Privileged and Confidential

OceanaGold New Zealand Ltd

WAIHI NORTH PROJECT
Gladstone Pit – Geotechnical Assessment

PSM125-260R Final Rev. 3 3 February 2025

This document has been produced for New Zealand consenting purposes only. Information contained herein must not be relied on for investment purposes.

Table of Contents

1. Introduction 7

2. Background and Planned Development 7

2.1 Introduction 7
2.2 Overall Pit Design Constraints 8
2.3 MUG Portal and Decline 8
2.4 Previous Mining 8
2.5 Infrastructure 9

3. Previous Studies 9

4. Scope Of Work and Study Approach 9

4.1 Study Brief 9
4.2 Study Approach 10
4.2.1 Geotechnical Factors 10
4.2.2 Approach to Mine Planning and Finalising the Geotechnical Design 10
4.3 Geotechnical Investigations 10
4.4 Scope of Work 10

5. Available Data and Information 11

5.1 Resource Drilling 11
5.2 Geotechnical Drilling 11
5.3 Structural Data 12
5.4 Laboratory Testing 12
5.5 Groundwater Data 12
5.6 Mining Schedule Summary 13

6. Regional Setting 13

6.1 Topography 13
6.2 Regional Geology 13

7. Site Geology 14

7.1 Lithology 14
7.2 Landslides 15
7.3 Geological Structure 15

8. Groundwater Conditions 16

8.1 Introduction 16
8.2 Underground Observations 17
8.3 Dewatering Settlement Monitoring Report 17
8.4 Pre-Existing Piezometers 17
8.5 GHD Study 18
8.6 Discussion of the Impacts of Underground Mining 19
8.7 Groundwater Model for Slope Design and Depressurisation 20

9. Geotechnical Units 21

9.1 Introduction 21

9.2 Interpretation Process 21
9.3 Geotechnical units 22

10. Laboratory Testing 22

10.1 Introduction 22
10.2 Point Load Index Testing 23
10.3 Unconfined Compressive Strength Testing 24
10.4 Multistage Consolidated Undrained (CUPP) Triaxial Testing 24

11. Geotechnical Parameters 24

11.1 Overview 24
11.2 Mohr-Coulomb Shear Strengths 25
11.3 Generalised Hoek-Brown Shear Strengths 25
11.3.1 GSI Assessment 25
11.3.2 Intact Rock Strength 26
11.3.3 Disturbance Factor (D) 26
11.3.4 Generalised Hoek Brown Parameter Mi 26
11.4 Design Parameters 26

12. Stability Analyses 27

12.1 Overview 27
12.2 Structural Analyses 27
12.2.1 Kinematic Mechanisms 27
12.2.2 Statistical Analysis 28
12.3 Limit Equilibrium Analyses 29
12.3.1 Introduction 29
12.3.2 Modelling Approach 29
12.3.3 Results of Analyses 29
12.3.4 Comparison with Previous Results 32
12.3.5 Summary 32

13. Gladstone Portal 32

14. Conclusions and Recommendations 32

REFERENCES 34

List of Tables

Table 5.1 Survey Details for Geotechnical Boreholes 11
Table 5.2 Field Estimation of Rock Strength 12
Table 5.3 Field Estimation of Soil Strength 12
Table 5.4 Summary Gladstone Open Pit Mining Schedule 13
Table 7.1 Defect Sets for Kinematic Assessment 16
Table 8.1 Summary of Gladstone Open Standpipe Piezometers 18
Table 8.2 Gladstone Permeability Test Results 19
Table 8.3 Hydraulic Characteristics of the Units (URS 2003) 19
Table 10.1 Laboratory Samples 23
Table 10.2 Point Load Index Testing Summary 23
Table 10.3 Unconfined Compressive Strength Testing Summary 24
Table 10.4 Triaxial Testing Summary 24
Table 11.1 Adopted Shear Strengths 25
Table 11.2 GSI 25
Table 11.3 Intact Rock Strengths 26
Table 11.4 Adopted Parameters for Design 27
Table 12.1 Summary of Failure Modes Assumed for Analysis and Design 28
Table 12.2 Stage 4 Risk Based Slope Angles 28
Table 12.3 Stability Analysis Results 29

List of Figures

Figure 1 Site Plan and Final Pit Development
Figure 2 Pit Plan and Section Locations
Figure 3 Staged Pit Development Section AA
Figure 4 Staged Pit Development Section BB
Figure 5 Boreholes Used for Rock Mass Assessment
Figure 6 Section A
Figure 7 Section B
Figure 8 Section C
Figure 9 Section D
Figure 10 Section E
Figure 11 Section F
Figure 12 Section G
Figure 13 Section H
Figure 14 Section I
Figure 15 Section J

Figure 16	Section K
Figure 17	Section L
Figure 18	Section M
Figure 19	Section N
Figure 20	Section N-2
Figure 21	Section O
Figure 22	Section P
Figure 23	Section Q
Figure 24	Long Section BB
Figure 25	Borehole Location Plan and Data
Figure 26	Geotechnical Boreholes
Figure 27	Oriented Cored Holes
Figure 28	Piezometer Locations
Figure 29	Regional Structure Plan and Schematic Section
Figure 30	Borehole Structural Data
Figure 31	Summary Borehole Structural Data
Figure 32	Structural Model
Figure 33	Rockmass Section A
Figure 34	Rockmass Section B
Figure 35	Rockmass Section C
Figure 36	Rockmass Section D
Figure 37	Rockmass Section E
Figure 38	Rockmass Section F
Figure 39	Rockmass Section G
Figure 40	Rockmass Section H
Figure 41	Rockmass Section I
Figure 42	Rockmass Section J
Figure 43	Rockmass Section K
Figure 44	Rockmass Section L
Figure 45	Rockmass Section M
Figure 46	Rockmass Section N
Figure 47	Rockmass Section O
Figure 48	Rockmass Section P
Figure 49	Rockmass Section Q
Figure 50	Final Pit Wall Geology and Rockmass Boundaries
Figure 51	Pit Design Sectors
Figure 52	Portal Section Gladstone Pit Perpendicular
Figure 53	Portal Section Gladstone Pit Parallel

Figure 54 Portal Section Gladstone Pit Perpendicular Rock Mass Classifications
Figure 55 Portal Section Gladstone Pit Parallel Rock Mass Classifications

List of Appendices

Appendix A Resources Log
Appendix B Geotech Logs
Appendix C Stereoplots
Appendix D Hydrographs
Appendix E OCG Aquifer
Appendix F Old Sections
Appendix G Histograms
Appendix H RMZ Sheets Updated
Appendix I Lab Testing
Appendix J Raw Point Load
Appendix K Triaxial Testing Interpretation
Appendix L RocLab
Appendix M Kinematic
Appendix N Pu Sheets
Appendix O Limit Equilibrium Analyses
Appendix P Moonlight Underground Mapping
Appendix Q Assessment of Landslides
Appendix R 3D PDF

1. Introduction

This report presents the results of a geotechnical study for the planned open pit mining of the Gladstone Deposit. The report has been prepared for OceanaGold (New Zealand) Limited (OGNZL) in support of the Fast-track Approvals Act application for the proposed Waihi North Project which includes the establishment of the Gladstone Open Pit.

Various studies for potential open pit mining at Gladstone and other related deposits have been ongoing since around 2017. The planned mining has evolved considerably over that time and this latest iteration entails an open pit that would be converted to an in-pit tailings storage facility (TSF) following the completion of mining. This document addresses the planned pit, incorporates the results of earlier studies as appropriate, and includes other associated work on the shallow groundwater system by GWS and groundwater information used by GHD to design the in-pit TSF.

2. Background and Planned Development

2.1 Introduction

An iterative approach has been used for the design of the Gladstone Open Pit (GOP). This approach recognised a number of important elements of the planned development, including:

- The open pit is being excavated in a rural setting,
- The pit is relatively small,
- The pit will be developed in stages,
- At the completion of open pit mining the pit will be partially backfilled with rock waste at flatter overall angles to facilitate the conversion to a TSF; and
- The pit has a relatively short design life.

There was no significant previous open pit mining in the immediate vicinity of GOP. Outcrops of the geology are rare and where available are either quite weathered or altered. In addition, the materials to be mined classify as relatively poor from a geotechnical perspective. These factors are in large part the reason a staged approach has been adopted for the pit development. Because of the higher topography along the northern side of the pit, large exposures will be available early in the mine life. The topography and pit staging gives the opportunity to confirm the geotechnical characteristics and performance before commitment to the final pit slope design and layout.

Consequently, the geotechnical approach has entailed drilling of three geotechnical boreholes, reliance on using the resource drill hole database and supplementing this with the available underground structural data.

The Gladstone Pit Design (GOP TSF 2021) was issued to PSM in mid-2021. Figure 1 shows the current planned final pit and Figures 2 to 4 show the final pit in plan and section.

Pit development staging and other related instrumentation to date have not been planned in detail. Nonetheless, early project planning for the GOP included three pit stages. The planned volumes for the three main earthworks components of the pit are:

1. Total Pit Volume – 9.33 M bcm.
2. Pit Backfill Earth Liner – 1.63 M bcm.
3. Total Tailings Storage Volume – 3.70 M m^3 at an assumed density of 1.2 t/m^3.

Consequently, there is substantial excess potential open pit storage volume which will allow considerable flexibility in the final pit design.

The planned Gladstone Pit design is positioned directly above the Moonlight Underground. Due to the complex three-dimensional nature between these, a 3D PDF is included in Appendix R and comprises the following triangulations and design strings:

- 17-04-2021 Gladstone Pit
  - DES_GOP_TSF_20210428_SURFACE_PART1.00t
- Favona Moonlight underground workings

- FAVONA_MOONLIGHT_DEVELOPMENT.00t
  - MOONLIGHT_STOPES.00t
- 17-04-2021 Gladstone Proposed Tunnels and Portals
  - GOP_TSF_TUNNEL_20210428_PART1.00t
  - TUNNELS_PART1.00t
- Areas of squeezing and ground collapse
  - SQUEEZING_NOTES.dxf.

2.2 Overall Pit Design Constraints

The Waihi North Project, Gladstone Pit Design constraints were provided by OceanaGold and comprised:

1. The pit footprint cannot be increased. However, it can be reduced provided it meets the requirements listed below.
2. The volume of rock mined from Gladstone Open Pit cannot be less than 20.5 Mt.
3. The Martha Underground Mine (MUG) Portal is located inside the pit in the upper northeast sector, Figure 1.
4. The design must comply with the basis of design for the Gladstone Open Pit TSF, as set out in Reference 4 and summarised below.

In summary the main elements of the TSF design relevant to the design of the open pit are:

- Minimum pit crest elevation is 1107 mRL,
- Final tailings level 1103 mRL,
- Required tailings storage 2.3 Mt,
- Tailings deposition from years 14 to 18,
- Pit partially backfilled with Run of Mine Rock (ROM) to 1060 mRL to provide a surface for installation of a geosynthetic liner,
- The backfilled slope extends up to 1107 mRL and is comprised of 10 m high benches at 33.7° with 10 m wide berms and this results in a flat overall backfilled slope of around 30°; and
- The backfill will be placed in 1 m thick lifts and spread by dozer.

These flatter backfilled slopes will merge with the existing flatter upper slopes excavated as part of open pit mining, Figure 1. The cross sections in Figures 6 to 24 show the backfilled levels.

2.3 MUG Portal and Decline

The development of the Gladstone Pit will impact directly on the existing MUG Portal, which provides the sole access to the Martha Underground. The existing MUG Decline Portal is located in the southern part of Gladstone Pit, Figure 1. The planned open pit will excavate approximately 240m of the existing decline.

A new MUG Portal, sited within the Gladstone Pit on the upper northeast pit wall and a new section of decline to join the portal with the existing underground infrastructure, will be developed. It is noted the Gladstone open pit will not be converted to an in-pit TSF until mining of the MUG has ceased.

Results from a preliminary geotechnical review of the new portal location are presented in Section 13.

2.4 Previous Mining

The northeast of the planned pit is positioned directly above the Moonlight Underground, Figure 1. Except for the existing Favona portal, the new planned pit development:

- Will not excavate any drives or stopes, Figures 6 to 24, and
- The minimum distance between the pit and any underground workings is around 17 m to a crosscut.

It is understood from correspondence with OGNZL that all stopes have been backfilled with waste rock, typically materials with high clay contents. In some cases, stopes have been backfilled with sand and layers of cement, where difficult ground conditions were encountered. In minor cases, problematic stopes have been supported with cable bolt reinforcement, but this was on an as required basis.

It is noted the Moonlight Underground experienced locally poorer conditions with squeezing ground and collapse. The Moonlight drive at 1030mRL experienced squeezing ground and collapse, and was subsequently abandoned, Figure 1 and Figures 6 to 24. None of these drives will be intersected by the planned pit.

2.5 Infrastructure

There is no significant natural infrastructure in the vicinity of Gladstone Pit. There is mining infrastructure near the eastern and north-eastern sides of Gladstone, Figure 1. OGNZL is currently assessing the relocation and or the design of the infrastructure as required. A major, regional power reticulation line goes through the centreline of Gladstone. This will need to be relocated prior to work starting on the pit.

3. Previous Studies

The initial pit designs were formulated by OGNZL based on judgement and experience.

A Preliminary Geotechnical Study was undertaken in early 2017, PSM125-257L. That study was based on the existing exploration information and general experience from mining at Waihi. The general aims of the study were to utilise existing information to carry out a high-level appraisal and identify any significant geotechnical or groundwater factors.

The conclusions arising from the Preliminary Geotechnical Study included:

1. Generally, the pit will be excavated in poor to fair materials, with no materials that would classify as high strength rock similar to the northwest wall of Martha Pit.
2. The overall slopes used for initial planning were considered appropriate. However, the planned 15 and 20m high benches at 50° to 65° were considered optimistic given the general rock character. Bench heights should be limited to 10m in the upper materials and 15m in the lower rock zones.
3. Although the pit is small, careful engineering studies will be required during early pit development in order to optimise the slopes in these marginal materials and this is the aim of the staged pit development.
4. This staging would thus provide early exposures of the rock conditions and allow the slope designs in the Gladstone Pit to be confirmed, and the design optimised.

4. Scope Of Work and Study Approach

4.1 Study Brief

A Brief and Specific Scope of Work were provided originally by OGNZL. The items to be addressed by the original geotechnical study comprised:

1. Preparation of and revision(s) of technical reports to support the Fast-track Approvals Act application, for the planned pit.
2. The reports should describe the potential effects and include monitoring and mitigation strategies as required.
3. Three time periods should be considered:
    a. Operating,
    b. ROM and tailings filling, and
    c. Closure.

At the completion of open pit mining, construction activities will commence to convert the structure to an in-pit TSF. Although the original Brief requested three time periods be considered, because of the planned backfilling and absence of any significant local natural or man-made infrastructure, only the Operating and ROM/Tailings Filling Cases need to be considered in the design. The ROM/Tailings Filling Case is addressed by GHD, Reference 4.

4.2 Study Approach

4.2.1 Geotechnical Factors

The approach to this study for Gladstone Pit was driven by the results from the preliminary study and the geotechnical nature of the materials. The preliminary geotechnical study identified a number of factors as important for the geotechnical studies and design, including:

1. For the Preliminary Pit there was very good existing drill coverage, and this data was considered sufficient to underpin the earlier slope designs.
2. There were a number of existing multi-point piezometers, and these were considered sufficient to give general groundwater levels.
3. The Andesite is overlain by recent volcanic deposits that are generally poorer and of variable quality.
4. The Andesite itself is variably altered and with low and variable strength.
5. The stability of the slopes will be sensitive to groundwater pressures and the degree of slope depressurisation that can be achieved.

The benefit of a short design life, relatively shallow pit depths and backfilling the whole pit on completion were all recognised as providing benefits for the optimised slope design approach.

The exploration logging appeared to have overstated the rock strengths, and this required checking with specific geotechnical drilling as discussed further below.

4.2.2 Approach to Mine Planning and Finalising the Geotechnical Design

The variability in the geology and poor to fair geotechnical conditions means it is important that final designs are allowed to be checked early in the mine life. This approach will be relatively easy to achieve at Gladstone because the centre of the open pit is on low hills and significant excavation occurs early.

The approach to finalising the geotechnical design assumed:

- Staged pits of limited depth would be developed within the envelope formed by the pit crest; and
- Such that final slope angles can be confirmed in the staged pits, prior to commitment to the exact final wall design.

4.3 Geotechnical Investigations

Because of the factors described above the study has relied heavily on collation and interpretation of existing information. However, because of the questions over the rock strength logging this was supplemented by a limited drilling investigation and laboratory testing program, comprising:

- Three fully cored holes, Figure 26,
- Vertical, PQ sized, 100 to 140 m deep; and
- Samples selected for testing in NZ.

4.4 Scope of Work

The following tasks have been carried out for this study:

- Collation and presentation of geotechnical logs using existing data from geological exploration holes,
- Collation and presentation of available piezometers and groundwater information;
- Collation and presentation of available structural data;
- Drilling, logging and laboratory testing of three geotechnical specific boreholes;
- Development of key geotechnical cross sections,
- Formulation of rock mass units from geotechnical interpretation of select boreholes, employing core photographs and geotechnical logs;
- Updating these units based on the geotechnical drilling,
- Laboratory testing of the low strength materials,

- Utilising information on groundwater provided by GWS and GHD;
- Interpretation of structural data and the formation of structural domains;
- Formulation of geotechnical parameters,
- Kinematic and statistical analyses;
- Limit equilibrium analyses,
- Formulation of indicative slope design parameters,
- Evaluation of pit designs and
- Reporting.

5. Available Data and Information

5.1 Resource Drilling

Parts of Gladstone Pit are well covered by the resource drilling, except there is a gap along much of the western half of the north wall, Figures 5 and 33 to 49. Figure 25 shows the resource drilling undertaken at Gladstone and the type of data available for each borehole. Geotechnical logs have been developed for the boreholes where logging data is available, Appendix A.

Gaps in exploration/resource drilling often occur and are a function of the resource definition process, as exploration results come progressively to hand and if the results are not promising for an area, then further drilling is curtailed in order to save costs. The gap will need to be covered by the planned staged pit development.

5.2 Geotechnical Drilling

Three geotechnical boreholes were drilled for this study, Figure 26. Geotechnical logs are presented in Appendix B and Table 5.1 summarises the survey details for each borehole. A description of rock and soil field estimated strengths used in geotechnical core logging is provided in Table 5.2 and Table 5.3.

Table 5.1 Survey Details for Geotechnical Boreholes

BOREHOLE	EASTING	NORTHING	RL (m)	DEPTH (m)
GT011	397111.311	642548.118	1139.265	120
GT012	397058.400	642329.860	1134.211	140
GT013	396846.487	642261.060	1129.174	101.2

[1] **Note** All level information in this report is based on mine datum set at 1,000 m below a pre-1949 datum. The current standard, New Zealand 2016 (NZVD2016) is approximately 1,002 m above mine datum. That is, reduced levels stated in this report can be reduced by 1,002 m to approximate the same level to NZGD2000/NZVD2016.

Table 5.2 Field Estimation of Rock Strength

SYMBOL	FIELD GUIDE TO STRENGTH	STRENGTH CLASSIFICAITON	UCS (MPa)
R0	Thumbnail easily scratches; gentle blow with geological pick leaves deep impression.	Extremely Low	0.7–1.5
R1	Can be peeled by a pocketknife. Crumbles under firm blows with geological pick.	Very Low	1.5–3.0
R2	Can be peeled by a pocketknife with difficulty; shallow indentation made by firm blow of geological pick.	Low	3.0–10
R3	Cannot be scraped or peeled with a pocketknife; specimen can be fractured with single firm blow of hammer end of geological pick.	Medium	10-25
R4	Specimen requires more than one blow with hammer end of geological pick to fracture.	High	25-80
R5	Specimen requires many blows of hammer end of geological pick to fracture.	Very High	>80

Table 5.3 Field Estimation of Soil Strength

SYMBOL	FIELD GUIDE TO STRENGTH	CONSISTENCY	CU (kPa)	UCS (MPa)
S0	Easily penetrated several centimetres by fist.	Very Soft	≤ 12	≤ 0.025
S1	Easily penetrated several centimetres by thumb. Can be moulded by light finger pressure.	Soft	12-25	0.025-0.05
S2	Can be penetrated by thumb with moderate effort. Can be moulded by strong finger pressure.	Firm	25-50	0.05-0.1
S3	Readily indented by thumb.	Stiff	50-100	0.1-0.2
S4	Readily indented by thumbnail.	Very Stiff	100-200	0.2-0.4
S5	Indented with difficulty by thumbnail.	Hard	200-350	0.4-0.7

5.3 Structural Data

Structural data is available from two sources, underground mapping and oriented drillhole core. Mapping was carried out by OGNZL for the Moonlight Underground beneath the north-eastern end of Gladstone, Figures 1 and 32. The structural data has been extracted from the mapping files and the information is presented as a series of stereoplots in Appendix P and summarised in Figure 32.

Orientated core is available for a limited number of the resource boreholes, Figure 27. Structural data for these boreholes is presented as a series of stereoplots in Appendix C and in Figures 30 and 31.

5.4 Laboratory Testing

There is no laboratory testing from the MUG Decline or the Moonlight Underground.

A small laboratory testing programme was undertaken for this study. The results are discussed in Section 11 and the test results are included in Appendix I.

5.5 Groundwater Data

Figure 28 presents a plan of the existing piezometers at Gladstone. Hydrographs are presented in Appendix D with cumulative rainfall deficit. The cumulative deficit evaluates the cumulative departure away from mean rainfall allowing long term periods of wetting and drying to be established. Assessing water levels in this manner aids in the interpretation of rainfall responses and also allows the effects of underground drainage to be evaluated.

Three additional multiple piezometers were installed by GHD as part of the groundwater studies for Gladstone; GLD 01, 02 and 03, Figure 28. Rising/falling head testing was carried out in each piezometer and the hydraulic conductivity values were calculated by GHD.

Where appropriate groundwater levels from the piezometers are shown on the geological sections, Figures 6 to 24. In addition, some hydrogeological information and parameters are available from:

- Testing and modelling carried out in 2003 by URS for Favona Underground Mine;
- A study of a shallow wetland in the central and south area of the Gladstone Pit by GWS, Reference 8, and
- The GHD study for tailings disposal in the pit, Reference 4.

5.6 Mining Schedule Summary

The mining schedule of Gladstone Pit is summarised in Table 5.4. The tailings storage development is scheduled to begin in year 13, with tailings Stage 1 and Stage 2 completed by the end of year 18.

Table 5.4 Summary Gladstone Open Pit Mining Schedule

YEAR	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
Total Material Movements (Tonnes)	2,087,903	4,735,229	5,057,051	4,481,908	3,902,748	1,052,800
Ore (Tonnes)	197,414	319,779	354,608	566,377	847,460	304,693

6. Regional Setting

6.1 Topography

The Gladstone Pit is at the head of the Waihi Basin and at the foot of the uplifted Coromandel Range. The head of the basin hosts the Waihi town and Martha Pit. The topography is gently sloping with a series of elevated paleo topographic peaks, Figure 29. The peaks rise up to 140m above the neighbouring lowlands and have been the focus of historic open pit activities (i.e., Martha Hill) and subsequent investigations.

Gladstone Pit is located across two elevated paleo-topographical peaks with gently dipping flanks, Figure 29 and Figures 6 to 24. The main pit area is positioned in the centre of the northern most peak (Gladstone Hill) with the southern pit area straddling the flank of a separate hill to the south (Winner Hill). The two peaks are separated by a shallow saddle.

6.2 Regional Geology

The regional geology and geomorphology of the mid to upper North Island can be characterised by a series of uplifted highlands (horst) and lowlands (graben) features. The Coromandel Range forms the eastern most regional scale horst feature and is defined as an uplifted fault bound block of basement greywacke (Edbrooke, 2001).

Two distinct volcanic groups overly the basement greywacke in the Coromandel Range; the early Miocene to Pliocene Coromandel Group and the late Miocene to Early Pleistocene Whitianga Group (Edbrooke, 2001).

The Coromandel Group is divided into four unconformable subgroups of which the Waiwawa subgroup, which includes the Uretara and Waipupu Formations, is the primary focus. The subgroup consists of multiple andesite, dacite and rhyodacite flow and domes with intercalated tuff, tuff breccia, volcaniclastic sediments and non-welded pumice rich ignimbrite (Edbrooke, 2001). The unit is variably weathered and hydrothermally altered which is locally associated with epithermal gold and silver bearing quartz veining. Paleo weathering is extensive and combined with hydrothermal alteration, creates a lower permeability clay cap at the top of the sequence (OceanaGold, 2016).

The Coromandel Group is unconformably overlain in part by the late Miocene to Early Pleistocene Ohinemuri member of the Whitianga Group which includes the Corbett, Owharoa and Waikino ignimbrites. The unit has a highly variable thickness and composition, and comprises non-welded to welded pumice rich ignimbrites, locally intercalated with pumice breccia and tuffaceous sediments, (Edbrooke, 2001).

The nature of deposition acts to drape and infill topographic depressions in the paleo surface of the older Coromandel Group (OGNZL, 2016).

Structurally, the Waihi basin is defined by Davies (2002) as a series of localised north to northeast trending horst and graben structures, Figure 29. It is inferred the basin and associated features are the result of an historical fault controlled caldera structure (OGNZL, 2015).

Steep, southeast dipping faulting bounds the horst and graben features which crosscut the basin, Figure 29. Veining also tends to strike north to northeast and is thought to be a fault-fracture mesh associated with north to northeast extensional faulting (OGNZL, 2015, Brathwaite et al, 2005).

The Waihi Fault is the largest of the bounding faults and marks the northern border of the Waihi Basin and associated caldera (Edbrooke, 2001, Oldfield, 1989). Other faults include the Martha Fault, Reptile Fault, Amaranth Fault, No 9 Fault and the Favona Fault (OGNZL, 2016).

According to OGNZL (2016), the Gladstone Open Pit straddles the steeply dipping Western Fault and No.9 Fault, Figure 29. The topographical peaks which host the proposed open pit are the result of the uplifted Union Horst (OGNZL, 2016). Both faults are interpreted to be steeply dipping, formed through extensional tectonics and host epithermal quartz veining.

7. Site Geology

7.1 Lithology

The geology of the Gladstone Open Pit can be broken down into five principal units by stratigraphic occurrence:

Rhyolitic Tuff/Ignimbrite

The Ignimbrite is yellow brown and red in colour, un-welded and unconsolidated. It is clayey sandy, with some fine to medium gravel and a trace coarse gravel and cobbles. This unit has probably been reworked in part. It has soil strength and is soft to hard (pocket penetrometer 80kPa to >600kPa).

The proportions of clay and sand vary throughout the unit. The clay is plastic and is observed to swell with significant gains after core recovery. The sand has a low to moderate plasticity and was not observed to swell. The clay and sand members are not easily delineated in plan or section.

Dacite

The Dacite is light brownish to green. It is typically low rock strength (R1 - R2) with some thin zones of very stiff soil toward the top of the profile. Micro-faulting and sub-rounded to sub-angular clasts are observed toward the bottom contact of the unit. The RQD is variable, and defects tend to be undulating clay infilled or iron stained.

Volcaniclastics

The Volcaniclastic is pale grey to brown. It is clayey and is typically a very stiff to hard soil (pocket penetrometer 300 to >600kPa). The clay is of moderate plasticity. The clay contains some clasts (<15%) which are less than 10mm in size. The clay is observed to swell with significant gains after core recovery. The unit becomes brown and carbonaceous with depth.

Hydrothermal Andesitic Breccia

The Andesitic Breccia is blueish grey, brown and light grey/white. It is gravelly, clayey and silty with angular to sub-rounded clasts up to 70mm. The unit varies between clast and matrix supported. The unit is clay altered, with clay infilling of defects, semi healed incipient fractures and also coating the clasts. Typically, strength varies between a stiff soil and very low rock strength (R1). The unit can often be broken by hand because of the clay alteration and incipient fracturing. The RQD is variable, and defects tend to be planar to undulating, slightly rough, clay infilled, or iron stained.

Andesite

The Andesite is light and dark grey, unweathered and altered. The unit is of medium rock strength (typically R2 to R3), although the strength is variable ranging from R1 and R4. The quartz veining is very high strength (R5). Fracture and brecciated zones are common throughout the unit. Defects are typically undulating, slightly rough to rough and commonly clay infilled. Intact core breaks along incipient clay filled fractures under minimal point load force. The clay filling tends to decrease and RQD tends to improve with depth.

The Andesite is the basement rock and the young volcanics are all the overlying units.

The geological model shows the dip of most geological units is generally north to east. Because of the volcanic origin the young volcanics tend to drape the paleo topographic highs and dips downslope at shallow to moderate angles. The young volcanics have been progressively eroded from the peaks and are thickest on the flanks of the hills, Figure 6 to 24. The hydrothermal breccia also tends to dip with topography.

The depth of the geological units varies around the pit walls and comprises, Figure 50. The north-western wall will comprise andesite, overlain by a thin band of hydrothermal breccia and a relatively thin sheet of rhyolitic tuff/ignimbrite thickening to the south. The south-eastern wall has a thicker band of rhyolitic tuff/ignimbrite and hydrothermal breccia overlying andesite.

The east wall has the greatest thicknesses of dacite and volcaniclastic.

The contacts between geological units have the following characteristics:

- A clear contact is often absent and difficult to interpolate between boreholes,
- Sometimes weathered,
- Sometimes sheared, of the seven geotechnical boreholes drilled as part of earlier studies, one planar, polished contact was observed between the dacite and volcaniclastics in borehole GT14 at Favona; and
- In the other six holes the contact zones were thin weathered units whose strength did not differ from the strength of the adjacent materials.

7.2 Landslides

There are two natural shallow landslides present at the site. They occur on the eastern and western sides of Gladstone Hill at the north-eastern end of Gladstone Pit, Figure 29. The landslide on the eastern side will be removed by open pit mining. The landslide on the western side will have the upper part removed by open pit mining.

These landslides are of no consequence for the planned open pit mining and at worst may require local over-excavation of the upper few metres of the upper bench.

An assessment of the applicability of back analysing the average basal strength of near surface layers at the failure site was completed and is attached in Appendix Q. In summary, the landslips are shallow, involving young volcaniclastic products (mostly soil strength material) that drape over the topography. It was considered therefore that back analysing the failures to determine saturated strengths in these materials was not applicable to the designated Rock Mass Units defined in the Gladstone Pit geotechnical assessment.

7.3 Geological Structure

Structural data is available from a wide range of sources including:

- The regional pattern of major faults and veins, Figure 29;
- The veins, shears and faults at the pit scale, Figures 29 and 30;
- The orientation of the vein, shear and faults in section, Figures 6 to 24;
- The oriented core drill data, Figures 30 and 31; and
- The Moonlight Underground mapping, Figure 32.

The data from the different sources is supportive with similar patterns repeated at a number of scales. This gives confidence and provides a good basis for analysis and design.

In addition to the orientation information above, the underground exposures at both Favona and Moonlight provide information on continuity. Both underground areas have shown that neither the jointing nor shearing was able to be correlated between levels or even along the same level (OGNZL). There is also one intermediate scale exposure of basement rock near the conveyor. The pattern in this exposure confirms the experience from the underground.

Notwithstanding this, a conservative assumption has been made for slope design, that a check is required on potential structure-controlled failure mechanisms. This is at the inter-ramp and overall slope scales. Based on the underground experience it is assumed this involves only the faults and shears.

Figure 30 presents a plan with fault and shear data from orientated core. The core orientation data suffers from a number of biases, which is typical of all this data. All 15 boreholes with data are drilled either toward the northwest or southeast. Of these 15 boreholes, five had insufficient defects recorded and were excluded. This data shows no obvious or significant structure concentrations. Hence one pit wide structural domain has been adopted for this analysis check, Figure 31.

In order to try and improve the data the boreholes have been grouped by azimuth and then combined, Figure 31. Based on this collation two principal structural sets, and up to four minor subsets can be identified, Figure 31 and Table 7.1. However, based on the pole concentrations alone it is considered there are probably only two main defect sets:

- Set 1, dipping sub-vertically and striking north northeast; and
- Set 2, dipping around 50º to east.

The Moonlight Underground data, Figure 32, confirms the main defect sets from the oriented core data. The orientation of the lodes/vein systems from the geological interpretations throughout Gladstone is shown in Figures 6 to 24. The overall dips range from 50º to 90º, which is in very good agreement with the mapping data for the main defect sets.

Table 7.1 Defect Sets for Kinematic Assessment

Defect Set	Mean Dip (deg)	Mean Dip Direction (deg)
Set 1	90	116
Set 2	55	95
Set 3	75	175
Set 4	60	320
Set 5	35	160
Set 6	45	270

Consequently, the geological structure model assumed for slope design comprises:

- A major set of sub-vertical veins, shears and faults striking north northeast;
- With dips greater than 50° and
- Other minor veins, shears and faults dipping at intermediate angles, but with a preferred dip direction to the southwest.

8. Groundwater Conditions

8.1 Introduction

The understanding of the groundwater at Gladstone is based on:

- Underground observations,
- The OGNZL Dewatering Settlement Report, Reference 5,
- The GHD study, Reference 4,
- The GWS study, Reference 8,
- The Favona groundwater data and
- The site piezometers.

Two aquifers have been interpreted across the site, an upper aquifer within the surficial materials and young volcanics, and a lower aquifer within the andesite, Appendix E. It is inferred the two aquifers are partially separated by the lower permeability, weathered and hydrothermally altered cap at the top of the andesite sequence (Reference 5).

Initially OGNZL assumed that the pit has been under-drained by the Moonlight Underground and MUG Decline. This appears to be the case in the Andesite in the northeast around Gladstone Pit. However, this situation is considered less likely further southwest, which is well away from underground workings, Figure 1. Notwithstanding this the data shows there has been some underdrainage of the Andesite by the underground mining. There is currently insufficient monitoring to fully define the distribution and degree of the dewatering and depressurisation due to the underground mining.

OGNZL plan to install a comprehensive piezometer monitoring network before mining begins, forming part of the Ground Control Management Plan for Gladstone Pit. While the piezometer network has not yet been formulated, groundwater and depressurisation are important elements for the Gladstone pit. Once the piezometer network has been established and monitoring has been undertaken, a groundwater management plan will be developed. Installation of the piezometer network and development of the groundwater management plan is specifically linked to the decision to commence mining at GOP in Year 5. If the mining timeline is delayed, the groundwater monitoring program for GOP will be deferred accordingly.

8.2 Underground Observations

The observations from the underground mining in the region south of Martha Pit are anecdotal and comprise:

- Correnso, Favona and Gladstone are separated hydraulically; and
- At Favona some geological structures gushed water for two to three days after being exposed. This is in accord with the nature of these structures and represents relatively quick drainage of stored water within the fractured quartz infill of these structures.

8.3 Dewatering Settlement Monitoring Report

The Annual Dewatering Settlement Report (2016) concludes (Reference 5):

- Groundwater monitoring data for the entire site does not show any widespread or significant dewatering of the alluvium or upper portions of the younger volcanic materials;
- Significant depressurisation is generally restricted to the veined andesite or structures interconnected to the vein system and the dewatering effect does not extend to piezometers in the upper andesite country rock overlying or adjacent to the vein systems;
- The water levels in the andesitic country rock surrounding the vein systems are higher and either do not respond or respond slowly to dewatering;
- There is no evidence the groundwater system at Martha is connected to Favona or Gladstone; and
- The separation barrier is not well defined but is probably due to block faulting, Figure 29.

8.4 Pre-Existing Piezometers

The pre-existing groundwater installations comprised one multi-tip and two single tip open standpipe piezometers in the north and south of the pit, screening the young volcanics and andesite units (P60, 61 and 79), Figure 28 and Appendix D. The water depths and hydrogeological observations are summarised in Table 8.1. The piezometric levels are shown on section in Figures 7, 13, 14 and 21.

It is not clear or obvious why the andesite aquifer at P79 experienced a significant drop since the beginning of 2016 (up to 14 m). The Dewatering and Settlement Report for 2016 considers this response is most likely due to water loss from an underground horizontal drill hole bored in March 2016 which experienced water issues. The borehole was plugged following drilling, but it is noted the groundwater level has not recovered. Overall, the explanation for the drop has not been fully resolved. However, the more comprehensive piezometer network planned as part of the ground Control management Plan will assist in resolving any questions around this behaviour.

Table 8.1 Summary of Gladstone Open Standpipe Piezometers

Piezometer	Screened Interval	WaterLevel	Notes
P60	Andesite	N/A	In veined andesite. Piezometer depressurised and became dry in October 2005 after a large fall in groundwater level. The groundwater level depth indicates major impacts from nearby underground mining.
P61	Andesite	1084mRL	The groundwater level depth indicates major impacts from nearby underground mining. Further evidence of vertical drainage to the nearby underground is given by comparative level in P60. No seasonal fluctuation and minimal response to rainfall (up to 1 m).
P75	Andesite	1061mRL	Evidence of underground drainage. Consistent seasonal fluctuation (up to 22 m) and delayed transient response to rainfall.
P79	Young Volcanics	1096mRL	Located well away from underground workings. Consistent seasonal fluctuation and response to rainfall (up to 4 m).
	Young Volcanics	1087mRL	Located well away from underground workings. Consistent seasonal fluctuationand response to rainfall (up to 8 m).
	Andesite	1075mRL	Evidence of some underground drainage due to the vertical stratification of groundwater levels with depth. Consistent seasonal fluctuation and delayed transient response to rainfall (up to 10 m). Reduction in groundwater level occurred in early 2016, approximately 12-14 m, and has partially recovered.

The piezometers are at two locations, and both show evidence of quite large impacts due to the underground mining with:

- The piezometers close to the workings (P60 P61, P75) showing much lower levels compared to more remote piezometer (P79); and
- Both piezometers show underdrainage from the Andesite, with both piezometers showing reducing levels at greater depths.

8.5 GHD Study

GHD installed three multi-point standpipe piezometers south of Gladstone (GLD 01, 02 and 03), Figure 28.

GHD has also compiled the permeability testing and the calibrated model properties from previous studies, and these are summarised in Tables 8.2 and 8.3.

Table 8.2 Gladstone Permeability Test Results

Piezometer/Well	Depth (M)	TestedUnit	Permeability (m/sec)
P60	82 to 97	Andesite	5×10^{-7}
P61	37 to 50	Andesite	7×10^{-9}
P61	1.5 to 4.5	Ash	$2\text{-}3 \times 10^{-6}$
GLD01	7.5	Alluvium	3×10^{-8}
GL01a	13.7	Alluvium	1×10^{-8}
GLD03a	20	Volcanics	6×10^{-8}
GLD03	8	Volcanics	4×10^{-8}

Table 8.3 Hydraulic Characteristics of the Units (URS 2003)

Unit	Porosity(%)	Hydraulic Conductivity (m/sec)	Calibrated Model Permeabilities (m/sec)
Ash/alluvium	10 to 30	10^{-4} to 10^{-7}	
Ignimbrite	<1	10^{-6} to 10^{-8}	5×10^{-8}
Dacite	<5	10^{-5} to 10^{-9}	1×10^{-6}
HydrothermalBreccia	<5	10^{-6} to 10^{-8}	1×10^{-7}
Andesite	0.1 to 5	10^{-4} to 10^{-8}	10^{-7} to 10^{-8}
Veins	1 to 10	10^{-3} to 10^{-7}	5×10^{-5}
Contact Zone		10^{-9} to 10^{-11}	1×10^{-9}

Both piezometer groupings GLD 01 and 03 indicate underdrainage in the Andesite due to nearby underground mining.

In addition to previous GHD reports, GHD (2024) has recommended slight geometry changes to the Gladstone Open Pit to allow additional tailing storage. It was also recommended that the pit should not be utilised for tailings until the underground mining has been completed to prevent the risk of inrush events.

8.6 Discussion of the Impacts of Underground Mining

The piezometers at Gladstone do not appear to have been specifically designed to target measurement of the impacts of the underground on the groundwater system. Notwithstanding this it is possible to draw some overall conclusions about the groundwater responses by evaluating the available factual information.

At Gladstone the underground is concentrated in one area. The next factor that needs to be considered is the location of the measurement points (the piezometers), which are remote from the underground. Most of the piezometers show a vertical downwards gradient indicating underdrainage of the basement Andesite by the underground.

The overall conclusion is that there has been substantial drawdown of groundwater pressures and levels in the Andesite due to underground mining. Close to the underground the rocks would be close to dewatered. This effect has spread partially into the overlying young volcanic sequence. Potential drawdown of groundwater pressures and levels is advantageous for open pit slope stability if confirmed.

A specifically designed and targeted piezometer network is required as part of future planned mining and this will be planned and installed as part of the Ground Control Management Plan.

8.7 Groundwater Model for Slope Design and Depressurisation

The permeabilities in Tables 8.2 and 8.3 are reasonably high, given the characteristics of the geological units as described above. These permeabilities indicate that dewatering and depressurisation will be achievable. This is supported by the piezometers which show:

1. The surficial materials and young volcanics are partially undrained/depressurised by the Andesite.
2. Where the young volcanics are thin or absent the Andesite aquifer exhibits significant transient rainfall response (up to 10 m).
3. Where the andesite is covered by young volcanics, the Andesite does not show any significant rainfall response.
4. Piezometer P79 is situated topographically below an upper higher-level exposure of andesite, Figure 7, and exhibits a delayed transient rainfall response.
5. The Andesite is showing a significant response to the underground with depressurisation across the pit area.
6. The Andesite is likely to be dewatered around the underground mine.

Based on this information the groundwater system adopted for stability and slope design, comprises:

1. An upper perched groundwater system within the surficial materials and young volcanics of moderate to low hydraulic conductivity, with:
   a. Pore pressures below hydrostatic,
   b. The standing water level at ~1096mRL dependent on surface elevation and seasonal fluctuations;
   c. Termination of this upper water level at the base of the young volcanics,
   d. A variable lower permeability layer at the base of the volcanics that acts to impede vertical drainage; and
   e. Immediately around the underground a higher degree of depressurisation has occurred.
2. A lower groundwater system in the Andesite with:
   a. A standing water level based on nearby piezometers, typically approximately ~1075mRL,
   b. Most of the Andesite shows some drainage to the underground,
   c. Local zones, mainly structures and veins of higher permeability,
   d. Possibly some compartmentalisation of groundwater and
   e. Around the underground the Andesite is dewatered.
3. Depressurisation of between 25% and 75% has already occurred or will be achievable in most areas.
4. The pit quadrant in the east immediately above the underground will have the highest degree of dewatering and depressurisation assumed to be 75%.
5. Based on experience, the permeabilities and the existing responses measured in the piezometers, further depressurisation of the pit walls will be achievable.
6. A horizontal drain hole system is required.

Depending on the final design of the TSF, the horizontal drains need to be installed with design measures that allow them to be sealed or recovered at a later date. Consequently, they should be installed with PVC pipe inserts and the outer 9 m grouted to form a sealed collar.

9. Geotechnical Units

9.1 Introduction

The interpretation of the geotechnical units for slope design at Gladstone has required several iterations. The study approach generally repeated the process used for the Preliminary Study but with increased use of the geological and geotechnical logs, core photographs and laboratory testing, in order to refine the detail. The process is described in some detail below because it is important to understand the support underlying the slope designs.

The process has comprised:

1. Preliminary Study (PSM125-257L).
2. Second interpretation using geological and geotechnical logging by OGNZL with some core photo calibration.
3. A third interpretation, mainly using the core photos, but with the geological and geotechnical logs being secondary, and mainly assisting with defining the very poor zones.
4. Re-checking of the interpretation from the third iteration using the geotechnical drilling.
5. Expanding the interpretation to encompass the new GOP TSF 2021 pit design area.

9.2 Interpretation Process

The second interpretation entailed the following steps:

1. Collation of all the existing drilling data.
2. Formulation of graphical geological and geotechnical logs, Appendix A and B.
3. Development of geological sections using the OGNZL interpreted geological layers.
4. Inclusion of the logs on sections and correlation of layers/units where possible.
5. Collation of the available piezometer information, Appendix D, and incorporation of the groundwater level information onto the sections.
6. Development of geological/geotechnical sections with geology, geotechnical logs and groundwater data.
7. Checking the interpreted conditions against some core photographs.

The resultant sections are included in Appendix F. In general, this process gave a low level of confidence and on review it was concluded that there was too much detail in the logging, and this tended to obscure the large scale rock mass units.

Consequently, a third iteration was undertaken using a different approach. Underpinning this revised approach was the recognition that the core photographs when viewed collectively, not box by box, did show broad consistent zonation. Three units were identified:

- Fresh, strong relatively unjointed rock at depth;
- Overlain by altered and or weathered Andesite, comprising either medium strength rock with some poor zones or lower strength rock with some medium strength zones; where these are two end members of a spectrum of materials; and
- Thicker zones of very low rock strength to soil strength material and these zones were quite well defined by the existing logging.

The third interpretation entailed the following steps:

1. Checking and updating the geological layers using model updates provided by OGNZL.
2. Reviewing core photos, section by section and defining geotechnical units.
3. Firstly, defining the top of fresh strong unjointed rock.
4. Then defining the zone altered and weathered Andesite and whether it is the stronger or weaker type.
5. Identifying the very low rock strength zones and correlating these with known geological structures and or lithological layers.

6. Entering these layers into the Vulcan geological model and contouring the layer tops to check any anomalies.
7. Developing revised geotechnical sections, Figures 6 to 24.
8. Placing the planned geotechnical drilling onto the sections and checking locations and representativeness.

This third interpretation process gave consistent results with a high degree of confidence.

9.3 Geotechnical units

Seven geotechnical units have been adopted for slope design. These units are a mixture of lithologies and rock mass classes in the Andesite:

- Ignimbrite,
- Dacite (in northeast only),
- Volcaniclastic (in northeast only), and
- Andesite – Classes 1 to 4, with Class 1 the best and Class 4 the worst rock quality.

A series of data histograms have been constructed which present the logging data for each geotechnical unit from the geotechnical drilling programme, Appendix G. In addition, rock mass zone sheets have been constructed and included with typical photographs, GSI and logged strengths in Appendix H.

The geotechnical character of the ignimbrite, dacite and volcaniclastic did not differ significantly enough to warrant further domaining of these units. The occurrence of these units is as per the OGNZL geological model and is presented on geotechnical sections, Figure 6 to 24.

The Andesite rock mass units for each class are shown in section, Figures 33 to 49, and in plan, Figure 50. The units are not uniform and vary around the pit.

10. Laboratory Testing

10.1 Introduction

Laboratory testing was undertaken to assess the engineering properties. The testing was conducted by Geotechnics in Newmarket, Auckland. Table 10.1 details the laboratory testing. Laboratory test certificates are presented in Appendix I. A total of 13 samples were selected comprising:

- 9 multistage Consolidated Undrained (CUPP) Triaxial Tests (TXL); and
- 4 Unconfined Compressive Strength (UCS) with Young's Modulus tests.

To aid in sample selection, locations were plotted on section and representative samples selected for individual geotechnical units. Triaxial samples were selected where the typical strength of a geotechnical unit was logged as less than or equal to R1 strength (<3MPa). The UCS testing was for samples logged as R2 strength (3MPa to 10MPa).

Where the intact strength exceeded R2, the Generalised Hoek-Brown Failure Criterion has been determined using the Point Load Index and logged strengths. For this purpose, a Point Load Index machine was sourced from OGNZL Waihi Underground and testing performed in the core shed during geotechnical logging. It should be noted the Point Load Machine was last calibrated in February 2012. Hence the results were viewed with caution and compared to the field estimated strengths.

Table 10.1 Laboratory Samples

Borehole Number	SampleId	Depth (M)		Logged Strength	GeotechnicalUnit	Test
		From	To			
GT011	GT011-002	9.28	9.50	R1	Class 4	TXL
GT012	GT012-002	18.34	18.61	S5	Class 4	TXL
GT013	GT013-001	38.83	39.08	R1	Class 3/4	TXL
GT014	GT014-004	28.10	28.34	S4	Volcaniclastic	TXL
GT014	GT014-011	43.00	44.10	R1	Class 4	TXL
GT015	GT015-002	14.03	14.27	S3	Ignimbrite	TXL
GT016	GT016-005	34.20	34.47	S4	Ignimbrite	TXL
GT017	GT017-006	23.60	23.90	S5	Class 4	TXL
GT017	GT017-007	41.40	41.70	R1	Class 3/4	TXL
GT011	GT011-005	79.58	79.77	R2	Class 3	UCS
GT013	GT013-005	68.80	69.00	R2	Class 3	UCS
GT014	GT014-007	21.35	21.58	R2	Dacite	UCS
GT016	GT016-013	60.90	61.20	R2	Class 3	UCS

10.2 Point Load Index Testing

A total of 179 valid axial/lump and 147 valid diametral tests were conducted on intact core of both PQ and HQ diameter across the geotechnical boreholes. Table 10.2 presents the distribution. Test results are presented in Appendix J for each borehole and summarised on geotechnical unit histograms, Appendix G.

It should be noted there was substantial difficulty in obtaining valid point load results given the nature of semi healed incipient clay infilled fractures resulting in breakage during testing. Because of this a number of tests were conducted on rock fragments as lump tests.

Table 10.2 Point Load Index Testing Summary

Borehole Id	No. of Tests		
	Axial/Lump	Diametral	Total
GT011	27	19	46
GT012	30	26	56
GT013	22	14	36
GT014	21	16	37
GT015	26	25	51
GT016	25	24	49
GT017	28	23	51

10.3 Unconfined Compressive Strength Testing

Results of UCS testing are presented in Table 10.3. UCS test certificates are included in Appendix I.

Table 10.3 Unconfined Compressive Strength Testing Summary

Sample	GeotechnicalUnit	Density (t/m^3)	Moisture Content (%)	UCS (kPa)	Young's Modulus(MPa)
GT011-005	Class 3	2.38	7.1	1282	117
GT013-005	Class 3	2.03	13.6	1785	222
GT014-007	Dacite	1.75	45.1	2199	364
GT016-013	Class 3	2.30	8.6	1591	210

10.4 Multistage Consolidated Undrained (CUPP) Triaxial Testing

Results of CUPP triaxial testing is summarised in Table 10.4. The results have been interpreted using a linear relationship between shear strength and normal stress to define cohesion and internal angle of friction, Appendix K.

Table 10.4 Triaxial Testing Summary

GeotechnicalUnit	No. of Tests	IndicatedShear Strength		LowerBound		UpperBound	
		C (kPa)	Φ (°)	C (kPa)	Φ(°)	C (kPa)	Φ(°)
Ignimbrite	2	42	25	27	24	56	27
Volcaniclastic	1	39	15	26	15	52	15
Andesite Class 4	4[(1)] (6)	65	24	30	18	103	29
Andesite Class 4 GT017	2	15	13	0	13	31	14

1 GT017 TXL results not included in deriving of Class 4 parameters. See Section 10.4.

Sample GT017 was not included in the Class 4 parameters due to an anomalous result, possibly due to the close proximity to the regional Western Fault.

11. Geotechnical Parameters

11.1 Overview

The geotechnical parameters have been assigned to the geotechnical units defined in Section 9 using two methods:

- Mohr-Coulomb Failure Criterion; and
- Generalised Hoek-Brown Failure Criterion.

The Mohr-Coulomb Failure Criterion has been used for the geotechnical units interpreted to be a soil, Section 10.4. This applies to:

- Ignimbrite,
- Volcaniclastic and
- Andesite, Class 4.

The Generalised Hoek-Brown Failure Criterion has been adopted where geotechnical unit is interpreted to be a rock. This applies to:

- Dacite,
- Andesite, Class 3, and
- Andesite, Class 2.

The Hoek-Brown methodology is empirical and uses:

- An assessment of GSI;
- An evaluation of the intact strength;
- An empirical constant (mi); and
- A disturbance factor (D) which takes account of damage to rock mass due to blasting.

These values provide a curved shear strength envelope for selected geotechnical units. Over a given stress range the curved strength envelope can be approximated with a straight line, which indicates equivalent Mohr-Coulomb strength parameters of cohesion and angle of friction.

11.2 Mohr-Coulomb Shear Strengths

Mohr-Coulomb parameters have been derived principally from the triaxial testing using a linear relationship to define cohesion and internal angle of friction. The adopted values are presented in Table 11.1.

Table 11.1 Adopted Shear Strengths

Geotechnical Unit	Cohesion (kPa)	Friction Angle (deg)
Ignimbrite	40	25
Volcaniclastic	40	15
Andesite Class 4	65	24
Andesite Class 4 Lower Bound	30	18
Andesite Class 4 Upper Bound	103	29

11.3 Generalised Hoek-Brown Shear Strengths

11.3.1 GSI Assessment

The rock quality has been assessed for each geotechnical unit applying Hoek's Geological Strength Index (GSI), using interpretation of the geotechnical core logging and a visual assessment of core. The adopted and typical GSI range per unit are summarised in Table 11.2. A graphical representation of the range of GSI for each unit is included in summary sheets in Appendix H.

Table 11.2 GSI

Geotechnical Unit	GSI Range	Adopted Value
Dacite	30 - 45	40
Andesite – Class 3	20 - 35	29
Andesite – Class 2	30 - 50	40
Andesite – Class 1	60 - 80	NOT INTERSECTED IN PIT

11.3.2 Intact Rock Strength

Intact rock strength has been assessed using the logged strengths, the Point Load Index Testing and the Unconfined Compressive Strength Testing. The ranges of intact strengths and the adopted strengths are summarised in Table 11.3. The adopted strengths have relied heavily on judgement and experience.

Table 11.3 Intact Rock Strengths

Geotechnical Unit	Logged	Mean Is50	UCS (MPa)	Adopted (MPa)
Dacite	R1 – R2	0.52[(1)]	2.2[(2)]	8
Andesite – Class 3	R1 – R3	0.75	1.6[(2)]	12
Andesite – Class 2	R2 – R4	0.85	N/A	25
Andesite – Class 1	NOT INTERSECTED IN PIT			

1 Mean axial strength

2 UCS failed along healed incipient fracture

11.3.3 Disturbance Factor (D)

No disturbance factor has been used. This is considered appropriate based on the extensive mining experience at Waihi with small mining equipment in a semi-rural to semi-urban environment.

11.3.4 Generalised Hoek Brown Parameter Mi

Intact modulus has been estimated using the guidelines methodology which indicates typical andesite Mi values in the range of 25 ± 5.

11.4 Design Parameters

The parameters have been derived using RocLab (Appendix L) and are presented in Table 11.4. The general effective normal stress range applicable for the potential failure paths in the Gladstone Pit is < 500 kPa and the parameters have been assessed for that stress range.

The collation in Table 11.4 highlights one apparent anomaly, the large strength difference between Andesite Classes 3 and 4. This large strength difference is not readily evident in the core and is possibly a function of:

- A sampling bias for more soil like materials in the triaxial testing; and
- Over-estimation of the Generalised Hoek-Brown parameters for the better quality sections of core.

This will result in areas of the pit with deeper intervals of Class 4 Andesite giving lower Factors of Safety (FoS). To account for this a Modified Andesite Class 4 strength has also been presented, which is equivalent to the upper bound triaxial strength envelope.

GSI values have also been lowered for Class 3 and Class 2 Andesite by 5 and 10 respectively compared to PSM125-260R Draft 4.

Table 11.4 Adopted Parameters for Design

GeotechnicaL Unit	Unit Weight (kN/m³)	Adopted UCS (MPa)	GeneraliseD Hoek Brown Parameters			Mohr Coulomb Parameters[(1)]		Method
			GSI	Mi	D	C (kPa)	Phi (°)	
Ignimbrite	18	N/A				40	25	Mohr Coulomb
Dacite	18	8	40	25	0	150*	50*	HoekBrown
Volcaniclastic	19	N/A				40	15	Mohr Coulomb
Andesite Class 4	22.5	N/A				65	24	
Andesite Class 3	22.5	12	29	25	0	140*	50*	HoekBrown
Andesite Class 2	22.5	25	40	25	0	190*	60*	

1 *normal stress range 0-1000 kPa

12. Stability Analyses

12.1 Overview

Based on the geotechnical model and the proposed mine plan, the potential failure mechanisms will comprise:

1. Structurally controlled kinematic sliding at the inter-ramp scale, that is, failure along persistent faults and shears that daylight and dip towards the pit.
2. Mass failure, that is, global circular or rotational failure through the weaker soil/rock mass.

Other failure modes such as bench scale kinematic sliding, or combination failure (rock mass and structure interaction) are not anticipated to control stability or design at Gladstone. No analysis is included for the old workings as these will need to be treated on a case by case basis during mining.

Based on this the following stability analyses have been carried out:

- Kinematics targeting planar and wedge failure at the inter-ramp scale;
- Statistical analysis of the probability of undercutting structures; and
- 2D limit equilibrium analysis using Slide 2018.

12.2 Structural Analyses

12.2.1 Kinematic Mechanisms

The slope aspects of the Gladstone pit have not changed significantly since PSM125-260R Draft 3. As such, the slope aspects used for structural analysis are those from the previous Gladstone Pit, Table 12.1.

The results of the analyses are presented in Appendix M and summarised in Table 12.1. These analyses have not been updated from PSM125-260R Draft 3.

For kinematic mechanisms the combined orientated core stereoplot presented in Figure 31, and structural sets presented in Section 7.2 have been used. The shear strength assumed for the faults and shears is phi = 20º.

The indicated failure potentials assume that defects are long and continuous enough to affect the pit slope at the inter-ramp scale. This is a very conservative assumption based on the available data. In many cases potential wedge development is controlled by subsets with limited pole populations, thus the likelihood of wedge development is assessed as low, Appendix M.

Table 12.1 Summary of Failure Modes Assumed for Analysis and Design

Pit Wall DesignSector	Slope Aspect (deg)	Failure Geometry[(1)]	
		Planar	Wedge
North Sector	210	Low	Low/Moderate
East Sector	300	Low/Moderate	Low
South Sector	355	Low/Moderate	Low
Northwest Sector	150	Low/Moderate	Low/Moderate

1 Low, moderate, high likelihoods

12.2.2 Statistical Analysis

Based on the failure potentials in Section 12.2.1, a statistical risk-based analysis was carried out to account for the distribution of defect orientations. Probability of undercutting (Pu) is defined as the percentage of defects in unstable orientations, or in other words, the chance a slope is undercut by a defect. This approach allows quantification of sensitivity of the design to changes in batter/slope angle. Indicated risk-based slope angles are summarised in Table 12.2 and the Pu analyses are presented in Appendix N.

The level of risk adopted for a particular slope design depends on a number of factors including the corporate risk profile, the style of mine development, the number and redundancy of haul roads and the ability of the operation to deal with loss of access. The determination of acceptable Pu values is normally calibrated by observation of pit performance, geological judgement and experience. In this case geological judgement and experience at Martha is a key factor in the selection.

In combination together with the available data on defect continuity, Tables 12.1 and 12.2 indicate:

- The current inter-ramp slope angles are generally appropriate for structurally controlled failures;
- However, there is a low level of residual risk and
- Pit mapping and development of a structural model is required during mining.

Table 12.2 Stage 4 Risk Based Slope Angles

Pit Wall DesignSector	Slope Aspect (deg)	Control (1)	Indicated Maximum Slope Angle (deg)	
			Planar Failure	Wedge Failure
North Sector	210	P	65	NA
East Sector	300	P	55	N/A
South Sector	355	P	52	N/A
Northwest Sector	150	P	40	22

1 (1) P = Planar, W = Wedge

12.3 Limit Equilibrium Analyses

12.3.1 Introduction

The Limit Equilibrium (LE) analyses have been re-assessed due to the Gladstone pit geometry changes. Overall, the stability situation has improved due to the presence of the haul road in the poorer materials on the south-east wall.

LE analyses were undertaken to check the potential for overall and inter-ramp mass failure of the current design pit slopes. Seven sections were selected to encompass the slopes with the steepest angle and greatest height, and the areas with the greatest thickness of the young volcanics and lower strength Andesite, Figures 50 and 51.

Analyses were undertaken using the Morgenstern Price method in Slide 2018. The target Factor of Safety (FoS) for design was taken as ≥ 1.2.

12.3.2 Modelling Approach

The LE model is based on the rock mass parameters in Table 11.4. Where geotechnical unit boundaries do not extend to the model limits, the surfaces have been extrapolated. The groundwater regime is defined in Section 8.7, modelled with four cases:

1. A completely saturated case using standing water levels. This case has been run to highlight the sensitivity of groundwater to stability.
2. 25% depressurisation (Hu value of 0.75).
3. 50% depressurisation (Hu value of 0.5).
4. A completely dry case.

12.3.3 Results of Analyses

The modelling results are summarised in Table 12.3 with model outputs included in Appendix O. Analysis cases with FoS < 1.2 are highlighted in red. Figure 51 shows the stability analysis sections. In Table 12.3 the slope stability analysis results are summarised into the following groups:

- The minimum overall FoS for the whole slope; typically, this is a shallow bench or multi-bench shallow failure;
- The overall slope,
- The upper inter-ramp divided in two based on geology:
- Young volcanics and Class 4 Andesite; and
- Andesite Class 3; and
- Lower Inter-ramp largely Andesite Class 3 with some minor Classes 2 and 4.

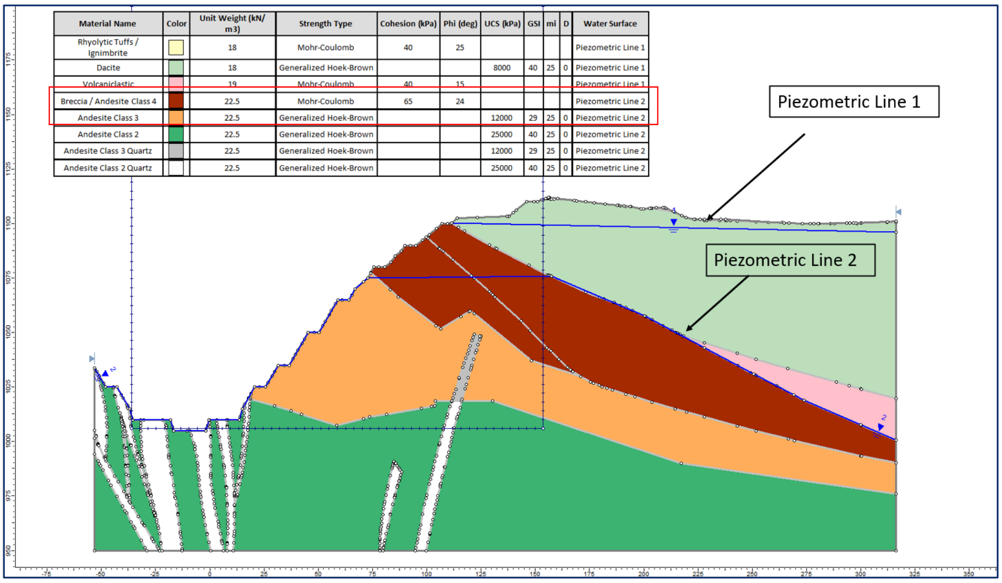
Table 12.3 Stability Analysis Results

Pit Segment	StabilitySection	Factor Of Safety			
		Saturated	Hu = 0.75	Hu = 0.5	Dry
Overall Minimum Typically bench /multi bench shallow failures	1	0.86	0.92	1.37	2.53
	2	1.19	1.49	1.81	1.81
	3	1.00	1.68	1.91	2.54
	4	0.66	0.91	1.33	2.15
	5	0.76	0.85	1.48	2.25
	6	0.73	0.93	1.48	1.97

Pit Segment	StabilitySection	Factor Of Safety			
		Saturated	Hu = 0.75	Hu = 0.5	Dry
	7	0.78	0.87	1.30	1.95
	8	0.71	0.92	1.35	2.34
Over-all slope	1	2.04	2.27	2.46	3.09
	2	2.29	2.31	2.36	2.37
	3	2.46	2.17	2.41	2.58
	4	2.72	3.08	1.77	2.15
	5	1.51	2.60	2.23	2.62
	6	2.51	2.21	2.22	3.09
	7	1.19	1.53	1.68	2.04
	8	2.00	2.29	2.13	2.74
Upper Inter-ramp Young Volcanicsand Andesite Class 4	1	3.57	3.42	3.50	-
	2	1.81	1.81	1.81	1.81
	3	5.44	5.44	5.49	4.01
	6	1.63	1.81	1.85	1.97
	7	2.48	1.87	2.17	1.95
	8	2.76	2.59	2.76	3.38
Upper Inter- ramp Andesite Class 3	1	3.38	2.91	2.92	3.16
	2	2.29	2.31	2.35	2.37
	3	2.00	1.68	2.41	2.58
	4	0.66	1.36	1.77	2.15
	5	0.76	1.99	1.75	2.62
	6	0.73	2.21	3.04	3.09
	7	0.78	0.87	1.68	2.32
	8	0.71	1.90	2.13	2.61
Lower inter-ramp Andesite Class3	1	1.00	1.53	1.37	2.53
	2	3.42	2.09	4.09	5.09
	3	5.13	4.91	5.61	6.94
	4	1.64	2.54	3.82	5.92
	5	3.23	3.54	4.39	5.63
	6	2.51	3.05	3.04	3.09
	7	0.78	1.30	2.10	2.32
	8	1.15	0.92	1.69	5.54

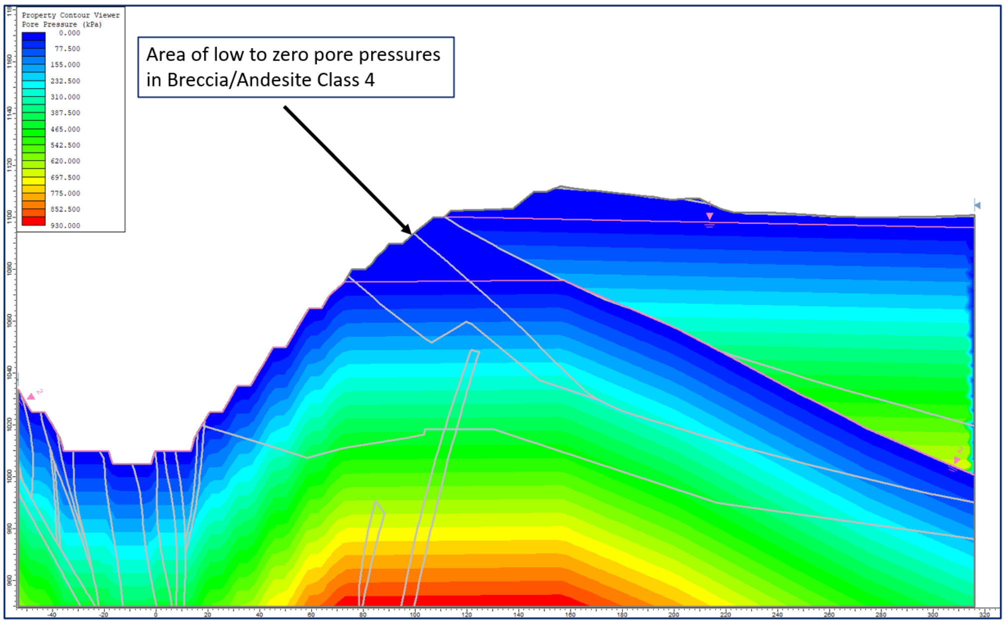
The saturated and 25% depressurised (Hu=0.75) case analyses show low FoS for shallow bench and multi-bench failures. The groundwater surface is modelled lying along the pit face. This is considered conservative and unrealistic because horizontal drains will be installed to further depressurise the rock mass, as well as existing depressurisation, which is already at 25% to 75%.

Section 7 for the inter-ramp segment show markedly lower FoS for the stronger class 3 compared to class 4 for all but dry conditions. This is despite approximately equivalent exposures of these two classes. In Section 7 there are two water surfaces (modelled as Piezometric lines in SLIDE) as shown in Inset 1. When water surfaces are added to a model in SLIDE, they are assigned to the desired material to calculate pore pressures for those materials. In the case of Section 7, the Piezometric Line 2 was assigned to both the Andesite Class 3 and Breccia/Andesite Class 4 materials. Consequently, the modelled pore pressures in the upper slope comprising Breccia/Andesite Class 4 are mostly zero based on the position of the Piezometric Line 2. Therefore, the lower FoS observed in the Andesite Class 3 is primarily a function of higher pore pressures as illustrated in Inset 2. In dry cases, pore pressures are not considered, and the considerably higher strength Andesite Class 3 expectedly yields a higher FoS than the weaker overlying Breccia/Andesite Class 4.



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	UCS (kPa)	GSI	mi	D	Water Surface
Rhyolytic Tuffs / Ignimbrite		18	Mohr-Coulomb	40	25					Piezometric Line 1
Dacite		18	Generalized Hoek-Brown			8000	40	25	0	Piezometric Line 1
Volcaniclastic		19	Mohr-Coulomb	40	15					Piezometric Line 1
Breccia / Andesite Class 4		22.5	Mohr-Coulomb	65	24					Piezometric Line 2
Andesite Class 3		22.5	Generalized Hoek-Brown			12000	29	25	0	Piezometric Line 2
Andesite Class 2		22.5	Generalized Hoek-Brown			25000	40	25	0	Piezometric Line 2
Andesite Class 3 Quartz		22.5	Generalized Hoek-Brown			12000	29	25	0	Piezometric Line 2
Andesite Class 2 Quartz		22.5	Generalized Hoek-Brown			25000	40	25	0	Piezometric Line 2

Inset 1: Section 7 geotechnical model showing the position of the two Piezometric lines.



Inset 2: Section 7 geotechnical model showing modelled pore pressures based on the position of the two Piezometric lines.

12.3.4 Comparison with Previous Results

The analyses presented FoS in Section 12.3.3 are similar but lower than the earlier results, PSM125-260R Draft 4, for each section shown in Figure 51. There are also more cases with FoS < 1.0. A direct comparison between sections is not possible due to the relocation of stability sections to suit the new pit design. The revised GSI andesite values have reduced the global minimum by approx. 0.1 when the critical surface was located within the Class 3 andesite.

12.3.5 Summary

The stability analyses show that the risk of rock mass failure with current standing water tables and 50% depressurisation is low. However, the 50 % depressurisation needs to be confirmed, and this will be accomplished by implementing the following:

1. A comprehensive piezometer network around the pit to be established before mining commences, which needs to be defined as part of the Ground Control Management Plan and installed before mining commences.
2. Planning for a comprehensive horizontal drain program in the pit.
3. Horizontal grading of the berms (that is inclined berms) in the upper flatter sections of slope to direct rainfall runoff and any shallow seepage away from lower slopes.
4. A staged early pit development to allow the rock mass conditions, geological structure and geology to be confirmed before commitment to final pit crest and overall design slopes.

13. Gladstone Portal

A preliminary geotechnical review of the proposed new portal location was requested as part of the Gladstone Pit design. The new Gladstone portal will be located within the Gladstone Pit North Wall.

The review is based on available exploration drilling, piezometer data and the current OGNZL geological models presented in the previous sections of this report. The two geotechnical design cross sections are shown in Figures 52 and 53. The Andesite rock mass units for these cross sections are shown in Figures 54 to 55. Cross section locations are shown in Figure 5.

The coverage of drillholes and data relative to the portal and tunnel gives good confidence in the geological and geotechnical model at the Gladstone portal. The following summarises the model interpretation:

1. The tunnel is anticipated within Class 3 and 2 Andesite.
2. The underground assists with groundwater depressurisation.
3. There is potential for axial tensile conditions to develop in tunnel arch as the pit is excavated at depth.
4. Axial tensile conditions can probably be designed for with additional/different tunnel support.
5. Tunnel conditions may become poor at some distance from the portal as the depth of cover to the unconformity reduces.

14. Conclusions and Recommendations

A number of earlier open pits within the GOP region have been assessed by PSM as part of the ongoing development of the planned mining. The geotechnical approach used for designing these earlier pits recognised the fact they were small, with short design lives, and were not particularly high value.

Consequently, the geotechnical approach adopted entailed drilling of three geotechnical boreholes, reliance on using the resource drill hole data and supplementing this with the available underground structural data. The pit designs, positioning of the haul road and haul road layouts were optimised to try an ameliorate some of the weaker rock mass areas at the same time as trying to maximise overall slopes in order to improve project economics.

The new planned Gladstone Pit is larger than the earlier pits and the in-pit TSF after the completion of mining will also entail backfilling the lower part of the pit with rock and also laying rock at flatter overall angles against the upper pit walls. This will effectively stabilise the pit walls. However, in conjunction with this there will be a requirement for the pit walls to be stable such that the TSF can be constructed.

One other factor is there is a gap in the exploration drilling along most of the new north wall, Figure 5.

The variability in the geology and poor to fair geotechnical conditions means it is important that final designs are allowed to be checked early in the mine life. This approach will be relatively easy to achieve at Gladstone because the centre of the open pit is on low hills and significant excavation occurs early.

A number of questions and uncertainties have arisen as a result of this study. These are not considered to be of sufficient magnitude to negate the results of this study, which has shown that the planned slopes in the Gladstone pit are achievable, provided the slopes are adequately depressurised and surface drainage is controlled. However, a Ground Control Management Plan (GCMP) must be formulated for the pit prior to mining.

The GCMP should include:

1. A detailed staged pit development plan to allow the rock mass conditions, geological structure and geology to be confirmed before commitment to final pit crest and overall design slopes. The plan should include hold points for the slope designs to be reassessed and confirmed.
2. A comprehensive piezometer network around the pit, established before mining commences to measure groundwater levels and pore pressures.
3. The characteristics of faults and shears, particularly the continuity.
4. The Unconfined Compressive Strengths and shear strengths of the young volcanic units and the Andesite Class 4.
5. Confirming Andesite Class 3 shear strengths.
6. Stability conditions around problem areas in the underground and the appropriate remediation treatments during mining.
7. Planning for a comprehensive horizontal drain program in the pit.
8. Horizontal grading of the berms (that is inclined berms) in the upper flatter sections of slope to direct rainfall runoff and any shallow seepage away from lower slopes.

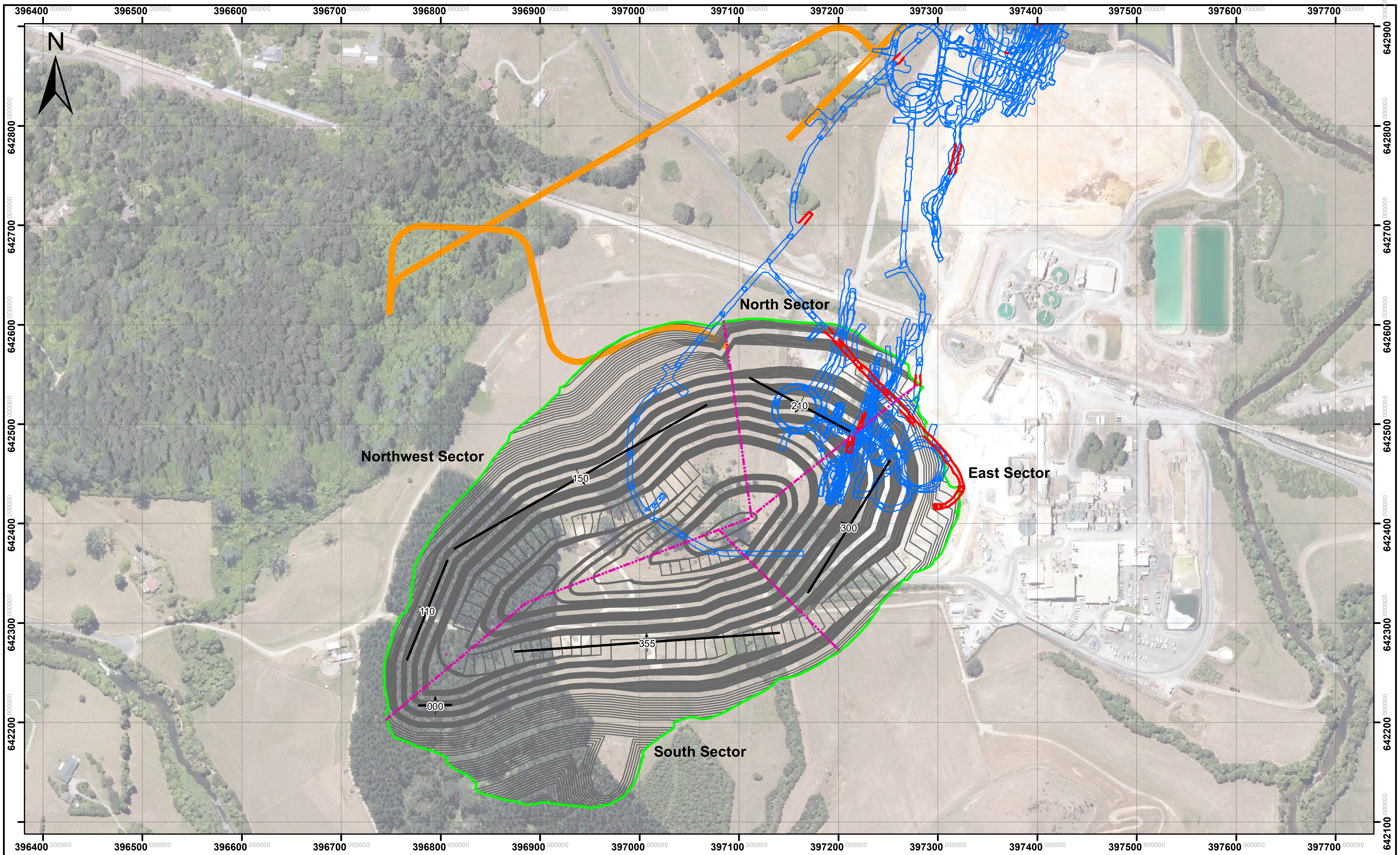
The Gladstone Pit is a commercial operation on OGNZL private land well away from private or public infrastructure. There are no significant downstream or other consequences such that external parties could be impacted. We understand the pit crest is fixed and the pit will not extend beyond that. The detail within the pit crest is still to be finalised by OGNZL. There will be considerable internal detail developed around how OGNZL deal with mining risks that lie within the open pit, for example underground interactions, design factors of safety, bench and berm profiles, horizontal drains, haul road layout and positioning.

Yours Sincerely

TIM SULLIVAN
PRINCIPAL

REFERENCES

1. Davies B., 2002. A review of the structural framework and evolution of the Waihi District, Hauraki Goldfield, New Zealand. Unpublished internal report, Newmont.
2. Brathwaite, R.L., Torckler, L.K. and Jones, P.K., 2006. The Martha Hill epithermal Au-Ag deposit, Waihi: Geology and mining history. Geology and Exploration of New Zealand Mineral Deposits. Parkville, Vic: Australasian Institute of Mining and Metallurgy Monograph, 25, pp.171-178.
3. Edbrooke, S.W., 2001. Geology of the Auckland Area: Scale 1: 250 000. Institute of Geological & Nuclear Sciences.
4. Gladstone Pit TSF Design Report, GHD, 2025.
5. OGNZL, 2016. Dewatering and Settlement Monitoring Report 2016. Document reference WAI-200-REP-007-002. Unpublished internal report, OceanaGold 2016.
6. OGNZL, 2015. NI43-101 Technical Report for the Waihi Gold Mine. Document reference NI43-101.Published public report, OceanaGold 2015.
7. Oldfield, G., 1989. Gladstone Hill Epithermal System, Waihi N.Z. Proc. 11th New Zealand Geothermal Workshop, 1989.
8. GWS, 2021. Gladstone Hill Wetland – Interpretation of Hydrogeological Conditions and Potential Effects from the Proposed Gladstone Open Pit, Technical Memo, 21July 2021.



Legend

- Design Sector Lines 2021
- Slope Aspect 2021
- Collapsing and/or Squeezing Ground
- Favona Moonlight Underground
- 17-04-2021 Gladstone Pit Crest
- 17-04-2021 Gladstone Pit
- 17-04-2021 Gladstone Proposed Tunnels and Portals

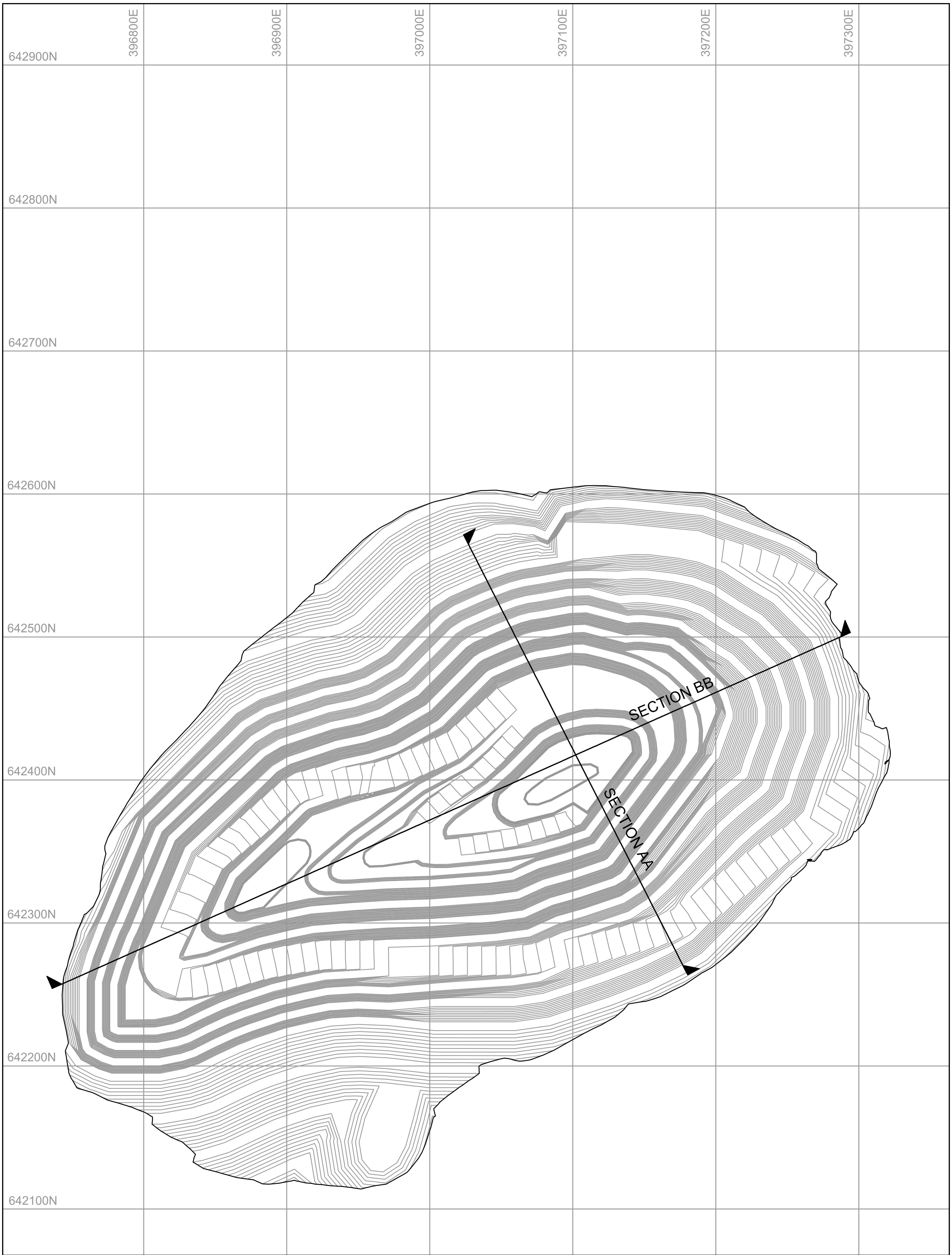
Scale

0 30 60 120 180 240 Meters

Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand
GLADSTONE PIT
SITE PLAN AND FINAL PIT DEVELOPMENT

PSM125-260R	Figure 1



LEGEND

Pit DTM 28 April 2021 1m Contours

Section Locations

0 50 100

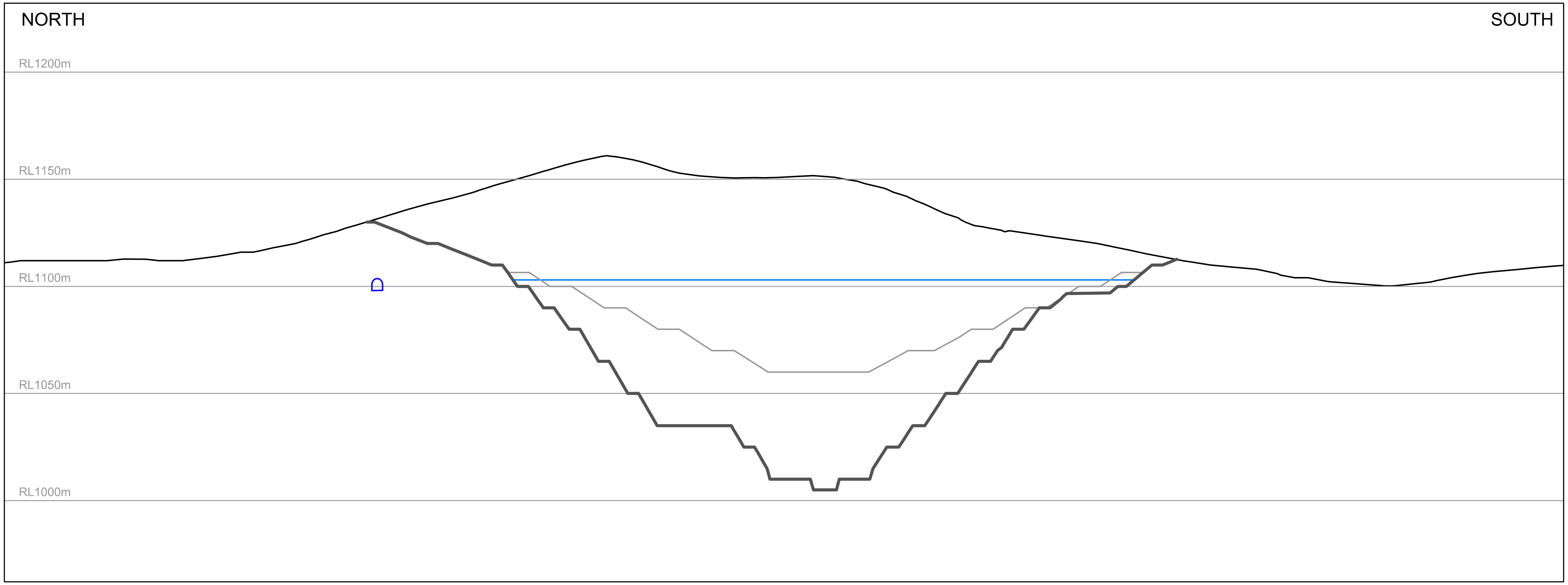
Scale (m)

PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION LOCATIONS AA & BB

PSM125-260R	Figure 2



LEGEND

Pre-mining Topography

Gladstone Final Pit

Surface of Backfill

Max Water/Tailings Level (1103mRL)

Proosed Gladstone Portal

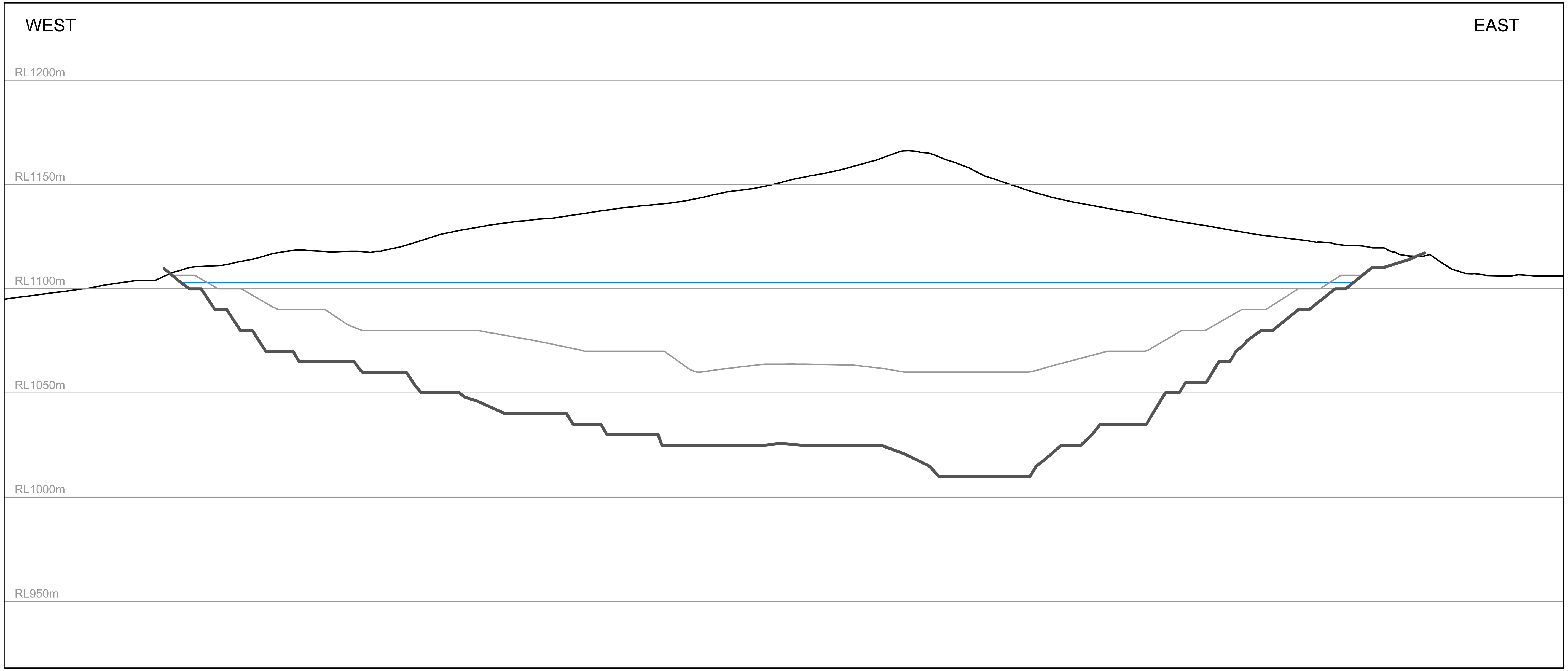
0 50 100

Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION AA

PSM125-260R | Figure 3



LEGEND

Pre-mining Topography

Gladstone Final Pit

Surface of Backfill

Max Water/Tailings Level (1103mRL)

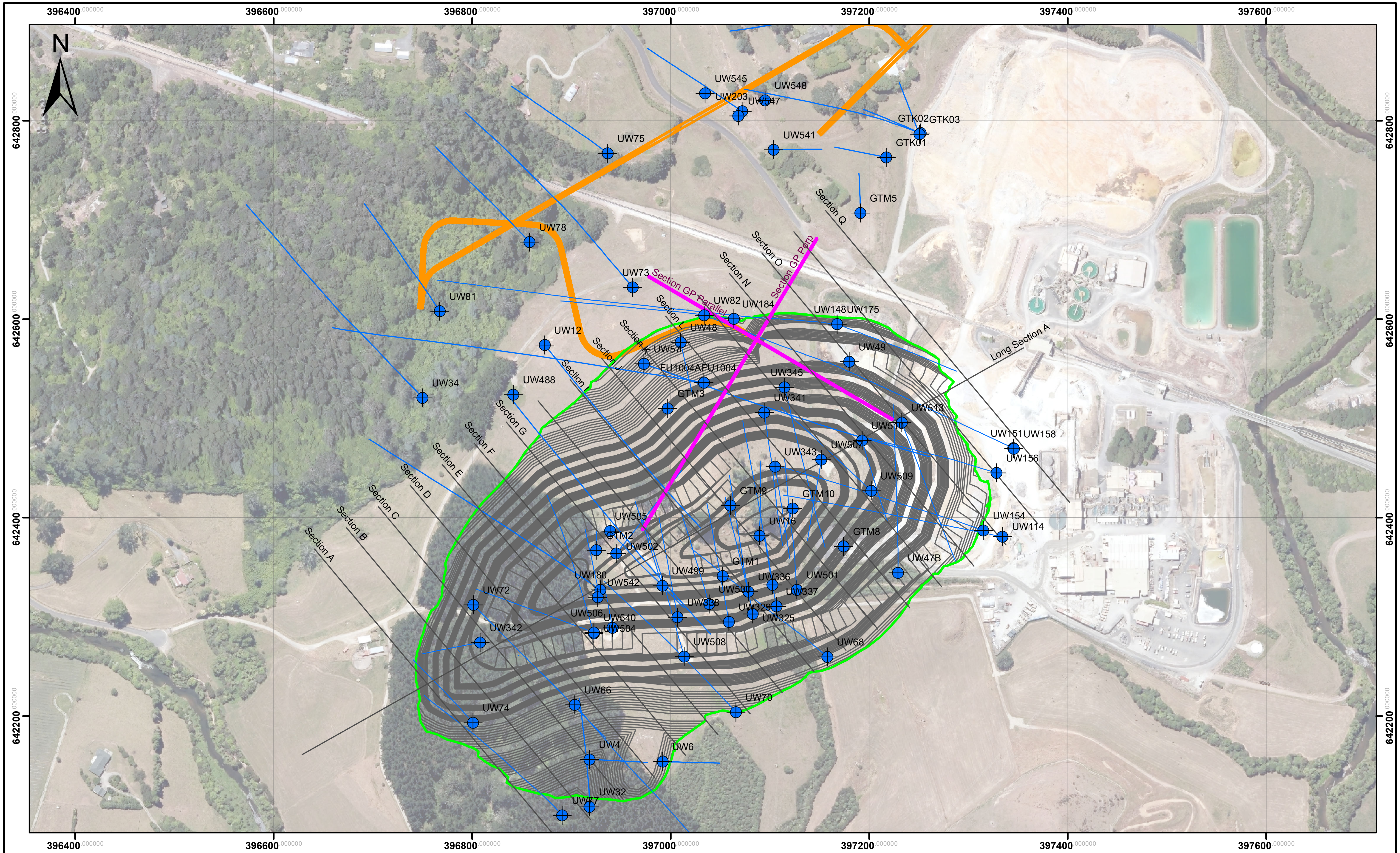
0 50 100

Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION BB

PSM125-260R | Figure 4



Legend

- Boreholes Used for Rock Mass Assessment
- Section Lines (Figures 6 - 23. 32 - 48)
- Borehole Traces
- Sections Southern Portal (Figures 53, 54, 57, 58)
- 17-04-2021 Gladstone Pit Crest
- 17-04-2021 Gladstone Pit
- 17-04-2021 Gladstone Proposed Tunnels and Portals

Scale

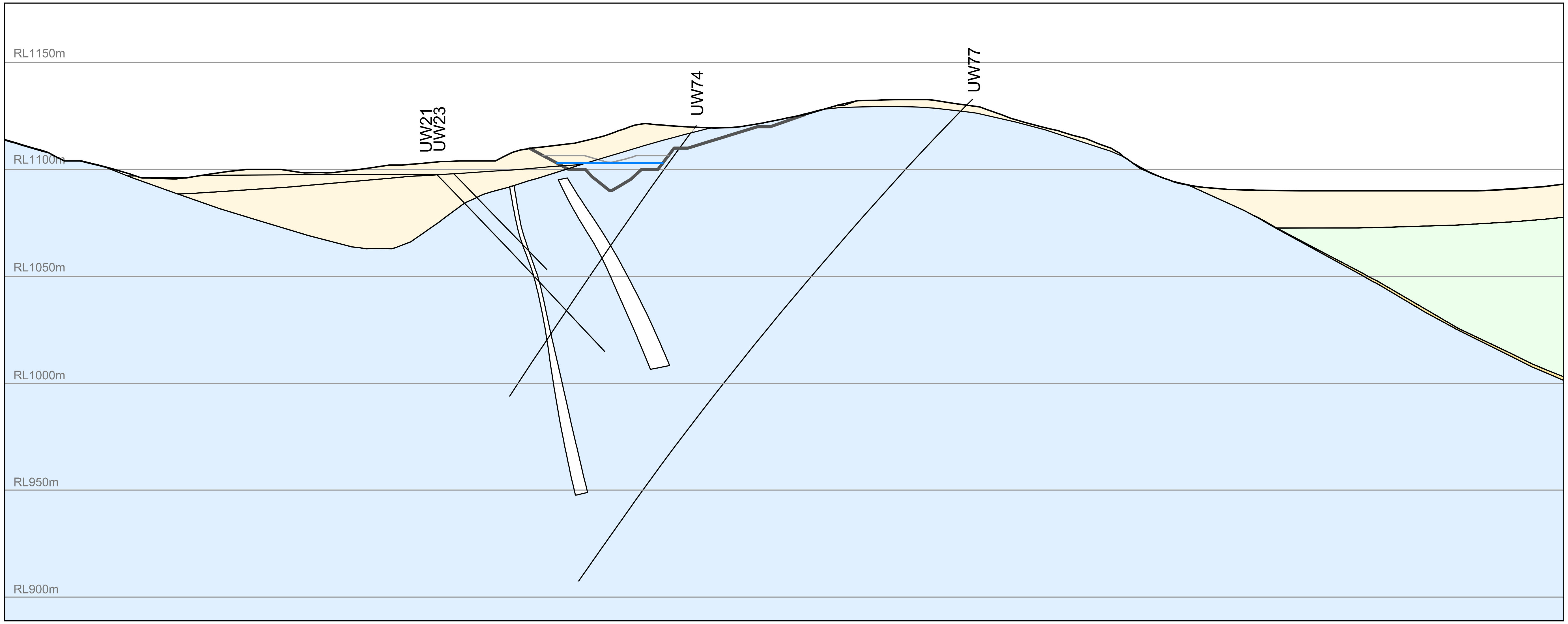
0 35 70 140 210 280 Meters

PSM Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT - BOREHOLES USED FOR ROCK MASS ASSESSMENT

PSM 125-260R	Figure 5



LEGEND

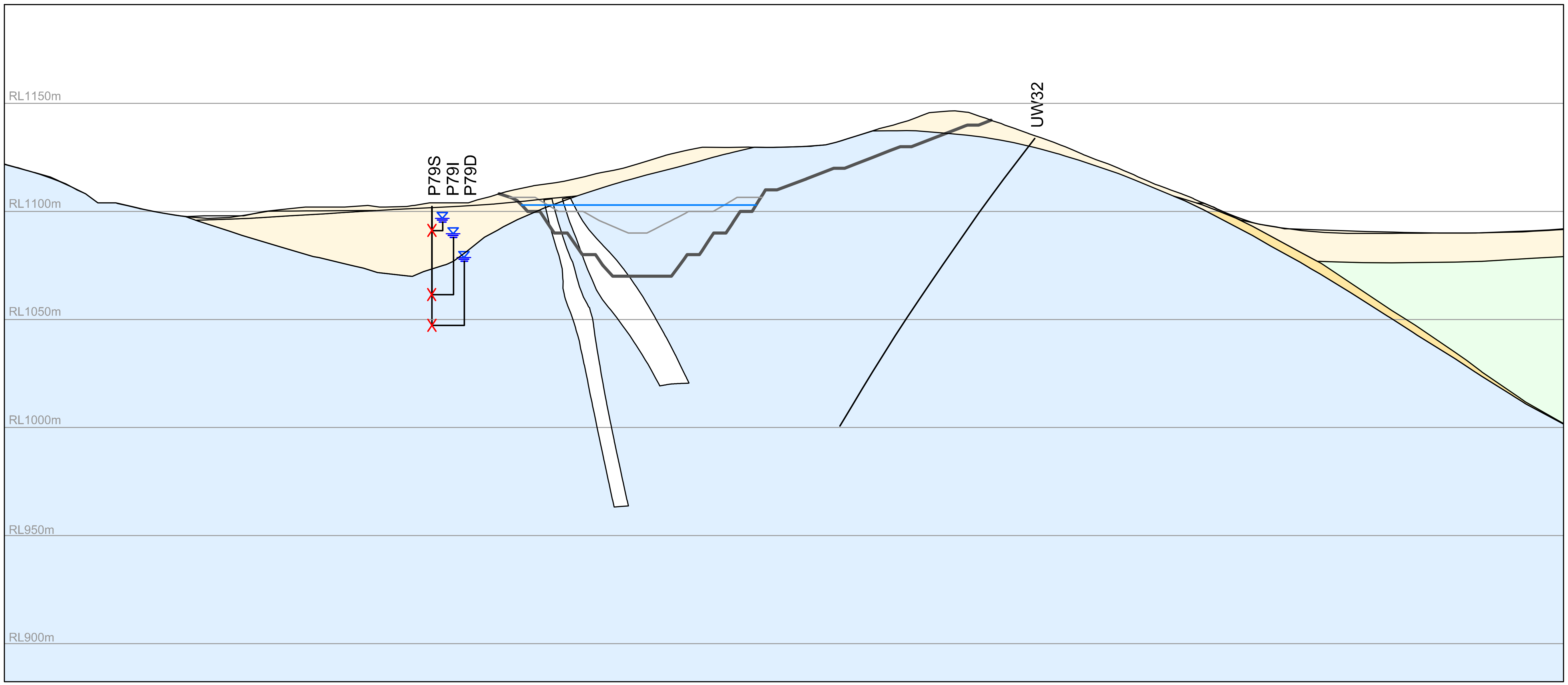
Gladstone Pit	Tuff / Ignimbrite
Surface of Backfill	Breccia
Underground Drives	Black Hill Dacite
Underground Stopes	Volcaniclastic
Squeezing/ Collapsing Ground	Andesite
Max Water/Tailings Level (1103mRL)	Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION A

PSM125-260R | Figure 6



LEGEND

- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

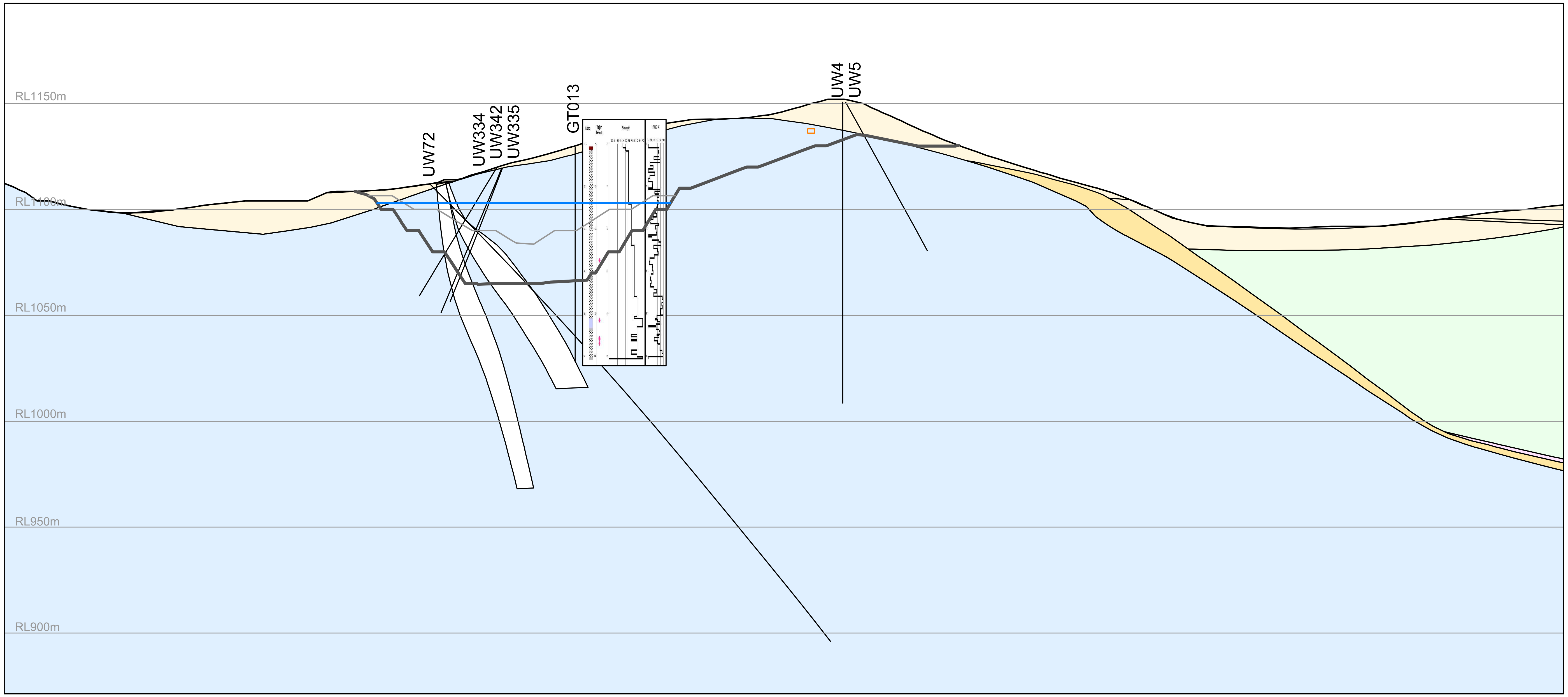
Standpipe Piezometer
- Dipped depth below ground level
- Base of screened interval

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi Norh Project
Waihi New Zealand

GLADSTONE PIT
SECTION B

PSM125-260R | Figure 7



LEGEND

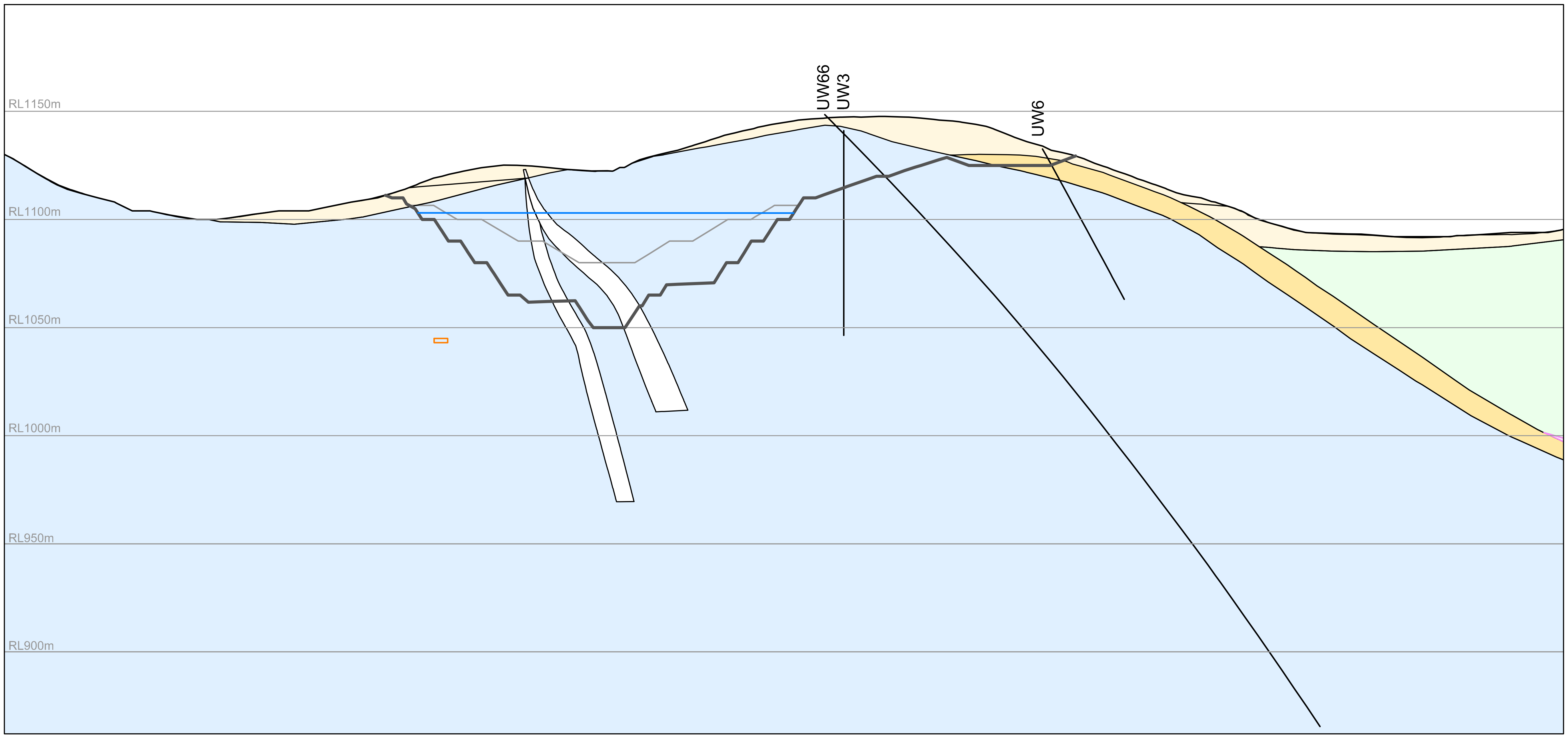
- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION C

PSM125-260R | Figure 8



LEGEND

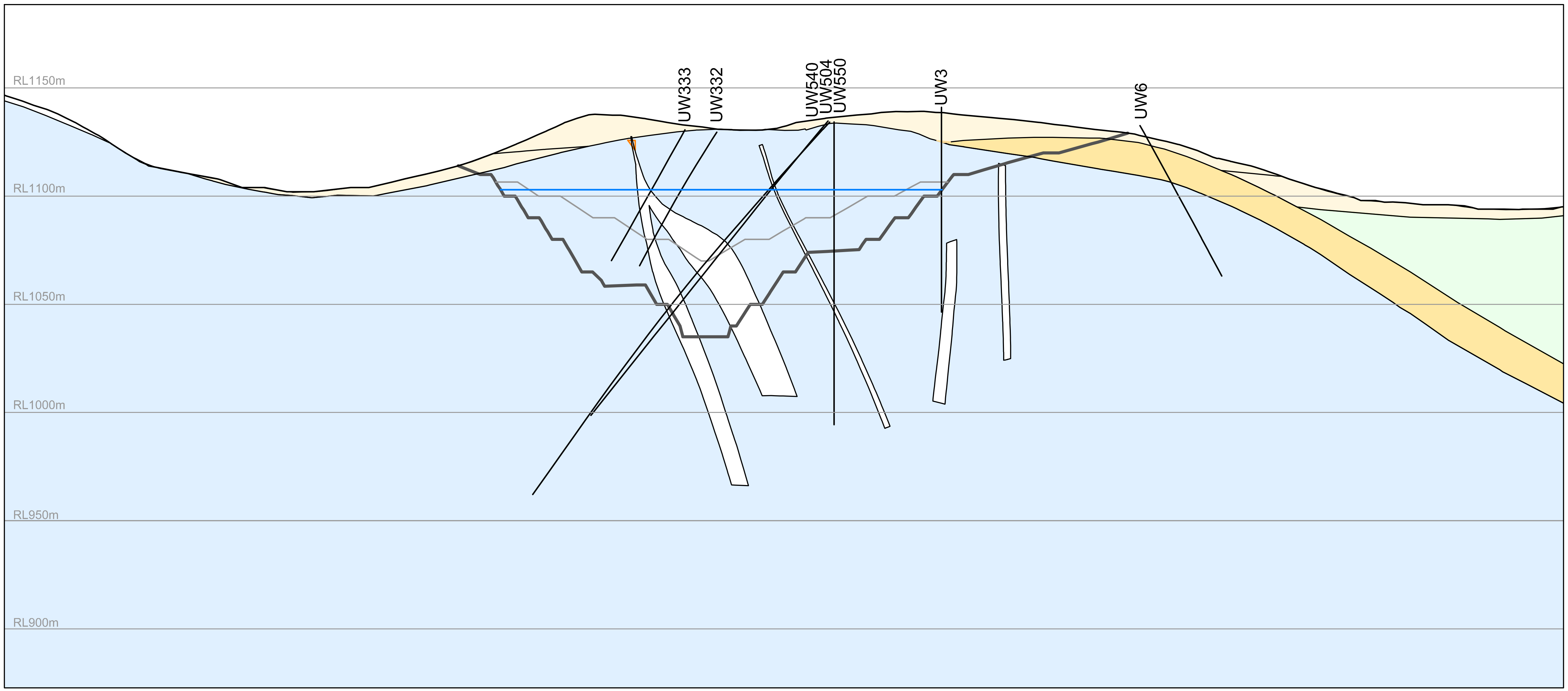
- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION D

PSM125-260R | Figure 9



LEGEND

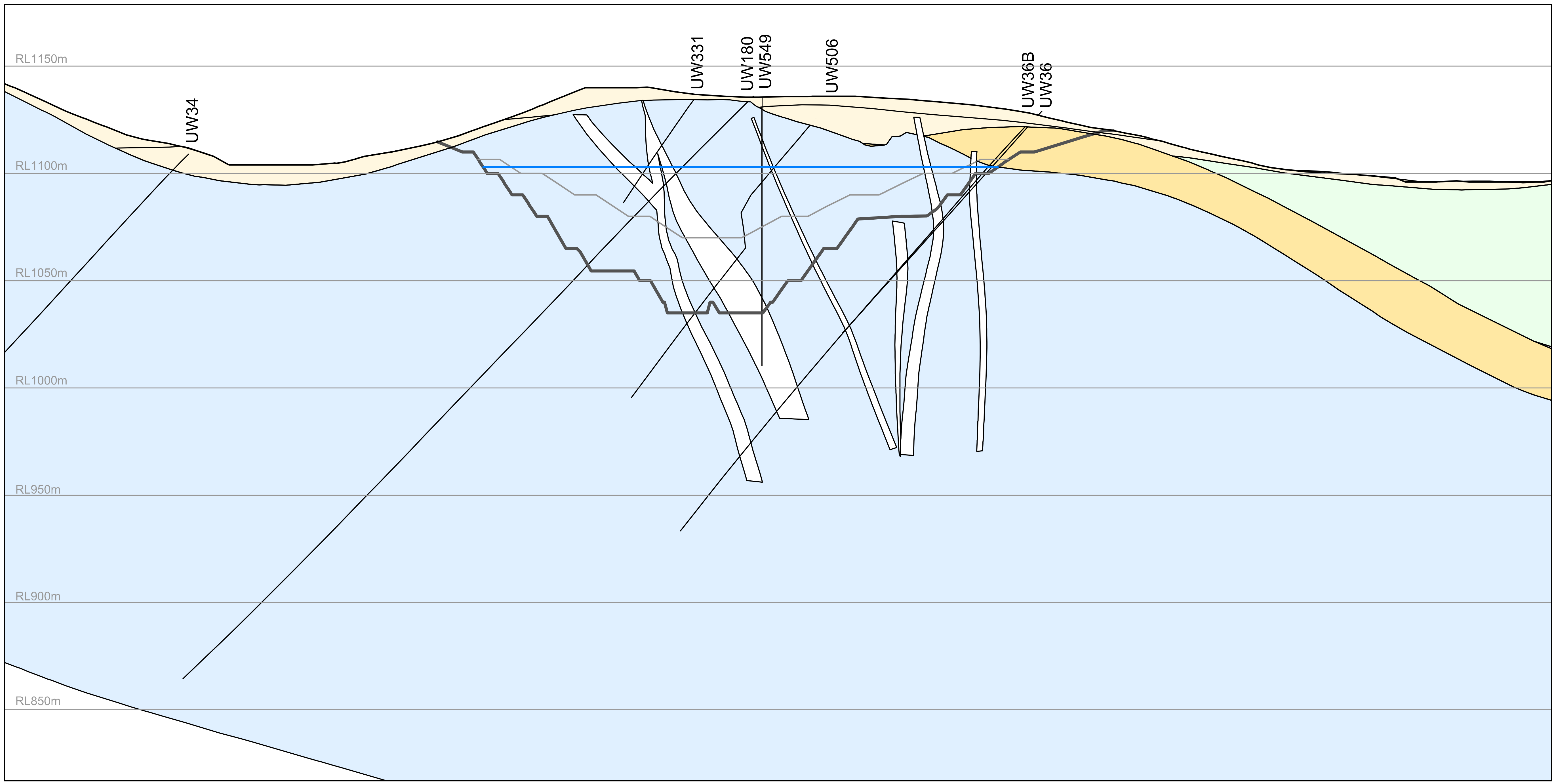
- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION E

PSM125-260R | Figure 10



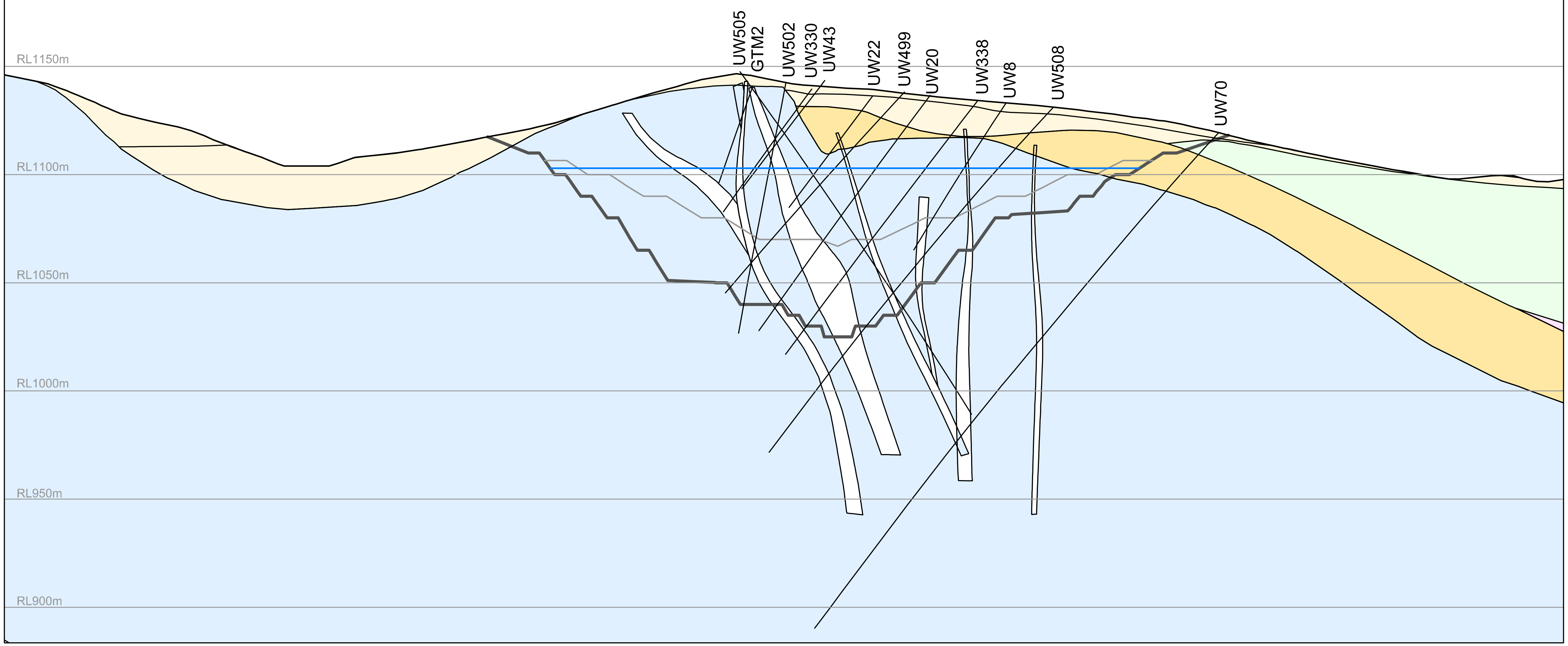
LEGEND

- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION F

PSM125-260R | Figure 11



LEGEND

Gladstone Pit	Tuff / Ignimbrite
Surface of Backfill	Breccia
Underground Drives	Black Hill Dacite
Underground Stopes	Volcaniclastic
Squeezing/ Collapsing Ground	Andesite
Max Water/Tailings Level (1103mRL)	Quartz Veins

0 50 100

Scale (m)

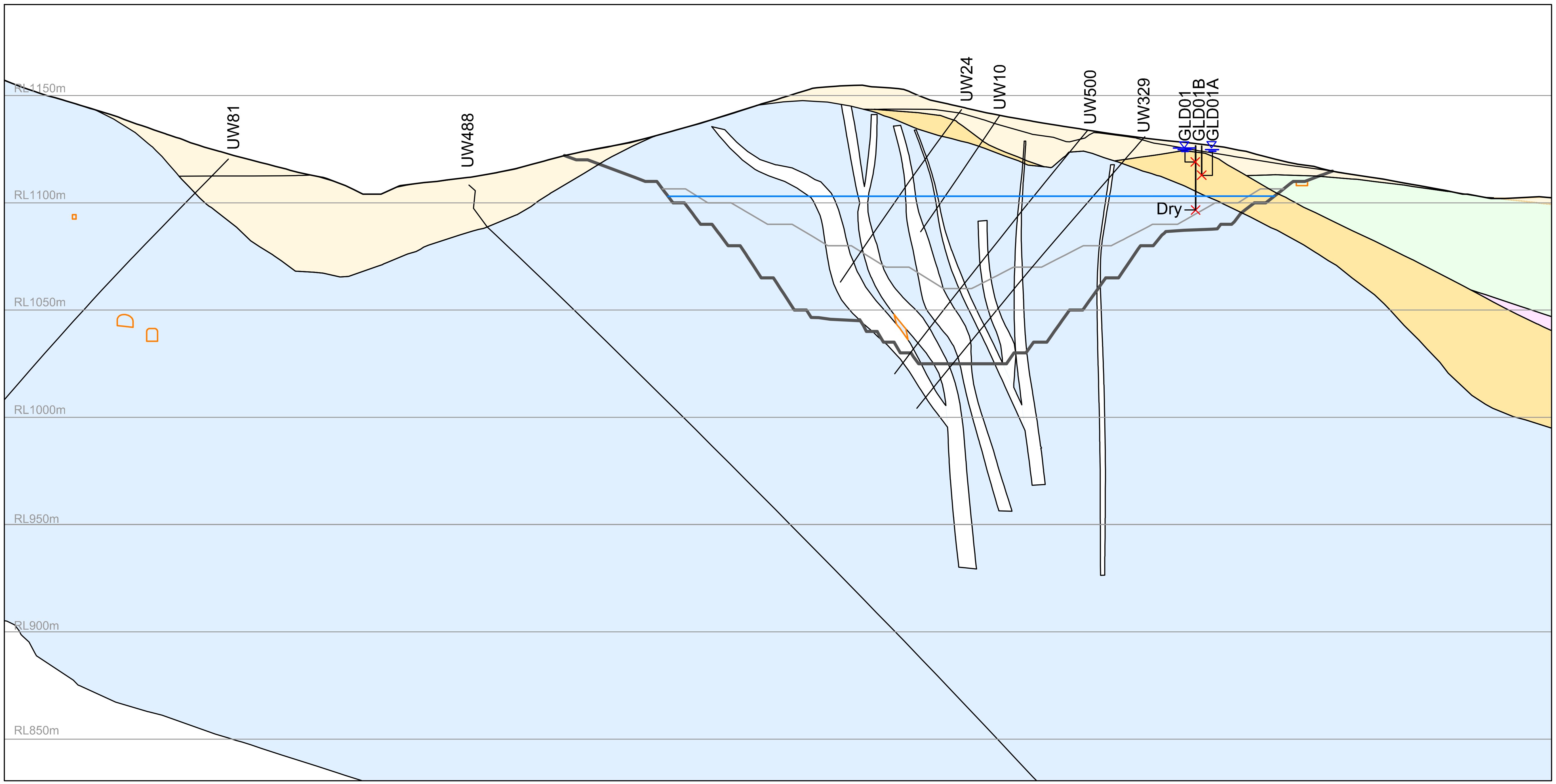
PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION G

PSM125-260R

Figure 12



LEGEND

Gladstone Pit
Surface of Backfill
Underground Drives
Underground Stopes
Squeezing/ Collapsing Ground
Max Water/Tailings Level (1103mRL)

Standpipe Piezometer
Dipped depth below ground level
Base of screened interval

Tuff / Ignimbrite
Breccia
Black Hill Dacite
Volcaniclastic
Andesite
Quartz Veins

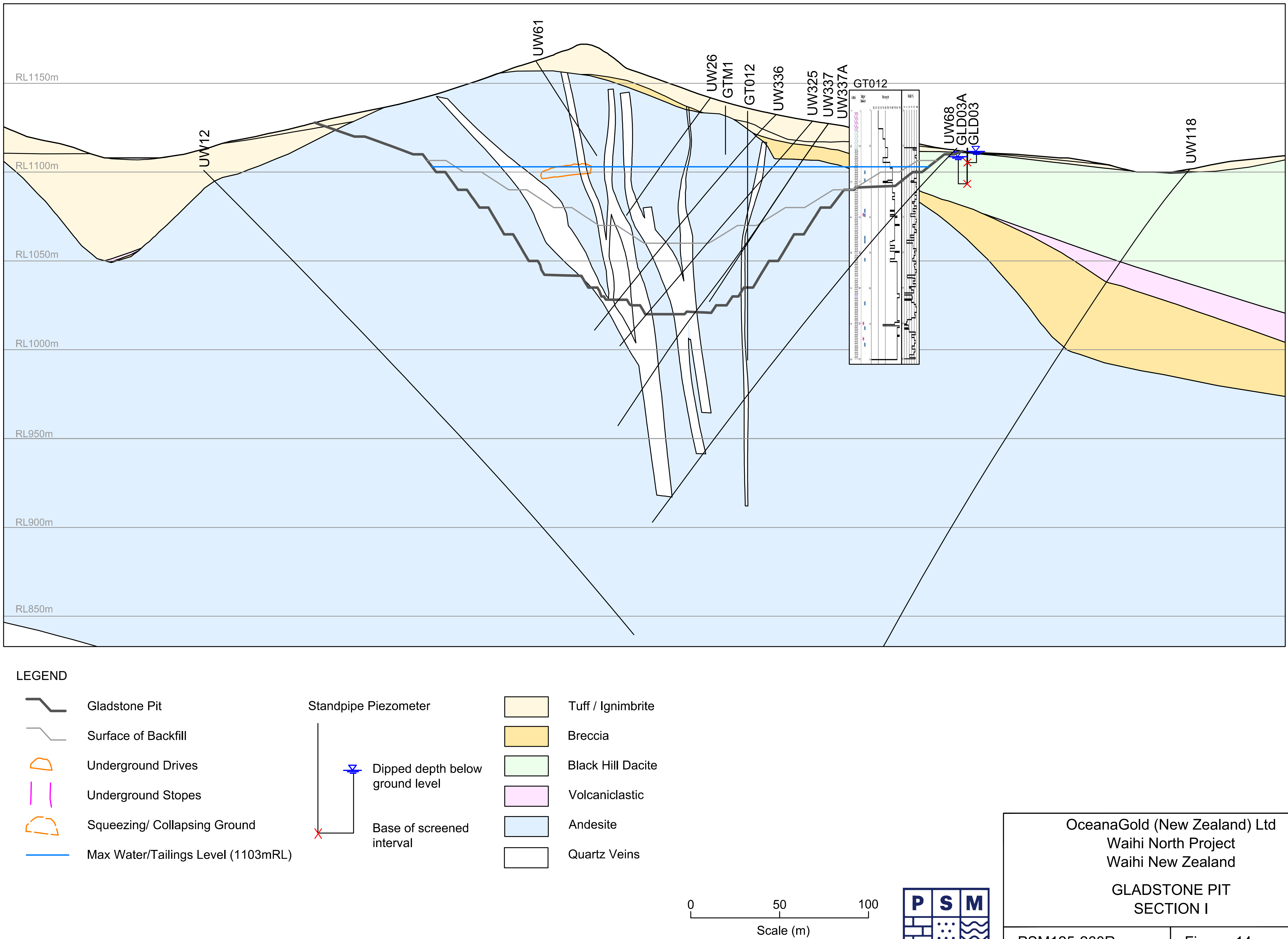
0 50 100
Scale (m)

PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION H

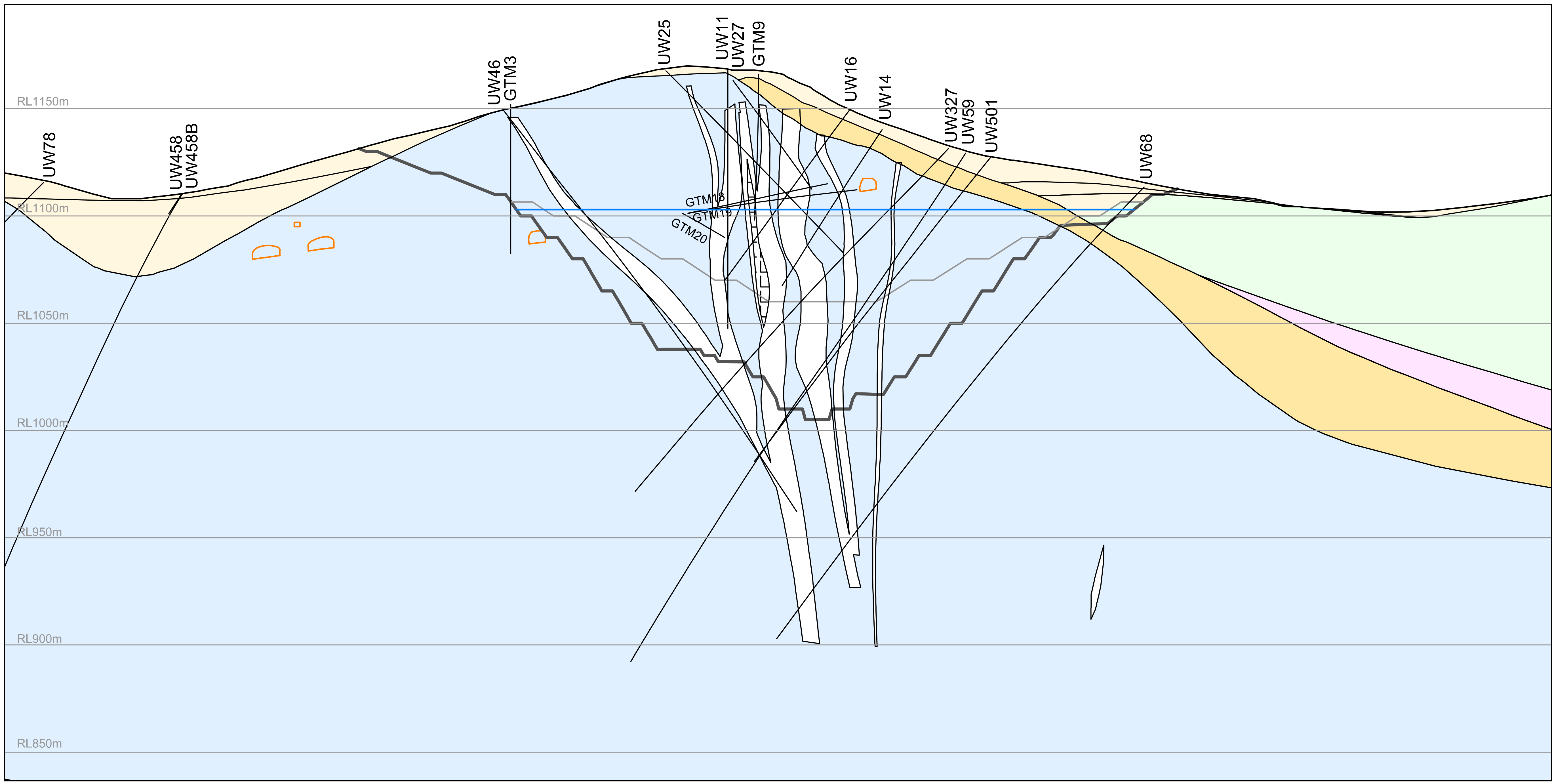
PSM125-260R | Figure 13



OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION I

PSM125-260R | Figure 14



LEGEND

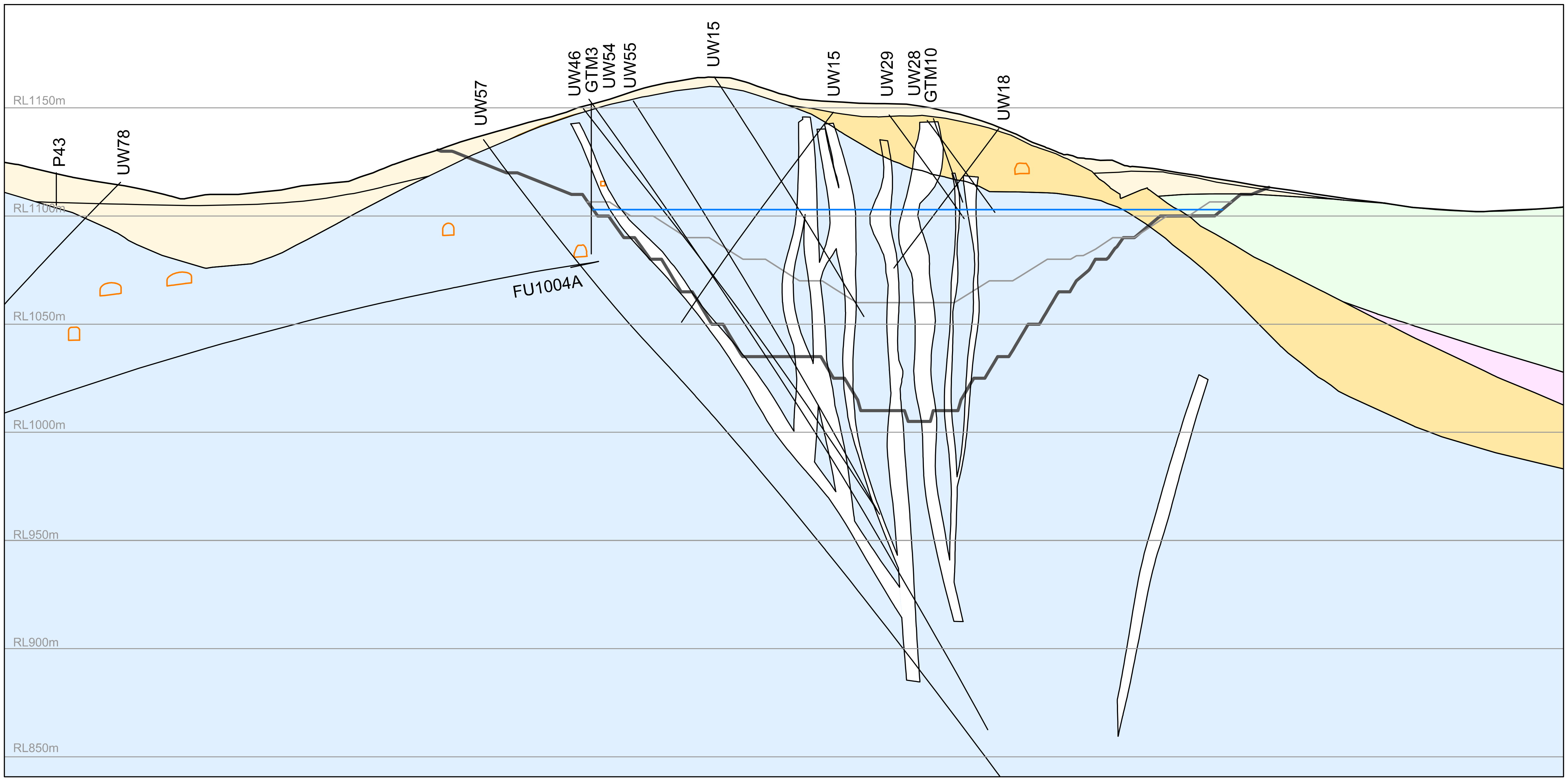
	Gladstone Pit		Tuff / Ignimbrite
	Surface of Backfill		Breccia
	Underground Drives		Black Hill Dacite
	Underground Stopes		Volcaniclastic
	Squeezing/ Collapsing Ground		Andesite
	Max Water/Tailings Level (1103mRL)		Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION J

PSM125-260R | Figure 15



LEGEND

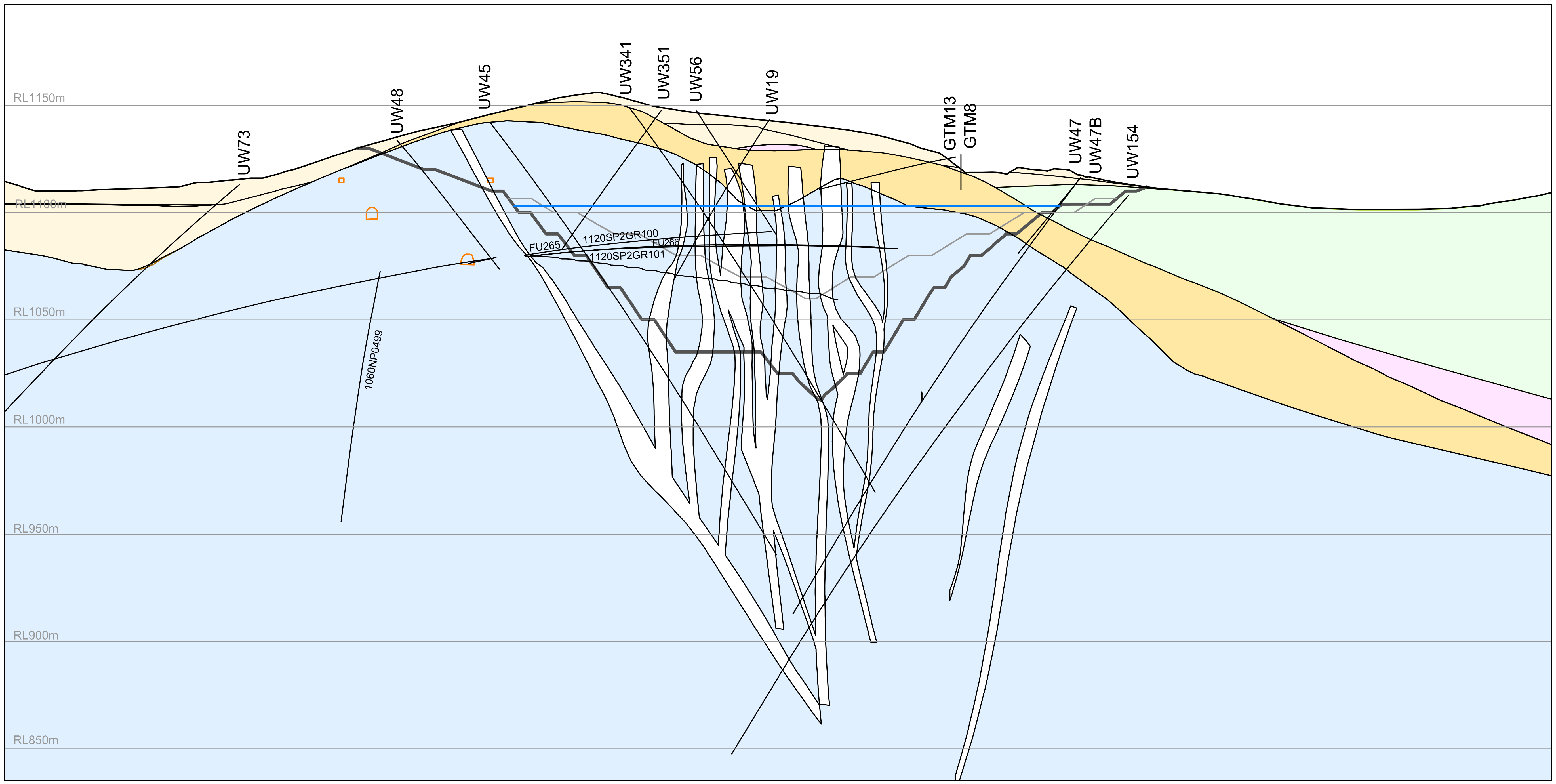
Gladstone Pit		Tuff / Ignimbrite	
Surface of Backfill		Breccia	
Underground Drives		Black Hill Dacite	
Underground Stopes		Volcaniclastic	
Squeezing/ Collapsing Ground		Andesite	
Max Water/Tailings Level (1103mRL)		Quartz Veins	

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION K

PSM125-260R | Figure 16



LEGEND

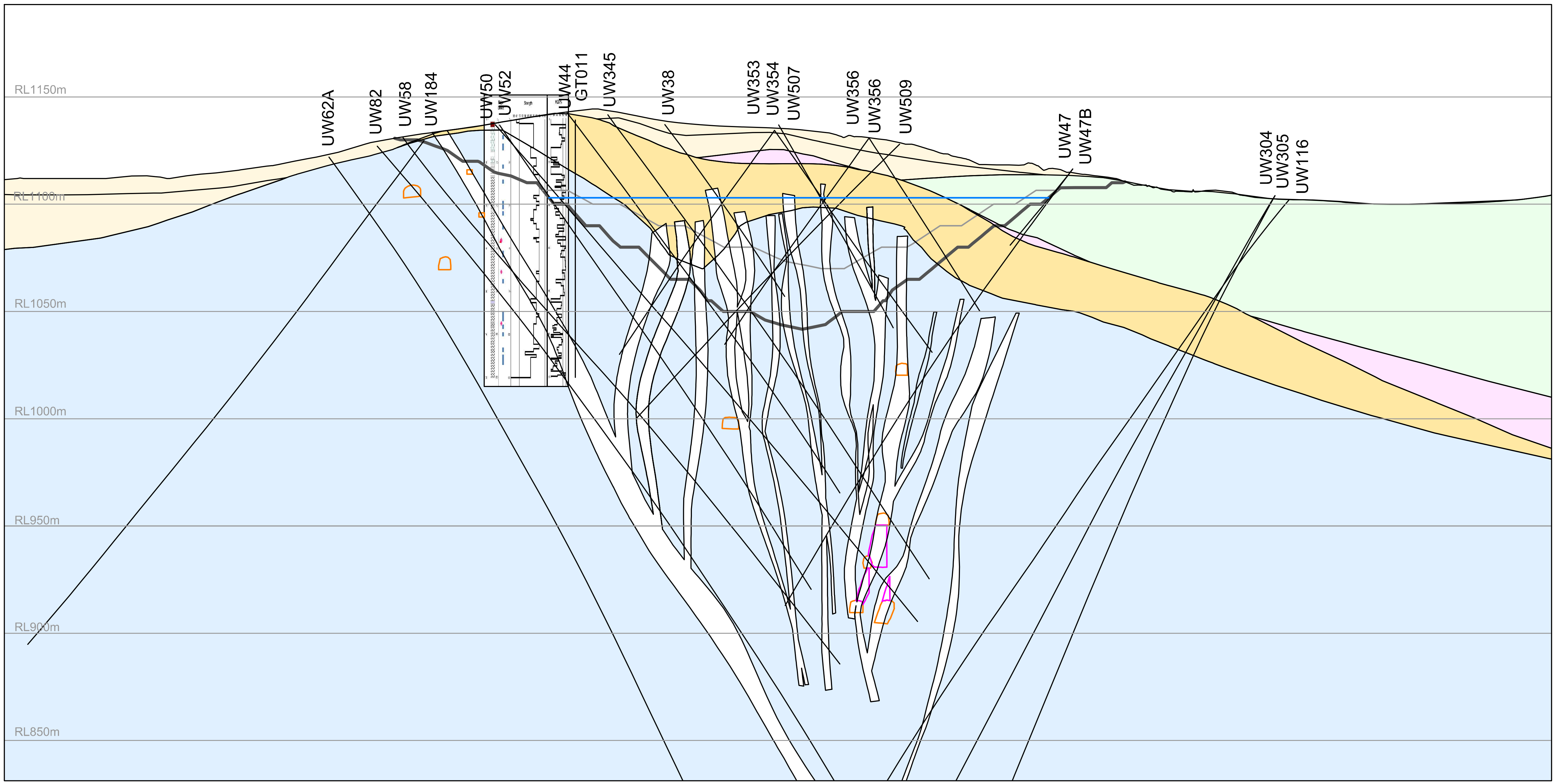
- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION L

PSM125-260R | Figure 17



LEGEND

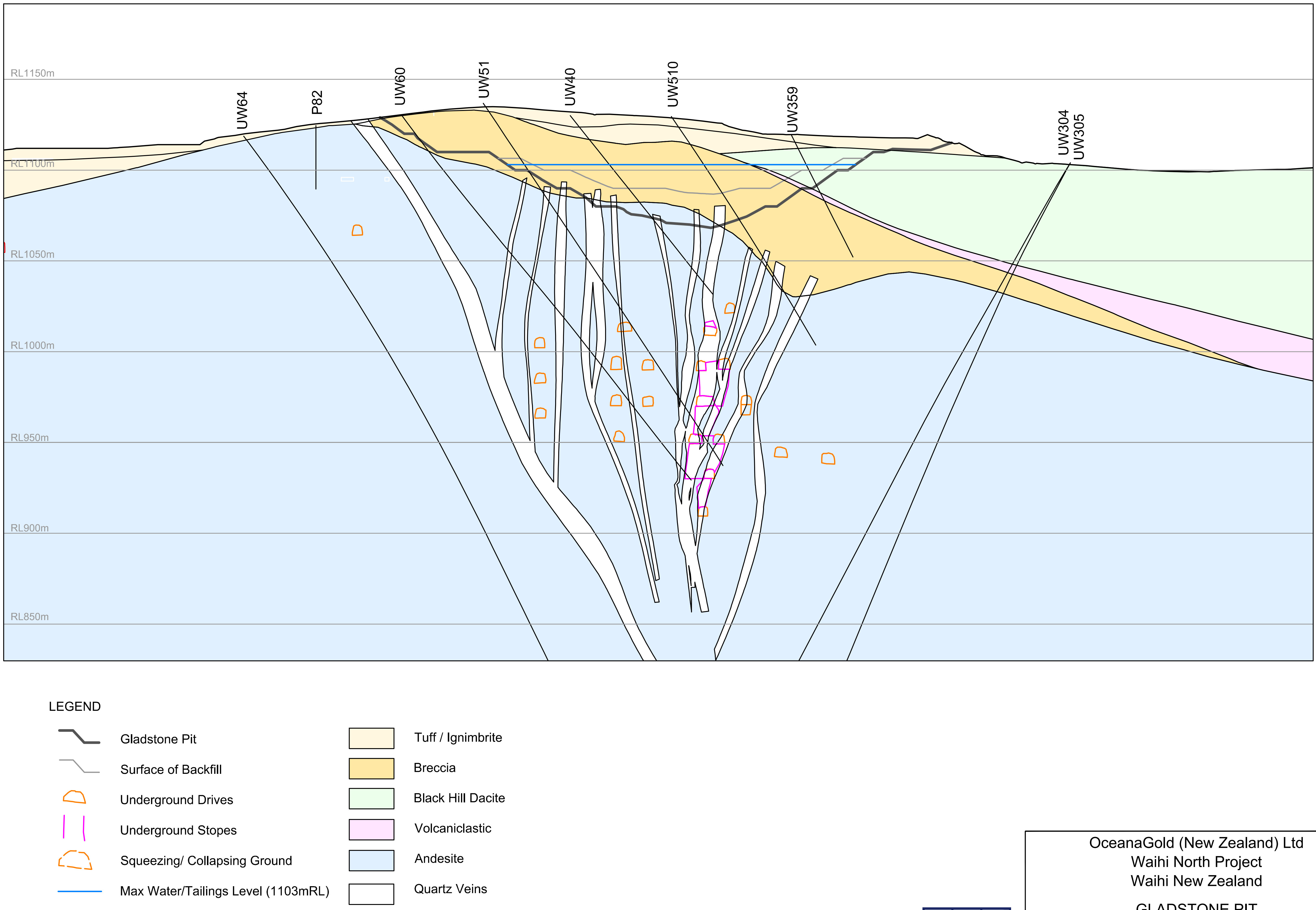
Gladstone Pit	Tuff / Ignimbrite
Surface of Backfill	Breccia
Underground Drives	Black Hill Dacite
Underground Stopes	Volcaniclastic
Squeezing/ Collapsing Ground	Andesite
Max Water/Tailings Level (1103mRL)	Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION M

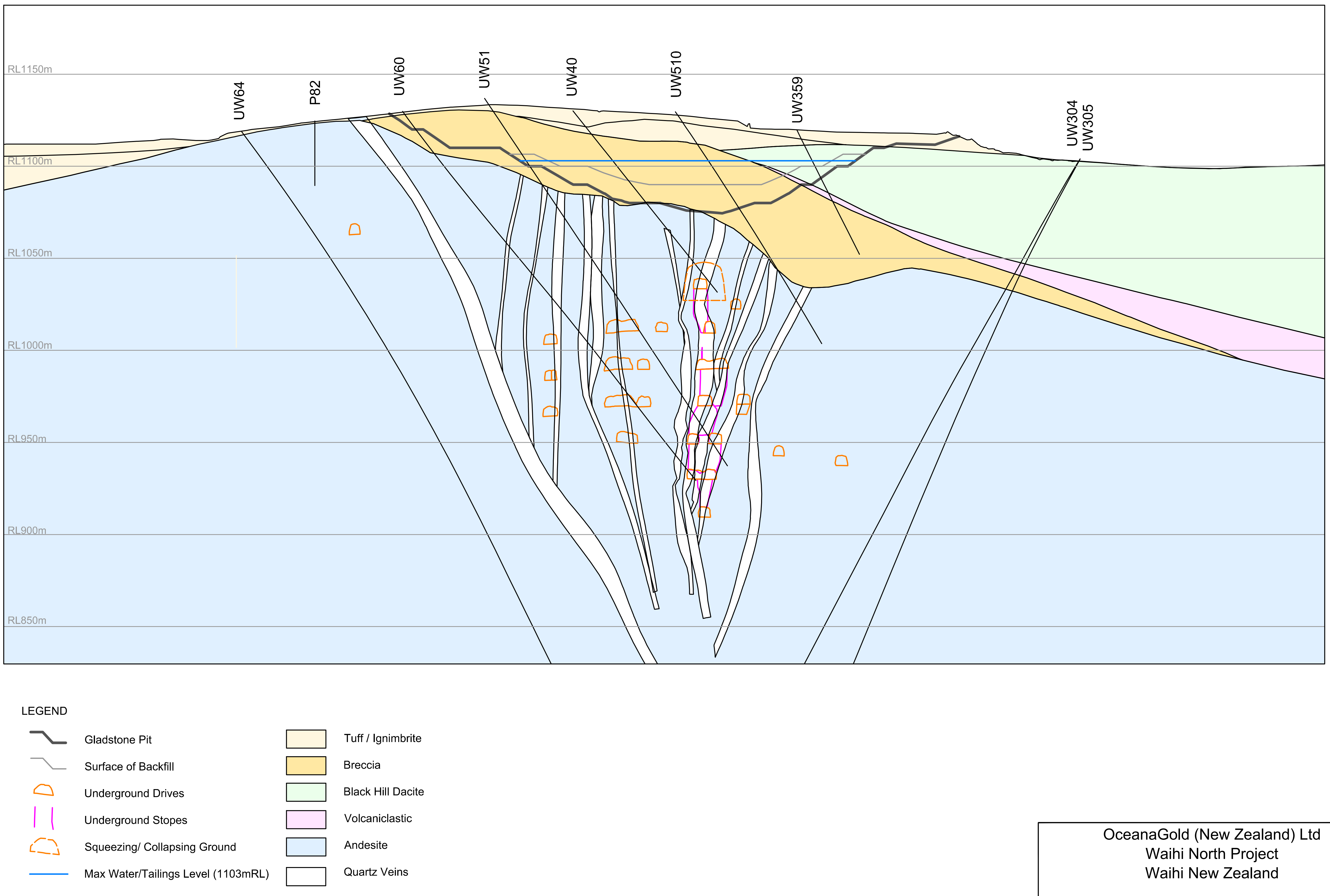
PSM125-260R Figure 18



OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION N

PSM125-260R | Figure 19

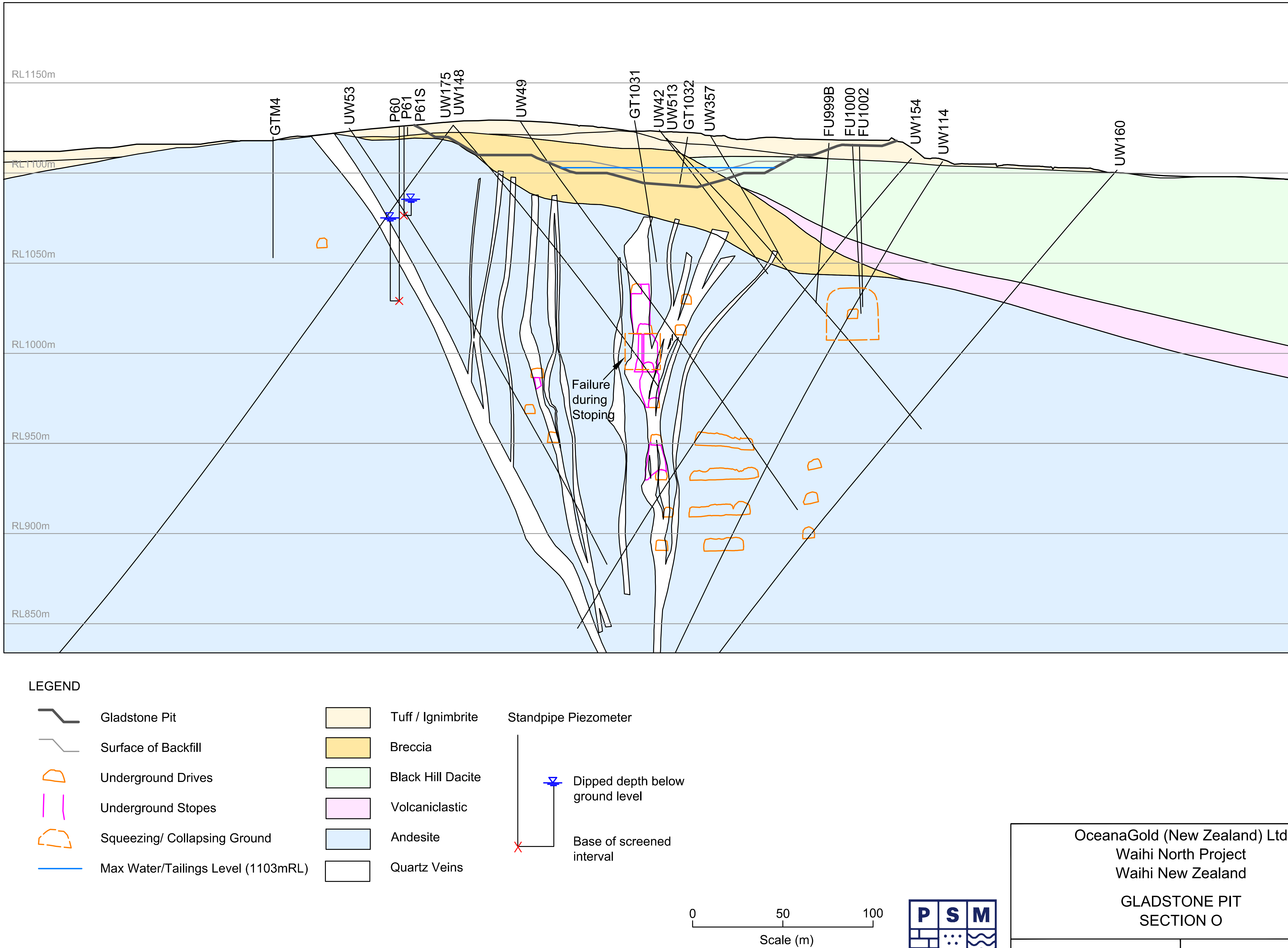


OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION N-2

PSM125-260R

Figure 20

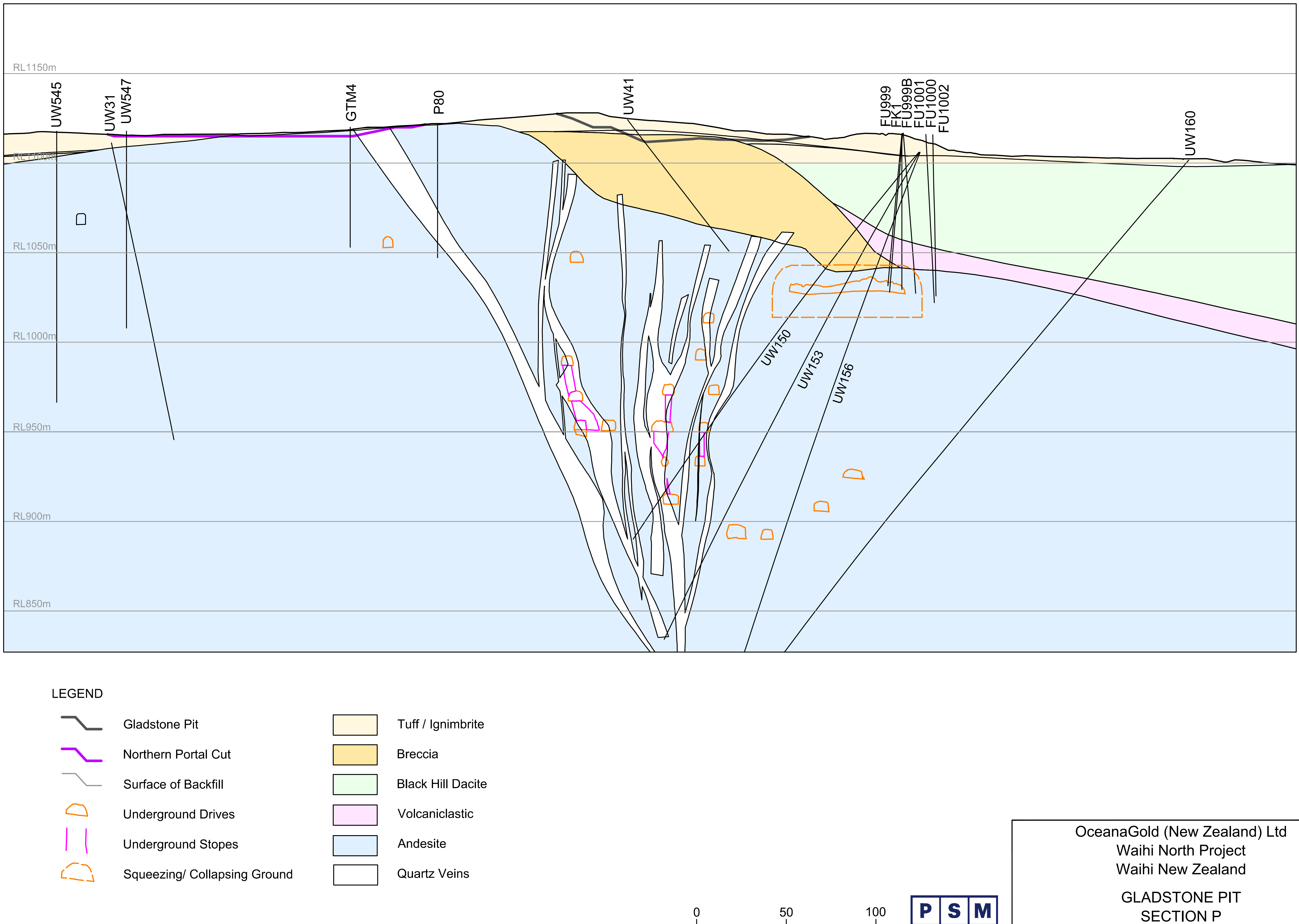


OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION O

PSM125-260R

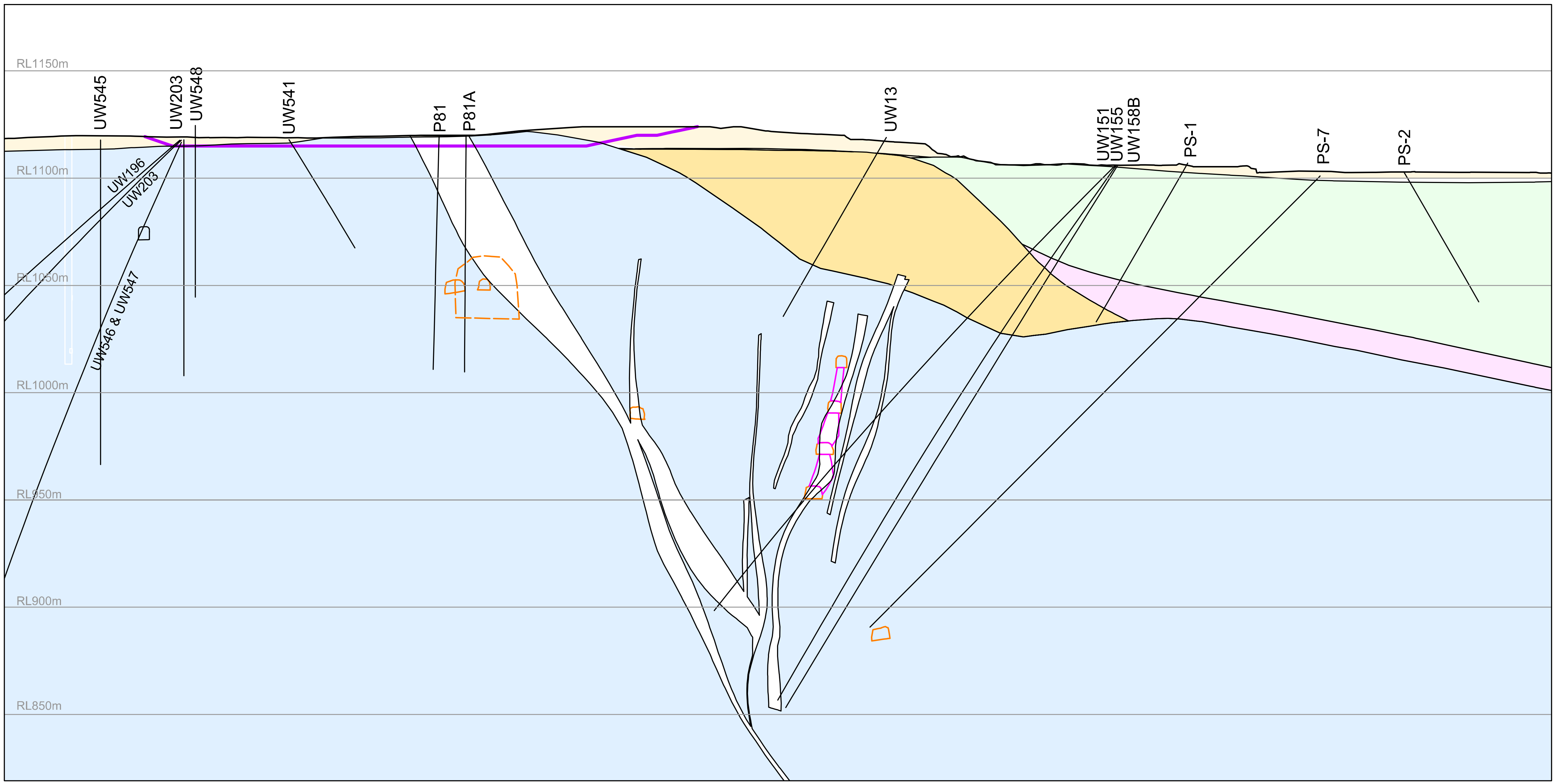
Figure 21



OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION P

PSM125-260R | Figure 22



LEGEND

	Northern Portal Cut		Tuff / Ignimbrite
	Surface of Backfill		Breccia
	Underground Drives		Black Hill Dacite
	Underground Stopes		Volcaniclastic
	Squeezing/ Collapsing Ground		Andesite
			Quartz Veins

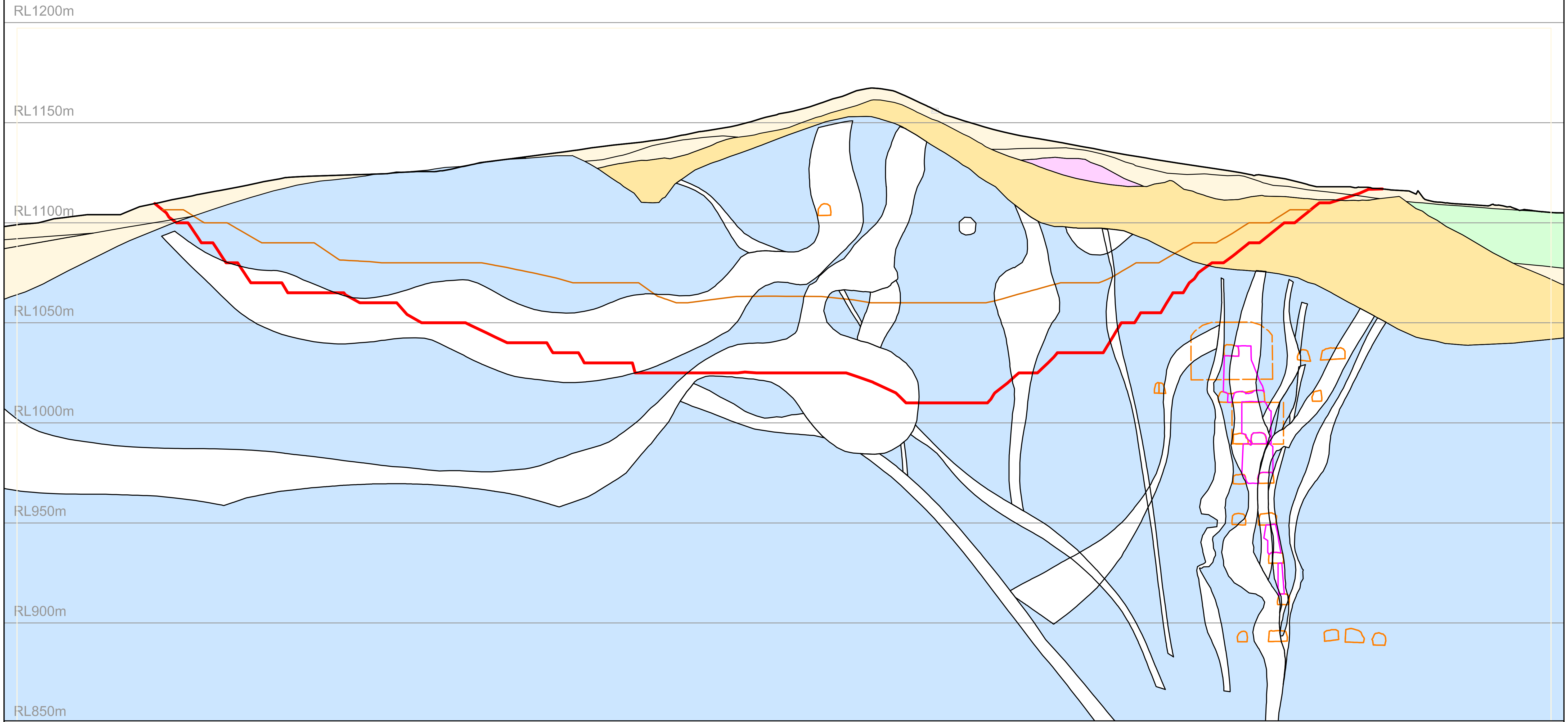
0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SECTION Q

PSM125-260R

Figure 23



LEGEND

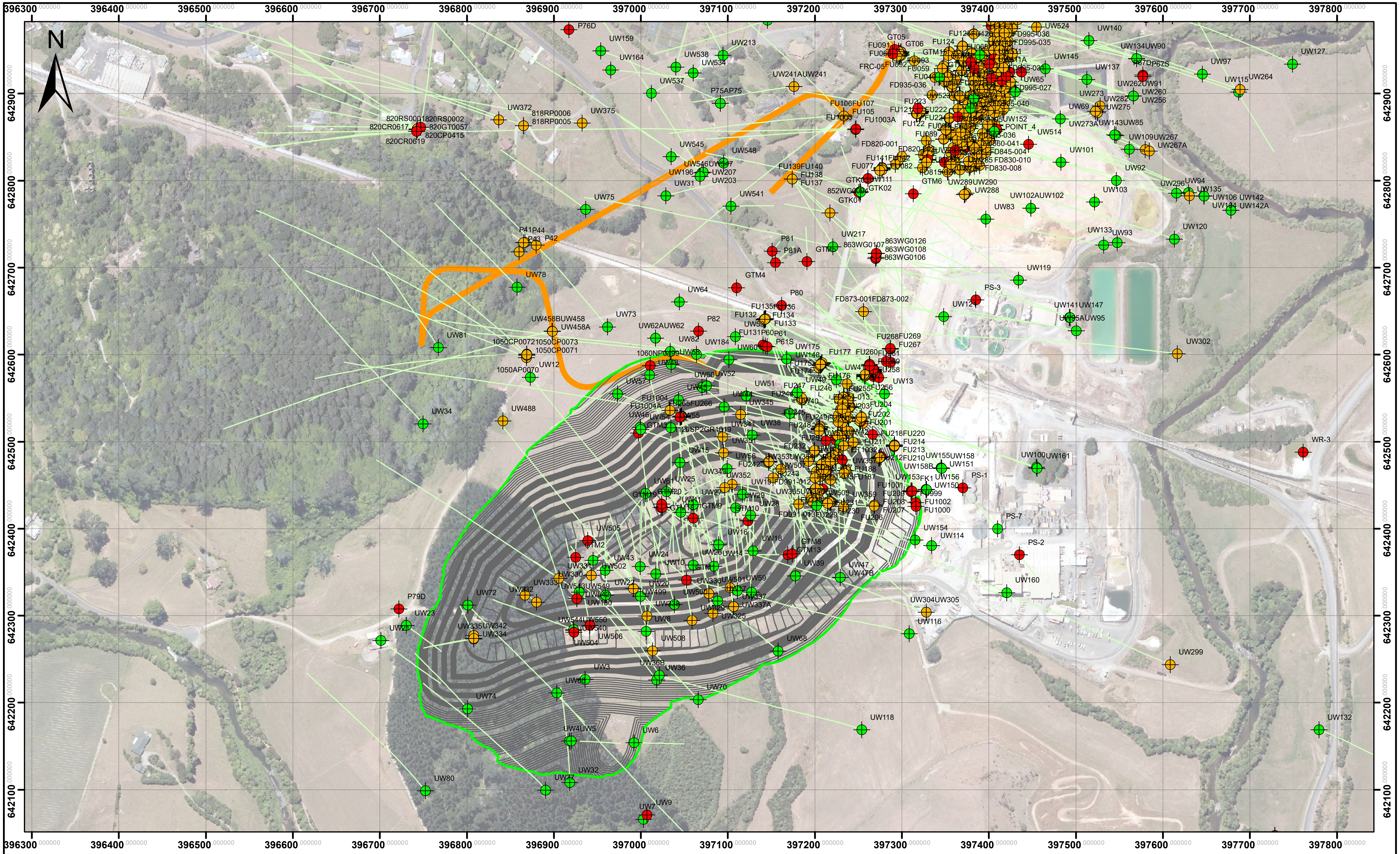
- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
LONG SECTION

PSM125-260R | Figure 24



Legend

Gladstone Resource Boreholes

- **Excel Logs**
- **PDF Logs**
- **No_Data**

- 27-04-2021 Gladstone Pit Crest
- 27-04-2021 Gladstone Pit
- Gladstone Proposed Tunnels and Portals

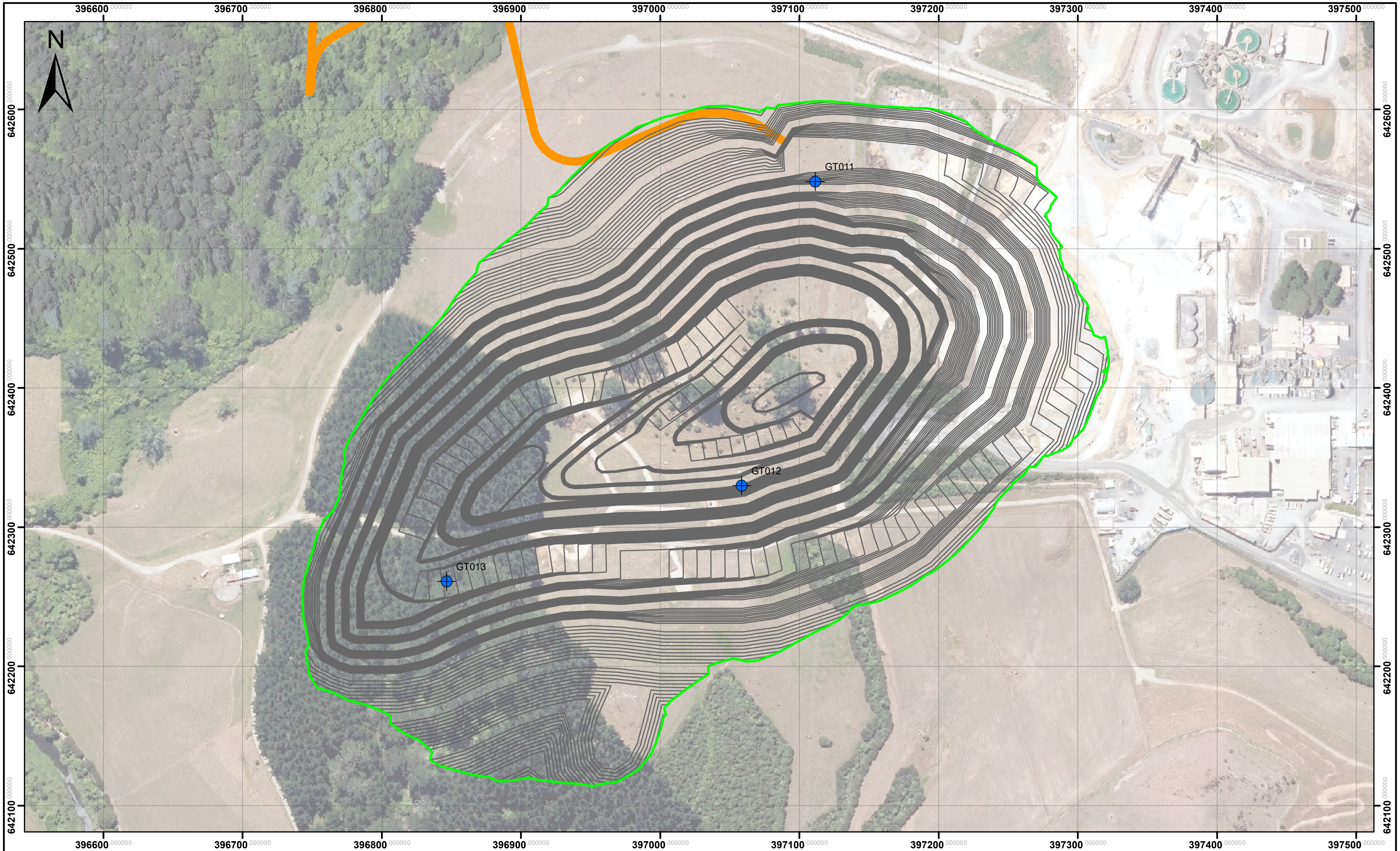
Scale

0 37.5 75 150 225 300 Meters

PSM Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand
GLADSTONE PIT
BOREHOLE LOCATION PLAN AND DATA

PSM125-260R | Figure 25



Legend

- Geotechnical Boreholes As Built
- 27-04-2021 Gladstone Pit Crest
- 27-04-2021 Gladstone Pit
- Gladstone Proposed Tunnels and Portals

Scale

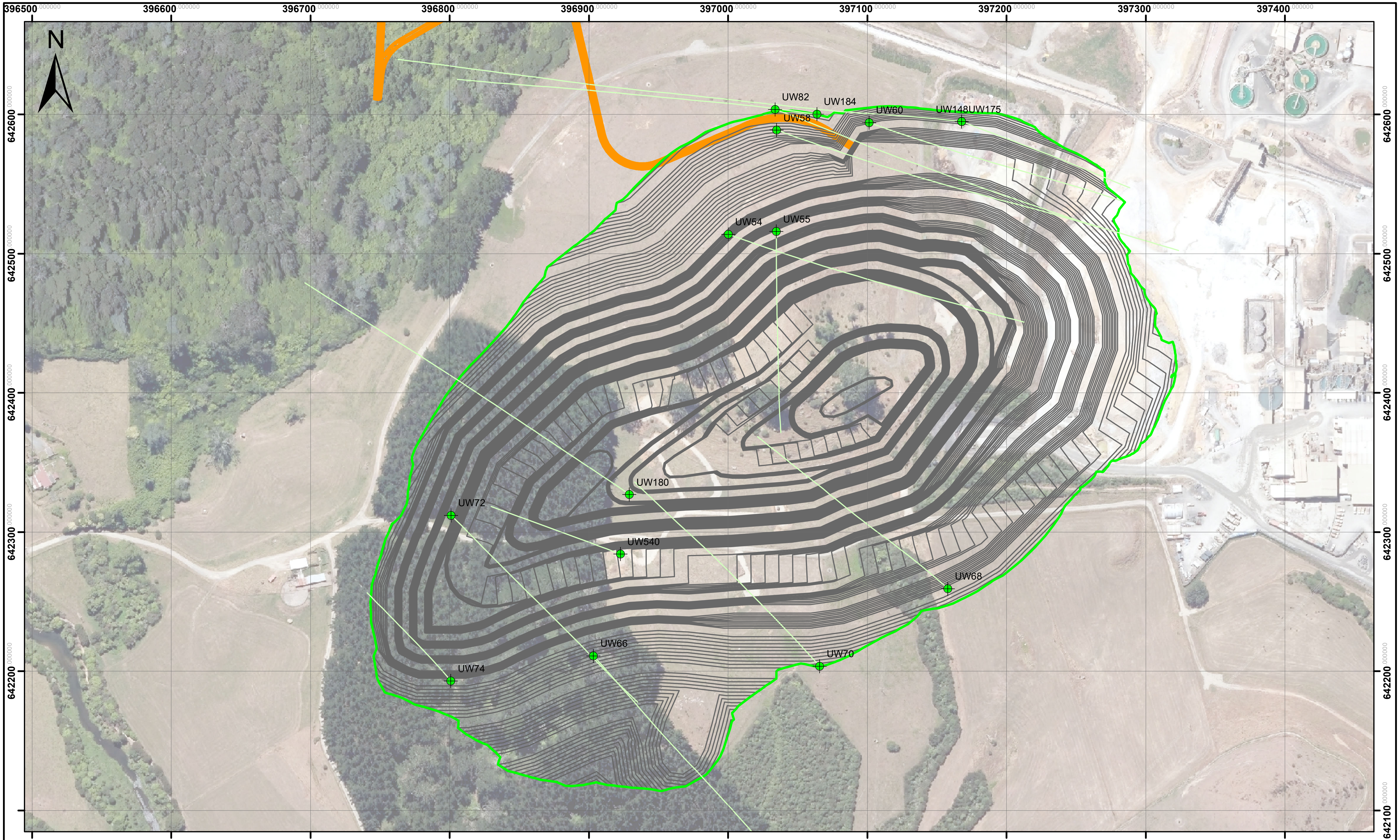
0 25 50 100 150 200 Meters

Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
GEOTECHNICAL BOREHOLES

PSM125-260R	Figure 26



Legend

- Orientated Core Boreholes
- Orientated Core Trace
- 27-04-2021 Gladstone Pit Crest
- 27-04-2021 Gladstone Pit
- Gladstone Proposed Tunnels and Portals

Scale

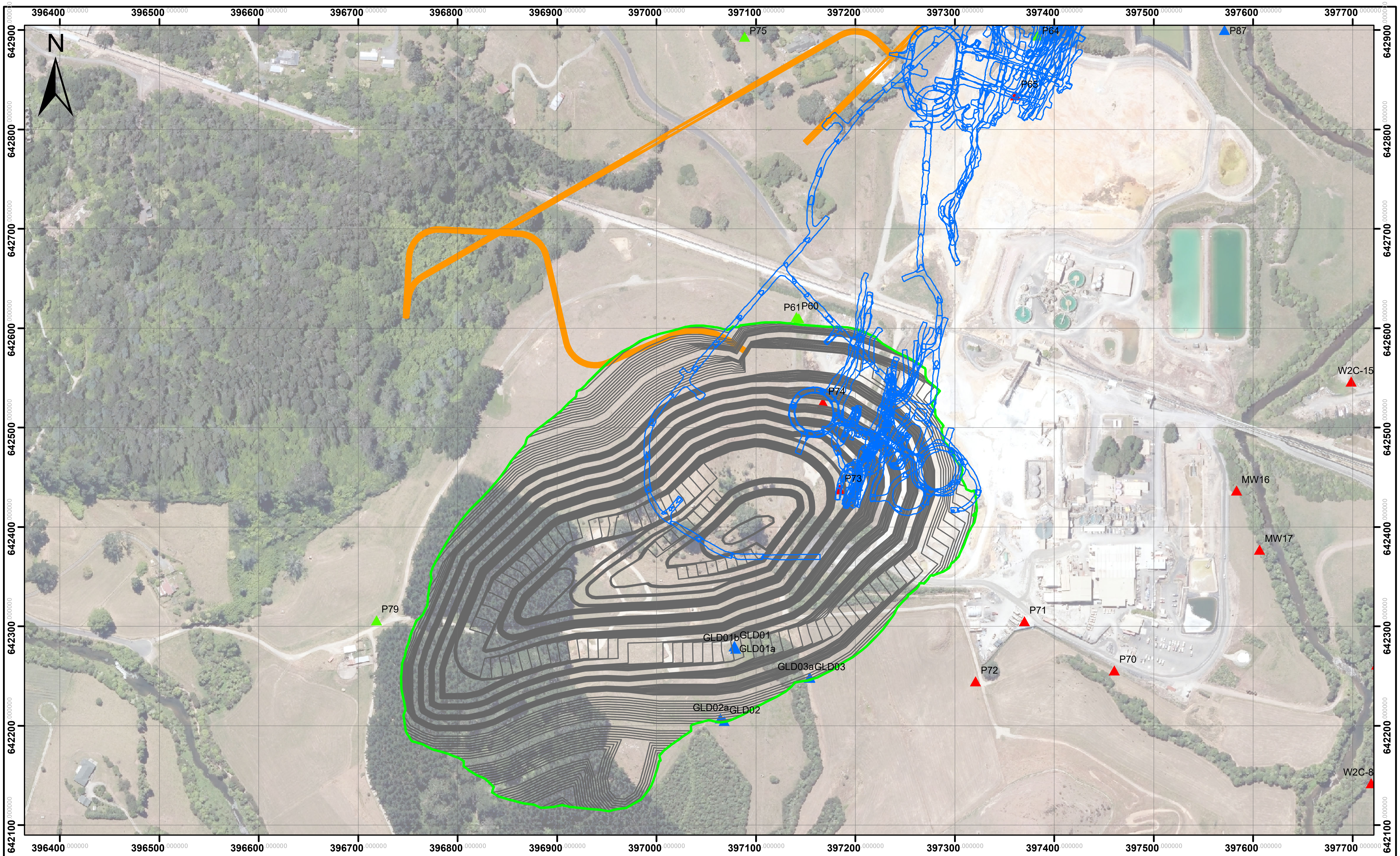
0 25 50 100 150 200 Meters

PSM Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ORIENTED CORE BOREHOLES

PSM125-260R | Figure 27



Legend

Favona Moonlight Underground
27-04-2021 Gladstone Pit Crest
27-04-2021 Gladstone Pit
Gladstone Proposed Tunnels and Portals

Well Locations

Data
No Data
GHD Shallow GW Study

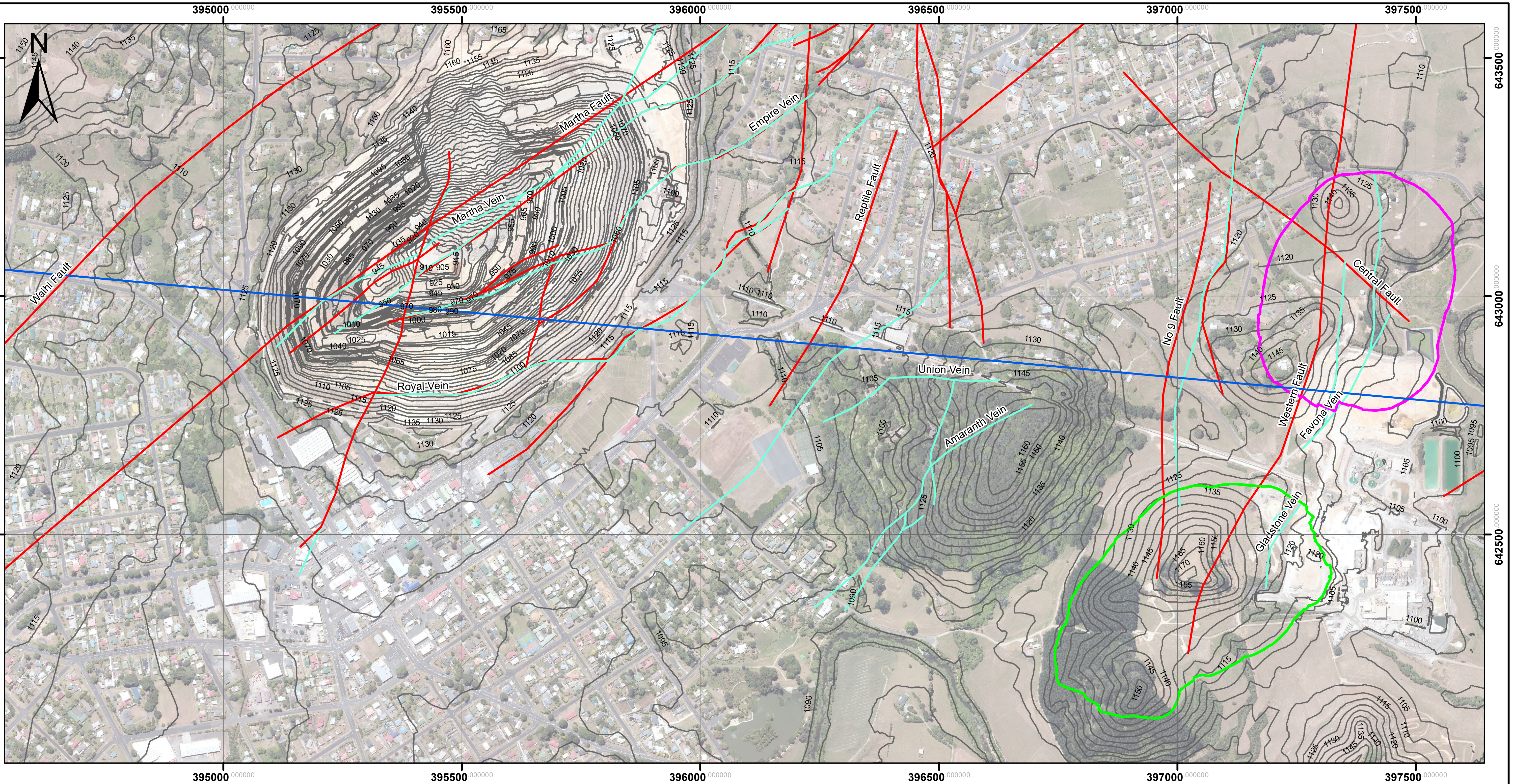
Scale

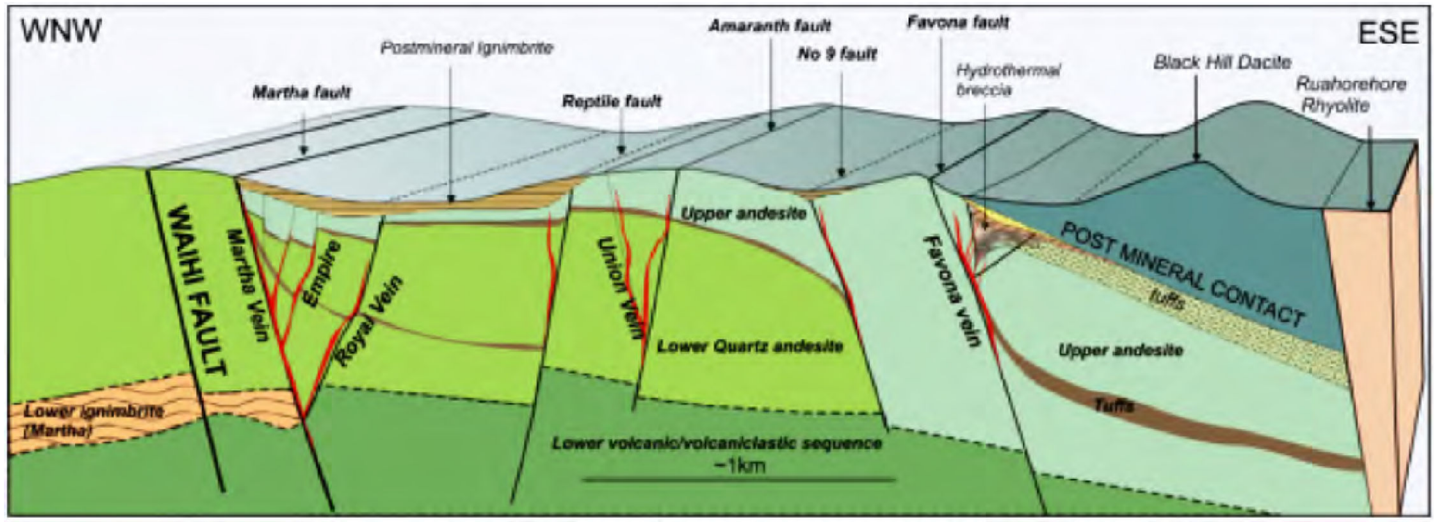
0 35 70 140 210 280 Meters

Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand
GLADSTONE PIT
PIEZOMETER LOCATIONS

PSM125-260R	Figure 28





Source: OceanaGold, 2016

Legend

- Approx. Schematic Section Location
- 22-05-2017 Favona Pit Crest
- 17-04-2021 Gladstone Pit Crest
- Major Faults
- Major Veins
- Contour 5m

Scale

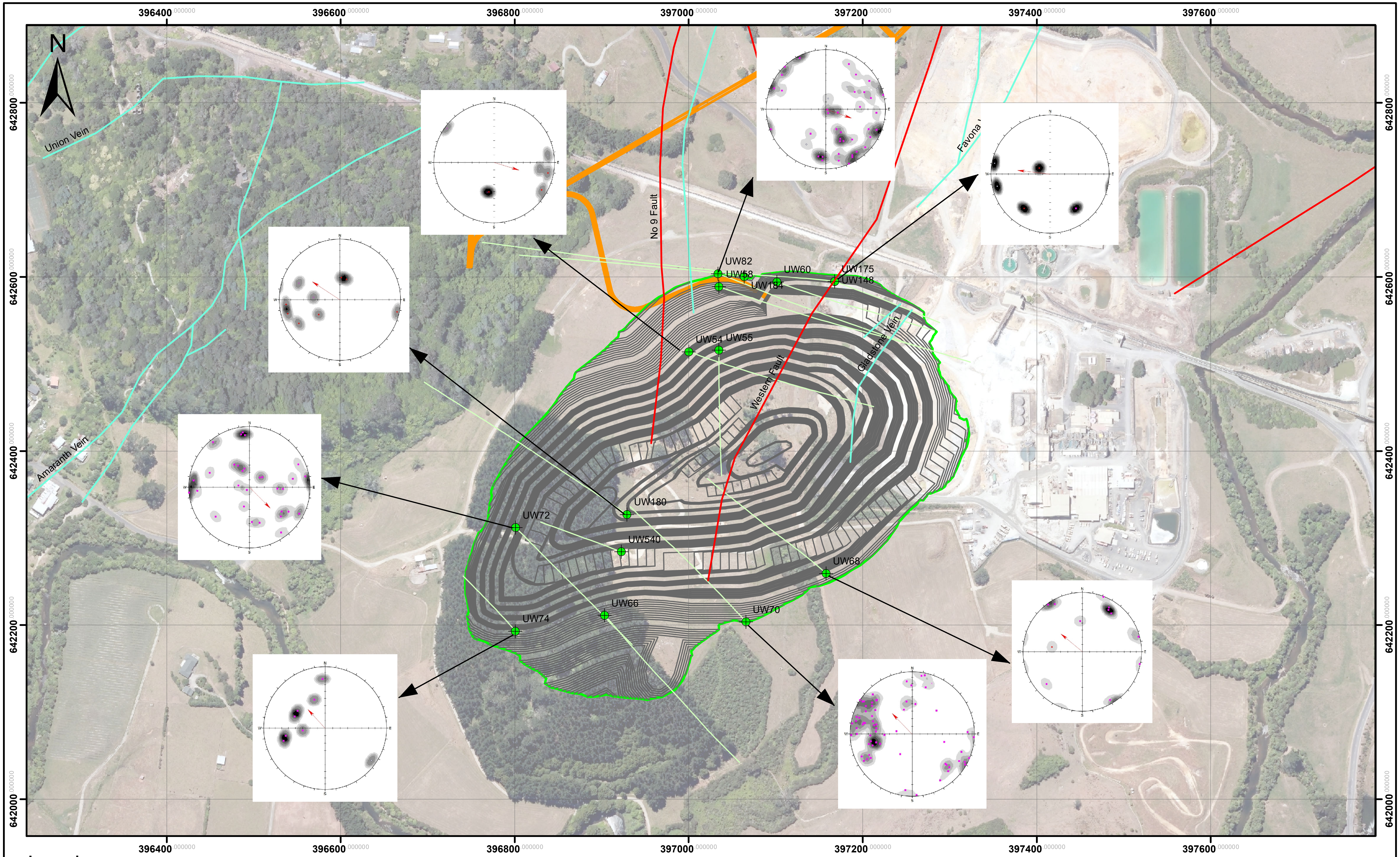
0 75 150 300 450 600 Meters

Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

REGIONAL STRUCTURE
PLAN AND SCHEMATIC CROSS SECTION

PSM125-260R	Figure 29



Legend

- Major Faults
- Major Veins
- Orientated Core Boreholes
- Orientated Core Trace
- 27-04-2021 Gladstone Pit
- 27-04-2021 Gladstone Pit Crest
- Gladstone_Pit_Tunnel

Scale

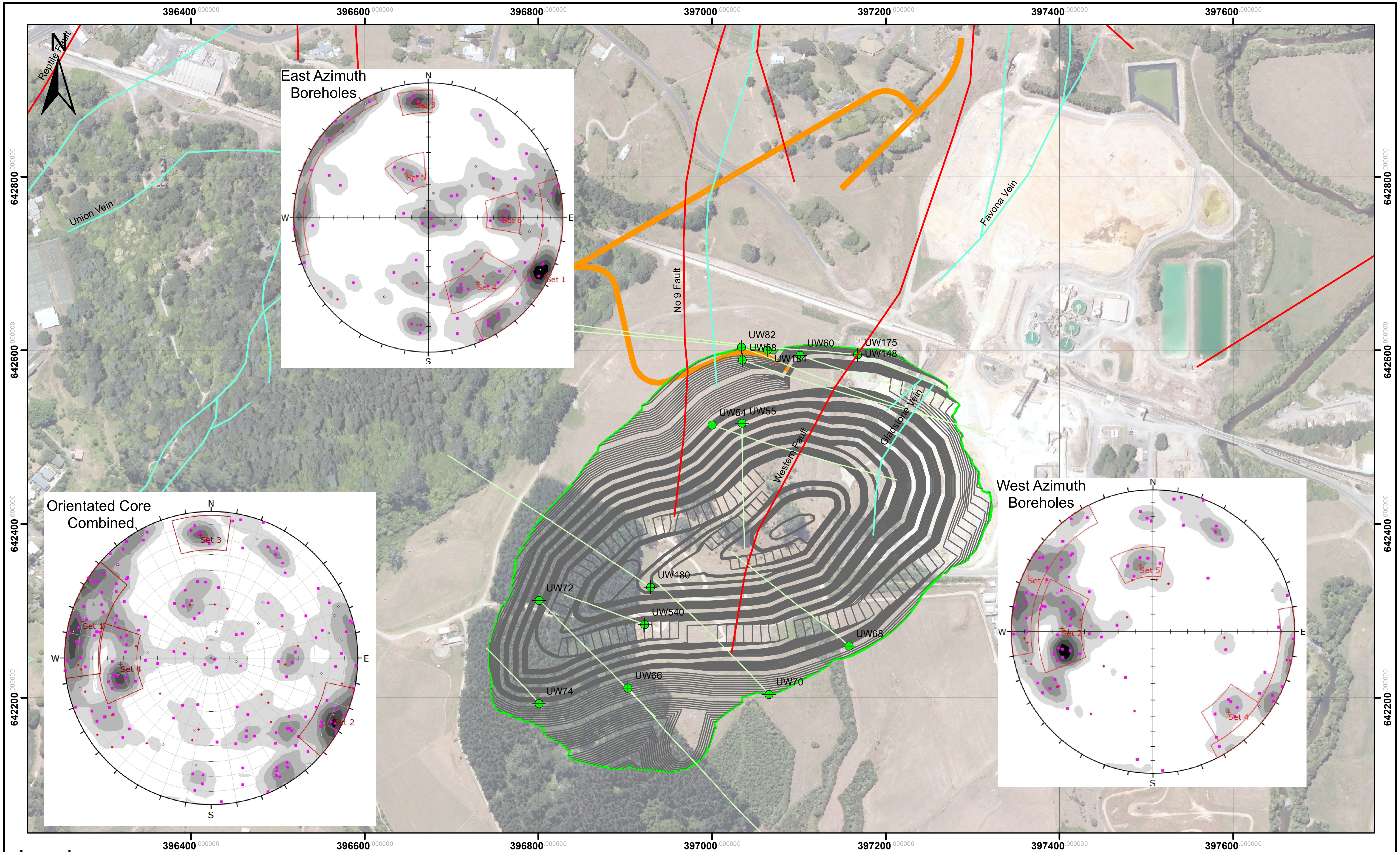
0 37.5 75 150 225 300 Meters

Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
BOREHOLE STRUCTURAL DATA

PSM125-260R	Figure 30



Legend

- Major Faults
- Major Veins
- Orientated Core Boreholes
- Orientated Core Trace
- 27-04-2021 Gladstone Pit
- 27-04-2021 Gladstone Pit Crest
- Gladstone Proposed Tunnels and Portals

Scale

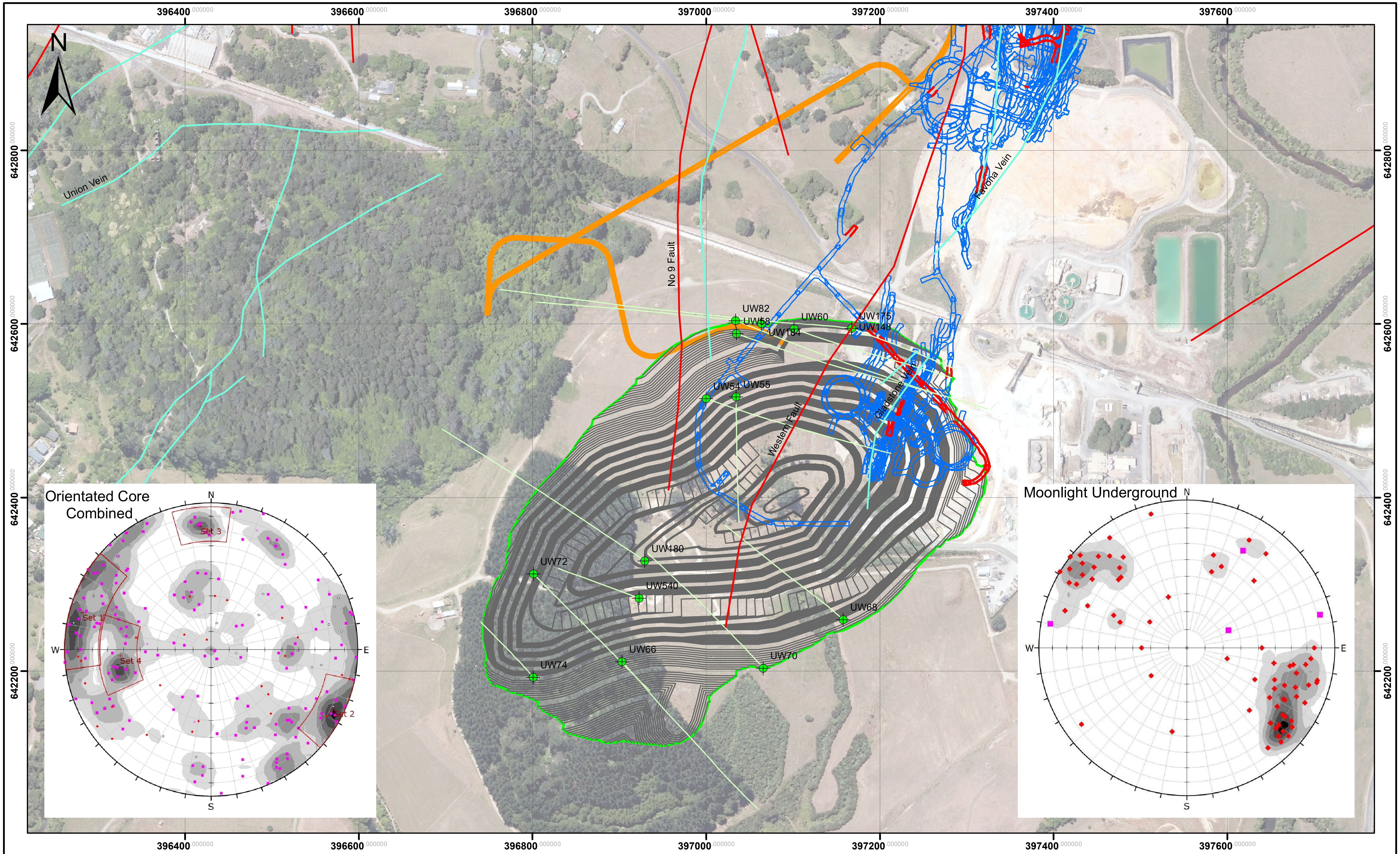
0 37.5 75 150 225 300 Meters

PSM Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
SUMMARY BOREHOLE STRUCTURAL DATA

PSM125-260R | Figure 31



Legend

- Major Faults
- Major Veins
- Orientated Core Boreholes
- Orientated Core Trace
- Collapsing and/or Squeezing Ground
- Favona Moonlight Underground
- 27-04-2021 Gladstone Pit
- 27-04-2021 Gladstone Pit Crest
- Gladstone Proposed Tunnels and Portals

Scale

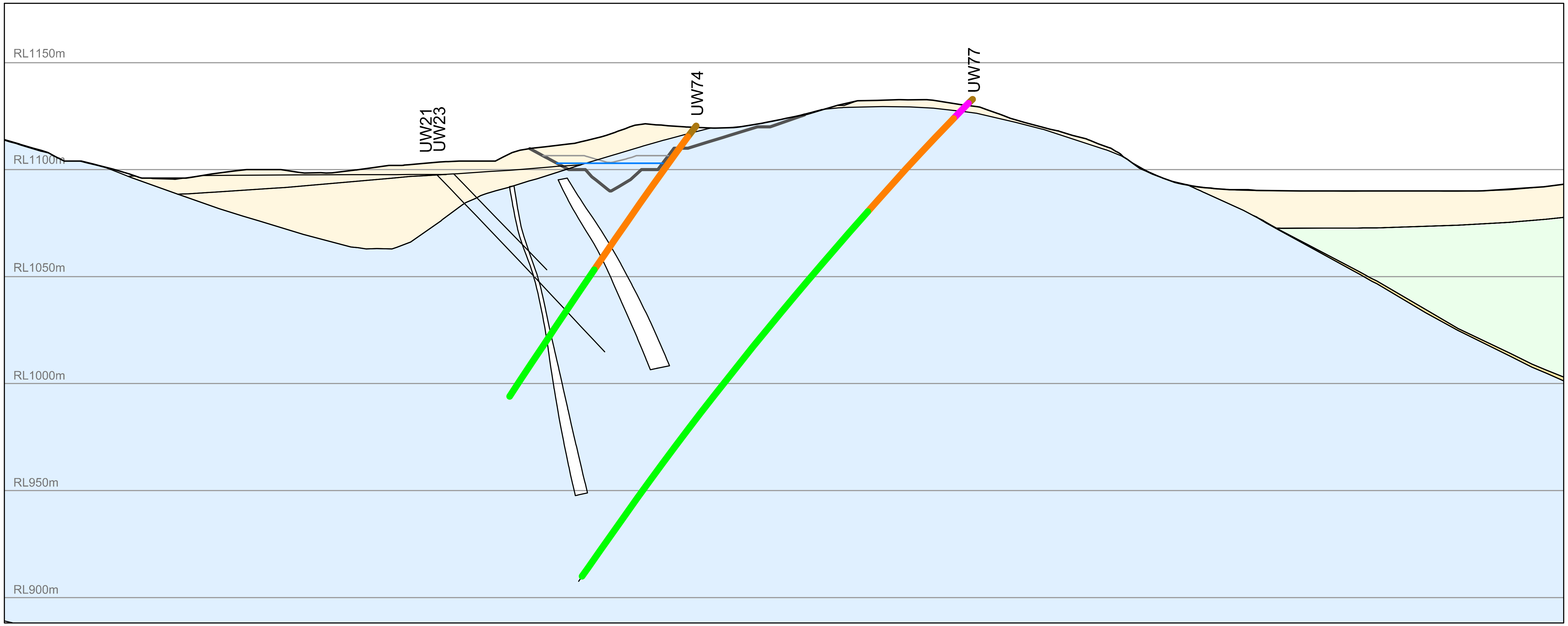
0 37.5 75 150 225 300 Meters

Pells Sullivan Meynink

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
STRUCTURAL MODEL

PSM125-260R	Figure 32



LEGEND

Gladstone Pit
Surface of Backfill
Underground Drives
Underground Stopes
Squeezing/ Collapsing Ground
Max Water/Tailings Level (1103mRL)

Tuff / Ignimbrite
Breccia
Black Hill Dacite
Volcaniclastic
Andesite
Quartz Veins

Top of Class 3 Andesite
Top of Class 2 Andesite

Borehole Domains

Class 4
Cass 3
Class 2
Soil
Dacite

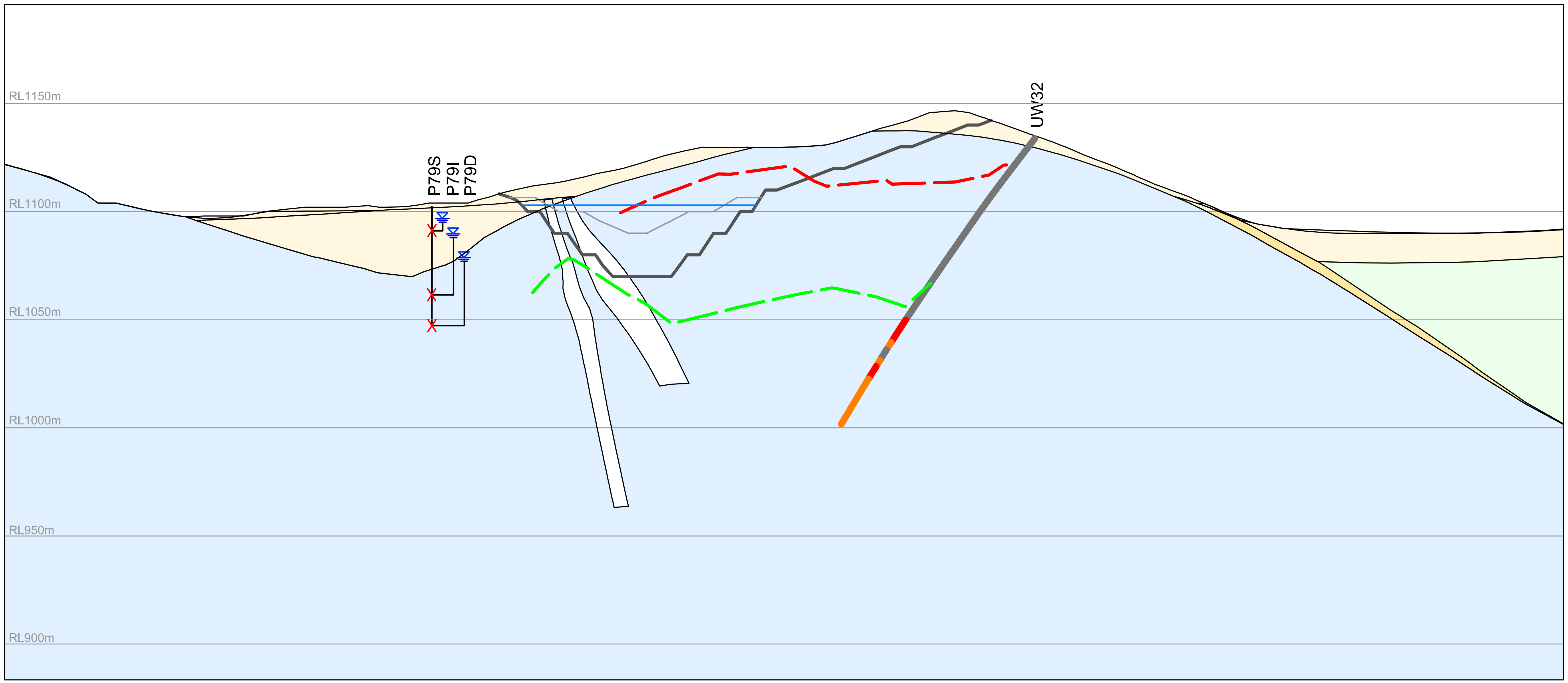
Ignimbrite
Contact Zone
Volcaniclastic
No Core Photos

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION A

PSM125-260R | Figure 33



LEGEND

- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins
- Top of Class 3 Andesite
- Top of Class 2 Andesite

Standpipe Piezometer

- Dipped depth below ground level
- Base of screened interval

Borehole Domains

- Class 4
- Cass 3
- Class 2
- Soil
- Dacite
- Ignimbrite
- Contact Zone
- Volcaniclastic
- No Core Photos

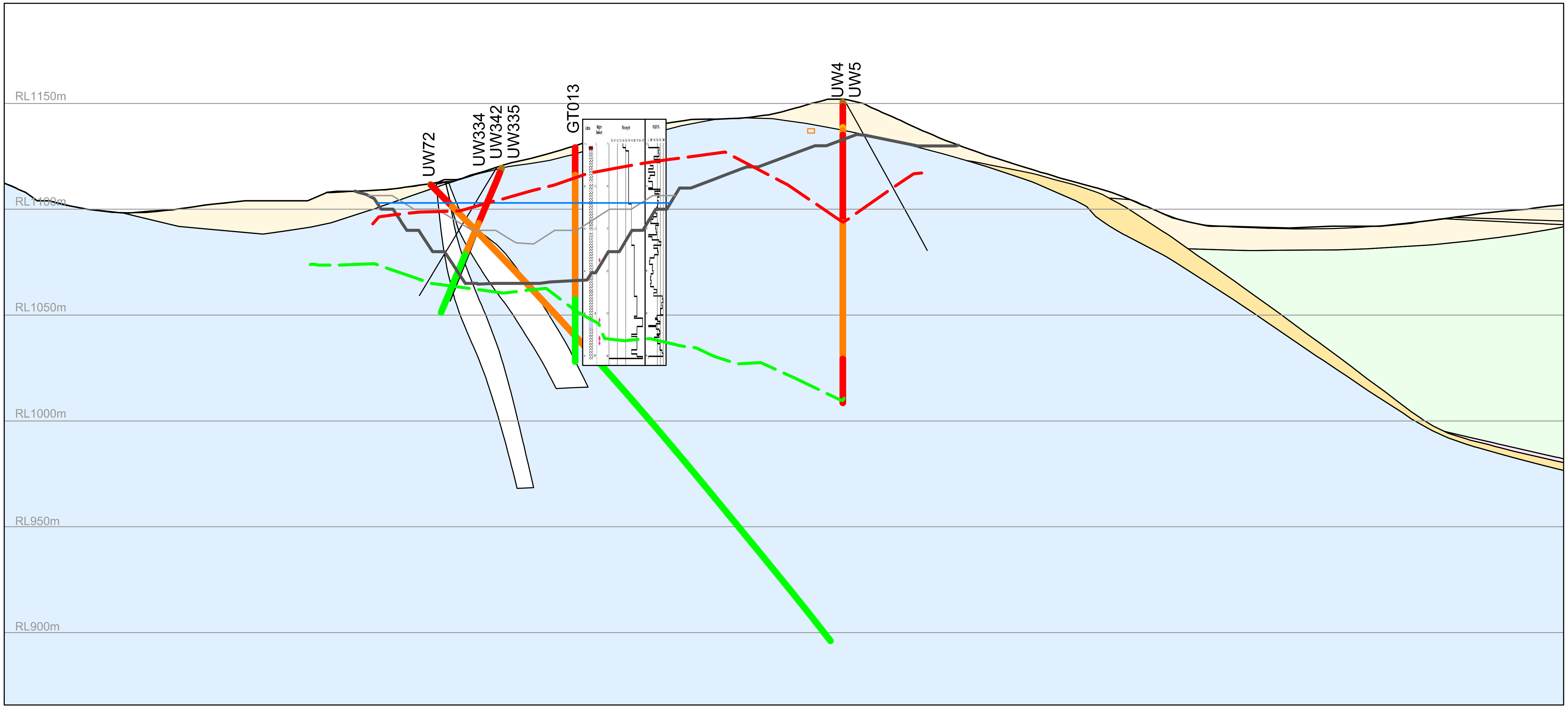
0 50 100
Scale (m)

PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION B

PSM125-260R | Figure 34



LEGEND

- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins
- Top of Class 3 Andesite
- Top of Class 2 Andesite

Borehole Domains

- Class 4
- Cass 3
- Class 2
- Soil
- Dacite
- Ignimbrite
- Contact Zone
- Volcaniclastic
- No Core Photos

Scale (m): 0, 50, 100

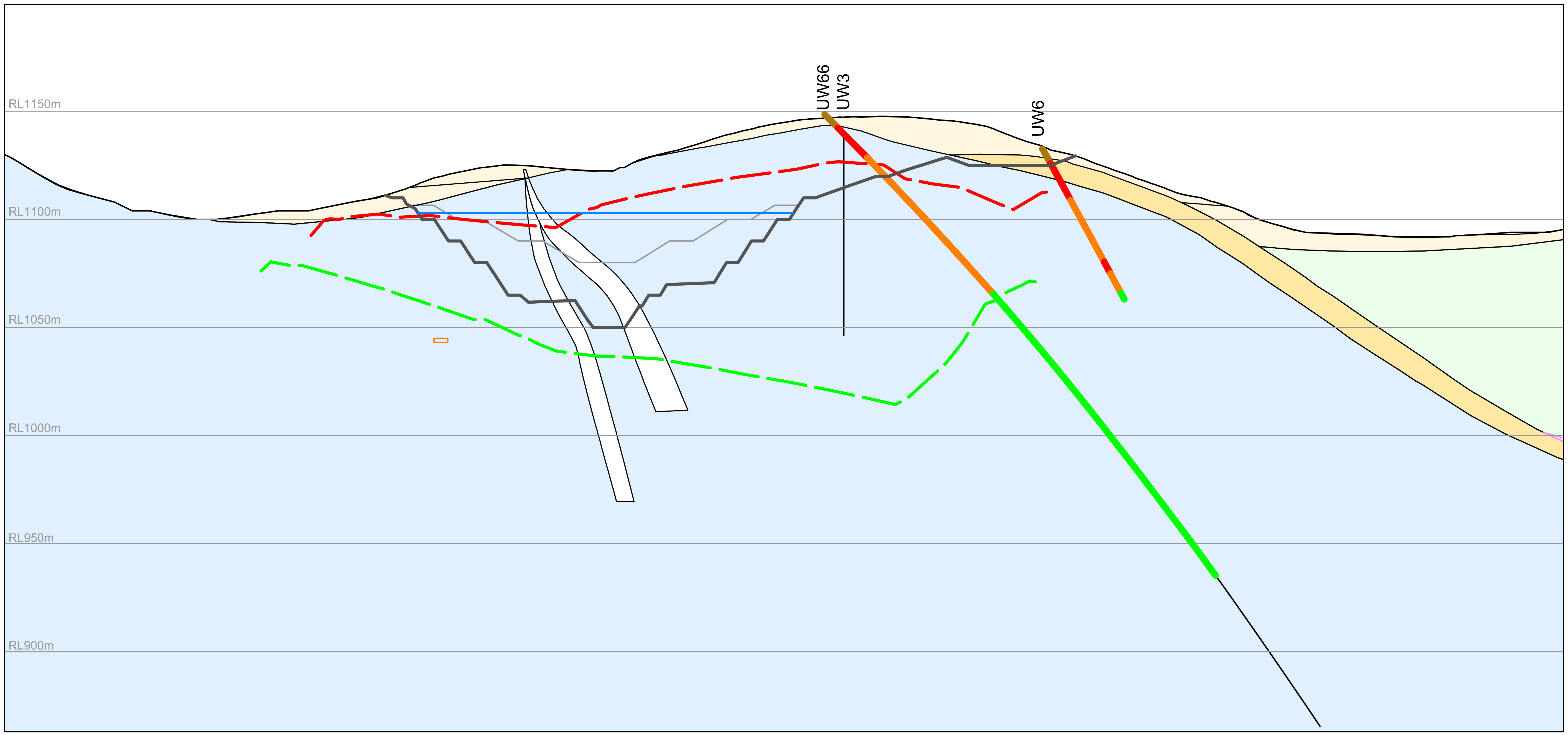
PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION C

PSM125-260R

Figure 35



LEGEND

Gladstone Pit	Tuff / Ignimbrite
Surface of Backfill	Breccia
Underground Drives	Black Hill Dacite
Underground Stopes	Volcaniclastic
Squeezing/ Collapsing Ground	Andesite
Max Water/Tailings Level (1103mRL)	Quartz Veins

Top of Class 3 Andesite

Top of Class 2 Andesite

Borehole Domains

Class 4	Ignimbrite
Cass 3	Contact Zone
Class 2	Volcaniclastic
Soil	No Core Photos
Dacite	

0 50 100

Scale (m)

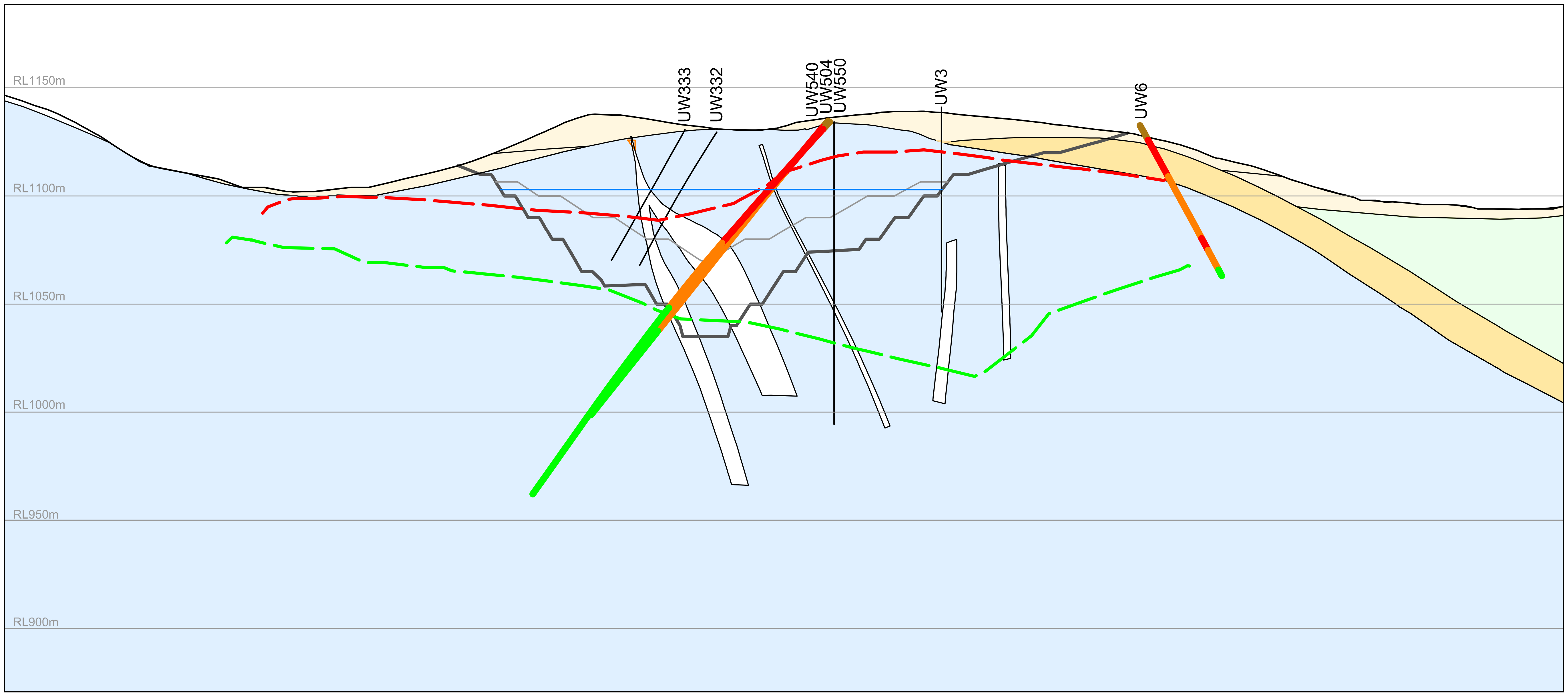
PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION D

PSM125-260R

Figure 36



LEGEND

Gladstone Pit
Surface of Backfill
Underground Drives
Underground Stopes
Squeezing/ Collapsing Ground
Max Water/Tailings Level (1103mRL)

Tuff / Ignimbrite
Breccia
Black Hill Dacite
Volcaniclastic
Andesite
Quartz Veins

Top of Class 3 Andesite
Top of Class 2 Andesite

Borehole Domains

Class 4
Cass 3
Class 2
Soil
Dacite
Ignimbrite
Contact Zone
Volcaniclastic
No Core Photos

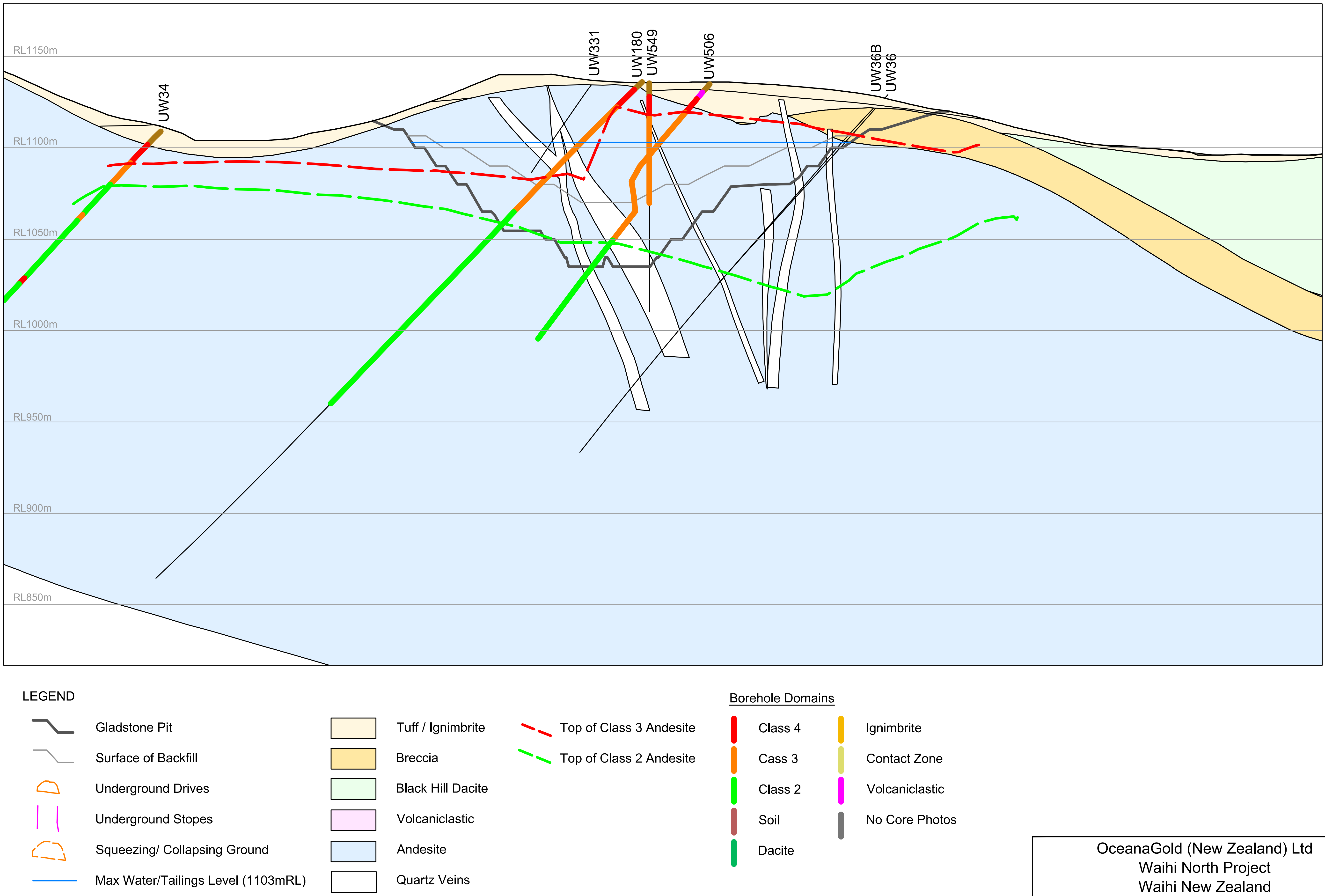
0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION E

PSM125-260R

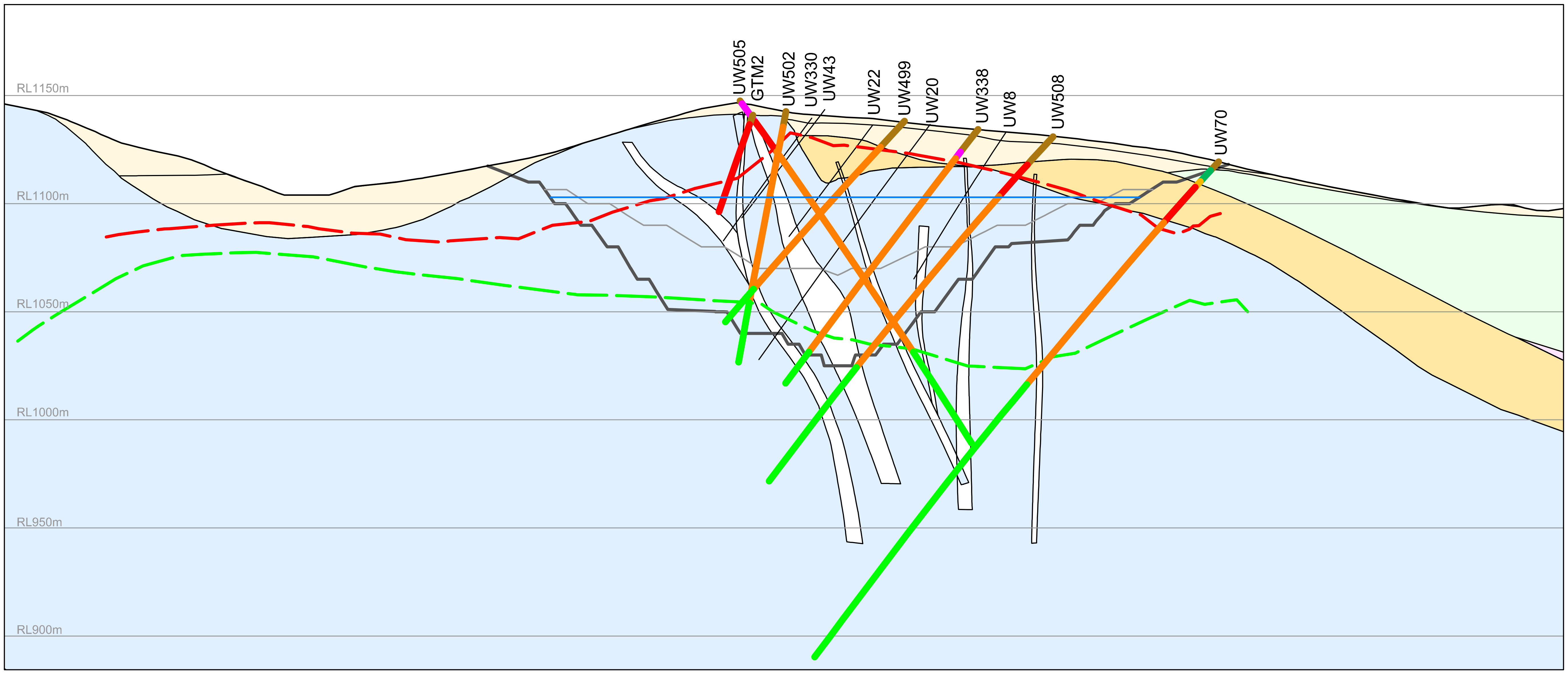
Figure 37



OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION F

PSM125-260R | Figure 38



LEGEND

Gladstone Pit	Tuff / Ignimbrite	Top of Class 3 Andesite			
Surface of Backfill	Breccia	Top of Class 2 Andesite			
Underground Drives	Black Hill Dacite				
Underground Stopes	Volcaniclastic				
Squeezing/ Collapsing Ground	Andesite				
Max Water/Tailings Level (1103mRL)	Quartz Veins				

Borehole Domains

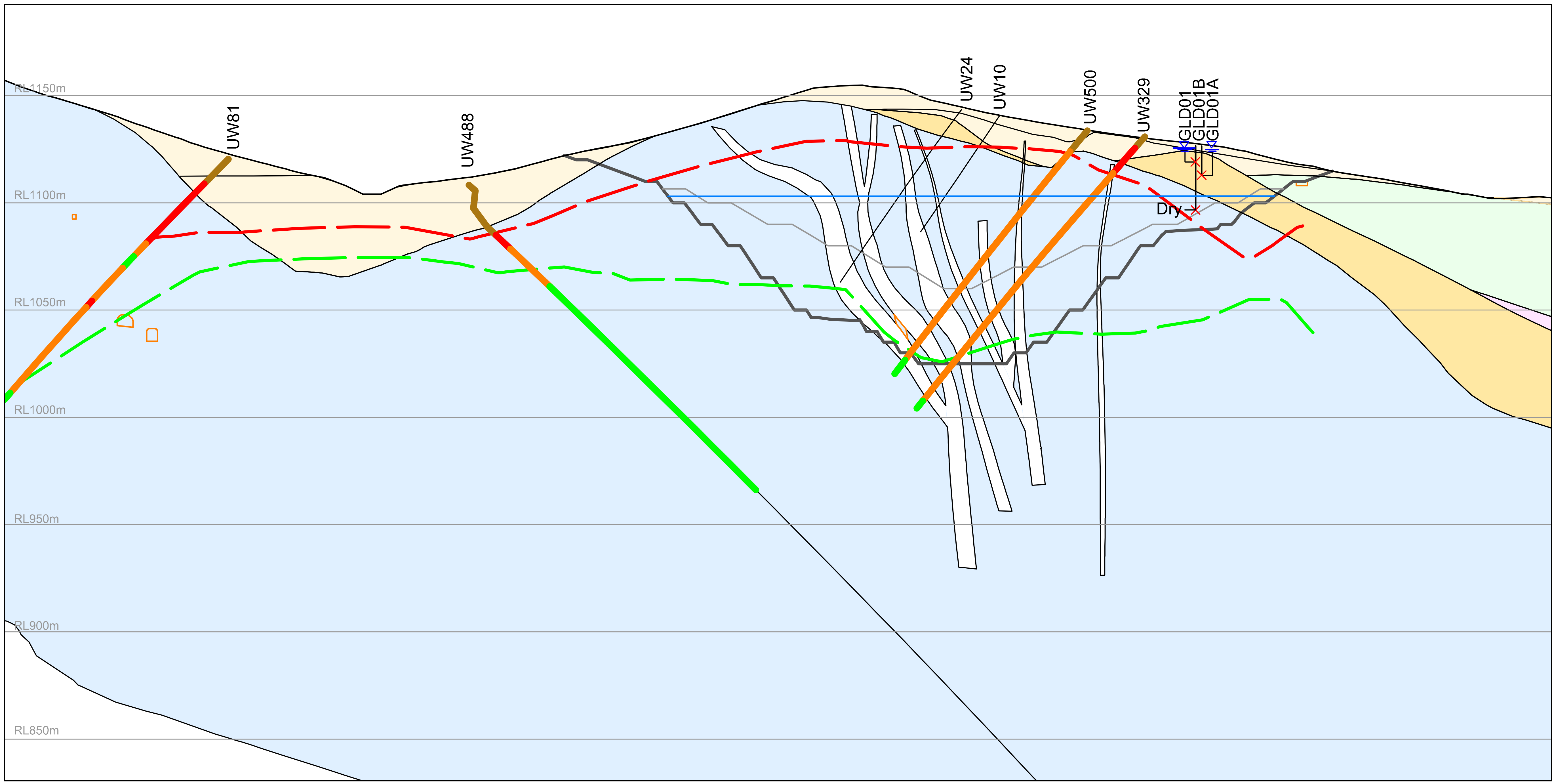
Class 4	Ignimbrite
Cass 3	Contact Zone
Class 2	Volcaniclastic
Soil	No Core Photos
Dacite	

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION G

PSM125-260R | Figure 39



LEGEND

Gladstone Pit
Surface of Backfill
Underground Drives
Underground Stopes
Squeezing/ Collapsing Ground
Max Water/Tailings Level (1103mRL)

Standpipe Piezometer
Dipped depth below ground level
Base of screened interval

Tuff / Ignimbrite
Breccia
Black Hill Dacite
Volcaniclastic
Andesite
Quartz Veins

Top of Class 3 Andesite
Top of Class 2 Andesite

Borehole Domains

Class 4
Cass 3
Class 2
Soil
Dacite
Ignimbrite
Contact Zone
Volcaniclastic
No Core Photos

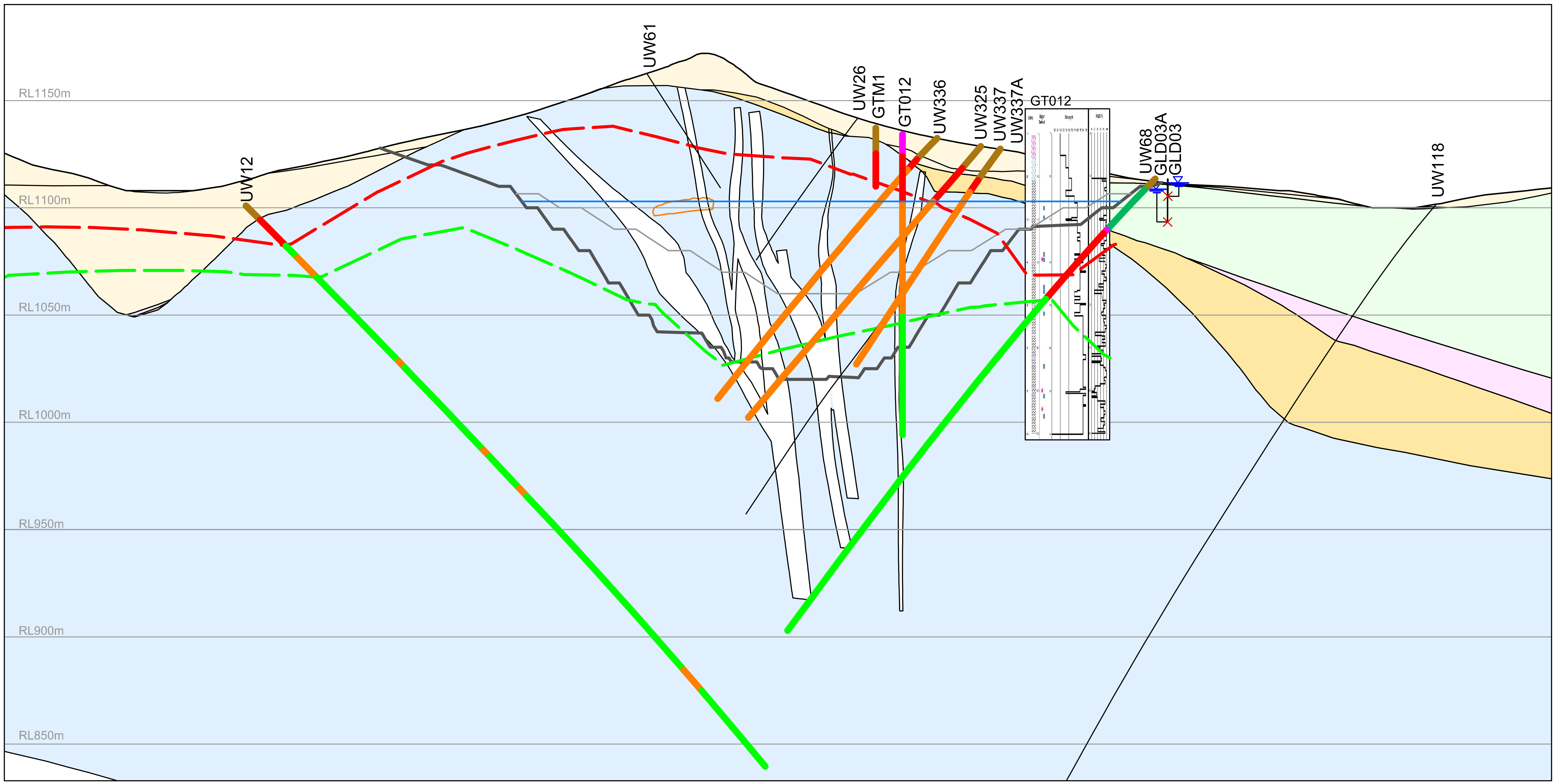
0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION H

PSM125-260R

Figure 40



LEGEND

Gladstone Pit
Surface of Backfill
Underground Drives
Underground Stopes
Squeezing/ Collapsing Ground
Max Water/Tailings Level (1103mRL)

Standpipe Piezometer
Dipped depth below ground level
Base of screened interval

Tuff / Ignimbrite
Breccia
Black Hill Dacite
Volcaniclastic
Andesite
Quartz Veins

Top of Class 3 Andesite
Top of Class 2 Andesite

Borehole Domains

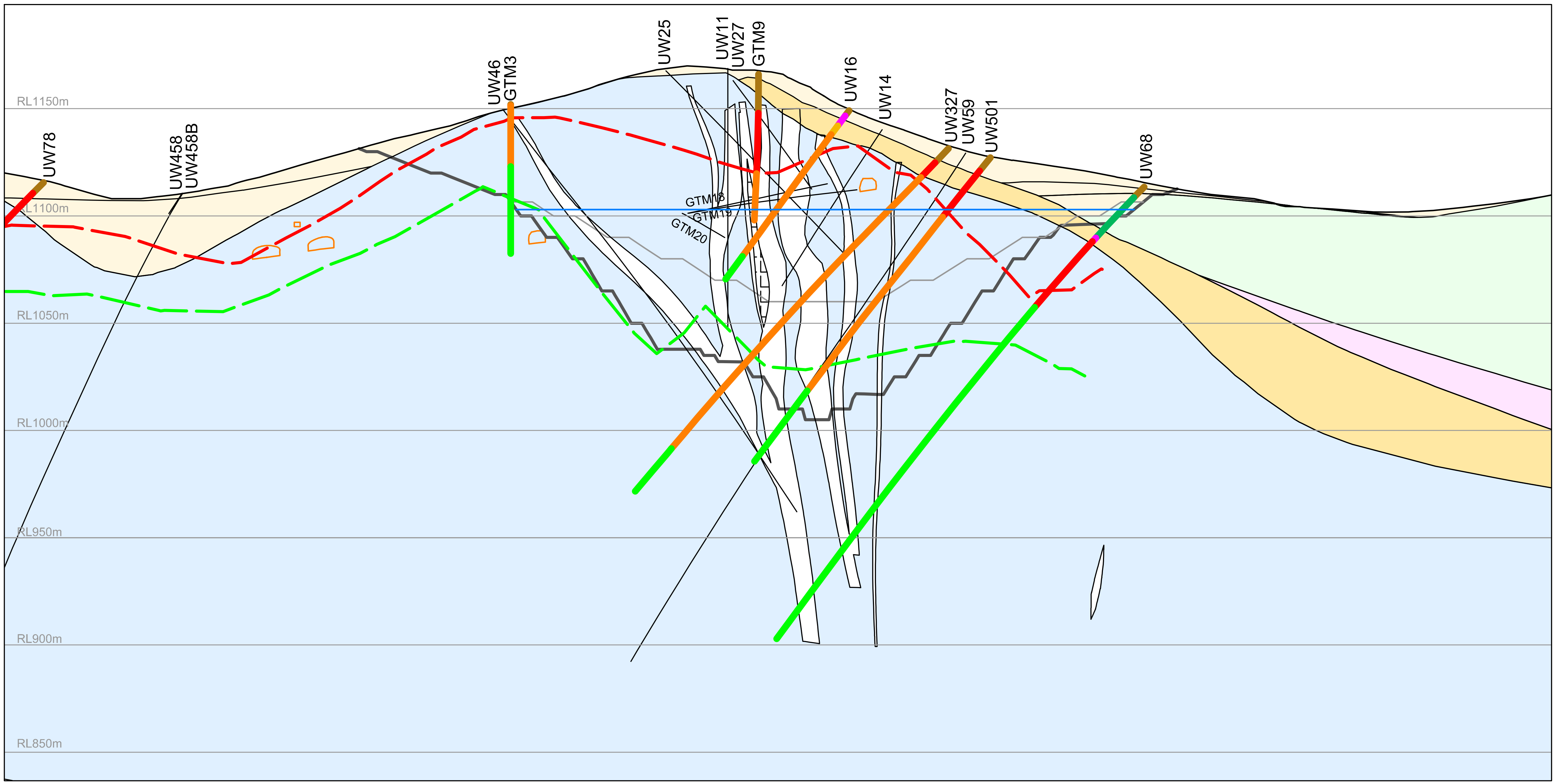
Class 4
Cass 3
Class 2
Soil
Dacite
Ignimbrite
Contact Zone
Volcaniclastic
No Core Photos

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION I

PSM125-260R
Figure 41



LEGEND

Gladstone Pit	Tuff / Ignimbrite	Top of Class 3 Andesite
Surface of Backfill	Breccia	Top of Class 2 Andesite
Underground Drives	Black Hill Dacite	
Underground Stopes	Volcaniclastic	
Squeezing/ Collapsing Ground	Andesite	
Max Water/Tailings Level (1103mRL)	Quartz Veins	

Borehole Domains

Class 4	Ignimbrite
Cass 3	Contact Zone
Class 2	Volcaniclastic
Soil	No Core Photos
Dacite	

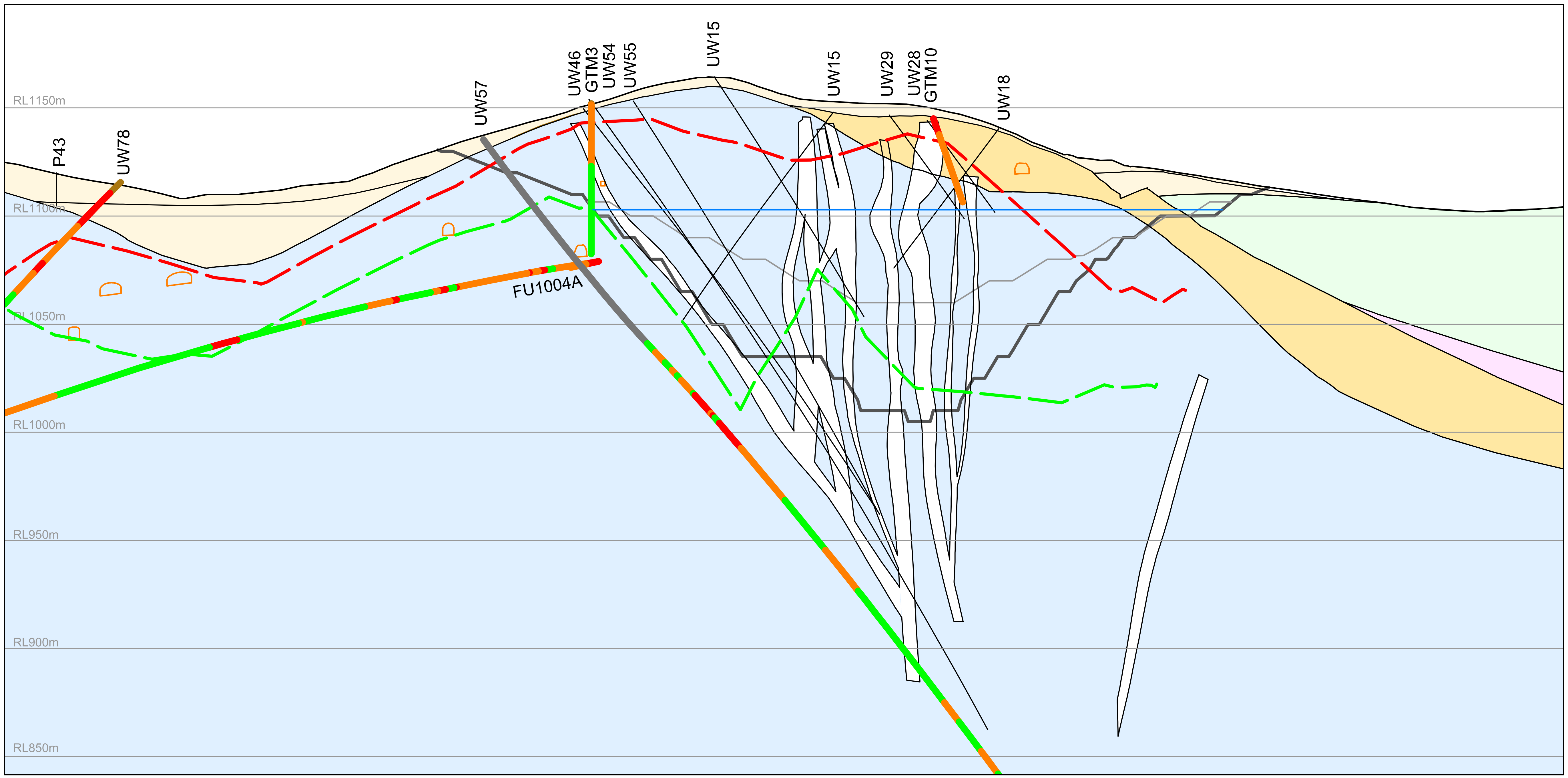
0 50 100
Scale (m)

PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION J

PSM125-260R | Figure 42



LEGEND

- Gladstone Pit
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins
- Top of Class 3 Andesite
- Top of Class 2 Andesite

Borehole Domains

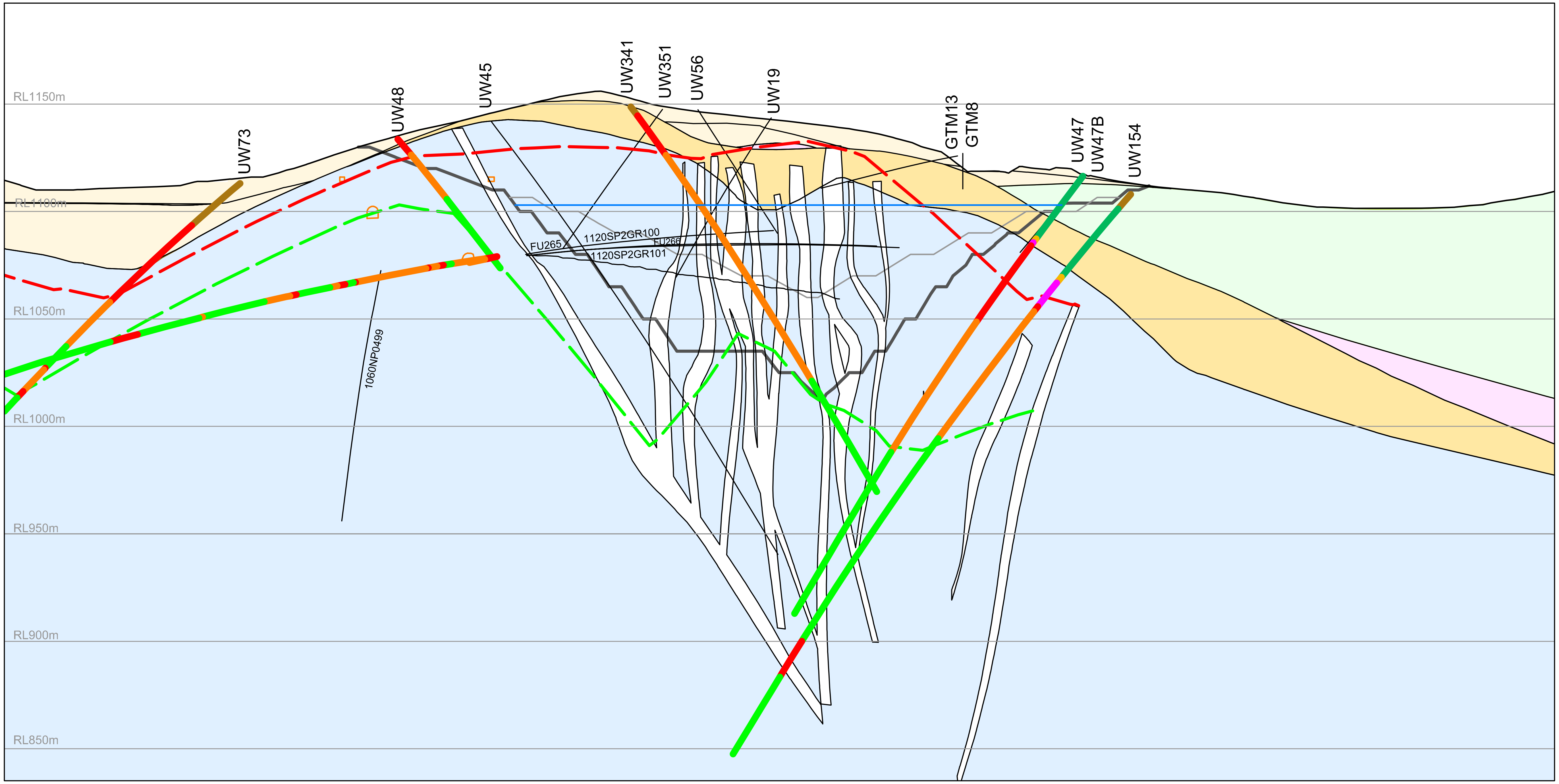
- Class 4
- Cass 3
- Class 2
- Soil
- Dacite
- Ignimbrite
- Contact Zone
- Volcaniclastic
- No Core Photos

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION K

PSM125-260R | Figure 43



LEGEND

Gladstone Pit	Tuff / Ignimbrite	Top of Class 3 Andesite
Surface of Backfill	Breccia	Top of Class 2 Andesite
Underground Drives	Black Hill Dacite	
Underground Stopes	Volcaniclastic	
Squeezing/ Collapsing Ground	Andesite	
Max Water/Tailings Level (1103mRL)	Quartz Veins	

Borehole Domains

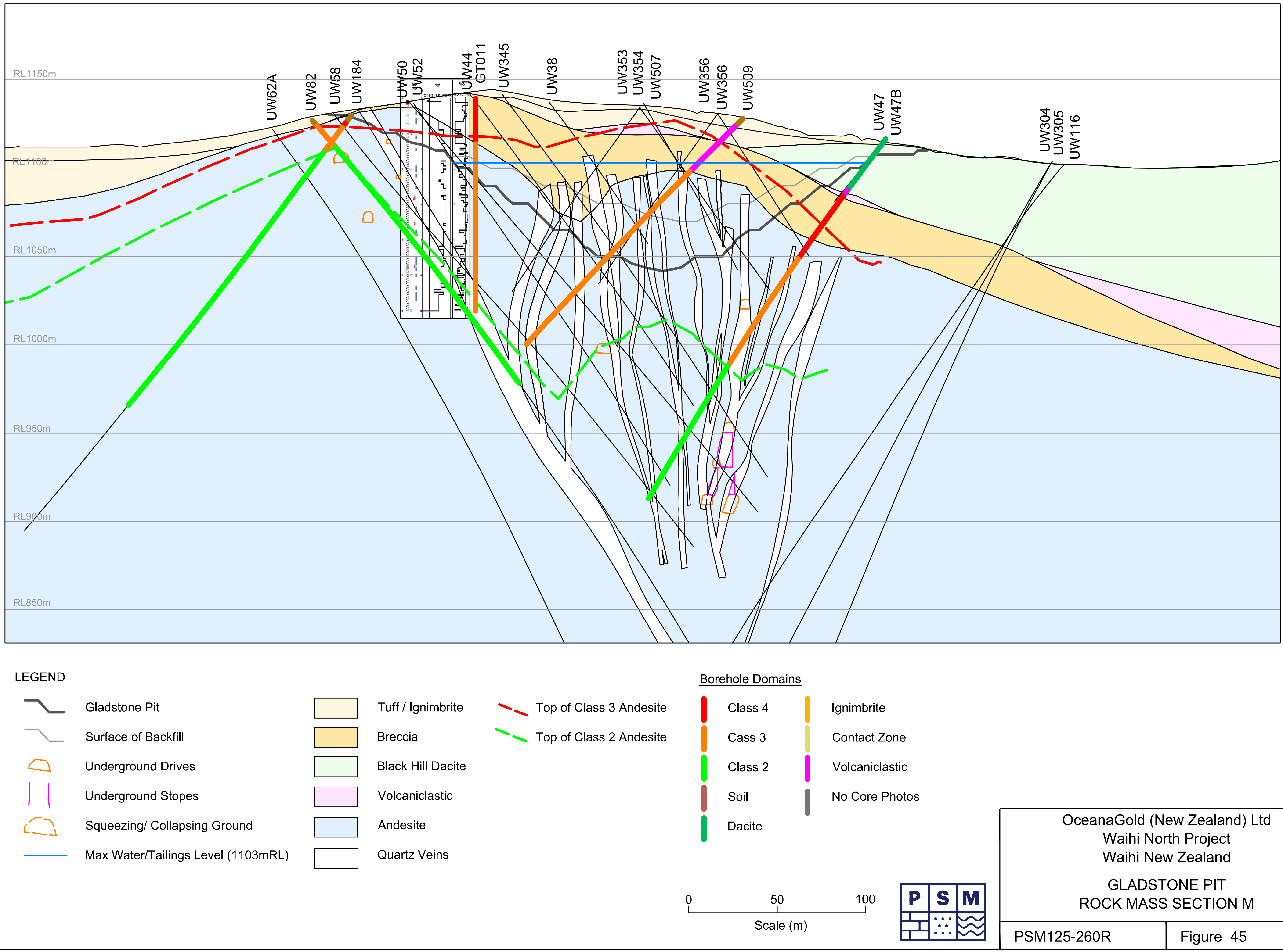
Class 4	Ignimbrite
Cass 3	Contact Zone
Class 2	Volcaniclastic
Soil	No Core Photos
Dacite	

0 50 100
Scale (m)

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION L

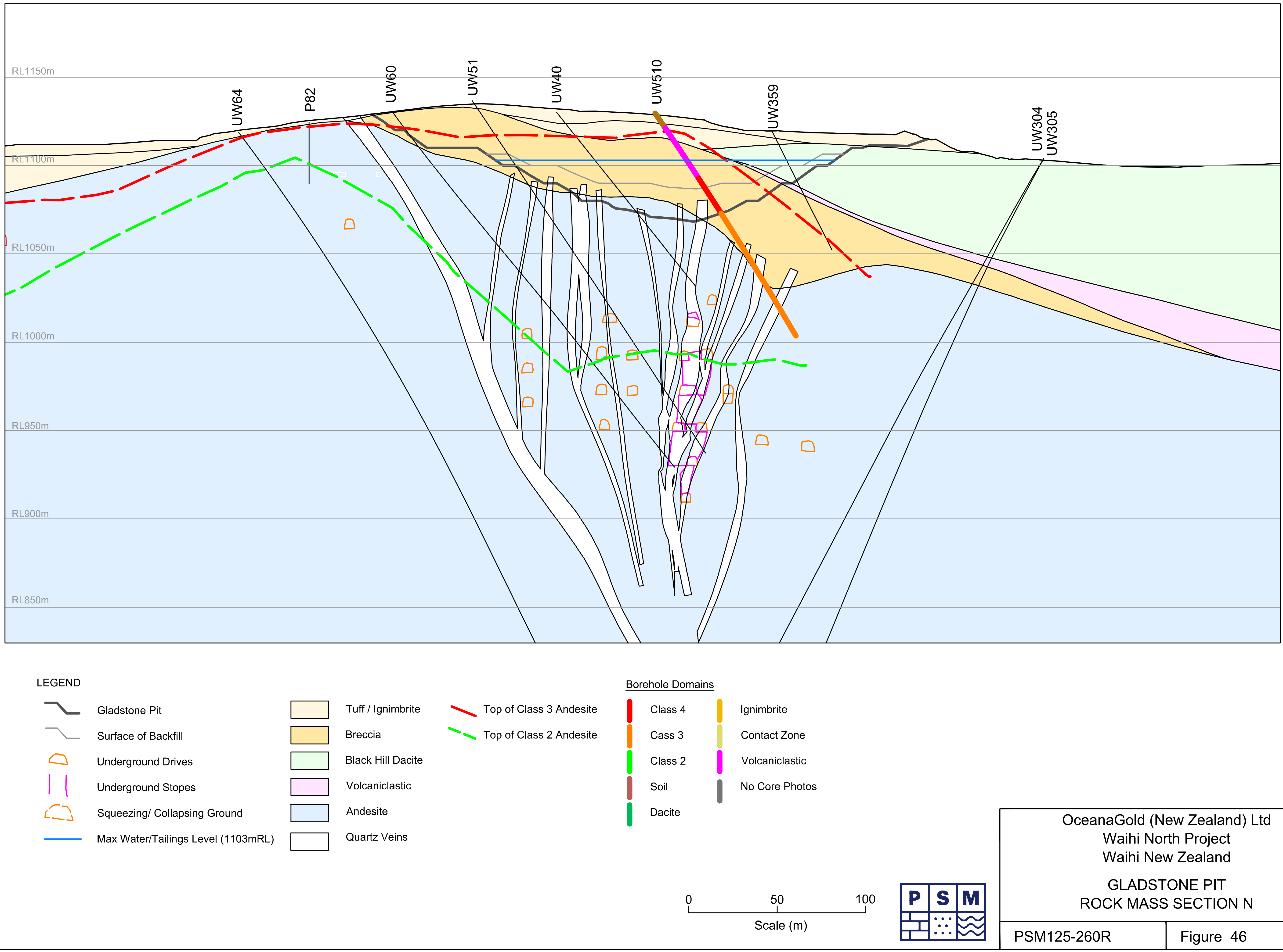
PSM125-260R | Figure 44



OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION M

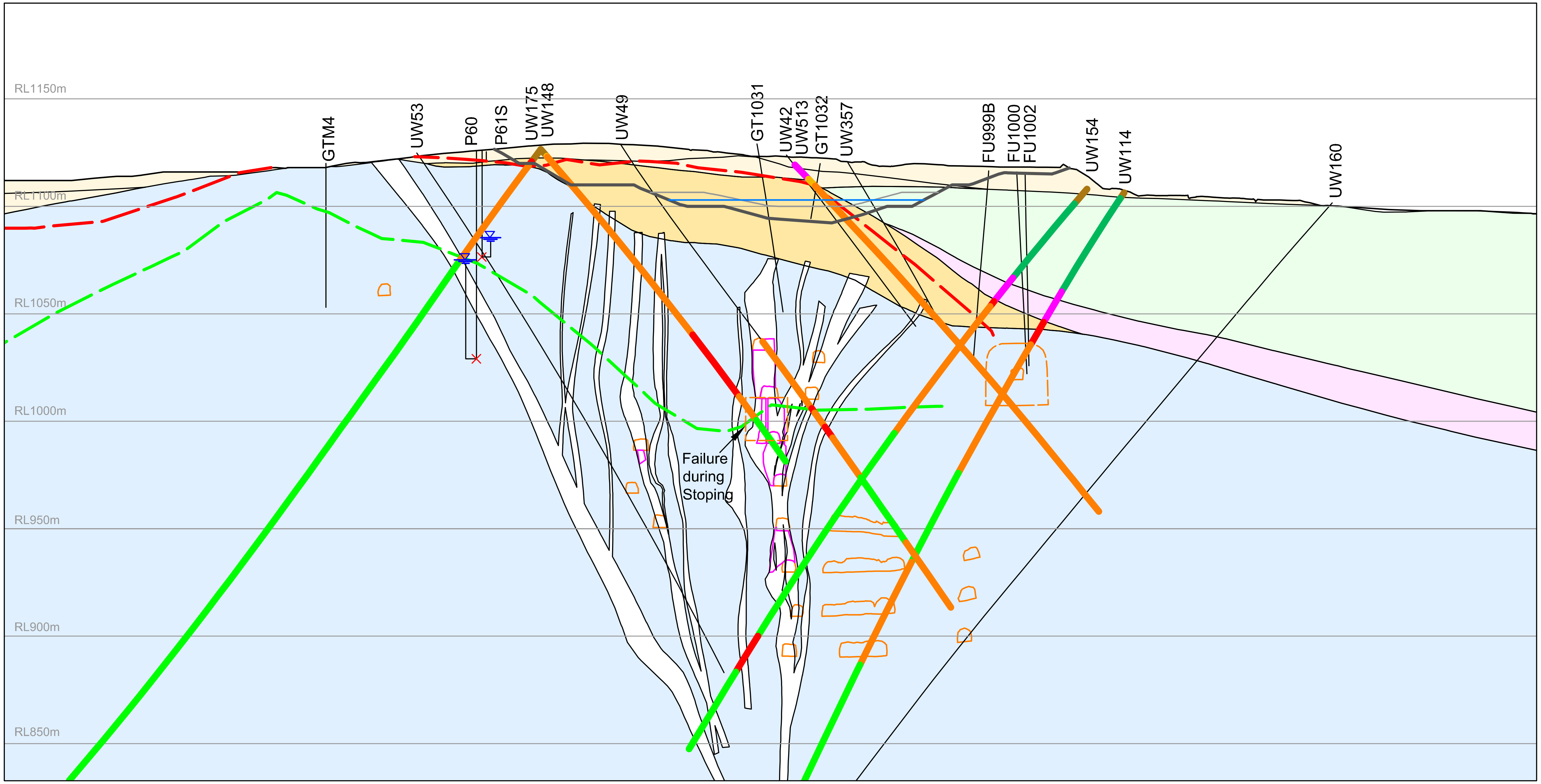
PSM125-260R | Figure 45



OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION N

PSM125-260R	Figure 46



LEGEND

Gladstone Pit	Tuff / Ignimbrite	Standpipe Piezometer	Top of Class 3 Andesite	Class 4	Ignimbrite
Surface of Backfill	Breccia		Top of Class 2 Andesite	Cass 3	Contact Zone
Underground Drives	Black Hill Dacite	Dipped depth below ground level		Class 2	Volcaniclastic
Underground Stopes	Volcaniclastic			Soil	No Core Photos
Squeezing/ Collapsing Ground	Andesite	Base of screened interval		Dacite	
Max Water/Tailings Level (1103mRL)	Quartz Veins				

Borehole Domains

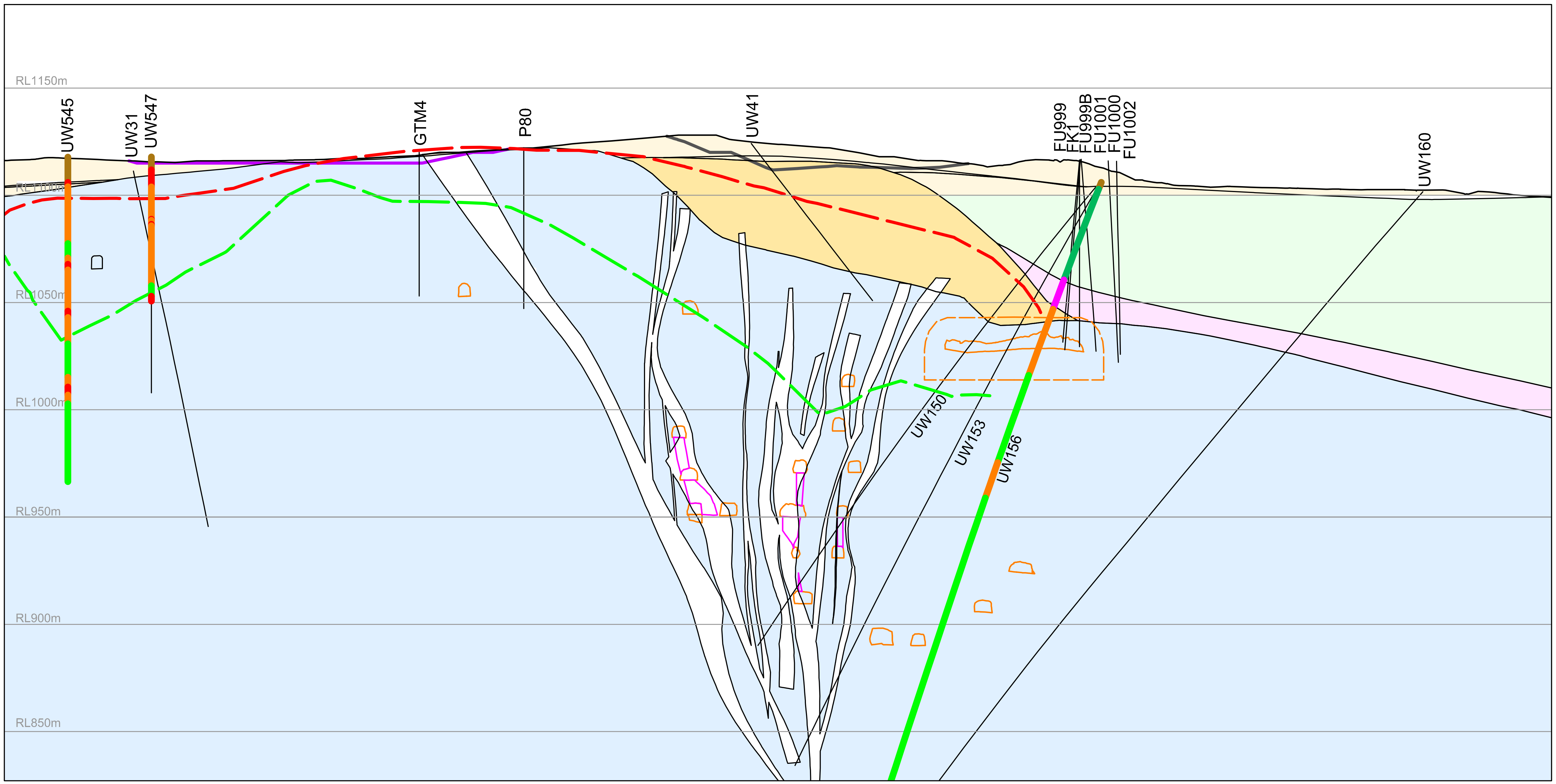
Scale (m): 0 50 100

PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION O

PSM125-260R | Figure 47



LEGEND

- Gladstone Pit
- Northern Portal Cut
- Surface of Backfill
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins
- Top of Class 3 Andesite
- Top of Class 2 Andesite

Borehole Domains

- Class 4
- Cass 3
- Class 2
- Soil
- Dacite
- Ignimbrite
- Contact Zone
- Volcaniclastic
- No Core Photos

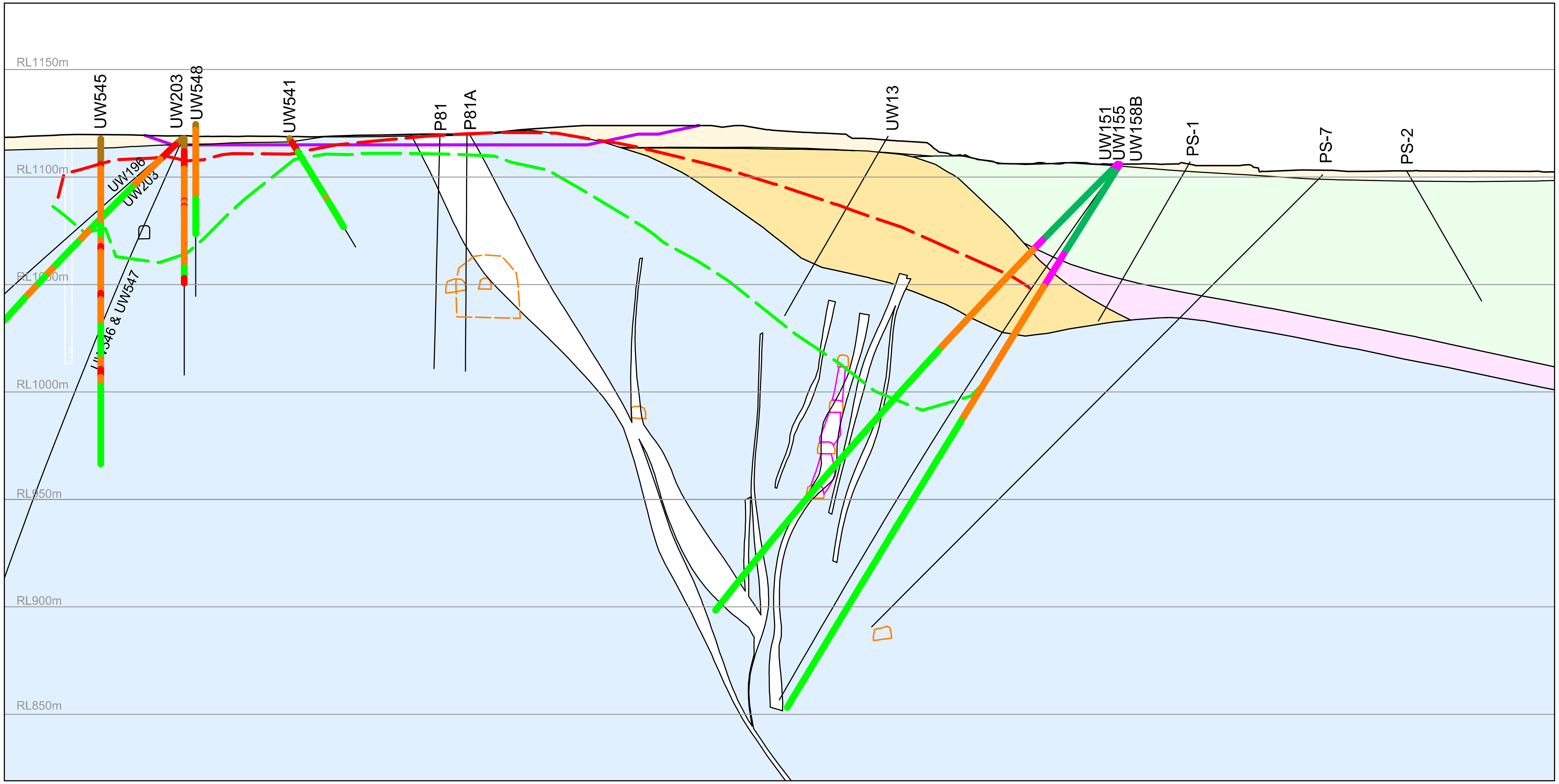
0 50 100
Scale (m)

P S M

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION P

PSM125-260R | Figure 48



LEGEND

Northern Portal Cut	Tuff / Ignimbrite
Surface of Backfill	Breccia
Underground Drives	Black Hill Dacite
Underground Stopes	Volcaniclastic
Squeezing/ Collapsing Ground	Andesite
	Quartz Veins

Top of Class 3 Andesite
Top of Class 2 Andesite

Borehole Domains

Class 4	Ignimbrite
Cass 3	Contact Zone
Class 2	Volcaniclastic
Soil	No Core Photos
Dacite	

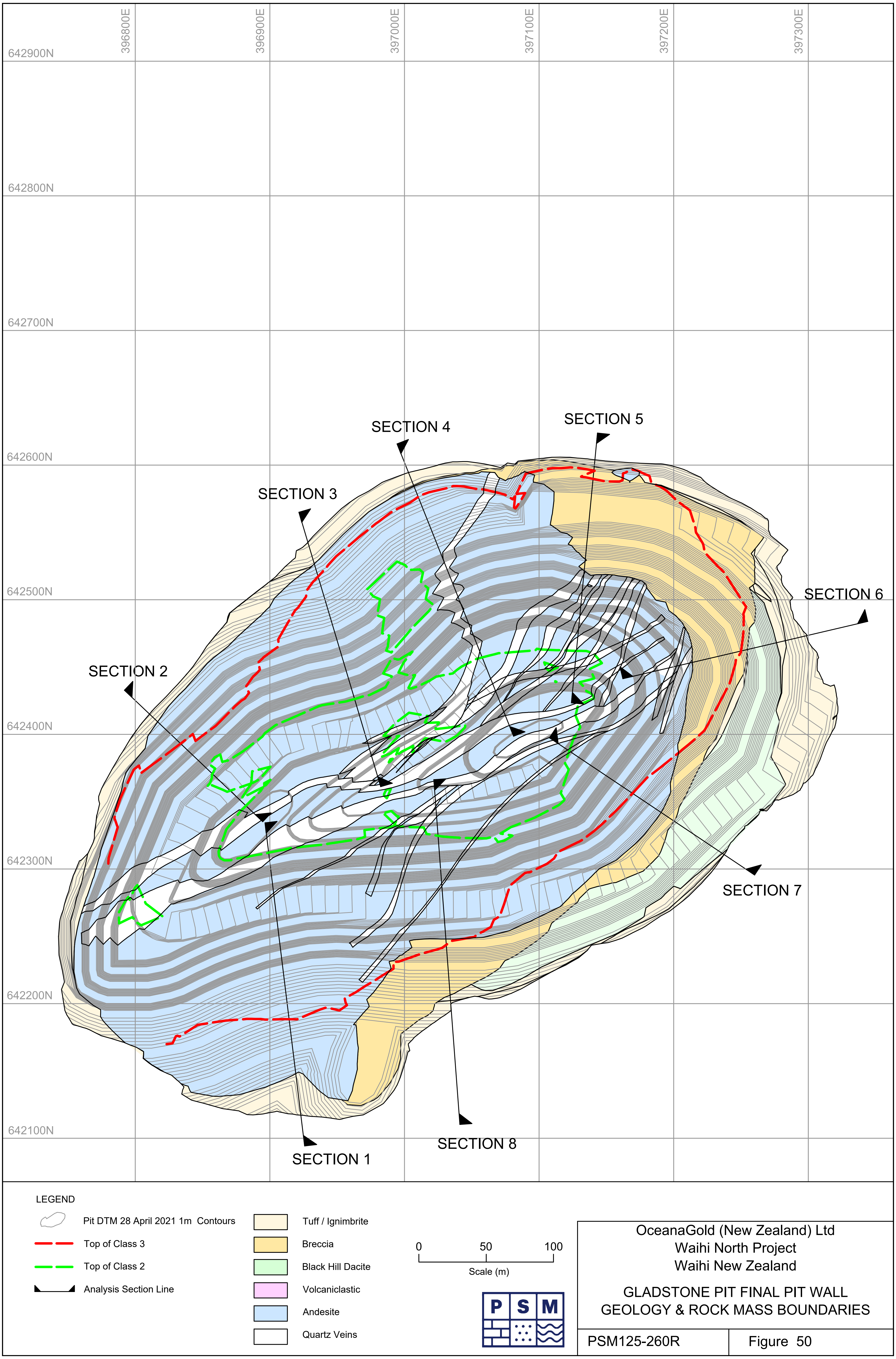
0 50 100
Scale (m)

PSM

OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT
ROCK MASS SECTION Q

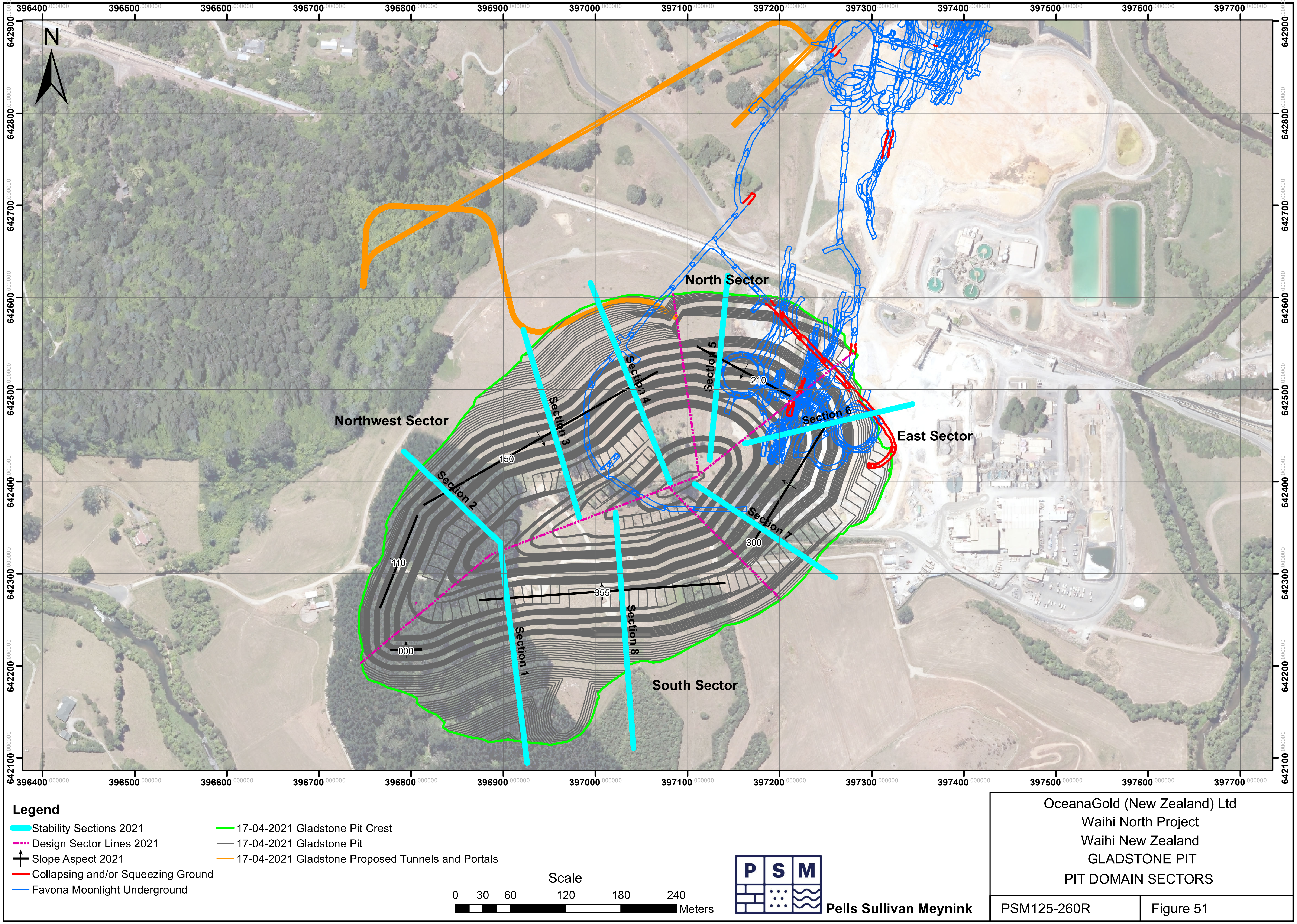
PSM125-260R | Figure 49

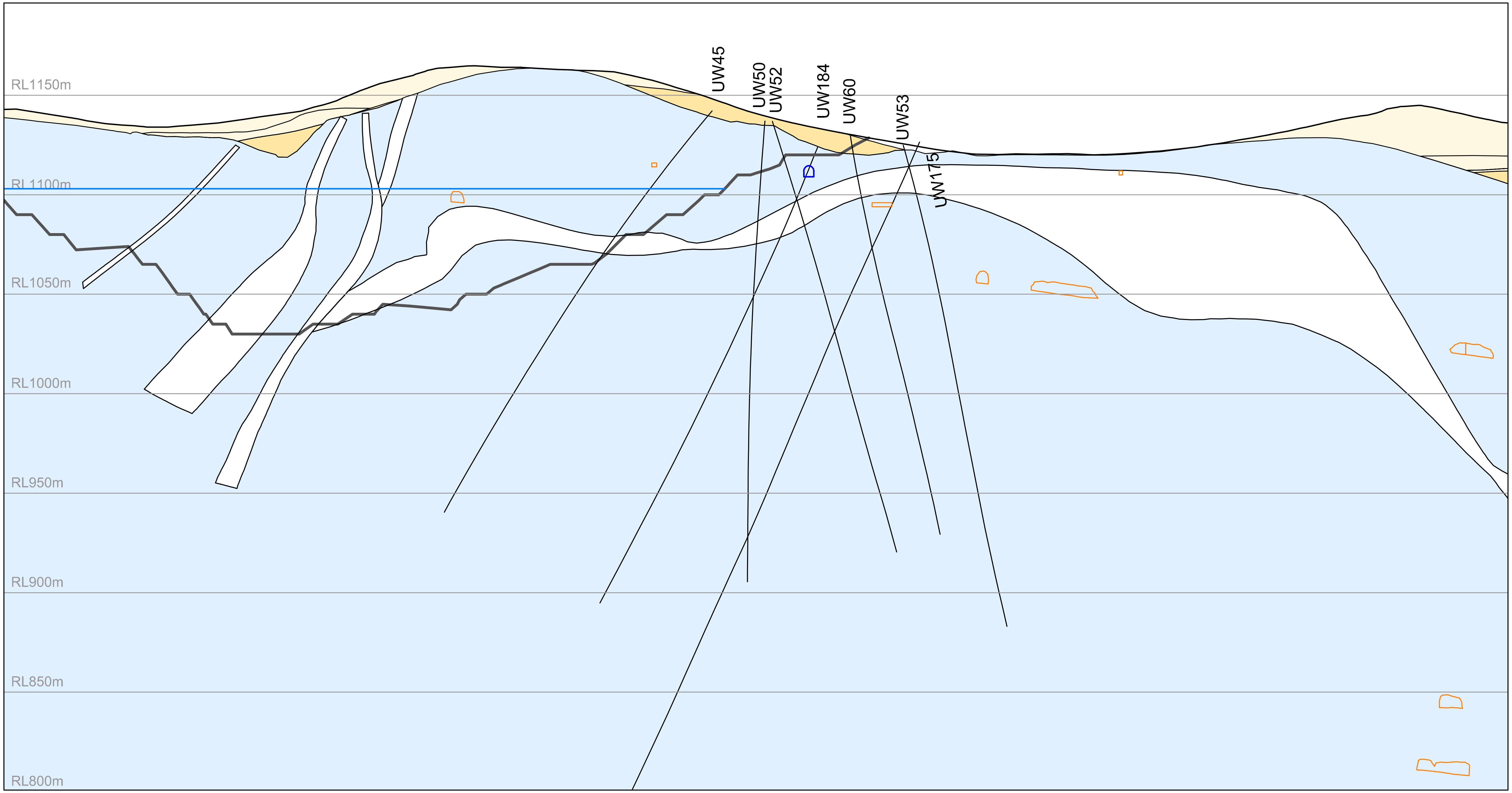


OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

GLADSTONE PIT FINAL PIT WALL
GEOLOGY & ROCK MASS BOUNDARIES

PSM125-260R	Figure 50


N
North Sector
Northwest Sector
East Sector
South Sector
Section 1
Section 2
Section 3
Section 4
Section 5
Section 6
Section 7
Section 8
000
110
150
210
300
355
Legend
Stability Sections 2021
Design Sector Lines 2021
Slope Aspect 2021
Collapsing and/or Squeezing Ground
Favona Moonlight Underground
17-04-2021 Gladstone Pit Crest
17-04-2021 Gladstone Pit
17-04-2021 Gladstone Proposed Tunnels and Portals
Scale
0 30 60 120 180 240
Meters
PSM
Pells Sullivan Meynink
OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand
GLADSTONE PIT
PIT DOMAIN SECTORS
PSM125-260R
Figure 51

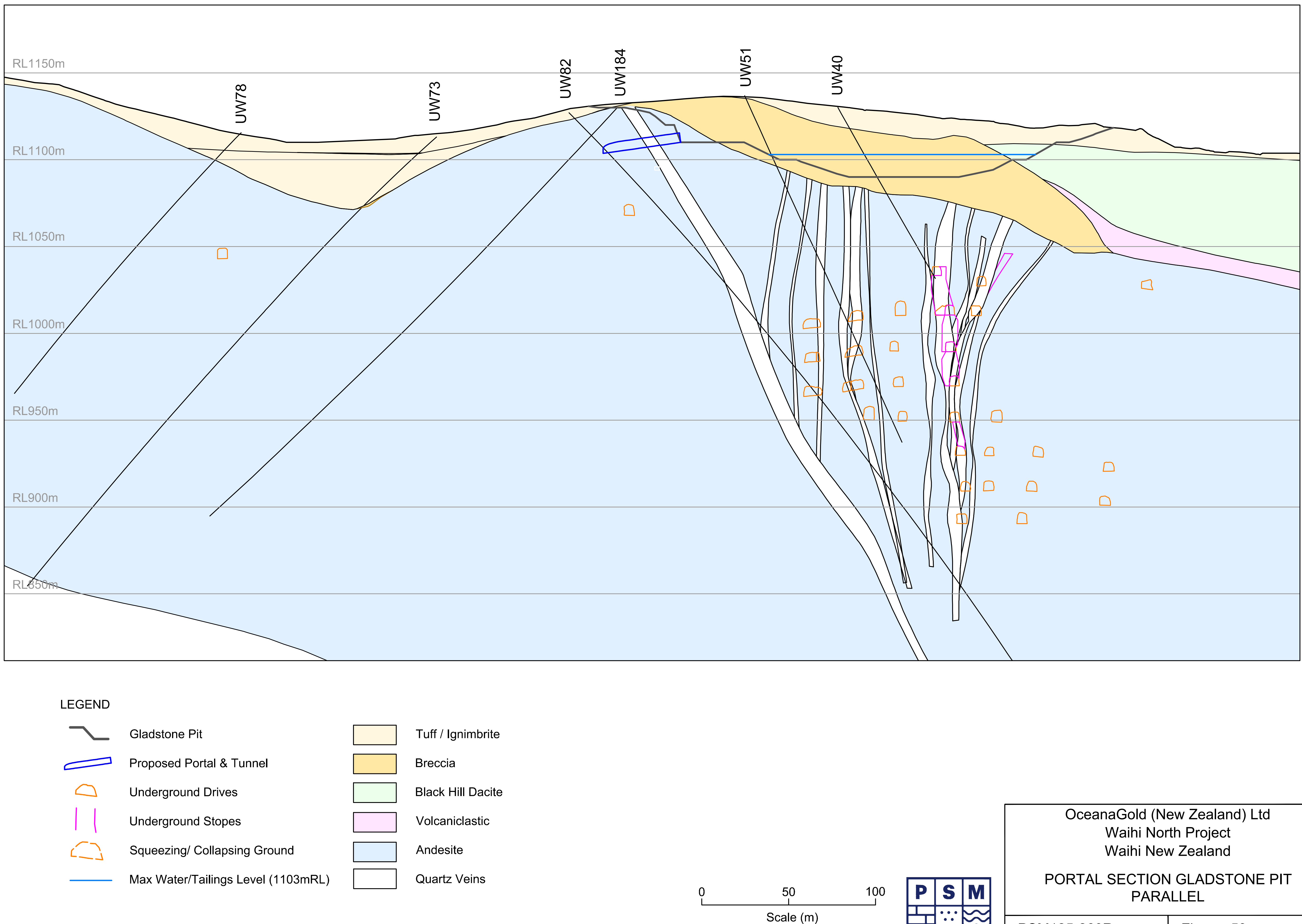


LEGEND

- Gladstone Pit
- Proposed Portal & Tunnel
- Underground Drives
- Underground Stopes
- Squeezing/ Collapsing Ground
- Max Water/Tailings Level (1103mRL)
- Tuff / Ignimbrite
- Breccia
- Black Hill Dacite
- Volcaniclastic
- Andesite
- Quartz Veins

0 50 100
Scale (m)

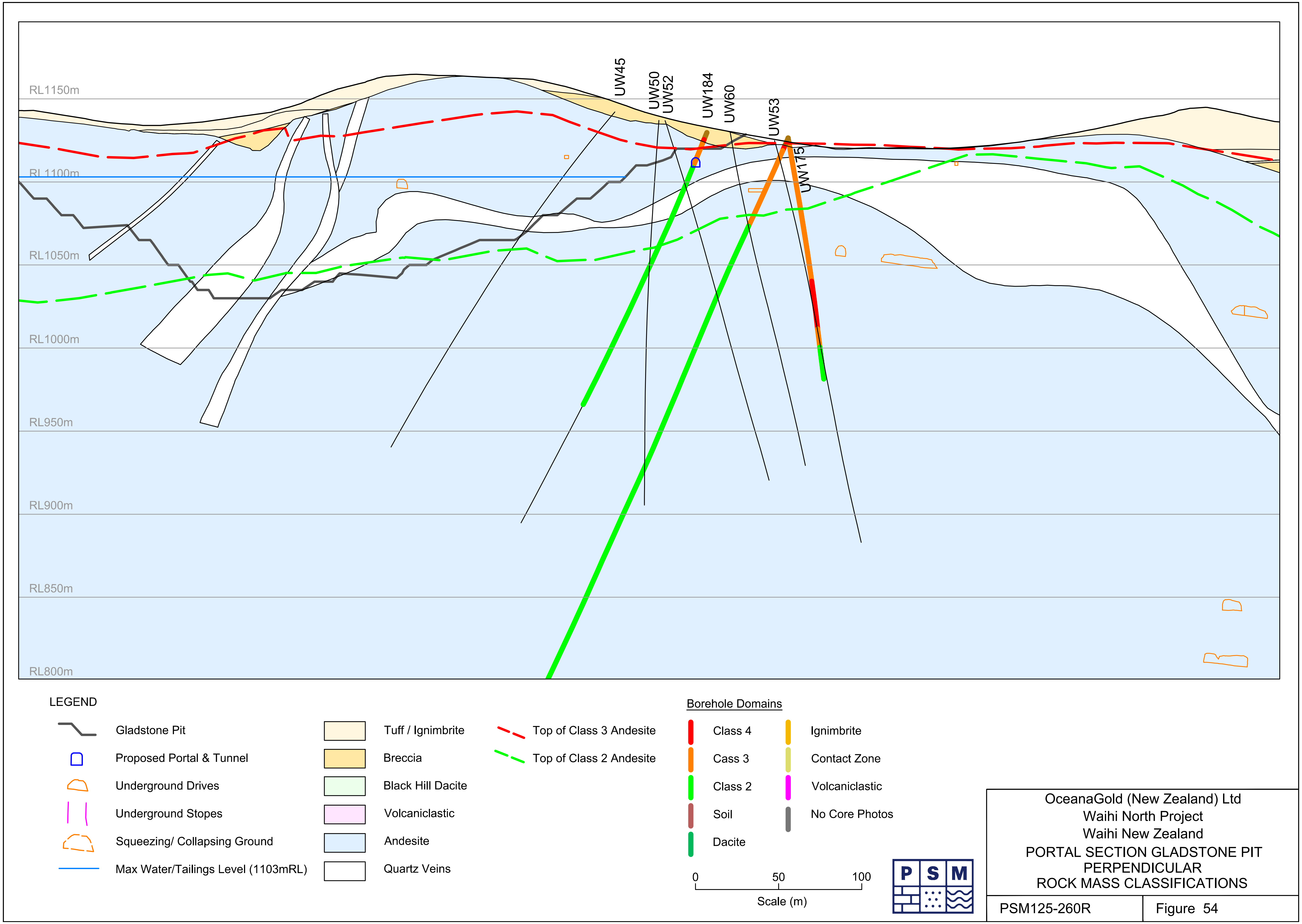
OceanaGold (New Zealand) Ltd Waihi North Project Waihi New Zealand PORTAL SECTION GLADSTONE PIT PERPENDICULAR	
PSM125-260R	Figure 52



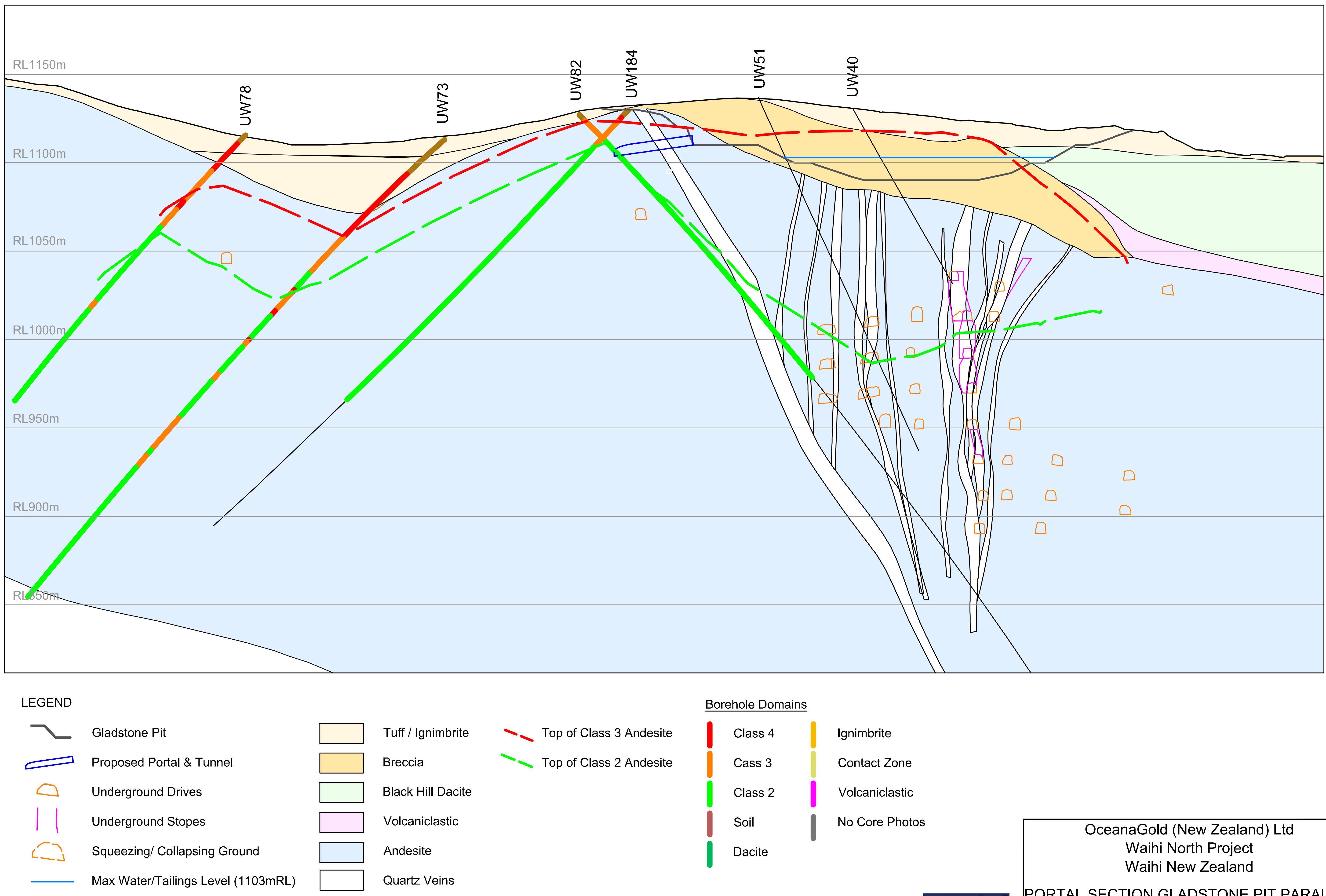
OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

PORTAL SECTION GLADSTONE PIT PARALLEL

PSM125-260R	Figure 53



RL1150m
RL1100m
RL1050m
RL1000m
RL950m
RL900m
RL850m
RL800m
UW45
UW50
UW52
UW184
UW60
UW53
UW175
LEGEND
Gladstone Pit
Proposed Portal & Tunnel
Underground Drives
Underground Stopes
Squeezing/ Collapsing Ground
Max Water/Tailings Level (1103mRL)
Tuff / Ignimbrite
Breccia
Black Hill Dacite
Volcaniclastic
Andesite
Quartz Veins
Top of Class 3 Andesite
Top of Class 2 Andesite
Borehole Domains
Class 4
Cass 3
Class 2
Soil
Dacite
Ignimbrite
Contact Zone
Volcaniclastic
No Core Photos
0
50
100
Scale (m)
P S M
OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand
PORTAL SECTION GLADSTONE PIT
PERPENDICULAR
ROCK MASS CLASSIFICATIONS
PSM125-260R
Figure 54

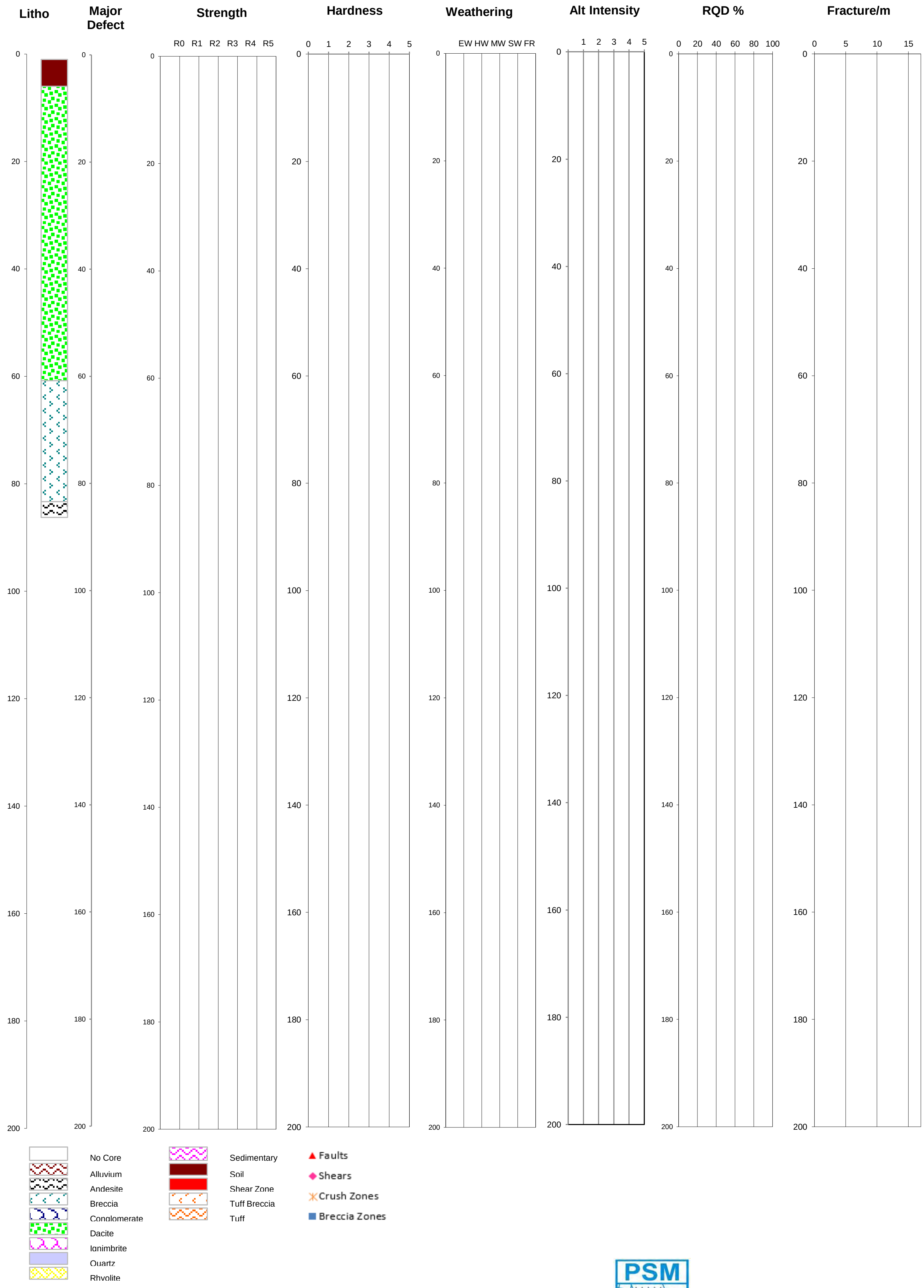


OceanaGold (New Zealand) Ltd
Waihi North Project
Waihi New Zealand

PORTAL SECTION GLADSTONE PIT PARALLEL
ROCK MASS CLASSIFICATIONS

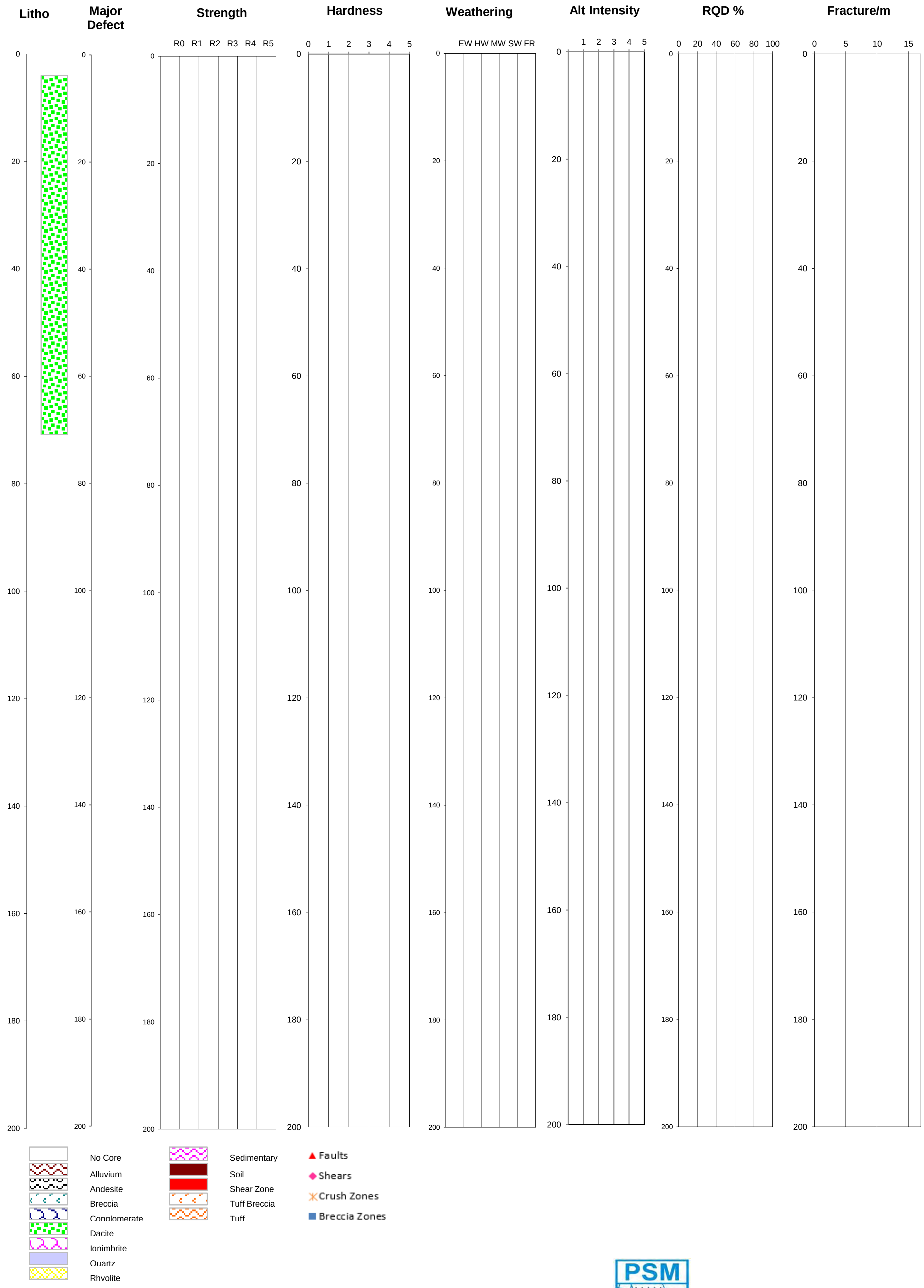
PSM125-260R	Figure 55

Appendix A
Resources Log



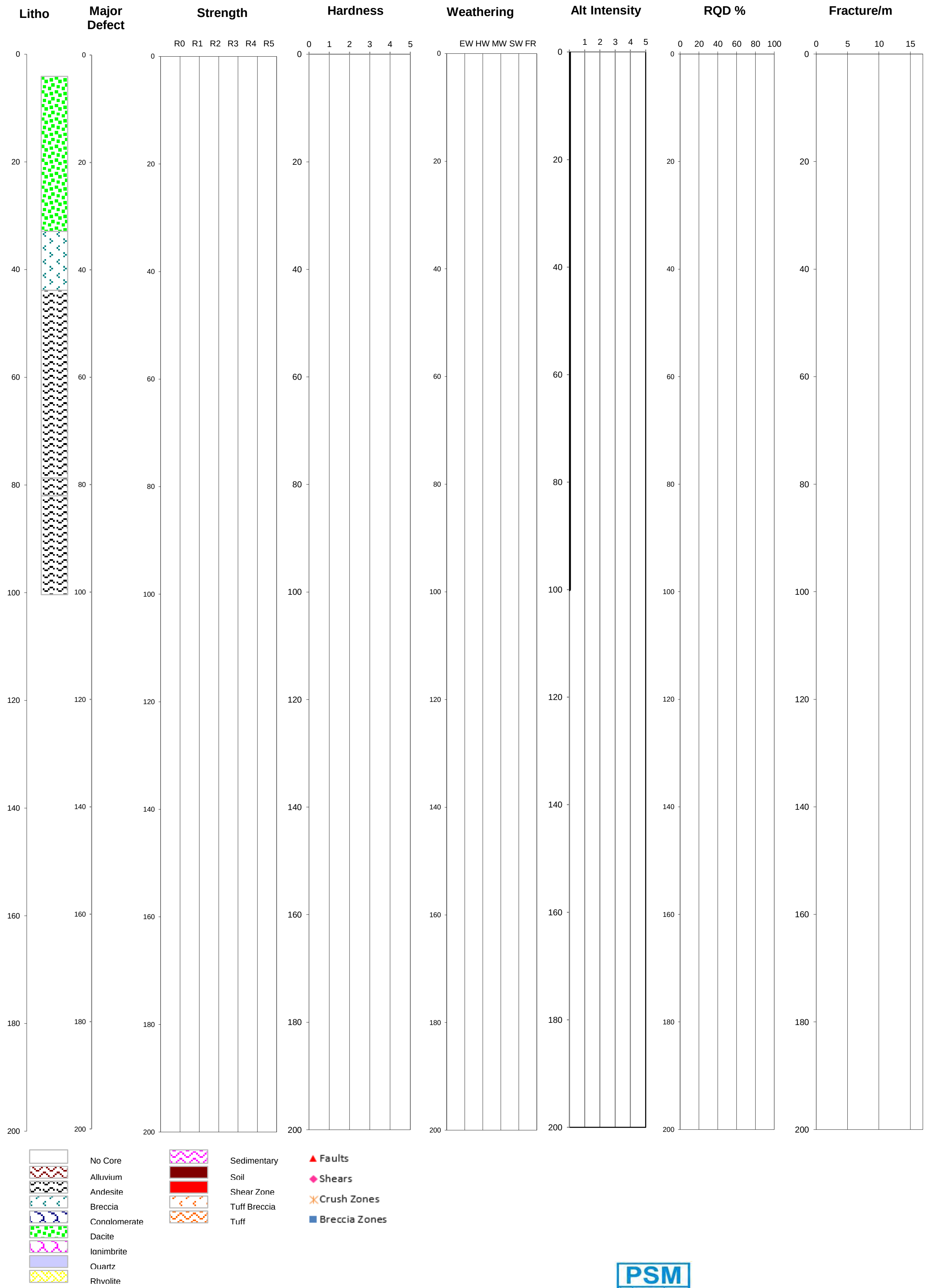
Borehole ID: **PS-1**

Pells Sullivan Meynink



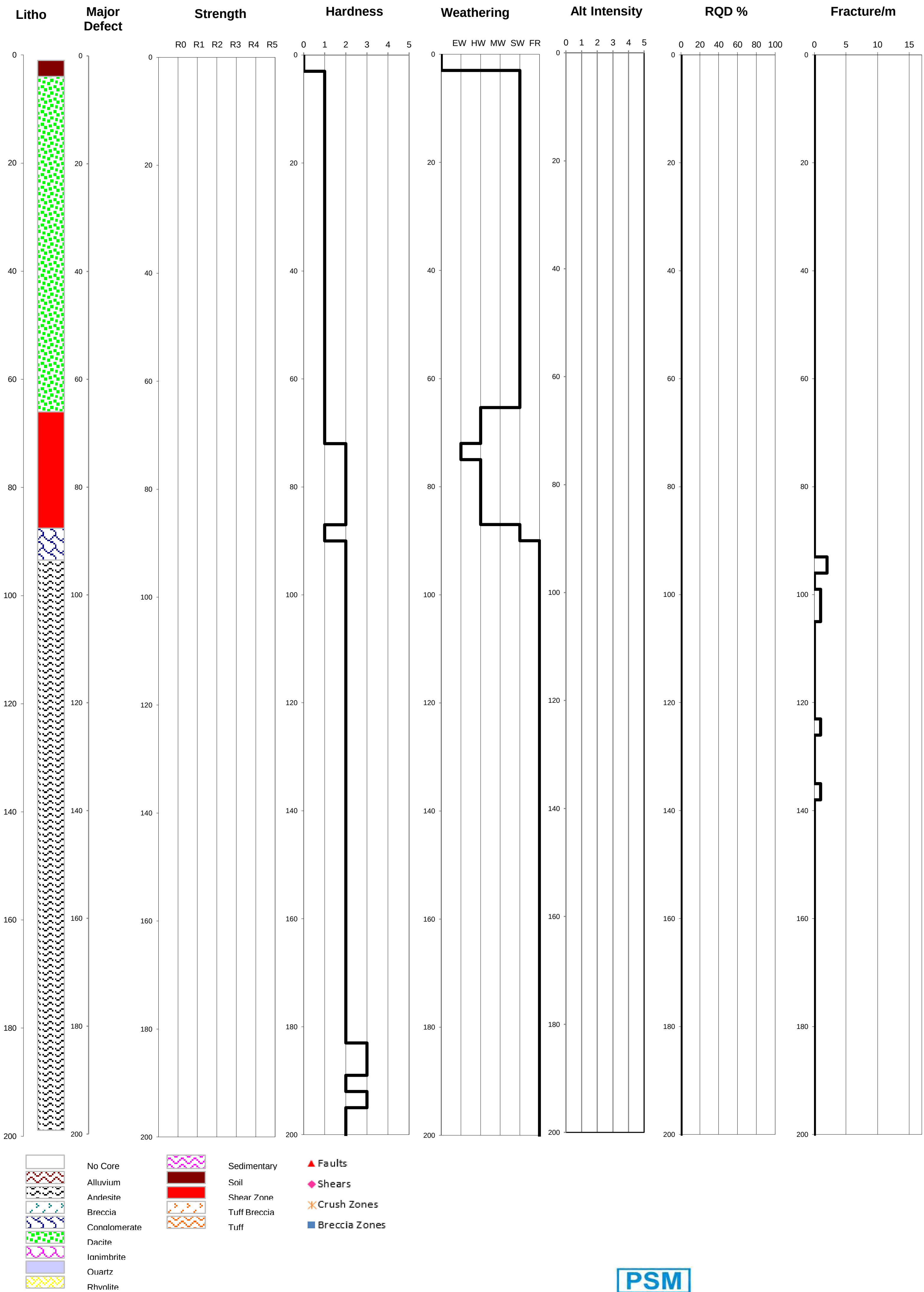
Borehole ID: **PS-2**

Pells Sullivan Meynink



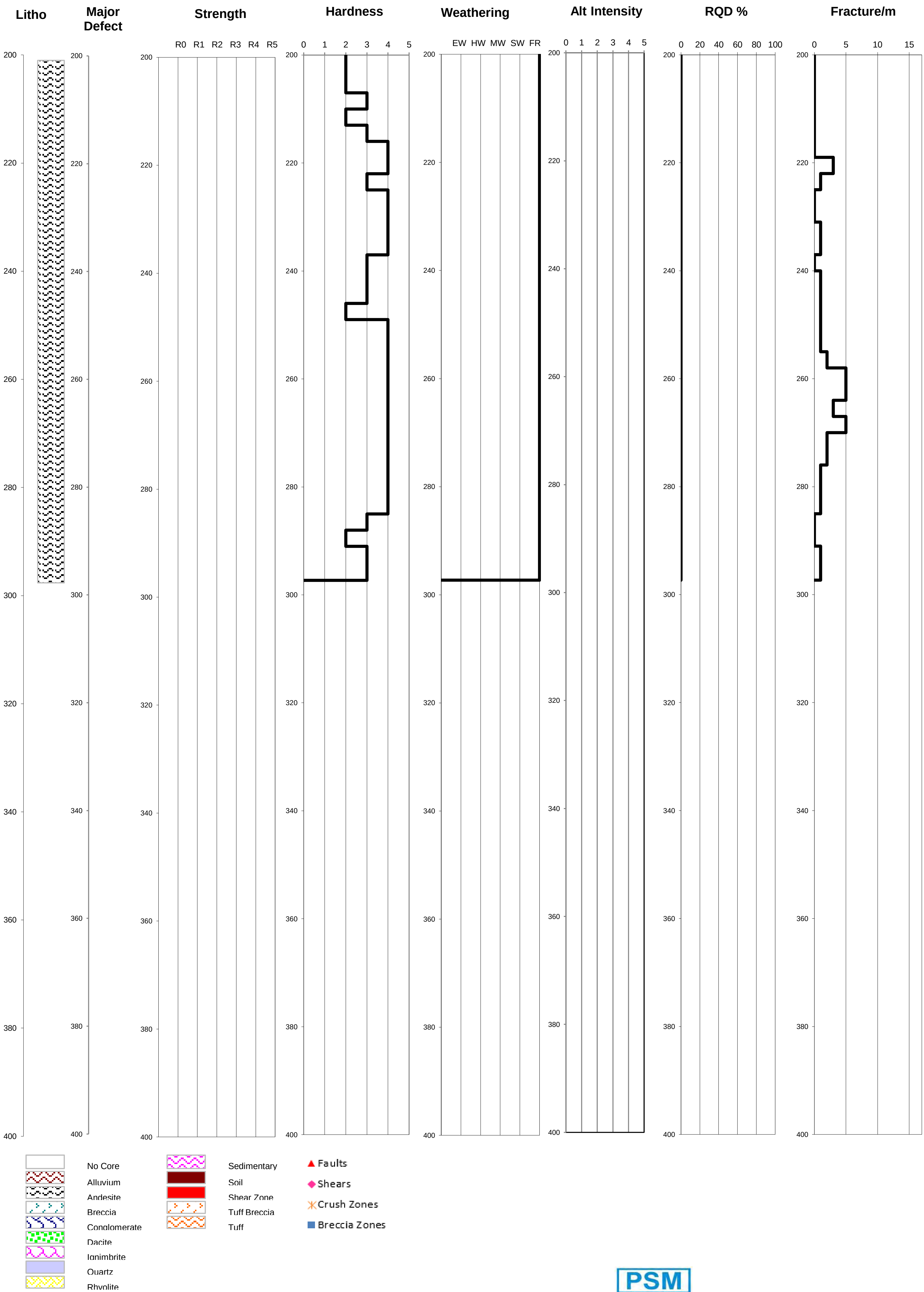
Borehole ID: **PS-3**

Pells Sullivan Meynink



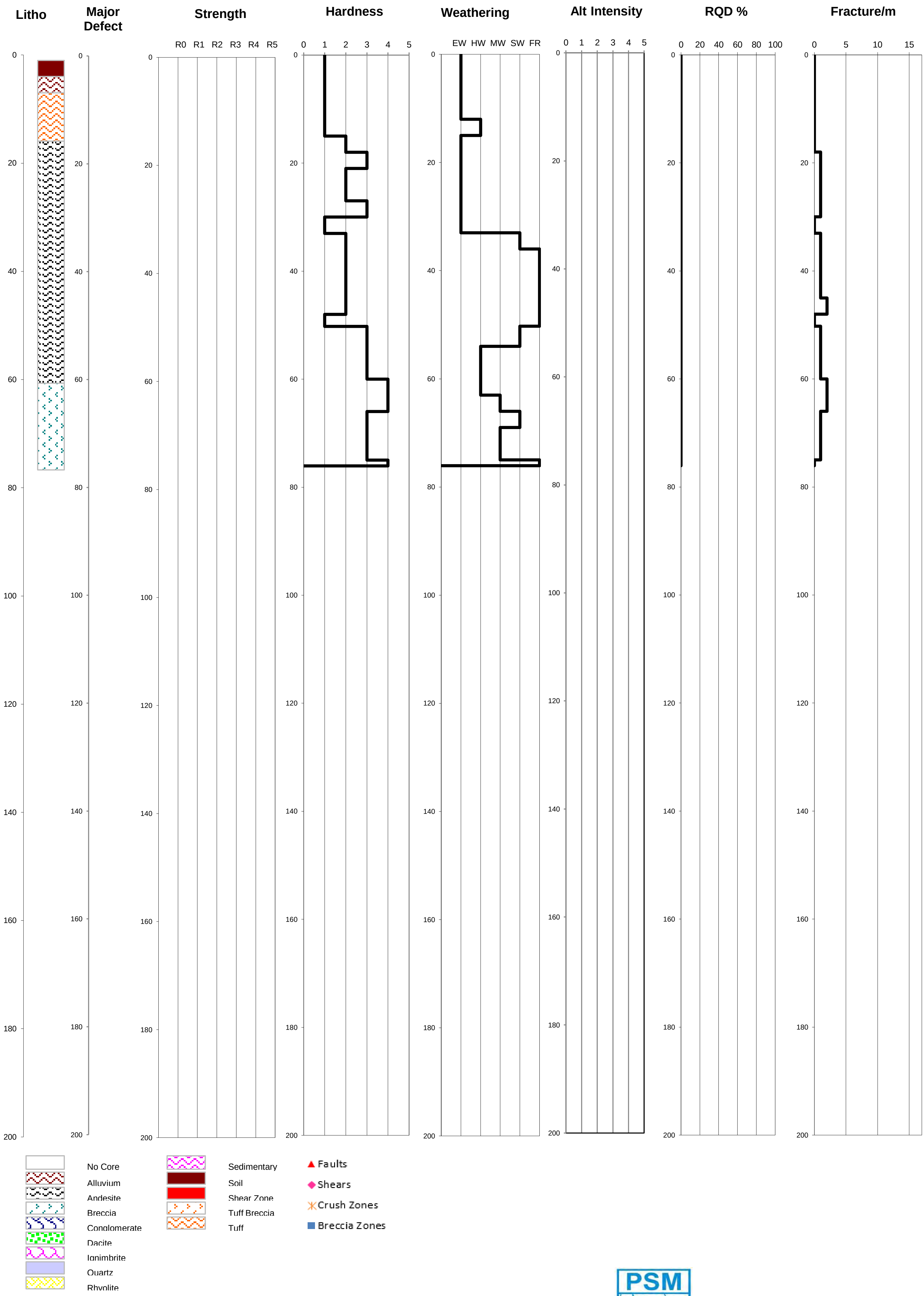
Borehole ID: **PS-7**

Pells Sullivan Meynink



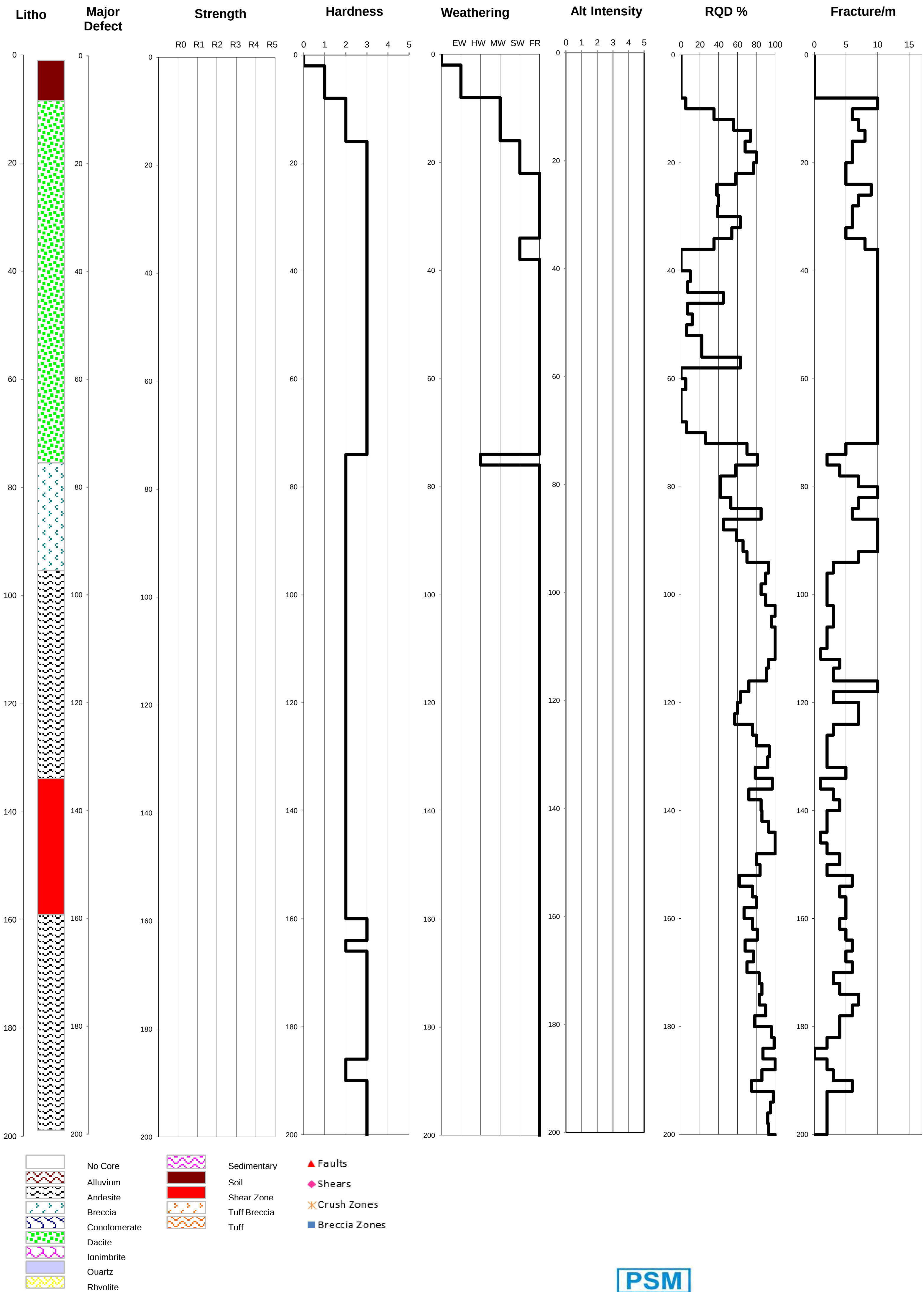
Borehole ID: **PS-7**

Pells Sullivan Meynink



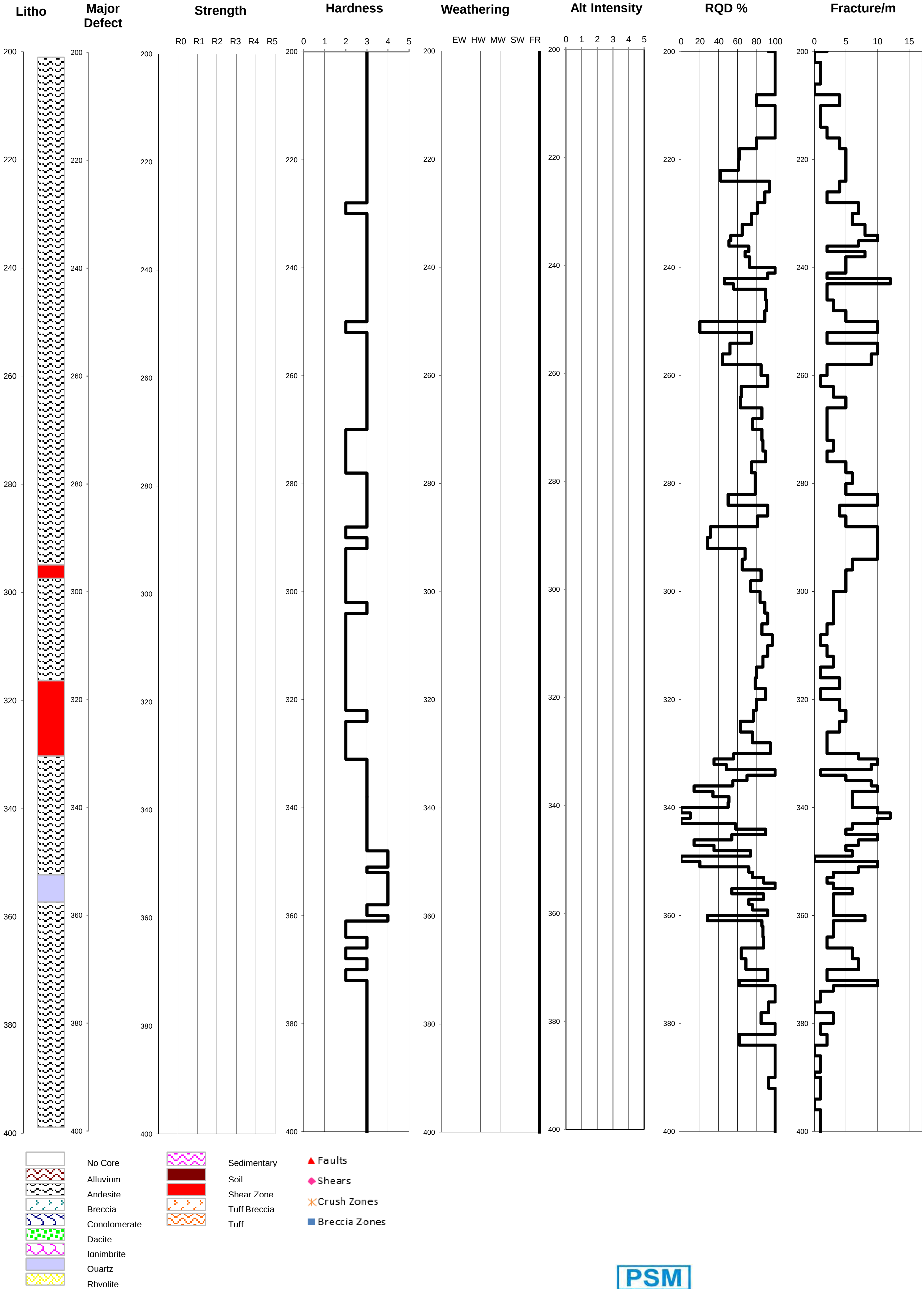
Borehole ID: UW10

Pells Sullivan Meynink



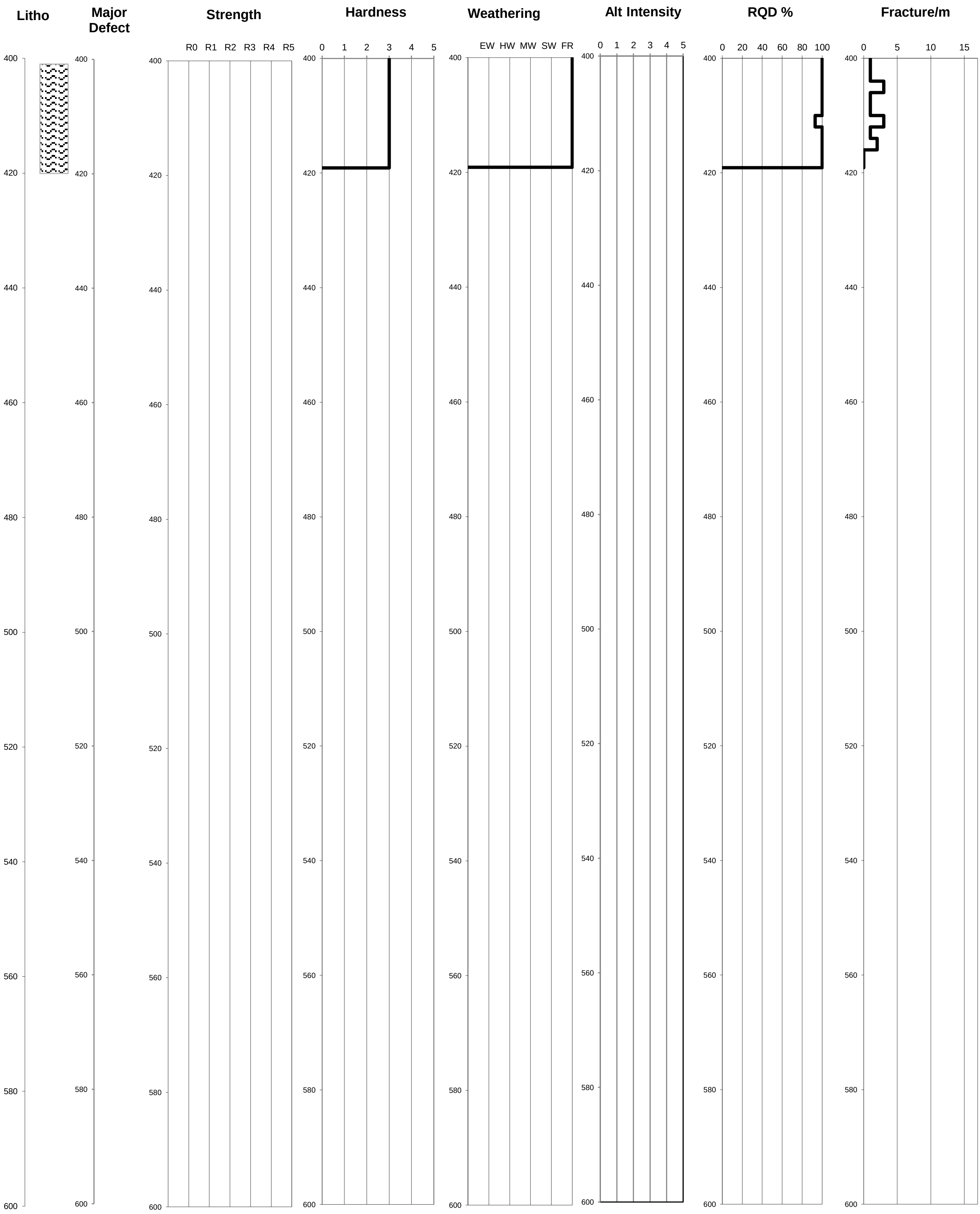
Borehole ID: **UW100**

Pells Sullivan Meynink



Borehole ID: UW100

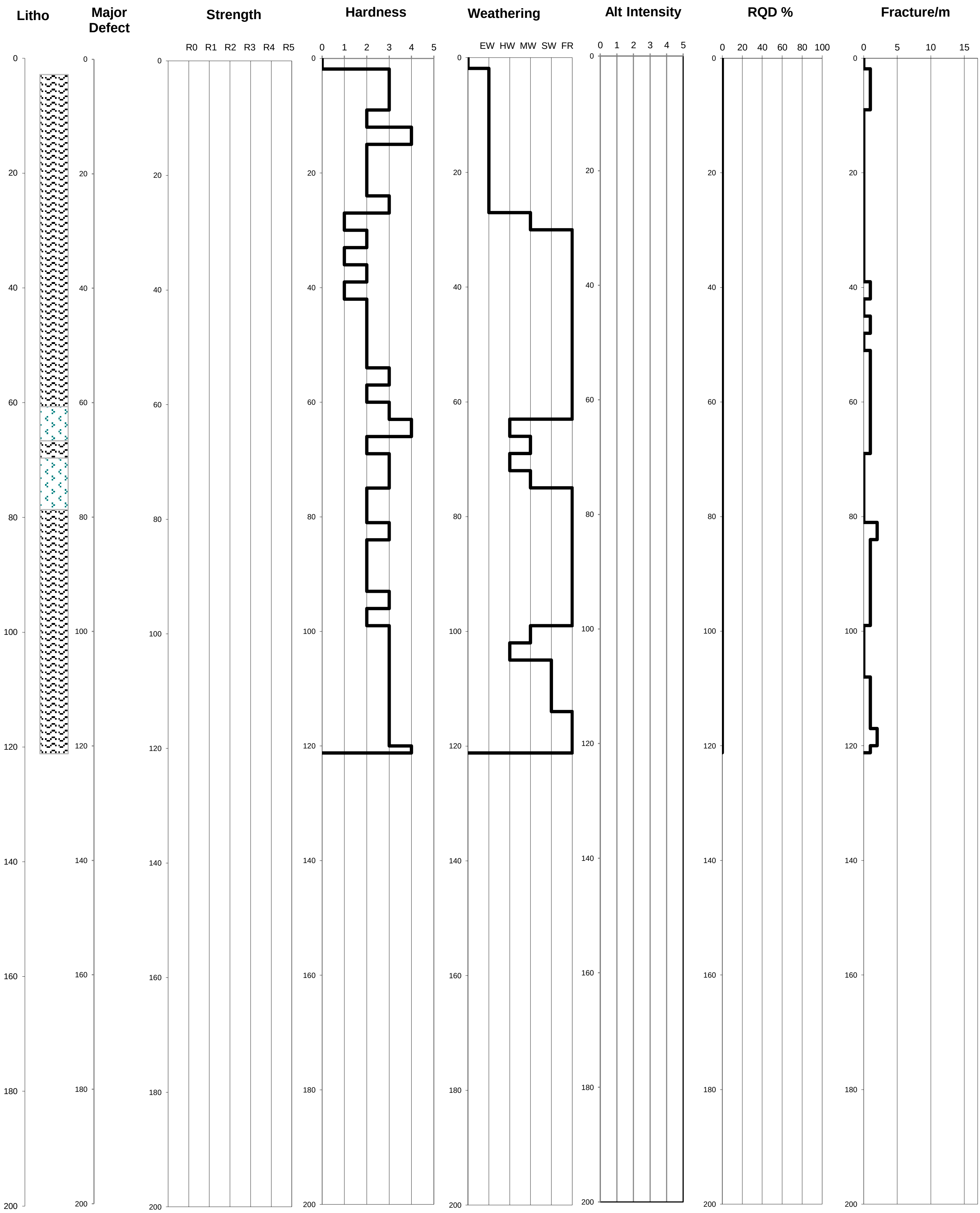
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

Borehole ID: **UW100**

PSM **Pells Sullivan Meynink**

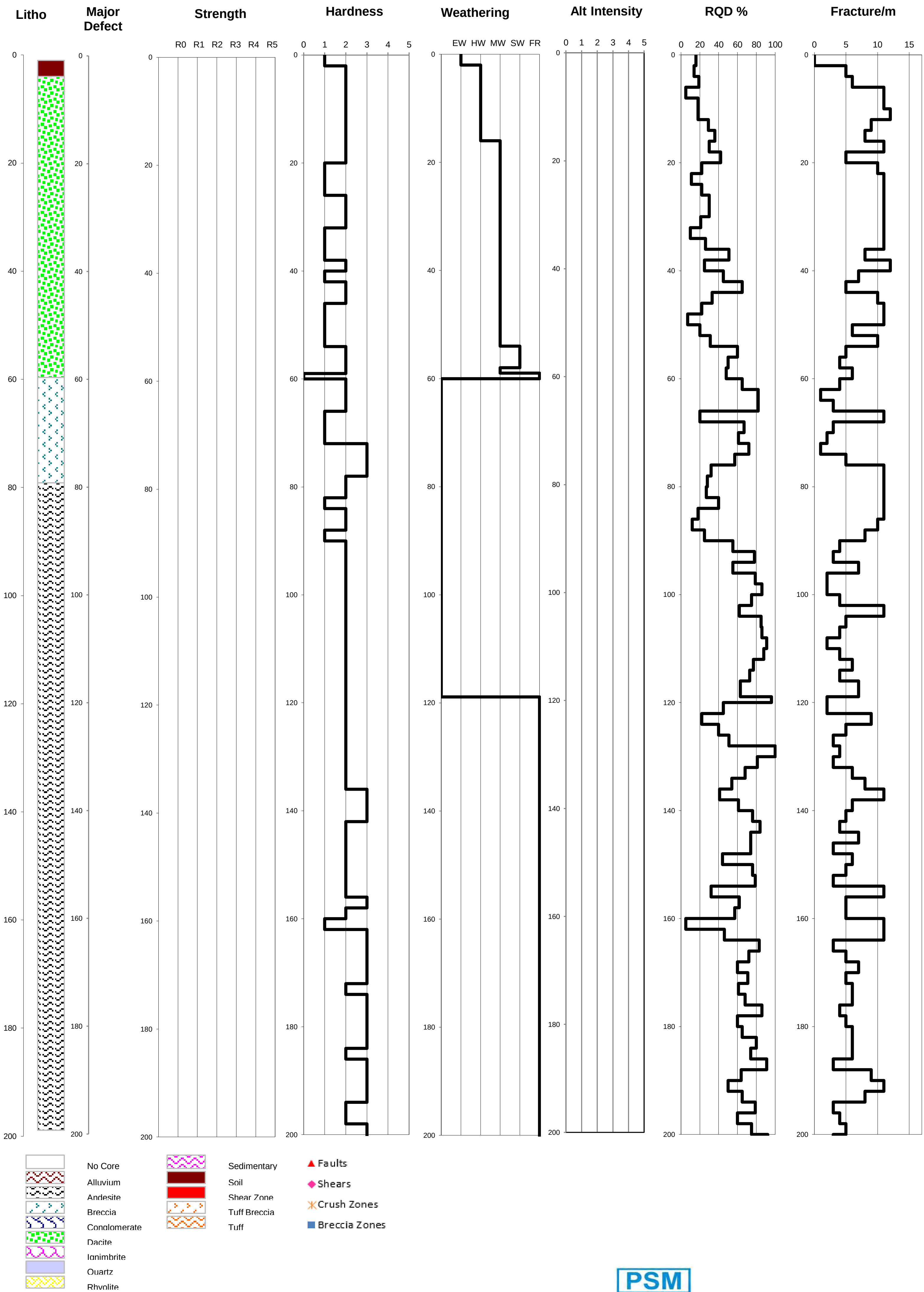


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

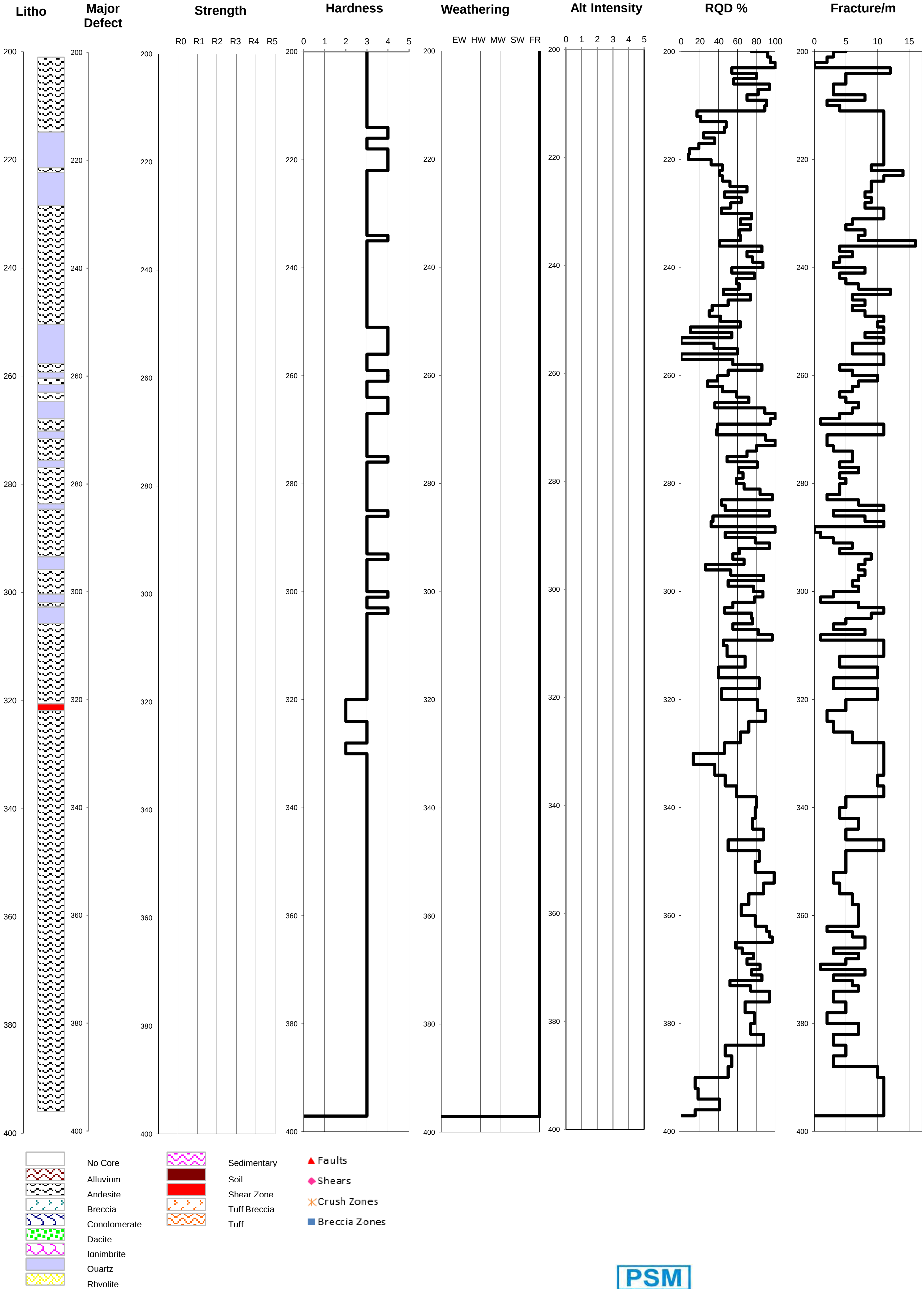
Borehole ID: **UW11**

Pells Sullivan Meynink



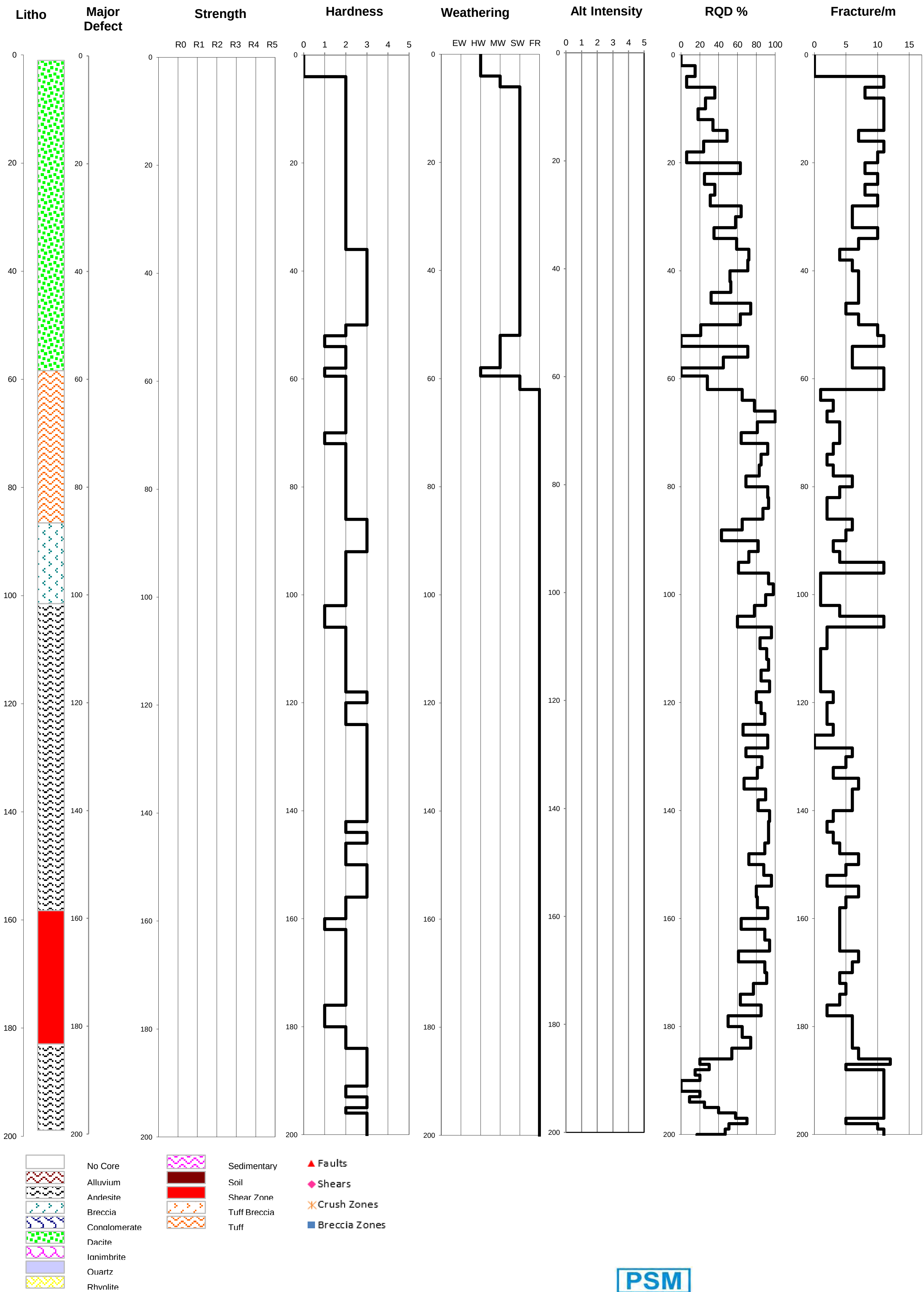
Borehole ID: UW114

Pells Sullivan Meynink



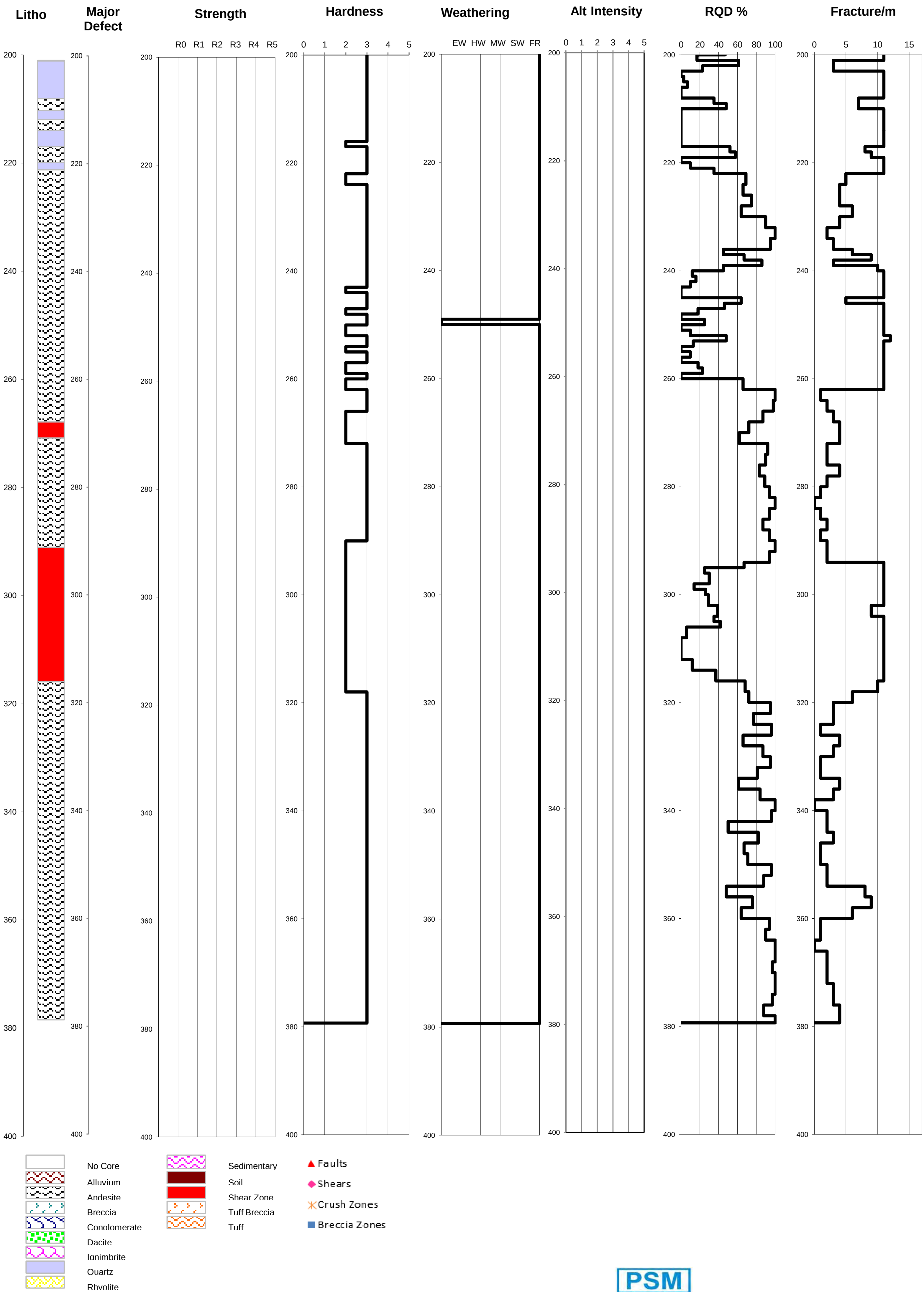
Borehole ID: **UW114**

PSM **Pells Sullivan Meynink**



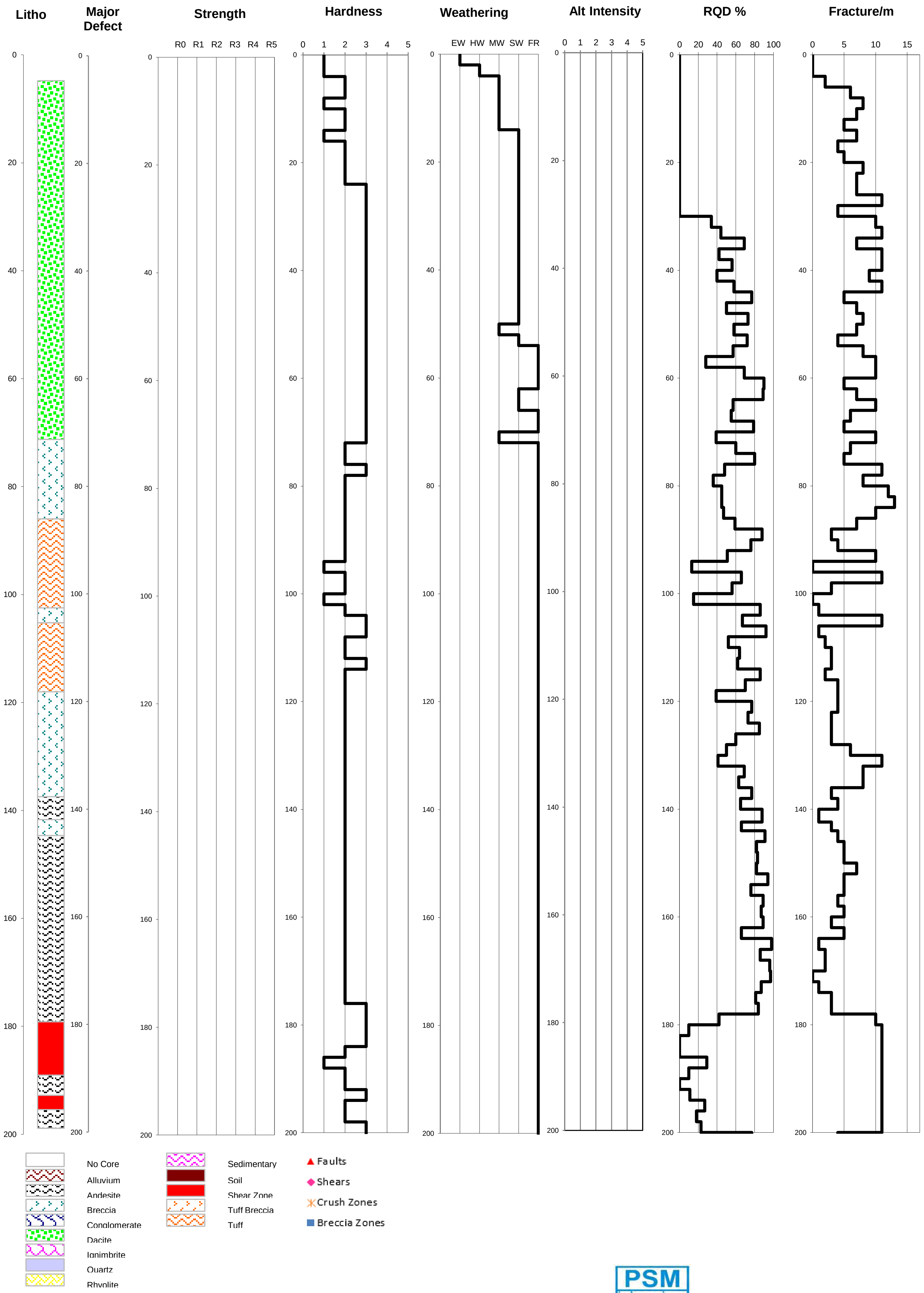
Borehole ID: **UW116**

Pells Sullivan Meynink



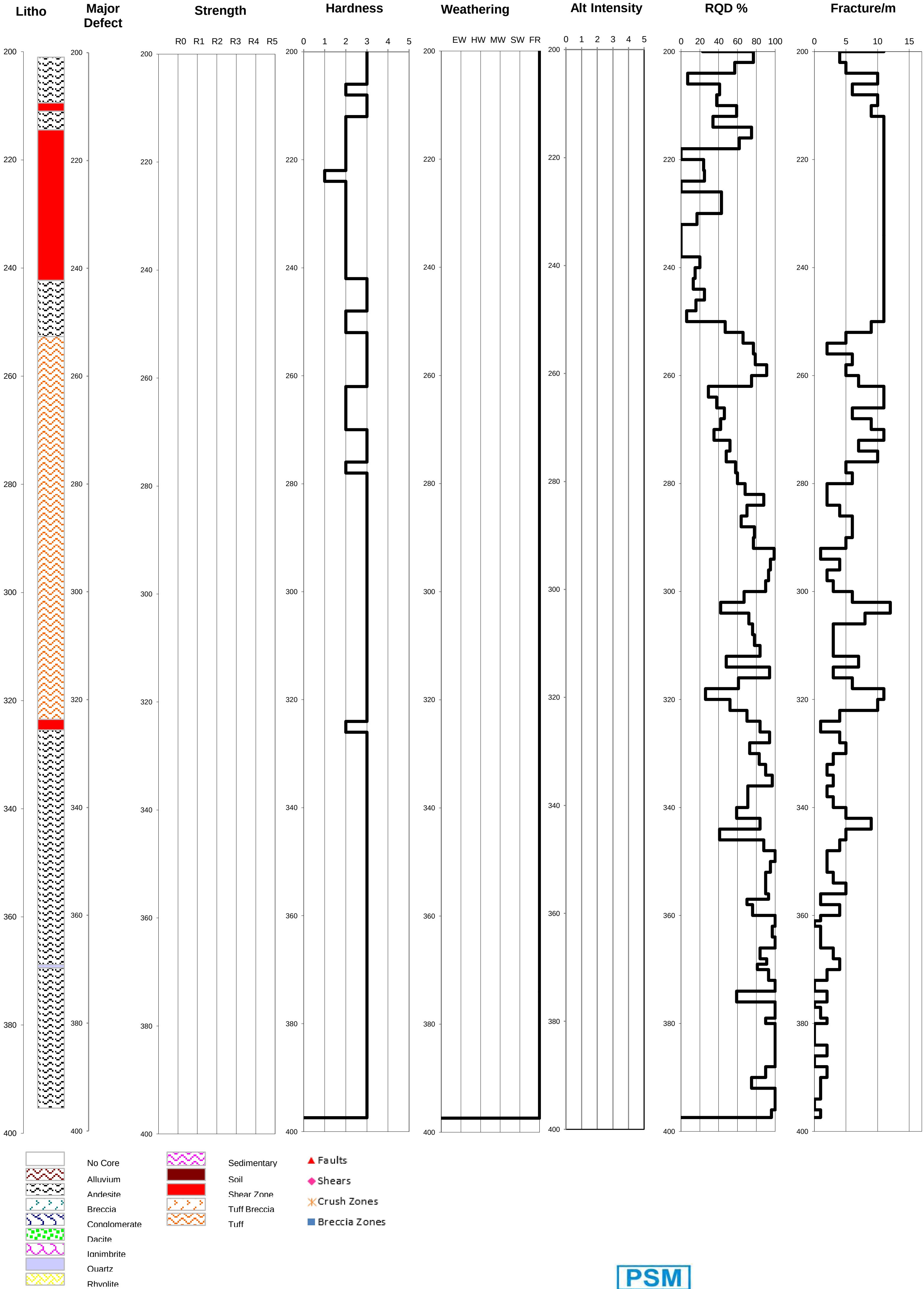
Borehole ID: **UW116**

Pells Sullivan Meynink



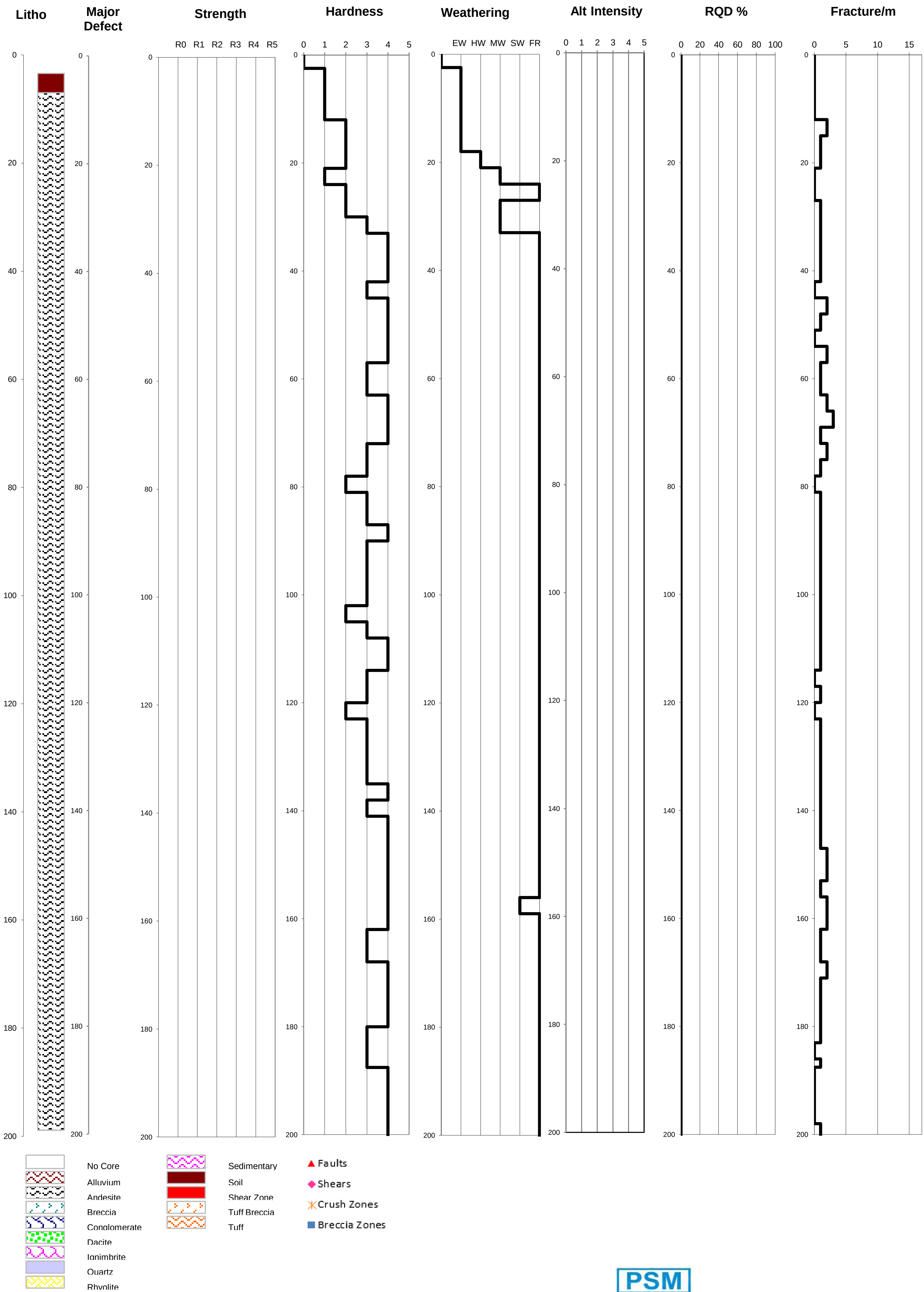
Borehole ID: **UW118**

Pells Sullivan Meynink



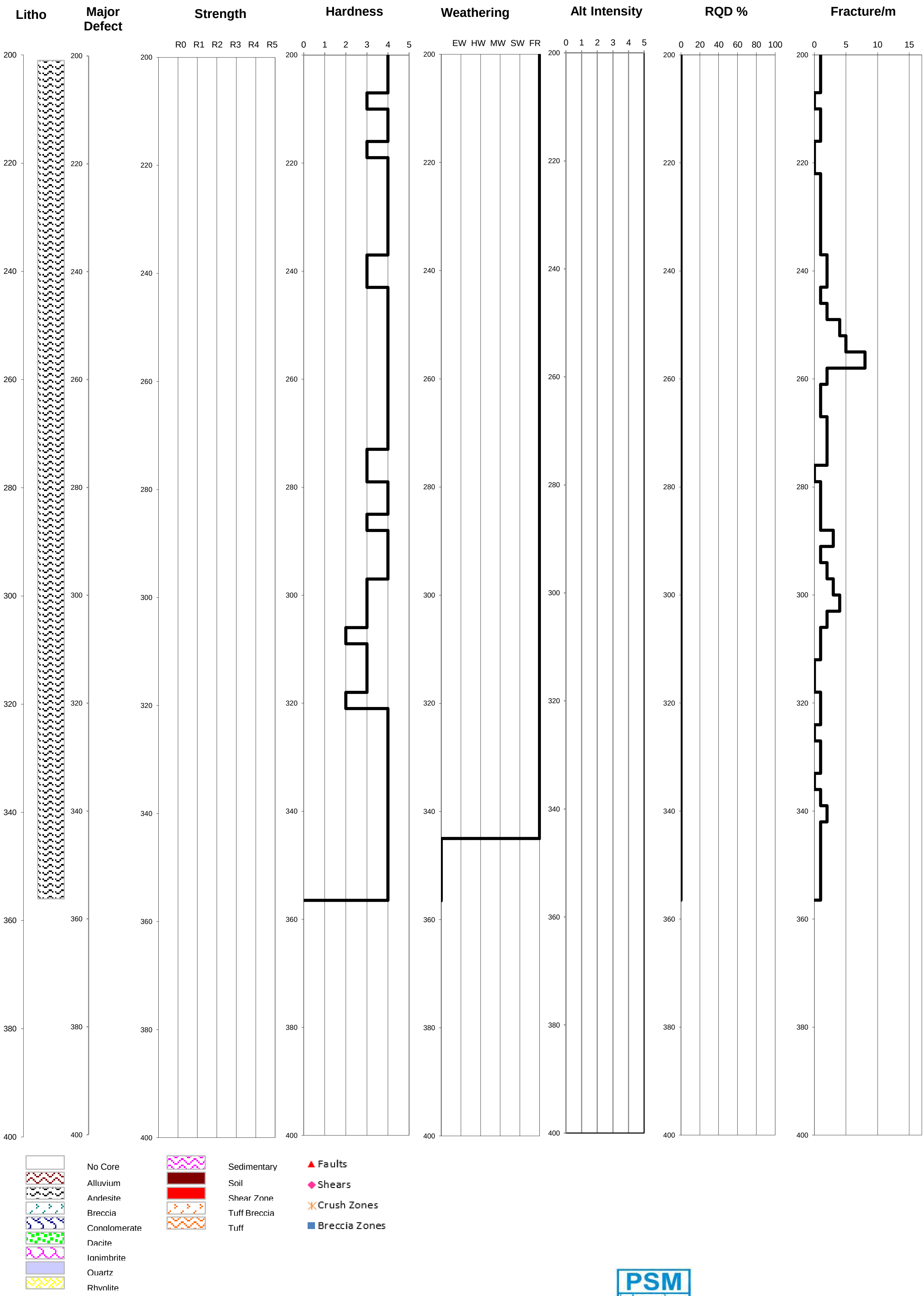
Borehole ID: **UW118**

Pells Sullivan Meynink



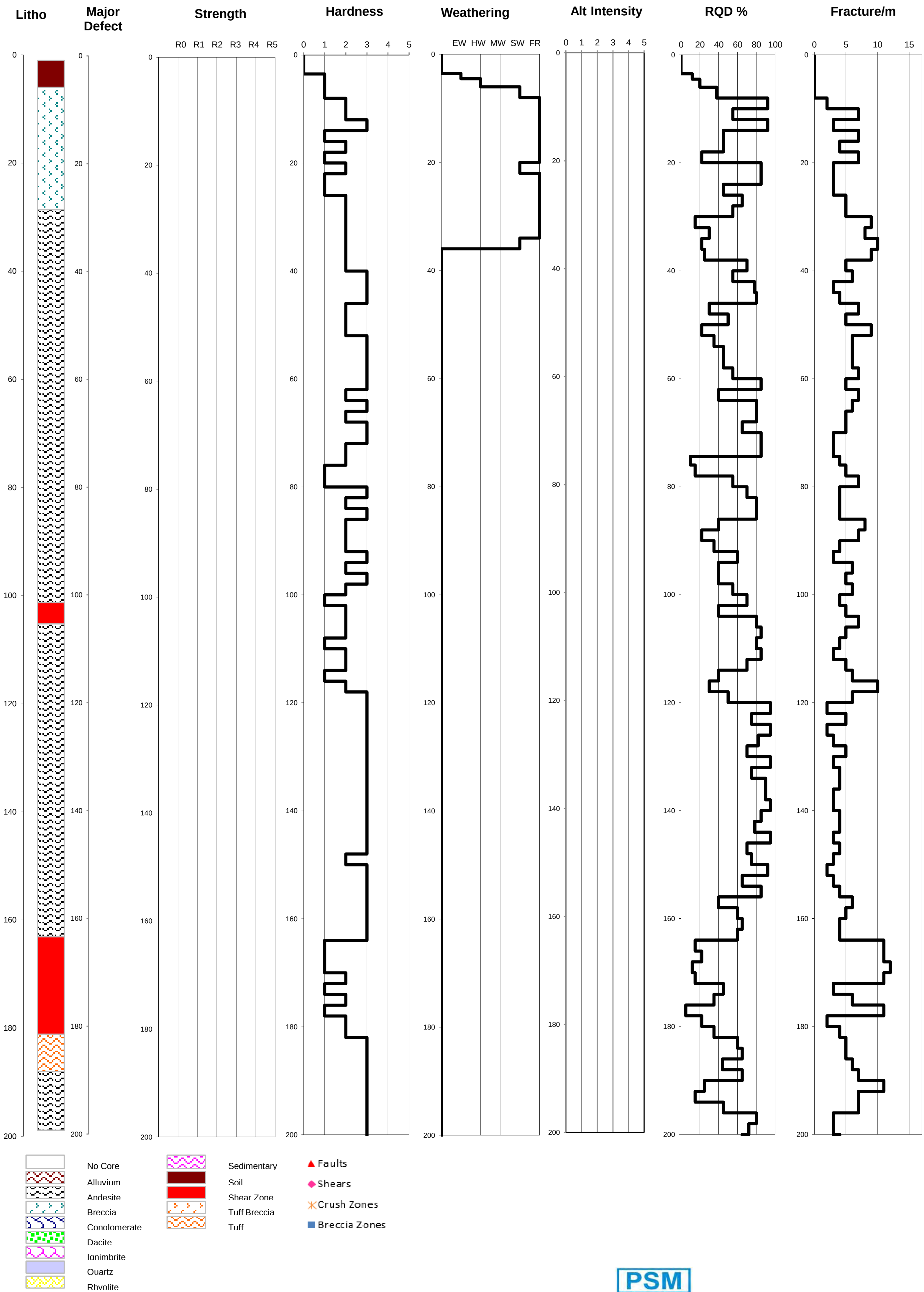
Borehole ID: UW12

Pells Sullivan Meynink



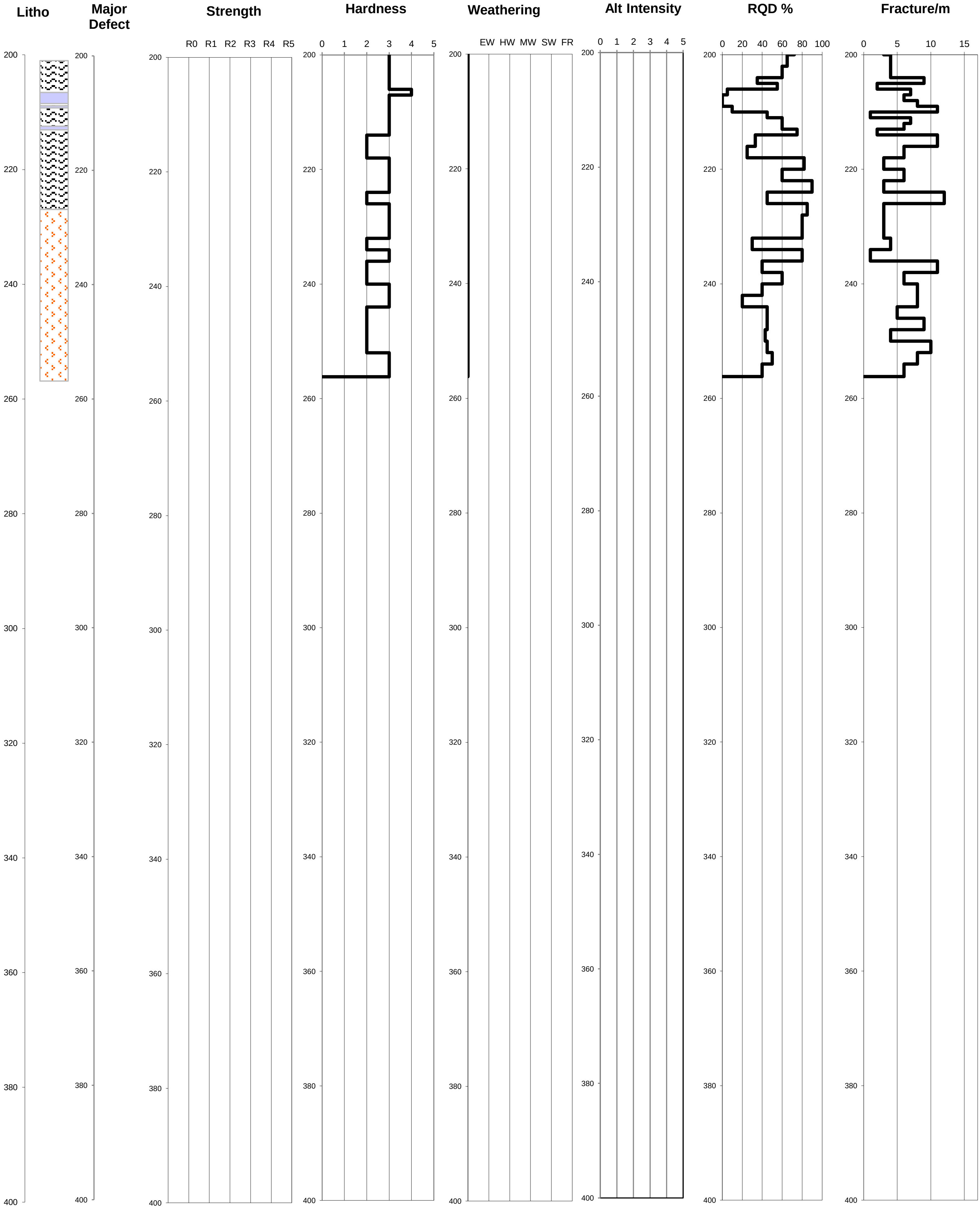
Borehole ID: UW12

Pells Sullivan Meynink



Borehole ID: **UW121**

Pells Sullivan Meynink



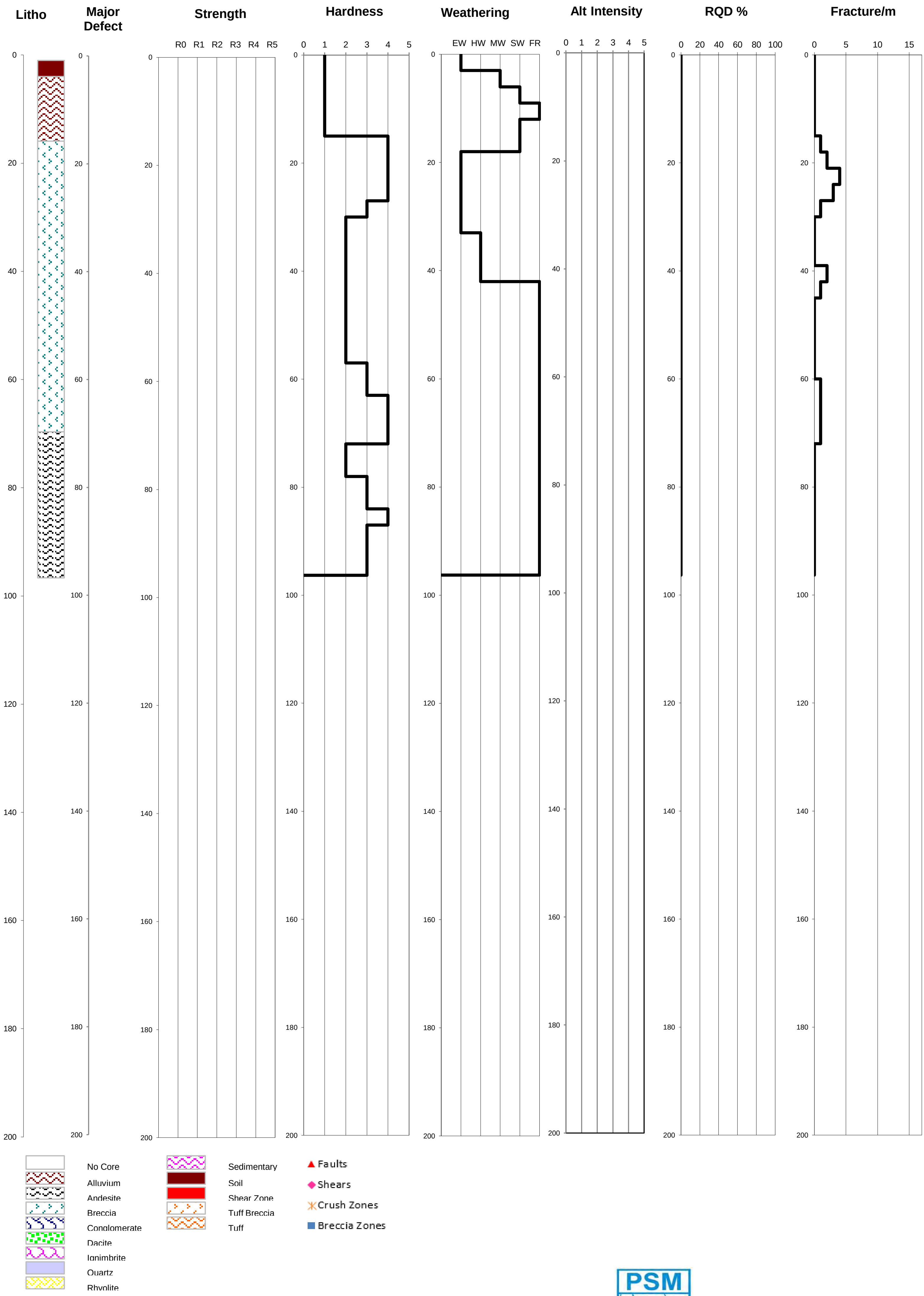
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

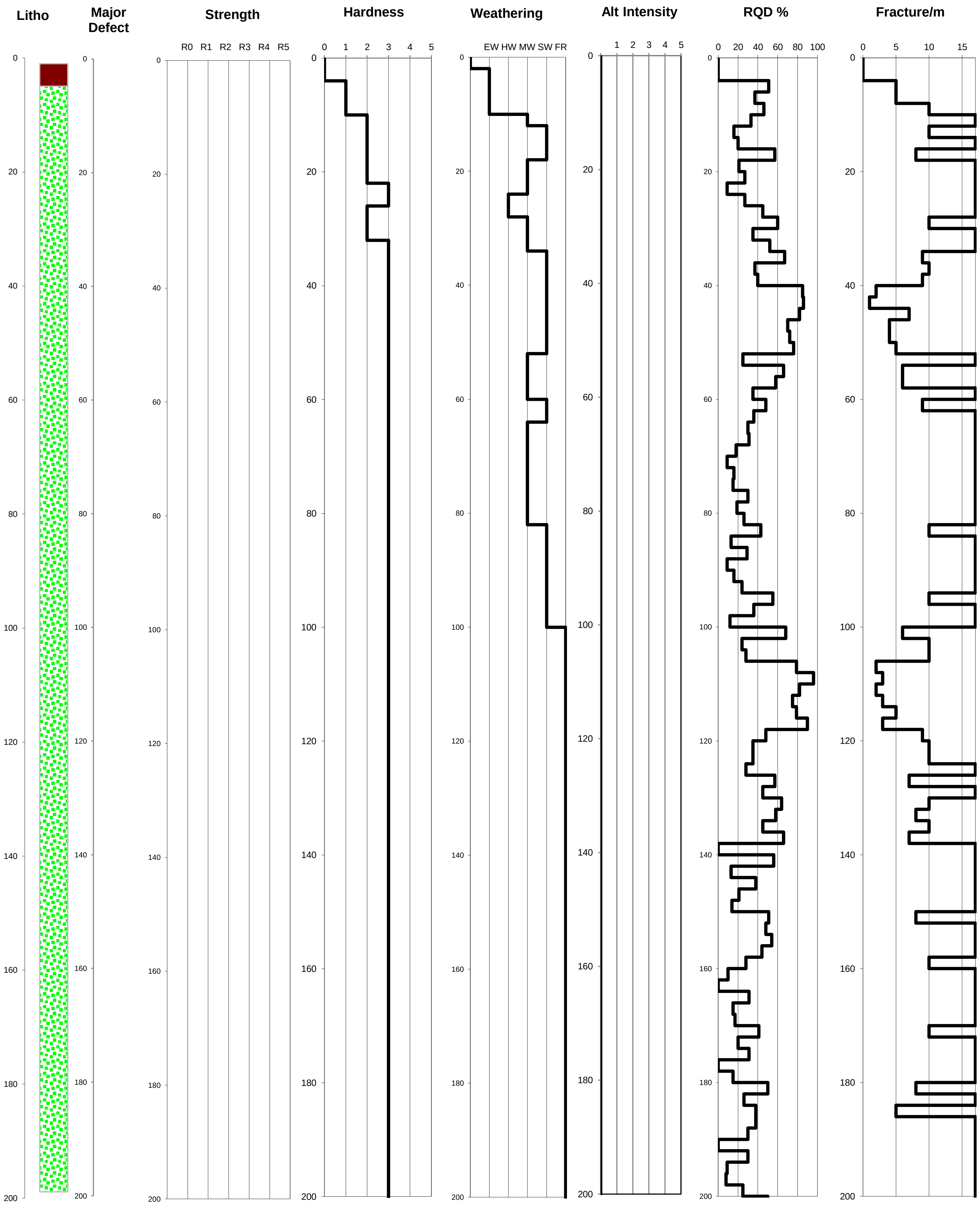
Borehole ID: **UW121**

Pells Sullivan Meynink



Borehole ID: UW13

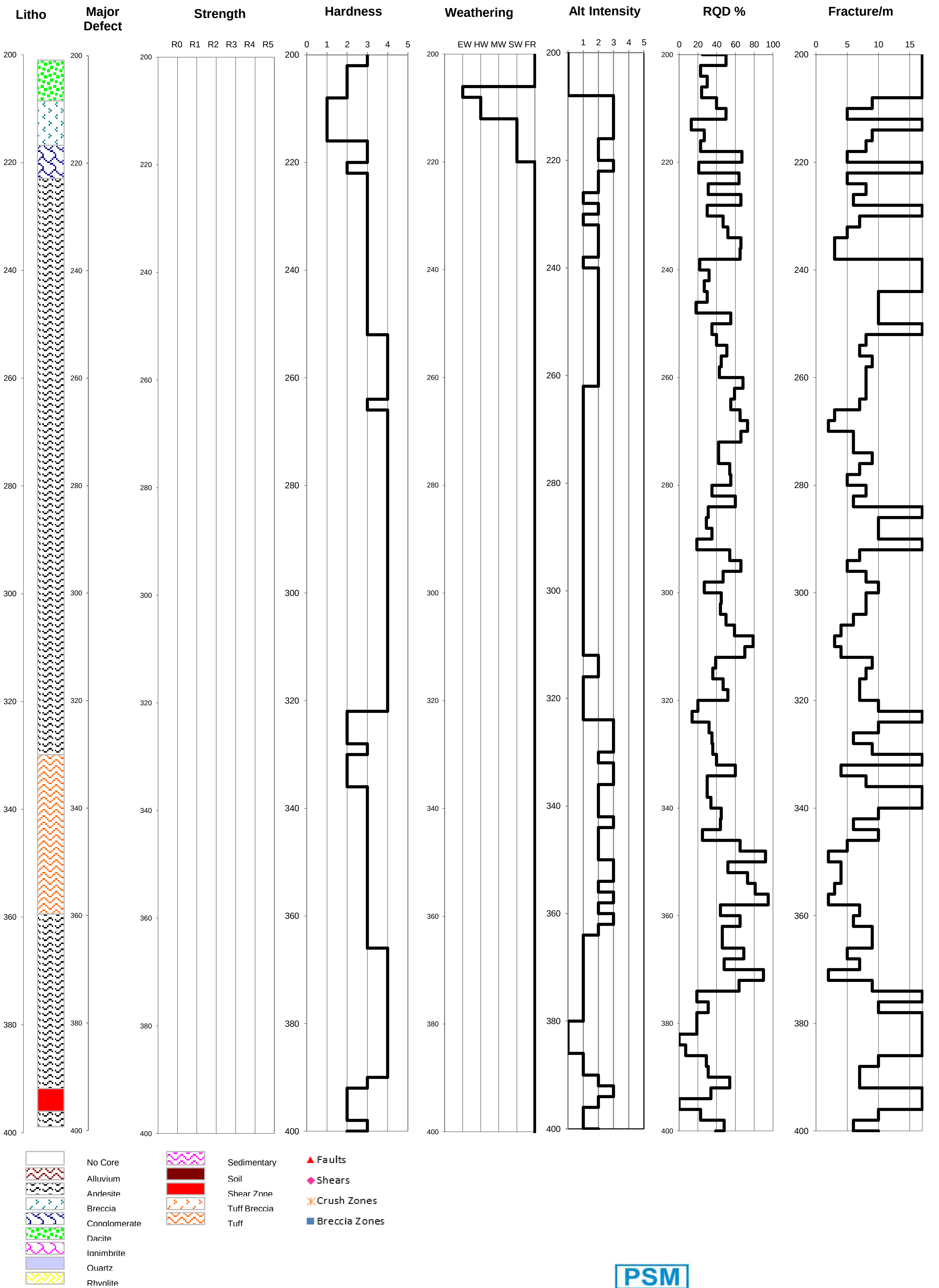
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
Faults
Shears
Crush Zones
Breccia Zones

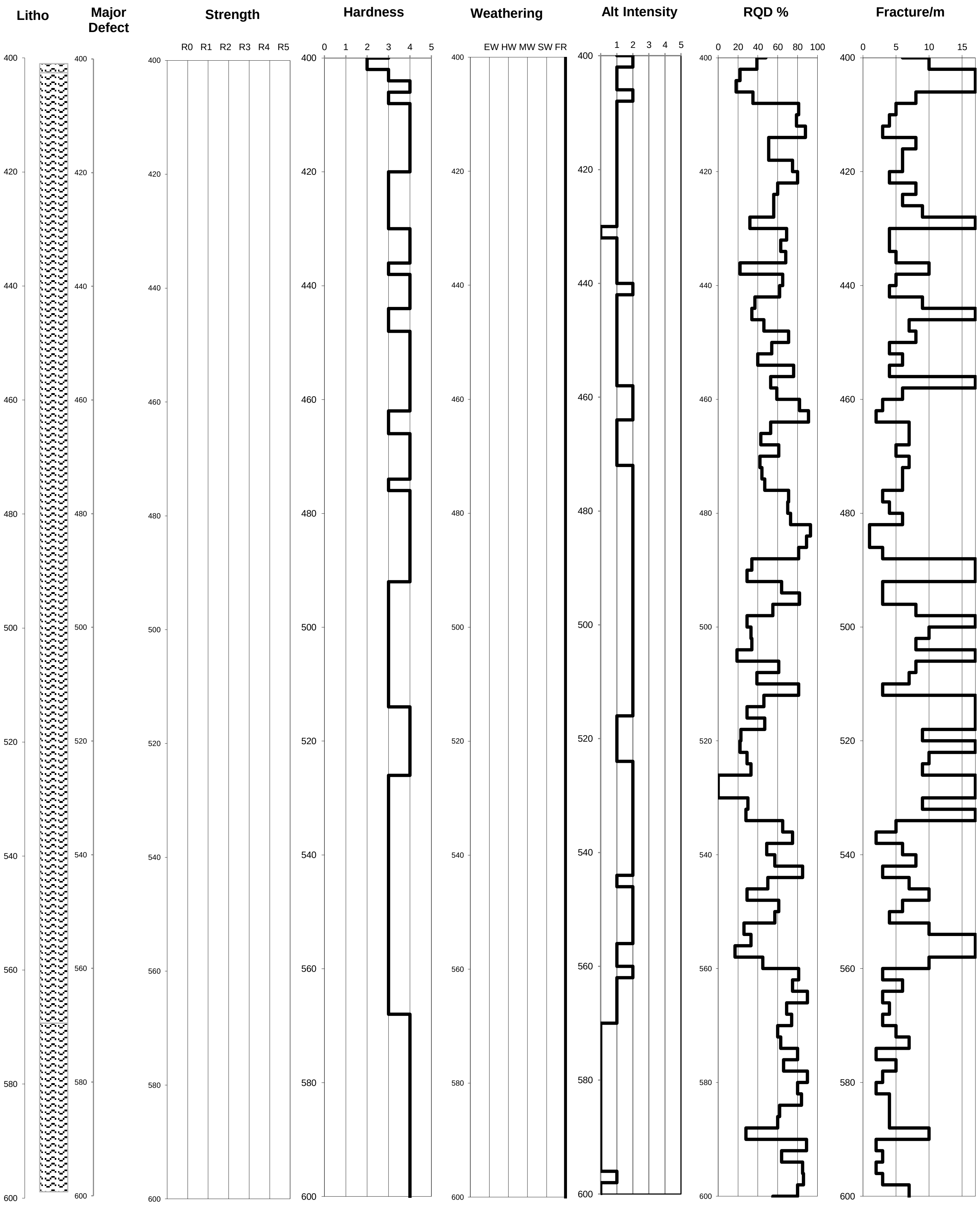
Borehole ID: UW132

Pells Sullivan Meynink



Borehole ID: UW132

Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

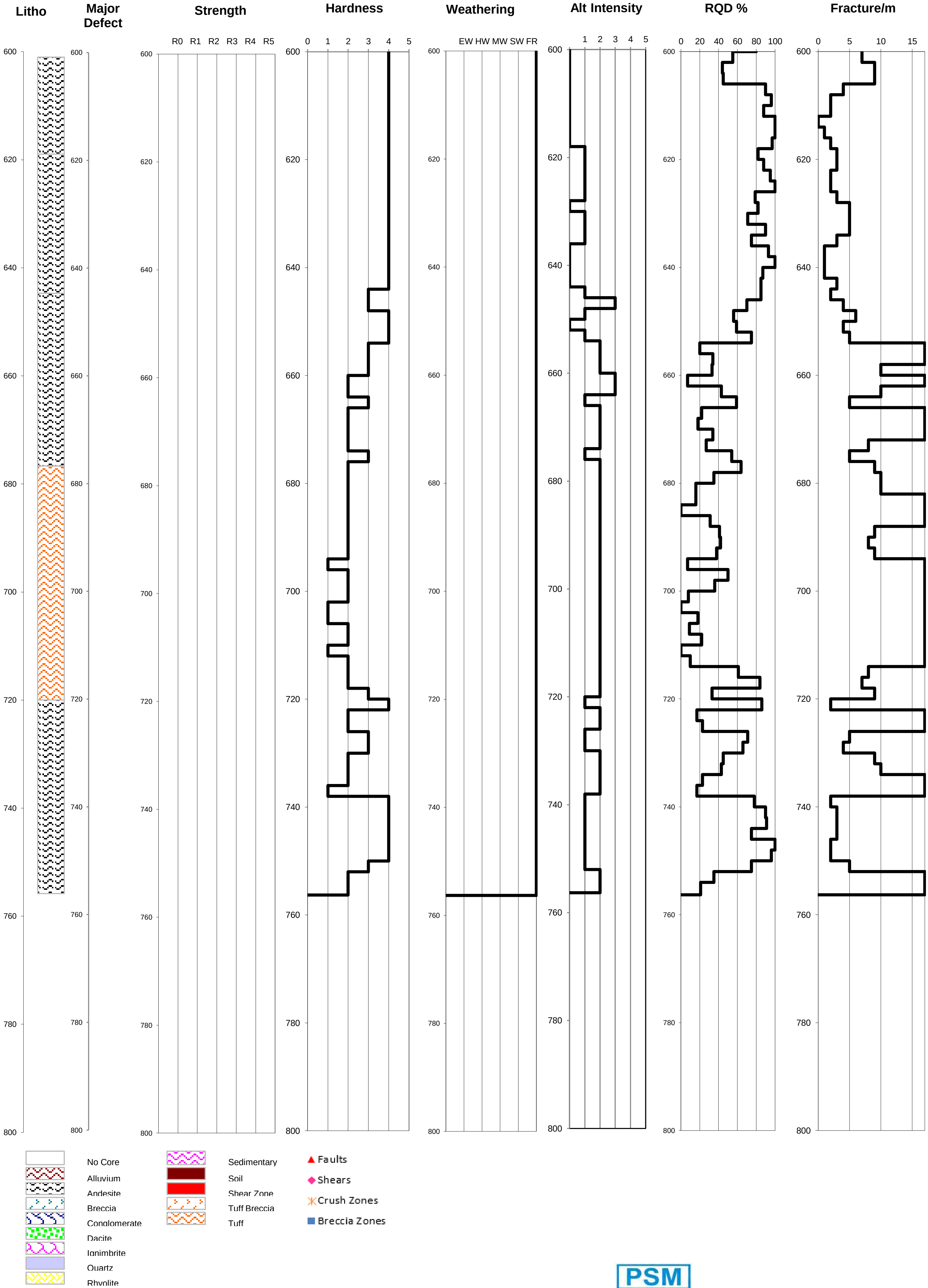
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

PSM

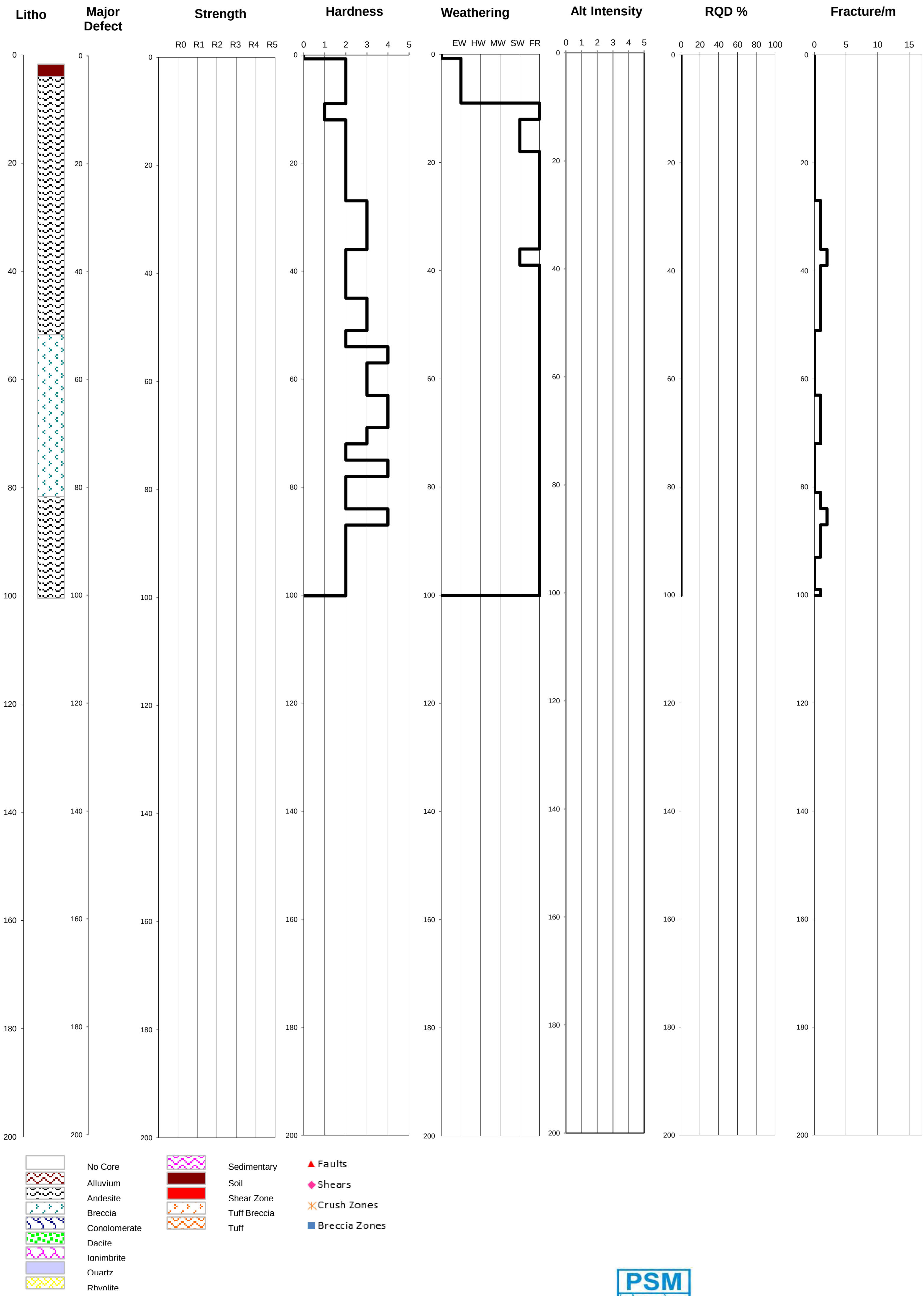
Borehole ID: UW132

Pells Sullivan Meynink



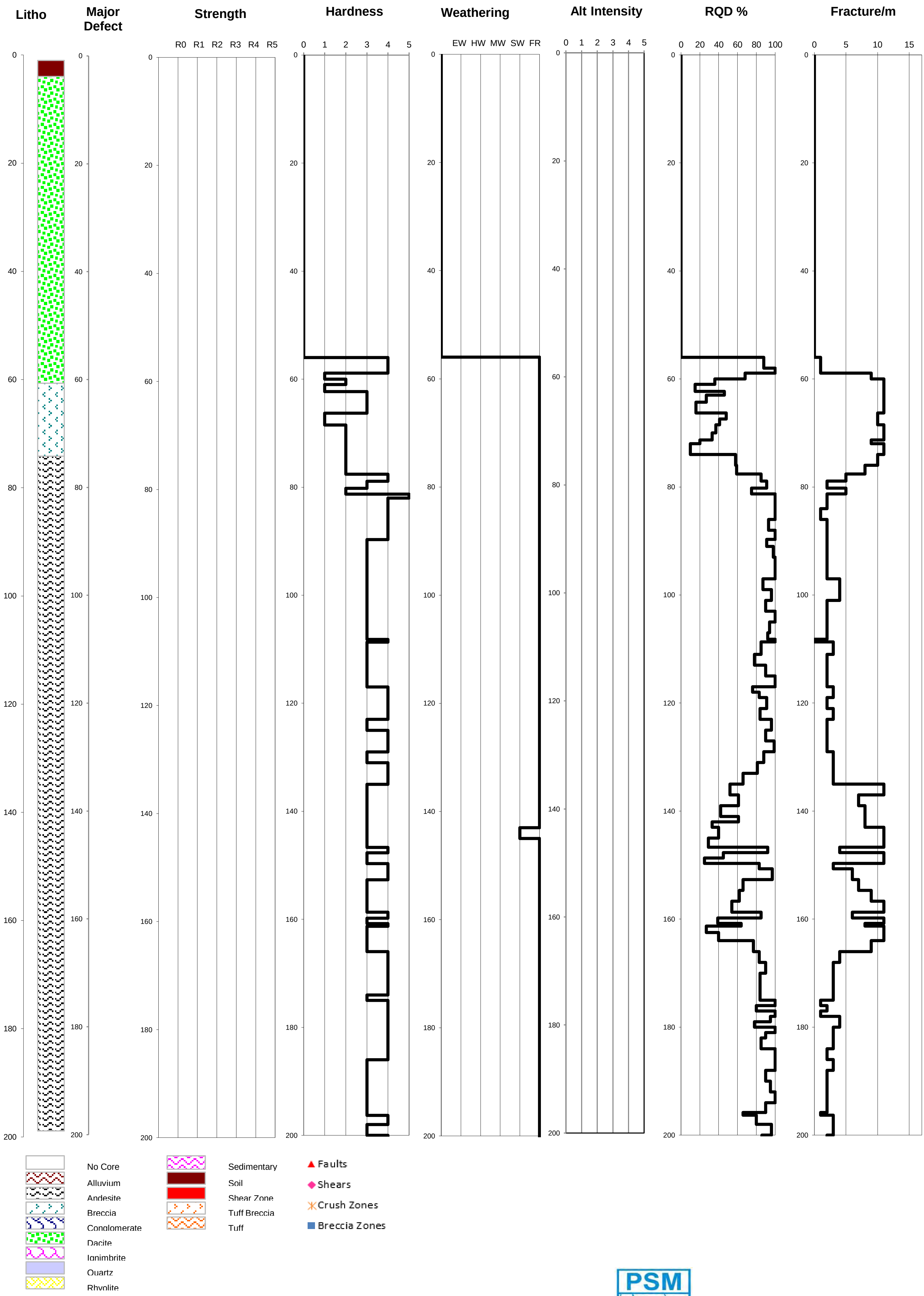
Borehole ID: UW132

Pells Sullivan Meynink



Borehole ID: **UW14**

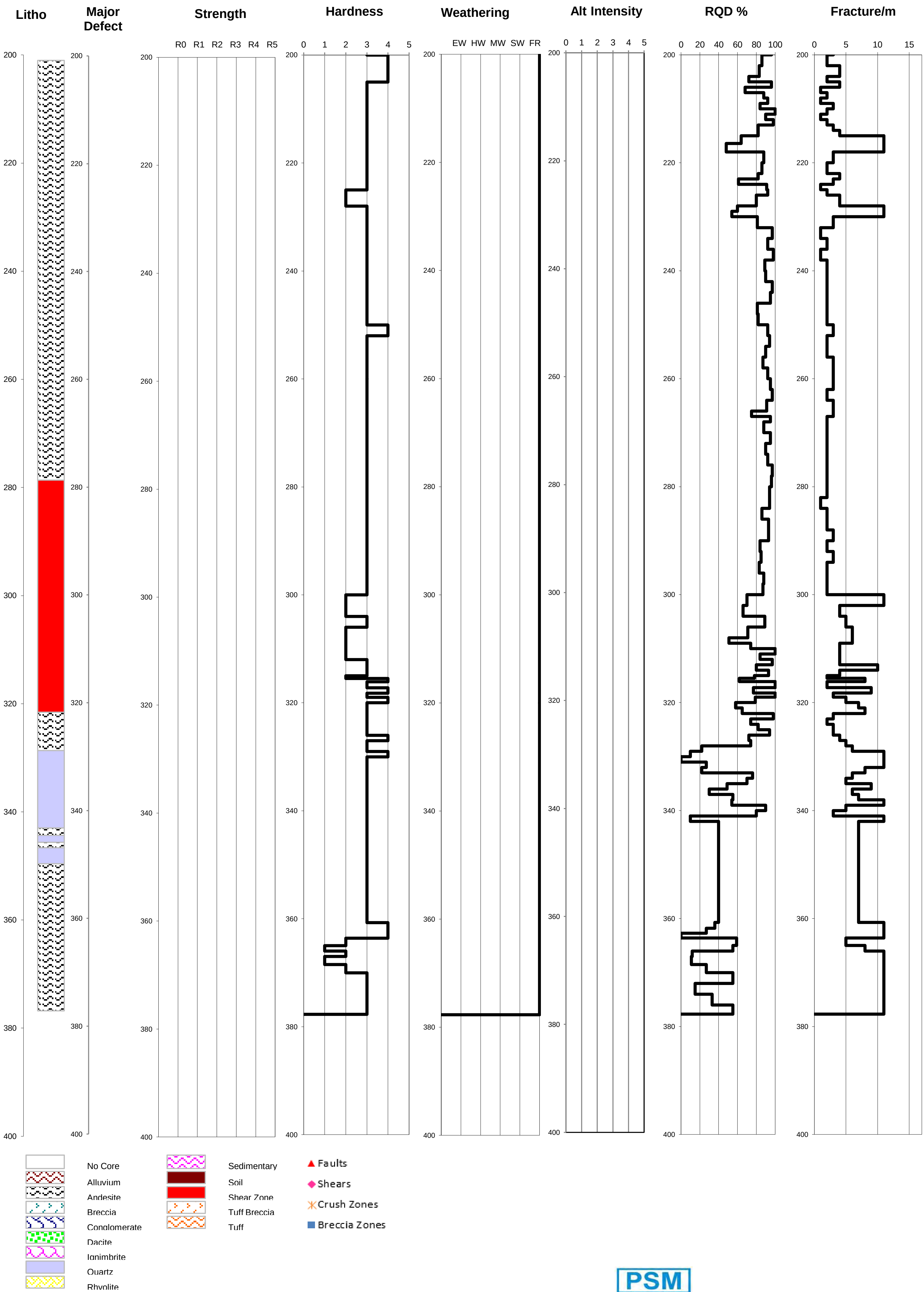
Pells Sullivan Meynink



Borehole ID: UW141

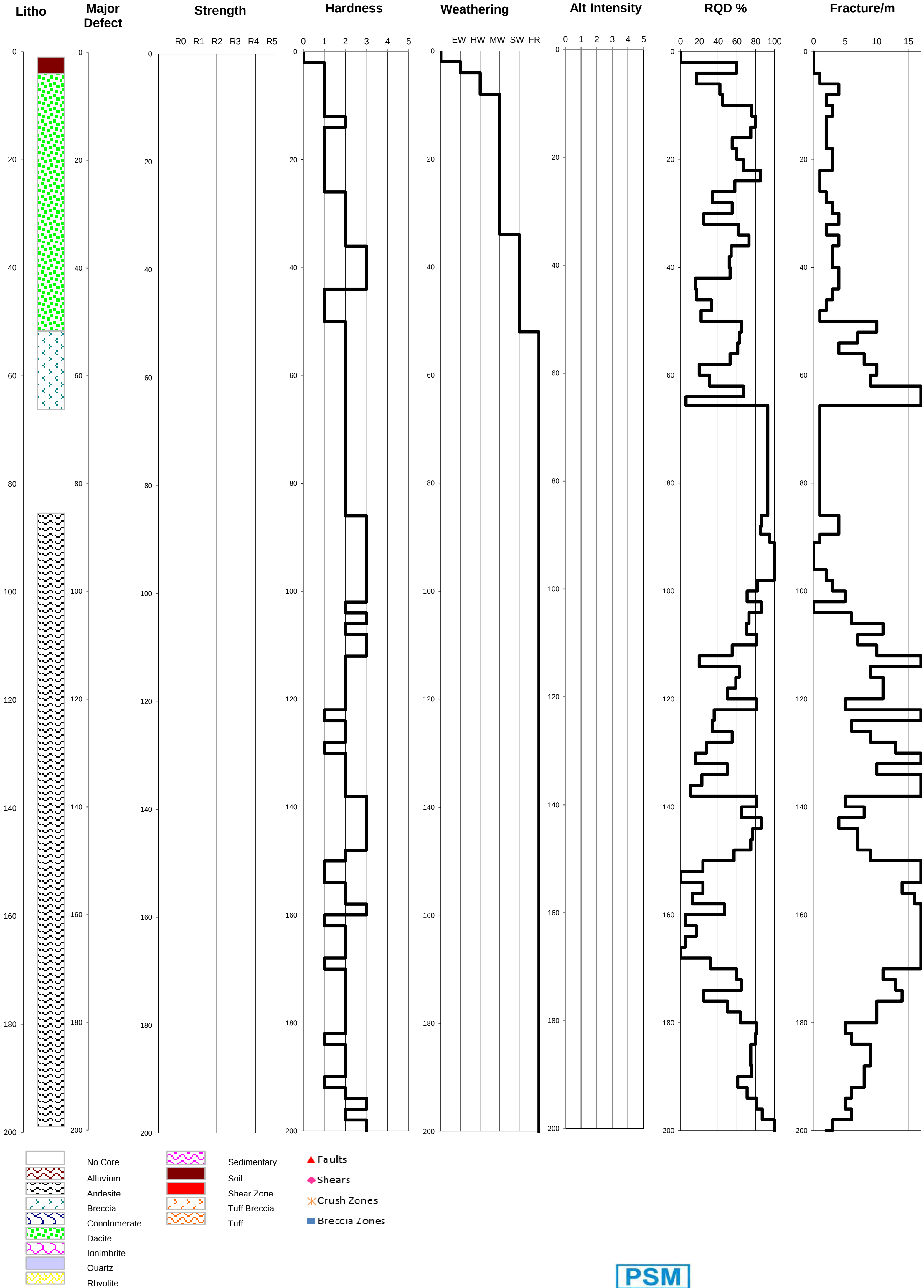
PSM

Pells Sullivan Meynink



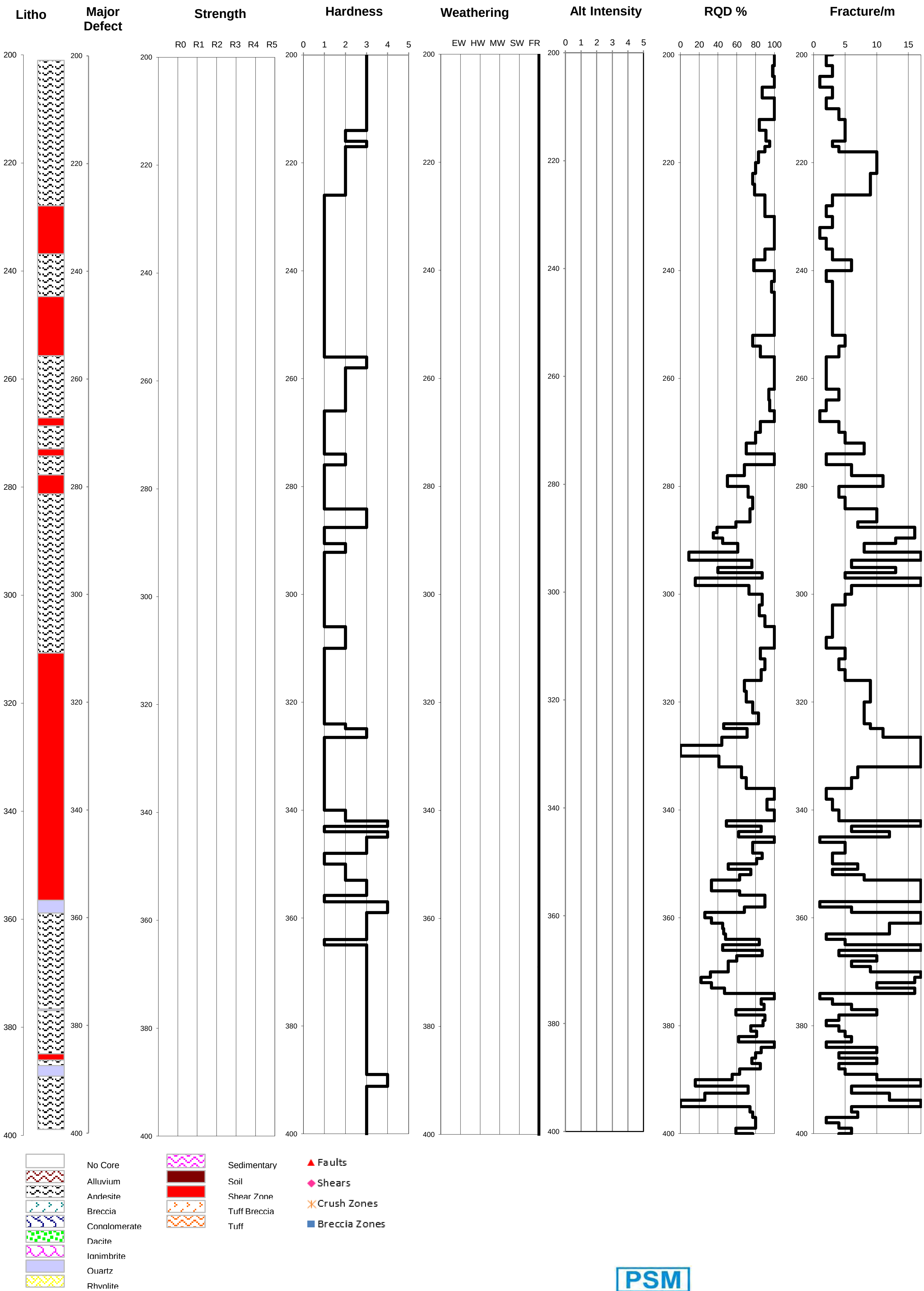
Borehole ID: UW141

Pells Sullivan Meynink



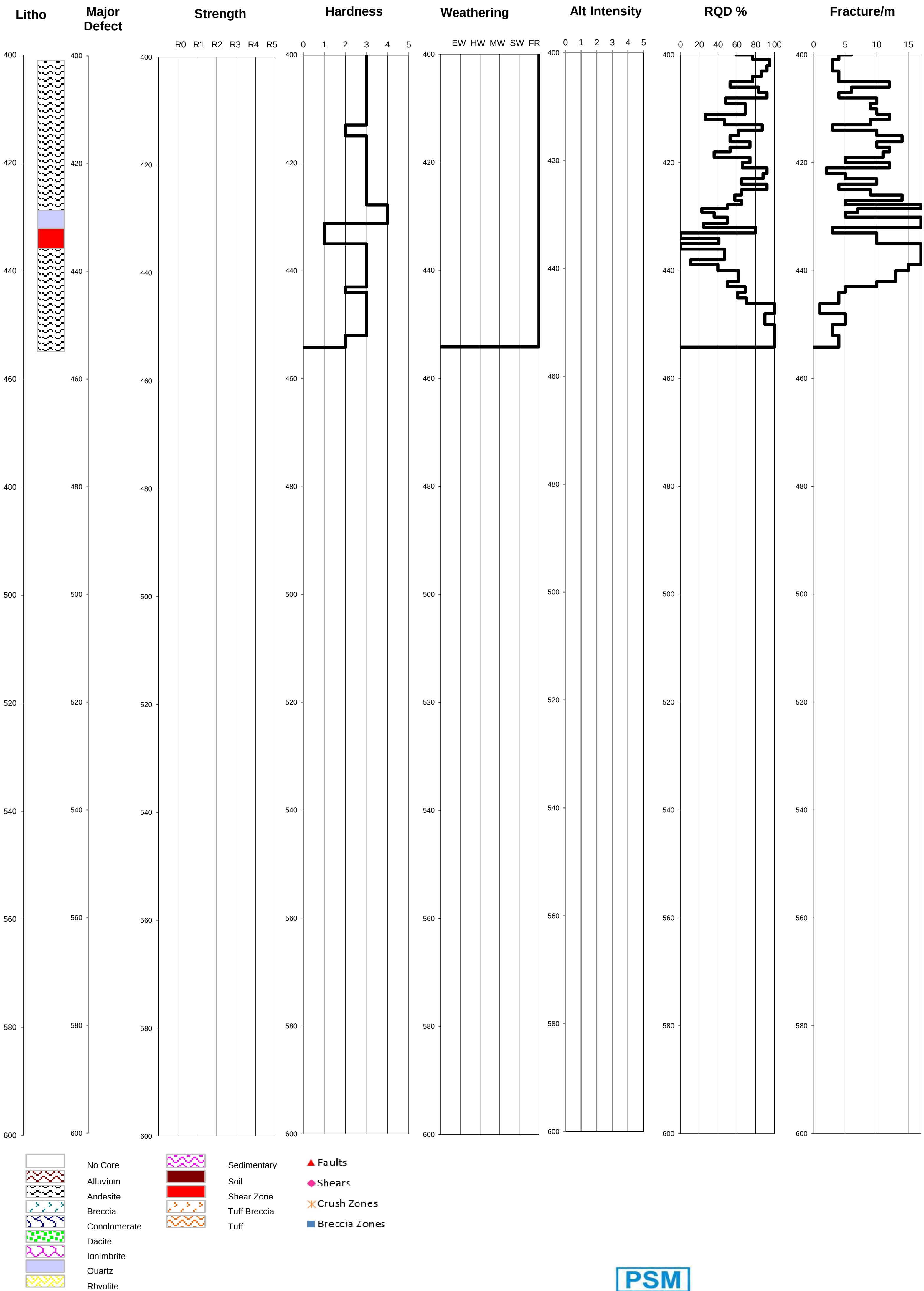
Borehole ID: **UW147**

Pells Sullivan Meynink



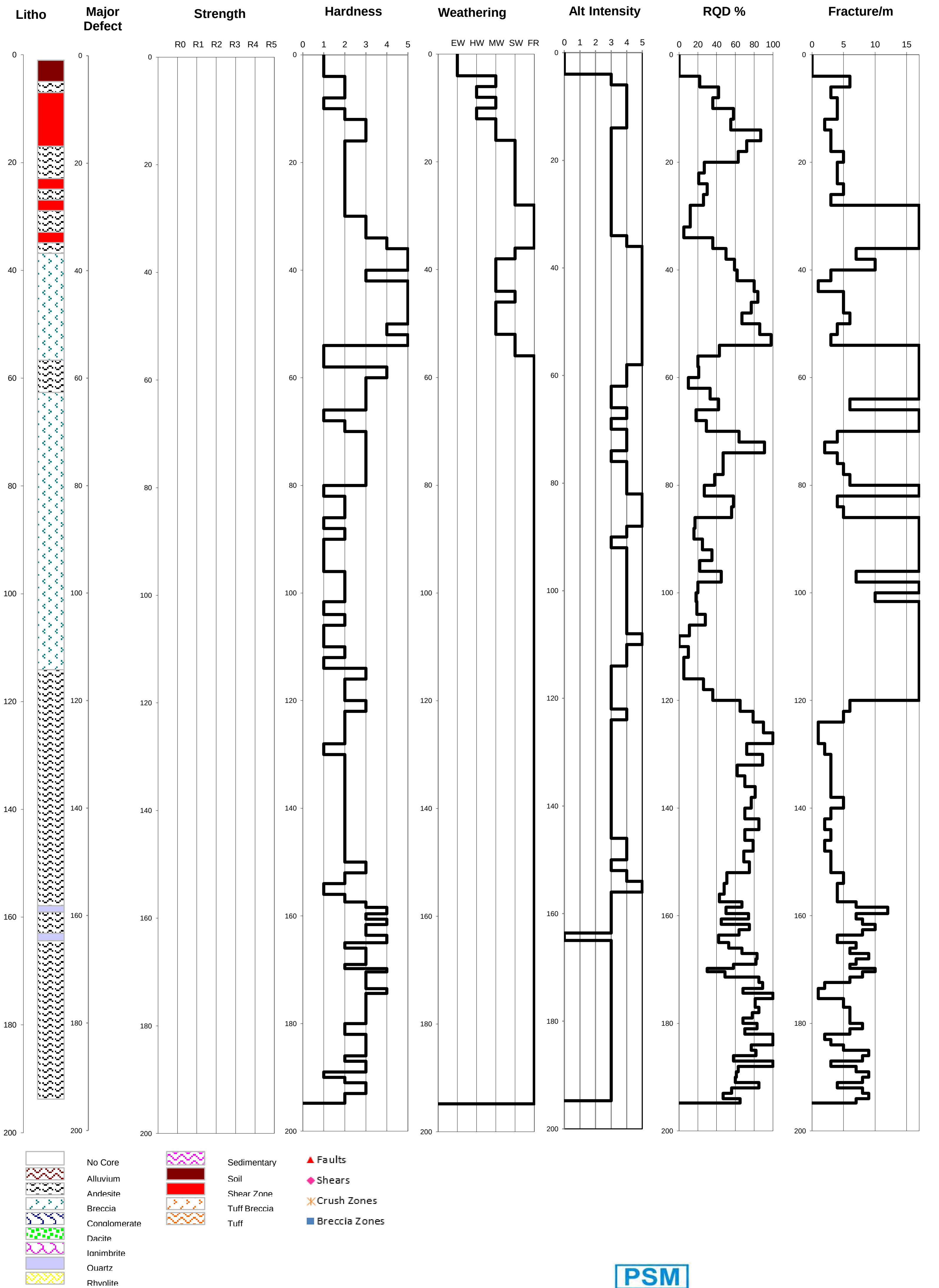
Borehole ID: **UW147**

Pells Sullivan Meynink



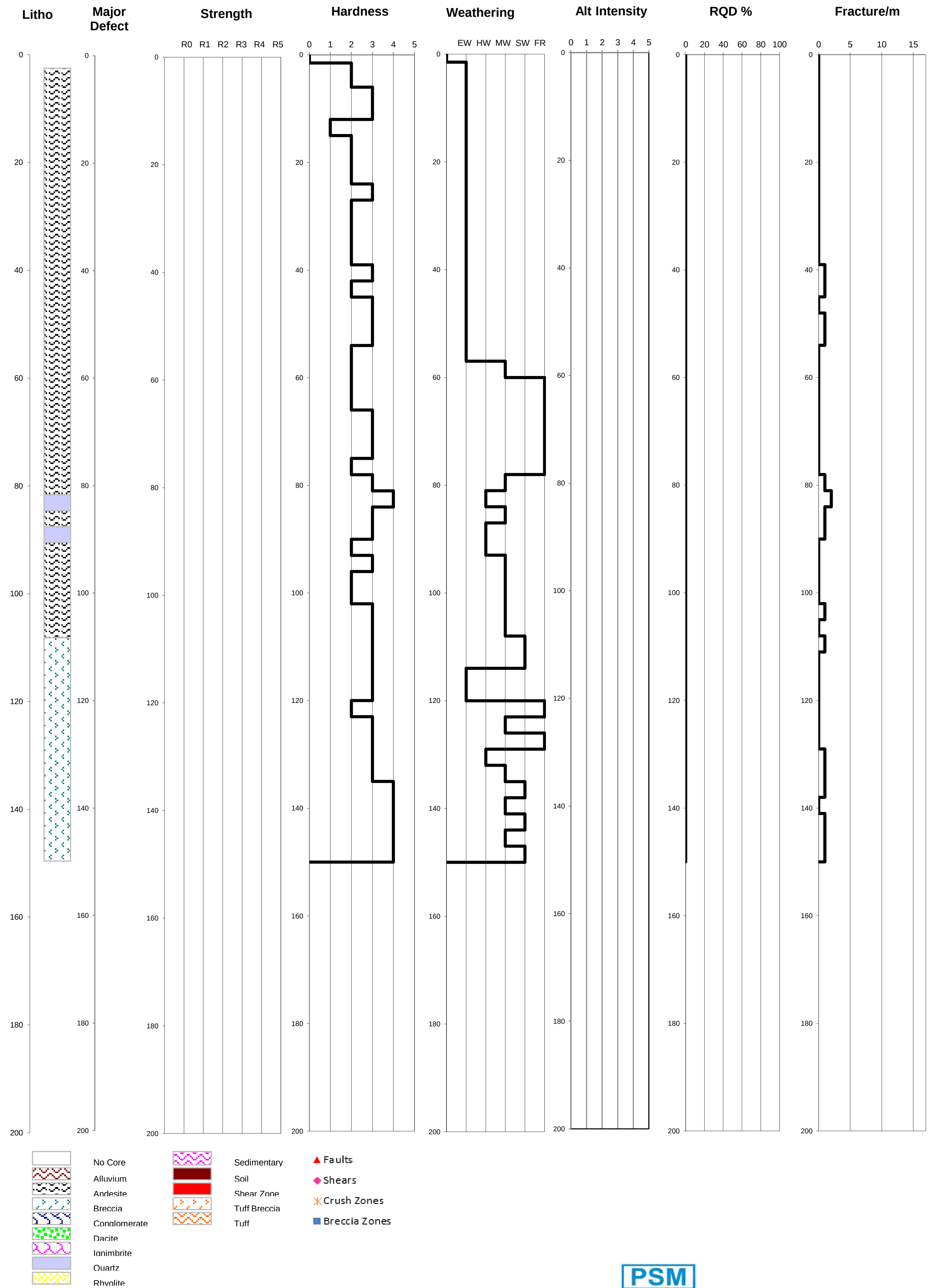
Borehole ID: **UW147**

Pells Sullivan Meynink



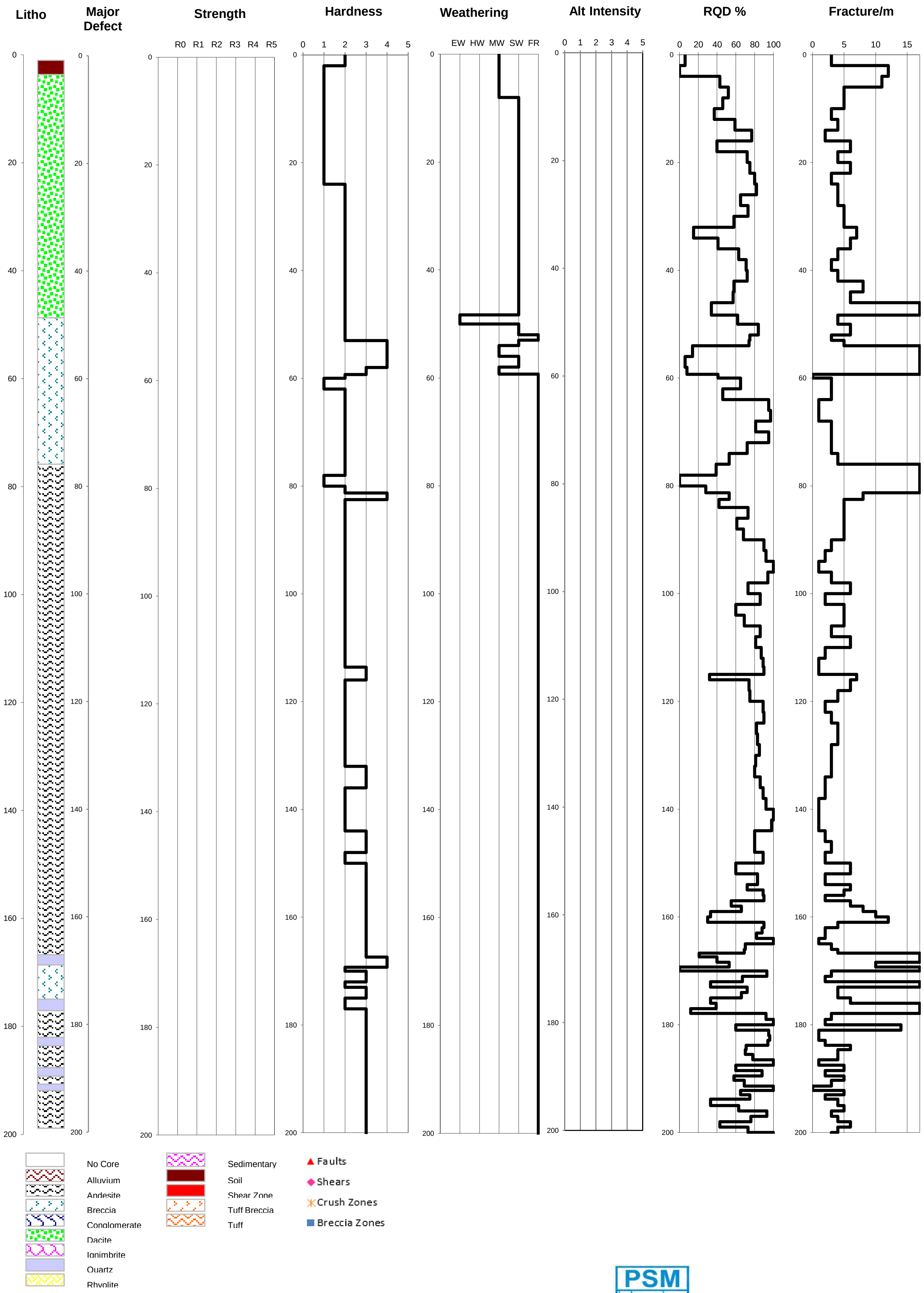
Borehole ID: **UW148**

PSM **Pells Sullivan Meynink**



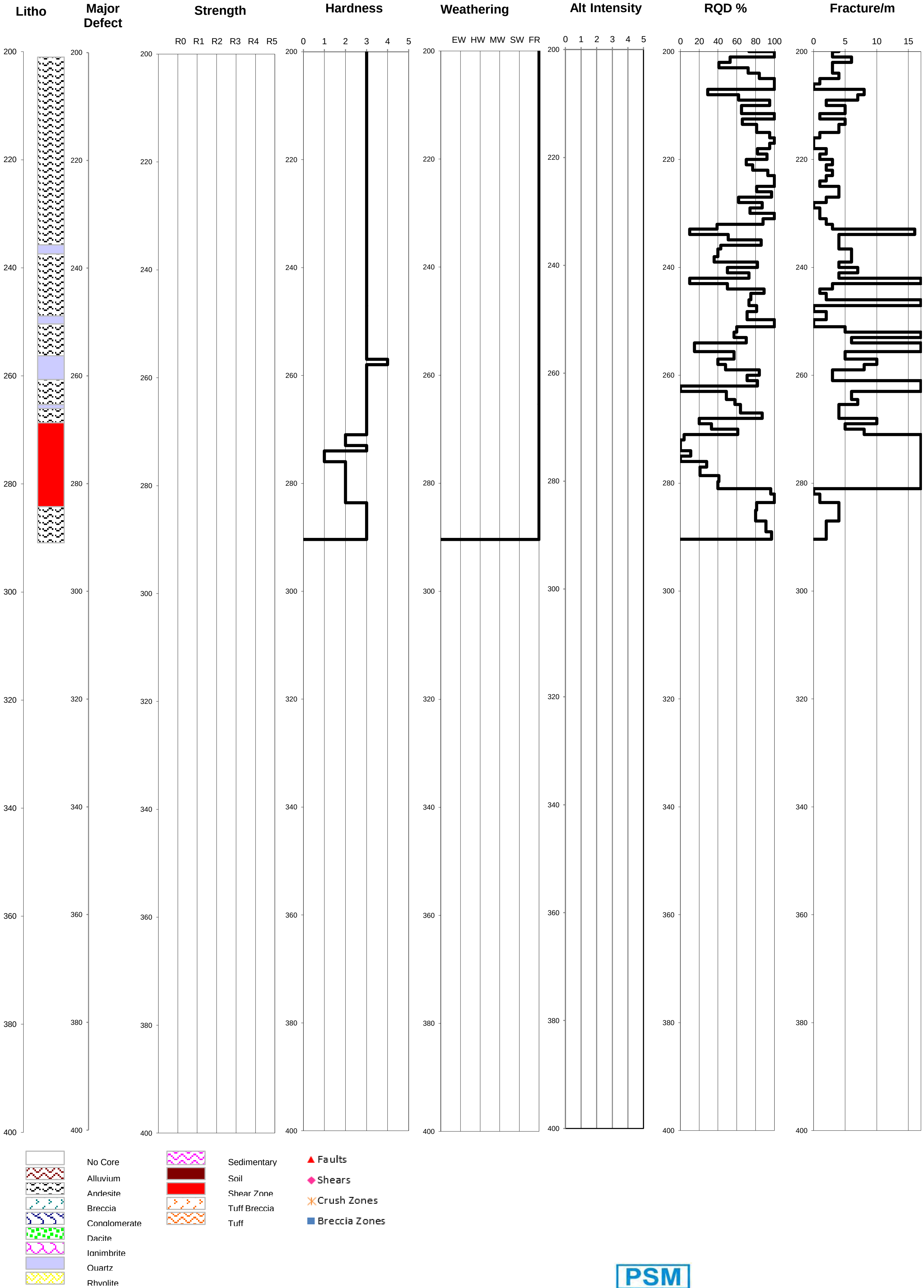
Borehole ID: **UW15**

Pells Sullivan Meynink



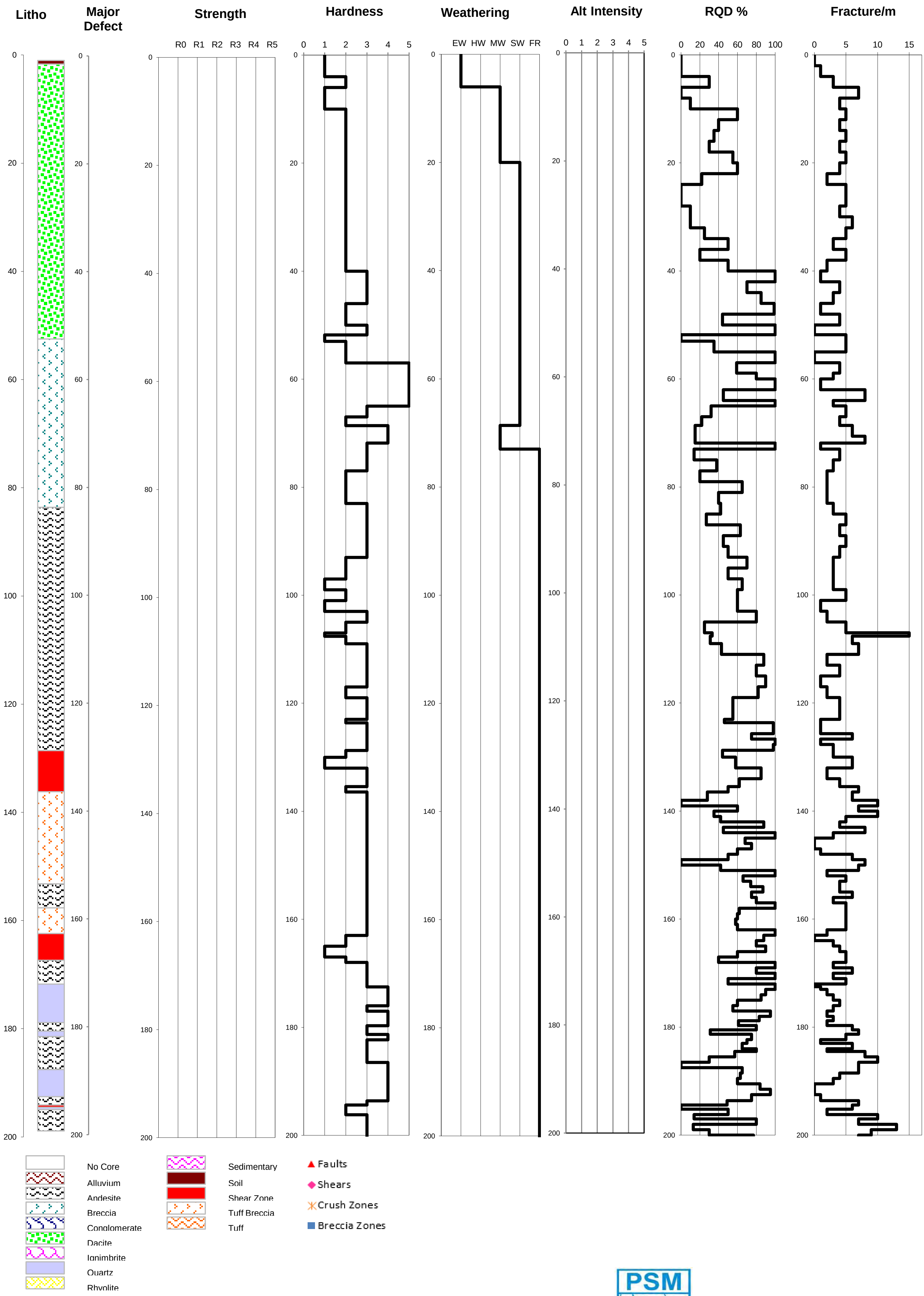
Borehole ID: **UW150**

Pells Sullivan Meynink



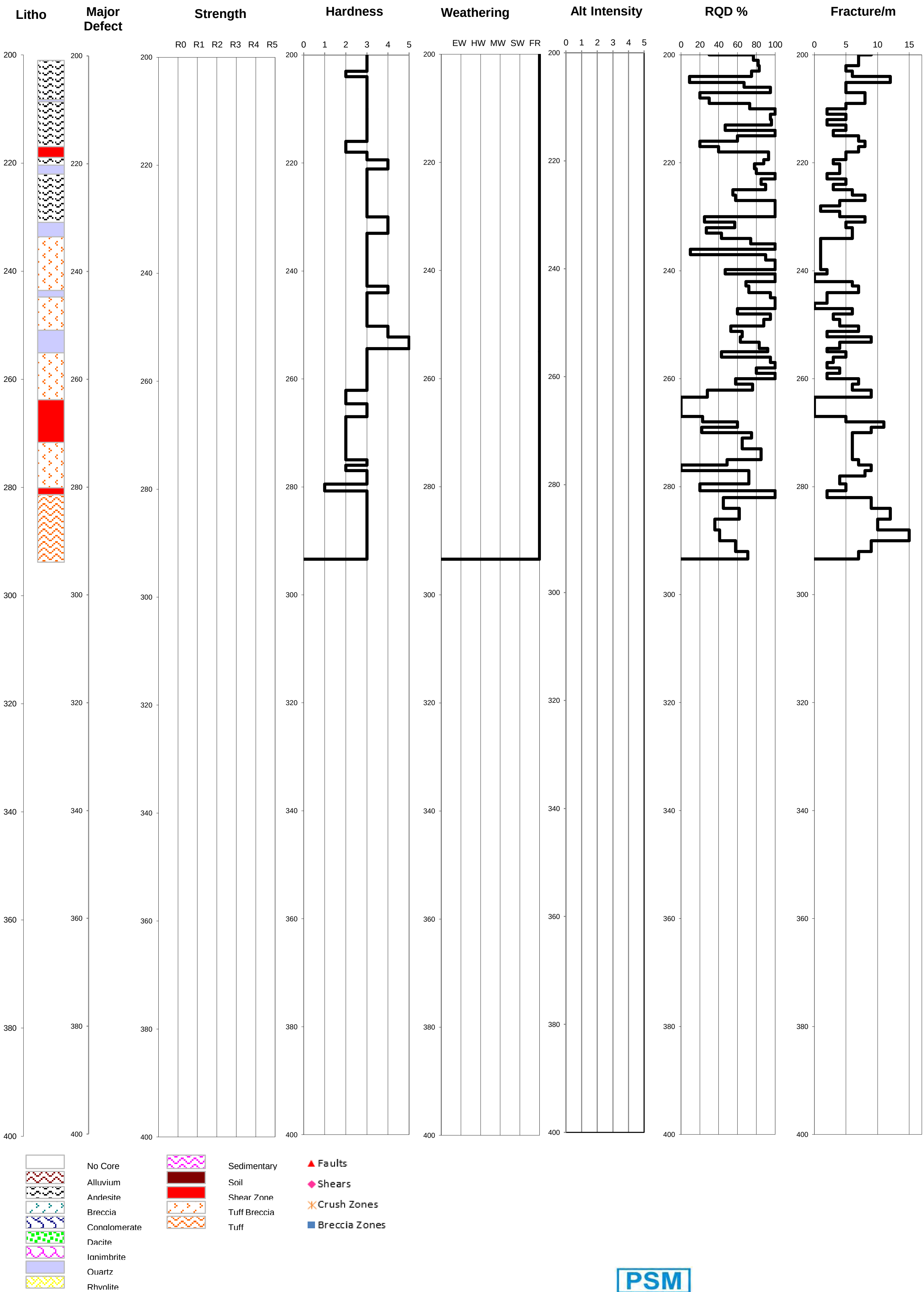
Borehole ID: **UW150**

Pells Sullivan Meynink



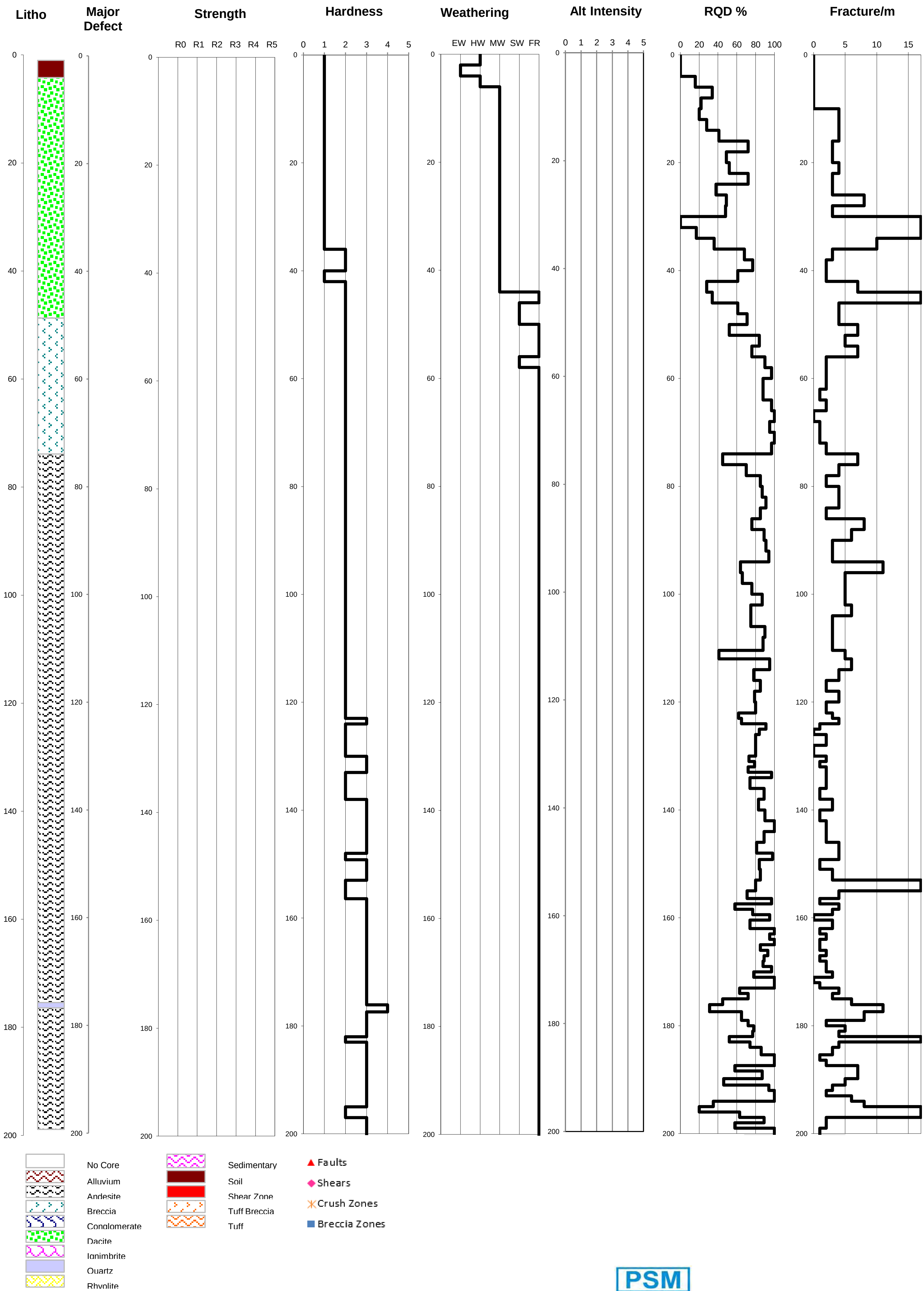
Borehole ID: UW151

Pells Sullivan Meynink



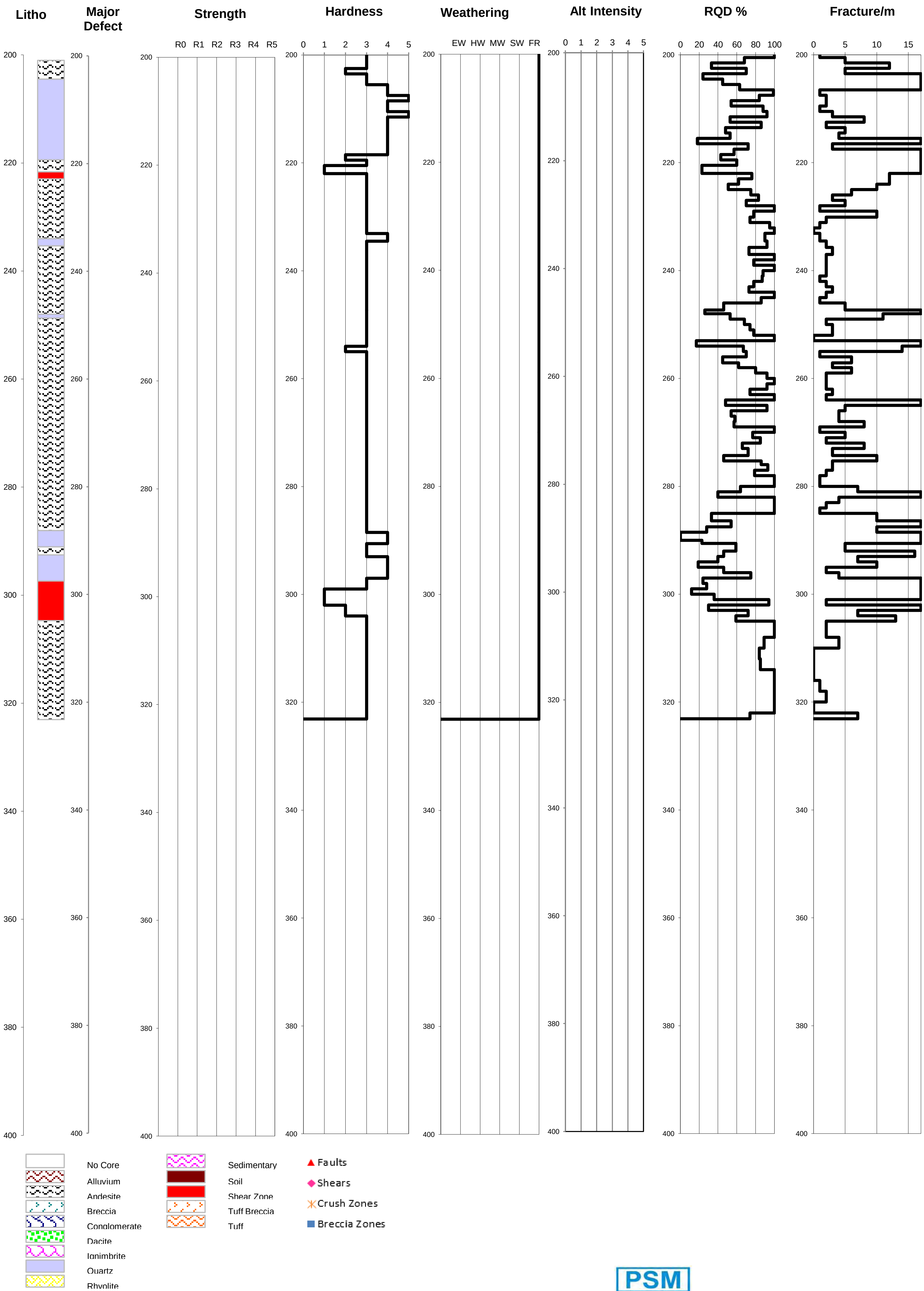
Borehole ID: UW151

Pells Sullivan Meynink



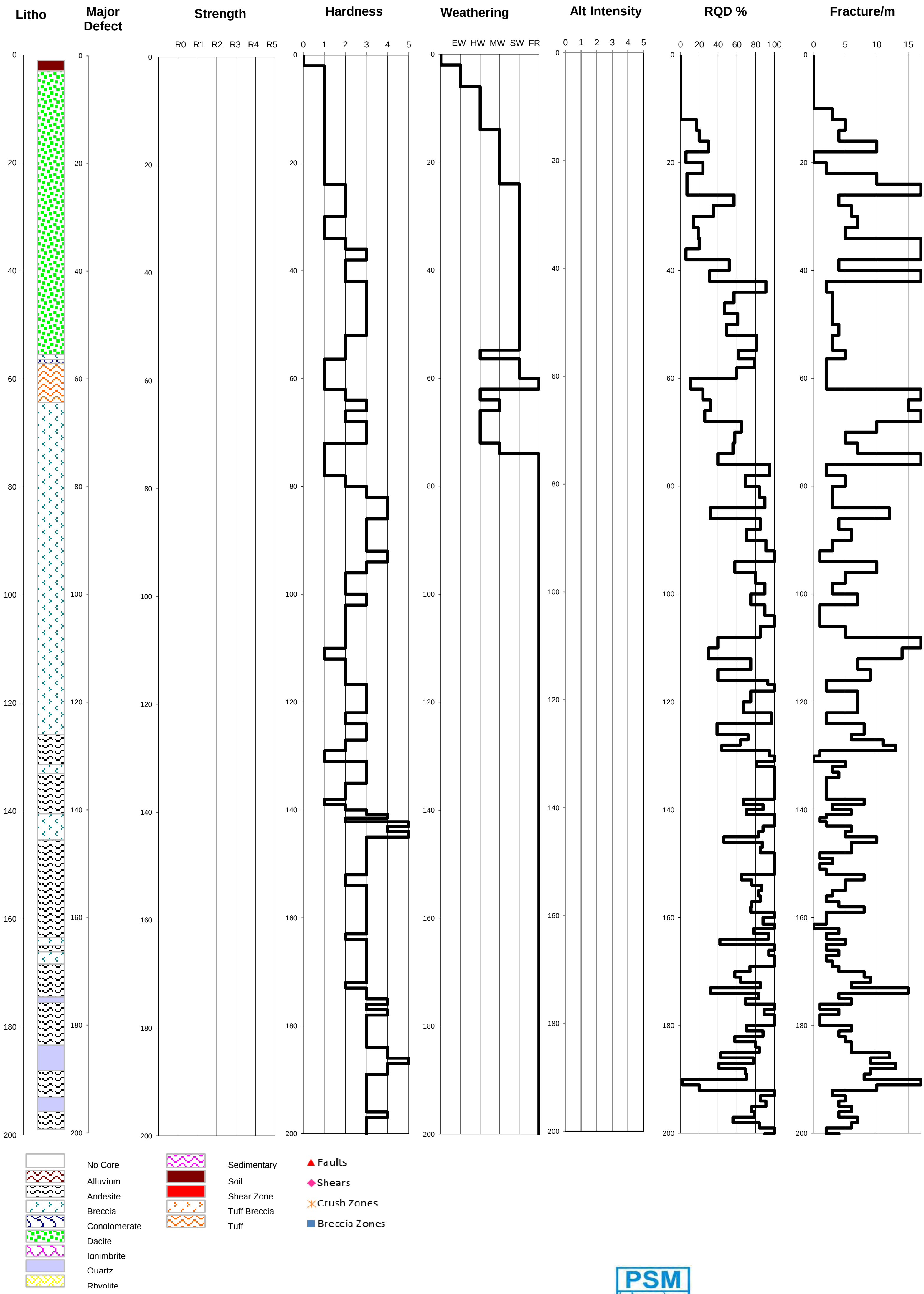
Borehole ID: **UW153**

Pells Sullivan Meynink



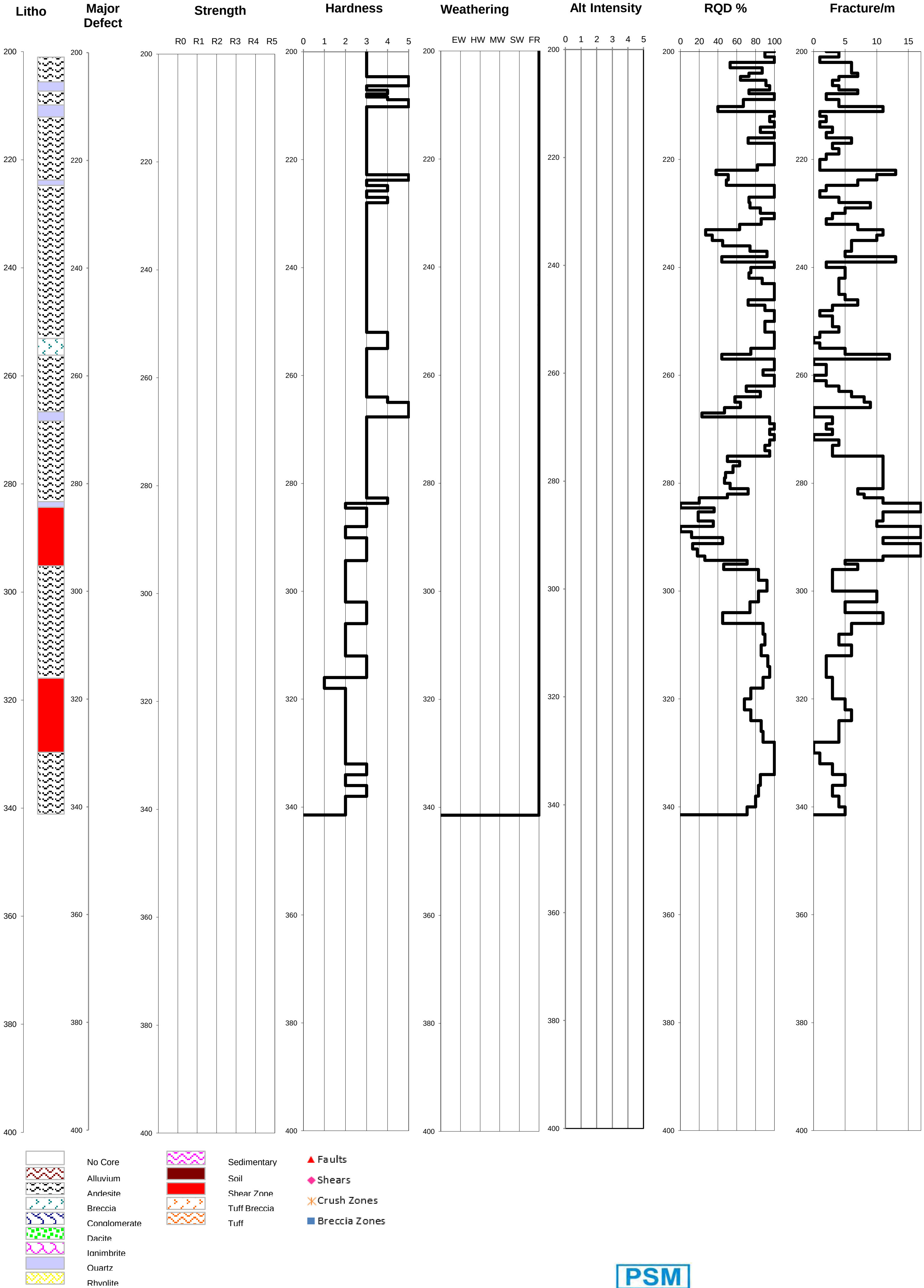
Borehole ID: **UW153**

Pells Sullivan Meynink



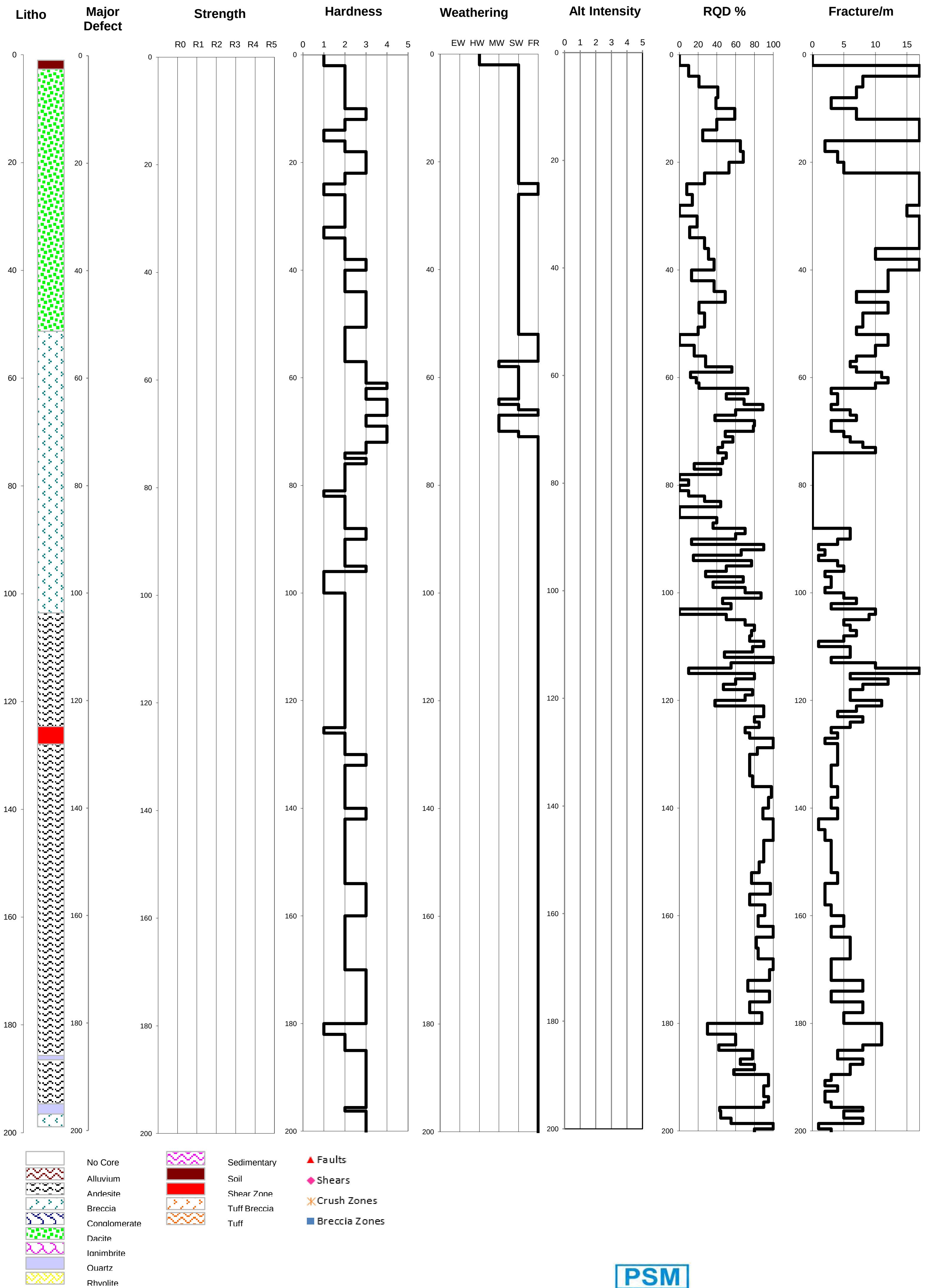
Borehole ID: **UW154**

Pells Sullivan Meynink



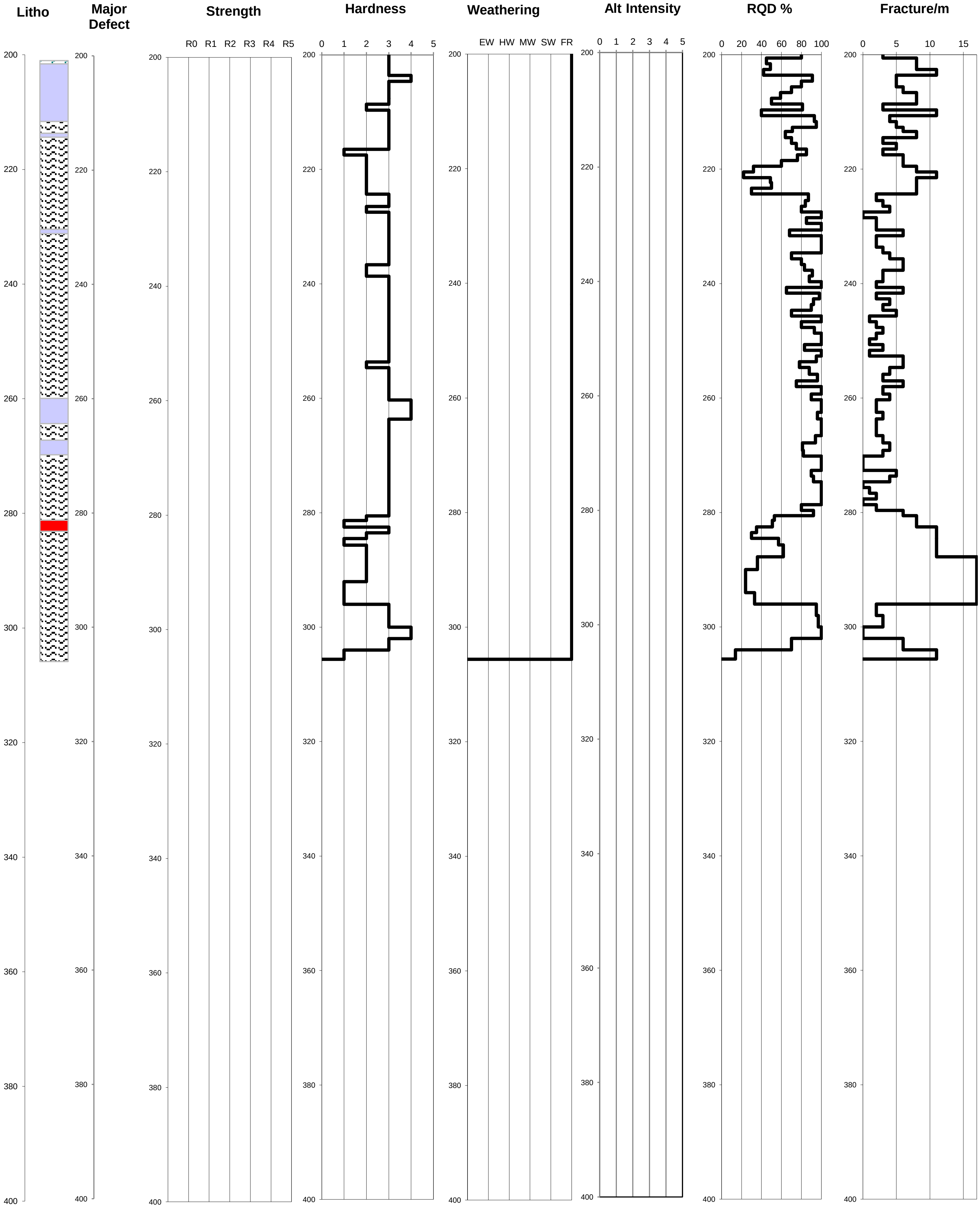
Borehole ID: **UW154**

PSM **Pells Sullivan Meynink**



Borehole ID: **UW155**

Pells Sullivan Meynink

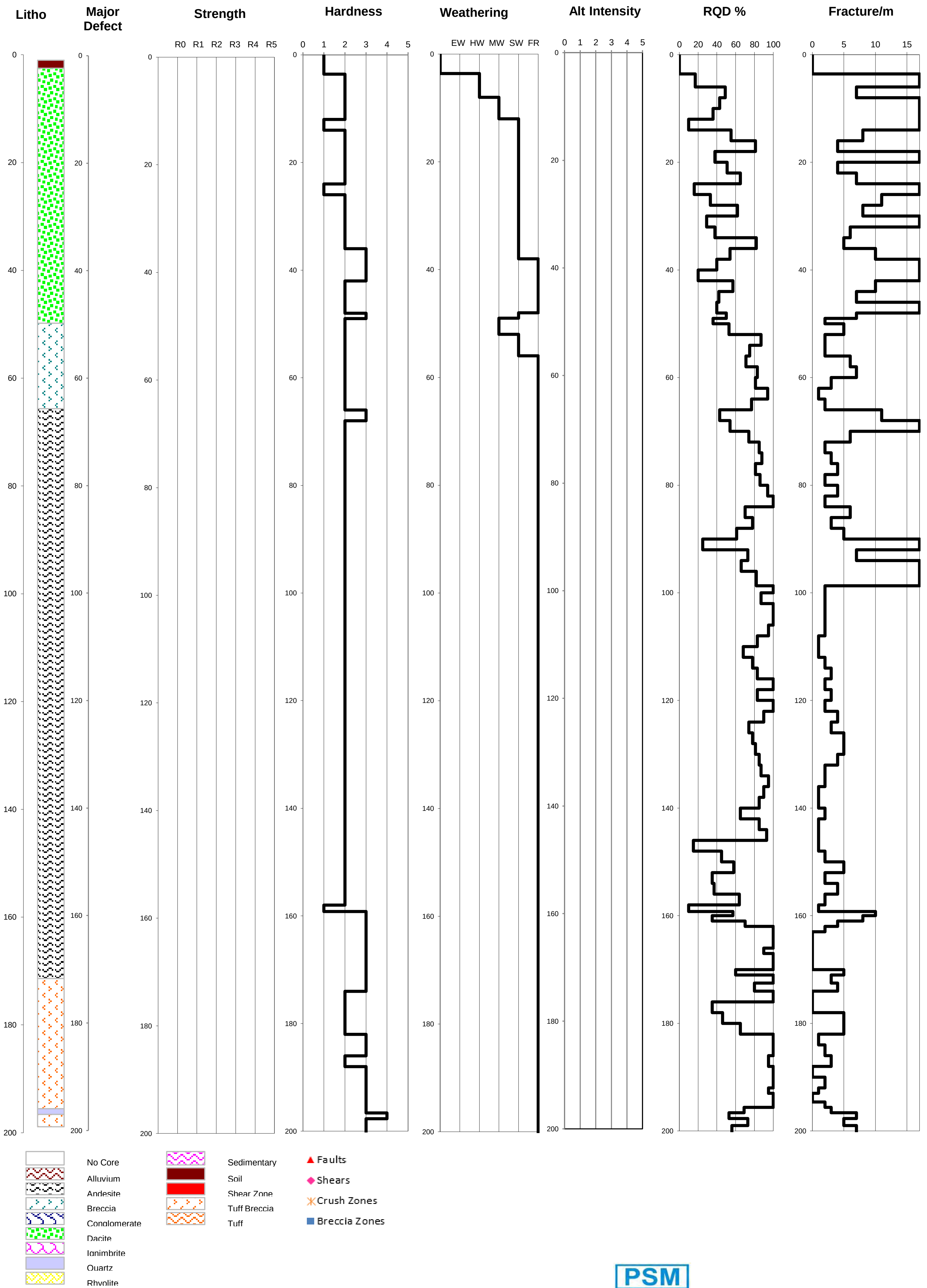


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

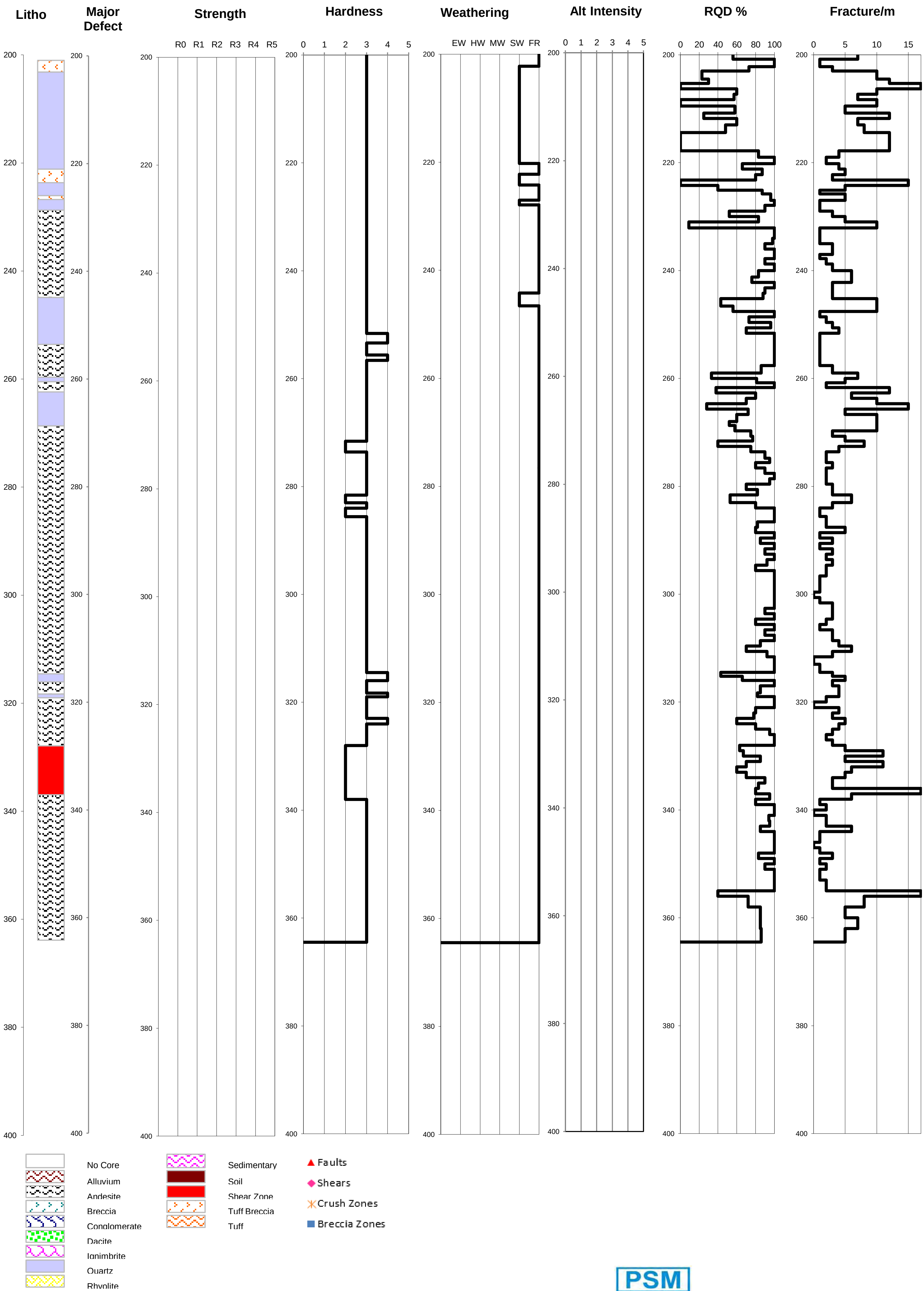
Borehole ID: **UW155**

Pells Sullivan Meynink



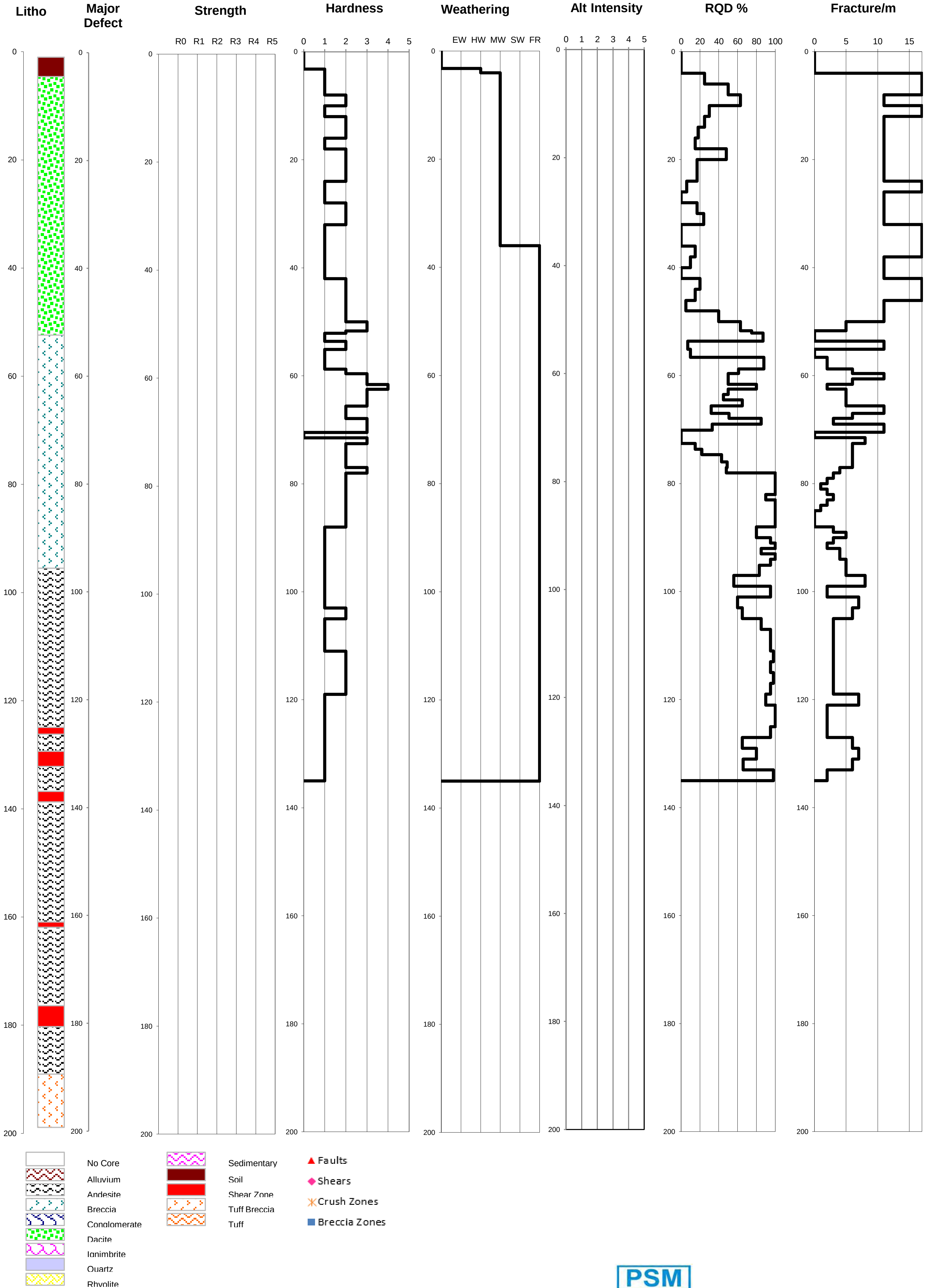
Borehole ID: **UW156**

Pells Sullivan Meynink



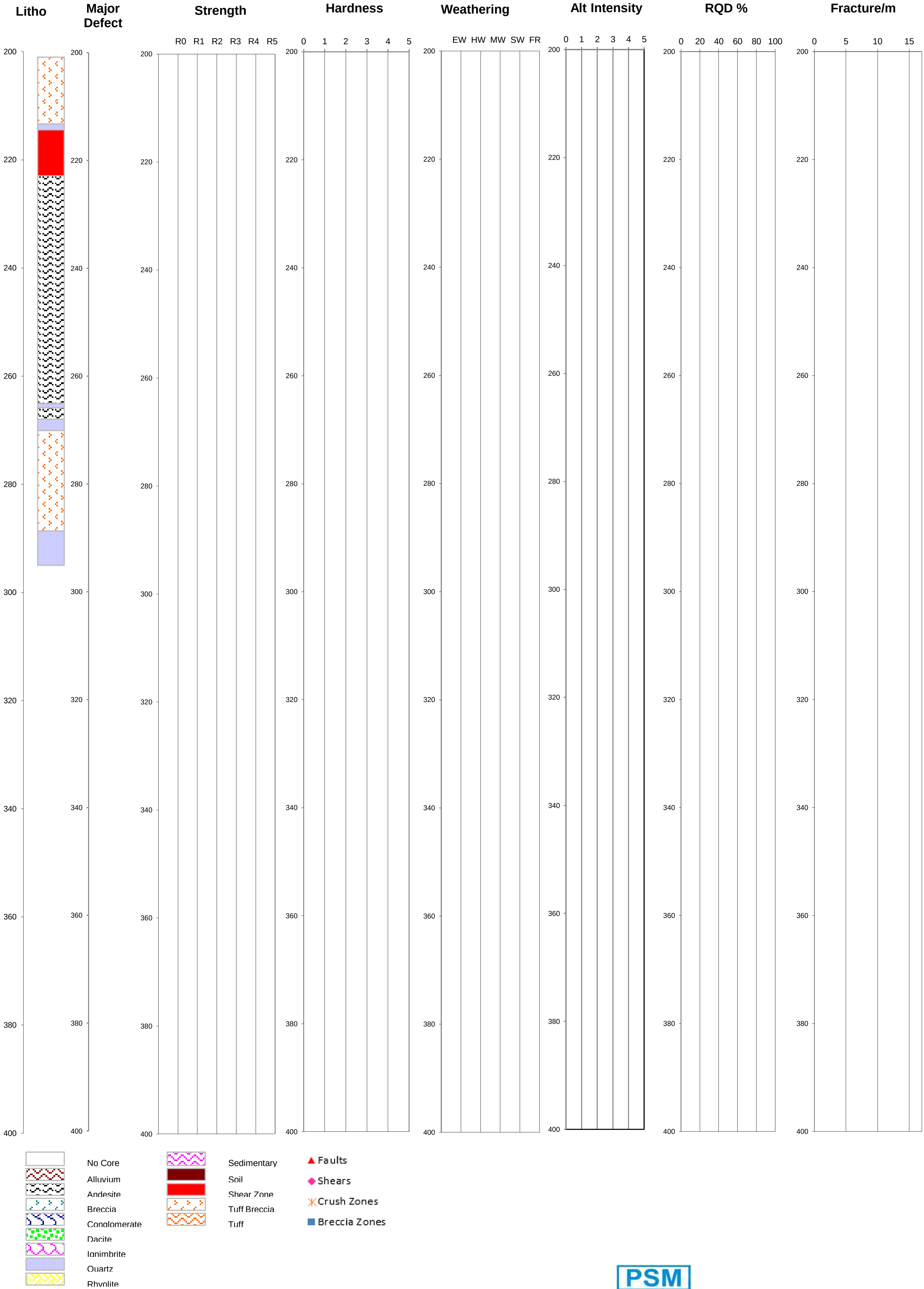
Borehole ID: UW156

Pells Sullivan Meynink



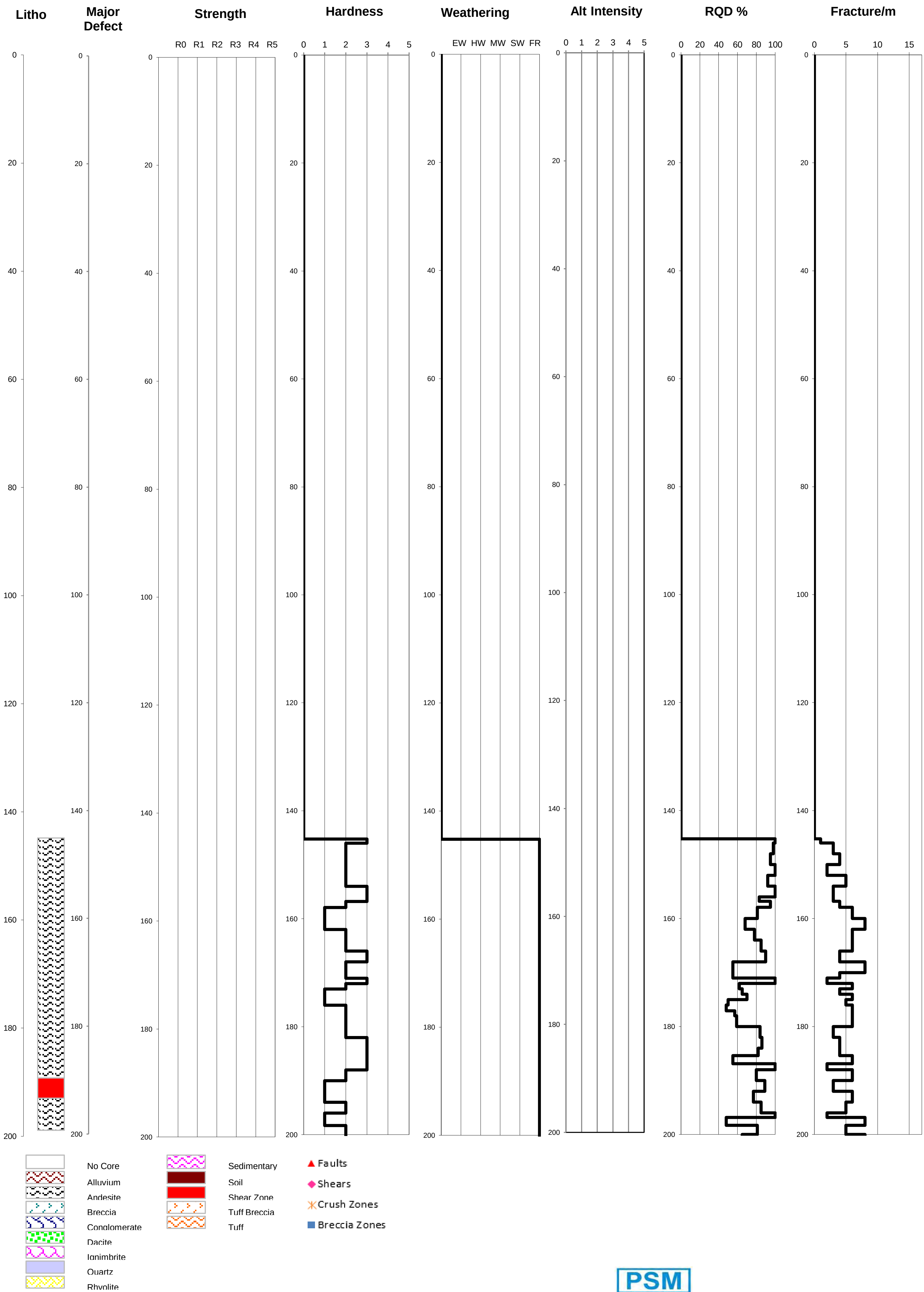
Borehole ID: **UW158**

Pells Sullivan Meynink



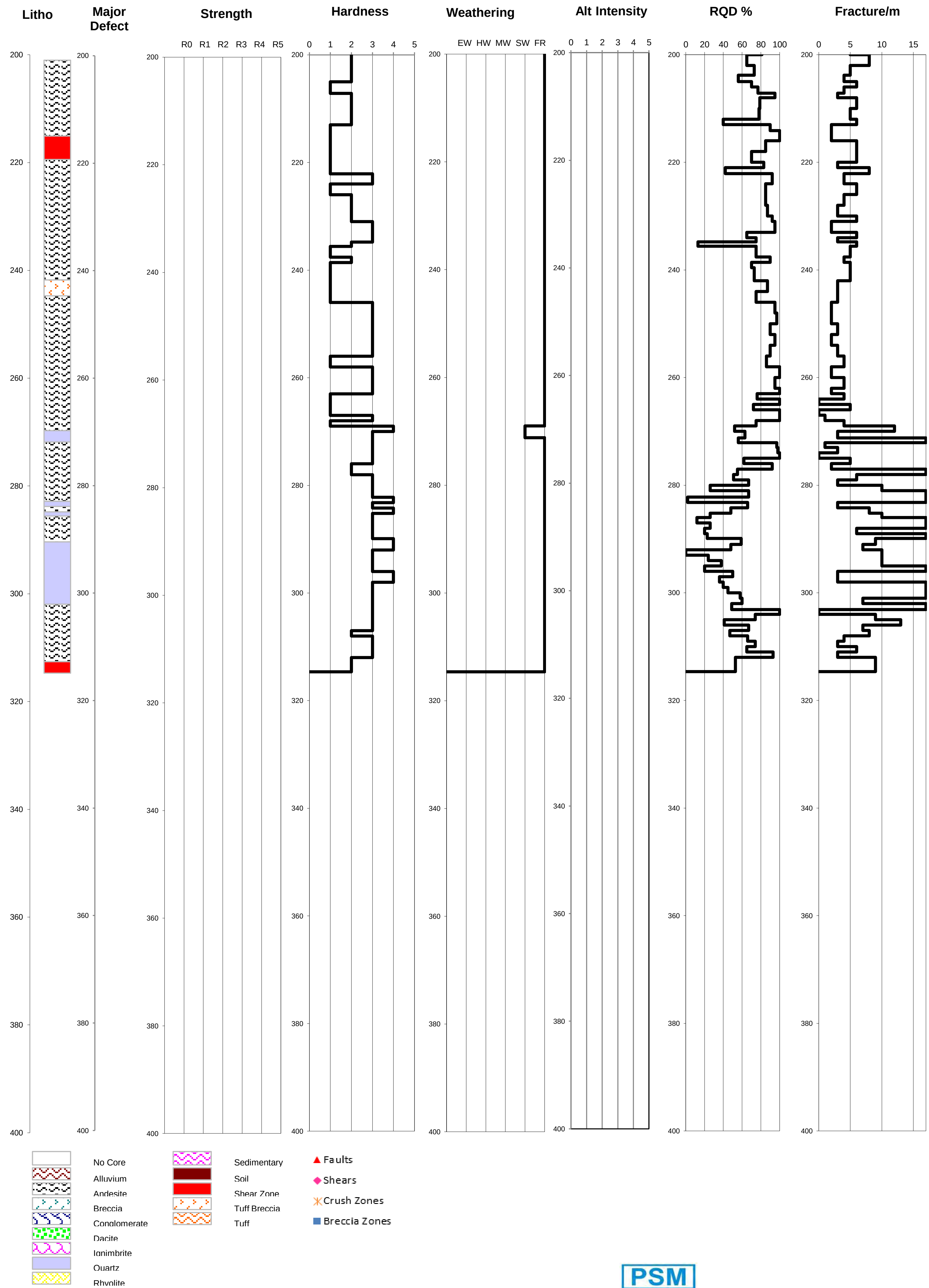
Borehole ID: UW158

Pells Sullivan Meynink



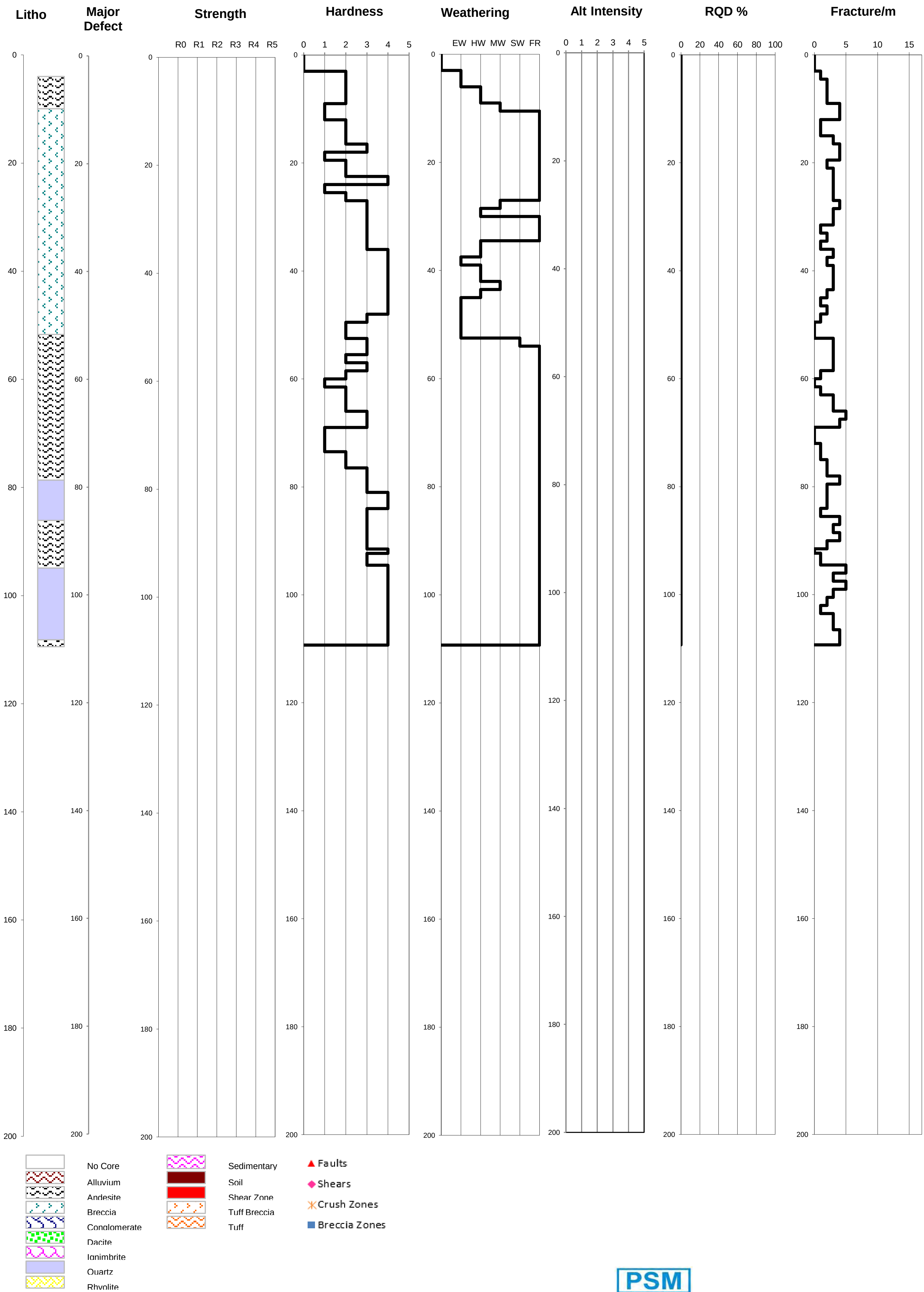
Borehole ID: **UW158B**

Pells Sullivan Meynink



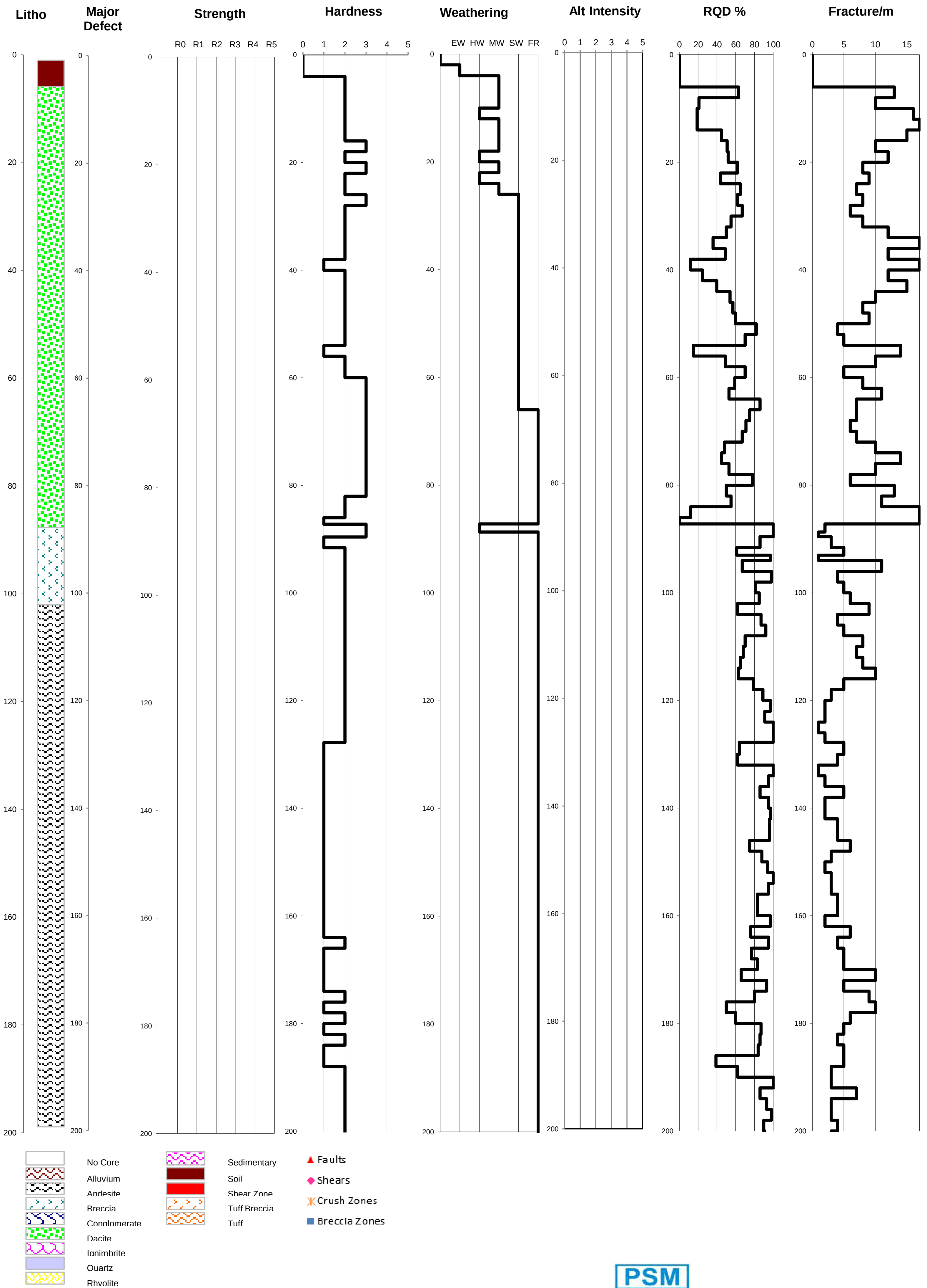
Borehole ID: **UW158B**

Pells Sullivan Meynink



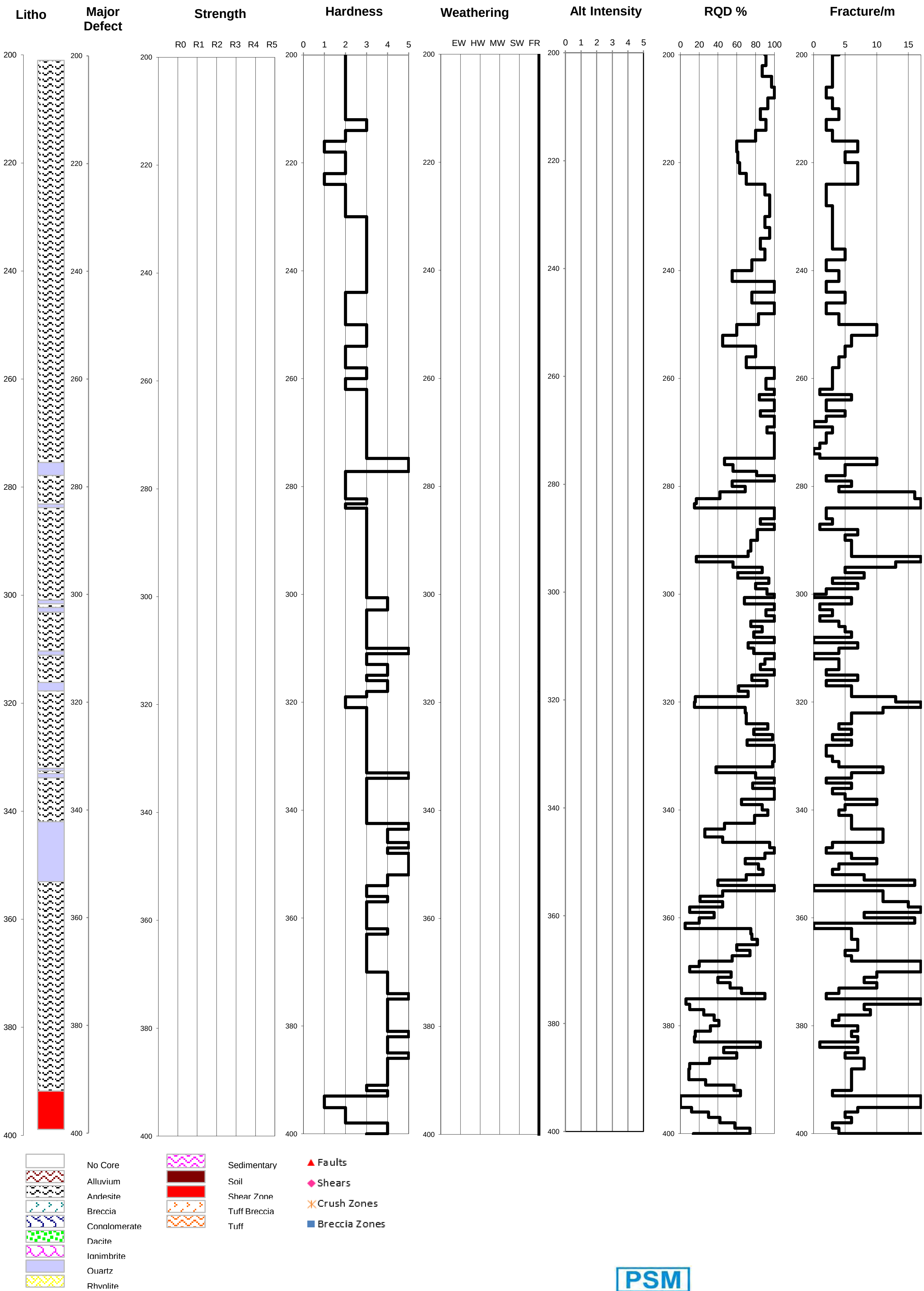
Borehole ID: UW16

Pells Sullivan Meynink



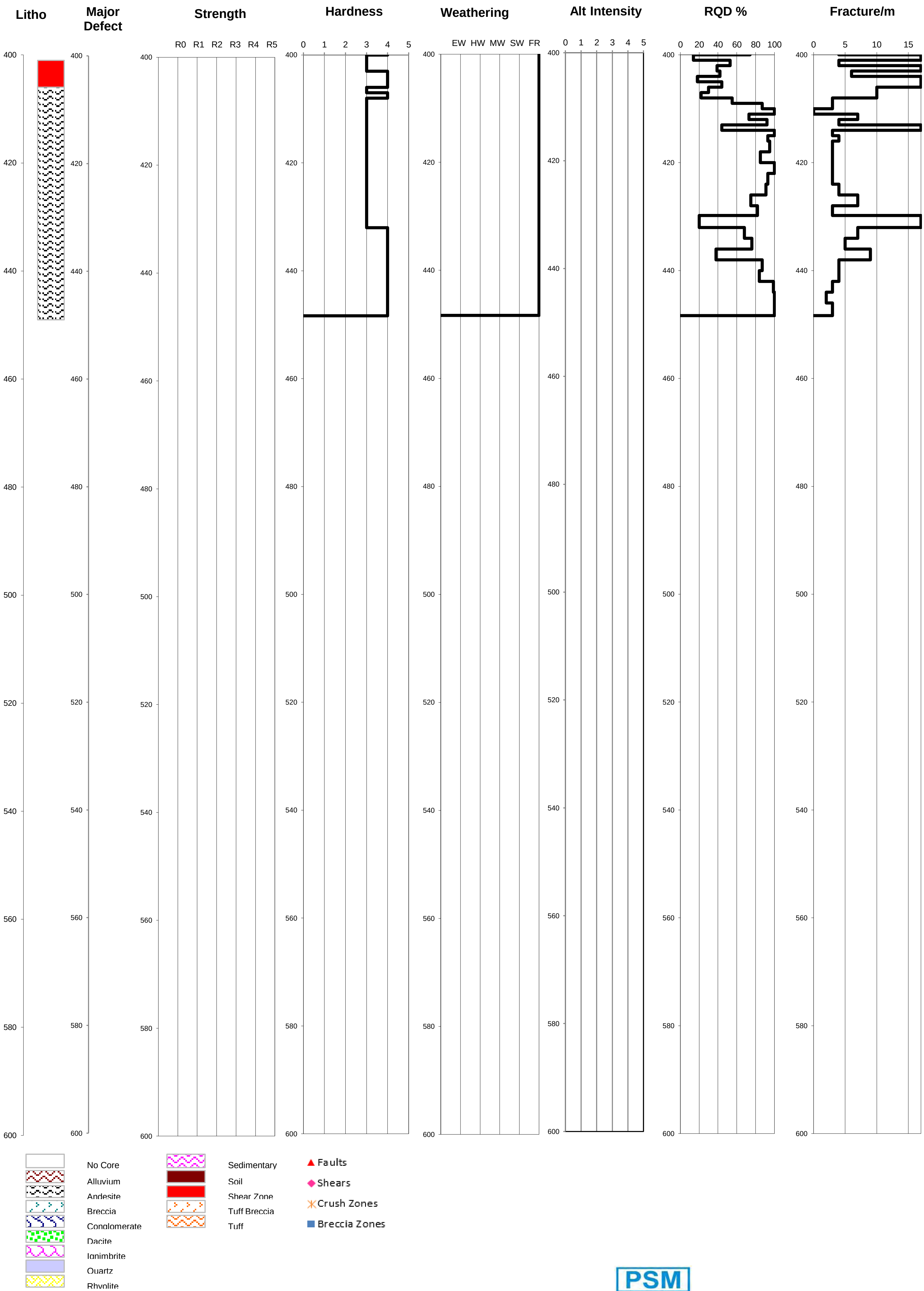
Borehole ID: **UW160**

Pells Sullivan Meynink



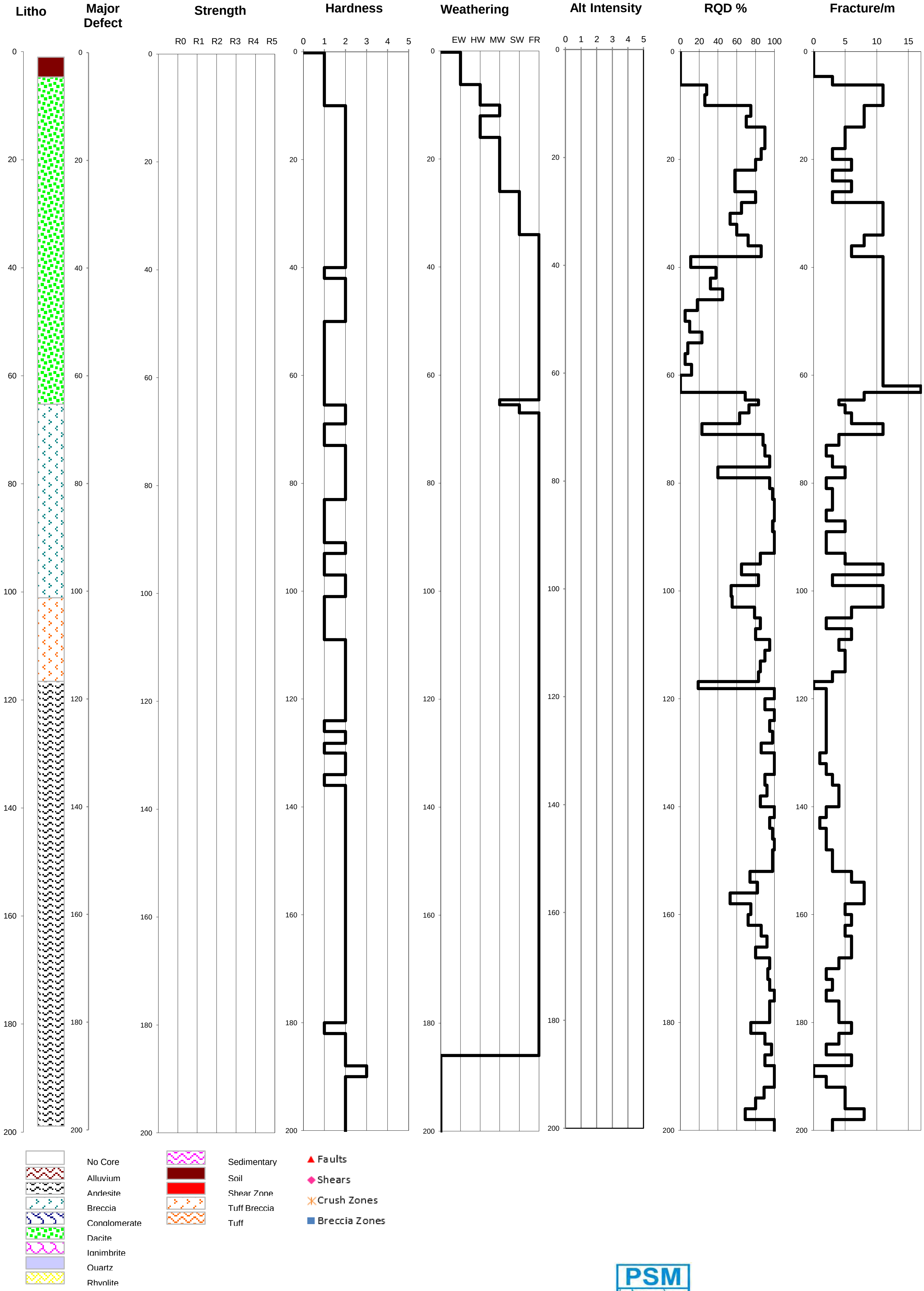
Borehole ID: UW160

Pells Sullivan Meynink



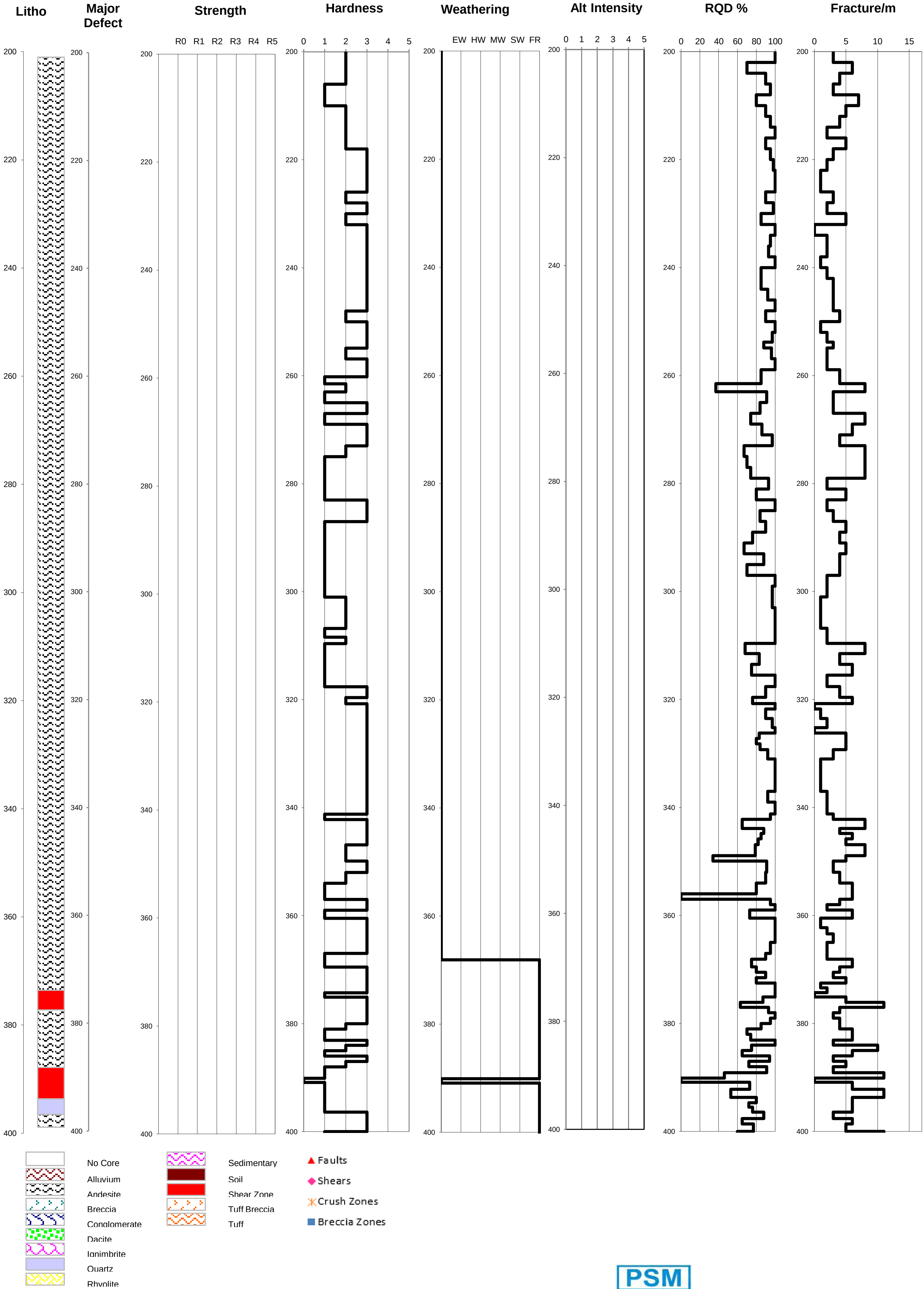
Borehole ID: **UW160**

Pells Sullivan Meynink



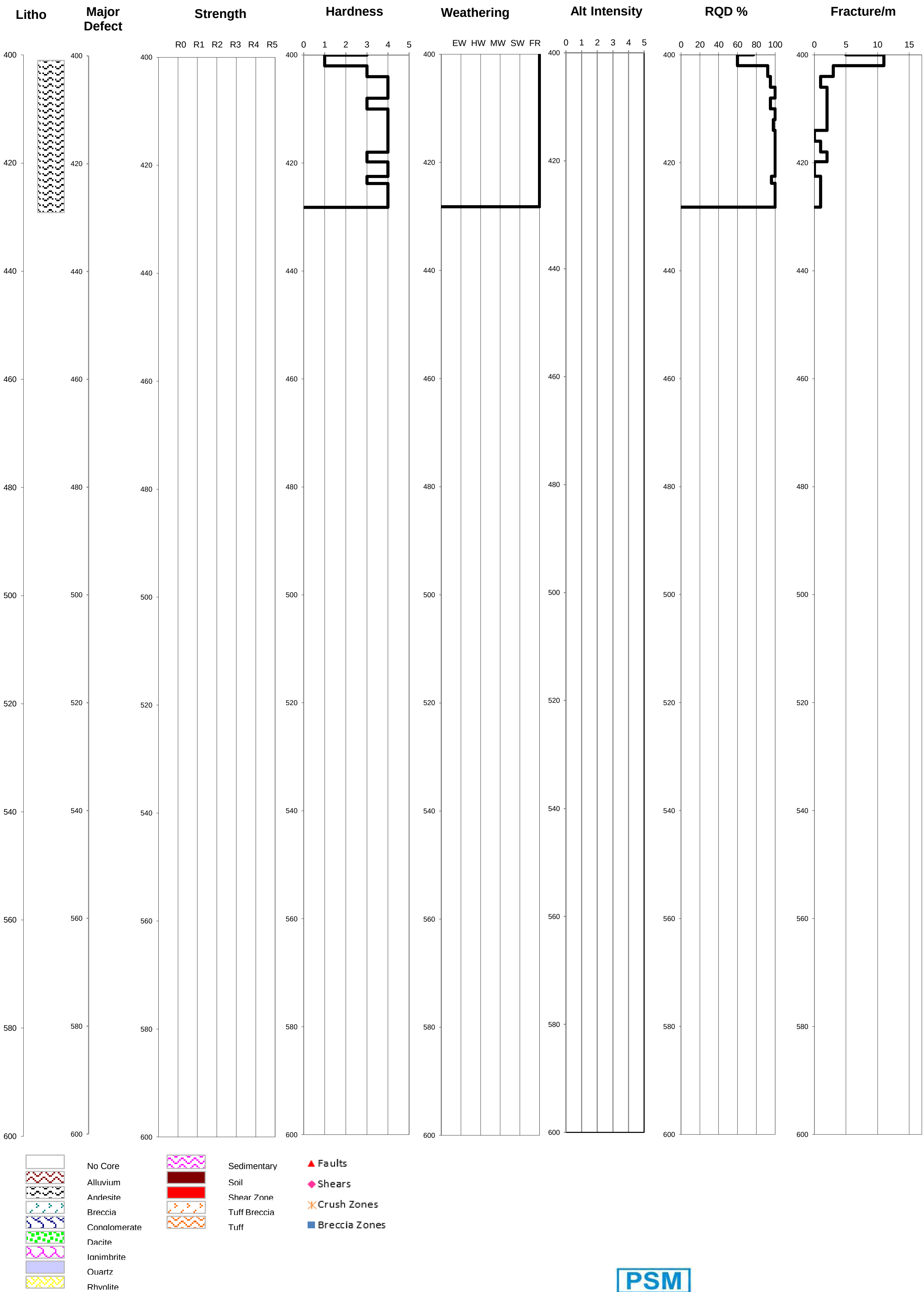
Borehole ID: **UW161**

Pells Sullivan Meynink



Borehole ID: **UW161**

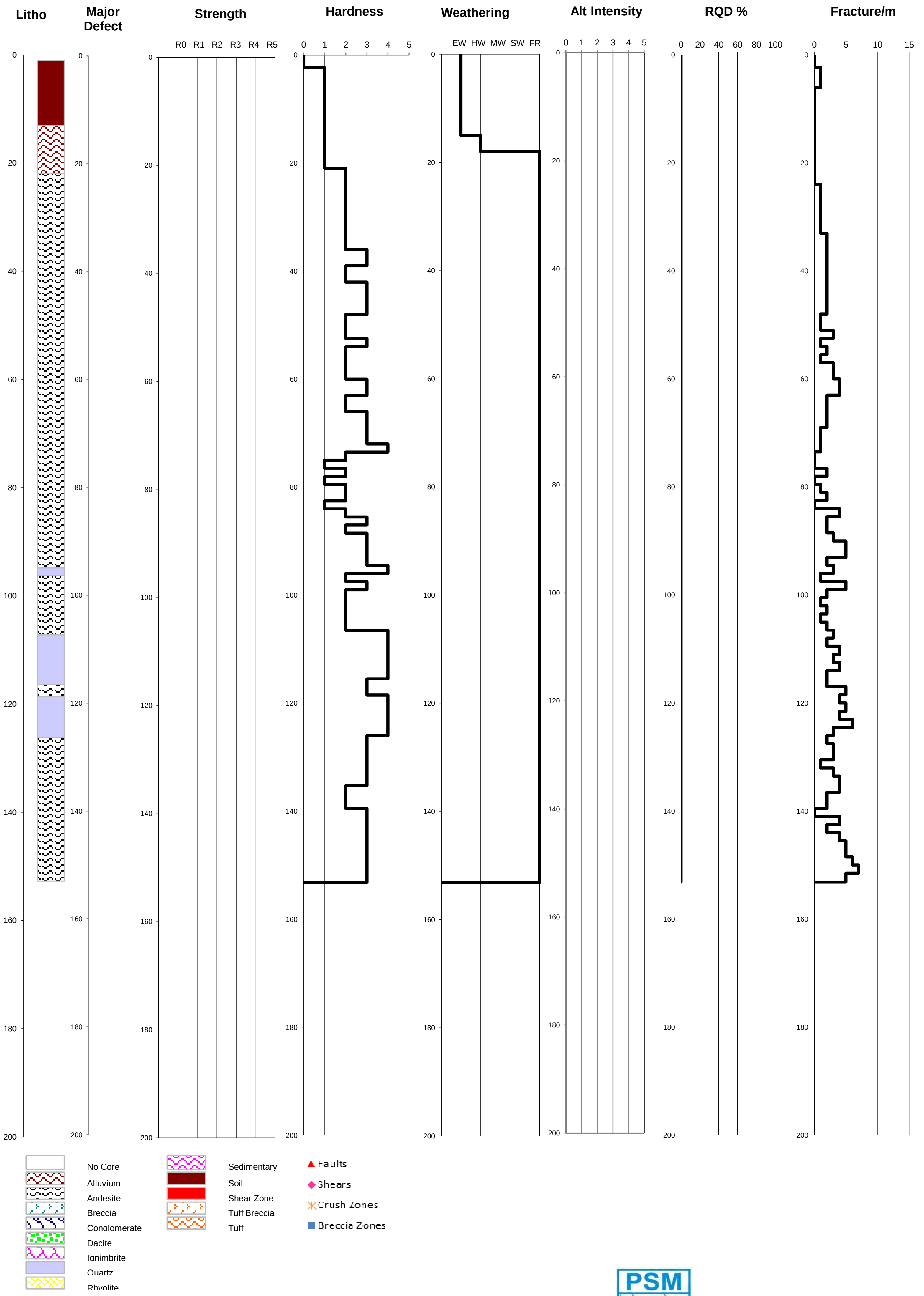
Pells Sullivan Meynink



Borehole ID: **UW161**

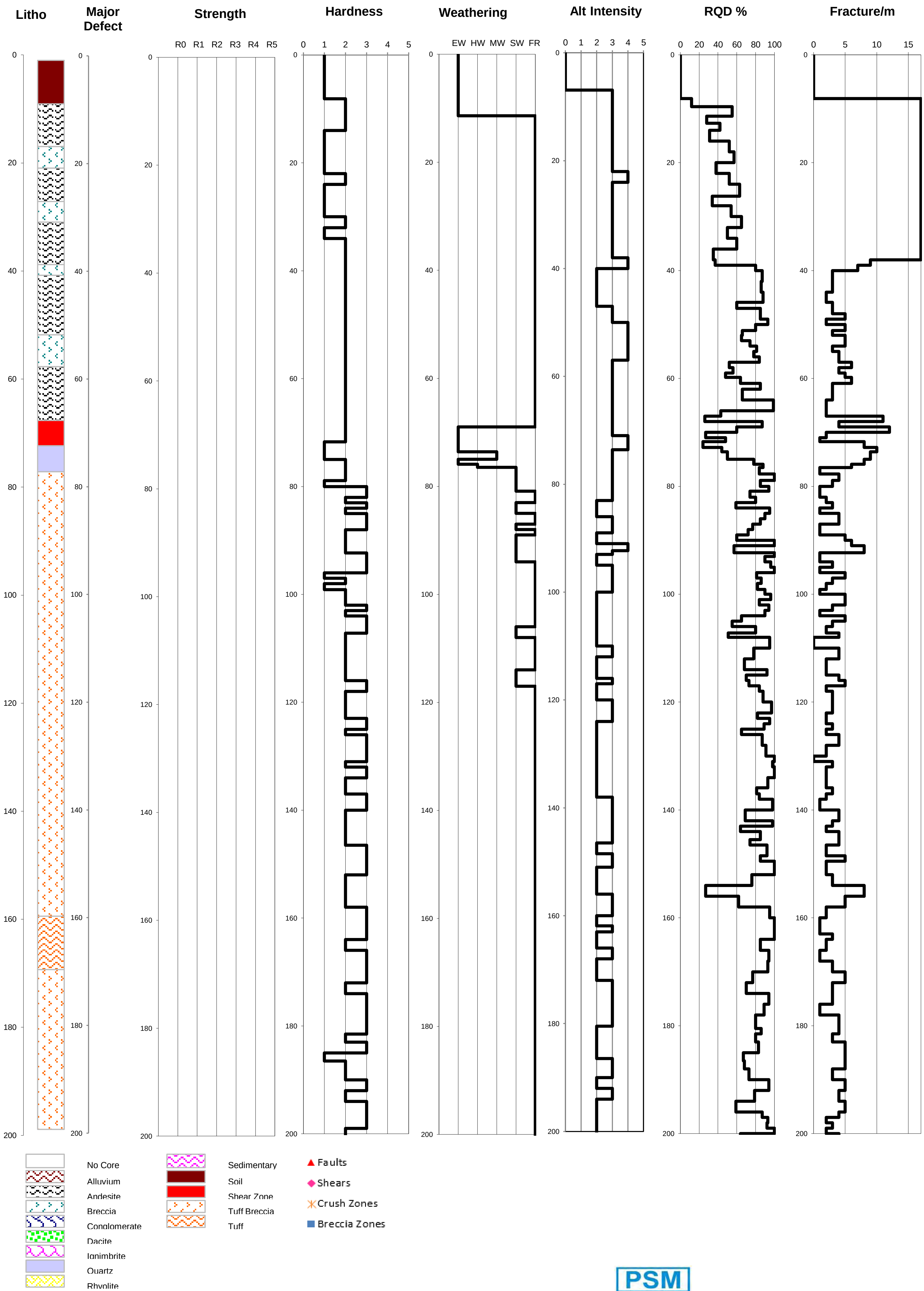
PSM

Pells Sullivan Meynink



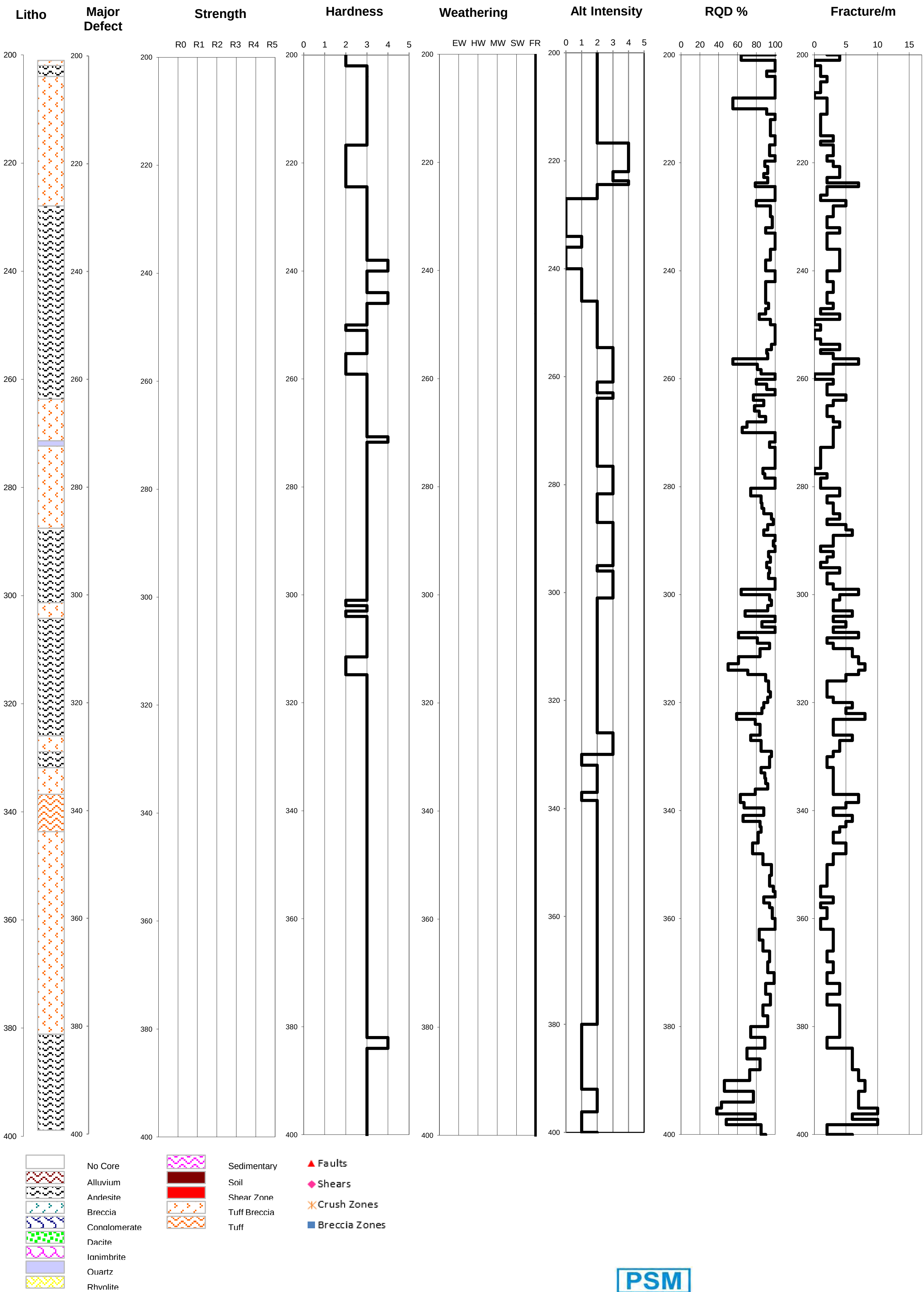
Borehole ID: **UW17**

Pells Sullivan Meynink



Borehole ID: UW175

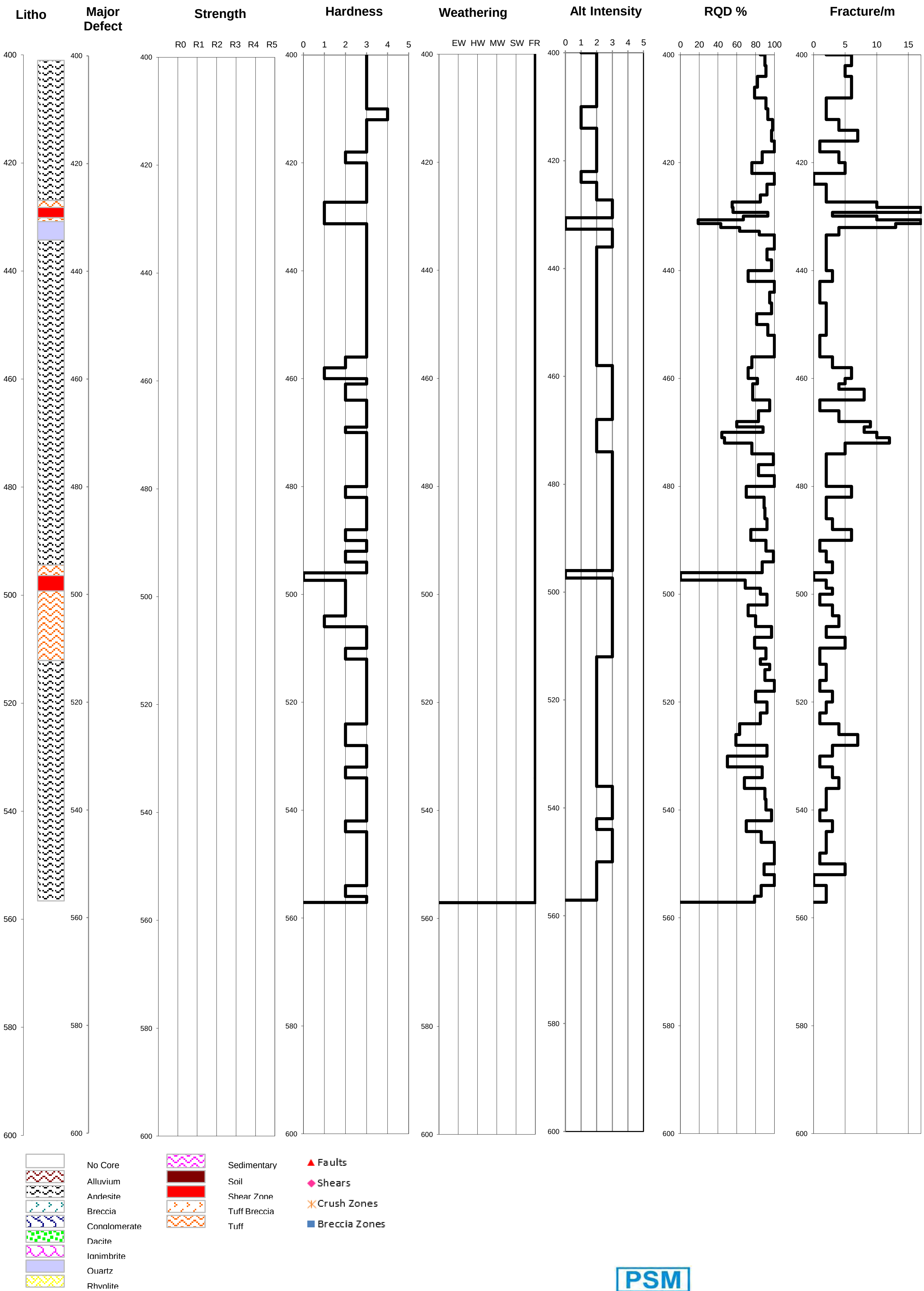
Pells Sullivan Meynink



Borehole ID: **UW175**

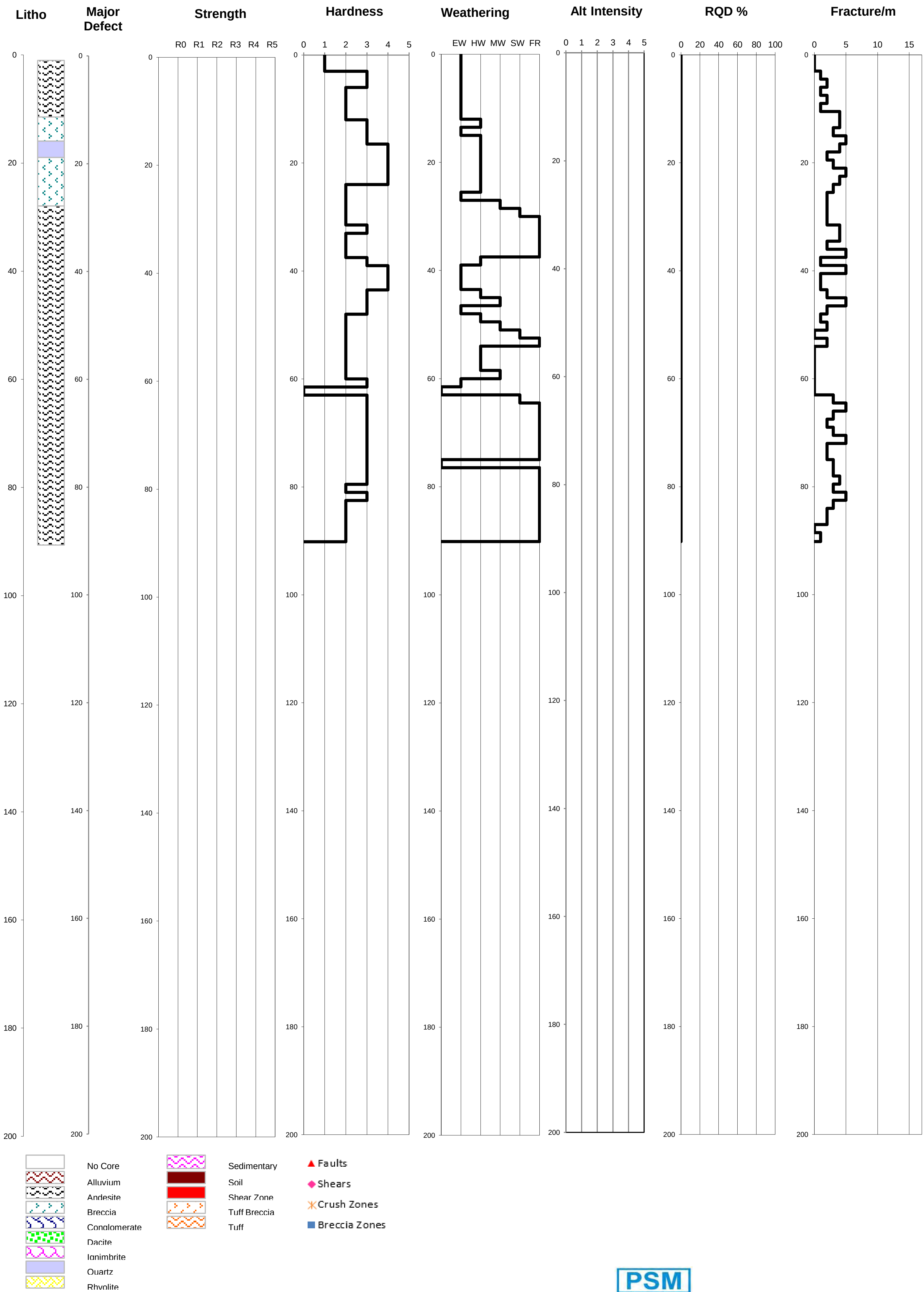
PSM

Pells Sullivan Meynink



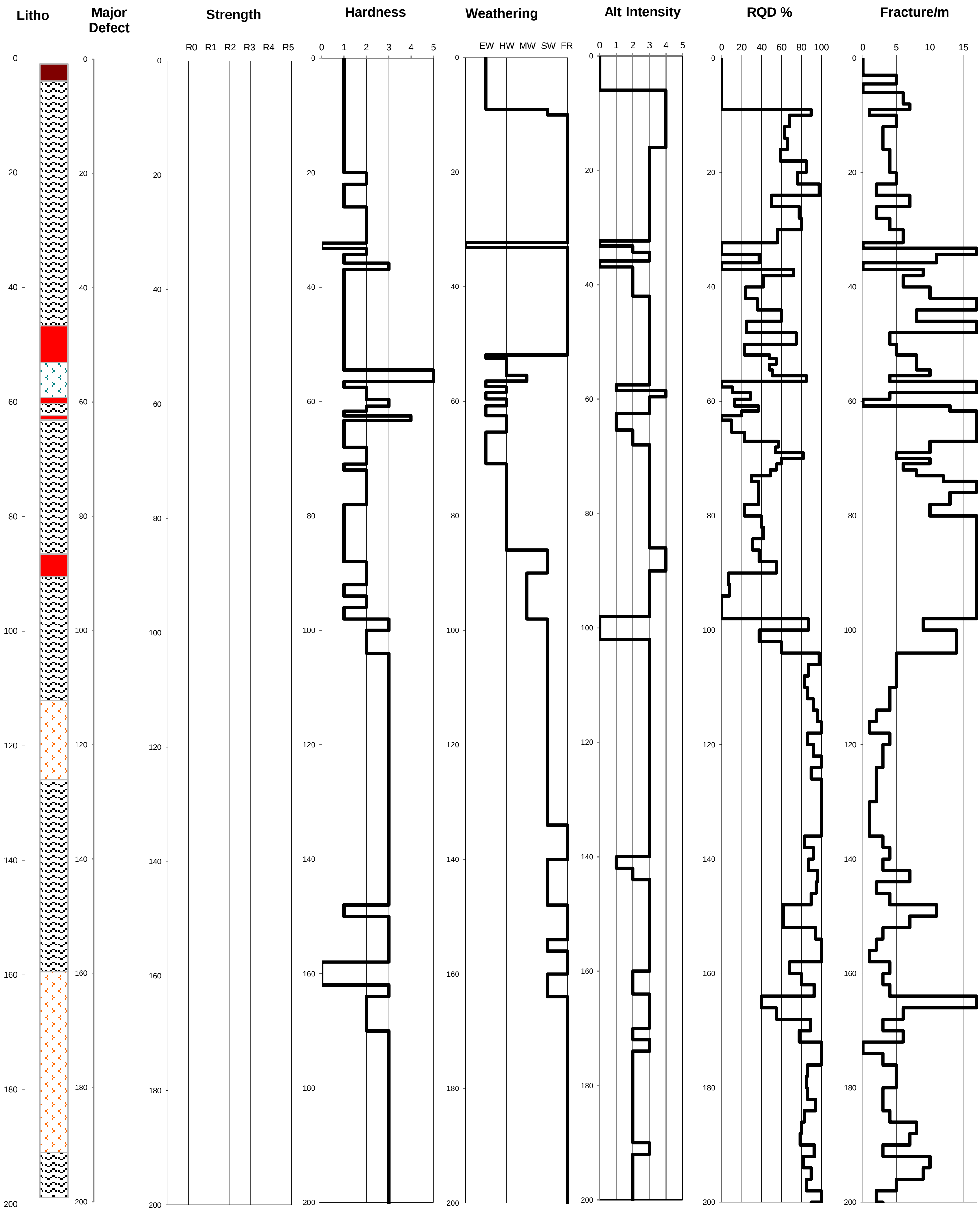
Borehole ID: **UW175**

Pells Sullivan Meynink



Borehole ID: **UW18**

Pells Sullivan Meynink



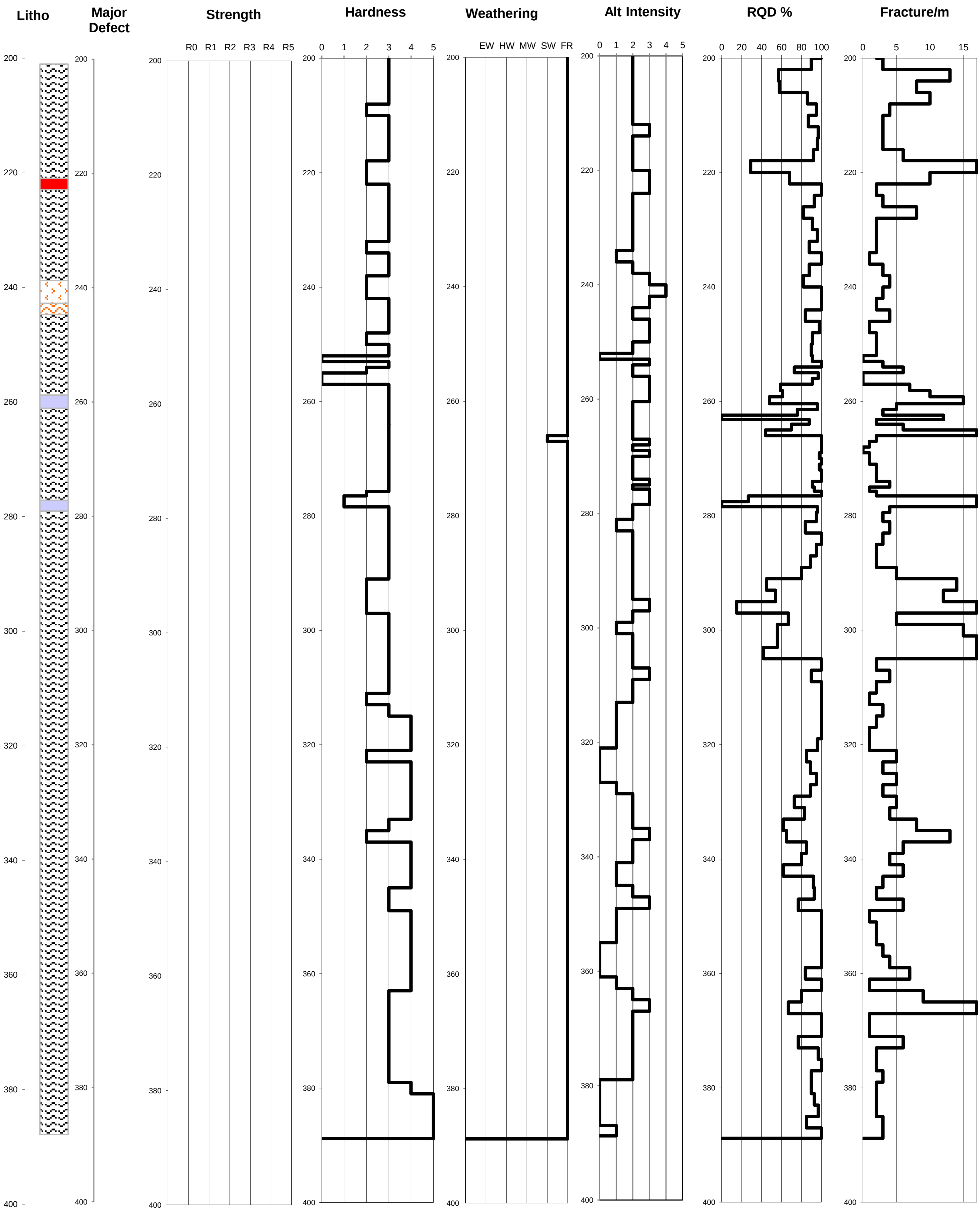
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

Borehole ID: **UW180**

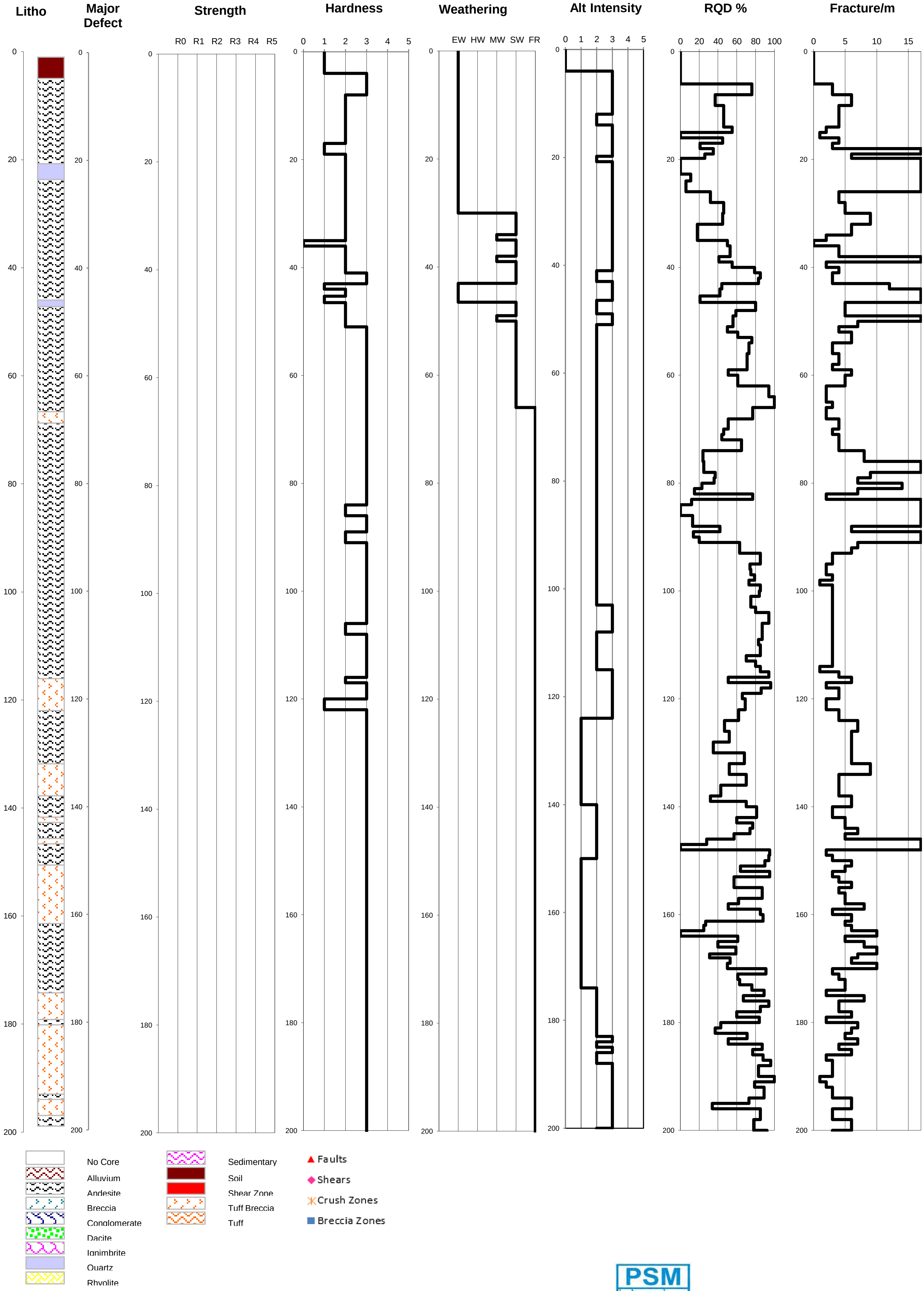
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
Faults
Shears
Crush Zones
Breccia Zones

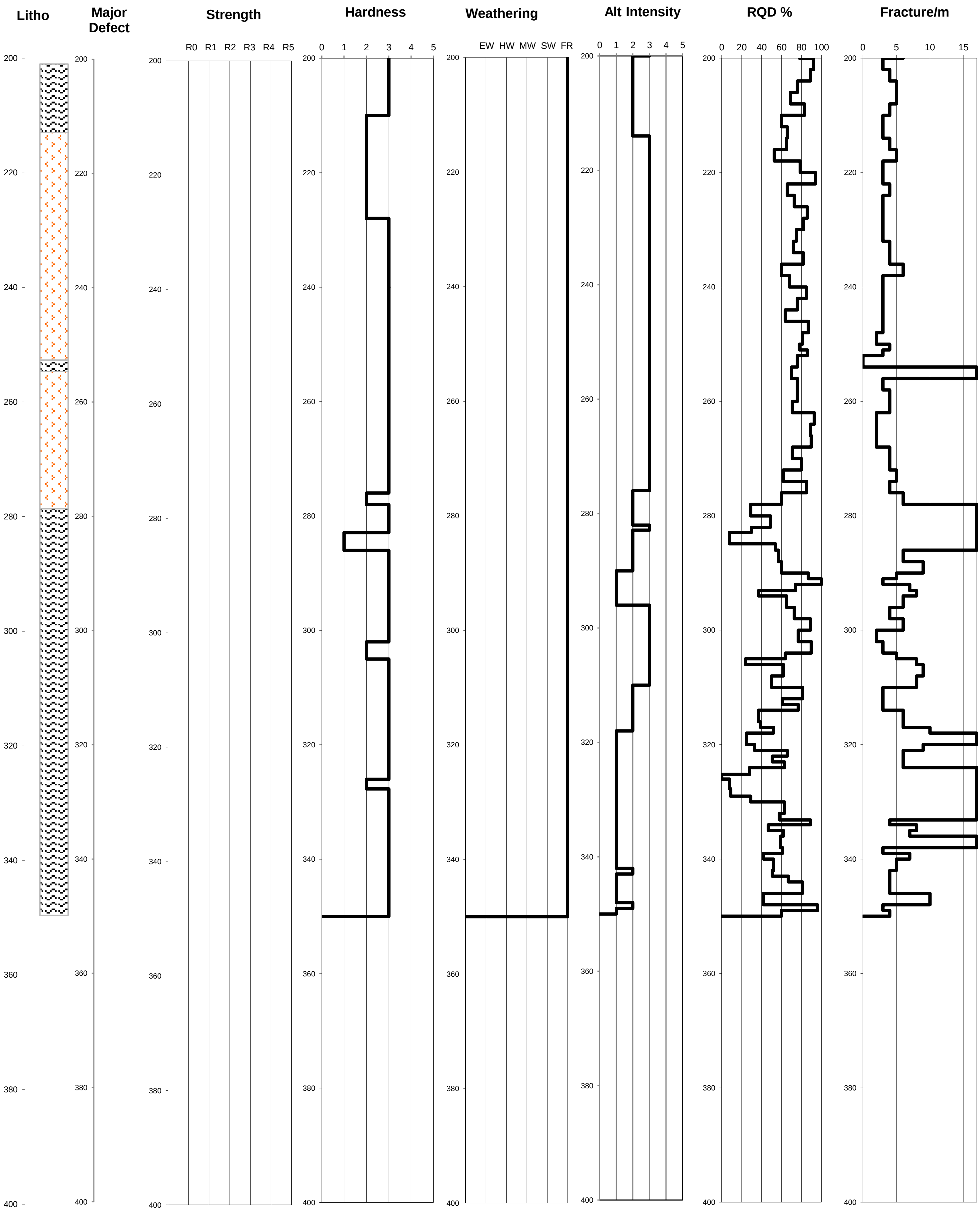
Borehole ID: UW180

Pells Sullivan Meynink



Borehole ID: **UW184**

Pells Sullivan Meynink

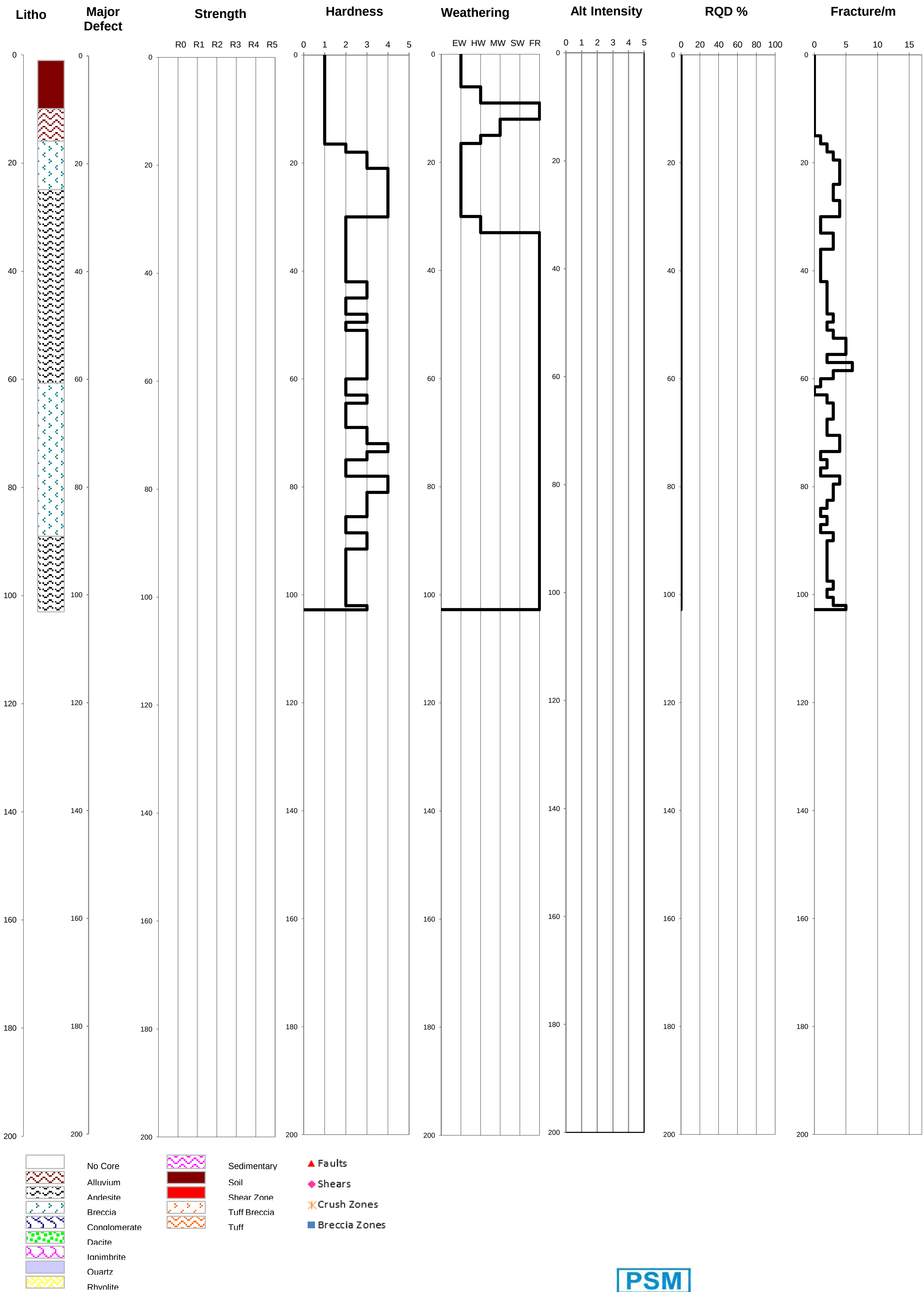


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

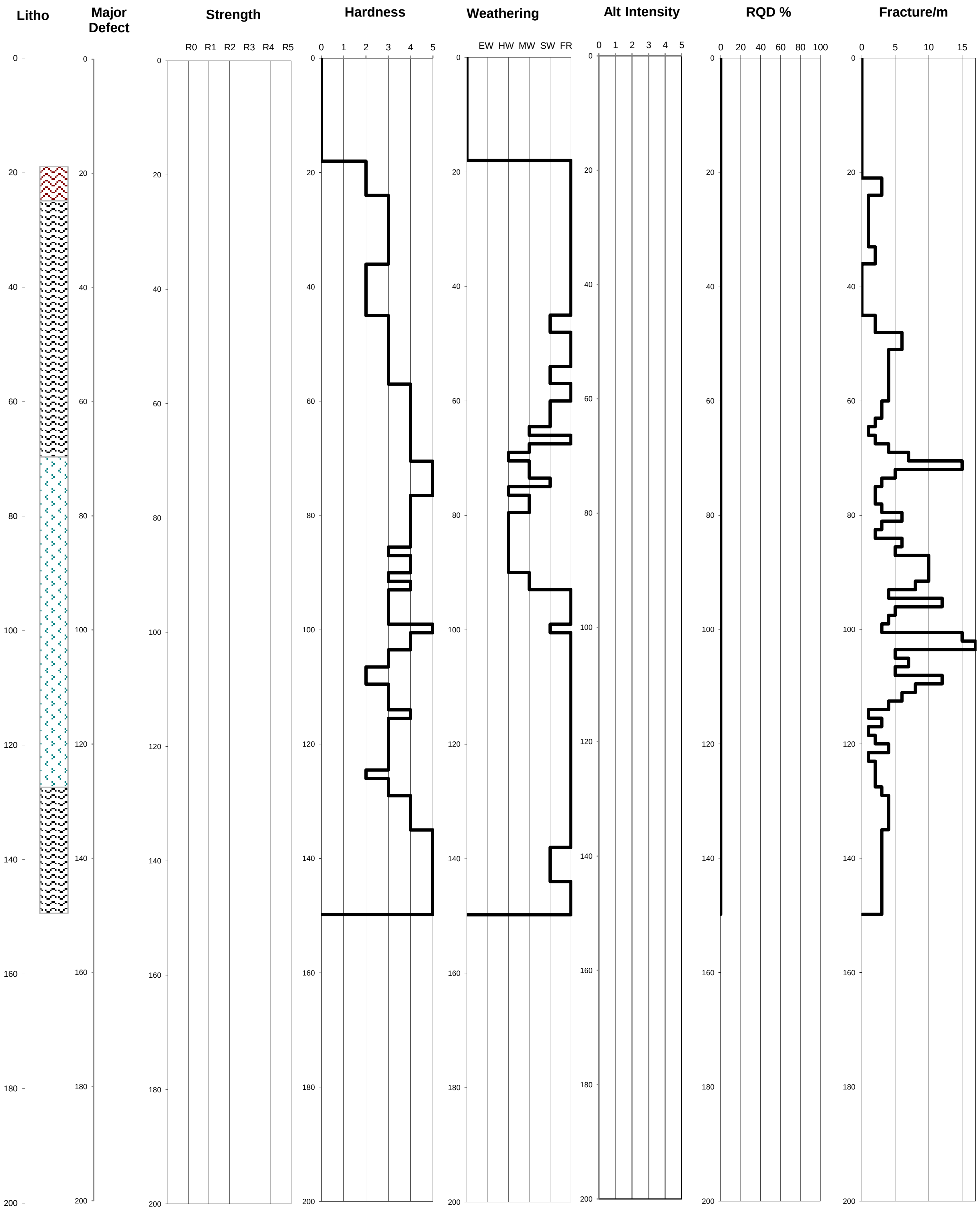
Borehole ID: **UW184**

Pells Sullivan Meynink



Borehole ID: **UW19**

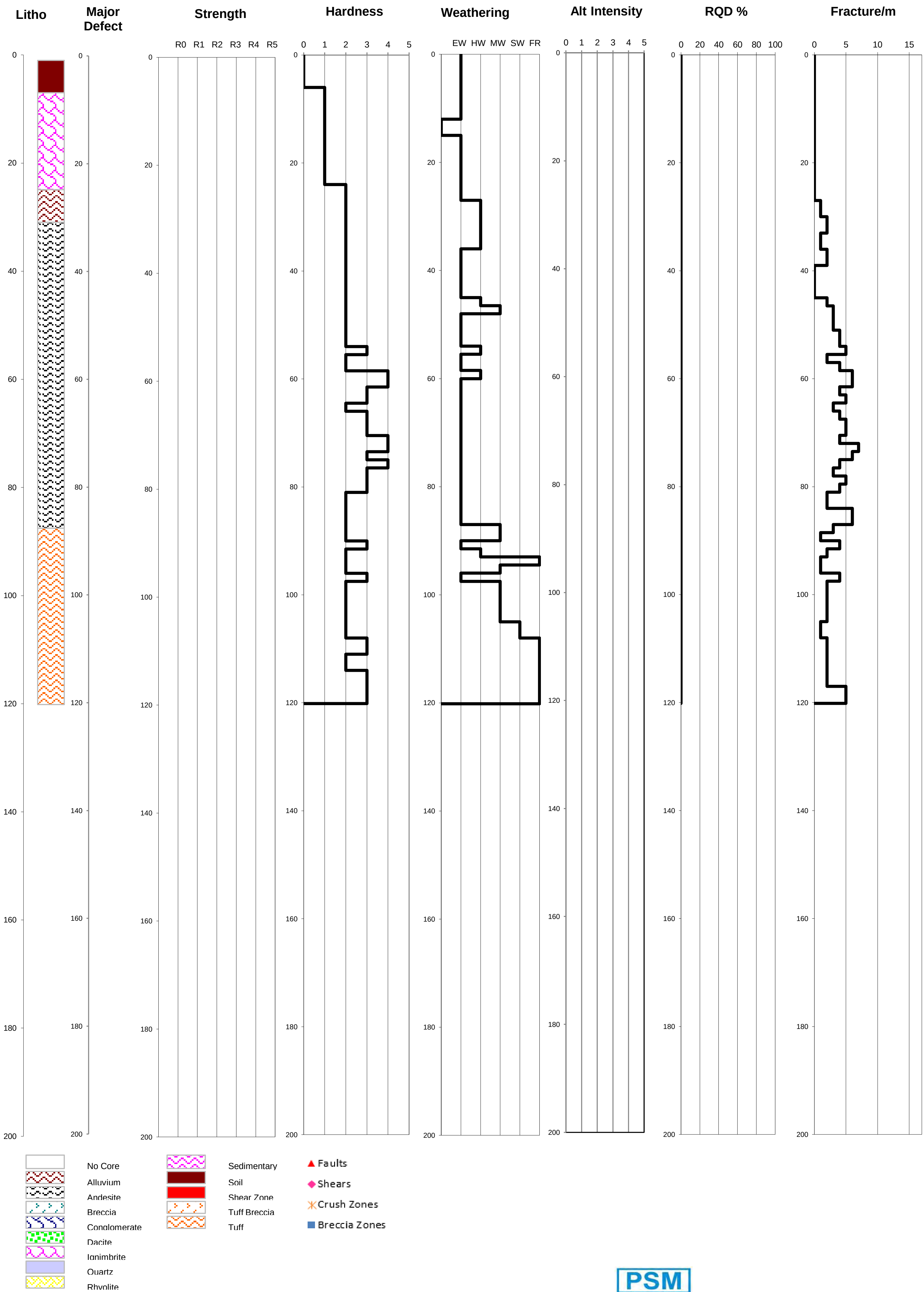
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
▲ Faults
◆ Shears
Crush Zones
■ Breccia Zones

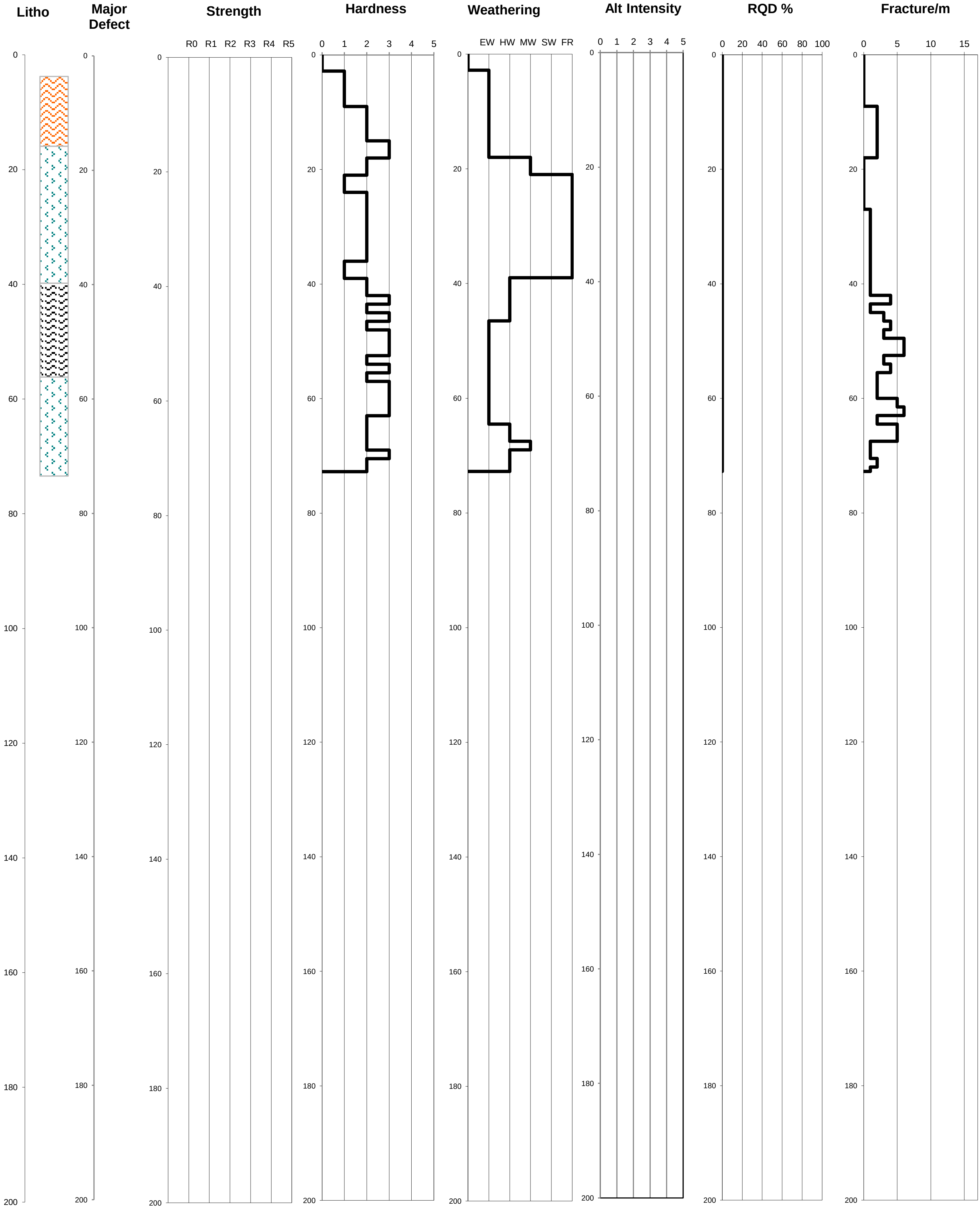
Borehole ID: **UW20**

Pells Sullivan Meynink



Borehole ID: UW21

PSM Pells Sullivan Meynink



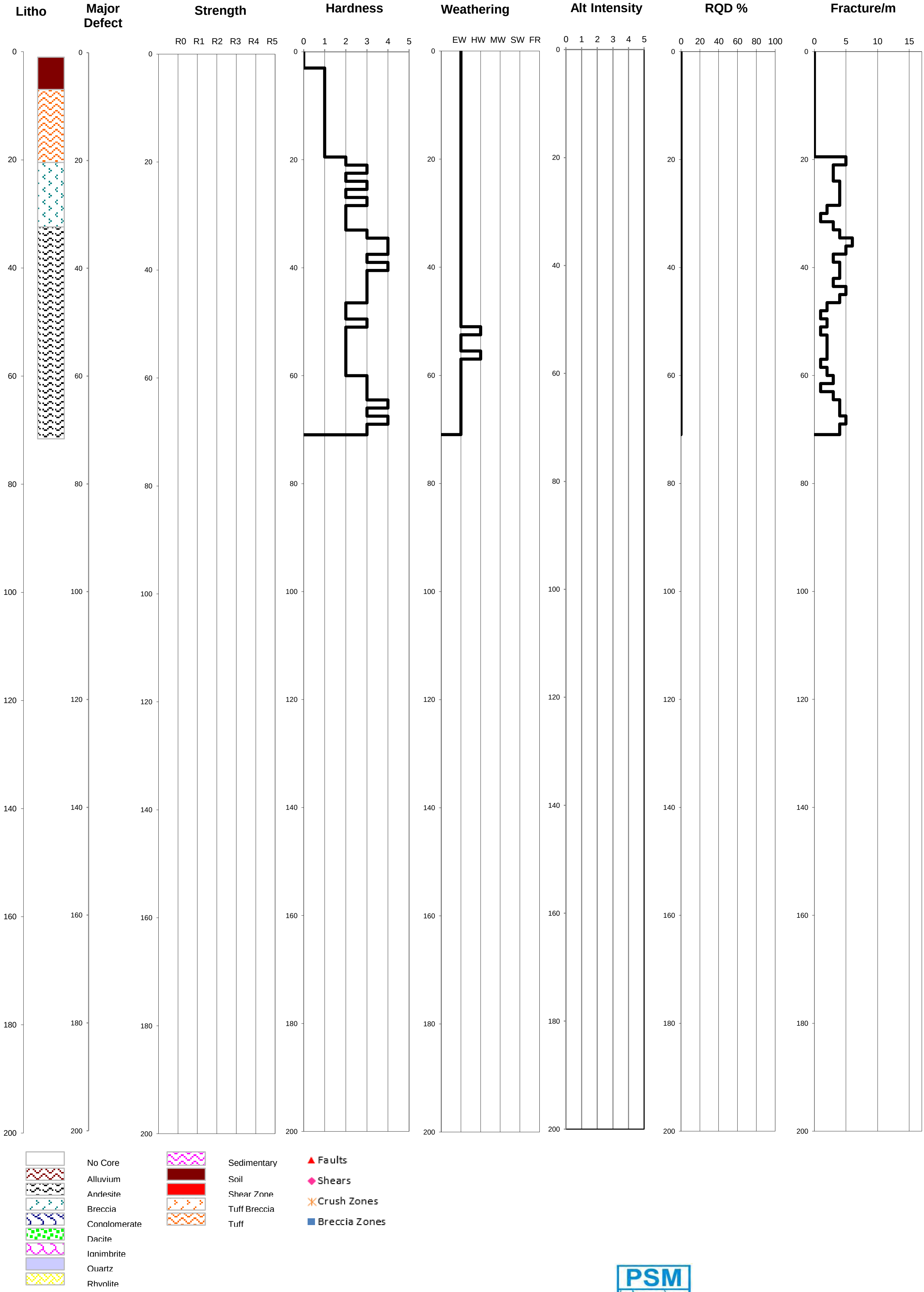
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
Crush Zones
■ Breccia Zones

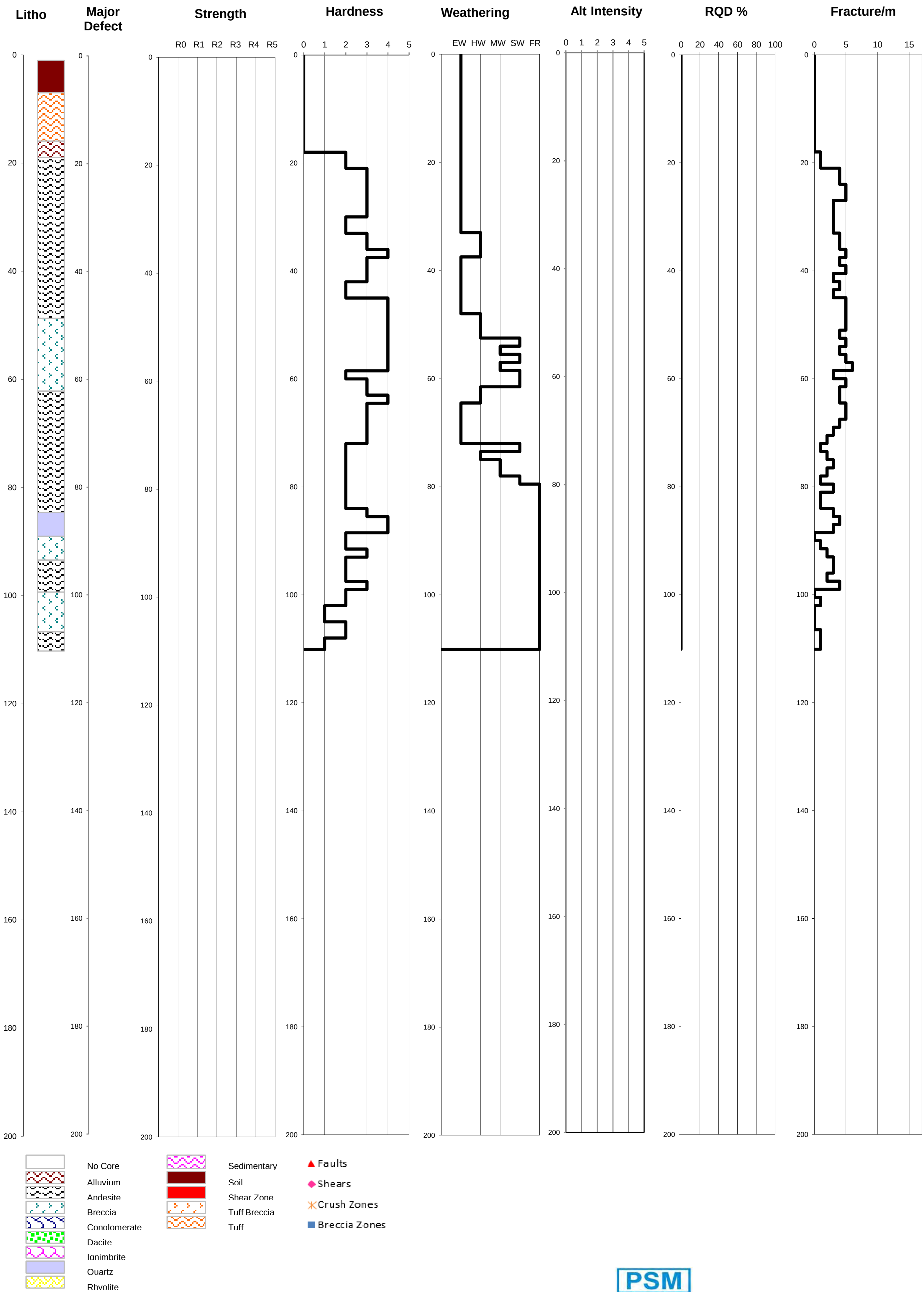
Borehole ID: UW22

Pells Sullivan Meynink



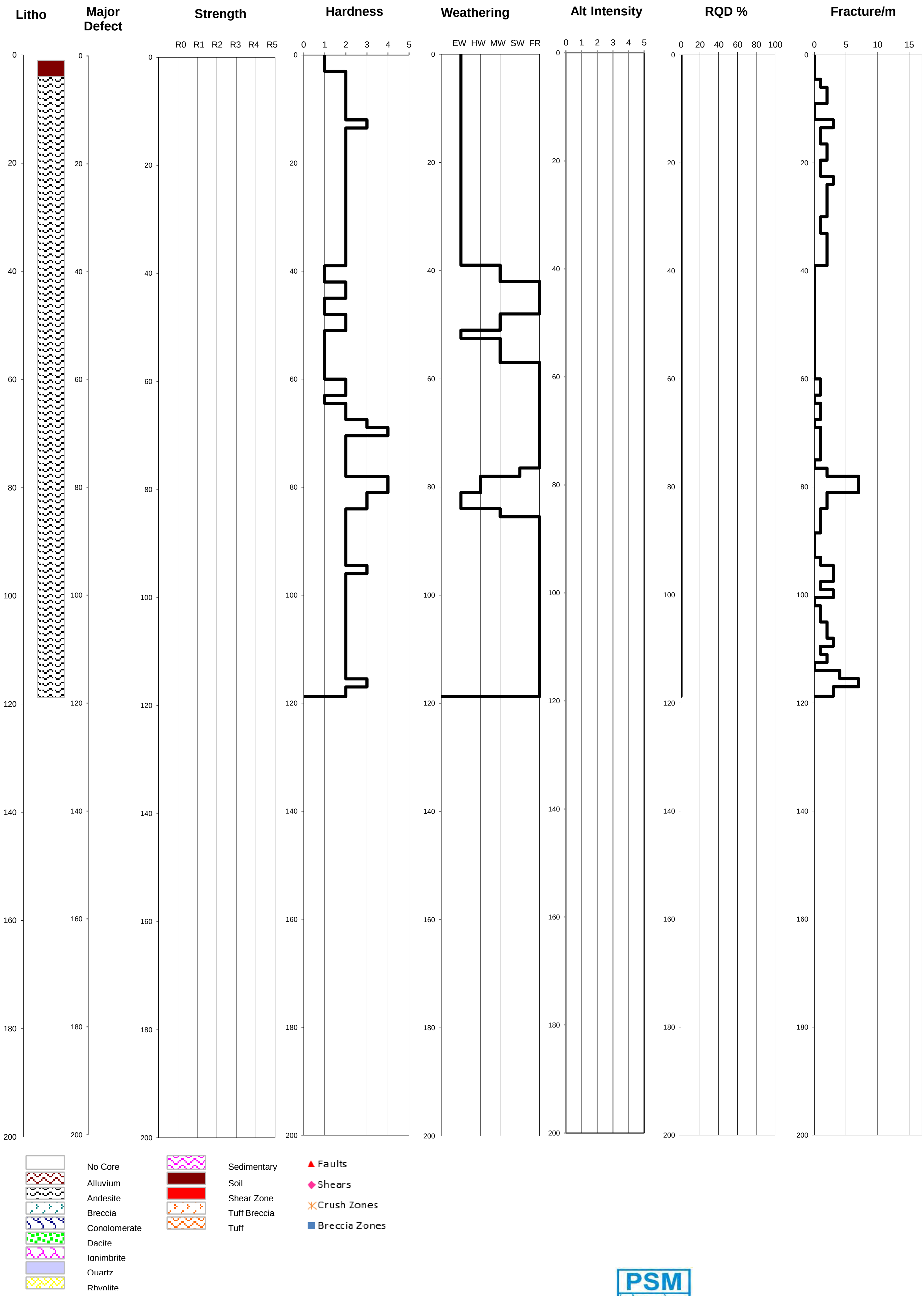
Borehole ID: **UW23**

Pells Sullivan Meynink



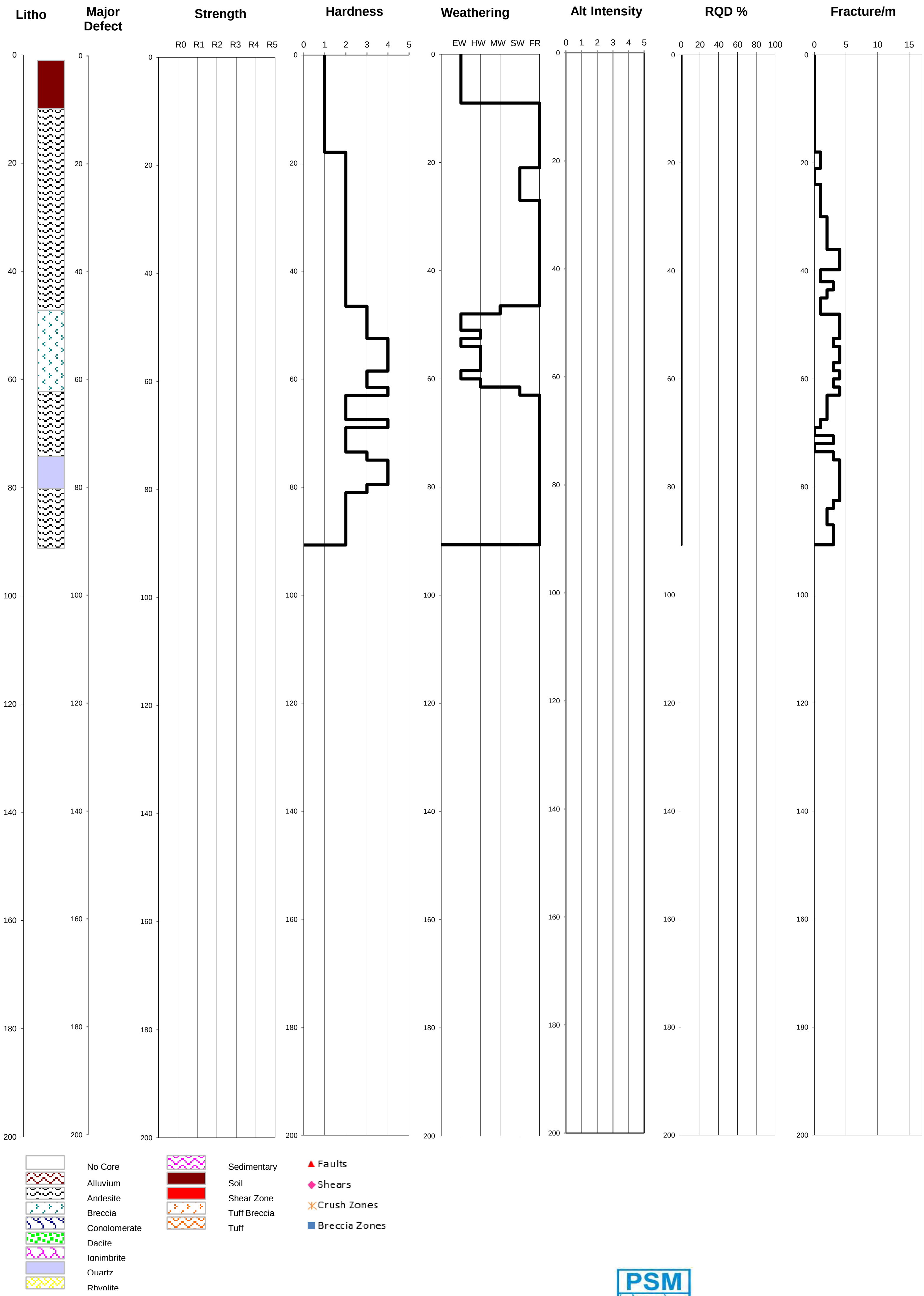
Borehole ID: **UW24**

Pells Sullivan Meynink



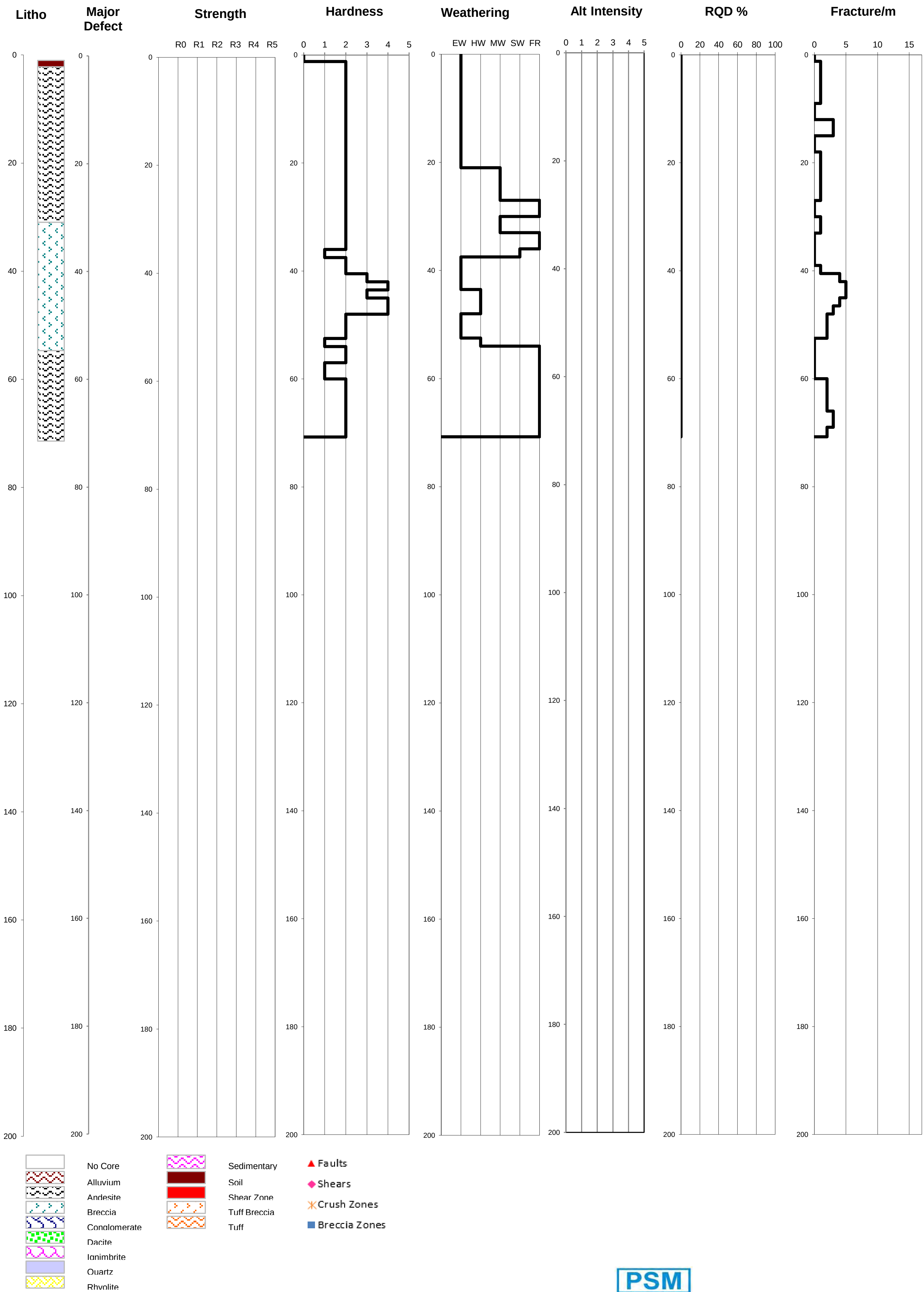
Borehole ID: UW25

Pells Sullivan Meynink



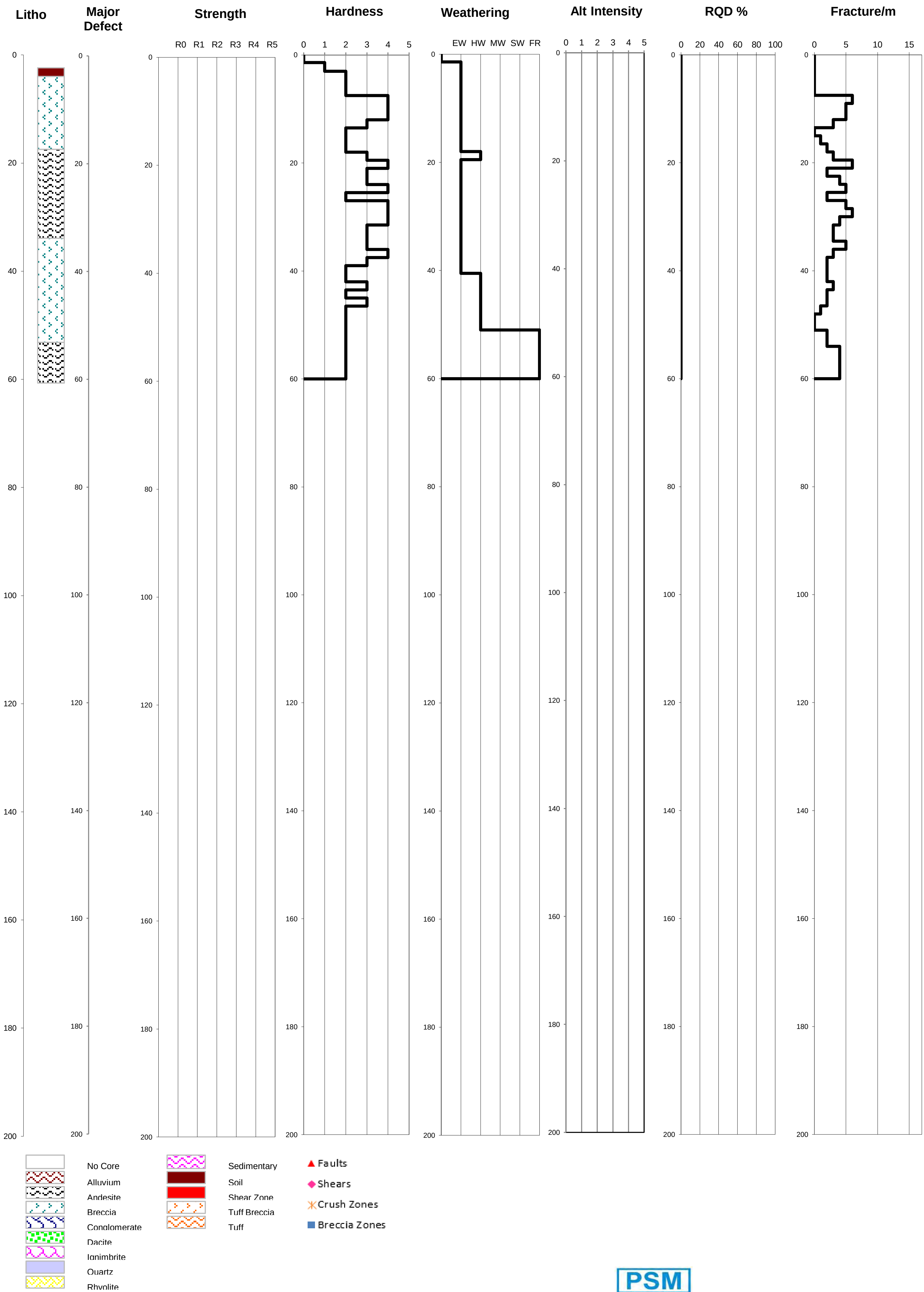
Borehole ID: UW26

Pells Sullivan Meynink



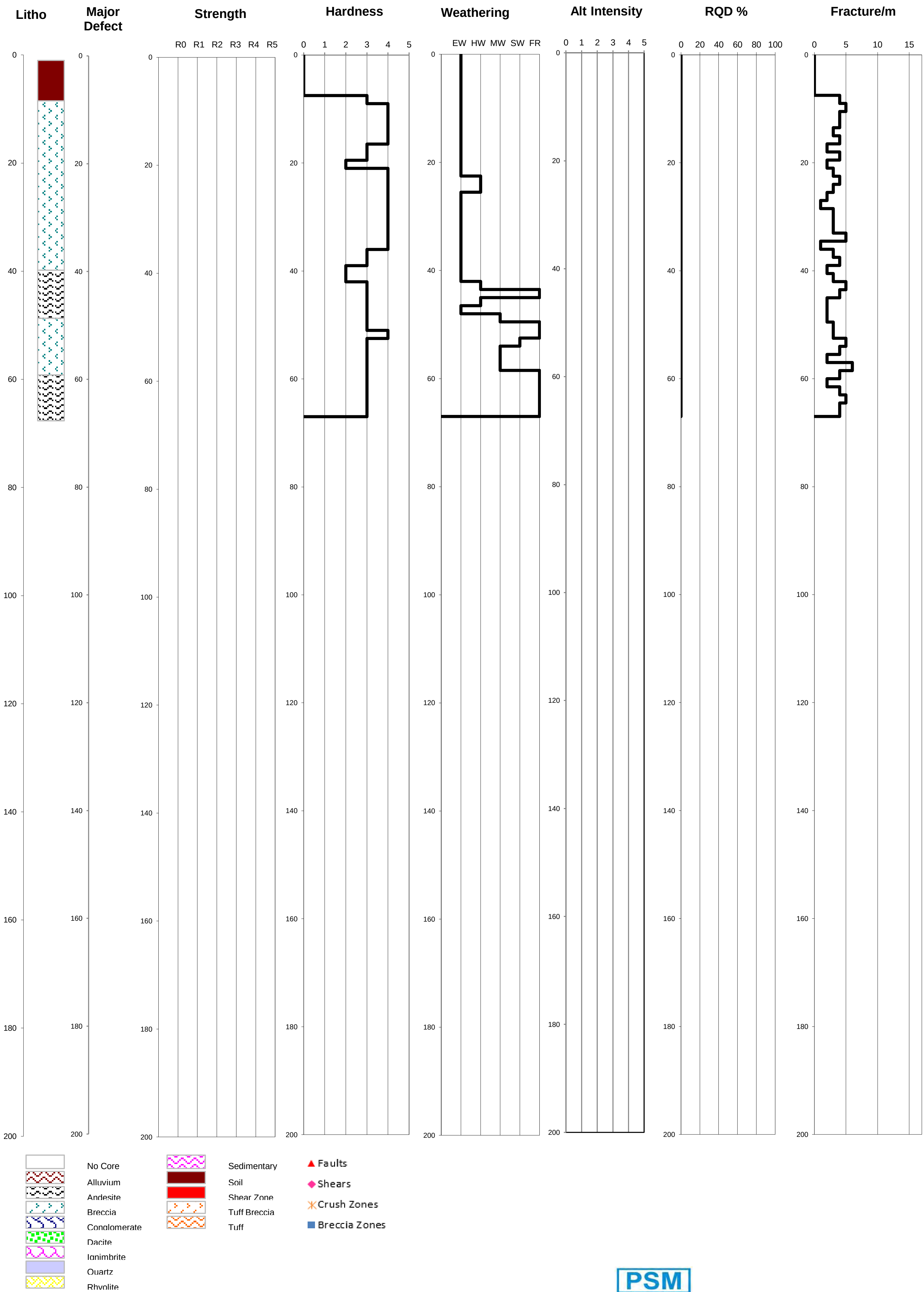
Borehole ID: UW27

Pells Sullivan Meynink



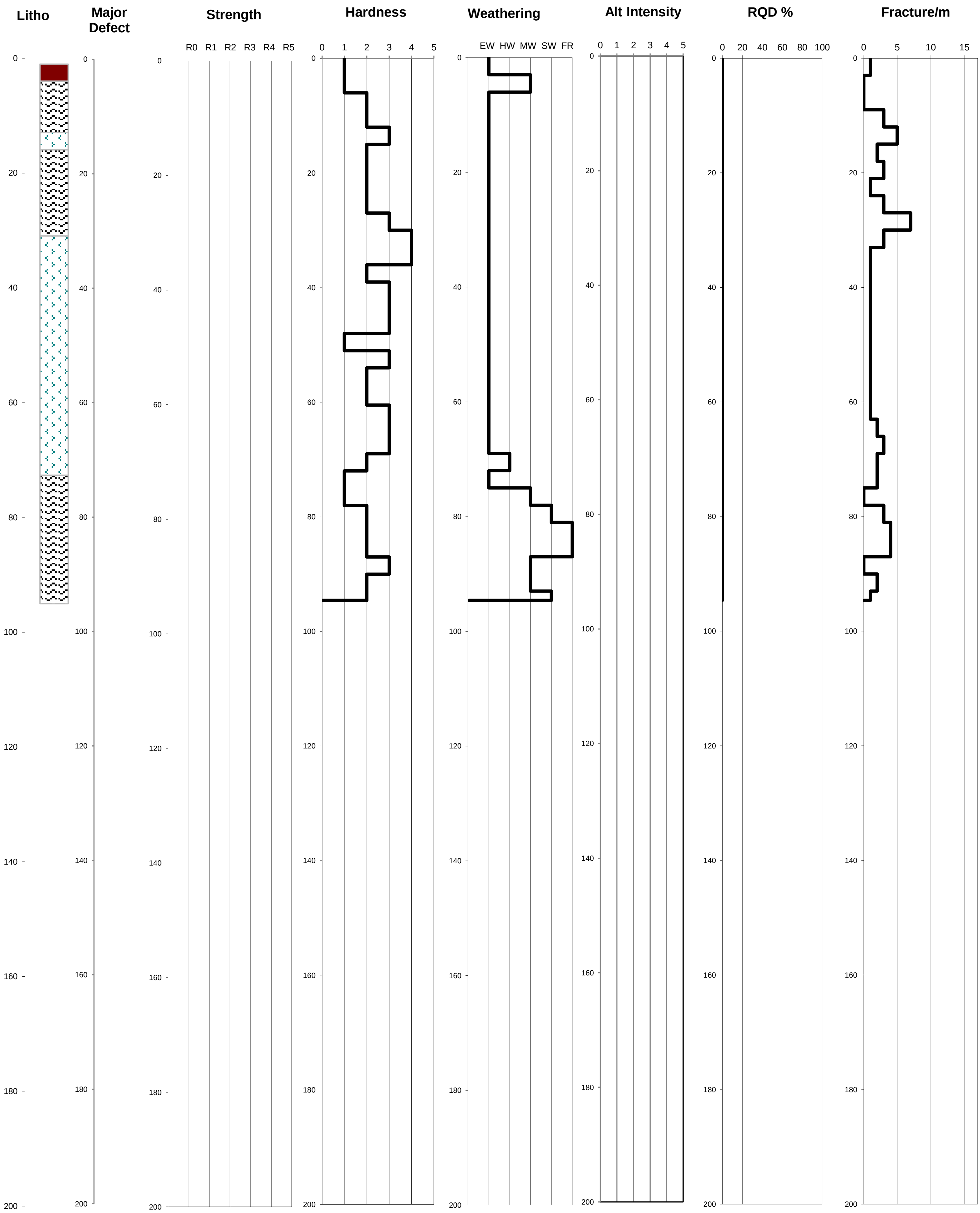
Borehole ID: **UW28**

Pells Sullivan Meynink



Borehole ID: **UW29**

Pells Sullivan Meynink



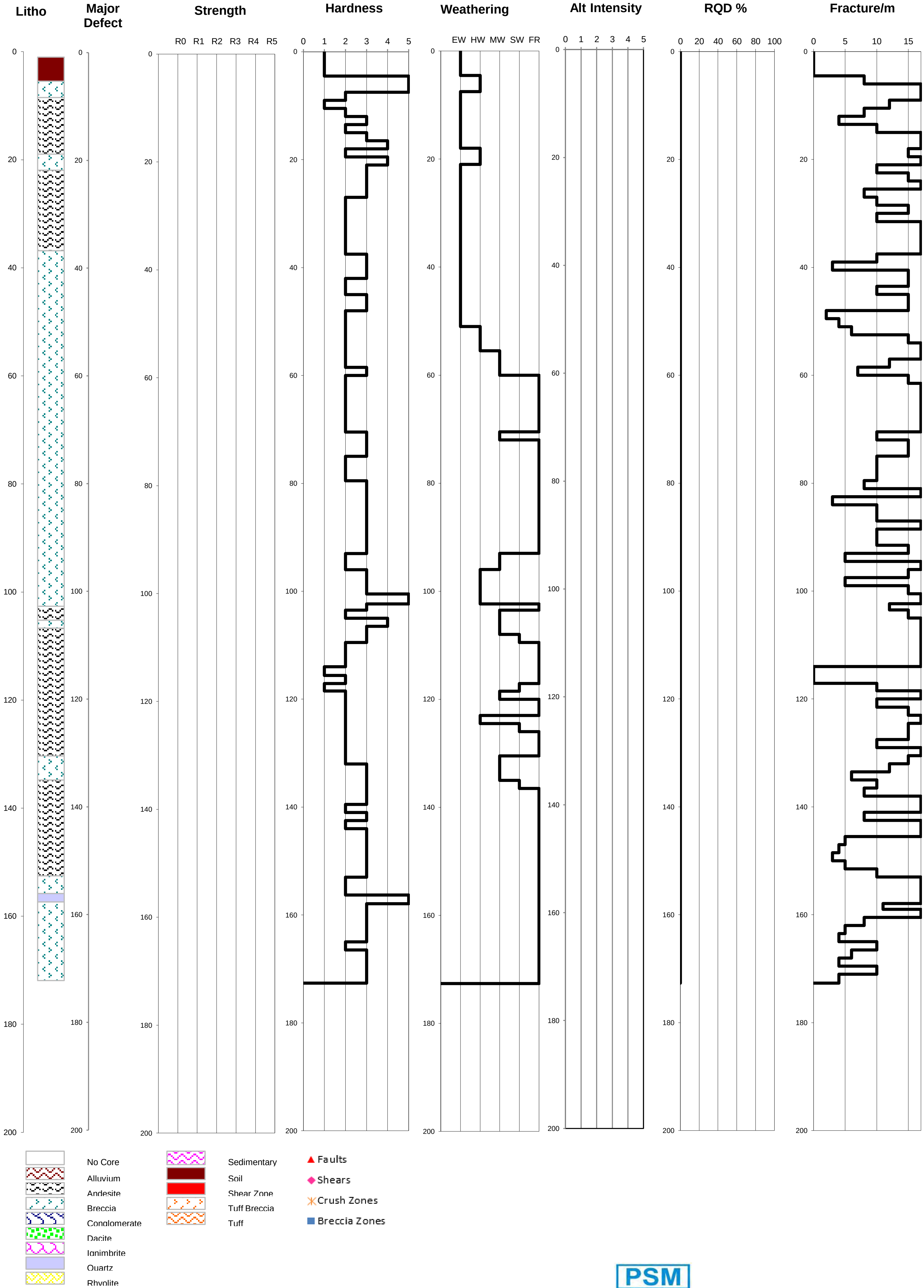
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

Borehole ID: **UW3**

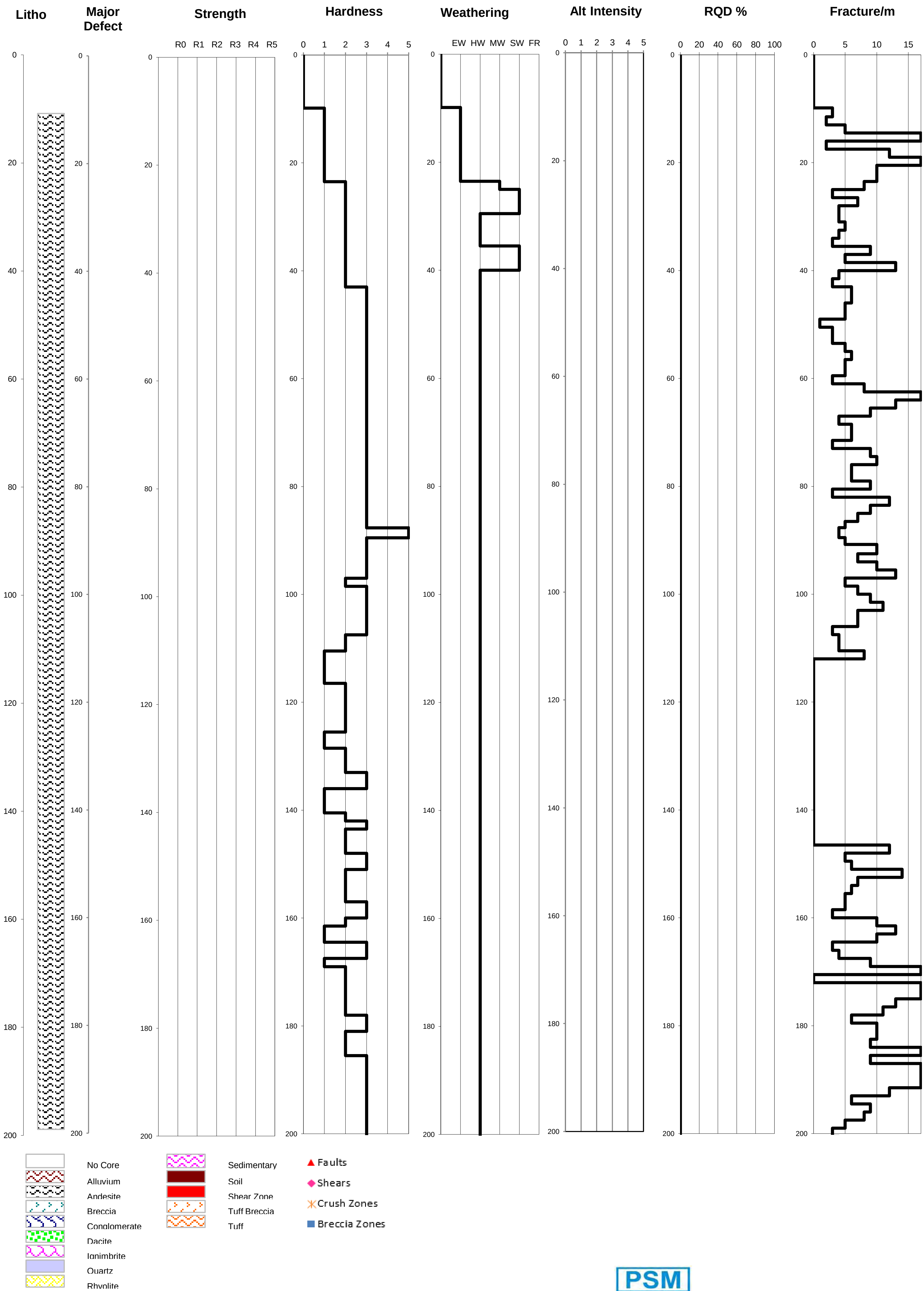
Pells Sullivan Meynink



Borehole ID: UW32

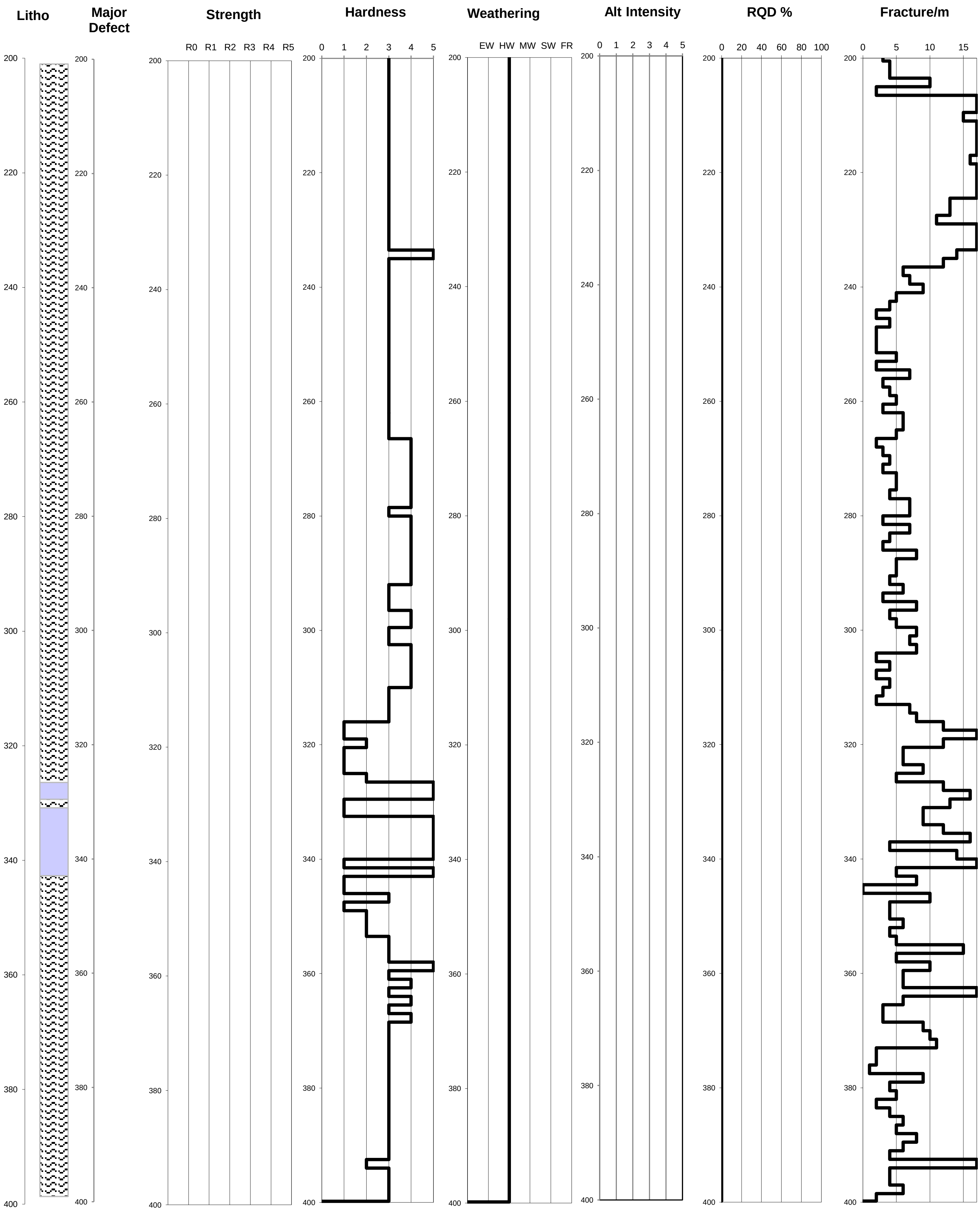
PSM

Pells Sullivan Meynink



Borehole ID: UW34

Pells Sullivan Meynink

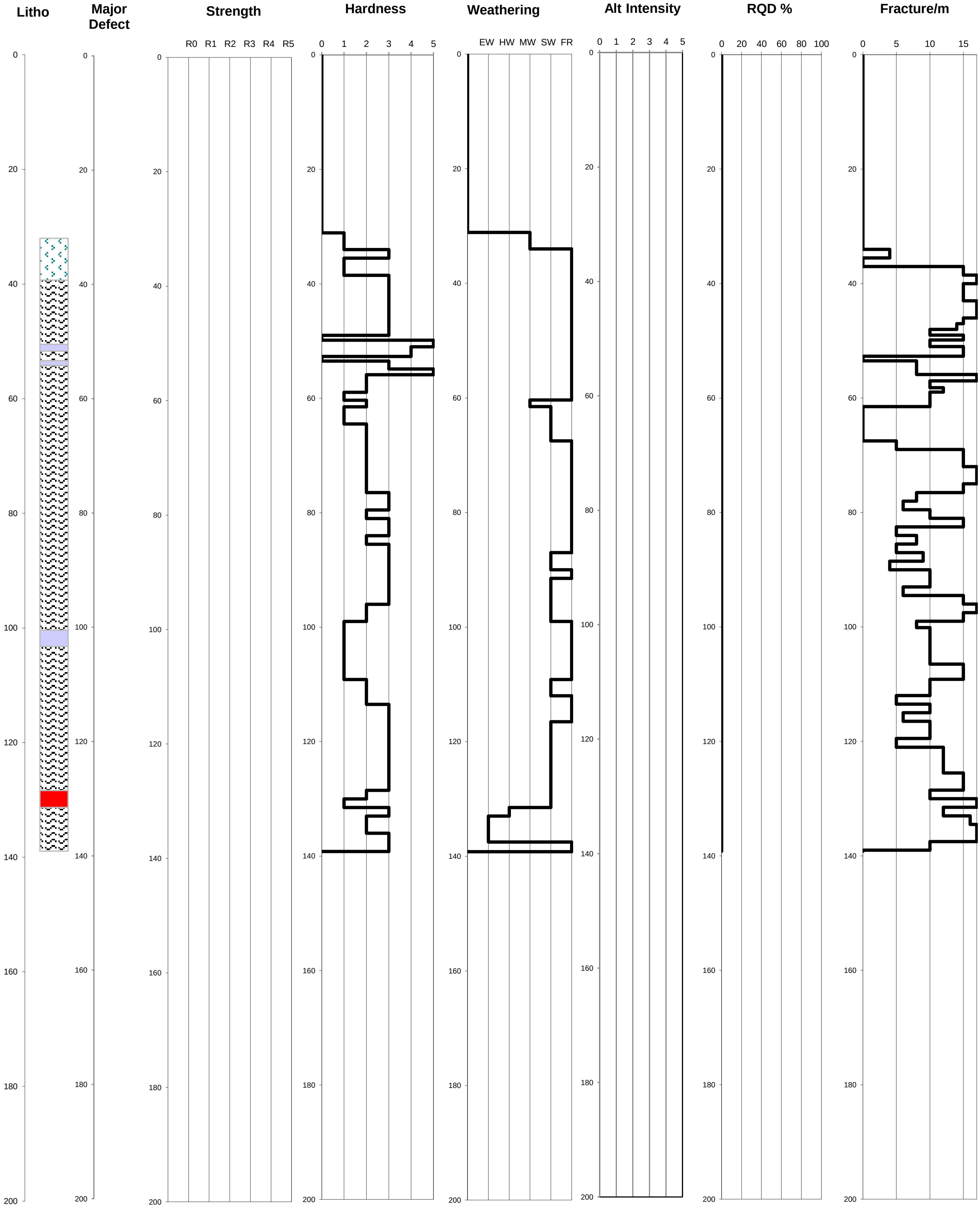


No Core	Sedimentary
Alluvium	Soil
Andesite	Shear Zone
Breccia	Tuff Breccia
Conglomerate	Tuff
Dacite	
Ignimbrite	
Quartz	
Rhyolite	

- ▲ Faults
- ◆ Shears
- ✳ Crush Zones
- ■ Breccia Zones

Borehole ID: **UW34**

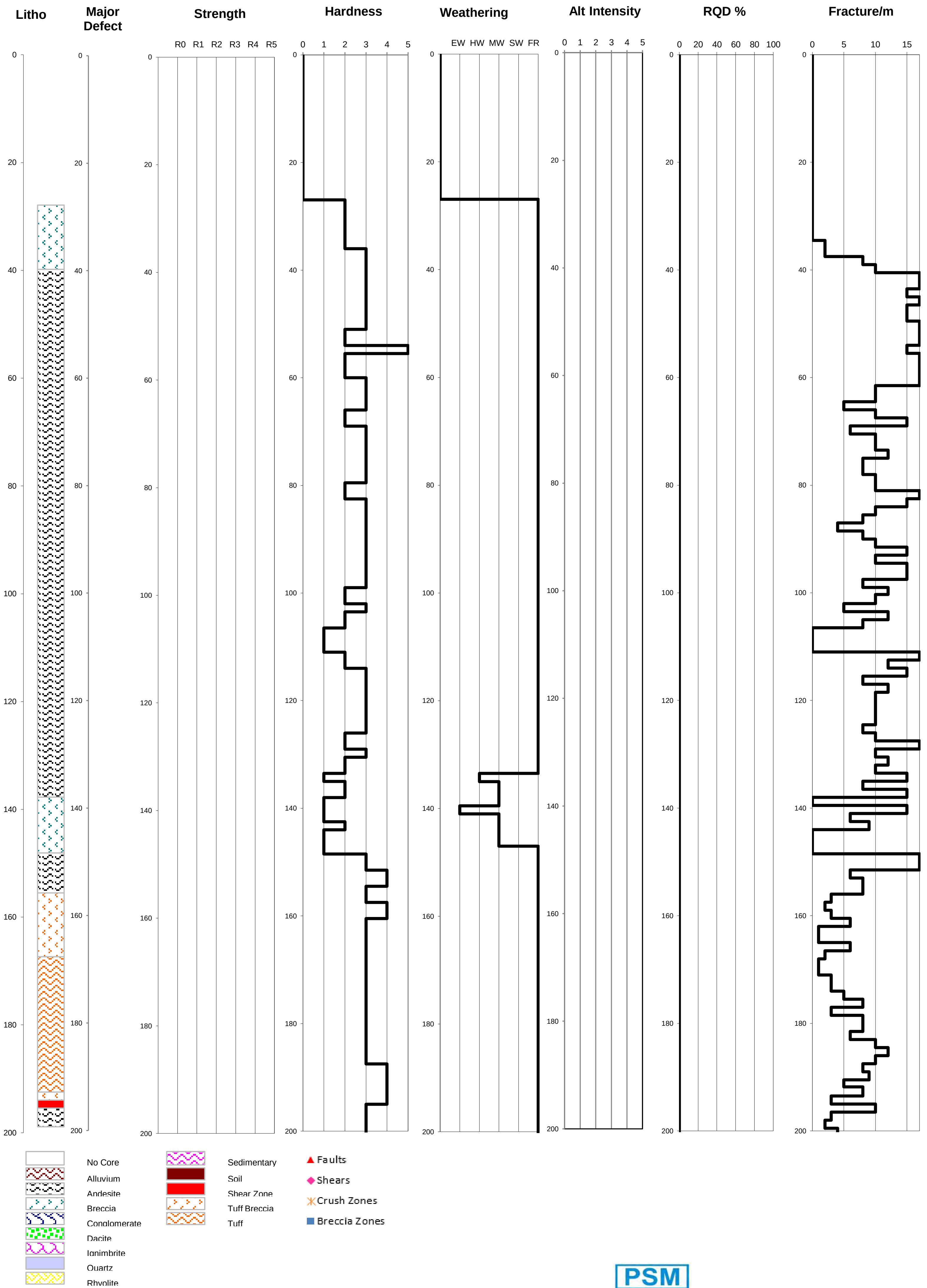
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

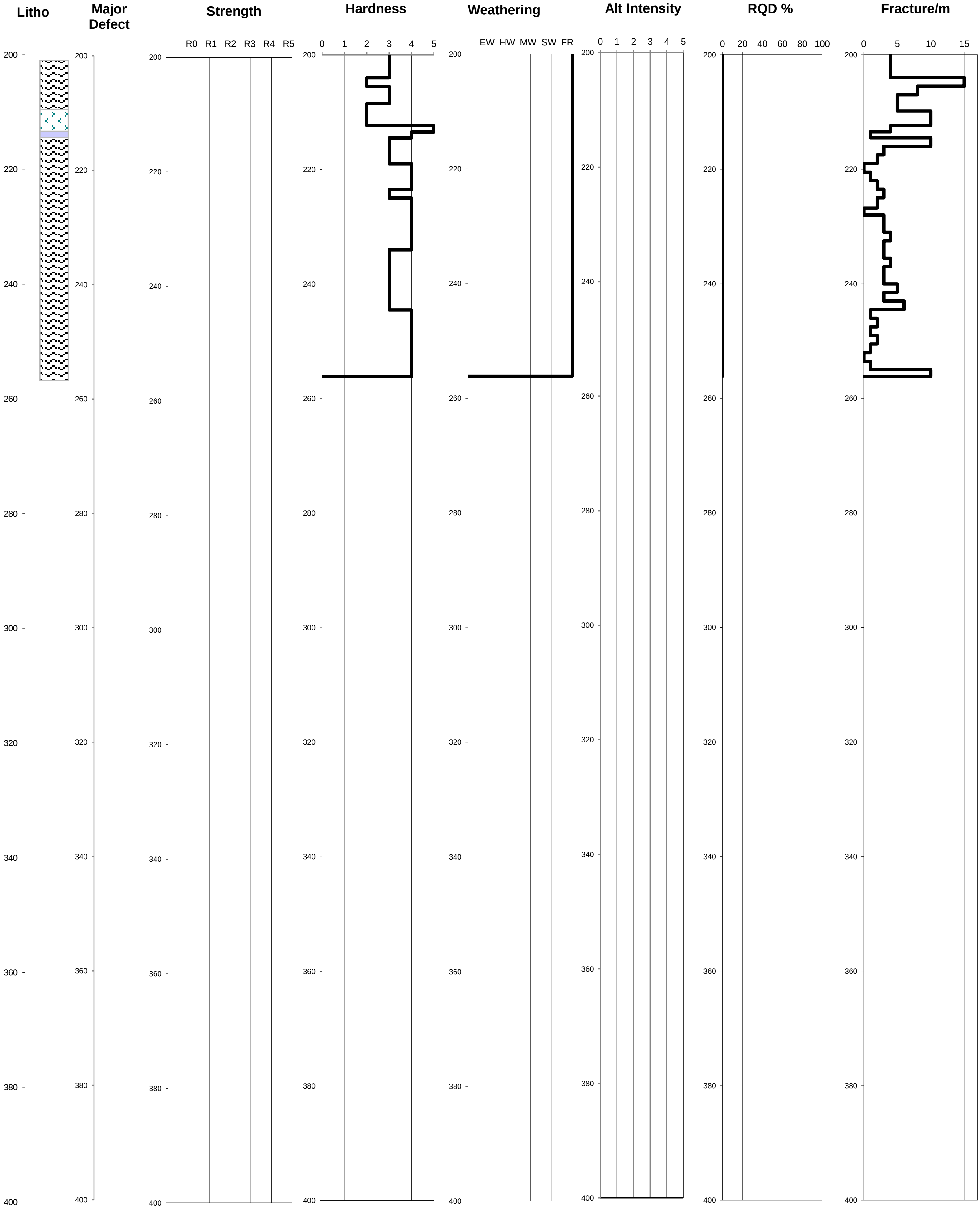
Borehole ID: **UW36**

PSM **Pells Sullivan Meynink**



Borehole ID: **UW36B**

Pells Sullivan Meynink

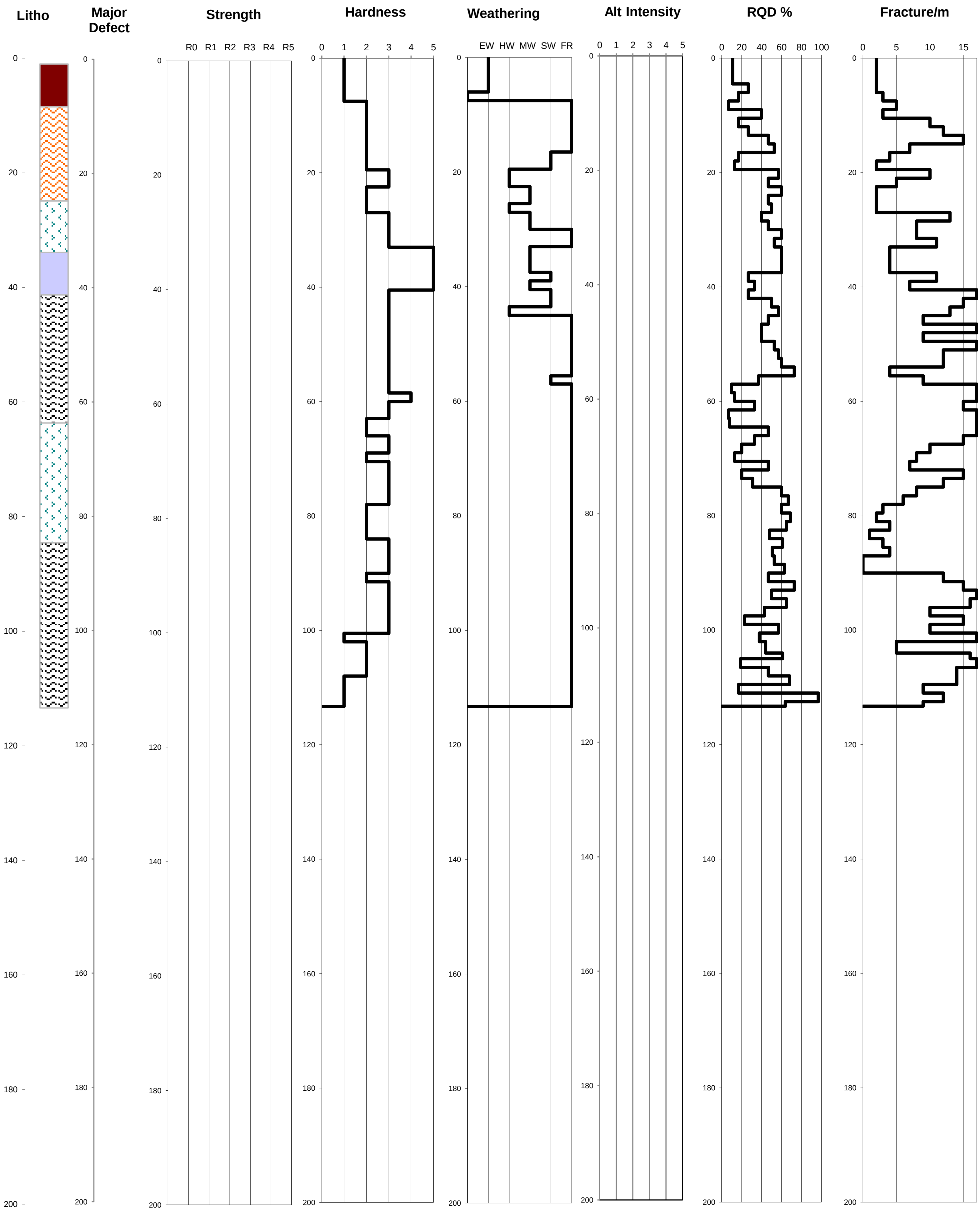


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
Crush Zones
■ Breccia Zones

Borehole ID: **UW36B**

Pells Sullivan Meynink



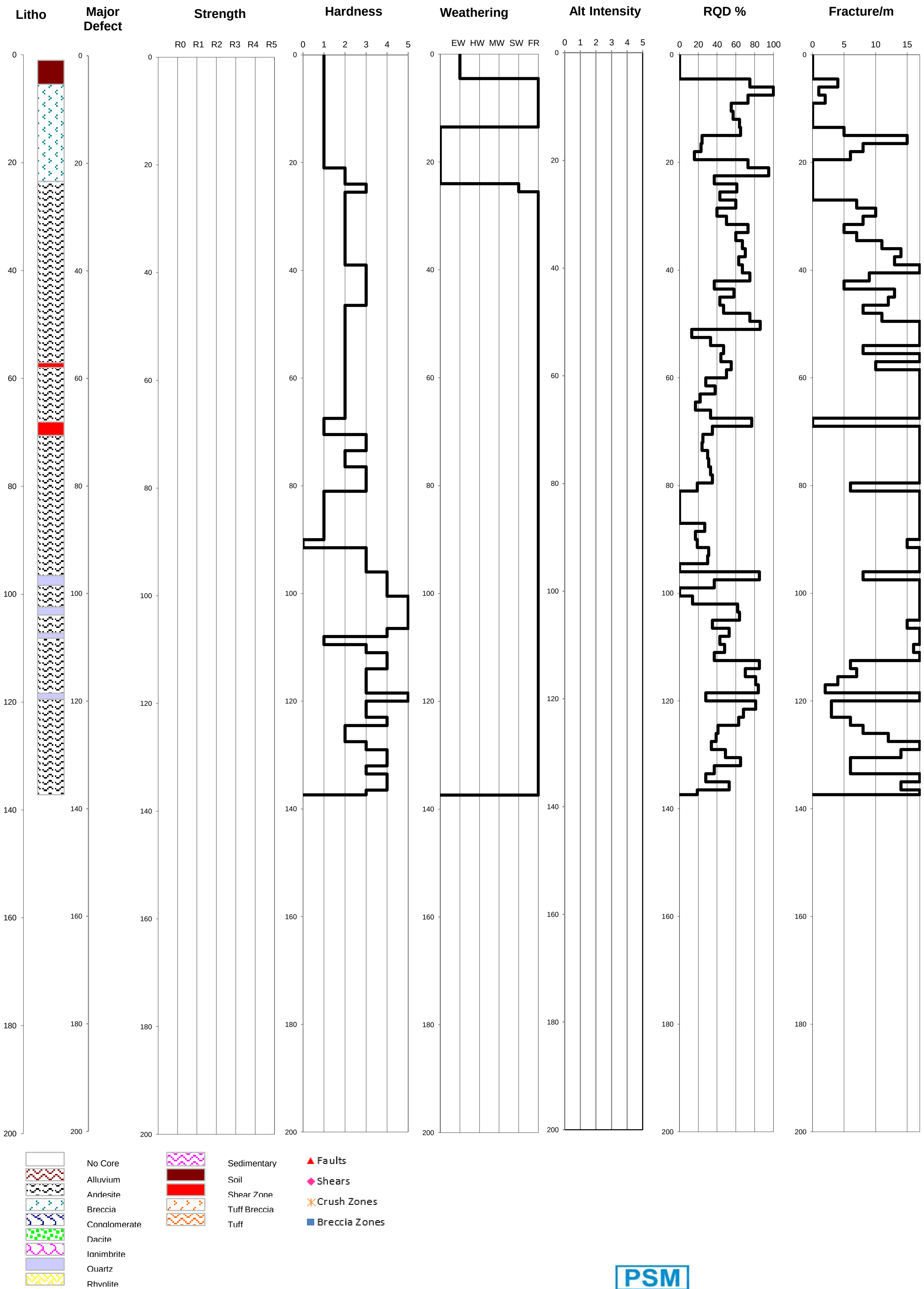
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

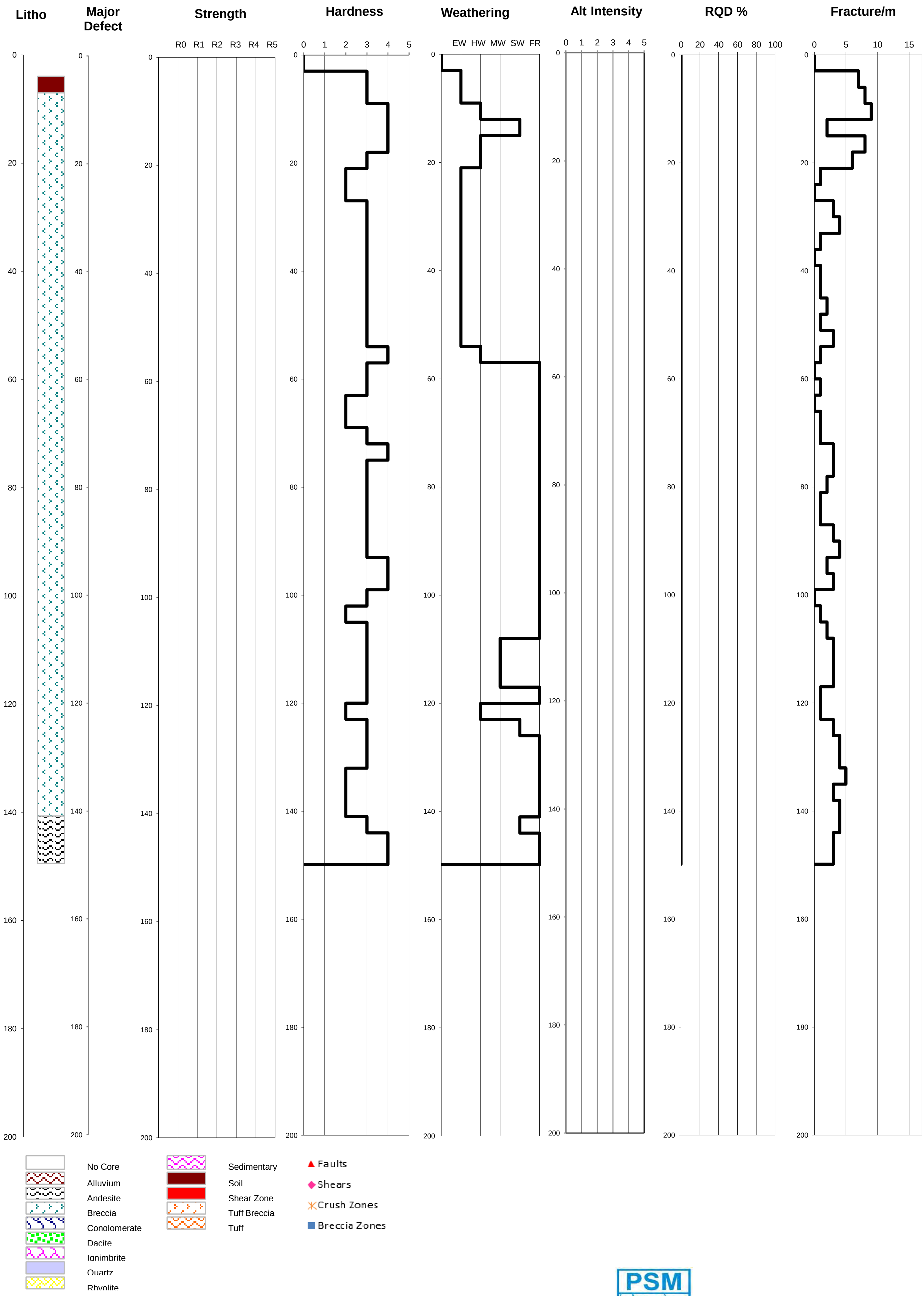
Borehole ID: **UW38**

Pells Sullivan Meynink



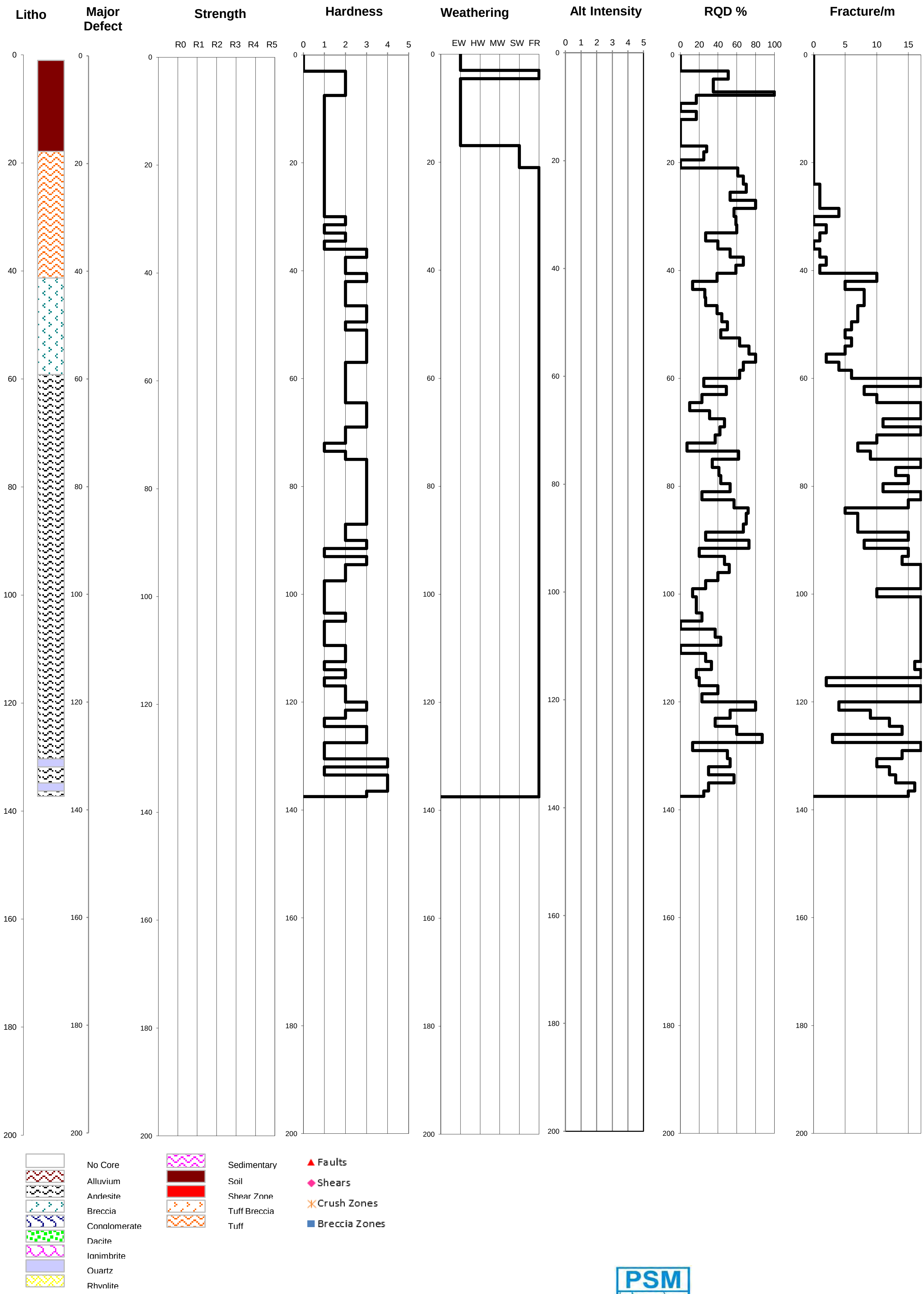
Borehole ID: **UW39**

Pells Sullivan Meynink



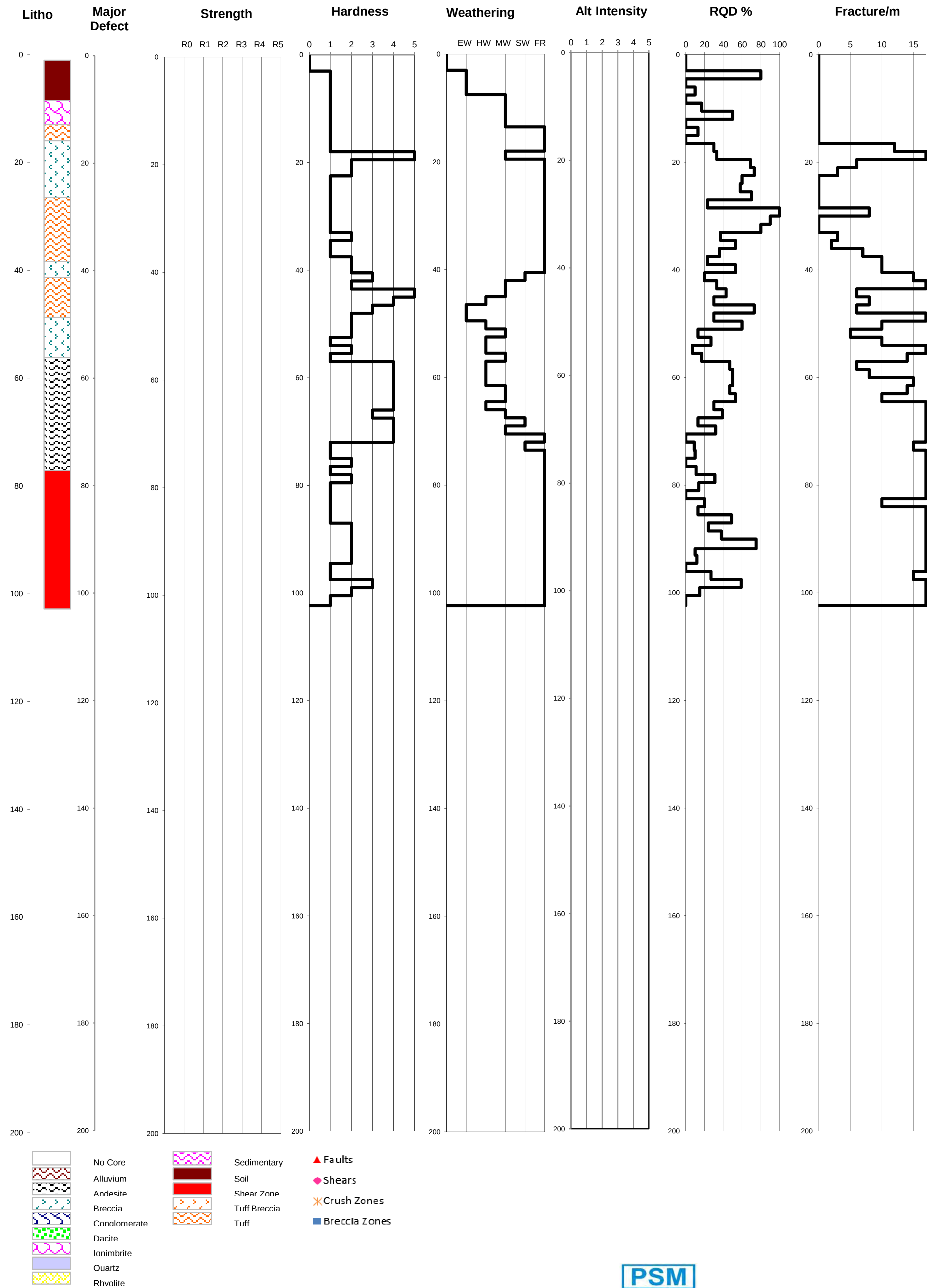
Borehole ID: UW4

Pells Sullivan Meynink



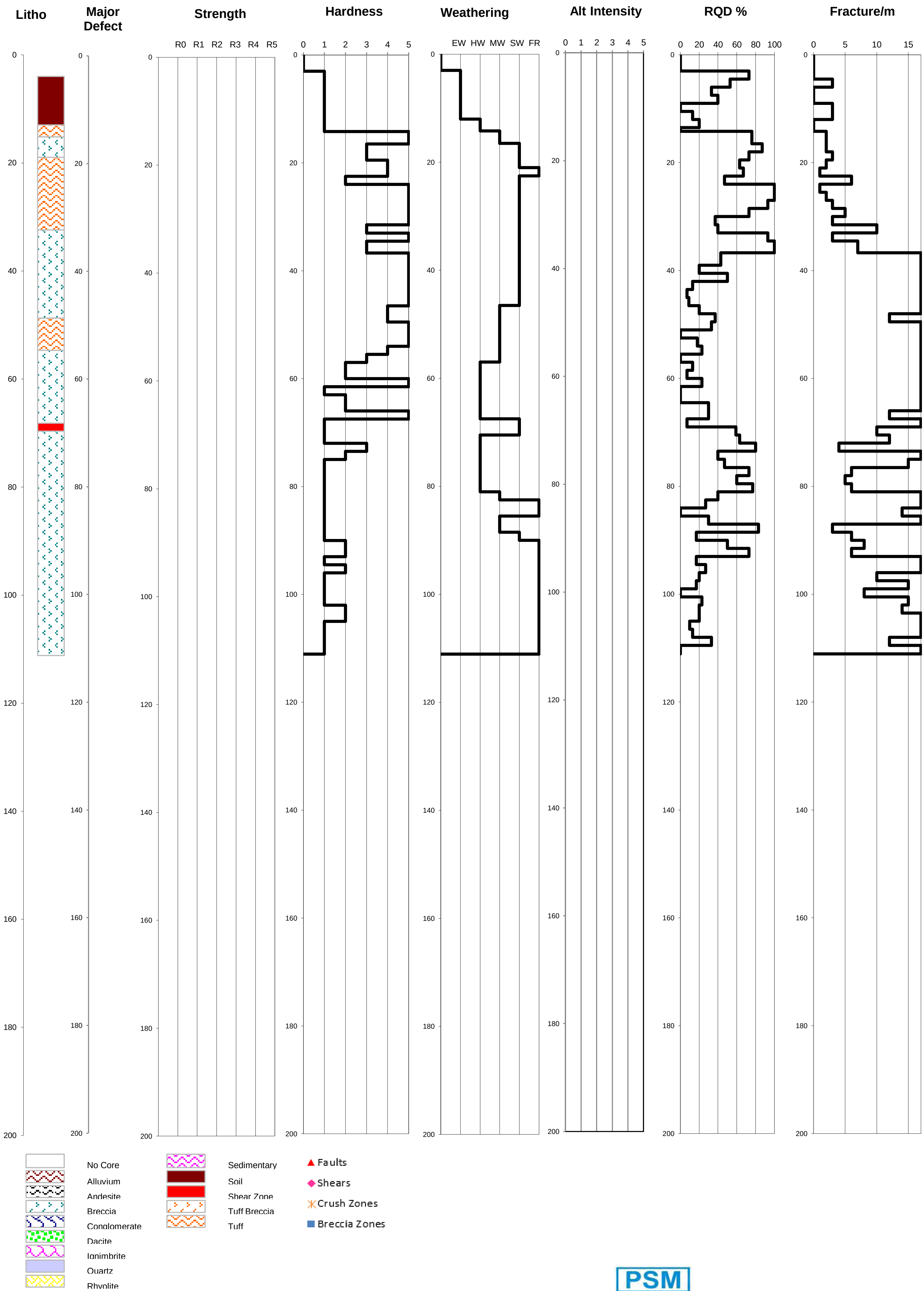
Borehole ID: **UW40**

Pells Sullivan Meynink



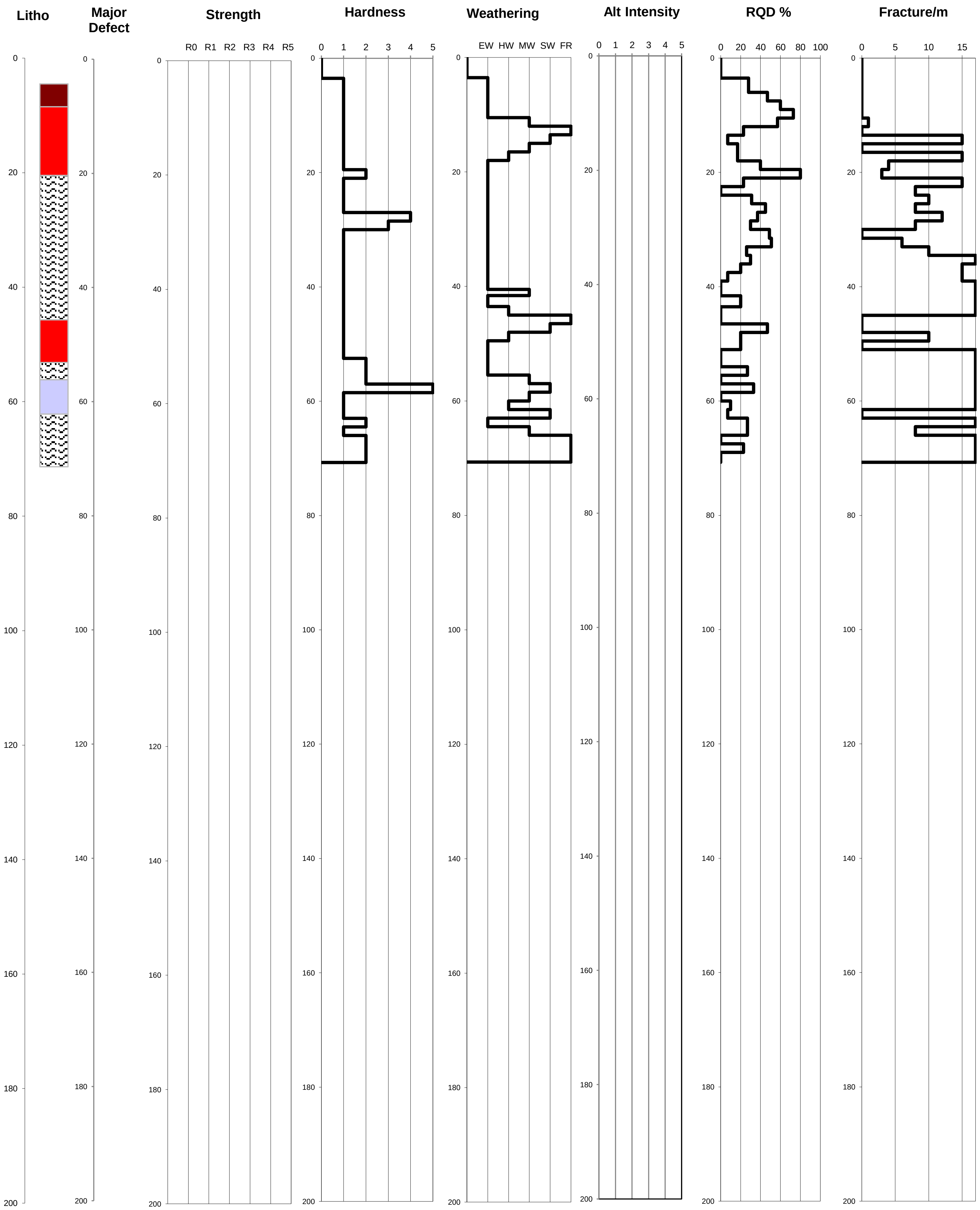
Borehole ID: **UW41**

Pells Sullivan Meynink



Borehole ID: UW42

Pells Sullivan Meynink



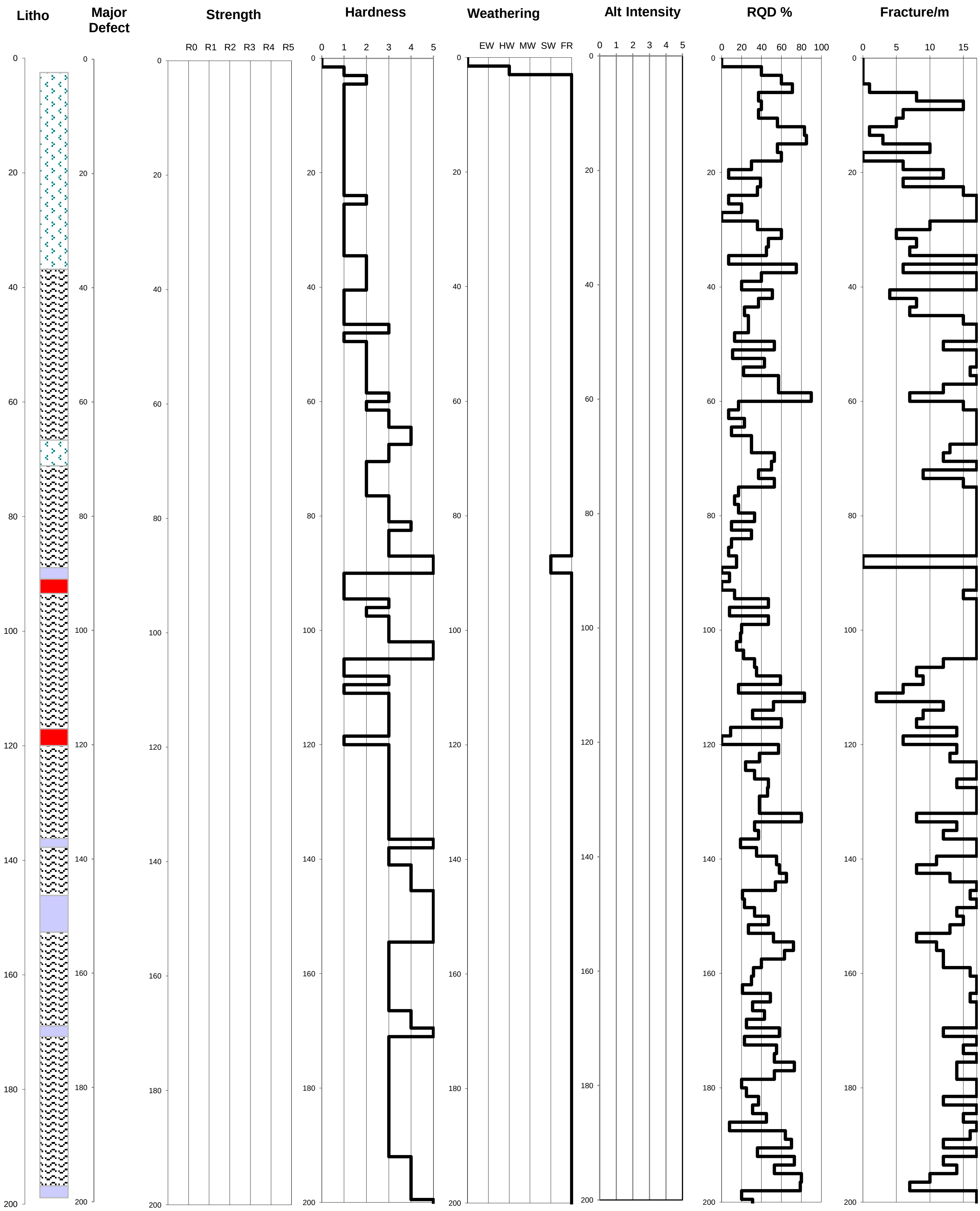
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

Borehole ID: **UW43**

Pells Sullivan Meynink

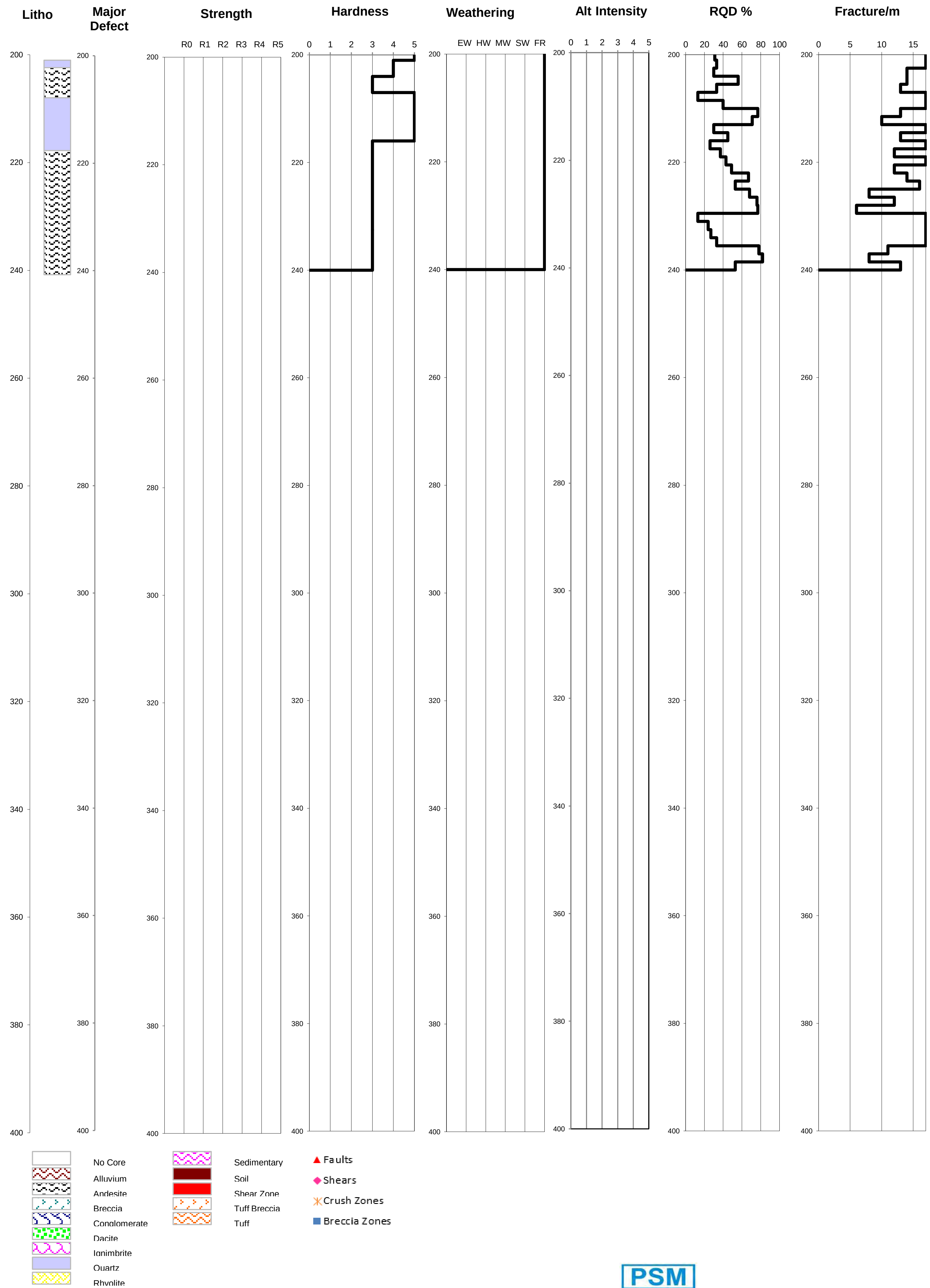


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

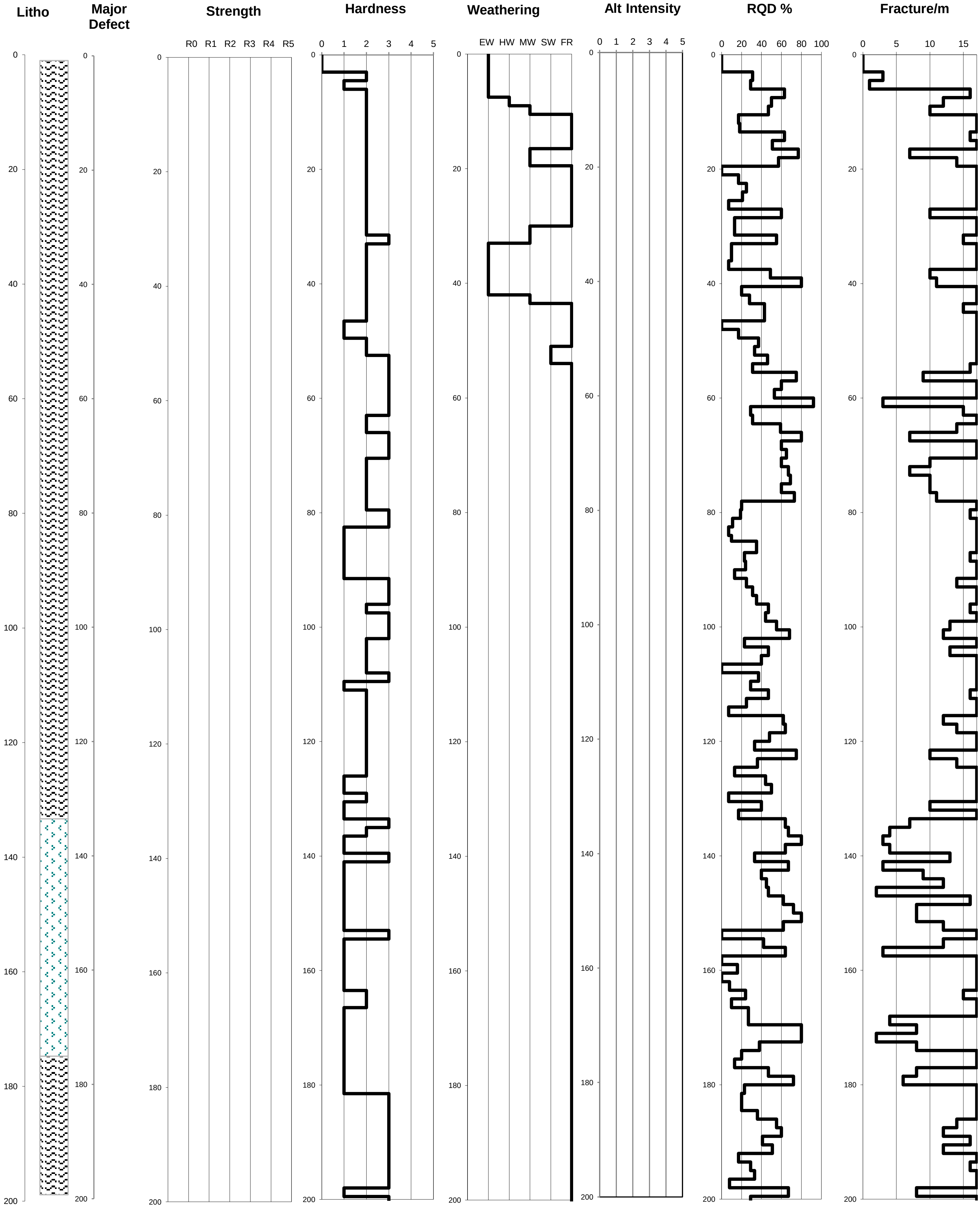
Borehole ID: UW44

Pells Sullivan Meynink



Borehole ID: **UW44**

Pells Sullivan Meynink



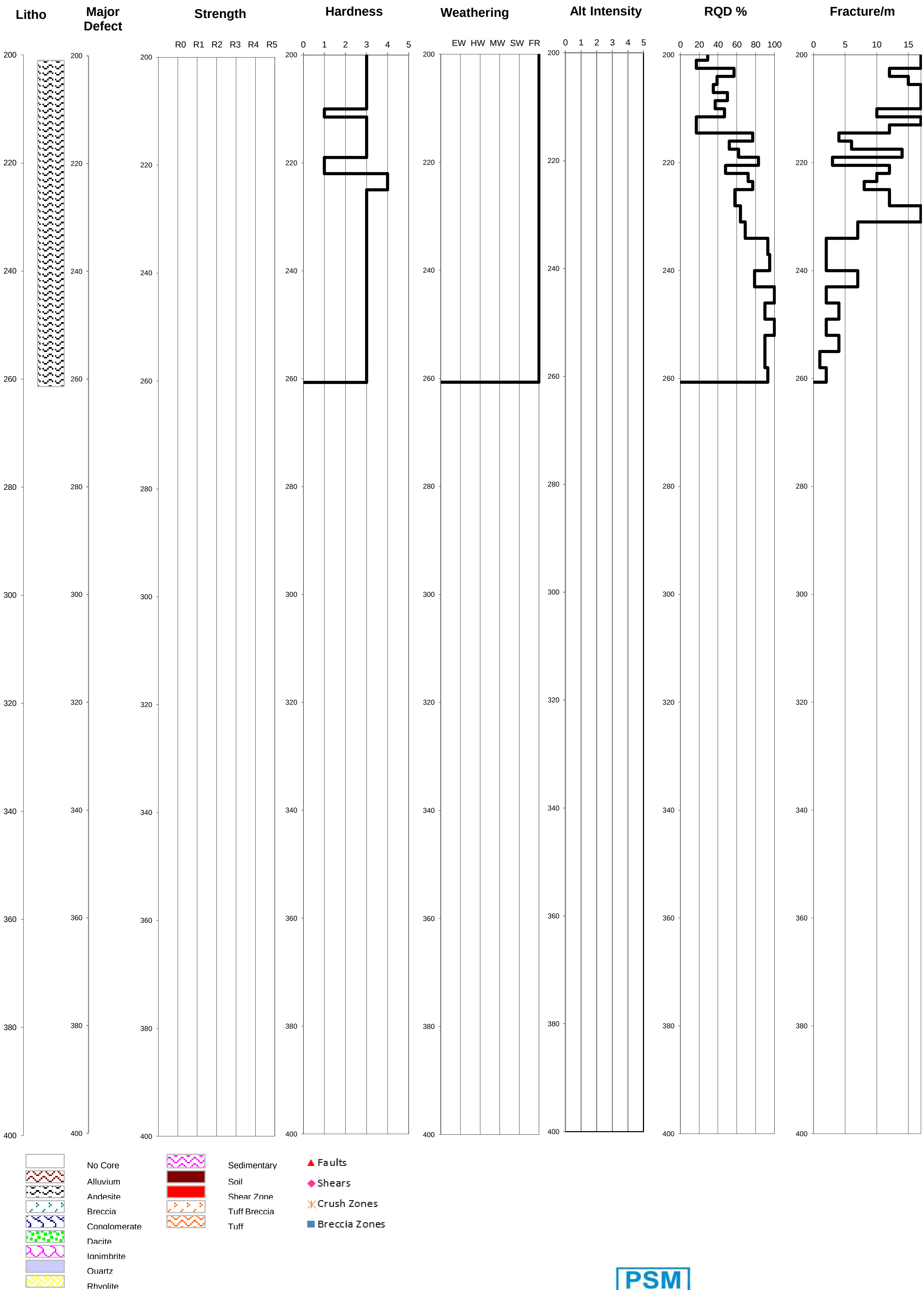
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

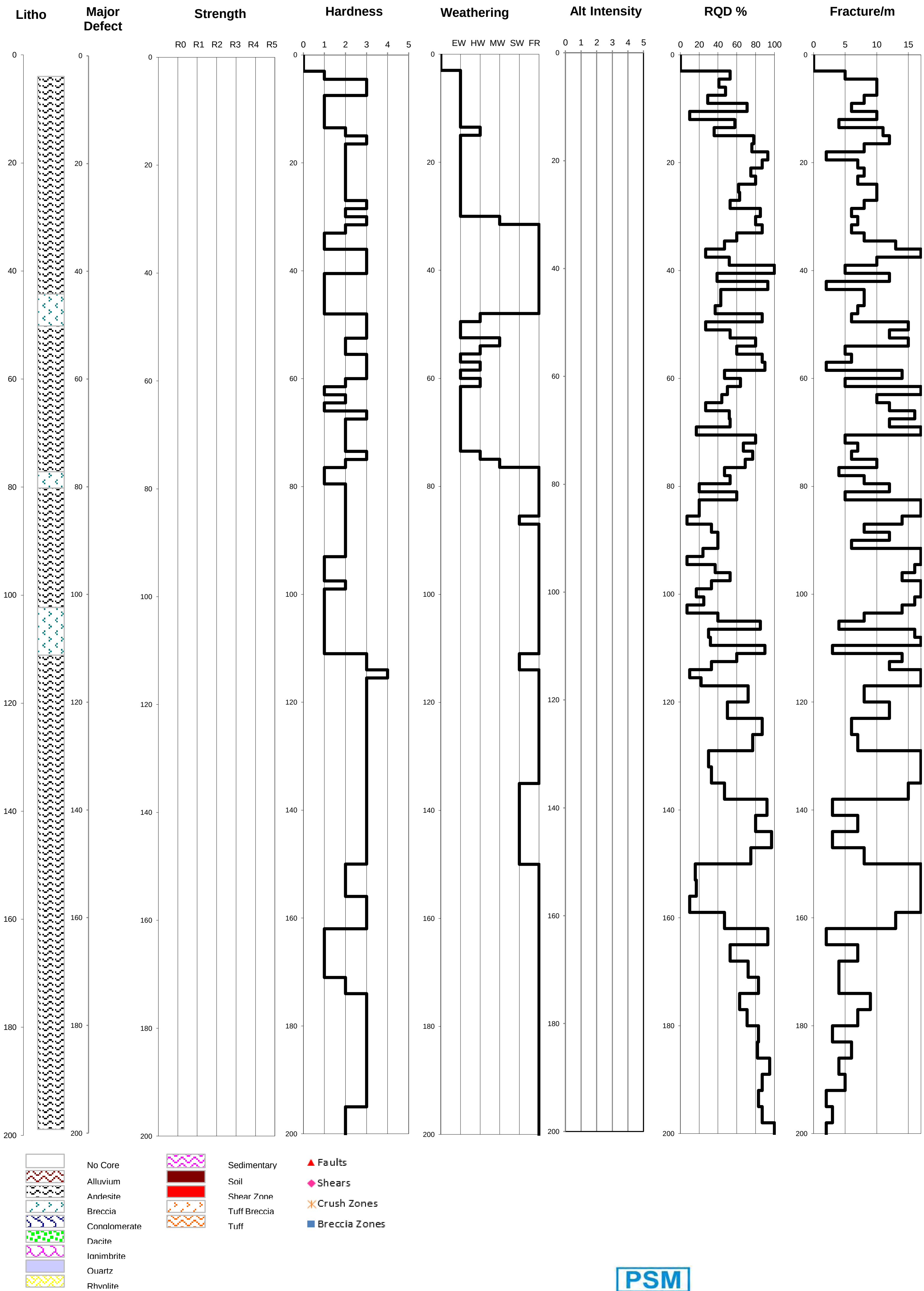
Borehole ID: **UW45**

Pells Sullivan Meynink



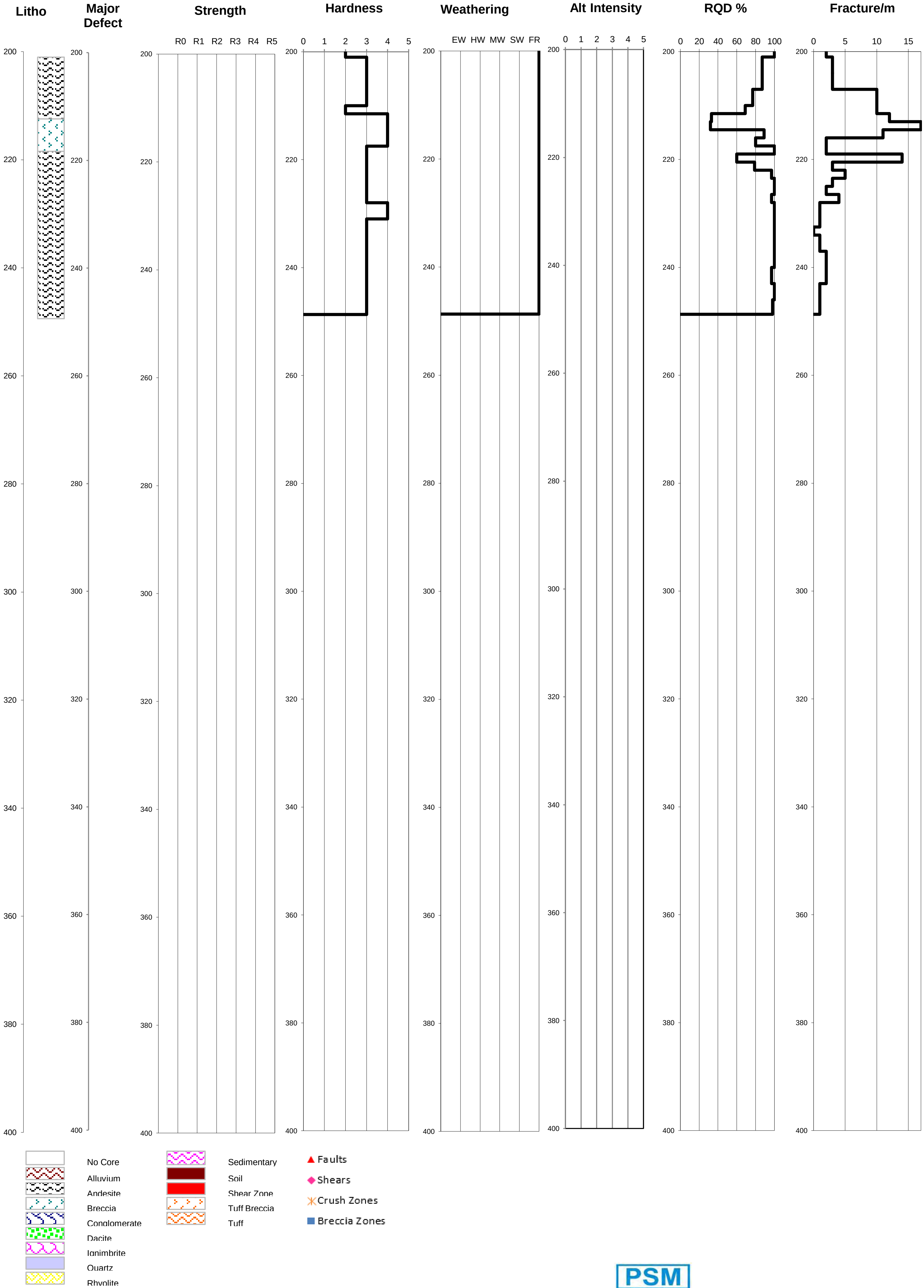
Borehole ID: UW45

Pells Sullivan Meynink



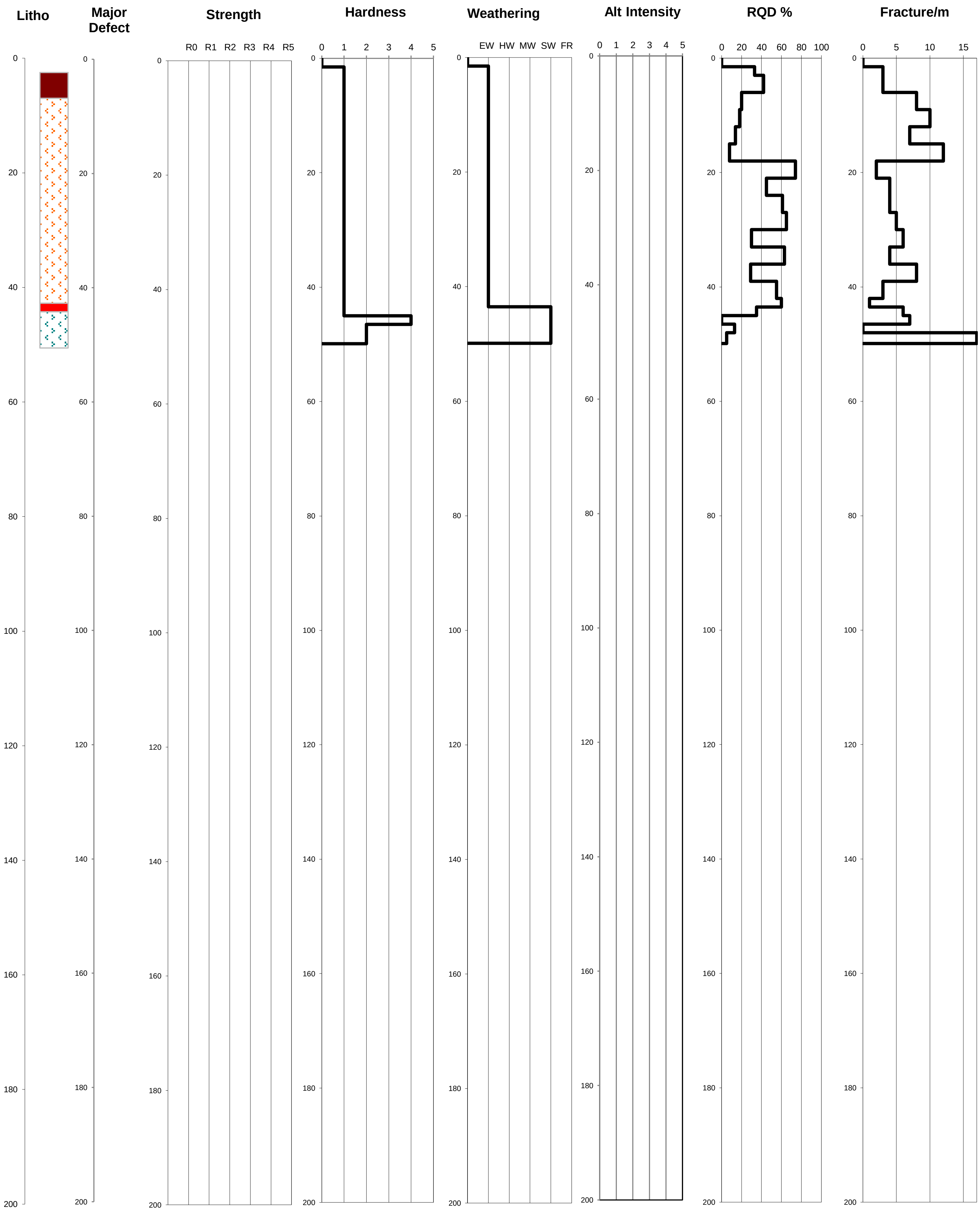
Borehole ID: **UW46**

Pells Sullivan Meynink



Borehole ID: **UW46**

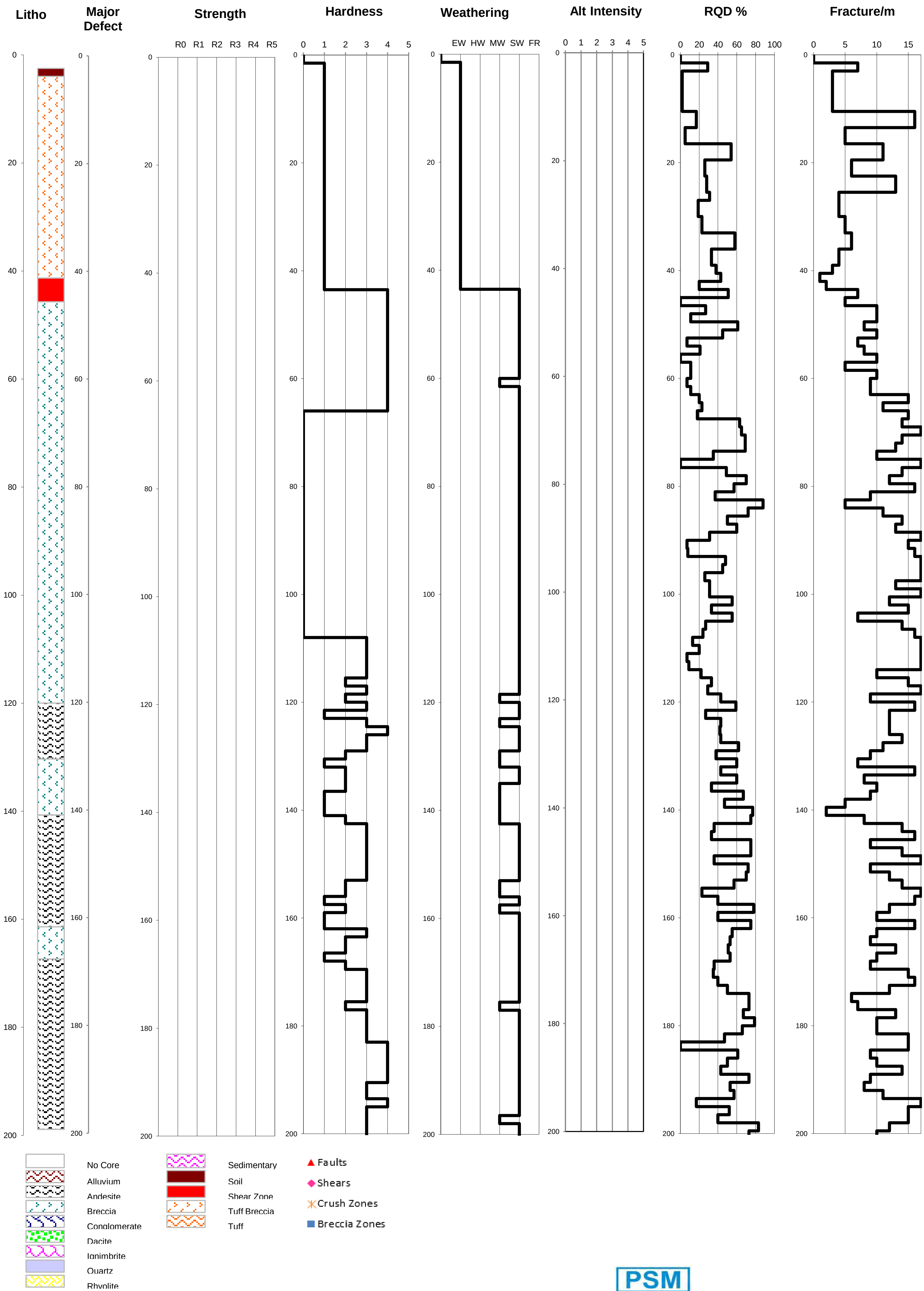
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
Faults
Shears
Crush Zones
Breccia Zones

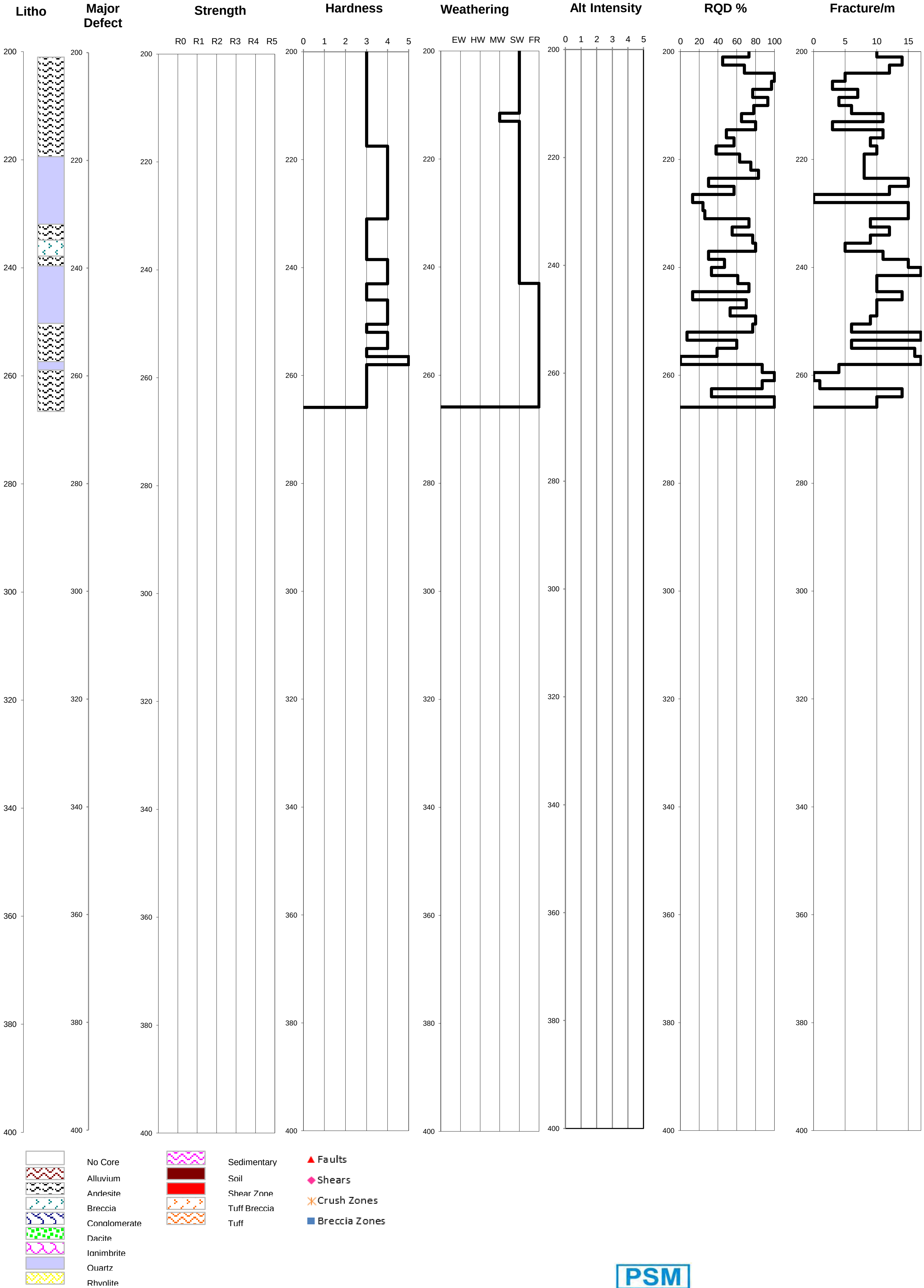
Borehole ID: UW47

PSM Pells Sullivan Meynink



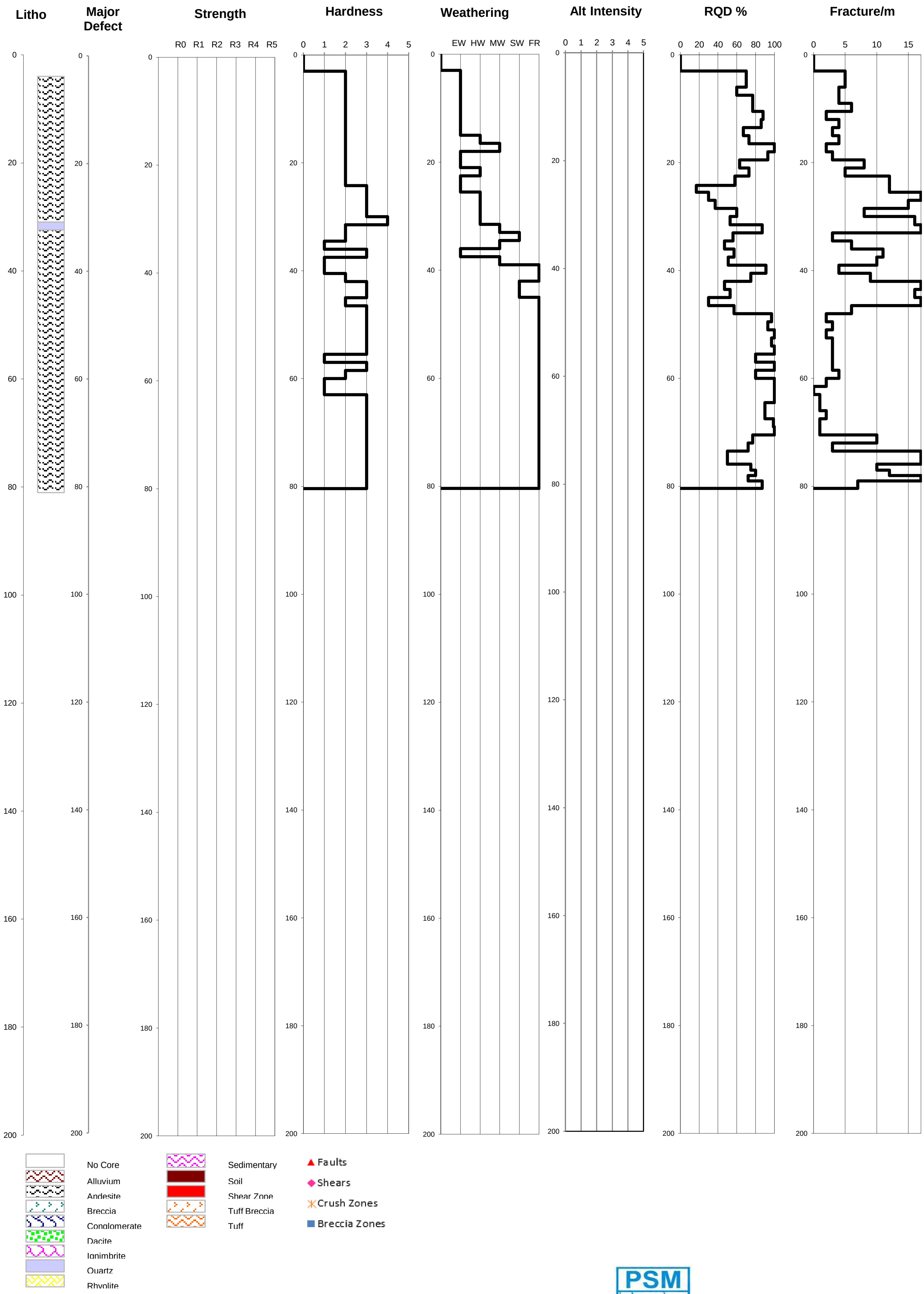
Borehole ID: UW47B

Pells Sullivan Meynink



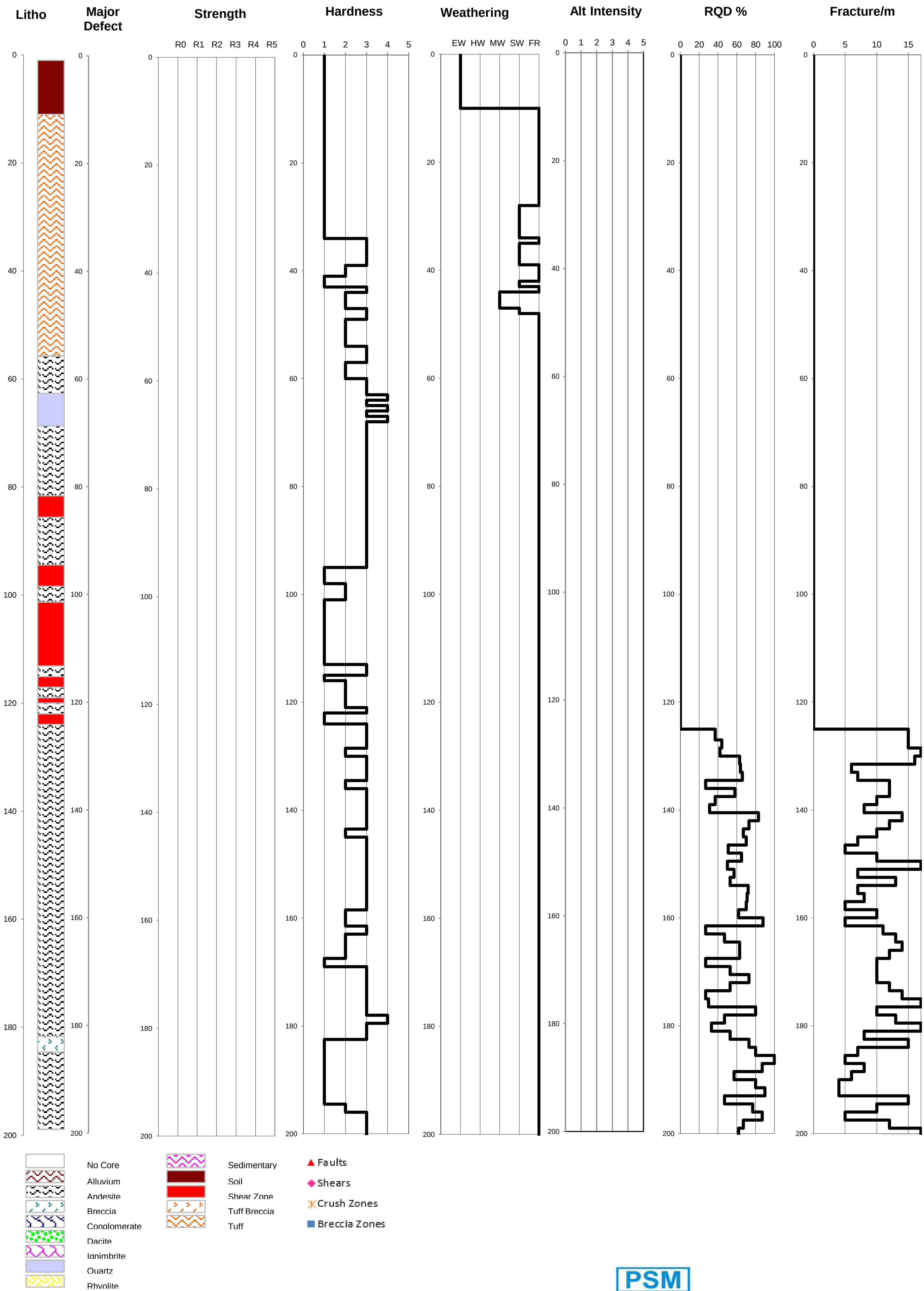
Borehole ID: **UW47B**

Pells Sullivan Meynink



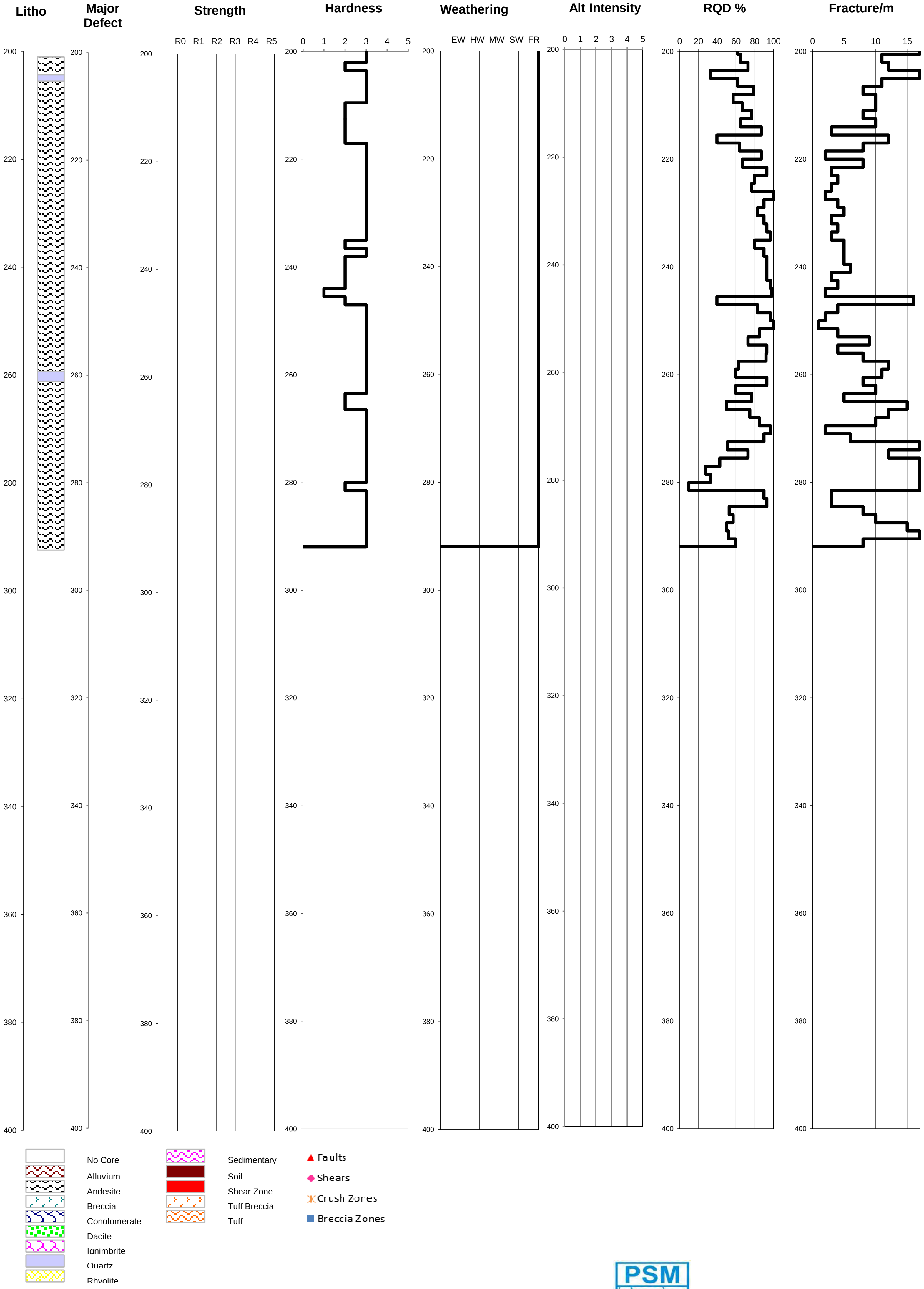
Borehole ID: UW48

Pells Sullivan Meynink



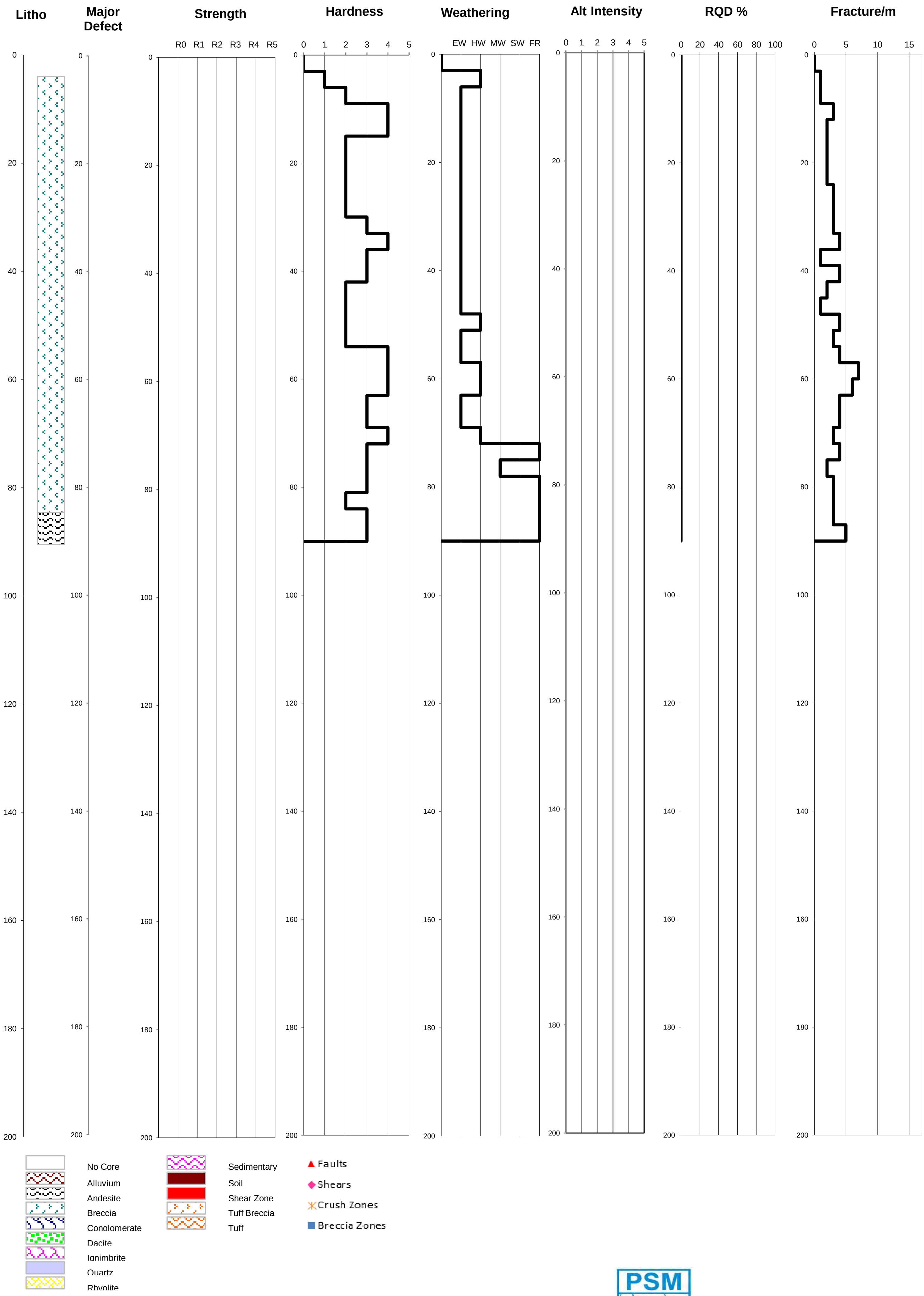
Borehole ID: UW49

Pells Sullivan Meynink



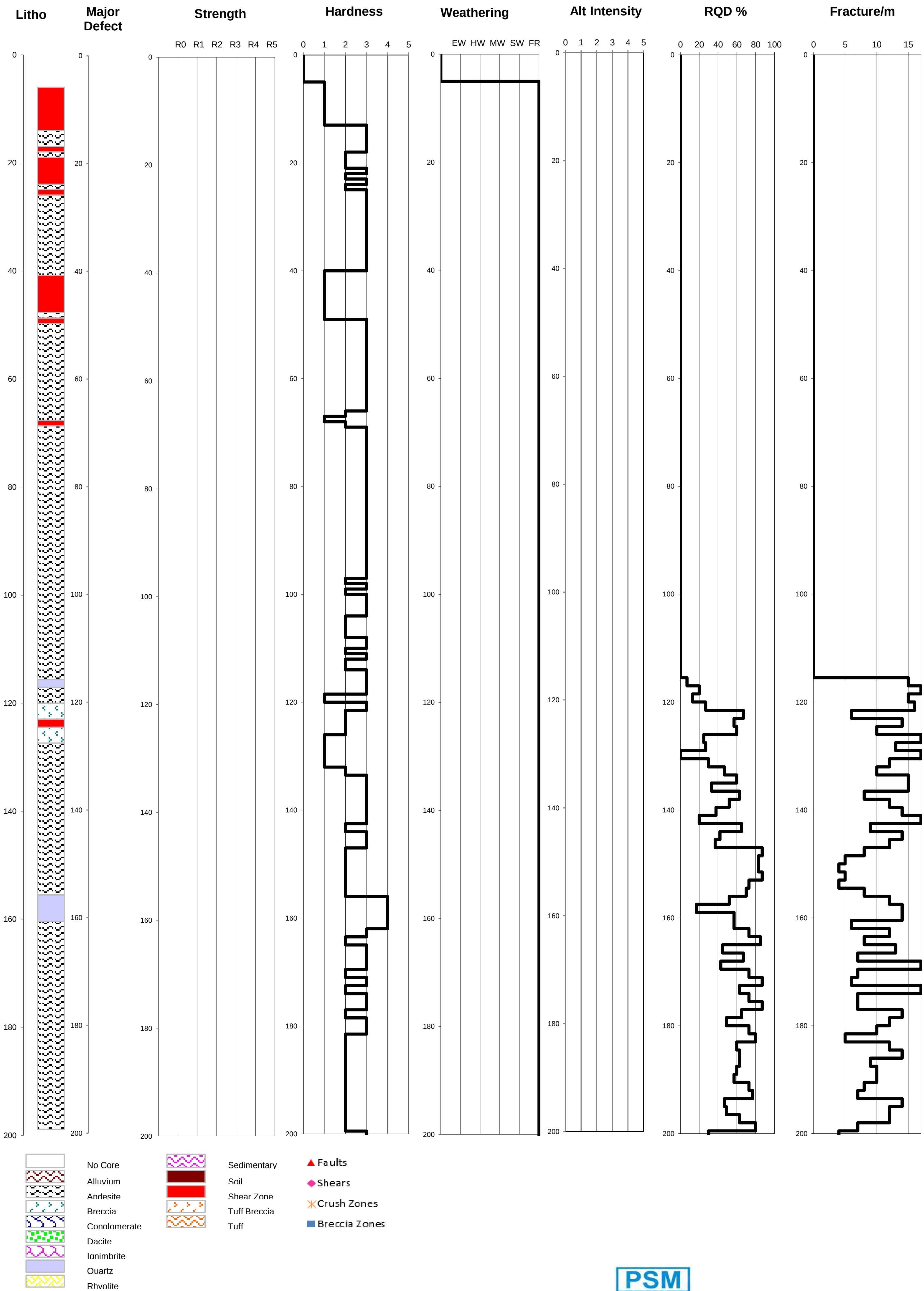
Borehole ID: UW49

Pells Sullivan Meynink



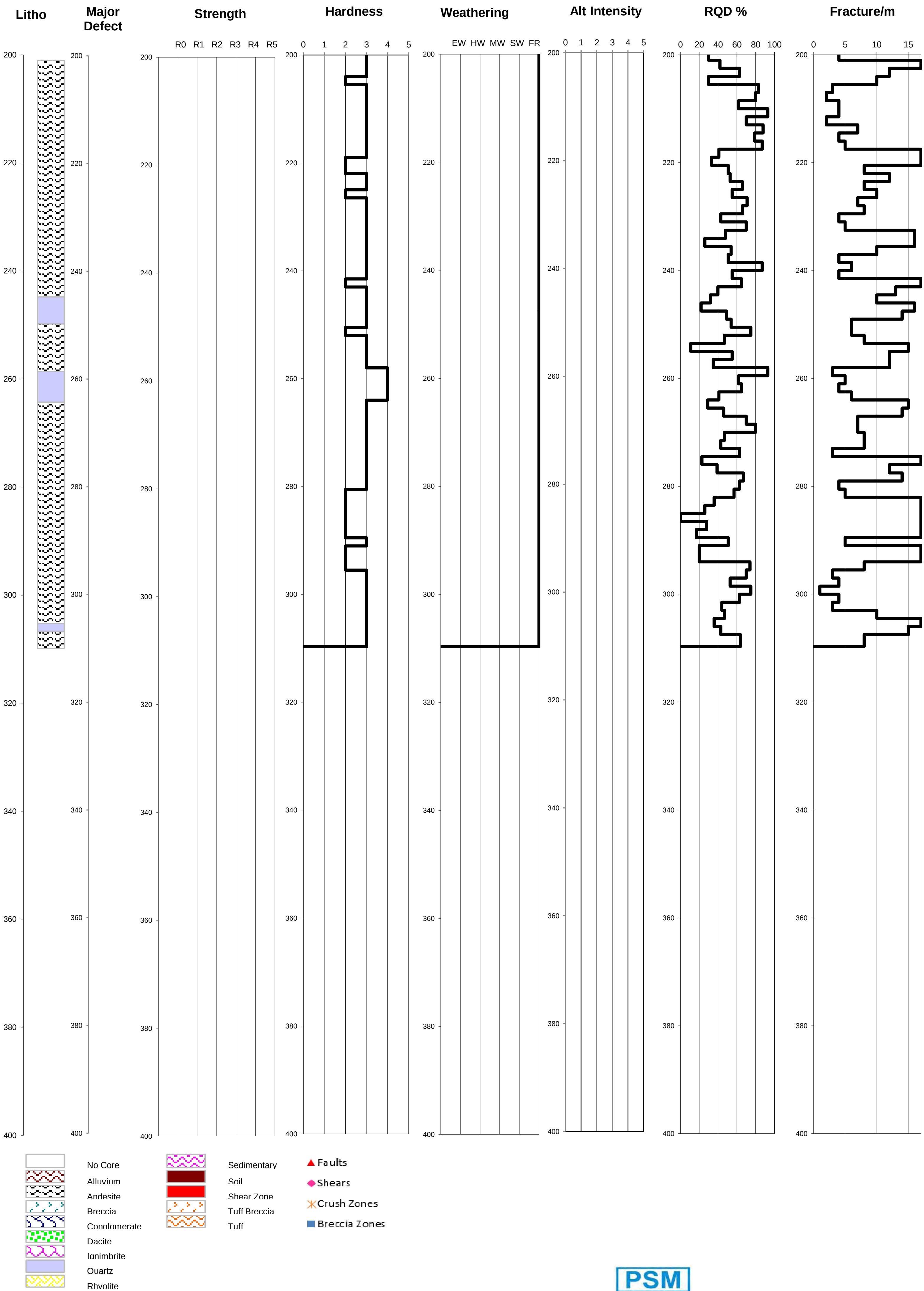
Borehole ID: **UW5**

Pells Sullivan Meynink



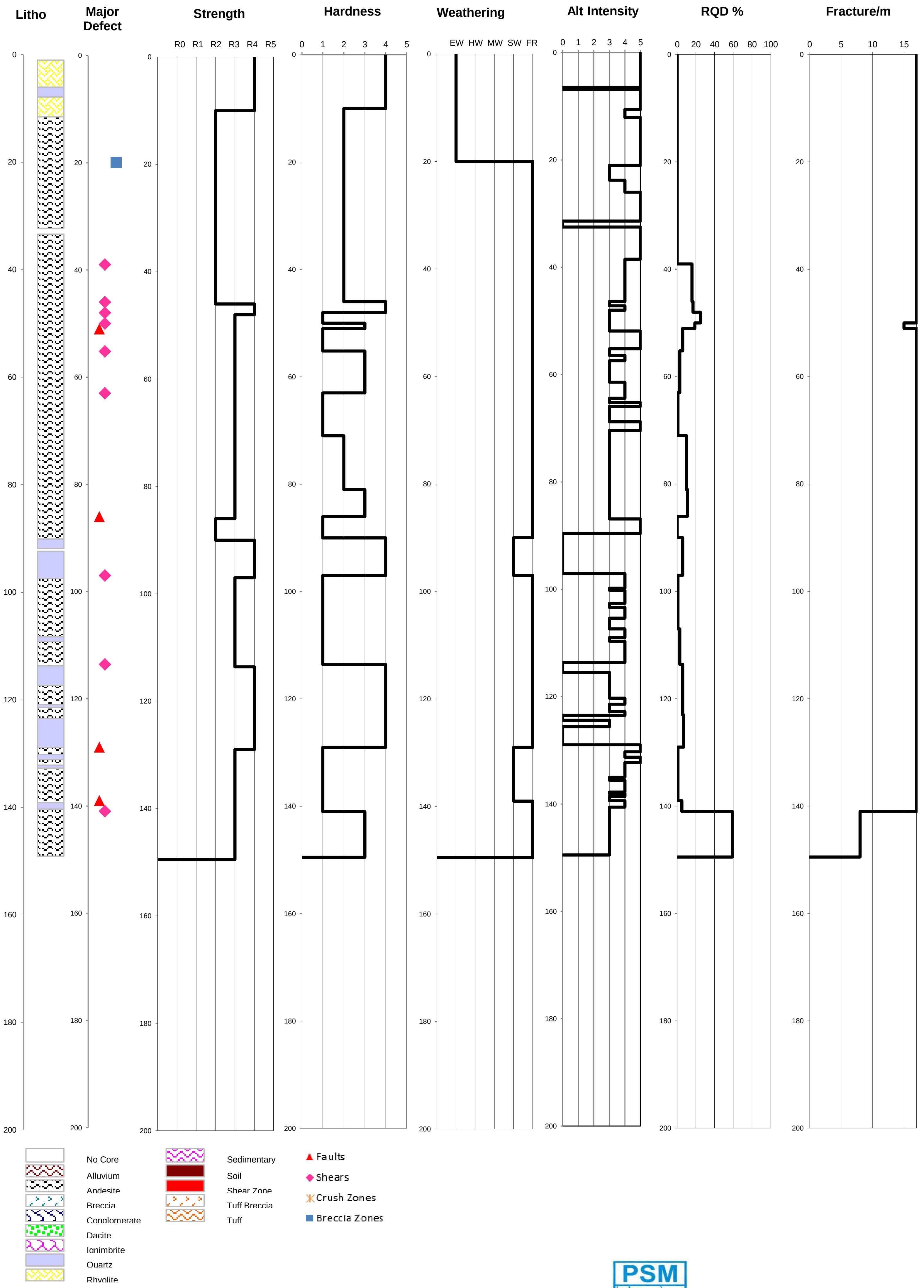
Borehole ID: **UW50**

Pells Sullivan Meynink



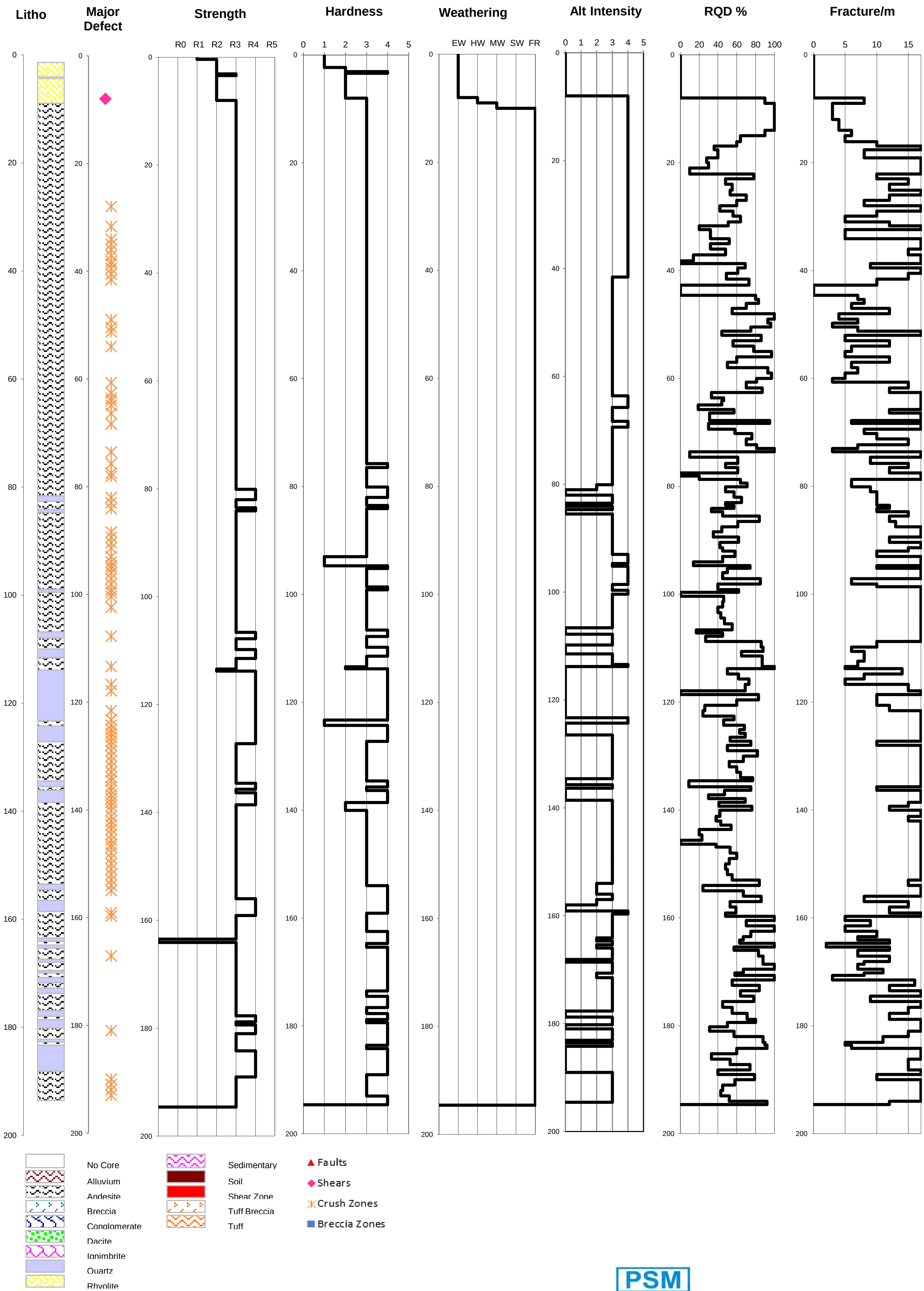
Borehole ID: **UW50**

PSM **Pells Sullivan Meynink**



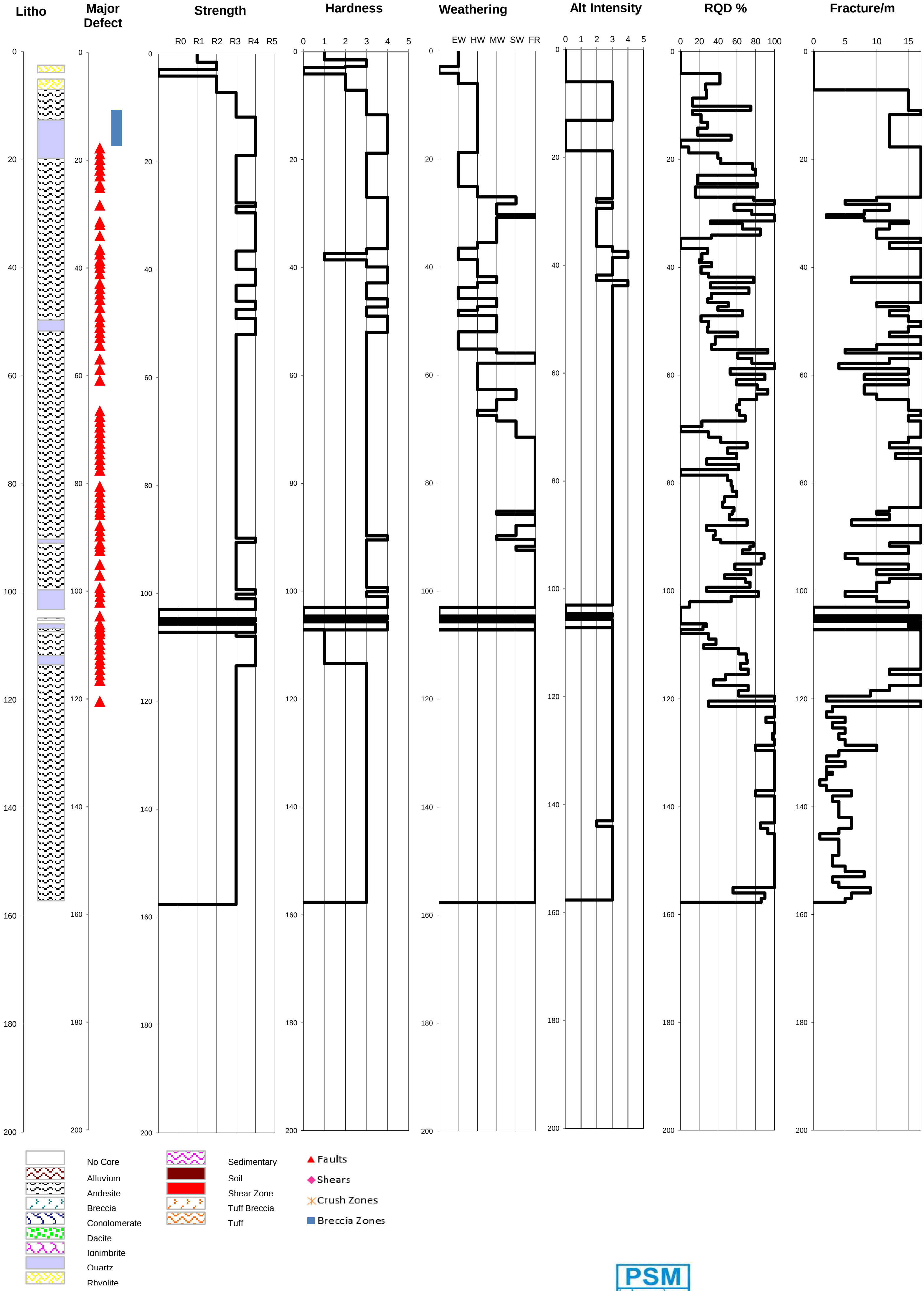
Borehole ID: **UW500**

Pells Sullivan Meynink



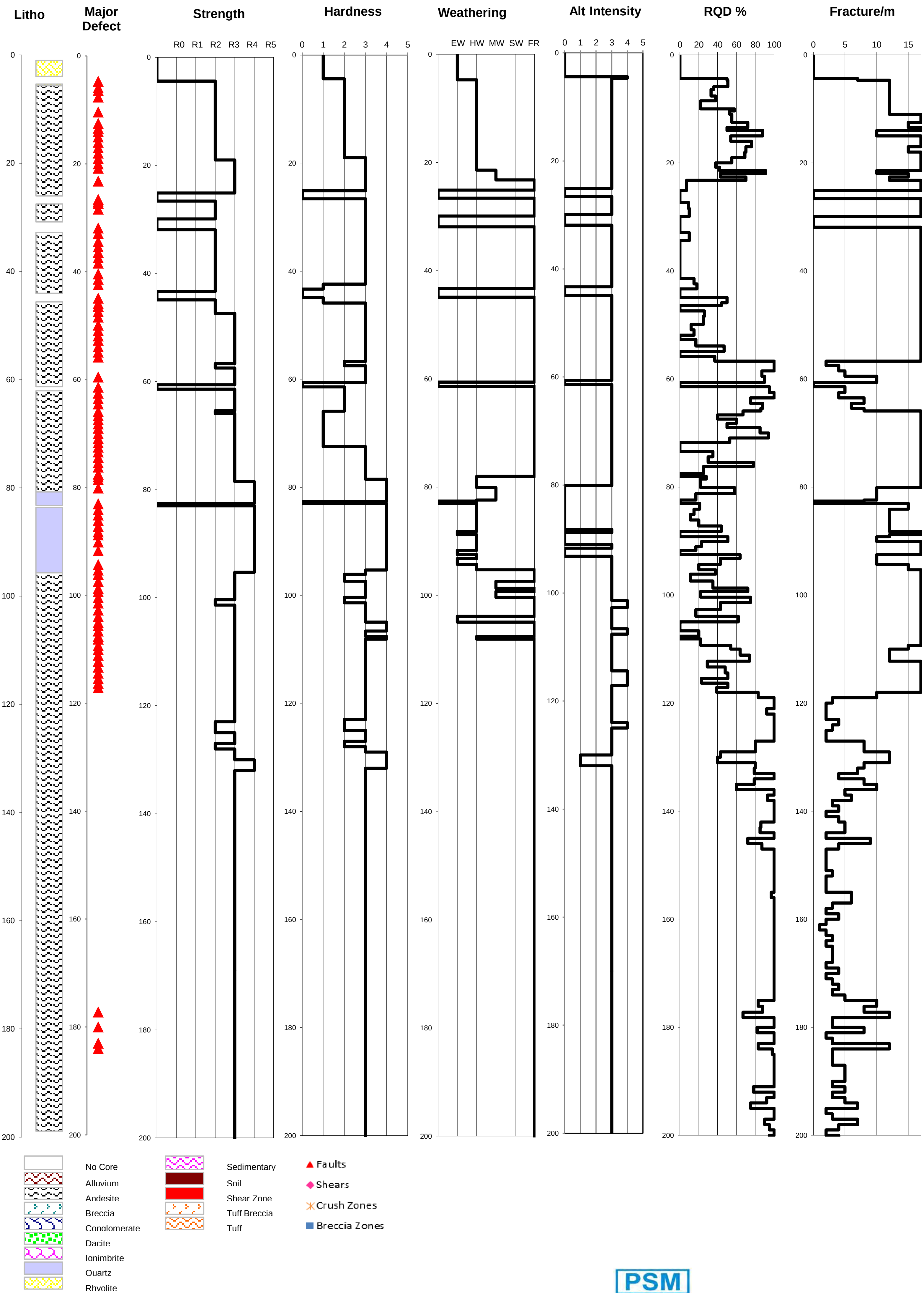
Borehole ID: **UW501**

Pells Sullivan Meynink



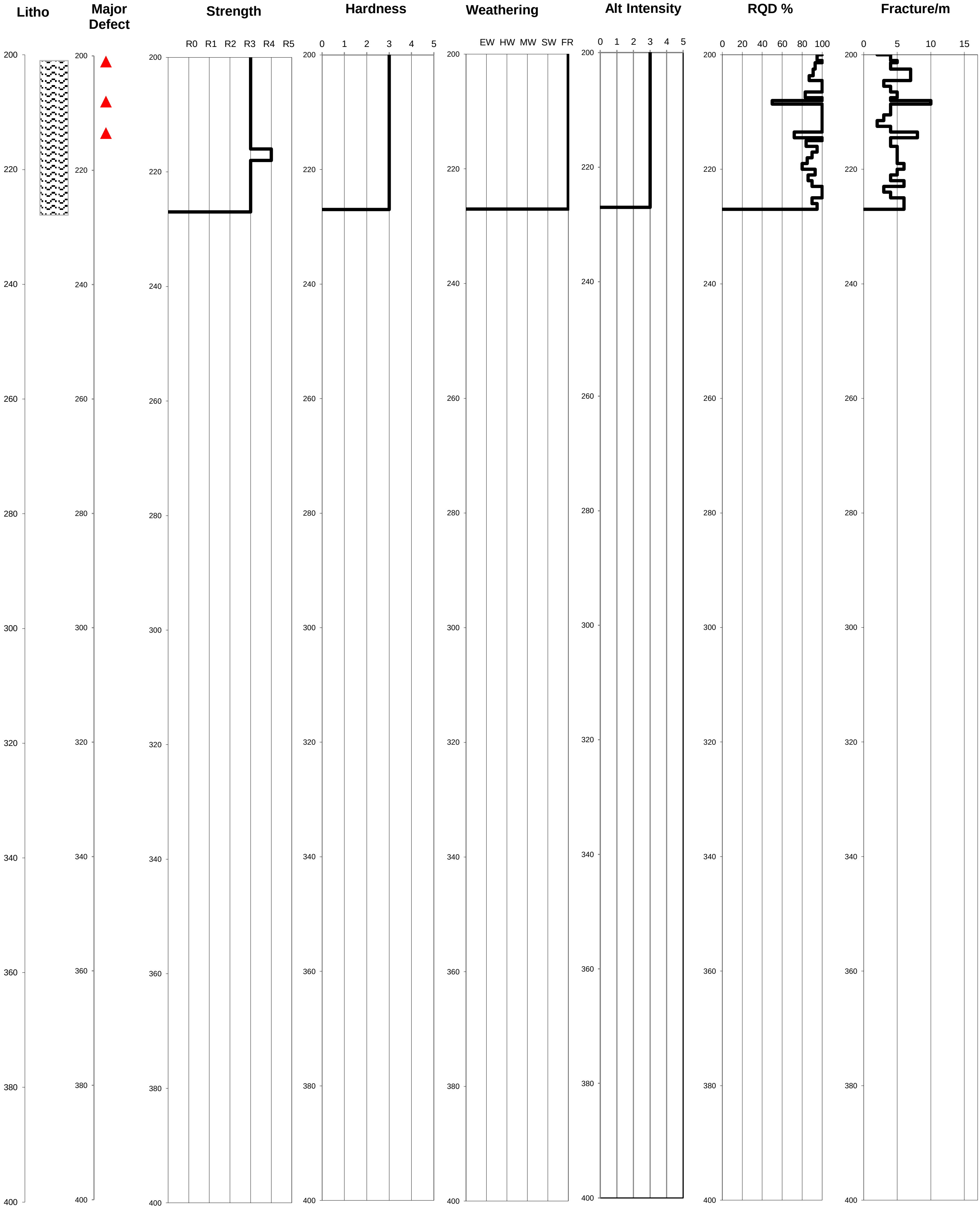
Borehole ID: **UW502**

Pells Sullivan Meynink



Borehole ID: **UW504**

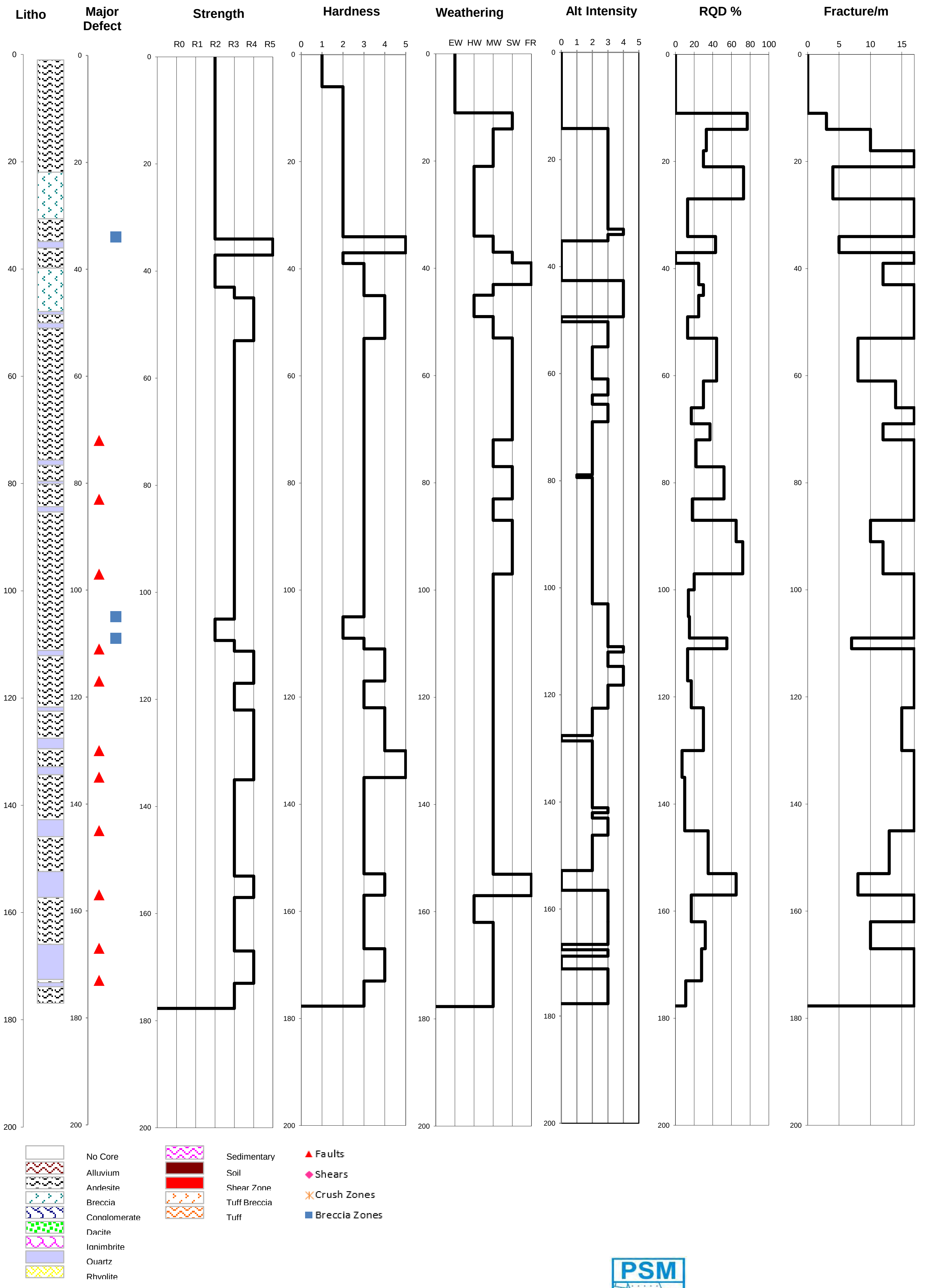
Pells Sullivan Meynink



No Core	Sedimentary	▲ Faults	
Alluvium	Soil	◆ Shears	
Andesite	Shear Zone	✳ Crush Zones	
Breccia	Tuff Breccia	■ Breccia Zones	
Conglomerate	Tuff		
Dacite			
Ignimbrite			
Quartz			
Rhyolite			

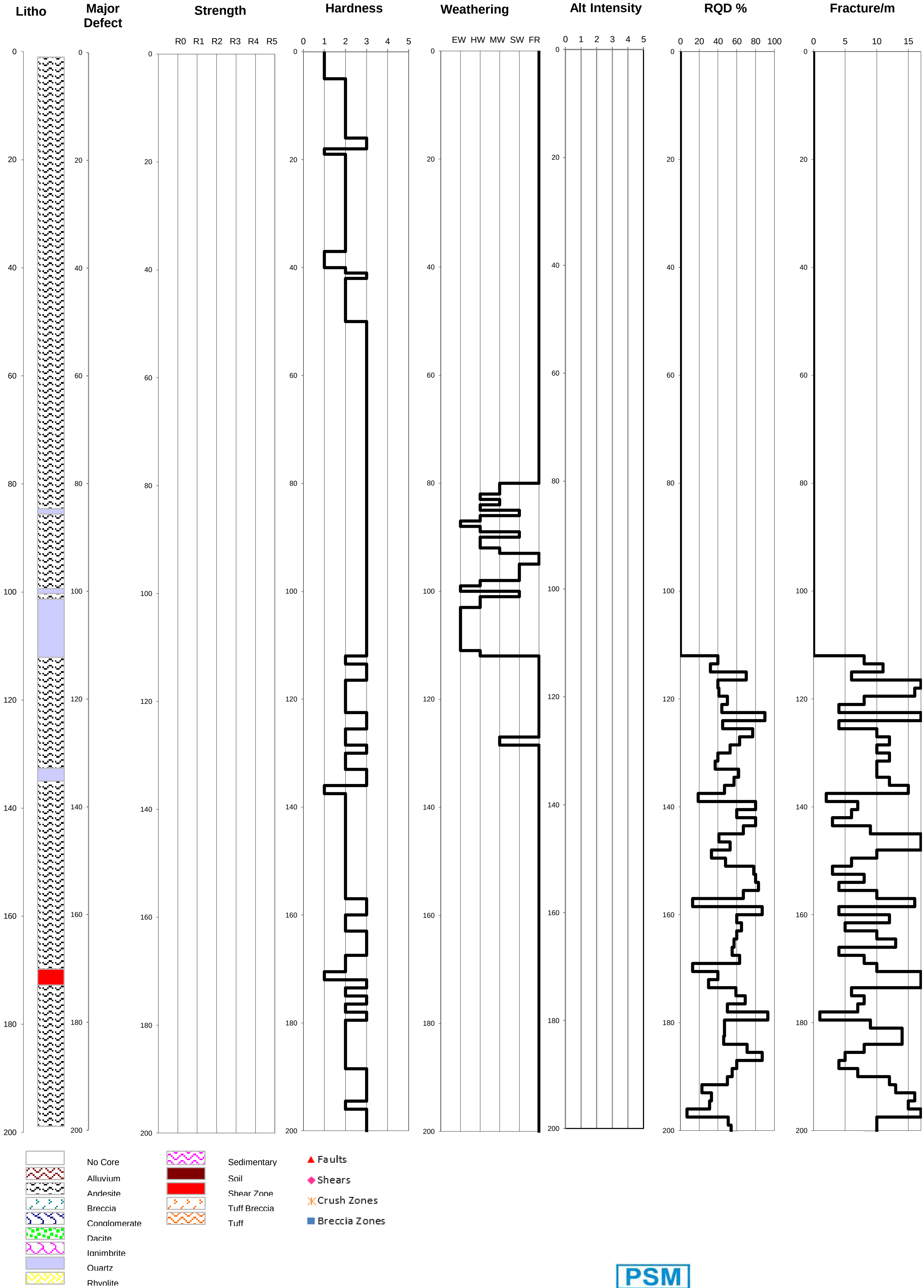
Borehole ID: **UW504**

Pells Sullivan Meynink



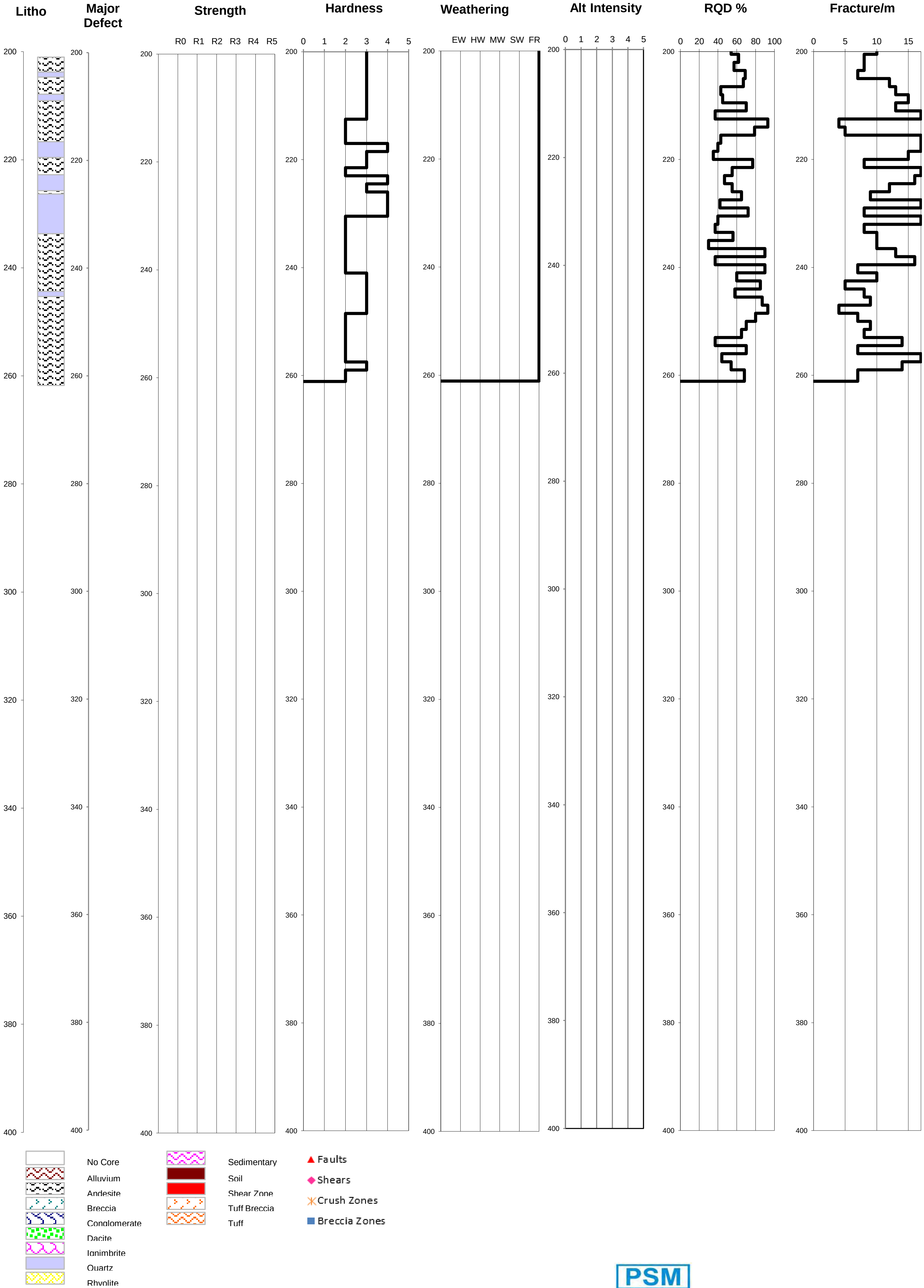
Borehole ID: **UW509**

Pells Sullivan Meynink



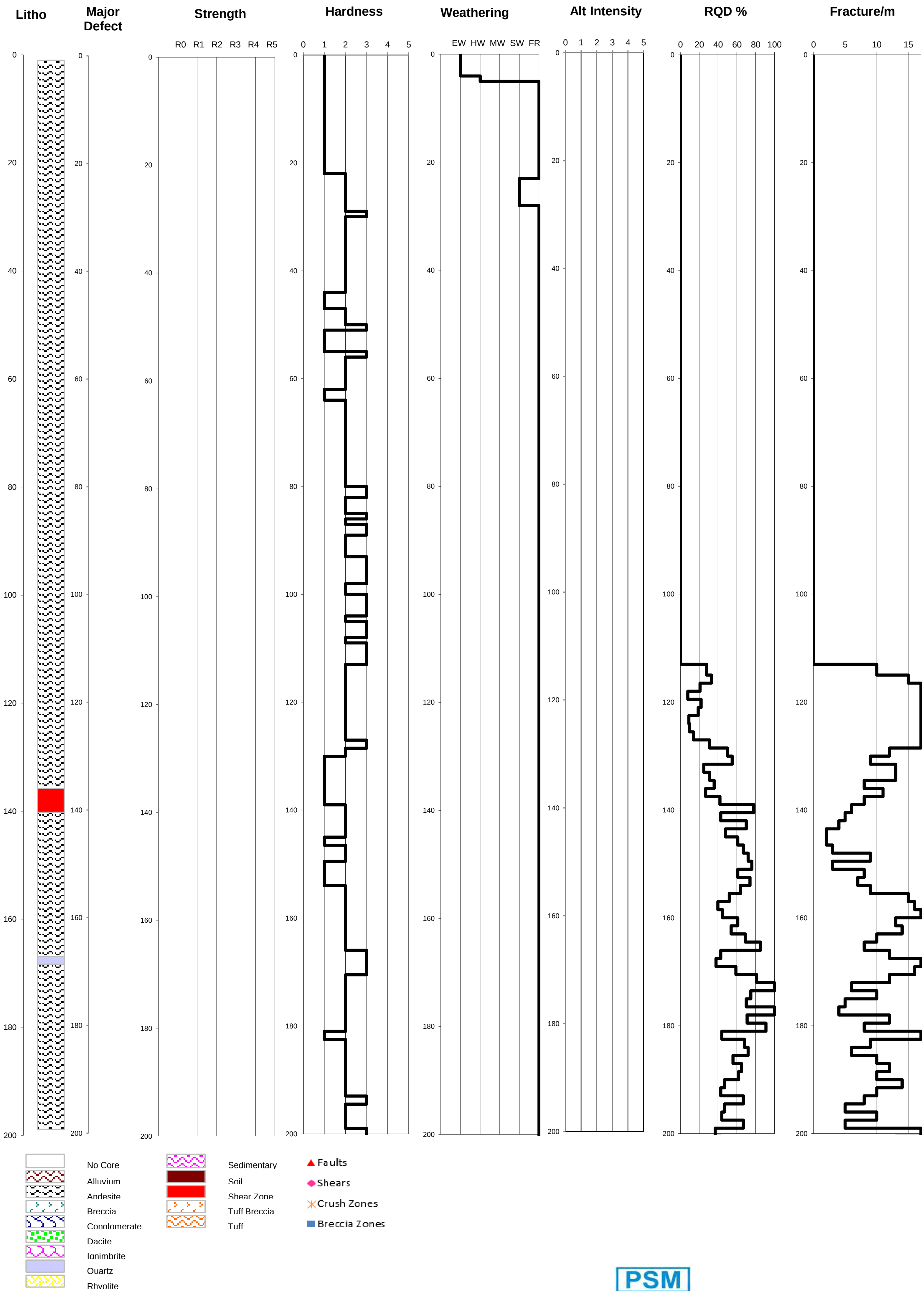
Borehole ID: **UW51**

Pells Sullivan Meynink



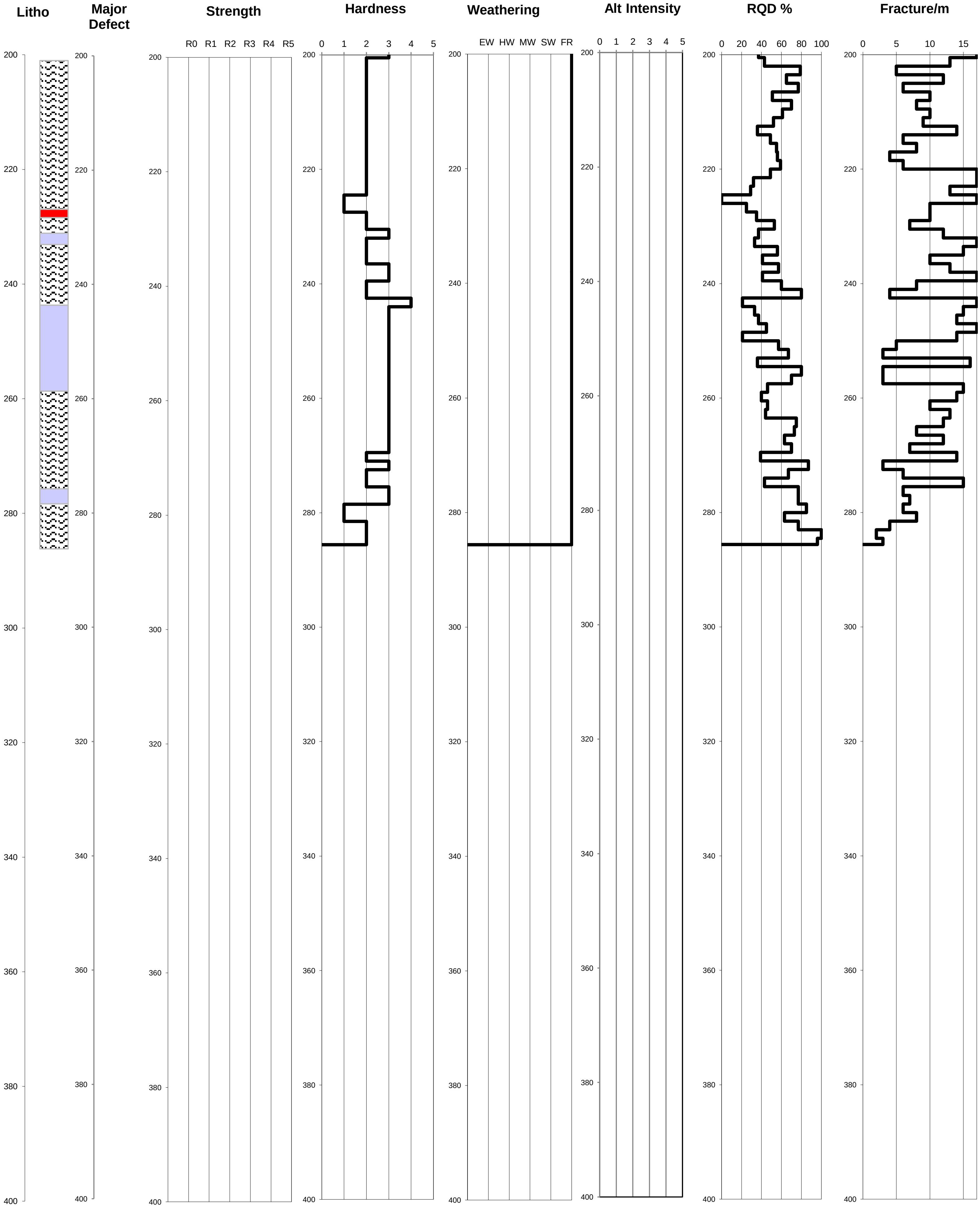
Borehole ID: **UW51**

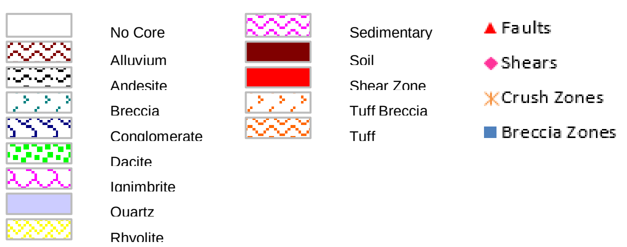
Pells Sullivan Meynink



Borehole ID: **UW52**

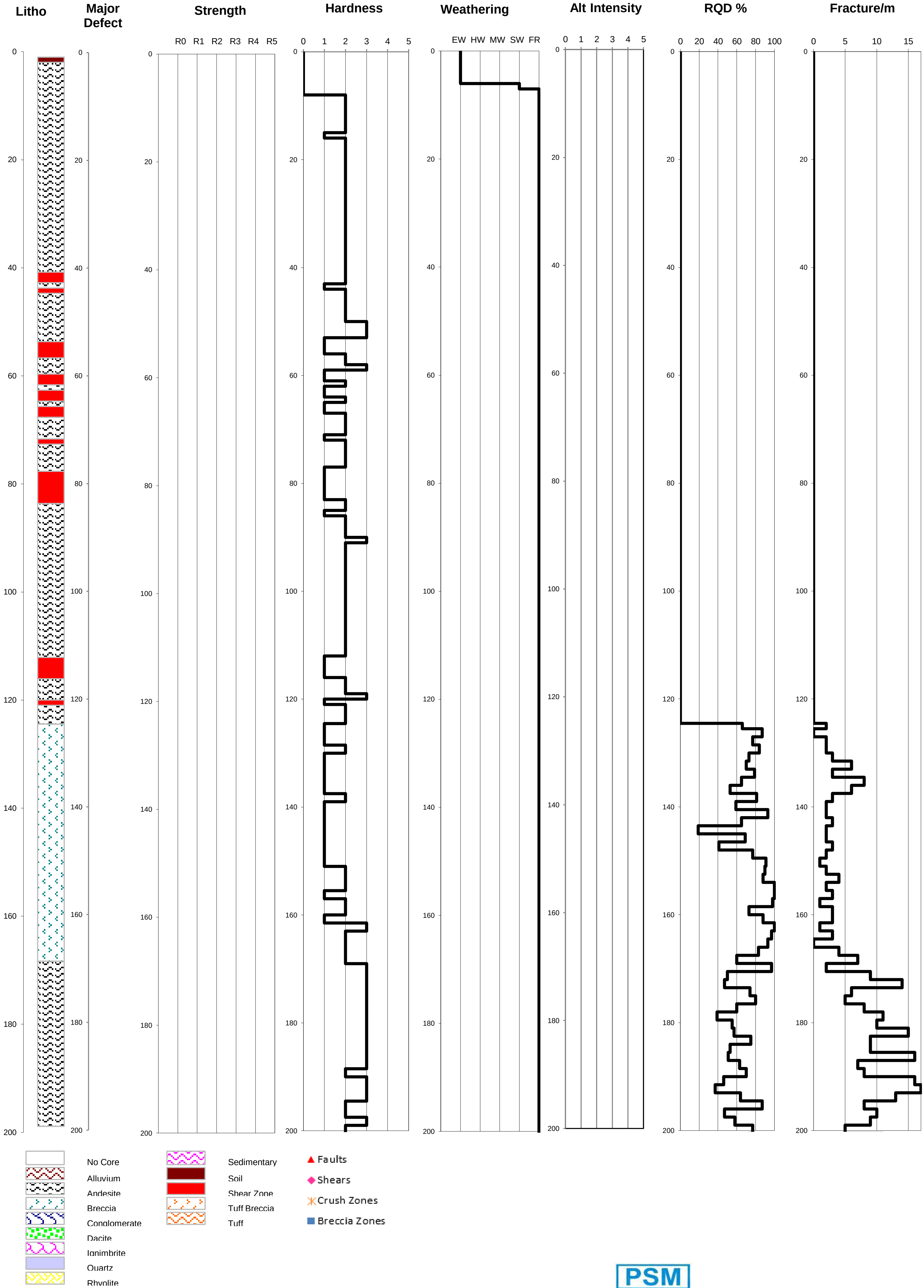
PSM **Pells Sullivan Meynink**





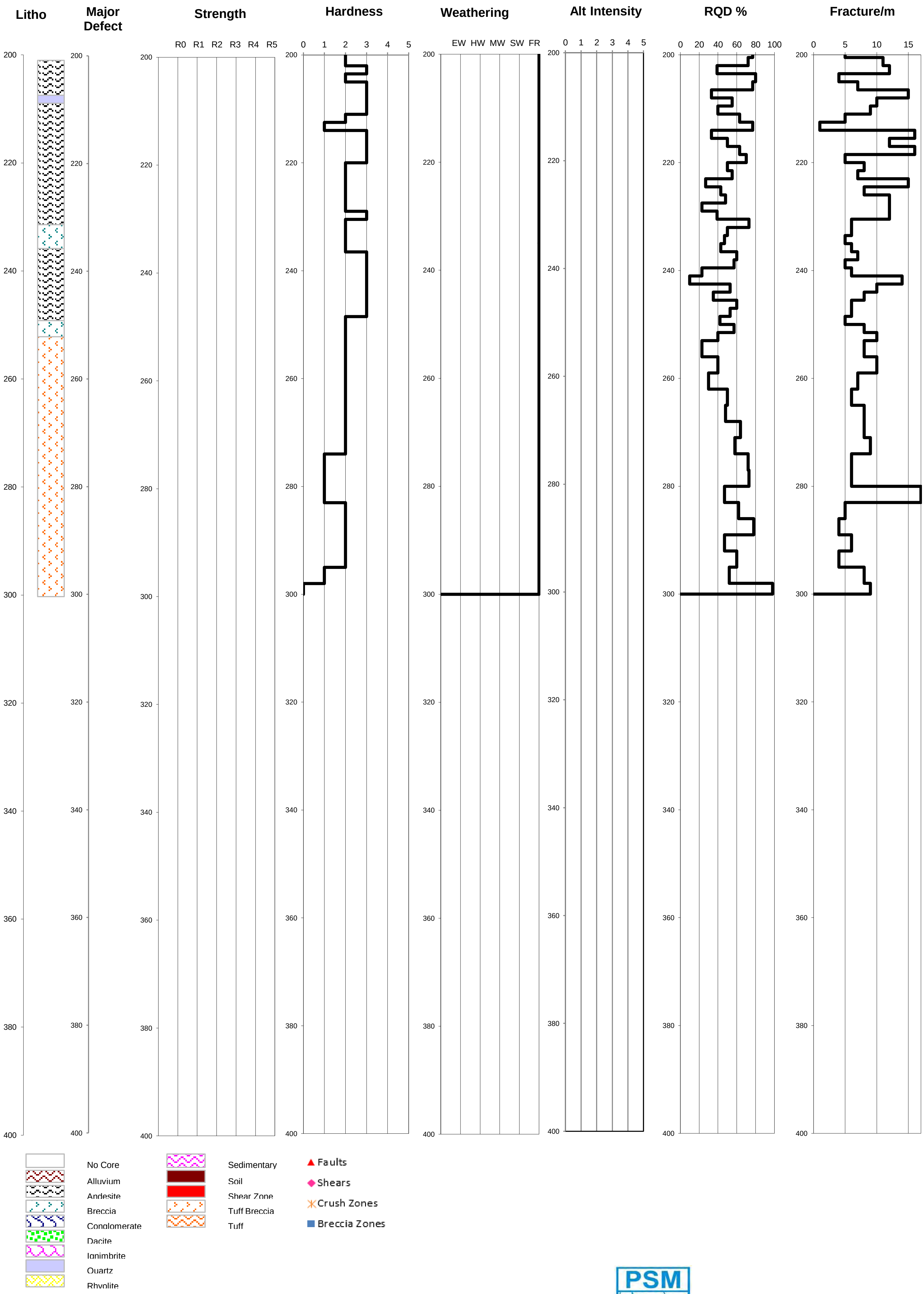
Borehole ID: **UW52**

Pells Sullivan Meynink



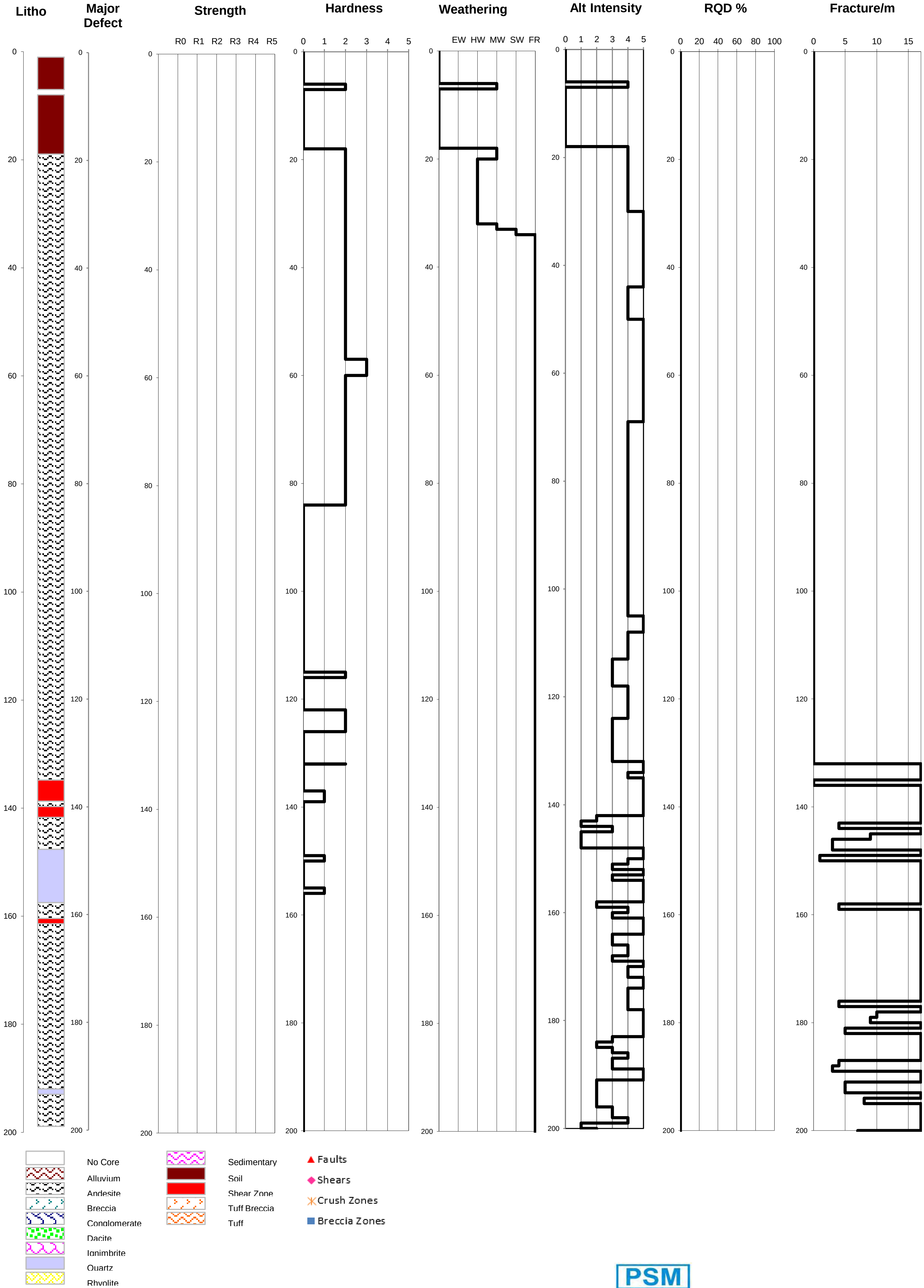
Borehole ID: **UW53**

Pells Sullivan Meynink



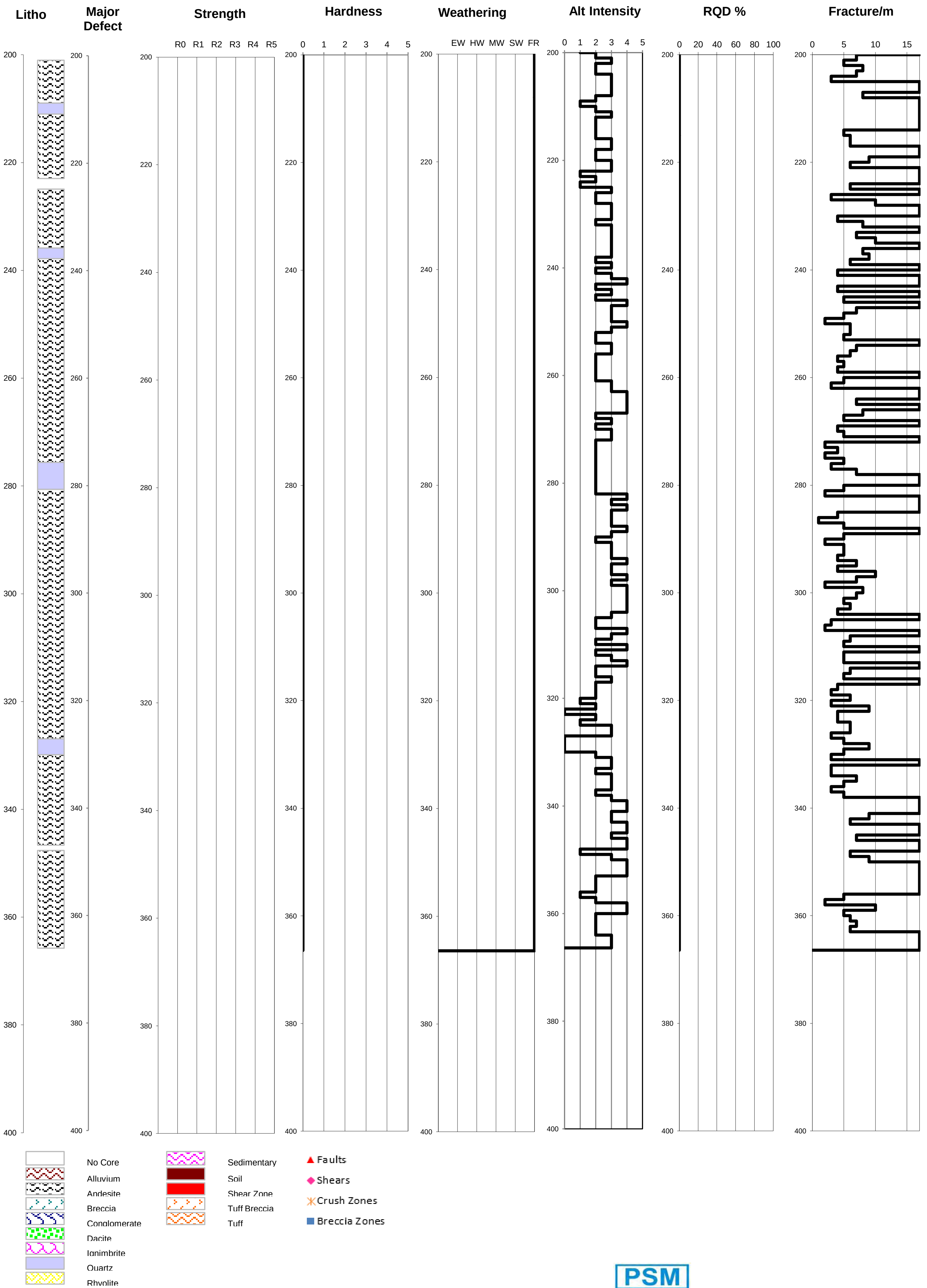
Borehole ID: **UW53**

Pells Sullivan Meynink



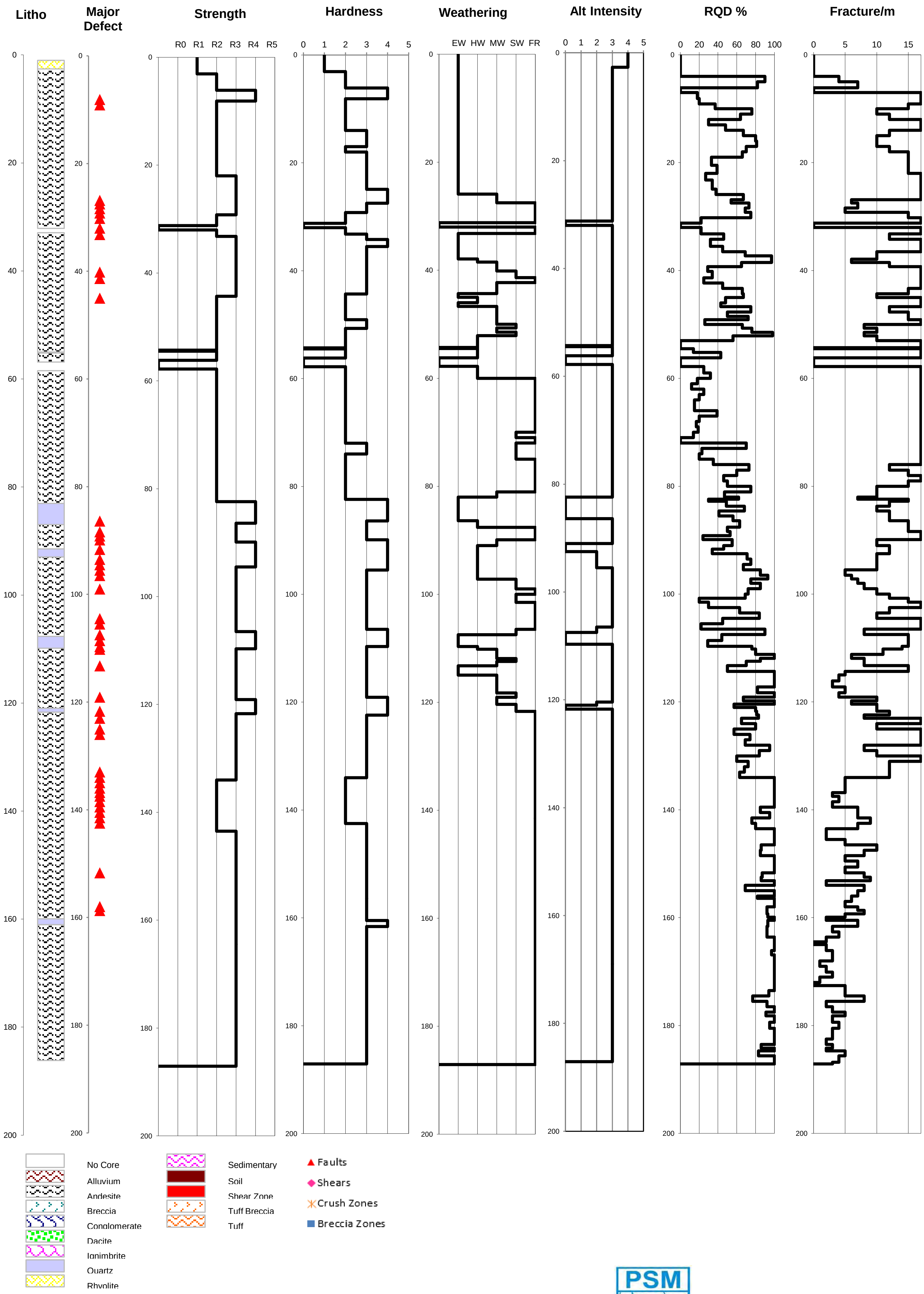
Borehole ID: UW54

Pells Sullivan Meynink



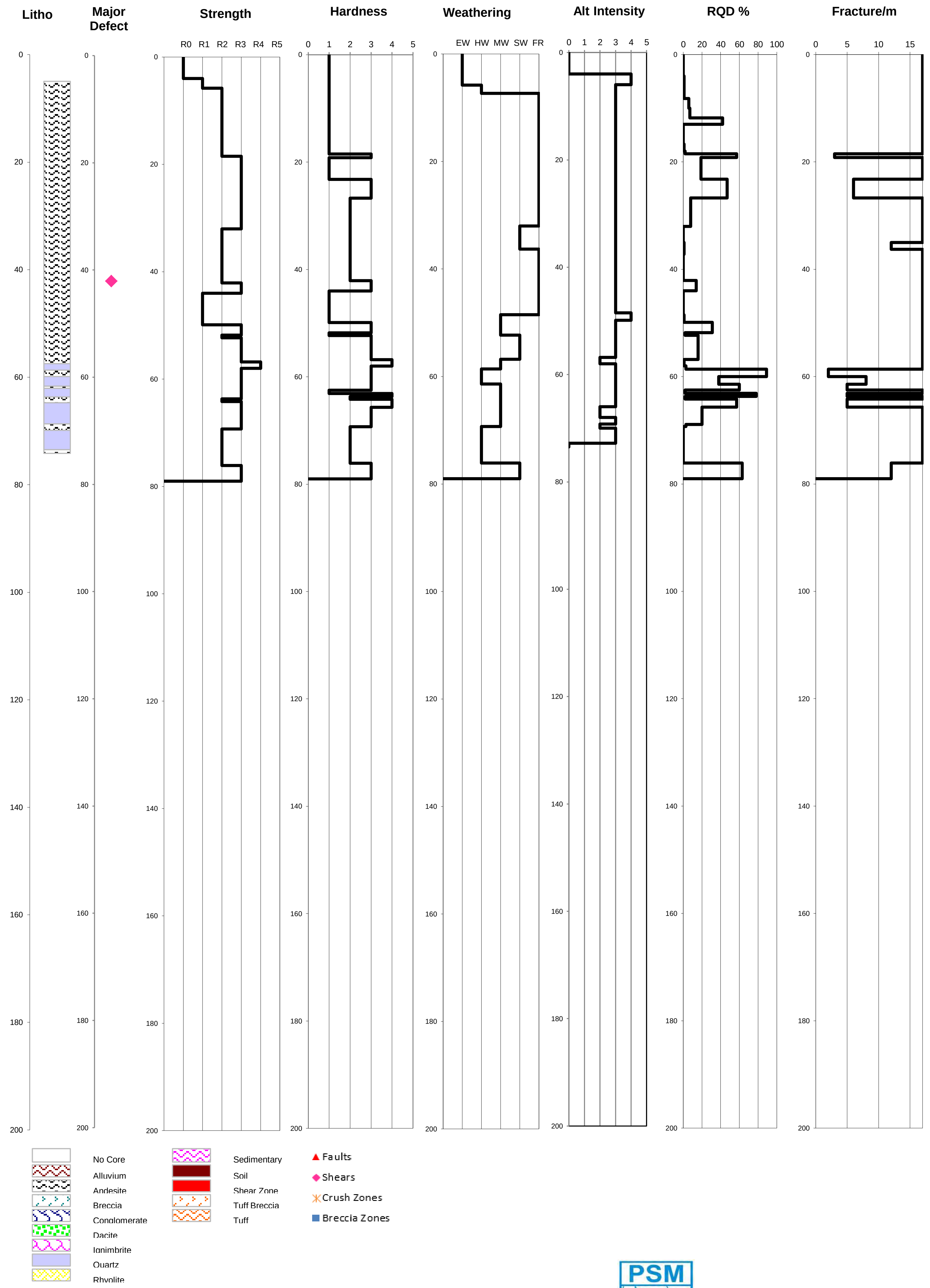
Borehole ID: UW54

Pells Sullivan Meynink



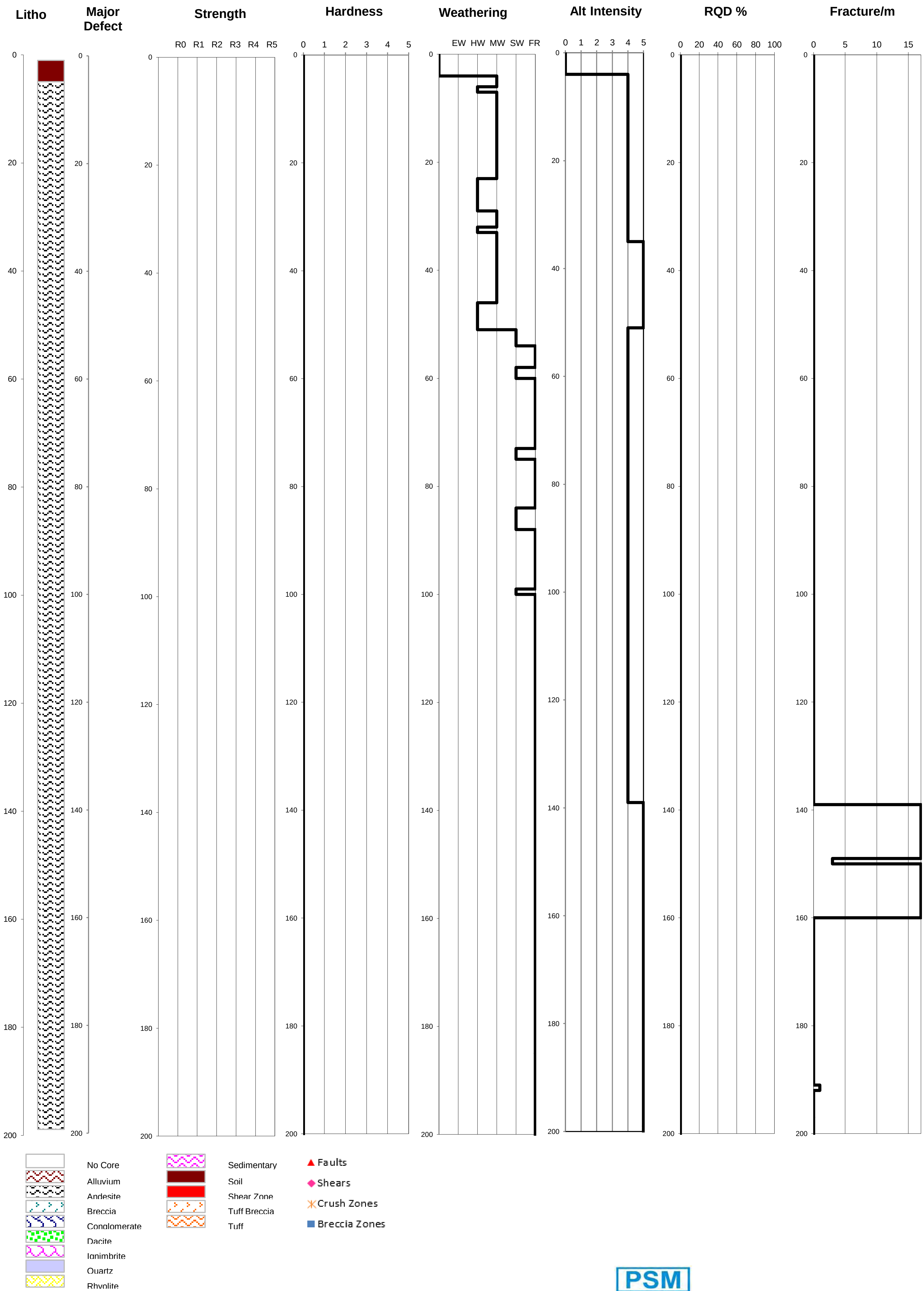
Borehole ID: UW540

Pells Sullivan Meynink



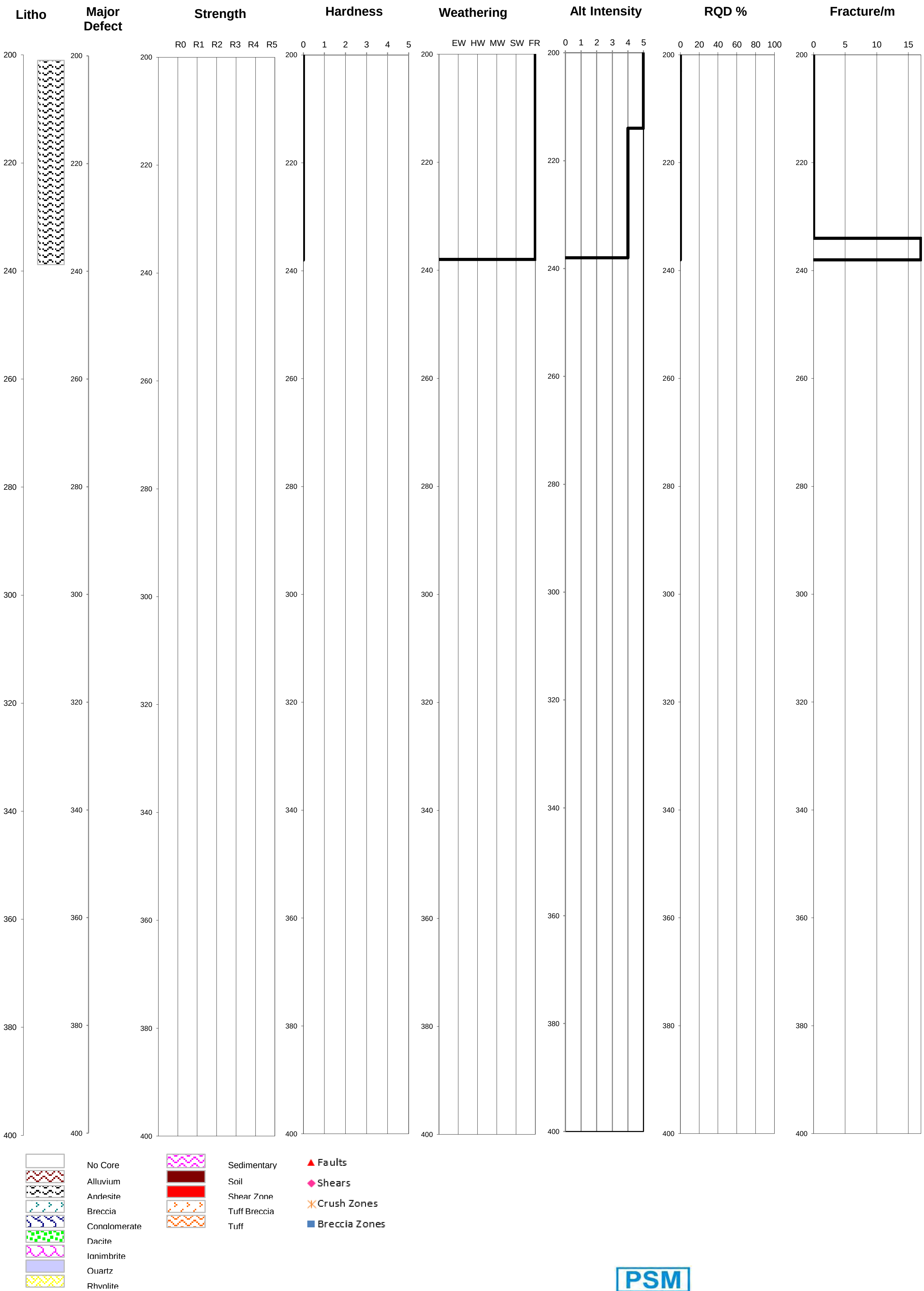
Borehole ID: UW542

Pells Sullivan Meynink



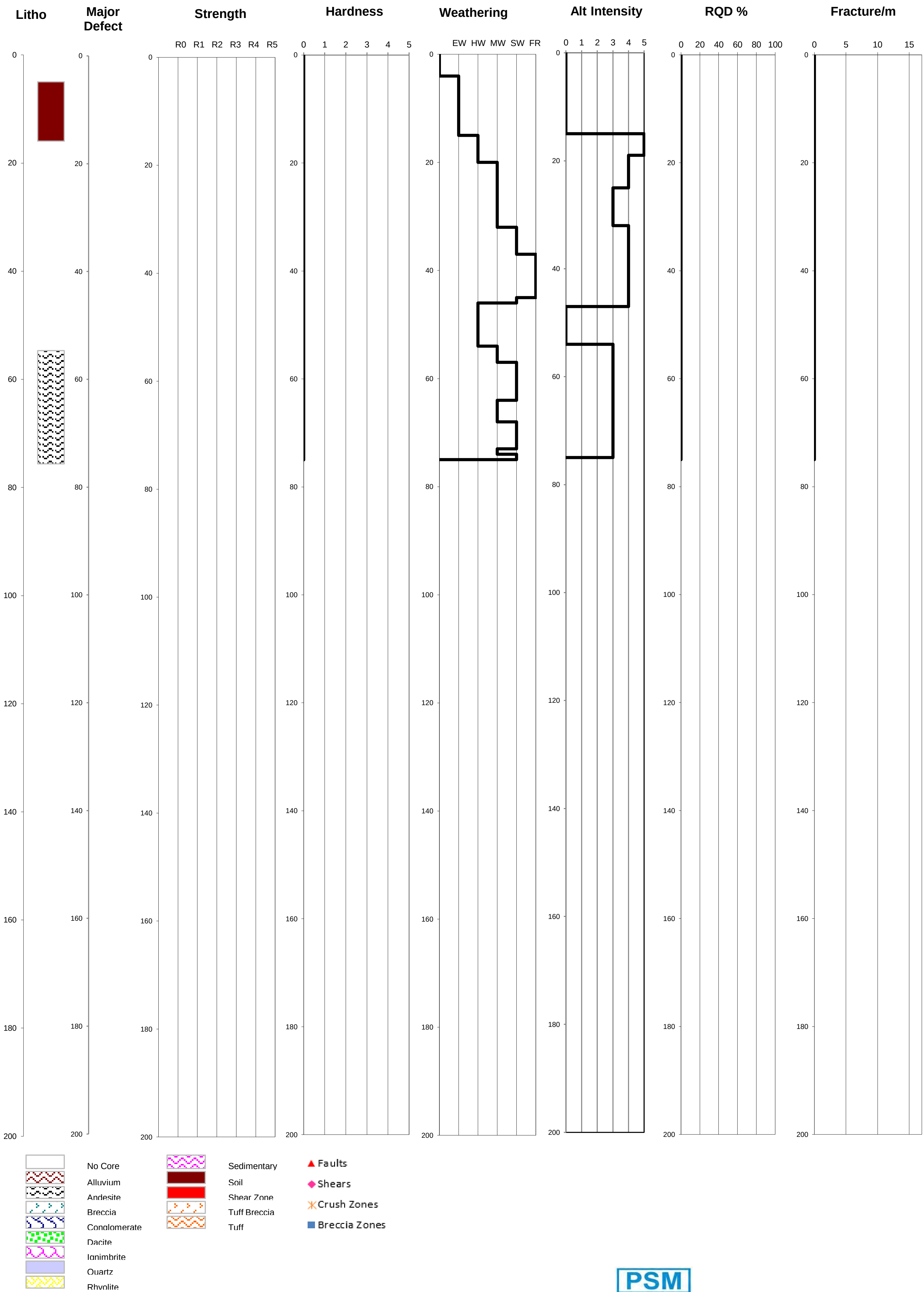
Borehole ID: UW55

Pells Sullivan Meynink



Borehole ID: **UW55**

PSM **Pells Sullivan Meynink**



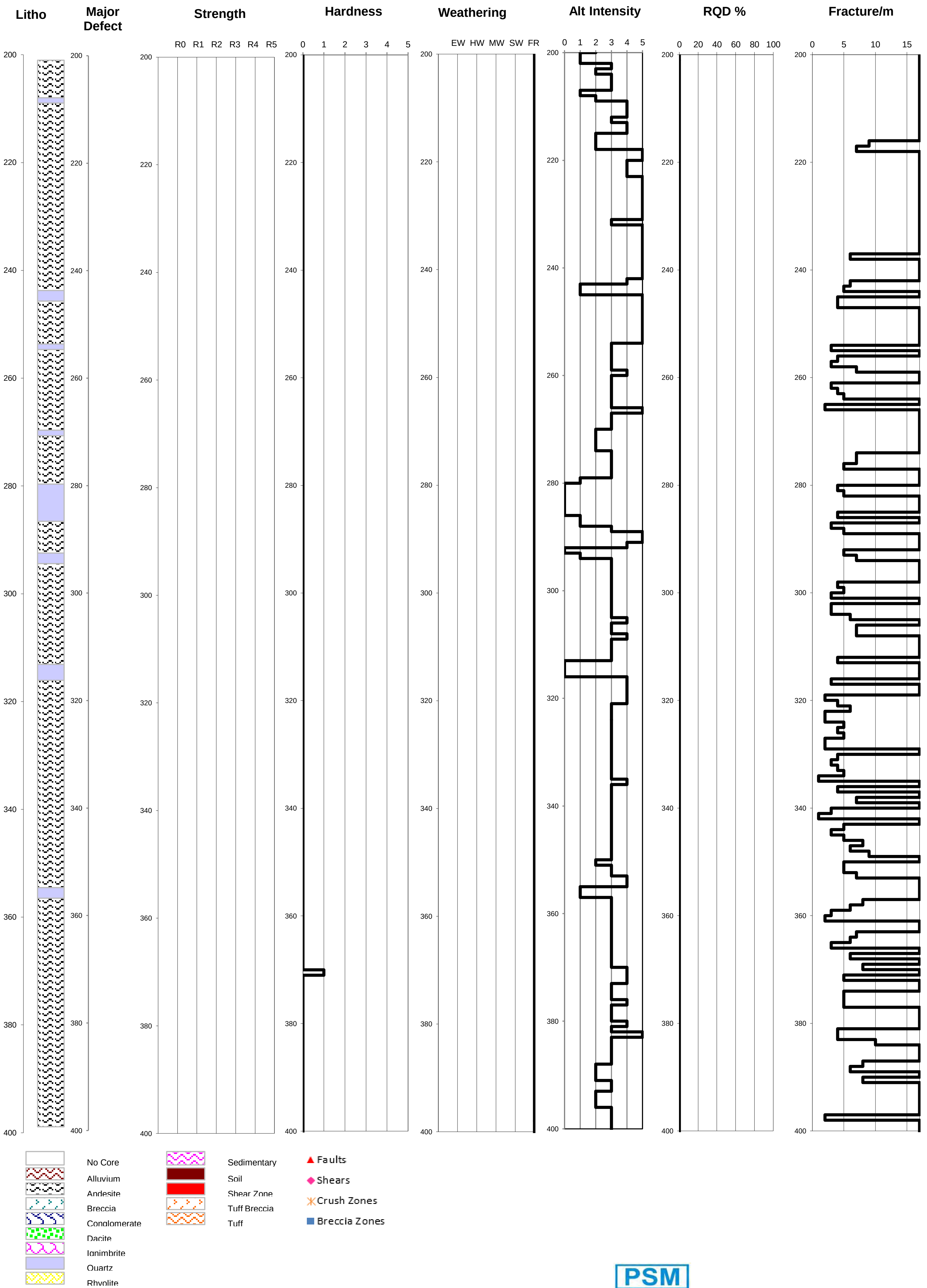
Borehole ID: UW56

PSM

Pells Sullivan Meynink

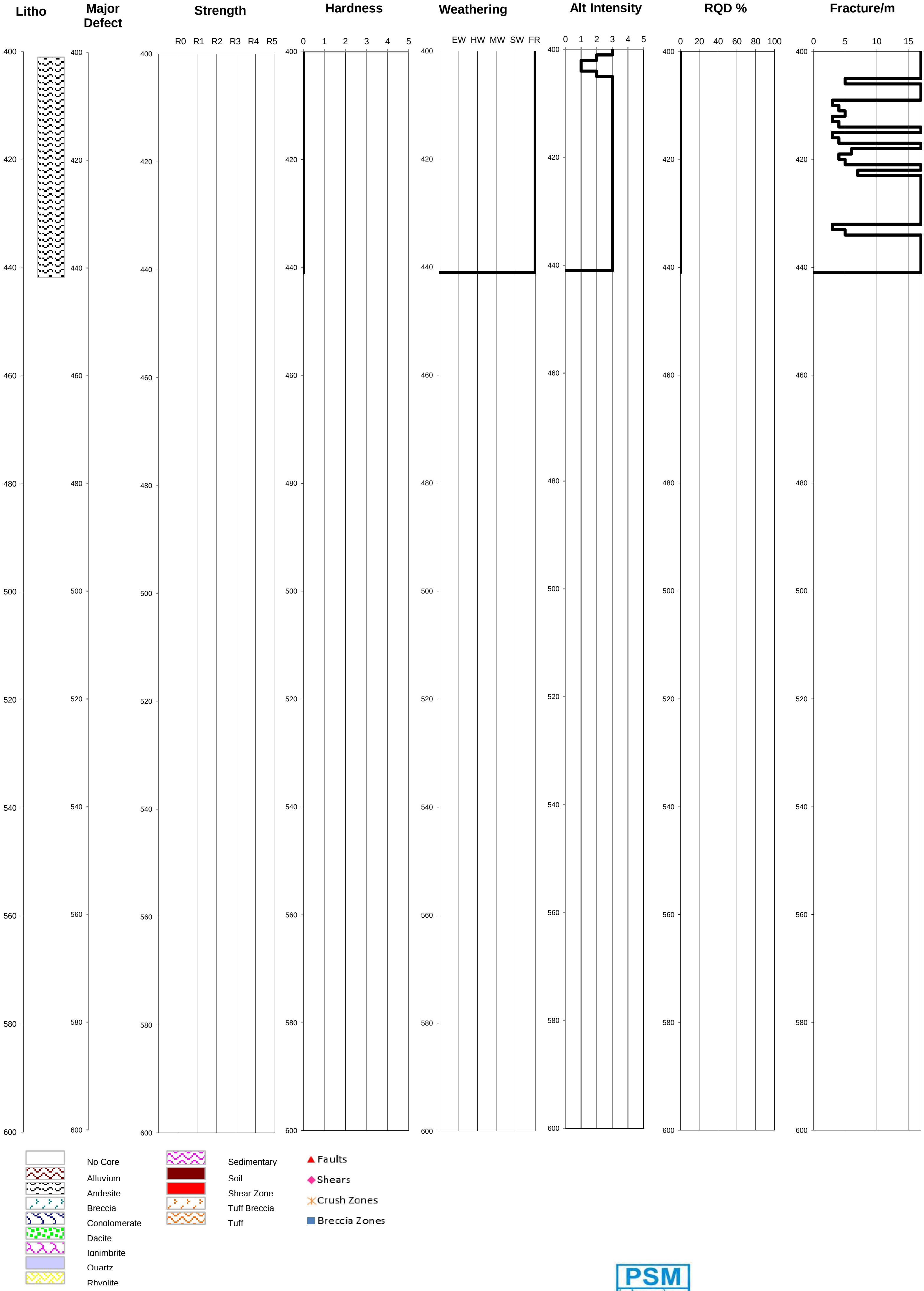
Borehole ID: **UW57**

Pells Sullivan Meynink



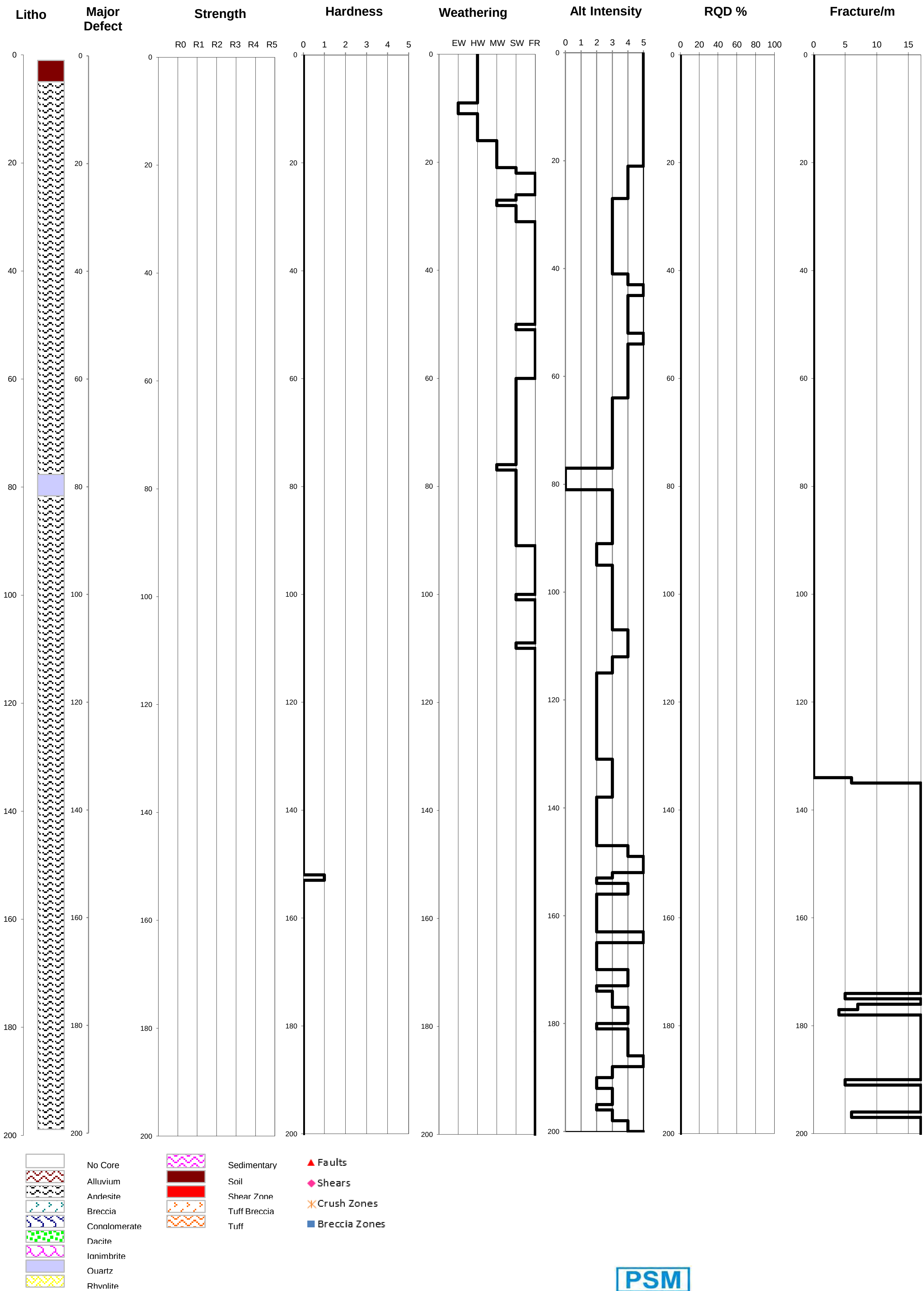
Borehole ID: UW57

PSM Pells Sullivan Meynink



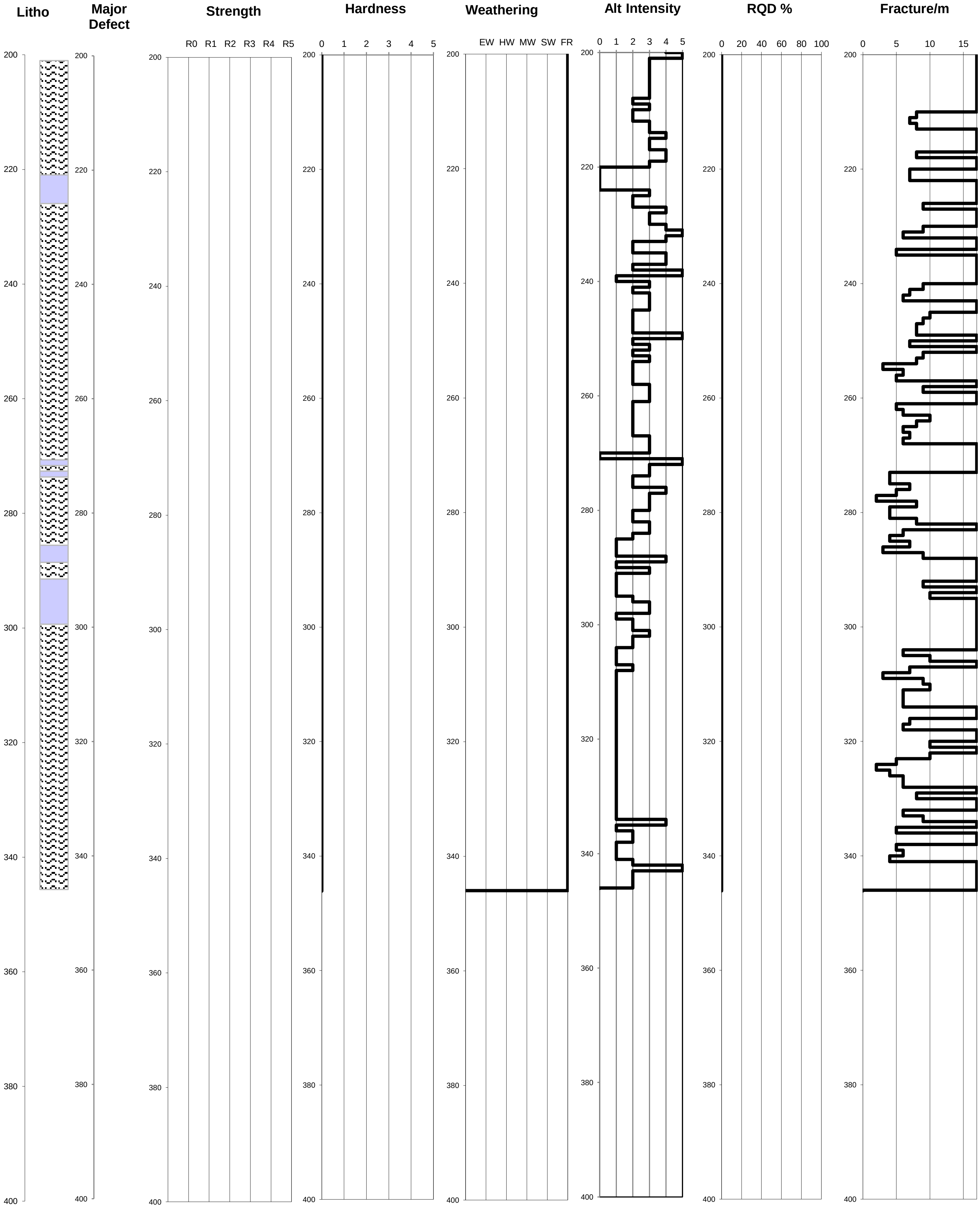
Borehole ID: **UW57**

Pells Sullivan Meynink



Borehole ID: **UW58**

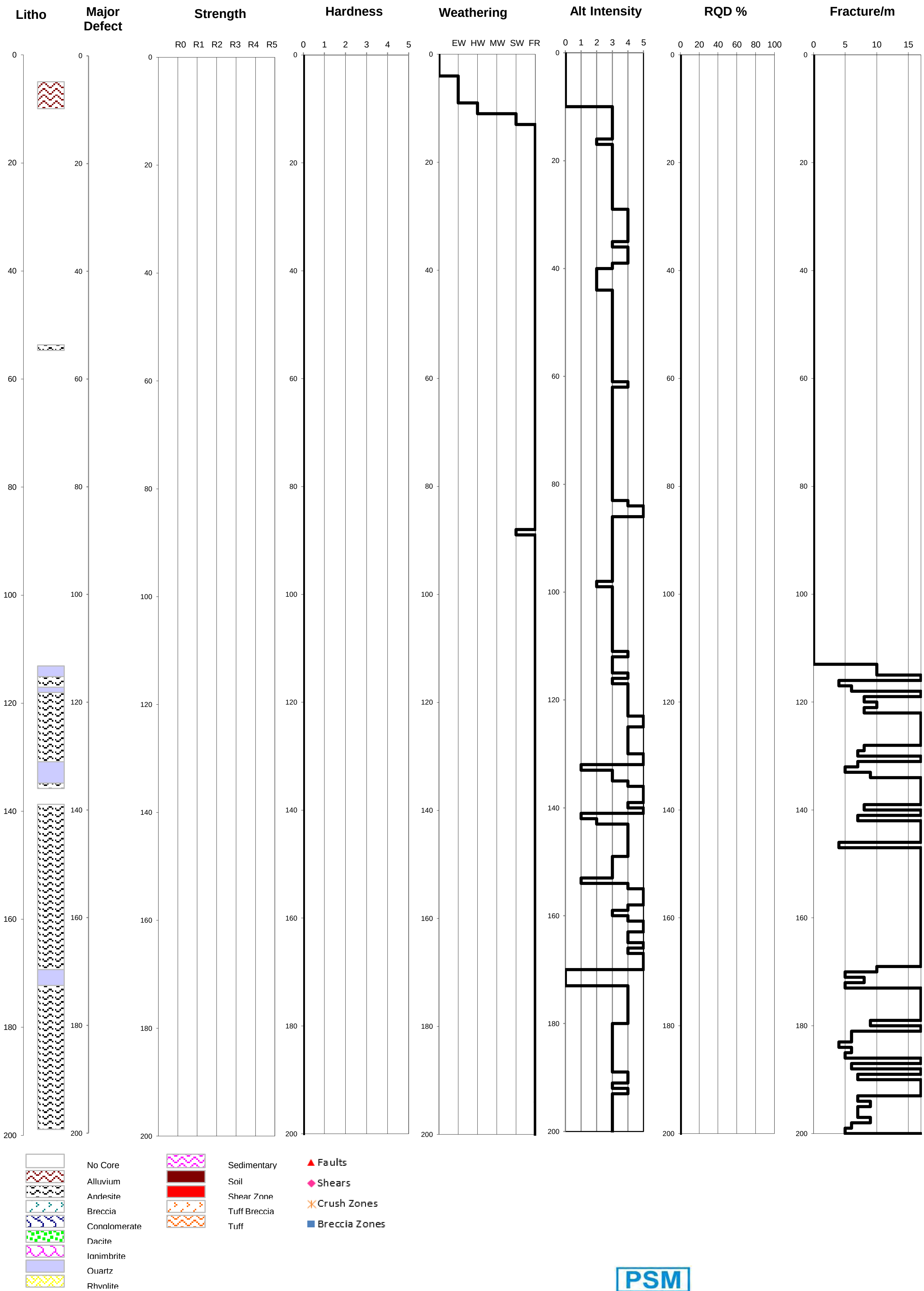
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
Faults
Shears
Crush Zones
Breccia Zones

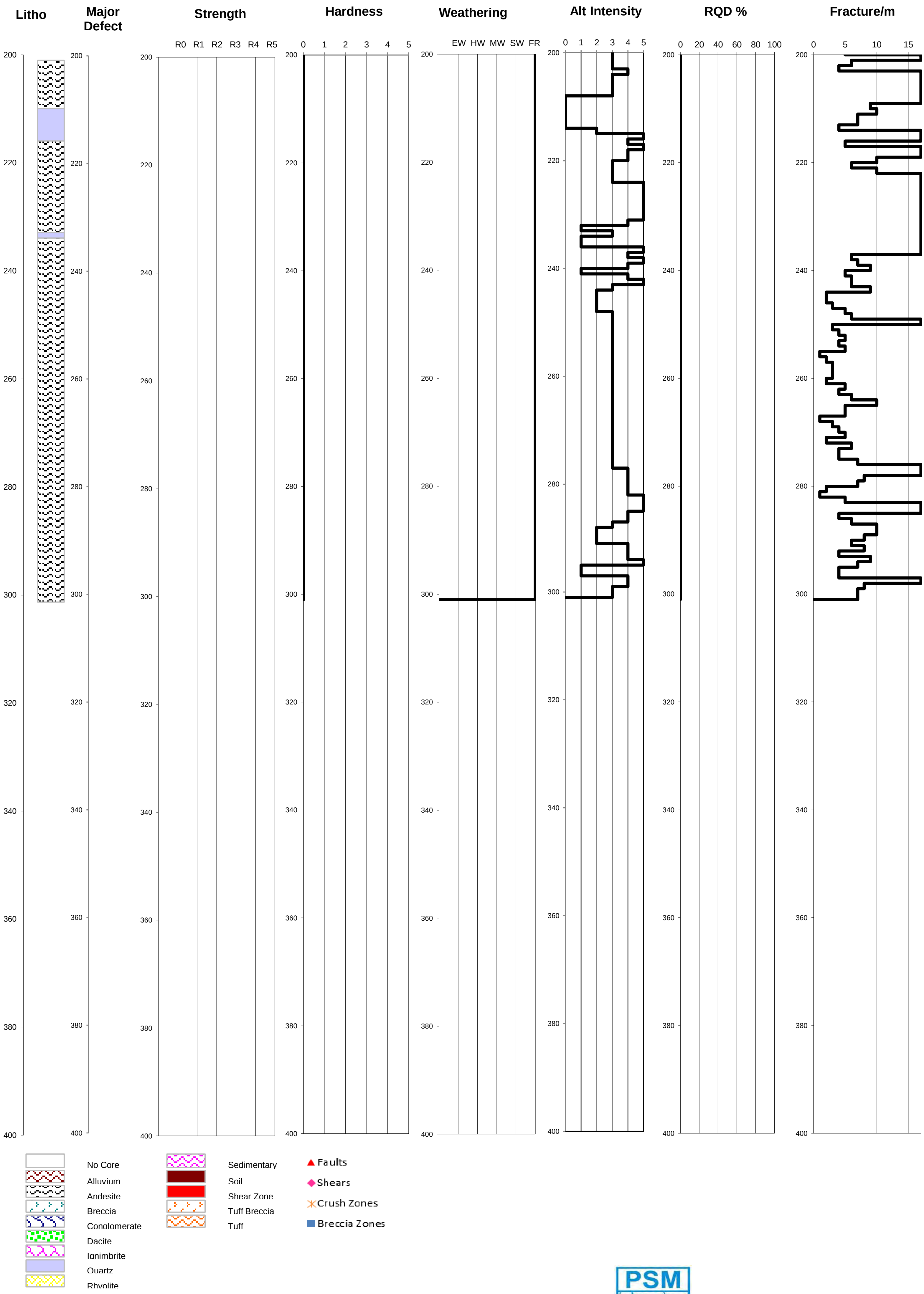
Borehole ID: UW58

Pells Sullivan Meynink



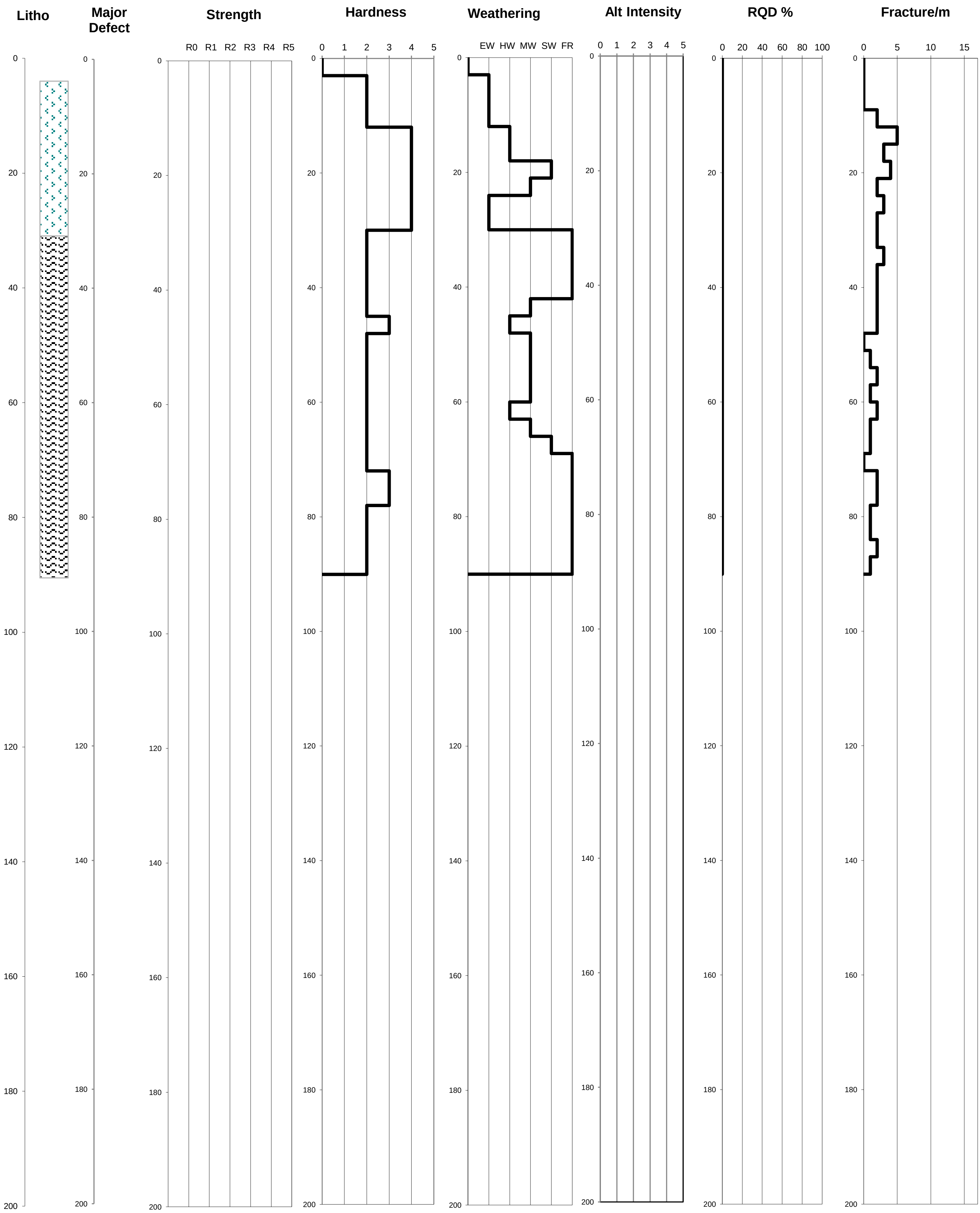
Borehole ID: UW59

Pells Sullivan Meynink



Borehole ID: UW59

Pells Sullivan Meynink

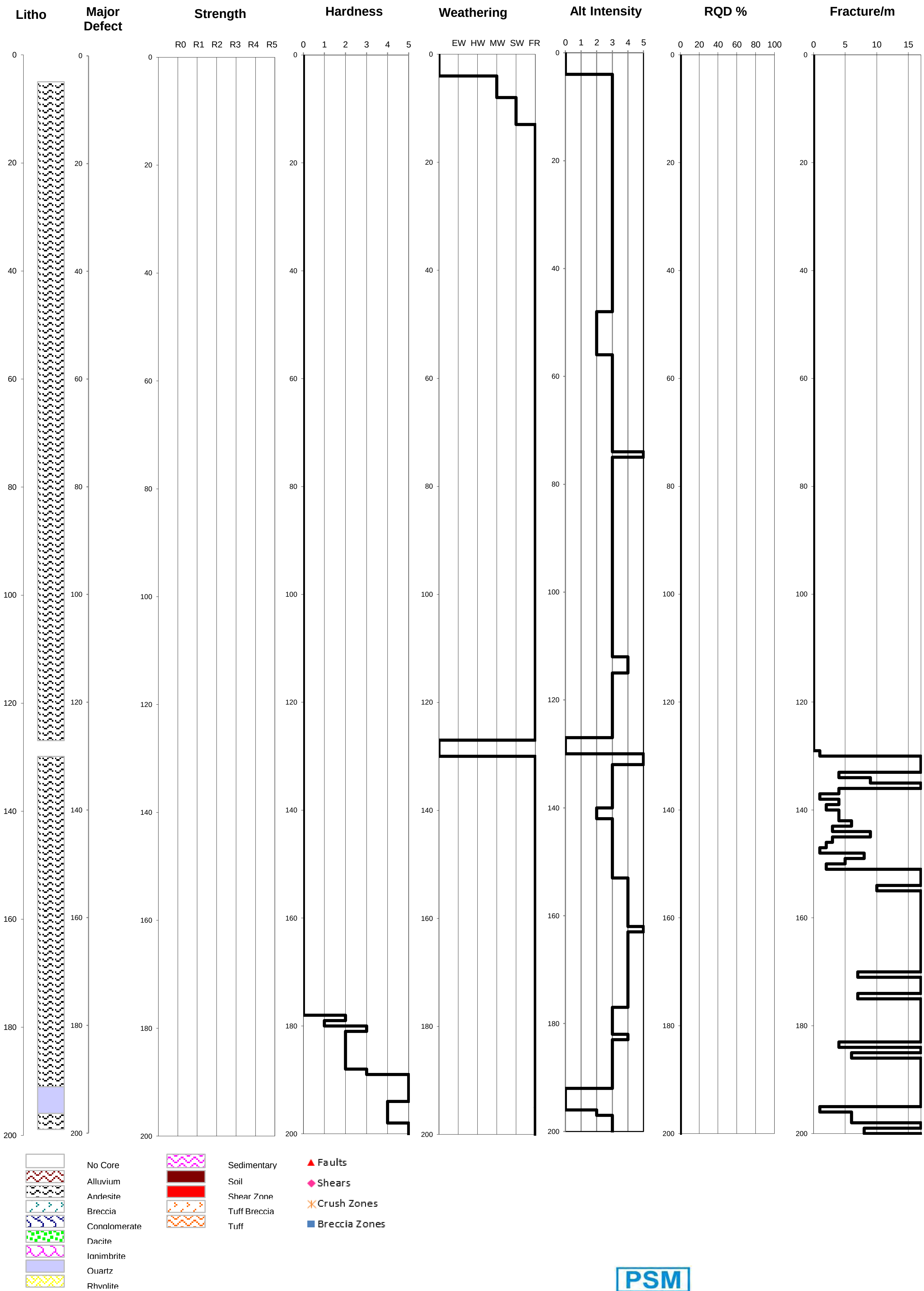


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
Faults
Shears
Crush Zones
Breccia Zones

Borehole ID: **UW6**

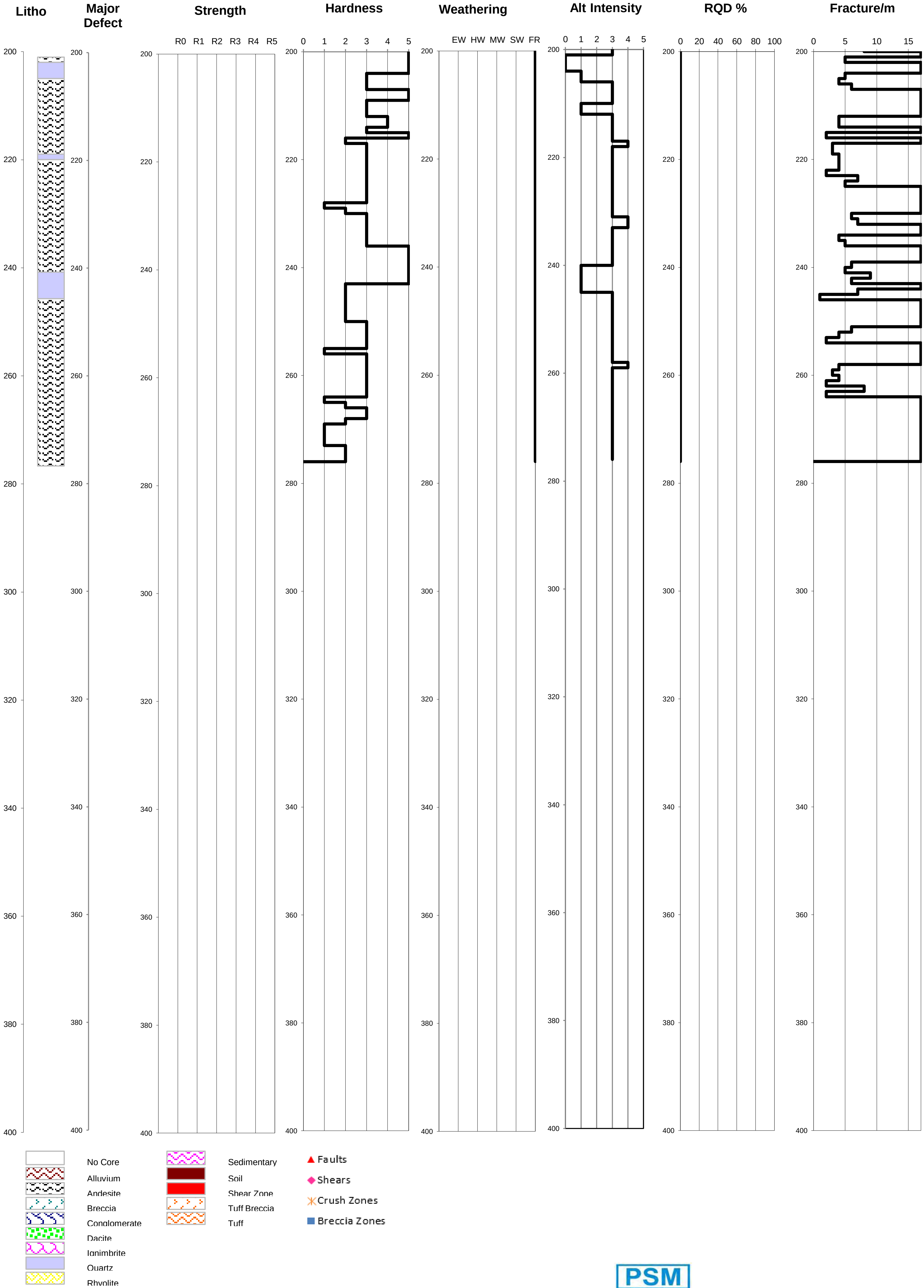
PSM

Pells Sullivan Meynink



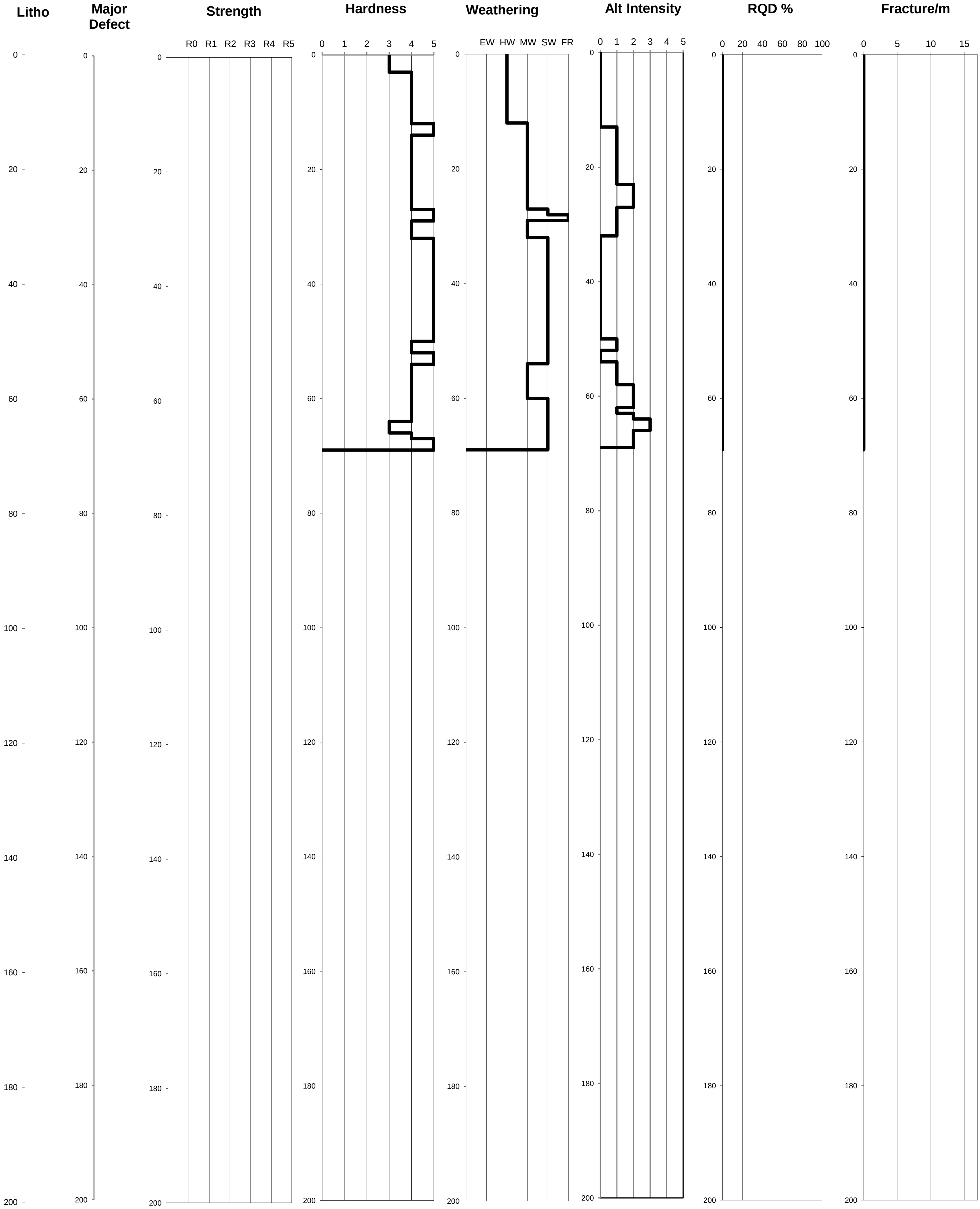
Borehole ID: UW60

Pells Sullivan Meynink



Borehole ID: **UW60**

Pells Sullivan Meynink



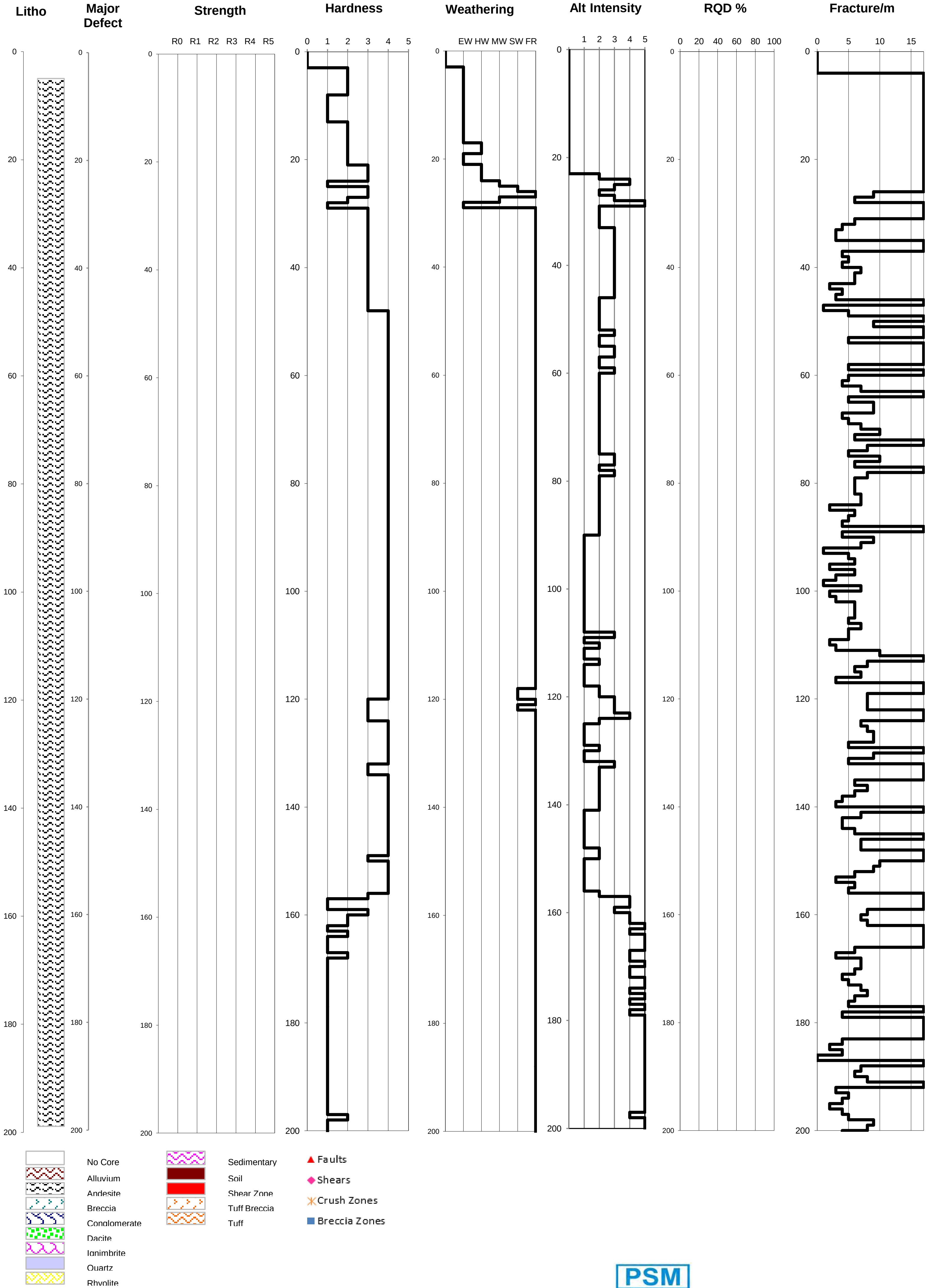
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

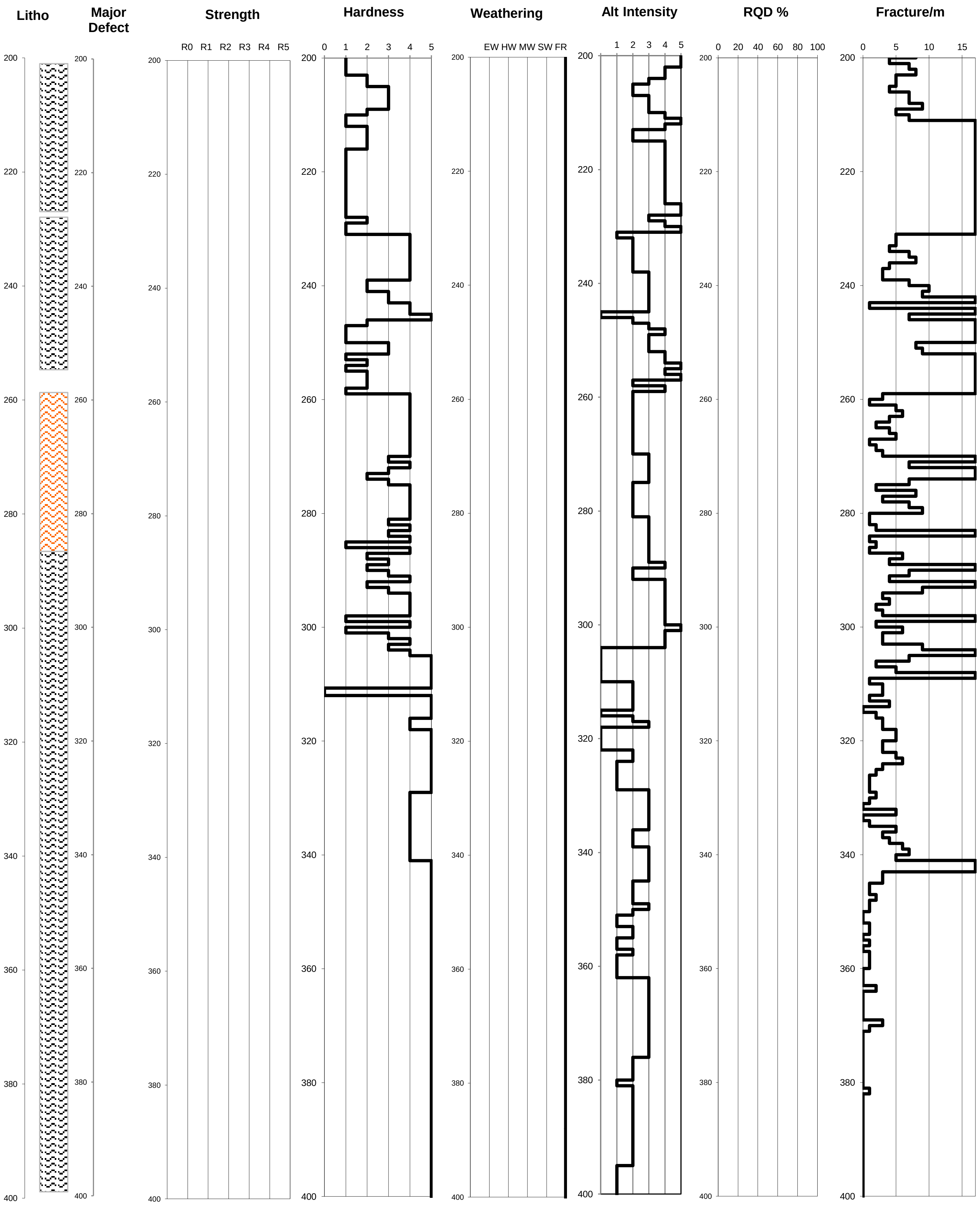
Borehole ID: **UW61**

Pells Sullivan Meynink



Borehole ID: **UW62**

Pells Sullivan Meynink



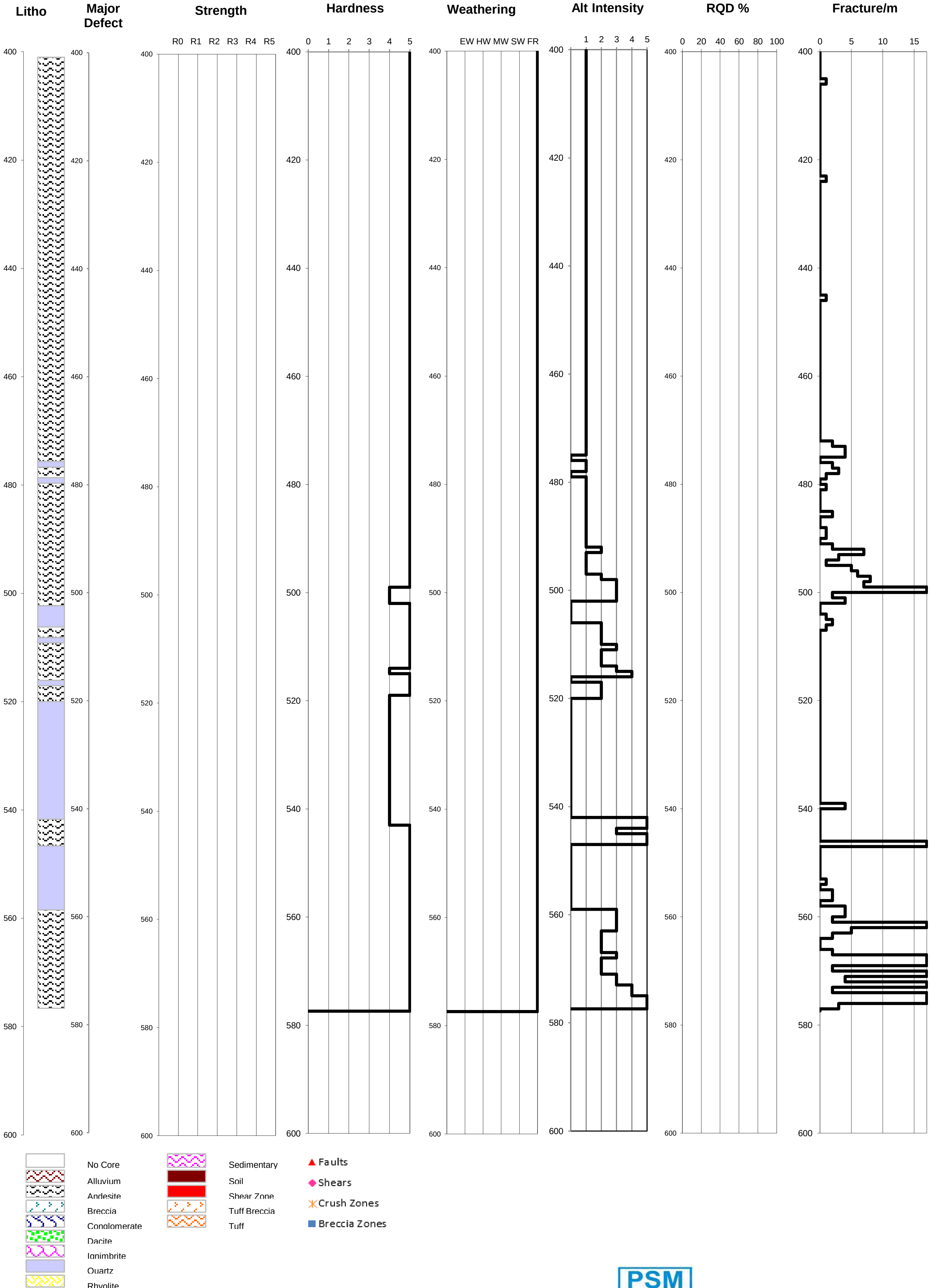
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

Faults
Shears
Crush Zones
Breccia Zones

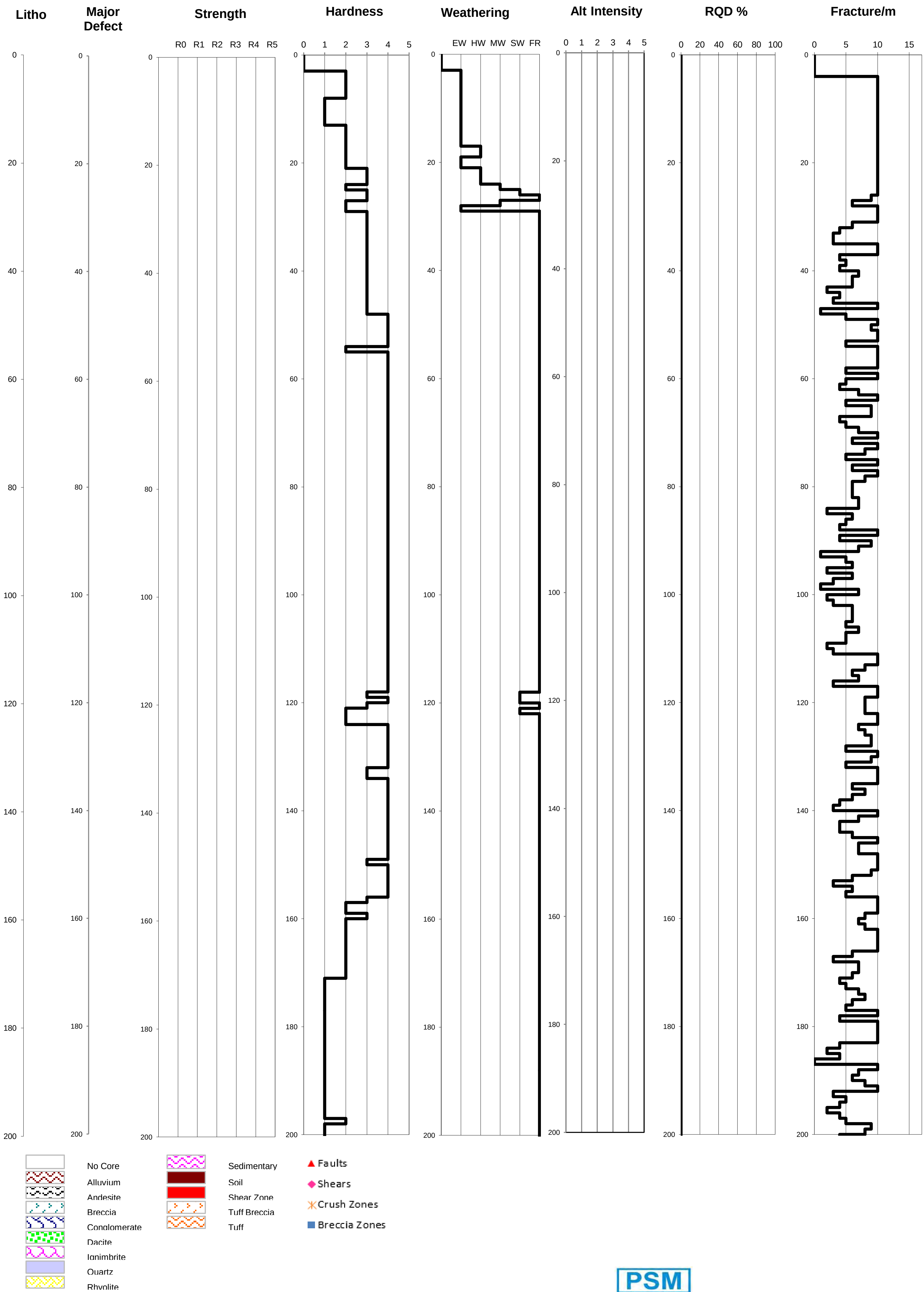
Borehole ID: **UW62**

Pells Sullivan Meynink



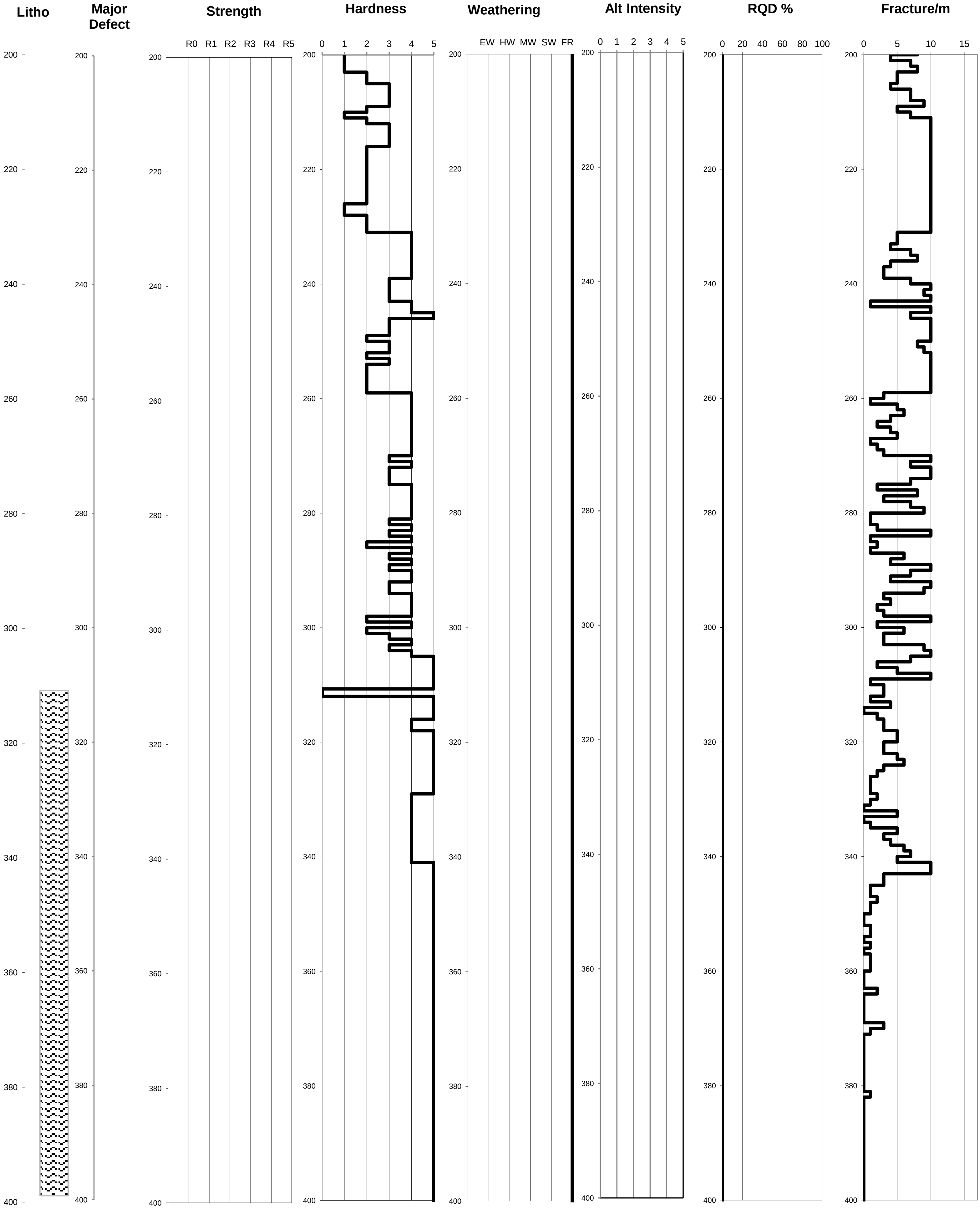
Borehole ID: UW62

Pells Sullivan Meynink



Borehole ID: **UW62A**

Pells Sullivan Meynink



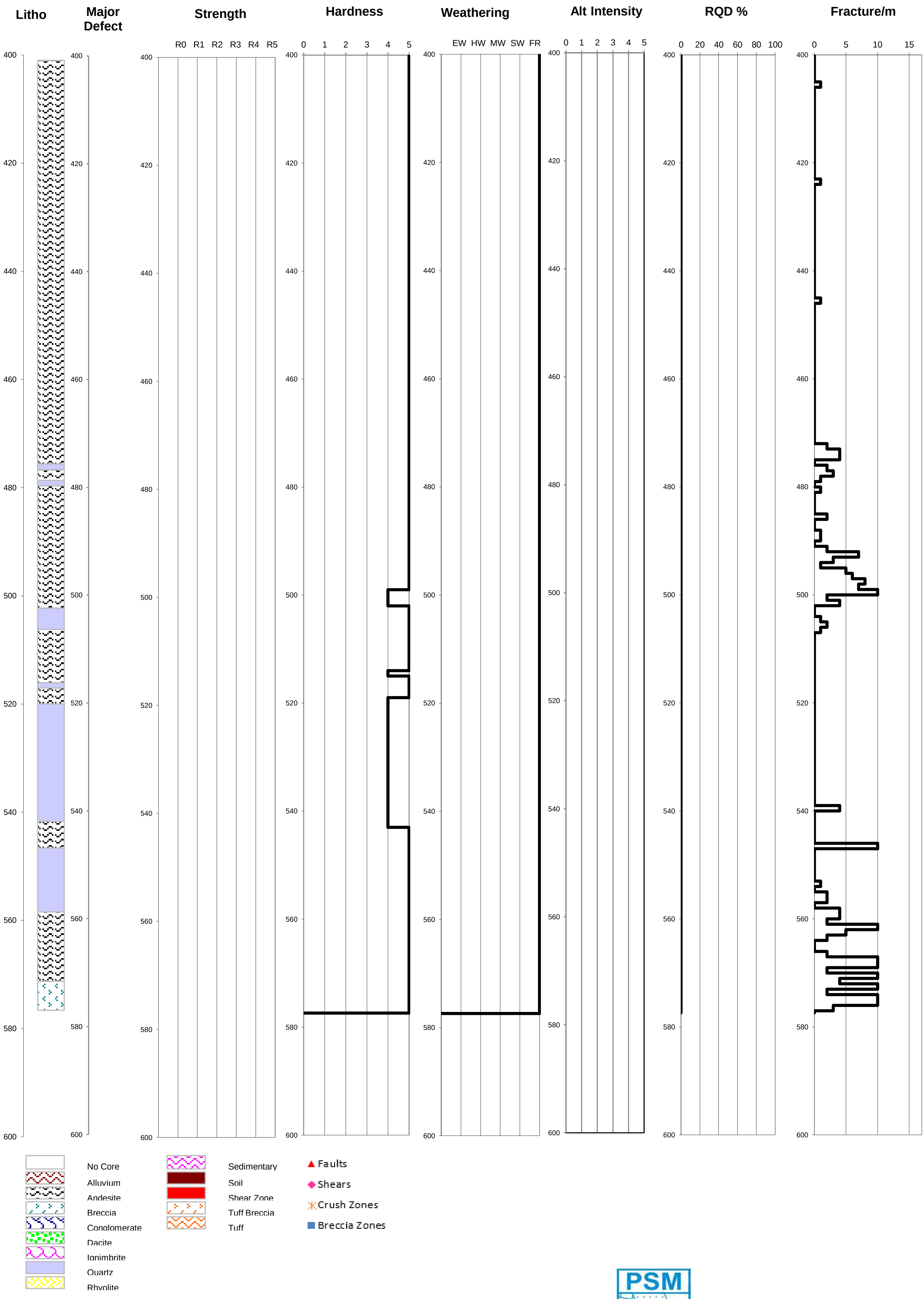
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

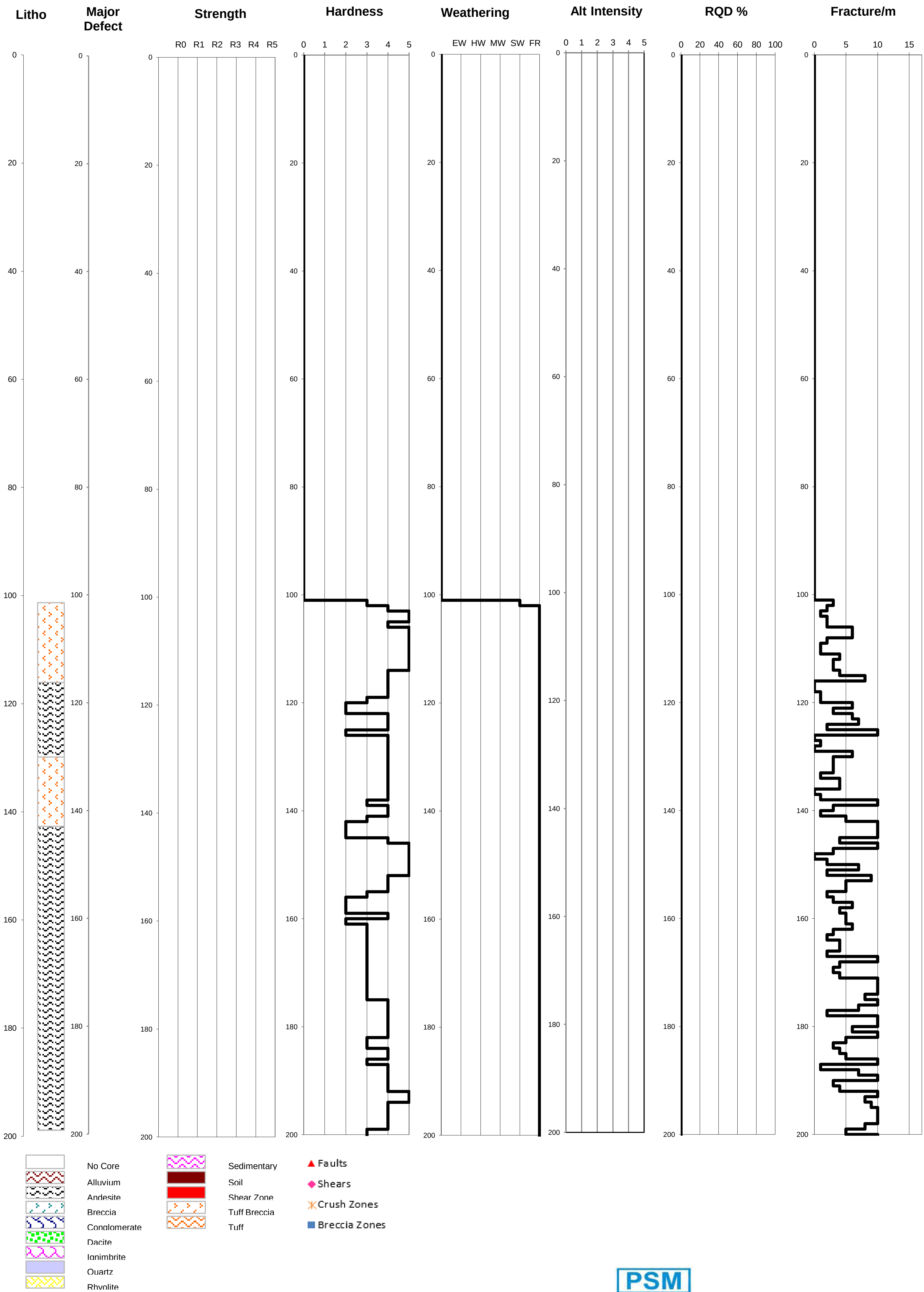
Borehole ID: **UW62A**

Pells Sullivan Meynink



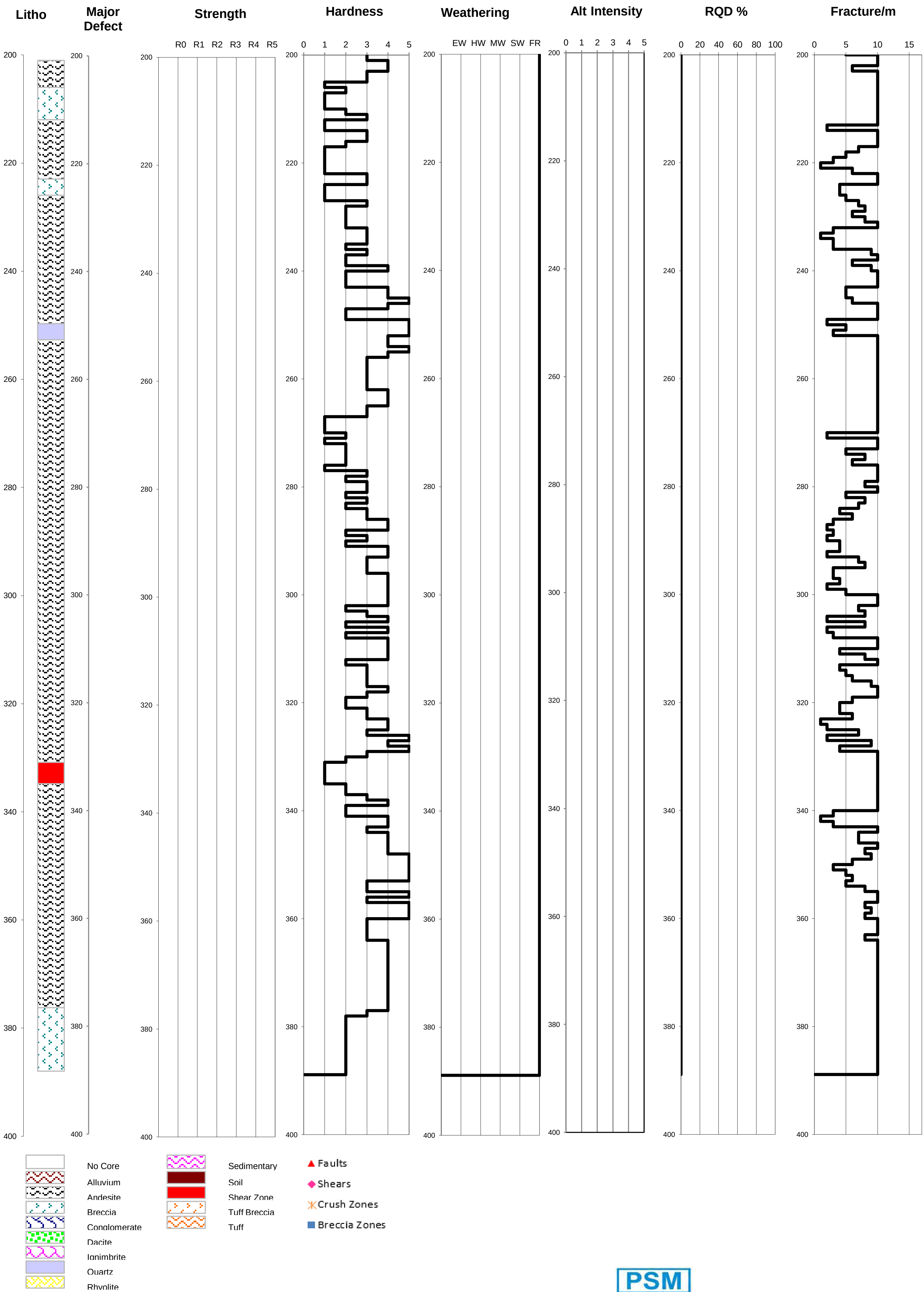
Borehole ID: UW62A

Pells Sullivan Meynink



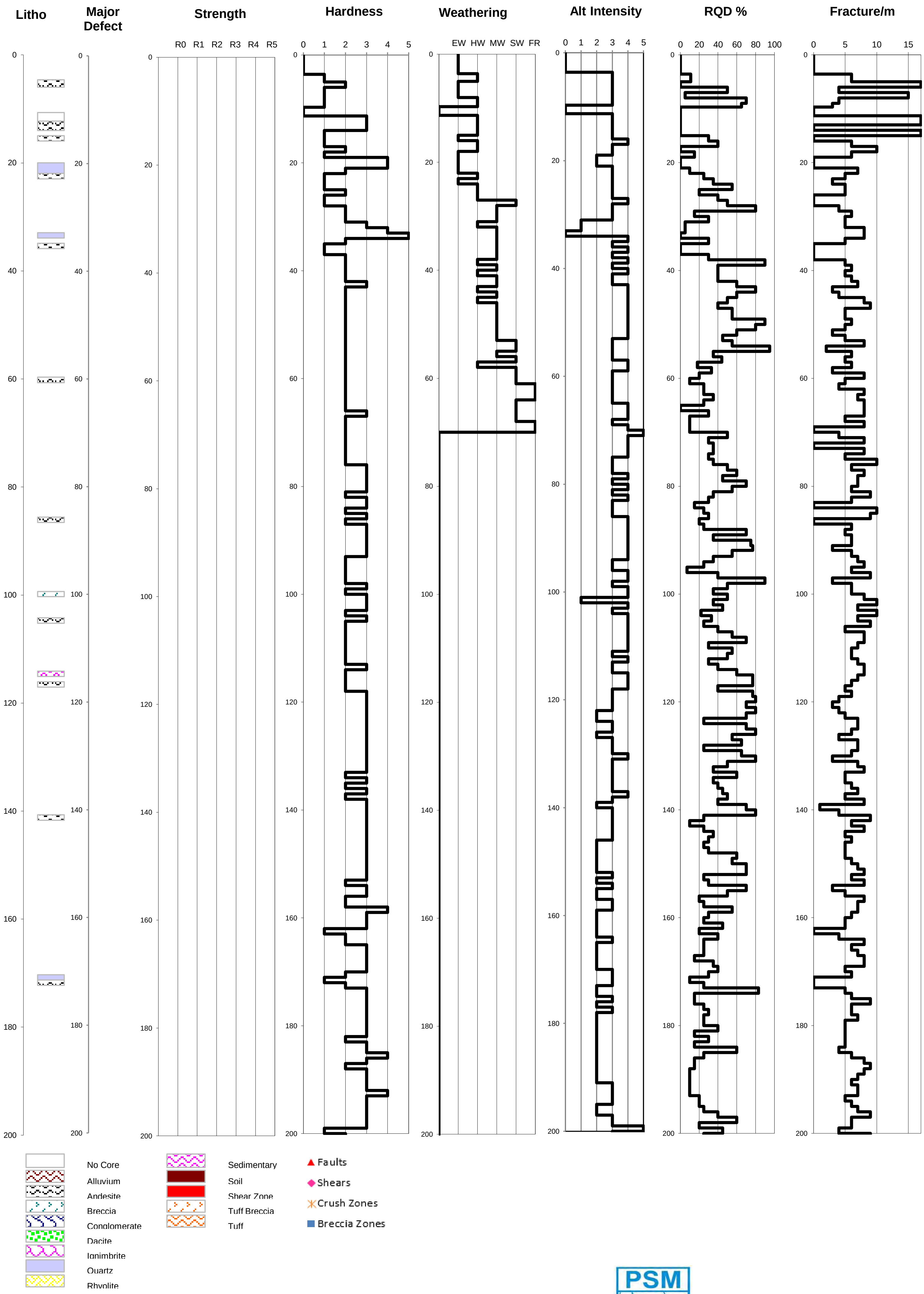
Borehole ID: **UW64**

Pells Sullivan Meynink



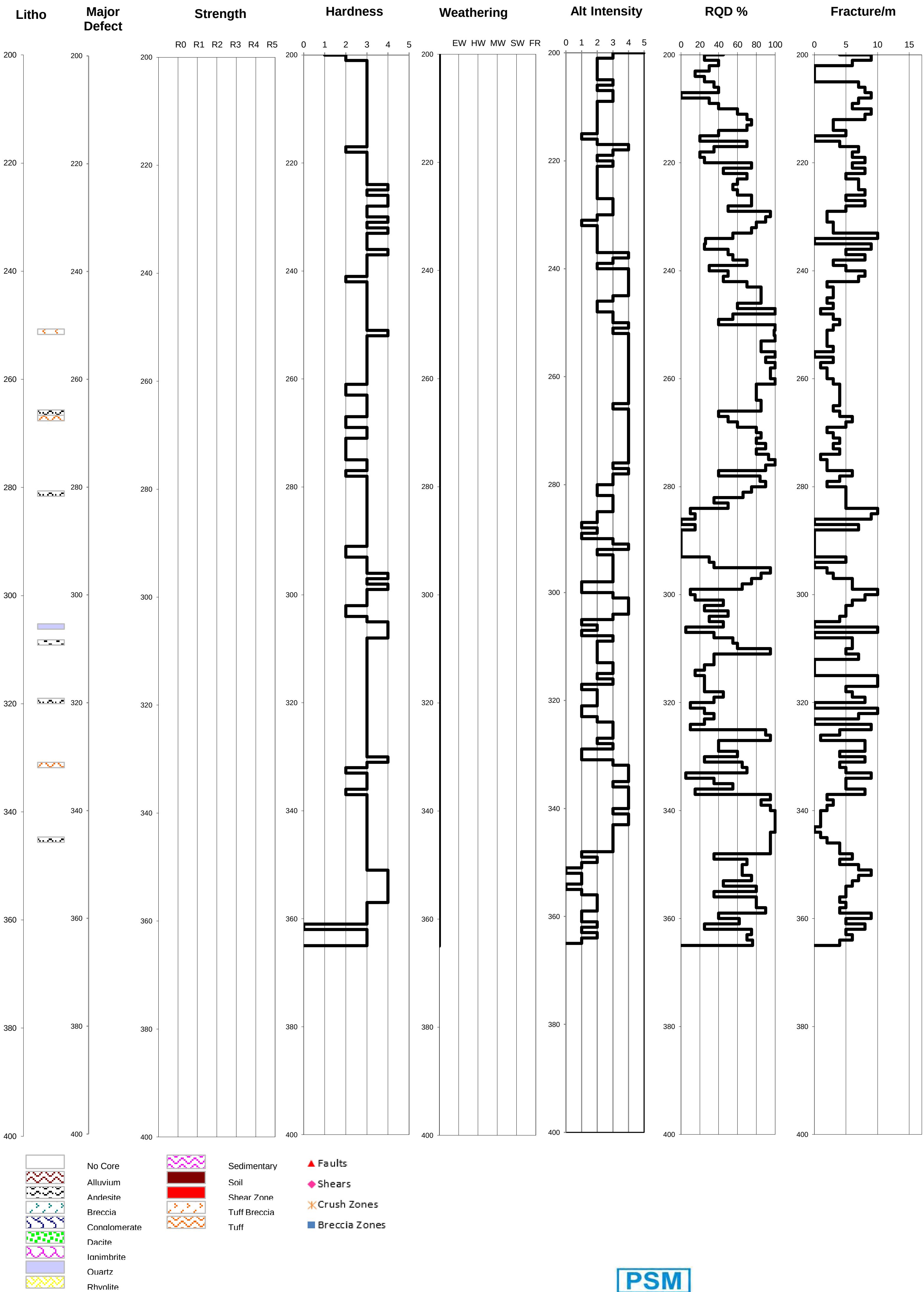
Borehole ID: **UW64**

Pells Sullivan Meynink



Borehole ID: **UW66**

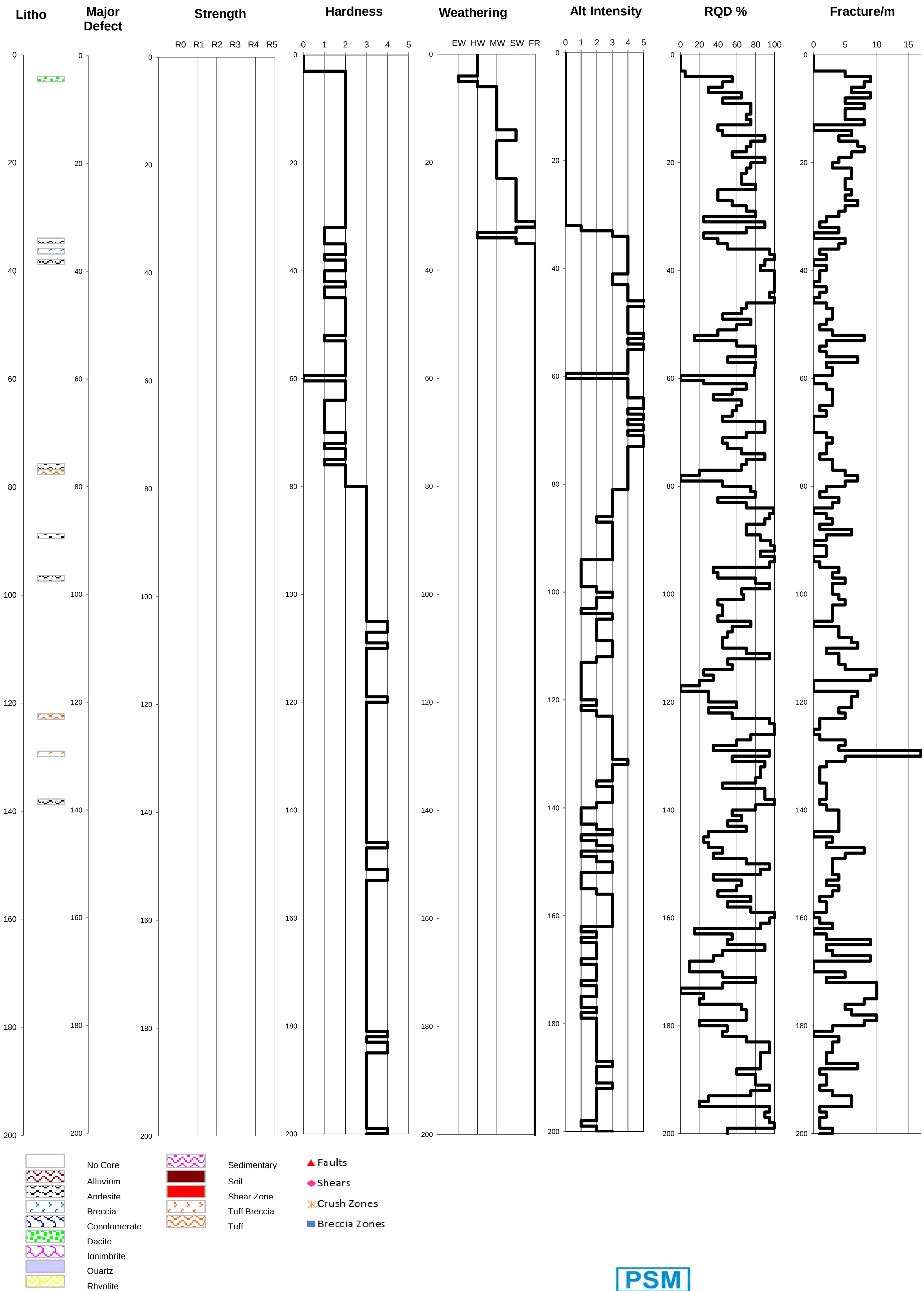
Pells Sullivan Meynink



Borehole ID: UW66

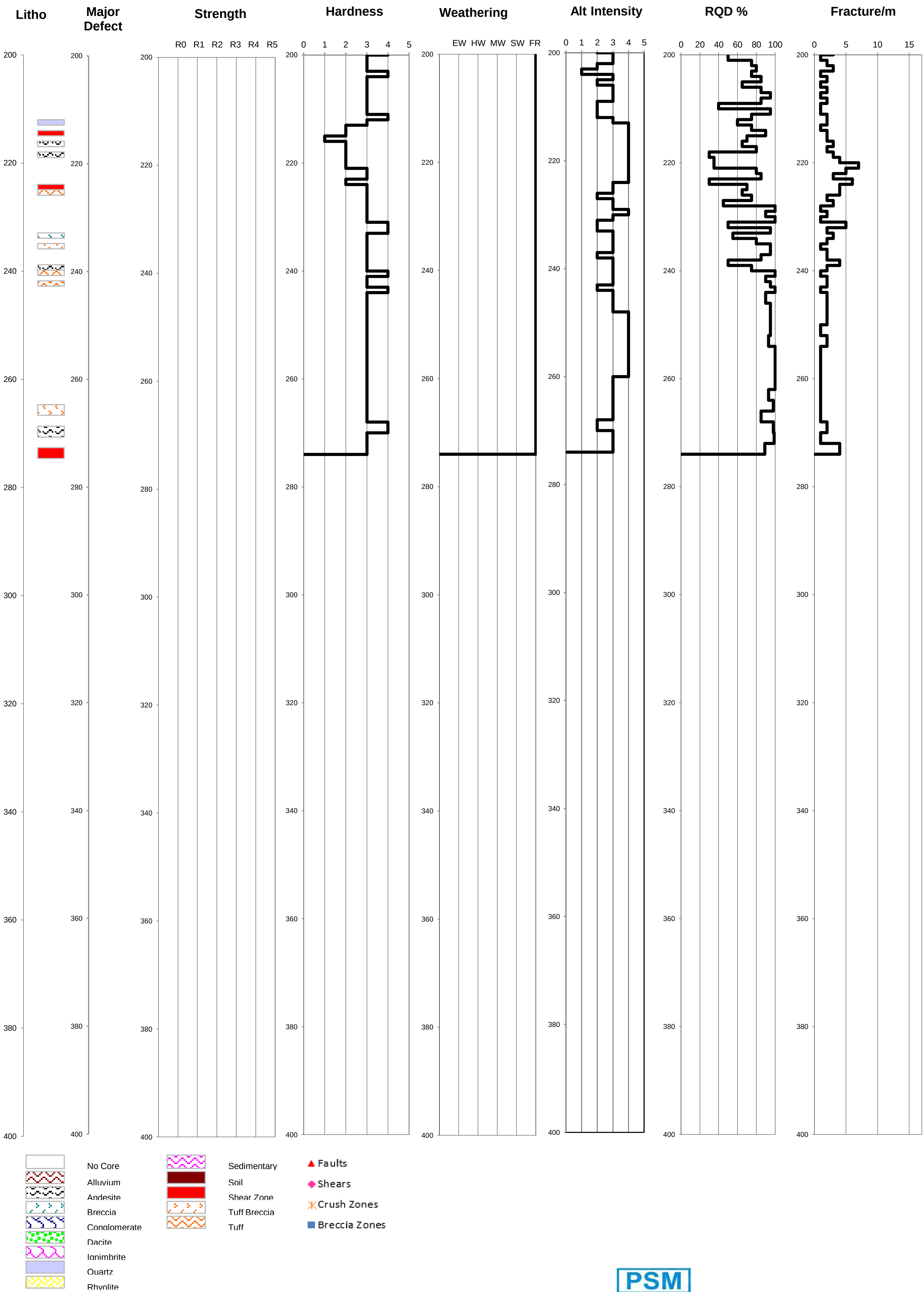
PSM

Pells Sullivan Meynink



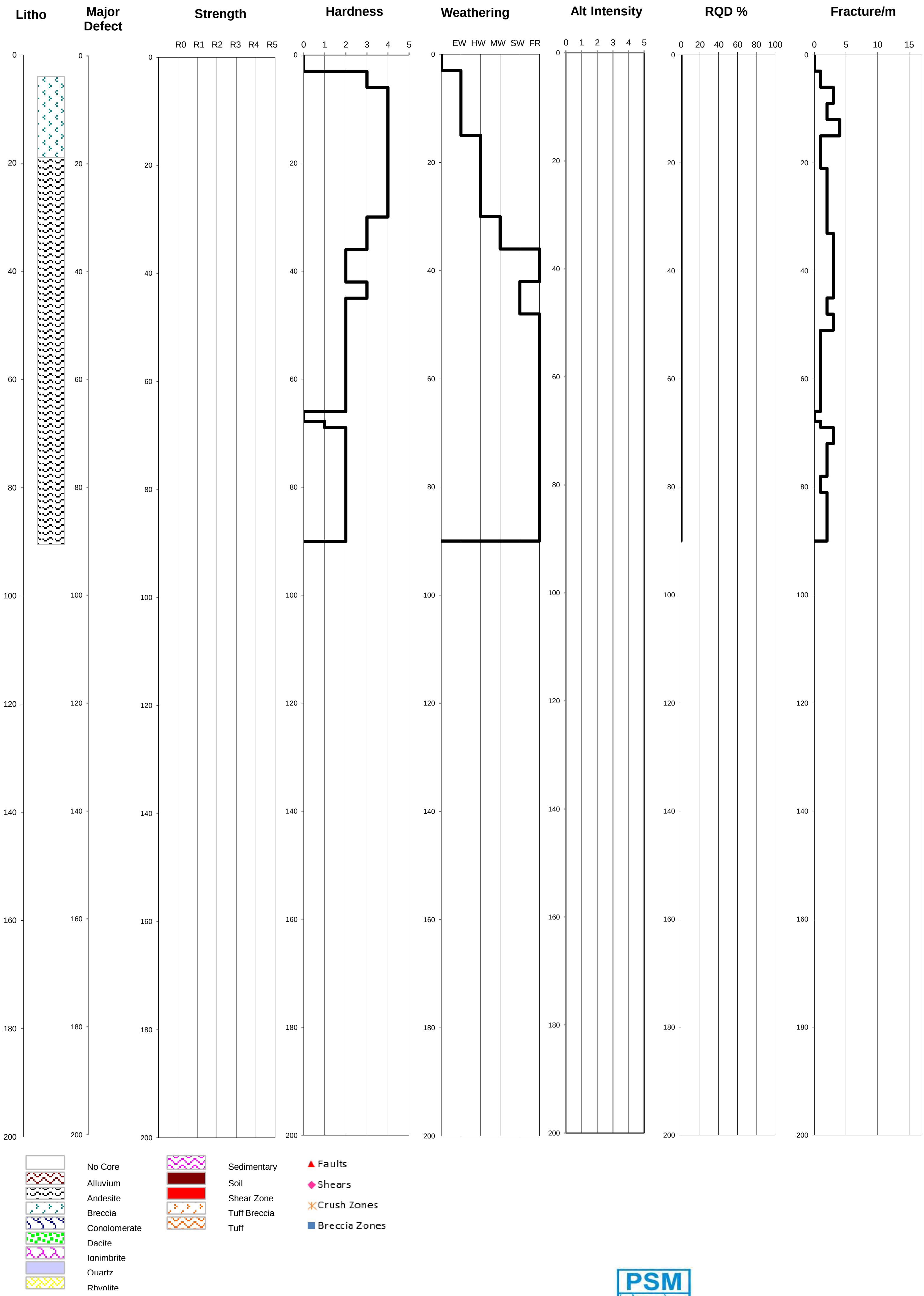
Borehole ID: **UW68**

Pells Sullivan Meynink



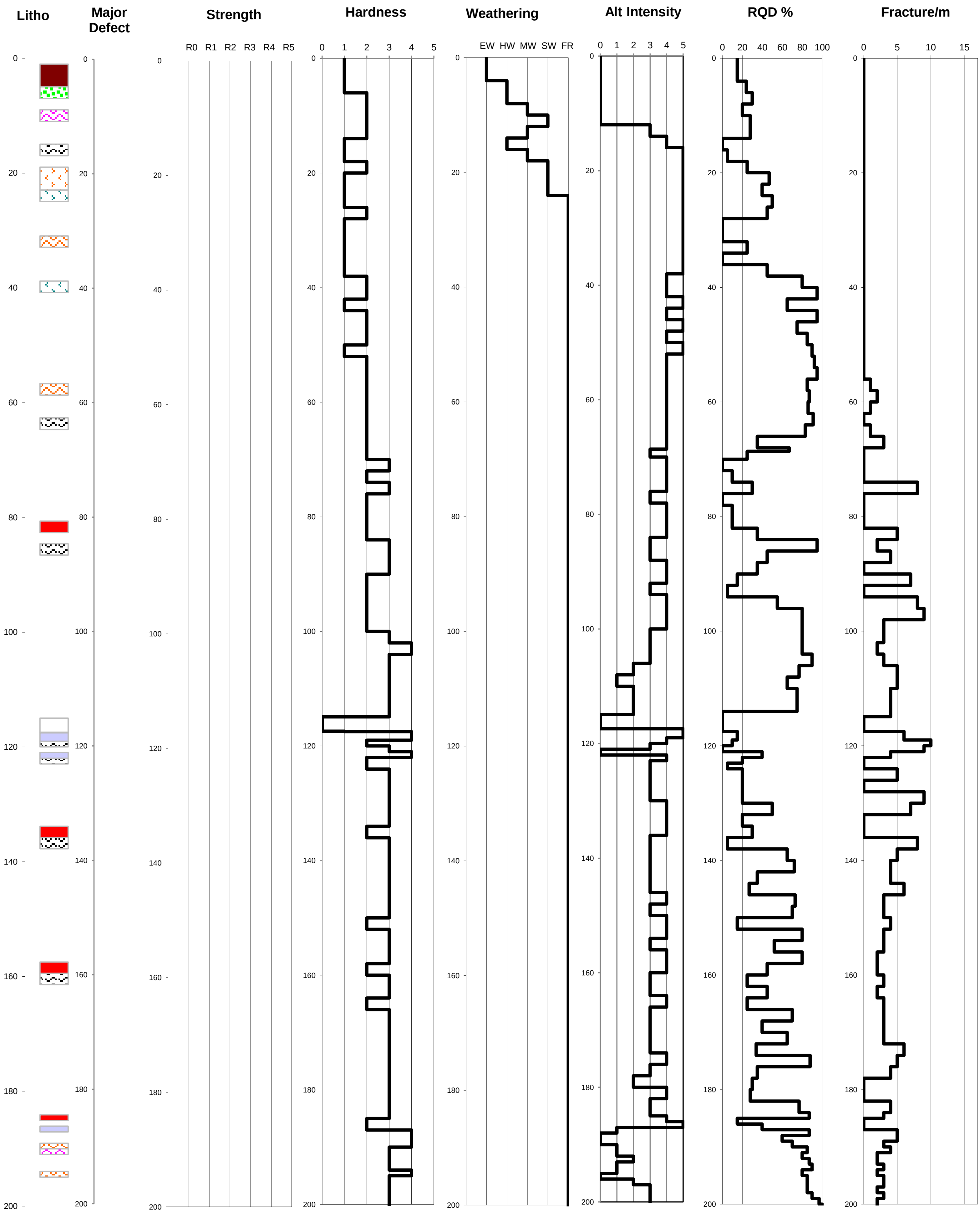
Borehole ID: **UW68**

Pells Sullivan Meynink



Borehole ID: **UW7**

Pells Sullivan Meynink

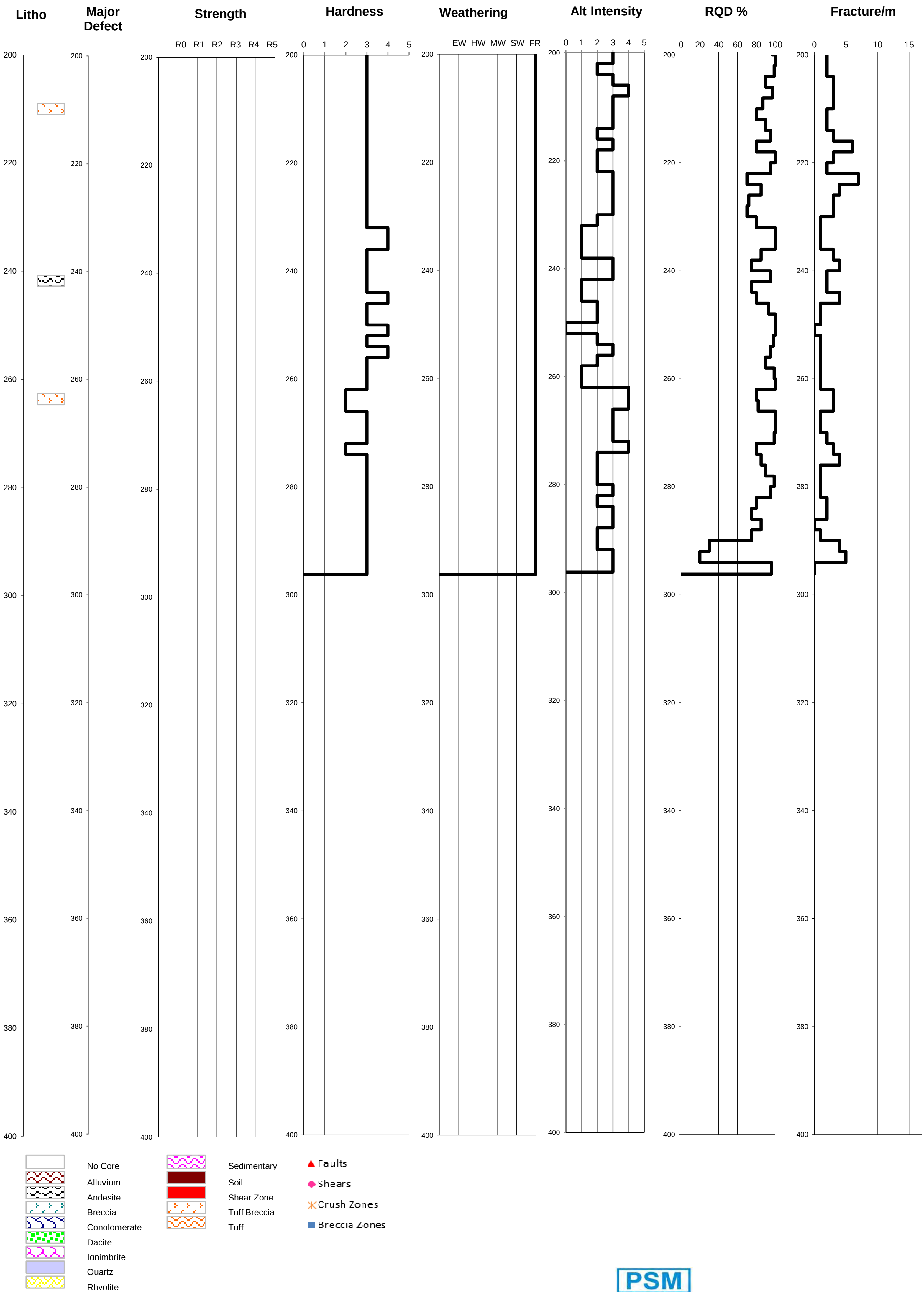


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

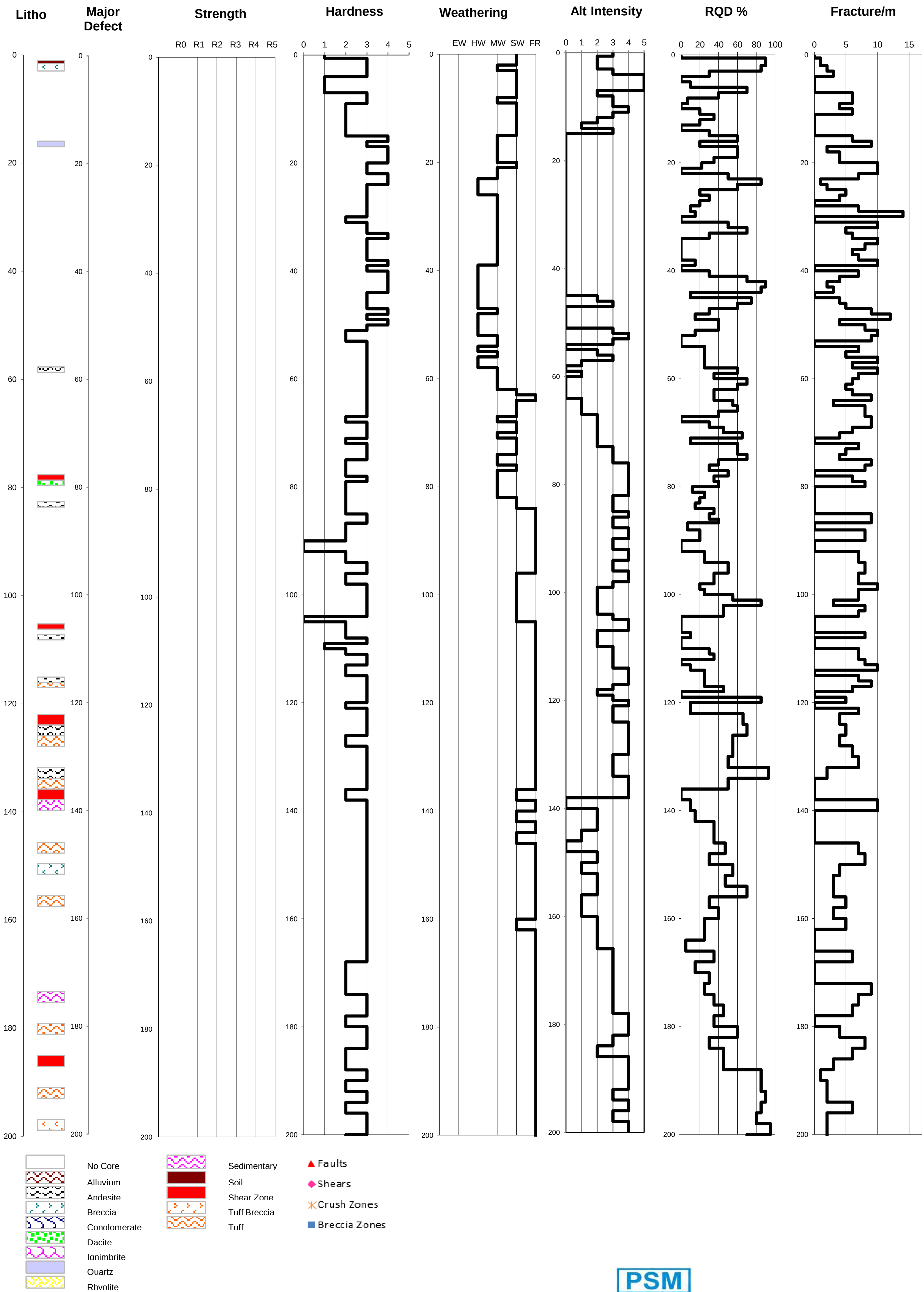
Borehole ID: **UW70**

Pells Sullivan Meynink



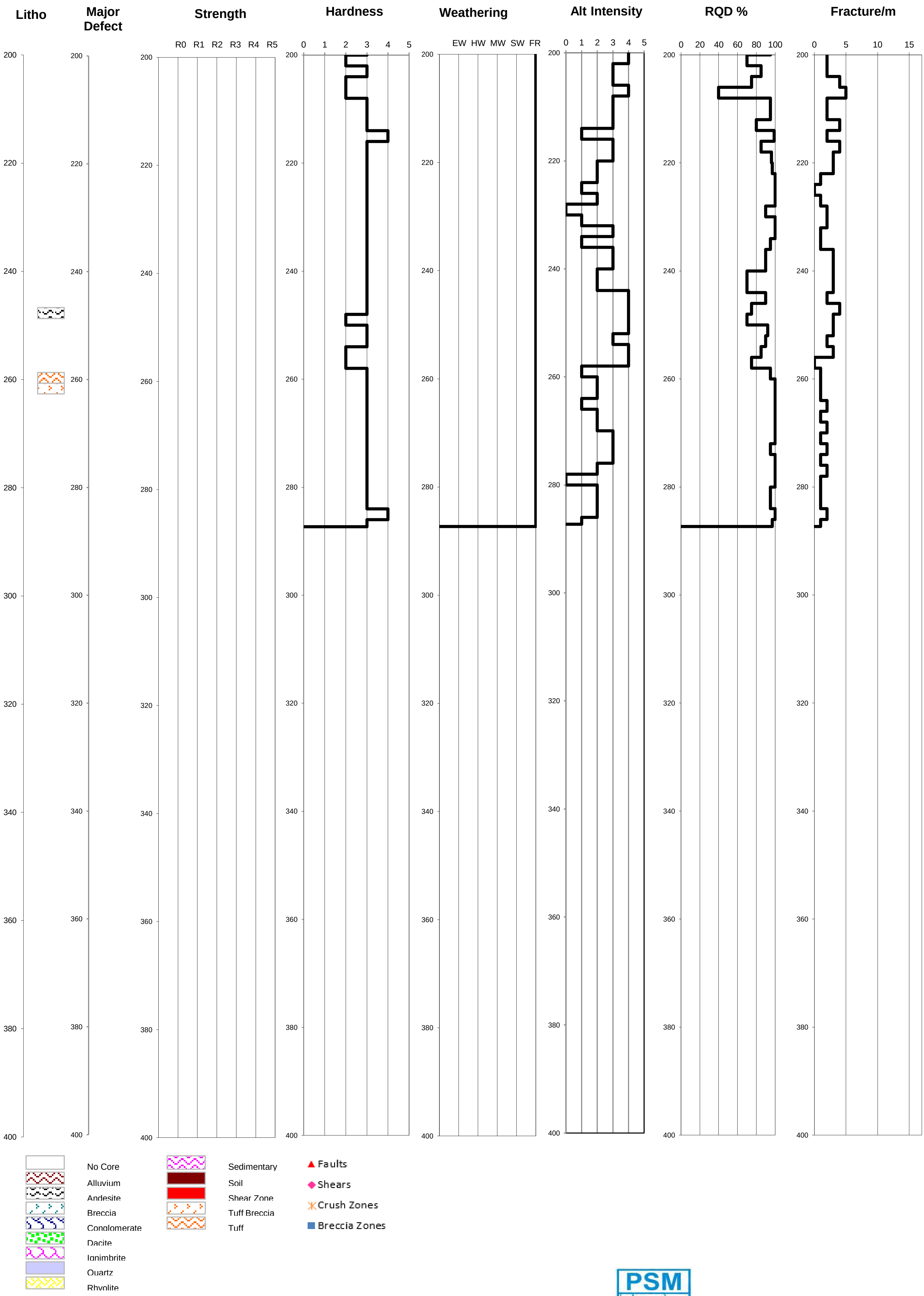
Borehole ID: **UW70**

Pells Sullivan Meynink



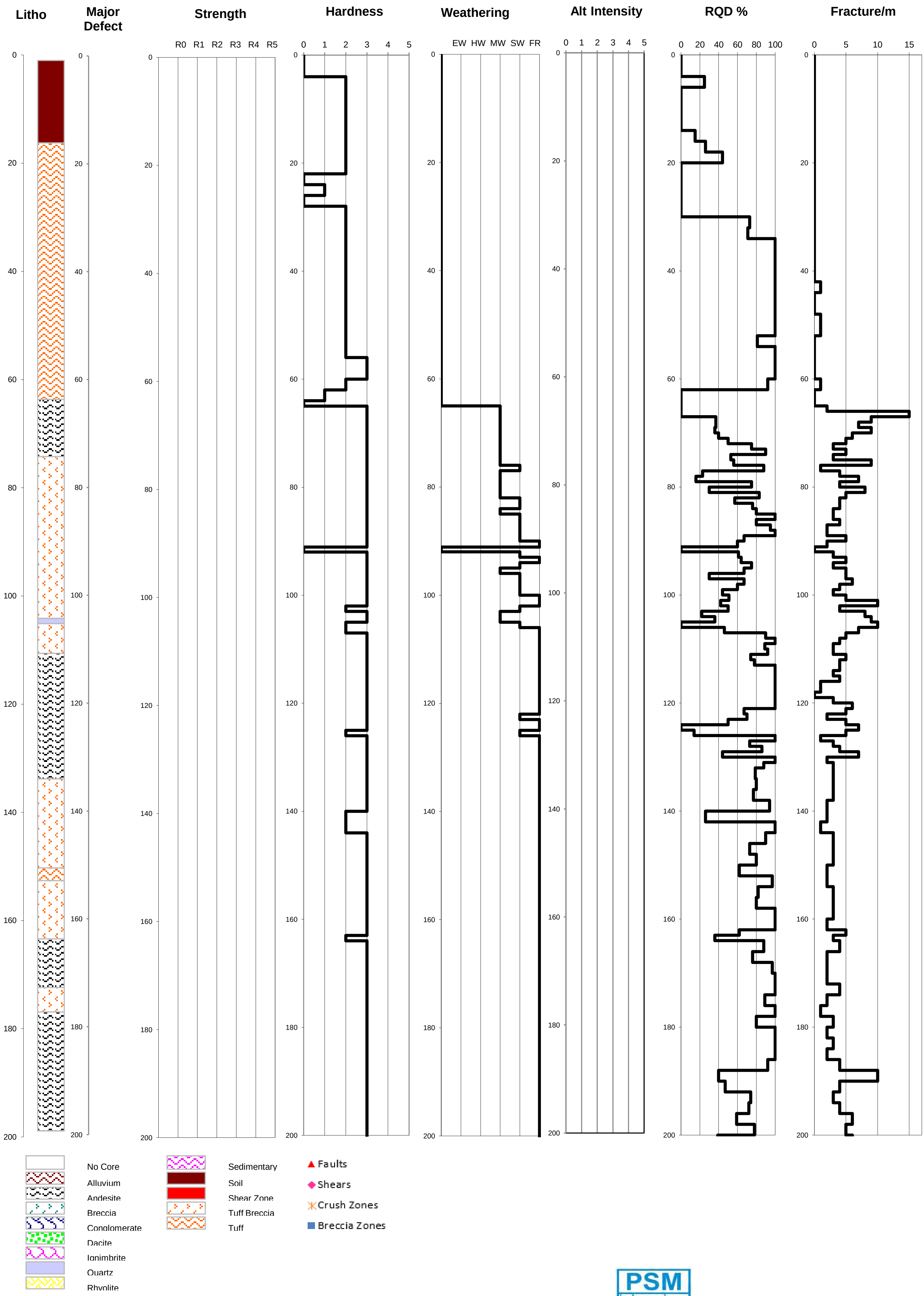
Borehole ID: UW72

Pells Sullivan Meynink



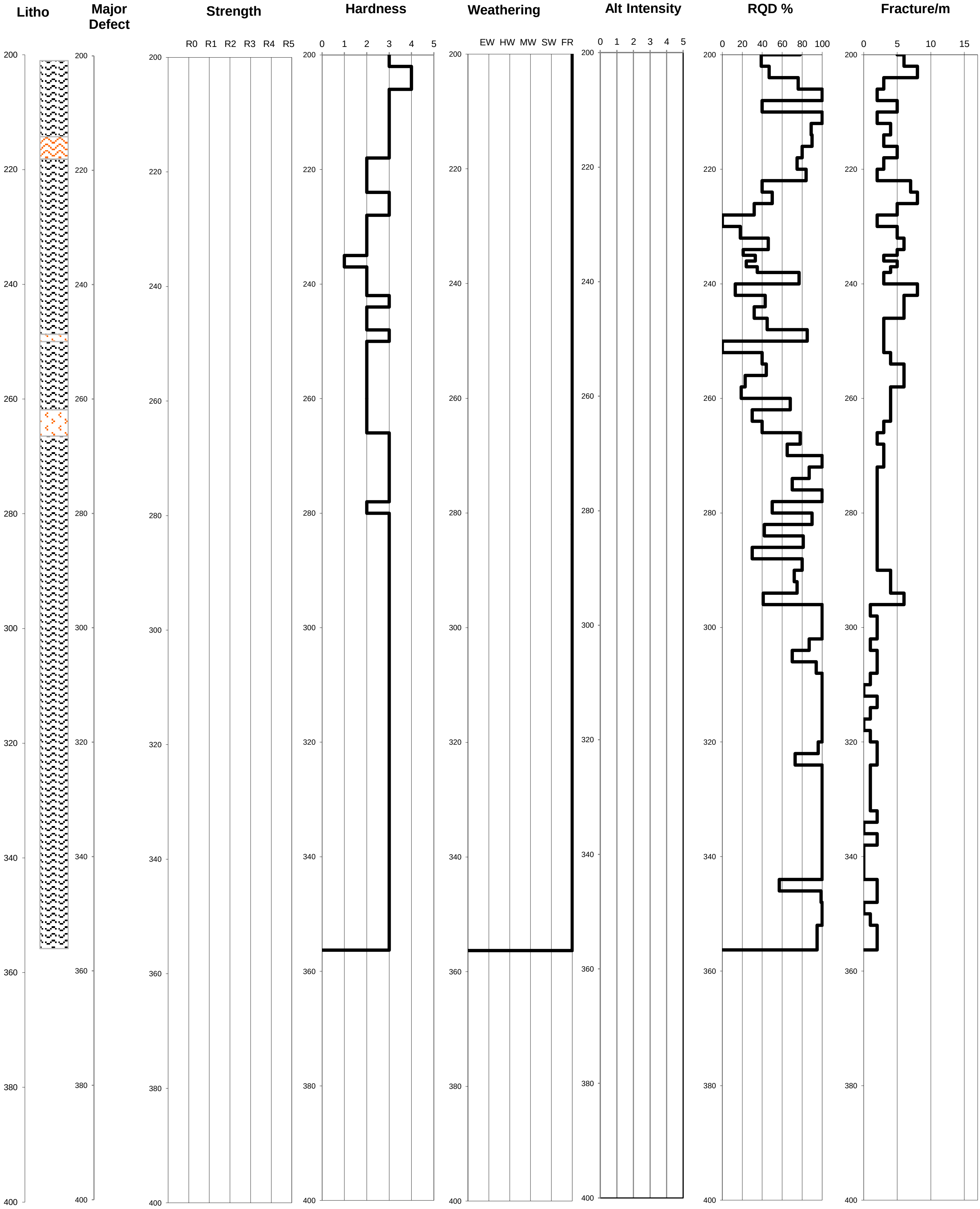
Borehole ID: **UW72**

Pells Sullivan Meynink



Borehole ID: UW73

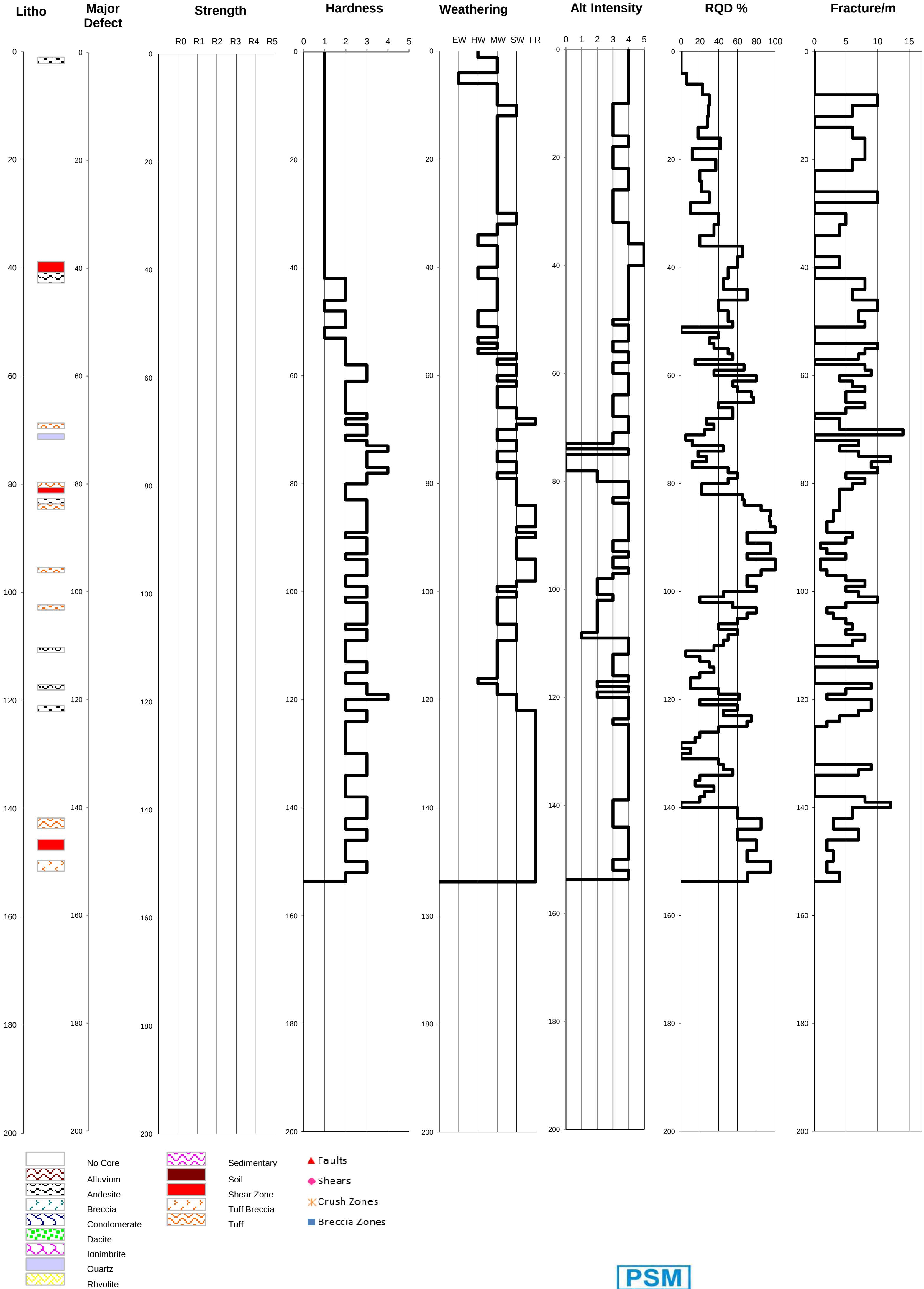
Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff
Faults
Shears
Crush Zones
Breccia Zones

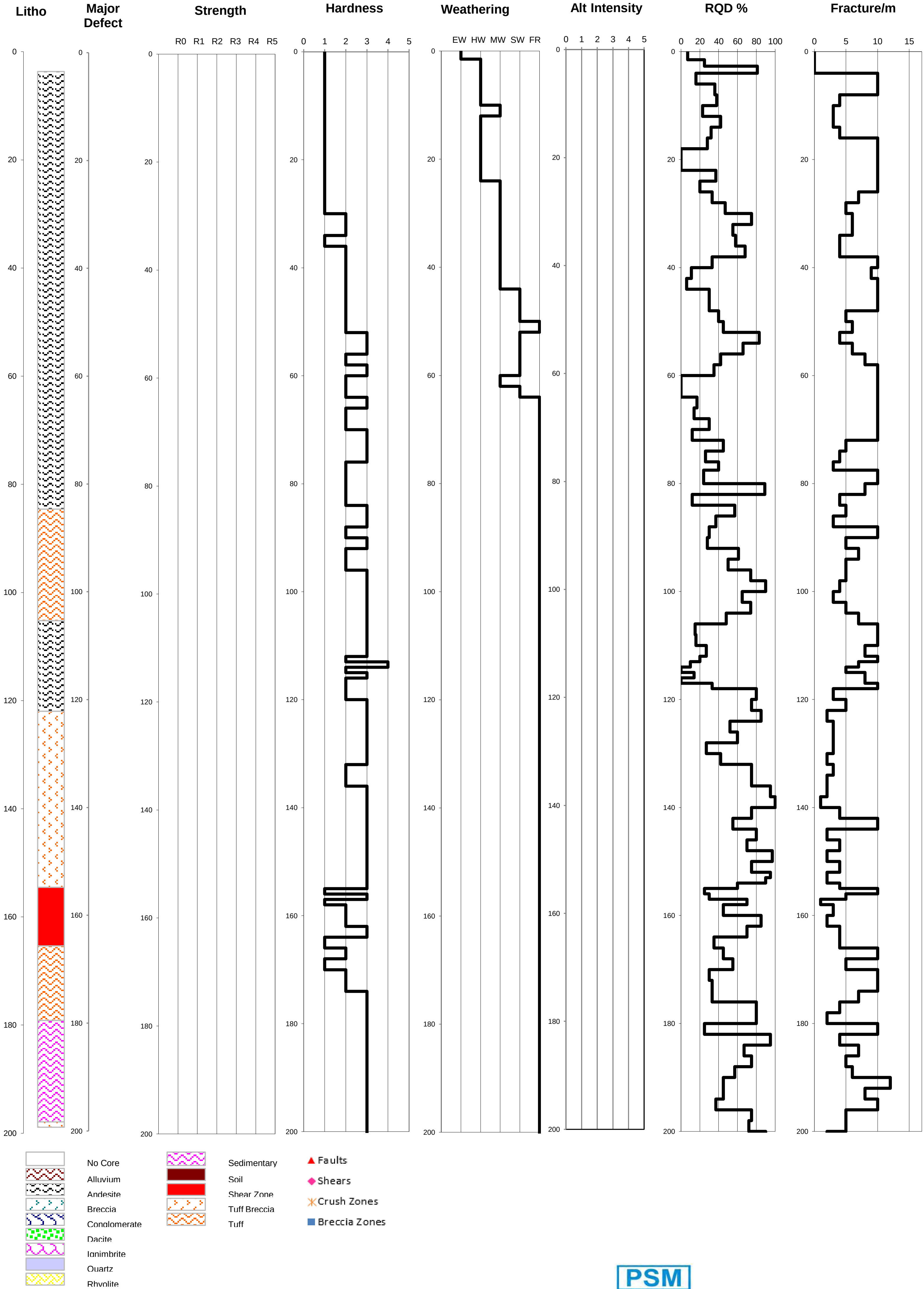
Borehole ID: UW73

Pells Sullivan Meynink



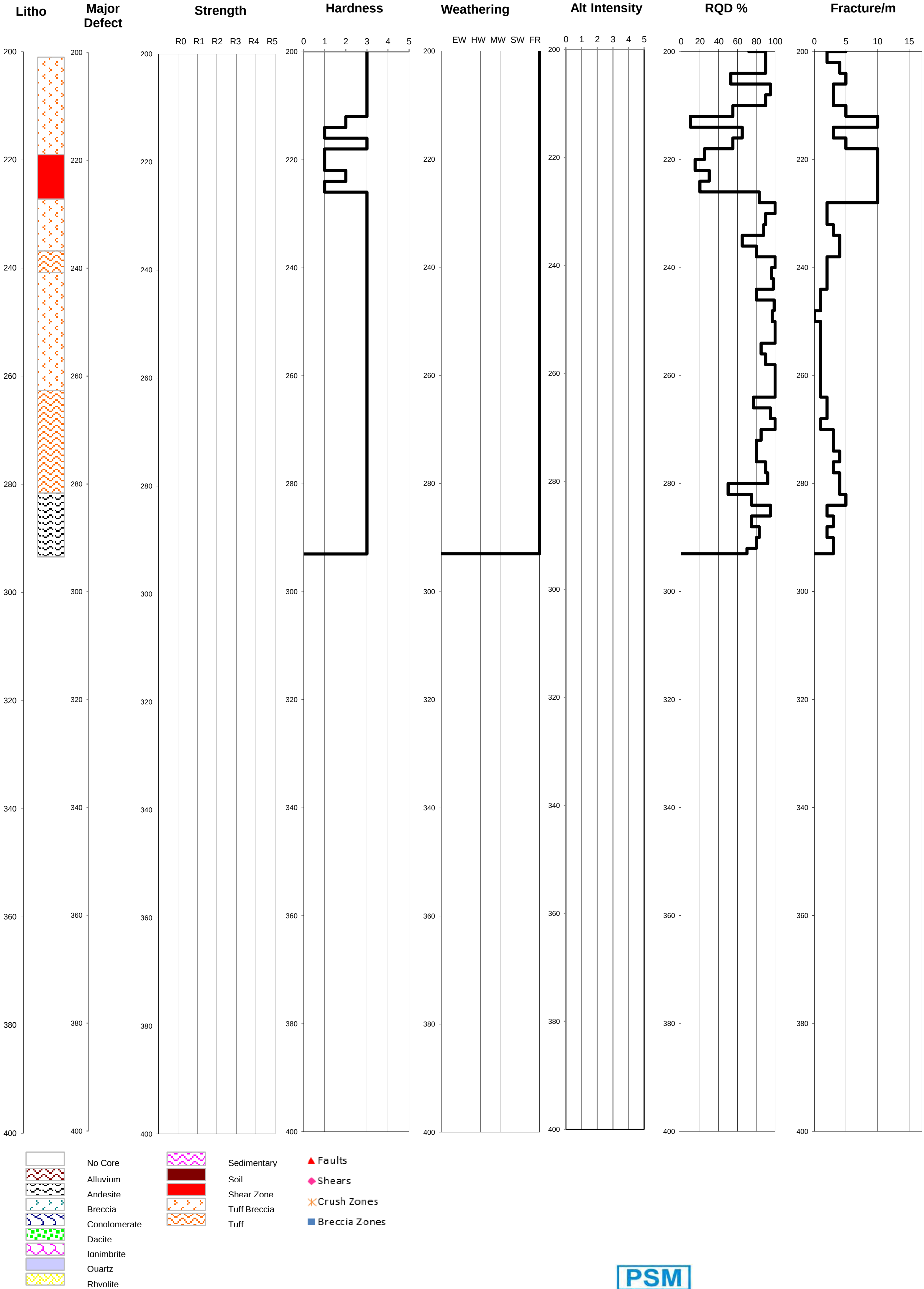
Borehole ID: **UW74**

Pells Sullivan Meynink



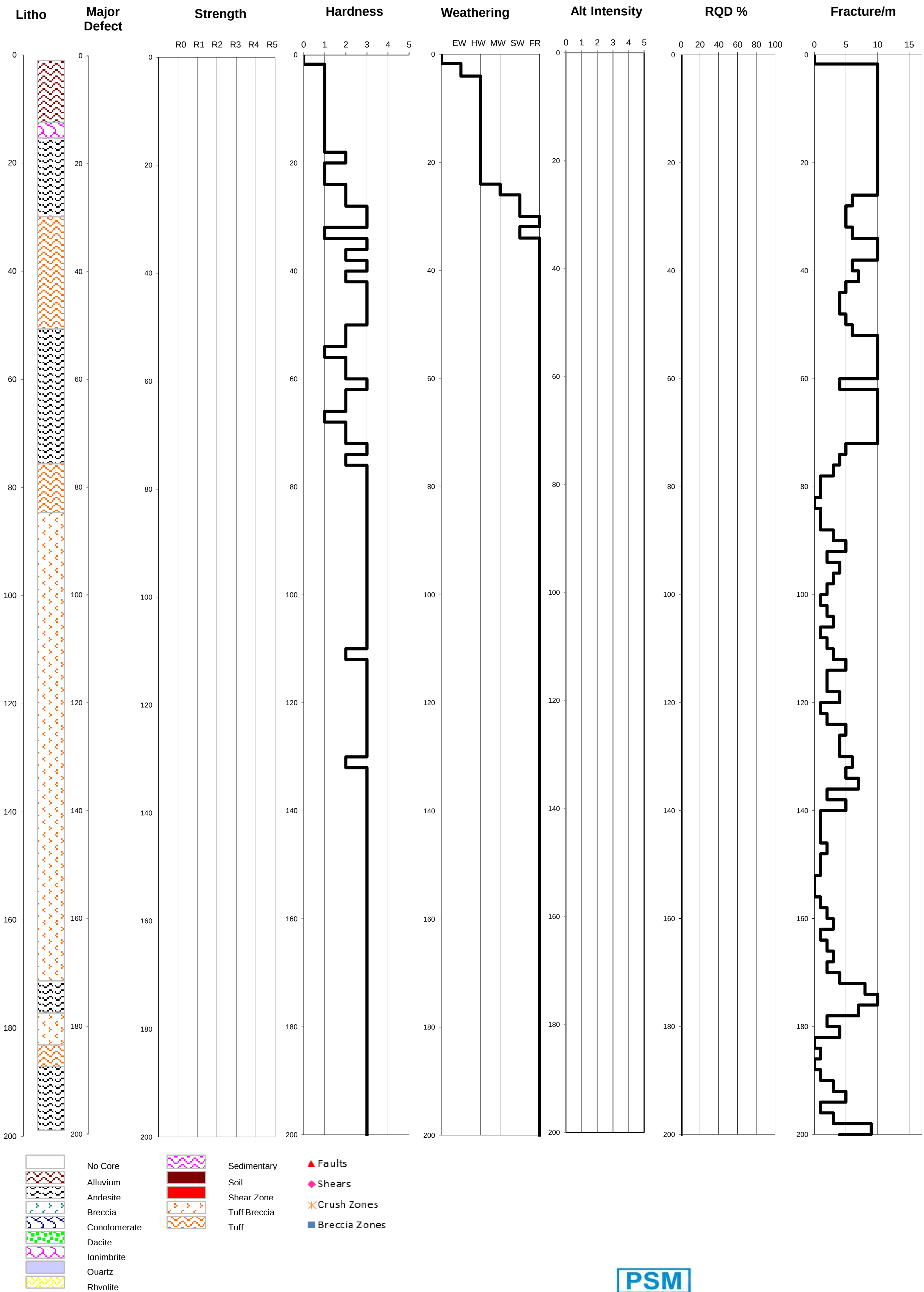
Borehole ID: **UW77**

PSM **Pells Sullivan Meynink**



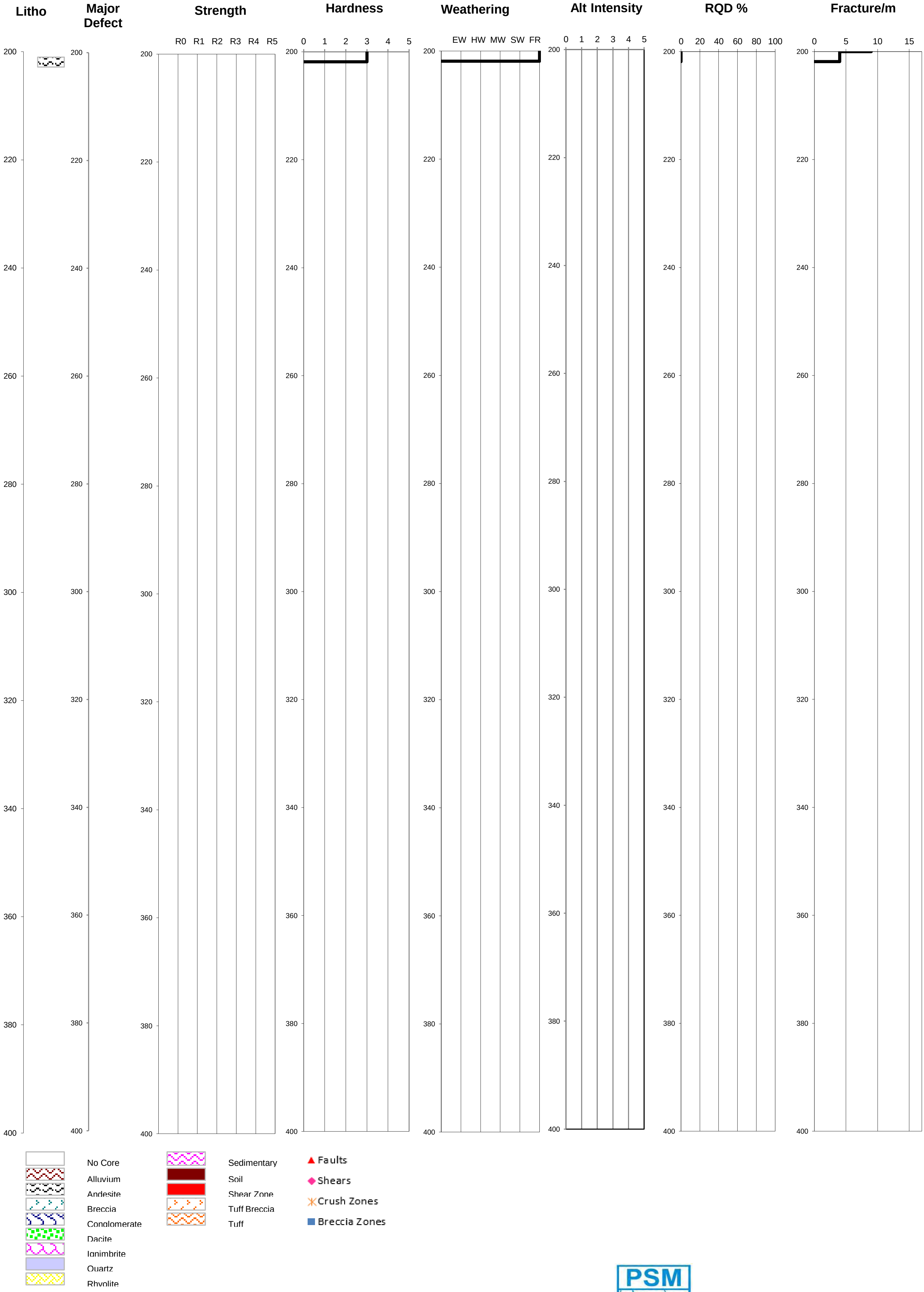
Borehole ID: UW77

Pells Sullivan Meynink



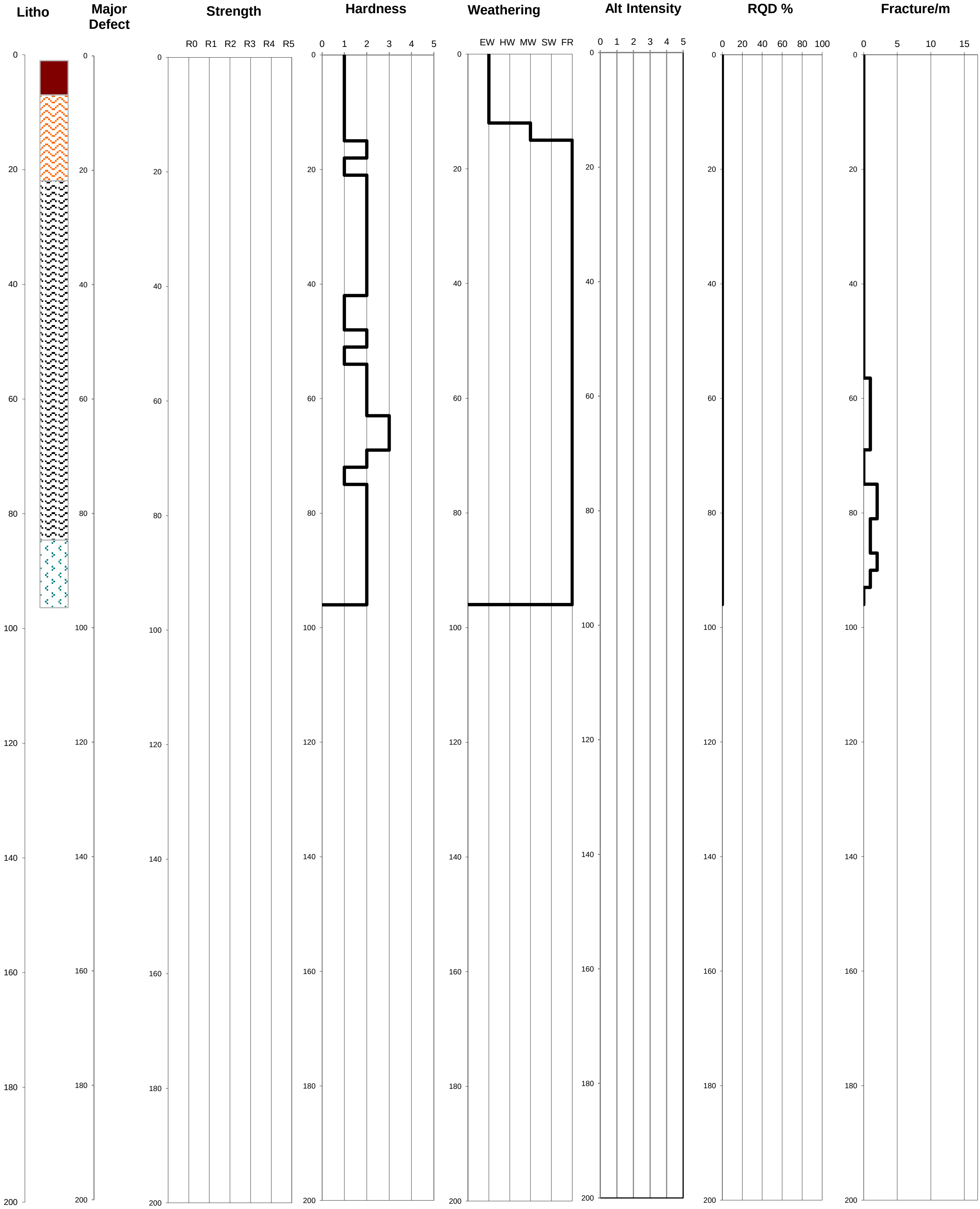
Borehole ID: UW78

Pells Sullivan Meynink



Borehole ID: **UW78**

Pells Sullivan Meynink

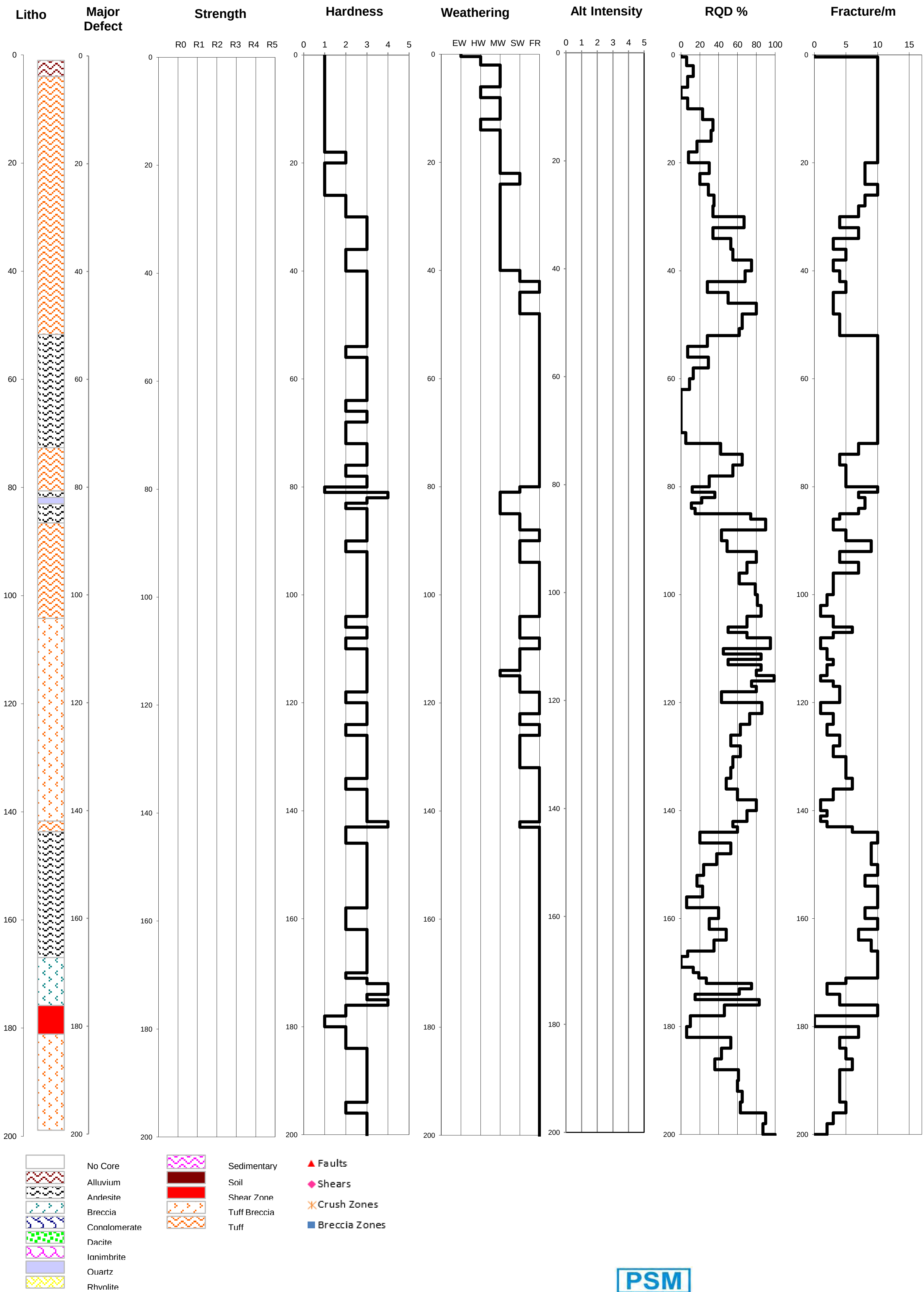


No Core	Sedimentary
Alluvium	Soil
Andesite	Shear Zone
Breccia	Tuff Breccia
Conglomerate	Tuff
Dacite	
Ignimbrite	
Quartz	
Rhyolite	

- ▲ Faults
- ◆ Shears
- ✳ Crush Zones
- ■ Breccia Zones

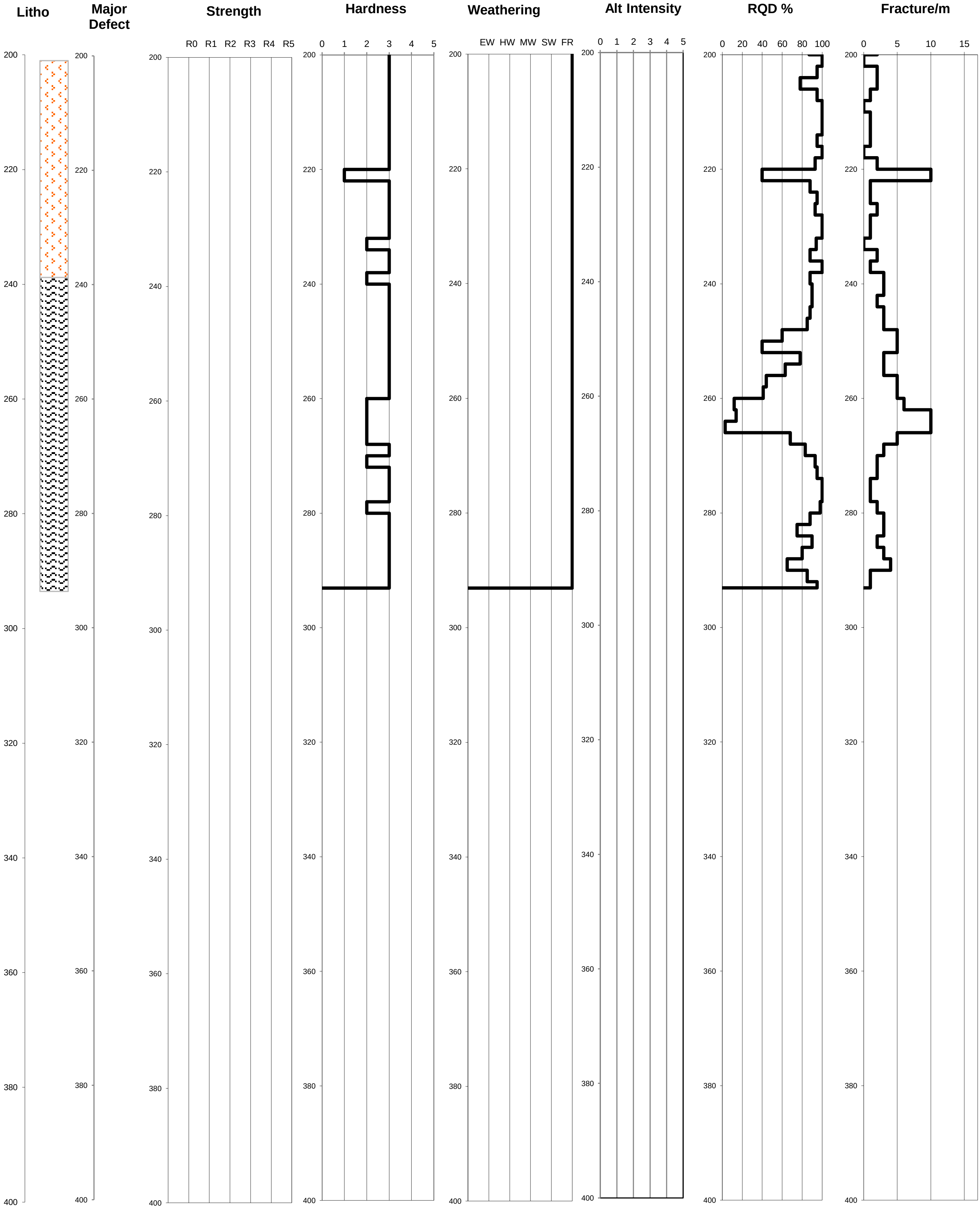
Borehole ID: UW8

Pells Sullivan Meynink



Borehole ID: **UW80**

Pells Sullivan Meynink

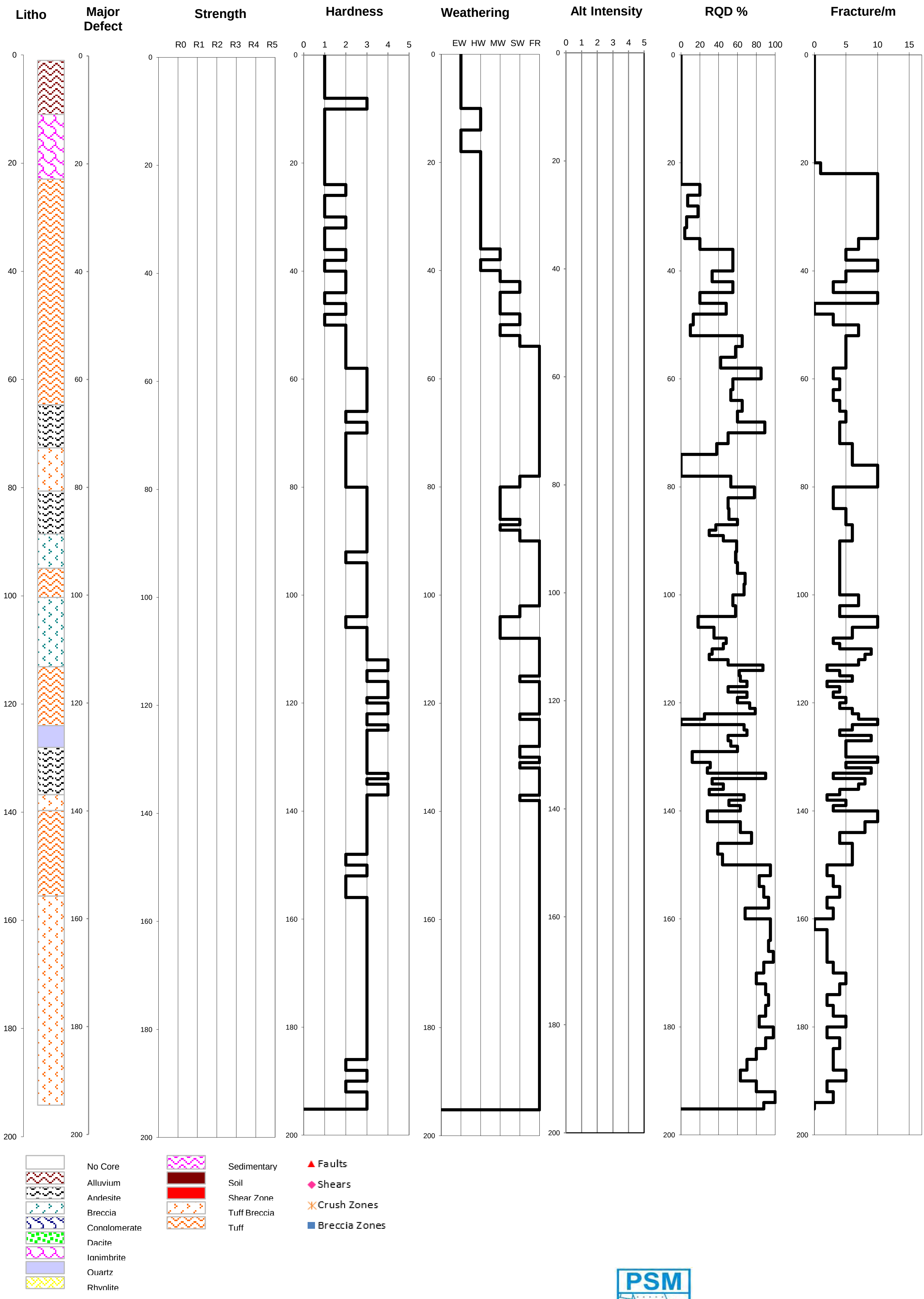


No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite
Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
Crush Zones
■ Breccia Zones

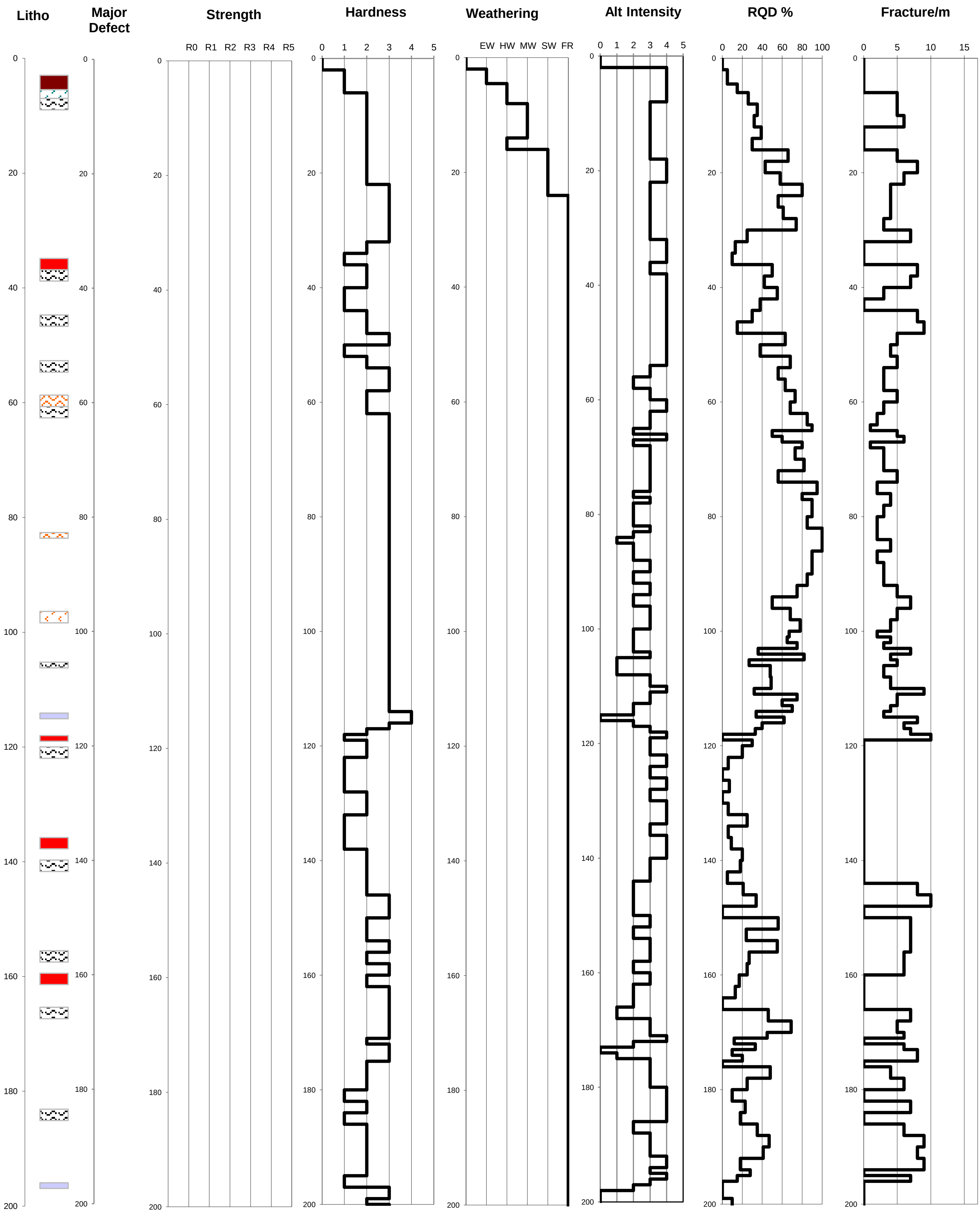
Borehole ID: UW80

Pells Sullivan Meynink



Borehole ID: **UW81**

Pells Sullivan Meynink



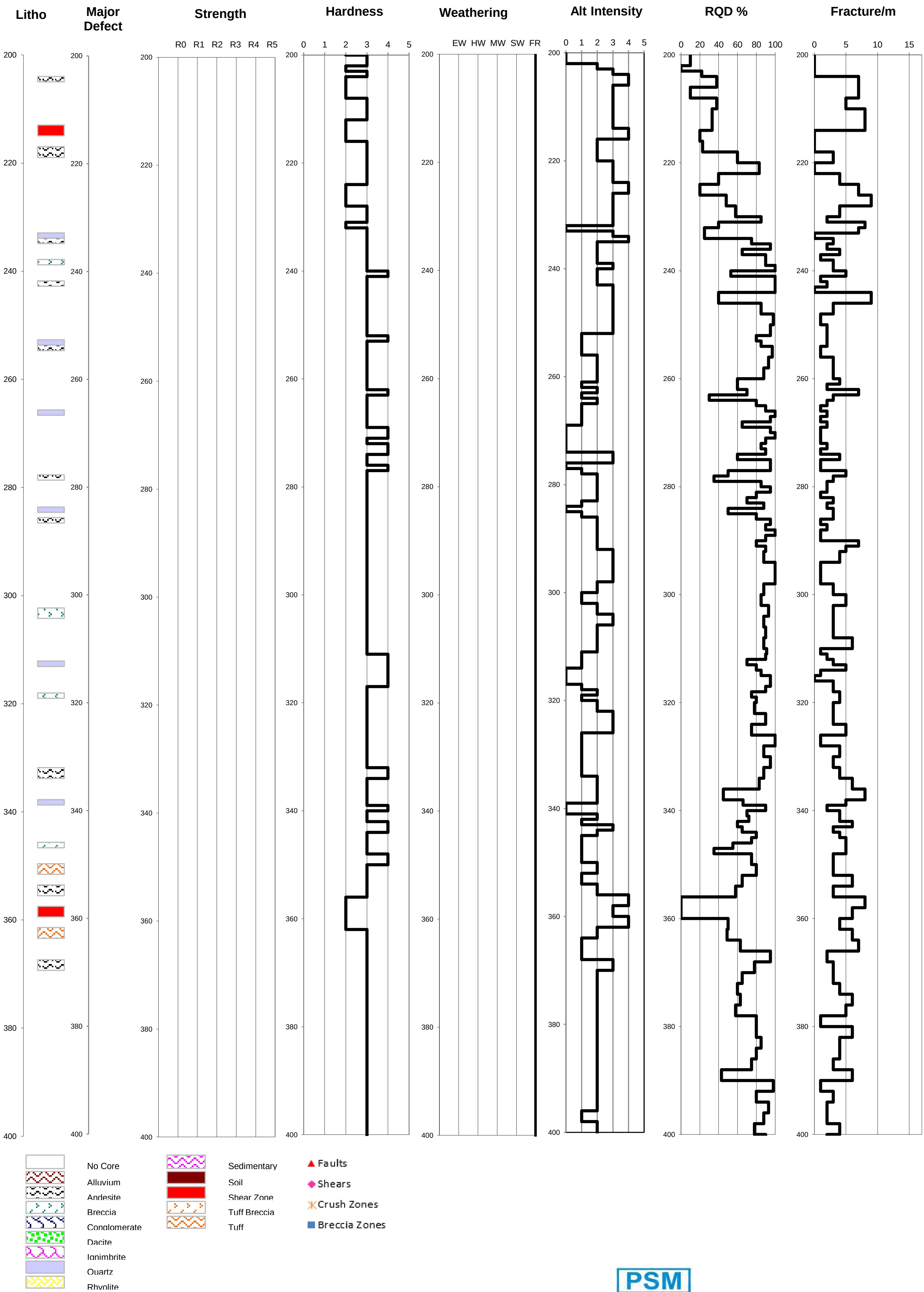
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✱ Crush Zones
■ Breccia Zones

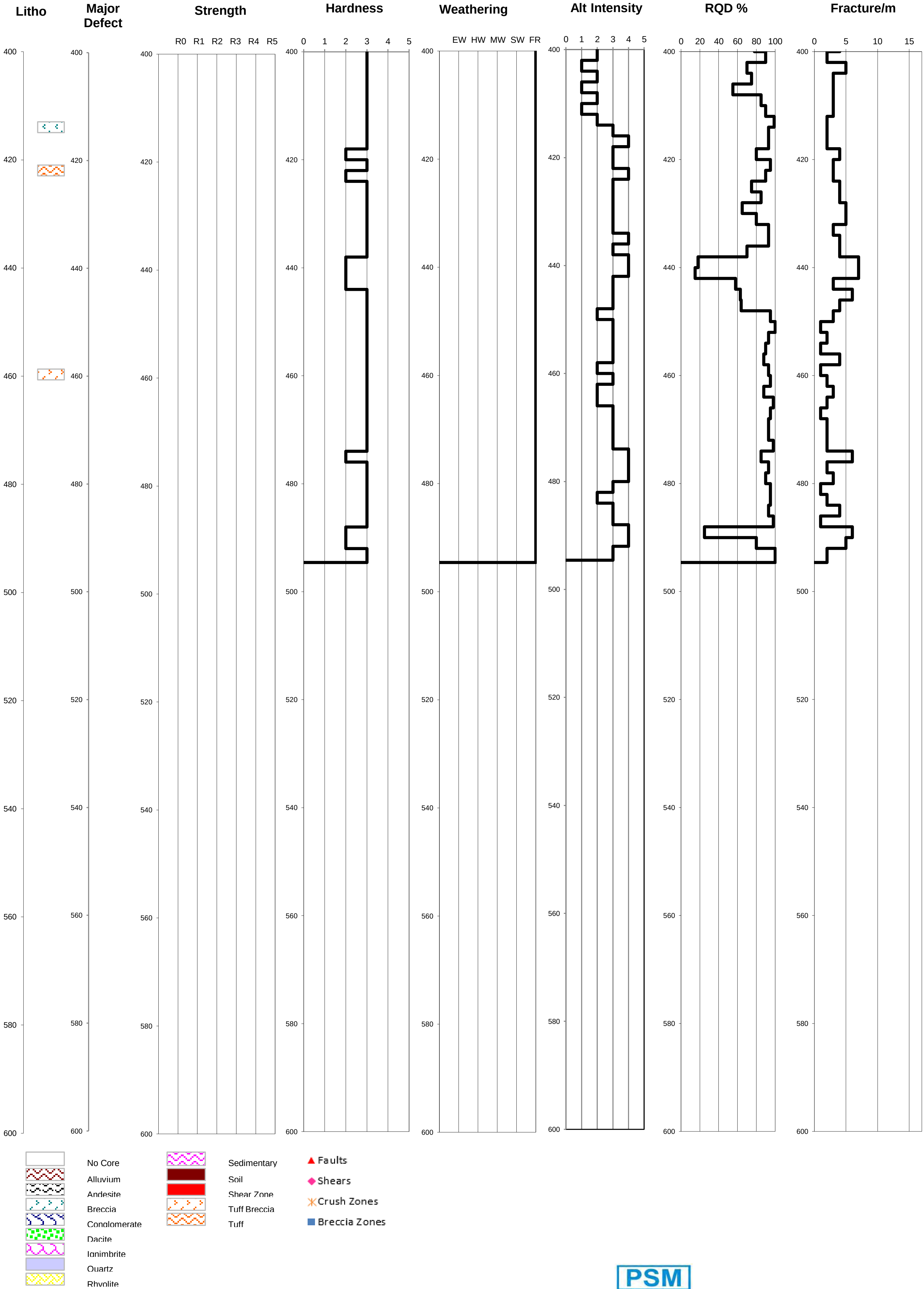
Borehole ID: **UW82**

Pells Sullivan Meynink



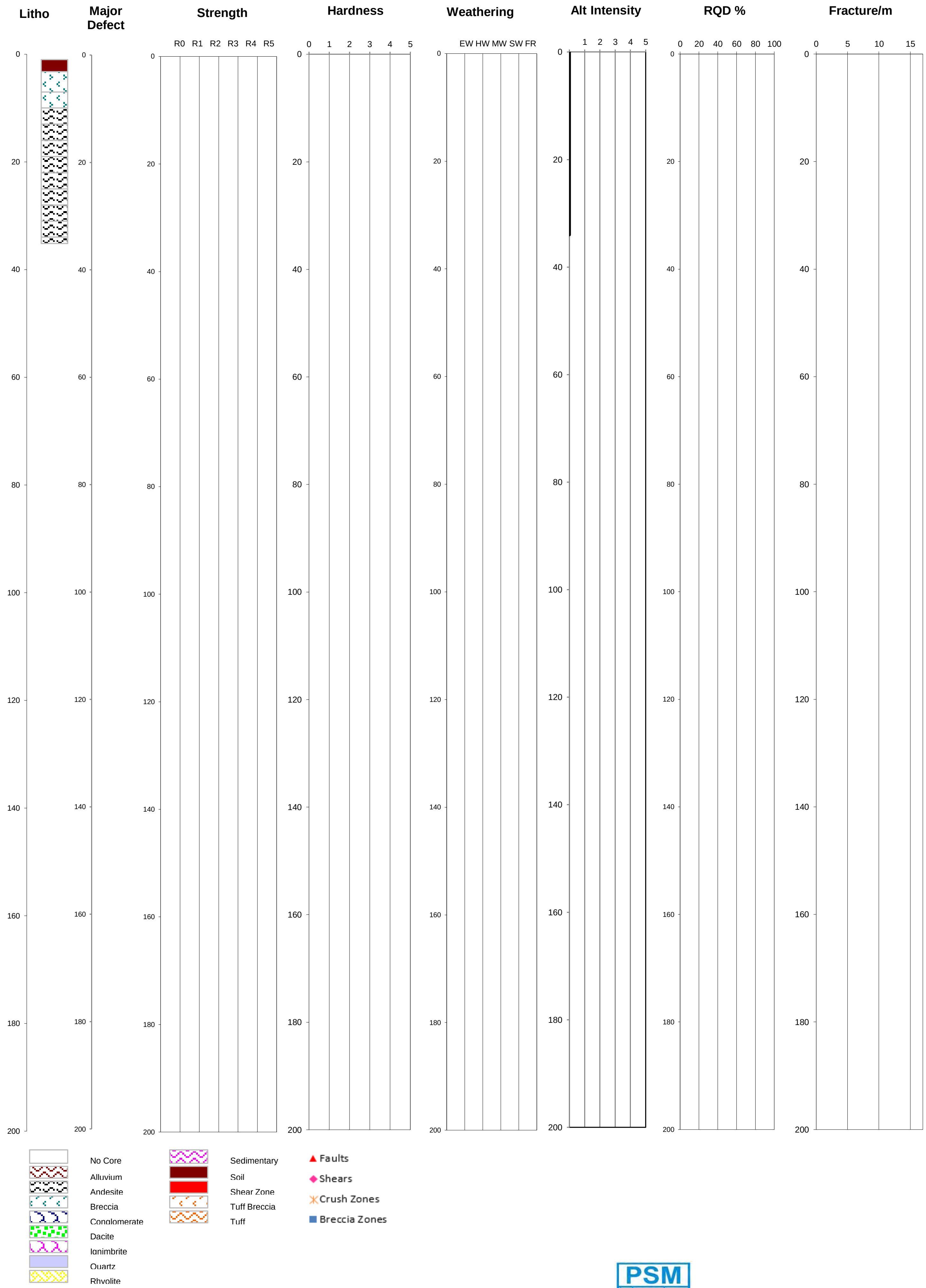
Borehole ID: **UW82**

Pells Sullivan Meynink



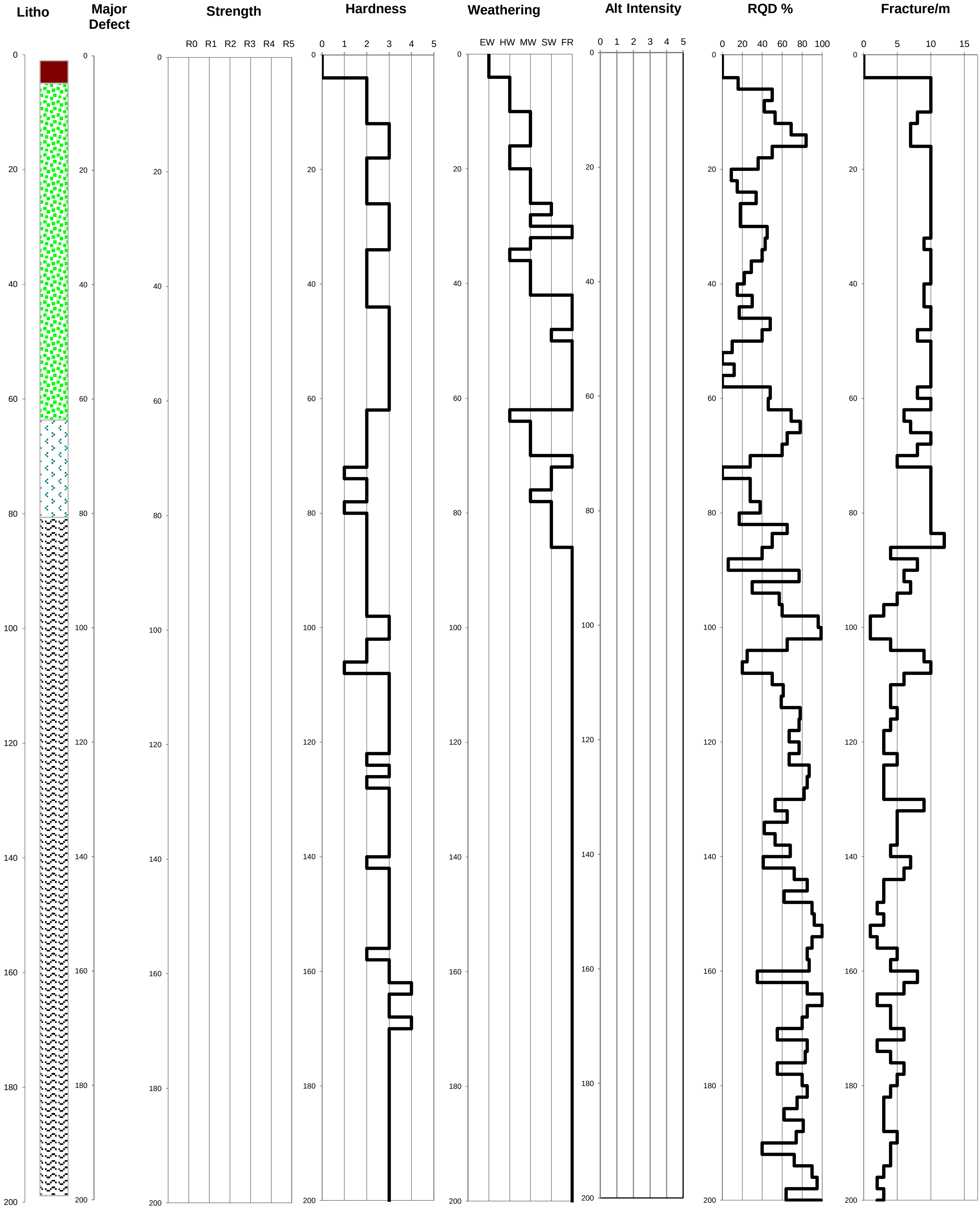
Borehole ID: **UW82**

Pells Sullivan Meynink



Borehole ID: **UW9**

Pells Sullivan Meynink



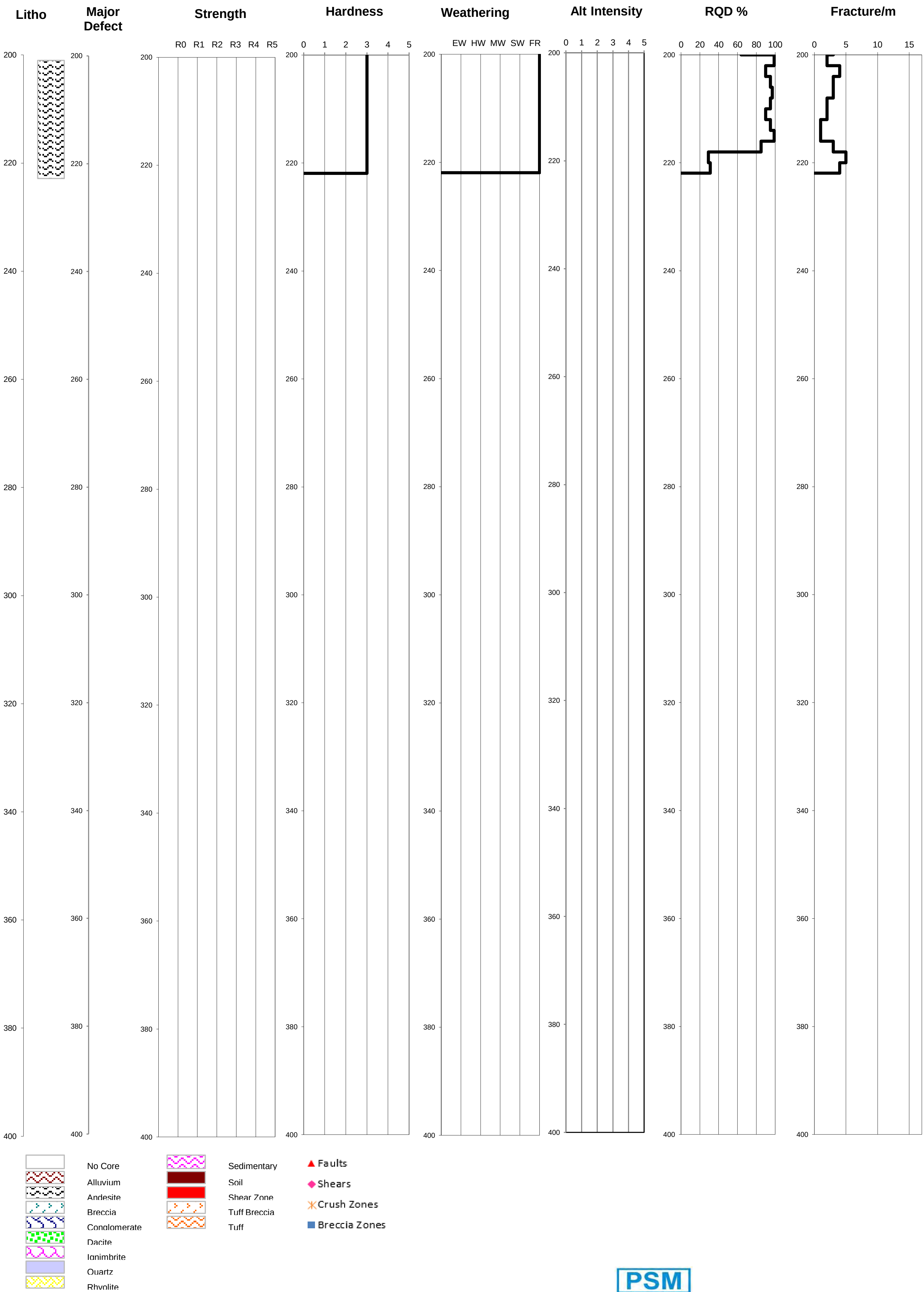
No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

▲ Faults
◆ Shears
✳ Crush Zones
■ Breccia Zones

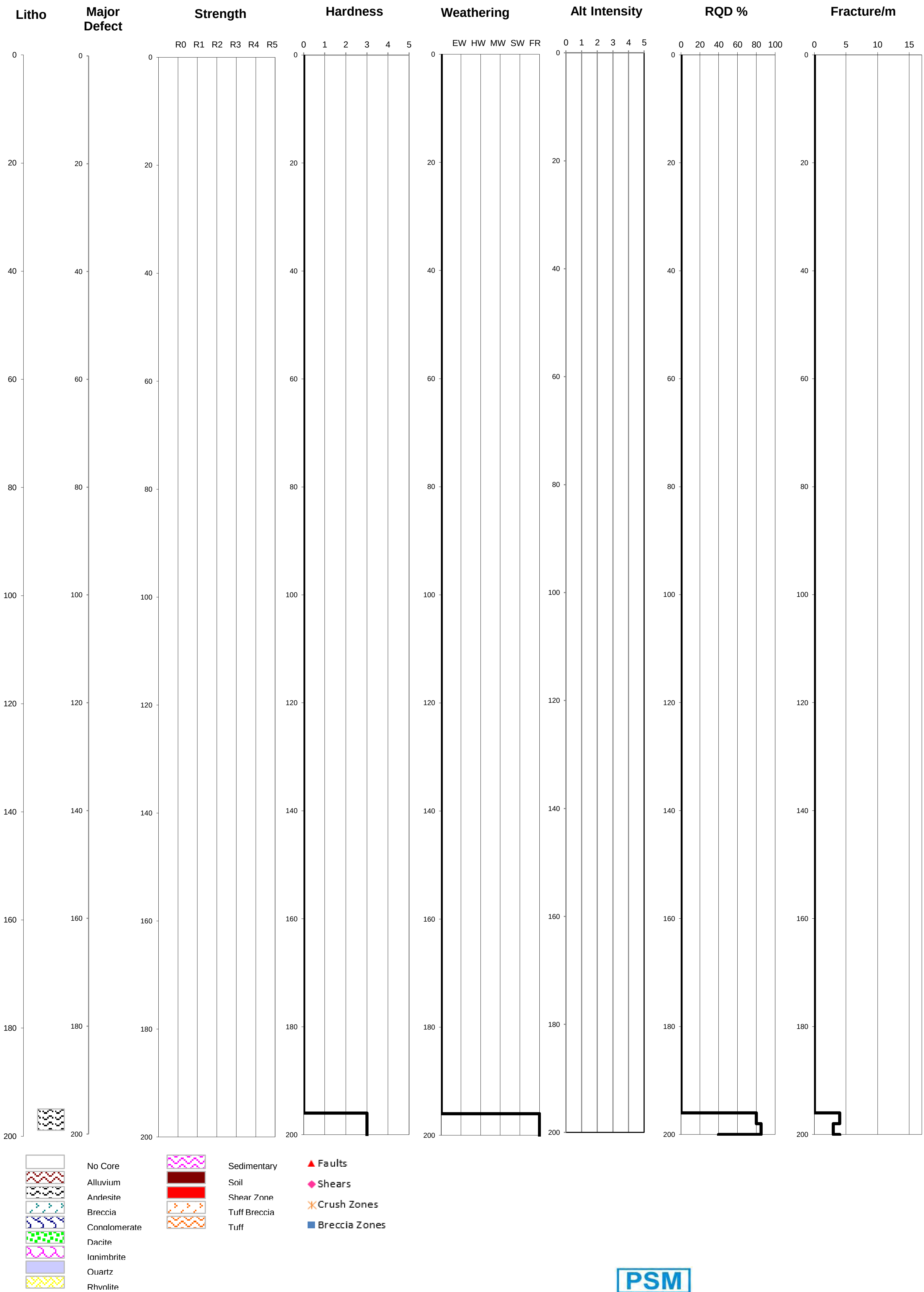
Borehole ID: UW95

Pells Sullivan Meynink



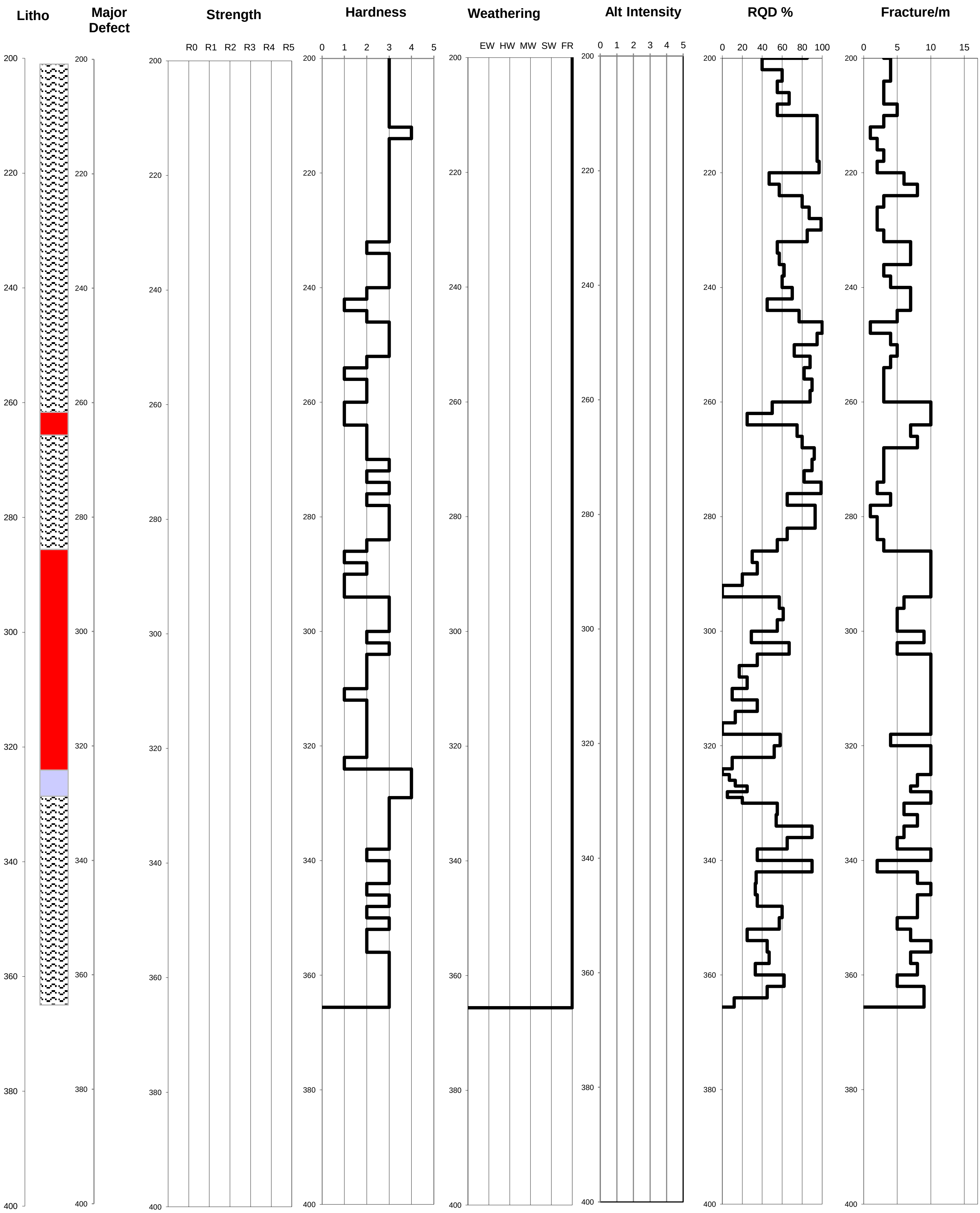
Borehole ID: UW95

Pells Sullivan Meynink



Borehole ID: **UW95A**

Pells Sullivan Meynink



No Core
Alluvium
Andesite
Breccia
Conglomerate
Dacite
Ignimbrite
Quartz
Rhyolite

Sedimentary
Soil
Shear Zone
Tuff Breccia
Tuff

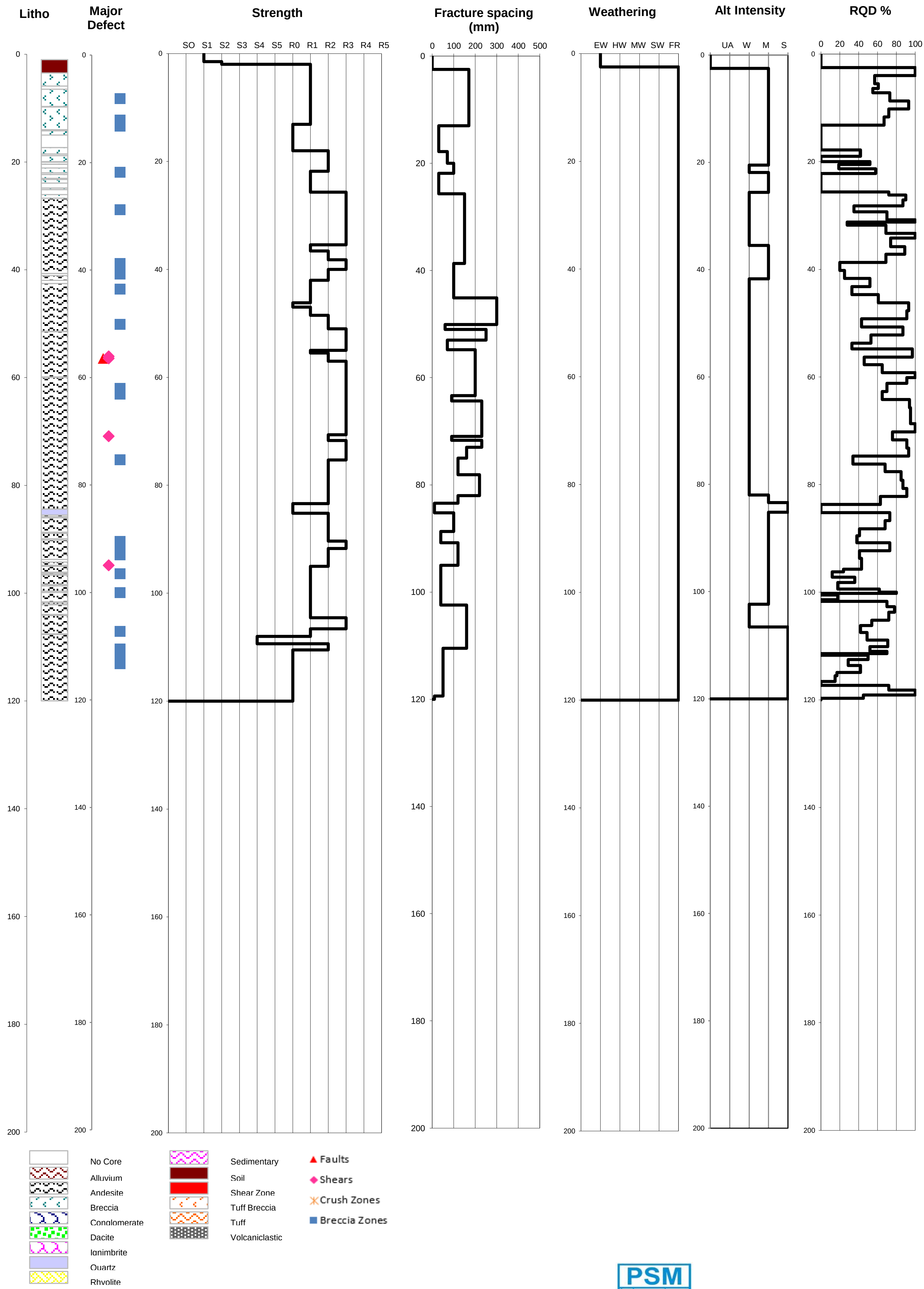
Faults
Shears
Crush Zones
Breccia Zones

Borehole ID: **UW95A**

PSM

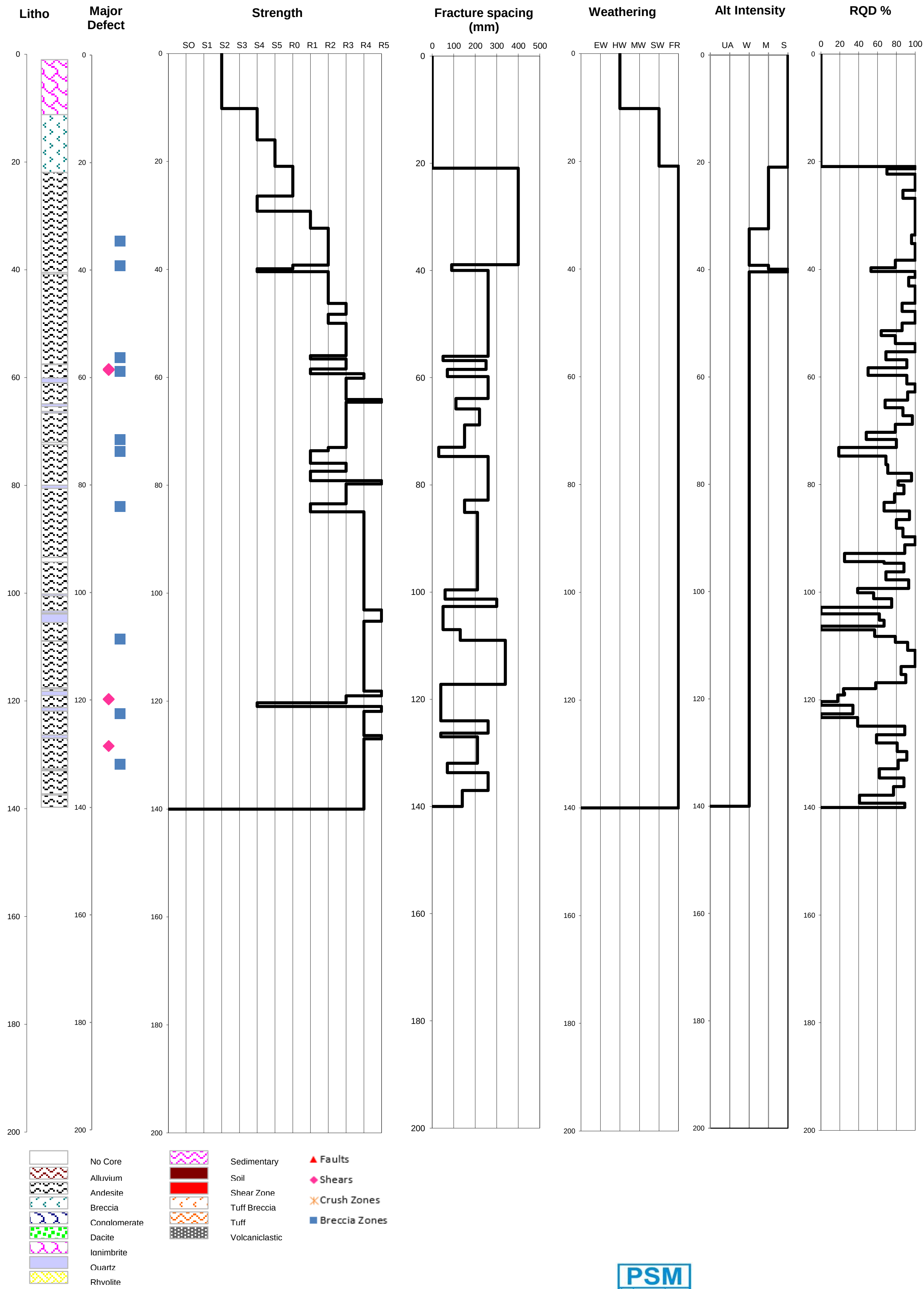
Pells Sullivan Meynink

Appendix B
Geotech Logs



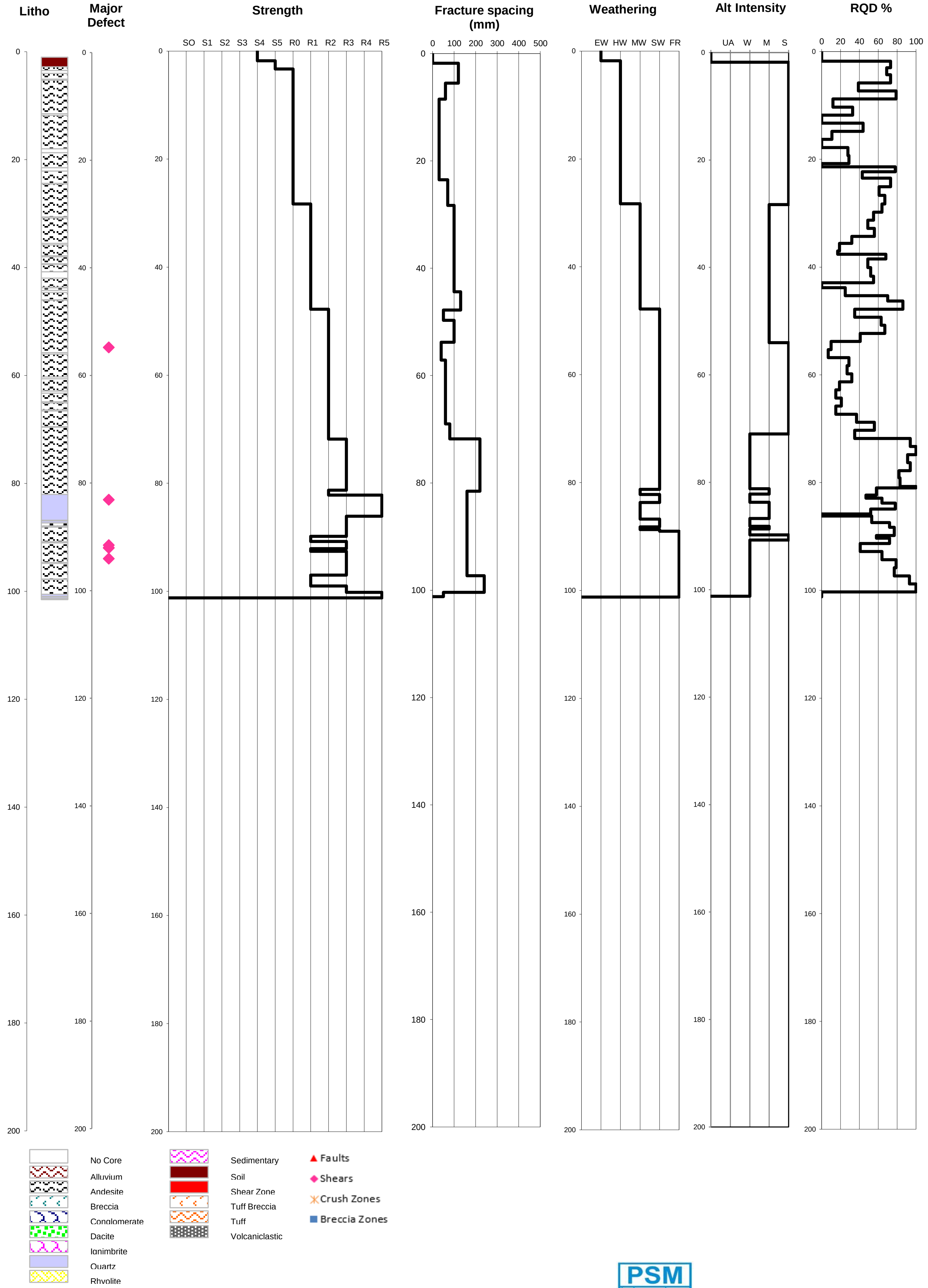
Borehole ID: **GT011**

Pells Sullivan Meynink



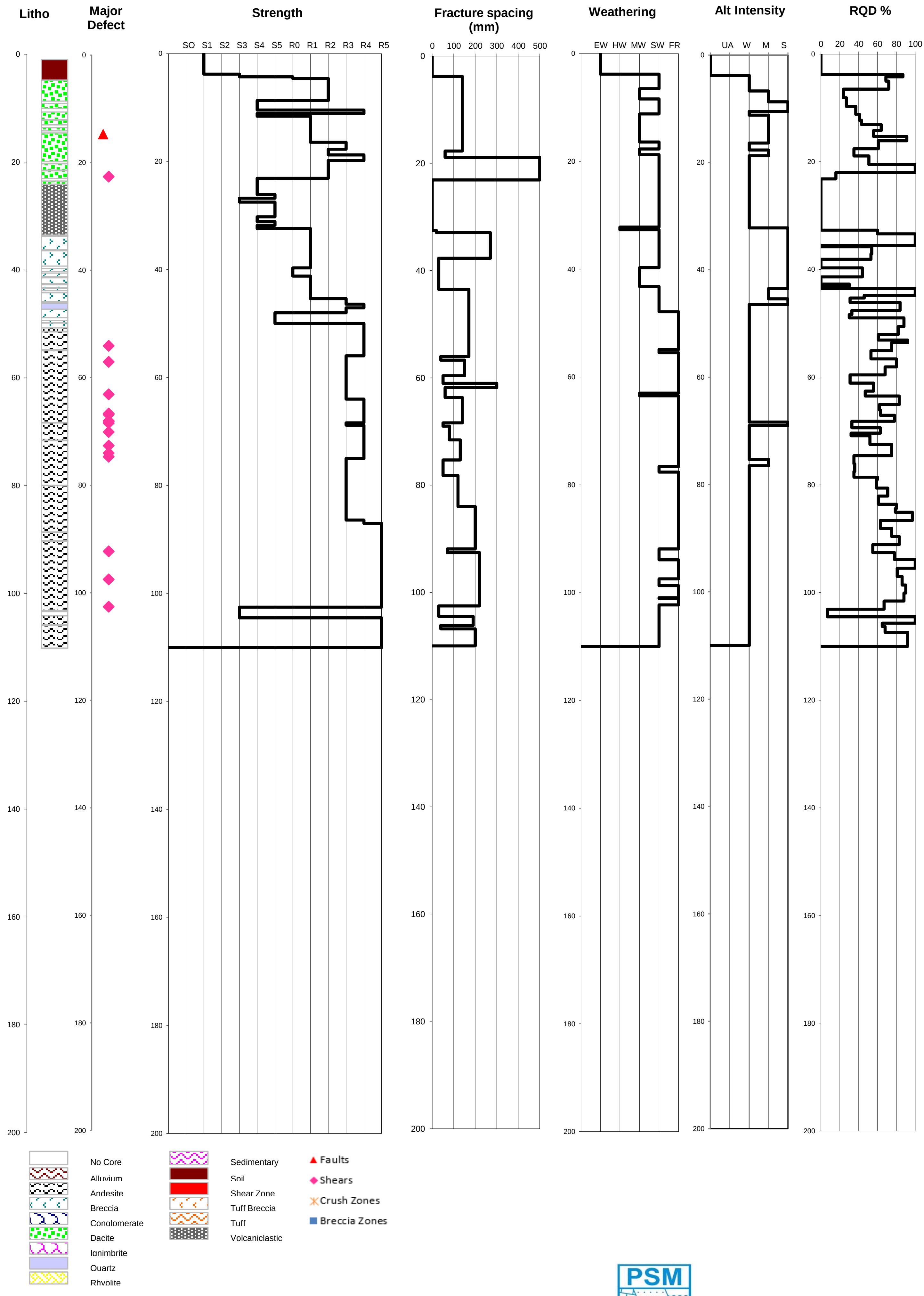
Borehole ID: **GT012**

Pells Sullivan Meynink



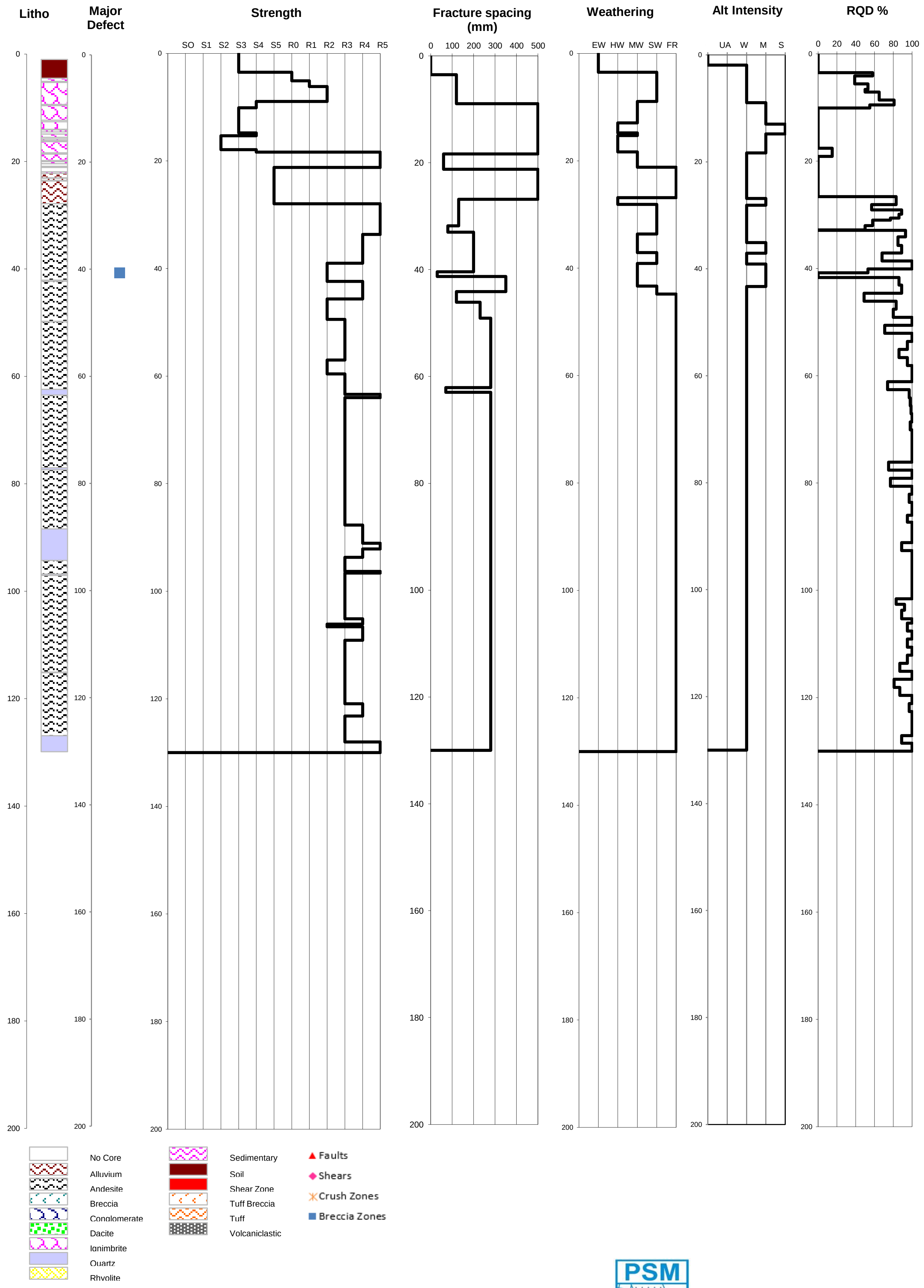
Borehole ID: GT013

Pells Sullivan Meynink



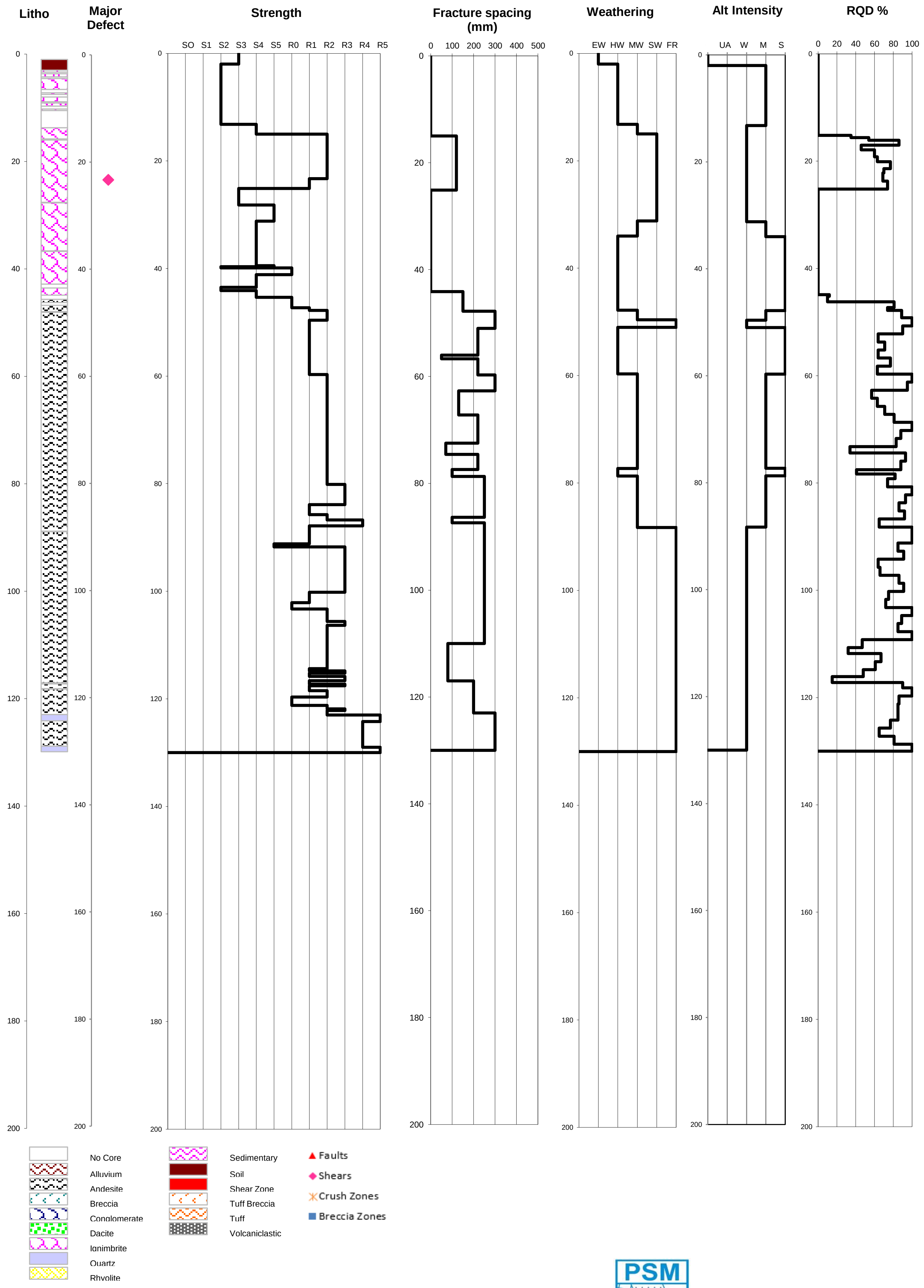
Borehole ID: **GT014**

Pells Sullivan Meynink



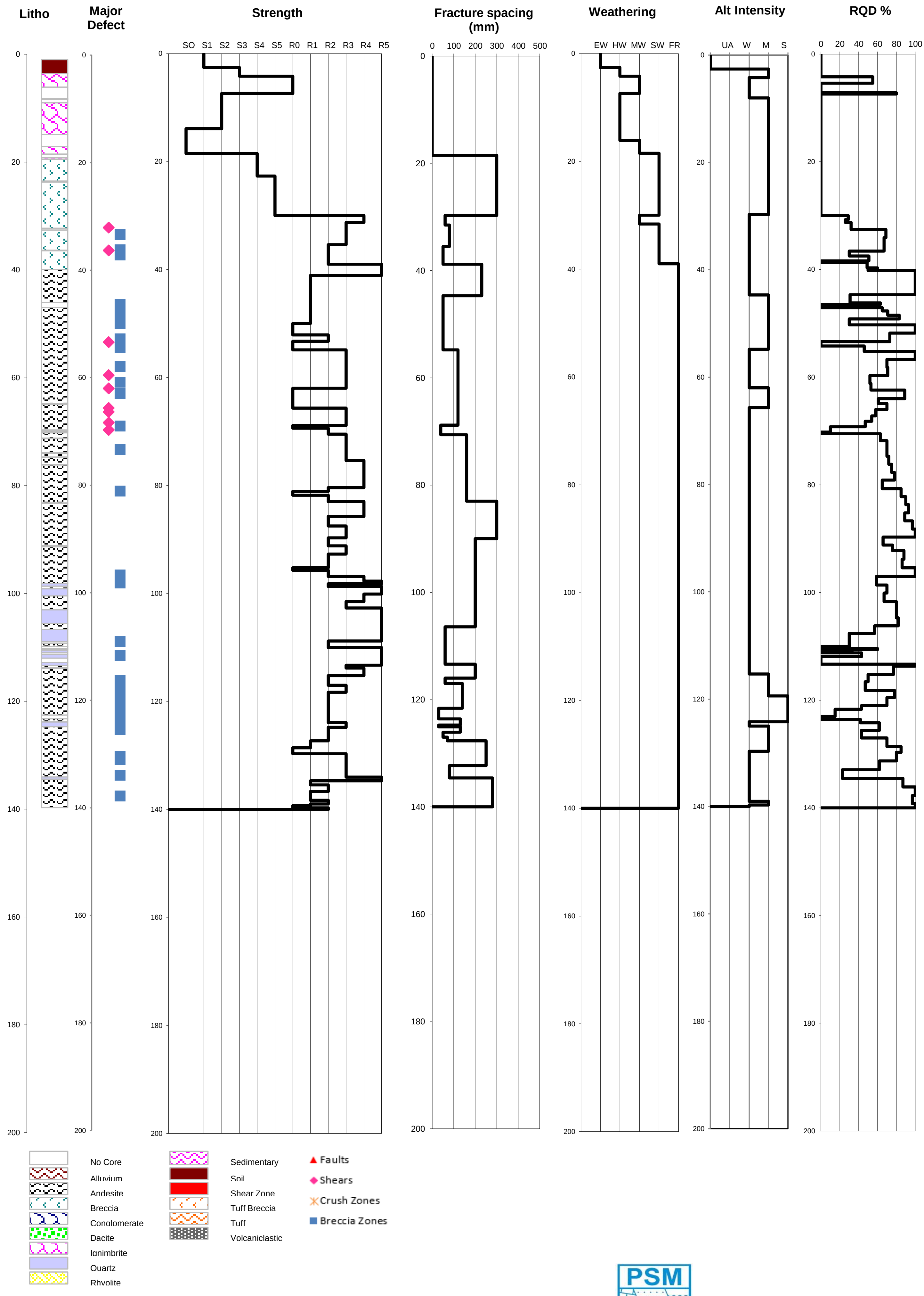
Borehole ID: **GT015**

Pells Sullivan Meynink



Borehole ID: **GT016**

Pells Sullivan Meynink



Borehole ID: GT017

PSM Pells Sullivan Meynink

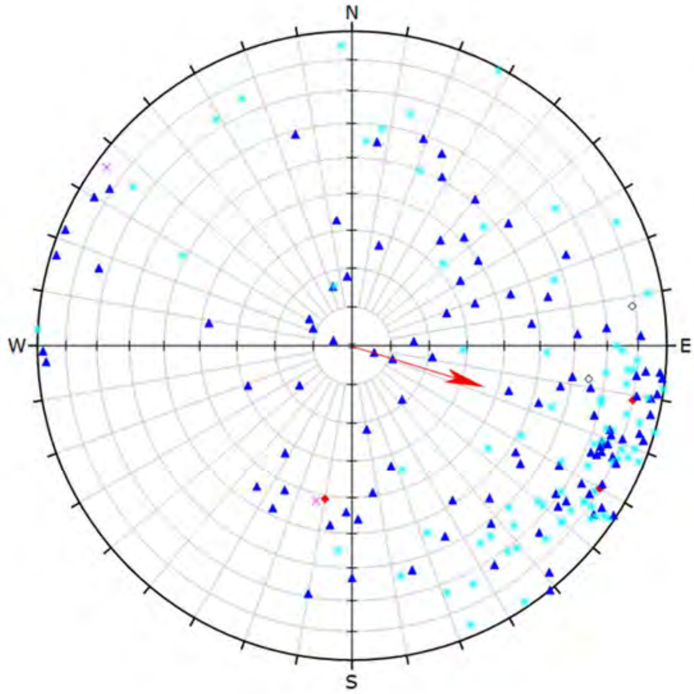
Appendix C
Stereoplots

Pells Sullivan Meynink

Stereo Plot

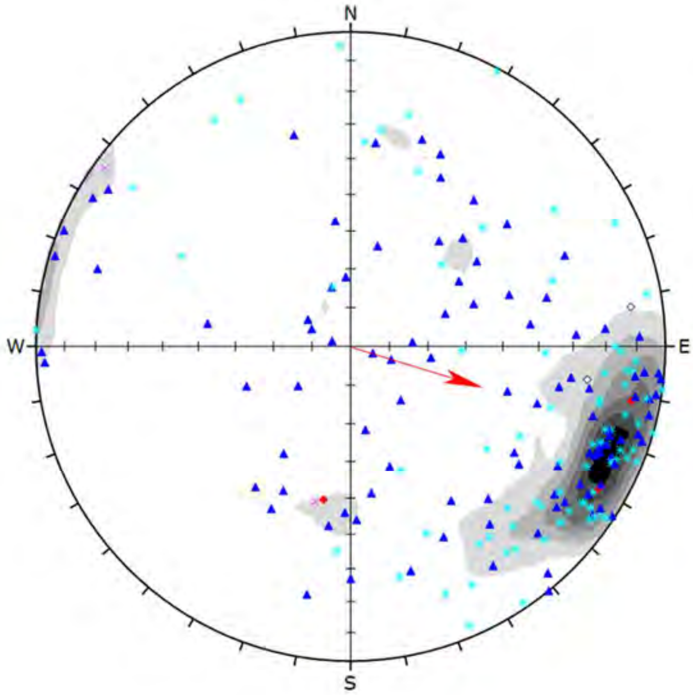
PSM125
ORI CORE
BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-53/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	All defects
Lithology:	All	**Borehole:**	UW54	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	2
◆	FT	3
▲	JT	102
●	VN	81

Plot Mode	Pole Vectors
Vector Count	190 (190 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	2
◆	FT	3
▲	JT	102
●	VN	81

Color	Density Concentrations
	0.00 - 1.90
	1.90 - 3.80
	3.80 - 5.70
	5.70 - 7.60
	7.60 - 9.50
	9.50 - 11.40
	11.40 - 13.30
Maximum Density	13.29%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

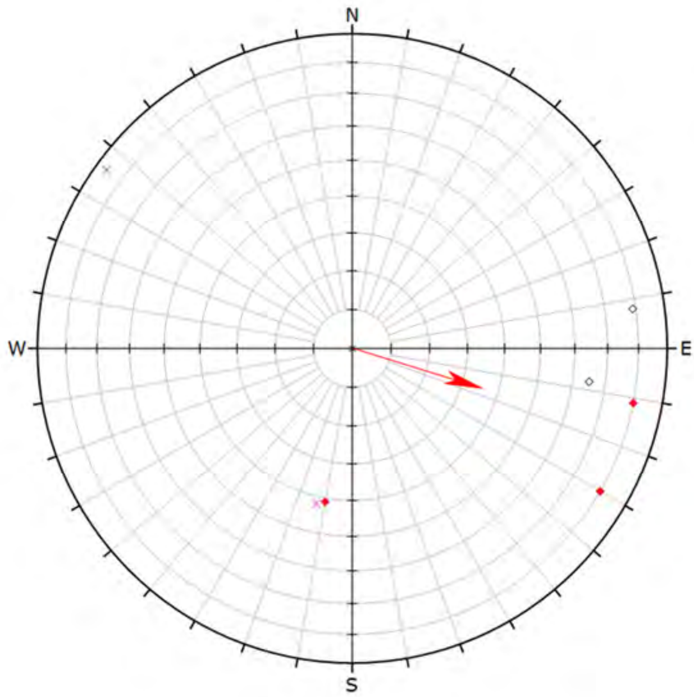
Plot Mode	Pole Vectors
Vector Count	190 (190 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

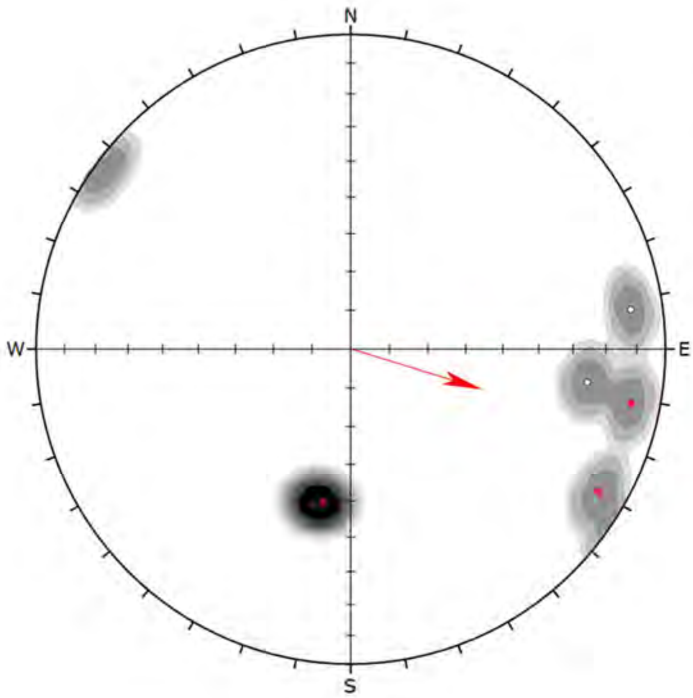
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-53/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Faults/Shears
Lithology:	All	**Borehole:**	UW54	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	2
◆	FT	3

Plot Mode	Pole Vectors
Vector Count	7 (7 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	2
◆	FT	3

Color	Density Concentrations
	0.00 - 4.10
	4.10 - 8.20
	8.20 - 12.30
	12.30 - 16.40
	16.40 - 20.50
	20.50 - 24.60
	24.60 - 28.70
Maximum Density	28.08%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

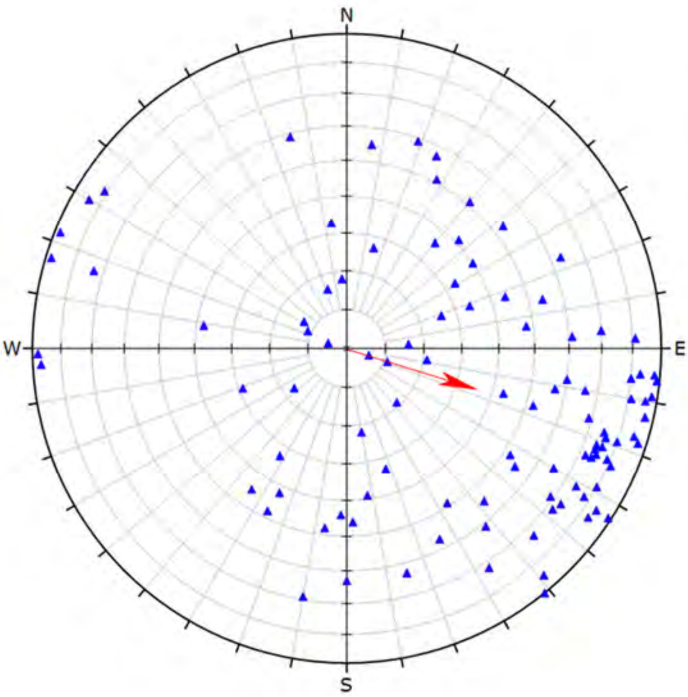
Plot Mode	Pole Vectors
Vector Count	7 (7 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

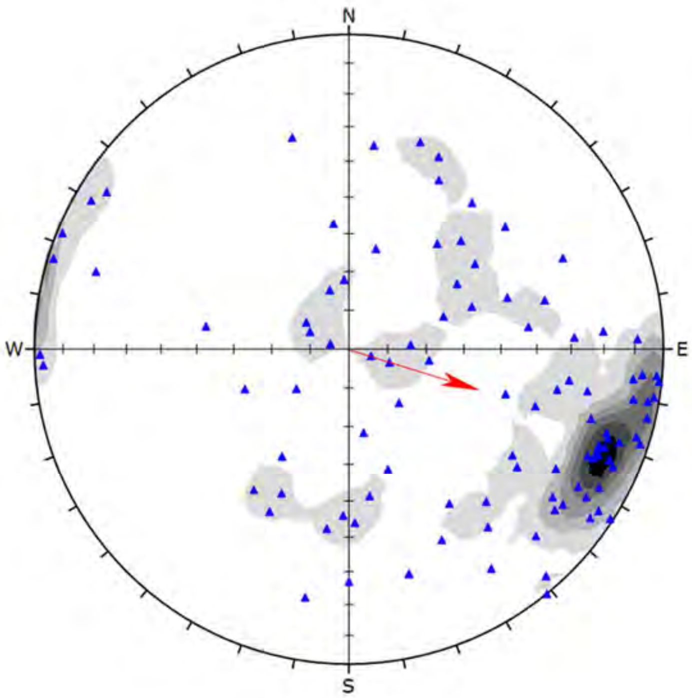
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-53/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Joints
Lithology:	All	**Borehole:**	UW54	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
▲	JT	102

Plot Mode	Pole Vectors
Vector Count	102 (102 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
▲	JT	102

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
Maximum Density	12.26%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

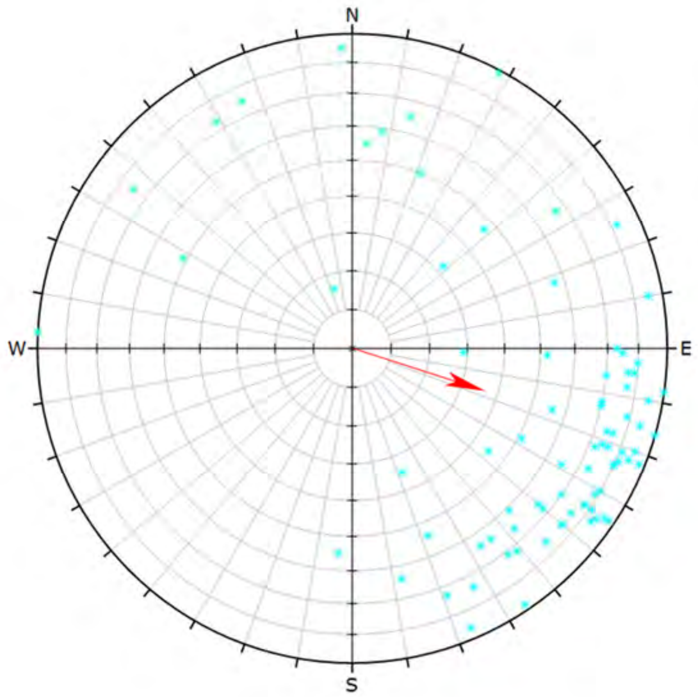
Plot Mode	Pole Vectors
Vector Count	102 (102 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

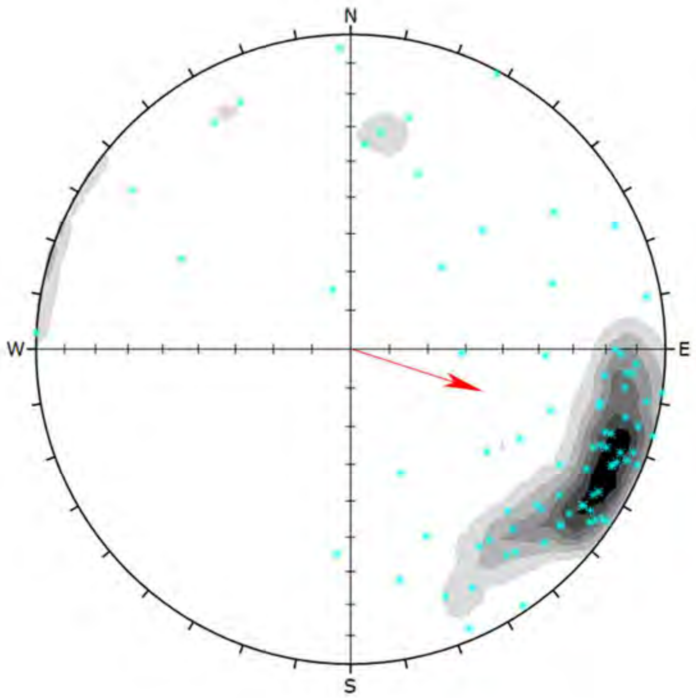
PSM125
ORI CORE
BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-53/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Veins
Lithology:	All	**Borehole:**	UW54	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
•	VN	81

Plot Mode	Pole Vectors
Vector Count	81 (81 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
•	VN	81

Color	Density Concentrations
	0.00 - 2.20
	2.20 - 4.40
	4.40 - 6.60
	6.60 - 8.80
	8.80 - 11.00
	11.00 - 13.20
	13.20 - 15.40

Maximum Density	15.28%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

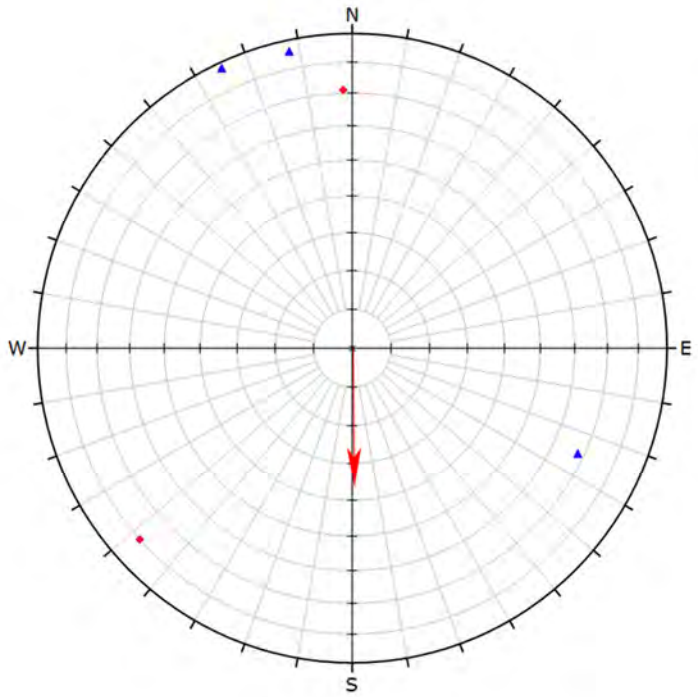
Plot Mode	Pole Vectors
Vector Count	81 (81 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

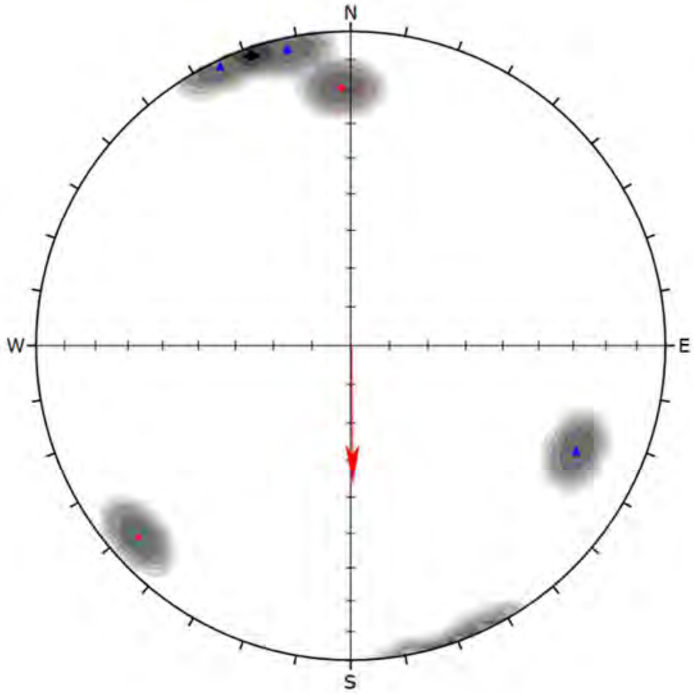
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-53/179	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	All defects
Lithology:	All	**Borehole:**	UW55	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
●	FT	2
▲	JT	3

Plot Mode	Pole Vectors
Vector Count	5 (5 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
●	FT	2
▲	JT	3

Color	Density Concentrations
	0.00 - 4.30
	4.30 - 8.60
	8.60 - 12.90
	12.90 - 17.20
	17.20 - 21.50
	21.50 - 25.80
	25.80 - 30.10
Maximum Density	29.51%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

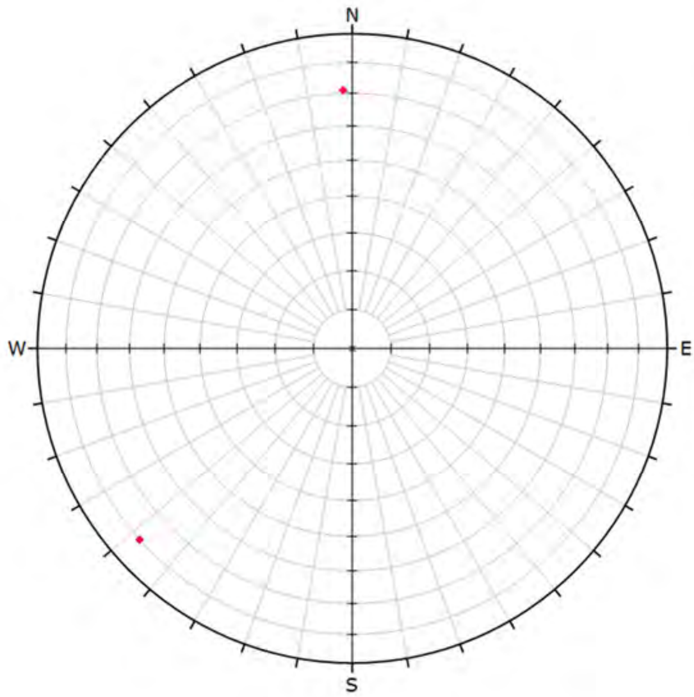
Plot Mode	Pole Vectors
Vector Count	5 (5 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

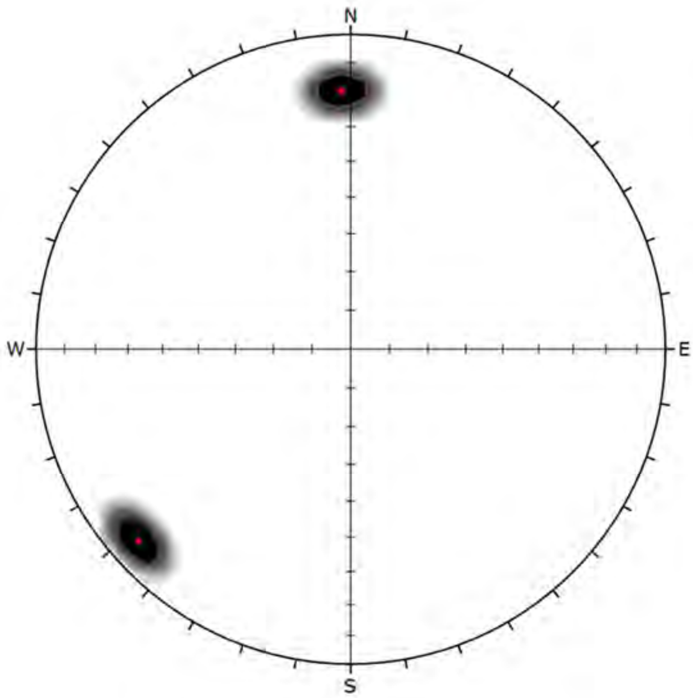
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-53/179	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Faults/Shears
Lithology:	All	**Borehole:**	UW55	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
◆	FT	2

Plot Mode	Pole Vectors
Vector Count	2 (2 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
◆	FT	2

Color	Density Concentrations
	0.00 - 7.20
	7.20 - 14.40
	14.40 - 21.60
	21.60 - 28.80
	28.80 - 36.00
	36.00 - 43.20
	43.20 - 50.40
Maximum Density	49.85%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

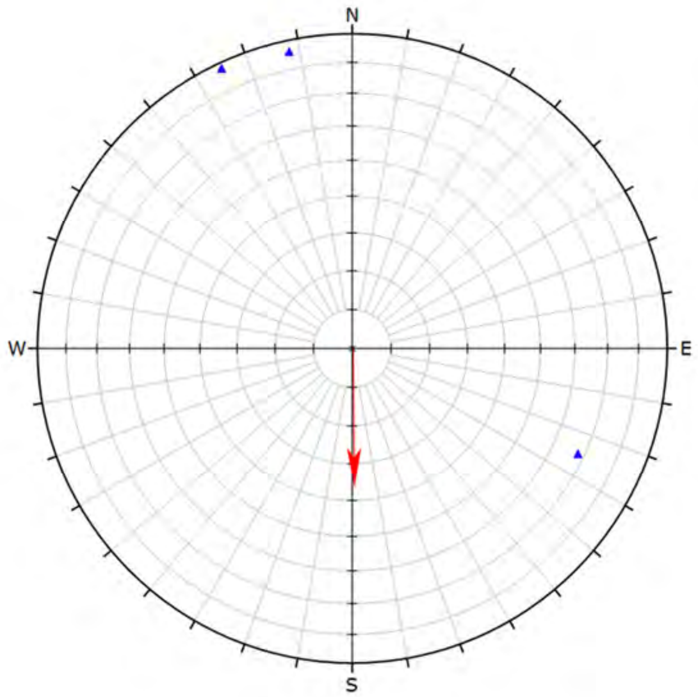
Plot Mode	Pole Vectors
Vector Count	2 (2 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

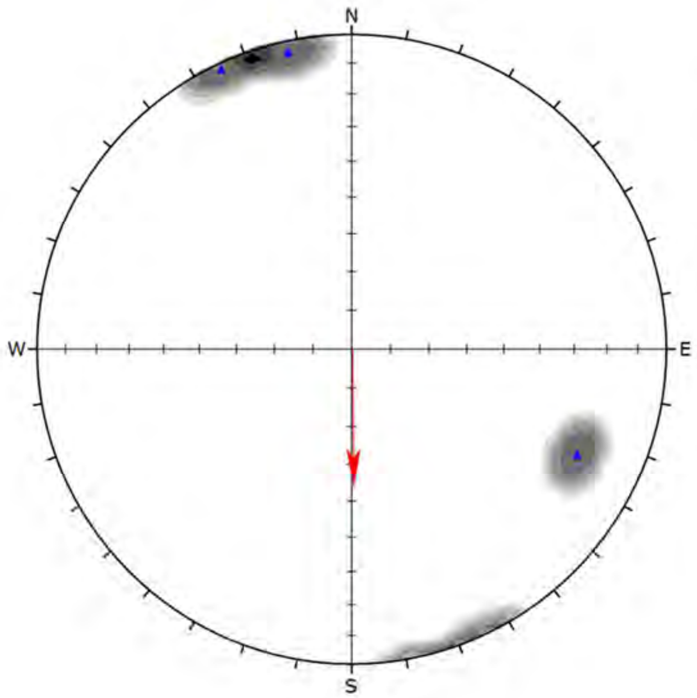
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-53/179	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Joints
Lithology:	All	**Borehole:**	UW55	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
▲	JT	3

Plot Mode	Pole Vectors
Vector Count	3 (3 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
▲	JT	3

Color	Density Concentrations
	0.00 - 7.10
	7.10 - 14.20
	14.20 - 21.30
	21.30 - 28.40
	28.40 - 35.50
	35.50 - 42.60
	42.60 - 49.70
Maximum Density	49.18%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

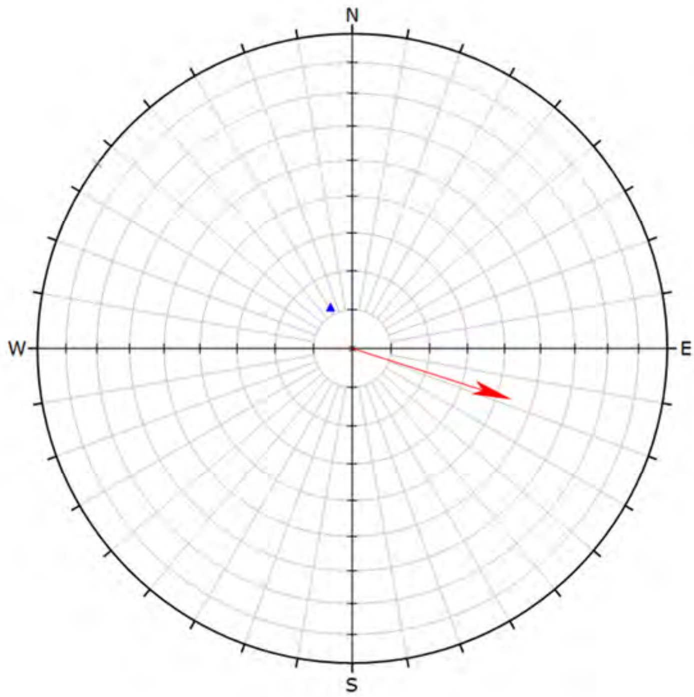
Plot Mode	Pole Vectors
Vector Count	3 (3 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

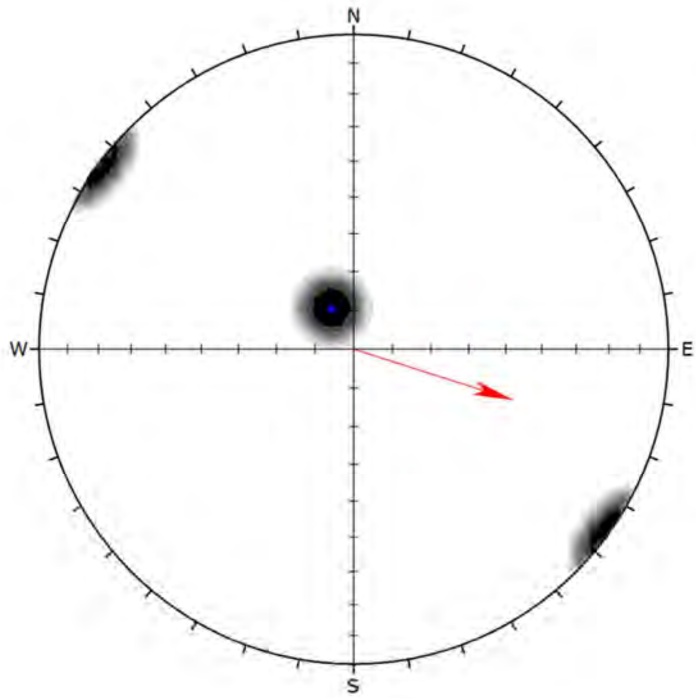
PSM125
ORI CORE
BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-45/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	All defects
Lithology:	All	**Borehole:**	UW58	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
×	CZ	1
▲	JT	1

Plot Mode	Pole Vectors
Vector Count	2 (2 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
×	CZ	1
▲	JT	1

Color	Density Concentrations
	0.00 - 7.20
	7.20 - 14.40
	14.40 - 21.60
	21.60 - 28.80
	28.80 - 36.00
	36.00 - 43.20
	43.20 - 50.40
Maximum Density	49.77%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

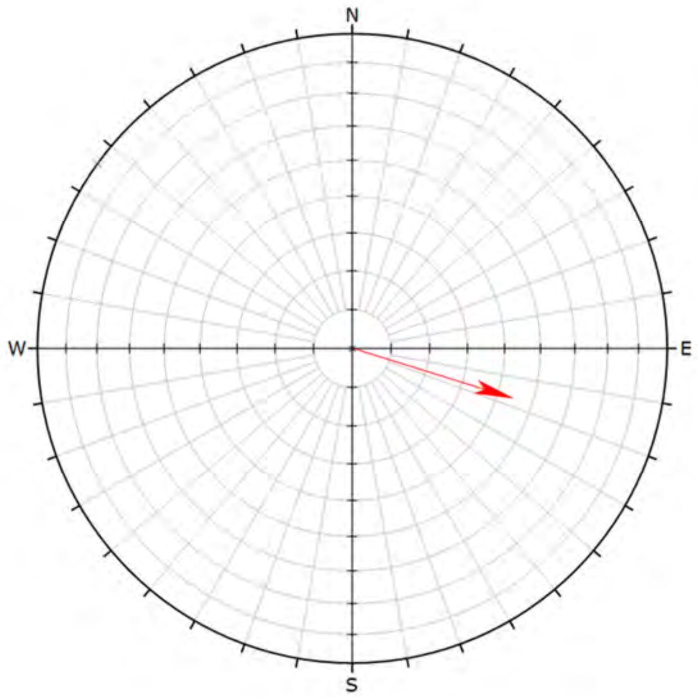
Plot Mode	Pole Vectors
Vector Count	2 (2 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

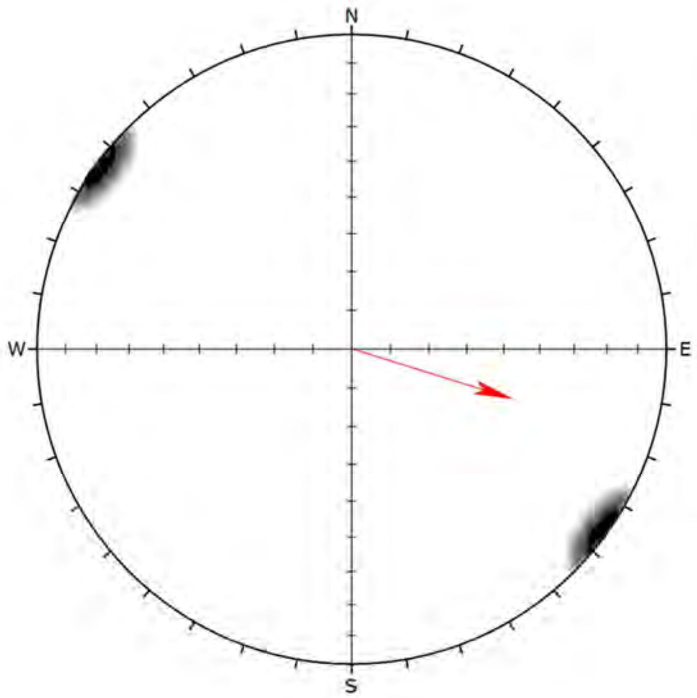
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-45/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Faults/Shears
Lithology:	All	**Borehole:**	UW58	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
×	CZ	1

Plot Mode	Pole Vectors
Vector Count	1 (1 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
×	CZ	1

Color	Density Concentrations
	0.00 - 14.30
	14.30 - 28.60
	28.60 - 42.90
	42.90 - 57.20
	57.20 - 71.50
	71.50 - 85.80
	85.80 - 100.10

Maximum Density	99.53%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

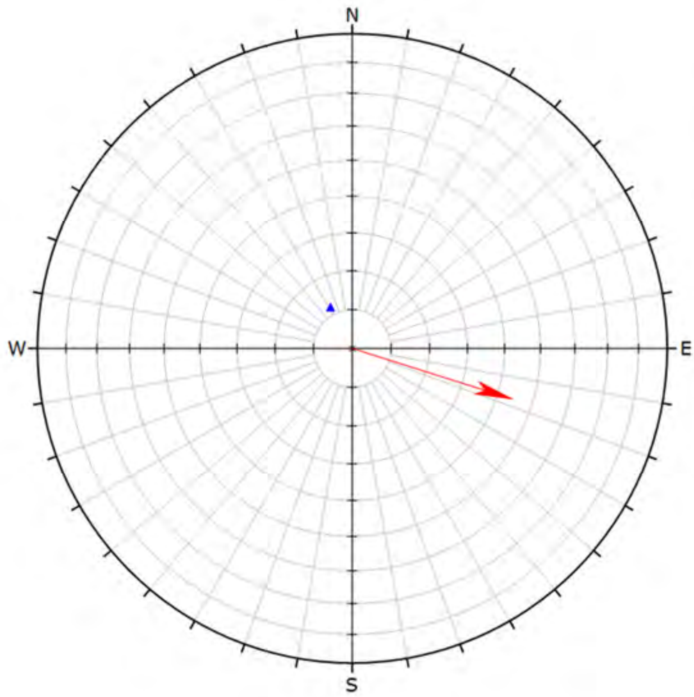
Plot Mode	Pole Vectors
Vector Count	1 (1 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

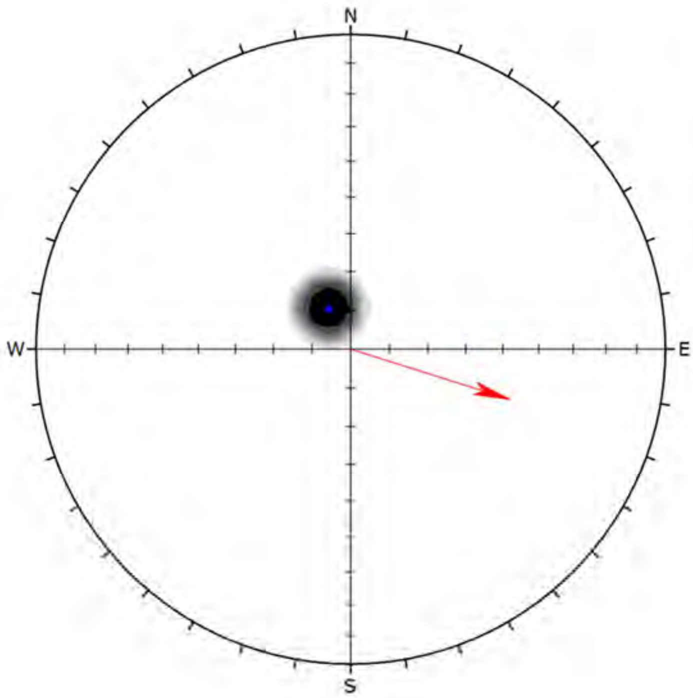
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-45/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Joints
Lithology:	All	**Borehole:**	UW58	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
▲	JT	1

Plot Mode	Pole Vectors
Vector Count	1 (1 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
▲	JT	1

Color	Density Concentrations
	0.00 - 14.20
	14.20 - 28.40
	28.40 - 42.60
	42.60 - 56.80
	56.80 - 71.00
	71.00 - 85.20
	85.20 - 99.40
Maximum Density	99.28%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

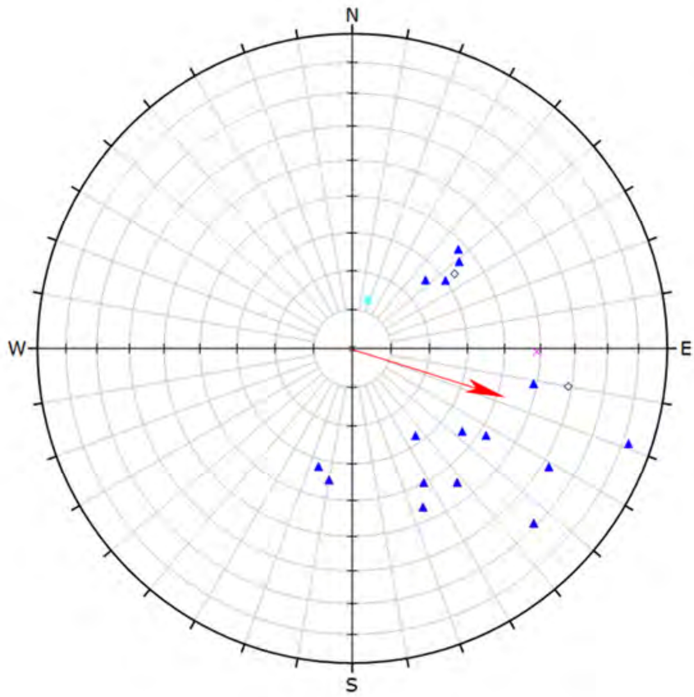
Plot Mode	Pole Vectors
Vector Count	1 (1 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

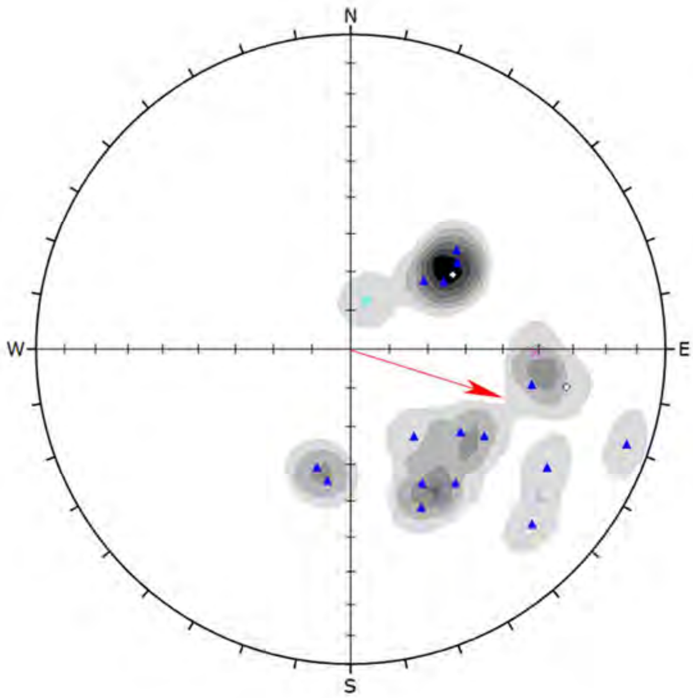
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-47/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	All defects
Lithology:	All	**Borehole:**	UW60	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	1
▲	JT	16
■	VN	1

Plot Mode	Pole Vectors
Vector Count	20 (20 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	1
▲	JT	16
■	VN	1

Color	Density Concentrations
	0.00 - 3.10
	3.10 - 6.20
	6.20 - 9.30
	9.30 - 12.40
	12.40 - 15.50
	15.50 - 18.60
	18.60 - 21.70
Maximum Density	21.61%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

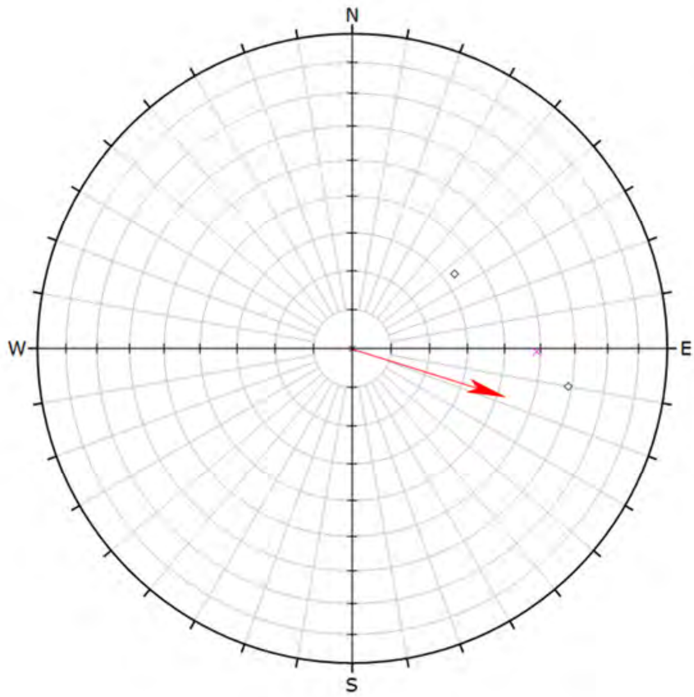
Plot Mode	Pole Vectors
Vector Count	20 (20 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

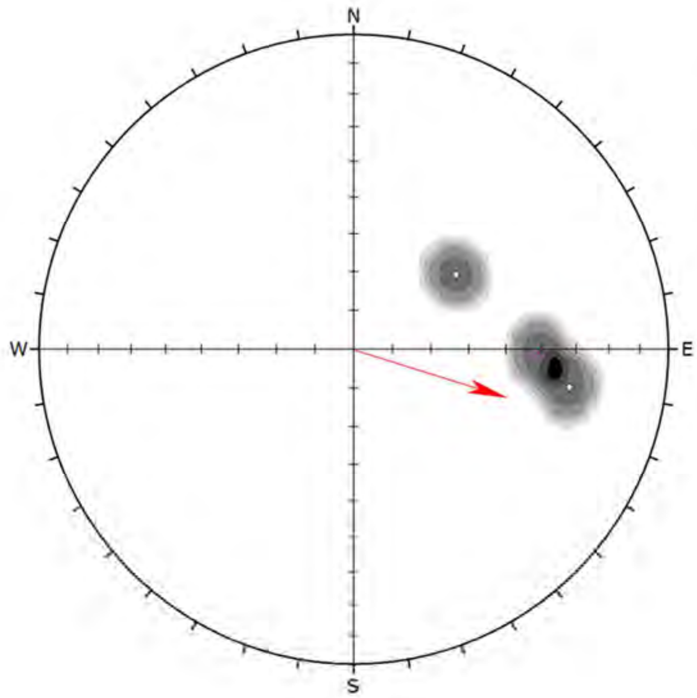
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-47/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Faults/Shears
Lithology:	All	**Borehole:**	UW60	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	1

Plot Mode	Pole Vectors
Vector Count	3 (3 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
◇	Breccia	2
×	CZ	1

Color	Density Concentrations
	0.00 - 7.40
	7.40 - 14.80
	14.80 - 22.20
	22.20 - 29.60
	29.60 - 37.00
	37.00 - 44.40
	44.40 - 51.80
Maximum Density	51.39%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

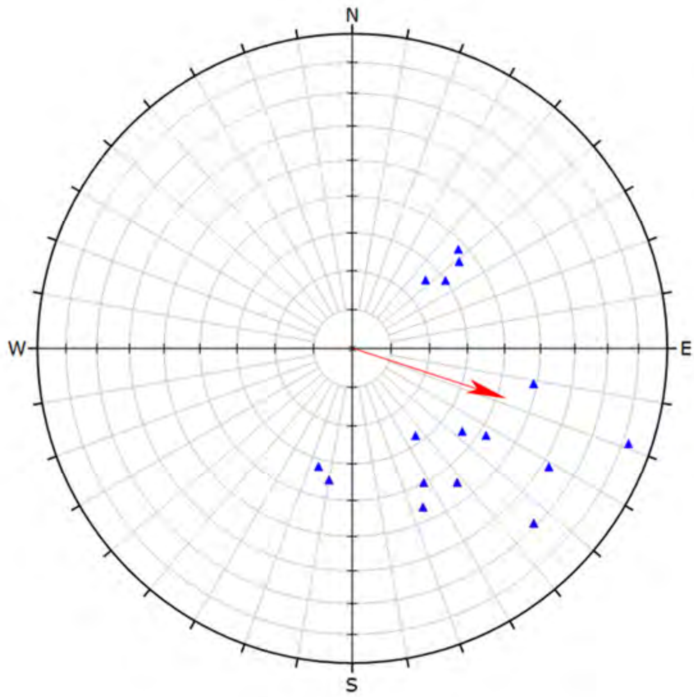
Plot Mode	Pole Vectors
Vector Count	3 (3 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

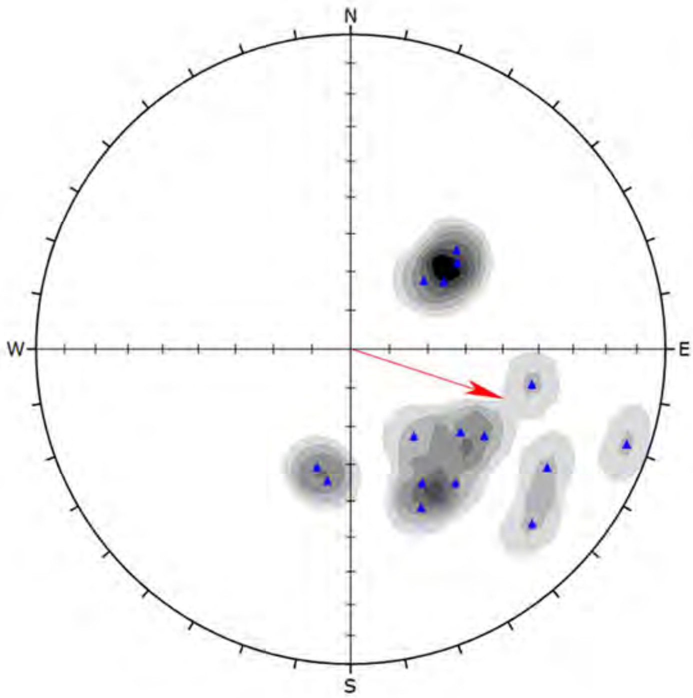
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-47/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Joints
Lithology:	All	**Borehole:**	UW60	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
▲	JT	16

Plot Mode	Pole Vectors
Vector Count	16 (16 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
▲	JT	16

Color	Density Concentrations
	0.00 - 3.00
	3.00 - 6.00
	6.00 - 9.00
	9.00 - 12.00
	12.00 - 15.00
	15.00 - 18.00
	18.00 - 21.00

Maximum Density	20.96%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

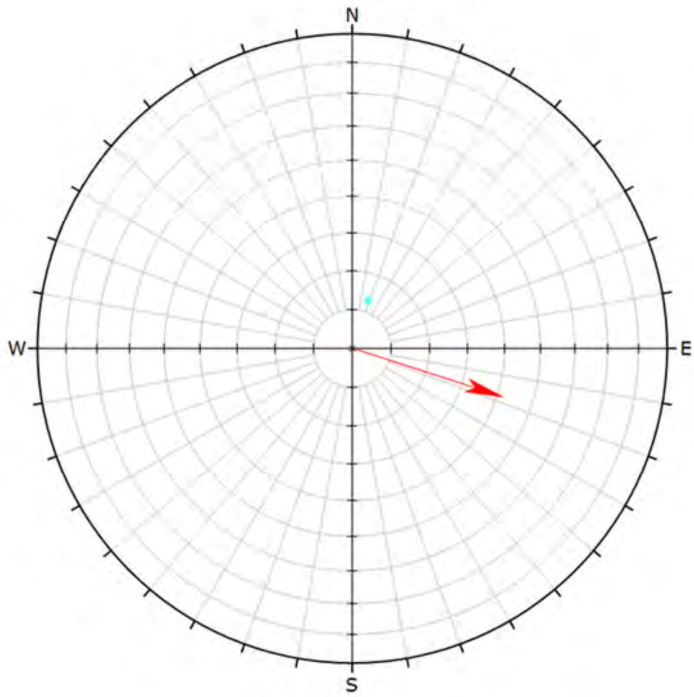
Plot Mode	Pole Vectors
Vector Count	16 (16 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

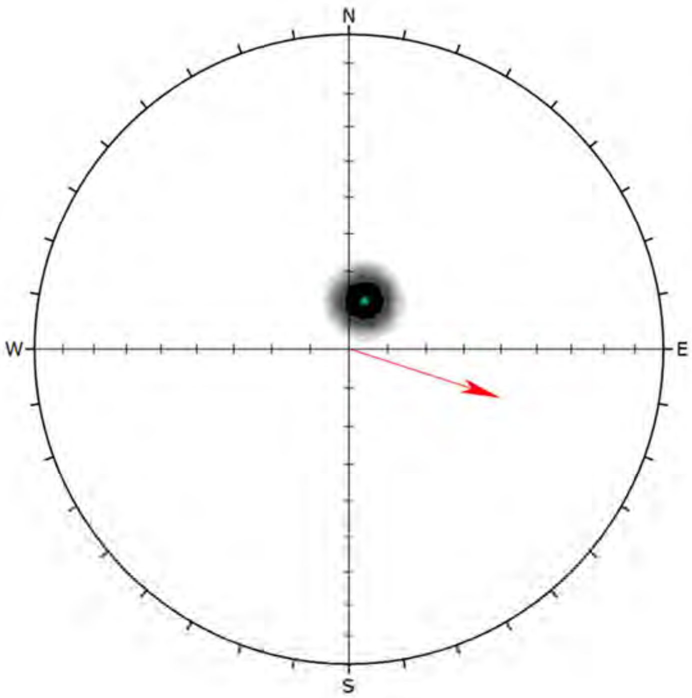
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-47/107	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Veins
Lithology:	All	**Borehole:**	UW60	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
•	VN	1

Plot Mode	Pole Vectors
Vector Count	1 (1 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
•	VN	1

Color	Density Concentrations
	0.00 - 14.30
	14.30 - 28.60
	28.60 - 42.90
	42.90 - 57.20
	57.20 - 71.50
	71.50 - 85.80
	85.80 - 100.10

Maximum Density	99.45%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

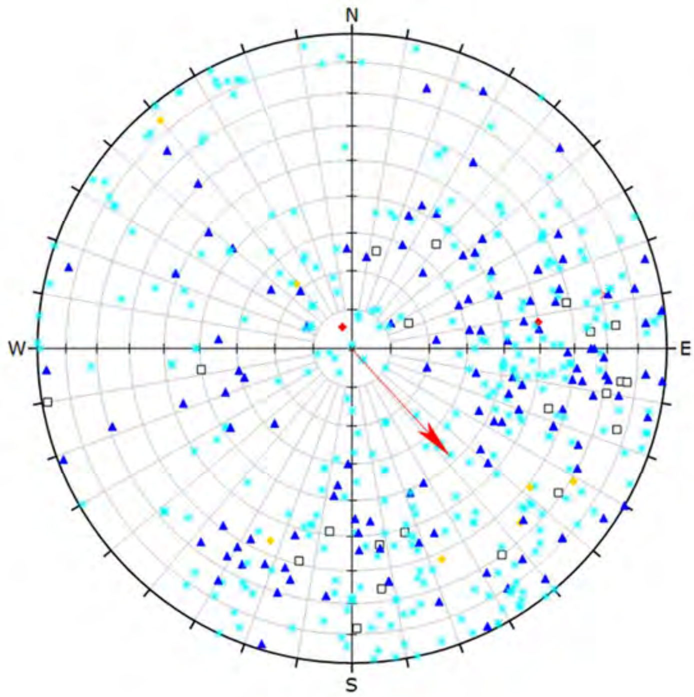
Plot Mode	Pole Vectors
Vector Count	1 (1 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

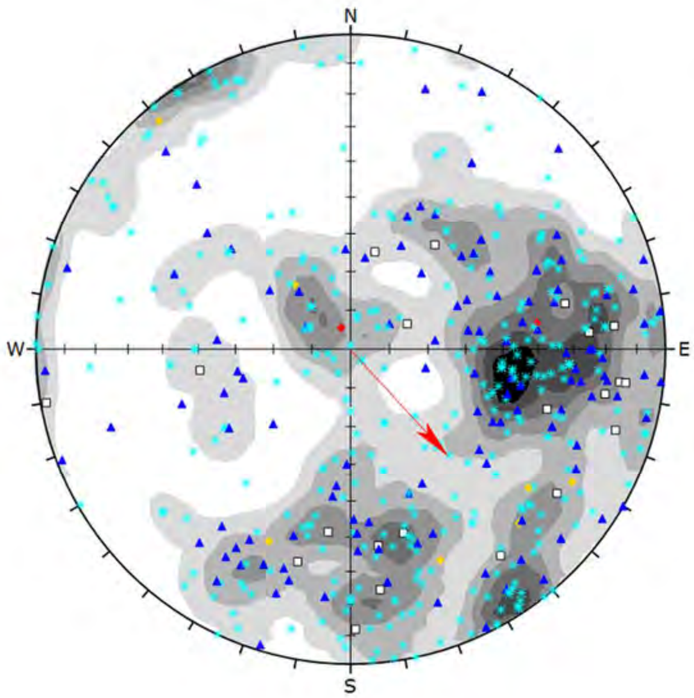
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-51/137	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	All defects
Lithology:	All	**Borehole:**	UW66	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
□	BG	21
×	Breccia	1
◆	CN	7
◆	FT	2
▲	JT	128
◆	VN	354

Plot Mode	Pole Vectors
Vector Count	513 (513 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
□	BG	21
×	Breccia	1
◆	CN	7
◆	FT	2
▲	JT	128
◆	VN	354

Color	Density Concentrations
	0.00 - 0.60
	0.60 - 1.20
	1.20 - 1.80
	1.80 - 2.40
	2.40 - 3.00
	3.00 - 3.60
	3.60 - 4.20
Maximum Density	4.20%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

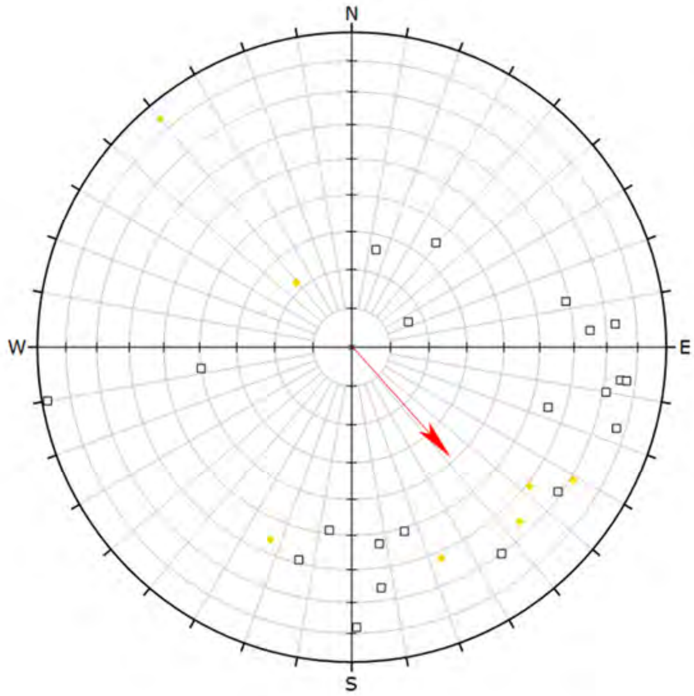
Plot Mode	Pole Vectors
Vector Count	513 (513 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

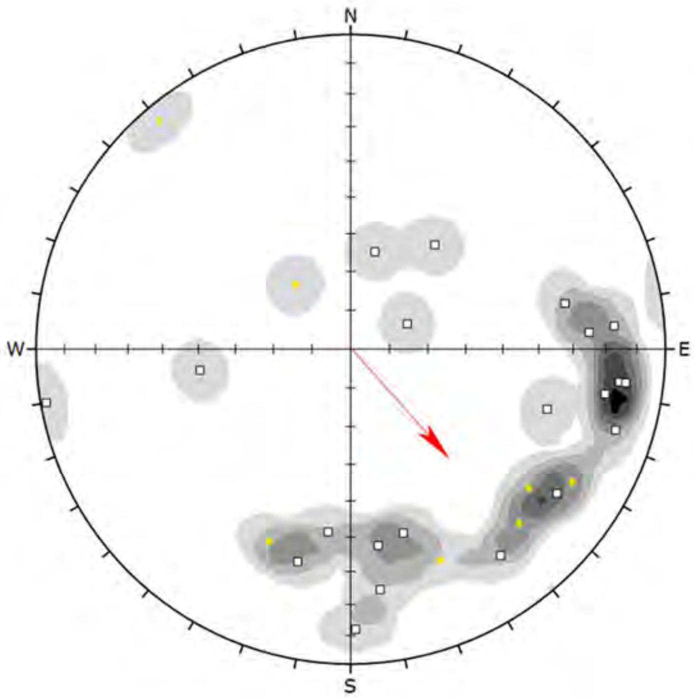
PSM125
ORI CORE
BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-51/137	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Bedding/Contact
Lithology:	All	**Borehole:**	UW66	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
□	BG	21
•	CN	7

Plot Mode	Pole Vectors
Vector Count	28 (28 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
□	BG	21
•	CN	7

Color	Density Concentrations
	0.00 - 1.90
	1.90 - 3.80
	3.80 - 5.70
	5.70 - 7.60
	7.60 - 9.50
	9.50 - 11.40
	11.40 - 13.30
Maximum Density	12.73%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

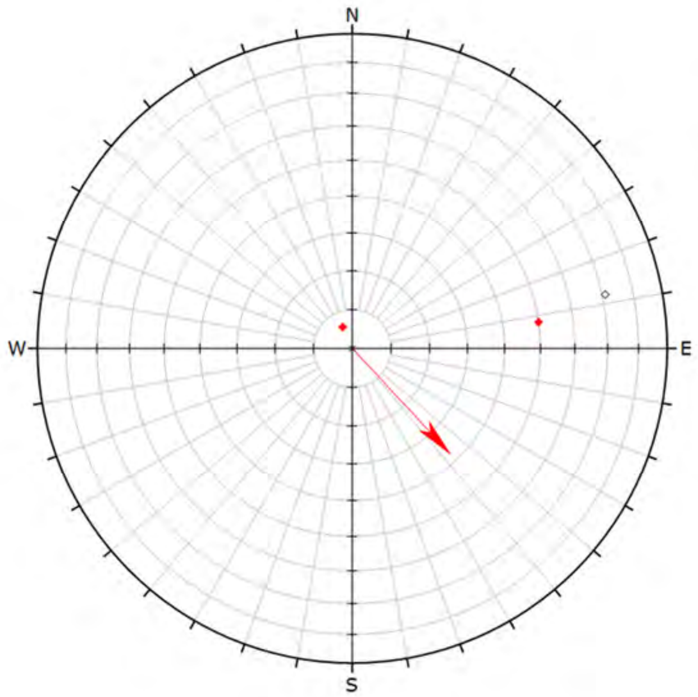
Plot Mode	Pole Vectors
Vector Count	28 (28 Entries)
Hemisphere	Lower
Projection	Equal Area

Pells Sullivan Meynink

Stereo Plot

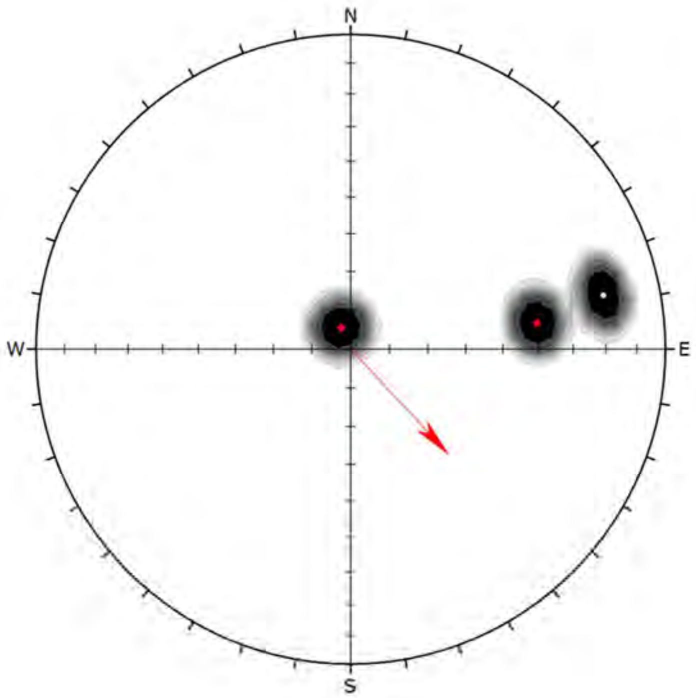
PSM125 ORI CORE BOREHOLE

Project:	Project Pye	**North datum:**	Grid North	**Processed by:**	VR
Job no:	PSM125	**Dip/Azi:**	-51/137	**Date:**	22/05/2017
Location:	Gladstone	**Traverse:**	N/A	**Defect type:**	Faults/Shears
Lithology:	All	**Borehole:**	UW66	**Stratigraphy:**	N/A



Symbol	TYPE	Quantity
◇	Breccia	1
◆	FT	2

Plot Mode	Pole Vectors
Vector Count	3 (3 Entries)
Hemisphere	Lower
Projection	Equal Area



Symbol	TYPE	Quantity
◇	Breccia	1
◆	FT	2

Color	Density Concentrations
	0.00 - 4.80
	4.80 - 9.60
	9.60 - 14.40
	14.40 - 19.20
	19.20 - 24.00
	24.00 - 28.80
	28.80 - 33.60
Maximum Density	33.20%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

Plot Mode	Pole Vectors
Vector Count	3 (3 Entries)
Hemisphere	Lower
Projection	Equal Area