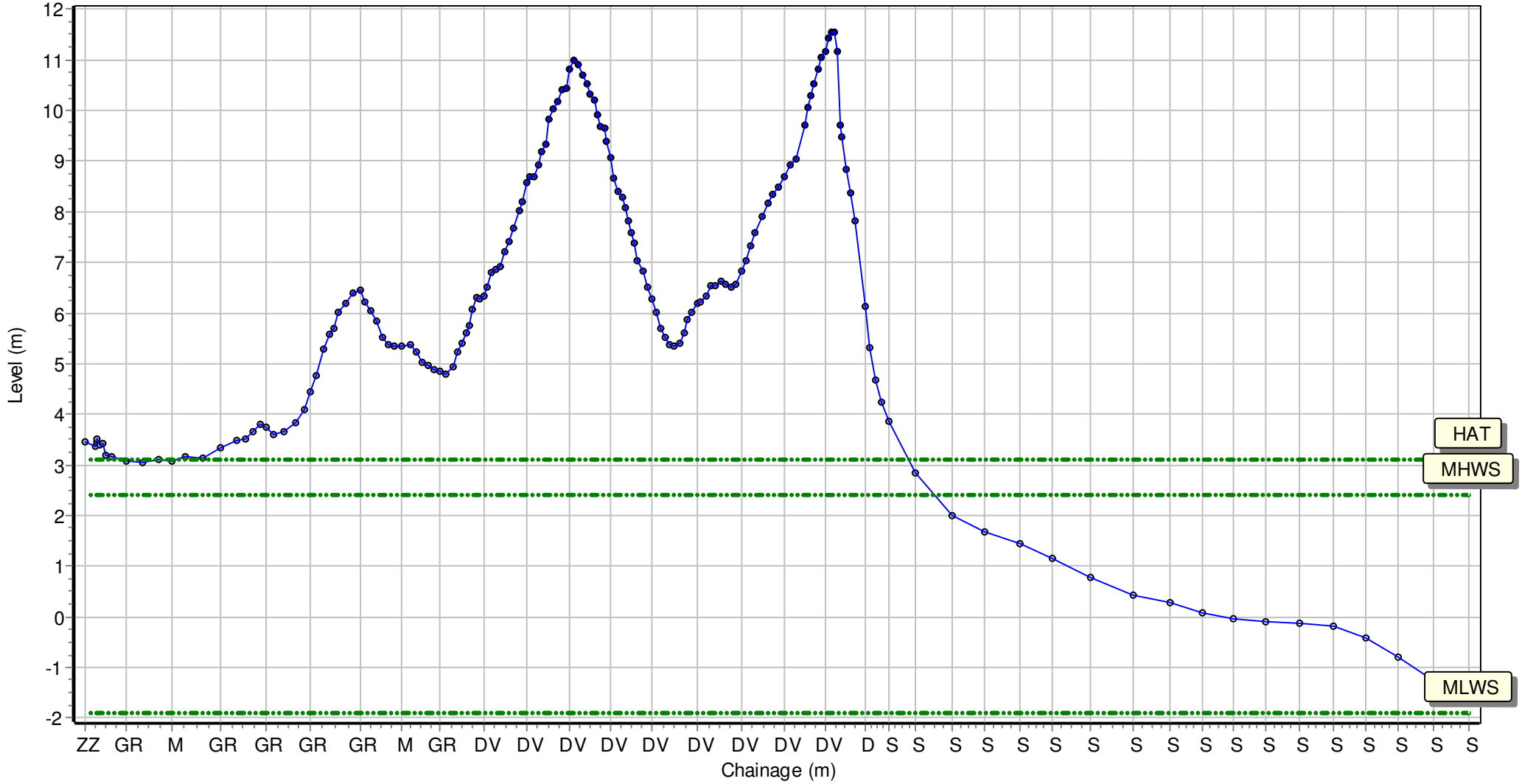
Location: **1aCMBC02**

Date: 24/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

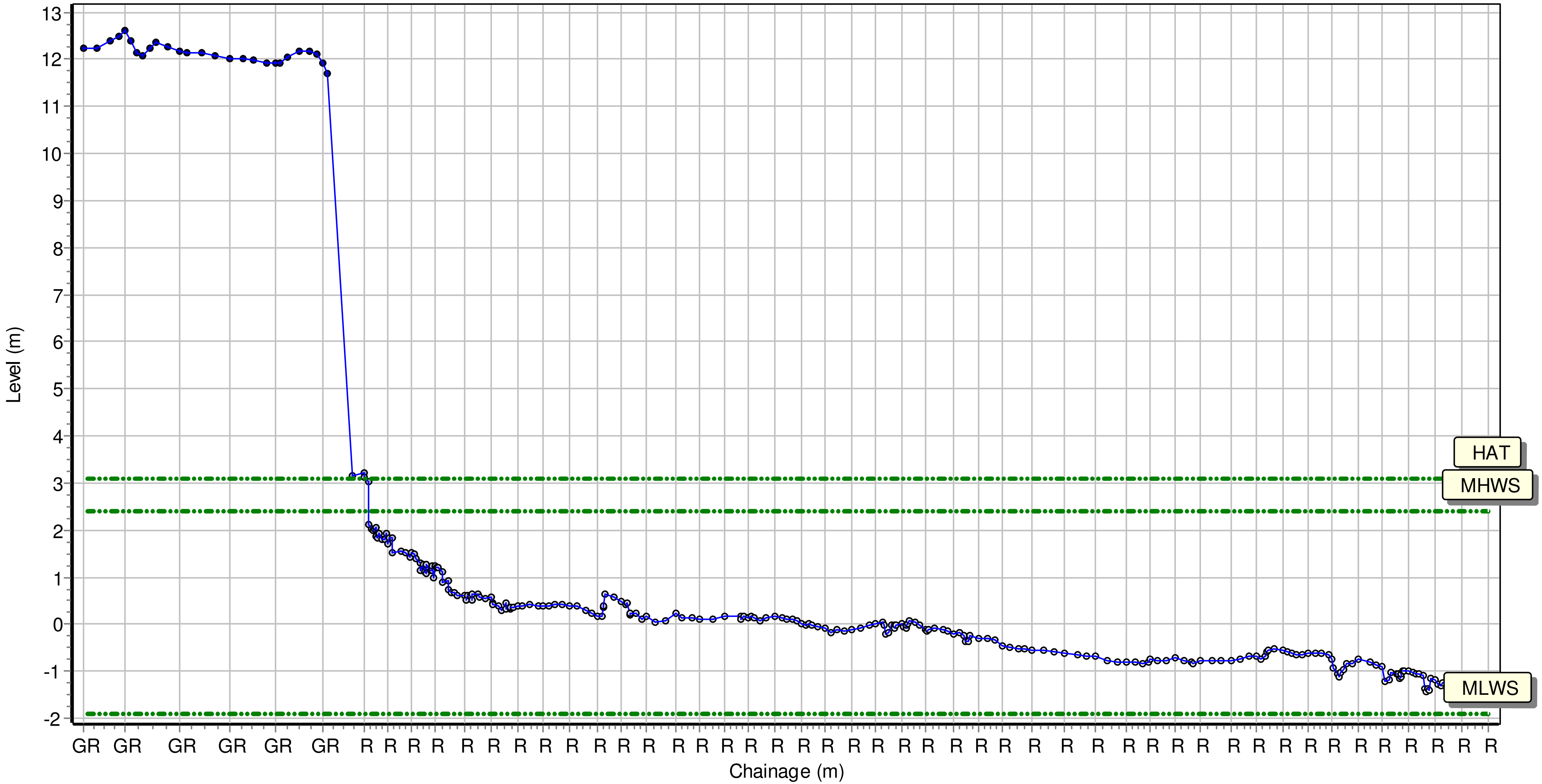
Location: 1aCMBC03

Date: 08/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430118.859 **Northing:** 592587.445 **Profile Bearing:** 115 ° from North



http://www.sandsuser.com

SANDS

Beach Profile

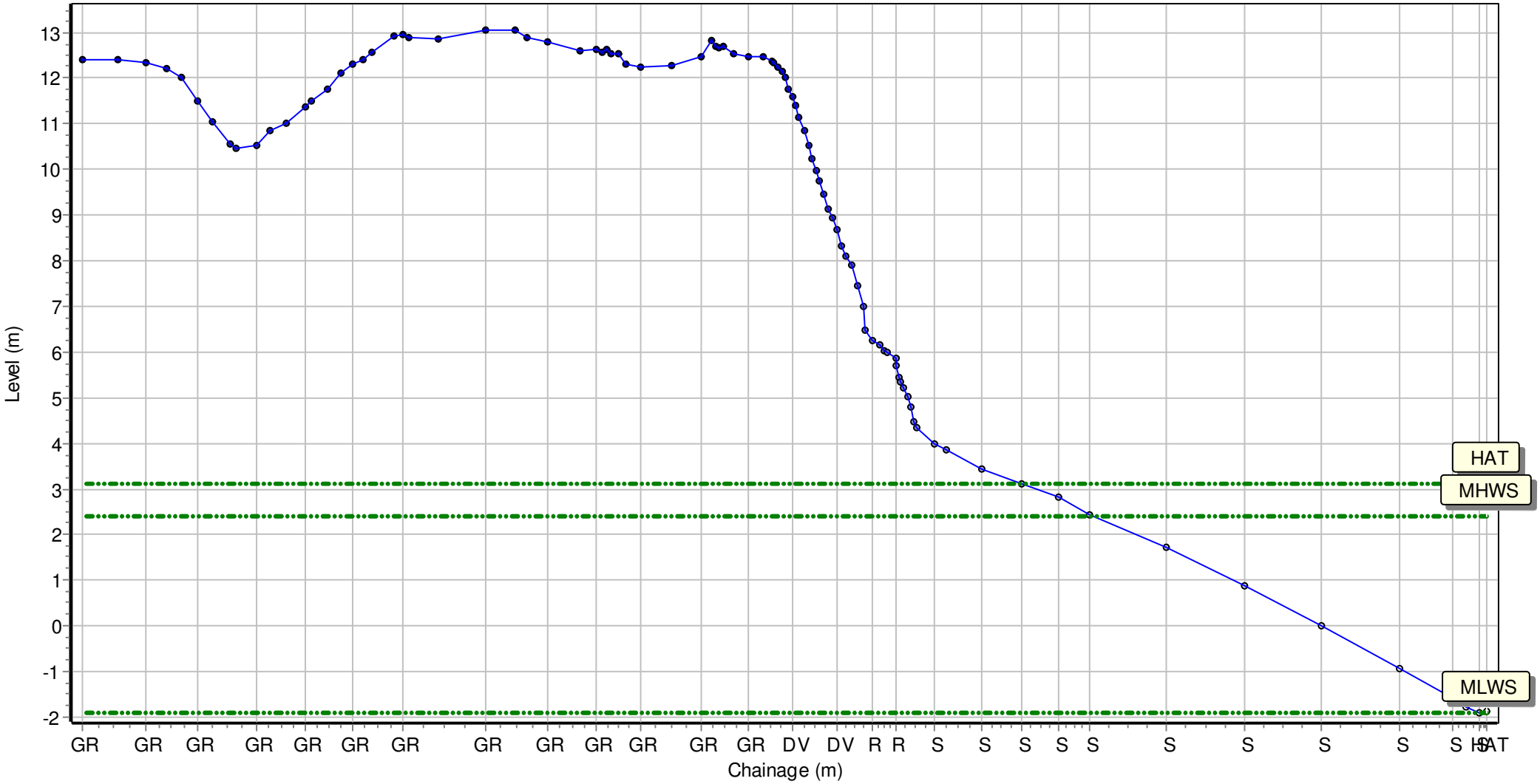
Location: **1aCMBC03A**

Date: 08/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

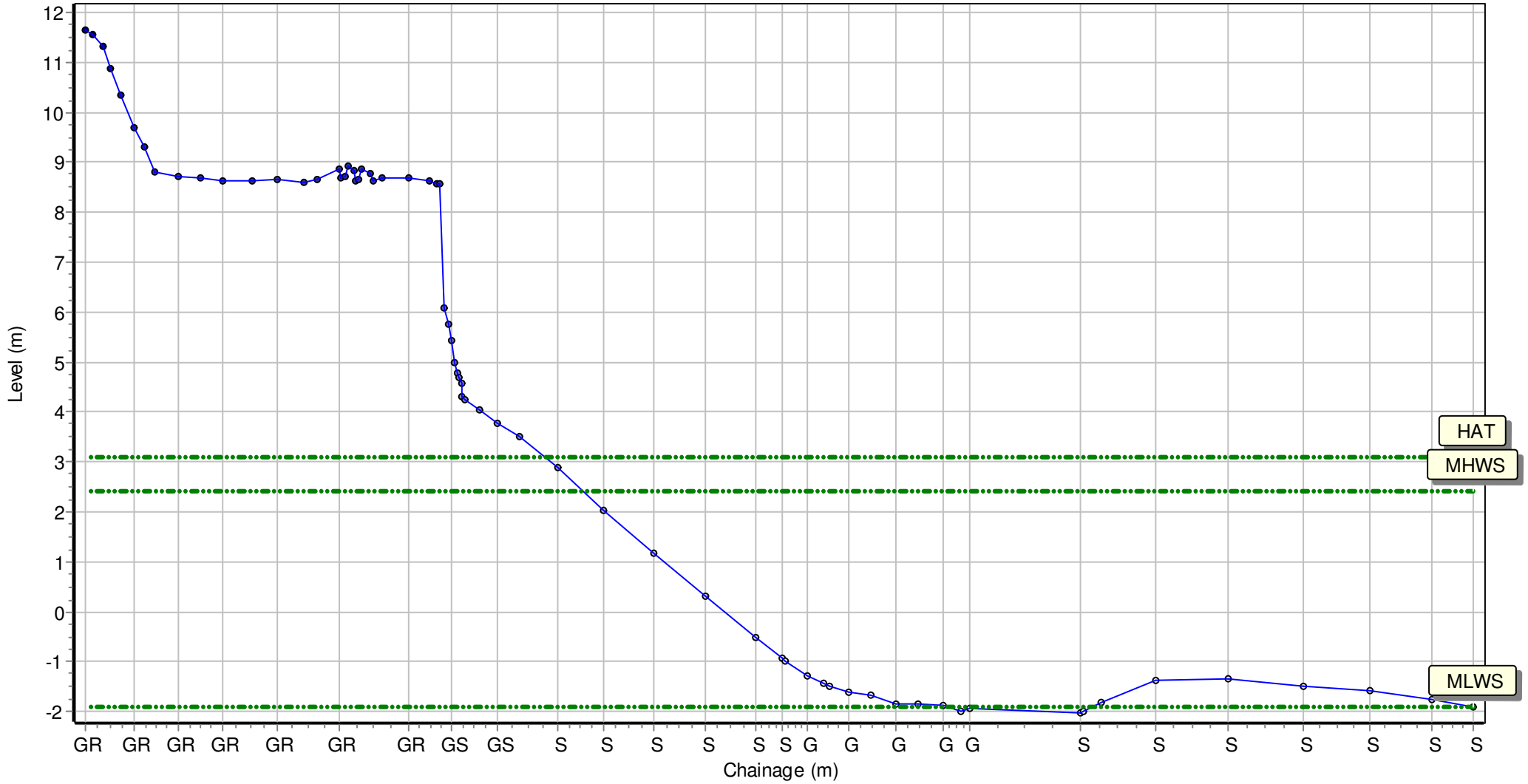
Location: **1aCMBC03B**

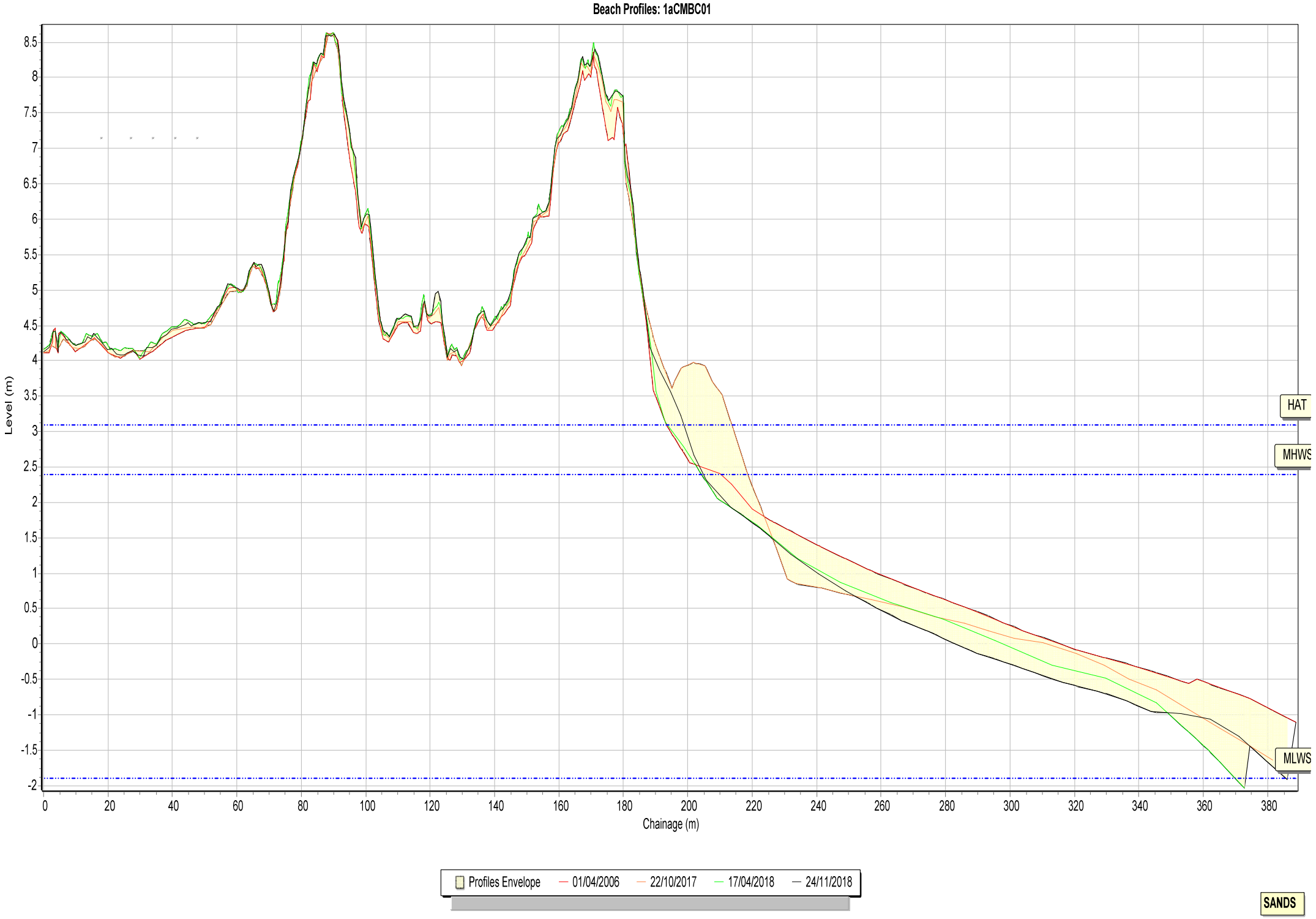
Date: 08/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

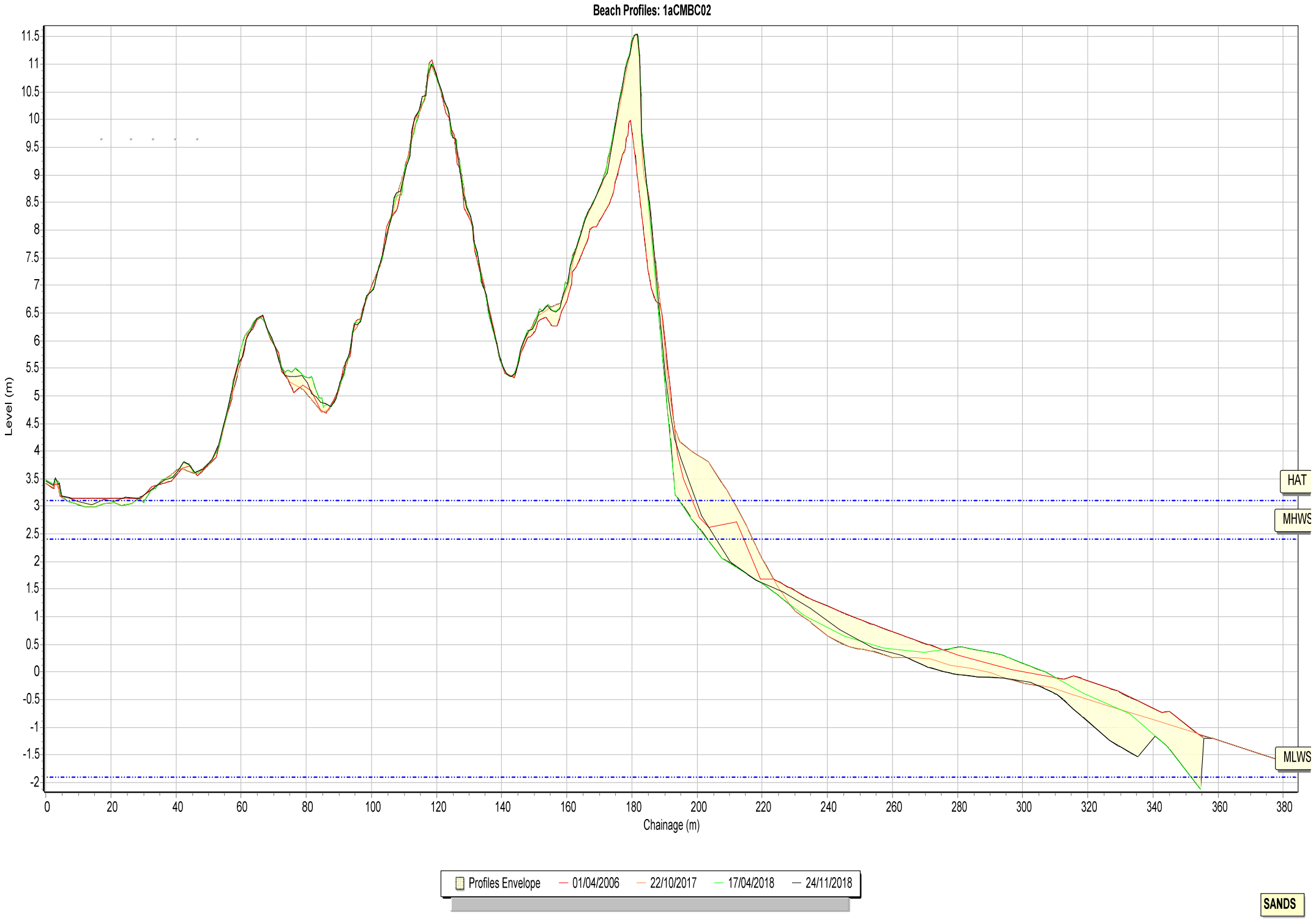
Wind **Sea State:** **Visibility:** **Rain:**

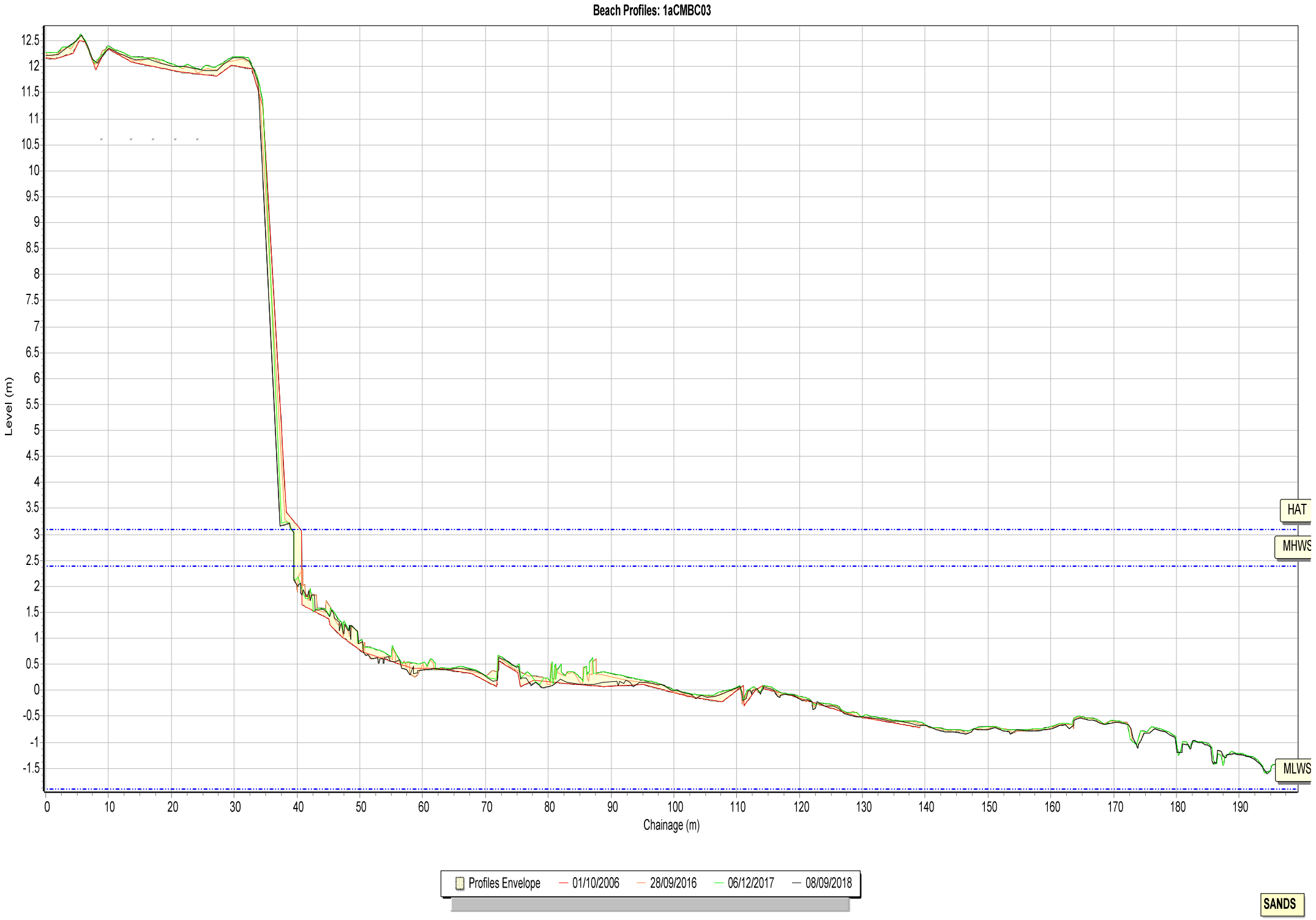
Summary: 2018 Full Measures Topo Survey

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

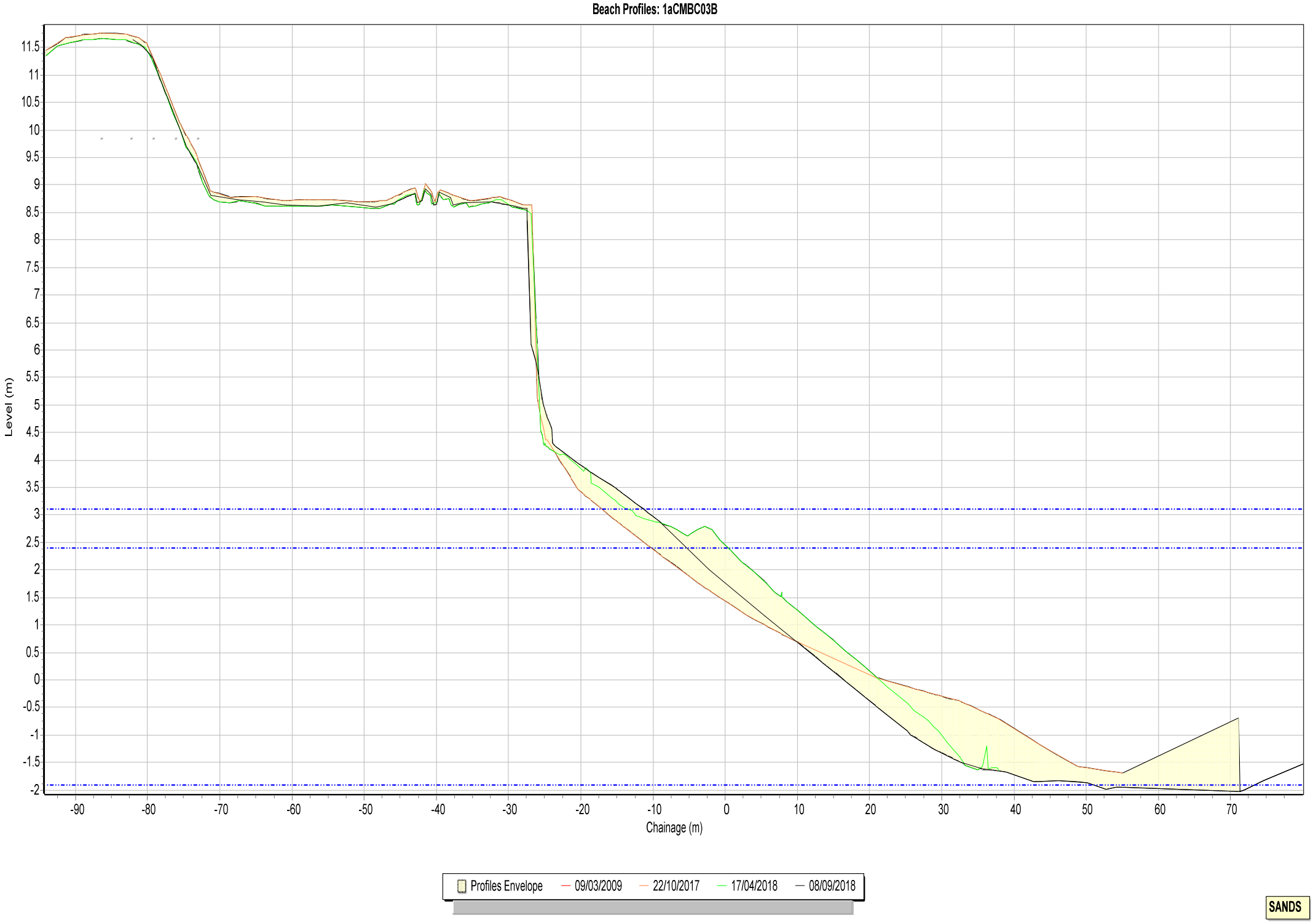



Beach Profiles: 1aCMBC01
Level (m)
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
22/10/2017
17/04/2018
24/11/2018
SANDS


Beach Profiles: 1aCMBC02
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
22/10/2017
17/04/2018
24/11/2018
SANDS


Beach Profiles: 1aCMBC03
Level (m)
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
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
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
28/09/2016
06/12/2017
08/09/2018
SANDS


Beach Profiles: 1aCMBC03A
Level (m)
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
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
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2007
22/10/2017
17/04/2018
08/09/2018
SANDS


Beach Profiles: 1aCMBC03B
Level (m)
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
Chainage (m)
Profiles Envelope
09/03/2009
22/10/2017
17/04/2018
08/09/2018
SANDS

Beach Profile

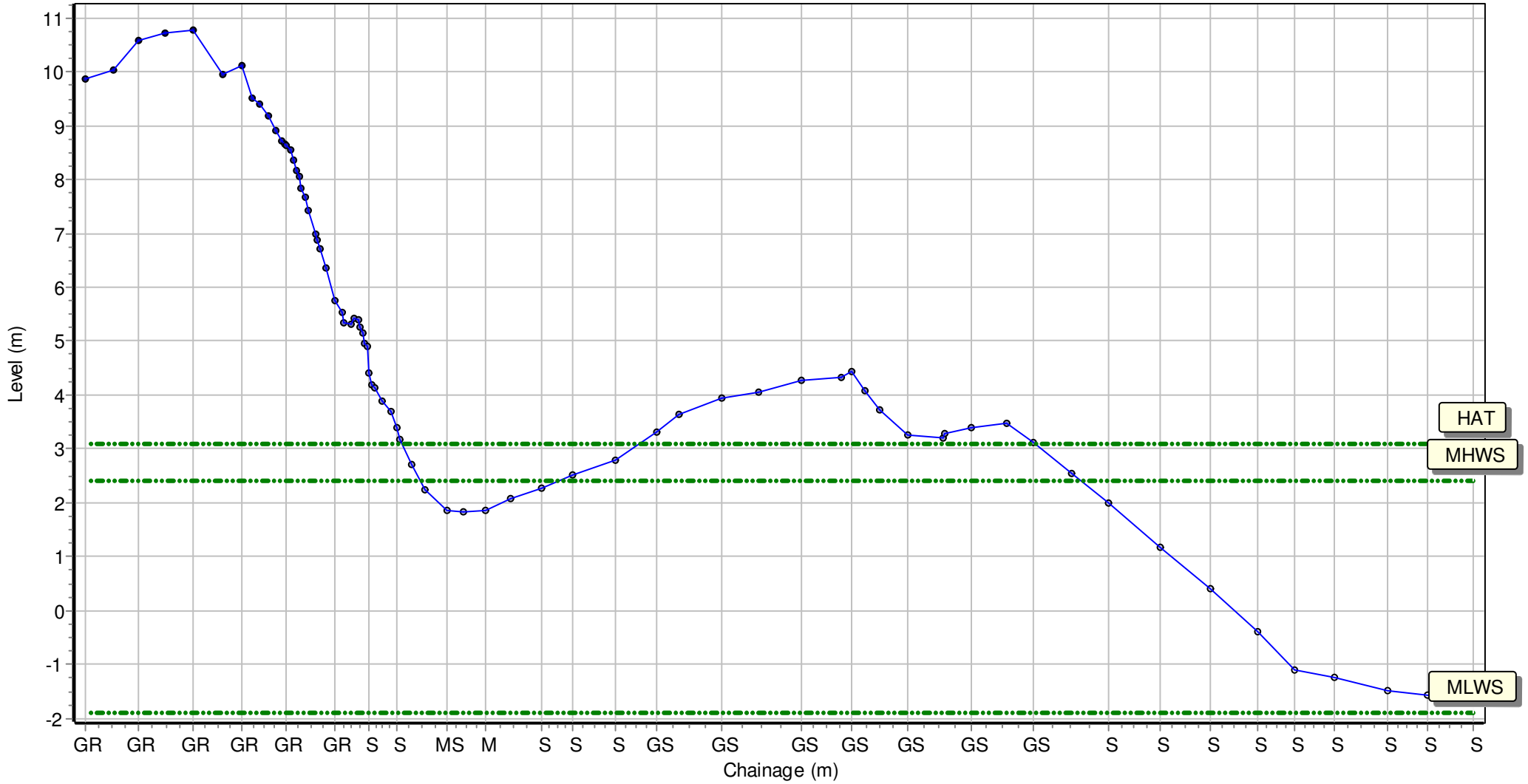
Location: **1aWDC02**

Date: 08/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430807.97 **Northing:** 589773.192 **Profile Bearing:** 59 ° from North



Beach Profile

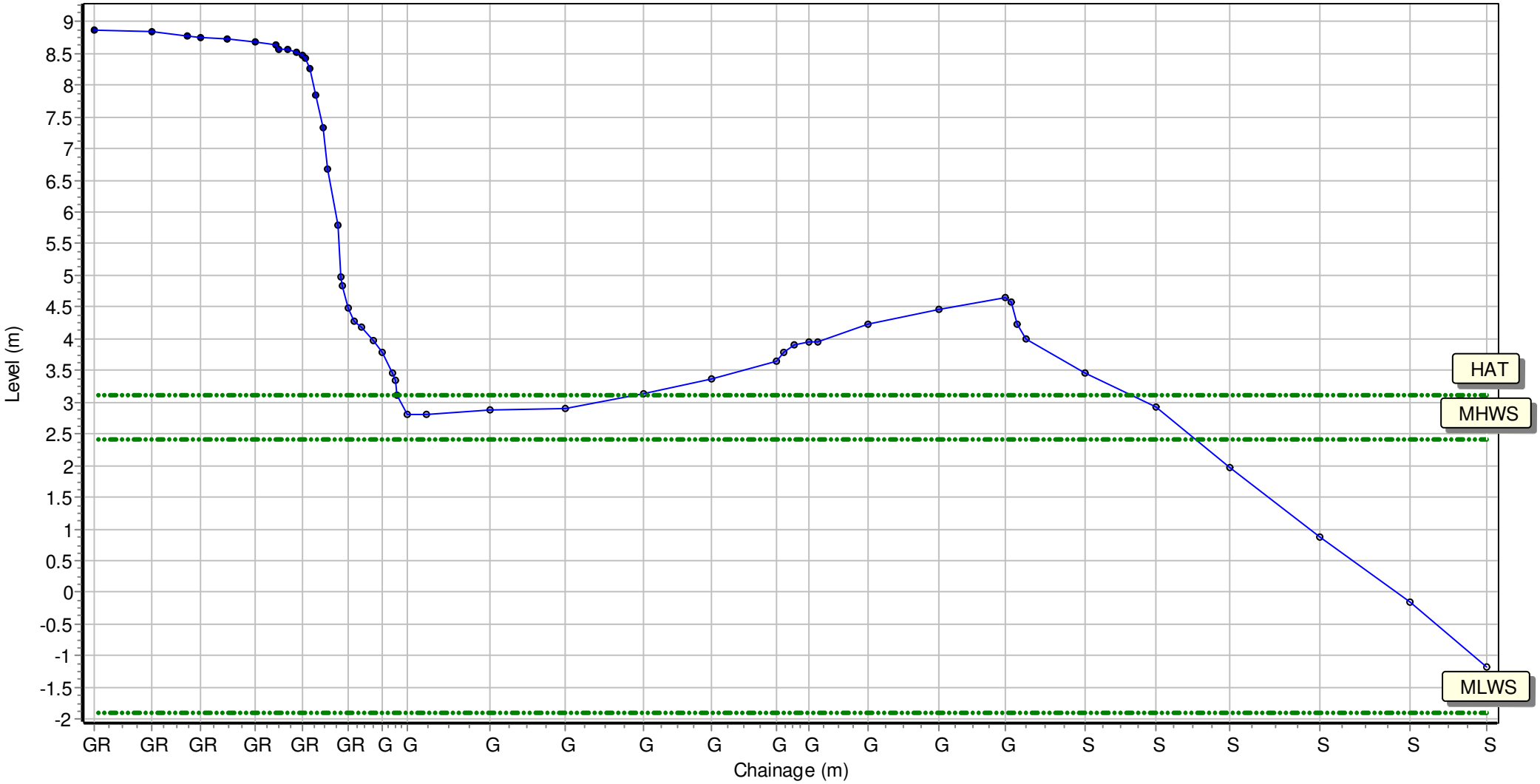
Location: **1aWDC03**

Date: 08/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430998.77 **Northing:** 589548.265 **Profile Bearing:** 58 ° from North



Beach Profile

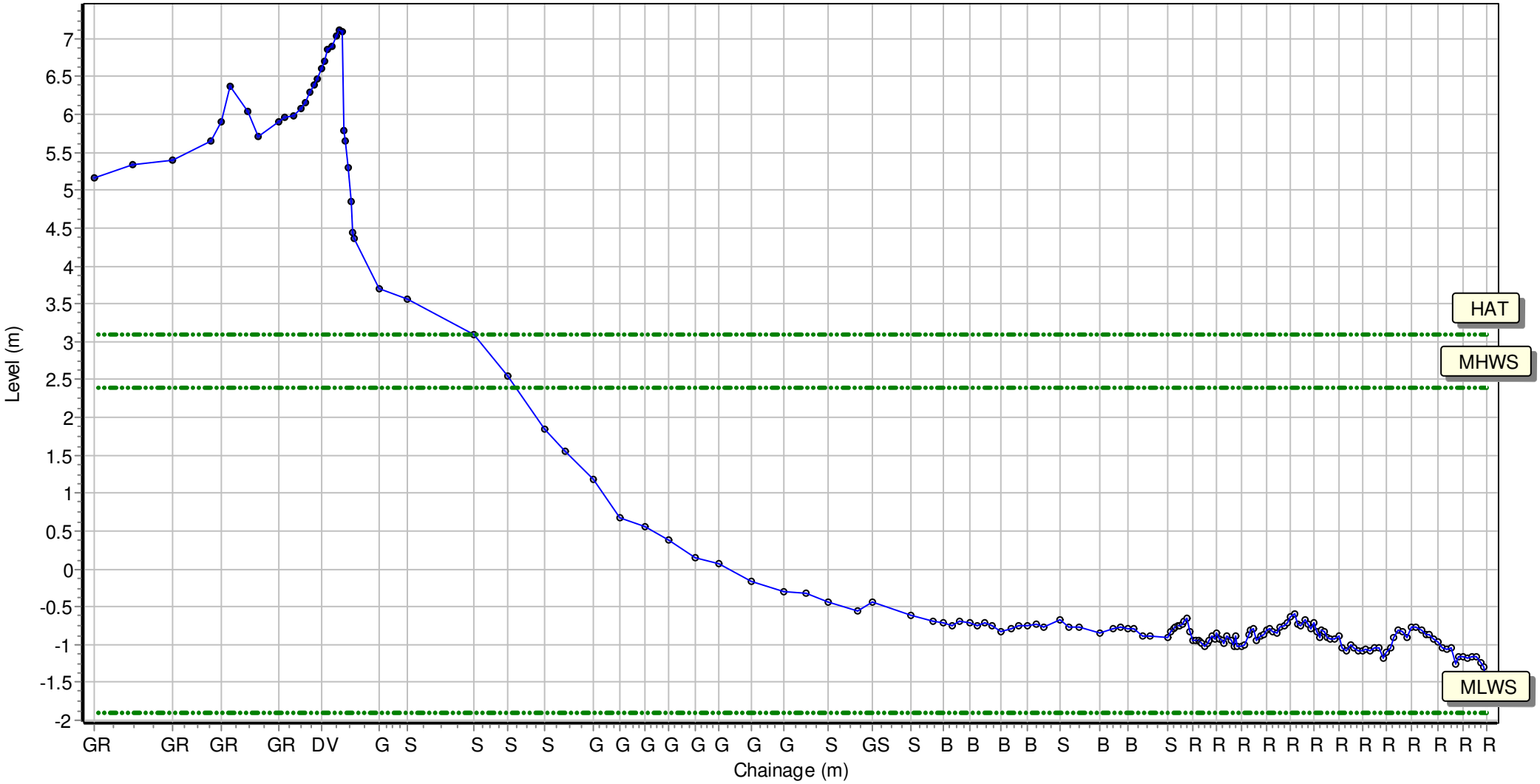
Location: **1aWDC04**

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 431518.807 **Northing:** 588823.532 **Profile Bearing:** 92 ° from North



Beach Profile

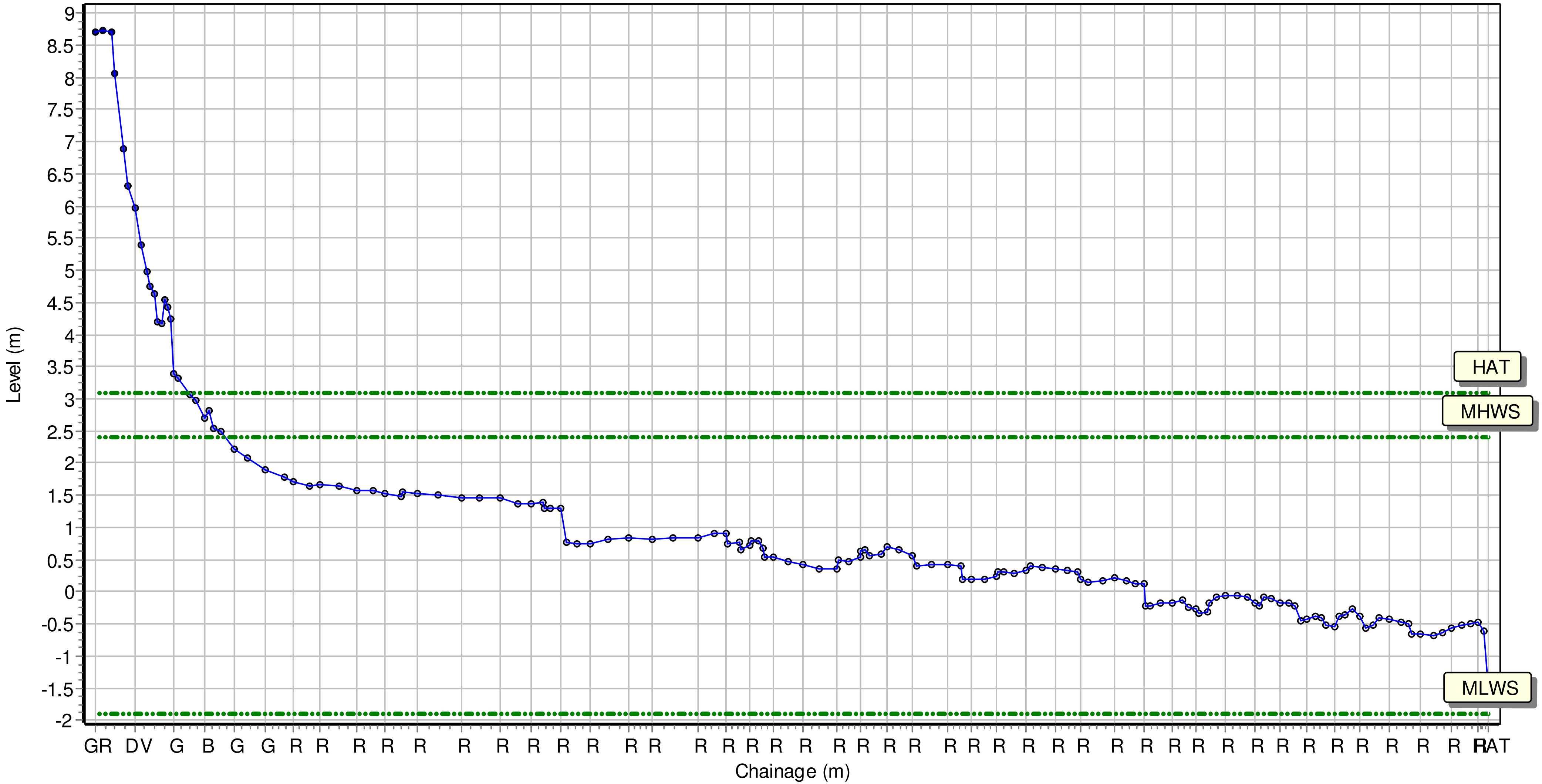
Location: 1aWDC05

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 431750.615 **Northing:** 588299.035 **Profile Bearing:** 56 ° from North



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Beach Profile

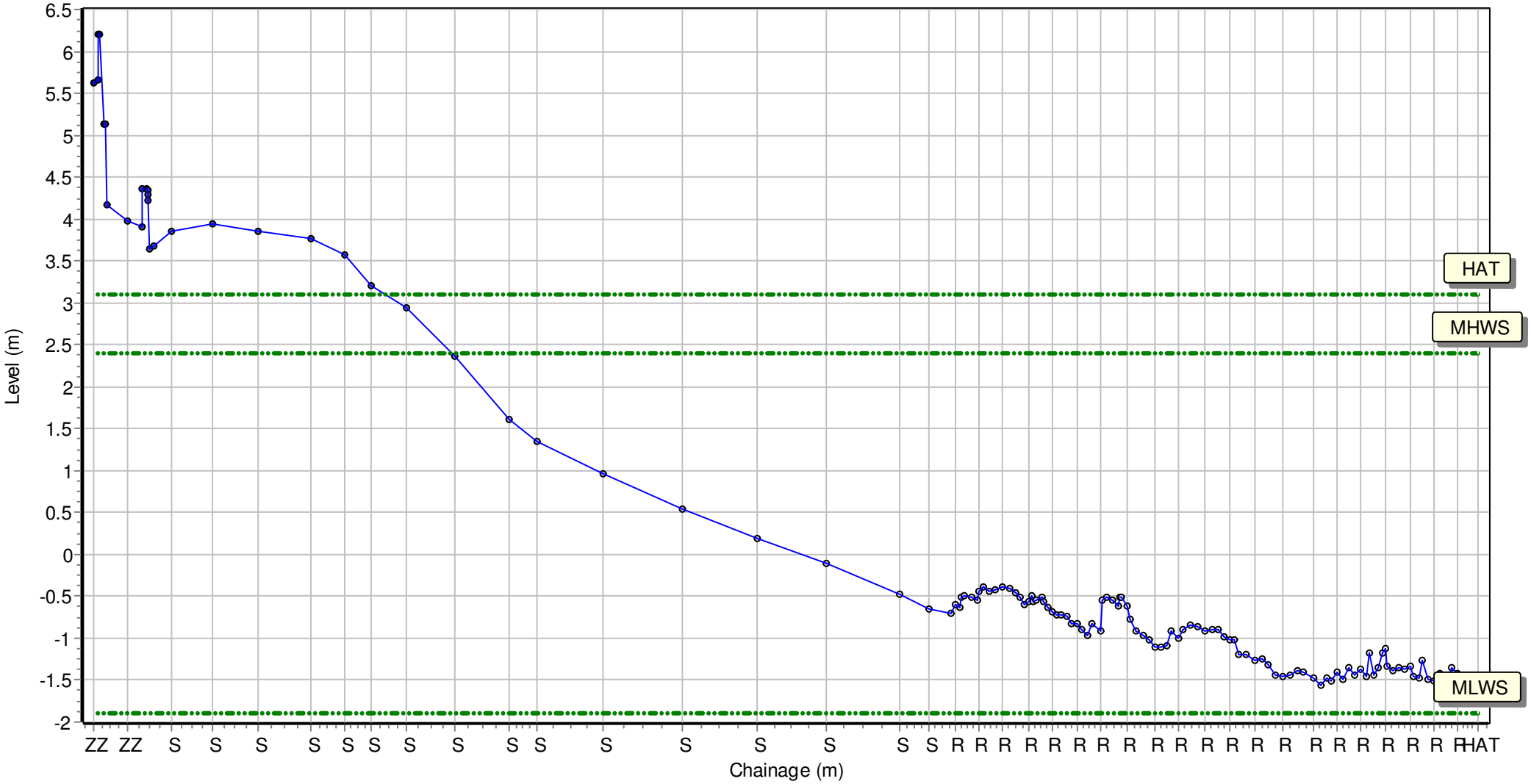
Location: **1aWDC05A**

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

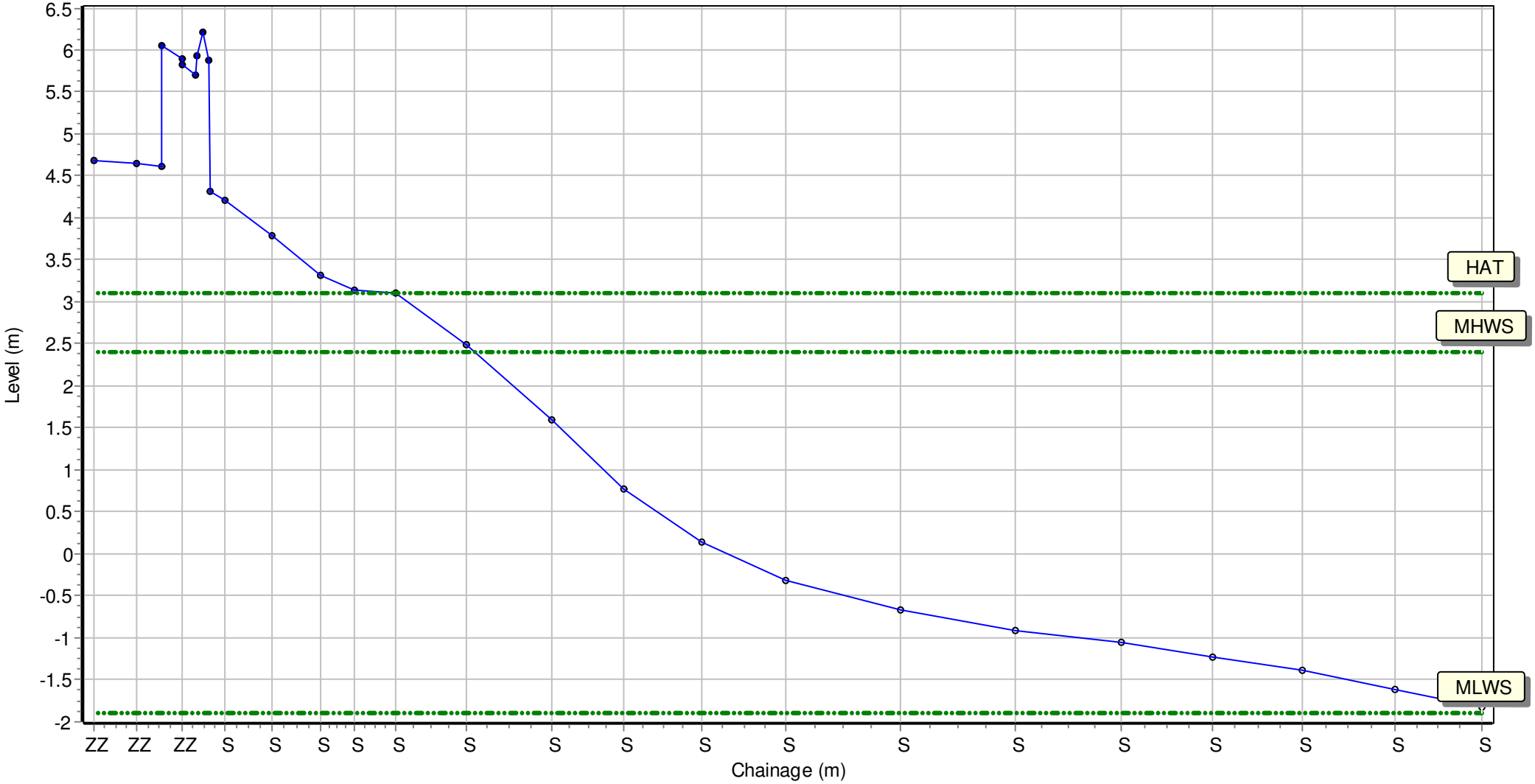
Location: **1aWDC06**

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

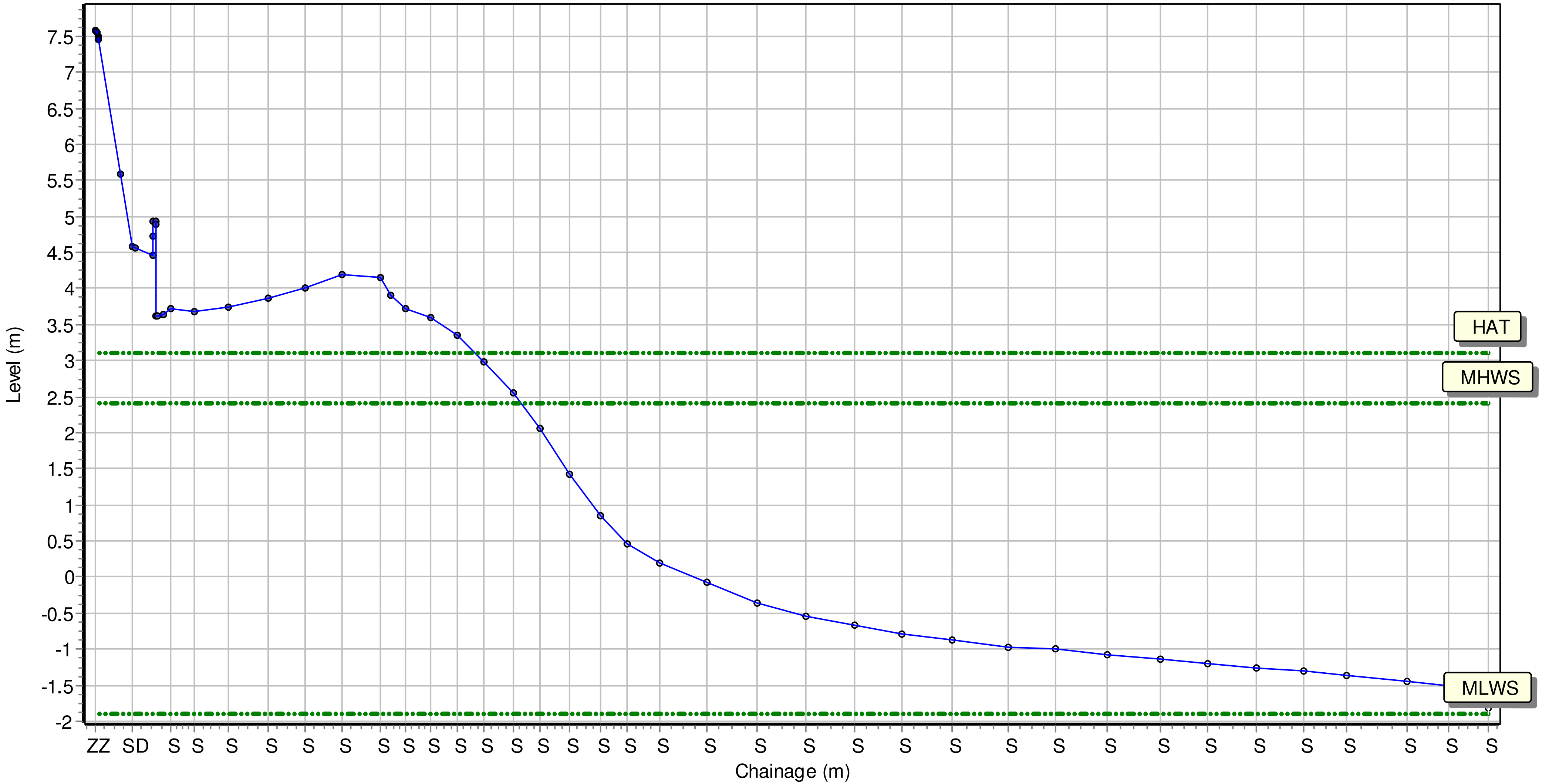
Location: 1aWDC06A

Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



http://www.sandsuser.com

SANDS

Beach Profile

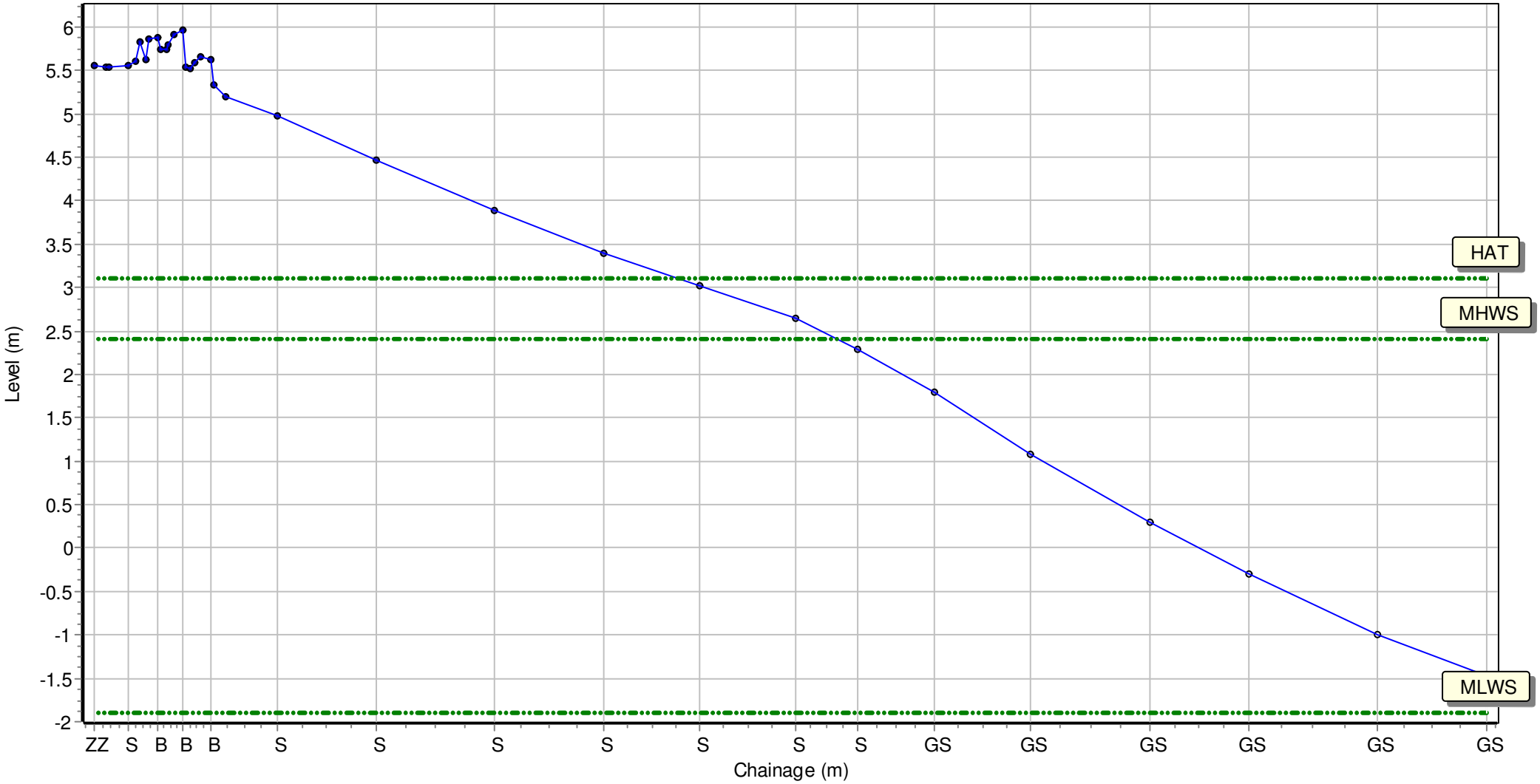
Location: **1aWDC07**

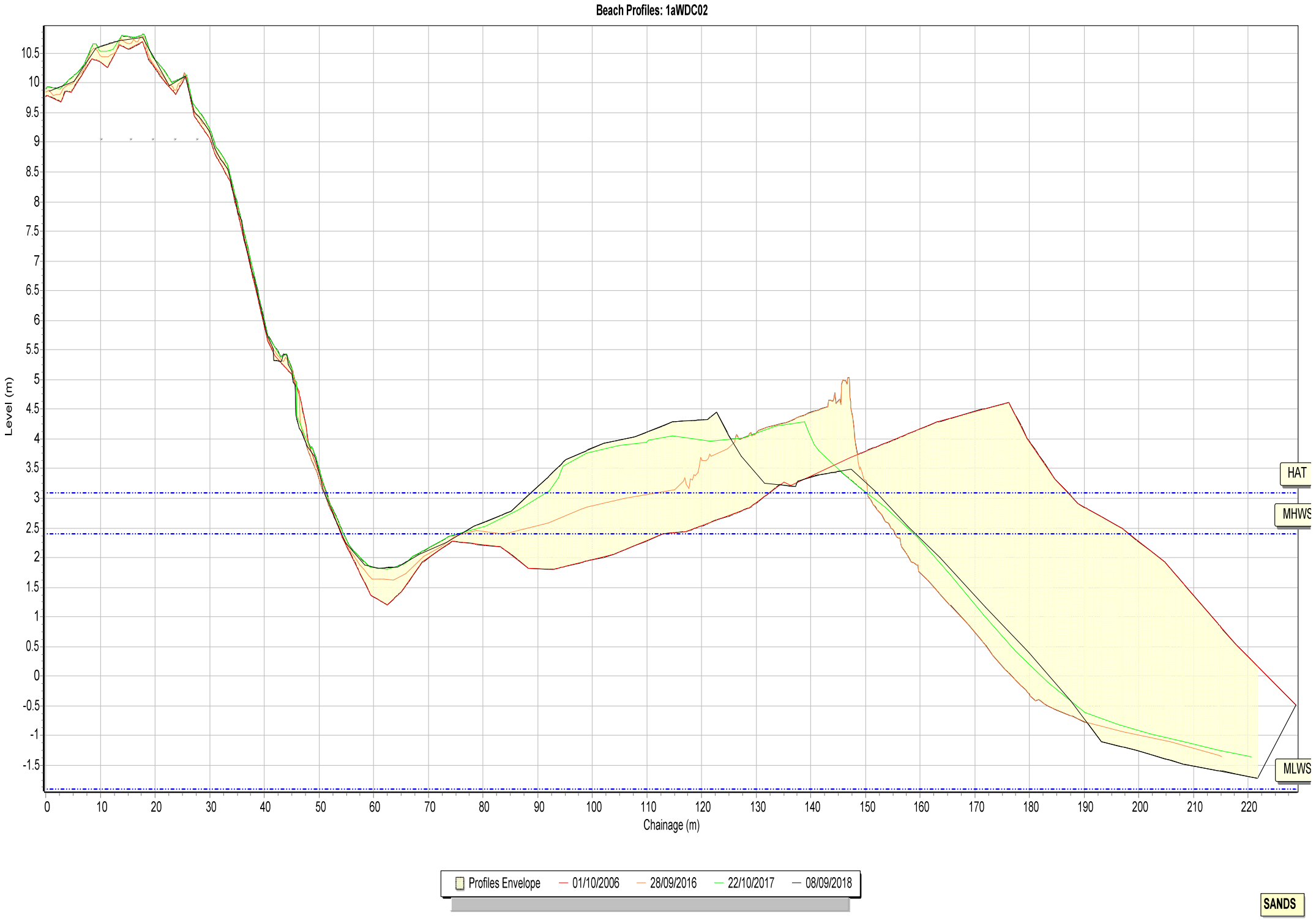
Date: 26/11/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

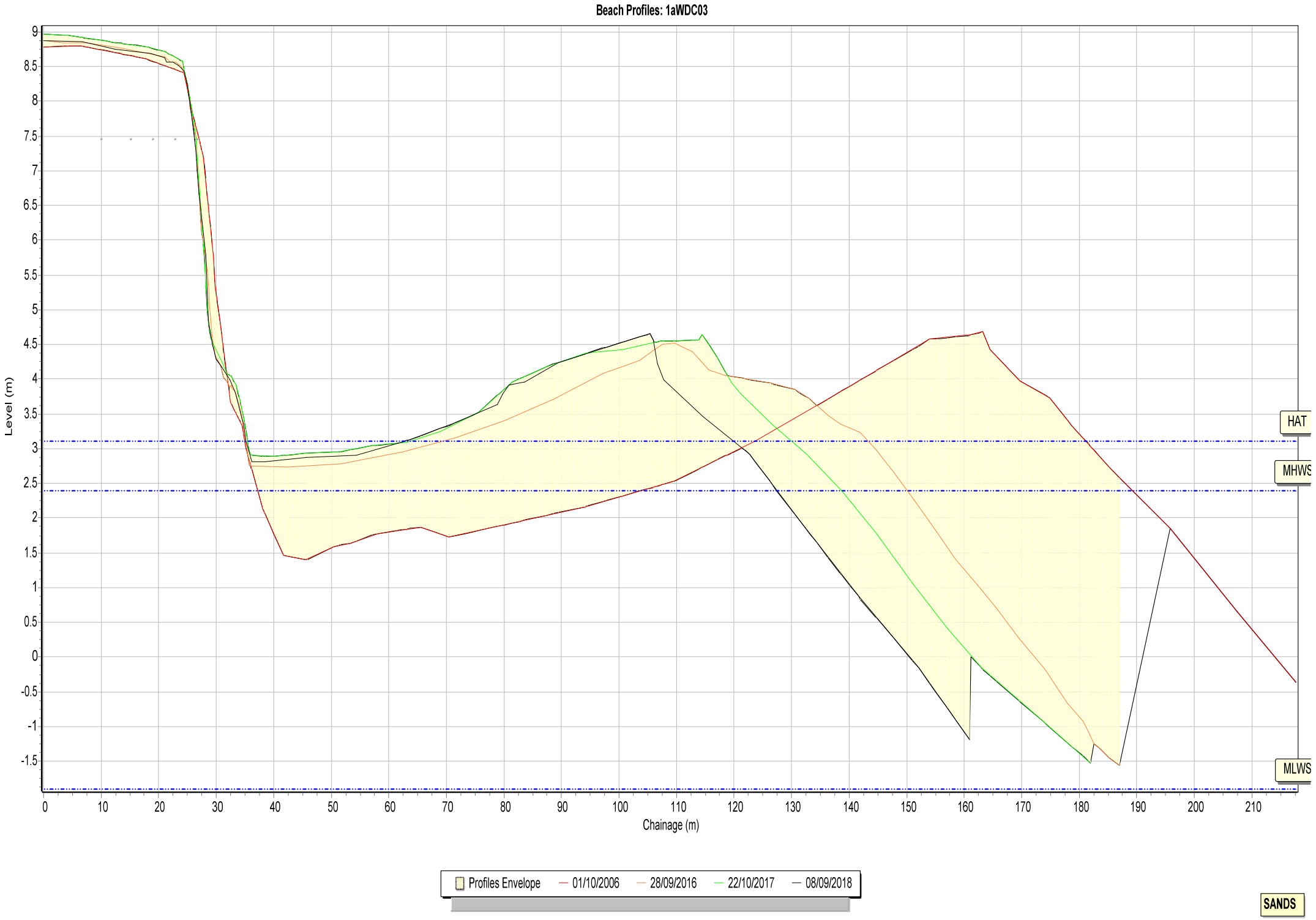
Wind **Sea State:** **Visibility:** **Rain:**

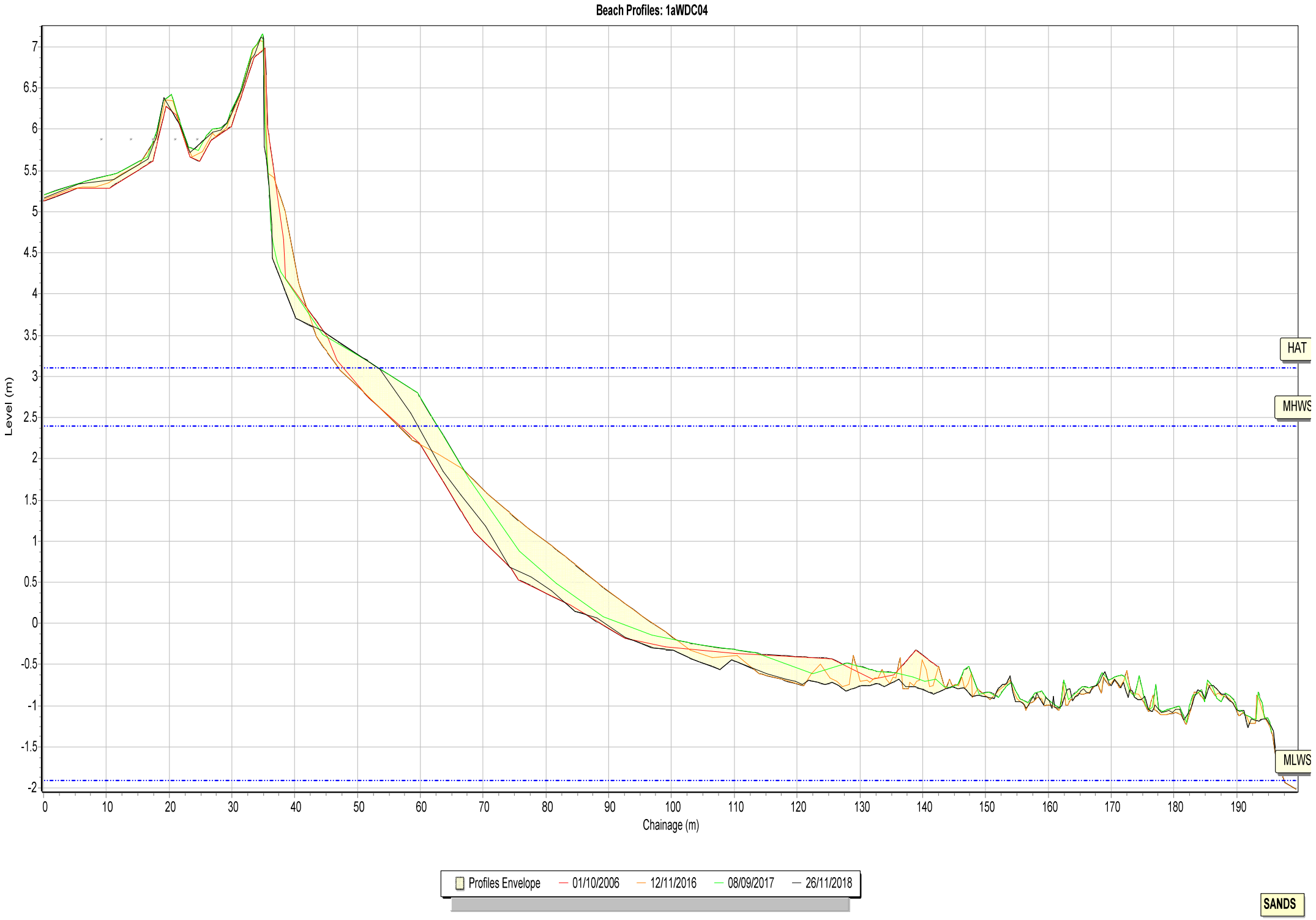
Summary: 2018 Full Measures Topo Survey

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

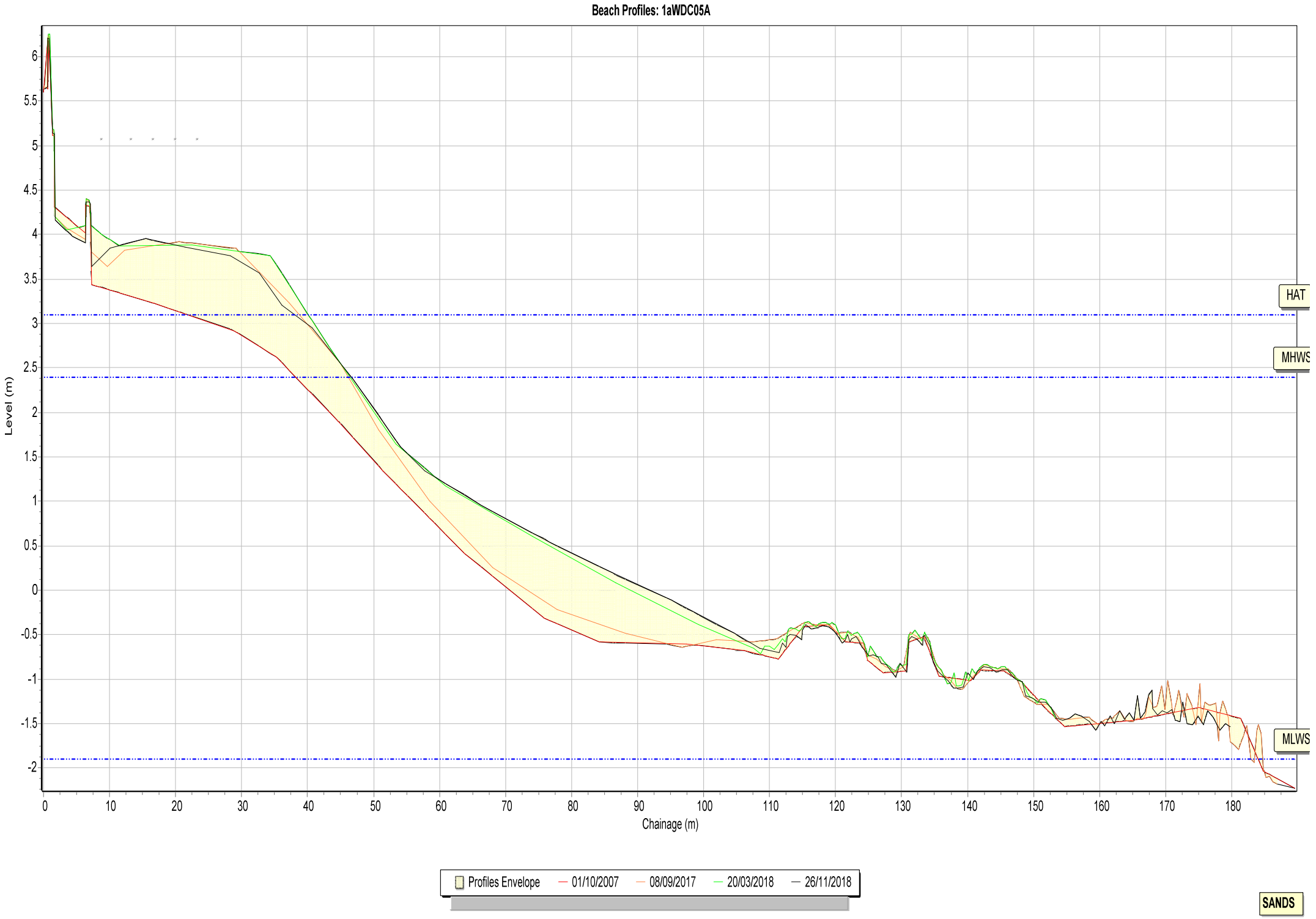


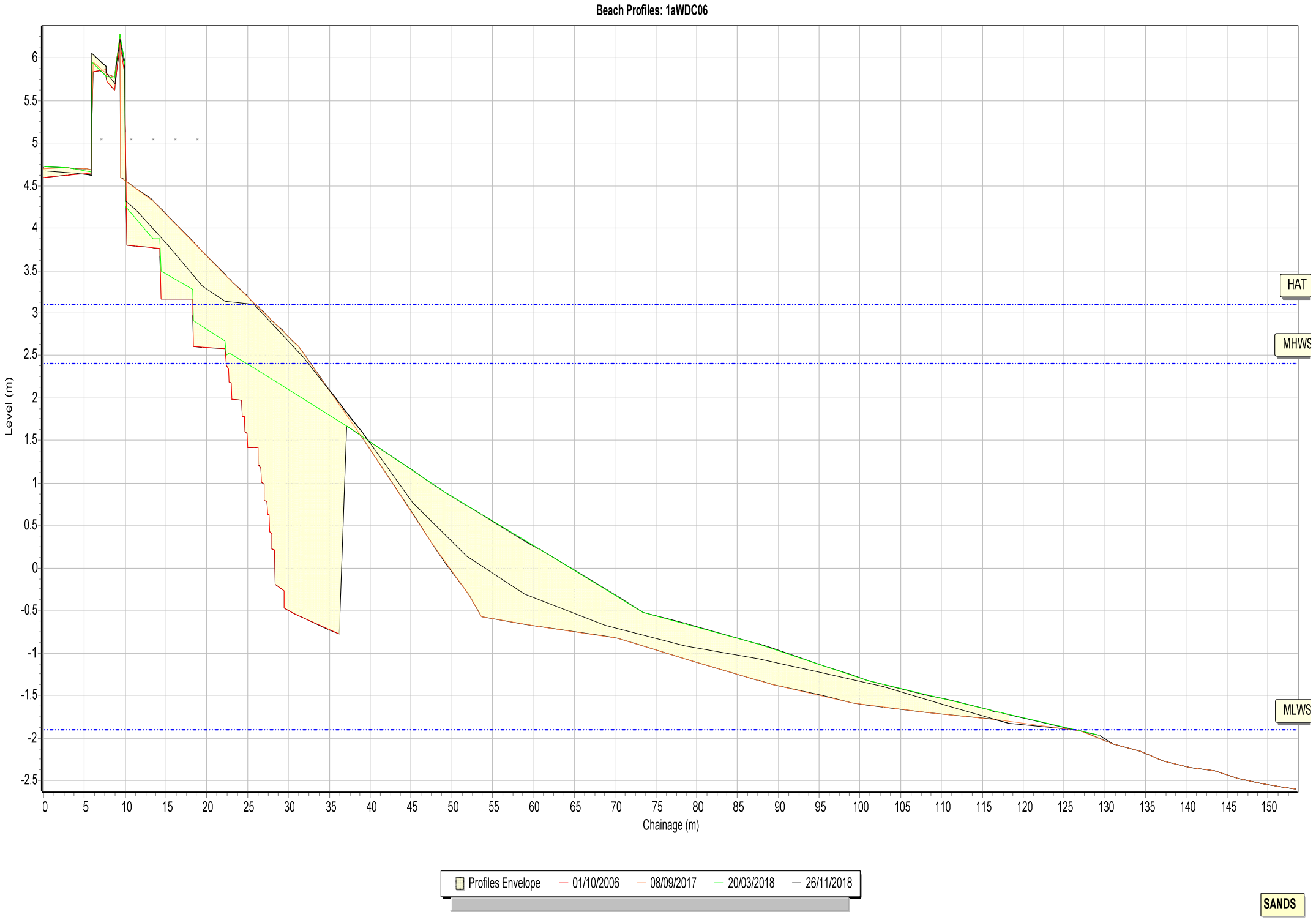

Beach Profiles: 1aWDC02
Level (m)
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
28/09/2016
22/10/2017
08/09/2018
SANDS

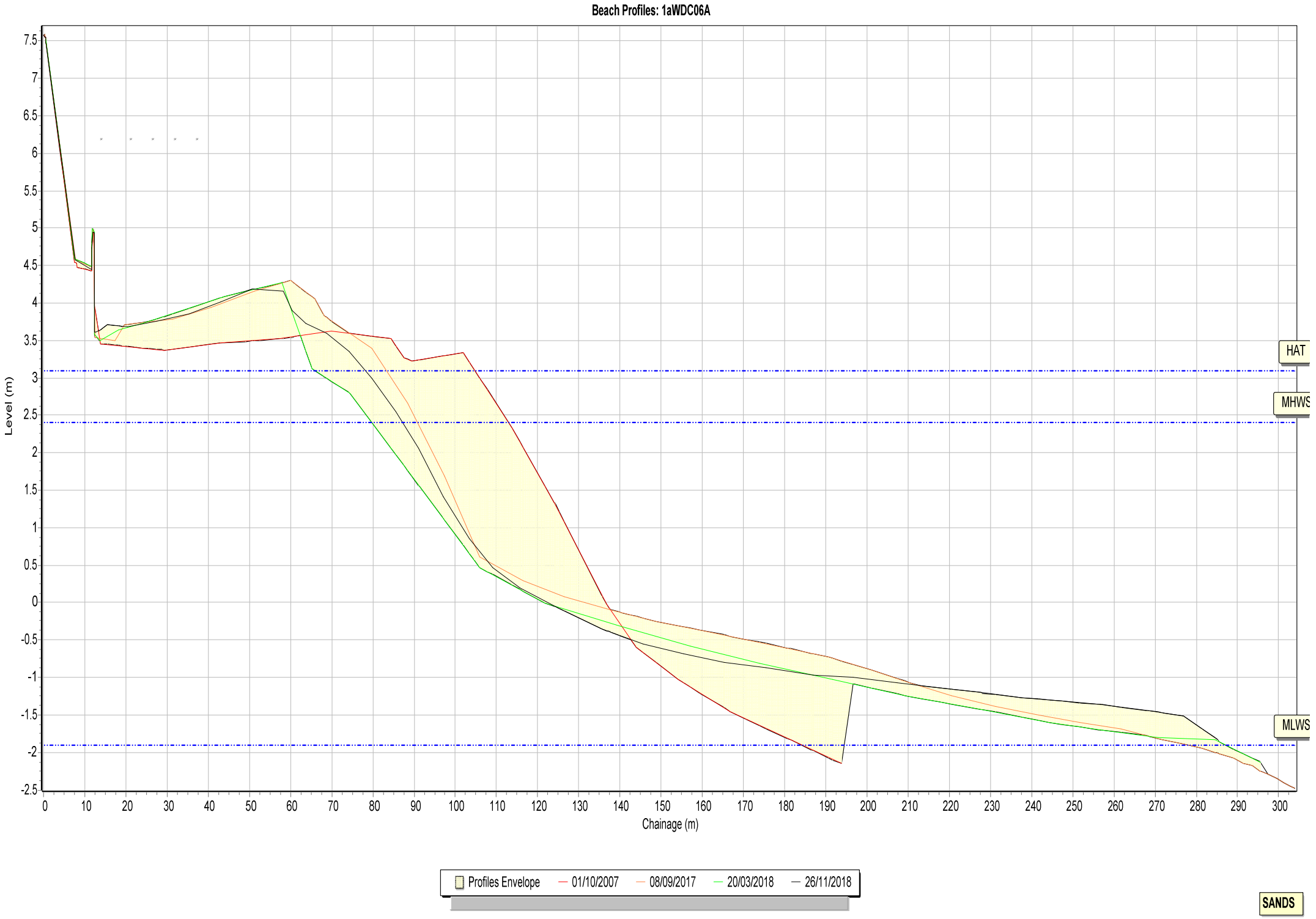

Beach Profiles: 1aWDC03
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
28/09/2016
22/10/2017
08/09/2018
SANDS

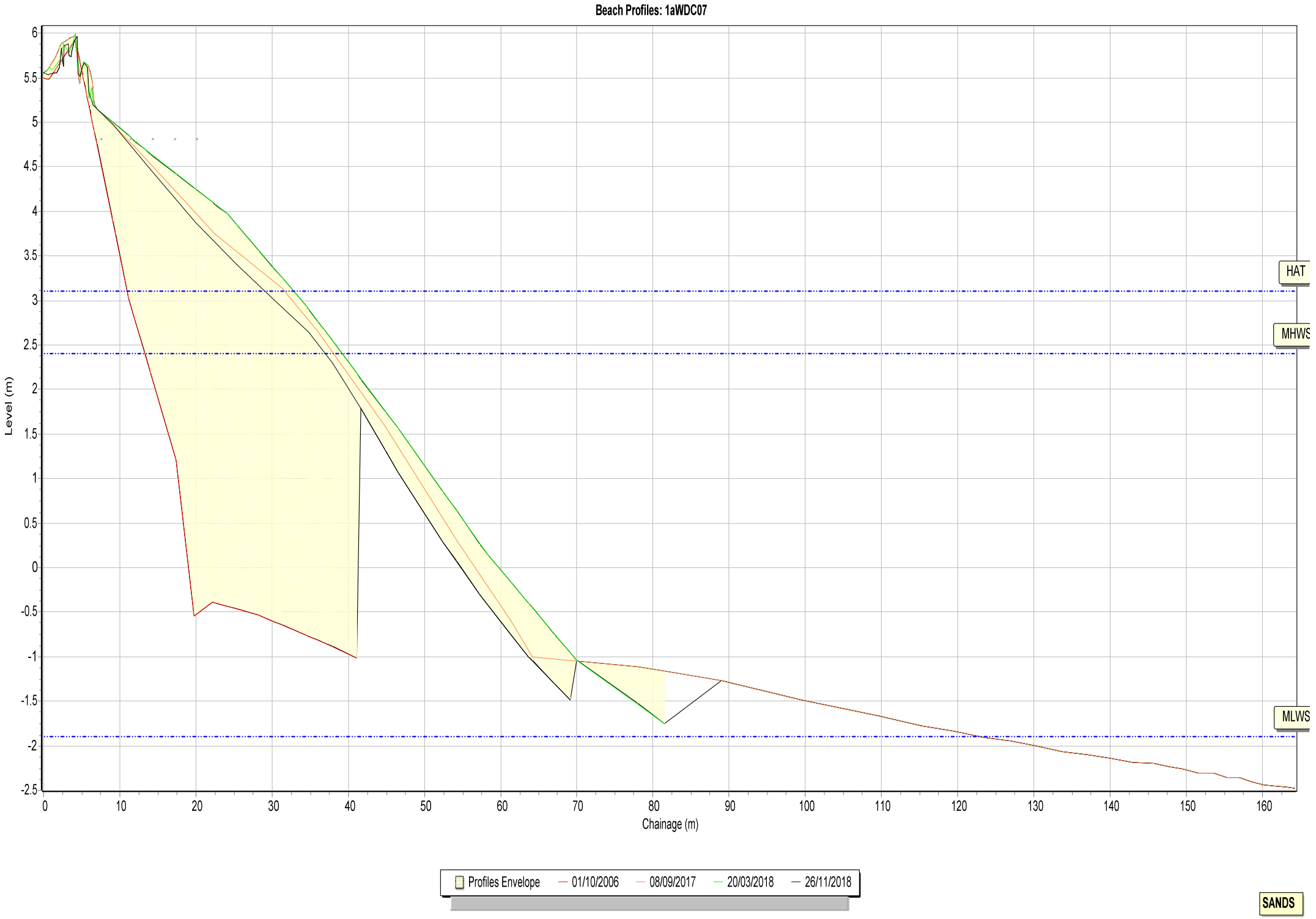

Beach Profiles: 1aWDC04
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
12/11/2016
08/09/2017
26/11/2018
SANDS


Beach Profiles: 1aWDC05
Level (m)
8.5
8
7.5
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
HAT
MHWS
MLWS
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
145
150
155
160
Chainage (m)
Profiles Envelope
01/10/2006
12/11/2016
08/09/2017
26/11/2018
SANDS


Beach Profiles: 1aWDC05A
Level (m)
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
Chainage (m)
Profiles Envelope
01/10/2007
08/09/2017
20/03/2018
26/11/2018
SANDS


Beach Profiles: 1aWDC06
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
08/09/2017
20/03/2018
26/11/2018
SANDS


Beach Profiles: 1aWDC06A
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2007
08/09/2017
20/03/2018
26/11/2018
SANDS


Beach Profiles: 1aWDC07
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
08/09/2017
20/03/2018
26/11/2018
SANDS

Beach Profile

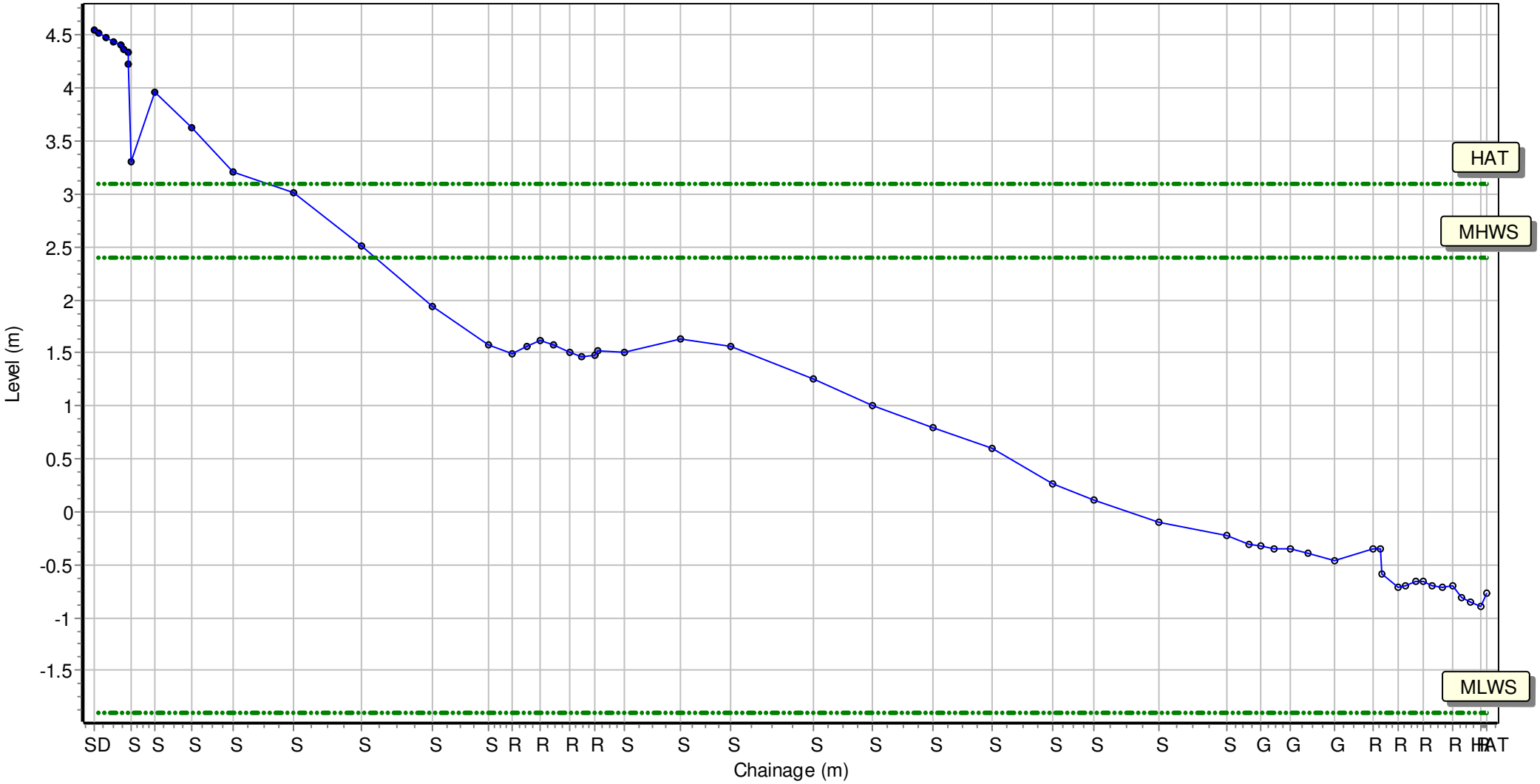
Location: **1aNWB1**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

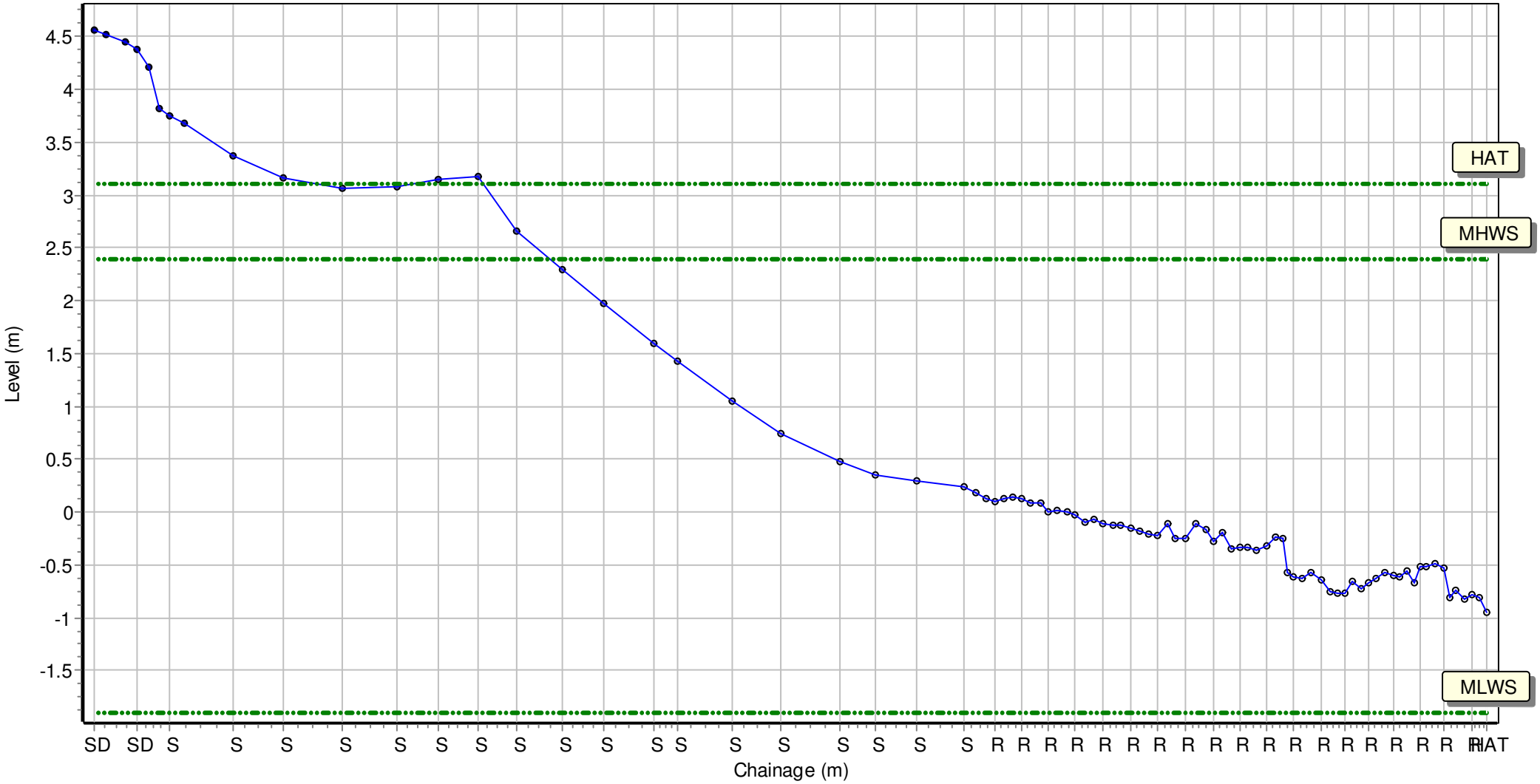
Location: **1aNWB2**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

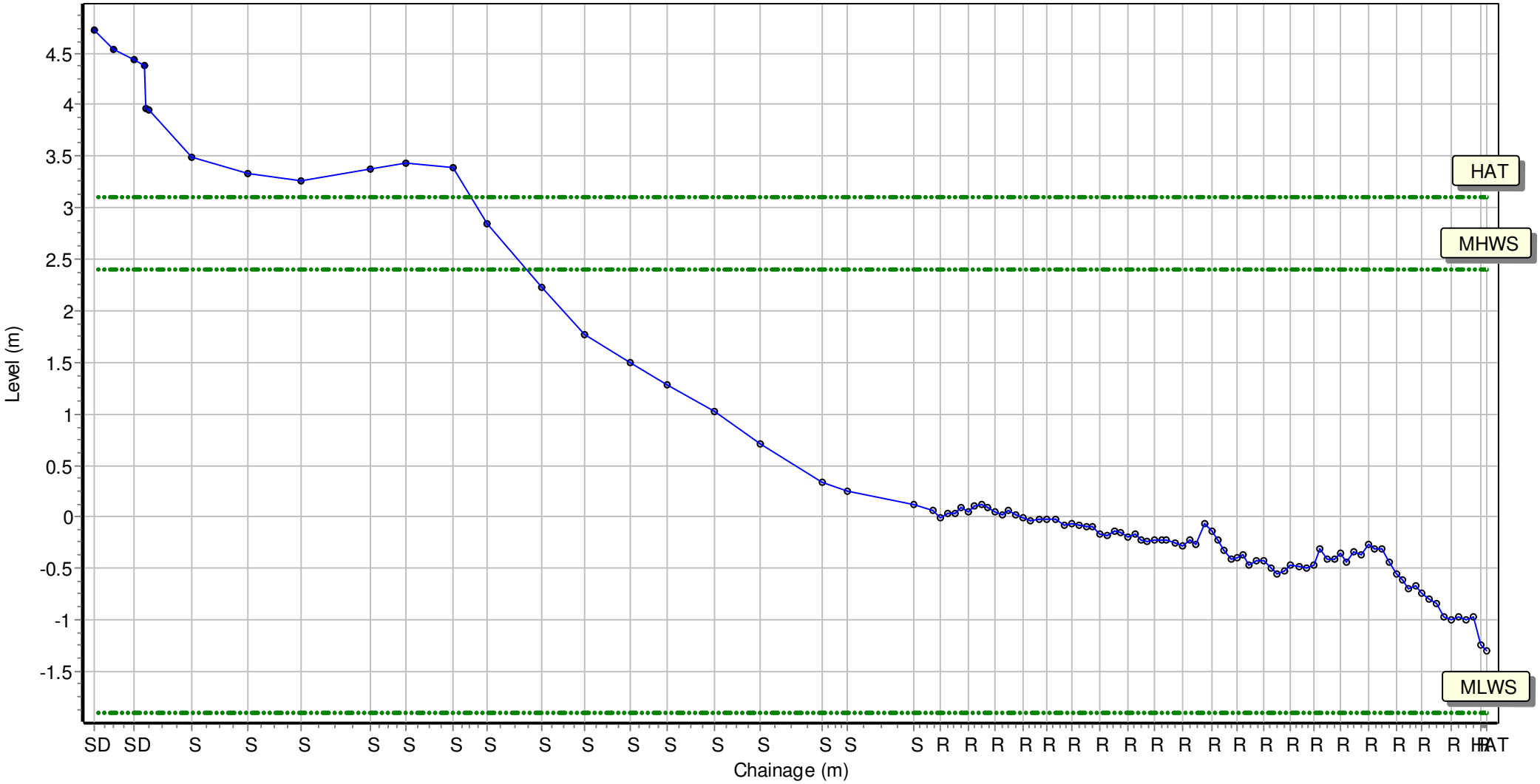
Location: **1aNWB3**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

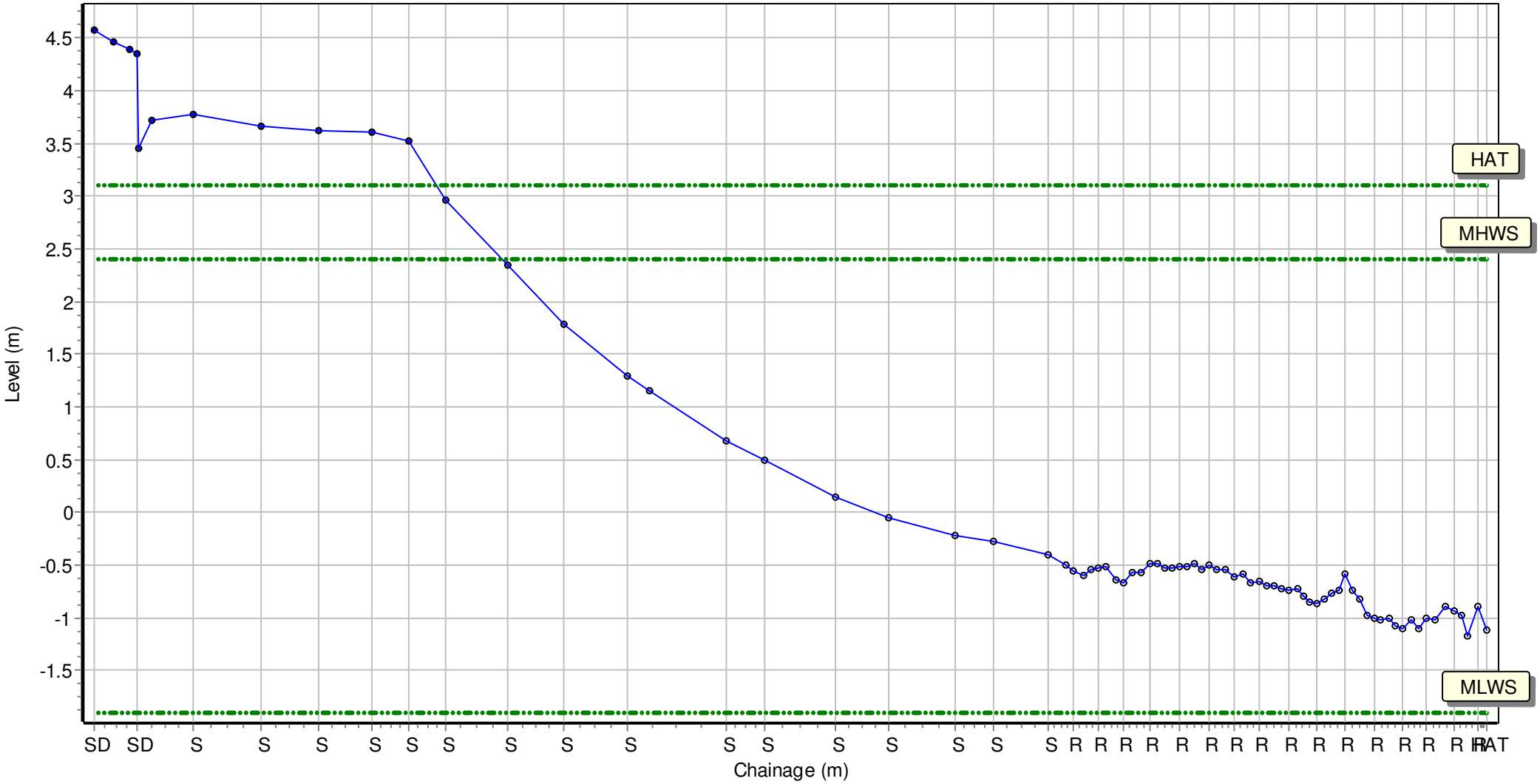
Location: **1aNWB4**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

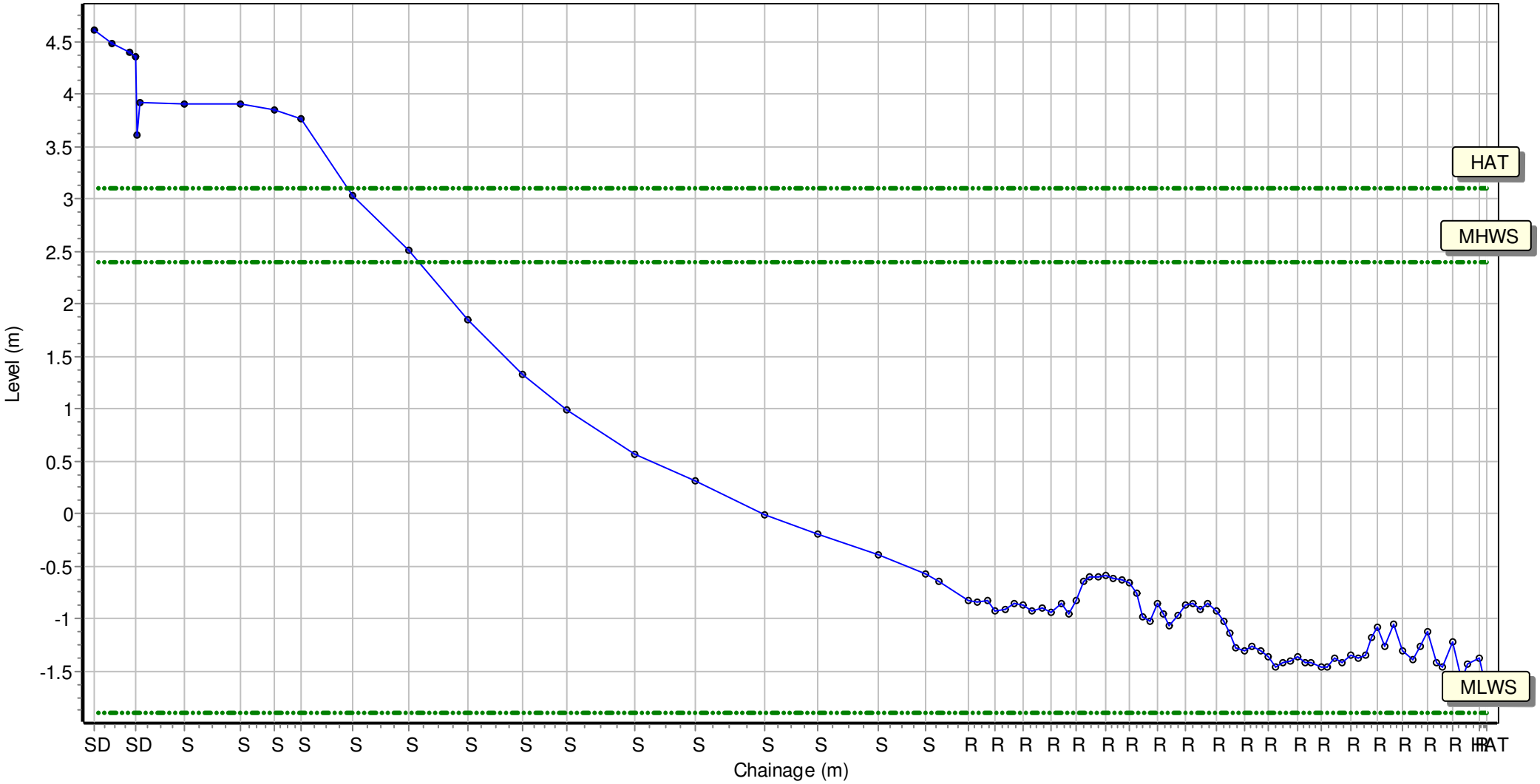
Location: **1aNWB5**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

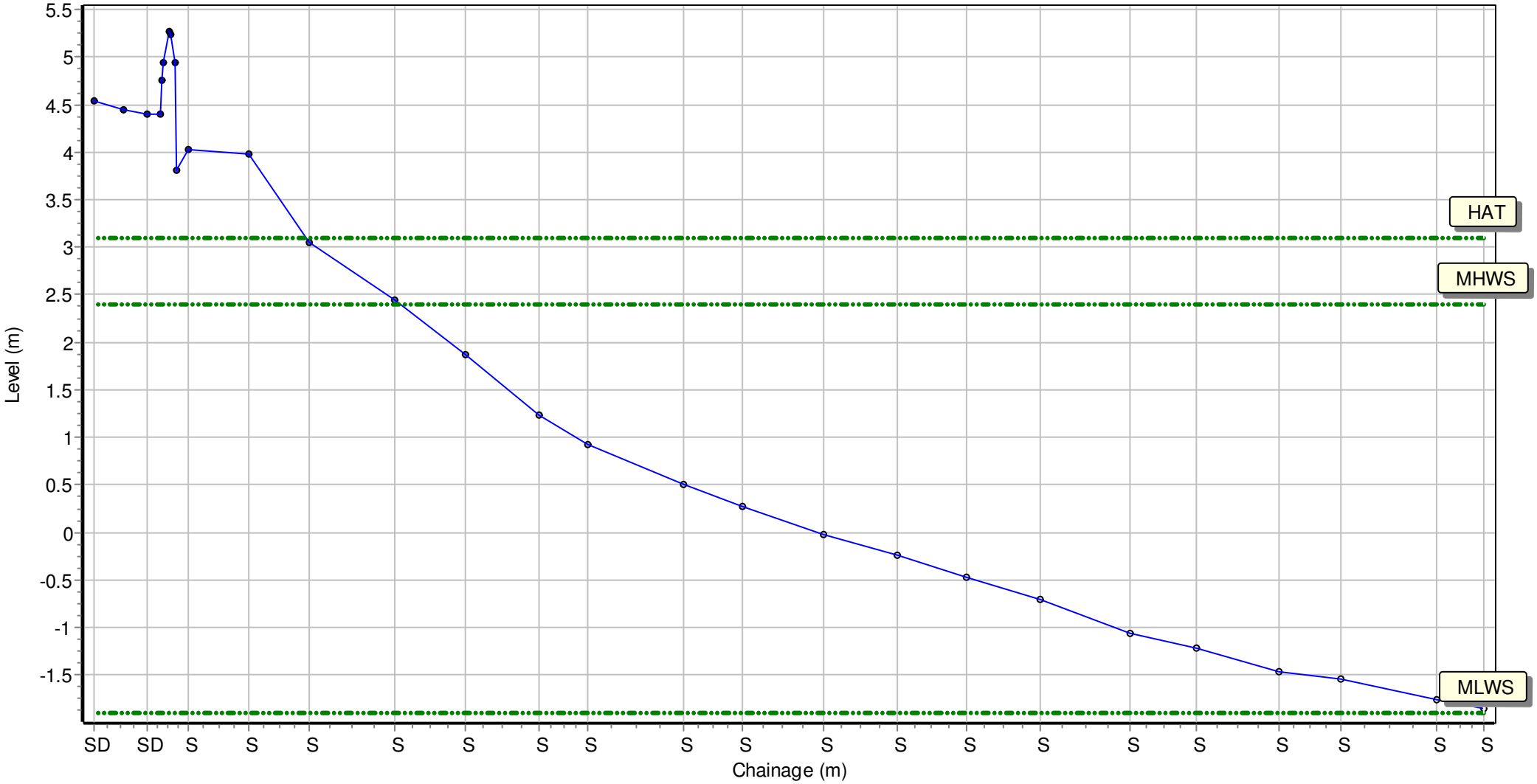
Location: **1aNWB6**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

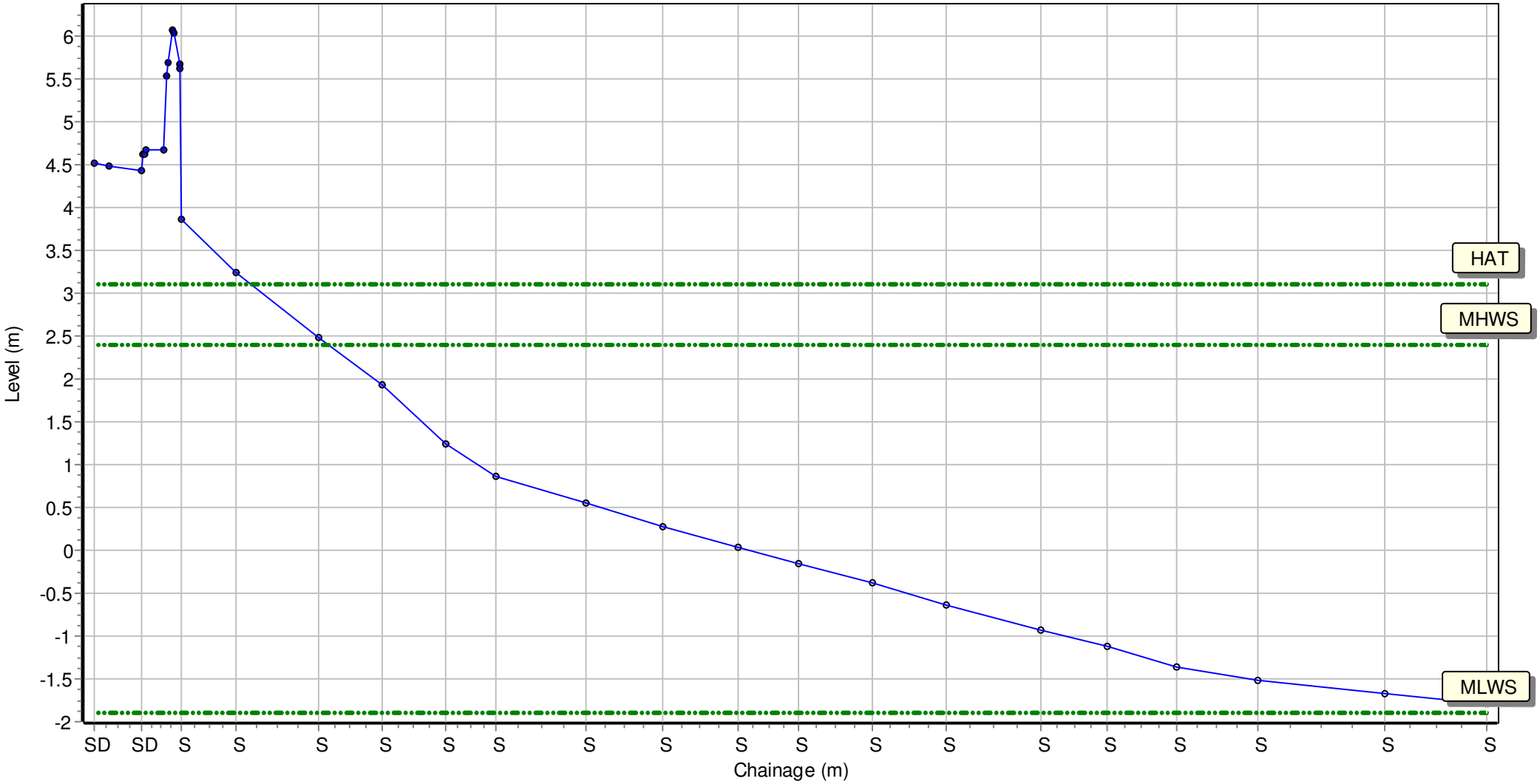
Location: **1aNWB7**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

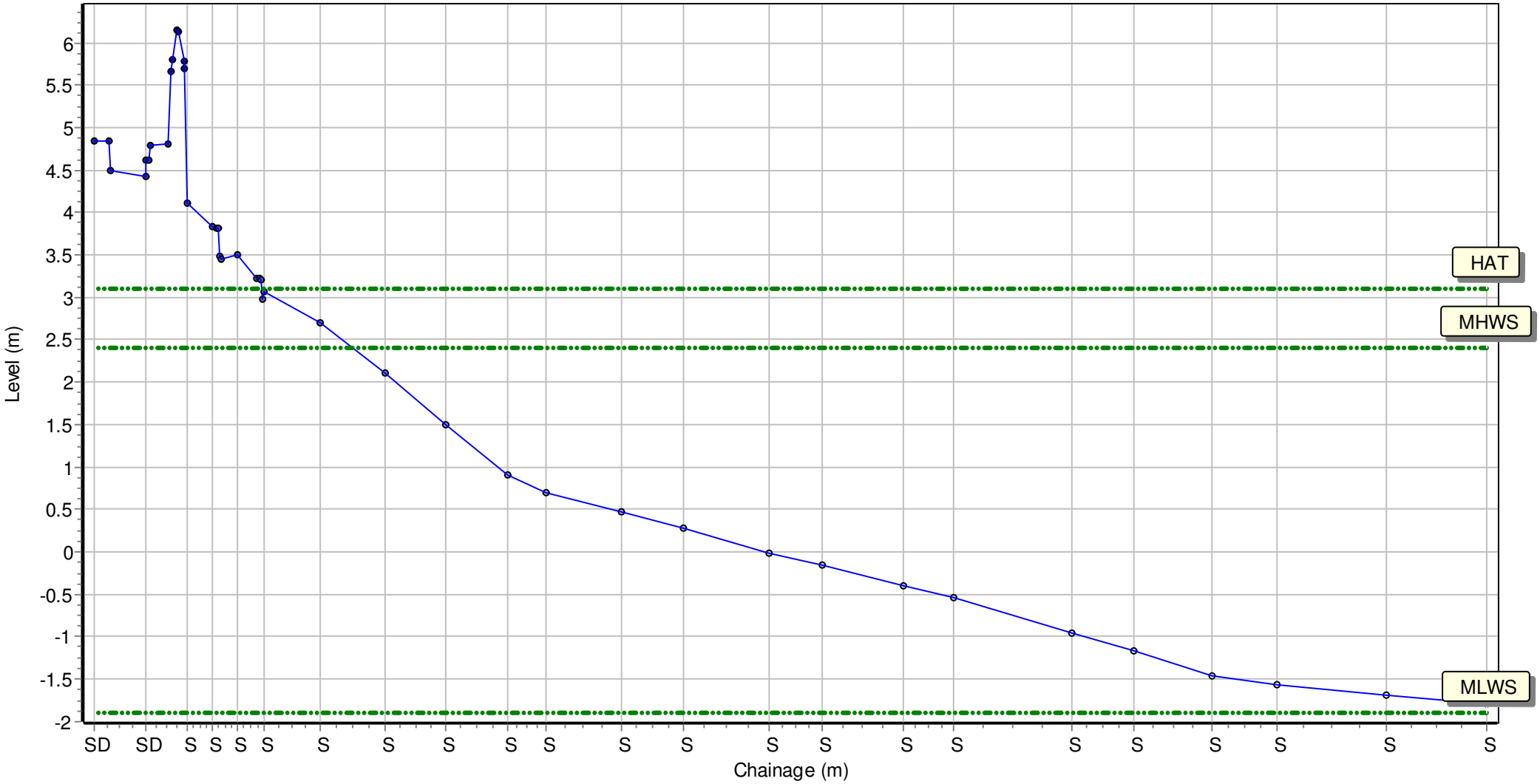
Location: **1aNWB8**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

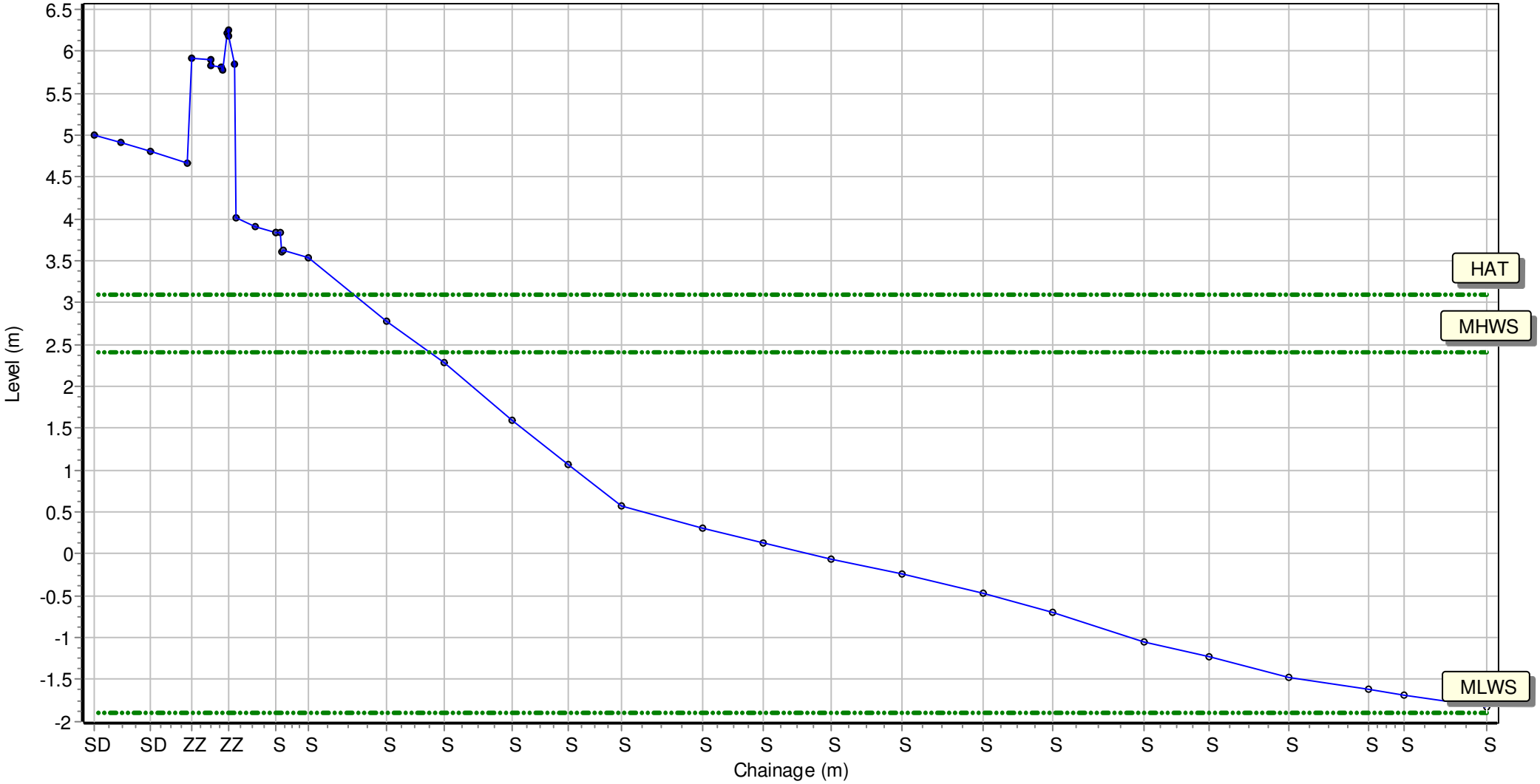
Location: **1aNWB9**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

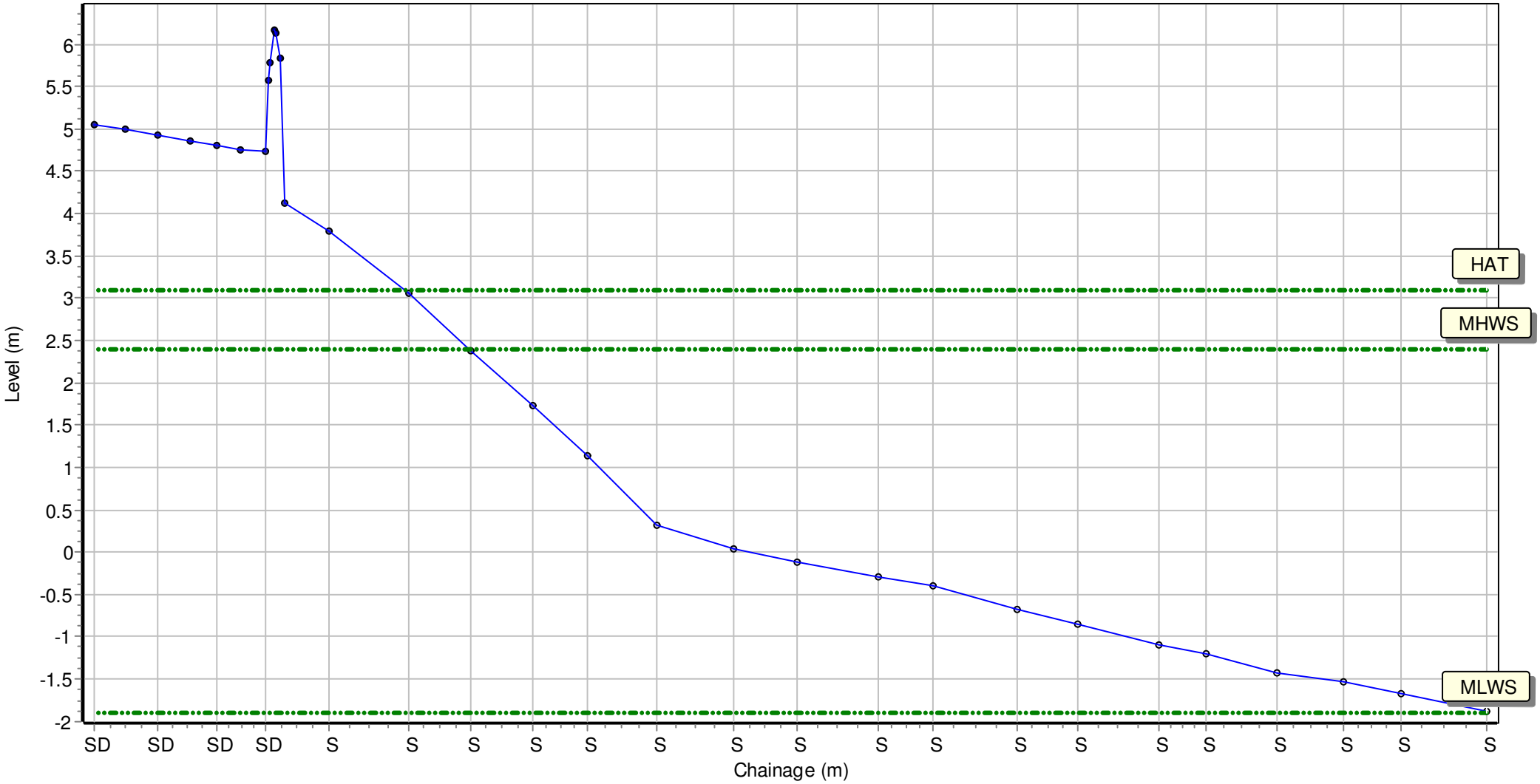
Location: **1aNWB10**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

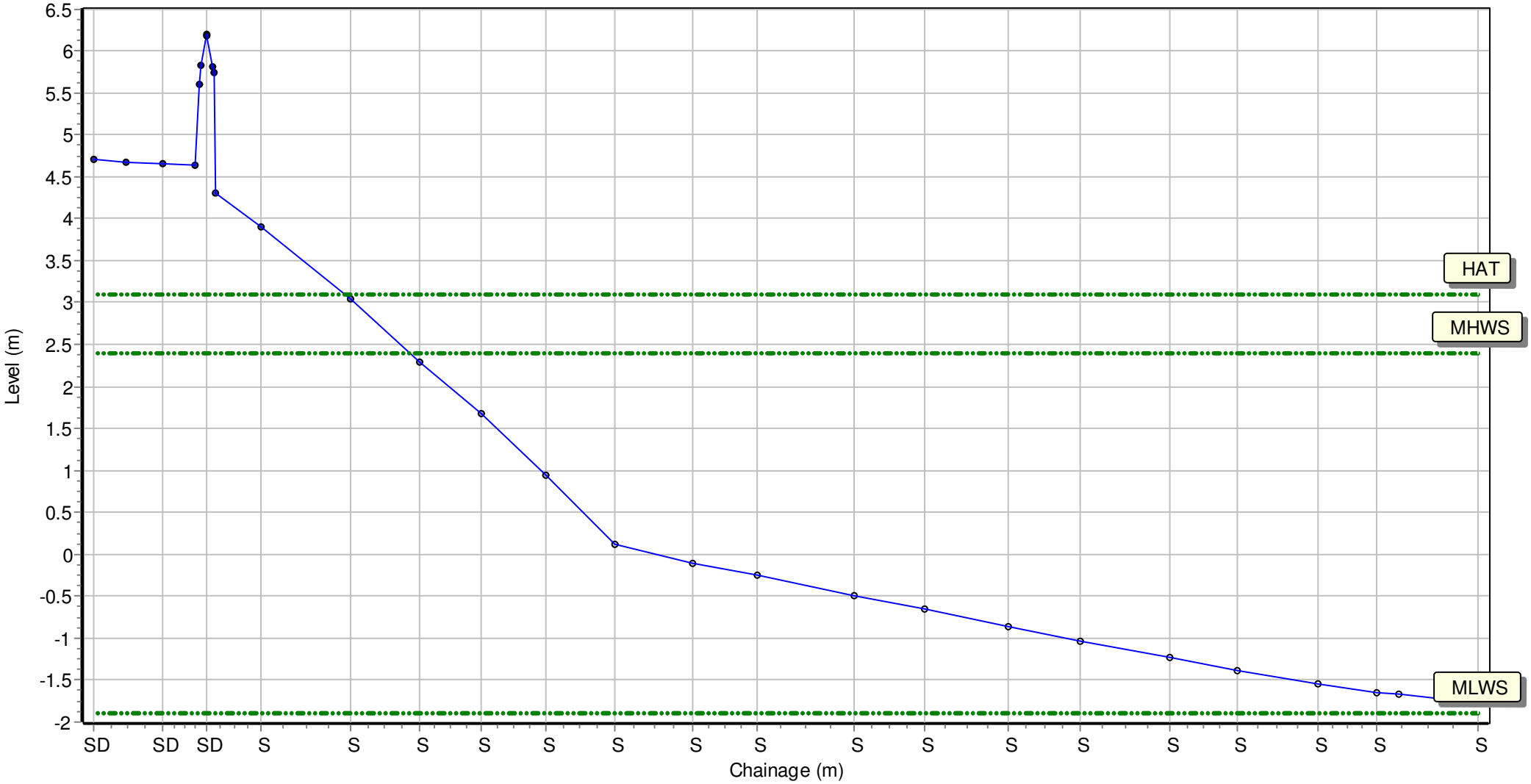
Location: **1aNWB11**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

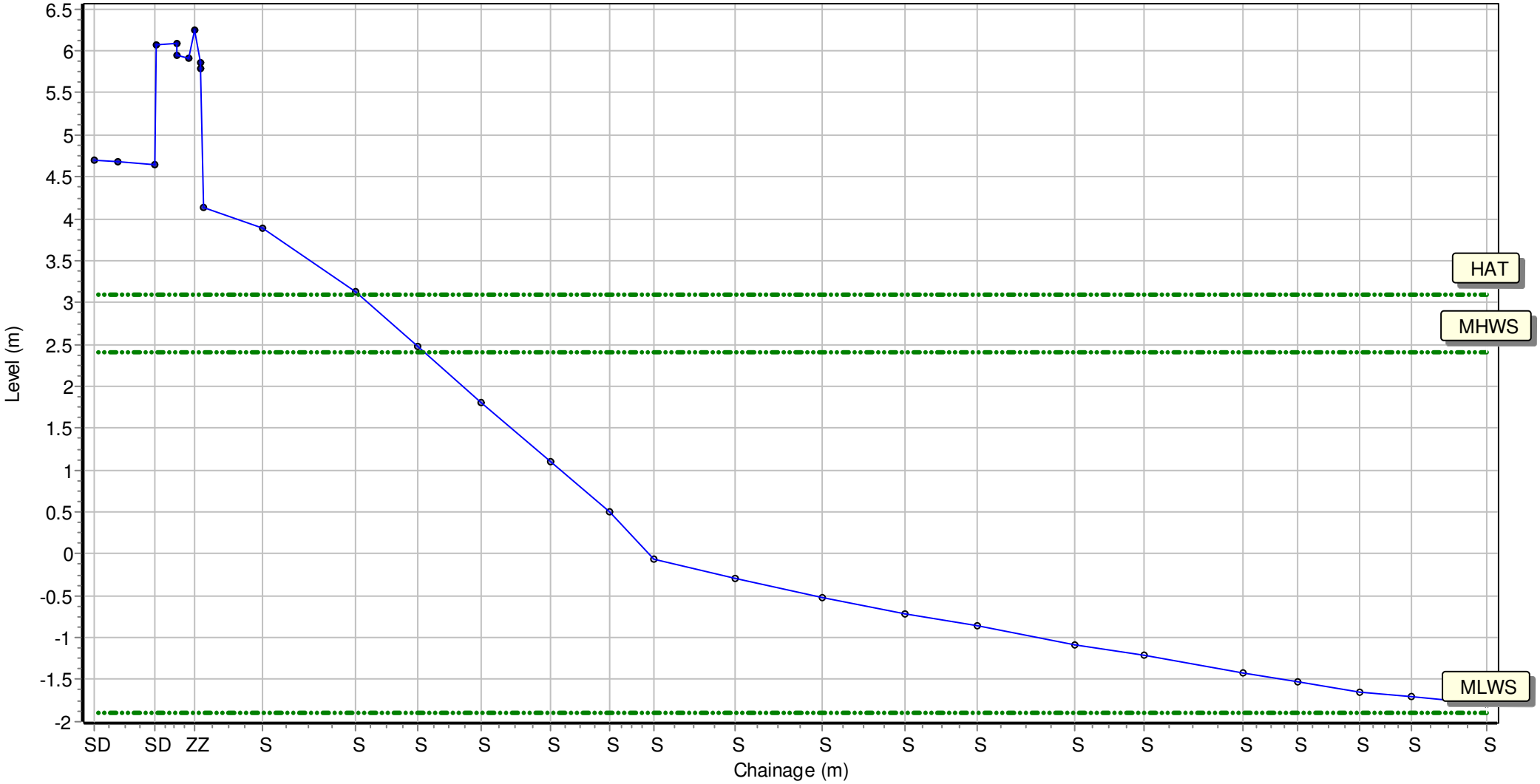
Location: **1aNWB12**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

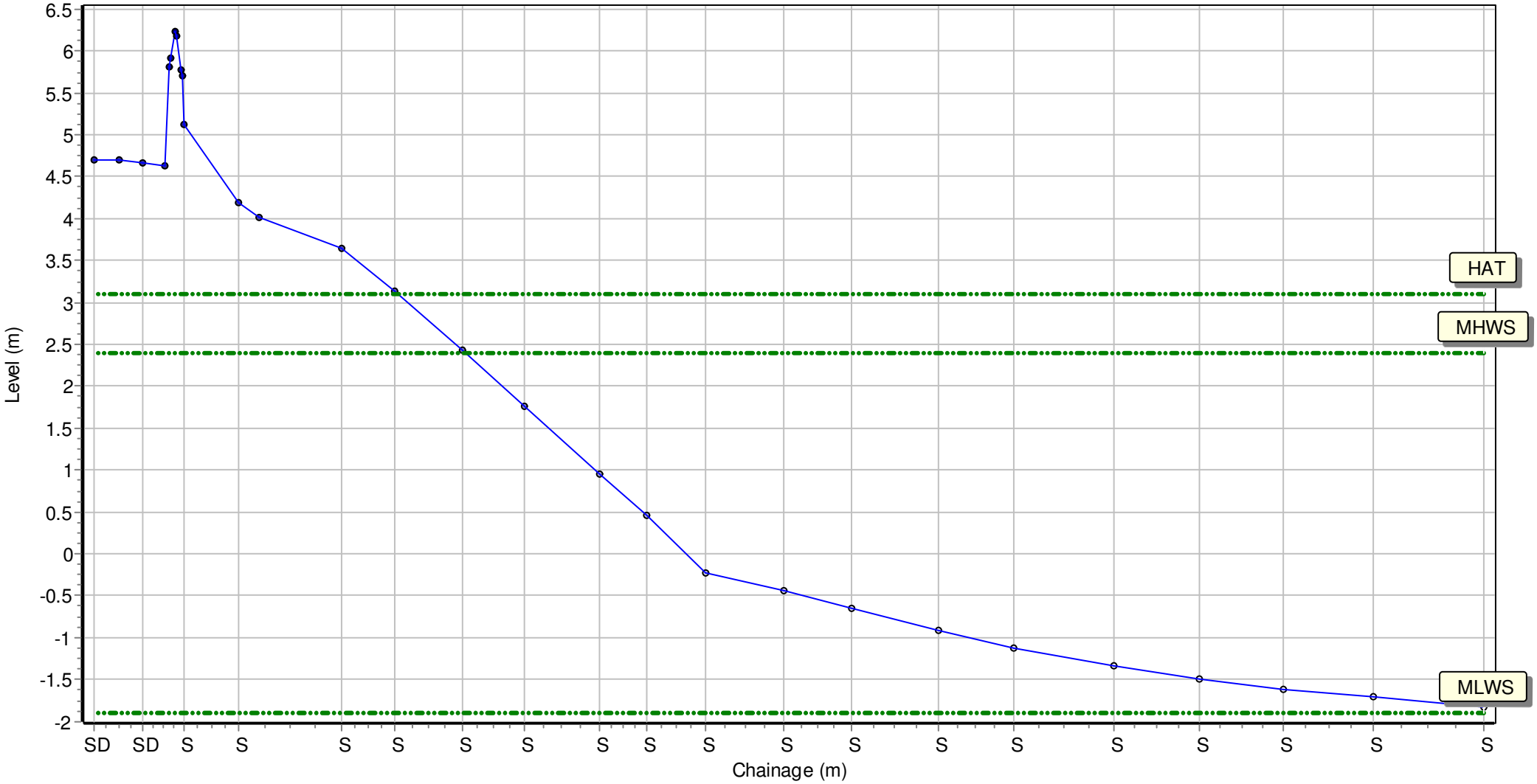
Location: **1aNWB13**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

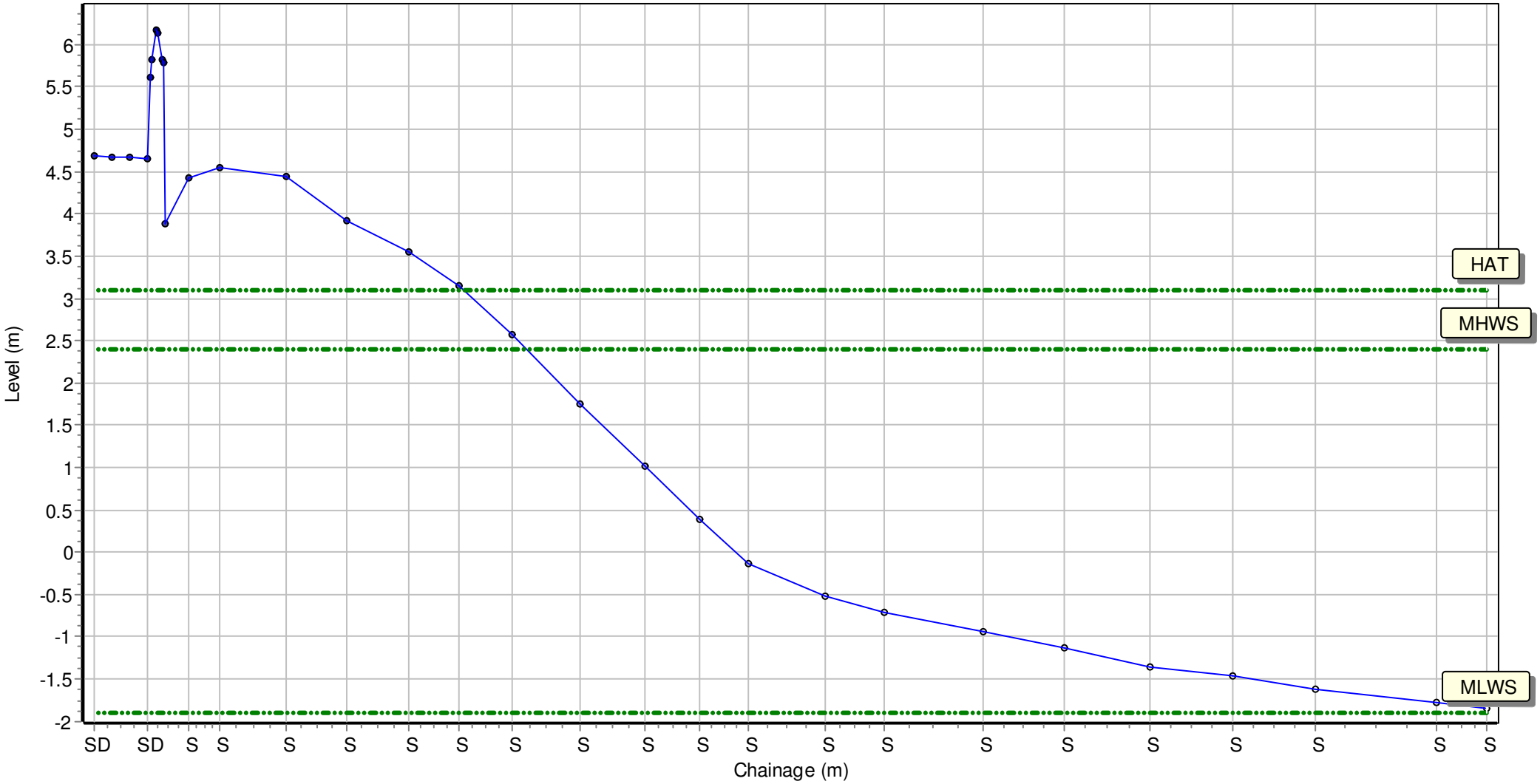
Location: **1aNWB14**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

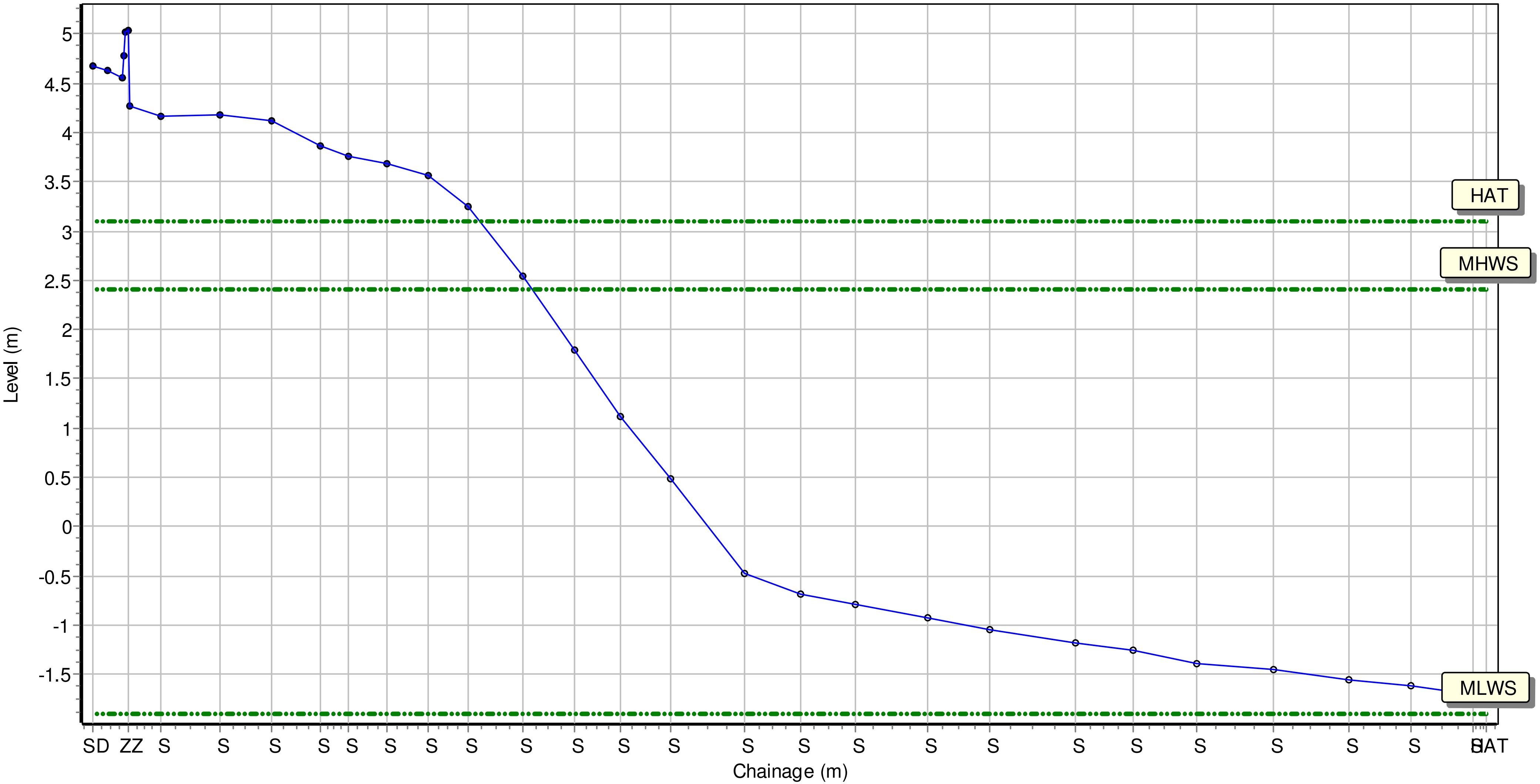
Location: **1aNWB15**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



http://www.sandsuser.com

SANDS

Beach Profile

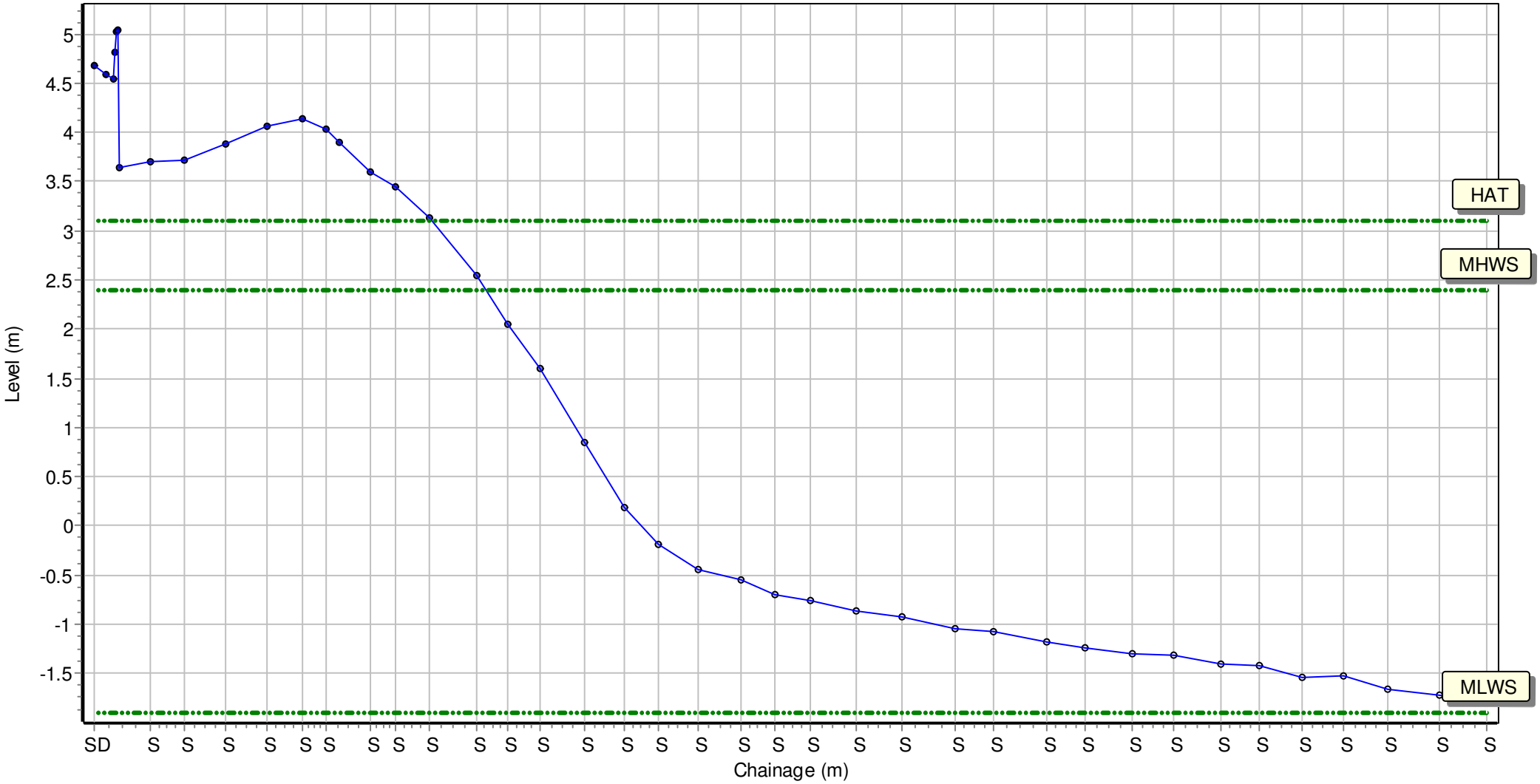
Location: **1aNWB16**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

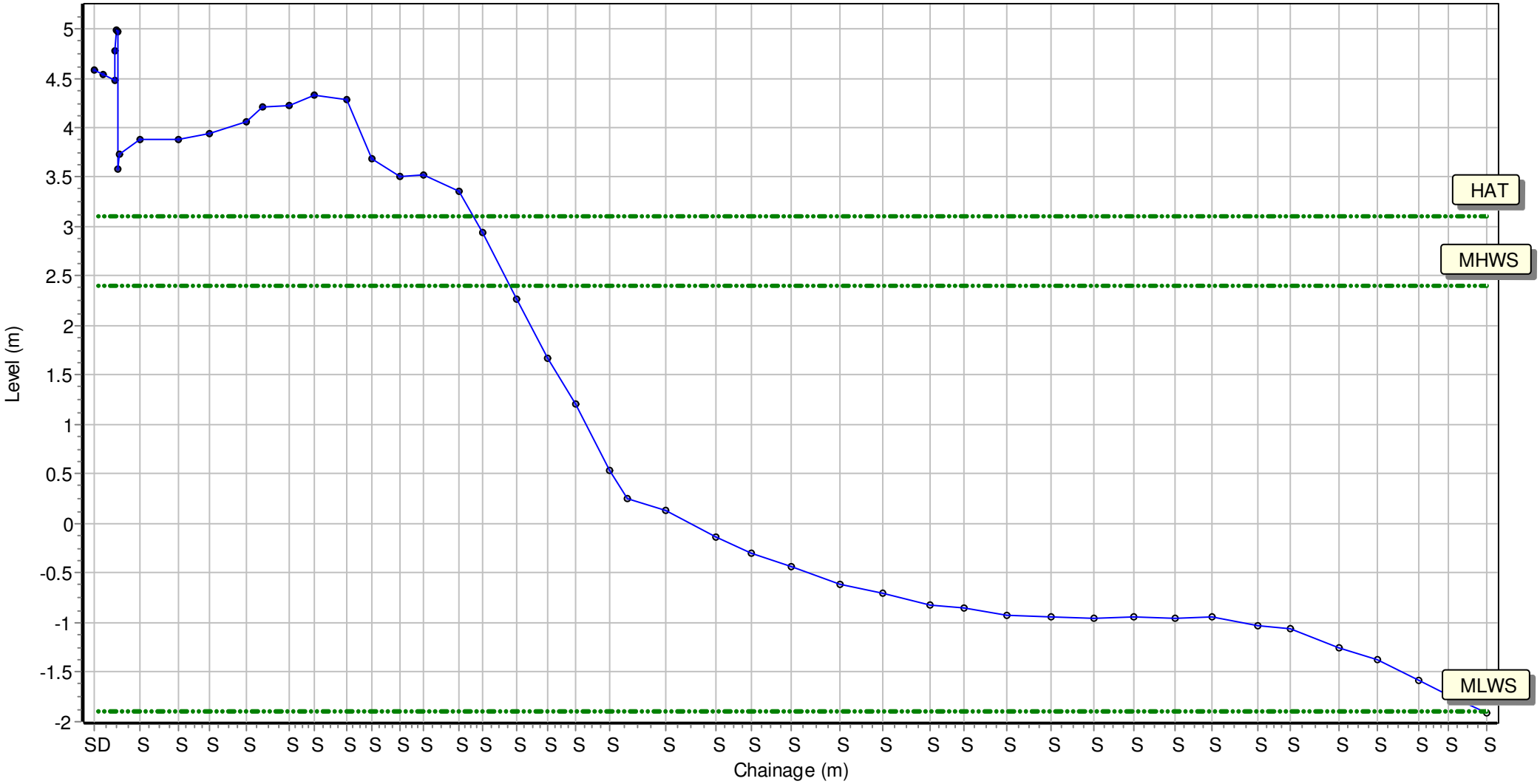
Location: **1aNWB17**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

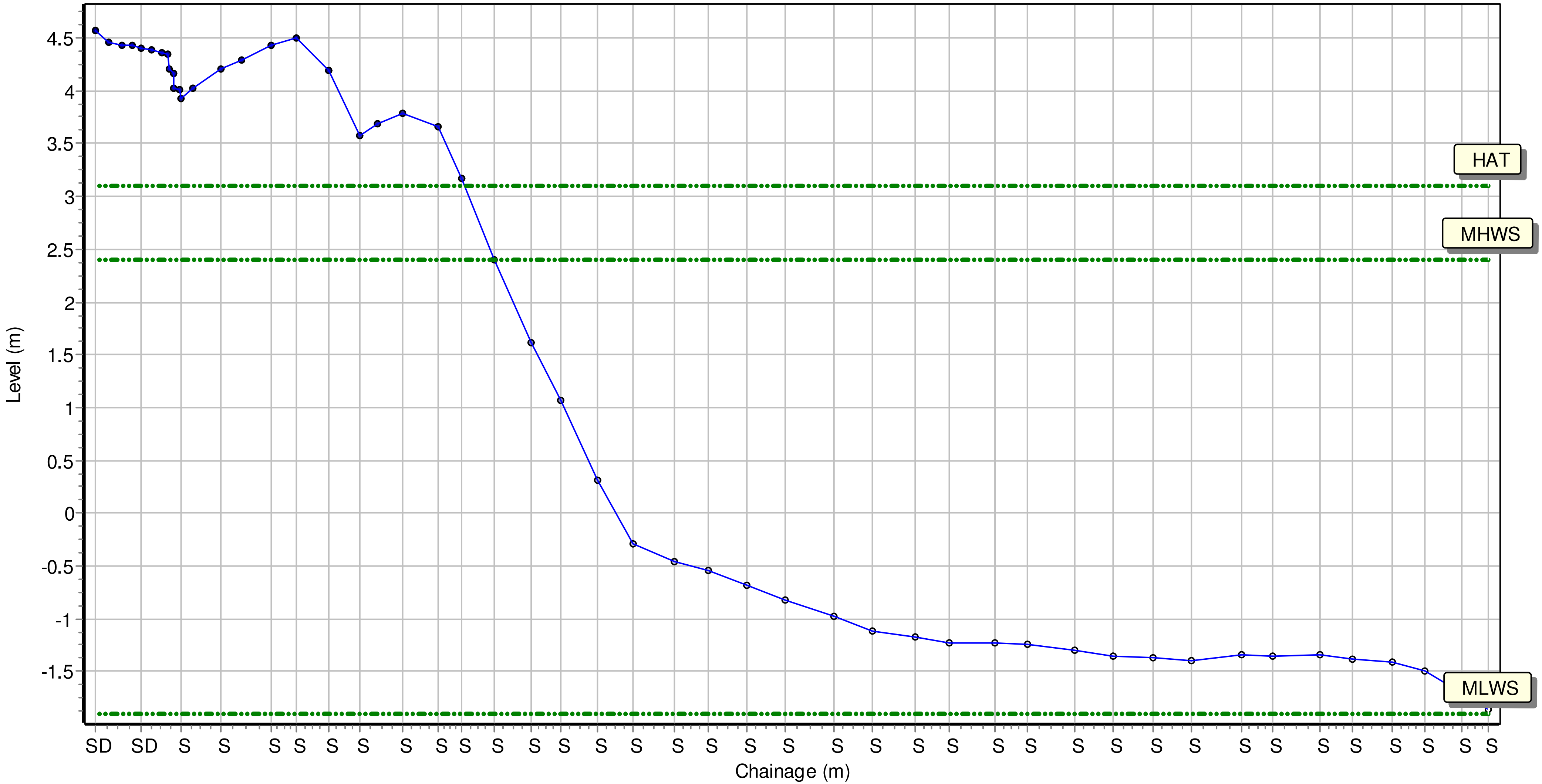
Location: **1aNWB18**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



http://www.sandsuser.com

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Beach Profile

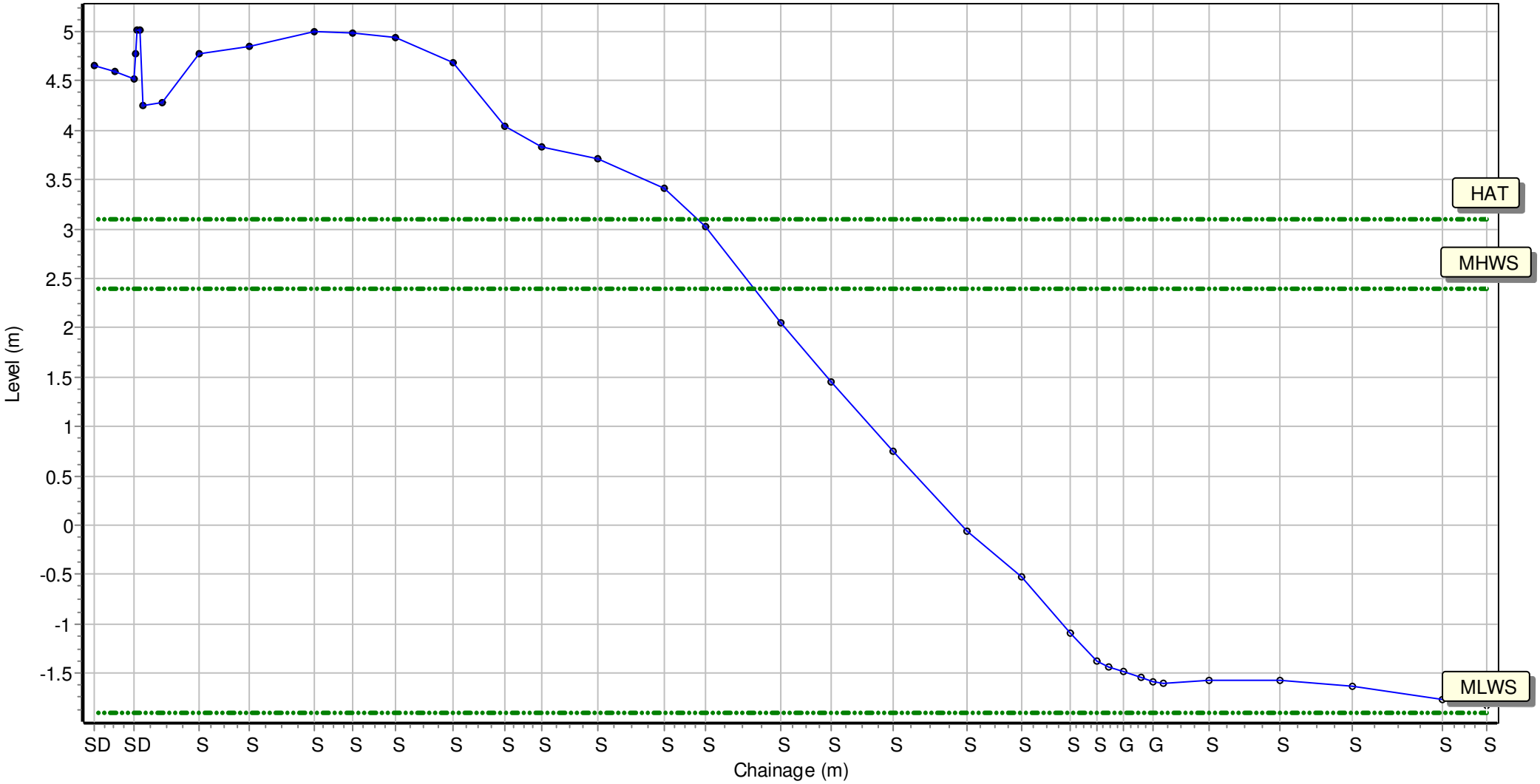
Location: **1aNWB19**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

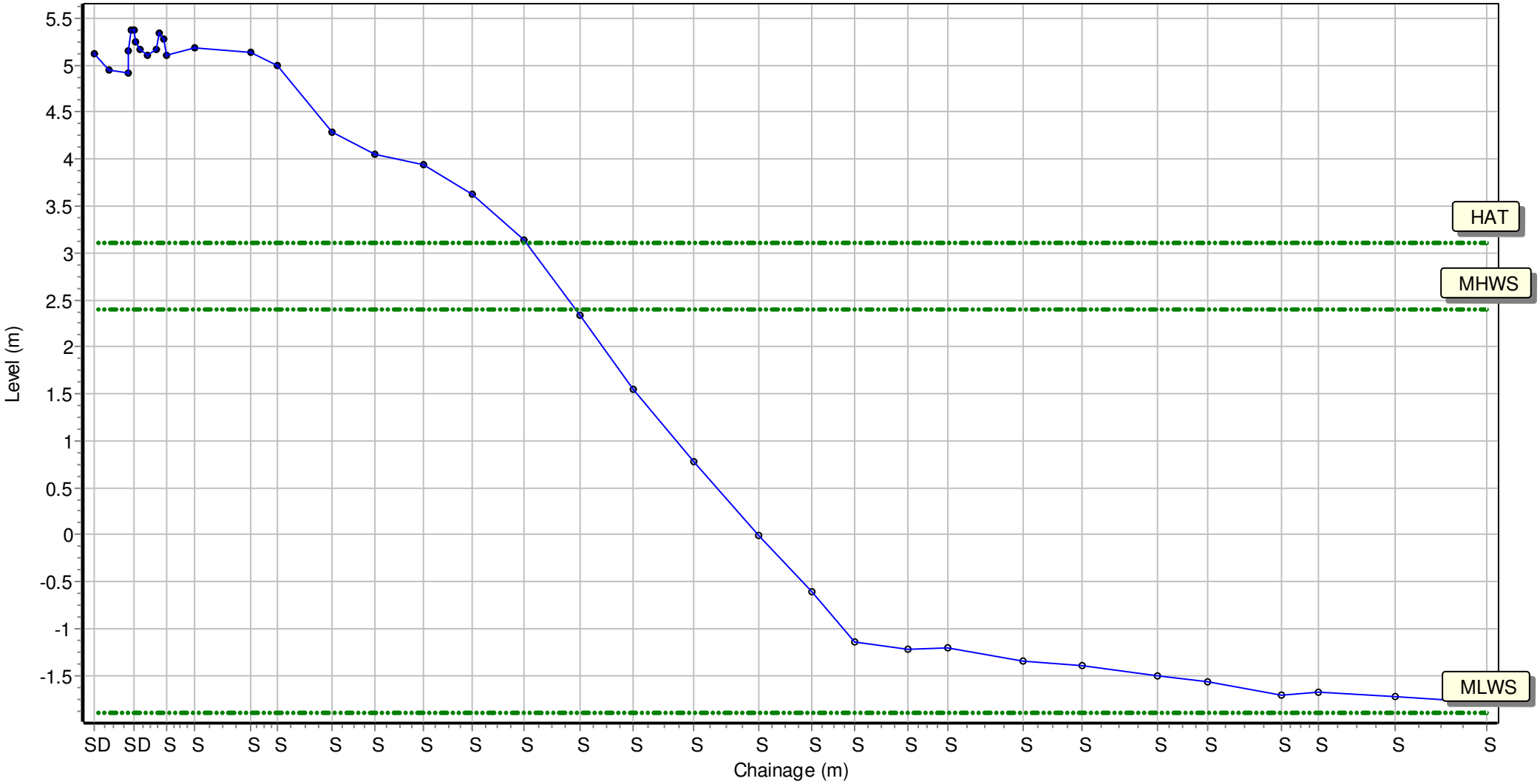
Location: **1aNWB20**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

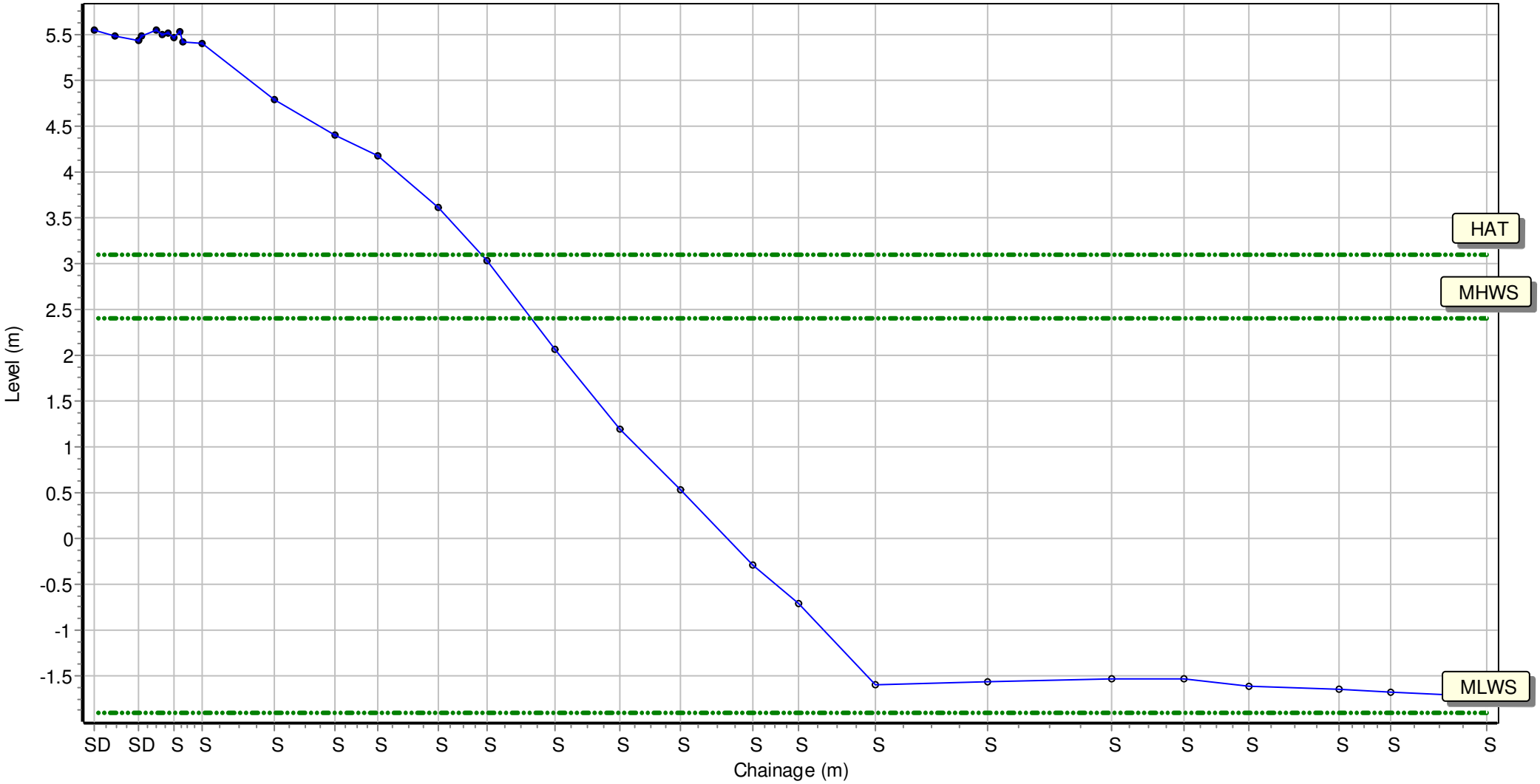
Location: **1aNWB21**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

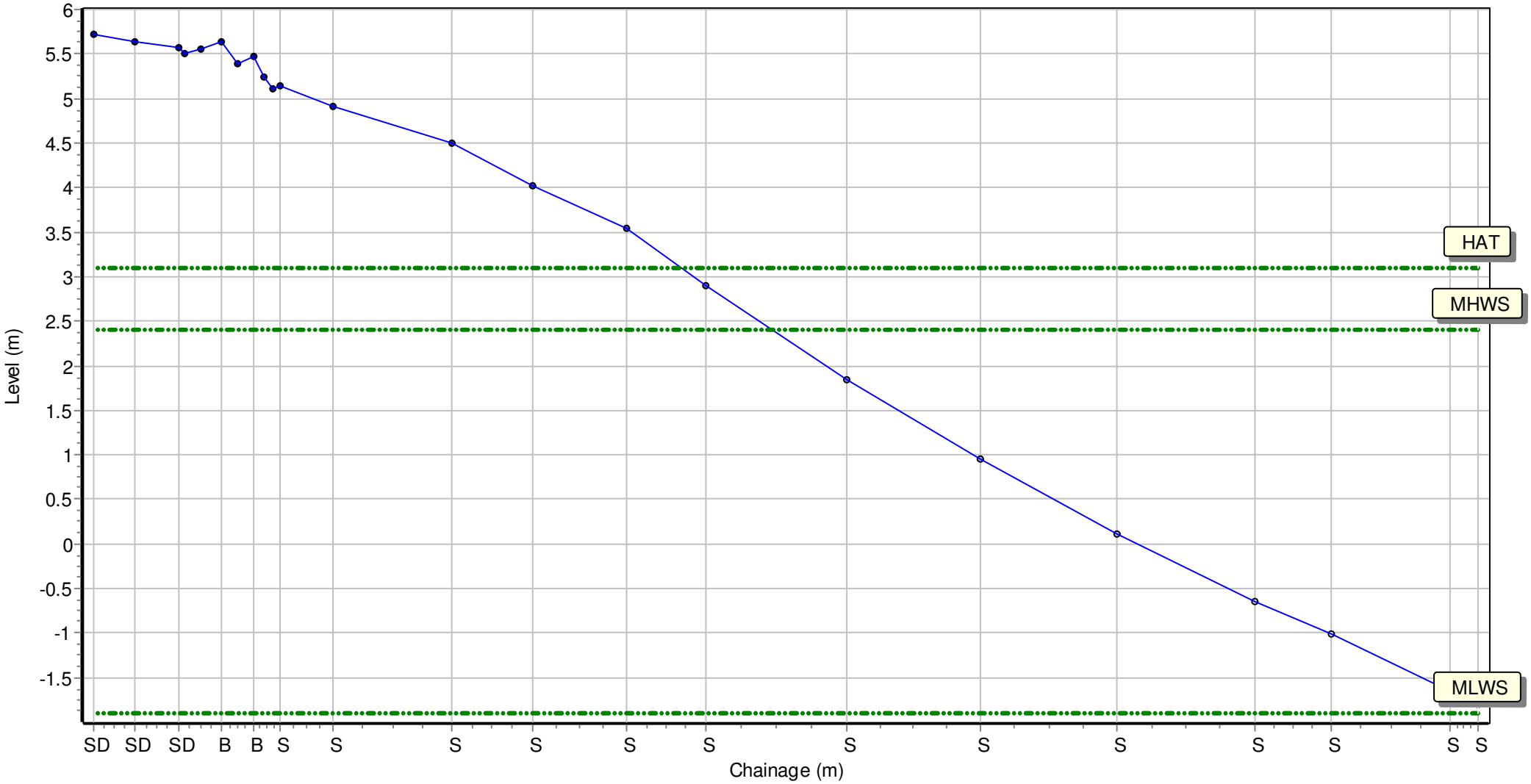
Location: **1aNWB22**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

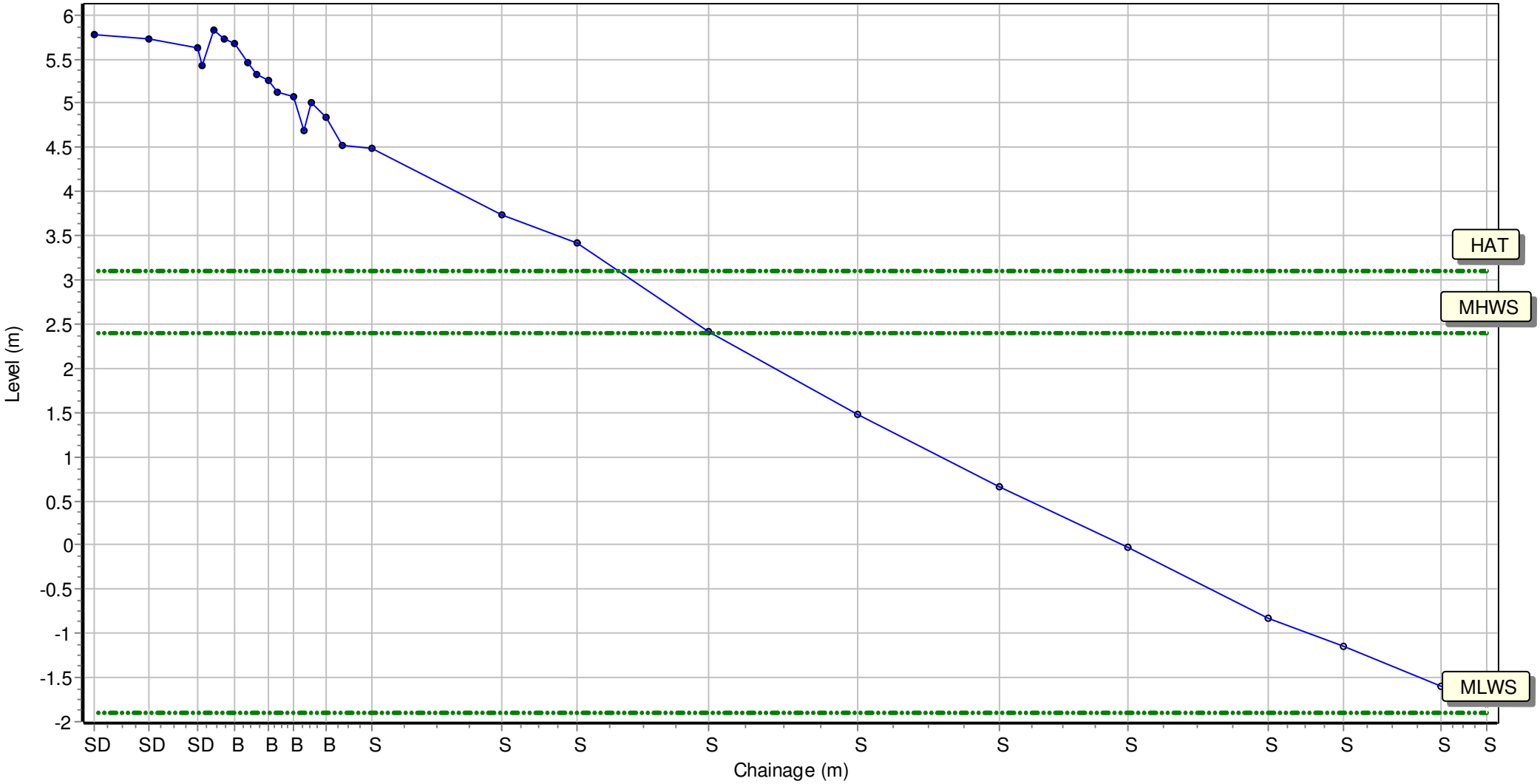
Location: **1aNWB23**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

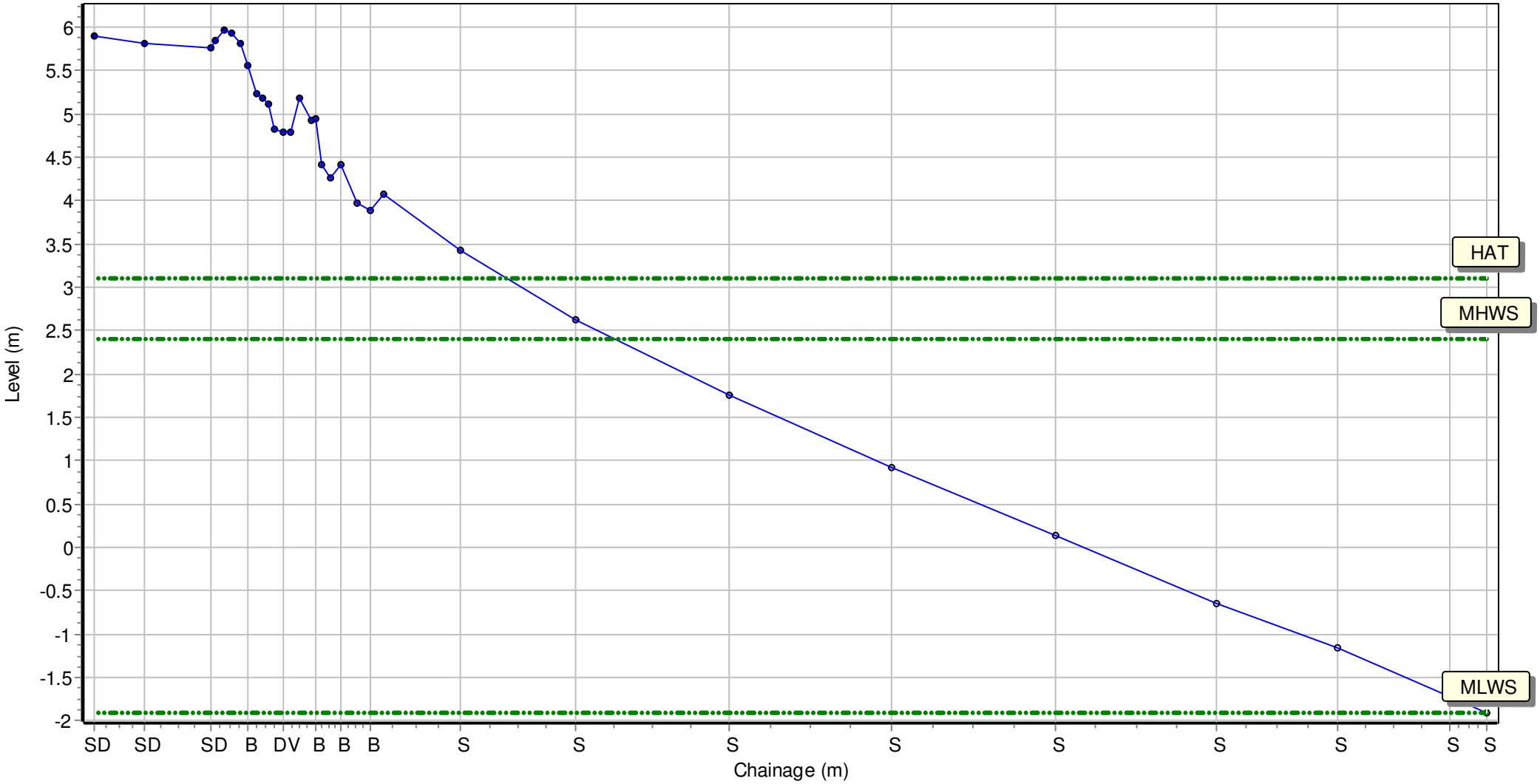
Location: **1aNWB24**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

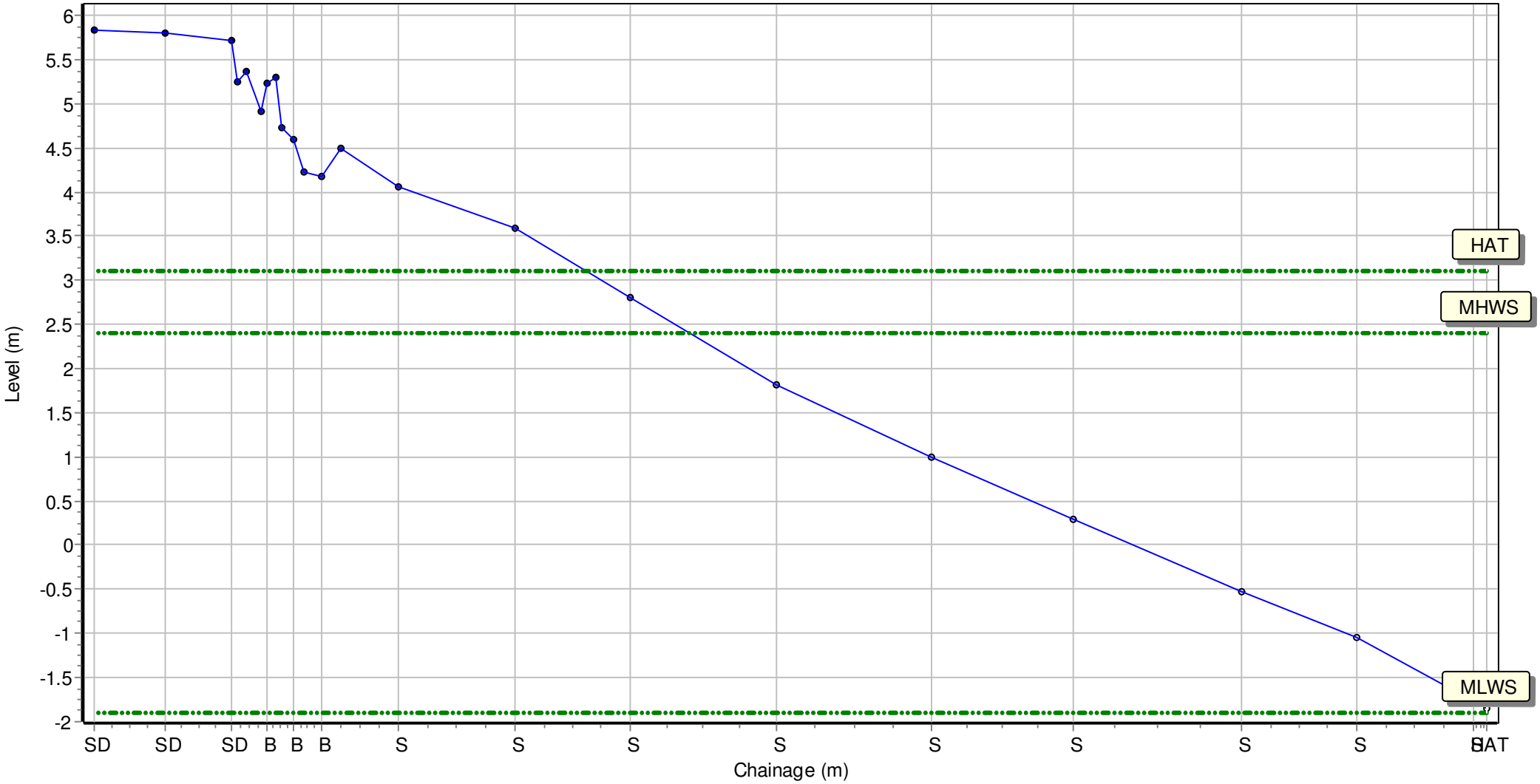
Location: **1aNWB25**

Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

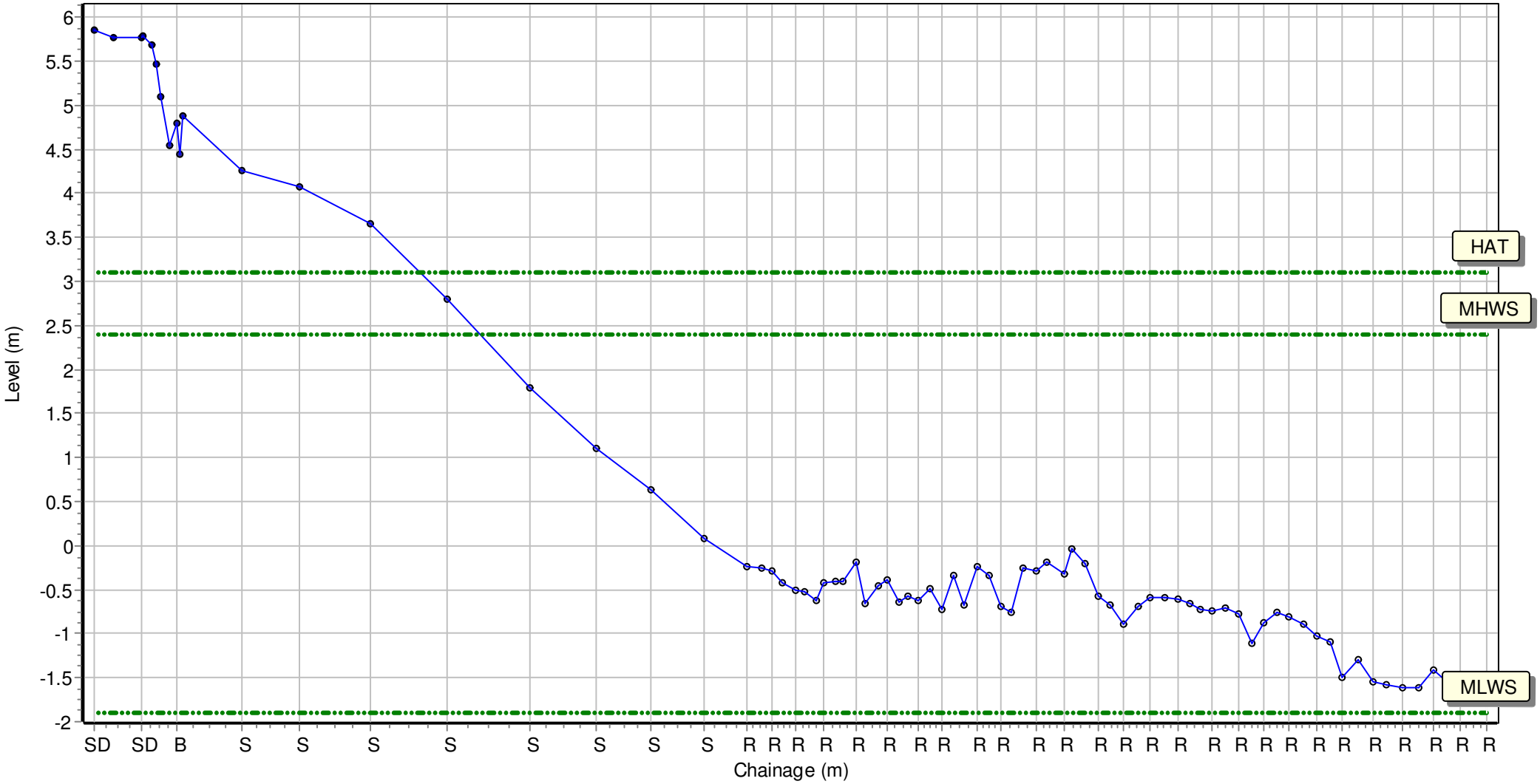
Location: **1aNWB26**

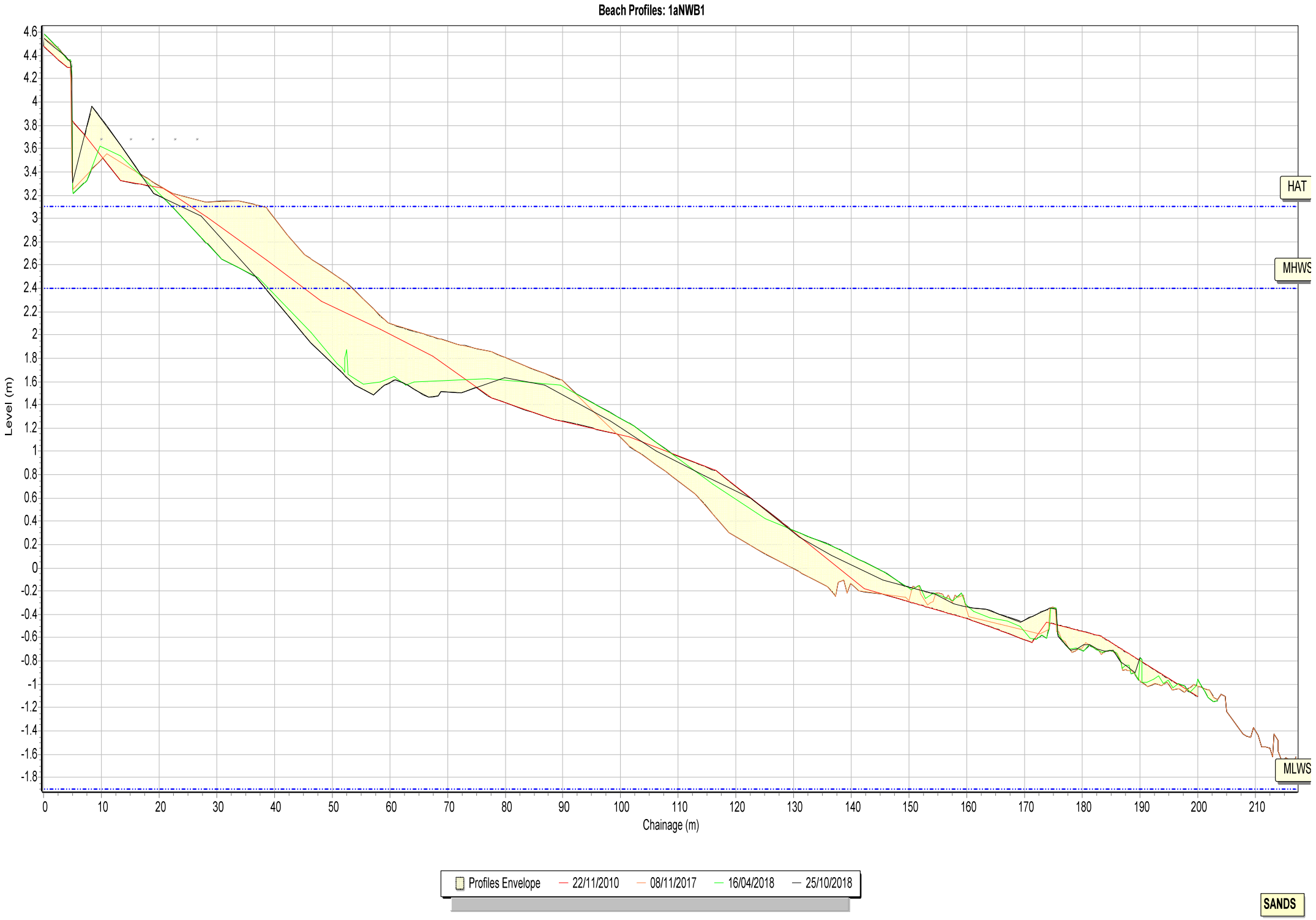
Date: 25/10/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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




Beach Profiles: 1aNWB1
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4.2
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3.8
3.6
3.4
3.2
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1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
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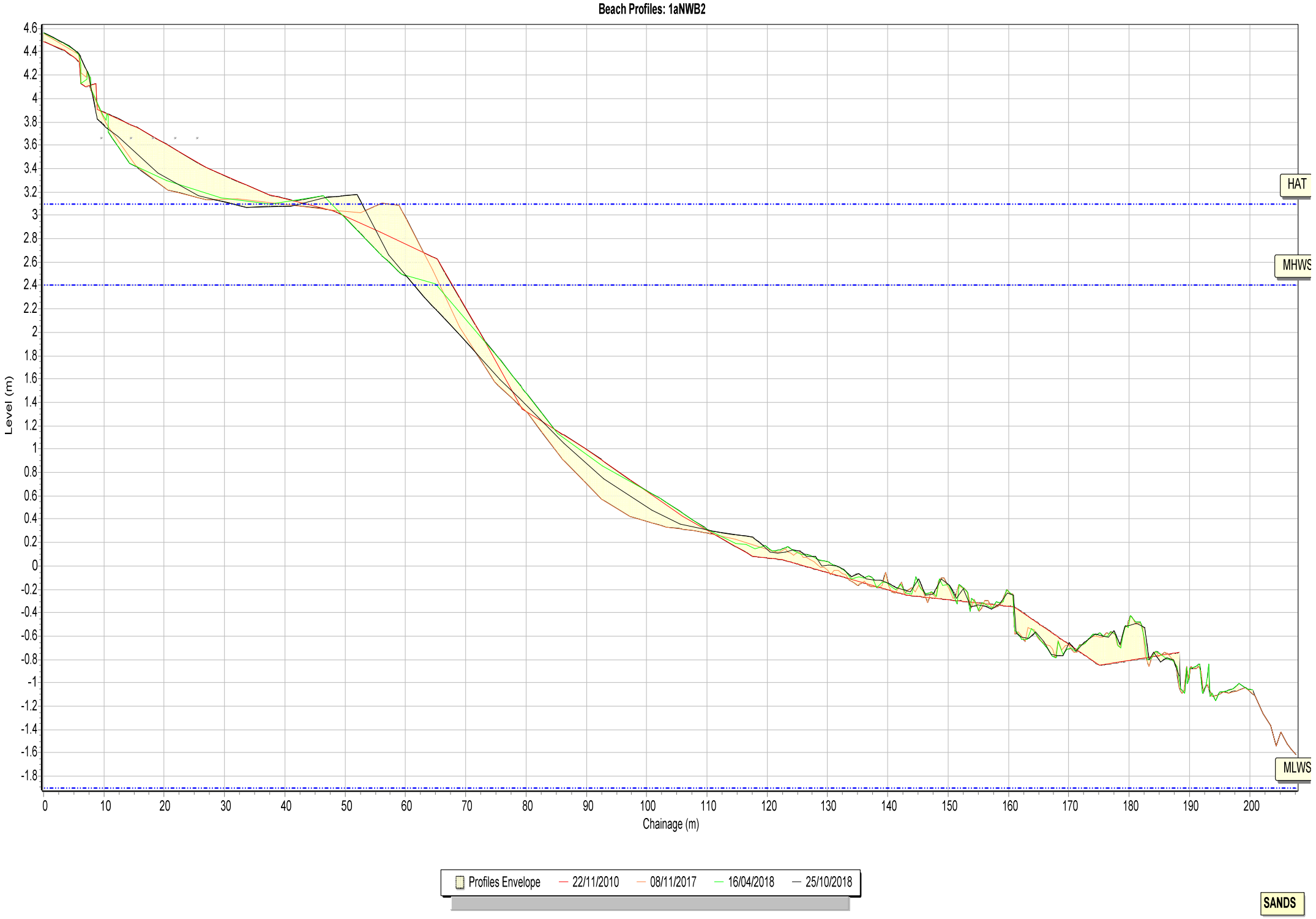
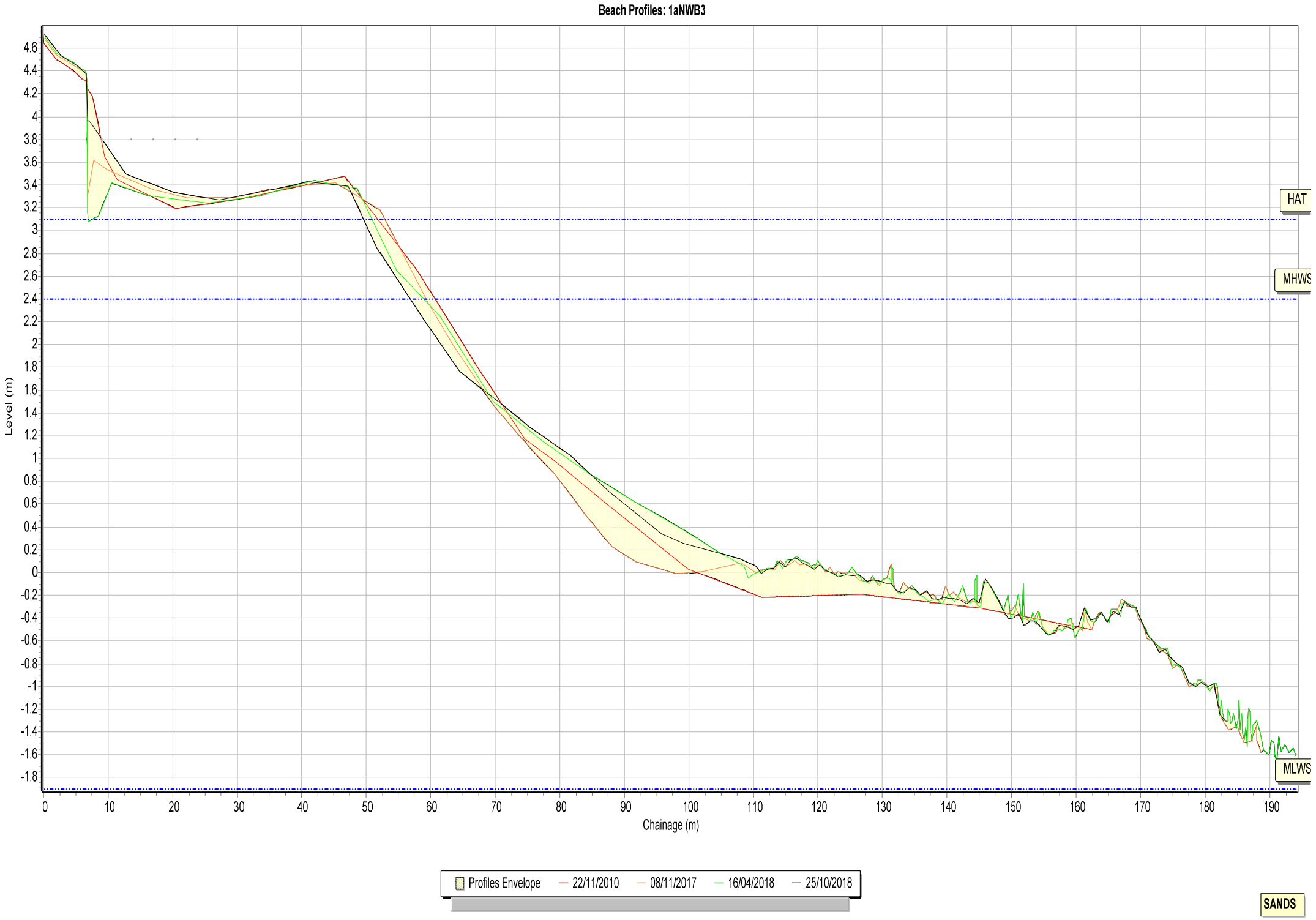
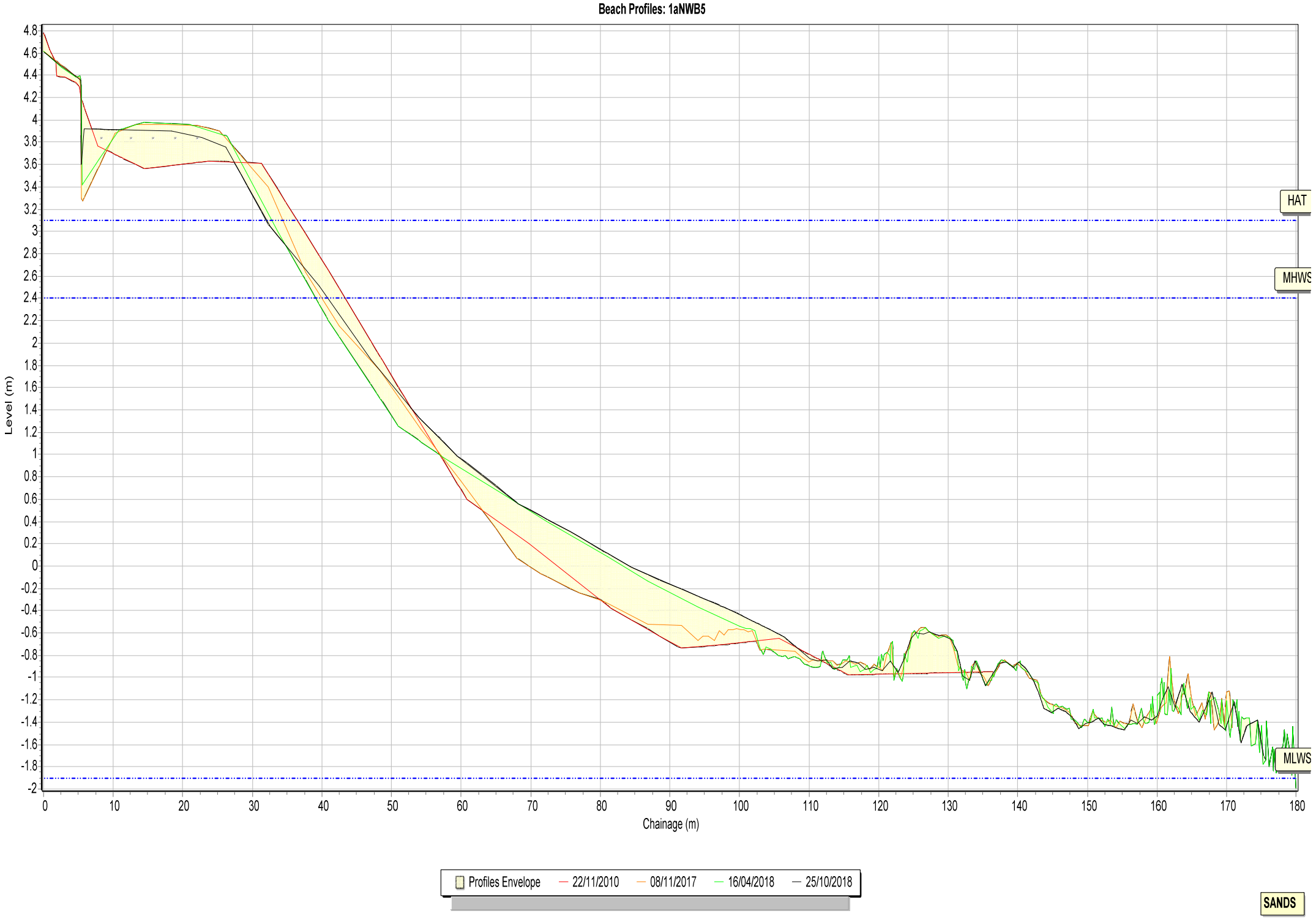
100
110
120
130
140
150
160
170
180
190
200
210
Chainage (m)
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB2
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB3
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB4
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB5
Level (m)
Chainage (m)
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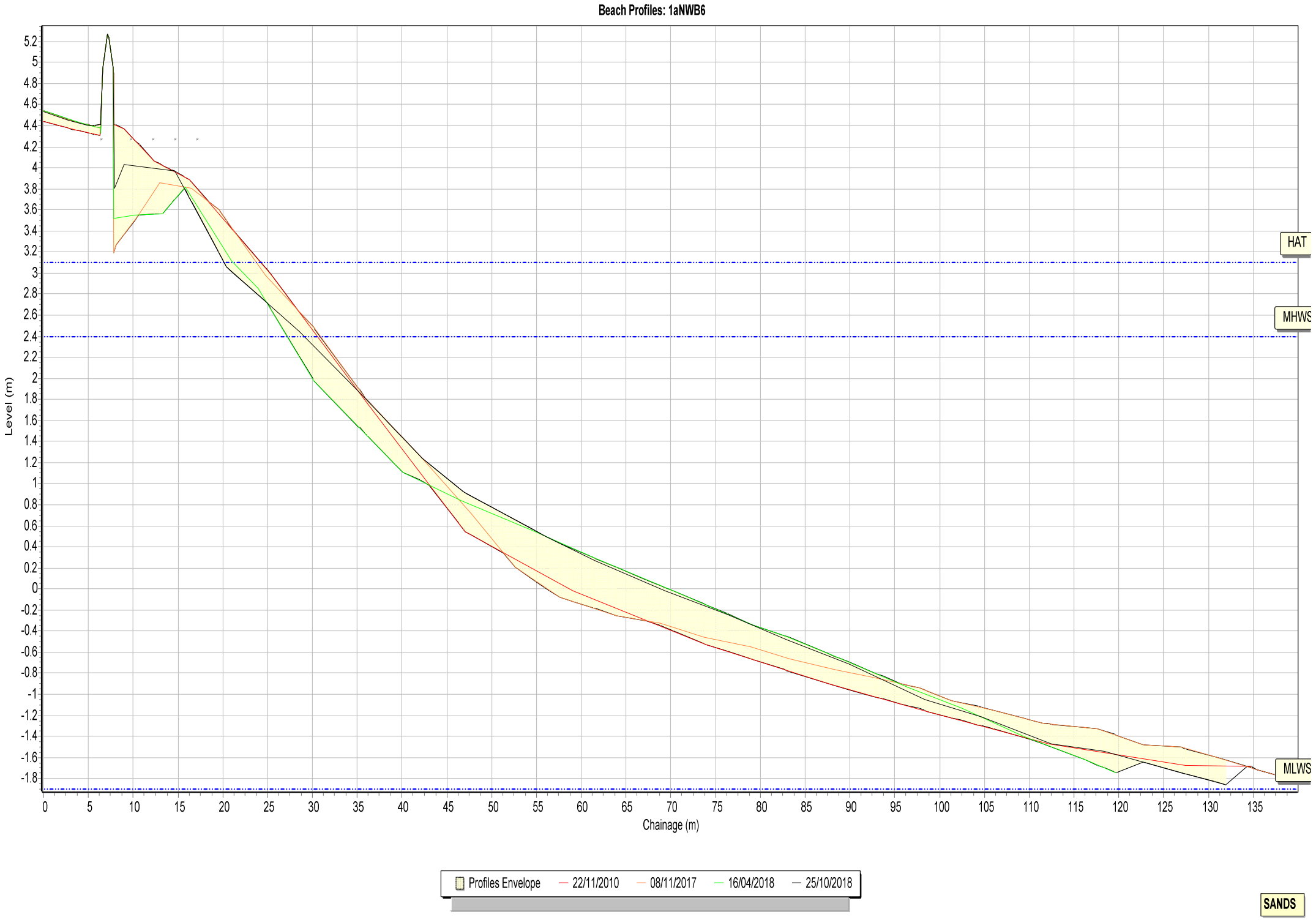
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS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Level (m)
Chainage (m)
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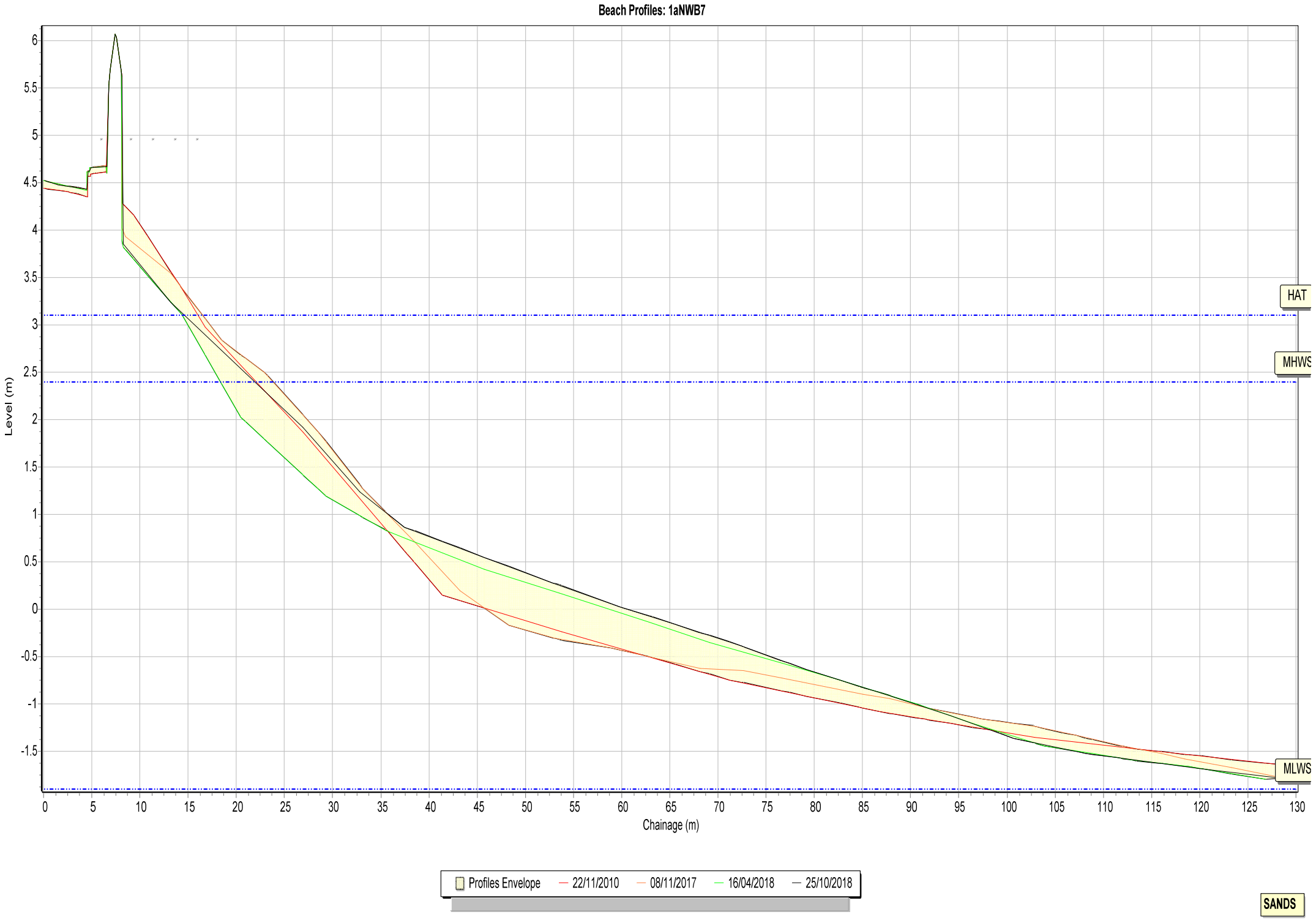
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS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Chainage (m)
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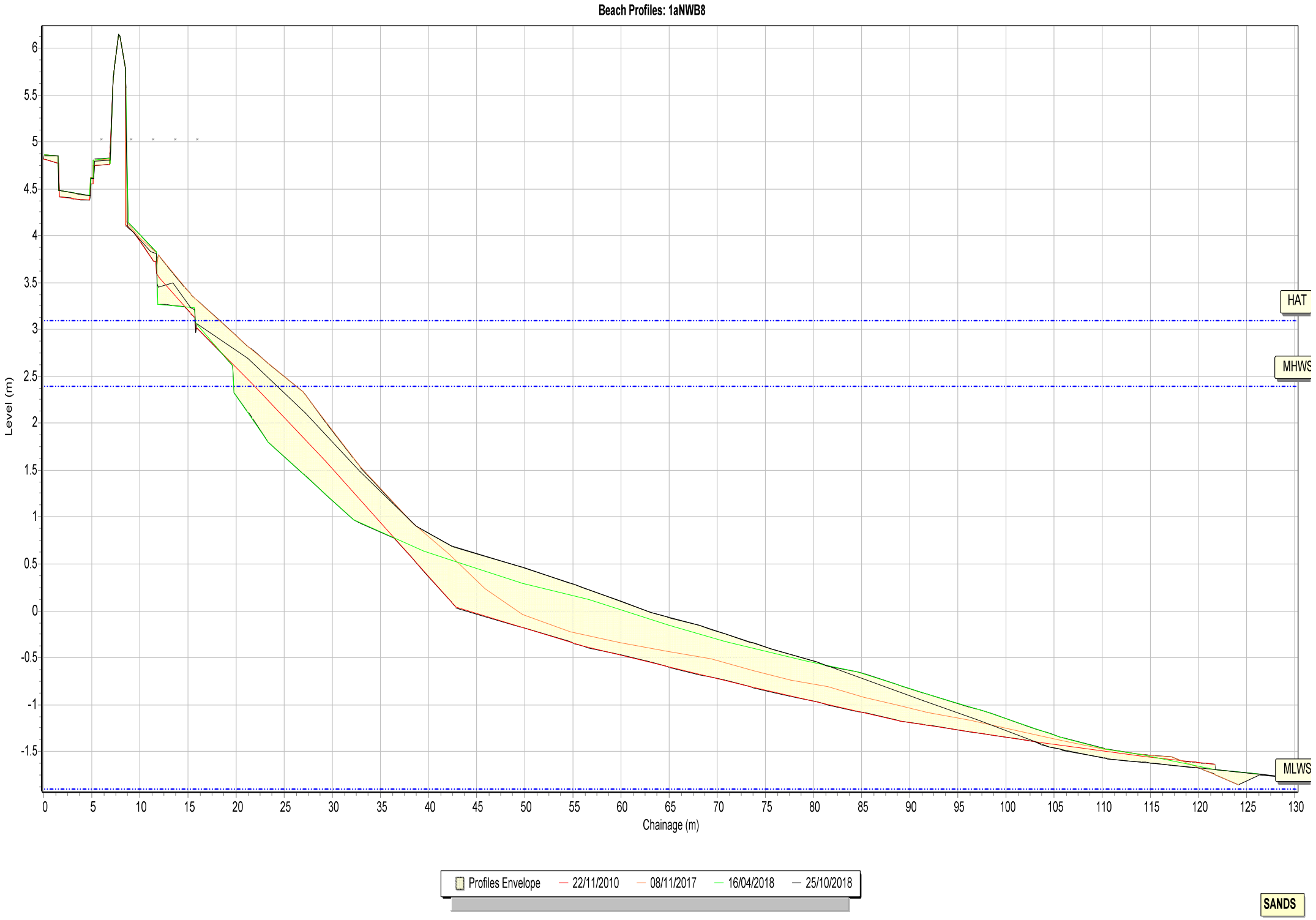
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB8
Level (m)
Chainage (m)
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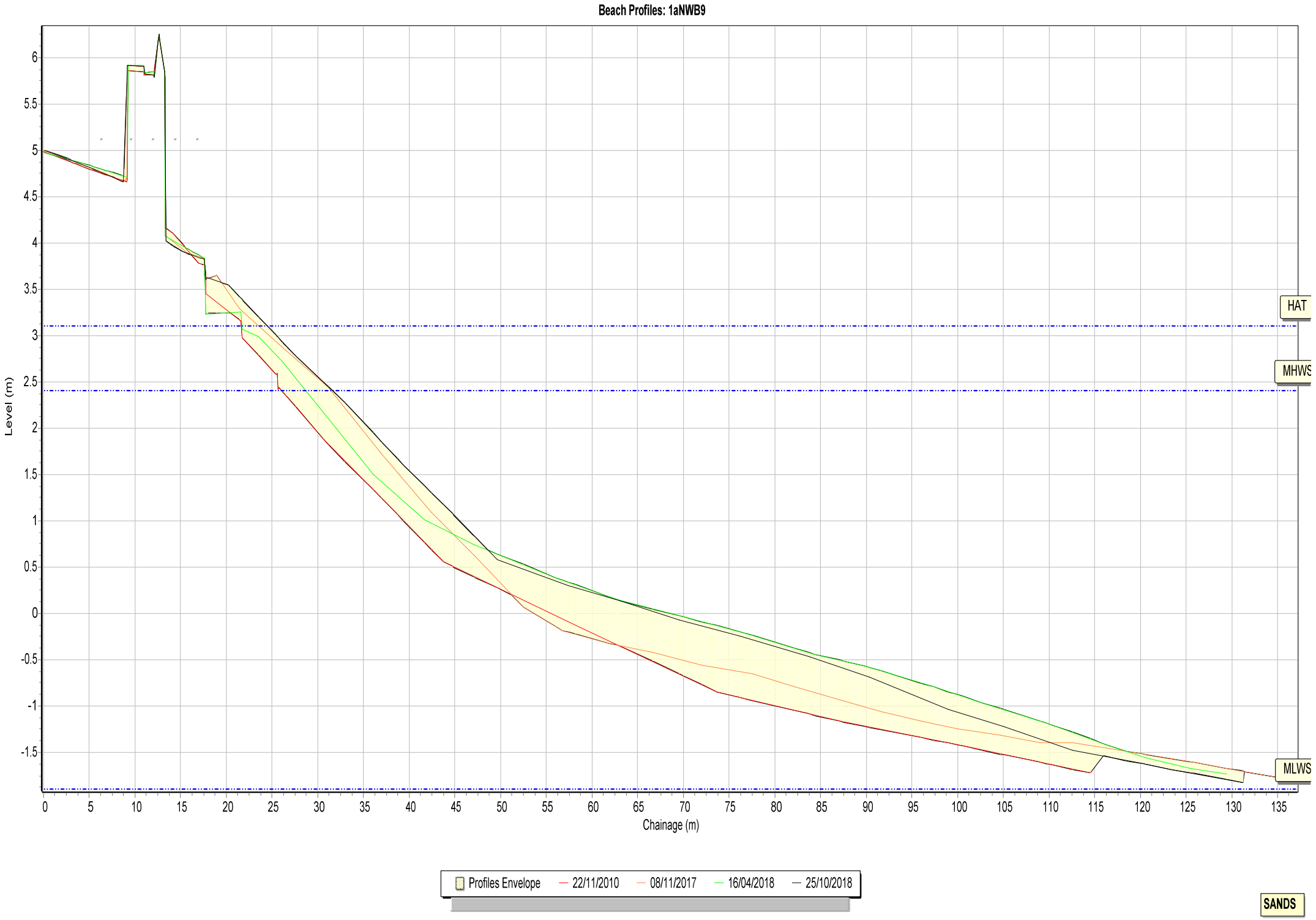
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB9
Level (m)
Chainage (m)
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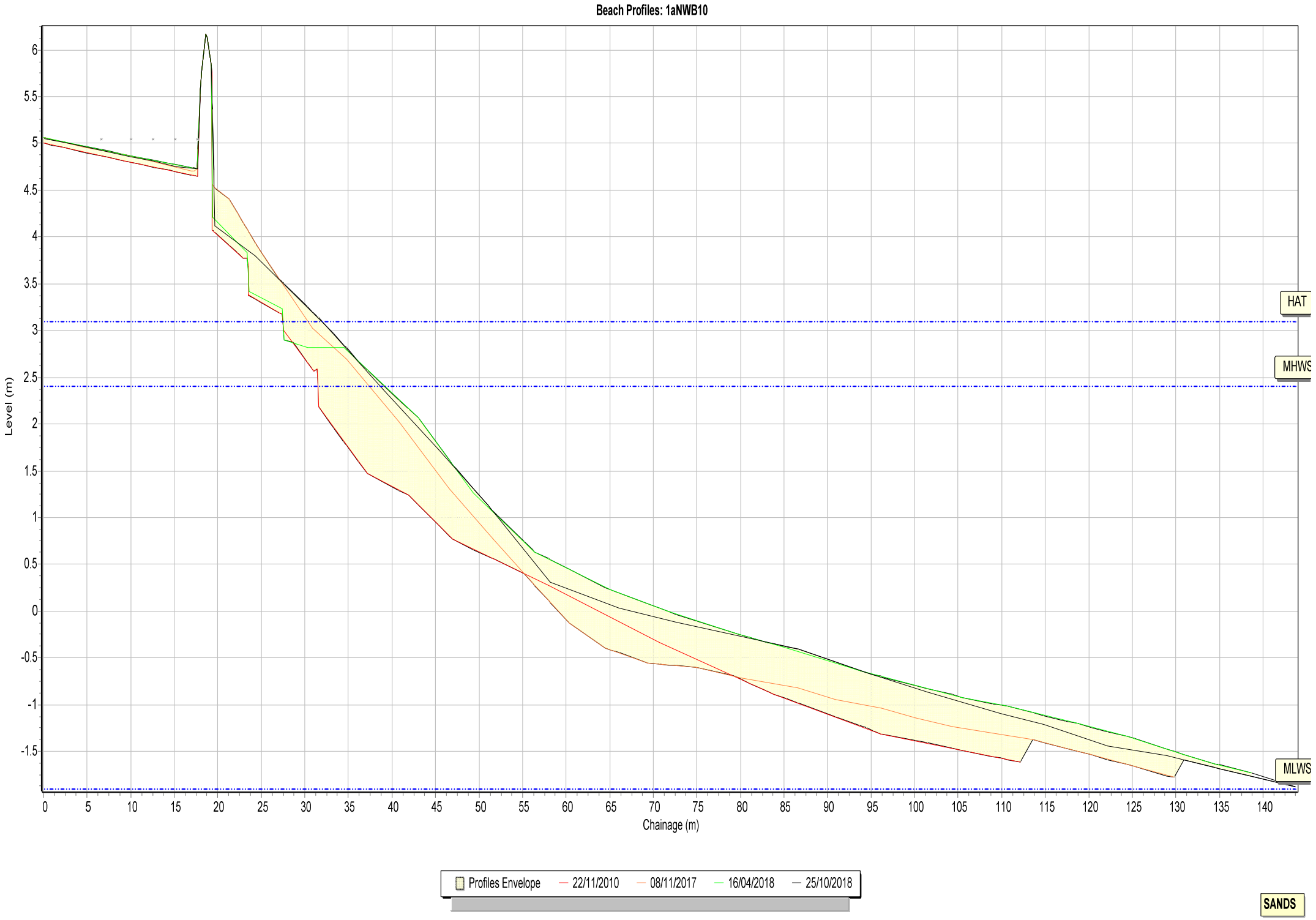
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB10
Level (m)
Chainage (m)
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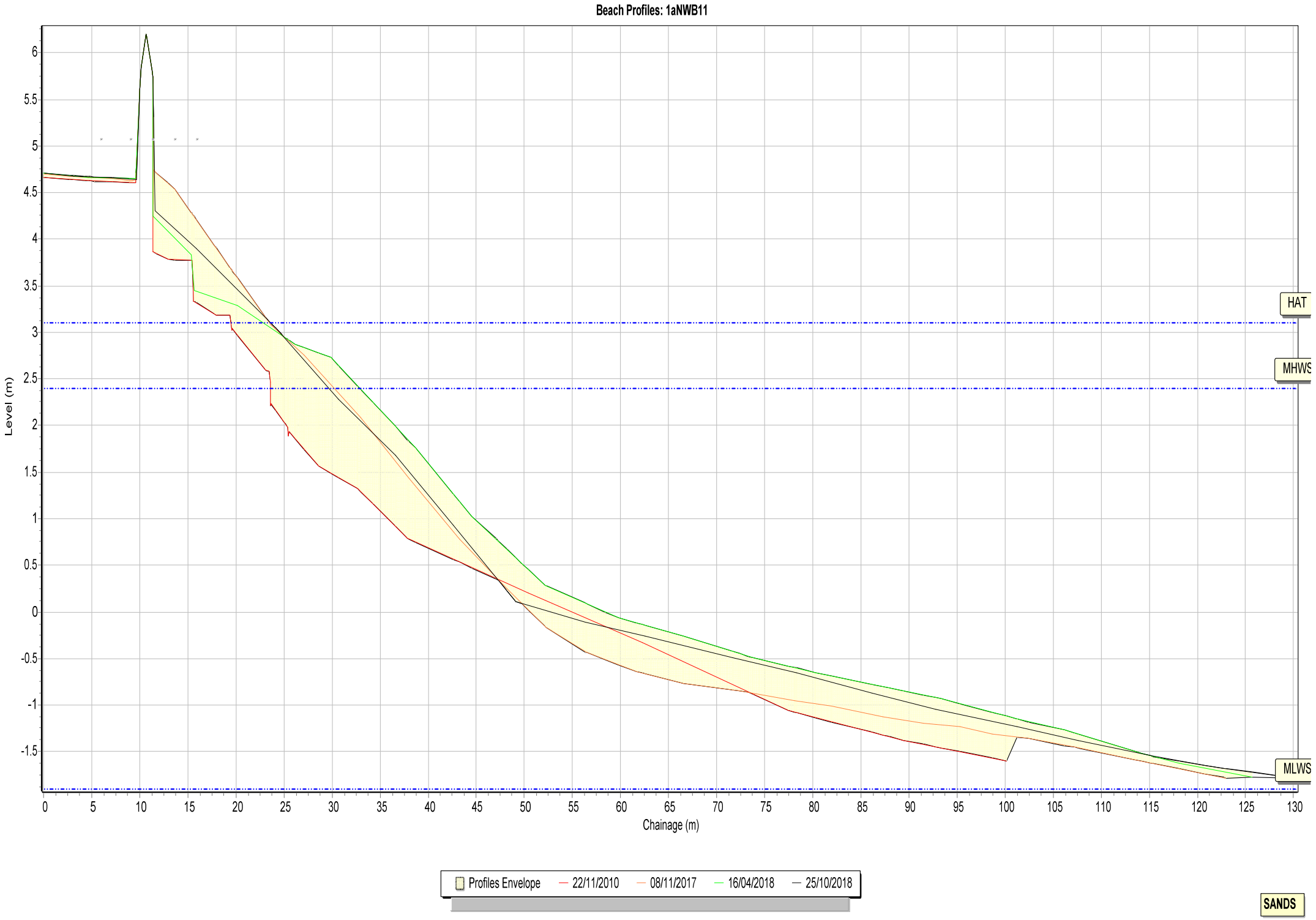
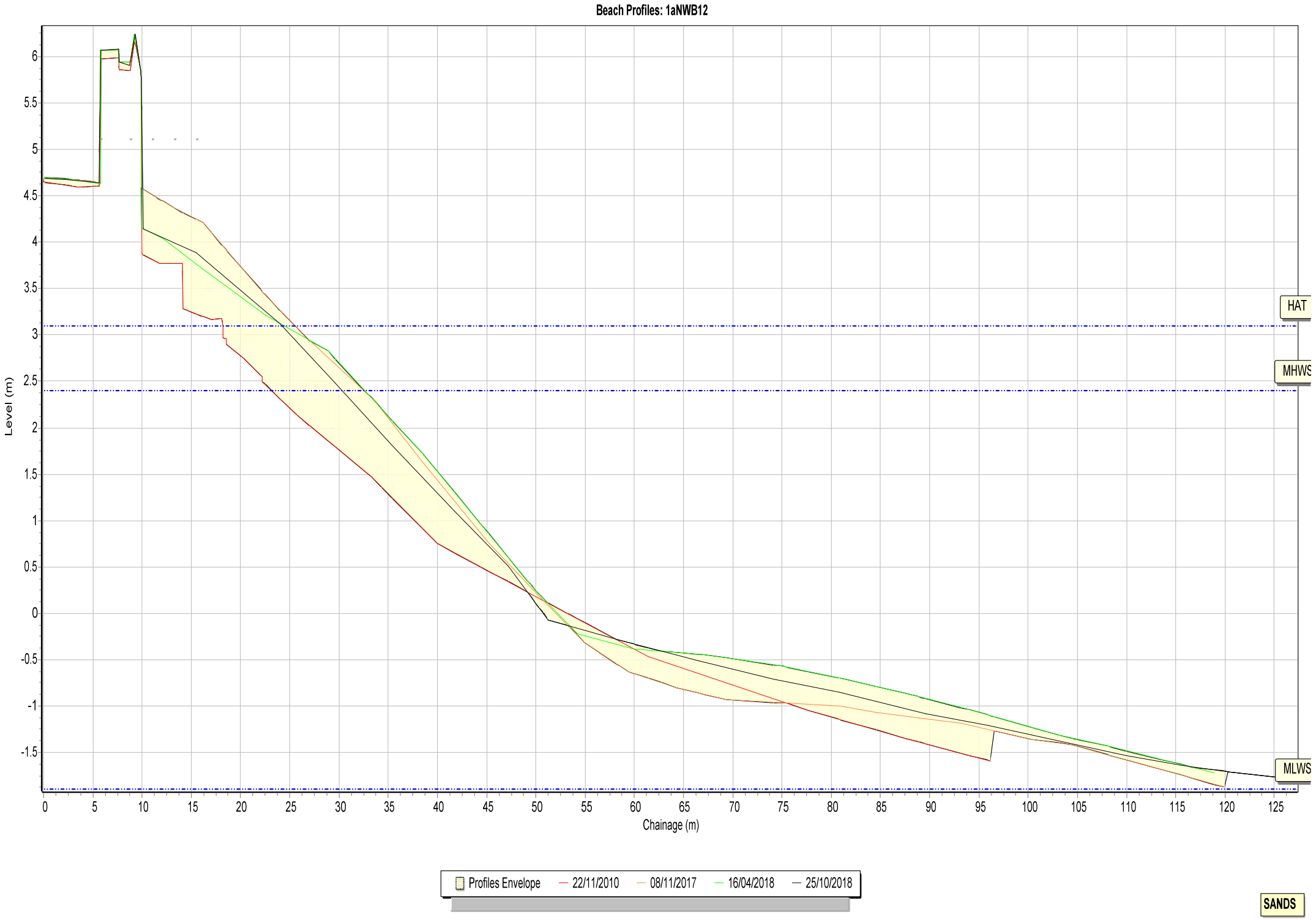
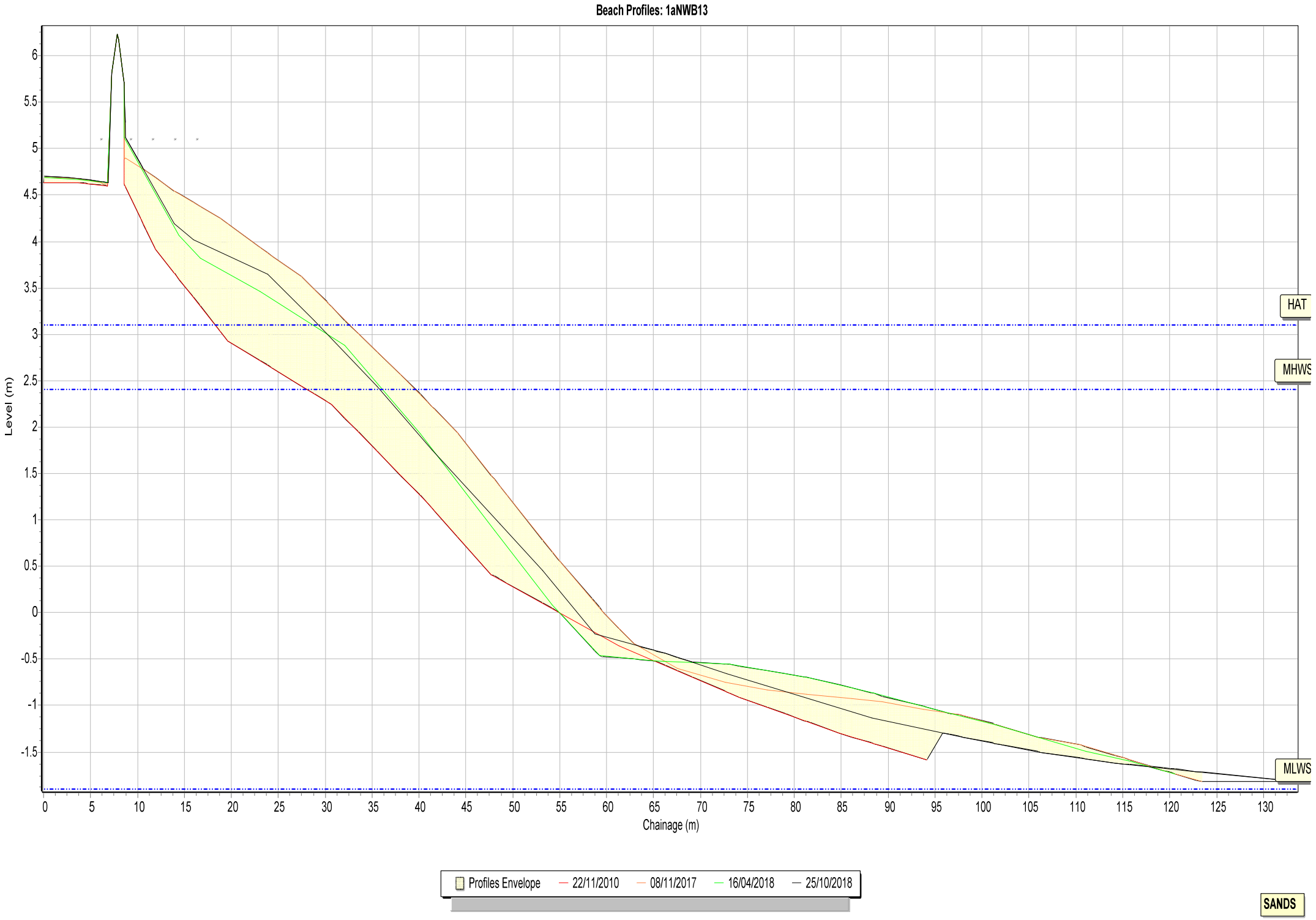
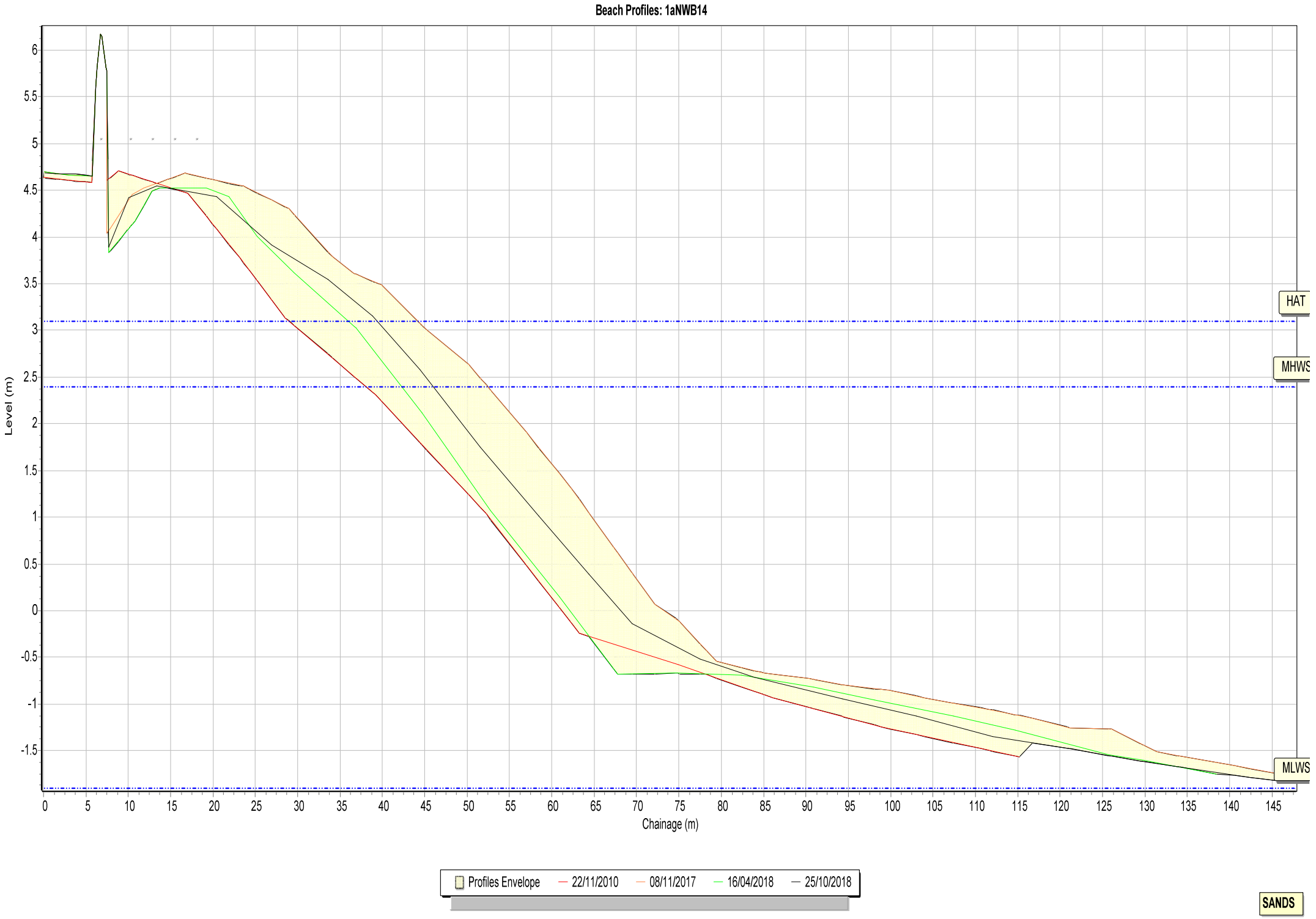
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB11
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB12
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB13
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS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4.5
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1
0.5
0
-0.5
-1
-1.5
HAT
MHWS
MLWS
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145
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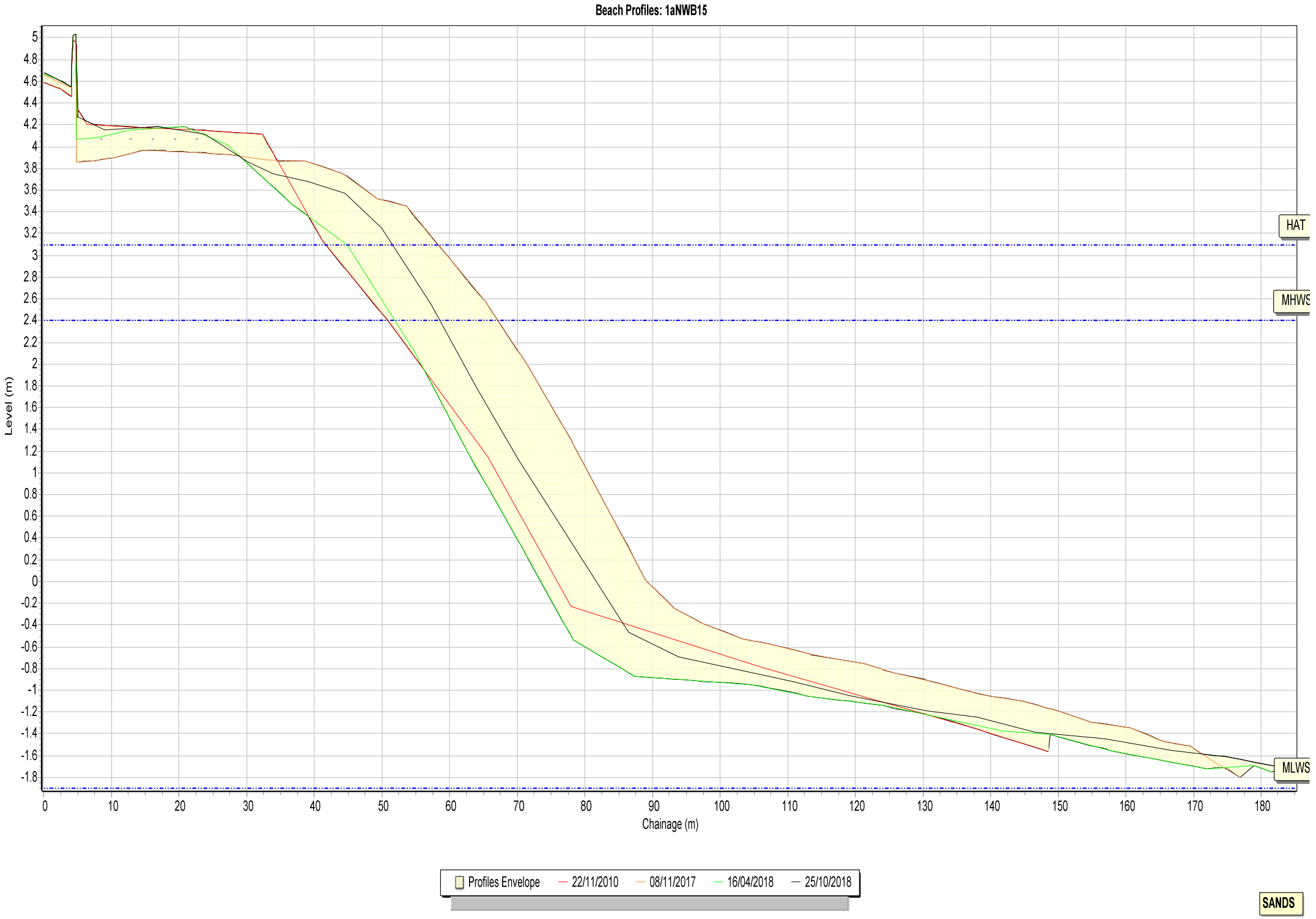
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS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MHWS
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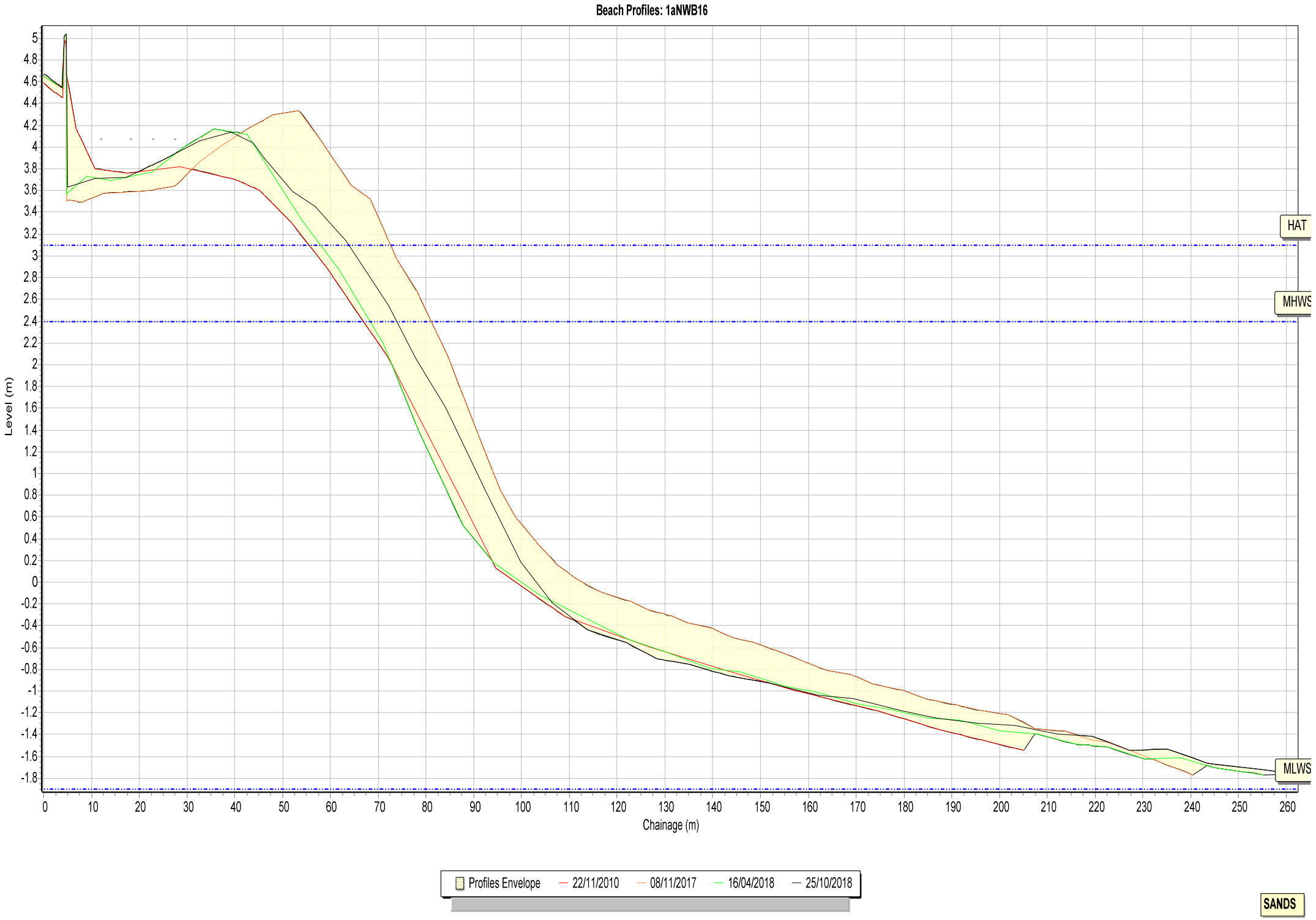
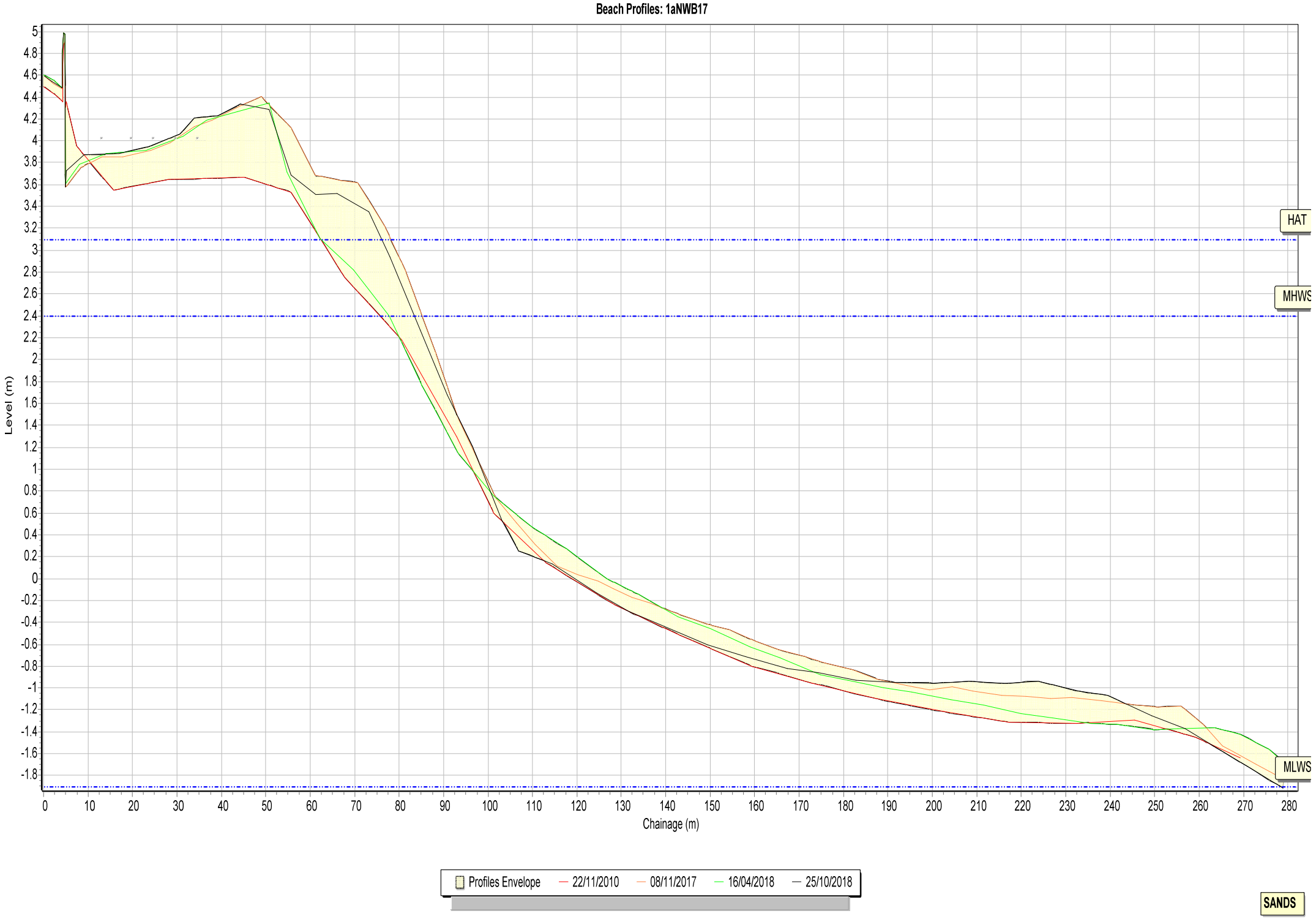
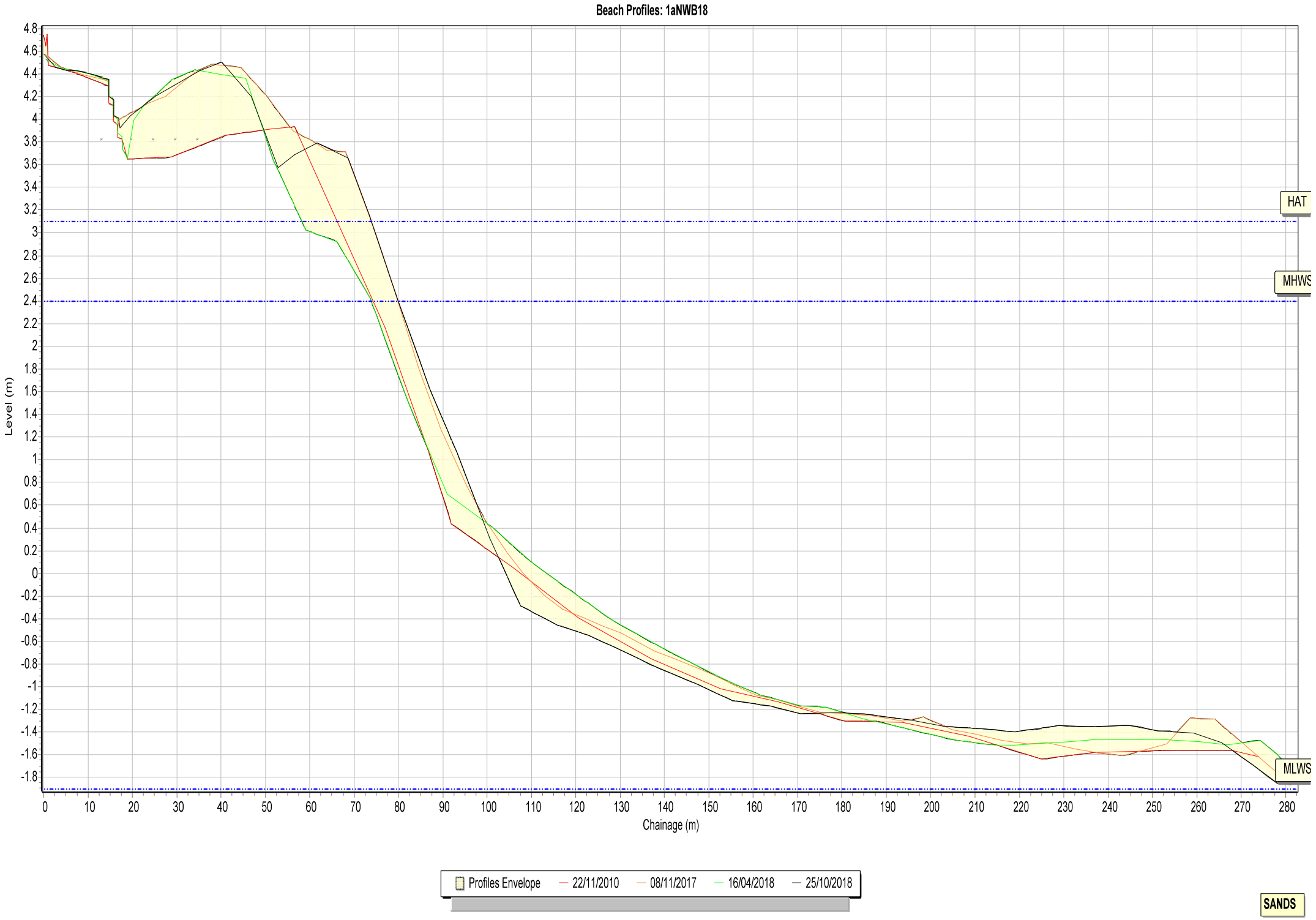
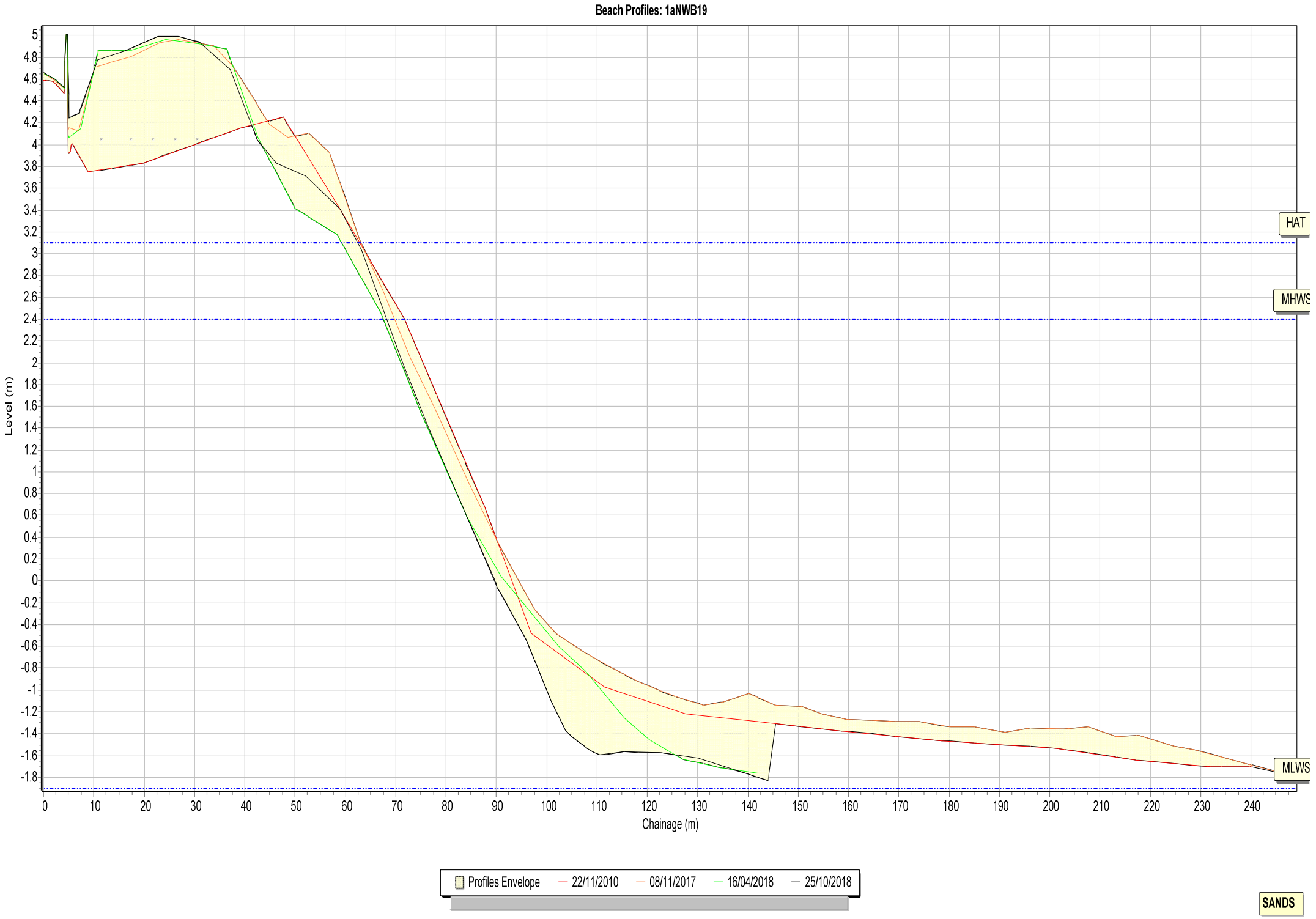
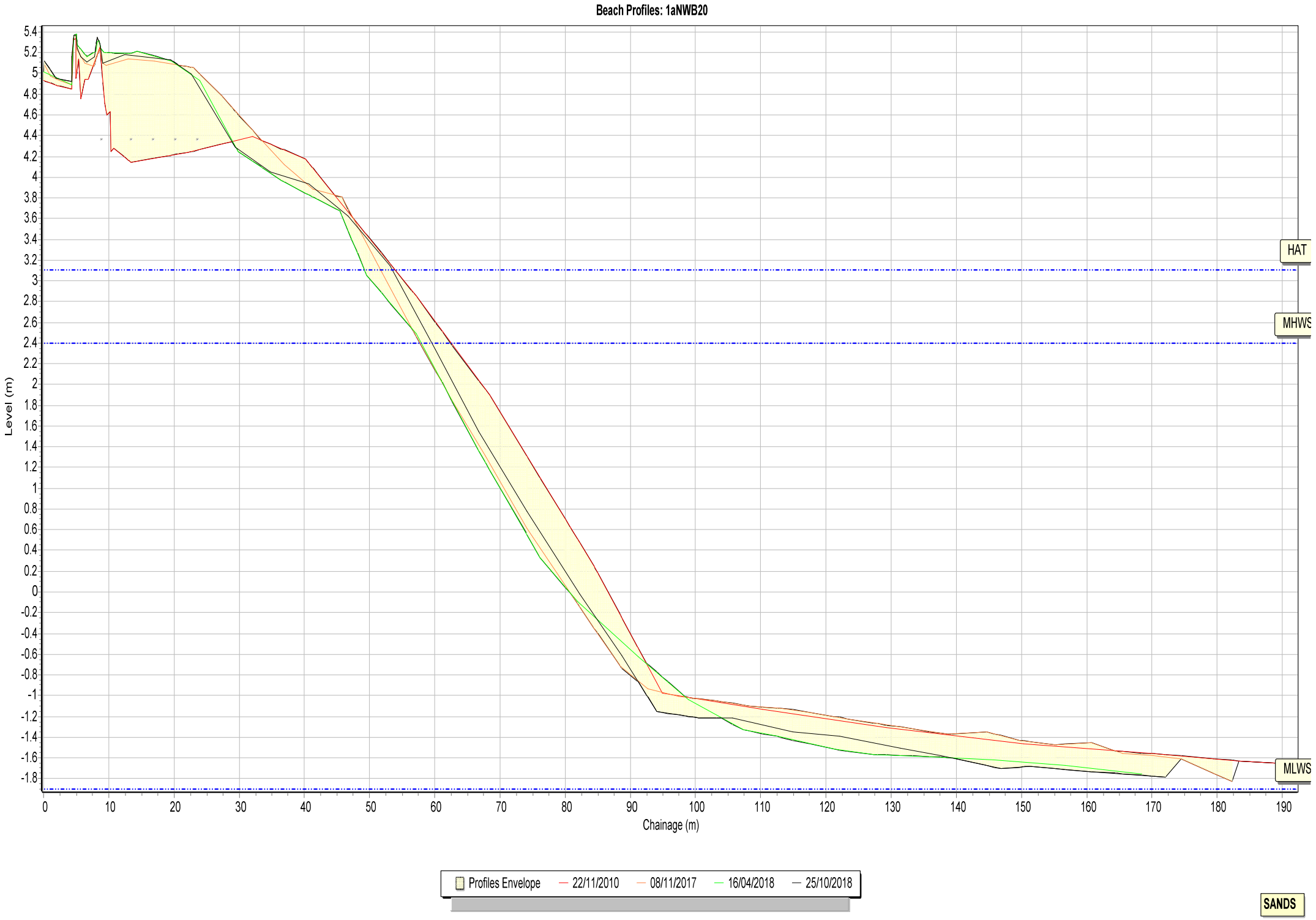
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS

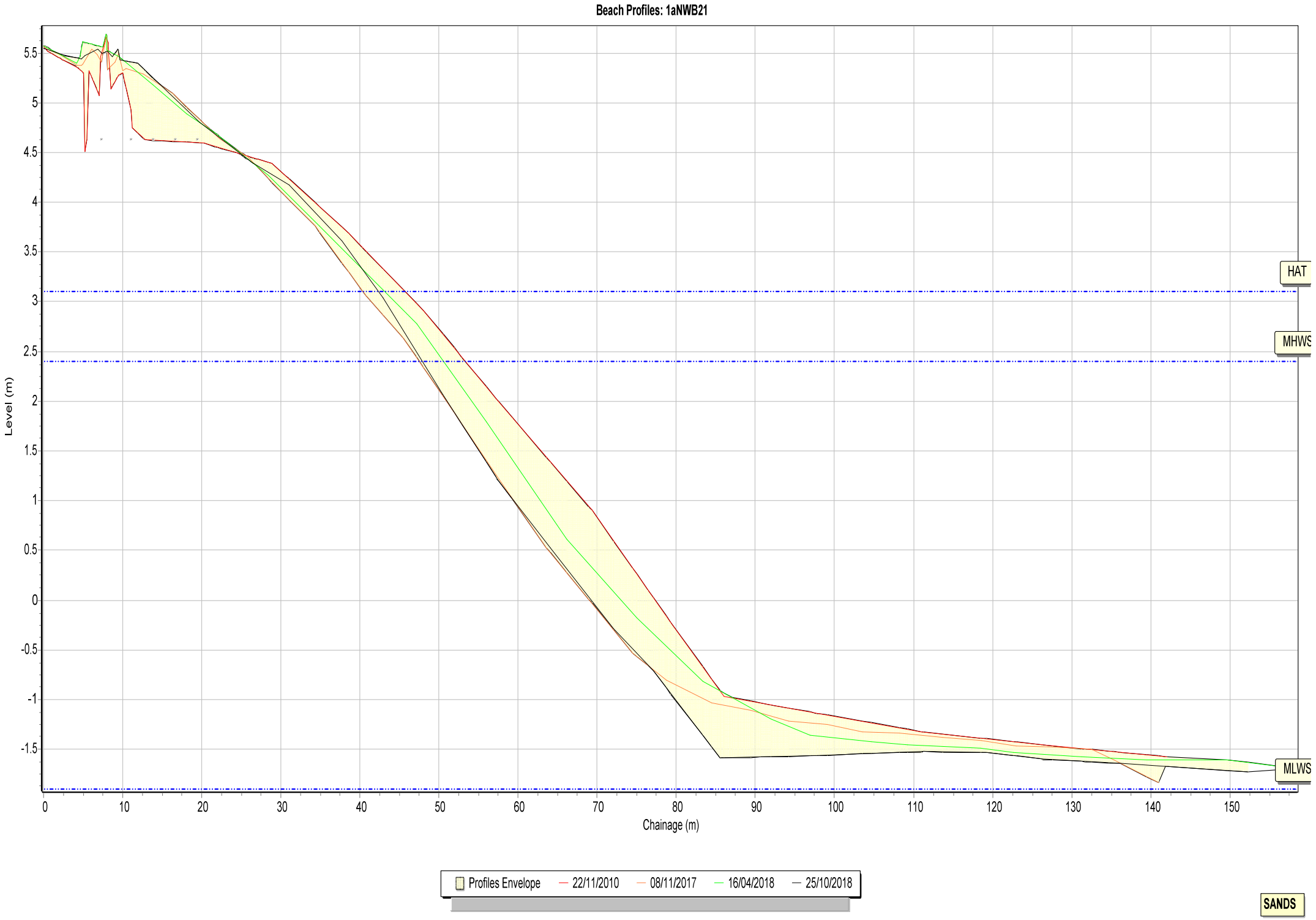

Beach Profiles: 1aNWB16
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS

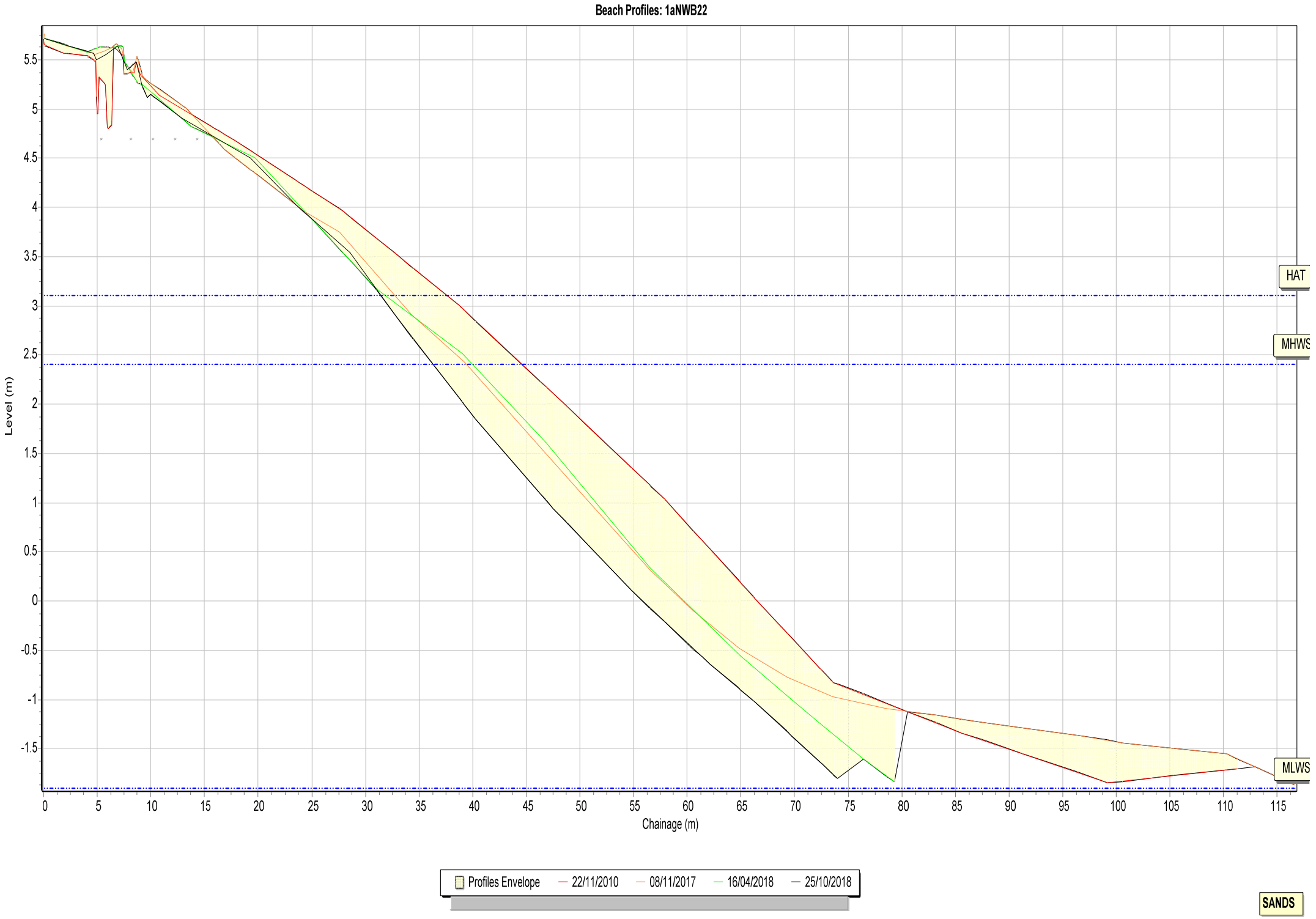

Beach Profiles: 1aNWB17
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS

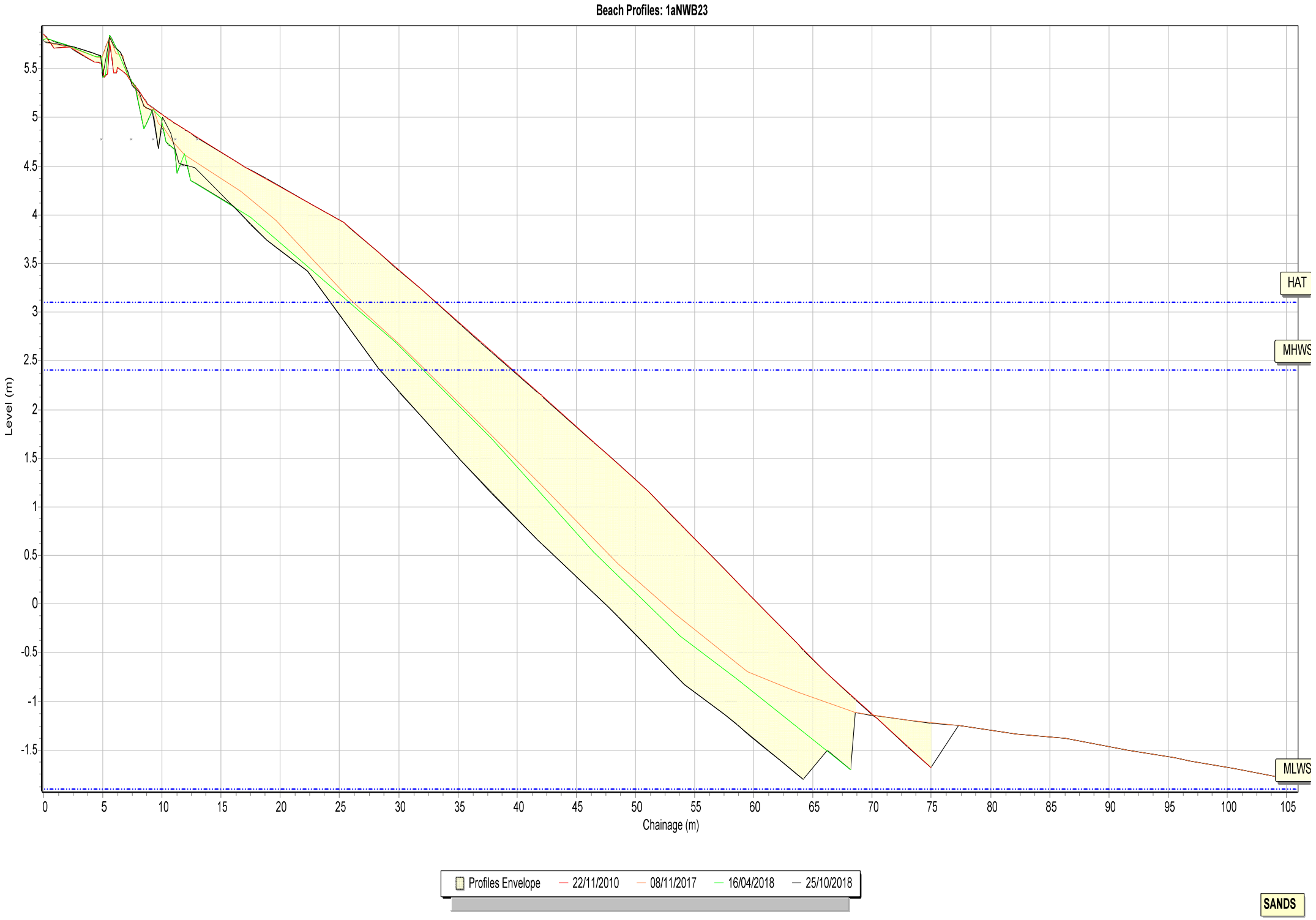

Beach Profiles: 1aNWB18
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS

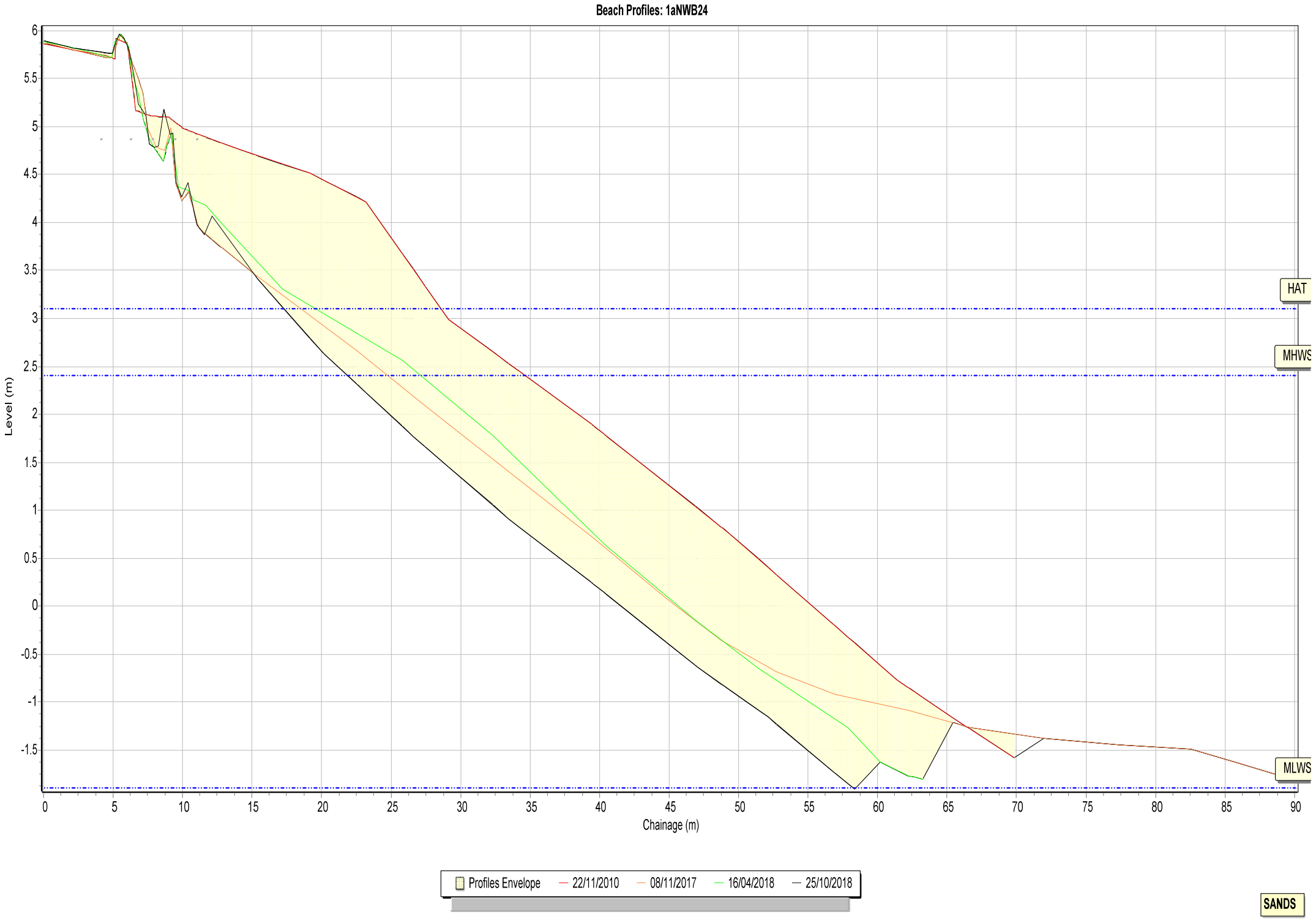

Beach Profiles: 1aNWB19
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS

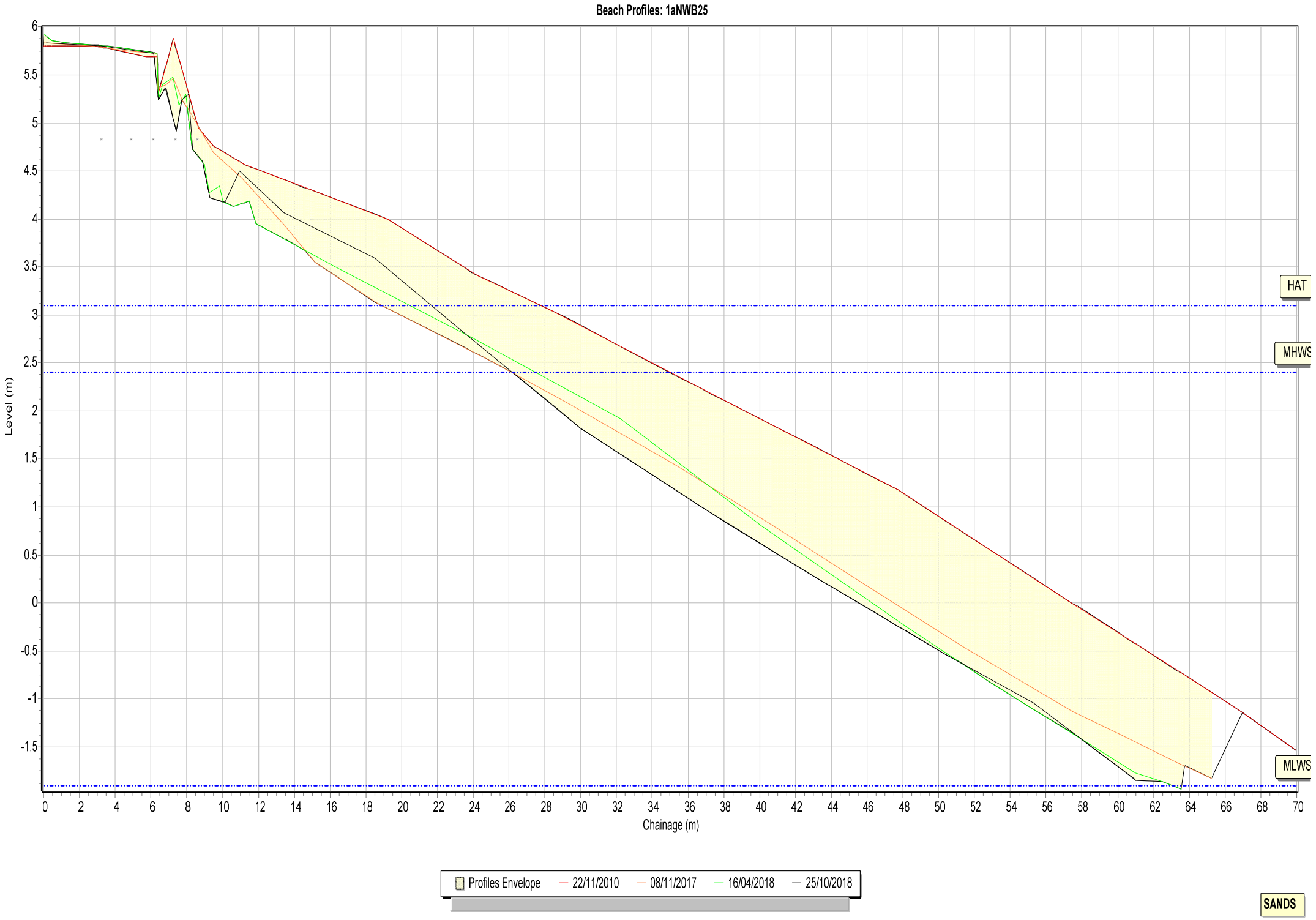

Beach Profiles: 1aNWB20
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS

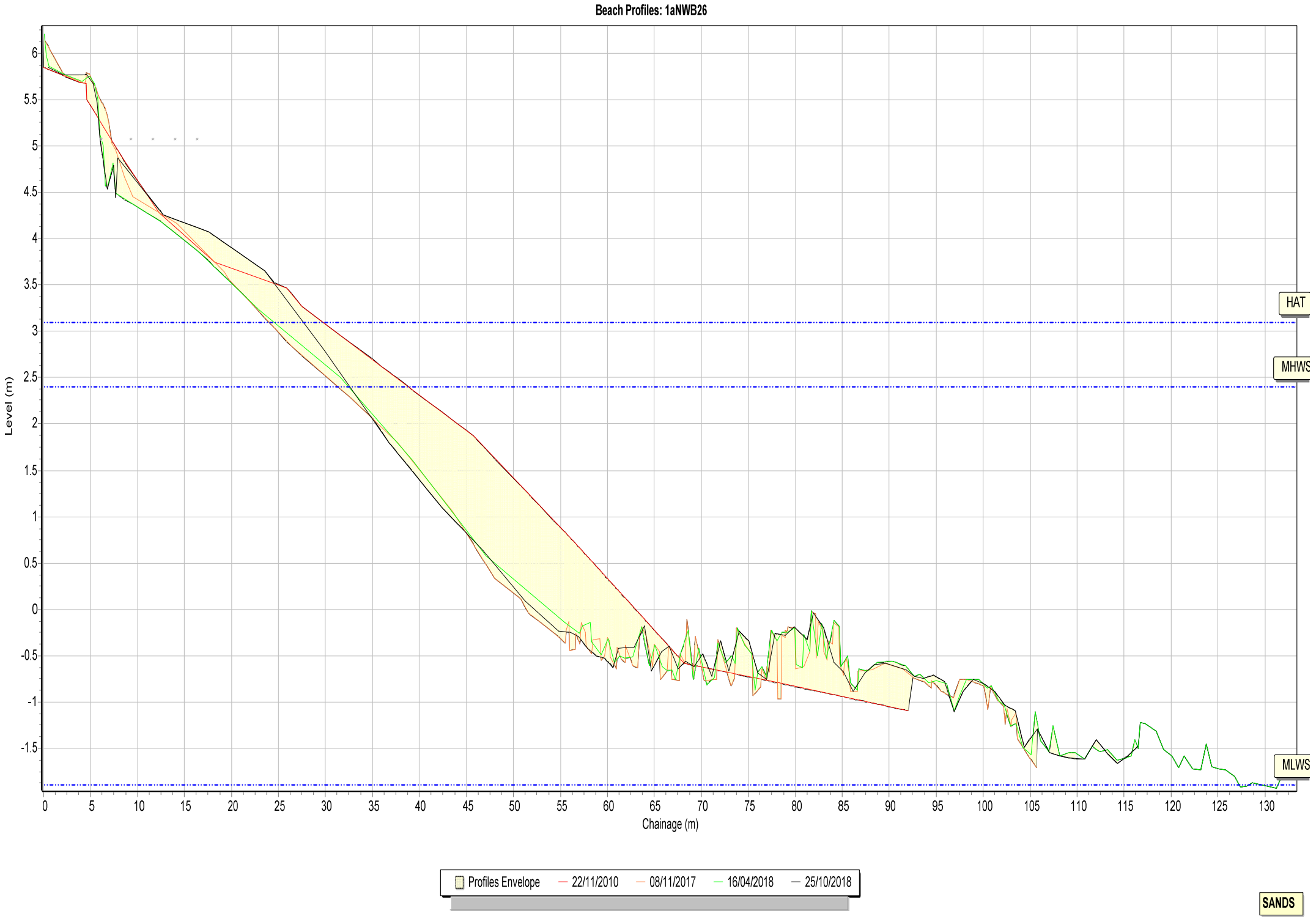

Beach Profiles: 1aNWB21
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB22
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB23
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB24
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB25
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS


Beach Profiles: 1aNWB26
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
22/11/2010
08/11/2017
16/04/2018
25/10/2018
SANDS

Beach Profile

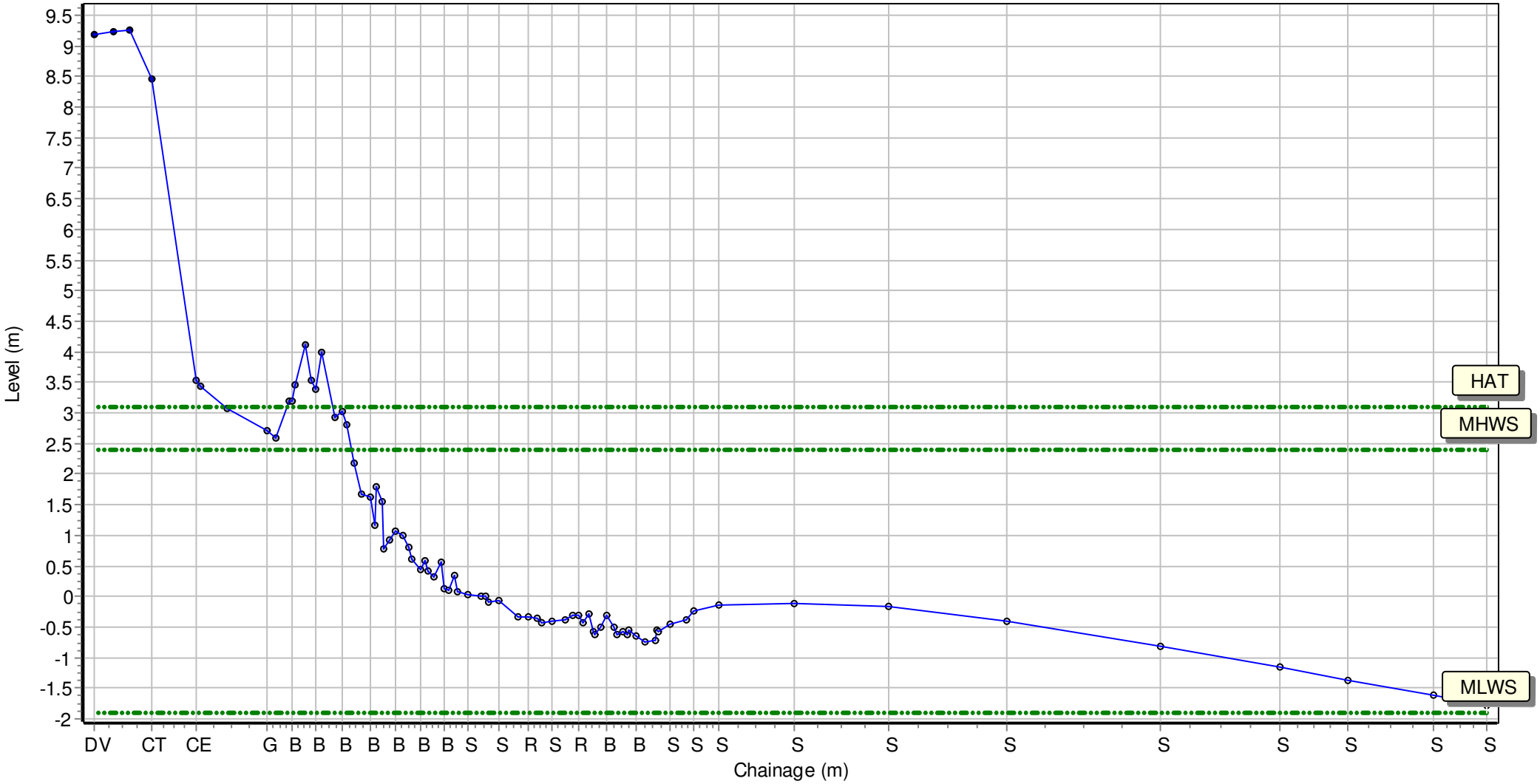
Location: **1aWDC08**

Date: 05/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430440.056 **Northing:** 585865.943 **Profile Bearing:** 105 ° from North



Beach Profile

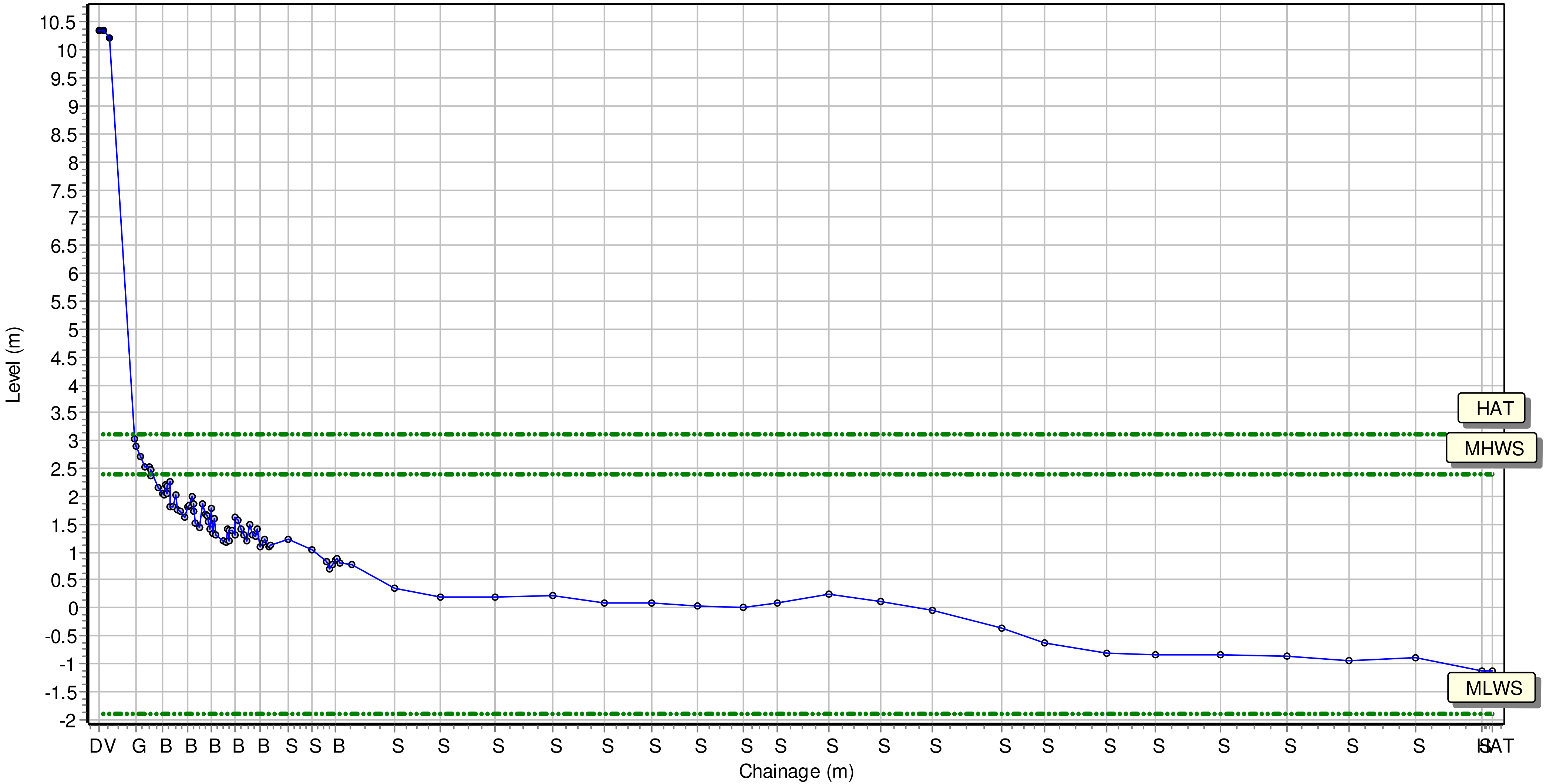
Location: **1aWDC09**

Date: 05/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430361.278 **Northing:** 585559.12 **Profile Bearing:** 130 ° from North



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SANDS

Beach Profile

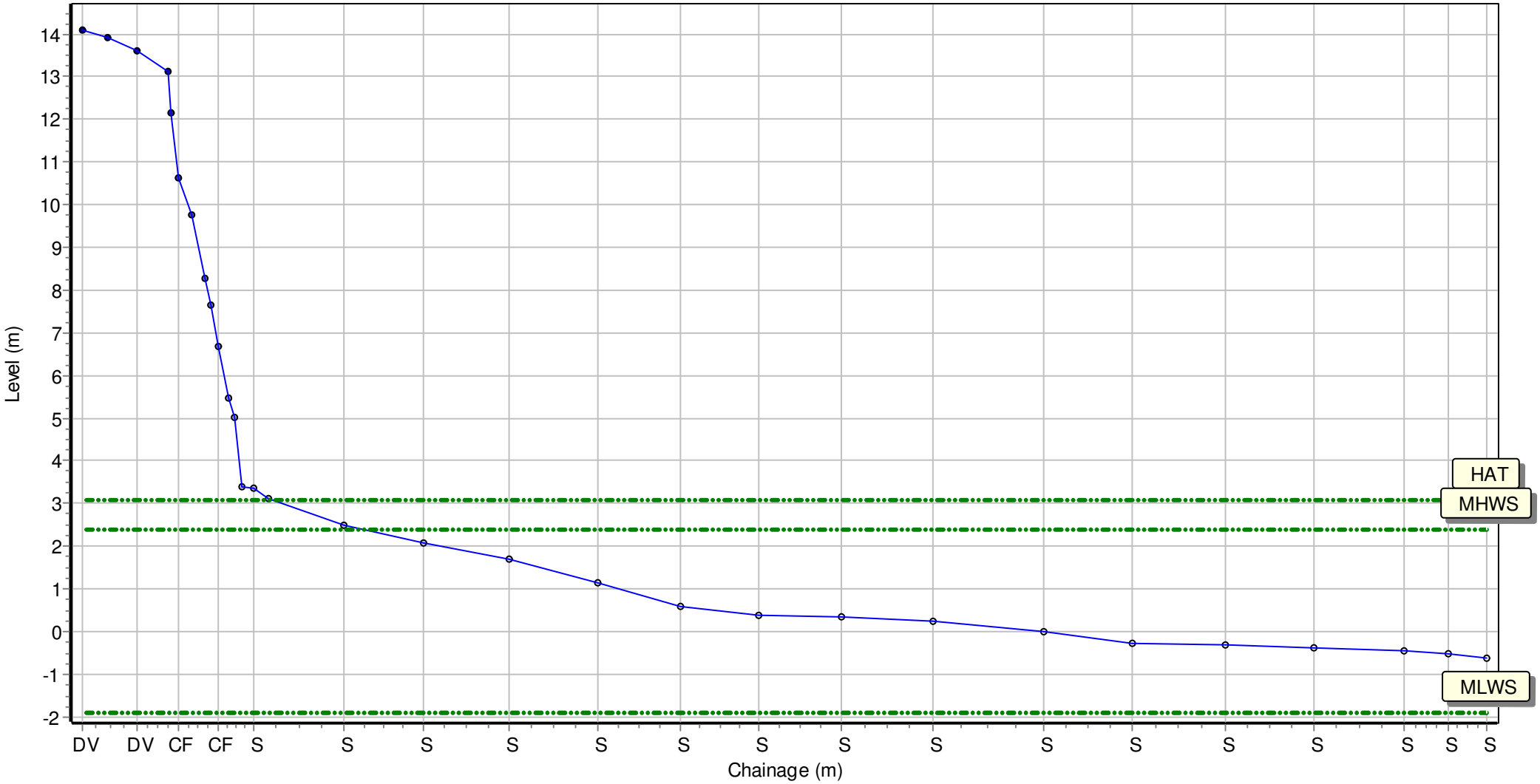
Location: **1aWDC10**

Date: 05/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430247.175 **Northing:** 585191.003 **Profile Bearing:** 71 ° from North



Beach Profile

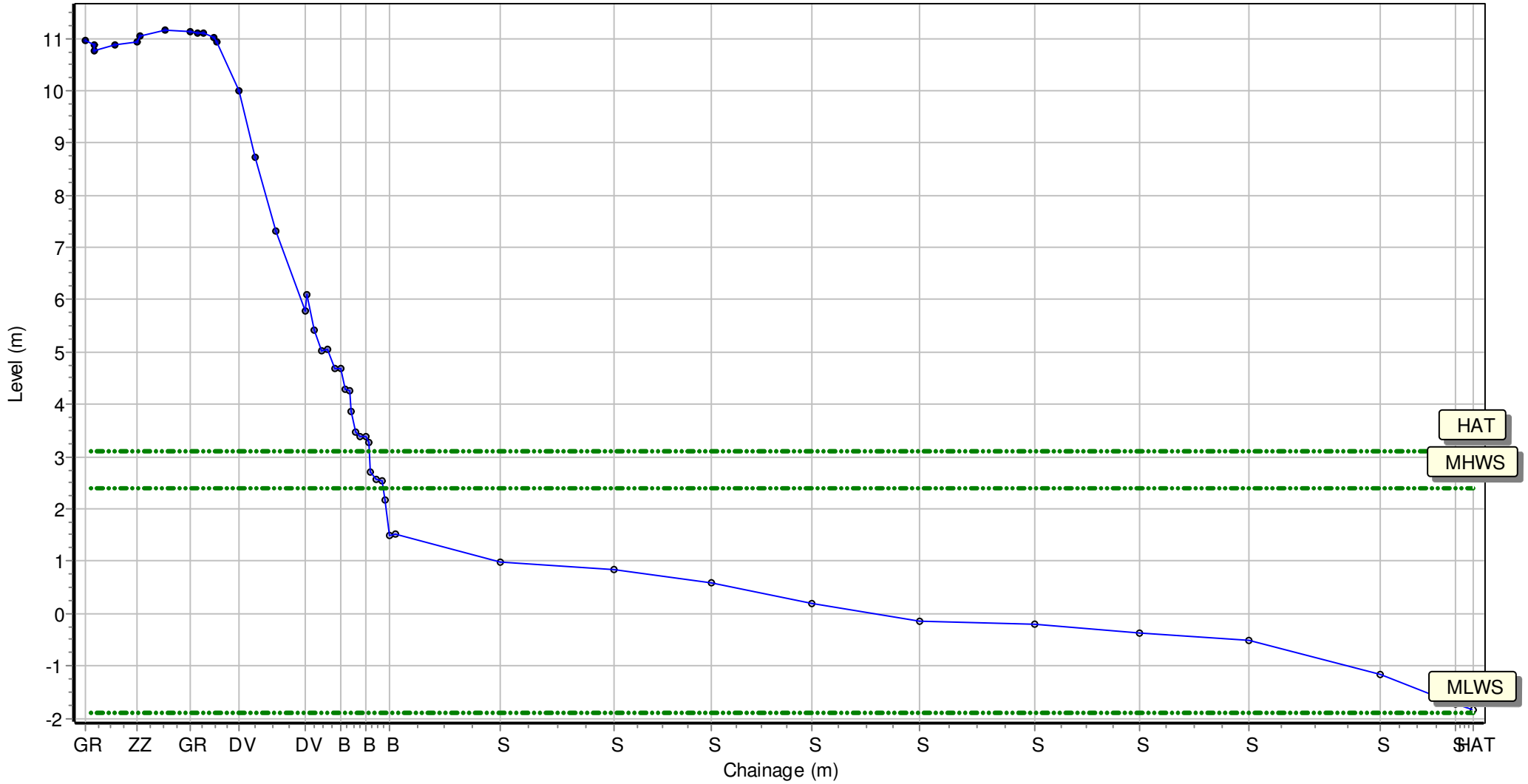
Location: **1aWDC11**

Date: 05/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430397.4 **Northing:** 584739.609 **Profile Bearing:** 74 ° from North



Beach Profile

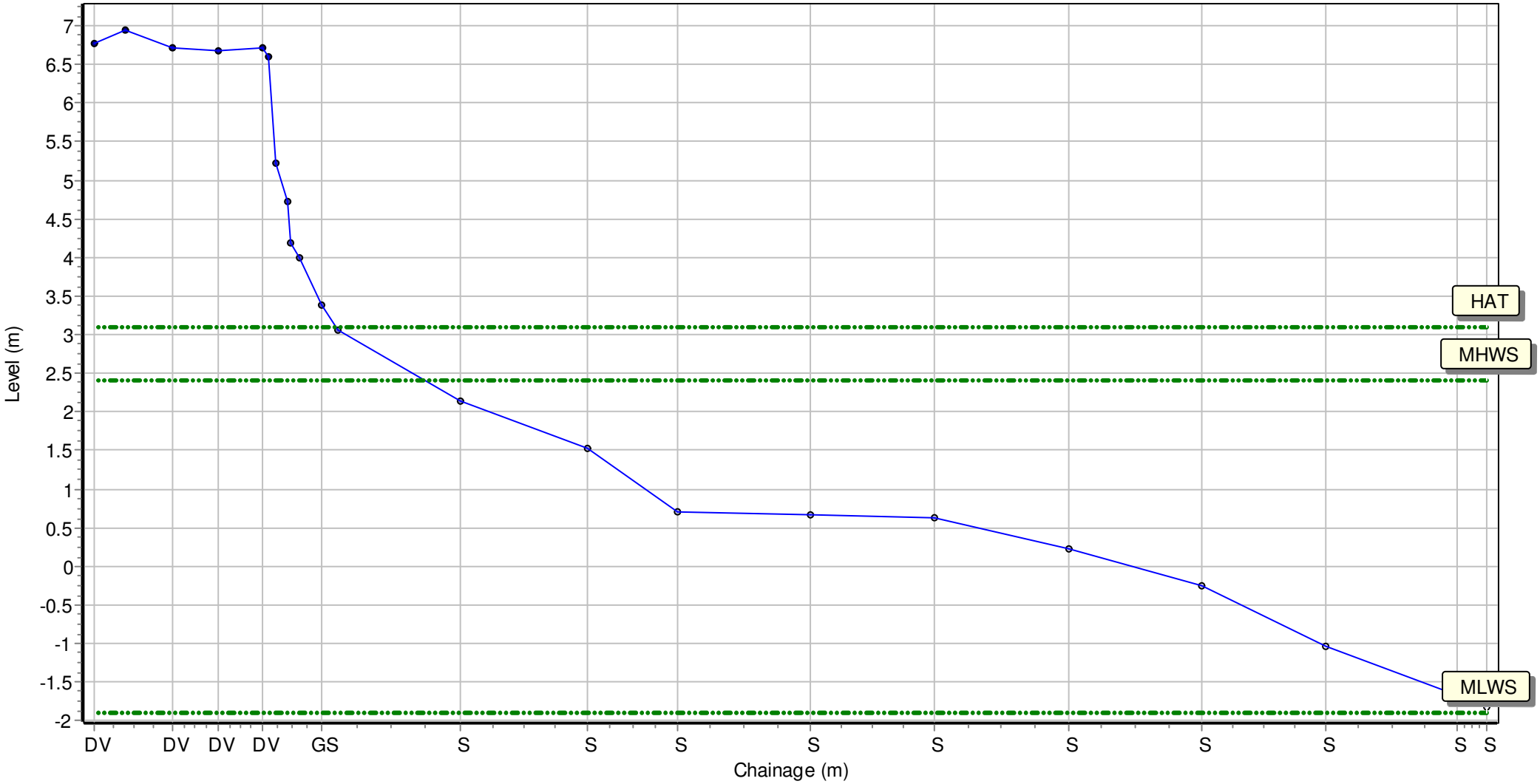
Location: **1aWDC12**

Date: 05/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430549.164 **Northing:** 584058.468 **Profile Bearing:** 73 ° from North



Beach Profile

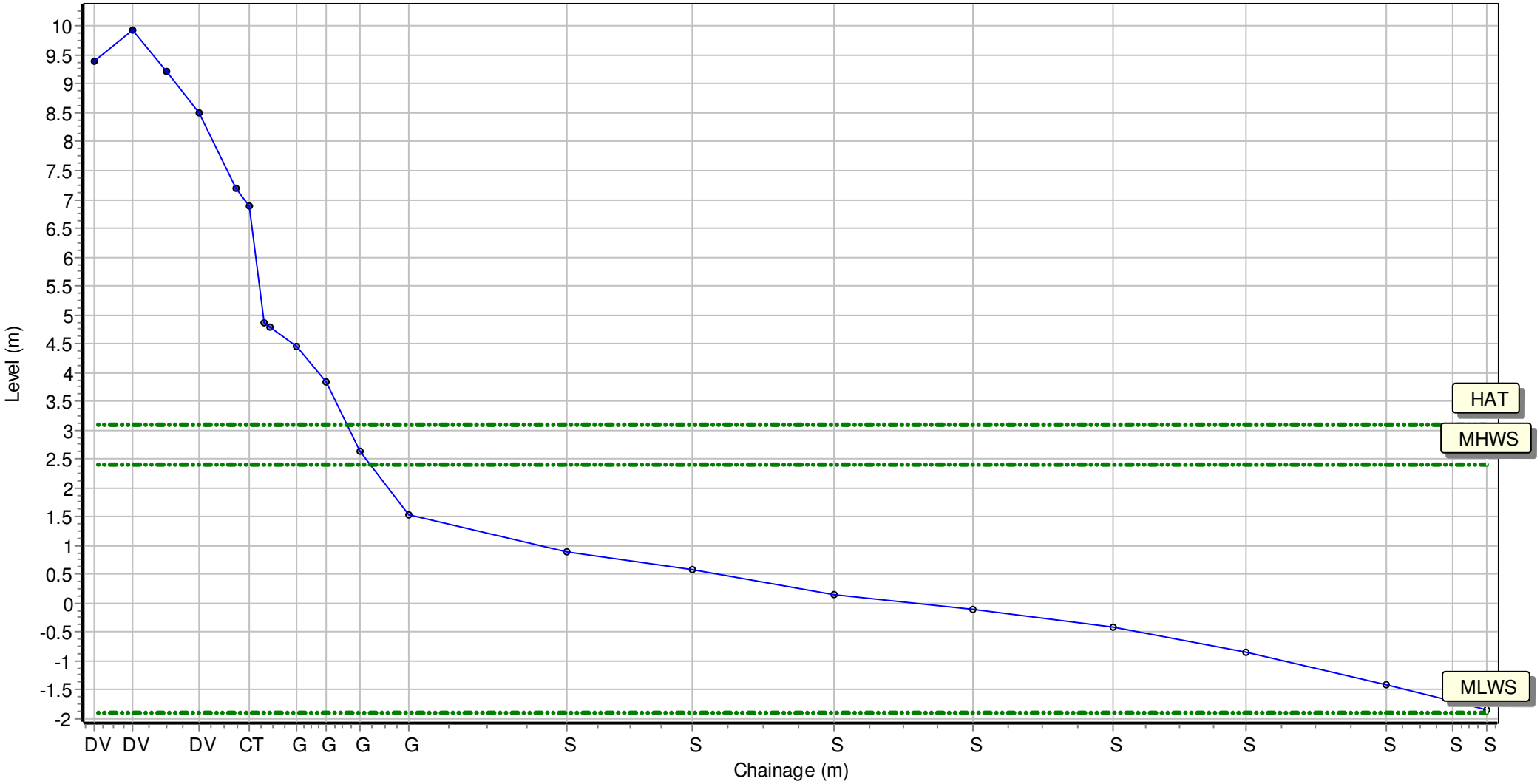
Location: **1aWDC13**

Date: 05/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 430983.324 **Northing:** 583146.489 **Profile Bearing:** 62 ° from North



Beach Profile

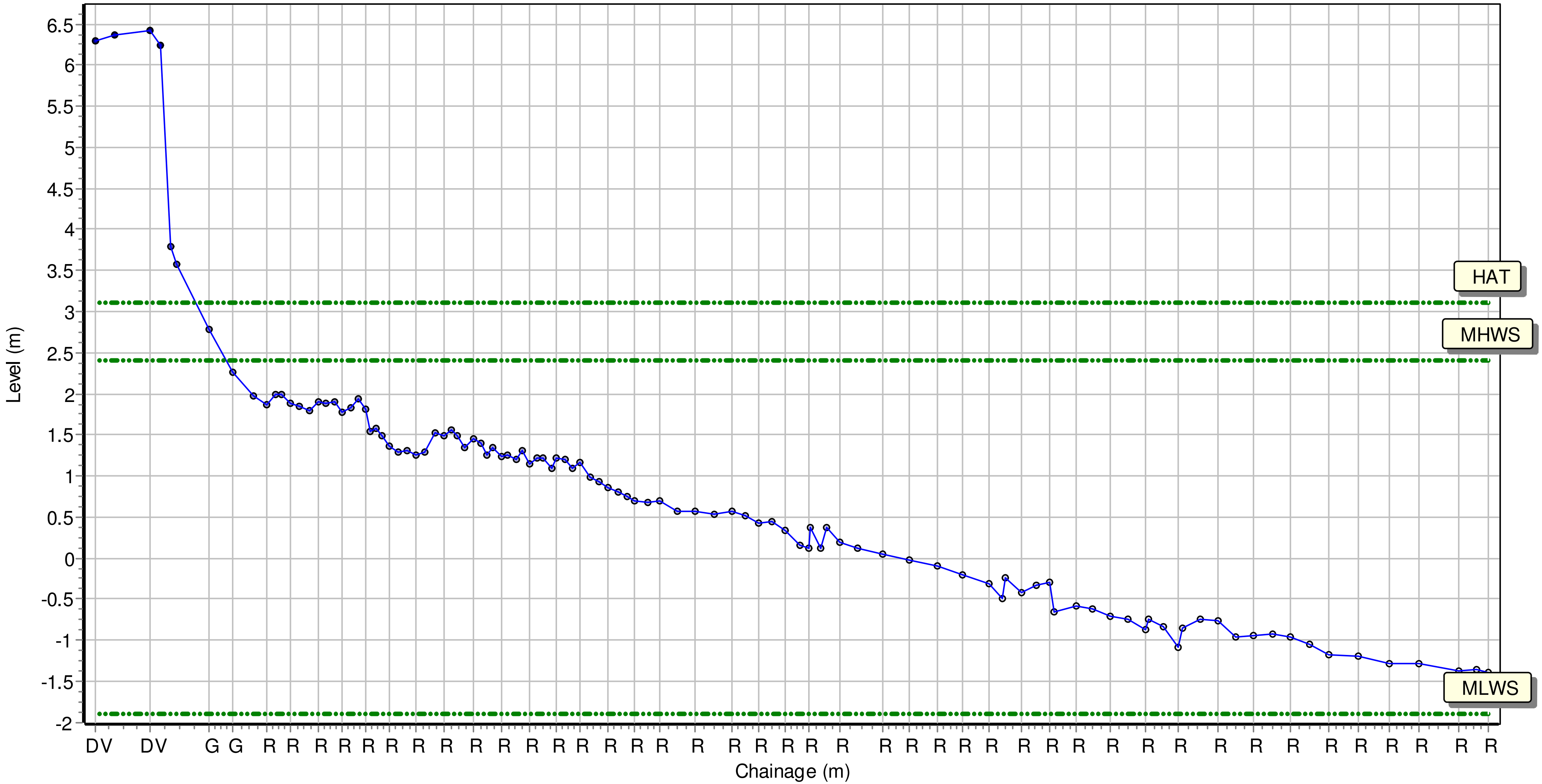
Location: 1aWDC14

Date: 05/12/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

Easting: 431317.646 **Northing:** 582642.372 **Profile Bearing:** 62 ° from North



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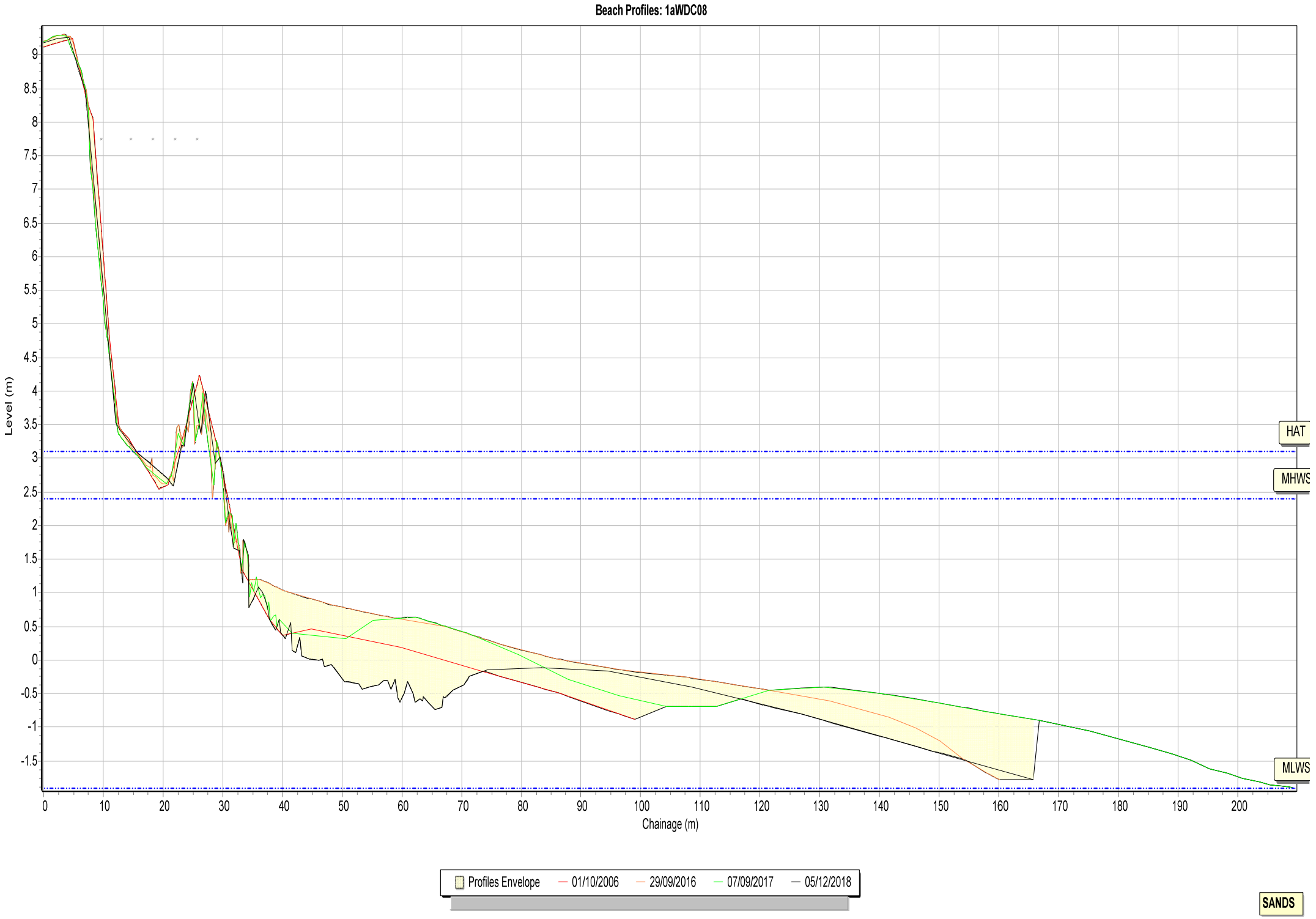
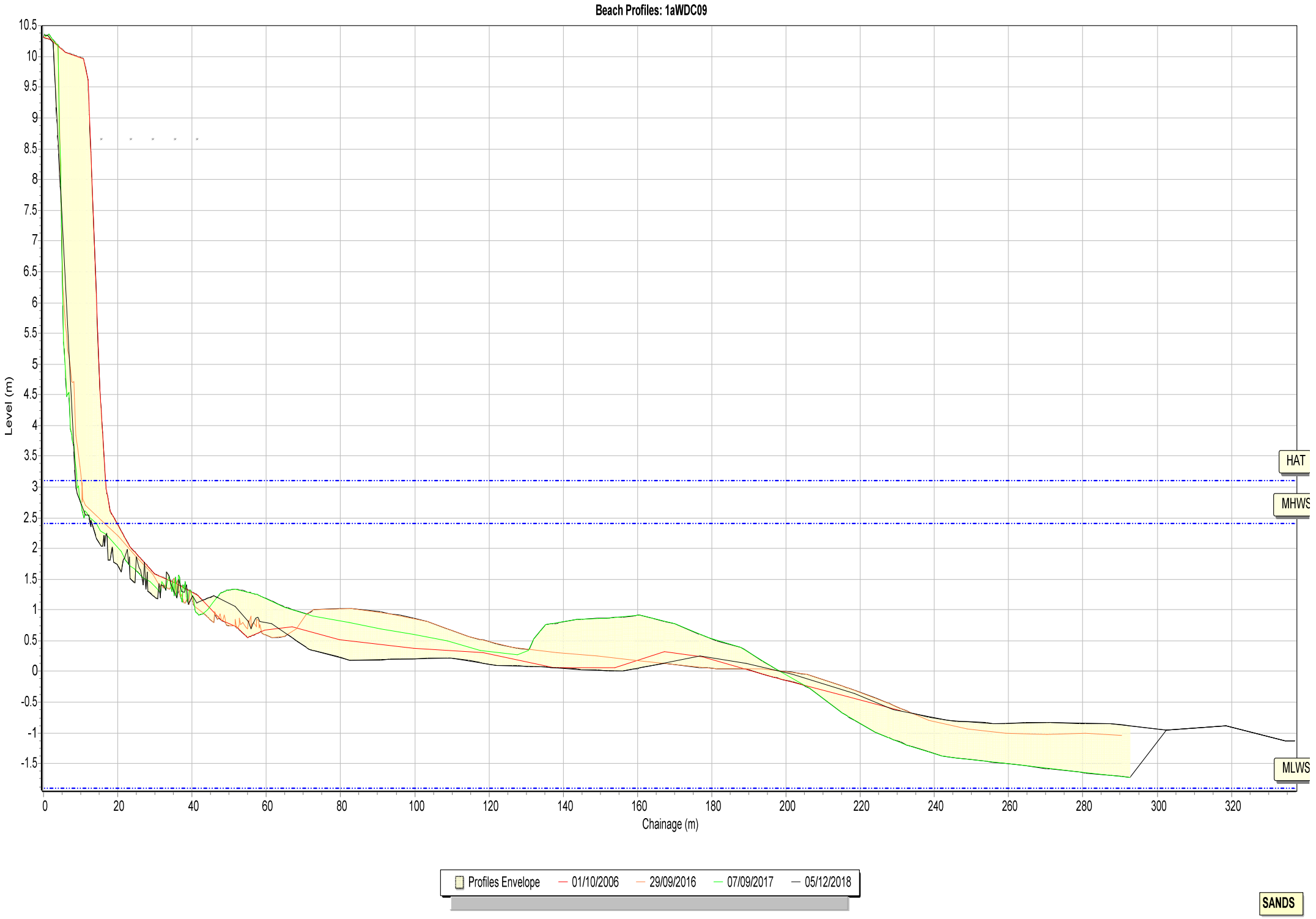
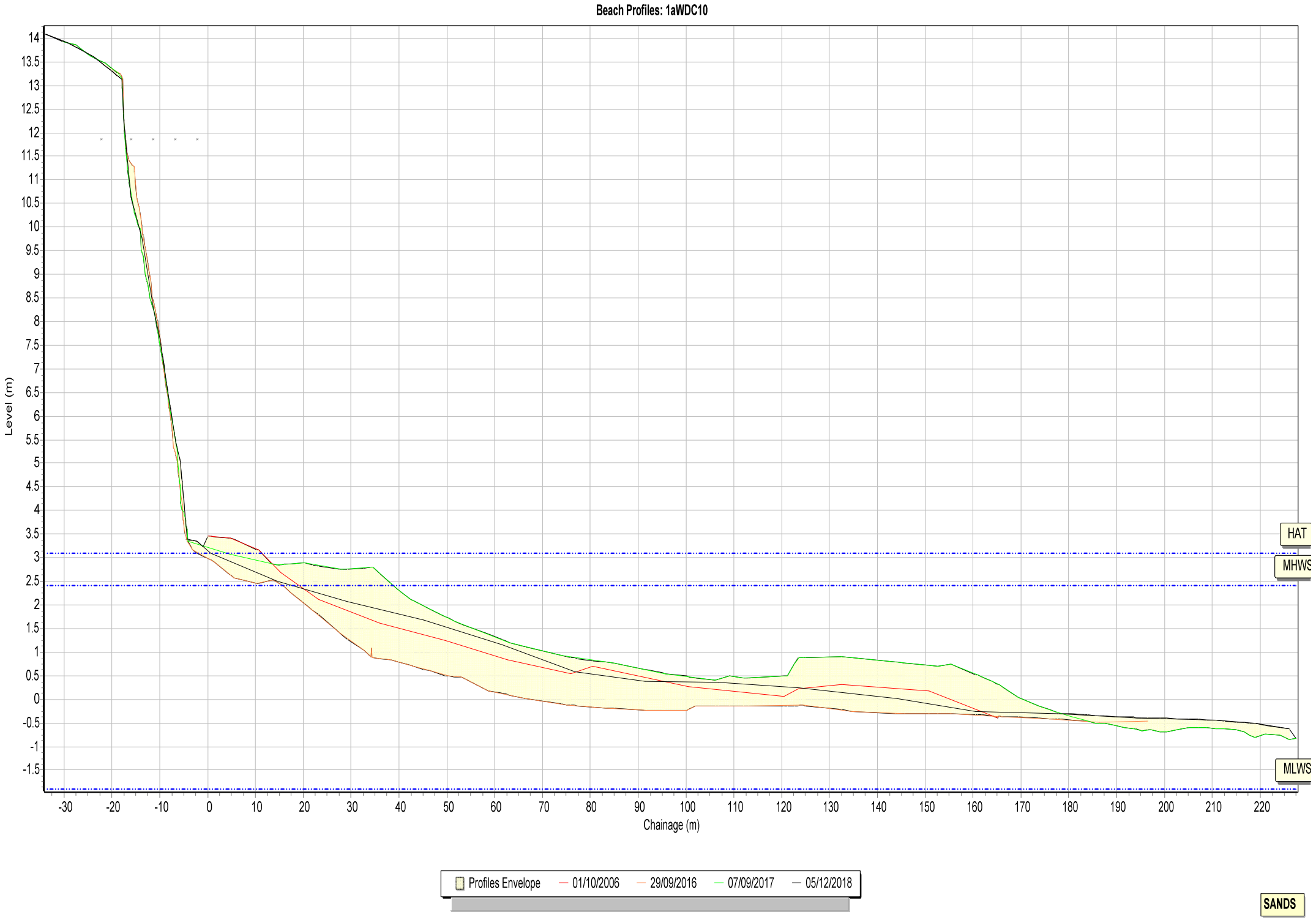
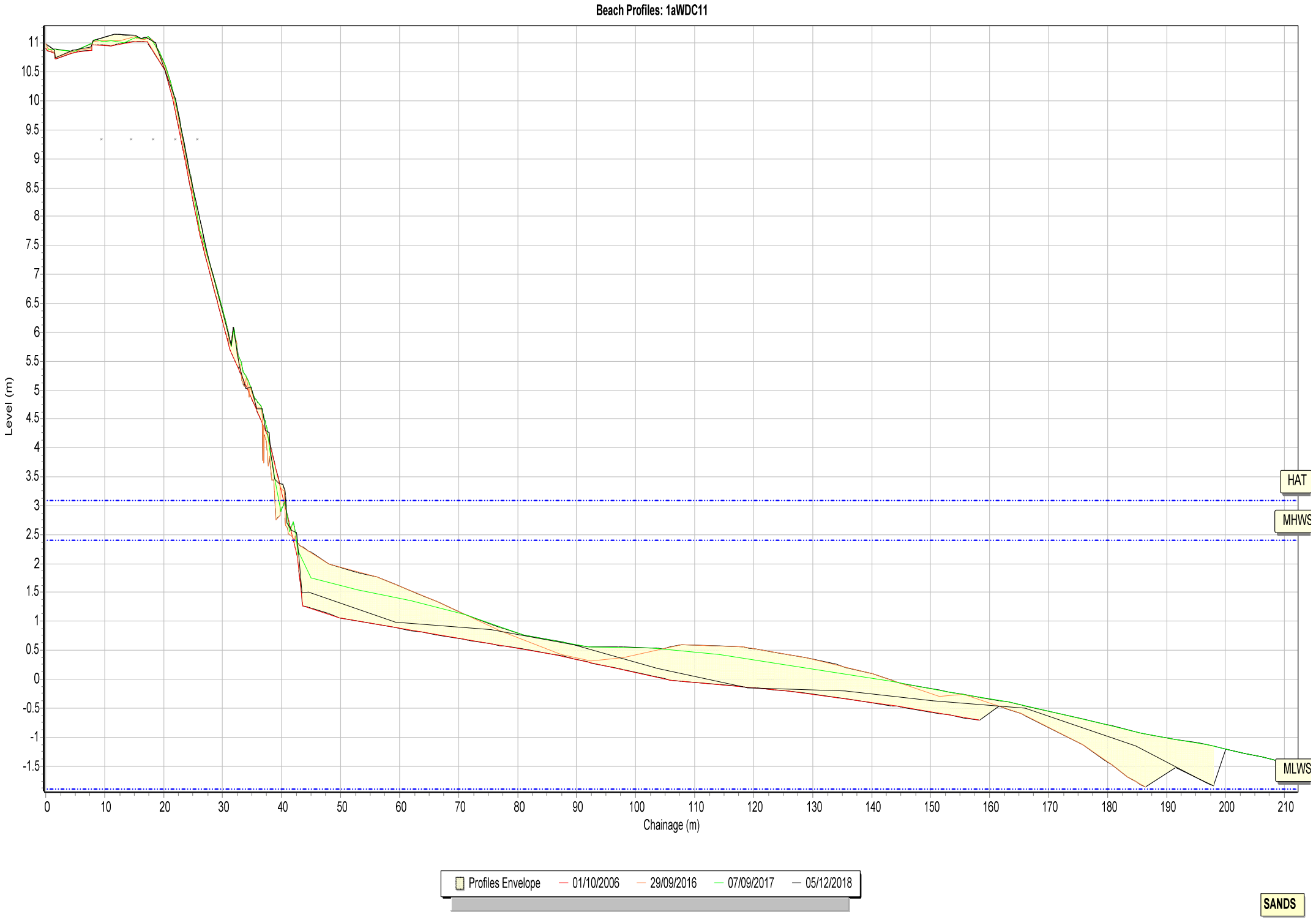
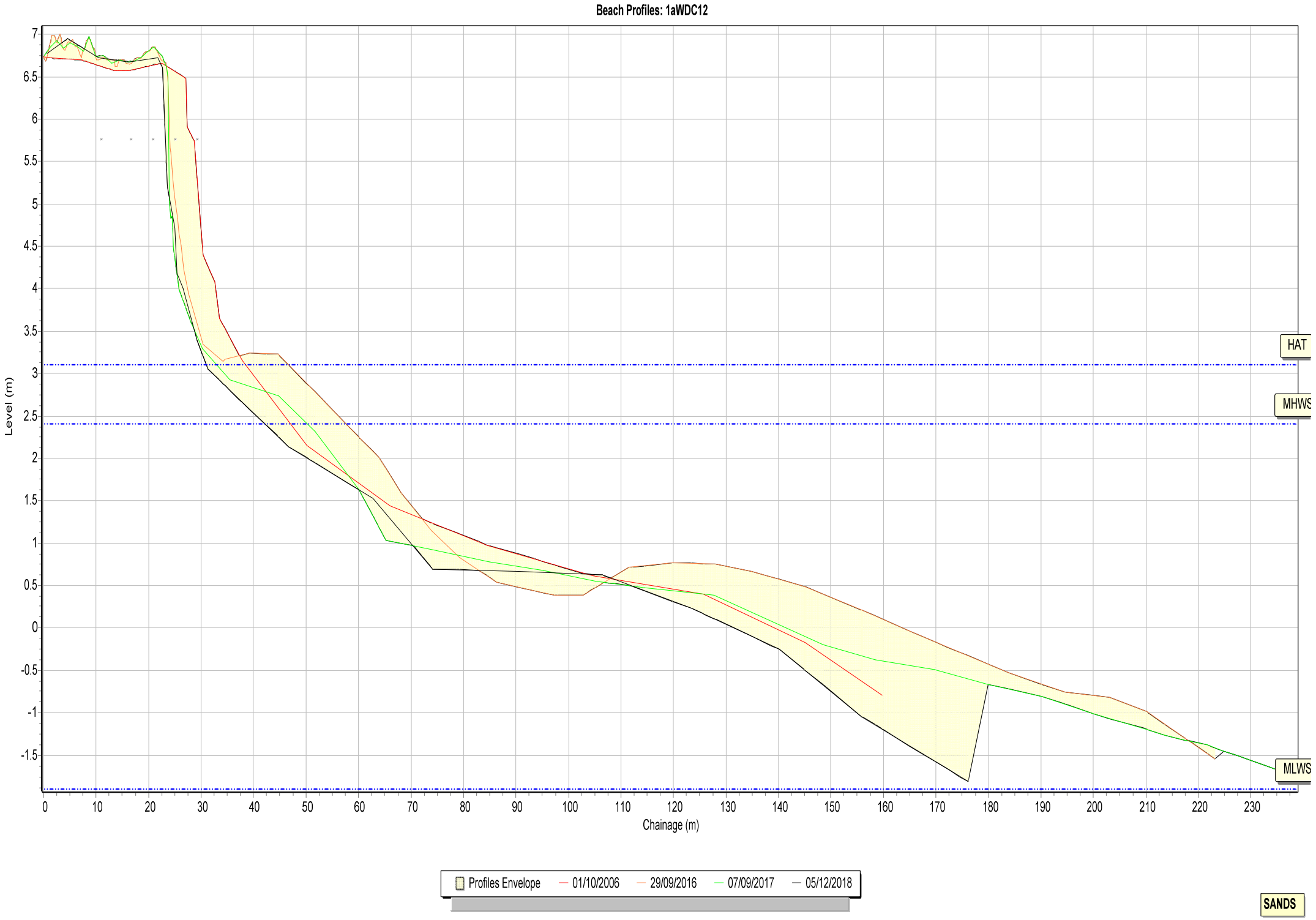
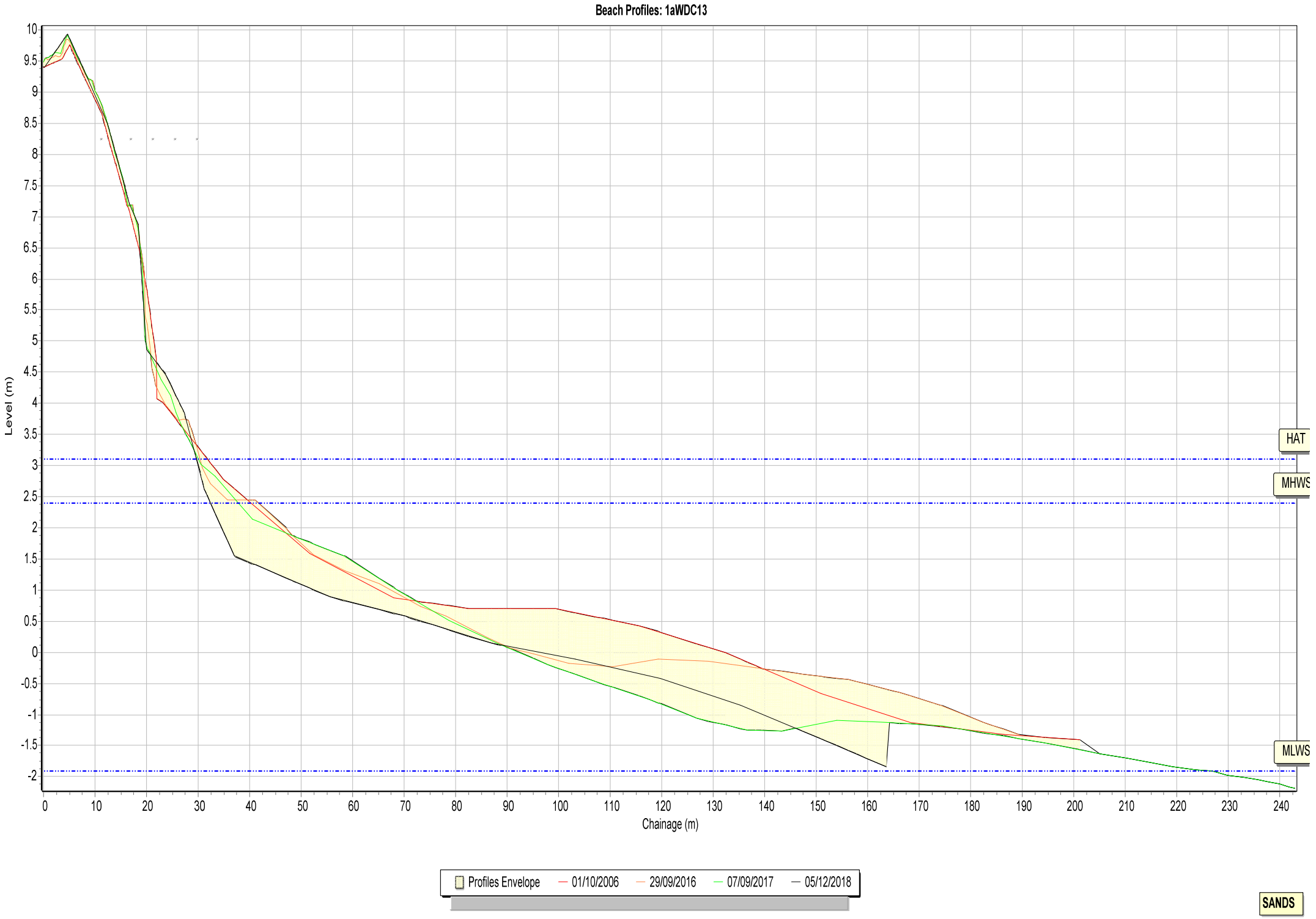

Beach Profiles: 1aWDC08
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
29/09/2016
07/09/2017
05/12/2018
SANDS


Beach Profiles: 1aWDC09
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
29/09/2016
07/09/2017
05/12/2018
SANDS


Beach Profiles: 1aWDC10
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
29/09/2016
07/09/2017
05/12/2018
SANDS


Beach Profiles: 1aWDC11
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
29/09/2016
07/09/2017
05/12/2018
SANDS


Beach Profiles: 1aWDC12
Level (m)
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
HAT
MHWS
MLWS
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
Chainage (m)
Profiles Envelope
01/10/2006
29/09/2016
07/09/2017
05/12/2018
SANDS


Beach Profiles: 1aWDC13
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/10/2006
29/09/2016
07/09/2017
05/12/2018
SANDS


Beach Profiles: 1aWDC14
Level (m)
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
-2
-5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150
Chainage (m)
Profiles Envelope
01/10/2006
29/09/2016
07/09/2017
05/12/2018
SANDS

Beach Profile

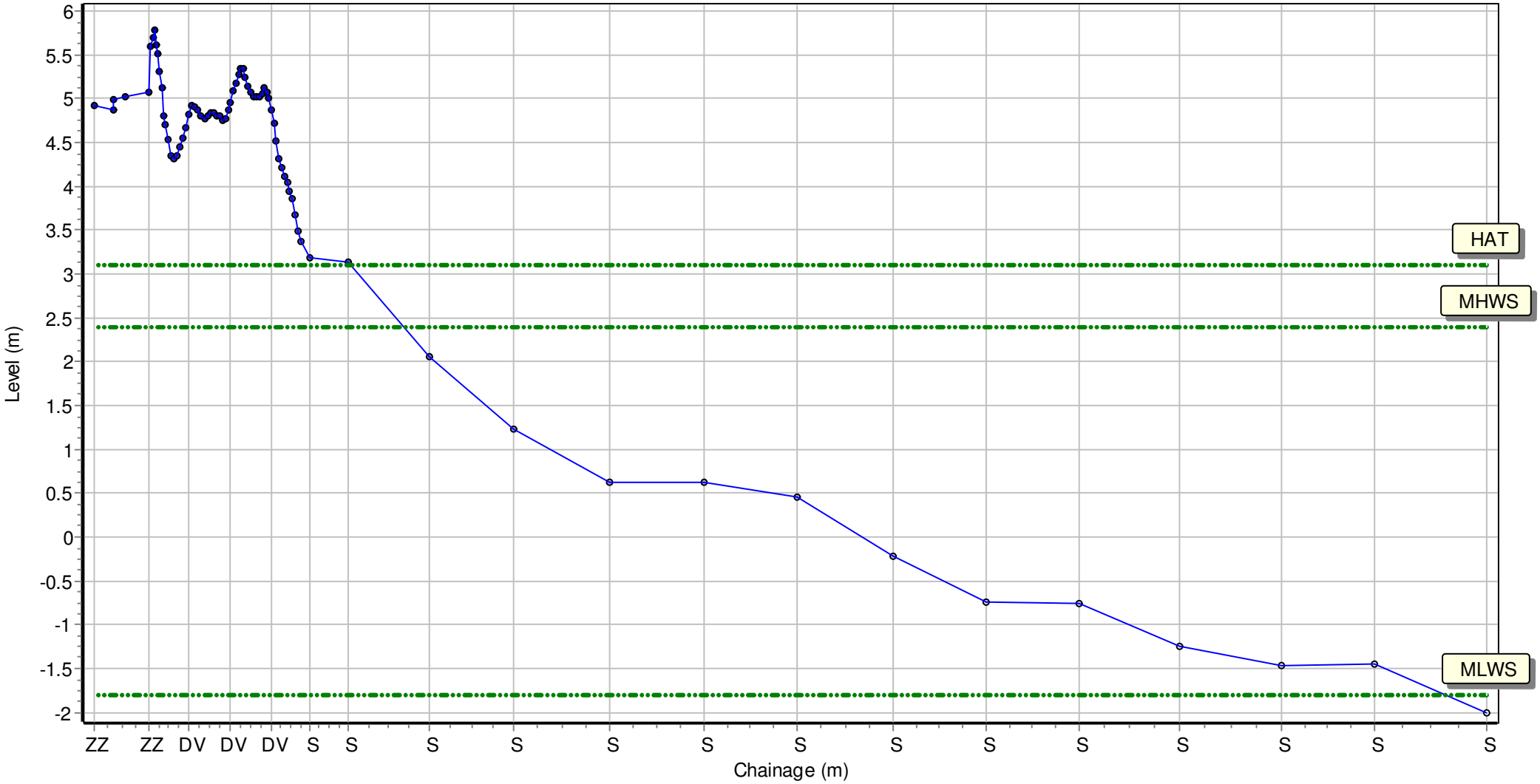
Location: **1aBVBC01**

Date: 12/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

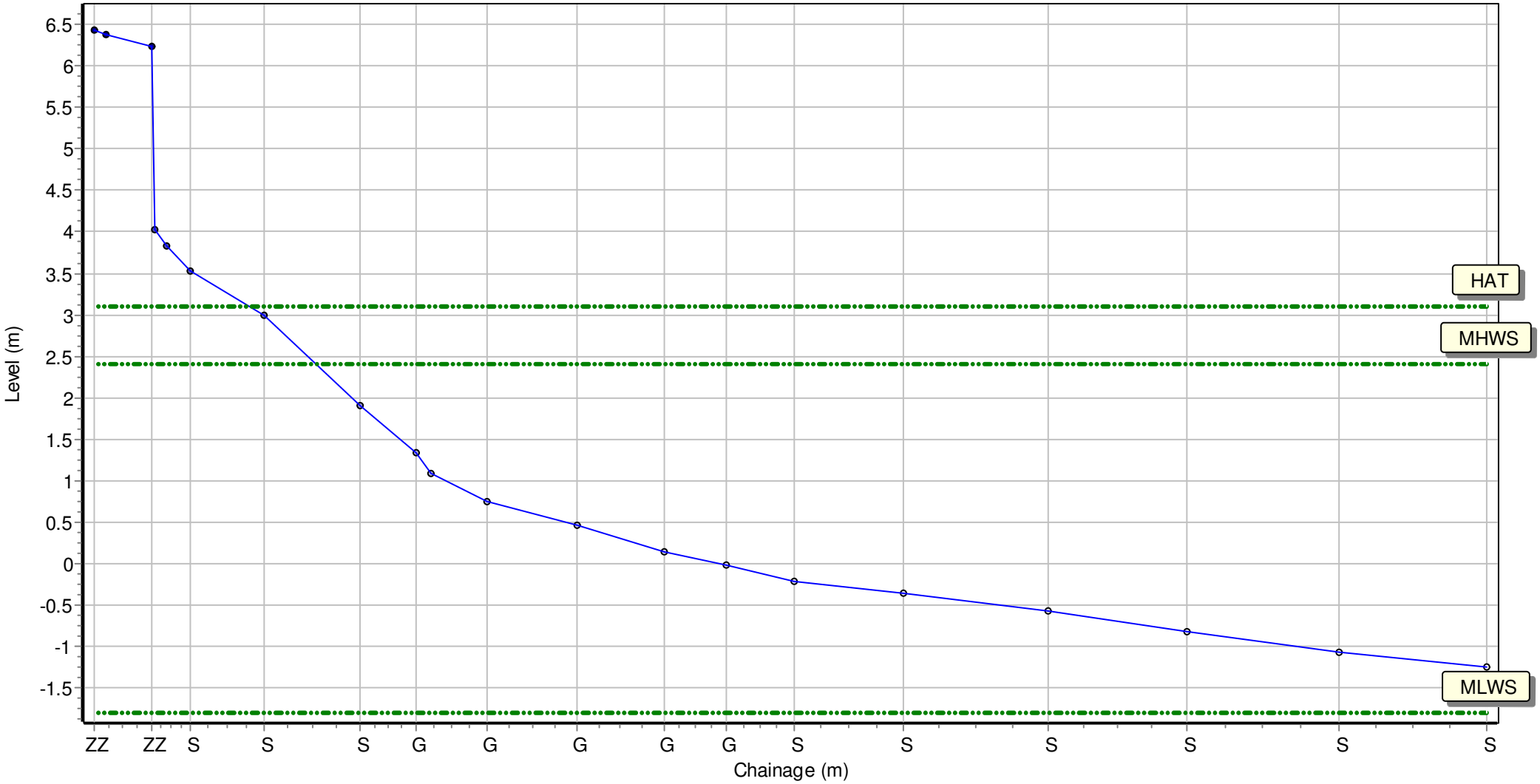
Location: **1aBVBC02**

Date: 12/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

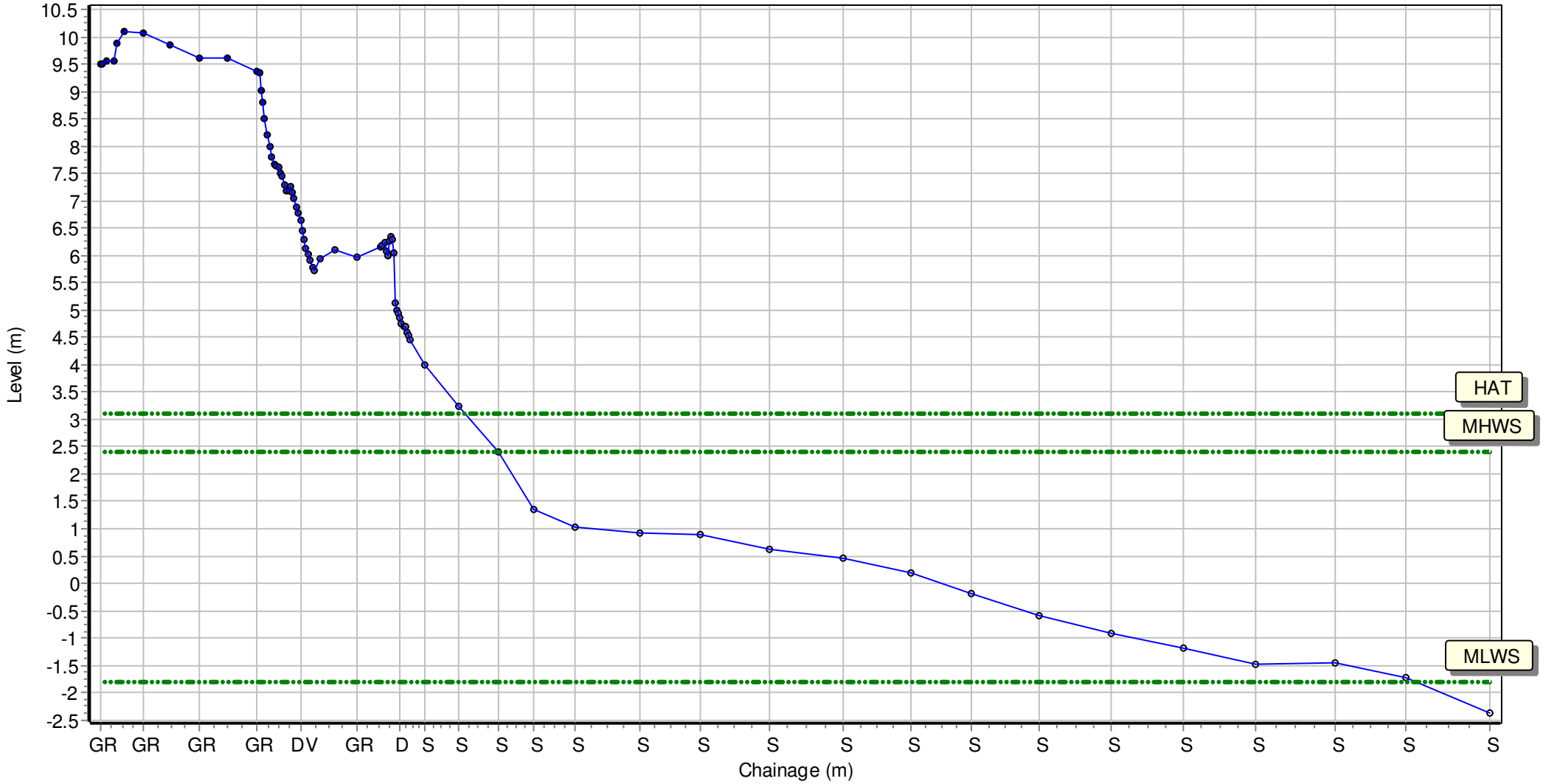
Location: **1aBVBC03**

Date: 12/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

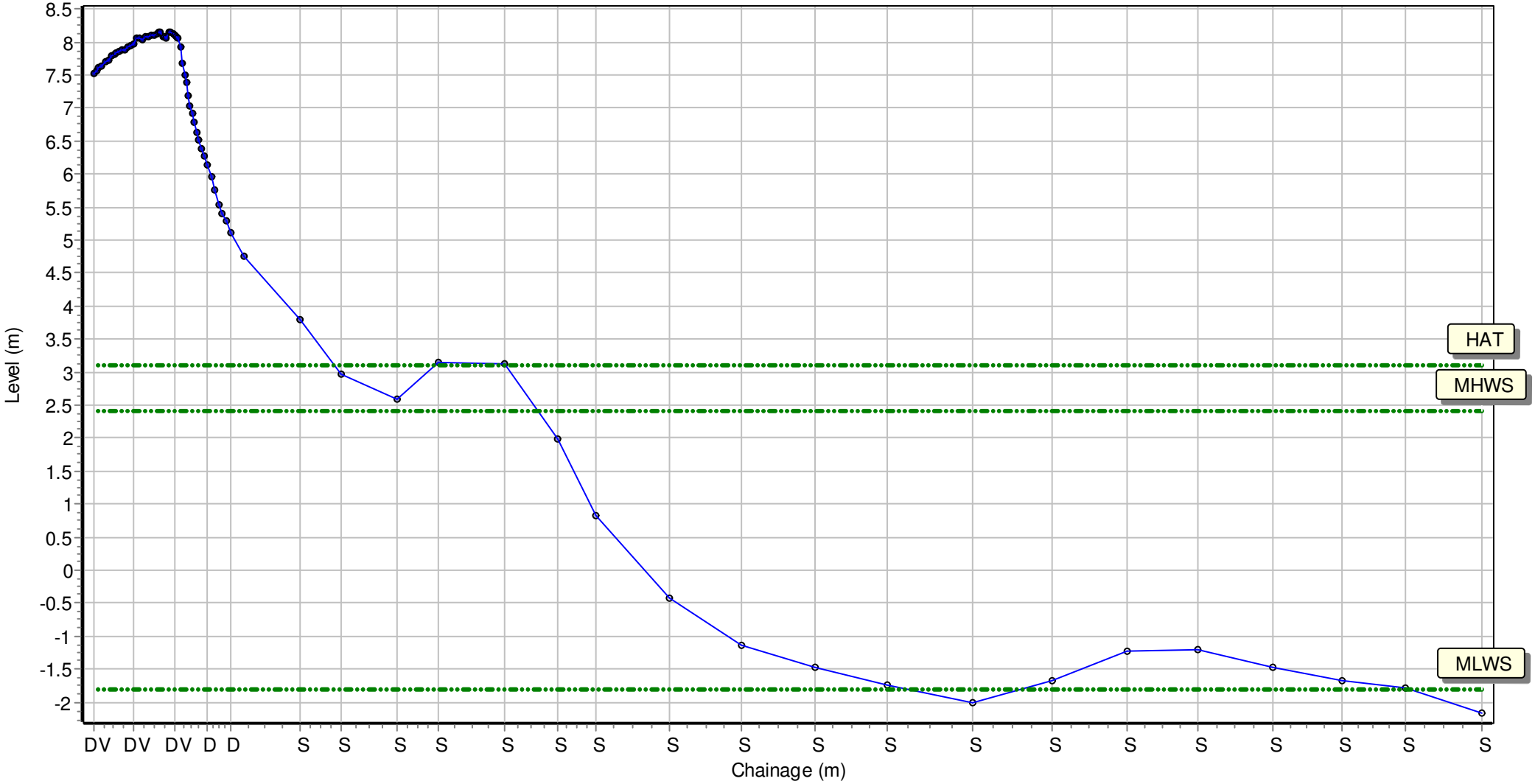
Location: **1aBVBC04**

Date: 12/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

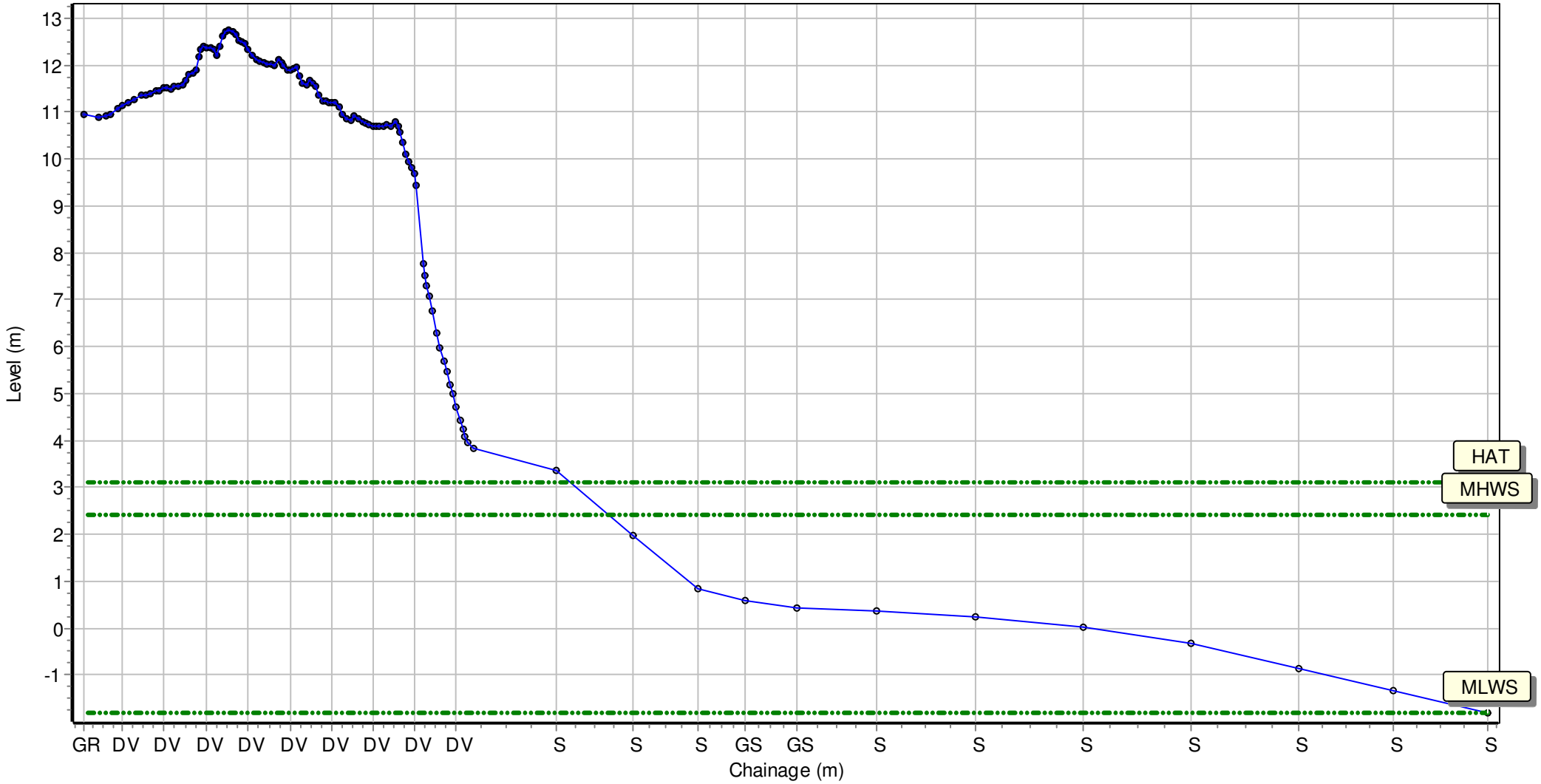
Location: **1aBVBC05**

Date: 12/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2018 Full Measures Topo Survey

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



Beach Profile

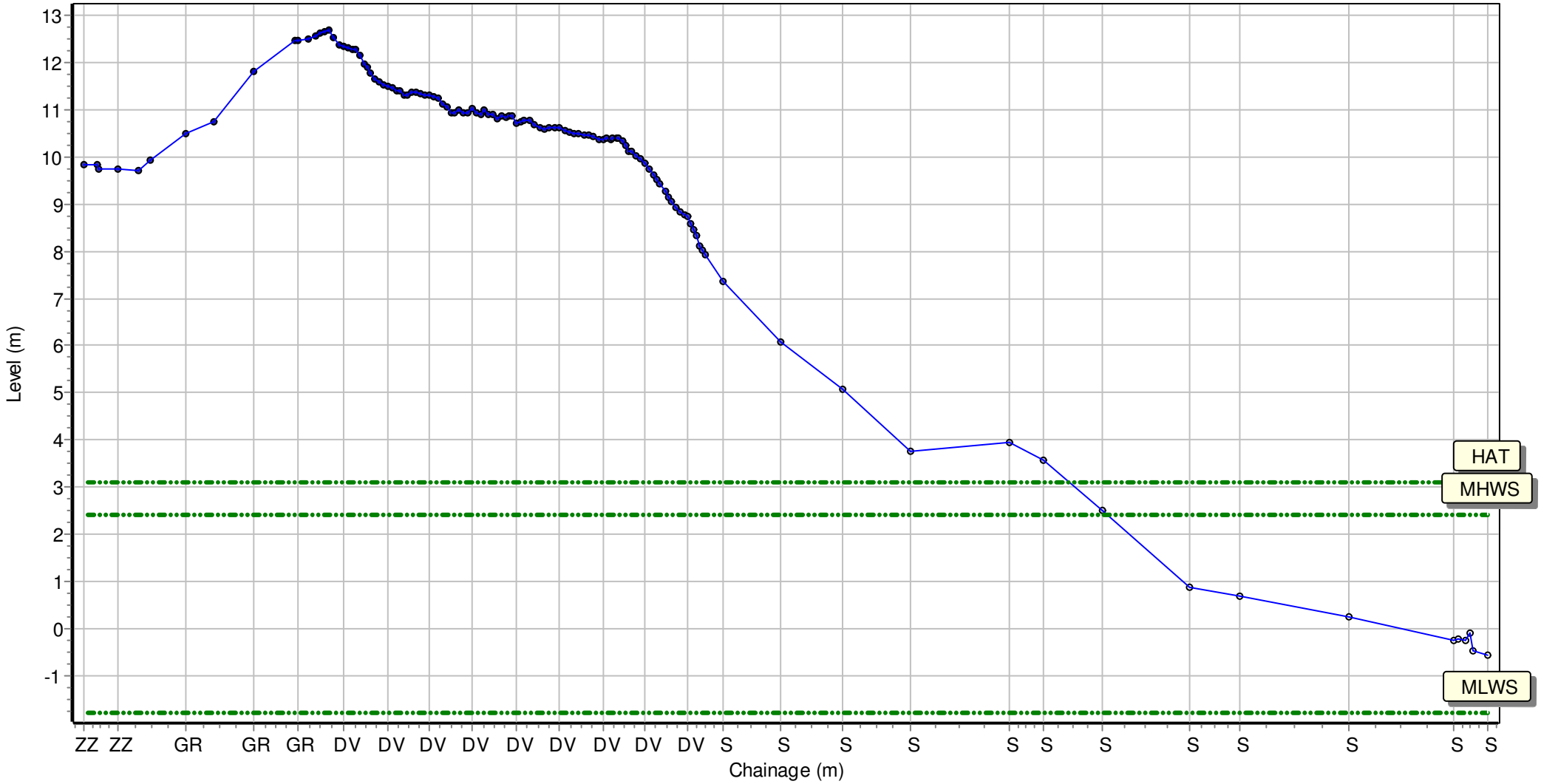
Location: **1aBVBC06**

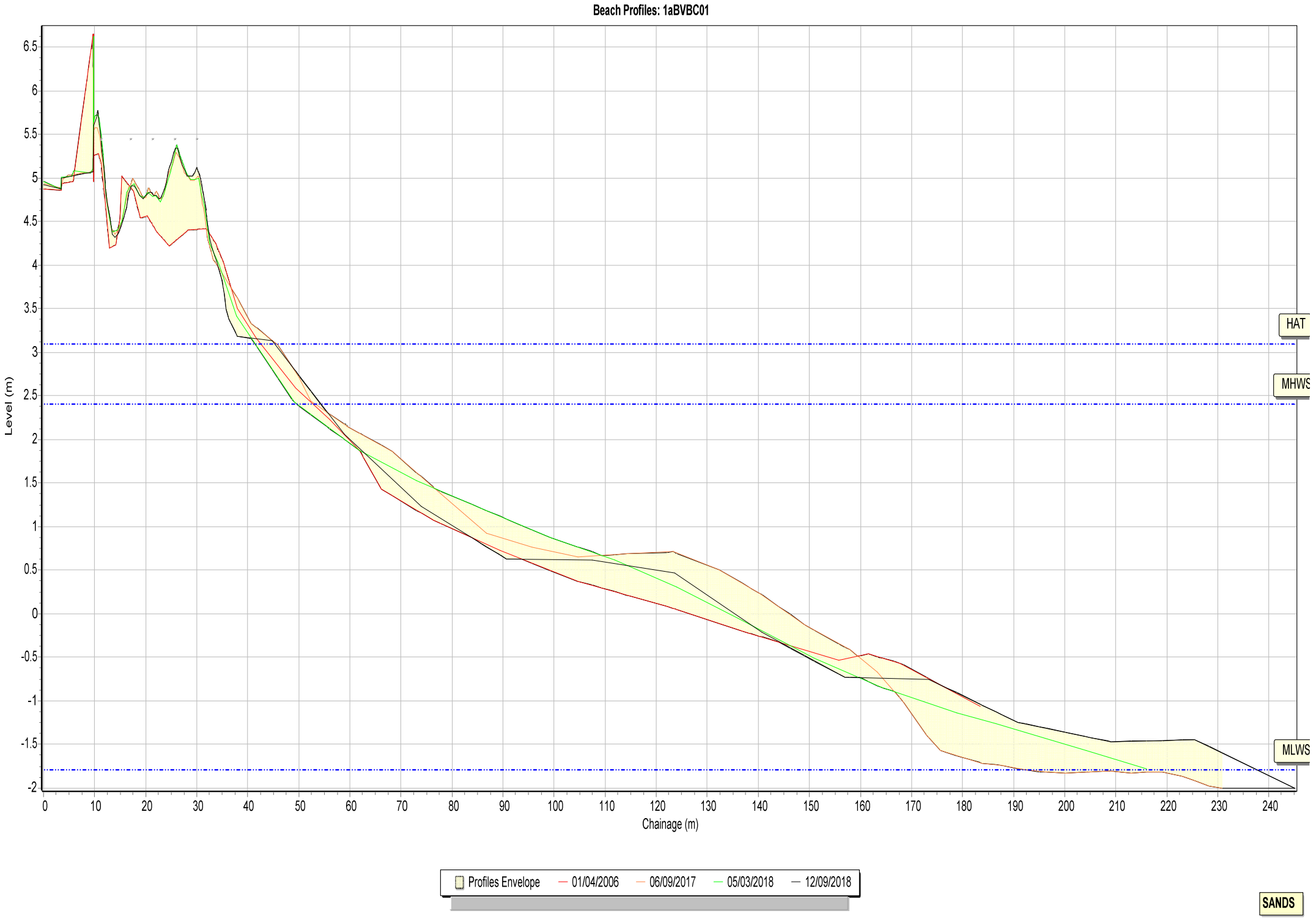
Date: 12/09/2018 **Inspector:** AG **Low Tide:** **Low Tide Time:**

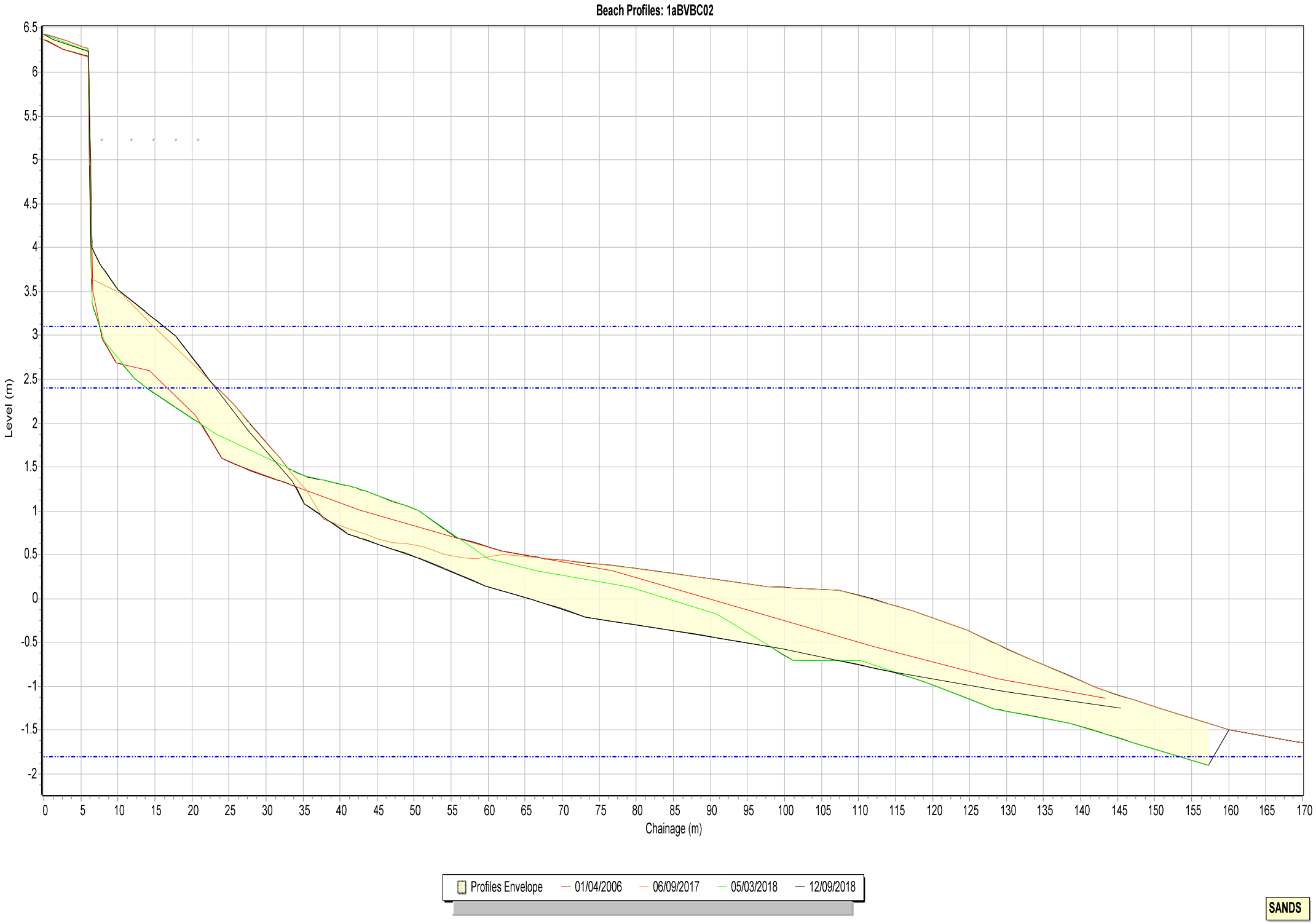
Wind **Sea State:** **Visibility:** **Rain:**

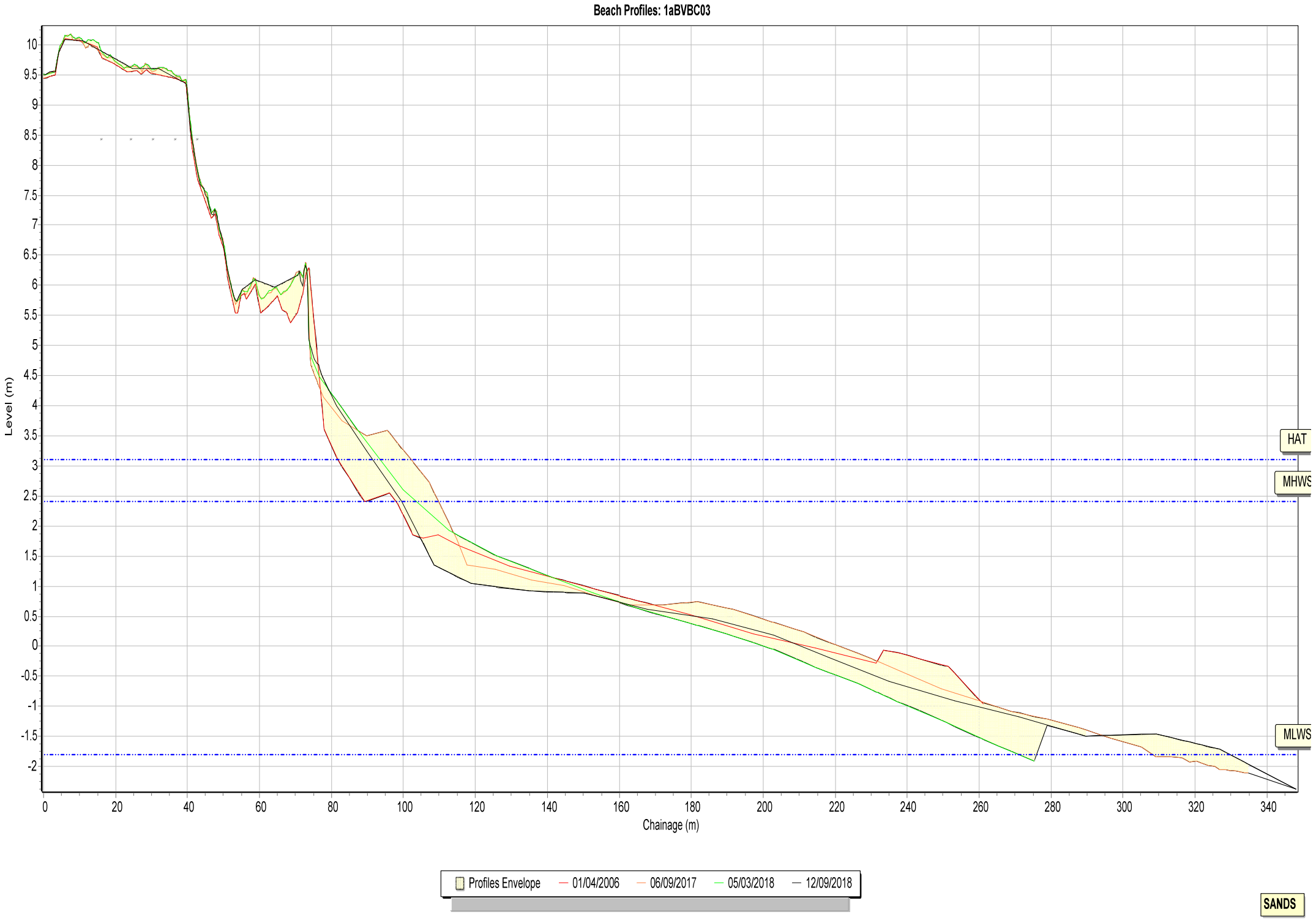
Summary: 2018 Full Measures Topo Survey

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

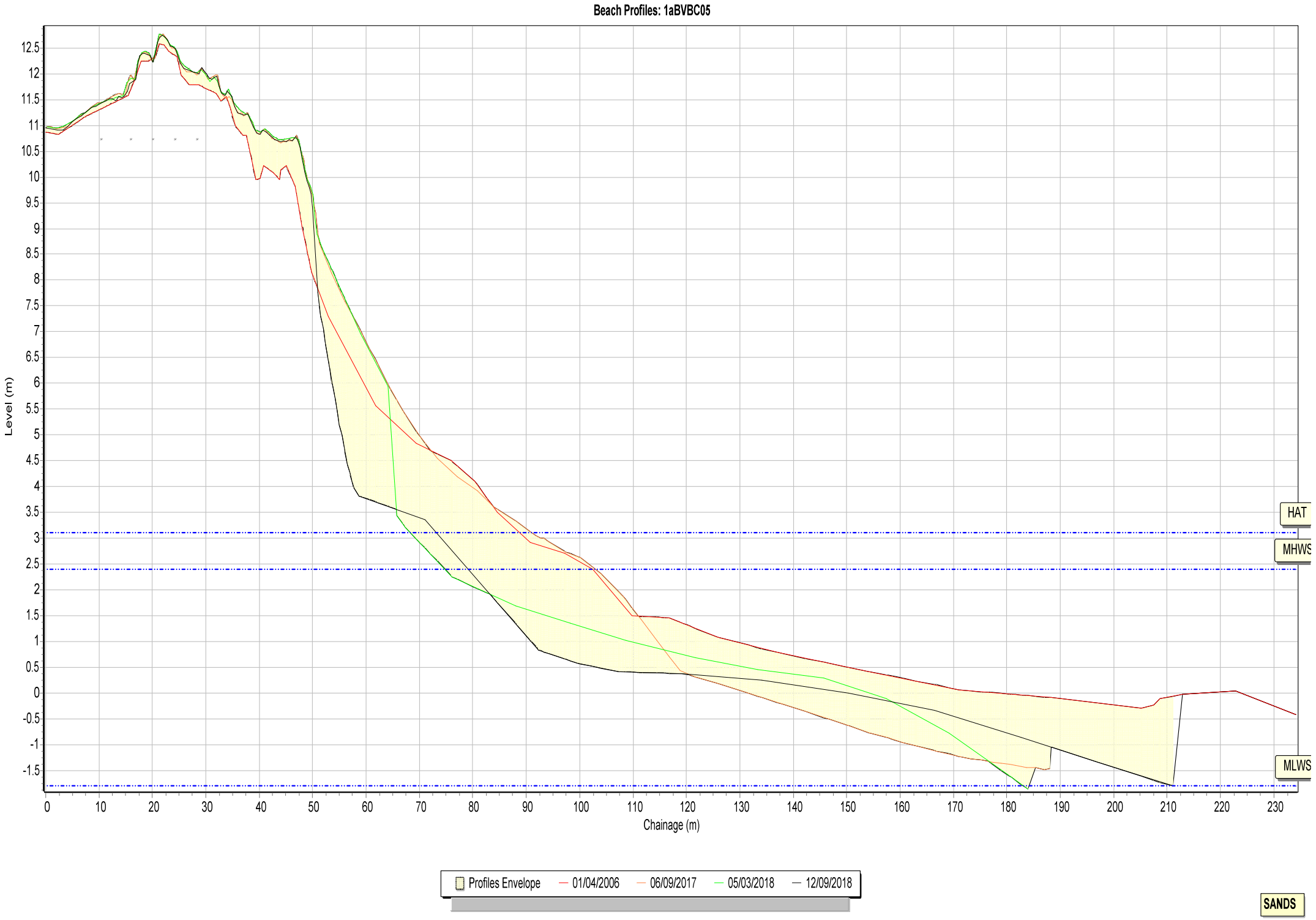



Beach Profiles: 1aBVBC01
Level (m)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/09/2017
05/03/2018
12/09/2018
SANDS


Beach Profiles: 1aBVBC02
Level (m)
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
-2
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170
Chainage (m)
Profiles Envelope
01/04/2006
06/09/2017
05/03/2018
12/09/2018
SANDS


Beach Profiles: 1aBVBC03
Level (m)
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
HAT
MHWS
MLWS
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
Chainage (m)
Profiles Envelope
01/04/2006
06/09/2017
05/03/2018
12/09/2018
SANDS


Beach Profiles: 1aBVBC04
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/09/2017
05/03/2018
12/09/2018
SANDS


Beach Profiles: 1aBVBC05
Level (m)
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
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
220
230
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/09/2017
05/03/2018
12/09/2018
SANDS


Beach Profiles: 1aBVBC06
Level (m)
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
10
20
30
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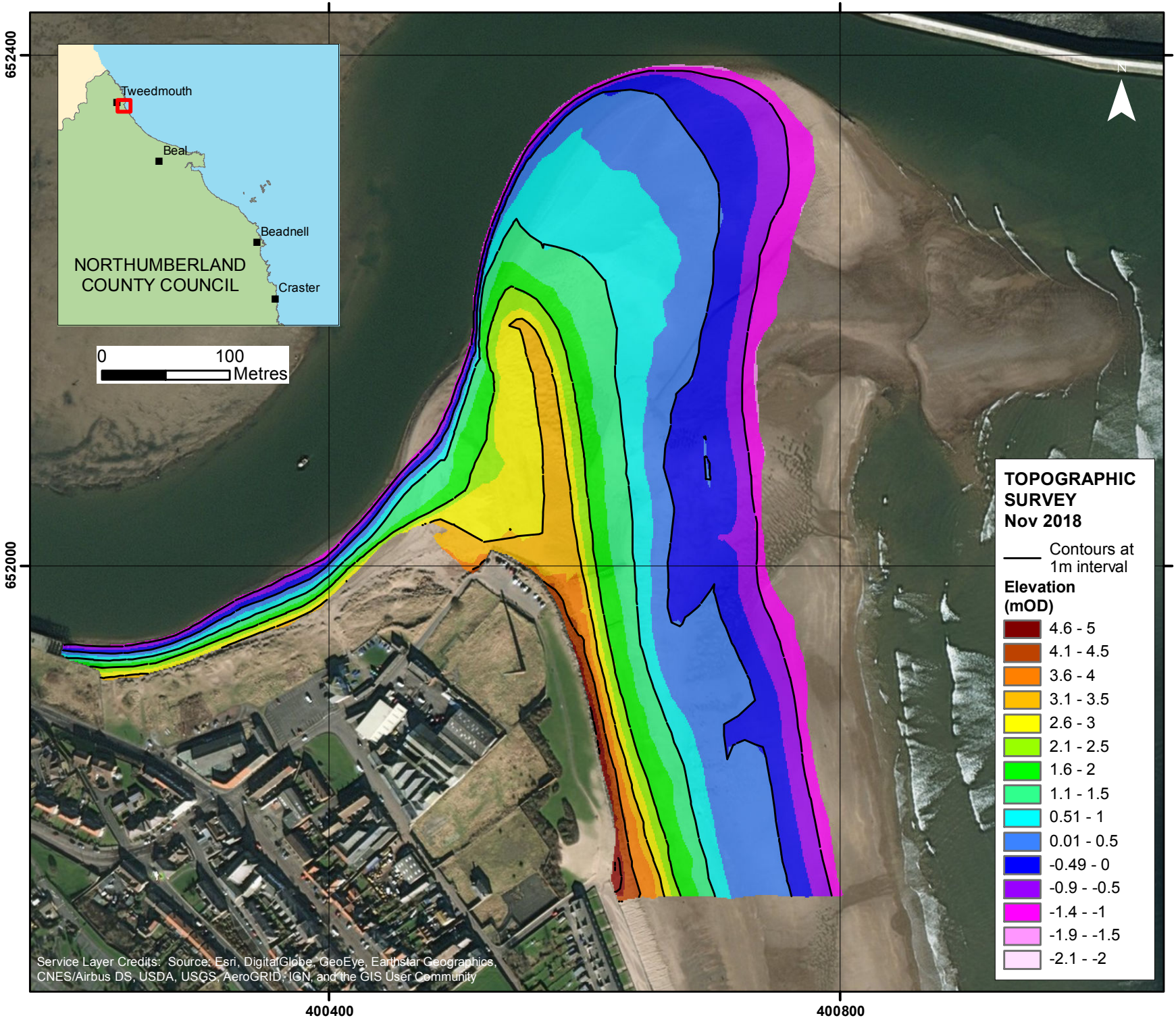
240
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
01/04/2006
06/09/2017
05/03/2018
12/09/2018
SANDS

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

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:4,000

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

Tel: +44 (0)191 211 1300
Fax: +44 (0)191 211 1313
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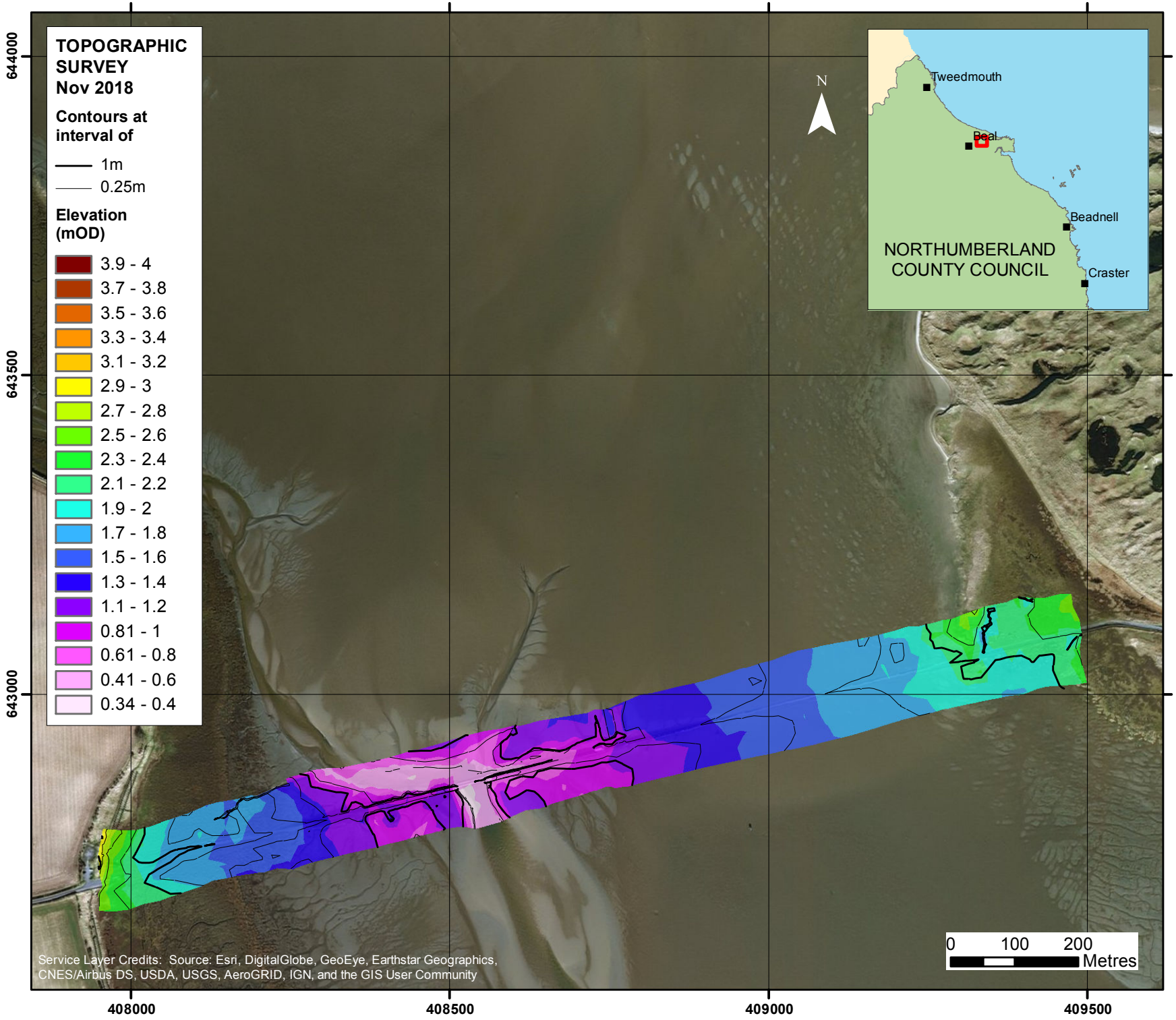

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 2

HOLY ISLAND CAUSEWAY

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:8,000

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

Tel: +44 (0)191 211 1300
Fax: +44 (0)191 211 1313
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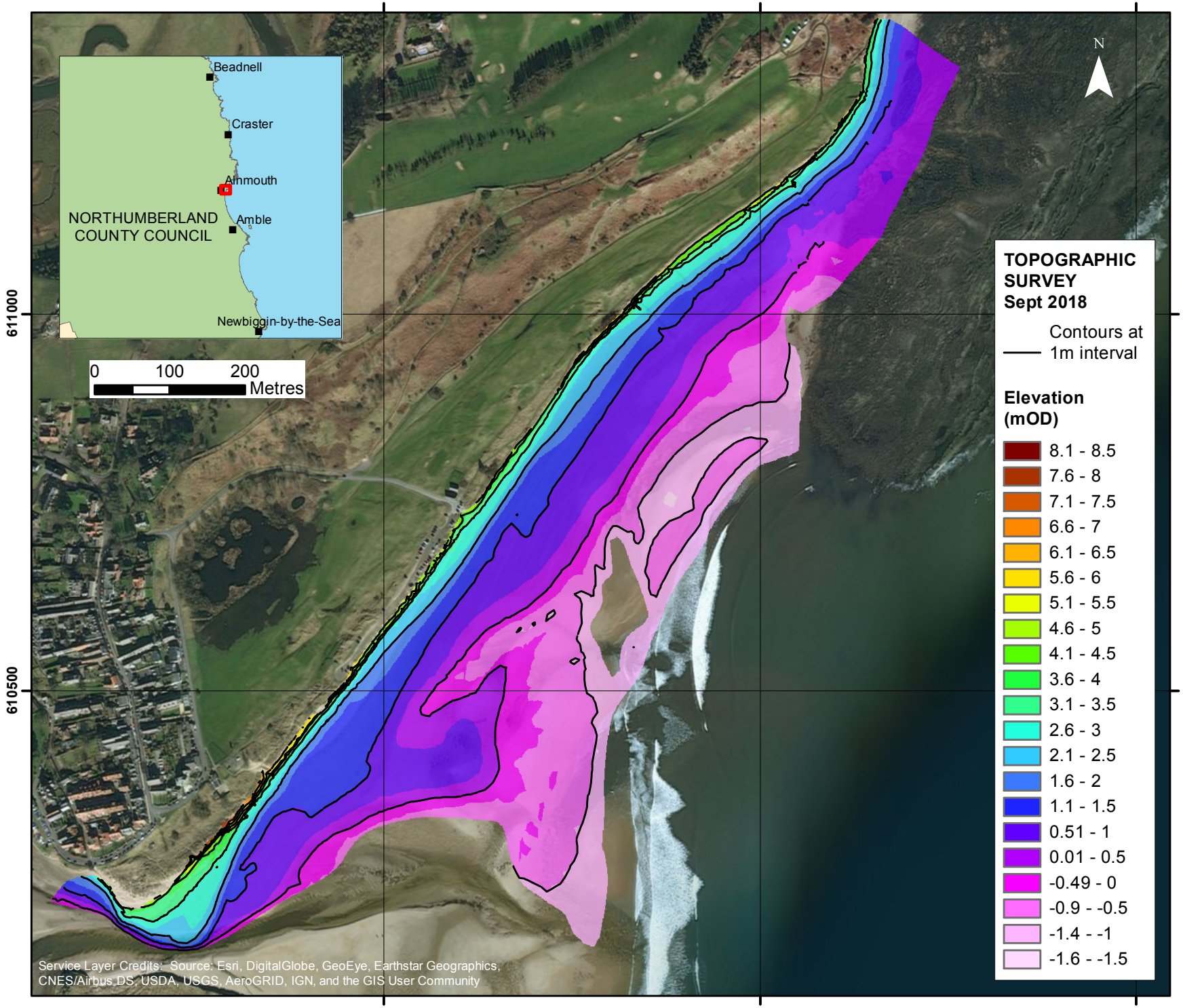

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 3

ALNMOUTH

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:6,821

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

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

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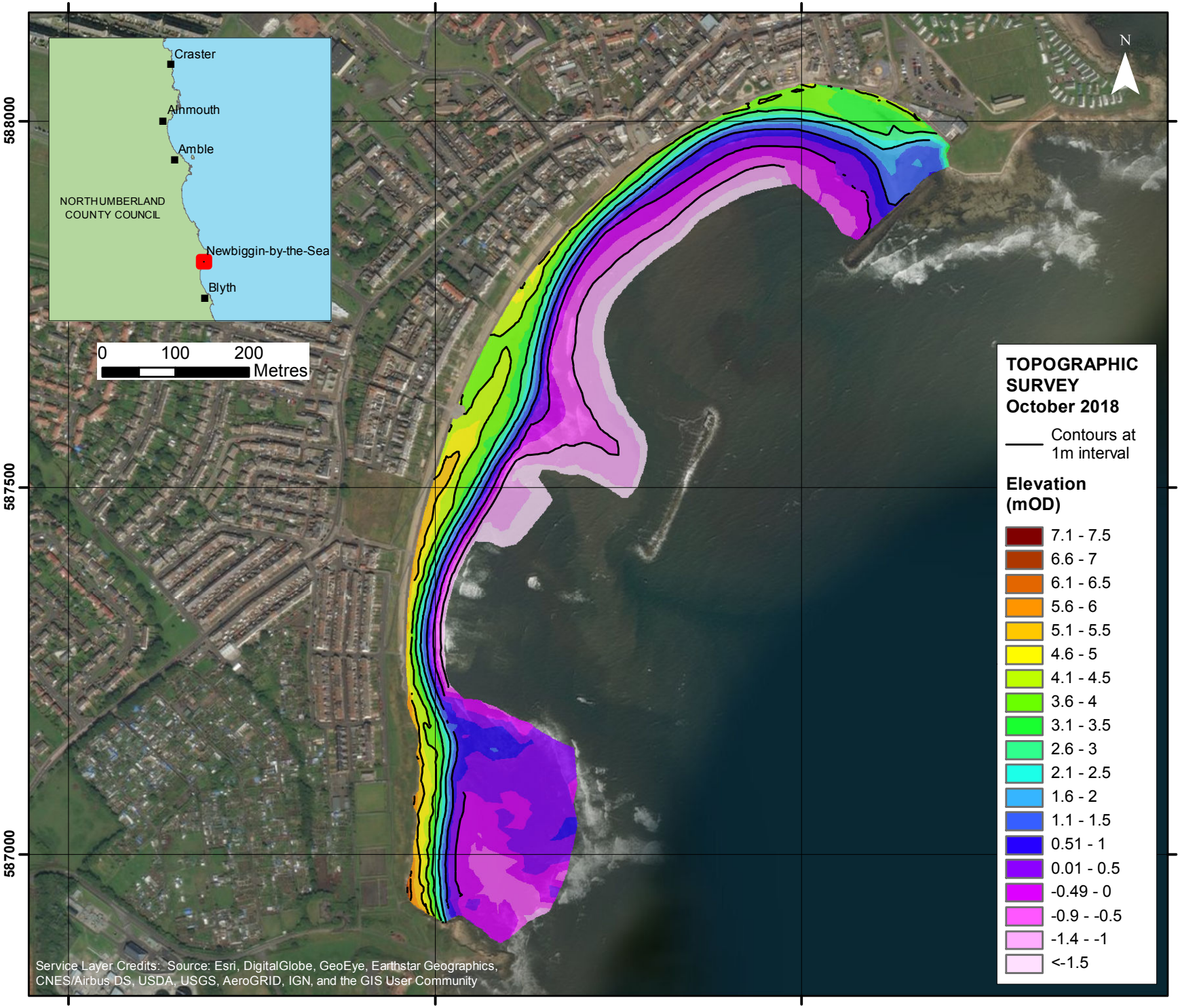

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 4

NEWBIGGIN-BY-THE-SEA

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:7,000

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

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

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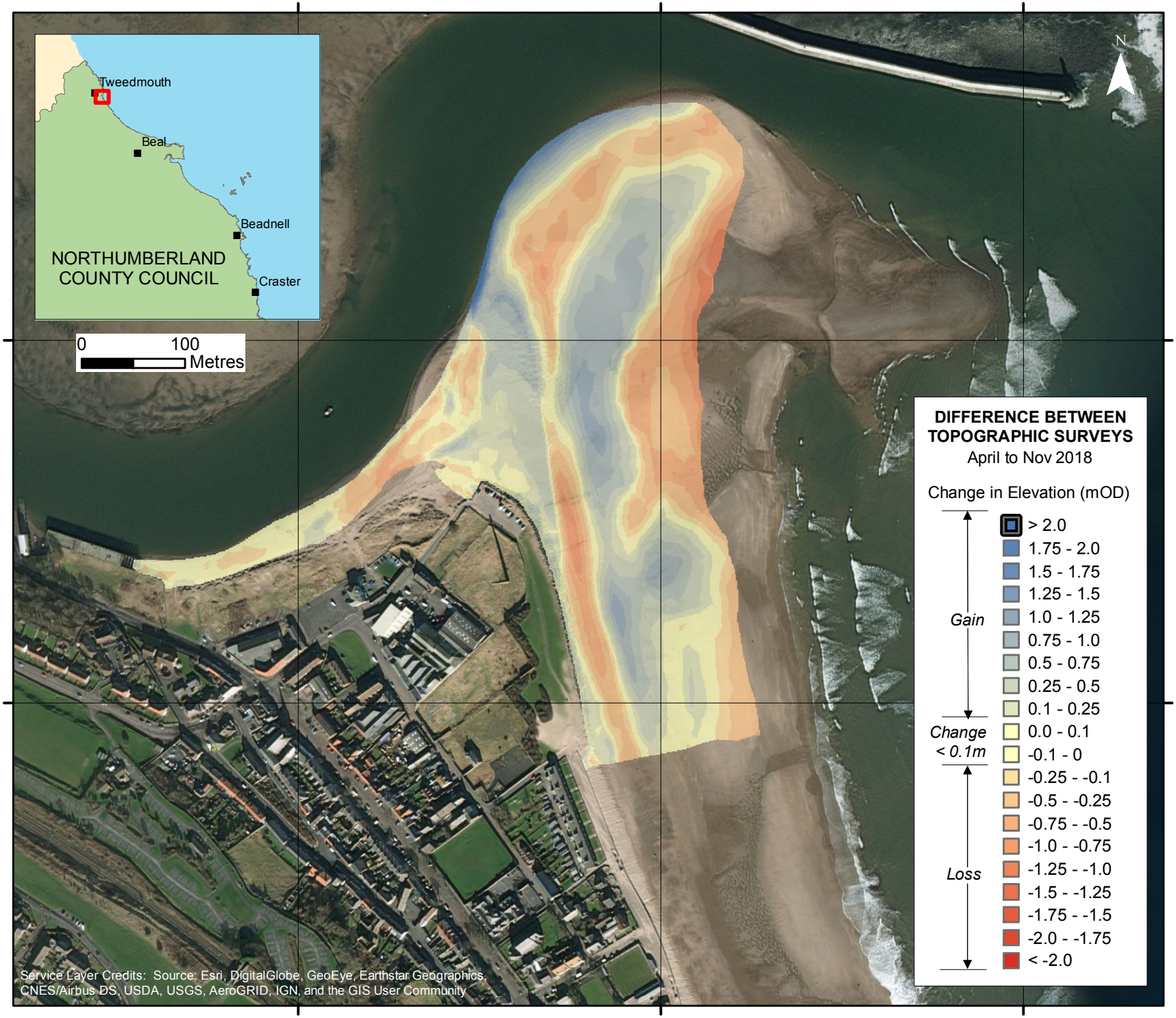

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 5

BERWICK

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:5,000

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

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

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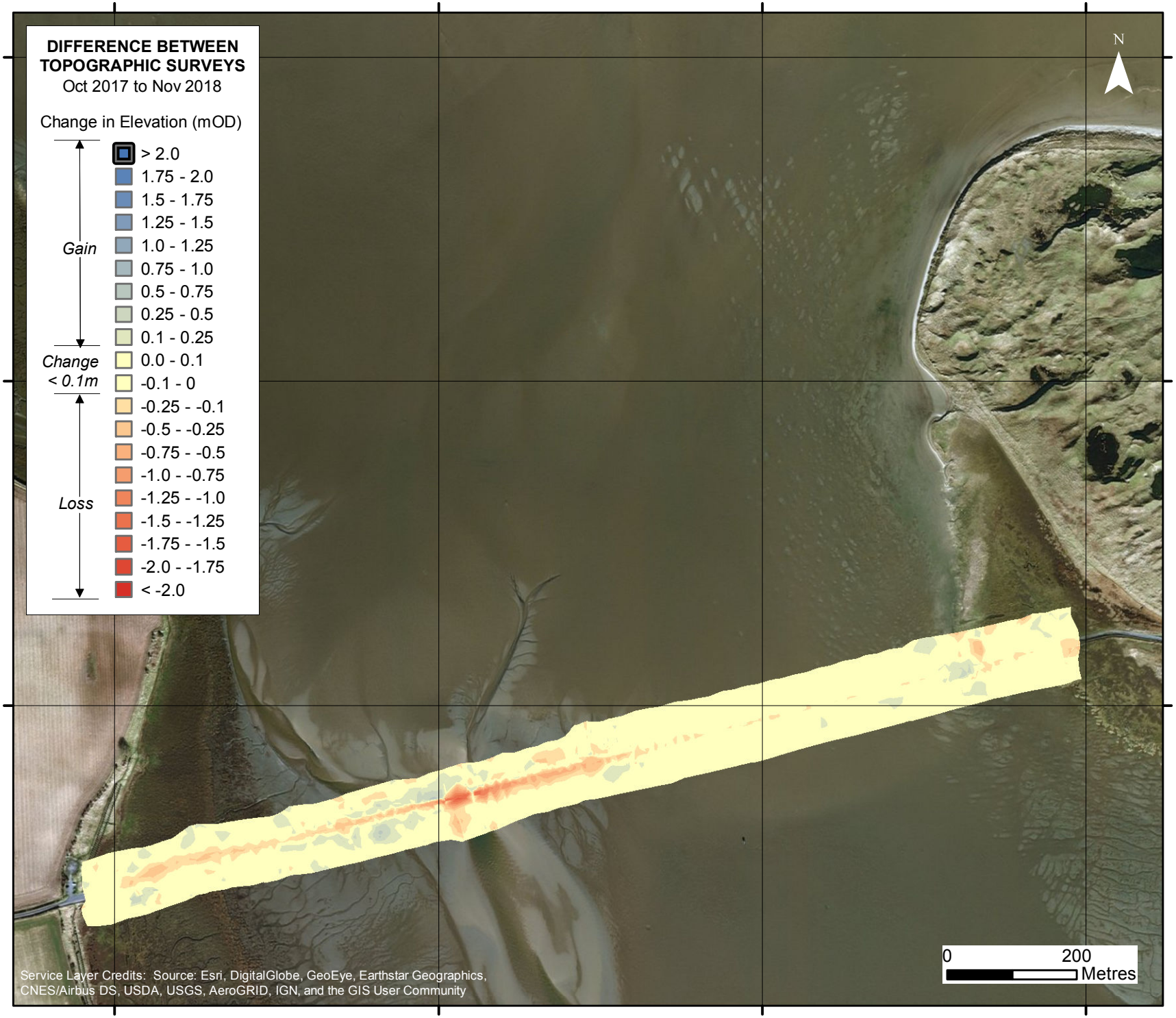

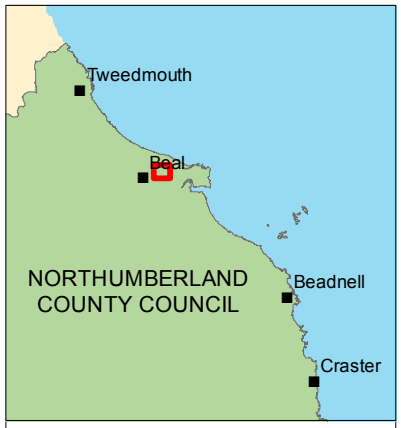

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 6

HOLY ISLAND CAUSEWAY

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:8,000

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

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

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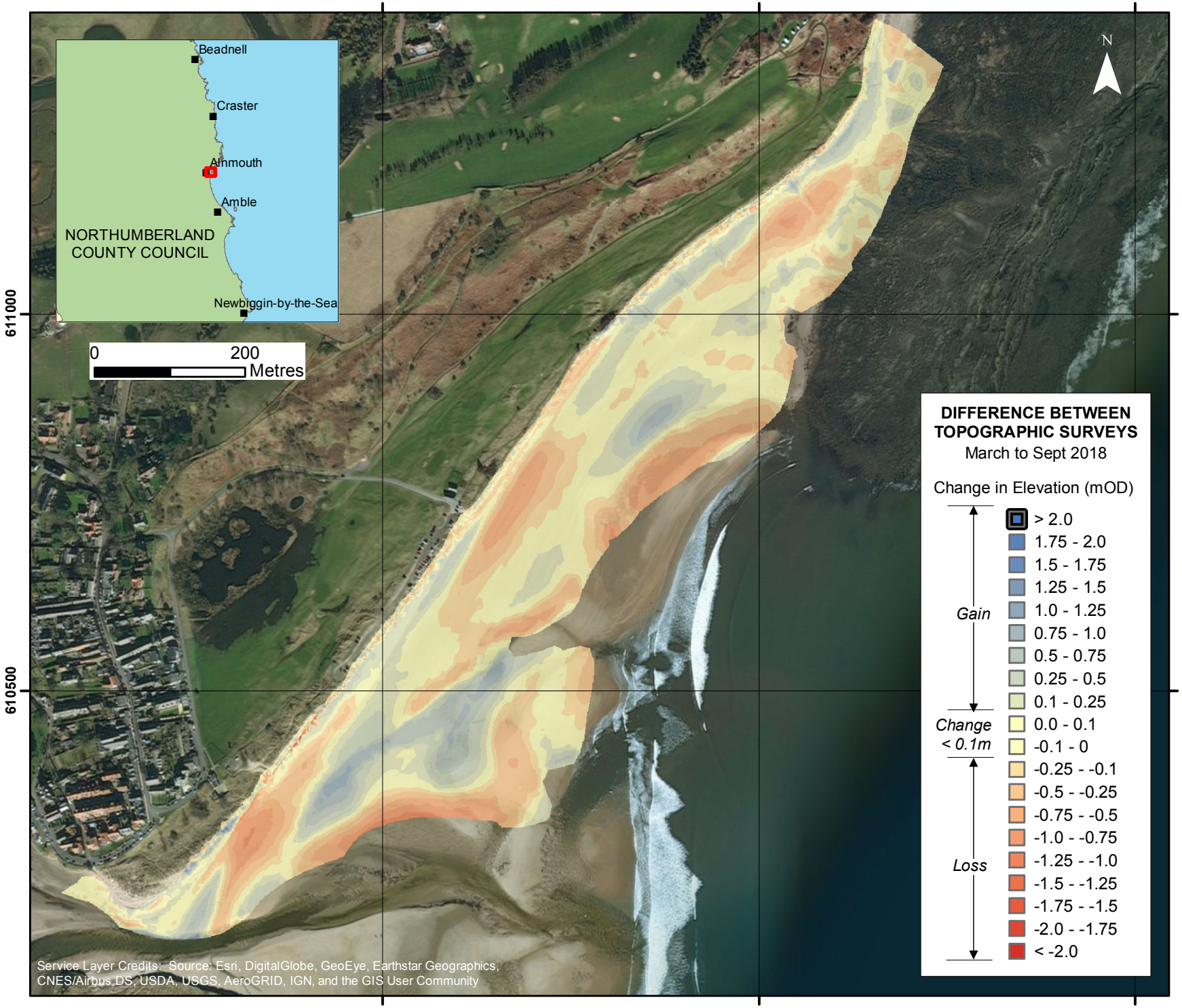

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 7

ALNMOUTH

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:6,821

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

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

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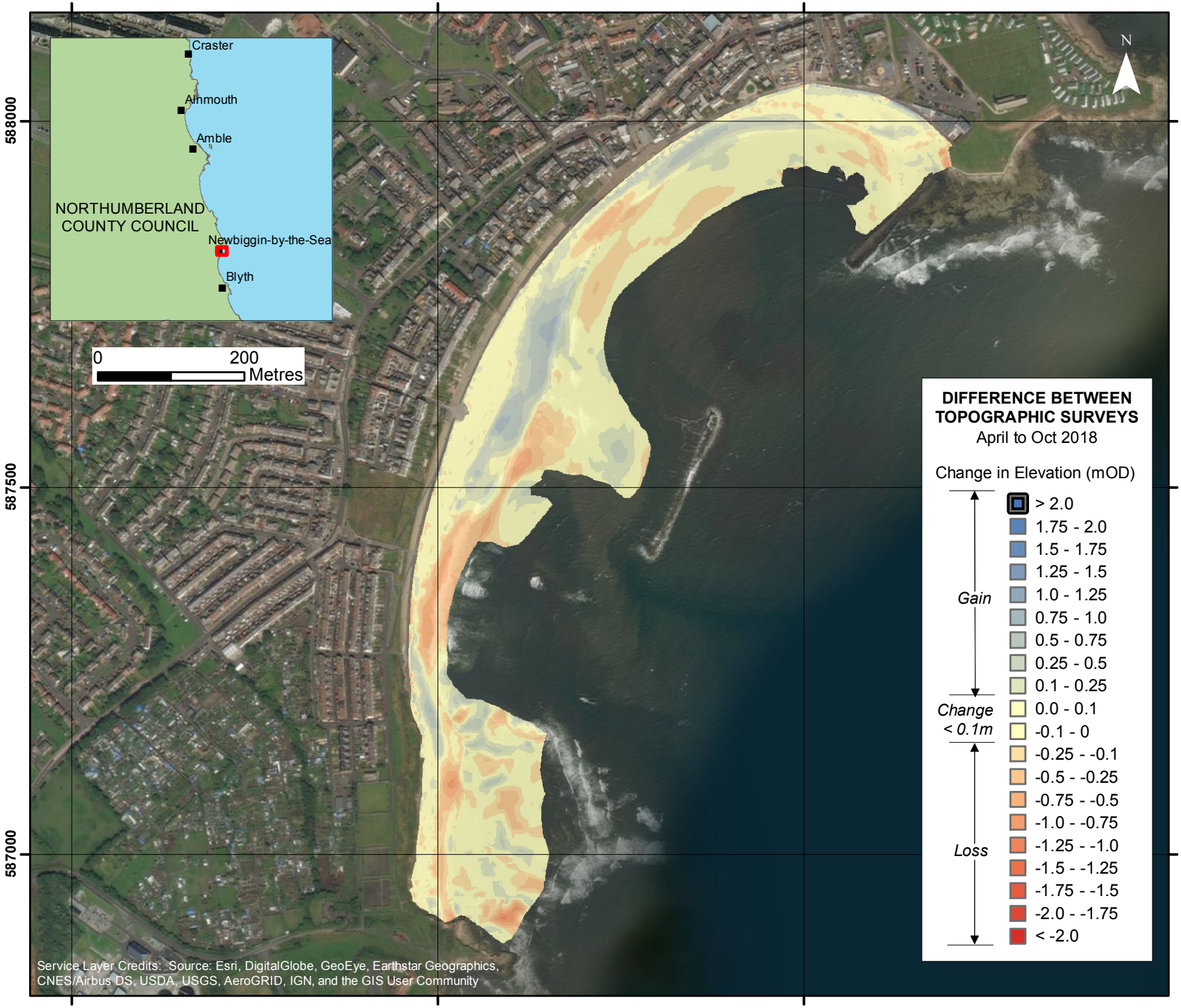

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 8

NEWBIGGIN-BY-THE-SEA

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:7,000

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

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

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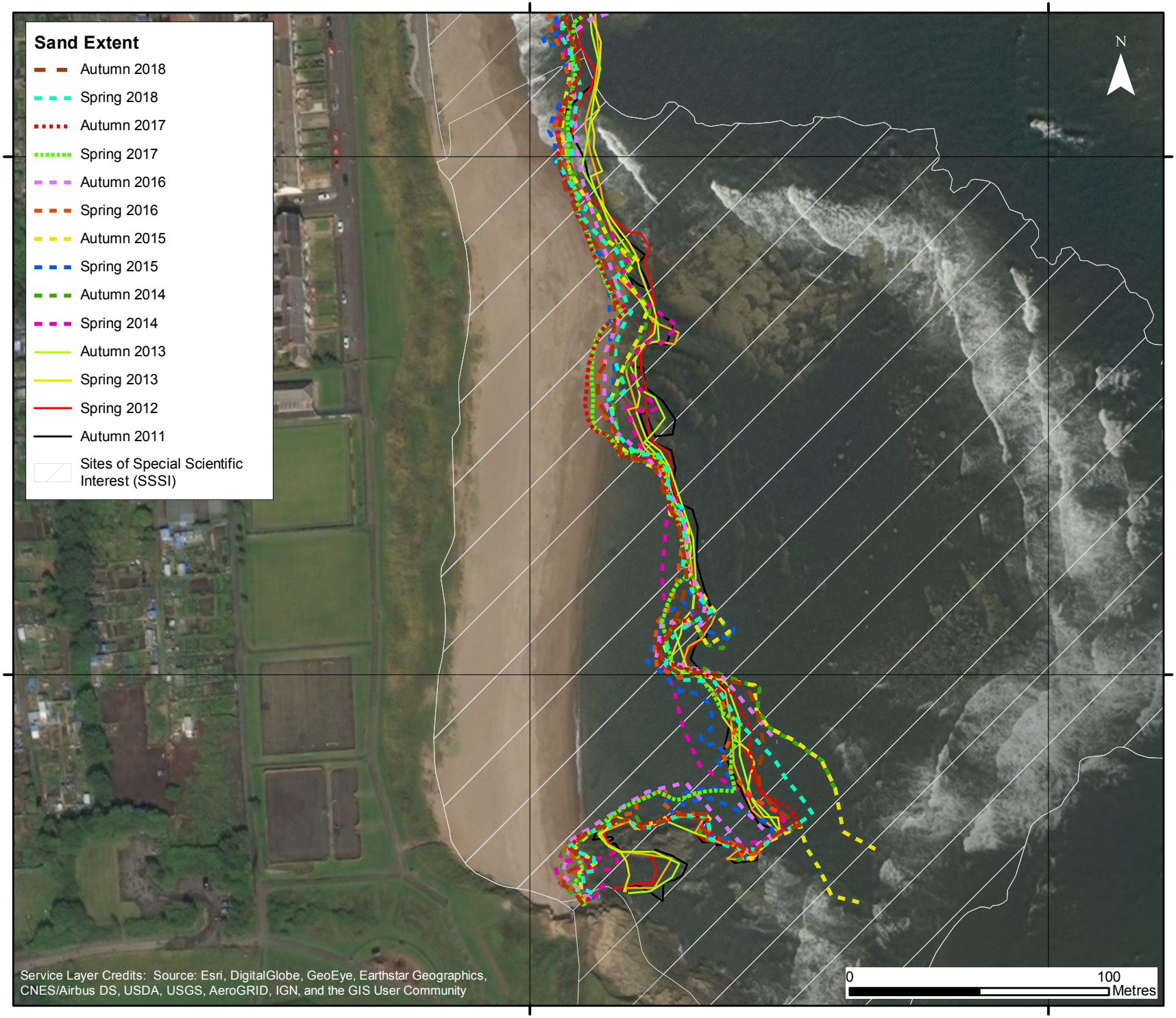
Appendix C

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

Analytical Report
'Full Measures' Survey 2018

Drawing Scale at A4 1:2,000

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

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

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