

Cell 1 Regional Coastal Monitoring Programme Update Report 13: 'Partial Measures' Survey 2021

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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).

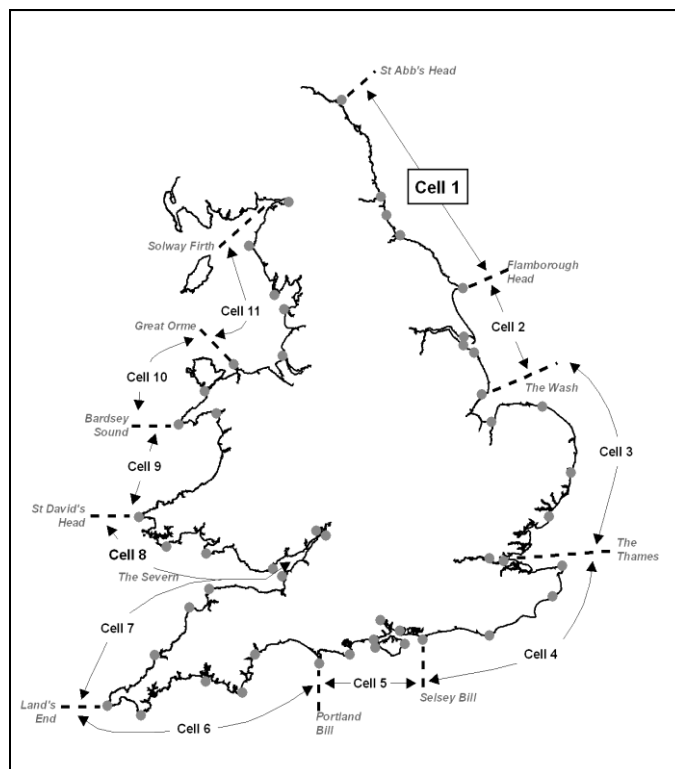


Figure 1 Sediment Cells in England and Wales

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
- LiDAR surveys
- walk-over cliff and coastal defence asset surveys

The beach profile surveys, topographic surveys and cliff top recession surveys are undertaken as a 'Full Measures' survey in autumn/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	
12	2019/20	Sep-Oct 19	Nov 19	May 20	Jul 20	
13	2020/21	Sep-Oct 20	Feb 21	Apr 21	May 21 (*)	Expected Summer 21

(*) The present report is **Update Report 13** and provides an analysis of the 2021 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

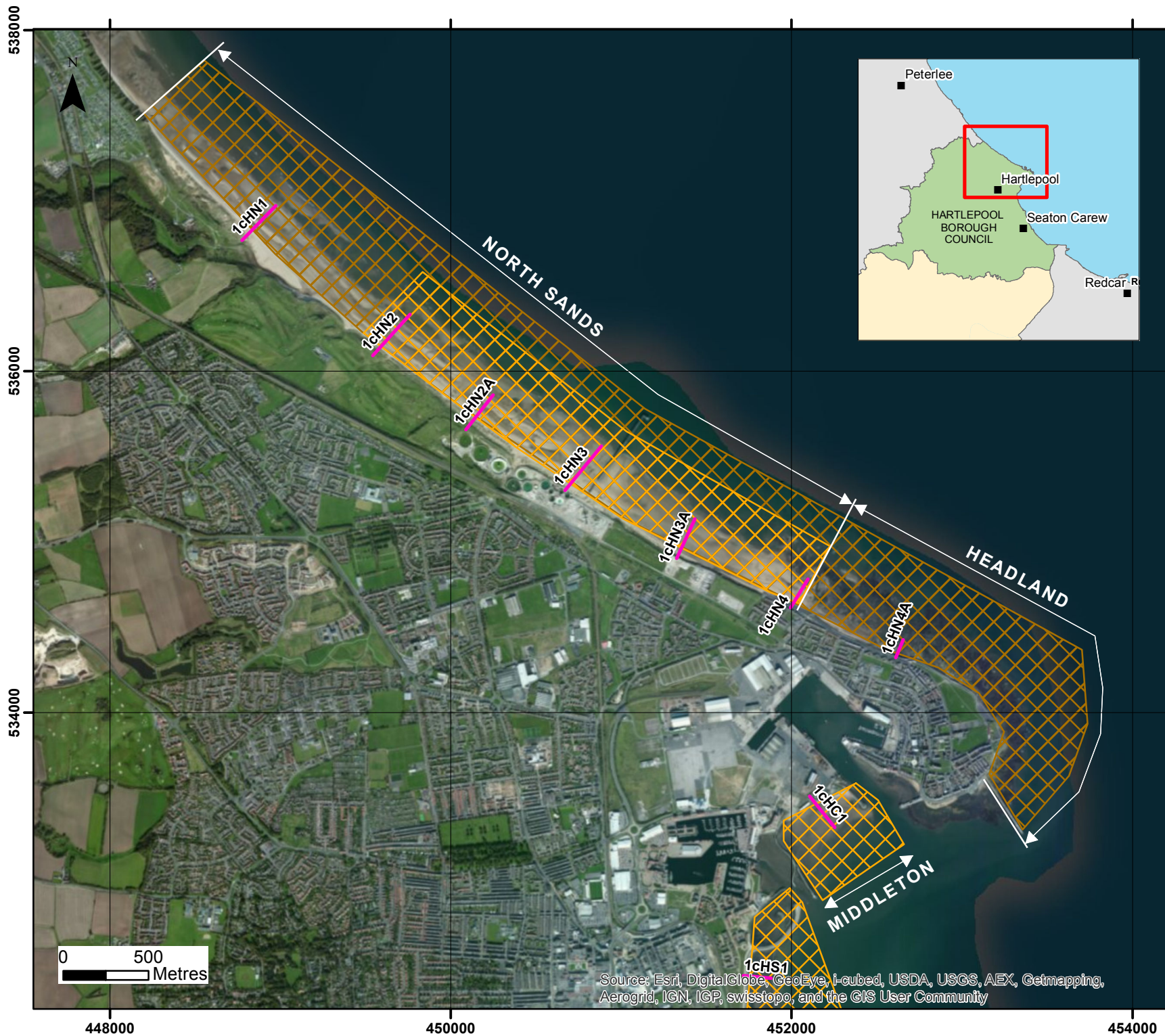
1.2 Methodology

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 26th and 27th April 2021. During this time, the weather conditions varied. 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
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



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



Key

SURVEY LOCATIONS

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- Annual
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- 6 monthly
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- 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
 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



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>26th – 27th April 2021</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 September 2020.</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 45m chainage covers dunes which have experienced sections of erosion and accretion limited to ± 0.1m. The crest of the foredune at chainage 50m has accreted up to 0.1m since the previous survey, whilst the dune face and dune toe has accreted by up to 0.3m to chainage 87m. The middle beach between chainages 87-160m has lowered by up to 0.4m. Accretion has occurred on the lower beach by up to 0.7m, forming a small berm at chainage 175m and covering the previously exposed rock patch between chainages 190-255m. Seaward of 255m the beach profile has lowered by up to 1.3m, leading to a steepened profile on the lower beach. Overall, the dunes are at a high level, particularly the foredune which is at its highest level recorded. The rest of the beach profile is at a medium level compared to the range recorded in previous surveys.</p> <p>Profile 1cHN2 covers the dune between chainage 0 and 52m. The lower dune face and dune toe has accreted by up to 0.5m to chainage 72m. Seaward of chainage 72m, the beach profile has alternated between accretion and erosion. Erosion occurs on the upper beach (0.8m) and lower beach (1.6m), with accretion on the middle beach by up to 0.9m, infilling a hollow from the previous survey. Overall, the beach profile is at a medium level compared to the range recorded from previous surveys.</p> <p>Profile 1cHN2A was established in October 2011 and runs through the dunes close to North Sands. The area of dunes between 0m and 68m chainage has remained reasonably stable. Between 68m and 92m the toe of the foredune has accreted by approximately 0.6m over the winter of 2020. Seaward of this point, the beach profile has alternated between accretion and erosion. Erosion occurs on the upper</p>	<p>The beach profiles are generally at a medium-low level, with several profiles experiencing drawdown of sediment from the upper beach to the middle and lower beach profile. This pattern is typical of winter conditions. However, several dune sections are at their highest recorded levels.</p> <p>Longer term trends:</p> <p>Following dune erosion over the winter of 2013/14 the areas with dunes have remained stable, with several dune sections currently at their highest recorded levels.</p> <p>At profiles 1cHN3, 1cHN4 and 1cHN4A 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>beach (0.4m) and middle-lower beach (0.9m), whilst accretion occurs on the middle beach (0.7m) and lower beach (0.9m). Overall, the dunes are at a high level and the beach is at a medium level compared to the range recorded from previous surveys.</p> <p>At profile 1cHN3 there has been little change to the dunes to chainage 38m. The dune toe from chainage 38m to 60m has accreted by up to 0.4m. Seaward of this point, the beach profile has alternated between accretion and erosion. Erosion occurs on the upper beach (0.1m) and middle-lower beach (1.2m). Accretion occurs on the middle beach (0.3m) and lower beach (0.7m). Overall, the dunes are at a high level and the upper and middle beach are at a medium level compared to the range recorded from previous surveys. The lower beach is at a low level.</p> <p>At profile 1cHN3A the dune front at 20m chainage has remained stable. The dune toe has lowered by up to 0.8m to chainage 92m. Seaward of this point, the beach profile has alternated between accretion and erosion. The middle beach and lower beach have lowered by up to 0.9m and 0.5m, respectively. Accretion is limited to 0.1m. Overall, the beach profile is at a medium to low level compared to the range recorded from previous surveys, particularly between chainages 120-160m which is at its lowest level recorded.</p> <p>Profile 1cHN4 shows no change in the defended part of the profile. Between chainage 15m and 56m the sandy upper beach has lowered by up to 0.2m throughout winter 2020. The middle beach (between 46m and 142m chainage) has been covered with sediment by up to 0.3m, however there appears to be the occasional rocky outcrop which remains exposed. From chainage 142m to the end of the survey at 219m 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 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 0.5m on the upper beach throughout the winter of 2020. There are occasional minor variations from the previous survey however these are likely to be due to the survey techniques as they generally are limited to ± 0.1m. 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
26 th – 27 th April 2021	<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 October 2020.</p> <p>At profile 1cHC1 the Partial Measures Survey Report notes '<i>no access to upper section on HC1 within the factory area</i>'. The seawall is in the same position as recorded in October 2018. 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, the beach has lowered by up to 1.0m to chainage 96m. Beach levels have risen by up to 0.2m on the middle beach and 0.5m on the lower beach. The beach profile is at a medium level on the upper and middle beach compared to the range recorded from previous surveys, whilst the lower beach is at a high level.</p>	<p>The beach profile at the toe of the seawall has lowered since the previous survey, however the profile appears generally healthy following the record low levels surveyed in March 2018.</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
26 th – 27 th April 2021	<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 0.4m from the toe of the defences to chainage 50m. Seaward of this point, the beach level has lowered by up to 0.2m. Overall, the beach is at a medium level compared to the range recorded from previous surveys.</p> <p>At profile 1cHS2 there has been a loss of material from the base of the coastal defence at chainage 20m across the upper and middle beach to chainage 300m by up to 0.2m. The lower beach has risen by 0.4m to the end of the survey. Overall, the profile is at a high level compared to the range recorded from previous surveys.</p> <p>Profile 1cHS3 shows no changes over the defended part of the profile up to 24m chainage. The beach profile seaward of chainage 24m has lowered by up to 0.3m on the upper beach, 0.4m on the middle beach and less than 0.1m on the lower beach. 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, with a further deepening of 0.1m since October 2020. The photographs suggesting lowering may result from footpath erosion. The toe of the foredune at 320m chainage has accreted by 0.2m to chainage 370m. The upper beach has undergone little change, limited to ± 0.1m to chainage 410m. The middle beach has lowered by up to 0.3m to chainage 456m, before switching to accretion on the lower beach by up to 0.2m to chainage 525m. The end of the survey has lowered by up to 0.6m. Overall, the crest and seaward face of the foredune are at the highest level recorded since 2009, however the hollow is at its lowest level recorded. The rest of the beach profile is at a medium-low</p>	<p>Beach levels have generally lowered over the winter 2020 period. The dunes are in good condition. The foredune continues to accrete, but erosion associated with a walkway is causing localised lowering in 1cHS4 that may affect stability of the wider dune system in the long term.</p> <p>Longer term trends: Overall, the beach profiles within Hartlepool Bay in April 2021 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
	level compared to the range recorded by the previous surveys.	

3. Problems Encountered and Uncertainty in Analysis

Individual Profiles

- 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.

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 with progression eastwards towards the headland, with 1c1HN4 and 1cHN4A showing an exposure of the wave cut platform. The beach profiles showed alternating bands of erosion and accretion, exhibiting the movement of sand berms across the beach. This pattern is typical of winter conditions.
- At Middleton the upper beach level has lowered, and the lower beach level has risen since the previous survey. The beach profile now lies within the mid-range of previously recorded results, except the lower beach which is at a high level.
- Hartlepool Bay has generally been dominated by erosion over the winter of 2020/21, however beach 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 in the 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: 27/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

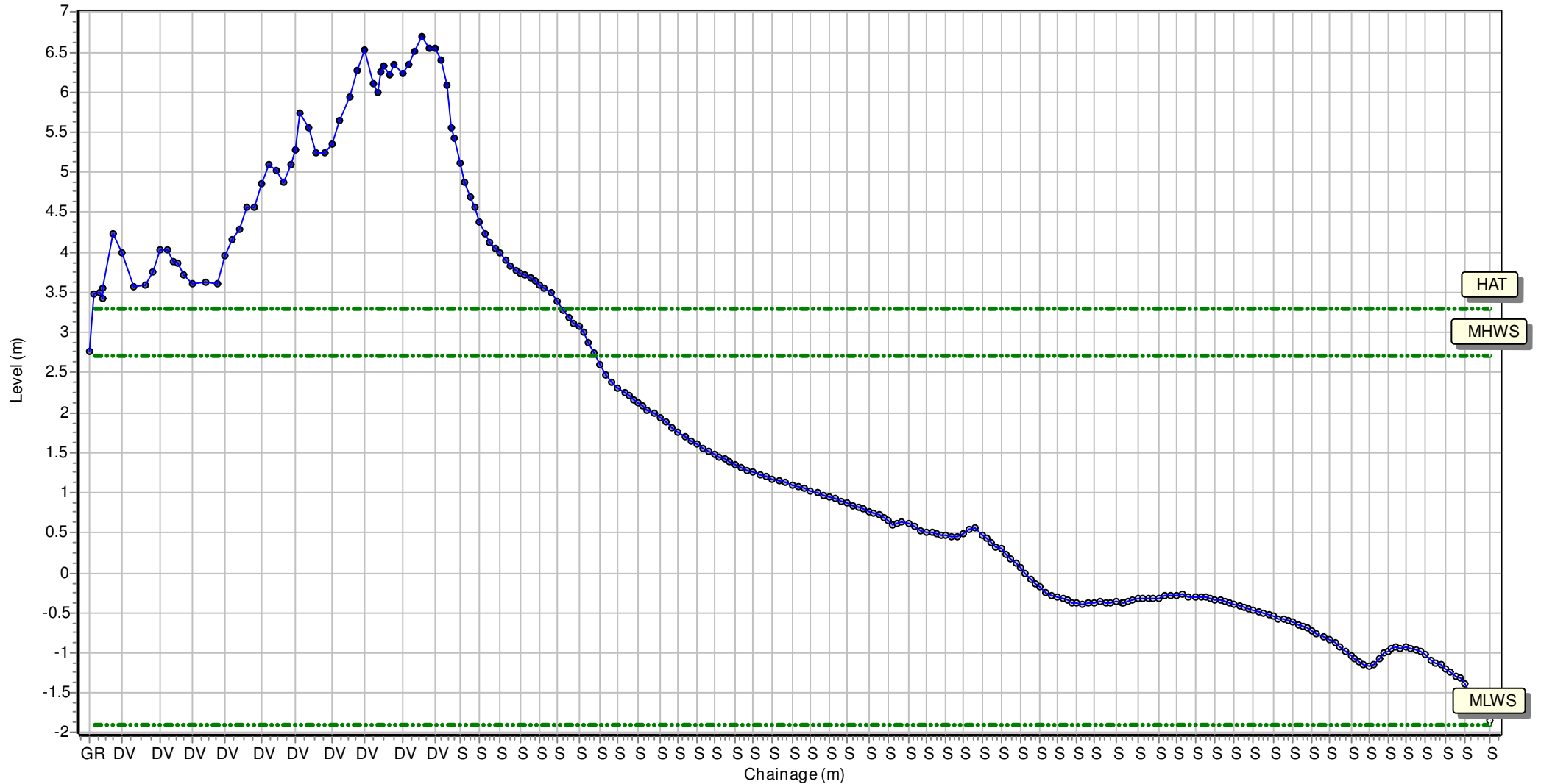
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHN2

Date: 27/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

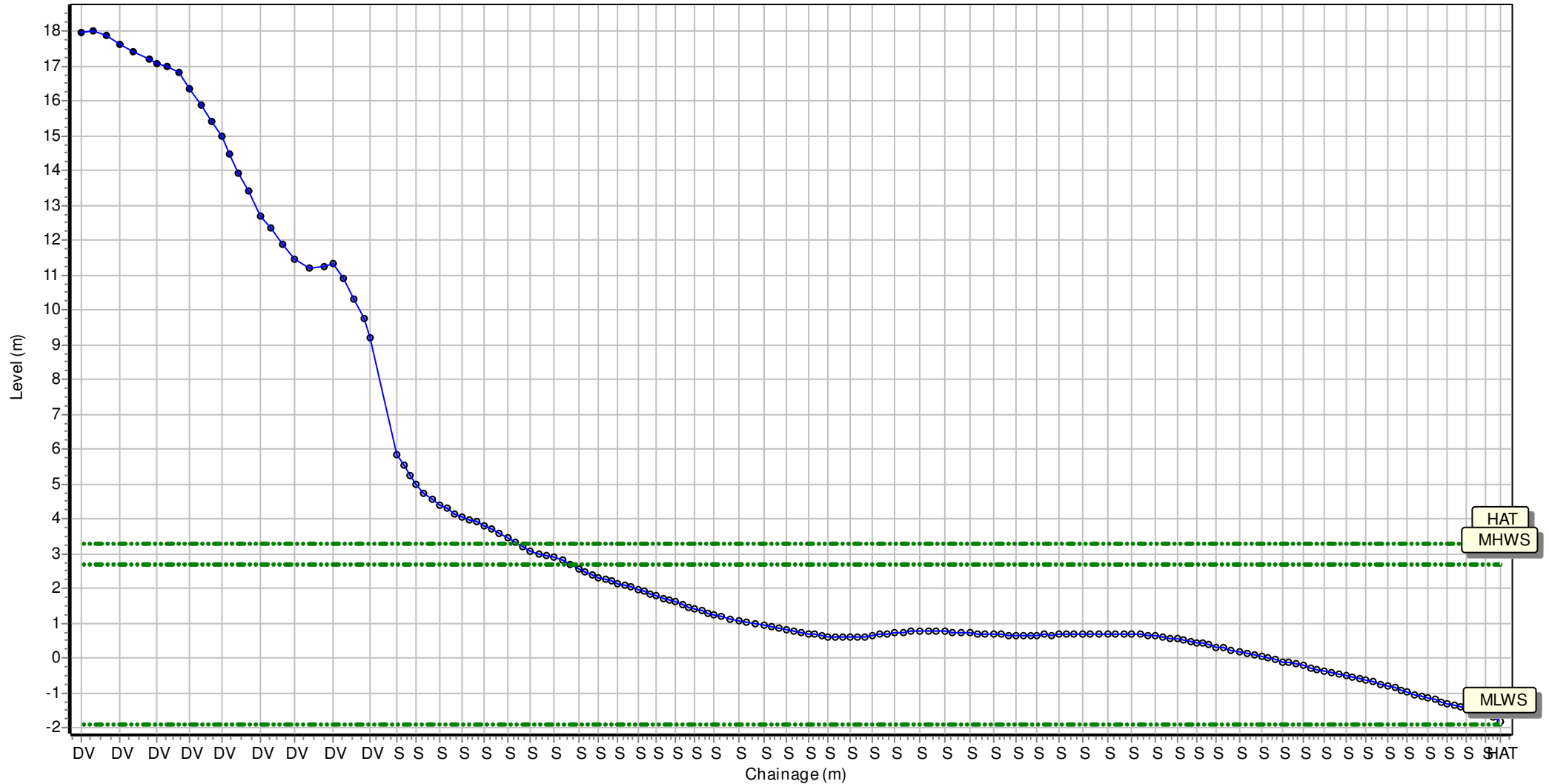
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHN2A

Date: 27/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

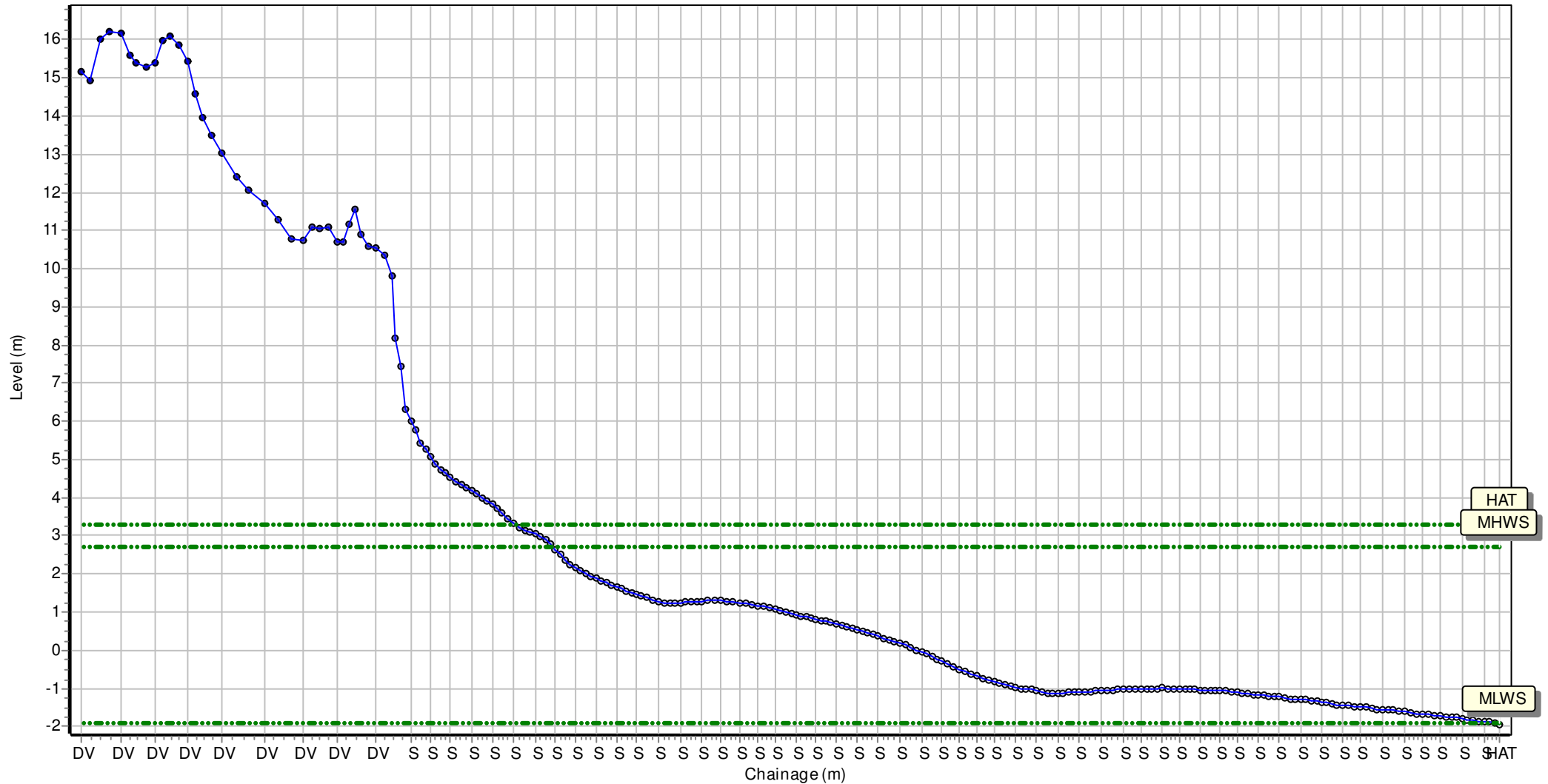
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHN3

Date: 27/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

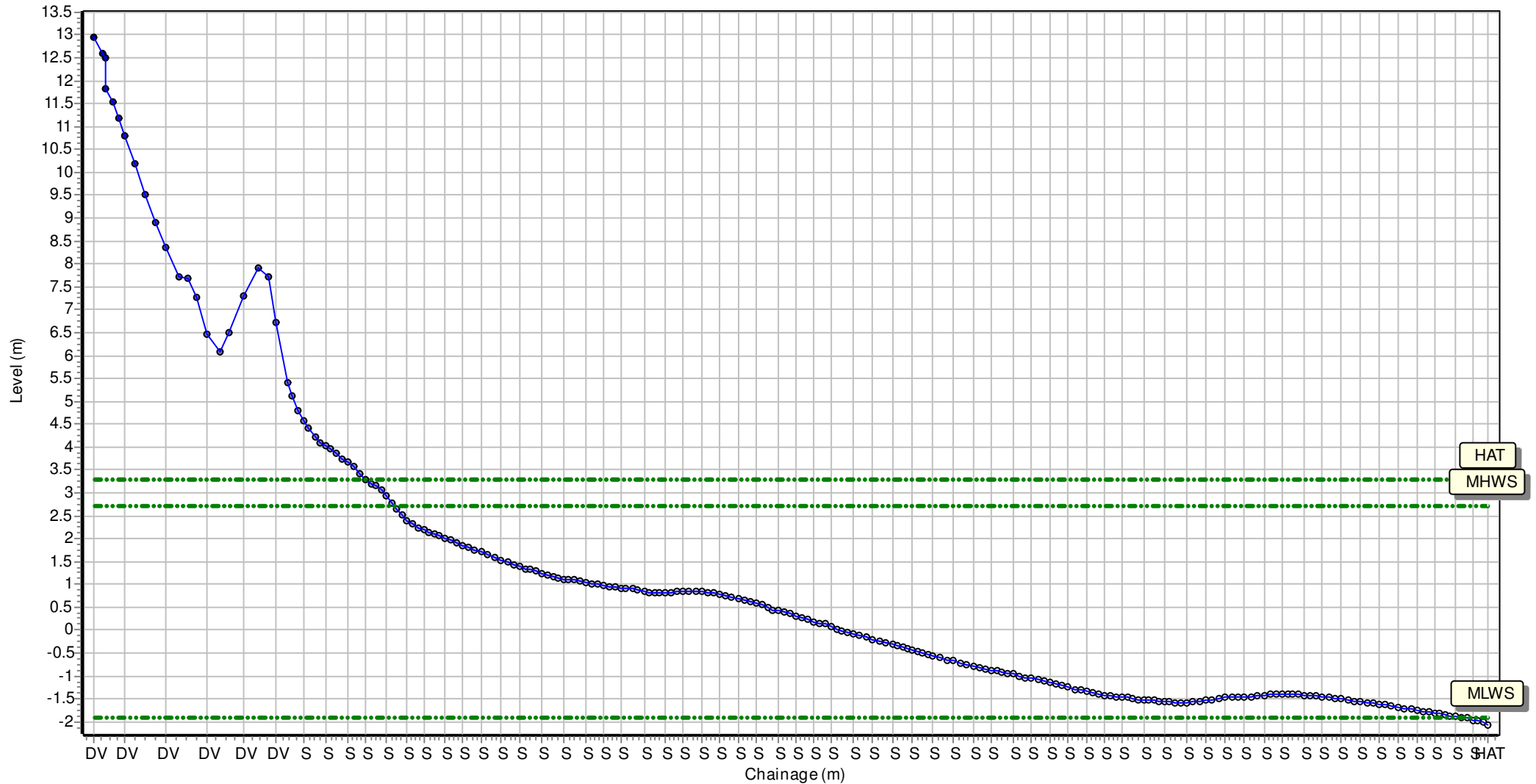
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHN3A

Date: 27/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

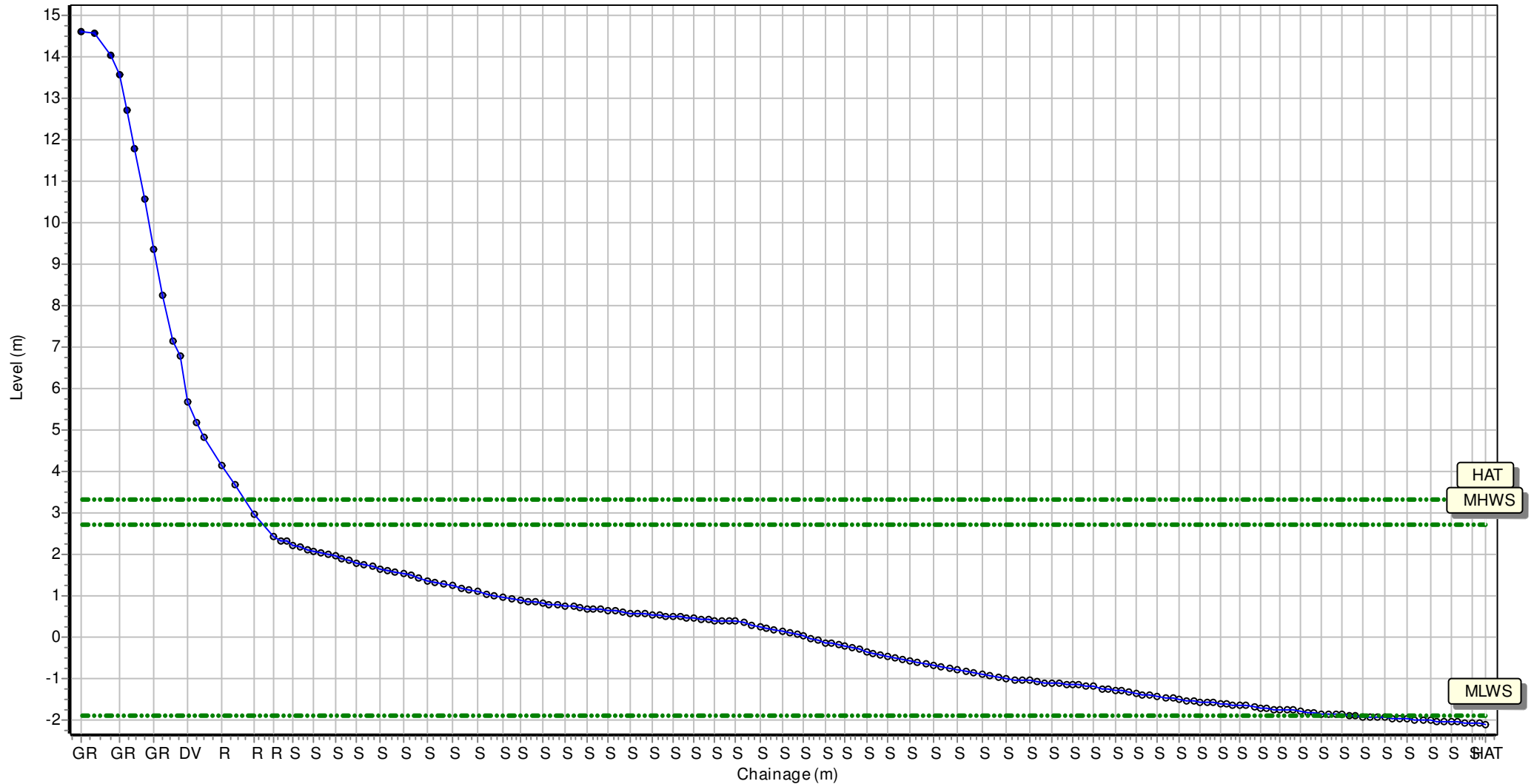
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHN4A

Date: 27/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHC1

Date: 26/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

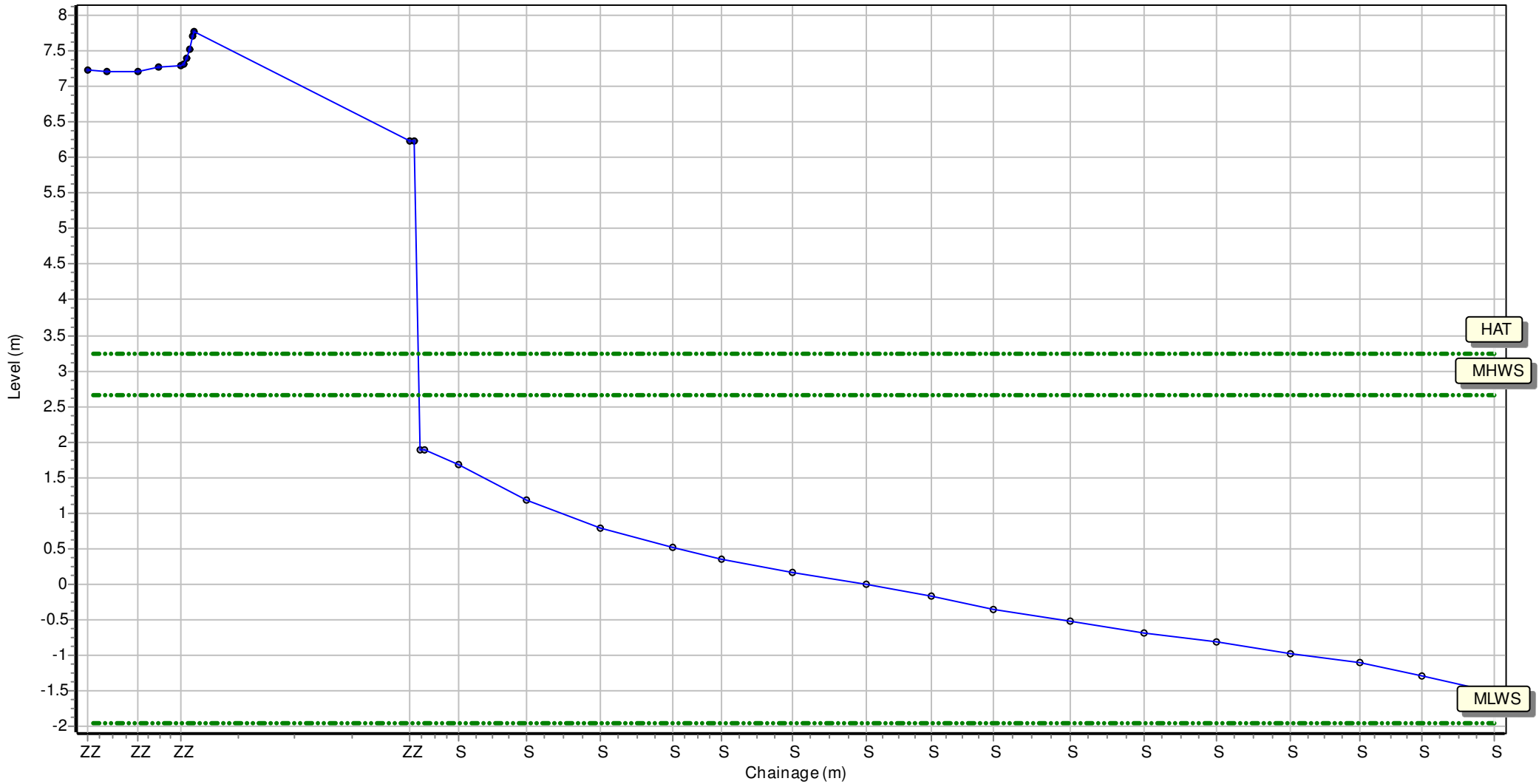
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHS1

Date: 26/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

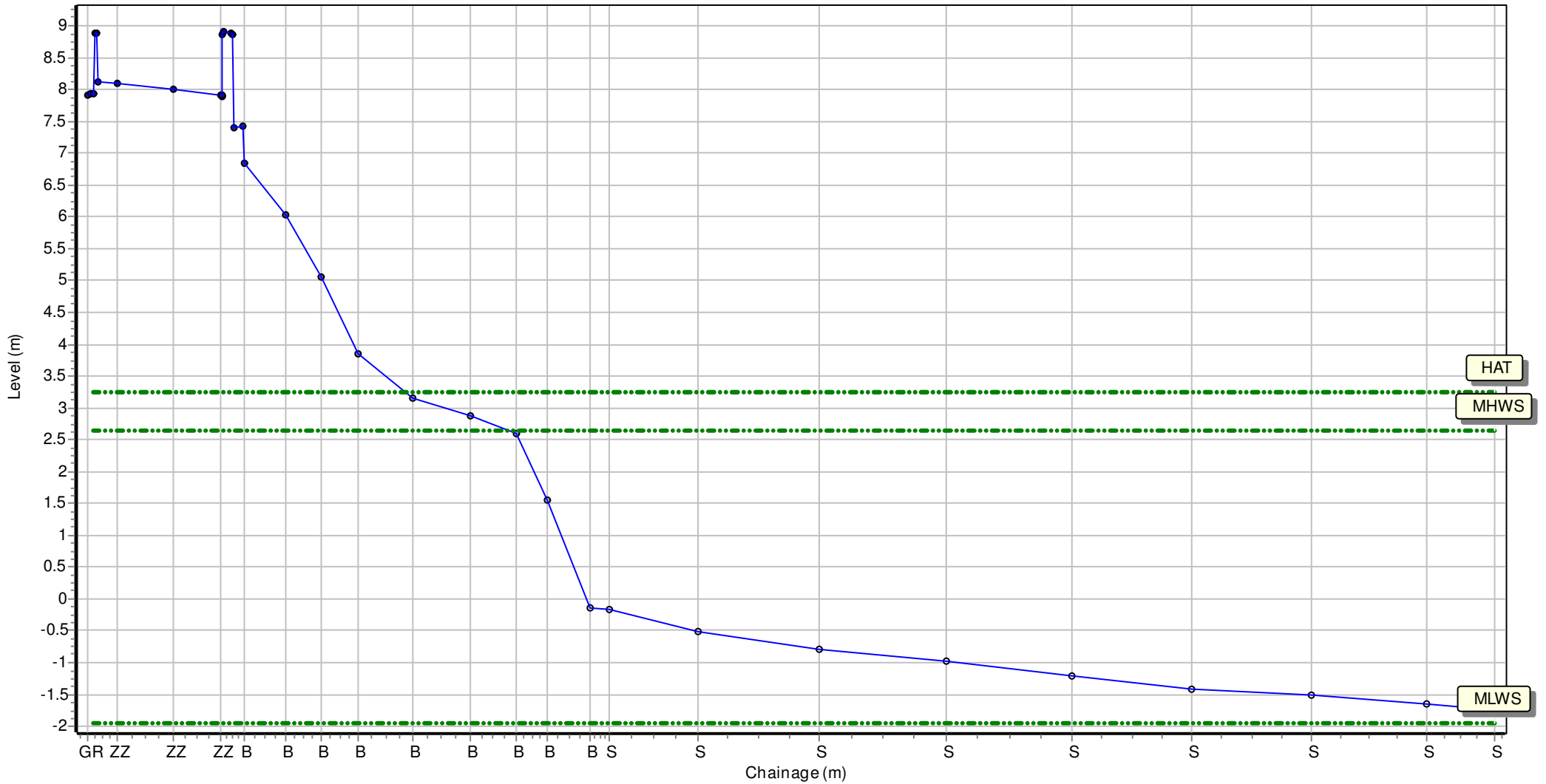
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHS2

Date: 26/04/2021

Inspector: AG

Low Tide:

Low Tide Time:

Wind

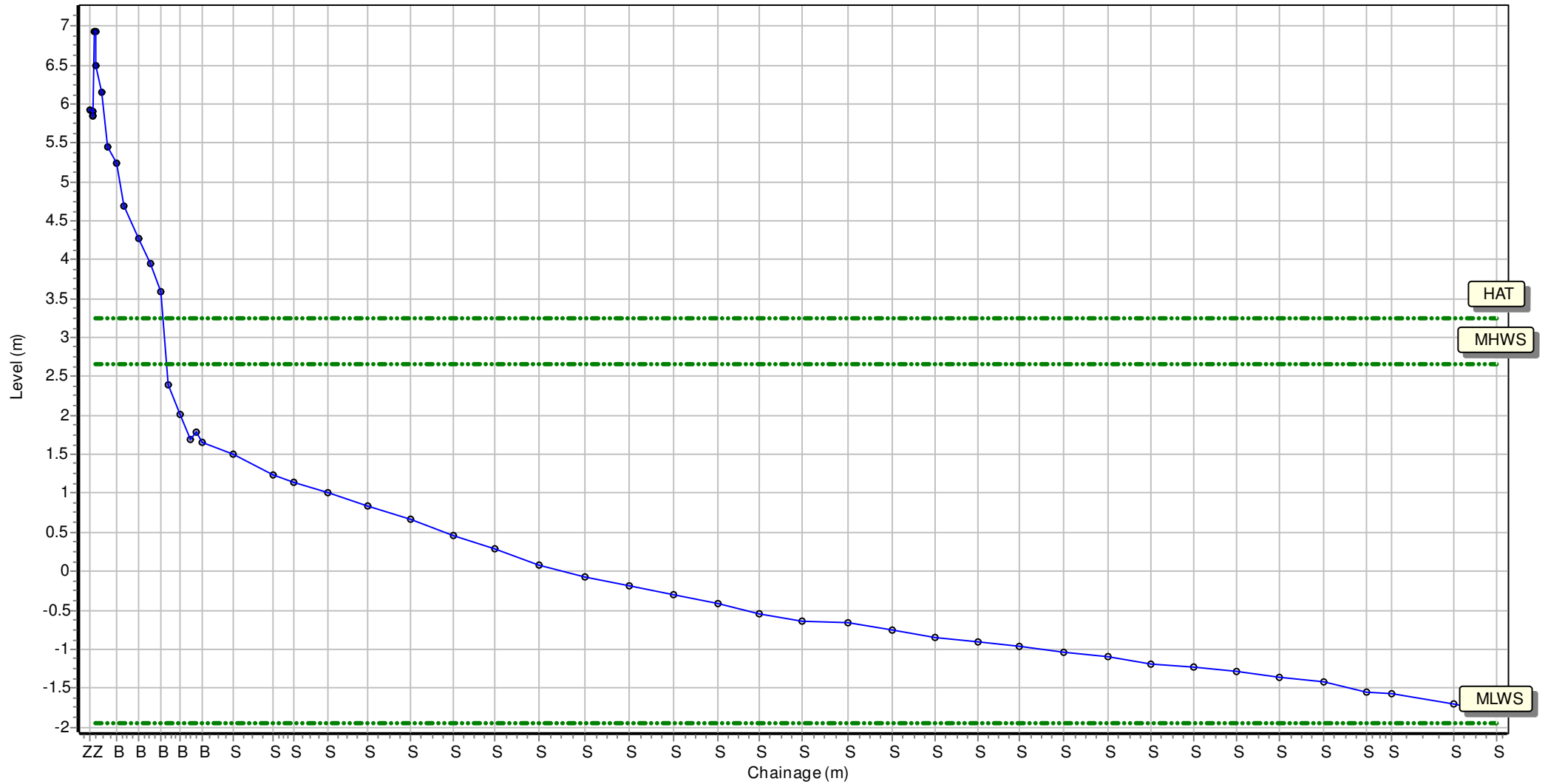
Sea State:

Visibility:

Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHS3

Date: 26/04/2021 Inspector: AG

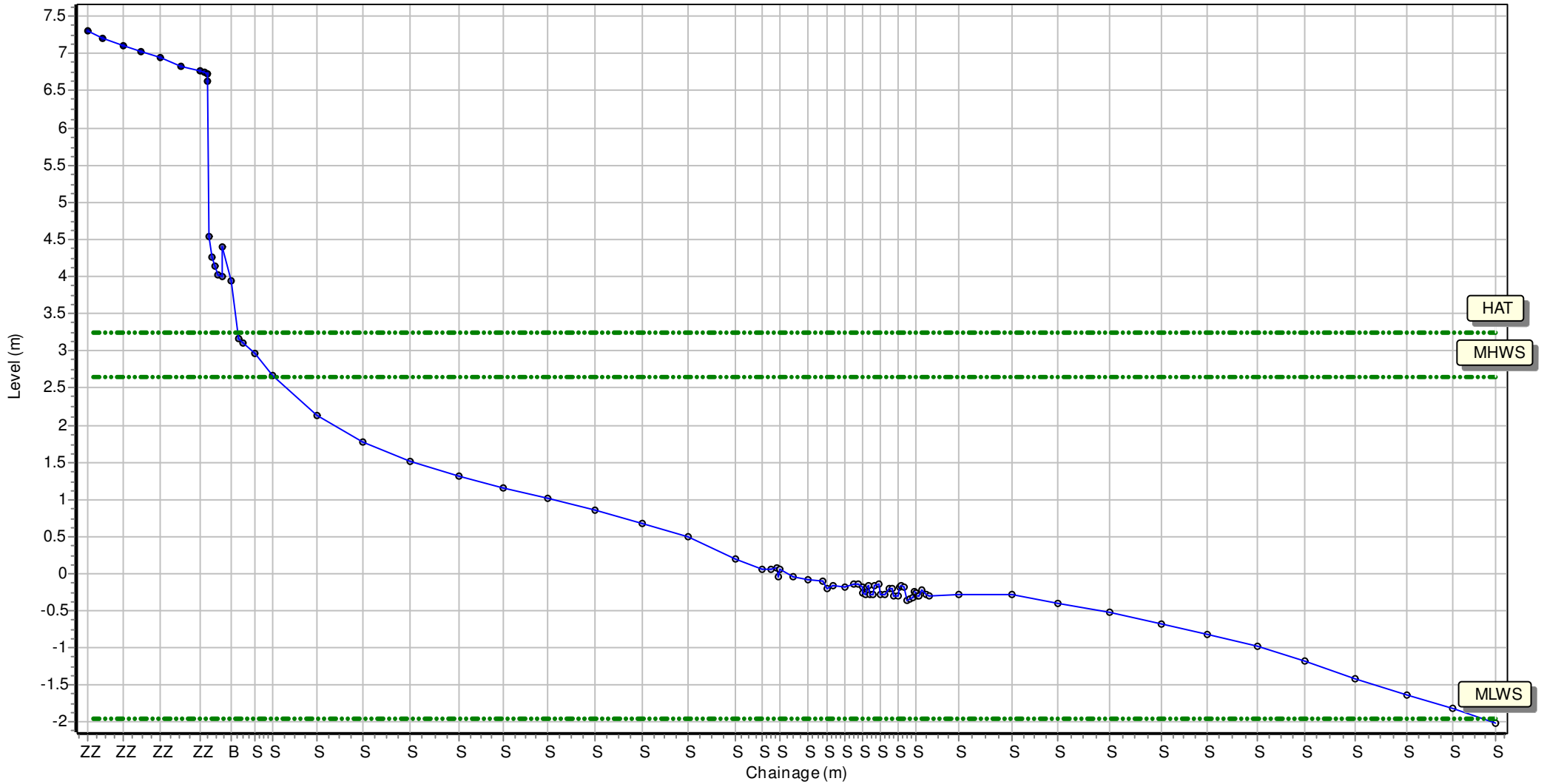
Low Tide: Low Tide Time:

Wind Sea State:

Visibility: Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profile

Location: 1cHS4

Date: 26/04/2021 Inspector: AG

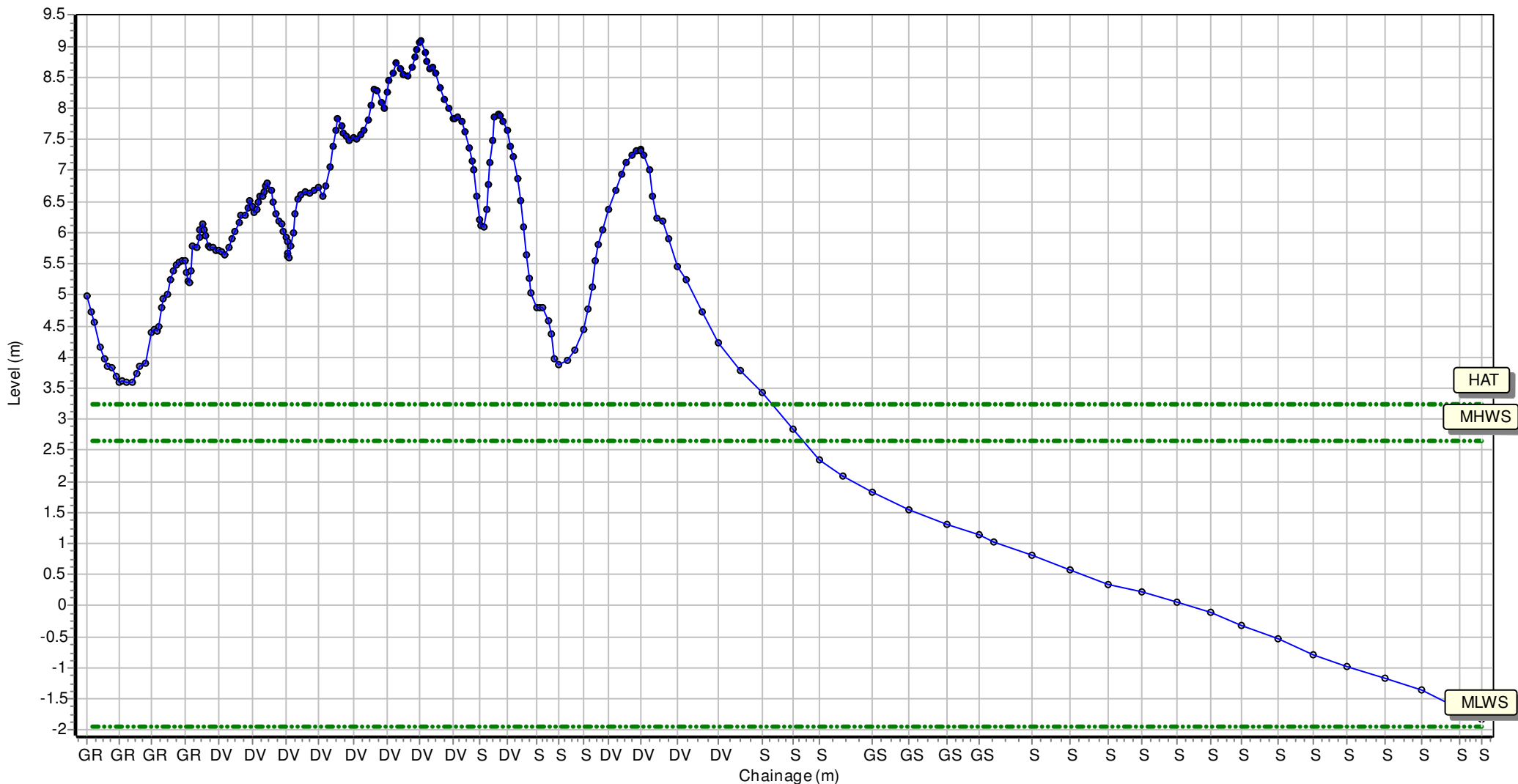
Low Tide: Low Tide Time:

Wind Sea State:

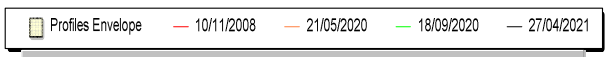
Visibility: Rain:

Summary: 2021 Partial Measures Topo Survey

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



Beach Profiles: 1cHN1



Beach Profiles: 1cHN2



Profiles Envelope 10/11/2008 21/05/2020 18/09/2020 27/04/2021

HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN2A



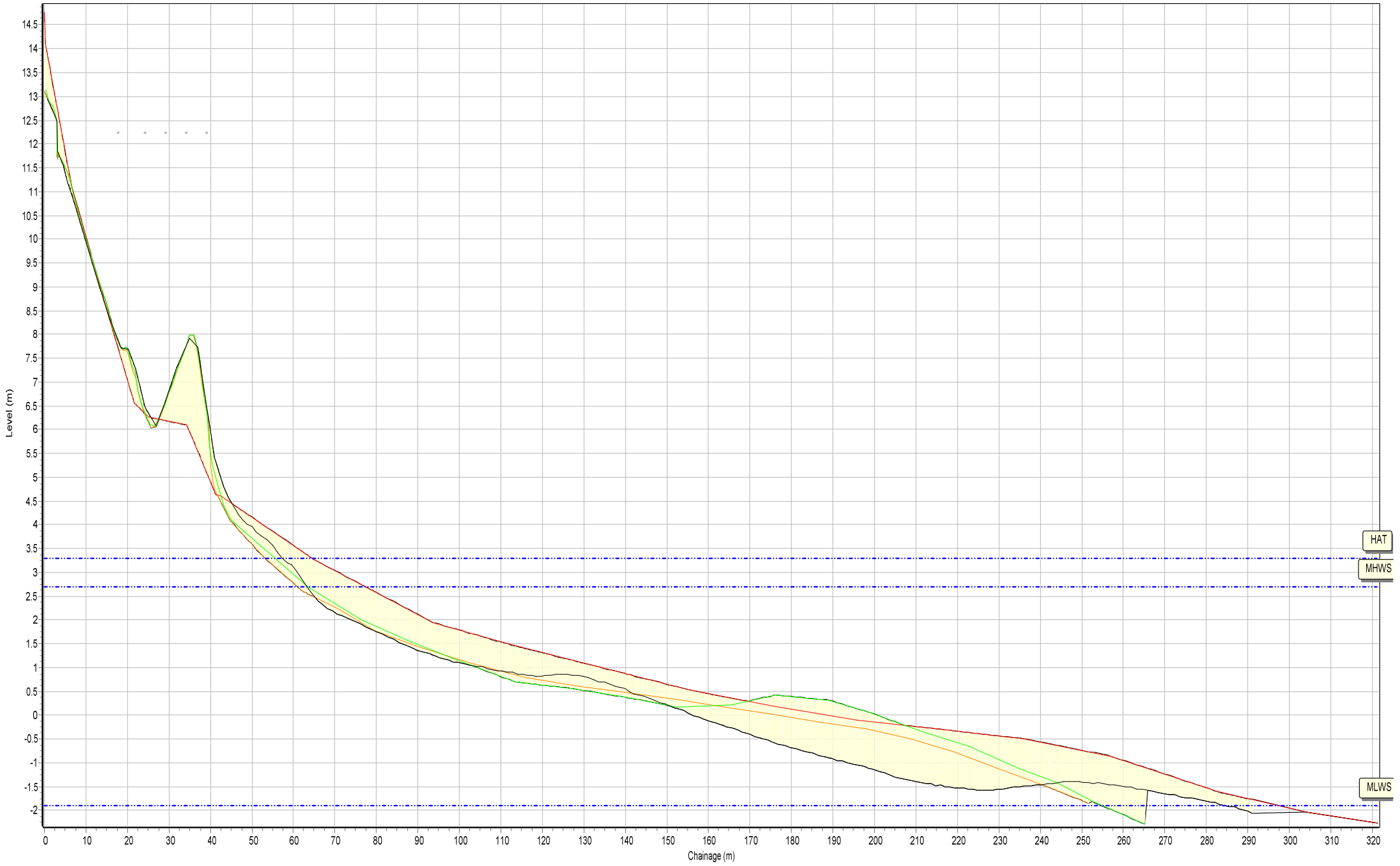
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN3



Profiles Envelope 10/11/2008 21/05/2020 18/09/2020 27/04/2021

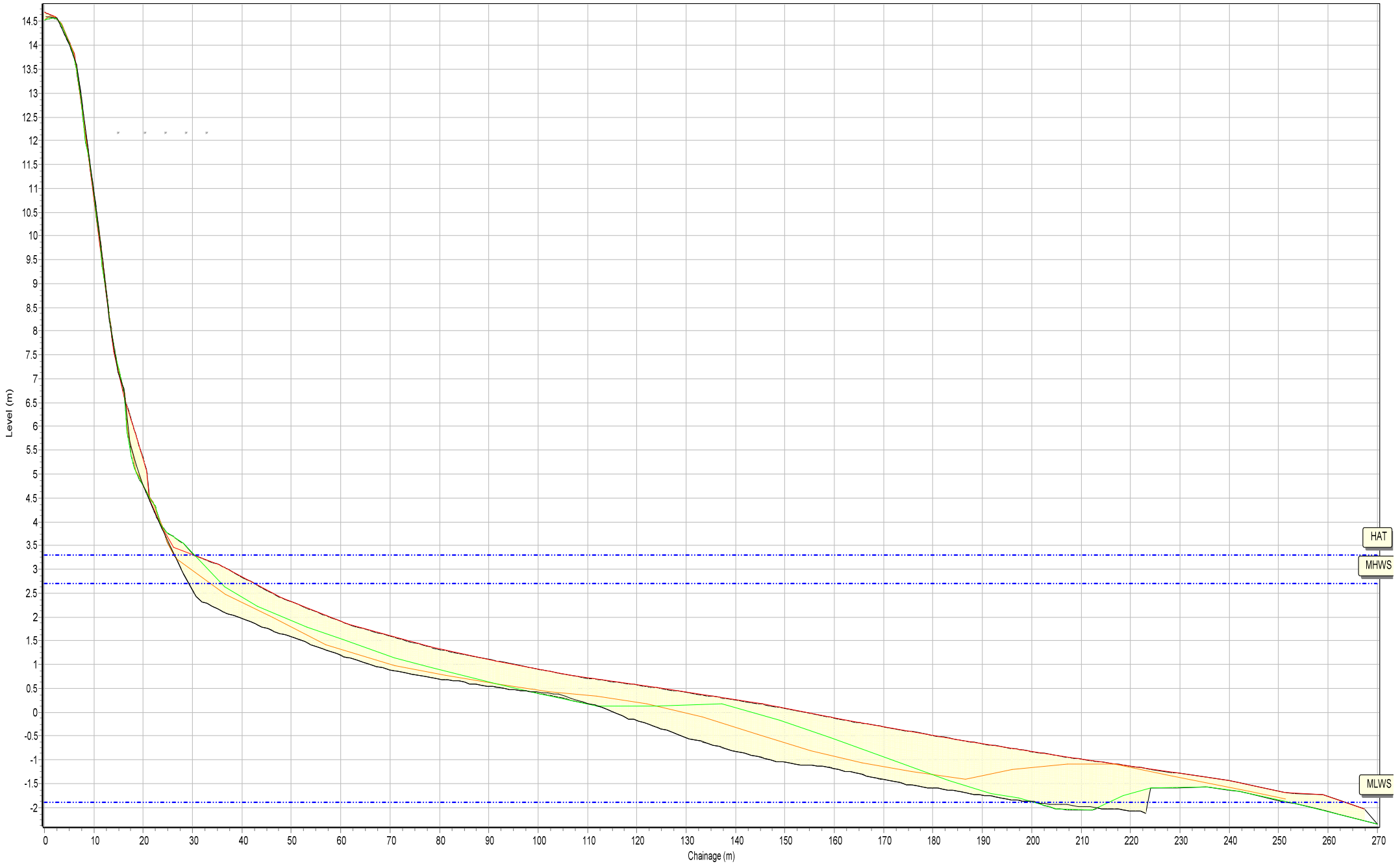
HAT

MHWs

MLWS

SANDS

Beach Profiles: 1cHN3A



Profiles Envelope 14/10/2011 21/05/2020 18/09/2020 27/04/2021

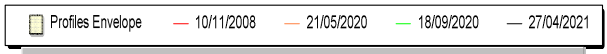
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHN4



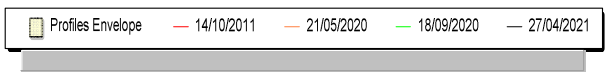
HAT

MHWS

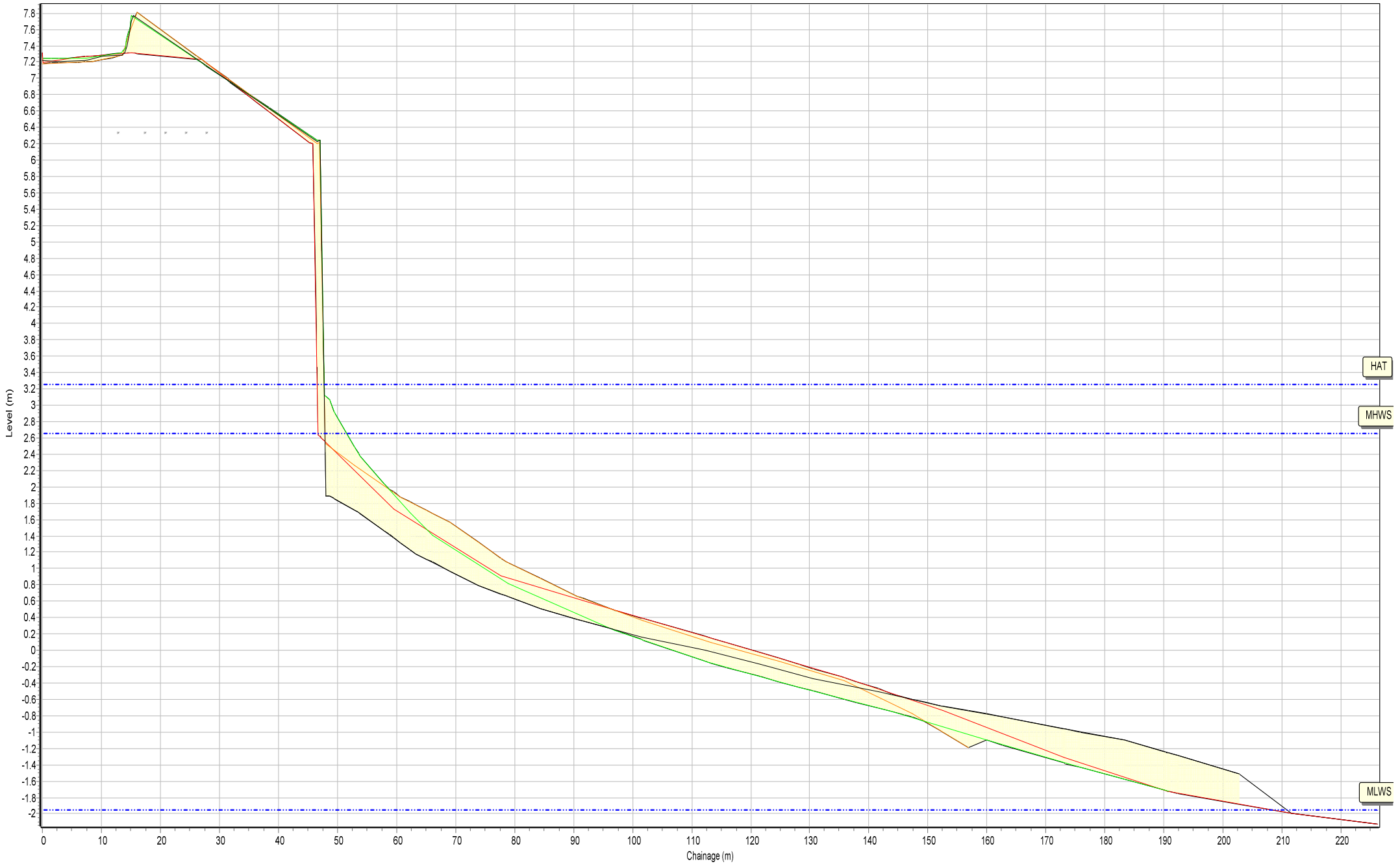
MLWS

SANDS

Beach Profiles: 1cHN4A



Beach Profiles: 1cHC1



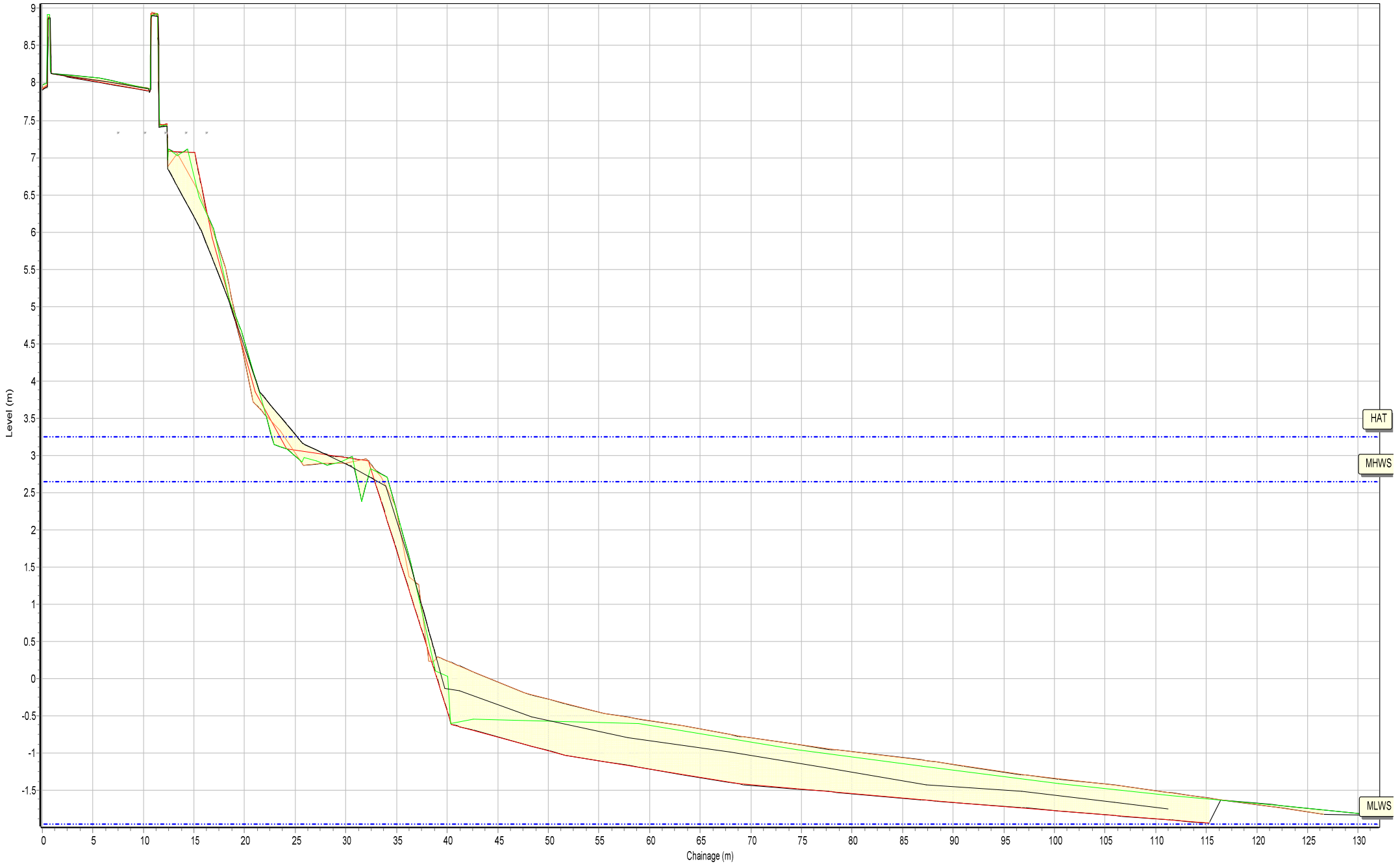
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHS1



Profiles Envelope 27/03/2009 22/05/2020 16/10/2020 26/04/2021

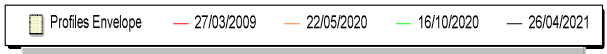
HAT

MHWS

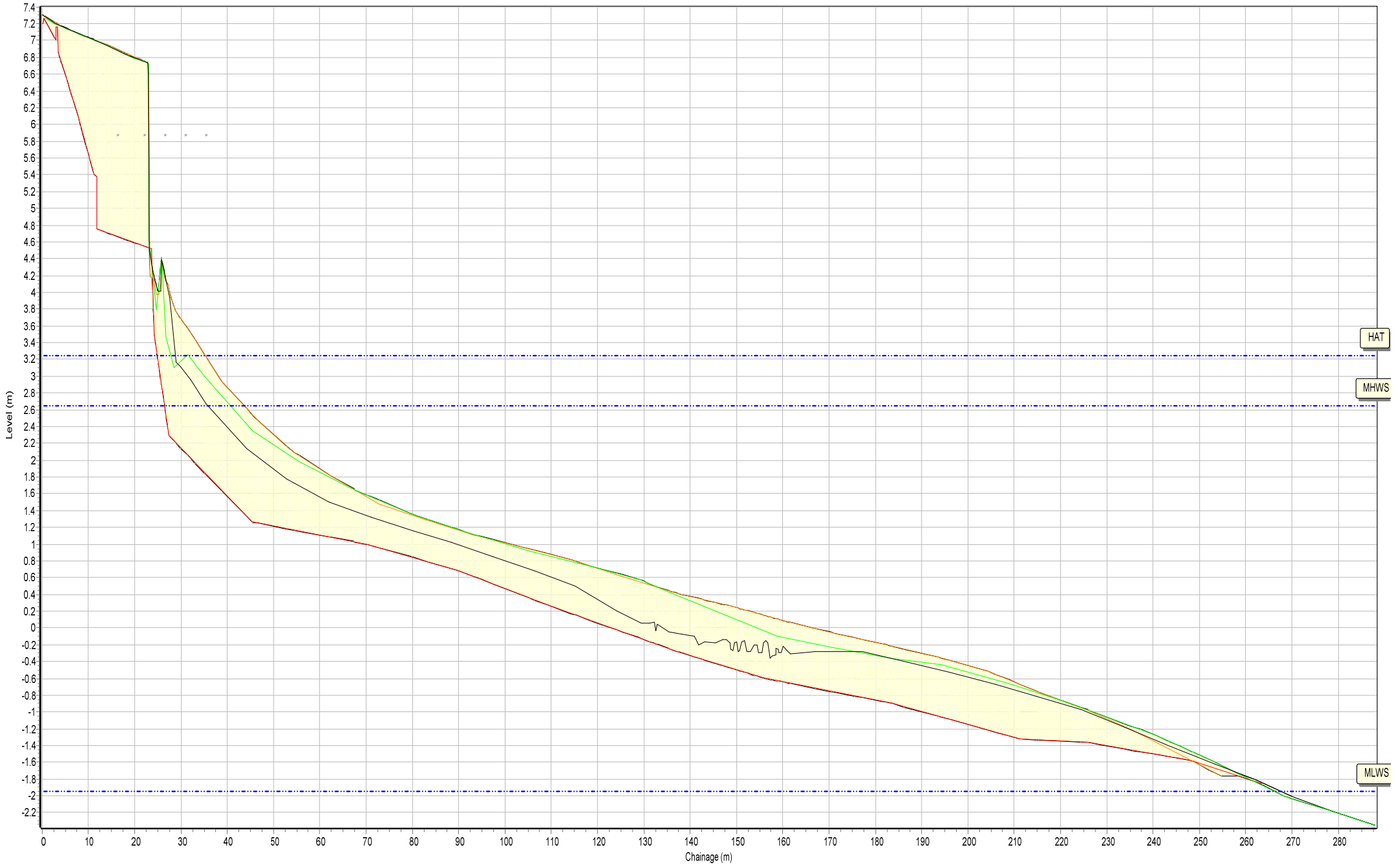
MLWS

SANDS

Beach Profiles: 1cHS2



Beach Profiles: 1cHS3



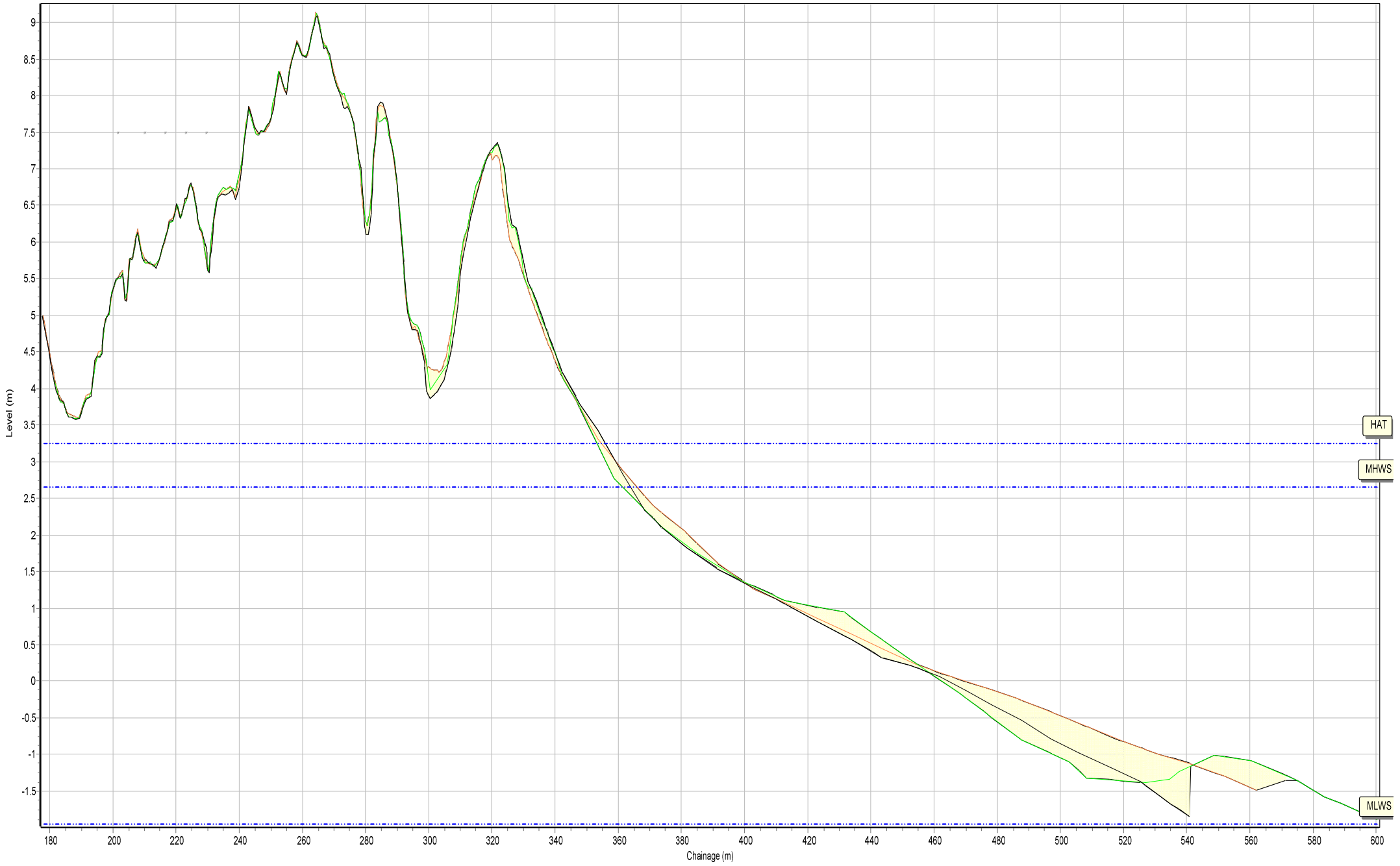
HAT

MHWS

MLWS

SANDS

Beach Profiles: 1cHS4



Profiles Envelope 27/03/2009 22/05/2020 16/10/2020 26/04/2021

HAT

MHWS

MLWS

SANDS