



**Cell 1 Regional Coastal Monitoring Programme
Update Report 11: 'Partial Measures' Survey 2019**

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Abbreviations and Acronyms

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

Water Levels Used in Interpretation of Changes

Water Level Parameter	Water Level (m AOD)			
	River Tyne to Frenchman's Bay	Frenchman's Bay to Souter Point	Souter Point to Chourdon Point	Chourdon Point to Hartlepool Headland
1 in 200 year	3.41	3.44	3.66	3.91
HAT	2.85	2.88	3.18	3.30
MHWS	2.15	2.18	2.48	2.70
MLWS	-2.15	-2.12	-1.92	-1.90

Water Level Parameter	Water Level (m AOD)			
	Hartlepool Headland to Saltburn Scar	Skinninggrove	Hummersea Scar to Sandsend Ness	Sandsend Ness to Saltwick Nab
1 in 200 year	3.87	3.86	4.1	3.88
HAT	3.25	3.18	3.15	3.10
MHWS	2.65	2.68	2.65	2.60
MLWS	-1.95	-2.13	-2.15	-2.20

Source: *River Tyne to Flamborough Head Shoreline Management Plan 2.*
Royal Haskoning, February 2007.

Glossary of Terms

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

Preamble

The Cell 1 Regional Coastal Monitoring Programme covers approximately 300km of the north east coastline, from the Scottish Border (just south of St. Abb's Head) to Flamborough Head in East Yorkshire. This coastline is often referred to as 'Coastal Sediment Cell 1' in England and Wales (Figure 1).

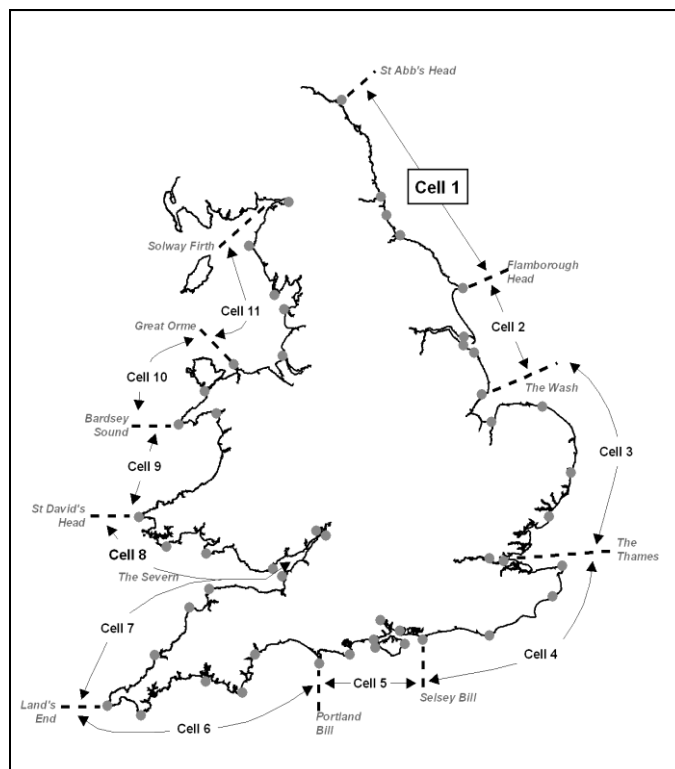


Figure 1 Sediment Cells in England and Wales

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

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

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

Table 1 Analytical, Update and Overview Reports Produced to Date

Year		Full Measures		Partial Measures		Cell 1 Overview Report
		Survey	Analytical Report	Survey	Update Report	
1	2008/09	Sep-Dec 08	May 09	Mar-May 09		-
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	Sep-Oct 11	Oct 12	Mar-May 12	Oct 12	-
5	2012/13	Sep 12	Jan 13	Apr 13	May 13	-
6	2013/14	Sep-Oct 14	Feb 14	Mar 13	Jul 14	-
7	2014/15	Sep-Oct 14	Feb 15	Apr 15	Jun 15	-
8	2015/16	Aug 15	Feb 16	Apr 16	Jul 16	Jun 16
9	2016/17	Aug-Sep 16	Feb 17	Apr 17	Jul 17	
10	2017/18	Sep-Nov 17	Feb 18	Mar 18	May 18	Nov 18
11	2018/19	Aug-Oct 18	Feb 19	Feb 19	May 19 (*)	

(*) The present report is **Update Report 11** and provides an analysis of the 2019 Partial Measures survey for Hartlepool Council's frontage.

1. Introduction

1.1 Study Area

Hartlepool Council's frontage extends from Crimdon Beck in the north to the North Gare Breakwater in the south. For the purposes of this report, it has been sub-divided into four areas, namely:

- North Sands
- Hartlepool Headland
- Middleton
- Hartlepool Bay

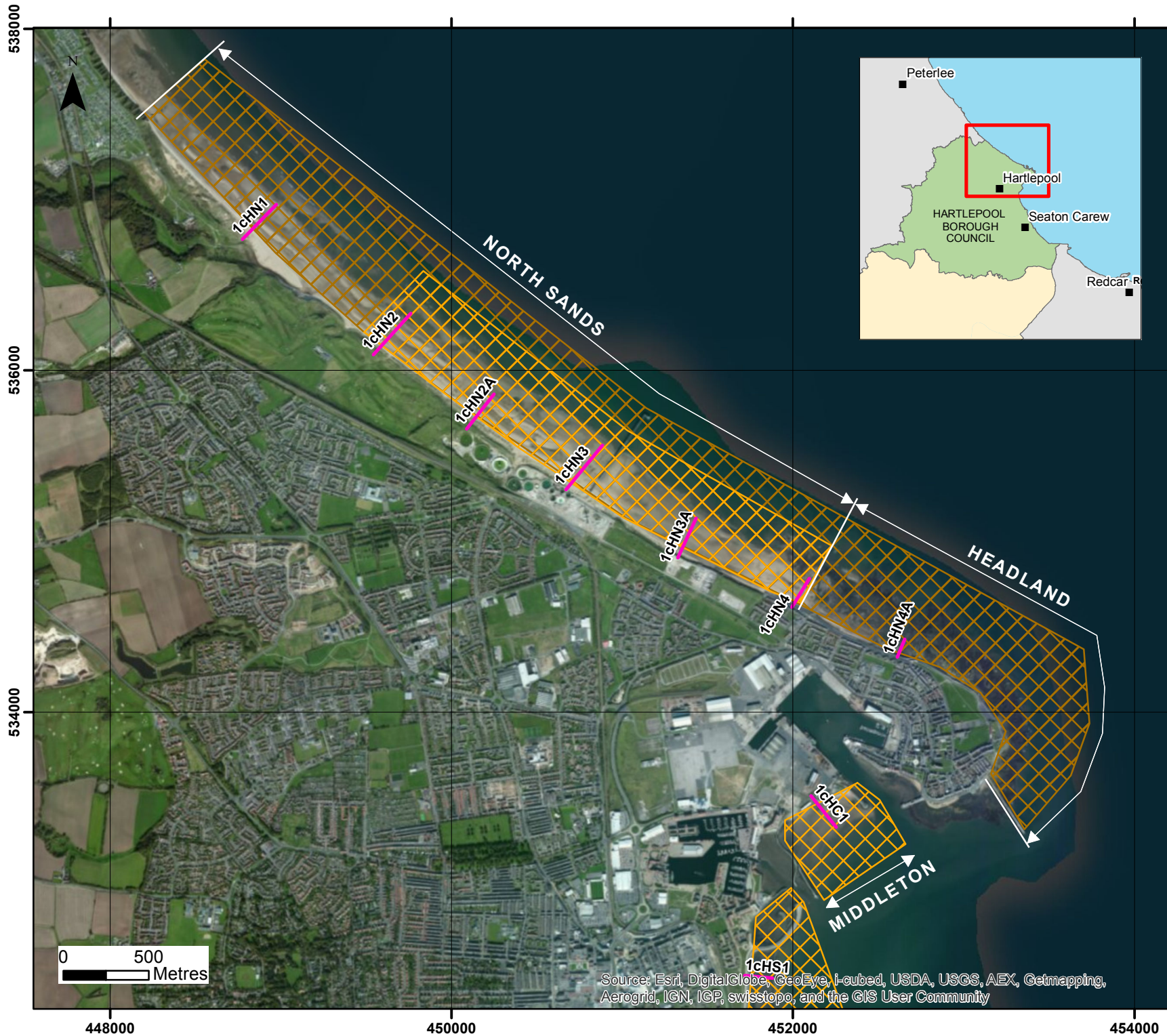
1.2 Methodology

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

- Full Measures survey annually each autumn/early winter comprising:
 - Beach profile surveys along twelve transect lines
 - Topographic survey along part of North Sands (referred to as Hartlepool North)
 - Topographic survey along Middleton (referred to as Hartlepool Central)
 - Topographic survey along Hartlepool Bay (referred to as Hartlepool South)
- Partial Measures survey annually each spring comprising:
 - Beach profile surveys along twelve transect lines
- Additionally, every five years (starting with 2008 as the baseline year), the Full Measures survey at Hartlepool North is extended to fully cover the whole of North Sands and Hartlepool Headland with a topographic survey. This extends across the boundary of jurisdiction between Hartlepool Borough Council and Durham County Council.

The location of these surveys is shown in Figure 2. The Partial Measures survey was undertaken along this frontage on the 21st and 22nd February 2019. During this time weather conditions were dry and sunny with a calm sea state and wind force 1 to 2. Full details of the weather conditions can be found in the surveyor's reports.

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
Hartlepool Borough
Council Frontage**

Analytical Report
Topo Surveys

Drawing Scale at A4 1:30,000

WATER
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Marlborough Crescent
Newcastle upon Tyne
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Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
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- 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

Hartlepool Borough Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:30,000

WATER
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Marlborough House
Marlborough Crescent
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Fax: +44 (0)191 211 1313
www.royalhaskoningdhv.com



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



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
Hartlepool Borough
Council Frontage**

Analytical Report
Topo Surveys

Drawing Scale at A4 1:12,000

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Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

2. Analysis of Survey Data

2.1 North Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
<p>21st February 2019</p>	<p>Beach Profiles:</p> <p>North Sands is covered by six beach profile lines during the Partial Measures survey (Appendix A) that were last surveyed in August 2018.</p> <p>Profile 1cHN1 is located within Durham County Council's jurisdiction, c. 400m north of the outfall of Crimdon Beck. It is reported here so changes can be interpreted in association with those observed elsewhere along North Sands.</p> <p>The beginning of the profile between 0m and 65m chainage covers dunes and has not changed since the previous survey. There have been varying amounts of erosion and accretion across the rest of the profile. A small degree of accretion has occurred on the upper beach. However, the largest area of accretion (up to 1.3m) has occurred between chainage 210m and 260m, where a sizeable high berm has formed. The area of greatest erosion occurs seaward from chainage 260m to the end of the survey at 280m. Berms in the mid reach of the profile (chainage 140m to 185m) which were reported in the previous partial measure survey report have flattened. Overall the profile is at a medium level compared to the range recorded from previous surveys, although it is at a higher level in the vicinity of the mid beach berm.</p> <p>Profile 1cHN2 covers the dune between chainage 0 and 50m. From chainage 55m to 210m the beach level has increased by up to 1.3m since March 2018. The lower beach seawards of chainage 200m has eroded by up to 1.0m. The profile now lies at the lowest limit of the profile envelope seaward of this point. MLWS now lies at chainage 210m, its most landward position on record. There has been a small volume of accretion on the upper beach towards the toe of the dunes. The accretion which occurred over the summer of 2018 between chainage 120m to 180m has decreased slightly with the crest of this mid-beach berm moving seawards and decreasing in level. The beach profile is at its lowest recorded level in the lower beach compared to the range recorded from previous surveys, low-medium in the middle beach, and medium in the upper beach.</p>	<p>The profiles are at or near the lowest elevation, particularly in the upper beach, with platforms exposed. This pattern is typical of winter conditions.</p> <p>Longer term trends:</p> <p>Following dune erosion over the winter of 2013/14 the areas with dunes have remained stable. At HN1 and 2 the beach levels are low-medium compared with previous years. At HN2a the beach is in the middle of the range of profiles showing likely seasonal fluctuation.</p> <p>At profiles HN3a, 4 and 4a the beach is low compared with previous profiles for at least some of the profile. The fluctuation in the veneer beach continues so that parts of the shore platform in the south of the bay have become exposed.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>Profile 1cHN2A was established in October 2011 and runs through the dunes close to North Sands. The area of dunes between 0m and 70m chainage has remained reasonably stable. Between 70m and 80m the toe of the foredunes has retreated by approximately six metres over the winter of 2018. This dune face is now at its most landward position following 12m of erosion since 2011. The beach profile shows accretion of up to 0.3m on the upper beach between chainage 100m and 140m, and up to 1.0m on the lower beach between chainage 180m and 220m. Seaward of chainage 220m the beach profile has shown accretion of up to 0.40m. Since 2011 erosion at the toe of the beach has moved MLWS landwards by around 60m. Overall the beach is at a low-medium level compared to the range recorded from previous surveys, having shown some recovery in the lower and mid reaches, despite further losses to the upper beach and dune face.</p> <p>At Profile 1cHN3 there has been little change to the dunes. The upper beach between chainage 40m and 70m has experienced some accretion of up to 0.3m. Between chainage 70m and 200m the beach has eroded slightly by up to 0.45m. The toe of the beach seawards of 200m shows some accretion of 0.7m. The profile is at its lowest recorded level between chainage 70m and 130m, similarly from chainage 155m to 200m. The remainder of the profile is at a low level compared to the range recorded from previous surveys.</p> <p>At Profile 1cHN3A the dune front at 20m chainage has remained stable. There has been erosion of up to 0.4m at the toe of the dunes, from chainage 25m to 45m. The general trend across the profile is of erosion of up to 1.5m. The exception is between chainage 95m and 130m where there has been accretion of up to 0.4m. Due to losses from the lower beach, MLWS falls at chainage 185m, rather than around chainage 250m. The beach is at its lowest recorded level between chainage 60m and 80m, and seawards of chainage 140m. The mid beach also remains at a low level compared to the range recorded from previous surveys, despite some accretion over the winter period.</p> <p>Profile 1cHN4 shows no change in the defended part of the profile. Between chainage 15m and 50m the sandy upper beach returned over the summer of 2018 and has only sustained some minor losses throughout the winter of up to 0.3m. The general trend across the upper and mid beach (between 50m and 110m chainage) is that the bed rock remains covered by around 0.3m of sand, however there appears to be the occasional rocky outcrop which remains exposed. From chainage 110m to the end of the survey at 200m chainage the rocks at the bottom of the beach are exposed, which is common for this profile. Overall the profile is at a low level compared to the range recorded from the previous</p>	

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>surveys,</p> <p>Profile 1cHN4A was established in October 2011. The defended part of the profile to 10m chainage has not changed since October 2011. The rocky shore platform has been exposed over the remainder of the profile, following a drop in beach level of up to 1.0m throughout the winter of 2017. There are occasional minor variations from the previous survey however these are likely to be due to the survey techniques as they generally are less than +/- 0.1m. As a result, from chainage 10m seawards, the rock platform remains exposed as it was in the previous survey. The profile is therefore at a low level compared to the range recorded in previous surveys as no beach is present at all, with the rock platform exposed over the full profile.</p>	

2.2 Middleton

Survey Date	Description of Changes Since Last Survey	Interpretation
<p>22nd February 2019</p>	<p>Beach Profiles:</p> <p>Middleton is covered by one beach profile line during the Partial Measures survey (Appendix A). The profile was last surveyed in September 2017.</p> <p>At Profile 1cHC1 there is an apparent retreat of the defence line in the upper profile, however this is an anomaly caused by lack of access to crest of the seawall due to a broken fence. From photographs taken during the survey the seawall face appears stable despite some open joints and evidence of differential settlement. At the toe of the seawall there has been an accretion beach material of around 1m. The profile has flattened since the last survey in October 2018. With accretion in the upper reaches and some depletion in the mid reaches. A berm present in the October 2018 survey has flattened over the winter of 2018. The profile is at the highest recorded level briefly from chainage 175m to 190m. Generally, the beach profile appears to be at a high-medium level compared to the range of previously recorded results.</p>	<p>The beach profile appears healthy and the accretion of material against the seawall has seen beach levels recover following the losses recorded in the October 2018 survey.</p> <p>Longer term trends: The beach level at this location tends to fluctuate through the year, with the most variable area being adjacent to the sea wall where wave energy is reflected. There is a pattern of seasonal variation, with lower levels typically recorded in the spring, following the period of winter storms. Recovery tends to occur by the autumn.</p>

2.3 Hartlepool Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
21 st February 2019	<p>Beach Profiles:</p> <p>Hartlepool Bay is covered by four beach profile lines during the Partial Measures survey (Appendix A).</p> <p>Profile 1cHS1 is located c. 150m south of the root of the South Pier. The profile starts at the wall to the rear of the promenade and extends over the fronting concrete splash wall and down the sloping face of the rock armour revetment before reaching the beach. Very little change has occurred until 40m chainage, which is the toe of the sea defences, since September 2014. There has been accretion of up to 1.0m across the beach profile. The toe of the beach has moved seaward by around 60m. Overall the beach is at a high-medium level compared to the range recorded from previous surveys.</p> <p>At Profile 1cHS2 there has been a loss of material against the base of the coastal defence meaning that more of the rock armour is exposed than in the previous survey (October 2018). In the upper-mid reaches of the profile there has been up to 0.40m of accretion, whilst the mid and lower reaches of the profile have experienced a drop in level of up to 0.3m. Seawards of chainage 330m the profile is at its lowest recorded level. Overall the profile is at a medium level compared to the range recorded from previous surveys, with the extremity of the lower beach being exceptionally low.</p> <p>Profile 1cHS3 shows no changes over the defended part of the profile up to 30m chainage. There has been a drop in levels of up to 0.6m across the upper reaches of the beach profile. However, a shallow depression which had formed over the summer of 2018, between chainage 65m and 110m, has been infilled leading to an evenly graded upper and mid beach which is at a medium level compared to the range of previous surveys. A shallow berm on the lower-mid section has moved seaward by approximately 40m, with the crest now lying between chainage 180m and 210m and forms the highest recorded level in this location, Seaward of this berm the profile decreases in level towards MLWS which lies 10m landward of the previous survey. Overall the profile is at a medium level compared to the range recorded from previous surveys.</p> <p>Profile 1cHS4 is located 1km north of the North Gare Breakwater, within the area of undefended dunes at Seaton Carew. The part of the profile dominated by dunes, to 290m chainage, has remained stable. The depression between the main body of dunes and the foredune at 300m chainage has been deepening since 2013, however recent surveys indicate the rate at which this is occurring is slowing.</p>	<p>Overall the profiles show that the beach remains at a relatively medium level in most places.</p> <p>The dunes are in good condition. The foredune continues to accrete but erosion associated with a walkway is causing localised lowering in HS4 that may affect stability of the wider dune system in the long term.</p> <p>Longer term trends: Beach levels within Hartlepool Bay in February 2019 were at a medium level in comparison to previous surveys. The beach levels have been progressively increasing across the bay.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>The photographs suggesting lowering may result from footpath erosion. The crest of the foredune at 320m chainage has shown some depletion over the winter of 2018, despite a general trend of accretion since 2011. Between chainage 340m and 415m the beach level has dropped by up to 0.6m, with the berm feature previously recorded at chainage 365m since April 2016 moving seaward to chainage 385m. Between chainage 385m and 430m there has been accretion of up to 0.5m as the face of the lower berm has moved seaward. Seawards of chainage 430m there has been erosion of up to 1.2m. The overall effect of the changes is a steeper lower beach profile than that recorded in previous surveys. The February 2019 survey recorded a total profile length of approximately 460m which is 100m shorter than the October 2018 survey. Overall the profile is at a medium level compared to the range recorded by the previous surveys, with the exception of the toe of the beach which now lies at its most landward position.</p>	

3. Problems Encountered and Uncertainty in Analysis

Individual Profiles

- At Hartlepool North construction work which has in recent surveys restricted access to the upper reaches of profiles 1cHN4 and 1cHN4A is now complete meaning these profiles were surveyed in full. The construction works comprised of a seawall encasement and new capstone resulting in a seaward movement of the seawall by approximately 1.2m.
- At Hartlepool Central a damaged fence along the crest of the brickwork seawall means that access was restricted to the upper reaches of profile 1cHC1
- The rest of the survey was completed without incident.

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

No changes are recommended at the present time.

5. Conclusions and Areas of Concern

- At North Sands the dunes are stable, and the beaches are healthy, although the sand depletes as you move east towards the headland, with HN4 showing an exposure of the wave cut platform. The profiles are at or near the lowest elevation, particularly in the upper beach, with platforms exposed. This pattern is typical of winter conditions.
- At Middleton the upper beach level has increased, and the lower beach level has depleted slightly. Shallow berms which were present in the previous survey have flattened and the beach profile now lies within the mid-range of previously recorded results.
- Hartlepool Bay has generally been dominated by erosion over the winter of 2018, however the profiles remain at medium levels compared to the range recorded from previous surveys. The area of greatest concern remains in the south of the bay, at 1cHS4, where the dunes are stable but unrestricted public access may affect their stability long term.

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: 1cHN1

Date: 21/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

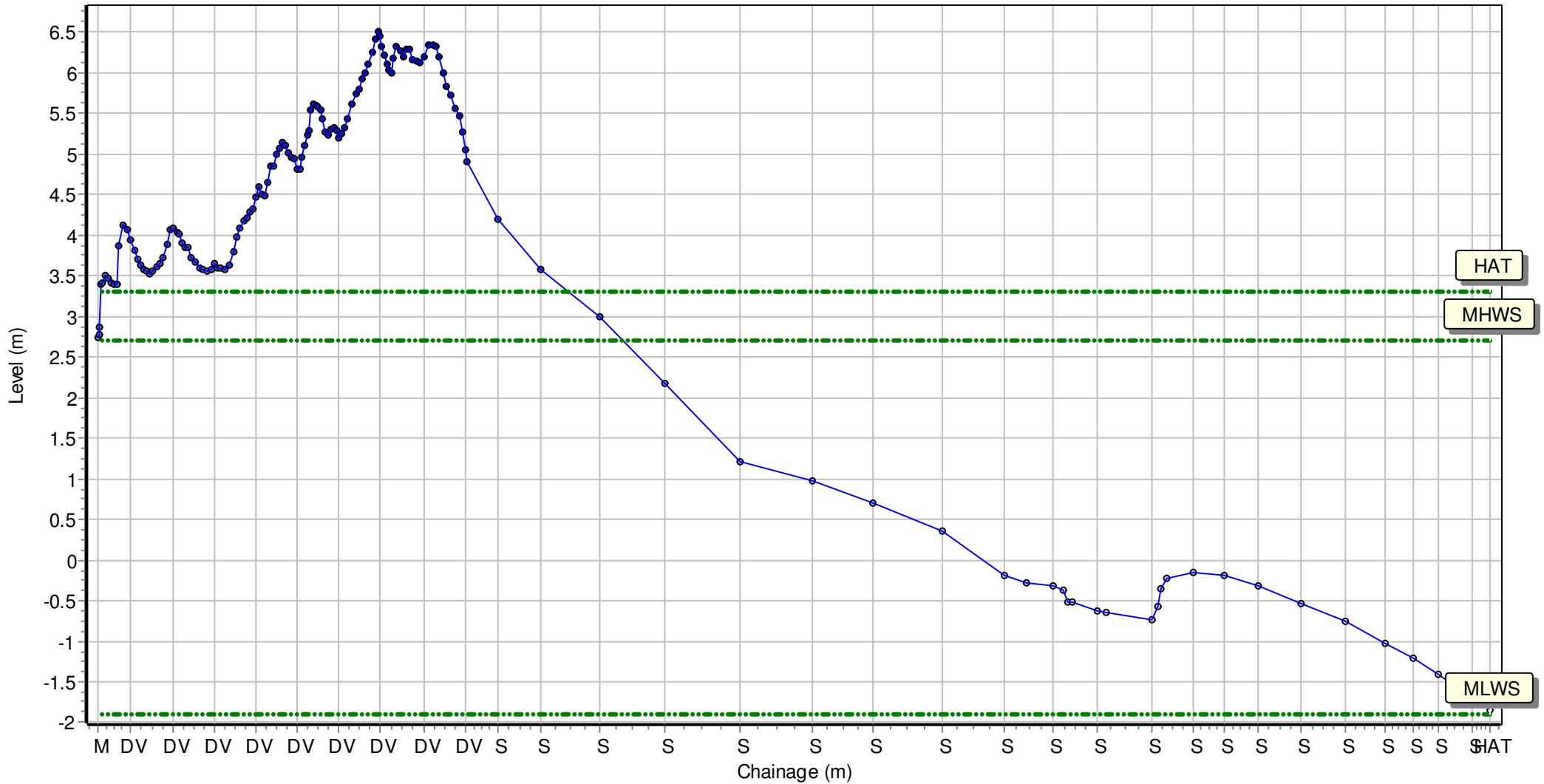
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 448779.624 Northing: 536767.42 Profile Bearing: 44 ° from North



Beach Profile

Location: 1cHN2

Date: 21/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

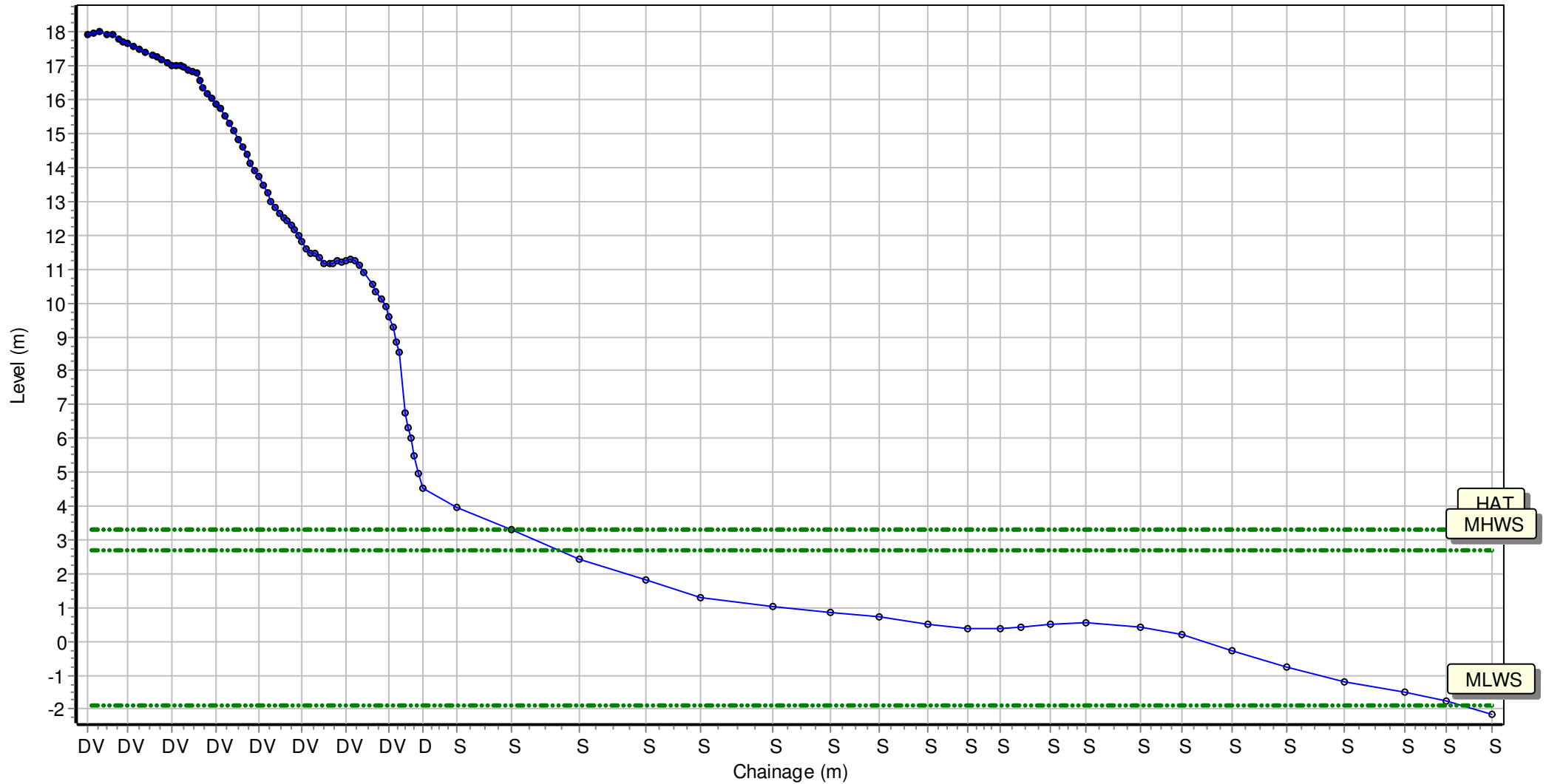
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 449547.217 Northing: 536095.458 Profile Bearing: 42 ° from North



Beach Profile

Location: 1cHN2A

Date: 21/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

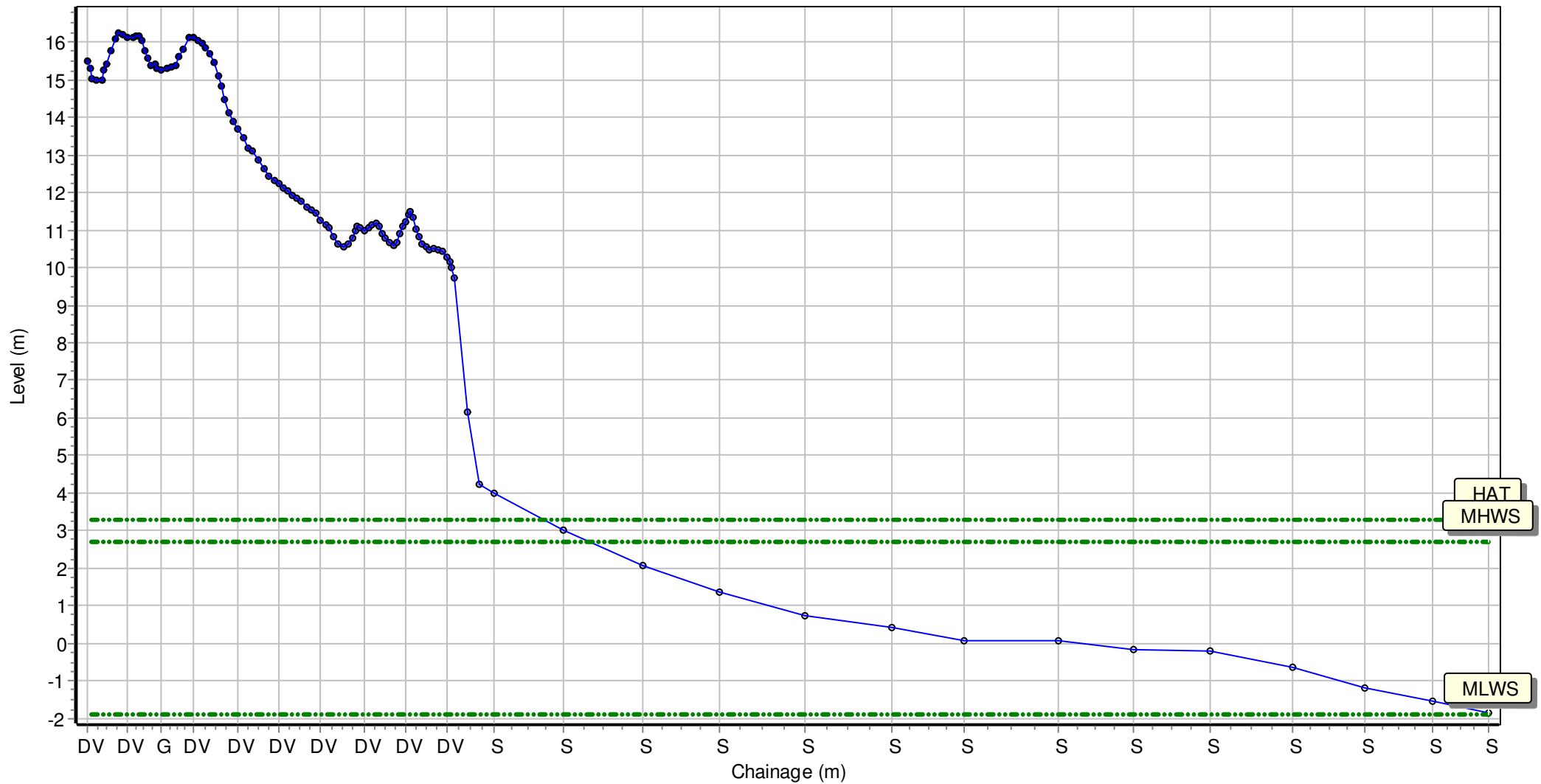
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 450088.047 Northing: 535658.212 Profile Bearing: 39 ° from North



Beach Profile

Location: 1cHN3

Date: 21/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

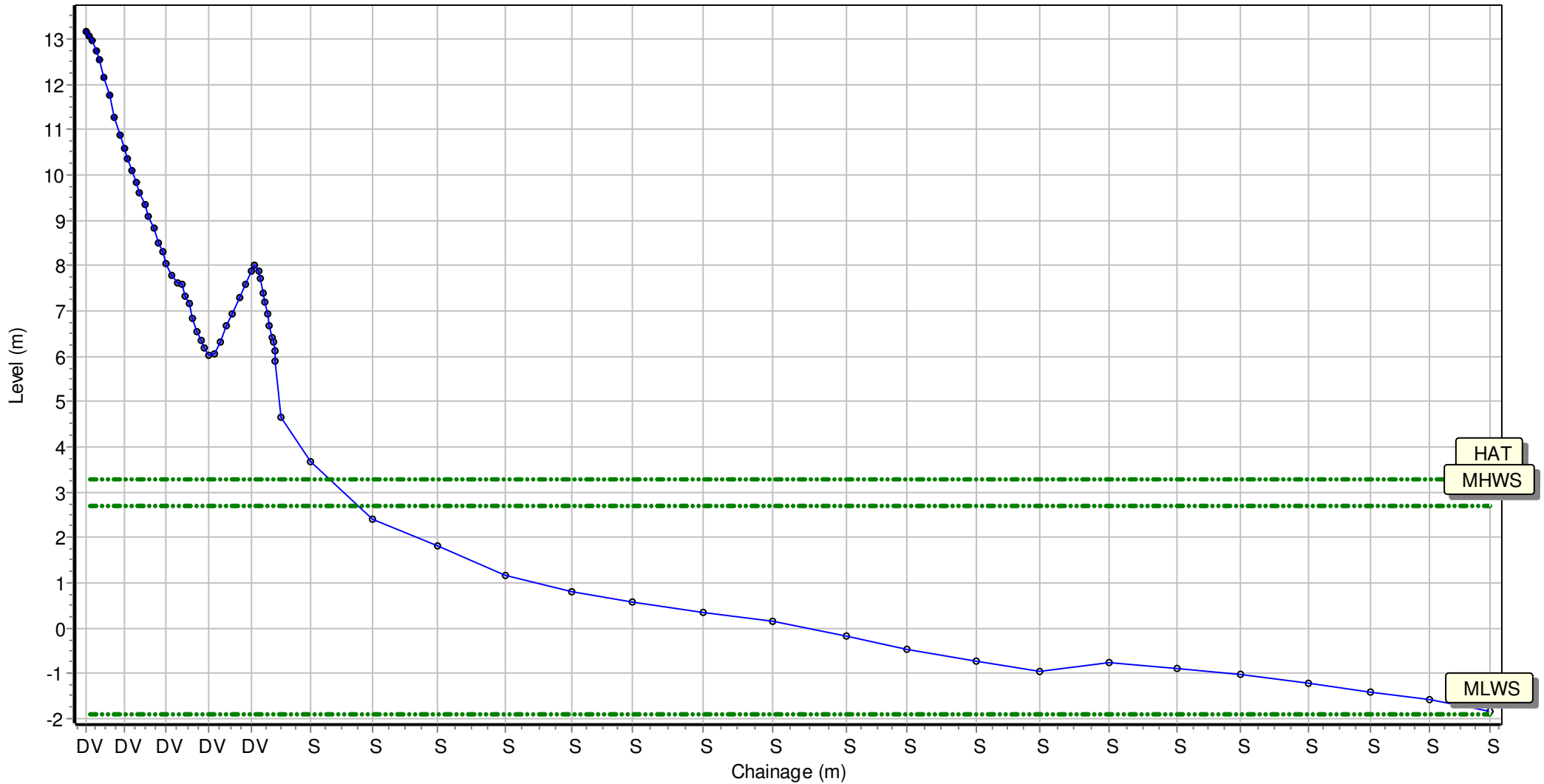
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 450674.424 Northing: 535305.141 Profile Bearing: 30 ° from North



Beach Profile

Location: 1cHN3A

Date: 21/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

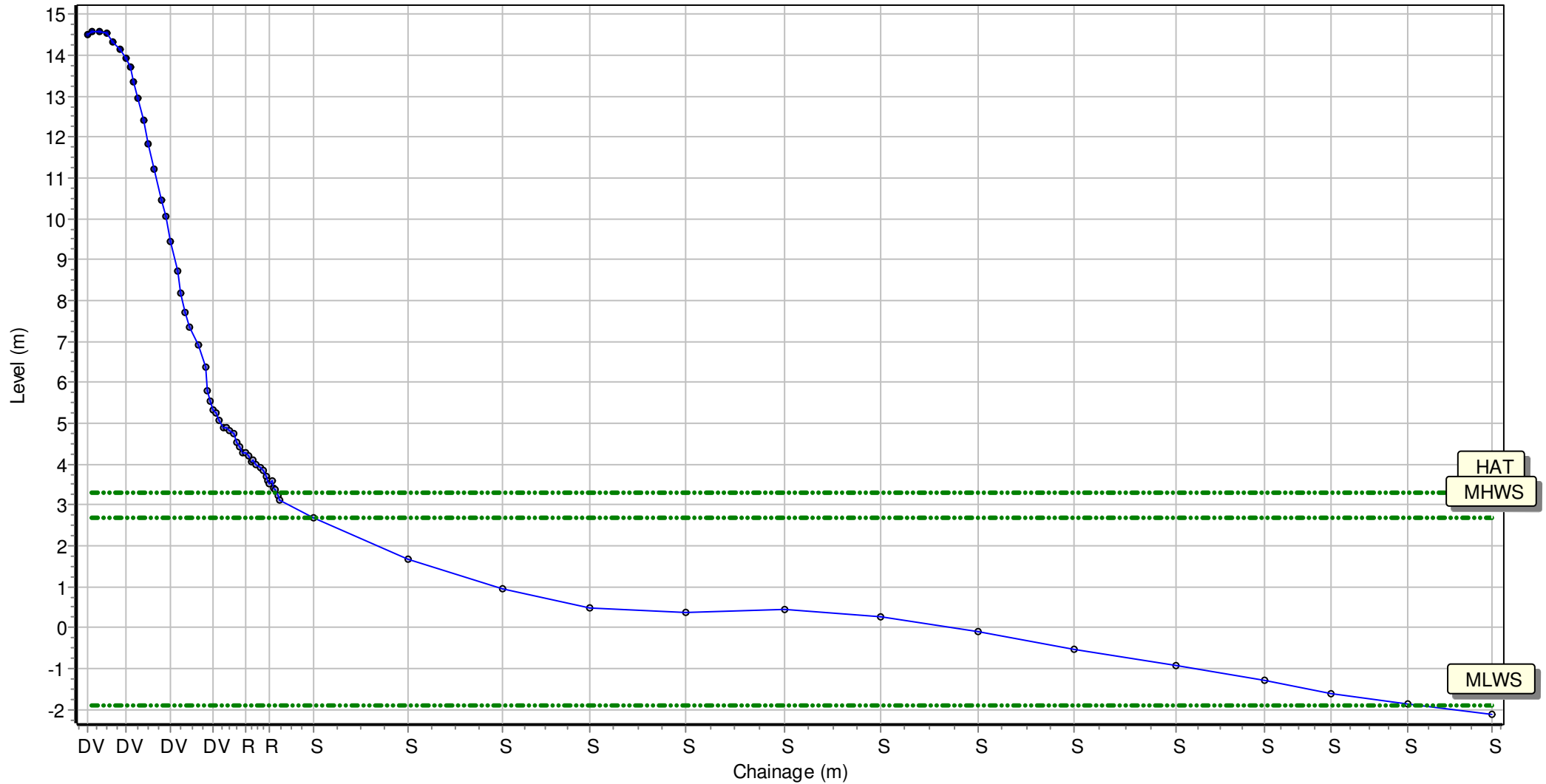
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 451324.71 Northing: 534903.35 Profile Bearing: 25 ° from North



Beach Profile

Location: 1cHN4

Date: 21/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

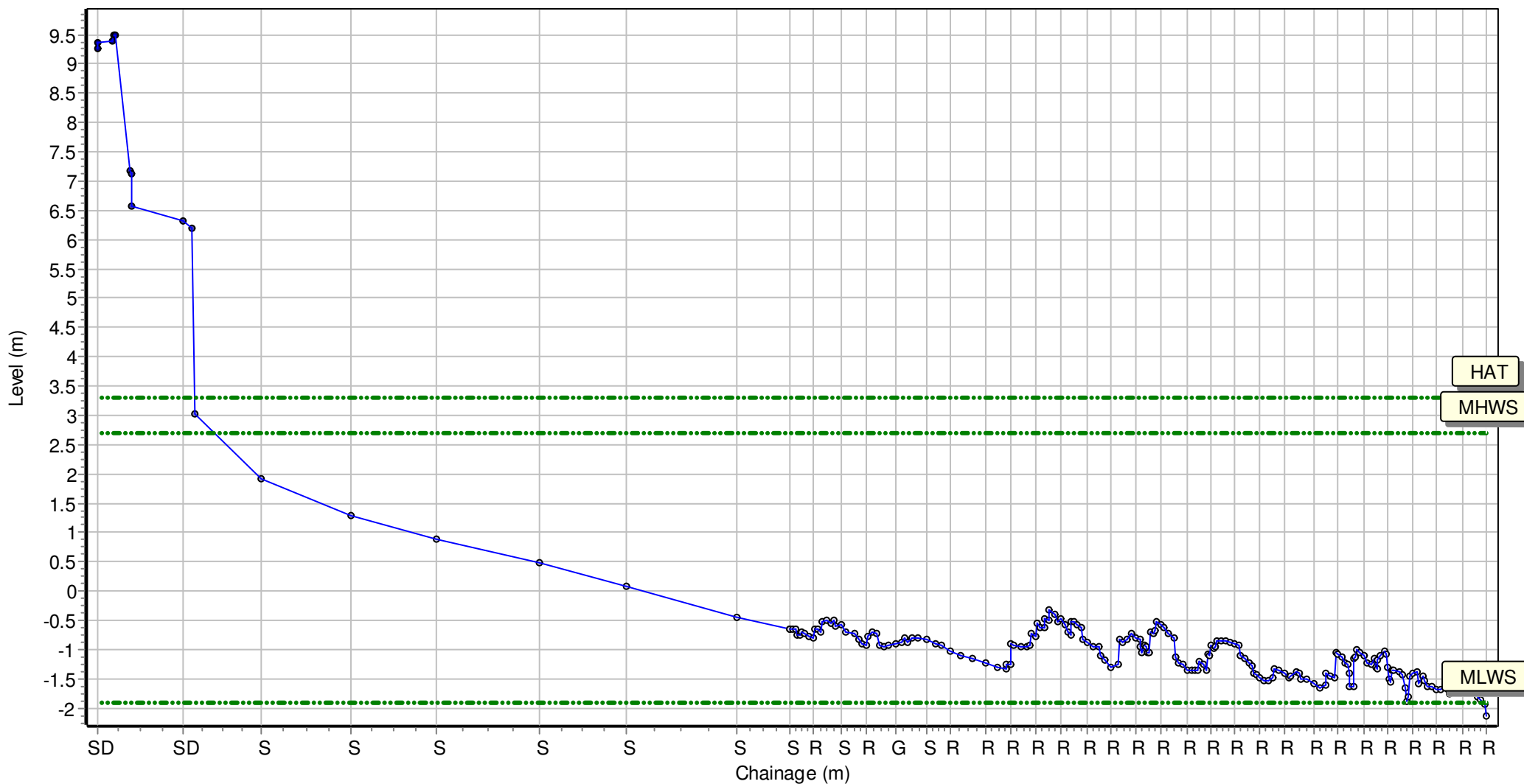
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 451997.114 Northing: 534616.627 Profile Bearing: 25 ° from North



Beach Profile

Location: 1cHN4A

Date: 21/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

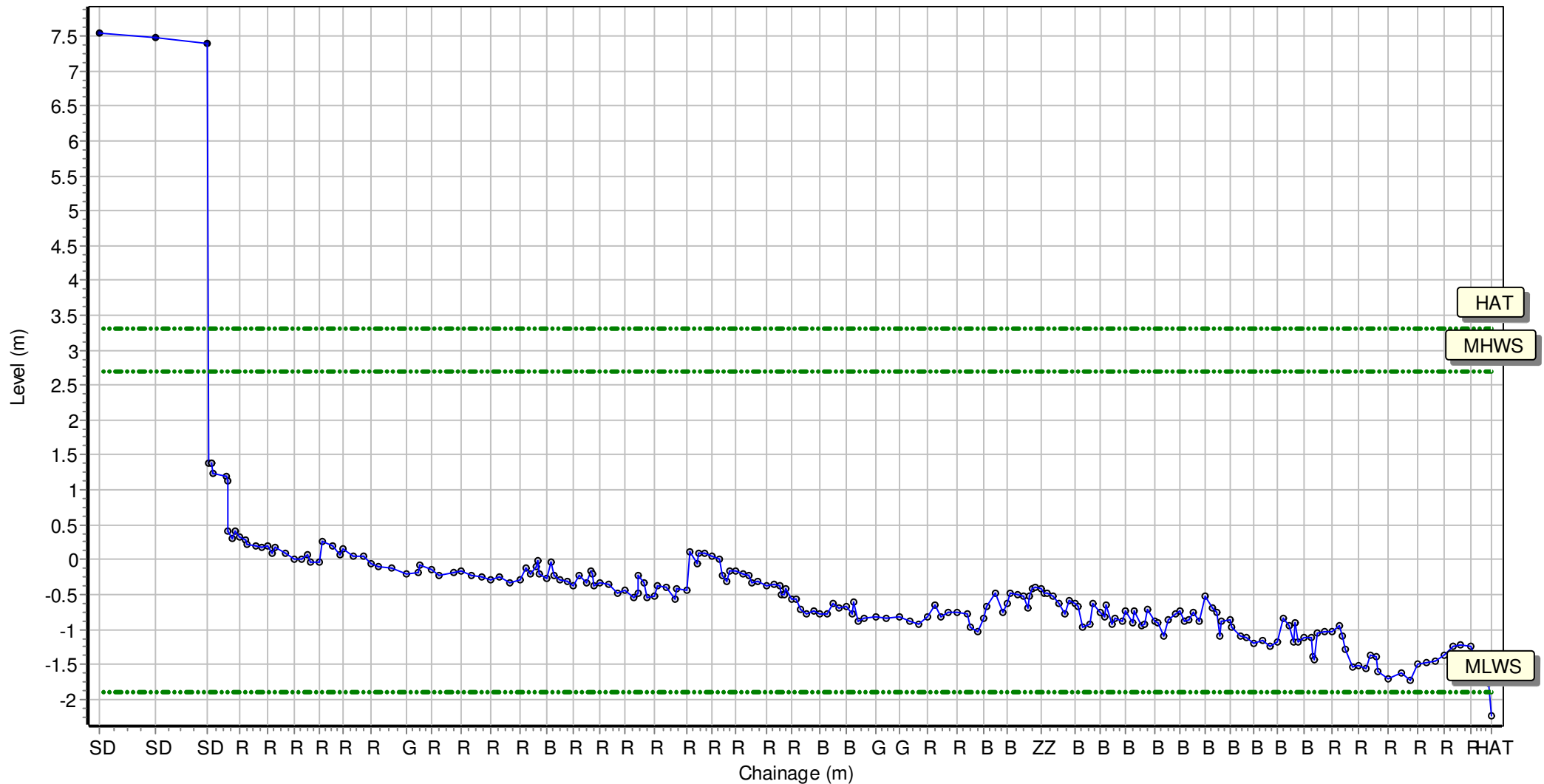
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 452610.565 Northing: 534321.038 Profile Bearing: 23 ° from North



Beach Profile

Location: 1cHC1

Date: 22/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

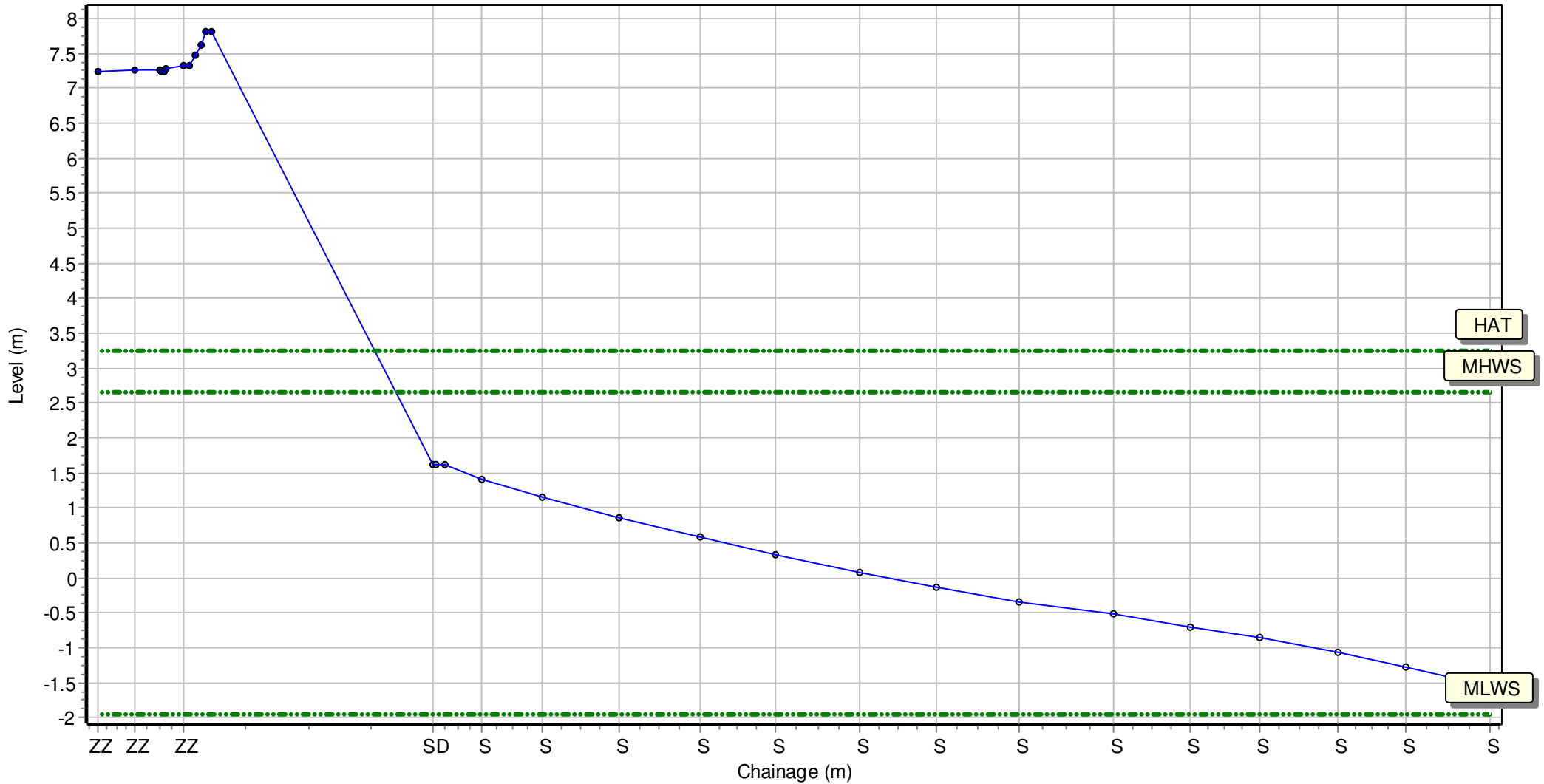
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 452108.075 Northing: 533506.119 Profile Bearing: 150 ° from North



Beach Profile

Location: 1cHS1

Date: 22/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

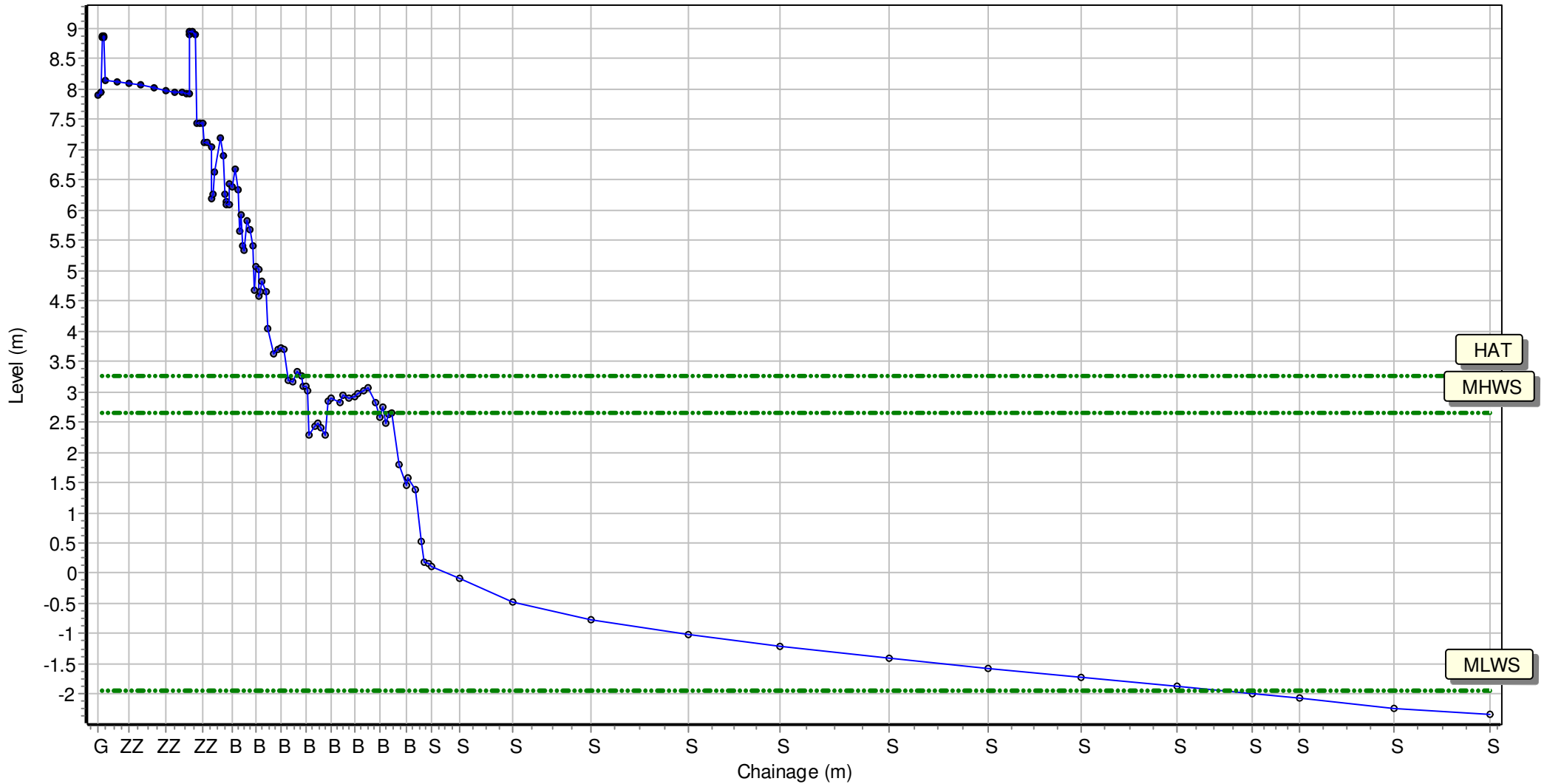
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 451718 Northing: 532455 Profile Bearing: 95 ° from North



Beach Profile

Location: 1cHS2

Date: 22/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

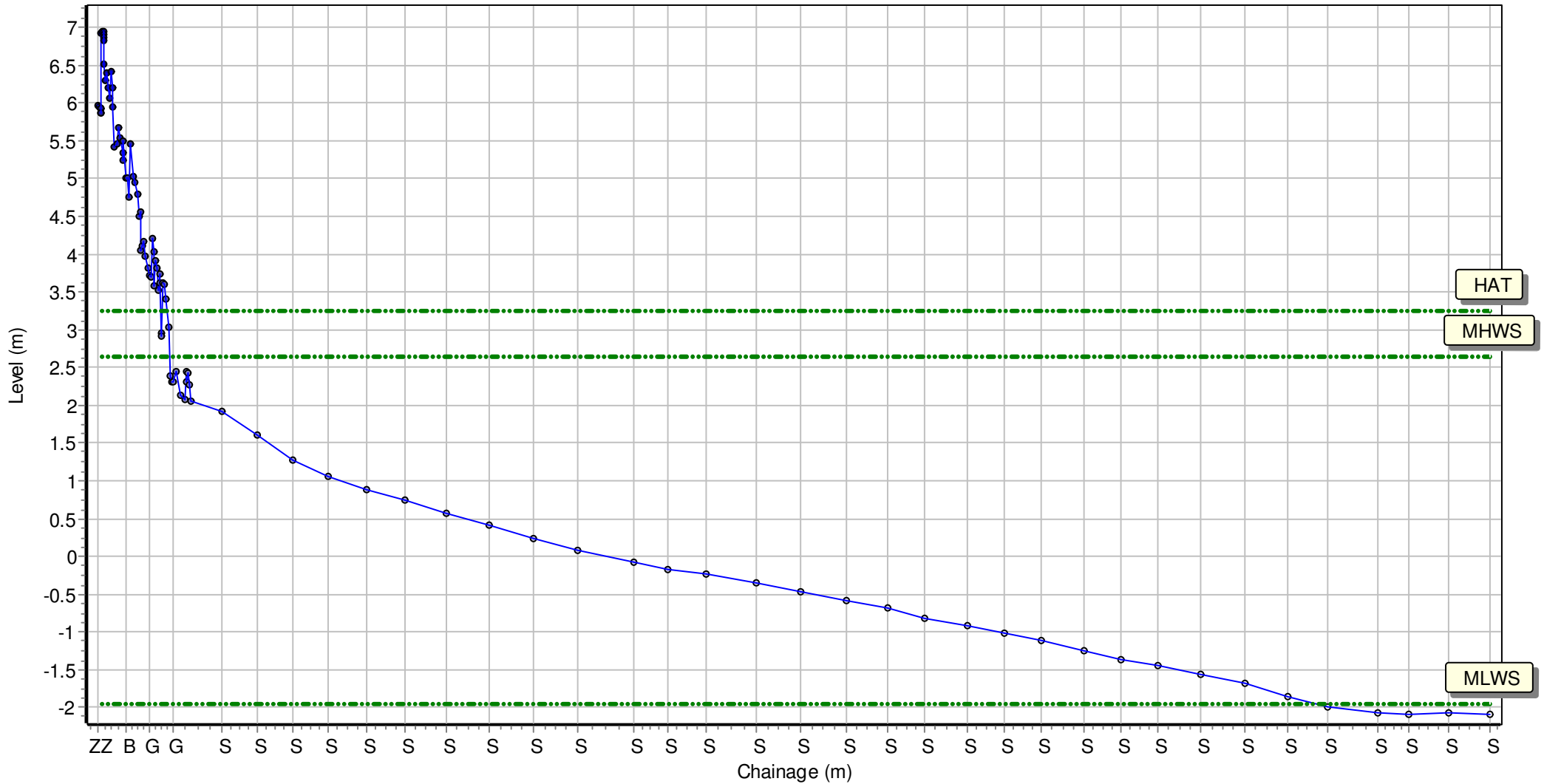
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 452160.59 Northing: 531071.39 Profile Bearing: 77 ° from North



Beach Profile

Location: 1cHS3

Date: 22/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

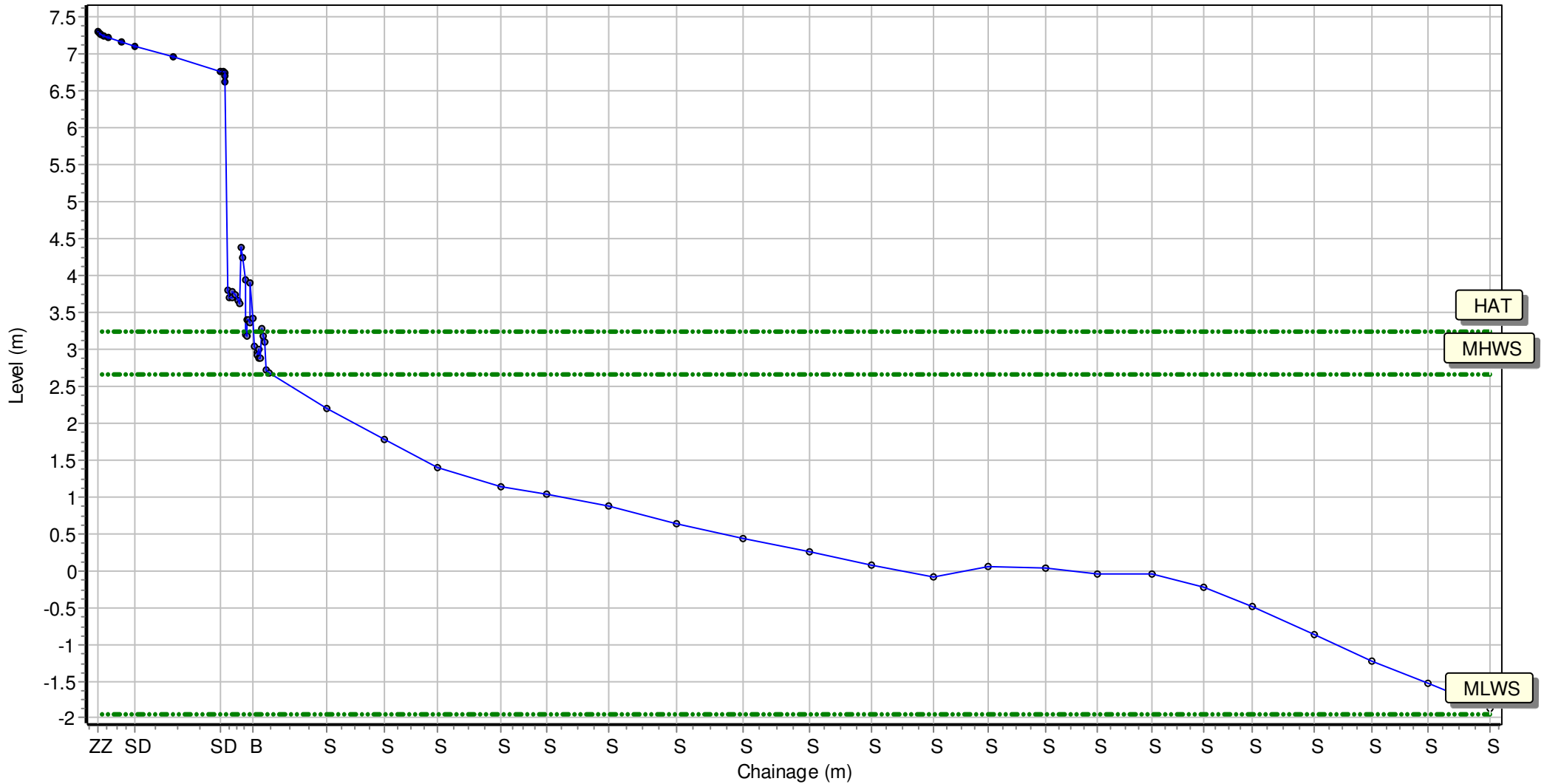
Sea State:

Visibility:

Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 452517.25 Northing: 530064.57 Profile Bearing: 76 ° from North



Beach Profile

Location: 1cHS4

Date: 22/02/2019

Inspector: AG

Low Tide:

Low Tide Time:

Wind

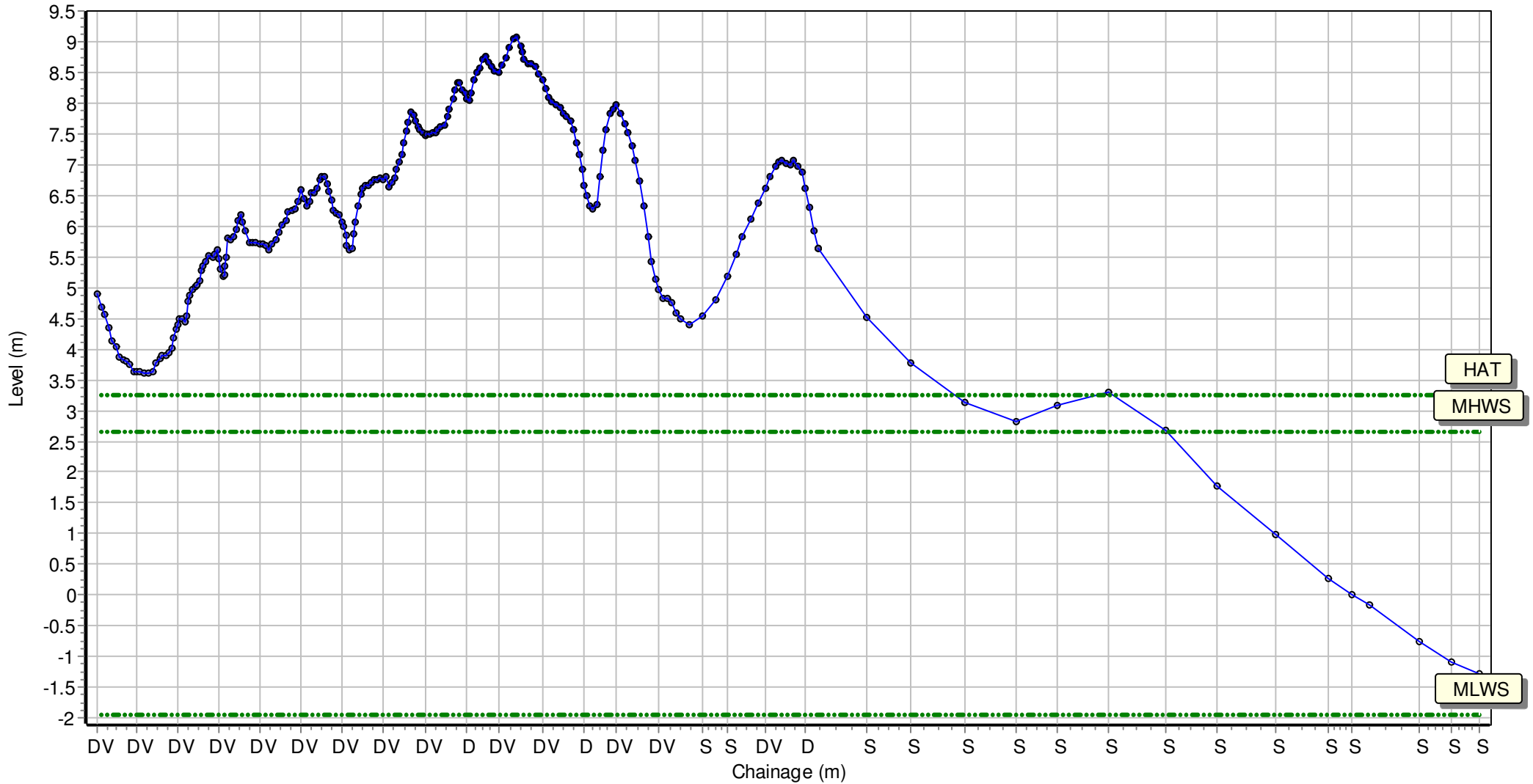
Sea State:

Visibility:

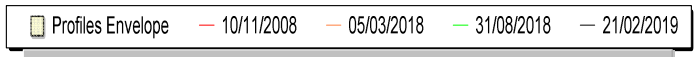
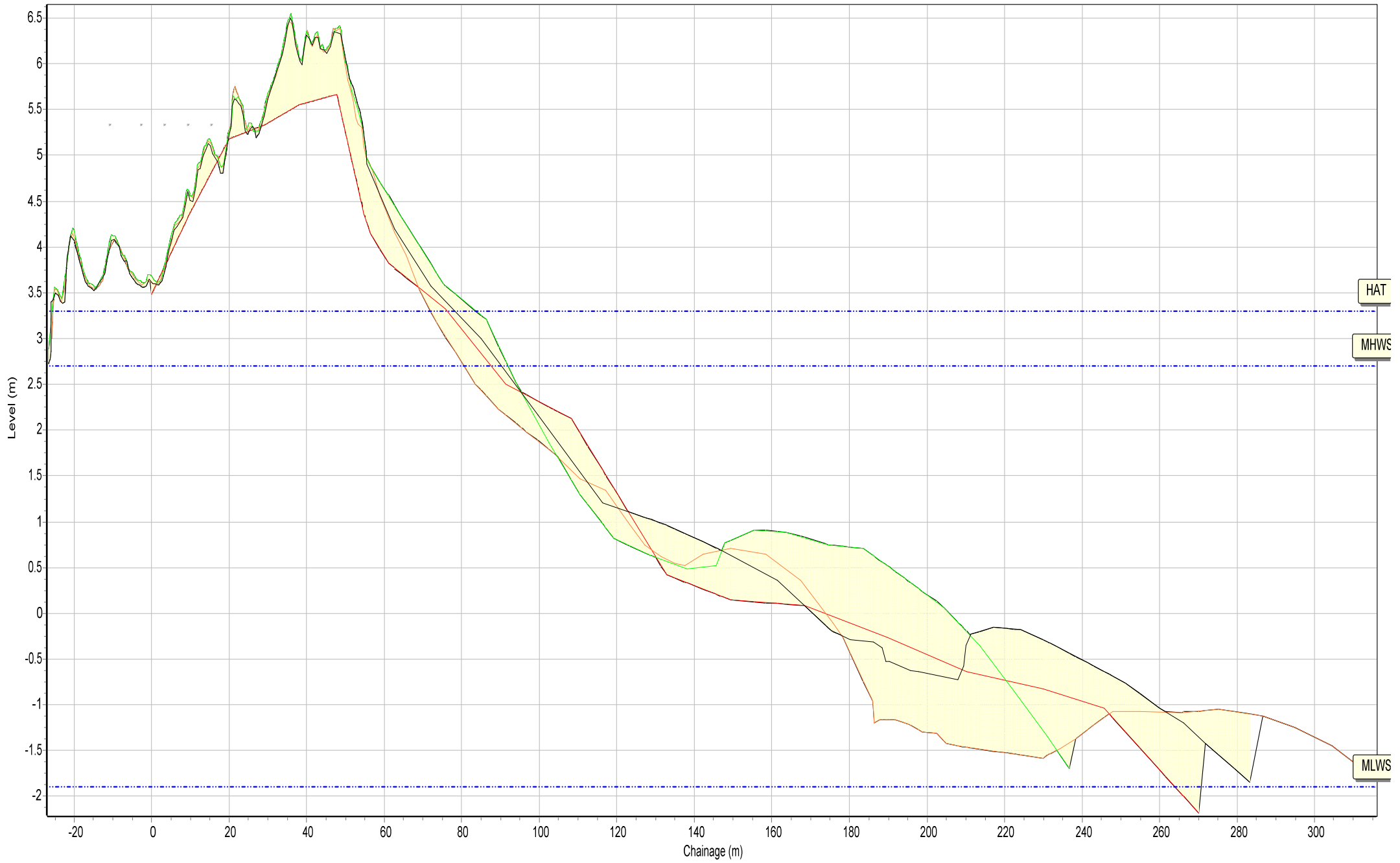
Rain:

Summary: 2019 Partial Measures Topo Survey

Easting: 452889 Northing: 528971 Profile Bearing: 76 ° from North



Beach Profiles: 1cHN1



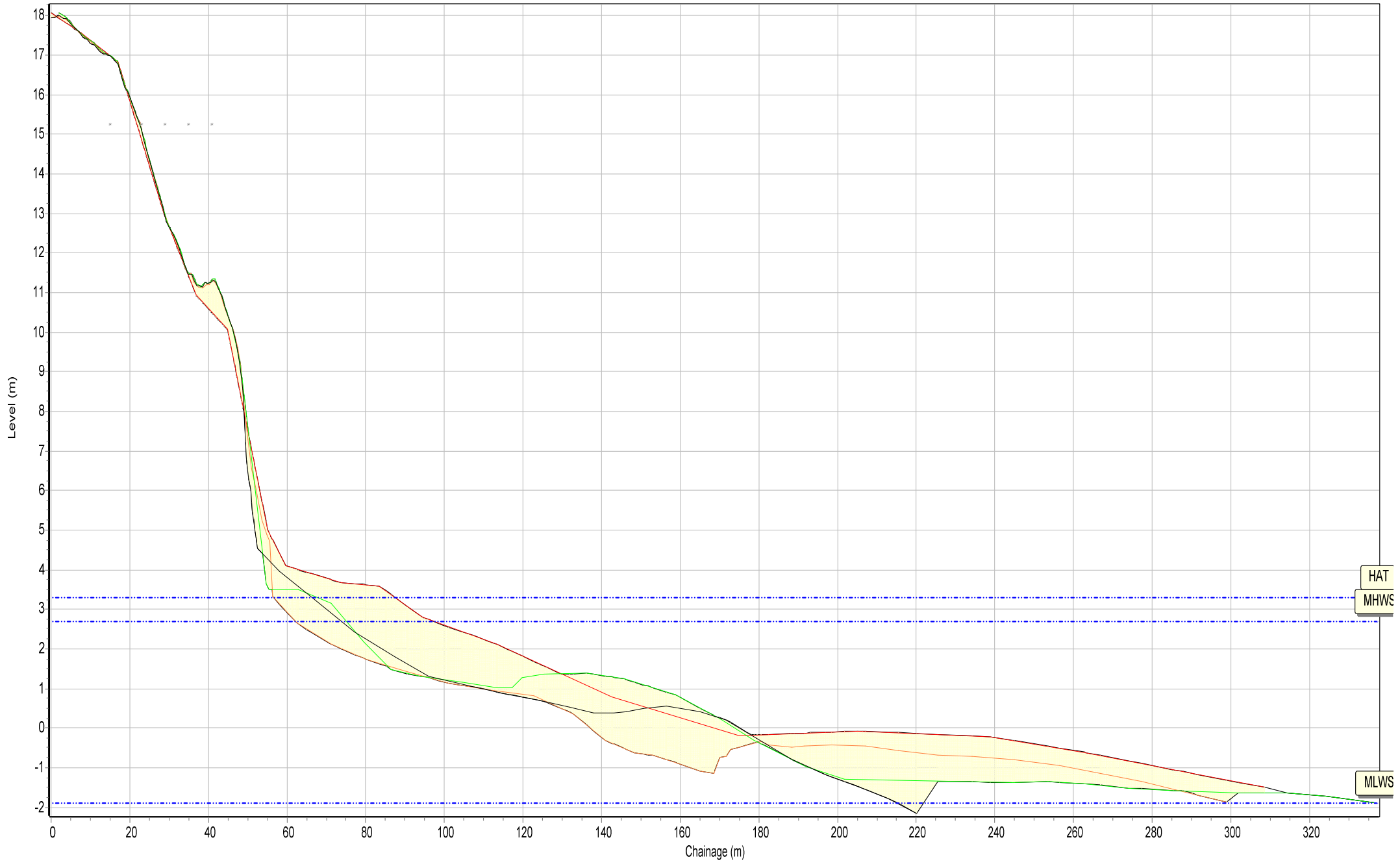
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN2



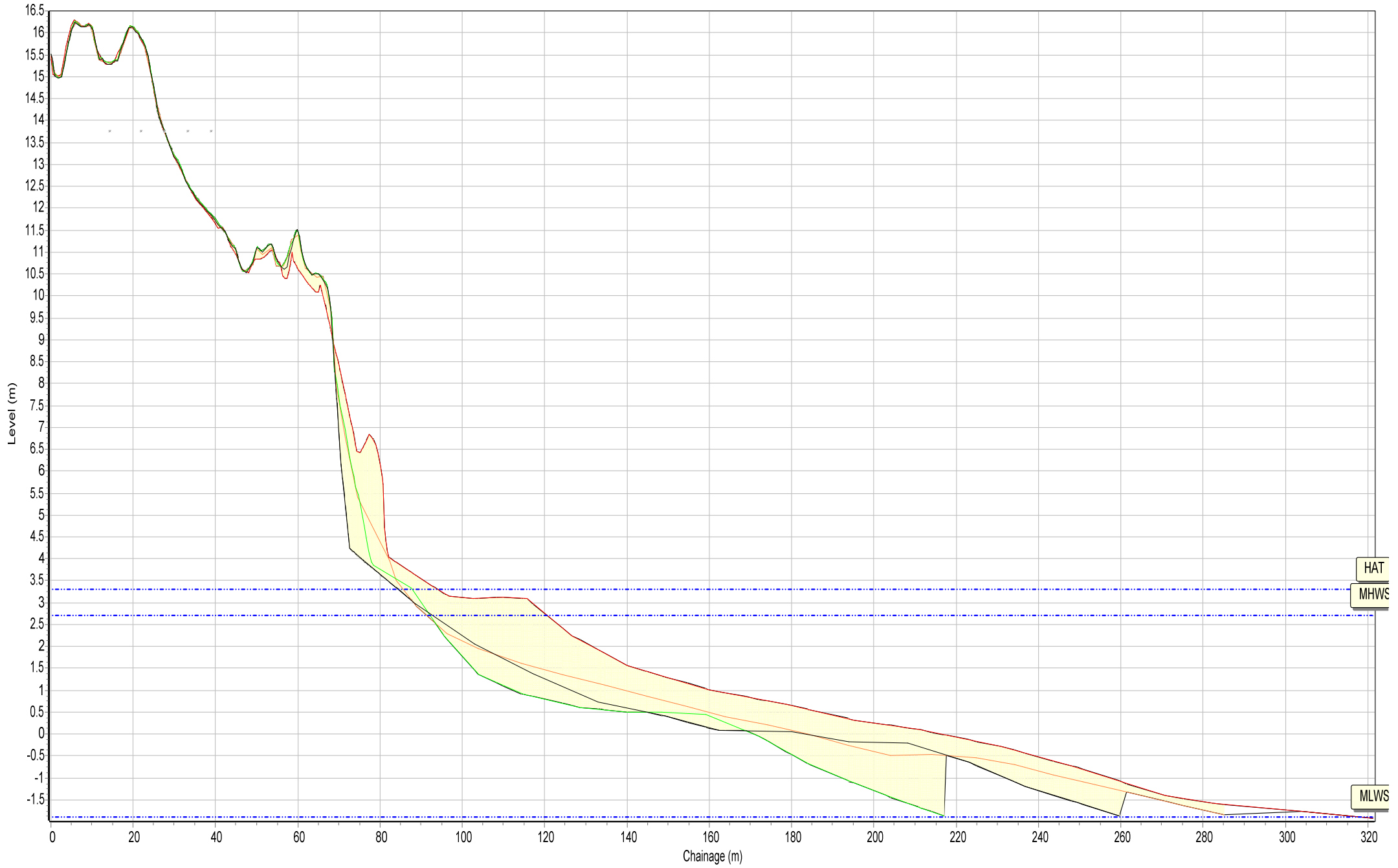
Profiles Envelope 10/11/2008 05/03/2018 31/08/2018 21/02/2019

HAT
MLWS

MLWS

SANDS

Beach Profiles: 1cHN2A



Profiles Envelope 14/10/2011 05/03/2018 31/08/2018 21/02/2019

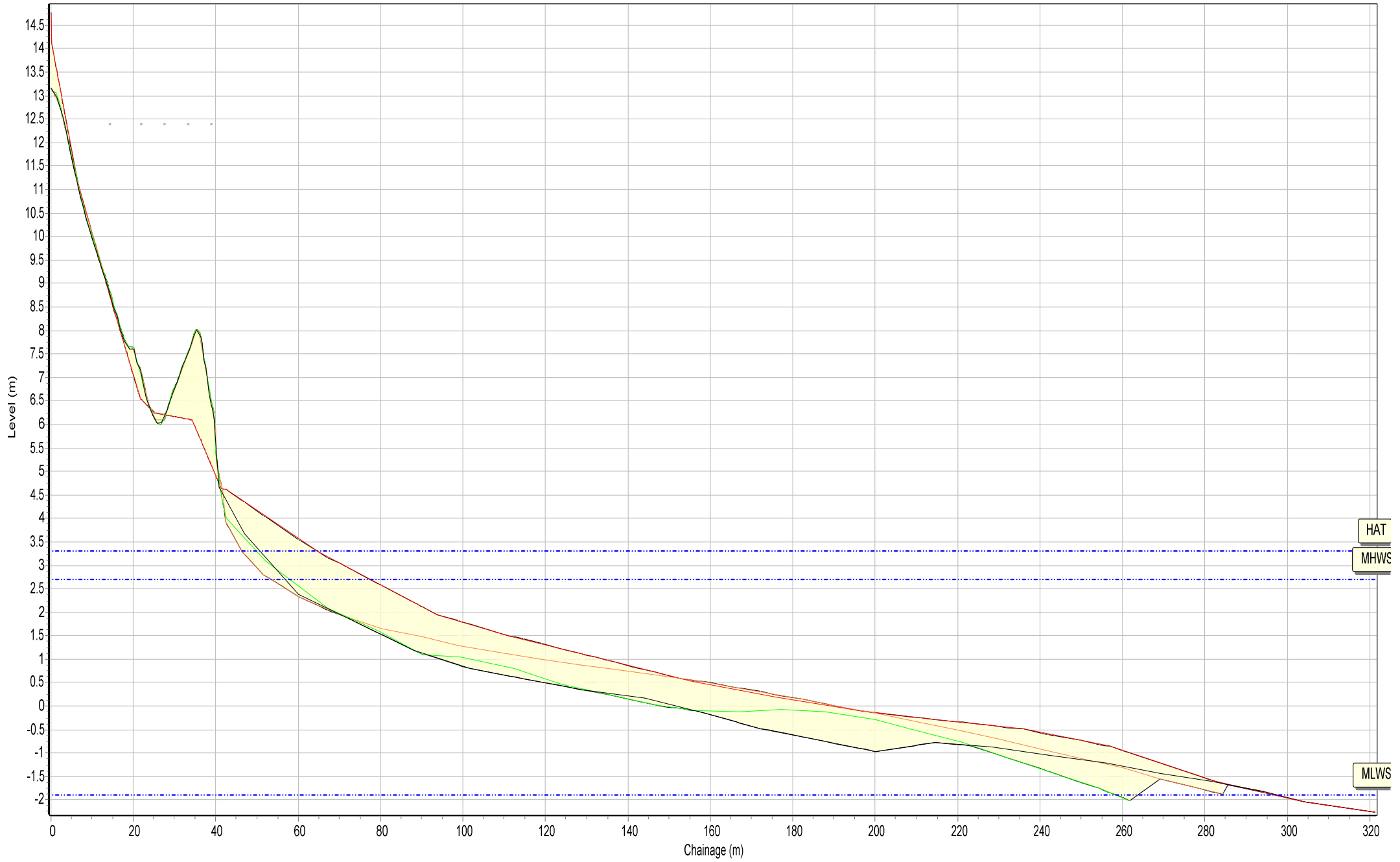
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN3



Profiles Envelope 10/11/2008 05/03/2018 31/08/2018 21/02/2019

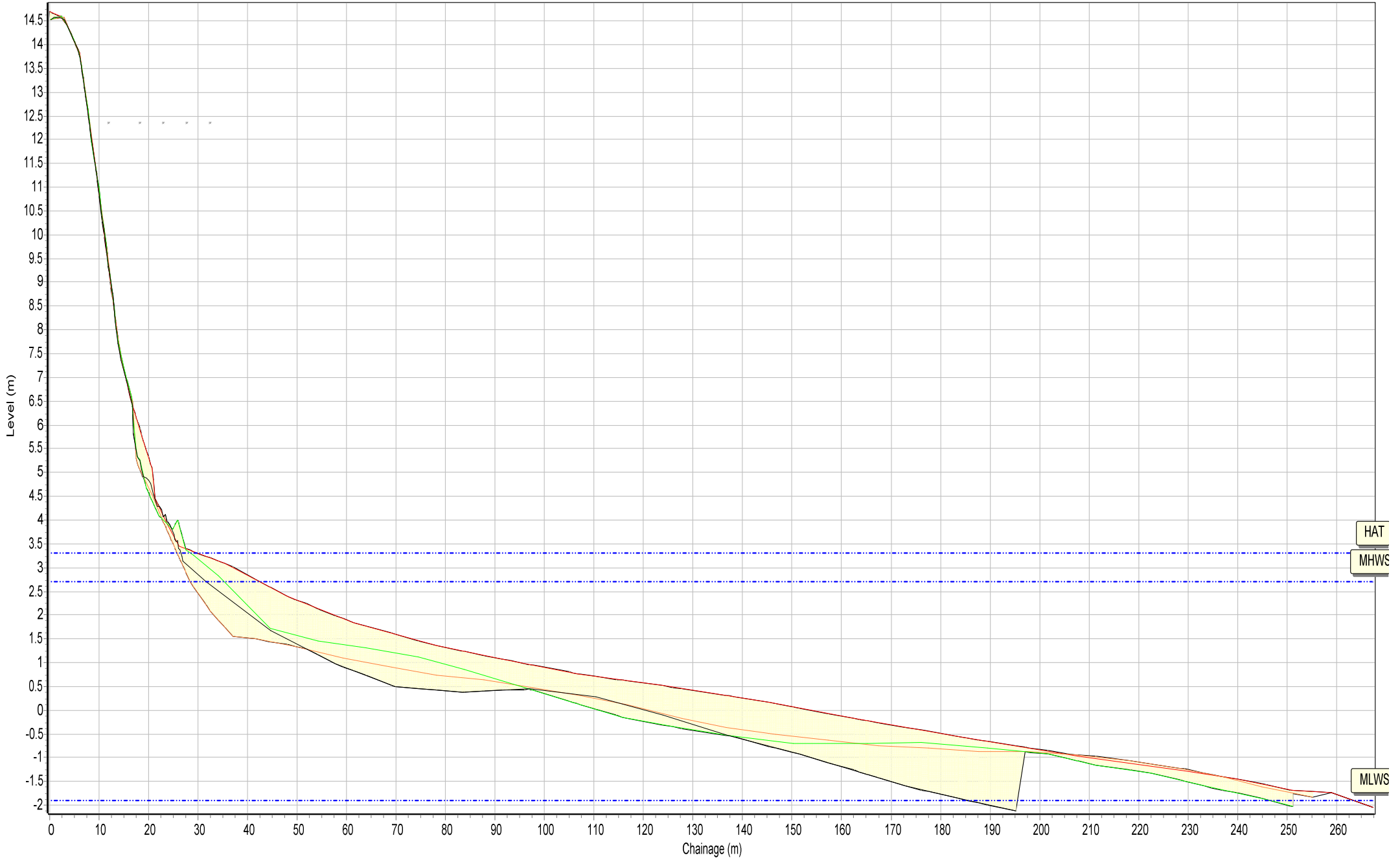
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN3A



Profiles Envelope 14/10/2011 05/03/2018 31/08/2018 21/02/2019

HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN4



Profiles Envelope 10/11/2008 05/03/2018 31/08/2018 21/02/2019

HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN4A



Profiles Envelope 14/10/2011 05/03/2018 31/08/2018 21/02/2019

HAT

MLWS

MLWS

SANDS

Beach Profiles: 1cHC1



Profiles Envelope 12/11/2008 23/03/2018 08/10/2018 22/02/2019

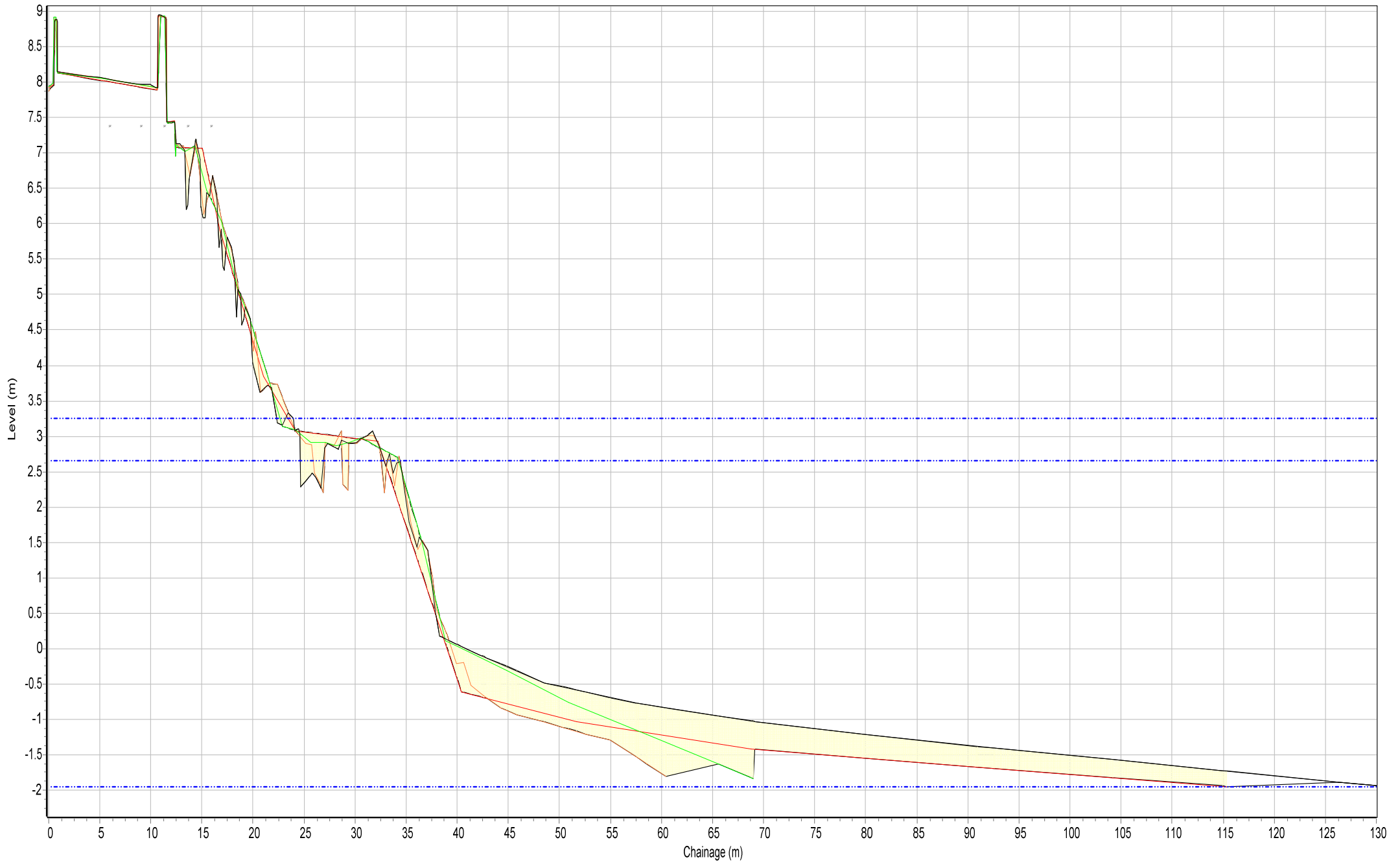
HAT

MHWS

MLWS

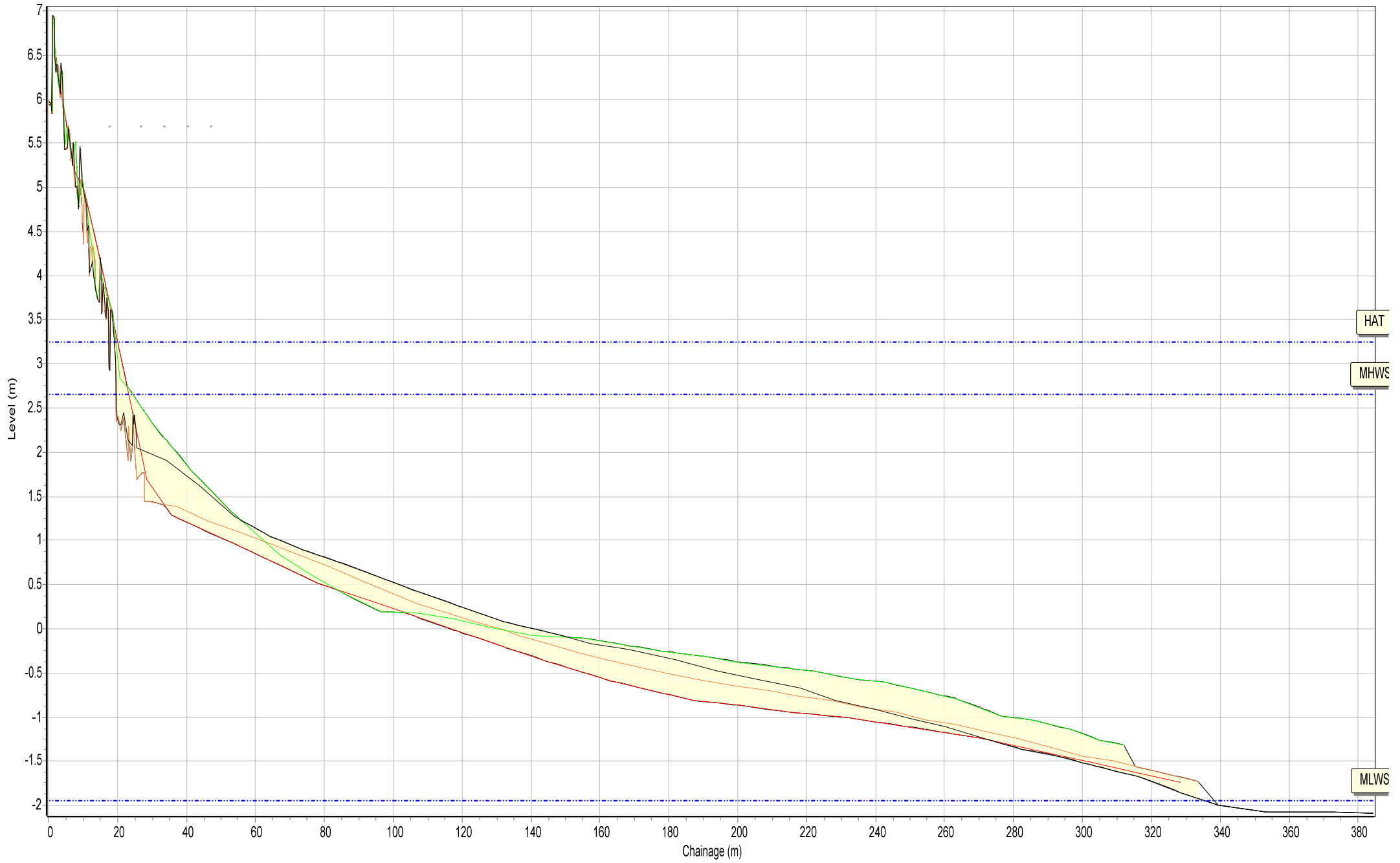
SANDS

Beach Profiles: 1cHS1



Profiles Envelope 27/03/2009 07/03/2018 24/10/2018 22/02/2019

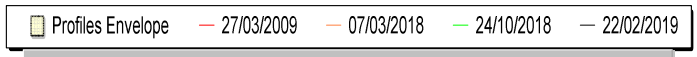
Beach Profiles: 1cHS2



Profiles Envelope 27/03/2009 07/03/2018 24/10/2018 22/02/2019

SANDS

Beach Profiles: 1cHS3



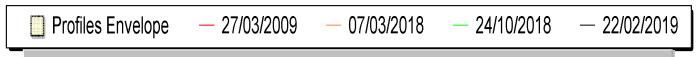
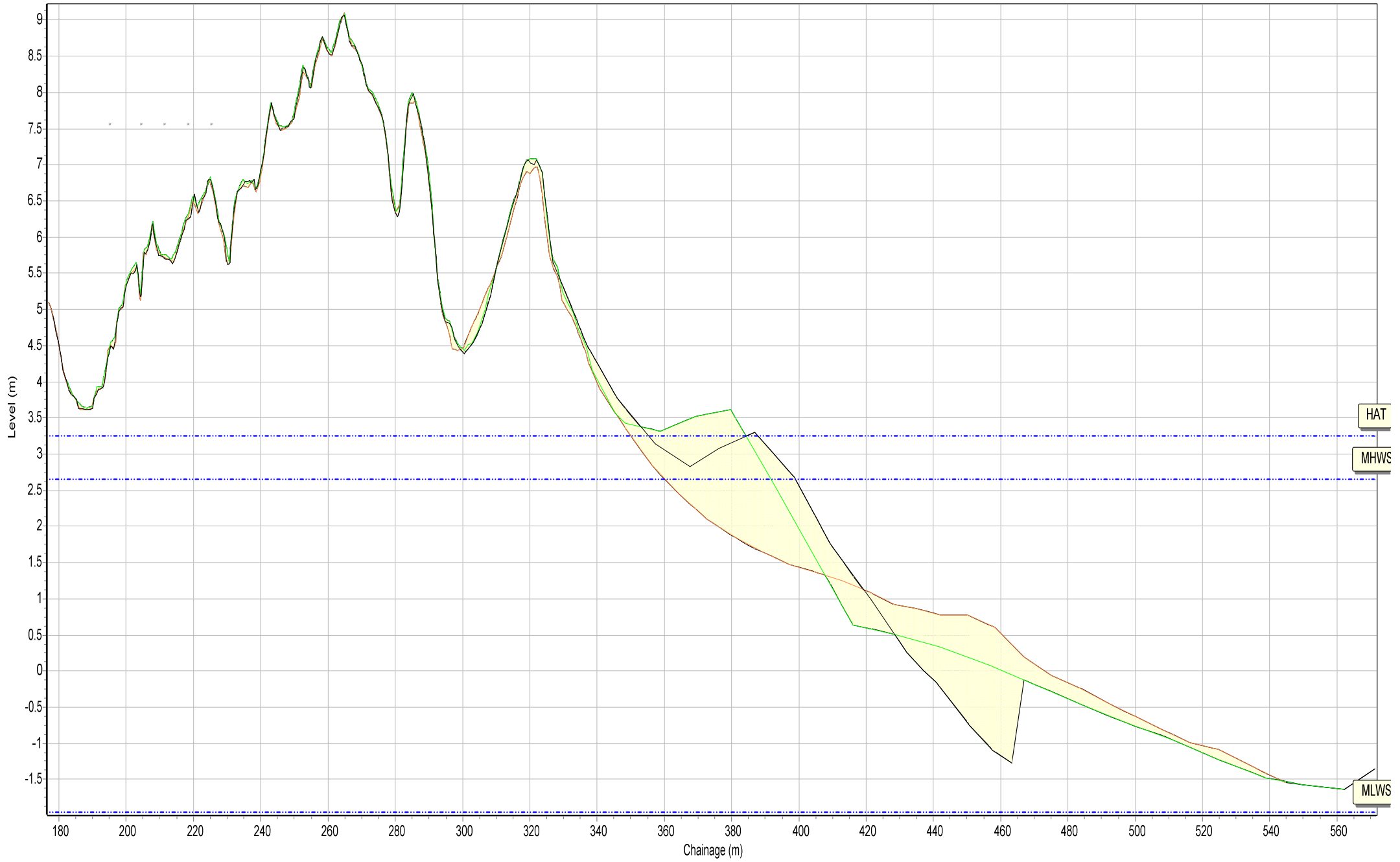
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHS4



HAT

MLWS

MLWS

SANDS