



**Cell 1 Regional Coastal Monitoring Programme  
Update Report 16: 'Partial Measures' Survey 2024**

**Sunderland  
City Council**

**Sunderland City Council  
May 2024**

## Contents

Disclaimer .....	i
Abbreviations and Acronyms.....	ii
Water Levels Used in Interpretation of Changes .....	ii
Glossary of Terms.....	iii
Preamble .....	iv
1. Introduction.....	1
1.1 Study Area .....	1
1.2 Methodology.....	1
2. Analysis of Survey Data .....	2
2.1 Whitburn Bay.....	2
2.2 Hendon to Ryhope (incl. Halliwell Banks) .....	3
3. Problems Encountered and Uncertainty in Analysis .....	8
4. Recommendations for 'Fine-tuning' the Monitoring Programme .....	8
5. Conclusions and Areas of Concern .....	8

## Appendices

Appendix A	Beach Profiles
Appendix B	Cliff Top Survey

## List of Figures

Figure 1	Sediment Cells in England and Wales
Figure 2	Survey Locations
Figure 3	Cliff Top Survey Locations
Figure 4	Movement of armour stones at Profile 1bSNS11(Image)
Figure 5	Oily leachate at Halliwell banks (Image)

## List of Tables

Table 1	Analytical, Update and Overview Reports Produced to Date
Table 2	Sub-division of the Cell 1 Coastline

Authors	
Tom Ward	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)
	Whitburn Bay to Ryhope
HAT	3.08
MHWS	2.58
MHWN	1.48
MLWN	-0.72
MLWS	-1.82

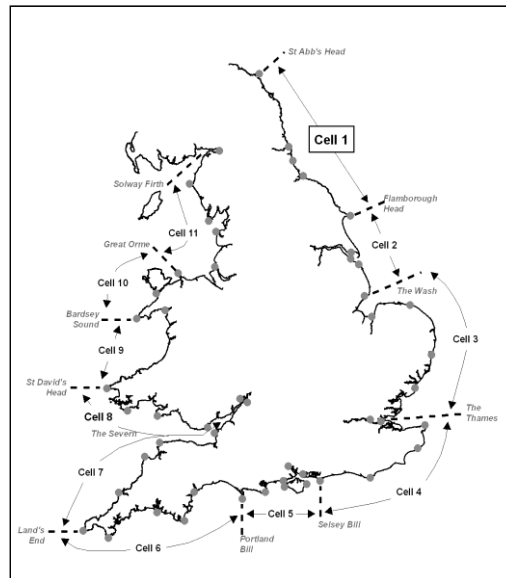
Source: UKHO Admiralty Tide Tables, 2020

## 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 programme commenced in its present guise in September 2008<sup>1</sup> and is managed by North Yorkshire Council on behalf of the North East Coastal Observatory. It is funded by the Environment Agency, working in partnership with the following organisations:



<sup>1</sup> Prior to 2008, coastal monitoring was undertaken on a consistent basis across Northumberland and North Tyneside as part of the (then) Northumbrian Coastal Authorities Group's monitoring programme which commenced in 2002, whilst several authorities between the River Tyne and Flamborough Head undertook their own local monitoring programmes.

Royal HaskoningDHV has been appointed to provide Analytical Services in relation to the present phase of the Cell 1 Regional Coastal Monitoring Programme, between 2016 - 2027.

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

- beach profile surveys
- topographic surveys
- cliff top recession surveys
- real-time wave data collection
- bathymetric and sea bed characterisation surveys
- aerial photography
- LiDAR Surveys
- walk-over cliff and coastal defence asset surveys.

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

At the end of each phase of the programme, 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	Oct 12	
5	2012/13	Sep-Oct 12	Mar 13	Mar 13	Jun 13	
6	2013/14	Sep-Oct 13	Feb 14	Mar 14	Jul 14	
7	2014/15	Sep-Nov 14	Feb 15	Mar-Apr 15	Jul 15	
8	2015/16	Sep-Nov 15	Feb 16	Mar 16	Jul 16	Jun 16
9	2016/17	Sep-Nov 16	Feb 17	Apr 17	Jul 17	
10	2017/18	Oct-Nov 17	Mar 18	Mar 18	May 18	Nov 18
11	2018/19	Oct-Nov 18	Feb 19	Feb-Mar 19	May 19	
12	2019/20	Sep-Nov 19	Jan 20	Mar 20	Apr 20	
13	2020/21	Sep-Oct 20	Jan 21	Mar-Apr 21	May 21	Aug 21
14	2022/23	Nov 21	Feb 22	Apr 22	Jun 22	
15	2022/23	Oct-Nov 22	Feb 23	Apr 23	May 23	
16	2023/24	Sep 23	Jan 24	Apr 24	May 24 (*)	

(\*) The present report is **Update Report 16** and provides an analysis of the 2024 Partial Measures survey for Sunderland City Council's frontage.

## **1. Introduction**

### **1.1 Study Area**

Sunderland City Council's frontage extends from The Bents to Ryhope. For the purposes of this report and for consistency with previous reporting, it has been sub-divided into three areas, namely:

- Whitburn Bay
- Sunderland Harbour and Docks
- Hendon to Ryhope (including Halliwell Banks)

### **1.2 Methodology**

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

- Full Measures survey annually each autumn comprising:
  - Beach profile surveys along 58 transect lines (commenced 2009)
  - Topographic survey at Whitburn Bay (commenced 2009)
  - Topographic survey at Hendon to Ryhope (including Halliwell Banks) (commenced 2009)
- Partial Measures survey annually each spring comprising:
  - Beach profile surveys along 16 transect lines (commenced 2009)
- Cliff top survey bi-annually at:
  - Hendon to Ryhope (including Halliwell Banks) (commenced 2009)

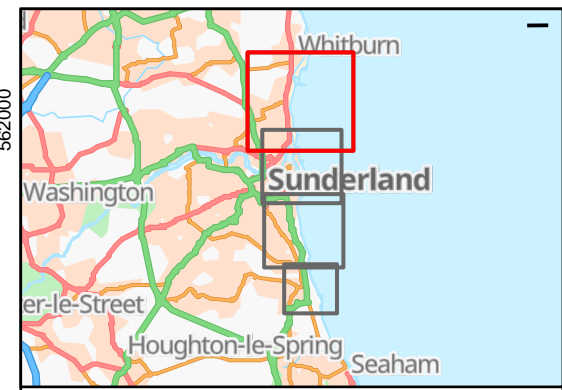
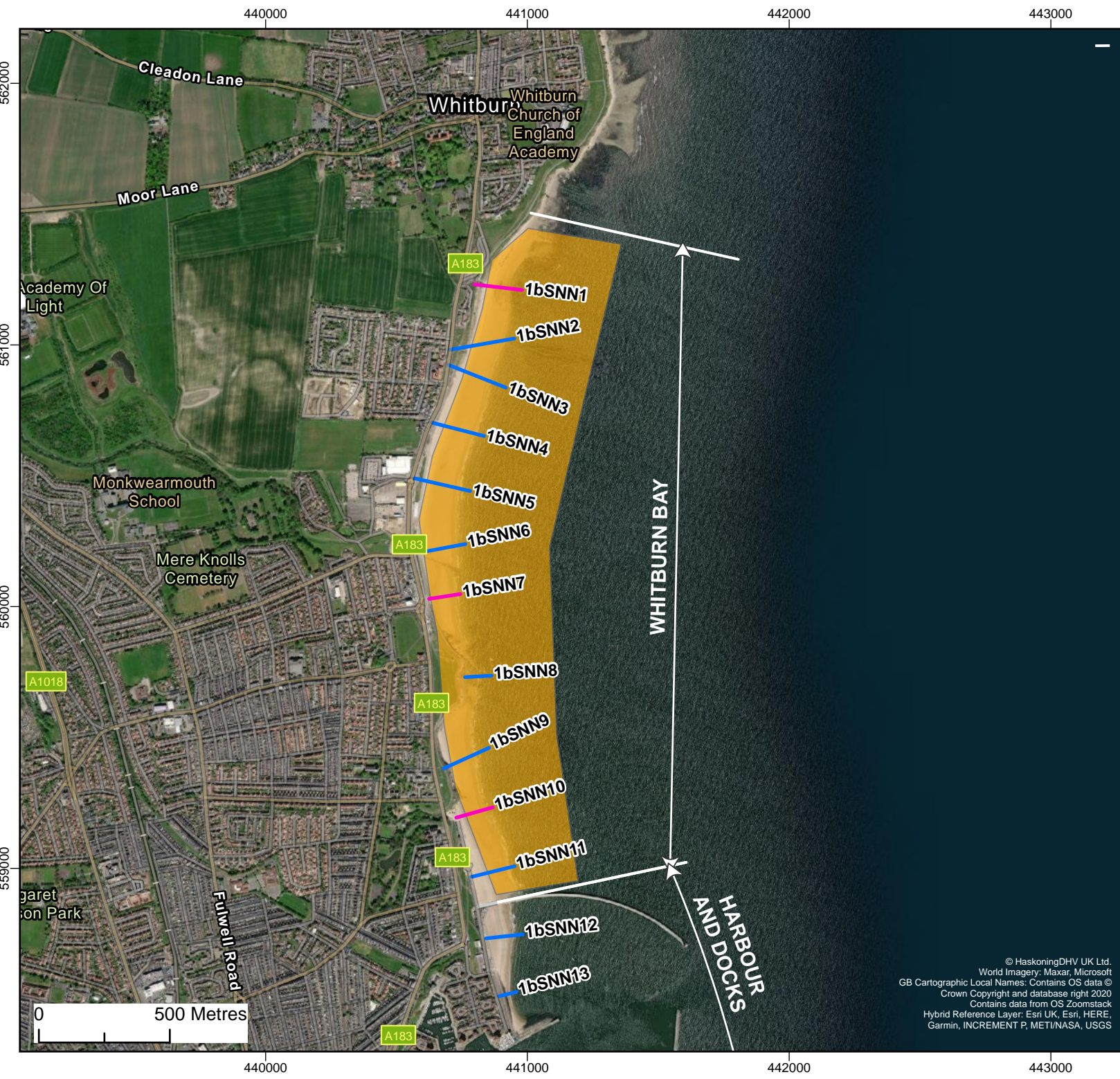
The location of these surveys is shown in Figure 2. The Partial Measures survey was undertaken along this frontage between 23<sup>rd</sup> and 24<sup>th</sup> April 2024. During this time weather conditions varied, see surveyors reports for details.

The Update Report presents the following:

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

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





**SURVEY LOCATIONS**

**Topographic Profile**

- Annual (Blue line)
- Bi-Annual (Pink line)

**Topographic Area**

- 6 monthly (Light Green)
- yearly (Yellow)
- 5 yearly (Light Purple)

- Cliff Top Survey Points (Red dot)

(refer to Figure 3 for details)

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

**Figure 2 - Map 1**

**WHITBURN BAY**

**Sunderland City Council Frontage**

Report:

Survey Report

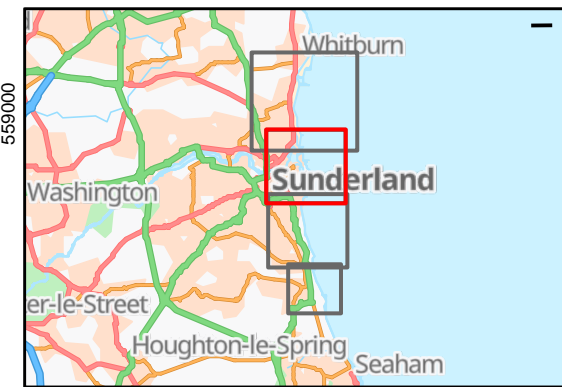
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Co-ordinate system: British National Grid

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Hybrid Reference Layer: Esri UK, Esri, HERE,  
Garmin, INCREMENT P, METI/NASA, USGS



**SURVEY LOCATIONS**

**Topographic Profile**

- Annual
- Bi-Annual

**Topographic Area**

- 6 monthly
- yearly
- 5 yearly
- Cliff Top Survey Points  
(refer to Figure 3 for details)

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

**Figure 2 - Map 2**

**HARBOUR AND DOCKS**

**Sunderland City Council Frontage**

Report:

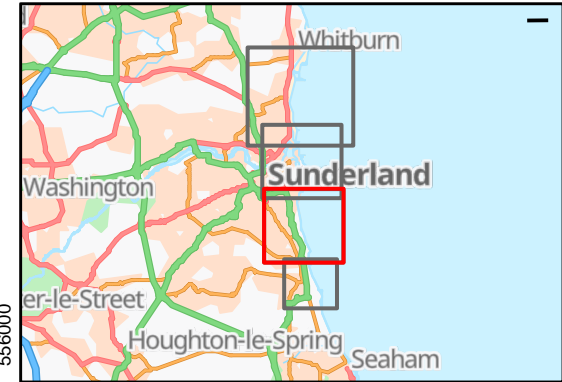
Survey Report

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Co-ordinate system: British National Grid

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 INCREMENT P, METI/NASA, USGS





**SURVEY LOCATIONS**

**Topographic Profile**

- Annual (Blue line)
- Bi-Annual (Pink line)

**Topographic Area**

- 6 monthly (Light Green)
- yearly (Yellow)
- 5 yearly (Light Purple)

- Cliff Top Survey Points (Red dot)

(refer to Figure 3 for details)

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

**Figure 2 - Map 3**

**HENDON TO RYHOPE (NORTH)**

**Sunderland City Council Frontage**

Report:

Survey Report

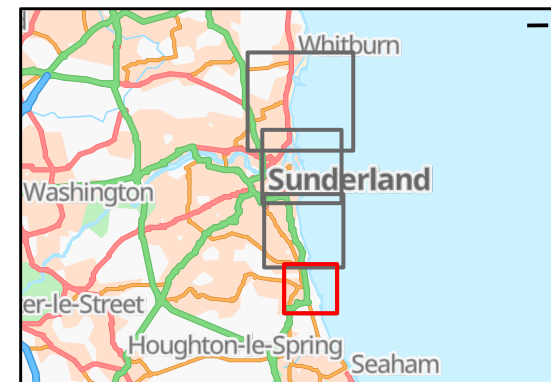
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Co-ordinate system: British National Grid

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Contributors: Esri UK, Esri, HERE, Garmin,  
INCREMENT P, METI/NASA, USGS



**SURVEY LOCATIONS**

**Topographic Profile**

- Annual (Blue line)
- Bi-Annual (Pink line)

**Topographic Area**

- 6 monthly (Light Green)
- yearly (Yellow)
- 5 yearly (Light Purple)

- Cliff Top Survey Points (Red dot)

(refer to Figure 3 for details)

Client:	North East Coastal Group	Project:	Cell 1 Regional Coastal Monitoring Programme
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Title:

**Figure 2 - Map 4**

**HENDON TO RYHOPE (SOUTH)**

**Sunderland City Council Frontage**

Report:

Survey Report

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Co-ordinate system: British National Grid

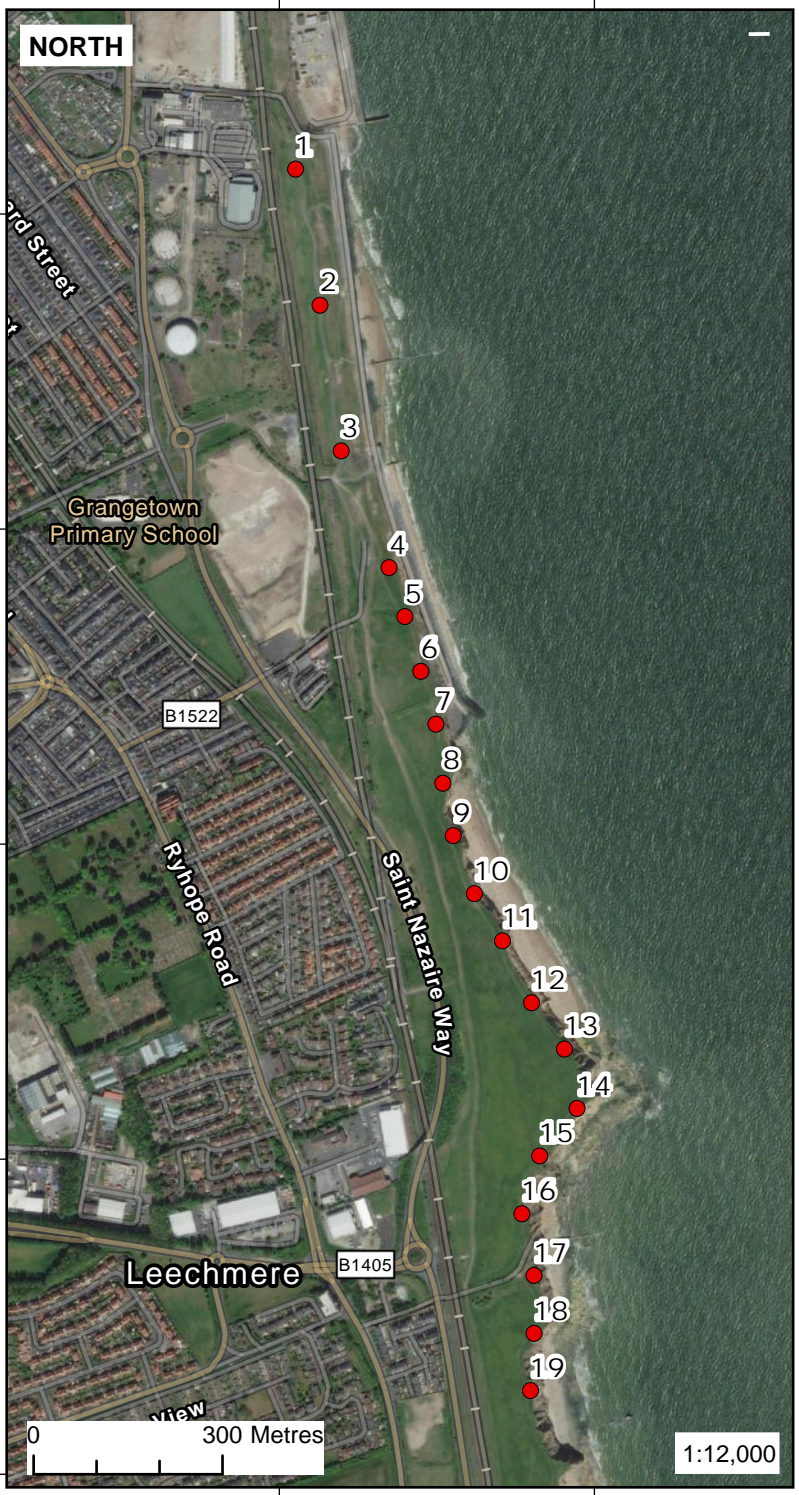
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UK, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS

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441500

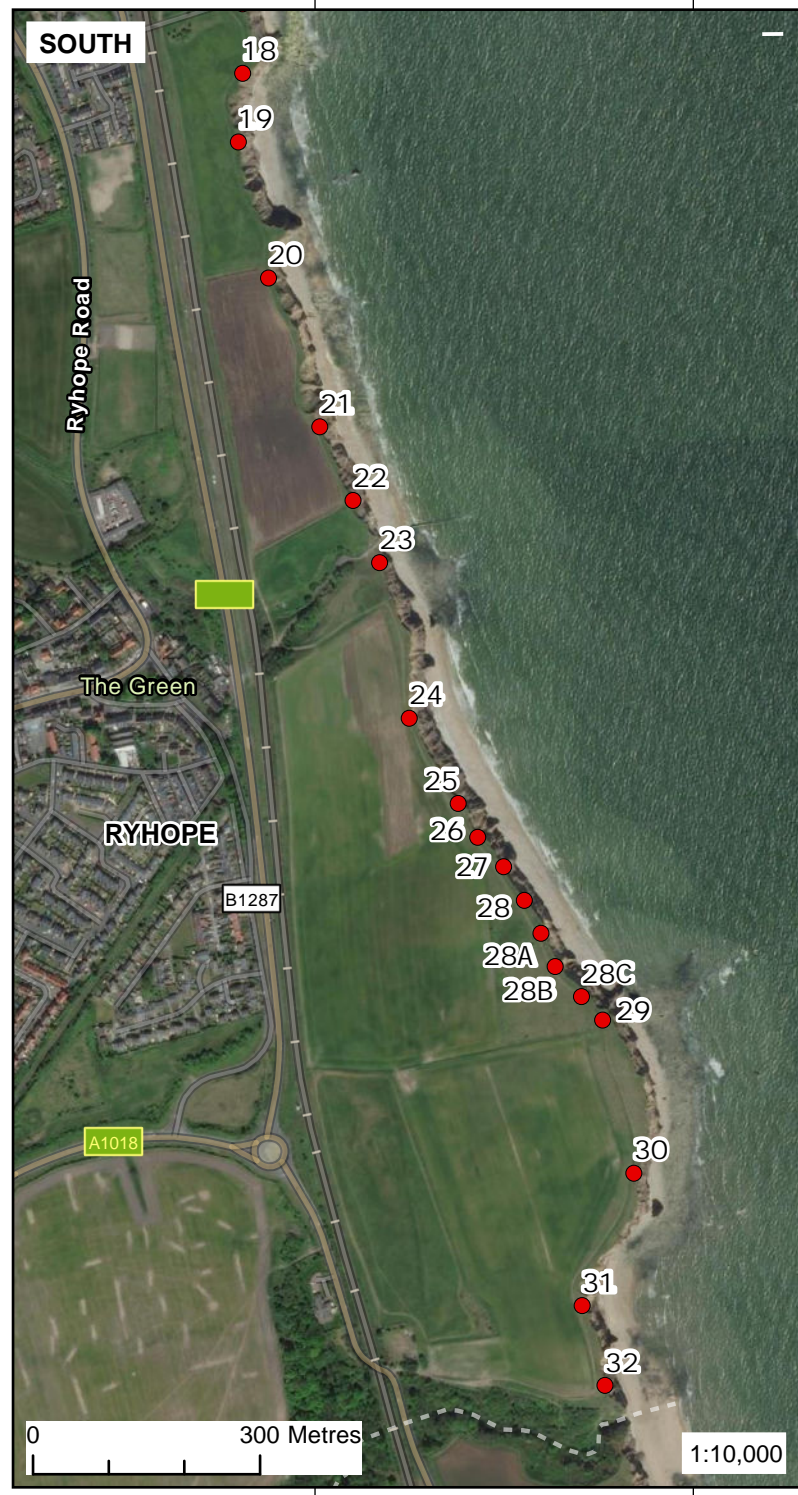


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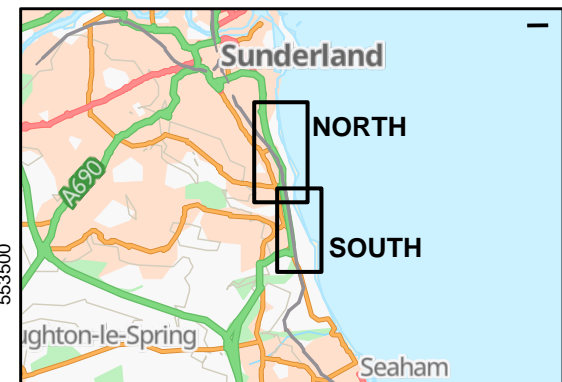
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441500

442000



**SURVEY LOCATIONS**

- Cliff Top Survey Points

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 Hybrid Reference Layer: Esri Community Maps Contributors, Esri UK, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

**Figure 3 - Map 1**

**HENDON TO RYHOPE**

**Sunderland City Council Frontage**

Report:

Survey Report

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Co-ordinate system: British National Grid



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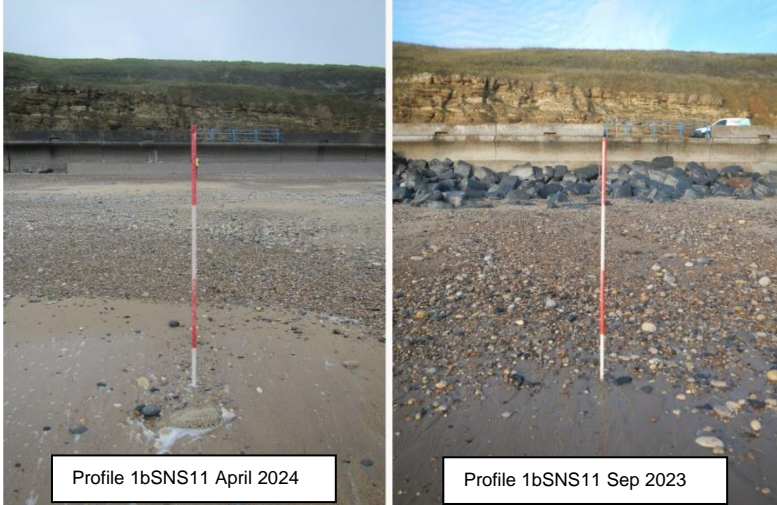
## 2. Analysis of Survey Data

### 2.1 Whitburn Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
23 <sup>rd</sup> April 2024	<p><b>Beach Profiles:</b></p> <p>Whitburn Bay is covered by three beach profile lines for the Partial Measures survey (Appendix A). The last survey was Full Measures, undertaken in September 2023.</p> <p><b>1bSNN1</b> is just to the south of Sunderland City Council’s northern boundary. Up to chainage 38m, the profile encompasses vegetated hinterland. Change across this section is limited to the movement /erosion of both pedestrian and vehicle access routes. A cobble berm is present at the interface between the beach, and this vegetated area. The beach seawards of the cobble berm has been dominated by erosion, with a drop in level up to 0.8m observed between chainage 52m and 174m. As a result, compared to the range of the previous surveys, the beach is at its lowest level on record between chainage 101m and 162m.</p> <p><b>1bSNN7</b> is at Seaburn, north of Parson’s Rock. The profile is defended by the seawall up until chainage 5m over which length it remains unchanged since the previous survey. At the toe of the seawall beach levels have dropped by 0.75m, once more exposing the concrete toe apron (which appears in very poor condition). This erosion is consistent across the entire beach up until the end of the profile at chainage 148m. Generally, the beach is at a low to very low level when compared to the range of the previous surveys.</p> <p><b>1bSNN10</b> is located mid-way between Parson’s Rock and Roker Pier. Beach levels at the toe of the sea wall have accreted by 0.75m since the previous survey. This accretion, the majority of which is larger cobbly material, continues across the upper beach tapering to no change by chainage 36m. Seawards of chainage 36m, the beach has eroded, increasing in magnitude down the profile. At the end of the profile, at chainage 142m, the beach level has dropped by 1.2m since the previous survey. Compared to the range of the previous surveys, the upper beach is at high level and the lower beach a low level.</p>	<p>Over winter 2023/24 the beach at Whitburn Bay has dropped notably with the levels across all three profiles now at very low level, and in places the lowest on record. This pattern is observed across much of the north east coastline as a result of the number, severity and direction of storms that occurred in winter 2023/24.</p>

## 2.2 Hendon to Ryhope (incl. Halliwell Banks)


Survey Date	Description of Changes Since Last Survey	Interpretation
<p>19<sup>th</sup> – 22<sup>nd</sup> April 2024</p>	<p><b>Beach Profiles:</b></p> <p>Hendon to Ryhope is covered by twelve beach profile lines for the Partial Measures survey (Appendix A). The last survey was Full Measures, undertaken in September 2023.</p> <p>Profile <b>1bSNS8</b> is located along the defended coastal slopes at south Hendon. The profile encompasses the seawall, rock revetment, and sandy beach. There has been no notable change across the profile up until the toe of the rock revetment at chainage 32m. Between chainage 32m and chainage 89m, the beach has eroded significantly. The upper beach has steepened resulting in a drop in level at chainage 48m of 1m before plateauing between 48m and 70m exposing a length of cobbly foreshore. The beach is at a very low when compared to the range of the previous surveys.</p> <p>Profile <b>1bSNS11</b> starts at the coastal slope backing the sea wall and extends over the rock armour and beach. There has been no notable change across the profile up until the toe of the seawall at chainage 45m. At the toe of the seawall, the rock revetment is no longer visible. It is thought this is predominantly due to accretion (+0.6m) of the beach, however a local drop in level of 0.6m at chainage 45m suggests the possible movement of an armour stone. Seawards of the rock revetment the accretion continues, gradually tapering out on the lower beach at chainage 78m. Seawards of chainage 78m the lower beach steepens resulting in a drop in level of 0.6m at chainage 83m. Compared to the range of the previous surveys, the beach is at a high level.</p>	<p>Along the defended section at Hendon, beach levels have generally dropped significantly in response to the storms over Winter 2023/24. A 25m length of rocky foreshore on profile 1bSNS8 has been exposed, an occurrence that has only been recorded once before in the 13 years in the monitoring. On the contrary, profile 1bSNS11 has accreted. It is thought this will be a very local accretion as result of the influence of the protruding breakwater protecting the slipway. The possible movement of an armour stone in this profile highlights the significance of the recent storms.</p> <p>Along Halliwell banks, both the cliff top survey and topographic profiles indicate that the cliffs have experienced significant erosion since the September 2023. This high level of cliff activity coincides, and is possibly as a result of, very low beach levels particularly across the lower beach where the rocky foreshore is exposed. Halliwell Banks remains a focus of concern due to the historic landfill activity in the hinterland behind the cliff line, a concern reiterated by the surveyor's report that noted 'oily substance leeching from the eroded cliff face' in this location.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	 <p data-bbox="347 778 974 805"><i>Figure 4 – Movement of armour stones at Profile 1bSNS11</i></p> <p data-bbox="347 826 1433 1066">Profile <b>1bSNS20</b> is located at Shirley Banks. The profile indicates that the toe of the cliff has advanced seaward by 2m since the previous inspection. The surveyors' photos confirm that this is a result of a cliff failure and resultant debris pile at the toe. As the cliff crest has not retreated it can be inferred the failure has occurred in the face of the cliff not picked in this profile survey. The steep upper beach has experienced erosion (up to 0.4m) between 45m and 55m and then accretion (up to 0.4m) between 55m and 66m. Seawards of chainage 66m the rocky foreshore remains exposed. The profile remains at a low level compared to the range of the previous surveys.</p> <p data-bbox="347 1088 1433 1152">Profiles <b>1bSNS25</b> to <b>1bSNS33</b> are located along Halliwell Banks to assess erosion of a former land fill site. As such the analysis focuses on the position of the cliff top and cliff toe.</p> <p data-bbox="347 1174 1433 1343">At profile <b>1bSNS25</b>, the cliff top has not retreated but the toe of the cliff has retreated by 0.7m. Beach levels at the toe of the cliff have dropped by 0.65m, tapering to no change by chainage 55m. Between chainage 55m and 78m, the beach has accreted by up to 0.4m in level. Seawards of chainage 78m, the beach has again dropped in level, exposing a length of rocky foreshore between chainage 86m and 105m. The beach is generally at a low level compared to the range of the previous surveys.</p>	



Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>At profile <b>1bSNS26</b>, the cliff top has retreated 1.6m, the toe of the cliff has retreated 1.7m. Beach levels at the toe of the cliff have dropped by 0.4m. This erosion continues across the upper beach, tapering to no change by chainage 97m. Between chainage 97m and 114m, the beach has accreted by up to 0.2m. Seawards of chainage 114m, the beach has lowered significantly by up to 1m, exposing a length of rocky foreshore from chainage 126m. The beach is at a low level (when compared to the range of the previous surveys, particularly across the lower extents which is at the lowest level on record).</p> <p>At profile <b>1bSNS27</b>, the cliff top has not retreated but the toe of the cliff has retreated by 2.8m. Beach levels at the toe of the cliff have dropped by 0.3m, tapering to no change by chainage 101m. No change is observed between chainages 101m and 112m. Seawards of chainage 112m, the beach has eroded significantly (by up to 1m) exposing a length of rocky foreshore from chainage 127m. The beach is at a very low level when compared to the range of the previous surveys (particularly across the lower beach).</p> <p>At profile <b>1bSNS28</b>, the cliff top has not retreated but the toe of the cliff has retreated by 1.4m. At the toe of the cliff, beach levels have dropped by 0.8m in level. This erosion continues across the upper beach tapering to no change by chainage 97m. Between chainage 97m and 115m, the profile has remained stable. Seawards of chainage 115m, the beach has lowered significantly, exposing the rocky foreshore seawards of chainage 121m. The beach is at a very low level when compared to the range of the previous surveys (particularly across the lower beach).</p> <p>At profile <b>1bSNS29</b>, the cliff top has retreated by 2.5m whilst the toe of the cliff has retreated 0.3m. Beach levels at the toe of the cliff have dropped significantly by 1.5m in level. This erosion continues across the upper beach, albeit gradually reducing in magnitude to 0.2m by chainage 97m. Between chainages 97m and 118m, beach lowering is limited to 0.15m. Seawards of chainage 118m the magnitude of lowering increases to up to 1.0m. Compared to the range of the previous surveys, the profile is at a very low level, including the lowest on record between changes 120m and 156m.</p> <p>At profile <b>1bSNS30</b>, the cliff top has retreated 8.3m and the toe of the cliff has advanced by 5.4m. This advancement is a result of the slippage of material from the cliff top. Seawards of the debris pile, the beach has been dominated by lowering. Between chainages 95m and 118m this is limited to 0.5m in level, before increasing in magnitude to 1.1m lowering seawards of chainage 118m. The rocky</p>	

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>foreshore has been exposed seawards of 123m. The profile is at a very low level, particularly along the lower beach where the rocky foreshore has been exposed.</p> <p>At profile <b>1bSNS31</b>, the cliff top has retreated 1.5m and the toe of the cliff has retreated by a similar distance. At the toe of the cliff, the debris pile observed previously has been eroded. Beach lowering dominates the beach profile. Between chainages 94m and 120m this erosion is modest in magnitude, generally limited to 0.3m change in level. Seawards of chainage 120m, the lowering increases to up to 1.3m, exposing a length of rocky foreshore. The profile is at very low level compared to the range of the previous surveys and places the lowest on record (chainage 125m to 150m).</p> <p>At profile <b>1bSNS32</b>, the cliff top has not retreated, the toe of the cliff has retreated 2.6m. Seawards of the cliff, the beach has been dominated by erosion echoing the pattern observed in Profile 1bSNS31. Between chainage 94m and 120m this erosion is modest in magnitude generally limited to 0.3m. Seawards of chainage 120m, the erosion increases to up to 1m, exposing a length of rocky foreshore. The profile is at very low level compared to the range of the previous surveys, and places the lowest on record (chainage 124m to 148m).</p> <p>At profile <b>1bSNS33</b>, the cliff top has retreated 0.7m, but the toe of cliff has not changed. Beach levels at the of the cliff have dropped locally by 0.3m tapering to no change by chainage 66m. Seawards of chainage 80m the beach profile has steepened significantly resulting in a drop in level by chainage 108m of 1.5m. As a result, the beach is at a low level when compared to the range of the previous surveys.</p>	
19 <sup>th</sup> April 2024	<p><b>Cliff-top Survey:</b></p> <p>32 ground control points (numbered 1-32) were established along the cliff top between Hendon and Ryhope in March 2009, with a further three (28A, 28B and 28C) added in September 2009 (Figure 3). <i>Note: the numbering of ground control points is not intended to correlate with that of the beach profile lines.</i> Measurements are taken from each ground control point along a fixed bearing to the edge of the cliff top. These cliff top surveys are undertaken bi-annually and are intended to inform on erosion rates of the sea cliffs extending from the defended industrial areas at Hendon southwards along the undefended cliffs to Ryhope Dene. The results from the cliff top monitoring are anticipated to have an accuracy of <math>\pm 0.2\text{m}</math> due to the technique used.</p>	<p><b>Longer term trends:</b> The annual average rate of retreat across the 32 control points varies from 0.00m/yr. to 0.85m/yr.</p> <p>The average rate of retreat across the defended section in the north (control points 1 to 7) is 0.00m/yr. compared to the rate across the undefended section in south (control points 8 – 32) is 0.42m/yr.</p> <p>It is clear from the data that actually the area of greatest activity is the cliffs fronting Halliwell Banks (Control points 24 to 32) where there is an average</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>Appendix B – Table B1 presents the results from the April 2024 survey, providing a comparison from both the previous survey (September 2023) and the Baseline survey (March 2009 – or September 2009 for points 28A, 28B and 28C). The table shows that since the previous survey 12 of the 32 Control Points have experienced a retreat greater than margin error of the surveying technique (0.2m). Of these seven have occurred in the approximate 1km length fronting Halliwell Banks at the southern end of the frontage. This includes significant losses at Point 28B (4.77m) and 28C (2.01m), indicating a period of significant activity. This is area remains a focus of concern due to the historic landfill activity in the hinterland behind the cliff line, a concern reiterated by the surveyor’s report that noted ‘oily substance leeching from the eroded cliff face’ in this location.</p>  <p><i>Figure 5 – Oily leachate at Halliwell banks.</i></p>	<p>rate of retreat of 0.52m/yr. This frontage also contains four of the five control points with the greatest rate of retreat namely;</p> <ol style="list-style-type: none"> <li>1. Control Point 25 – 0.85m/yr.</li> <li>= Control Point 27 – 0.85m/yr.</li> <li>3. Control Point 21 – 0.82m/yr. (outside area)</li> <li>4. Control Point 26 – 0.74m/yr.</li> <li>5. Control Point 31 – 0.68m/yr.</li> </ol>

### **3. Problems Encountered and Uncertainty in Analysis**

No problems were encountered.

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

No changes are recommended at the present time.

### **5. Conclusions and Areas of Concern**

- At Whitburn Bay, the beach has dropped notably over the winter of 2023/24, with the levels across all three profiles now at very low levels, and in places the lowest levels on record.
- Along the defended section at Hendon, beach levels have generally dropped significantly in response to the storms over the winter of 2023/24. One 25m length of rocky foreshore on profile 1bSNS8 has been exposed, an occurrence that has only been recorded once before in the 13 years of the monitoring record. In contrast, profile 1bSNS11 has accreted. It is thought this is a very local accretion as a result of the influence of the protruding breakwater protecting the slipway. The possible movement of an armour stone in this profile highlights the significance of the recent storms.
- Along Halliwell banks, both the cliff top survey and topographic profiles indicate that the cliffs have experienced significant erosion since the September 2023. This high level of cliff activity coincides, and is possibly as a result of, very low beach levels particularly across the lower beach where the rocky foreshore is exposed. Halliwell Banks remains a focus of concern due to the historic landfill activity in the hinterland behind the cliff line, a concern reiterated by the surveyor's report that noted 'oily substance leeching from the eroded cliff face' in this location.

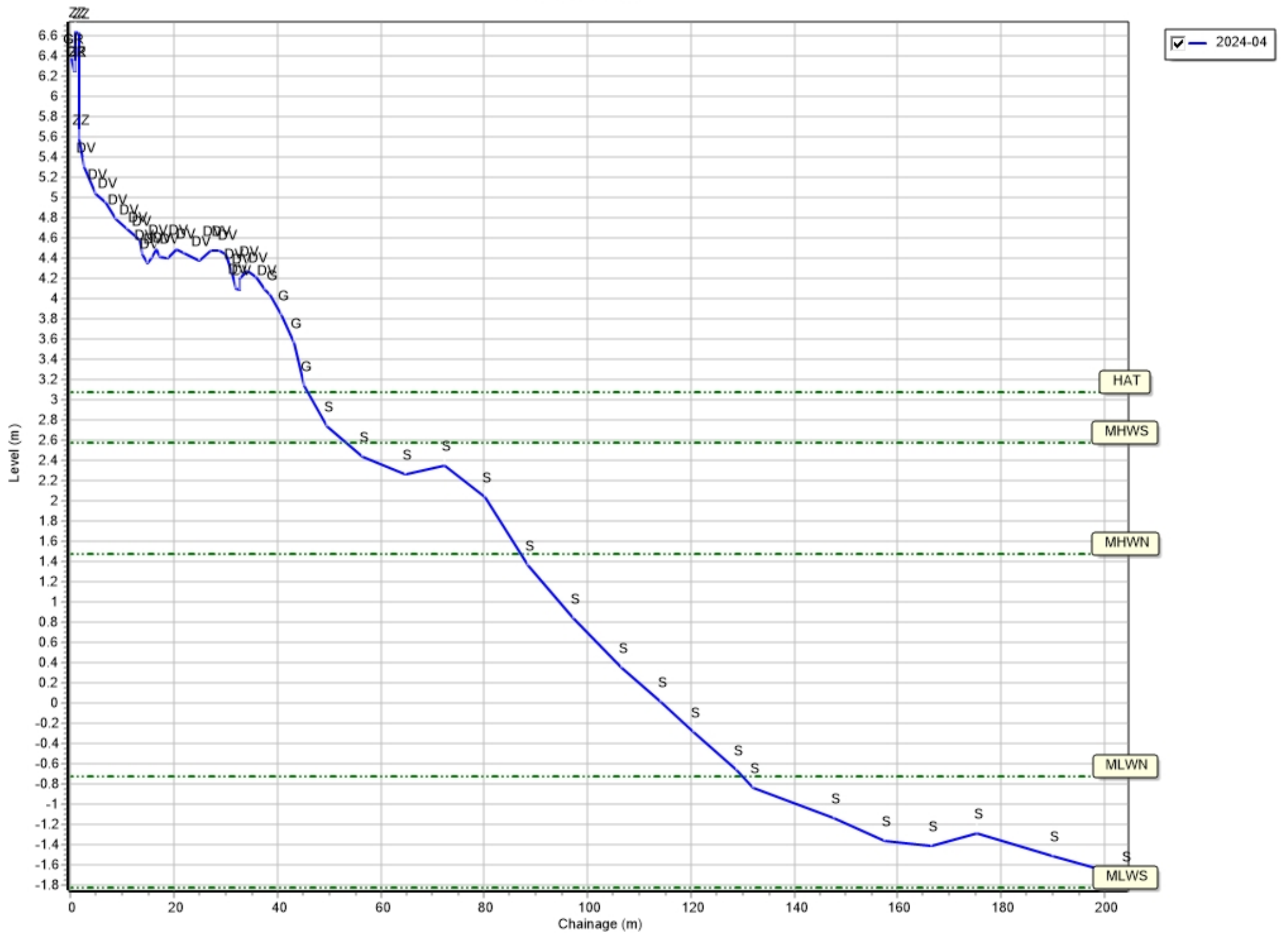
## **Appendices**

**Appendix A**  
**Beach Profiles**

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

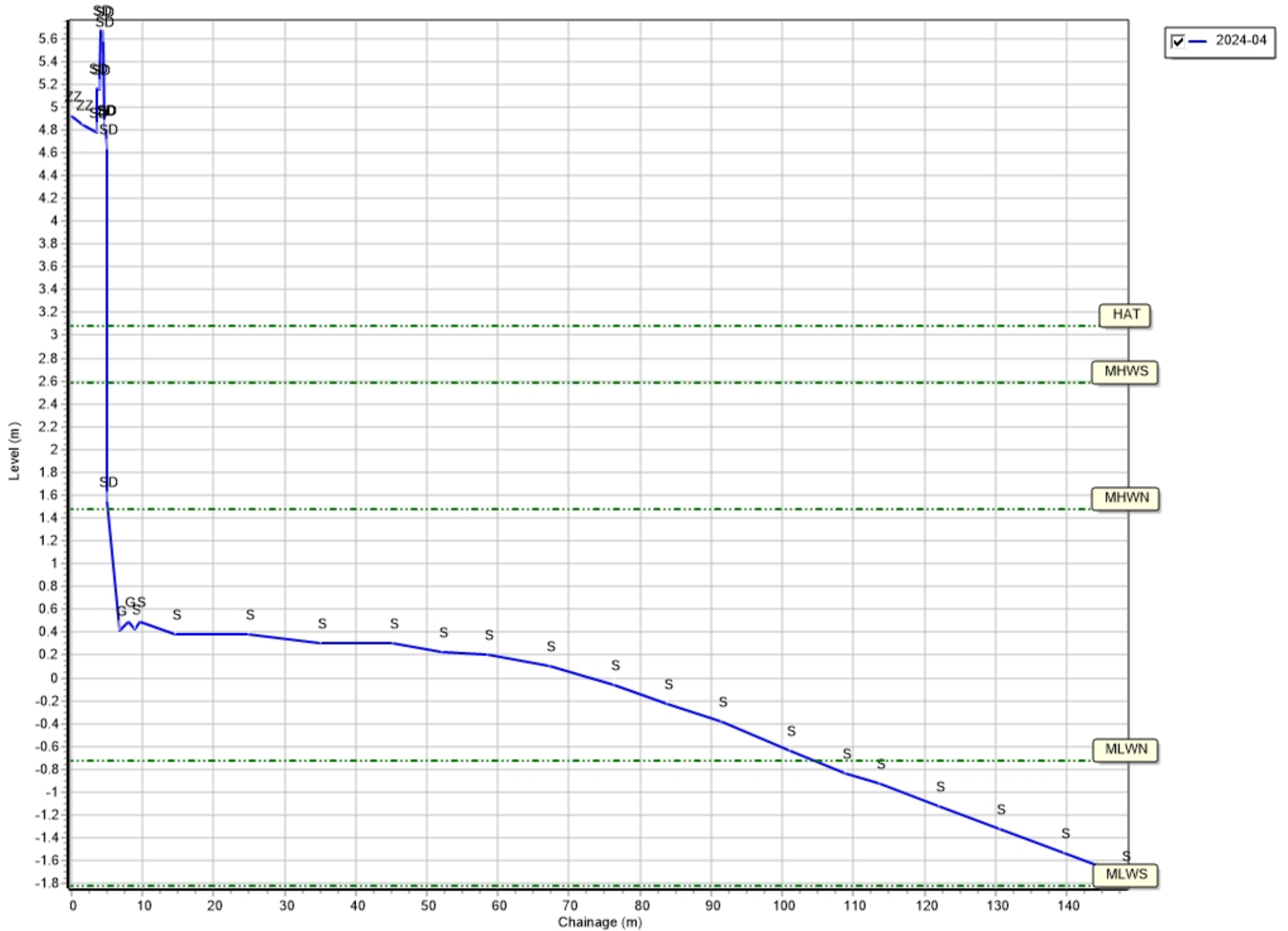
<b>Code</b>	<b>Description</b>
S	Sand
M	Mud
G	Gravel
GS	Gravel & Sand
MS	Mud & Sand
B	Boulders
R	Rock
SD	Sea Defence
SM	Saltmarsh
W	Water Body
GM	Gravel & Mud
GR	Grass
D	Dune (non-vegetated)
DV	Dune (vegetated)
F	Forested
X	Mixture
FB	Obstruction
CT	Cliff Top
CE	Cliff Edge
CF	Cliff Face
SH	Shell
ZZ	Unknown

# Profiles: 1bSNN1

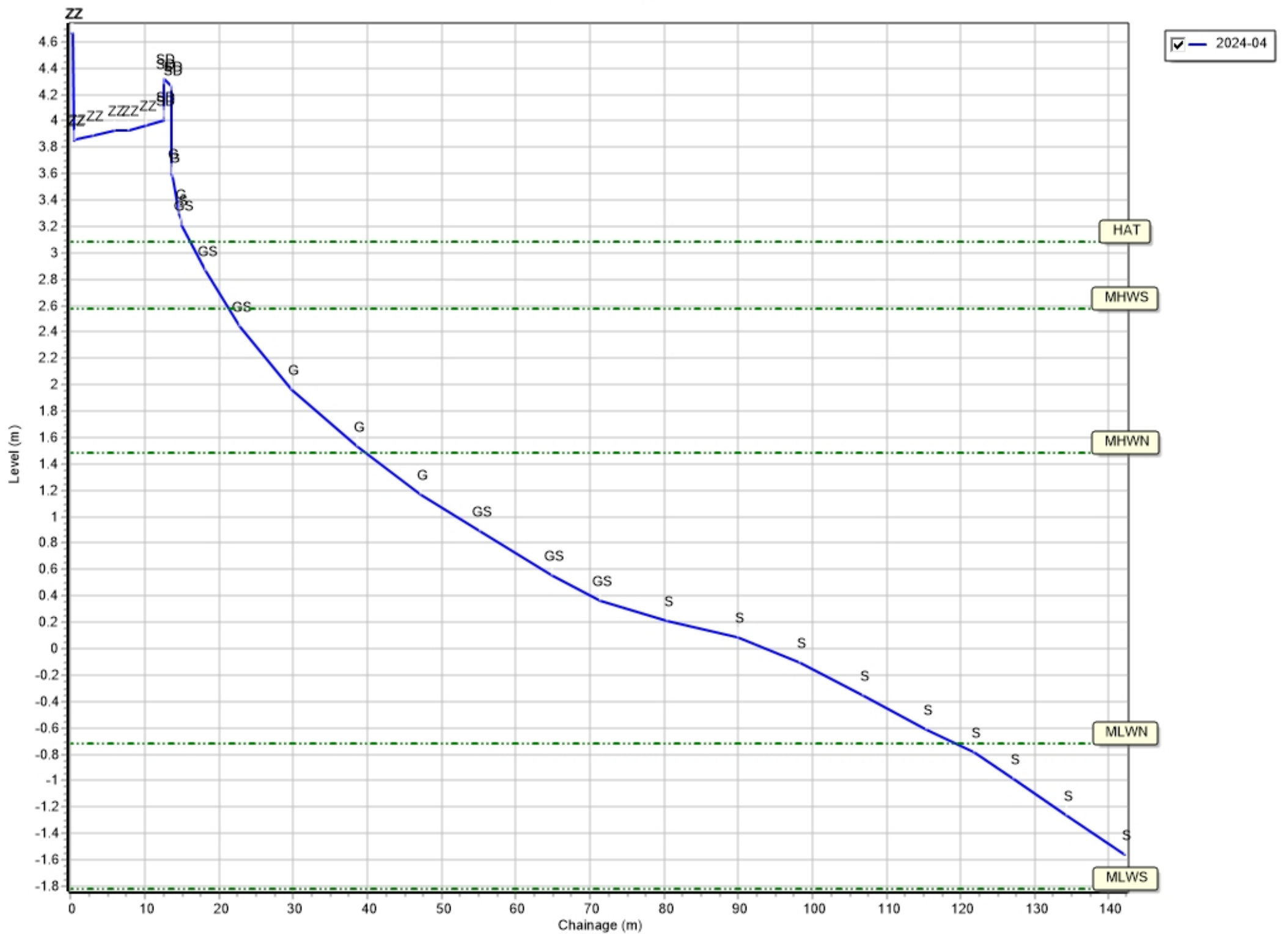




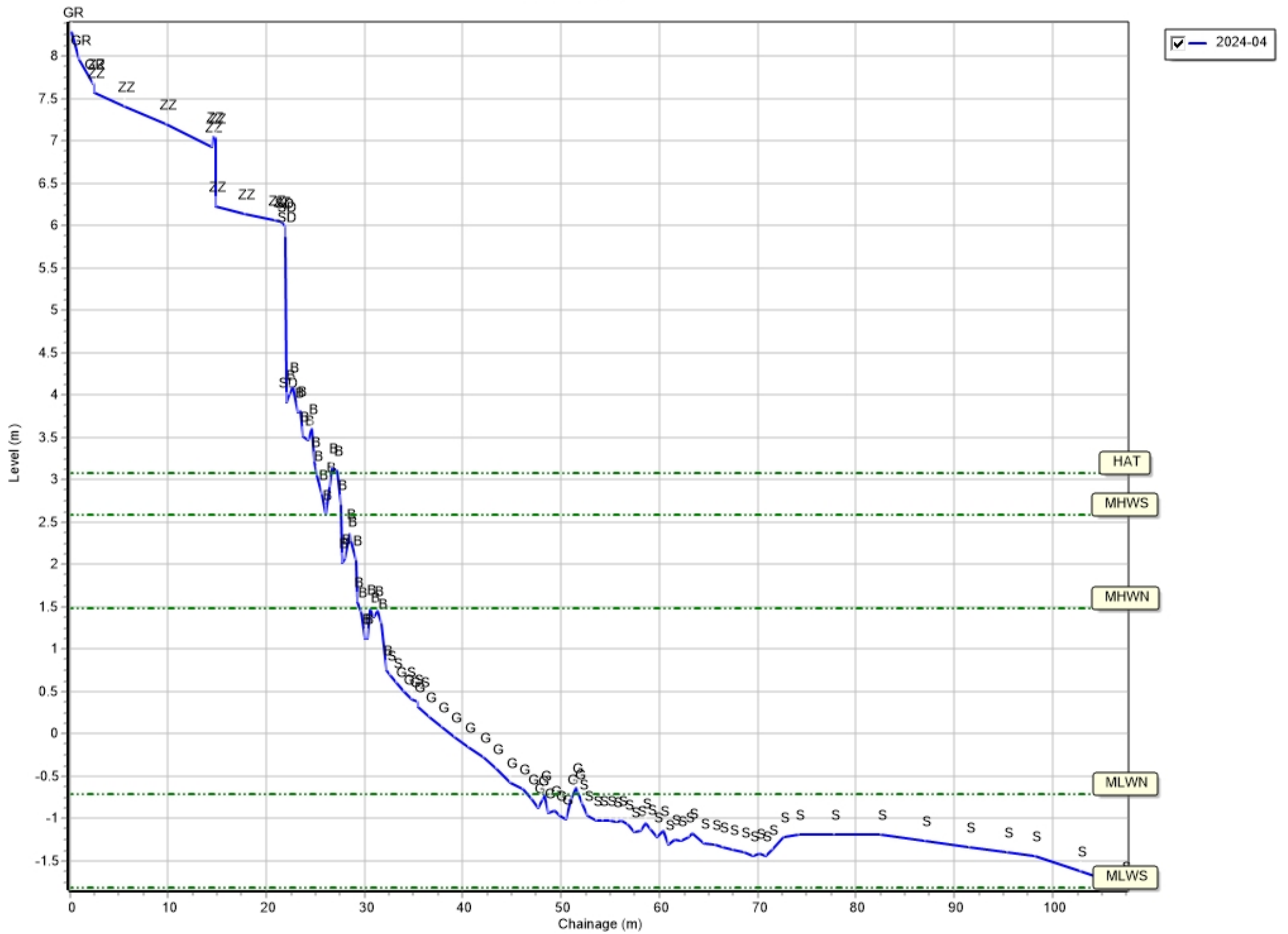
# Profiles: 1bSNN7



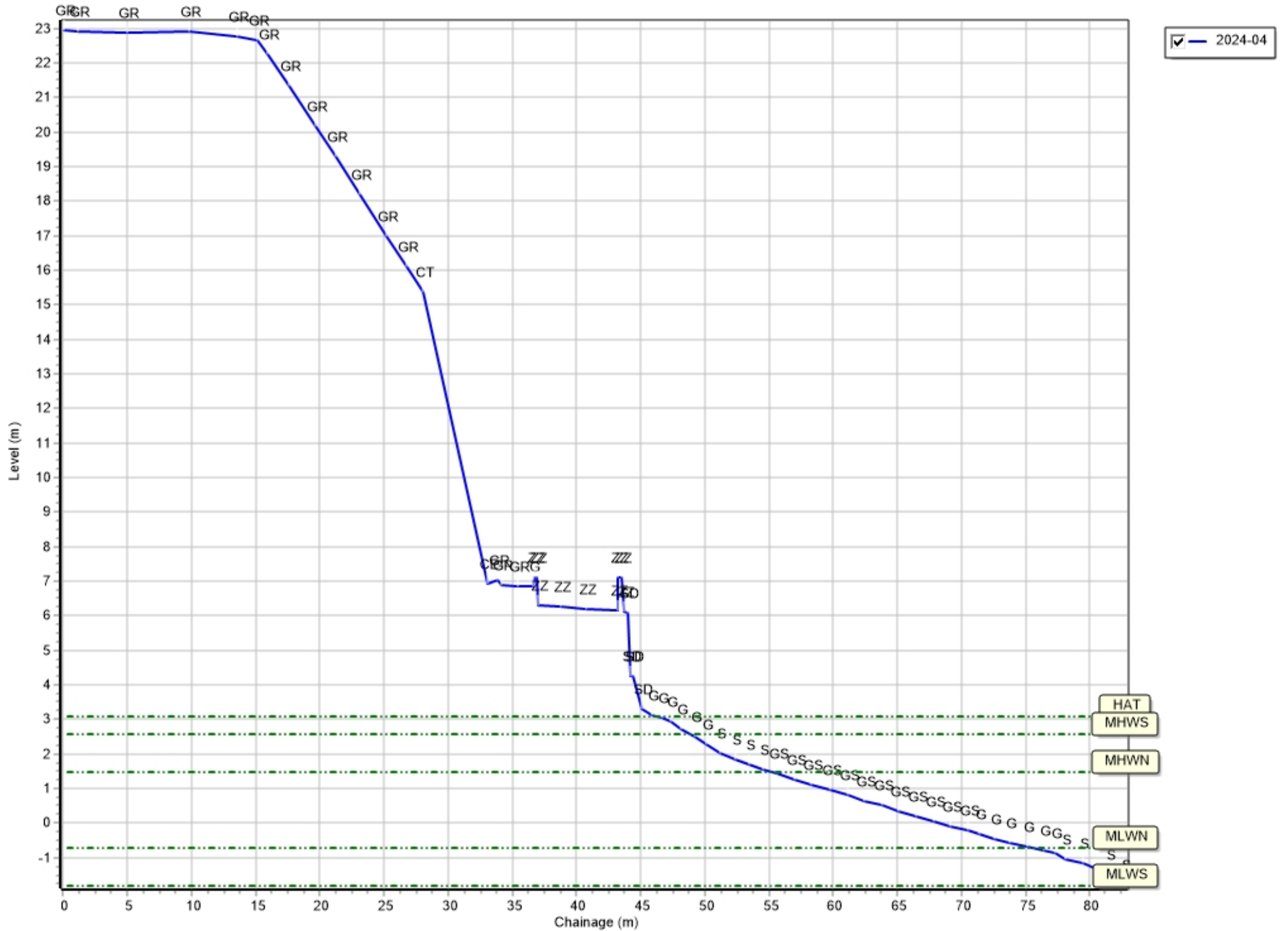
# Profiles: 1bSNN10



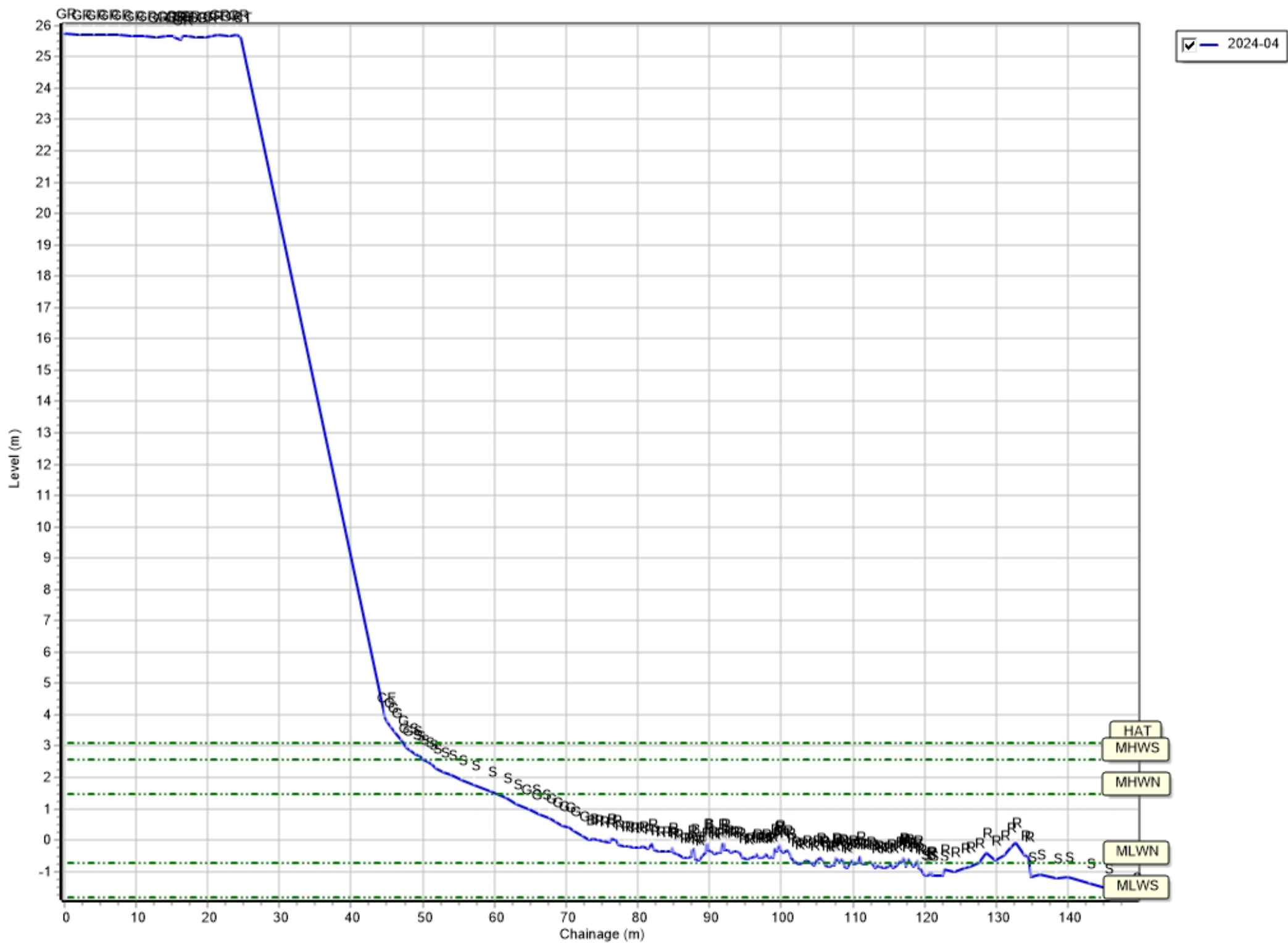
# Profiles: 1bSNS8



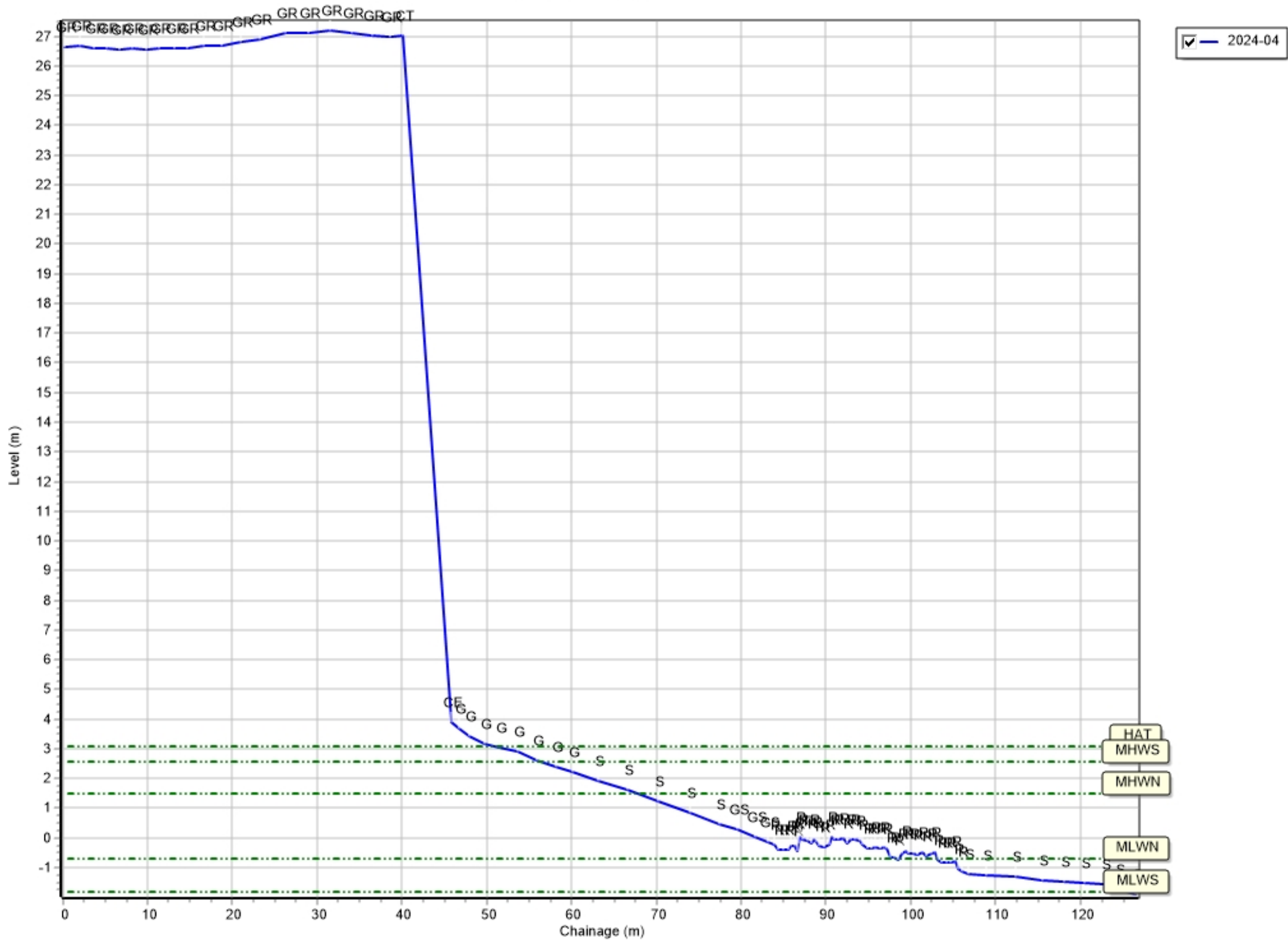
# Profiles: 1bSNS11



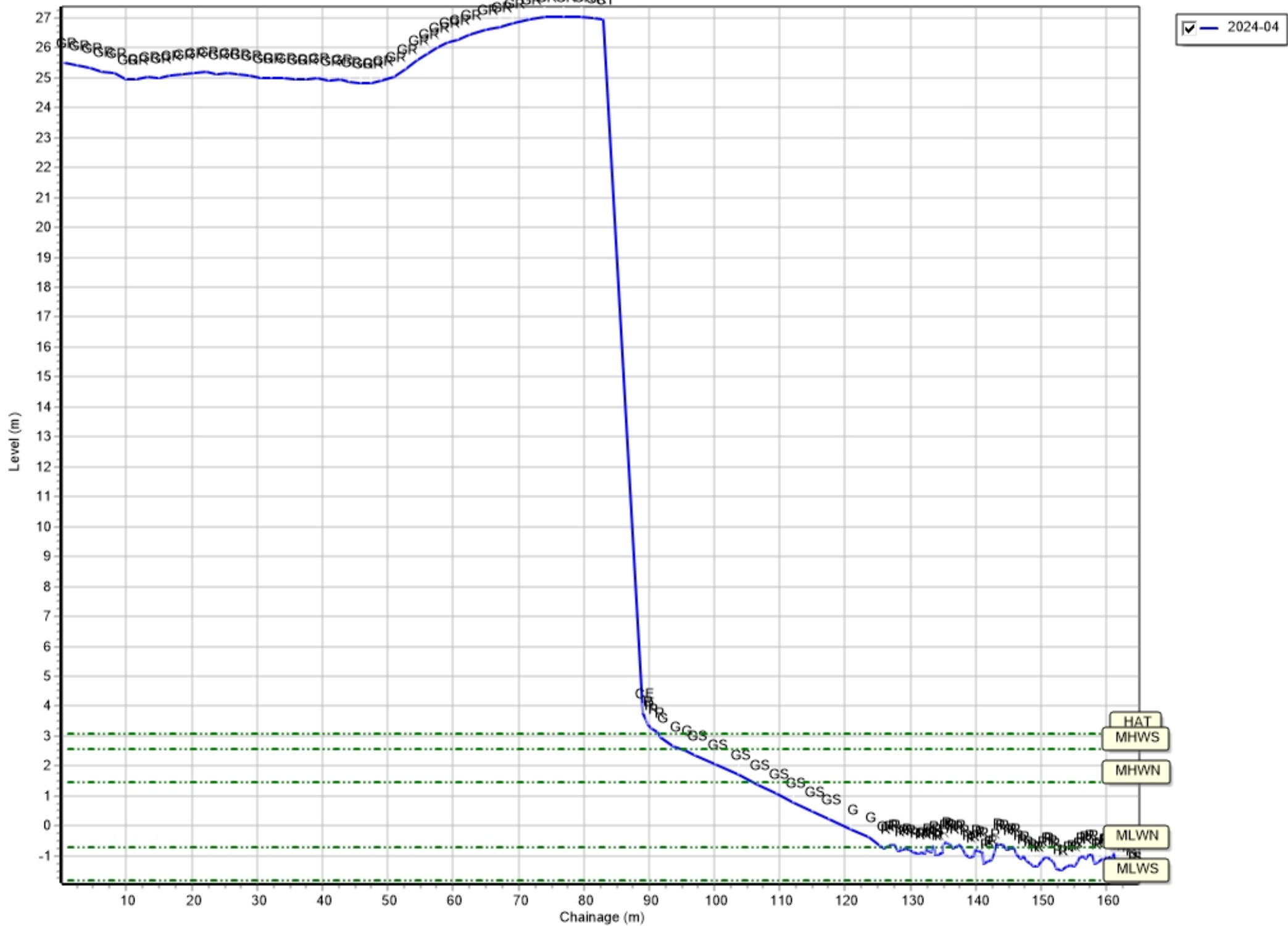
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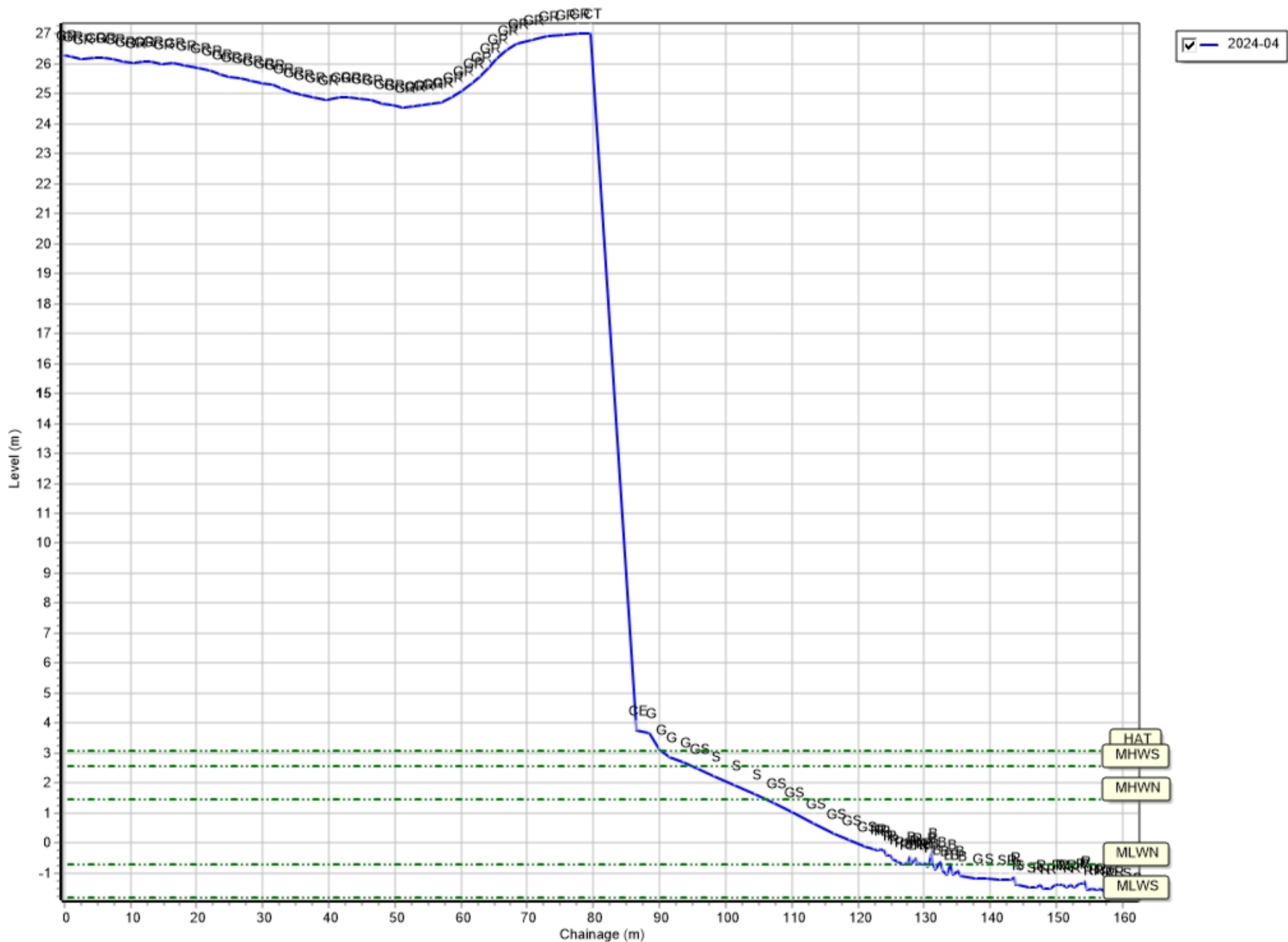
# Profiles: 1bSNS25



# Profiles: 1bSNS26

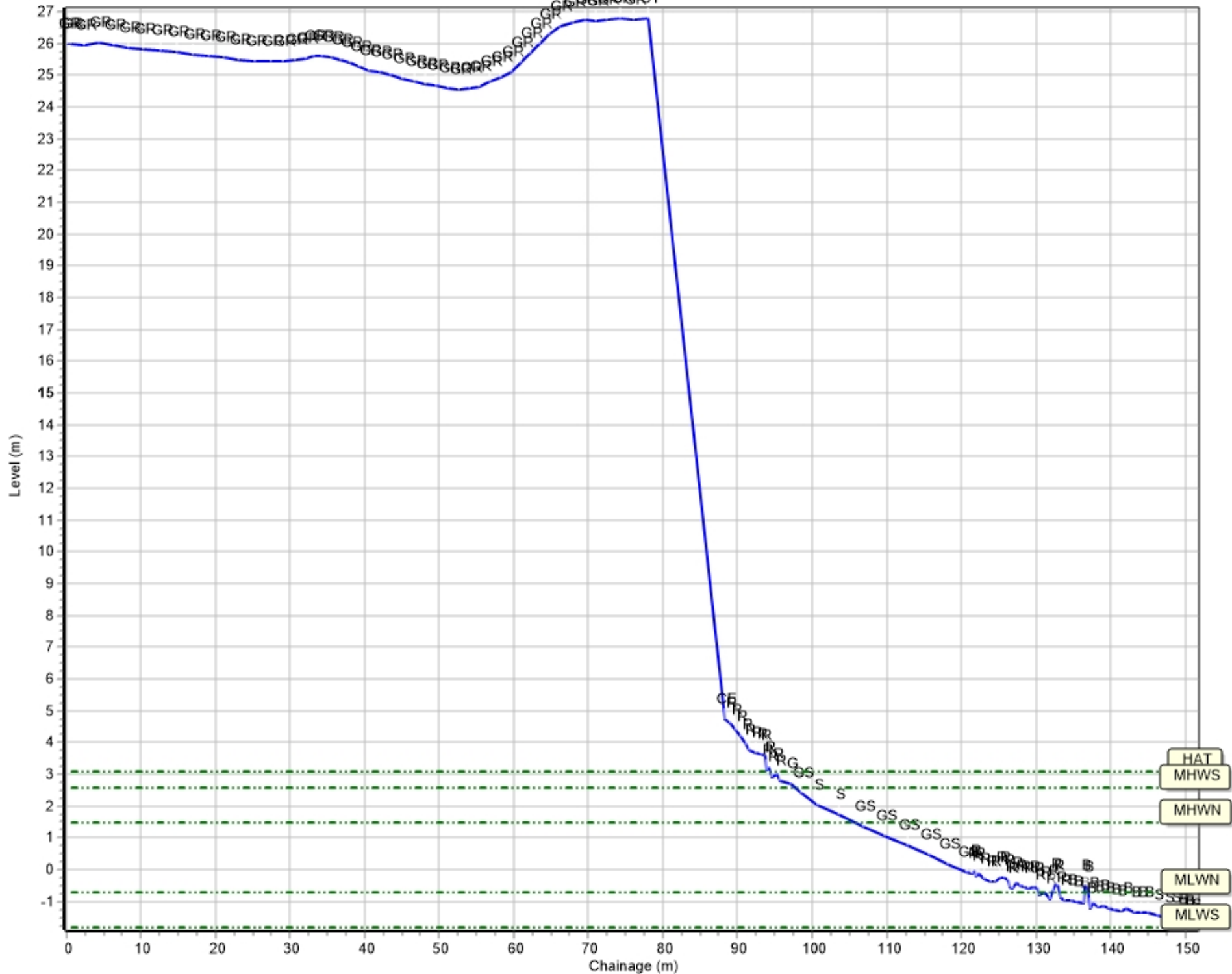


# Profiles: 1bSNS27



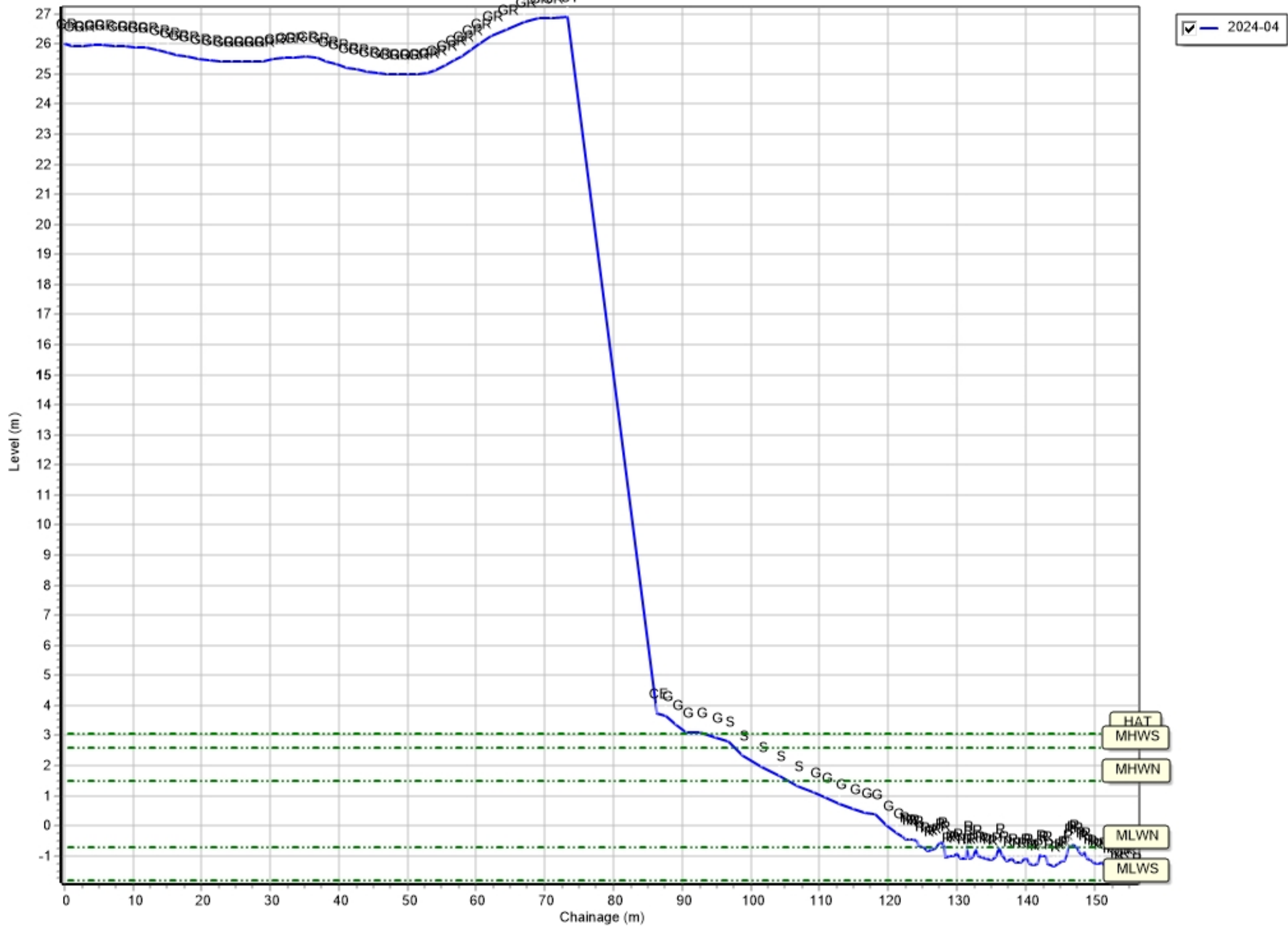


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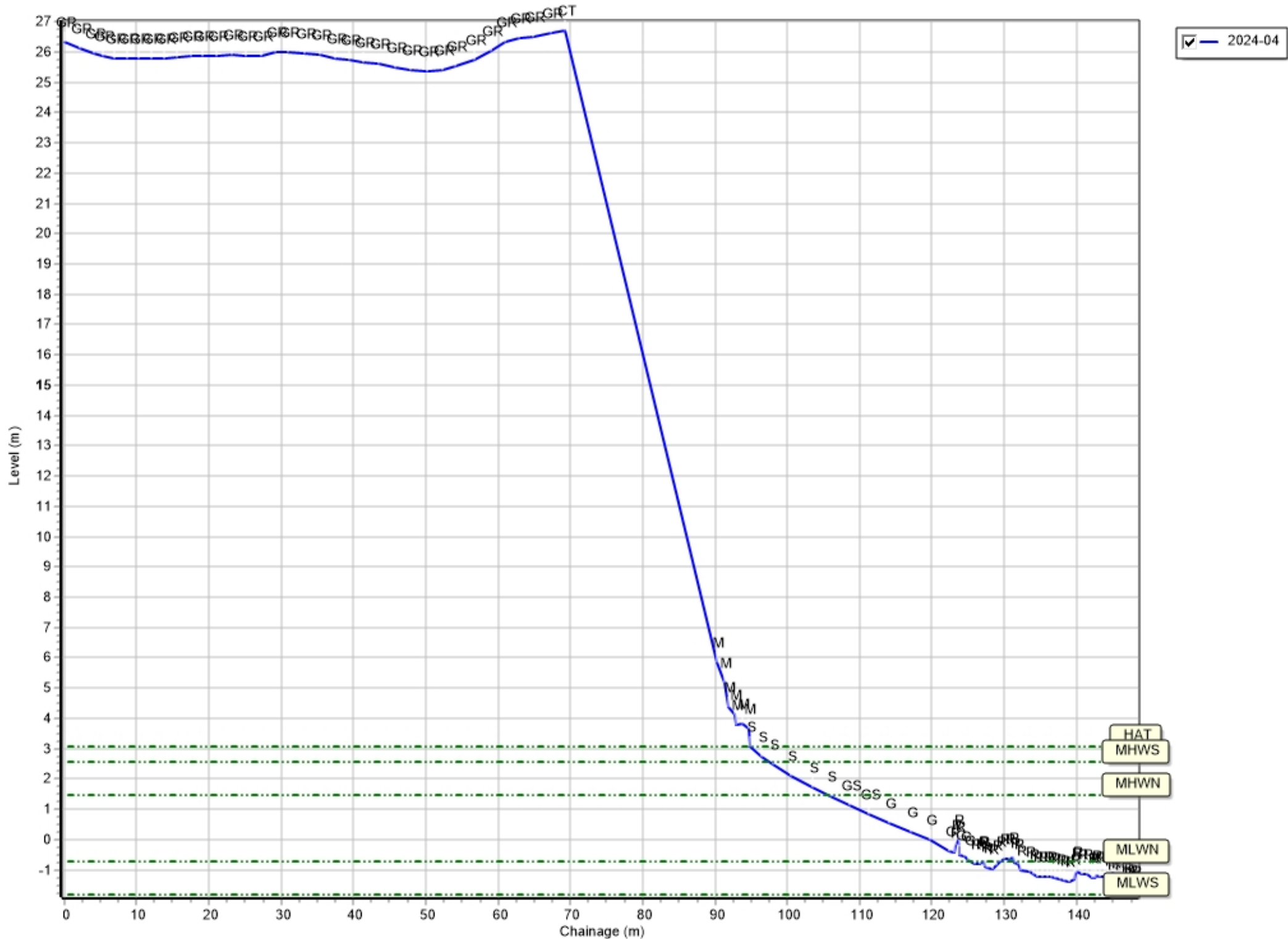


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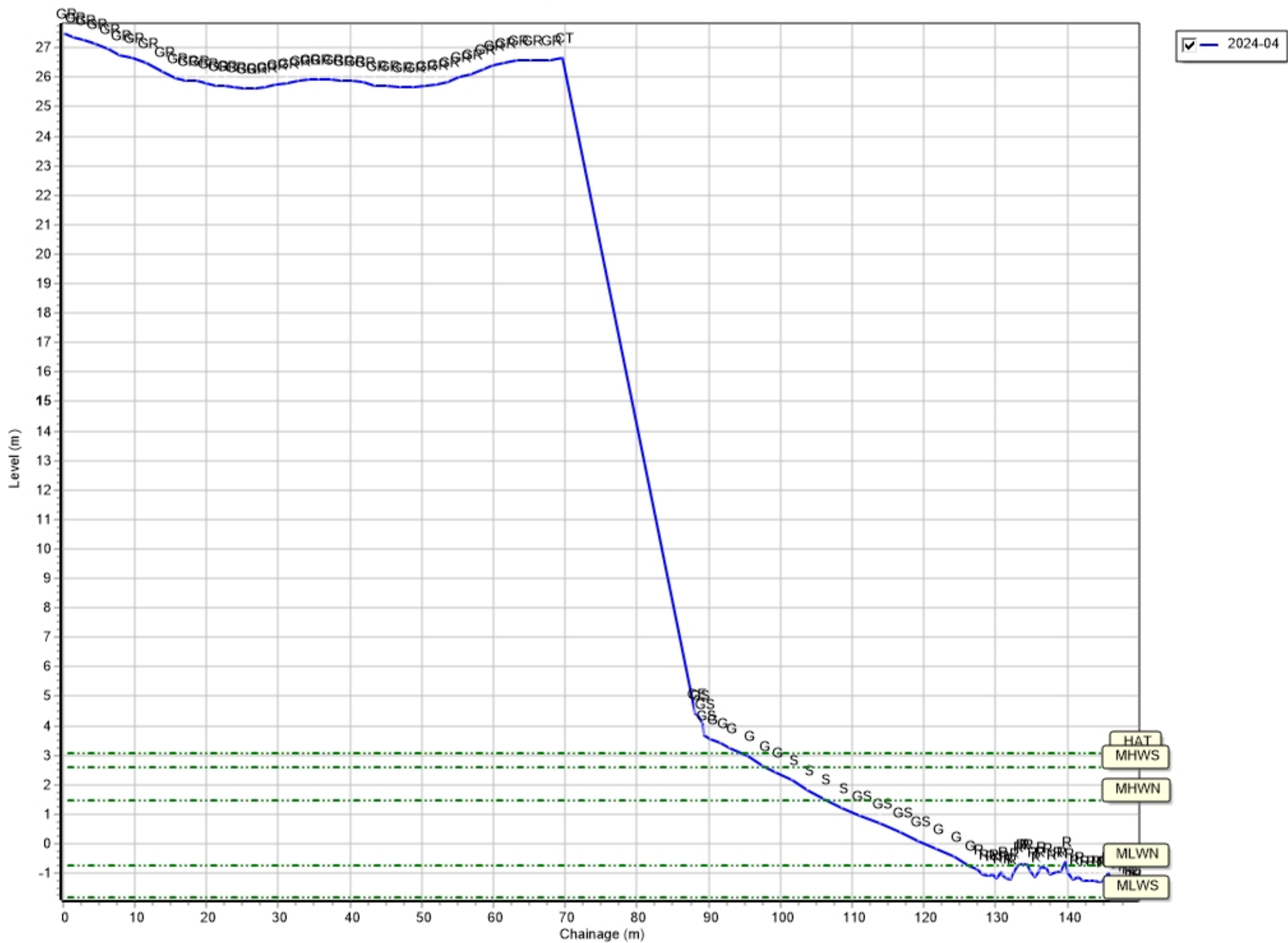
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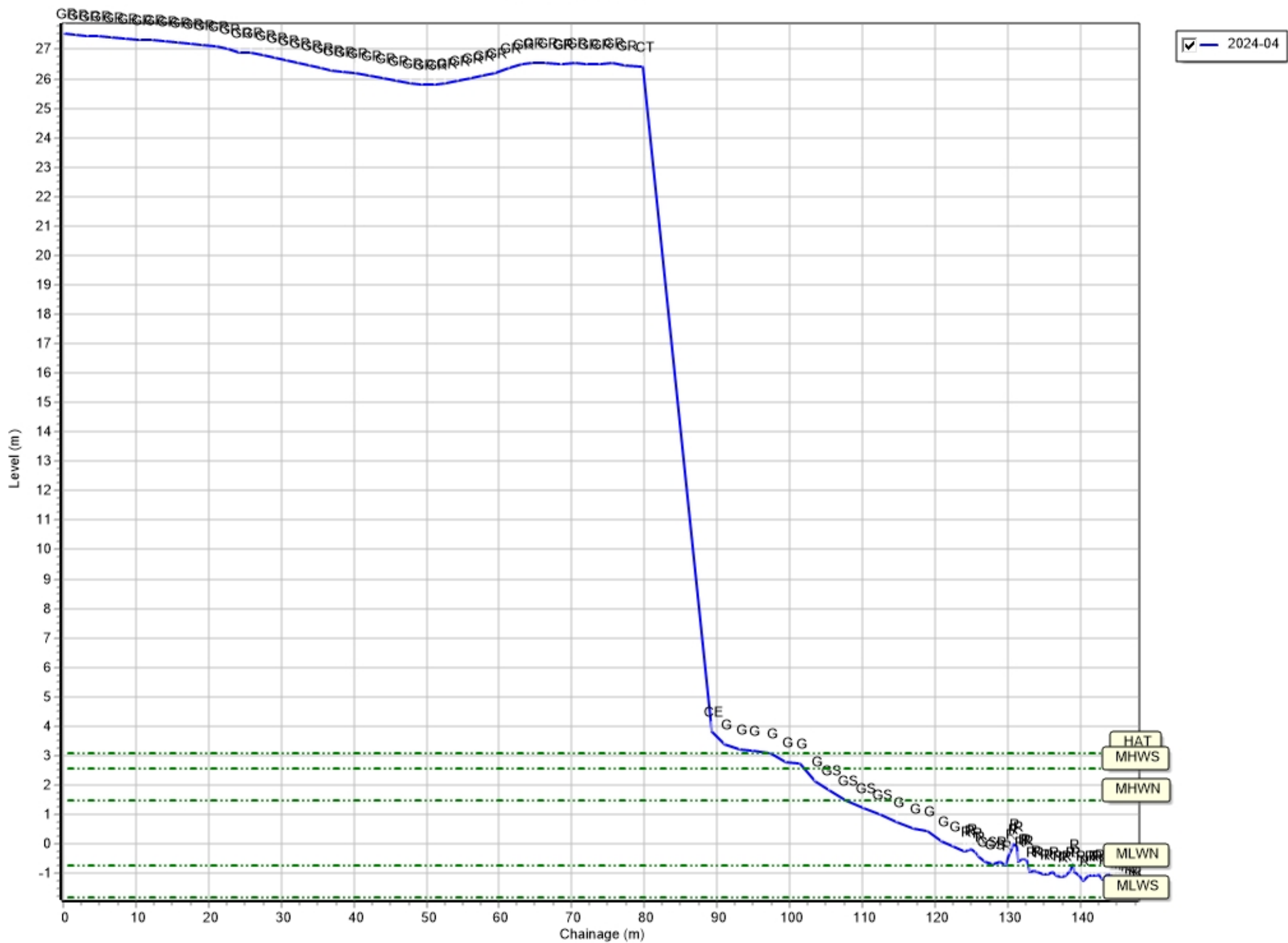
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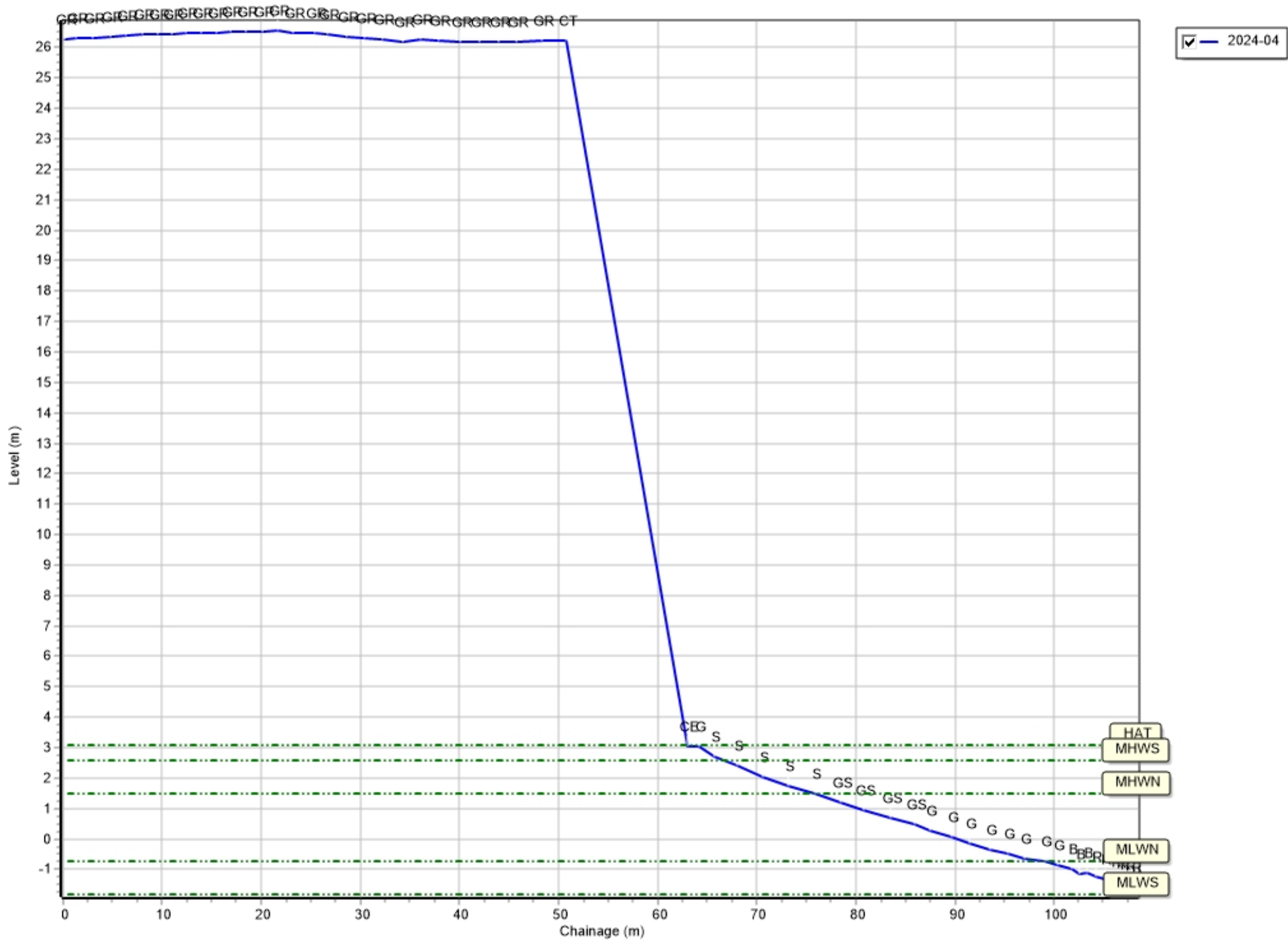
# Profiles: 1bSNS31



# Profiles: 1bSNS32



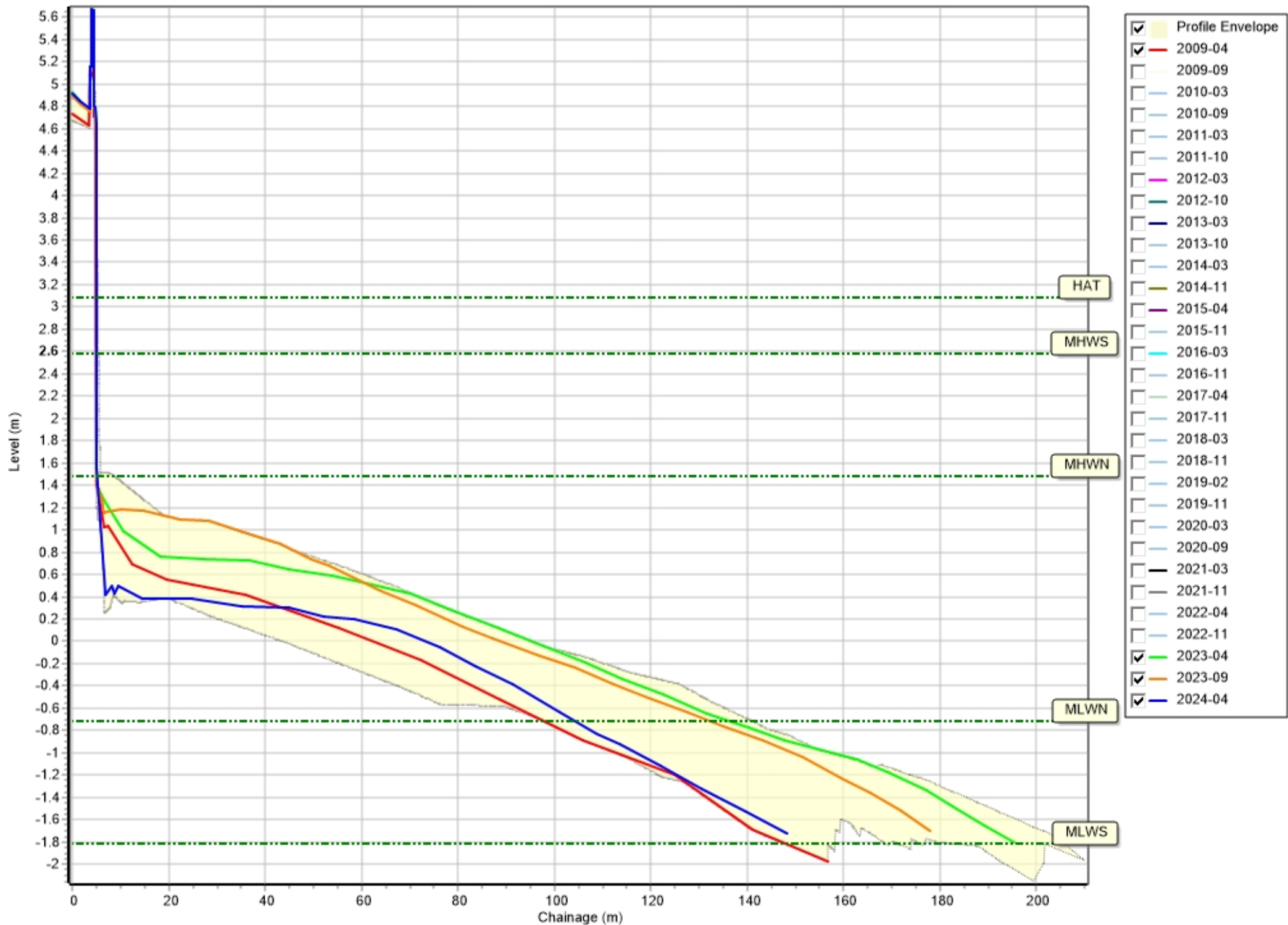
# Profiles: 1bSNS33



Profiles: 1bSNN1

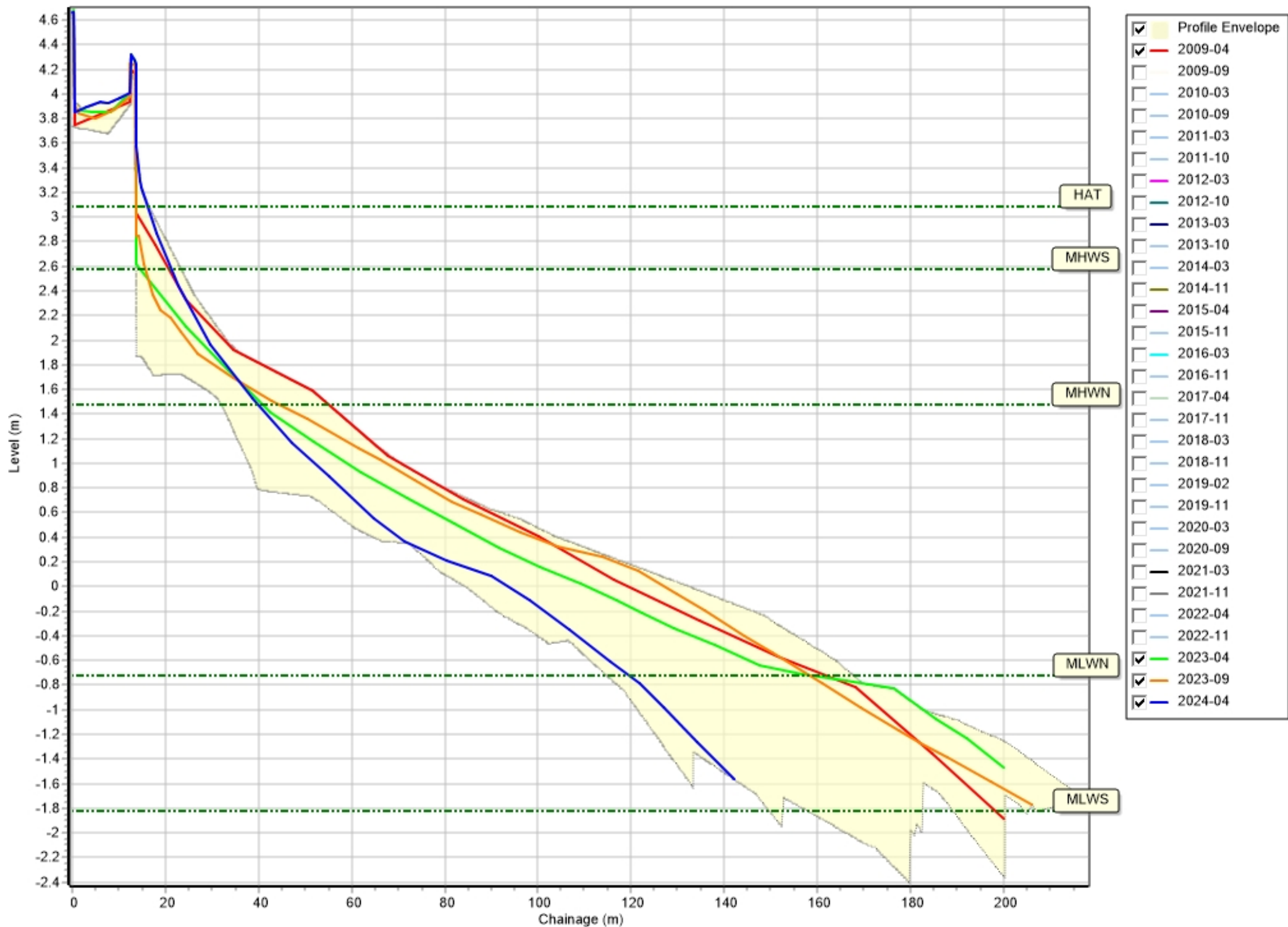


Profiles: 1bSNN7

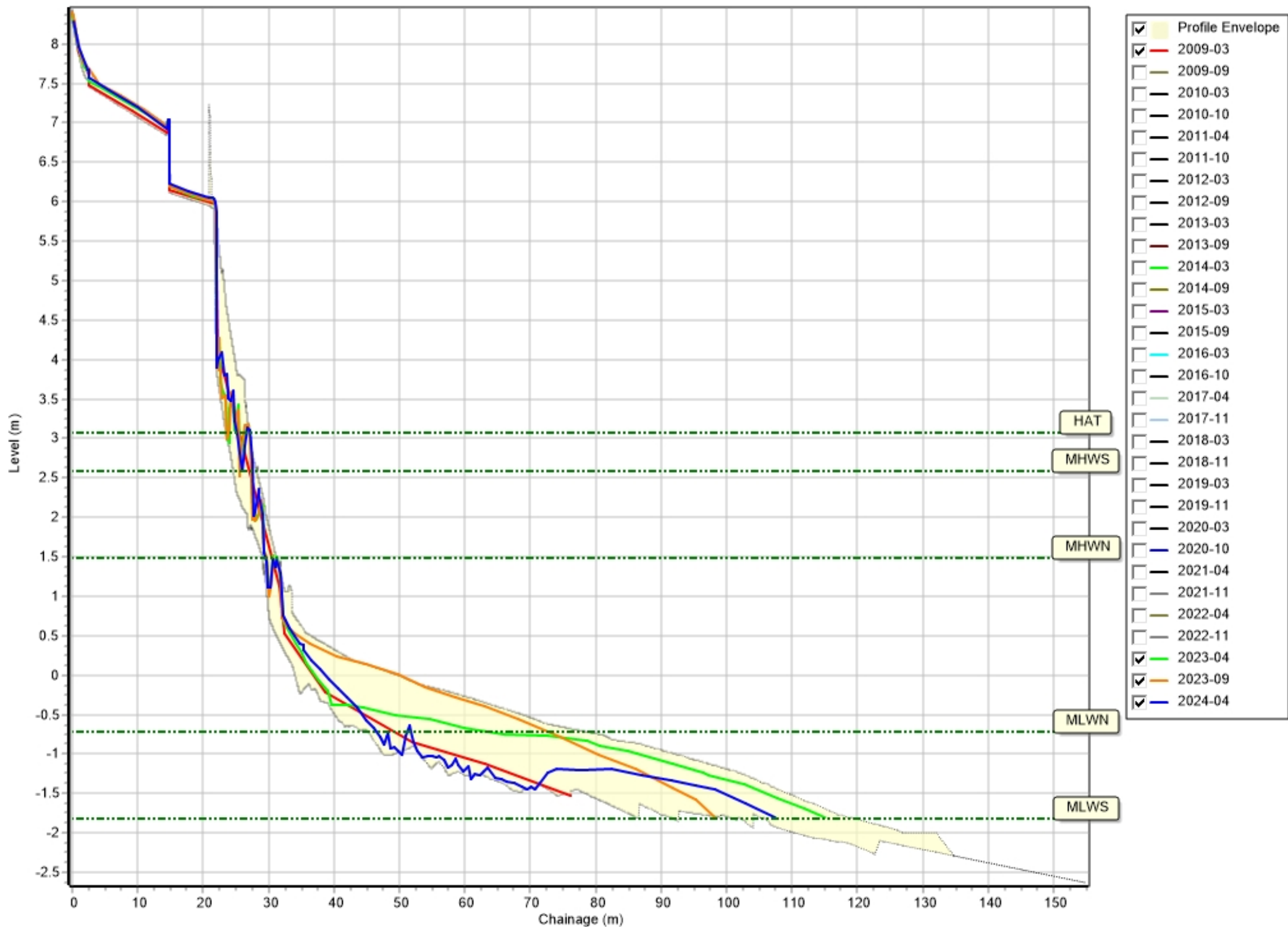




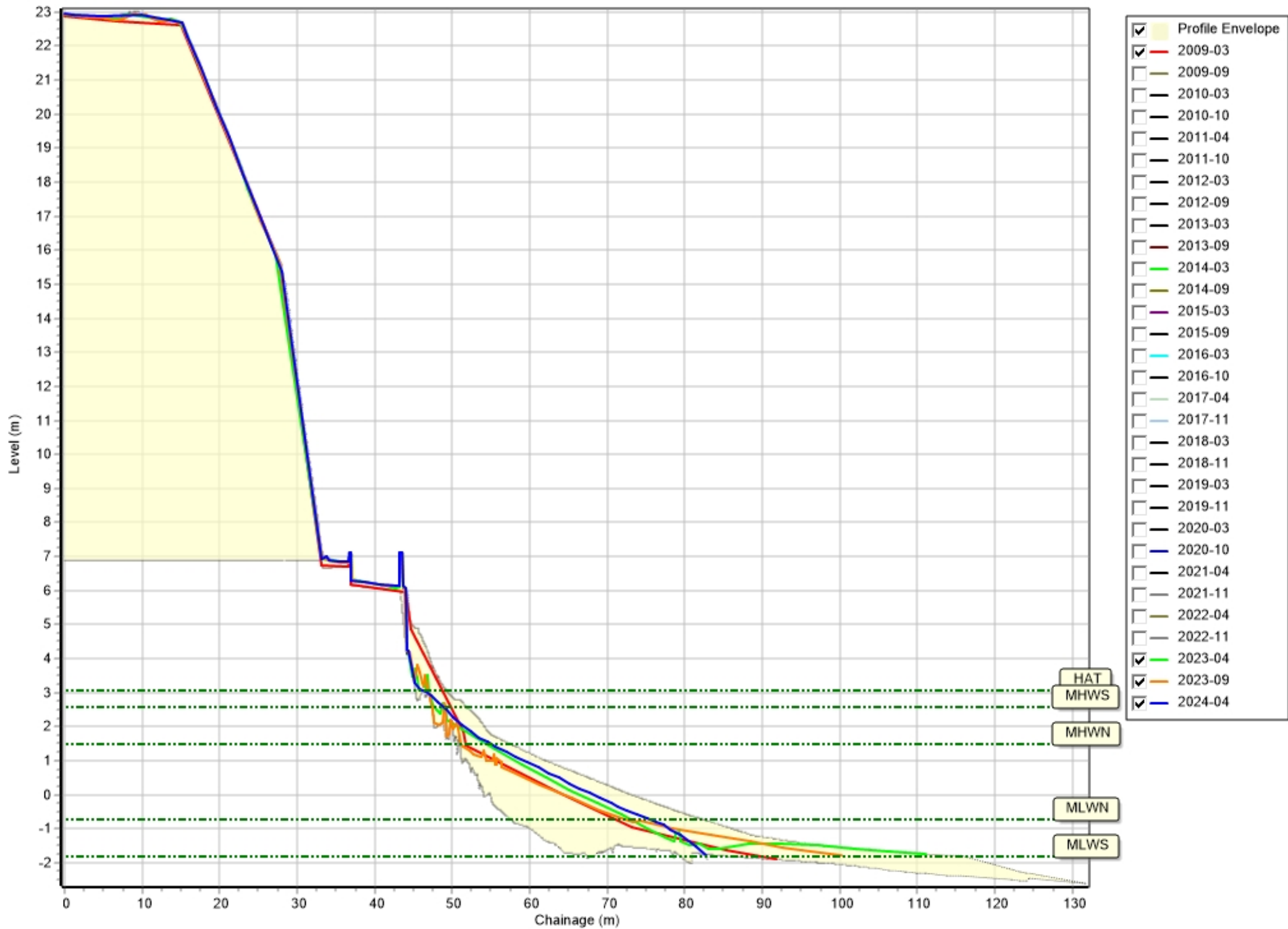
Profiles: 1bSNN10



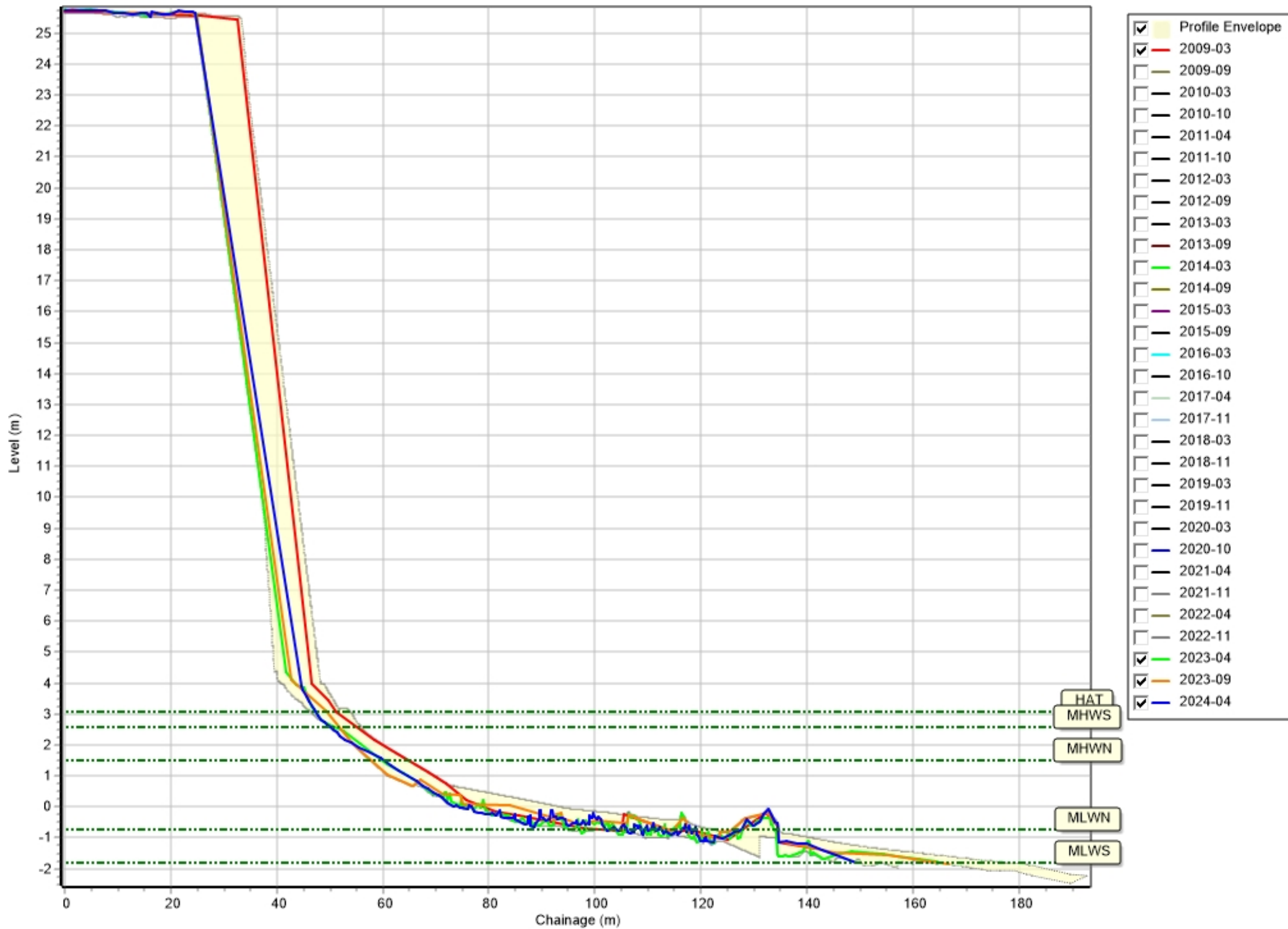
Profiles: 1bSNS8



# Profiles: 1bSNS11

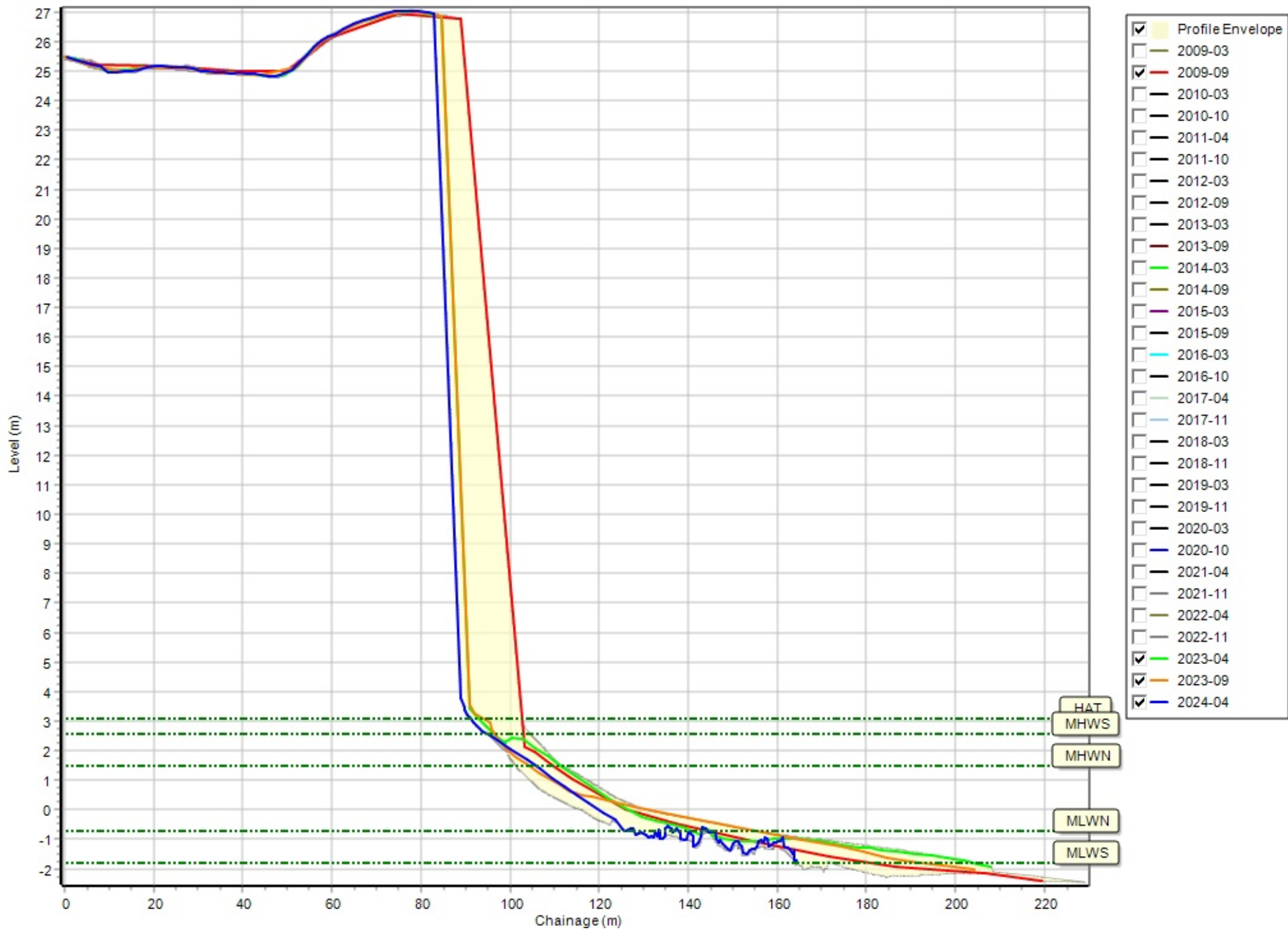


# Profiles: 1bSNS20

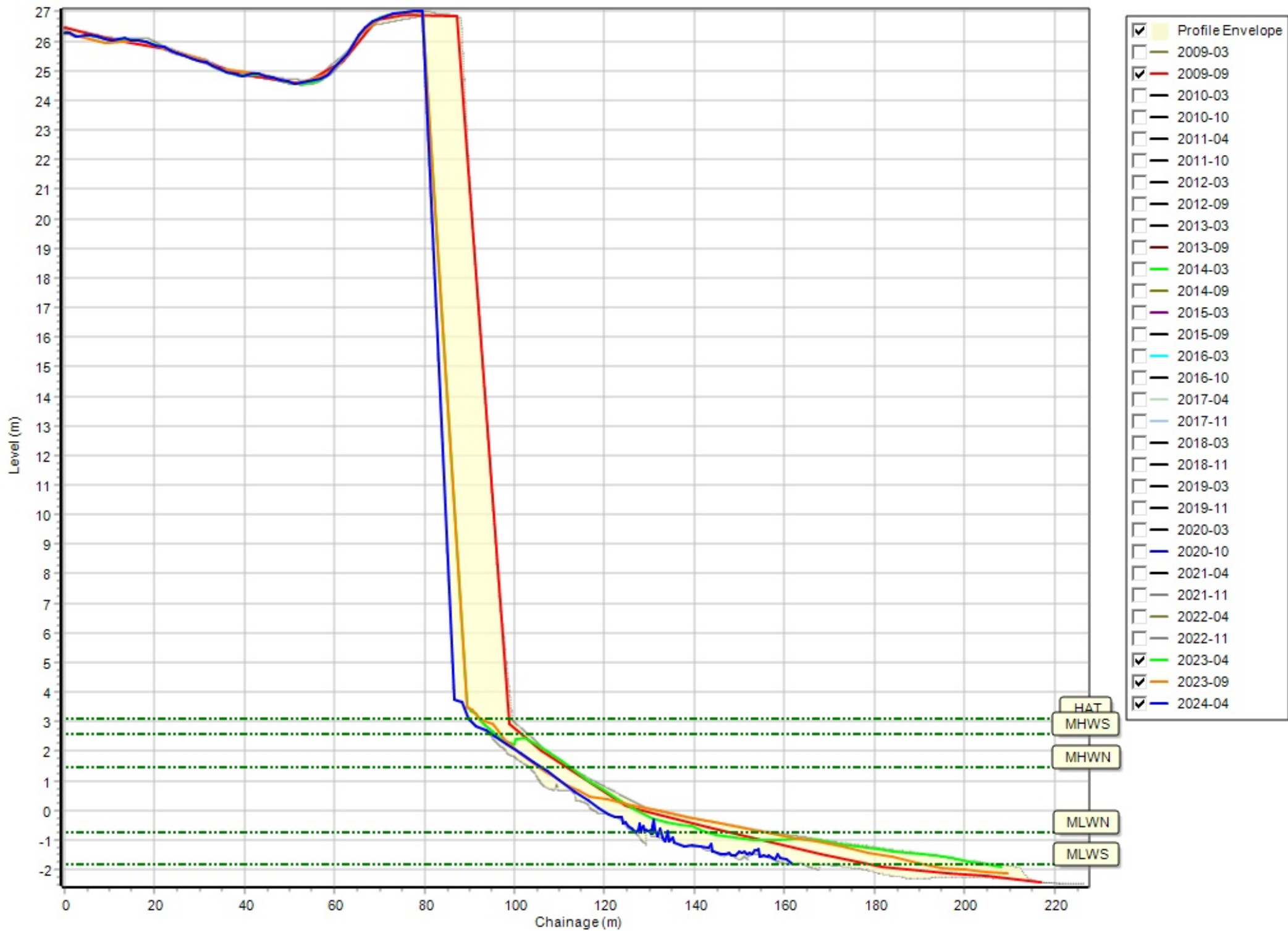




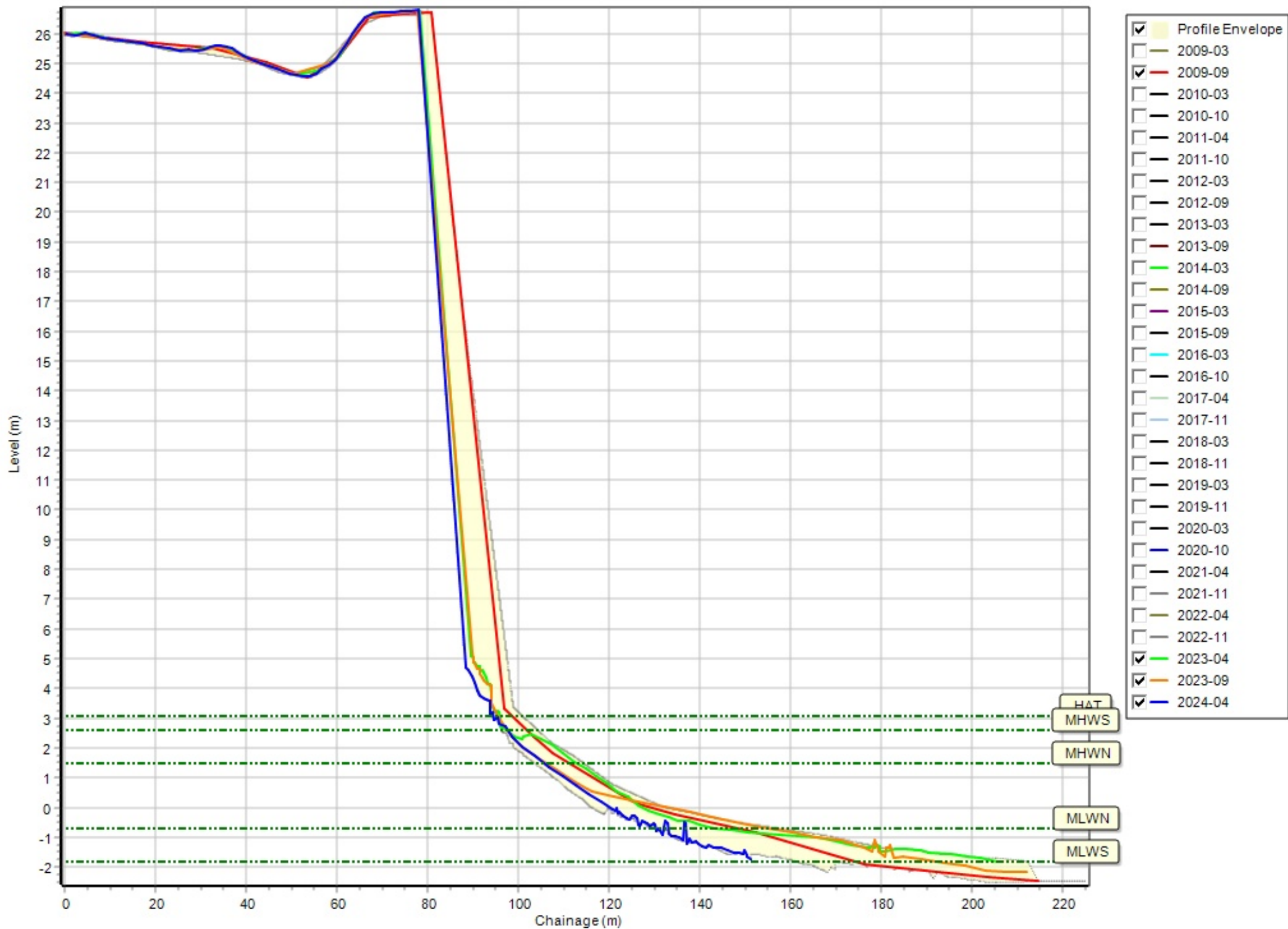
Profiles: 1bSNS26



# Profiles: 1bSNS27

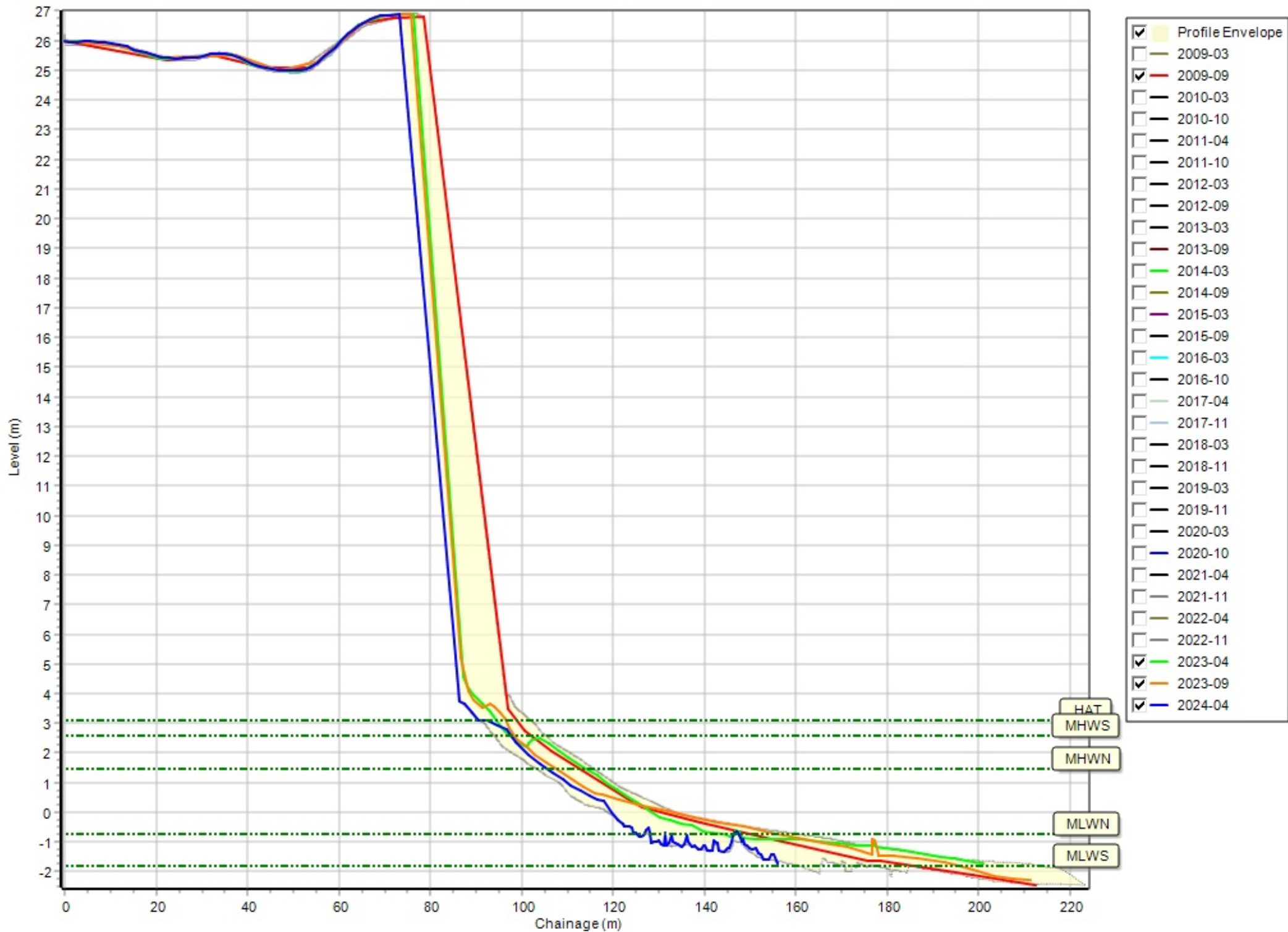


Profiles: 1bSNS28

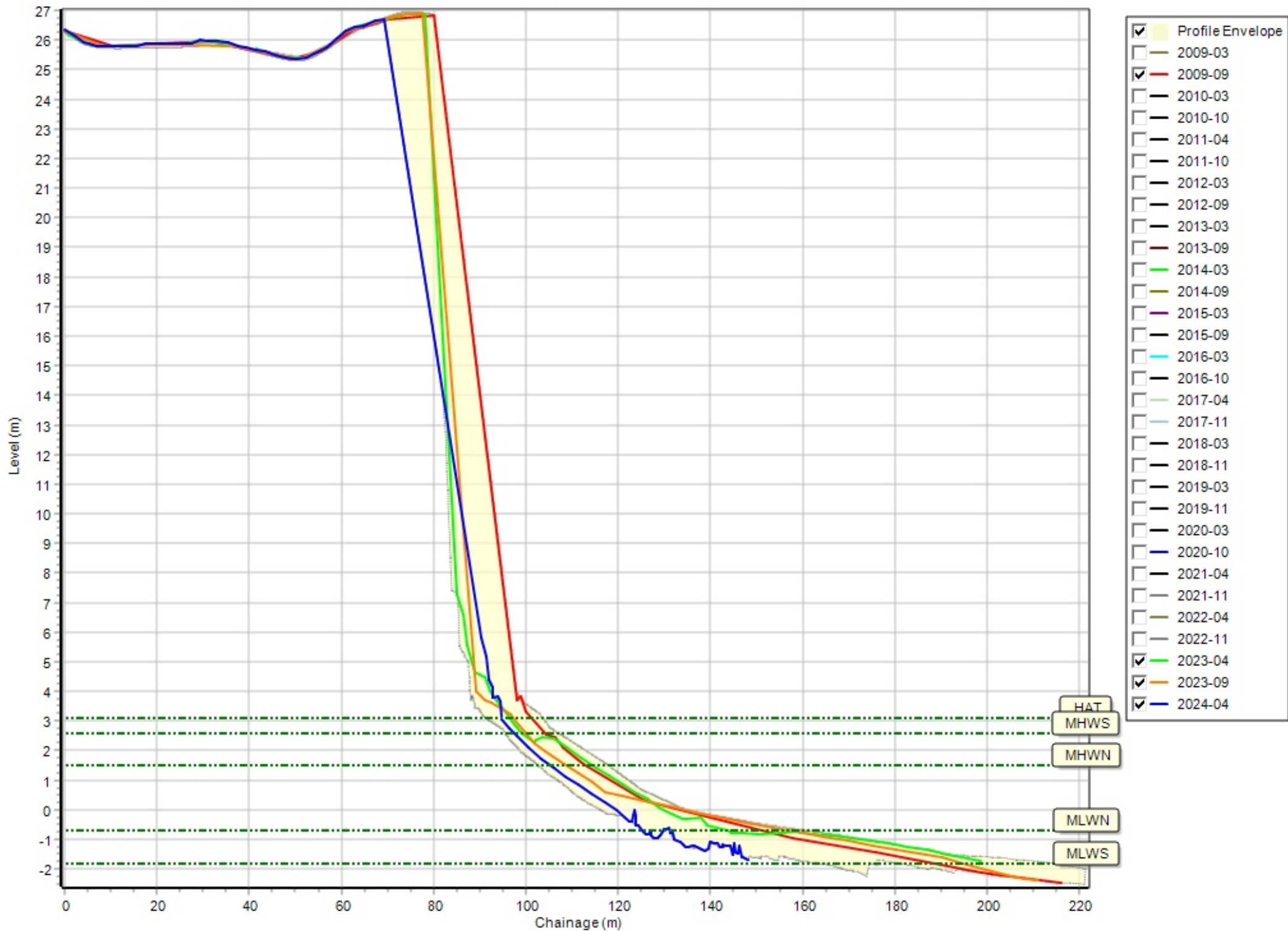




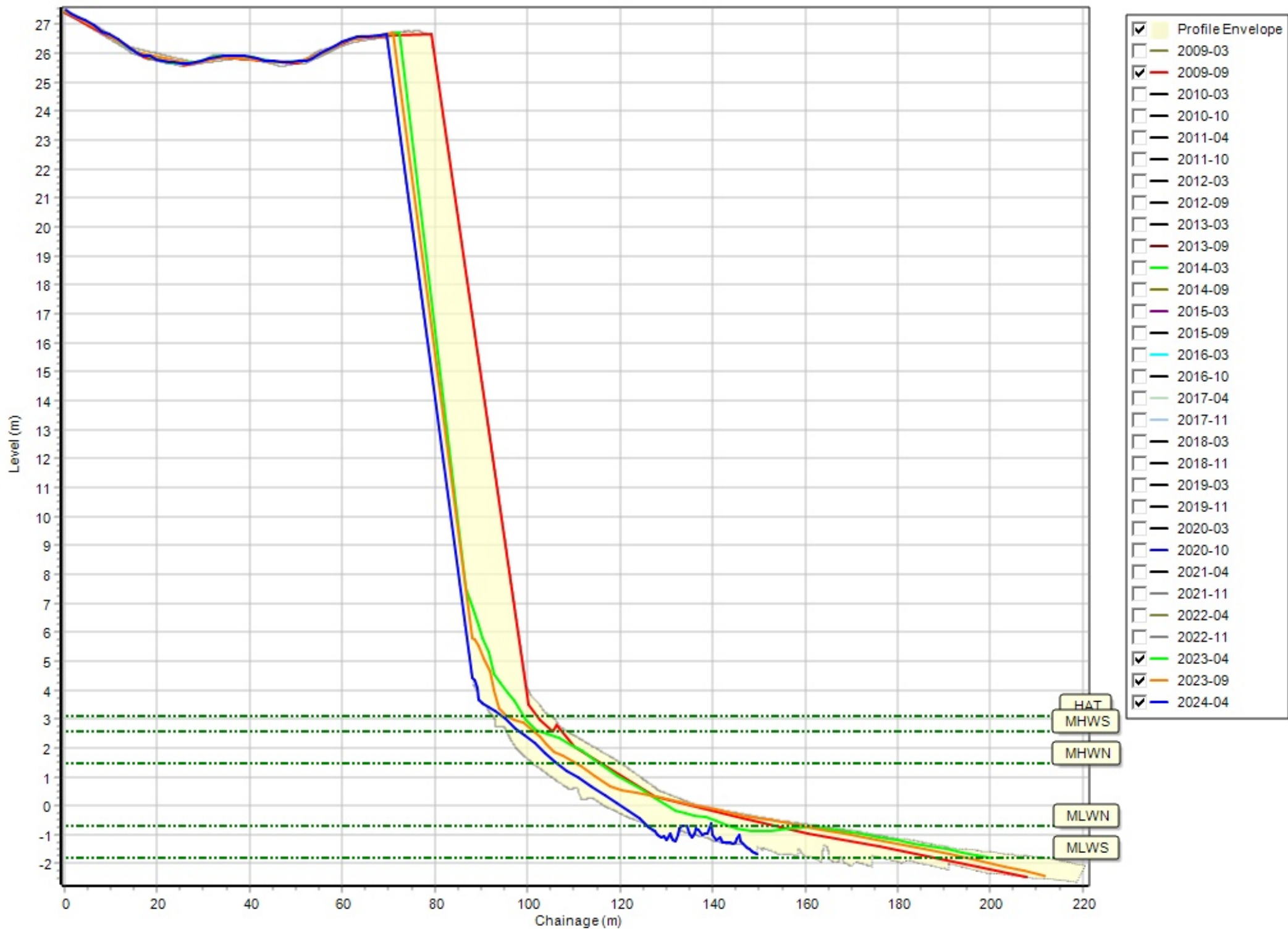
Profiles: 1bSNS29



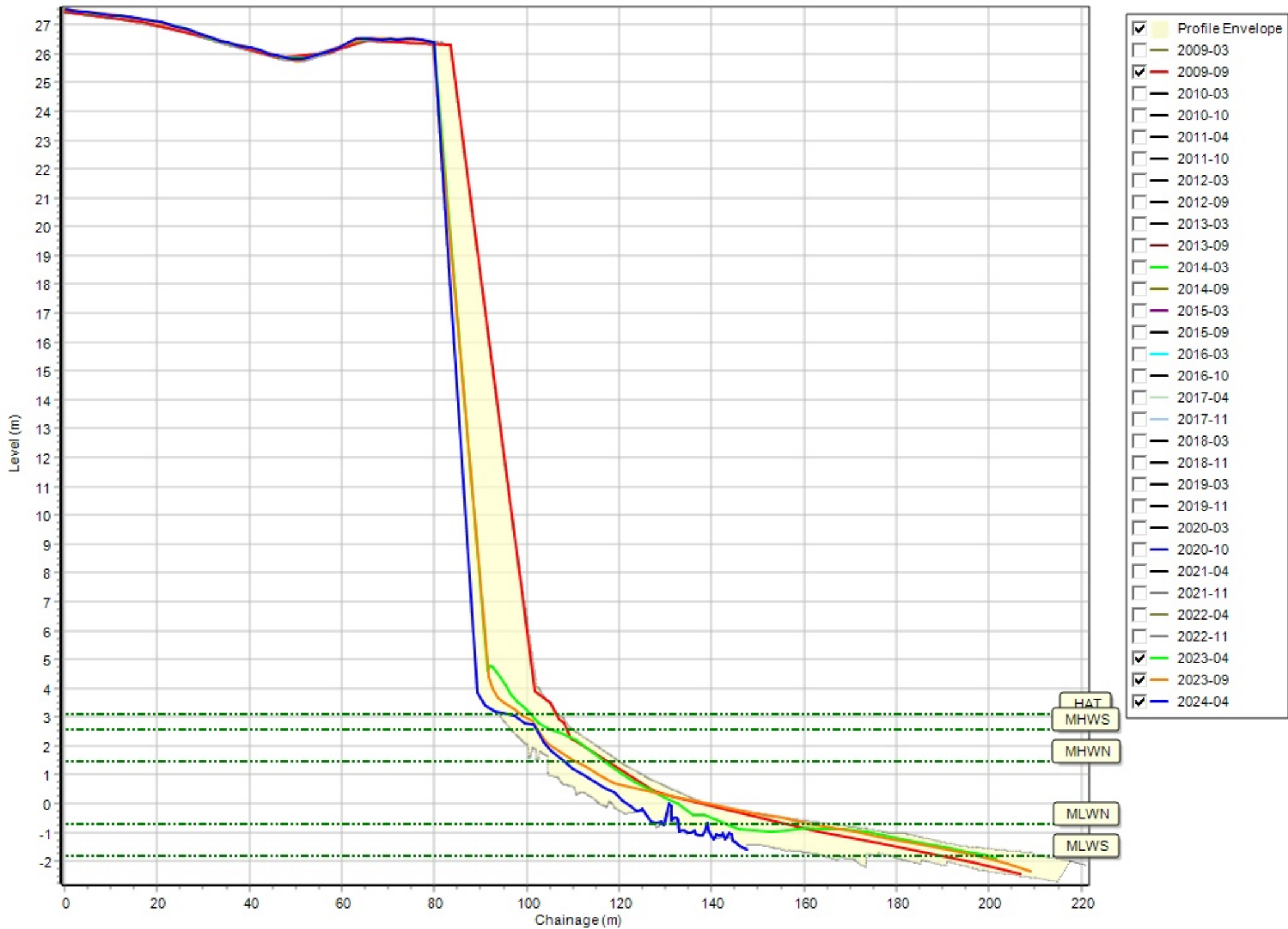
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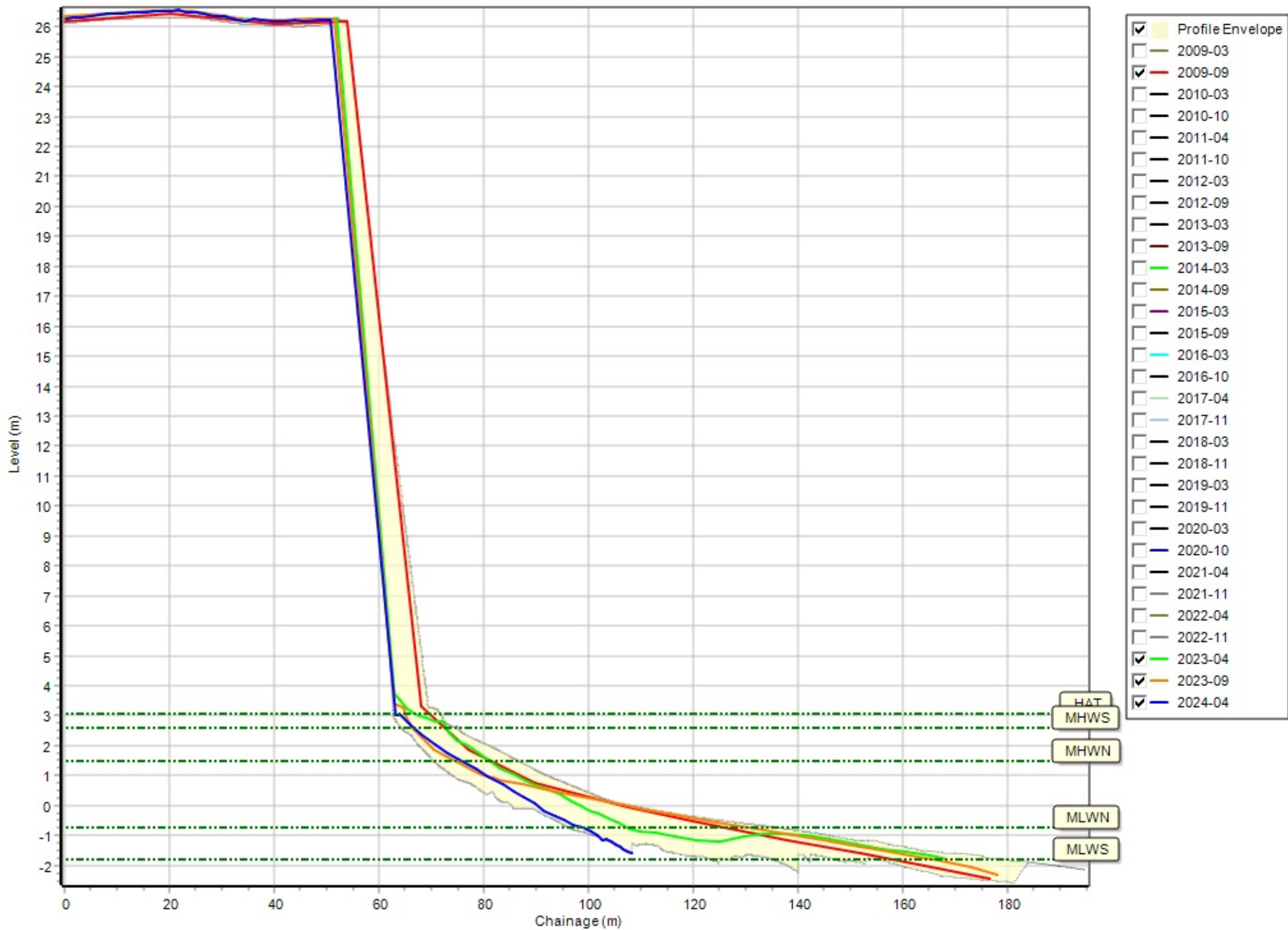
# Profiles: 1bSNS31



Profiles: 1bSNS32



Profiles: 1bSNS33



**Appendix B**  
**Cliff Top Survey**

## **Cliff Top Survey**

### **Hendon and Ryhope**

Thirty-two ground control points have been established between Hendon and Ryhope. The maximum separation between any two points varies along the coast, reflecting the degree of risk from the erosion.

The cliff top surveys between Hendon and Ryhope are undertaken bi-annually. Measurements are taken from a fixed ground control point along a fixed bearing to the edge of the cliff top.

Table B1 provides baseline information about these ground control points and results from the 2009 (baseline) survey showing the position from the ground control point to the edge of the cliff top along the defined bearing. Future reports will show results from subsequent surveys and provide a means of assessing erosion since the baseline survey.

**Table B1 – Cliff Top Surveys between Hendon and Ryhope**

Ground Control Points				Distance to Cliff Top (m)			Total Erosion (m)		Erosion Rate (m/year)
Ref	Easting	Northing	Bearing	Baseline Survey	Previous Survey	Present Survey	Baseline to Present	Previous to Present	Baseline to Present
			(°)	Mar-09	Sep-23	Apr-24	Mar 2009 - Apr 2024	Sep 23 - Apr 24	Mar 2009 - Apr 2024
1	441025.7	555571.1	75	8.16	8.08	8.13	0.03	-0.05	0.00
2	441064.4	555355.1	85	7.09	4.94	4.93	2.16	0.01	0.14
3	441098	555124	82	10.01	10.18	10.14	-0.13	0.04	-0.01
4	441174	554938.7	65	10.3	10.12	10.11	0.19	0.01	0.01
5	441199.1	554861.1	65	7.71	10.75	10.7	-2.99	0.05	-0.20
6	441224.5	554774.2	71	10.83	10.82	10.86	-0.03	-0.04	0.00
7	441248.4	554690.3	74	10.18	10.48	10.38	-0.2	0.10	-0.01
8	441259.3	554596.6	101	10.08	9.5	9.37	0.71	0.13	0.05
9	441275.8	554513.4	66	10.52	5.65	5.51	5.01	0.14	0.33
10	441309.4	554421.3	58	8.77	1.12	-0.04	8.81	1.16	0.59
11	441354	554346.5	68	8.2	-0.26	-0.33	8.53	0.07	0.57
12	441400.2	554248.2	56	6.17	5.64	5.66	0.51	-0.02	0.03
13	441452.3	554174.7	63	11.61	5.18	5.21	6.4	-0.03	0.43
14	441472.3	554080.5	127	7.33	5.01	5.01	2.32	0.00	0.15
15	441413	554005.1	122	7.84	7.66	7.64	0.2	0.02	0.01
16	441384.8	553913.3	90	9.89	6.89	5.93	3.96	0.96	0.26



17	441404.1	553815.5	93	6.32	5.65	5.65	0.67	0.00	0.04
18	441404.1	553723.6	119	8.1	2.76	2.65	5.45	0.11	0.36
19	441398.5	553632.8	78	8.23	3.89	3.63	4.6	0.26	0.31
20	441438.3	553452.9	71	10.09	5.15	5.07	5.02	0.08	0.33
21	441506.1	553256.1	62	8.57	-3.66	-3.8	12.37	0.14	0.82
22	441550.1	553158.7	103	6.57	2.09	-0.9	7.47	2.99	0.50
23	441585.2	553076.5	64	8.11	1.63	-1.25	9.36	2.88	0.62
24	441624.4	552870.7	69	7.53	1.14	1.13	6.4	0.01	0.43
25	441689.1	552758	70	14.58	1.79	1.76	12.82	0.03	0.85
26	441715	552713.3	54	12.87	2.1	1.75	11.12	0.35	0.74
27	441749.2	552674.4	62	14.56	2.08	1.79	12.77	0.29	0.85
28	441776.6	552629.9	57	8.62	2.37	2.31	6.31	0.06	0.42
28A	441798.6	552586.3	56	13.63	5.4	4.9	8.73	0.50	0.58
28B	441817.4	552542.4	64	12.3	7.02	2.25	10.05	4.77	0.67
28C	441852.2	552502.6	52	13.11	12.3	10.29	2.82	2.01	0.19
29	441880.1	552471.6	83	15.46	14.33	14.46	1	-0.13	0.07
30	441921.4	552269	97	8.55	3.83	3.84	4.71	-0.01	0.31
31	441853.1	552094	75	11.2	1.85	0.93	10.27	0.92	0.68
32	441883.3	551988.5	96	9.82	2.05	1.73	8.09	0.32	0.54

\*Note that 28A-28C baseline is September 2009.