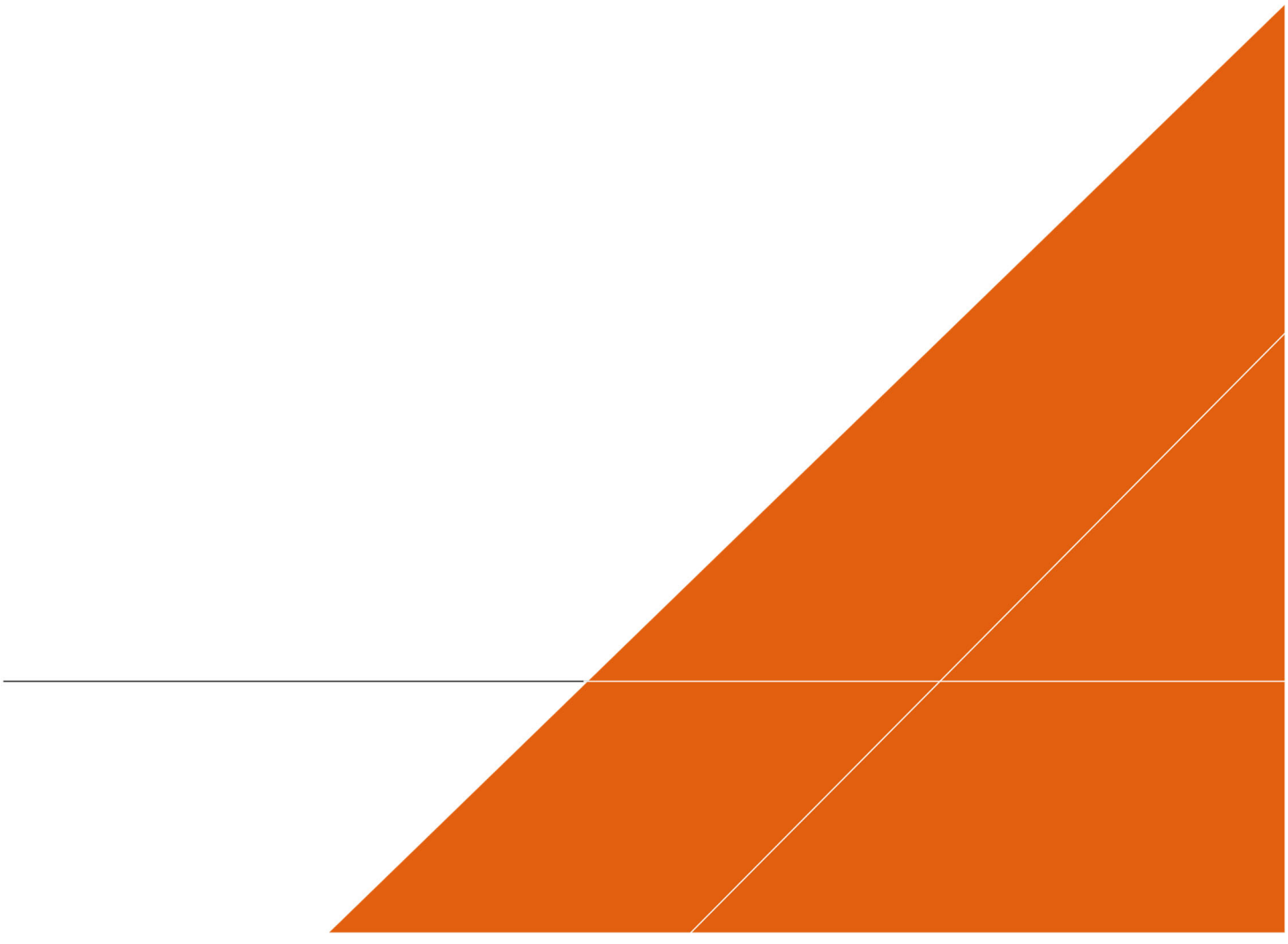
ARCADIS Design & Consultancy for natural and built assets

# BRITISH SUGAR, YORK

## Slope Stability Assessment

10024487-AUK-XX-XX-RP-GE-0074-03-Slope Stability Report

SEPTEMBER 2022



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# British Sugar, York

## Slope Stability Assessment


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| | |
|---|---|
| Report No | 10024487-AUK-XX-XX-RP-GE-0074-03-Slope Stability Report |
| Date | SEPTEMBER 2022 |

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## APPENDIX B

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## APPENDIX D

**Output from Slope Stability Assessments**

# 1 Introduction

Arcadis UK Limited (Arcadis) was commissioned by British Sugar to undertake a slope stability assessment of the proposed landform at the Former British Sugar Factory, Millfield Lane, York, YO26 6AY (the 'site').

The site is to be redeveloped with the construction of a development platform which will subsequently be redeveloped with residential properties. The proposed landform will be constructed by using materials which are currently present on site including a combination of made ground and waste materials form the former sugar processing activities at the site. These wastes principally include soils generated by washing sugar beet on the site and consist principally of natural soils including silt and clay and sand however other materials are also present. The waste materials are present within a permitted waste facility in the form of bunds and mounds in the northern part of the site.

The made ground on site is more heterogeneous in nature and is associated with the historic development of sugar refining structures on site, these materials are generally present in the south east of the site away from the permitted waste area.

A site location plan is presented as Figure 1, and the location of the permitted and non permitted sections of the site is shown in Figure 2.

A planning application for the construction of the development platform has been approved by York City Council. A remedial strategy has been developed for the site, which will include:

- Excavation of all waste and made ground across the site.
- Carrying out remediation of soil as required to meet environmental objectives.
- Processing arisings to make them suitable for use as geotechnical fill by a combination of stabilisation and moisture modification.
- Placement of fill to an earthworks specification to the agreed landform.

As a proportion of the materials being reused include waste, these materials will be reused under a Deposit for Recovery (DfR) permit. Made ground materials will be reused using a Dowcop Materials Management Plan (MMP) framework. The purpose of this report is to confirm the stability of the proposed landform to support both the Deposit for Recovery and materials management plan.

The works are in accordance with discussions between Arcadis and British Sugar during the Concept Design Review Workshop on the 23rd May and the findings of the Due Diligence and Data Gap Review works undertaken by Arcadis (Arcadis Report No. 10024487-AUK-XX-XX-RP-GE-0005-01, June 2019).

## 1.1 Report Context

The site is currently subject to an Environmental Permit (EP) (EPR/QP3593NF) which has been in a state of Definitive Closure since October 2009 until EP variation consolidation in October 2015, when the period of aftercare monitoring & maintenance was commenced.

British Sugar now wish to vary the EP in order to enable waste recovery and remediation activities required to create a development platform for a residential development for which planning permission has been granted (ref: 14/02798/FULM, 15/00523/FULM and 15/00524/OUTM).

A summary of the proposed EP variation is provided below.

1. **Adding land** to the current EP by extending (and including) the current EP boundary. The current and proposed EP boundaries are shown on Figure 2;
2. **Addition of a Bespoke Waste Operation** – specifically a Deposit for Recovery (DfR) waste operation to enable recovery of waste material present within the current EP boundary followed by reuse / deposit of recovered waste across the proposed extended EP boundary as fill to create the development platform;
3. **Adding a R11 recovery code** activity to the permit to allow the 'use of wastes obtained from any of the operations numbered R1 to R10', in this case as fill to create the development platform; and

4. **Changing the Operating Techniques (Table S1.2)** such that aspects of the EP Working Plan (URS, 2015) that were previously excluded and not agreed by the Environment Agency (covering monitoring and permit surrender) are superseded by the testing, monitoring, verification and remediation criteria associated with the waste recovery operation (remediation) and can be agreed.

This slope stability report has been prepared to support the application to vary the EP and the addition of bespoke (DfR) waste operation (DfR) for which a Waste Recovery Plan (WRP) (Arcadis Report Ref: 10024487-AUK-XX-XX-RP-GE-0034-P6-Waste Recovery Plan, September 2022) has been prepared.

## 1.2 Aims and Objectives

The overall aims of this assessment are to support the reuse of materials on site to form a stable development platform, and in particular:

- To assess the stability of the proposed landform ;
- To provide information to support the deposit for recovery waste operation.

## 1.3 Scope of Works

The scope of work was developed by Arcadis, and comprises the following:

- Review of all available ground investigation data to establish ground and groundwater conditions at the site and to establish suitable soil parameters to be adopted ;
- Assessment of the stability of the proposed landform, and consider how this stability may be affected by changing conditions ;
- If necessary, provide guidance on amendments or modifications to the proposed design.

## 1.4 Reliability of Information / Limitations

Arcadis' liability, pursuant to the terms of the appointment of Arcadis by British Sugar, is strictly limited to the work undertaken and the matters contained and specifically referred to in this report. Readers are referred to the Study Limitations in Appendix A.

## 1.5 Reliance

This report has been prepared for the use of British Sugar. The contents of this report may not be used or relied upon by any person other than this party without the express written consent and authorisation of Arcadis. No guarantee can be provided by us for the content or accuracy of previous reports, and this report should be read in conjunction with earlier reports

# 2 Site Setting and Landforms

## 2.1 Site Description

The Site can be split into several sections which include:

**Permitted Area**

The current waste permit covers most of the north west of the site where the current landform has been constructed by reusing waste materials from sugar beet processing.

- North West Water Treatment Area (NWWTA) – located in the north of the site and currently comprises three large lagoons with steep sided earth bunds (approx. 1v:1.5h) that are approximately 30m wide by 180m long. Two former ponds of similar dimensions (ponds 4 and 5) have been filled or partially filled;
- Limex pond – located in the centre of the Site and comprises an area of shallow water bounded by 9.5m high steep sided earth bunds. The southernmost bund wall has been breached to allow access to the base of the former pond and to prevent water collecting;
- Soil conditioning area (landfill mound) – located in the centre of the site and comprises a large vegetated mound extending approximately 10 to 13m above the surrounding area with side slopes of approximately 1v:1.5h.
- Tank farm bund- a screening bund extending to approximately 12m has been constructed along the western boundary of the site to provide a visual screen of the former tank farm.

**Non Permitted Area**

The areas excluded from the current waste permit include a playing field and former school in the west of the site, and the former main manufacturing area in the south east of the site. All areas have now been cleared of above ground structures.

- Former Main factory – located in the central and southern portions of the site and comprises the majority of the site area. All above ground structures, roads and surface hardstanding have been removed. The main factory area is generally flat lying, however steep boundary slopes (approx. 1v: 2h) exist within the southernmost area sloping down to adjoining residential properties and a railway line.
- Former Tank farm – located to the north of the main factory area of the site and is generally flat lying.
- Former school – located in the west of the site, all above ground structures have been demolished to slab level;
- Playing field – located in the west of the site and comprises a generally flat lying grassed field;

A site layout plan is presented as Figure 2.

## 2.2 Site Inspections

A condition of the existing permitting regime requires regular inspection of landforms within the permitted area. This includes a weekly visual inspection carried out by British Sugar management, and an annual inspection carried out by a geotechnical engineer (Golder Associates). British Sugar also forward the weekly inspection records to Golder Associates for review. All of this information is compiled into an annual report which includes recommendations for further monitoring or remedial measures as required.

The latest report available covers the period January to December 2019:

- *British Sugar York Environmental Permit- Annual Monitoring Report 2019 Environmental Permit EPR/QP3593NF,* Prepared by Golder Associates, March 2020.

The report identifies signs of instability on the northern bund of Pond 1 in the waste water treatment area including a tension crack running parallel to the bund crest- i.e. along the northernmost site boundary. The report noted that this was due to the slope being over steepened at 1v:1.7h and recommended further monitoring, with remedial works (reducing the slope angle) if the slope was noted to deteriorate further. Some minor movement was noted throughout the year (particularly following heavy rainfall, however it is our understanding that no remedial works have yet needed to be carried out.

The report also noted tension cracks along the boundaries of Pond 3 in the waste water treatment area. Pond 3 is not adjacent to sensitive structures, neighbours and Golder recommended that the area be cordoned off and monitored.

Other areas of previous instability around the waste mound and limeX pond were noted. Previous recommendations had included preventing vehicles from accessing the main waste bound from one of the access tracks due to instability. This recommendation remains in place. No significant signs of further slope instability or deterioration were noted during the 2019 monitoring period.

It is noted that the scope of the slope monitoring includes only those areas of the site which are covered by the environmental permit, consequently the southern boundary slopes are not included within the weekly or annual inspections. However, while these slopes are not formally recorded within the report detailed above, British Sugar do undertake site inspections and have not noted any significant instability.

# 3 Slope Stability Ground Model

## 3.1 Introduction

To enable the stability of the slopes on site to be analysed it was necessary to interpret the data recovered from the boreholes of the previous ARCADIS investigations to derive strata profiles, create cross sections through the site using topographical survey data and to apply appropriate geotechnical parameters to the various soils within and beneath the slope.

## 3.2 Current and Proposed Topography

As discussed above, the site includes a number of man made mounds and slopes associated with the site's former use as a sugar production facility. These slope vary in height and profile, however slopes as steep as approximately 1v : 1.5h are present. Locally these slopes show signs of minor movement.

A plan showing the topographic elevation of the site is included in Appendix B.

The proposed development platform for the site is designed to achieve gravity drainage of the proposed residential development. The landform has also been designed to accommodate SUDS features in the south of the site including an attenuation pond. Proposed levels have been designed to accommodate a maximum slope around the perimeter of 1h :3v which will result in significantly reduced slope angles around the site perimeter, and in particular several of the unstable slopes which currently show signs of instability will have reduced heights or be removed altogether.

The proposed topography for the site is included in Appendix B and a selection of section lines comparing the existing and proposed site elevations is included in Appendix C.

## 3.3 Ground Conditions

The site has been subject to numerous phases of ground investigation. These have confirmed the general sequence of strata on site to consist of an upper layer of waste soil or made ground overlying natural strata. The investigation has confirmed that in general, the waste or made ground has been placed on the original land surface and so the current site topography reflects the thickness of made ground or waste present. Geotechnical testing has identified that much of the made ground on site will require stabilisation or modification by the addition of lime or cement to form a suitable engineering fill. A laboratory trial has been conducted to assist with the stabilised soil design. A full list of previous reports is included in Section 5.0.

Natural strata at the site were found to include a sequence of Quaternary deposits of glacial, fluvio glacial and lacustrine origin including sand, gravel, silt and clay. These deposits were found to be underlain by sandstone of the Sherwood Sandstone formation at typically 20m below original ground level.

## 3.4 Groundwater Conditions

Monitoring of groundwater elevations across the site indicates a groundwater body within the superficial deposits with a flow towards the River Ouse.

Discontinuous water bodies were also recorded within the made ground, and associated with the current ponds. The proposed remedial strategy will involve excavation and processing of all made ground on site and so groundwater conditions within fill will vary significantly following reprofiling of the site. For this reason, an assessment of equilibrium groundwater conditions has been made during the slope modelling assessment.

## 3.5 Soil Properties

Using the borehole information and laboratory test data conducted in the earlier phases of investigation together with the results of the soils stabilisation trial, geotechnical parameters were assigned to the soil profile as detailed in the following table. As the remedial strategy includes excavation of all made ground and waste materials at site, and placing these in a controlled manner, this will give the opportunity to ensure these parameters are met.

| Material Type | Bulk Density $\gamma_b$ ($Mg/m^3$) | Effective Angle of Friction $\phi'$ (degrees) | Cohesion ($kN/m^2$) |
|---|---|---|---|
| **Stabilised Fill** | 18 | 25° | 1 |
| **Quaternary silty SAND** | 18 | 36° | 0 |
| **Quaternary CLAY** | 19.6 | 28° | 2 |
| **Quaternary sandy GRAVEL** | 18 | 38° | 0 |
| **Sherwood Sandstone** | Not used in analysis | | |

# 4 Slope Stability Analysis

## 4.1 Methodology

In order to assess the stability of the slopes on site, analysis was carried out using Slope/W, proprietary software provided by Geosolve. Slope/W is capable of carrying out slope stability analysis based on limit state design as required by Eurocode 7.

Groundwater conditions were modelled using Geosolve SEEP/W. SEEP/W allows for modelling of pore water pressures based on saturated steady state conditions based on average, historic peak and worst case rainfall data. These assumed average monthly rainfall rates of 75, 175 and 225mm respectively.

In addition, SEEP/W allowed for modelling of excess pore water pressures following rapid drawdown of water levels contained within the attenuation ponds on site.

The following data were used in the development of the slope model:

- Proposed elevation- basic slope geometry.
- Ground Investigation and soil stabilisation trial results- geological profile and basic soil parameters
- Groundwater elevation data.
- Predicted pore pressure conditions.

The following locations were chosen for analysis:

| Profile | Location | Comments |
|---|---|---|
| A | South East Corner of site- Attenuation Pond adjoining residential development | Modelling of internal and external slopes of pond for average, peak and worst case rainfall events including following rapid drawdown. |
| B | South East Corner of site- Attenuation Pond adjoining railway land | Modelling of internal and external slopes of pond for average, peak and worst case rainfall events |
| C | Eastern site boundary Attenuation pond. | Modelling of internal and external slopes of pond for average, peak and worst case rainfall events |
| D | Eastern site boundary. | Modelling of external slope for average, peak and worst case rainfall events |
| G | Western site boundary adjacent tangerine factory | Modelling of external slope for average, peak and worst case rainfall events |

The slope stability analysis has been conducted for a number of situations and groundwater conditions and the ratio of resisting moments to overturning moments (F) is calculated. Where F is > 1, the slope is stable as resisting moments are greater than overturning moments. Where F<1, the slope is unstable.

## 4.2 Results

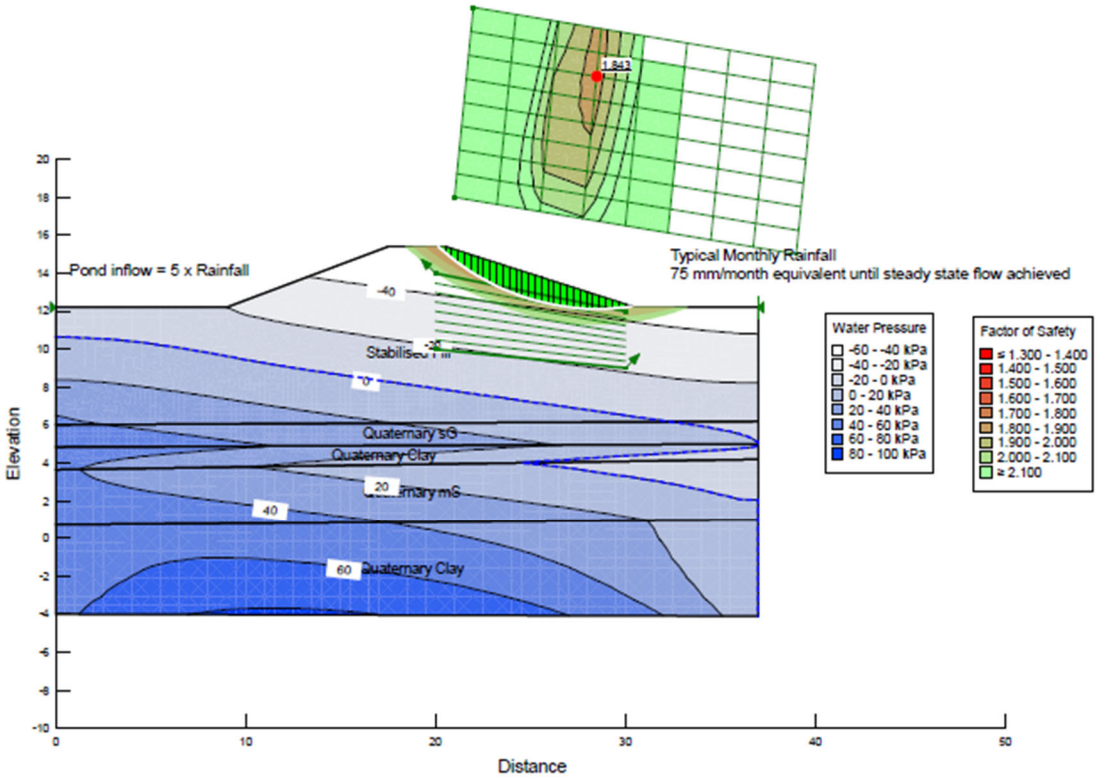
The outputs of the slope stability assessment are included in Appendix D and summarised below.

### 4.2.1 Global Stability

The overall stability of the proposed slopes was assessed to confirm whether there was potential for a large-scale failure to occur. This analysis was carried out for average, historic peak, and worst case rainfall conditions.

A typical output from the Slope/W analysis is shown below:

*Figure 3: A typical output from the Slope/W analysis*




In addition, for Profile A which adjoins residential properties, the assessment also included for rapid drawdown of water levels within the attenuation pond proposed for the site. In this instance, excess pore pressures may develop leading to an enhanced risk of instability occurring. This condition is considered to represent a realistic worst case for the proposed slopes on site.

The outputs from each iteration are included in Appendix D and summarised below:

| Location | Rainfall Condition | F | Stability |
|---|---|---|---|
| Profile A- External Slope | Average | 2.501 | Stable |
| | Historic Peak | 1.844 | Stable |
| | Worst Case | 1.207 | Stable |
| Profile A- Internal Slope | Average | 3.209 | Stable |
| | Historic Peak | 2.369 | Stable |
| | Worst Case | 6.174 | Stable |
| Profile A-Rapid Drawdown | Worst Case | 1.337 | Stable |
| Profile B-External Slope | Average | 1.843 | Stable |
| | Historic Peak | 1.843 | Stable |
| | Worst Case | 1.843 | Stable |
| Profile B- Internal Slope | Average | 1.612 | Stable |
| | Historic Peak | 1.612 | Stable |
| | Worst Case | 1.604 | Stable |
| Profile C-External Slope | Average | 2.323 | Stable |
| | Historic Peak | 2.323 | Stable |
| | Worst Case | 2.323 | Stable |
| Profile C- Internal Slope 1 | Average | 2.315 | Stable |
| | Historic Peak | 2.204 | Stable |
| | Worst Case | 3.506 | Stable |
| Profile C- Internal Slope 2 | Average | 2.105 | Stable |
| | Historic Peak | 1.980 | Stable |
| | Worst Case | 2.413 | Stable |
| Profile D- External Slope | Average | 1.539 | Stable |
| | Historic Peak | 1.539 | Stable |
| | Worst Case | 1.539 | Stable |
| Profile G- External slope | Average | 1.712 | Stable |
| | Historic Peak | 1.712 | Stable |

| | | | |
|---|---|---|---|
| | Worst Case | 1.712 | Stable |
| Profile G- Internal slope | Average | 2.789 | Stable |
| | Historic Peak | 2.789 | Stable |
| | Worst Case | 2.789 | Stable |

In all instances, the analysis predicts that the proposed slopes on site will remain stable.

## 4.3 Discussion

Ground conditions at the site are well understood and include a layer of made ground or beet washing waste overlying natural strata. The current landform on site includes a number of slopes with slope angles up to 1v:1.5h (approx. 33º) These have been subject to visual inspection over a number of years, and although evidence of movement has been recorded locally, significant mitigation works such as slope reprofiling have not been deemed necessary.

The proposed remedial strategy for the site involves excavation of made ground and waste at the site, which will then be processed and subject to stabilisation or moisture modification to form an engineering fill material. which will be placed in a controlled manner and subject to validation testing.

The proposed landform will have a number of slopes which have been designed with a maximum gradient of 1v:3h (approx. 18º). Slope stability analysis has been carried out using Geosolve SLOPE/W, porewater pressures have been estimated using SIGMA/W.

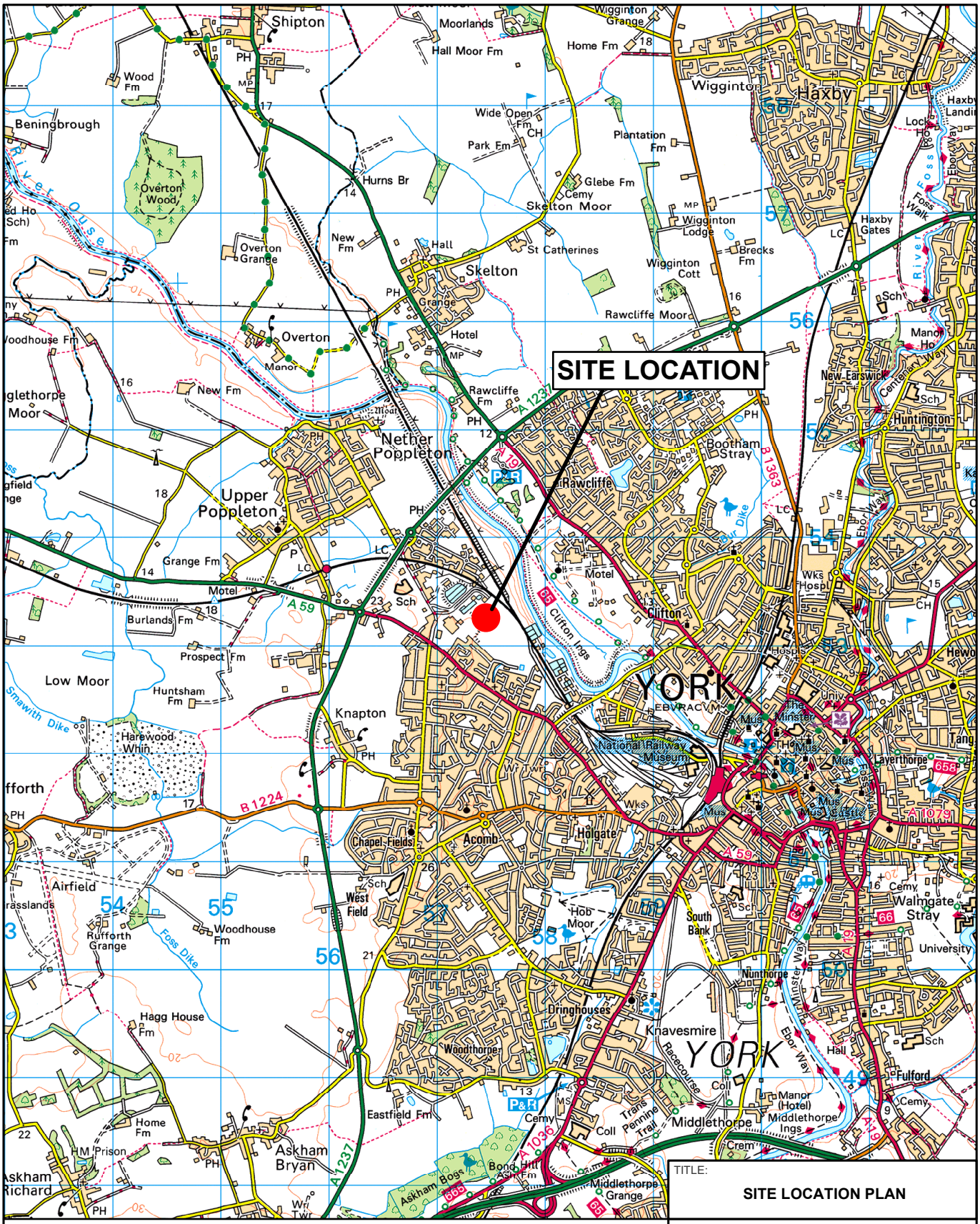
Slope behaviour has been modelled assuming a range of pore water conditions based on average monthly rainfall, peak monthly rainfall based on historic records, and a predicted worst case monthly rainfall. Additionally, a section of slope adjacent to a rainfall attenuation pond has been modelled assuming rapid drawdown within the pond. In all cases, numerical modelling predicted the slopes would remain stable.

The proposed remediation works at the site will involve improving the geotechnical properties of soil and waste materials by a combination of modification of moisture content and placement of material to an engineering specification. The proposed landform will also reduce slope profiles from 33º to no more than 18º. Numerical modelling has confirmed that the proposed landform will be stable. Consequently, the proposed remediation works will render the site stable as required under the proposed deposit for recovery scheme.

# 5 Previous Reports

The following reports have been reviewed in the completion of this assessment.

- Additional Ground Investigation Factual Report, 10024487-AUK-XX-XX-RP-GE-0032-01, Arcadis, March 2020;
- Updated Hydrogeological Risk Assessment Report, 10024487-AUK-XX-XX-RP-GE-0020-01, Arcadis, January 2020; and
- Ground Investigation Factual Report, 10024487-AUK-XX-XX-RP-GE-0015-01, Arcadis, August 2019.
- British Sugar Stabilisation Trials, Laboratory Bench Scale Mix Design Study, CE Geochem, Report A190504, November 2019;
- Quarter 2 2019 Gas and Groundwater Permit Monitoring Factual Report, Golder Associates (UK) Ltd, 2019;
- EP Annual Monitoring Reports, Golder Associates, 2015 to 2019;
- Remediation and Reclamation Strategy – Final, URS (AECOM) February 2015;
- Environmental Permit Variation: Working Plan (47068825), URS, August 2015;
- URS (2013) Summary Report for Ground Gas and Groundwater Data, 2006 – 2012, British Sugar Former Factory Site, York for ABF;
- Factual Report on Ground Investigation: Ian Farmer Associates Limited (2010) Associated British Foods - British Sugar York Site - August 2010: Contract No:W10/40642;
- British Sugar Factory York: Factual Vendor Due Diligence Report: Golder Associates (UK) Ltd, April 2010: Ref. 09514540114.500/A.0;
- Definitive Closure Management Plan – Annual Reports, Golder Associates, 2010 to 2014;
- Phase II Geotechnical and Geo-environmental Assessment Report, Scott Wilson, 2010;
- Phase III Geo Environmental Remediation Options Appraisal, Scott Wilson, December 2010;
- Geotechnical and Geo-environmental Audit of Available Site Information: Scott Wilson Ltd, August 2009;
- Definitive Closure Report for Waste Management Licence NYCC/028, Golder Associates, July 2009;
- Preliminary Geotechnical Considerations Non-Technical Summary: Golder Associates (UK) Ltd , December 2008: Ref.08514540111.504/B.1;
- Preliminary Report on Intrusive Site Investigation of Northern and Southern Waste Water Treatment Plant Areas: British sugar Factory, York: Golder Associates (UK) Ltd, October 2008: Ref. 08514540111.500;
- York Sugar Factory: SPMP Reporting: Assessment of Groundwater and Gas Reference Data - Final: Enviros Consulting Ltd, March 2008;
- *British Sugar York Environmental Permit- Annual Monitoring Report 2019 Environmental Permit EPR/QP3593NF,* Prepared by Golder Associates, March 2020.

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## LEGEND

SITE LOCATION

## NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 0.2 0.4 0.8 1.2 1.6 2 Kilometres

N

TITLE: **SITE LOCATION PLAN**

SITE : **BRITISH SUGAR YORK**

CLIENT : **BRITISH SUGAR**

PROJECT : **10024487** | **FIGURE 1**

DATE : 30/07/19 | DRAWN BY : AP

DRG No. : 10024487-AUK-XX-XX-DR-ZZ-0002-P1.GIS

SCALE : **1 : 50,000** | PRINT : **A4**

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## Legend

- Former Water Treatment Area
- Former Factory Area
- Historic Ponds and Soil Conditioning Area
- Site Boundary
- Current Ponds on Site
- Site Wide Topo Countors

Under the Microsoft® BingTM Maps

| Issued for Information | | | |
|---|---|---|---|
| Design | S.Sohni | 3-4-2020 | |
| Drawn | S.Sohni | 3-4-2020 | |
| Checked | J.Hurst | 3-4-2020 | |
| Approved | C.Piddington | 3-4-2020 | |
| Scale | 1:4000 | Datum | AOD |
| Original Size | A3 | Grid | OS |
| Suitability Code: | | Project Number | 10024487 |

Client - British Sugar Plc

BritishSugar

Figure 2

PROJECT

British Sugar, York

TITLE

Site Layout Plan

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Drawing Number:
10024487-AUK-XX-XX-DR-ZZ-0047-P1-Site layout Plan

# APPENDIX A

## Study Limitations

**IMPORTANT**. This appendix should be read before reliance is placed on any of the information, opinions, advice, recommendations or conclusions contained in this report.

1 This report has been prepared by Arcadis LLP ('Arcadis'), with all reasonable skill, care and diligence within the terms of the Appointment and with the resources and manpower agreed with British Sugar, York (the 'Client'). Arcadis does not accept responsibility for any matters outside the agreed scope.

2 This report has been prepared for the sole benefit of the Client unless agreed otherwise in writing. The contents of this report may not be used or relied upon by any person other than this party without the express written consent and authorisation of Arcadis.

3 Unless stated otherwise, no consultations with authorities or funders or other interested third parties have been carried out. Arcadis is unable to give categorical assurance that the findings will be accepted by these third parties as such bodies may have unpublished, more stringent objectives. Further work may be required by these parties.

4 All work carried out in preparing this report has used, and is based on, Arcadis' professional knowledge and understanding of current relevant legislation. Changes in legislation or regulatory guidance may cause the opinion or advice contained in this report to become inappropriate or incorrect. In giving opinions and advice, pending changes in legislation, of which Arcadis is aware, have been considered. Following delivery of the report, Arcadis has no obligation to advise the Client or any other party of such changes or their repercussions.

5 This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report.

6 Whilst this report and the opinions made are correct to the best of Arcadis' belief, Arcadis cannot guarantee the accuracy or completeness of any information provided by third parties. provided by third parties. Arcadis has taken reasonable steps to ensure that the information sources used for this assessment provided accurate information and has therefore assumed this to be the case.

7 This report has been prepared based on the information reasonably available during the project programme. All information relevant to the scope may not have been received.

8 This report refers, within the limitations stated, to the condition of the Site at the time of the inspection. No warranty is given as to the possibility of changes in the condition of the Site since the time of the investigation.

9 The content of this report represents the professional opinion of experienced environmental consultants. Arcadis does not provide specialist legal or other professional advice. The advice of other professionals may be required.

10 Where intrusive investigation techniques have been employed they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. In some cases the investigation is further limited by Site operations, underground obstructions and above ground structures. Unless otherwise stated, areas beyond the boundary of the Site have not been investigated.

11 If below ground intrusive investigations have been conducted as part of the scope, safe location of exploratory holes has been carried out with reference to the Arcadis ground disturbances procedure. No guarantee can be given that all services have been identified. Additional services, structures or other below ground obstructions, not indicated on the drawing, may be present on Site.

12 Unless otherwise stated the report provides no comment on the nature of building materials, operational integrity of the facility or on any regulatory compliance issues.

13 Unless otherwise stated, an inspection of the Site has not been undertaken and there may be conditions present at the Site which have not been identified within the scope of this assessment.

14 Unless otherwise stated, samples from the Site (soil, groundwater, building fabric or other samples) have not been obtained.

15 Arcadis has relied upon the accuracy of documents, oral information and other material and information provided by the Client and others, and Arcadis assumes no liability for the accuracy of such data, although in the event of apparent conflicts in information, Arcadis would highlight this and seek to resolve.

16 Unless otherwise stated, the scope of works has not included an environmental compliance review, health and safety compliance review, hazardous building materials assessment, interviews or contacting Local Authority, requests for information to the petroleum officer, sampling or analyses of soil, ground water, surface water, air or hazardous building materials or a chain of title review.

17 Unless otherwise stated, this assessment has considered the ongoing use of the Site and has not been prepared for the purposes of redevelopment which may act as a trigger for Site investigation and remediation works not needed for ongoing use.

# APPENDIX B

## Existing and Proposed Topography

100 0 100 200 m

## Legend

Current Site Topography (QGIS 2D Elevation Layer)

- 5.97
- 12.36
- 18.74
- 25.12
- 31.5
- Site Boundary

Under the Microsoft® BingTM Maps

N

Issued for Information

| | | | |
|---|---|---|---|
| Design | S.Sohni | 3-4-2020 | |
| Drawn | S.Sohni | 3-4-2020 | |
| Checked | J.Hurst | 3-4-2020 | |
| Approved | C.Piddington | 3-4-2020 | |
| Scale | 1:4000 | Datum | AOD |
| Original Size | A3 | Grid | OS |
| Suitability Code: | | Project Number | 10024487 |

Client - British Sugar Plc

BritishSugar

PROJECT

British Sugar, York

TITLE

Current Site Topography (QGIS 2D Elevation Layer)

ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way,
London
N1 9AB

Co-Ordinating office:
1 Whitehall Riverside
Leeds
LS1 4BN
United Kingdom
T: +44 (0)113 284 5300

Drawing Number:
10024487-AUK-XXXX-DR-ZZ-0037-P1-New Topo Survey Map

NOTES

1. FOR CROSS SECTION DRAWINGS REFER TO BRS-AUK-XX-XX-DR-CE-0102 - 0104.

KEY

- SITE BOUNDARY
- MAJOR CONTOUR 5m INTERVAL
- MINOR CONTOUR 1m INTERVAL
- ENVIRONMENTAL PERMIT BOUNDARY

CROSS SECTION C-C, SEE NOTE 5

CROSS SECTION D-D, SEE NOTE 5

CROSS SECTION A-A, SEE NOTE 5

ADDITIONAL CROSS SECTION E - E

ADDITIONAL CROSS SECTION F - F

CROSS SECTION B-B, SEE NOTE 5

| Rev | Date | Description | Drawn | Check | Approv |
|---|---|---|---|---|---|
| P0 | 13/03/20 | FIRST ISSUE | AK | TF | MD |

Client

British Sugar

PROJECT:

British Sugar

Site

Boroughbridge Road
York
Yorkshire
YO26 6AQ

Client

British Sugar


ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way
London
N1 9AB

Coordinating office:
2 Glass Wharf
Bristol
BS2 0FR
Tel: 44 (0)117 372 1200

www.arcadis.com


TITLE:

# PROPOSED GROUND MODEL

| | | | |
|---|---|---|---|
| Designed | A.KHAN | Signed | Date 21/02/20 |
| Drawn | A.KHAN | Signed | Date 21/02/20 |
| Checked | A.KHAN | Signed | Date 21/02/20 |
| Approved | M DAVIES | Signed | Date 21/02/20 |
| Scale: | 1:1000 | Datum: | AOD |
| Original Size: | A1 | Grid: | OS |
| Suitability Code: | S2 | Project Number: | 10024487 |

Suitability Description:

SUITABLE FOR INFORMATION

| Drawing Number: | Revision: |
|---|---|
| BRS-AUK-XX-XX-DR-CE-0100 | P0 |

100mm on Original

Print Date: 2020-03-13 11:52:34

C:\Users\khana2975\ARCADIS\10024487 - British Sugar York Stage 1 - Documents\09 Drawings\BRS-AUK-XX-XXX-CE-100 Proposed Ground Model.dwg

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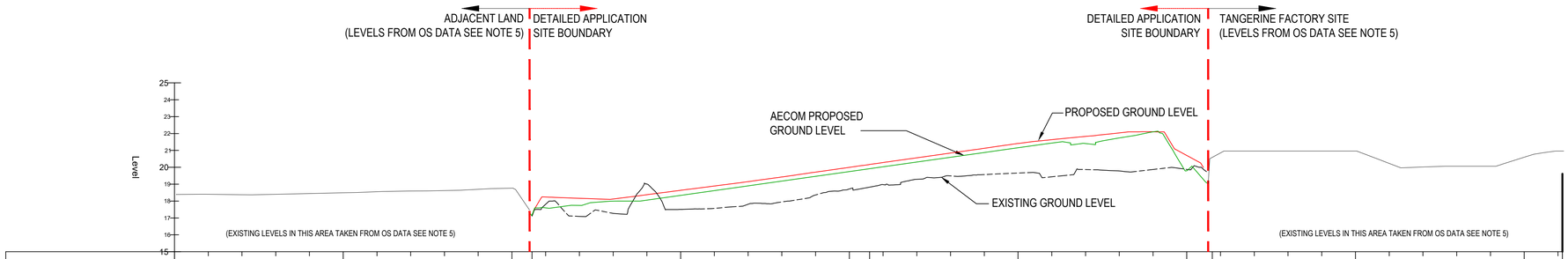
# APPENDIX C

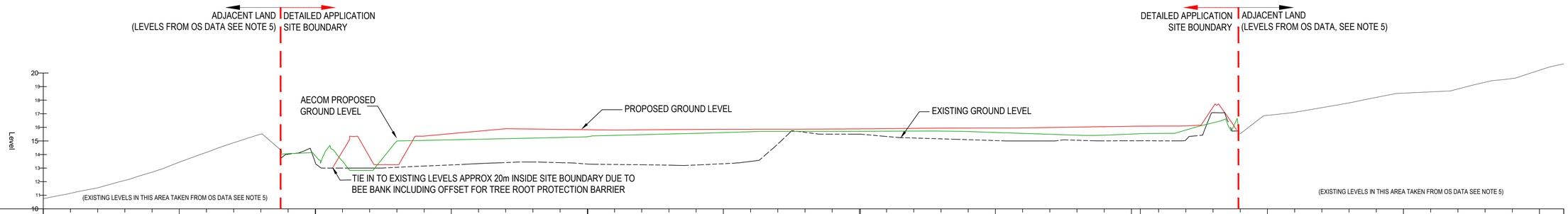
## Indicative Cross Sections




| Chainage | 0.000 | 10.000 | 20.000 | 30.000 | 40.000 | 50.000 | 60.000 | 70.000 | 80.000 | 90.000 | 100.000 | 105.864 | 110.000 | 120.000 | 130.000 | 140.000 | 150.000 | 160.000 | 170.000 | 180.000 | 190.000 | 200.000 | 206.009 | 210.000 | 220.000 | 230.000 | 240.000 | 250.000 | 260.000 | 270.000 | 280.000 | 290.000 | 300.000 | 307.568 | 310.000 | 320.000 | 330.000 | 340.000 | 350.000 | 360.000 | 370.000 | 380.000 | 390.000 | 400.000 | 418.999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Levels | | | | | | | | | | | | 17.107 | 17.812 | 17.093 | 17.268 | 18.006 | 17.505 | 17.567 | 17.811 | 17.946 | 18.394 | 19.715 | 19.824 | 19.972 | 19.286 | 19.409 | 19.571 | 19.660 | 19.437 | 19.864 | 19.781 | 19.869 | 19.976 | 19.743 | 19.745 | 19.752 | 19.760 | 19.743 | 19.725 | 19.707 | 19.689 | 19.671 | 19.653 | 19.634 | 19.616 |
| Proposed Levels | | | | | | | | | | | | 17.416 | 18.241 | 18.163 | 18.123 | 18.576 | 18.639 | 18.891 | 19.151 | 19.426 | 19.715 | 19.997 | 20.211 | 20.262 | 20.961 | 20.945 | 21.125 | 21.412 | 21.634 | 21.828 | 22.037 | 22.103 | 20.700 | | | | | | | | | | | | |
| Level Difference | | | | | | | | | | | | -0.429 | -1.070 | -0.856 | 0.630 | -1.131 | -1.324 | -1.340 | -1.479 | -1.352 | -1.282 | -1.343 | -1.309 | -1.273 | -1.355 | -1.554 | -1.752 | -2.196 | -1.963 | -2.256 | -2.234 | -0.824 | | | | | | | | | | | | | |

## SECTION A-A

SCALE: H 1:1000,V 1:200




| Chainage | 0.000 | 10.000 | 20.000 | 30.000 | 40.000 | 50.000 | 60.000 | 70.000 | 80.000 | 90.000 | 100.000 | 100.202 | 110.000 | 120.000 | 130.000 | 140.000 | 150.000 | 160.000 | 170.000 | 180.000 | 190.000 | 200.000 | 200.223 | 210.000 | 220.000 | 230.000 | 240.000 | 250.000 | 260.000 | 270.000 | 280.000 | 290.000 | 300.000 | 300.272 | 310.000 | 320.000 | 330.000 | 340.000 | 350.000 | 360.000 | 370.000 | 380.000 | 390.000 | 400.000 | 403.273 | 410.000 | 420.000 | 430.000 | 440.000 | 450.000 | 460.000 | 470.000 | 480.000 | 490.000 | 500.000 | 510.000 | 520.000 | 530.000 | 540.000 | 550.000 | 558.972 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Levels | | | | | | | | | | 14.023 | 13.838 | | 13.000 | 13.002 | 13.058 | 13.152 | 13.235 | 13.330 | 13.406 | 13.447 | 13.401 | 13.296 | | 13.266 | 13.247 | 13.218 | 13.228 | 13.322 | 13.490 | 14.771 | 15.632 | 15.501 | 15.550 | | 15.328 | 15.216 | 15.154 | 15.091 | 15.027 | 15.001 | 15.000 | 15.049 | 15.007 | 15.012 | 15.014 | | 15.006 | 15.070 | 17.064 | | | | | | | | | | | | |
| Proposed Levels | | | | | | | | | | | | 13.100 | 14.231 | 13.802 | 13.250 | 15.355 | 15.538 | 15.717 | 15.899 | 15.876 | 15.851 | 15.827 | | 15.803 | 15.617 | 15.831 | 15.946 | 15.858 | 15.861 | 15.865 | 15.868 | 15.876 | 15.889 | | 15.894 | 15.824 | 15.939 | 15.948 | 15.953 | 15.958 | 15.969 | 16.020 | 16.050 | 16.060 | | 15.992 | 16.102 | 17.500 | | | | | | | | | | | | |
| Level Difference | | | | | | | | | | | | -1.231 | -0.800 | -0.192 | -2.203 | -2.301 | -2.387 | -2.493 | -2.429 | -2.450 | -2.527 | | -2.536 | -2.570 | -2.613 | -2.618 | -2.535 | -2.372 | -1.094 | -0.236 | -0.376 | -0.339 | | -0.574 | -0.708 | -0.785 | -0.857 | -0.926 | -0.957 | -0.969 | -0.971 | -1.043 | -1.049 | -1.076 | -1.085 | -1.031 | -0.416 | | | | | | | | | | | | |

## SECTION B-B

SCALE: H 1:1000,V 1:200

**NOTES:**

1. PROFILES SHOWN ARE AT AN x5 EXAGGERATED VERTICAL SCALE.
2. EXISTING GROUND INFORMATION WITHIN DETAILED APPLICATION SITE BOUNDARY TAKEN FROM GREENHATCH TOPOGRAPHICAL SURVEY DRAWING 33199_T DATED APRIL 2019.
3. FOR SECTION LOCATION PLANS REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
4. FOR PROPOSED CONTOURS, REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
5. EXISTING GROUND INFORMATION OUTSIDE DETAILED APPLICATION SITE BOUNDARY TAKEN FROM ORDINANCE SURVEY DATA 10m DIGITAL TERRAIN MODEL, ARE THEREFORE OF REDUCED ACCURACY AND SHOULD BE TREATED AS INDICATIVE ONLY, LEVELS SHOWN MAY ACTUALLY BE TOP OF BUILDING LEVELS. DATA TAKEN FROM AECOM DETAIL APPLICATION CROSS SECTION DRAWINGS PRODUCED IN NOV 2013.

| Rev | Date | Description | Drawn | Check | Approv |
|---|---|---|---|---|---|
| P0 | 13/03/20 | FIRST ISSUE | AK | TF | MD |

100mm on Original

Client: British Sugar

PROJECT: British Sugar

Site: Boroughbridge Road, York, Yorkshire, YO26 6AQ

Client: British Sugar

Suitability Description: FOR INFORMATION NOT TO BE USED FOR CONSTRUCTION

| | | | |
|---|---|---|---|
| Designed | A.KHAN | Date 21/02/20 | Signed |
| Drawn | A.KHAN | Date 21/02/20 | Signed |
| Checked | T.FAIRLIE | Date 21/02/20 | Signed |
| Approved | M.DAVIES | Date 21/02/20 | Signed |
| Scale: | AS SHOWN | Datum: | AOD |
| Original Size: | A1 | Grid: | OS |
| Suitability Code: | S2 | Project Number: | 10024487 |

**PROJECT:** BRITISH SUGAR

**TITLE:** CROSS SECTIONS SHEET 1 OF 3

ARCADIS Design & Consultancy for natural and built assets

Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: 2 Glass Wharf, Bristol, BS2 0FR, Tel: 44 (0)117 372 1200

www.arcadis.com

Drawing Number: BRS-AUK-XX-XX-DR-CE-0102 | Revision: P0

Print Date: 2020-03-13 14:01:30

C:\Users\khana2975\ARCADIS\10024487 - British Sugar York Stage 1 - Documents\09 Drawings\BRS-AUK-XX-XX-DR-CE-0102-0104 Cross Sections.dwg

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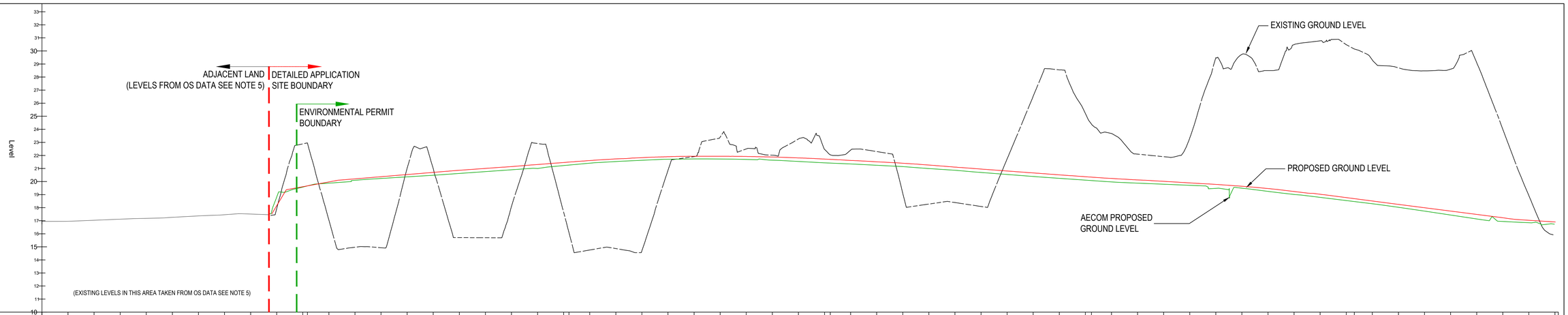
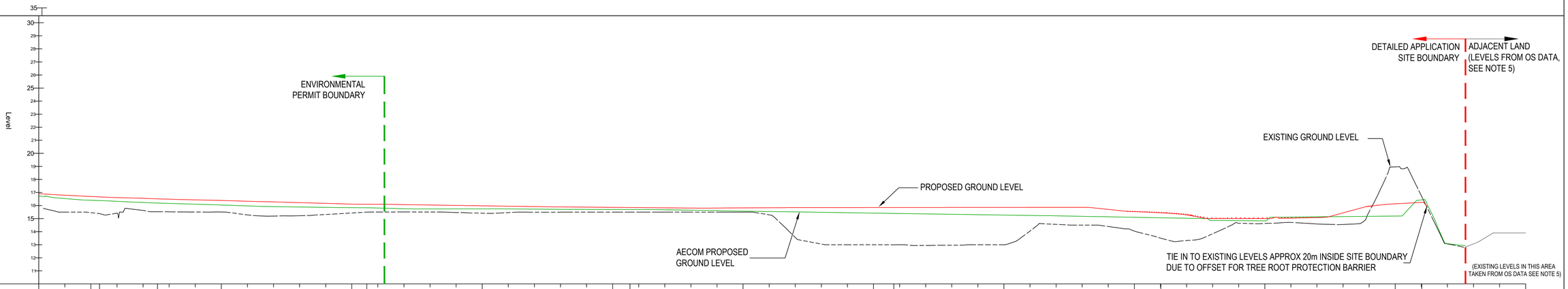



| Chainage | 0.000 | 10.000 | 20.000 | 30.000 | 40.000 | 50.000 | 60.000 | 70.000 | 80.000 | 90.000 | 100.000 | 100.000 | 110.000 | 120.000 | 130.000 | 140.000 | 150.000 | 160.000 | 170.000 | 180.000 | 190.000 | 200.000 | 200.031 | 210.000 | 220.000 | 230.000 | 240.000 | 250.000 | 260.000 | 270.000 | 280.000 | 290.000 | 300.000 | 302.200 | 310.000 | 320.000 | 330.000 | 340.000 | 350.000 | 360.000 | 370.000 | 380.000 | 390.000 | 400.000 | 402.592 | 410.000 | 420.000 | 430.000 | 440.000 | 450.000 | 460.000 | 470.000 | 480.000 | 490.000 | 500.000 | 503.079 | 510.000 | 520.000 | 530.000 | 540.000 | 550.000 | 560.000 | 570.000 | 580.000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Levels | | | | | | | | | | 17.917 | 22.893 | 22.893 | 17.057 | 14.972 | 14.932 | 21.015 | 20.991 | 15.706 | 15.698 | 18.104 | 22.912 | 17.647 | 16.102 | 14.756 | 14.867 | 14.701 | 20.859 | 21.909 | 23.404 | 22.498 | 22.021 | 23.263 | 22.469 | 22.041 | 22.406 | 22.296 | 19.091 | 18.276 | 18.392 | 18.091 | 21.734 | 26.532 | 28.548 | 25.211 | 24.402 | 23.677 | 22.102 | 21.904 | 23.325 | 29.486 | 29.739 | 28.499 | 30.486 | 30.775 | 30.480 | 30.152 | 29.311 | 28.706 | 28.475 | 28.605 | 29.114 | 24.010 | 18.924 | 15.886 |
| Proposed Levels | | | | | | | | | | 18.053 | 19.922 | 19.797 | 19.871 | 20.107 | 20.272 | 20.436 | 20.601 | 20.761 | 20.904 | 21.047 | 21.204 | 21.369 | 21.467 | 21.508 | 21.635 | 21.730 | 21.802 | 21.837 | 21.833 | 21.820 | 21.780 | 21.710 | 21.621 | 21.545 | 21.517 | 21.413 | 21.303 | 21.163 | 21.005 | 20.857 | 20.708 | 20.560 | 20.413 | 20.270 | 20.107 | 20.137 | 20.025 | 19.917 | 19.798 | 19.681 | 19.541 | 19.364 | 19.137 | 18.928 | 18.670 | 18.412 | 18.223 | 18.154 | 17.896 | 17.639 | 17.383 | 17.127 | 16.929 | 16.807 |
| Level Difference | | | | | | | | | | -0.136 | 3.381 | 3.380 | -2.814 | -5.135 | -5.340 | 0.579 | 0.390 | -5.055 | -5.206 | -2.944 | 1.708 | -3.278 | -5.366 | -6.751 | -6.768 | -7.029 | -0.943 | 0.072 | 1.570 | 0.678 | 0.241 | 1.553 | 0.848 | 0.443 | 0.889 | 0.883 | -2.212 | -2.887 | -2.613 | -2.766 | 1.026 | 5.972 | 8.134 | 4.941 | 4.146 | 3.539 | 2.077 | 1.987 | 3.527 | 9.805 | 10.198 | 9.135 | 11.348 | 11.847 | 11.810 | 11.661 | 10.899 | 10.552 | 10.379 | 10.967 | 11.731 | 6.883 | 1.995 | -0.921 |

## SECTION C-C
## CHAINAGE 0-625

(SCALE: H 1:1000,V 1:200)




| Chainage | 590.000 | 600.000 | 603.306 | 610.000 | 620.000 | 630.000 | 640.000 | 650.000 | 660.000 | 670.000 | 680.000 | 690.000 | 700.000 | 706.763 | 710.000 | 720.000 | 730.000 | 740.000 | 750.000 | 760.000 | 770.000 | 780.000 | 790.000 | 800.000 | 806.632 | 810.000 | 820.000 | 830.000 | 840.000 | 850.000 | 860.000 | 870.000 | 880.000 | 890.000 | 900.000 | 907.773 | 910.000 | 920.000 | 930.000 | 940.000 | 950.000 | 960.000 | 970.000 | 980.000 | 990.000 | 1000.000 | 1018.488 | 1020.000 | 1030.000 | 1040.000 | 1050.000 | 1060.000 | 1070.000 | 1080.000 | 1090.000 | 1100.000 | 1118.428 | 1120.000 | 1130.000 | 1140.000 | 1150.000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Levels | 15.500 | 15.469 | 15.391 | 15.417 | 15.627 | 15.518 | 15.505 | 15.505 | 15.283 | 15.191 | 15.222 | 15.316 | 15.430 | 15.499 | 15.502 | 15.509 | 15.504 | 15.469 | 15.414 | 15.462 | 15.491 | 15.495 | 15.498 | 15.499 | 15.500 | 15.500 | 15.500 | 15.500 | 15.500 | 15.500 | 15.287 | 13.555 | 13.052 | 13.000 | 12.997 | 12.995 | 13.000 | 12.945 | 12.980 | 13.000 | 13.000 | 14.048 | 14.558 | 14.503 | 14.395 | 14.047 | 14.028 | 13.320 | 13.838 | 14.646 | 14.628 | 14.704 | 14.590 | 14.549 | 15.526 | 18.964 | 18.981 | 13.061 | | | |
| Proposed Levels | 16.692 | 16.595 | 16.599 | 16.472 | 16.454 | 16.388 | 16.337 | 16.287 | 16.231 | 16.180 | 16.123 | 16.069 | 16.008 | 16.000 | 15.995 | 15.992 | 15.990 | 15.984 | 15.978 | 15.971 | 15.963 | 15.956 | 15.949 | 15.941 | 15.934 | 15.927 | 15.919 | 15.912 | 15.905 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.900 | 15.651 | 15.285 | 15.000 | 15.001 | 15.000 | 15.000 | 15.000 | 15.000 | 15.395 | 15.658 | 16.035 | 16.141 | | | |
| Level Difference | -1.192 | -1.126 | -1.193 | -1.055 | -0.828 | -0.870 | -0.832 | -0.782 | -0.948 | -0.989 | -0.900 | -0.753 | -0.578 | -0.501 | -0.498 | -0.486 | -0.486 | -0.515 | -0.564 | -0.509 | -0.472 | -0.461 | -0.451 | -0.442 | -0.434 | -0.434 | -0.427 | -0.419 | -0.412 | -0.405 | -0.614 | -2.346 | -2.848 | -2.900 | -2.903 | -2.905 | -2.900 | -2.955 | -2.940 | -2.900 | -2.900 | -1.852 | -1.342 | -1.397 | -1.505 | -1.853 | -2.148 | -1.965 | -1.162 | -0.355 | -0.372 | -0.296 | -0.411 | -0.846 | -0.332 | 2.309 | 0.233 | | | |

## SECTION C-C
## CHAINAGE 625-1150

**NOTES:**

1. PROFILES SHOWN ARE AT AN x5 EXAGGERATED VERTICAL SCALE.
2. EXISTING GROUND INFORMATION WITHIN DETAILED APPLICATION SITE BOUNDARY TAKEN FROM GREENHATCH TOPOGRAPHICAL SURVEY DRAWING 33199_T DATED APRIL 2019.
3. FOR SECTION LOCATION PLANS REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
4. FOR PROPOSED CONTOURS, REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
5. EXISTING GROUND INFORMATION OUTSIDE DETAILED APPLICATION SITE BOUNDARY TAKEN FROM ORDINANCE SURVEY DATA 10m DIGITAL TERRAIN MODEL, ARE THEREFORE OF REDUCED ACCURACY AND SHOULD BE TREATED AS INDICATIVE ONLY, LEVELS SHOWN MAY ACTUALLY BE TOP OF BUILDING LEVELS. DATA TAKEN FROM AECOM DETAIL APPLICATION CROSS SECTION DRAWINGS PRODUCED IN NOV 2013.

| Rev | Date | Description | Drawn | Check | Approv |
|---|---|---|---|---|---|
| P0 | 13/03/20 | FIRST ISSUE | AK | TF | MD |

Client: British Sugar

PROJECT: British Sugar

Site: Boroughbridge Road, York, Yorkshire, YO26 6AQ

Client: British Sugar

Suitability Description: FOR INFORMATION NOT TO BE USED FOR CONSTRUCTION

| | | | |
|---|---|---|---|
| Designed | A.KHAN | Date 21/02/20 | Signed |
| Drawn | A.KHAN | Date 21/02/20 | Signed |
| Checked | T.FAIRLIE | Date 21/02/20 | Signed |
| Approved | M.DAVIES | Date 21/02/20 | Signed |
| Scale: | AS SHOWN | Datum: | AOD |
| Original Size: | A1 | Grid: | OS |
| Suitability Code: | S2 | Project Number: | 10024487 |

PROJECT: BRITISH SUGAR

TITLE: SHEET 2 OF 3

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: 2 Glass Wharf, Bristol, BS2 0FR
Tel: 44 (0)117 372 1200
www.arcadis.com

Drawing Number: BRS-ARC-XX-XX-DR-CE-0103 | Revision: P0

100mm on Original

Print Date: 2020-03-13 14:02:41

C:\Users\khana2975\ARCADIS\10024487 - British Sugar York Stage 1 - Documents\09 Drawings\BRS-AUK-XX-XX-DR-CE-0102-0104 Cross Sections.dwg

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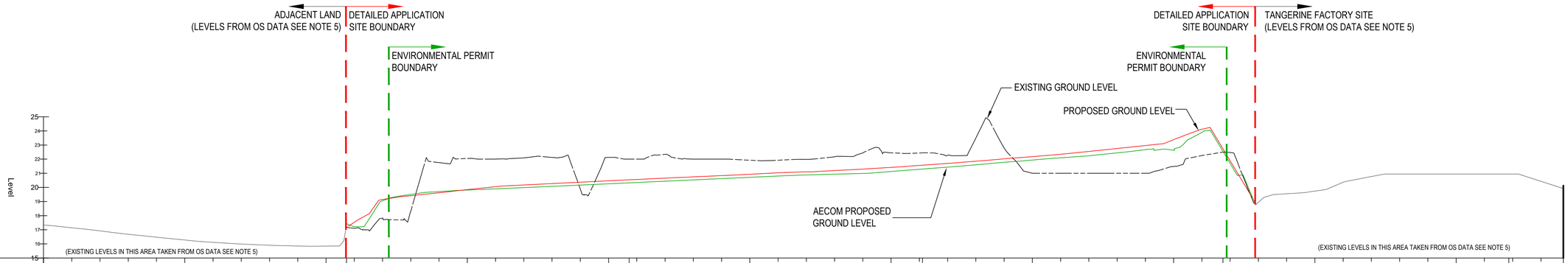


| Chainage | 0.000 | 10.000 | 20.000 | 30.000 | 40.000 | 50.000 | 60.000 | 70.000 | 80.000 | 90.000 | 100.000 | 107.235 | 110.000 | 120.000 | 130.000 | 140.000 | 150.000 | 160.000 | 170.000 | 180.000 | 190.000 | 200.000 | 207.289 | 210.000 | 220.000 | 230.000 | 240.000 | 250.000 | 260.000 | 270.000 | 280.000 | 290.000 | 300.000 | 310.000 | 320.000 | 330.000 | 340.000 | 350.000 | 360.000 | 370.000 | 380.000 | 390.000 | 400.000 | 410.000 | 417.454 | 420.000 | 430.000 | 440.000 | 450.000 | 460.000 | 470.000 | 480.000 | 490.000 | 500.000 | 510.000 | 518.940 | 520.000 | 530.000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Levels | | | | | | | | | | | | 17.188 | 17.104 | 17.821 | 18.322 | 21.758 | 22.049 | 22.004 | 22.090 | 22.125 | 19.887 | 22.124 | 22.000 | 22.000 | 22.340 | 22.000 | 22.000 | 21.927 | 21.926 | 21.985 | 22.168 | 22.445 | 22.449 | 22.449 | 22.278 | 23.498 | 22.795 | 21.000 | 21.000 | 21.000 | 21.000 | 21.486 | 22.250 | 22.500 | 22.472 | 18.895 | 18.993 | 19.061 | 19.226 | 19.382 | 19.492 | 19.622 | 19.753 | 19.821 | 19.938 | 19.953 | 20.049 | |
| Proposed Levels | | | | | | | | | | | | 17.151 | 17.431 | 19.043 | 19.309 | 19.522 | 19.741 | 19.949 | 20.070 | 20.170 | 20.268 | 20.387 | 20.000 | 20.000 | 20.556 | 20.646 | 20.733 | 20.830 | 20.932 | 21.000 | 21.092 | 21.197 | 21.318 | 21.551 | 21.598 | 21.756 | 21.923 | 22.079 | 22.245 | 22.447 | 22.657 | 22.864 | 23.280 | 24.118 | 21.783 | | | | | | | | | | | | | | |
| Level Difference | | | | | | | | | | | | -0.327 | -1.221 | -0.988 | 2.236 | 2.305 | 2.055 | 2.020 | 1.955 | -0.382 | 1.767 | 1.563 | 1.538 | 1.784 | 1.354 | 1.267 | 1.097 | 0.993 | 0.985 | 1.076 | 1.248 | 1.151 | 0.887 | 0.681 | 1.741 | 0.872 | 1.079 | -1.245 | -1.447 | -1.607 | -1.864 | -1.794 | -1.794 | -0.131 | 0.689 | | | | | | | | | | | | | | |

# SECTION D-D

SCALE: H 1:1000,V 1:200

**NOTES:**

1. PROFILES SHOWN ARE AT AN x5 EXAGGERATED VERTICAL SCALE.
2. EXISTING GROUND INFORMATION WITHIN DETAILED APPLICATION SITE BOUNDARY TAKEN FROM GREENHATCH TOPOGRAPHICAL SURVEY DRAWING 33199_T DATED APRIL 2019.
3. FOR SECTION LOCATION PLANS REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
4. FOR PROPOSED CONTOURS, REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
5. EXISTING GROUND INFORMATION OUTSIDE DETAILED APPLICATION SITE BOUNDARY TAKEN FROM ORDINANCE SURVEY DATA 10m DIGITAL TERRAIN MODEL, ARE THEREFORE OF REDUCED ACCURACY AND SHOULD BE TREATED AS INDICATIVE ONLY, LEVELS SHOWN MAY ACTUALLY BE TOP OF BUILDING LEVELS. DATA TAKEN FROM AECOM DETAIL APPLICATION CROSS SECTION DRAWINGS PRODUCED IN NOV 2013.

| Rev | Date | Description | Drawn | Check | Approv |
|---|---|---|---|---|---|
| P0 | 13/03/20 | FIRST ISSUE | AK | TF | MD |

Client: British Sugar

PROJECT: British Sugar

Site: Boroughbridge Road, York, Yorkshire, YO26 6AQ

Client: British Sugar

Suitability Description: FOR INFORMATION NOT TO BE USED FOR CONSTRUCTION

| | | | |
|---|---|---|---|
| Designed | A.KHAN | Date 21/02/20 | Signed |
| Drawn | A.KHAN | Date 21/02/20 | Signed |
| Checked | T.FAIRLIE | Date 21/02/20 | Signed |
| Approved | M.DAVIES | Date 21/02/20 | Signed |
| Scale: | AS SHOWN | Datum: | AOD |
| Original Size: | A1 | Grid: | OS |
| Suitability Code: | S2 | Project Number: | 10024487 |

**PROJECT:** BRITISH SUGAR

**TITLE:** CROSS SECTIONS SHEET 3 OF 3

ARCADIS Design & Consultancy for natural and built assets

Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: 2 Glass Wharf, Bristol, BS2 0FR, Tel: 44 (0)117 372 1200

www.arcadis.com

Drawing Number: BRS-ARC-XX-XX-DR-CE-0104 | Revision: P0

100mm on Original

Print Date: 2020-03-13 14:03:53

C:\Users\khana2975\ARCADIS\10024487 - British Sugar York Stage 1 - Documents\09 Drawings\BRS-AUK-XX-XX-DR-CE-0102-0104 Cross Sections.dwg

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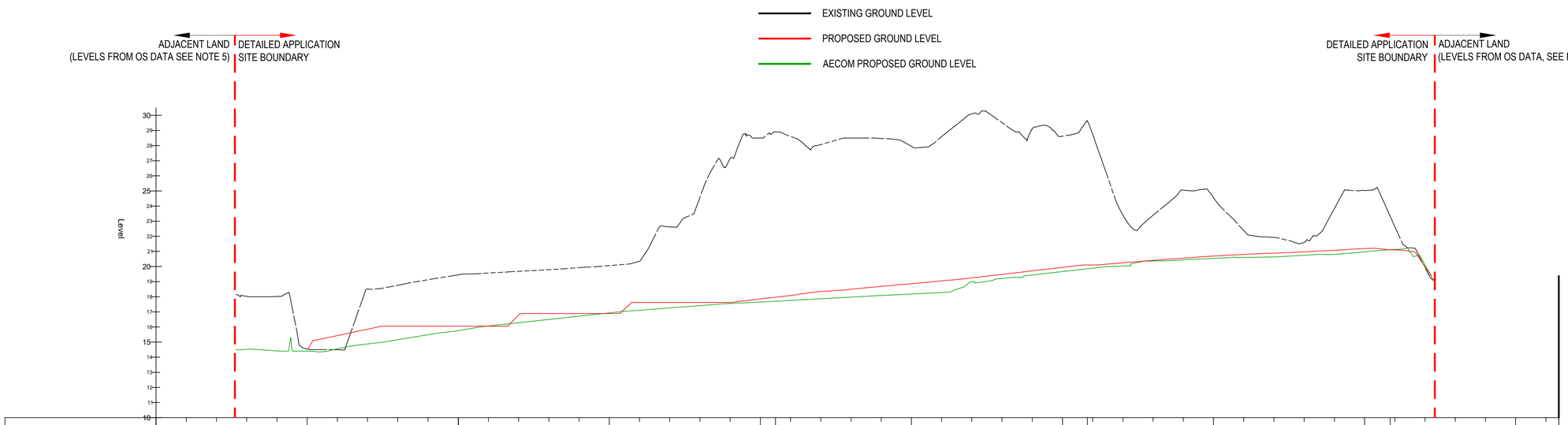
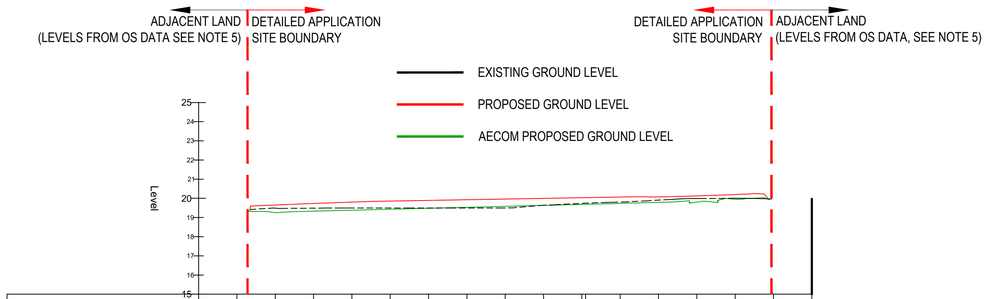



| Chainage | 0.000 | 10.000 | 20.000 | 30.000 | 40.000 | 50.000 | 60.000 | 70.000 | 80.000 | 90.000 | 100.000 | 100.098 | 110.000 | 120.000 | 130.000 | 140.000 | 150.000 | 160.000 | 170.000 | 180.000 | 190.000 | 200.000 | 205.002 | 210.000 | 220.000 | 230.000 | 240.000 | 250.000 | 260.000 | 270.000 | 280.000 | 290.000 | 300.000 | 308.276 | 310.000 | 320.000 | 330.000 | 340.000 | 350.000 | 360.000 | 370.000 | 380.000 | 390.000 | 400.000 | 408.485 | 410.000 | 420.000 | 430.000 | 440.000 | 450.000 | 460.000 | 464.270 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Levels | | | | 14.523 | 14.416 | 14.405 | 14.550 | 14.875 | 15.157 | 15.485 | 15.774 | 15.774 | 16.063 | 16.280 | 16.498 | 16.716 | 16.932 | 17.105 | 17.258 | 17.412 | 17.551 | 17.688 | 17.688 | 17.757 | 17.867 | 17.975 | 18.083 | 18.181 | 18.290 | 18.988 | 19.212 | 19.437 | 19.664 | 19.716 | 19.892 | 20.031 | 20.383 | 20.438 | 20.540 | 20.597 | 20.633 | 20.744 | 20.809 | 20.969 | 21.011 | 21.130 | 20.079 | | | | | |
| Proposed Levels | | | | | | | 15.326 | 15.752 | 15.949 | 15.949 | 15.949 | | 15.949 | 16.661 | 16.789 | 16.789 | 16.789 | 17.522 | 17.522 | 17.522 | 17.522 | 17.795 | | 17.960 | 18.237 | 18.397 | 18.587 | 18.781 | 18.953 | 19.148 | 19.379 | 19.613 | 19.844 | | 20.003 | 20.143 | 20.305 | 20.449 | 20.592 | 20.700 | 20.778 | 20.871 | 20.973 | 21.087 | | 21.006 | | 19.796 | | | | | |
| Level Difference | | | | | | | -0.851 | 2.755 | 2.808 | 3.174 | 3.692 | | 3.617 | 3.021 | 3.004 | 3.137 | 3.268 | 2.828 | 5.102 | 7.046 | 9.624 | 10.727 | | 10.832 | 9.834 | 10.101 | 9.883 | 9.194 | 9.640 | 10.949 | 10.144 | 9.512 | 8.775 | 8.803 | 8.746 | 3.263 | 3.088 | 4.602 | 3.964 | 1.683 | 1.146 | 0.725 | 2.860 | 3.940 | 3.955 | 1.633 | | 0.171 | | | | | |

# SECTION E-E

SCALE: H 1:1000,V 1:200




| Chainage | 0.000 | 10.000 | 20.000 | 30.000 | 40.000 | 50.000 | 60.000 | 70.000 | 80.000 | 90.000 | 100.000 | 100.098 | 110.000 | 120.000 | 130.000 | 140.000 | 150.000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Levels | | | 19.489 | 19.488 | 19.493 | 19.494 | 19.494 | 19.496 | 19.499 | 19.537 | 19.732 | 19.732 | 19.806 | 19.907 | 19.960 | 20.000 | 19.967 |
| Proposed Levels | | | 19.551 | 19.634 | 19.705 | 19.756 | 19.791 | 19.826 | 19.861 | 19.897 | 19.932 | | 19.967 | 19.984 | 19.974 | 20.026 | 20.099 |
| Level Difference | | | -0.062 | -0.146 | -0.212 | -0.262 | -0.297 | -0.331 | -0.363 | -0.360 | -0.200 | -0.200 | -0.161 | -0.067 | -0.037 | -0.098 | |

# SECTION F-F

SCALE: H 1:1000,V 1:200

**NOTES:**

1. PROFILES SHOWN ARE AT AN x5 EXAGGERATED VERTICAL SCALE.
2. EXISTING GROUND INFORMATION WITHIN DETAILED APPLICATION SITE BOUNDARY TAKEN FROM GREENHATCH TOPOGRAPHICAL SURVEY DRAWING 33199_T DATED APRIL 2019.
3. FOR SECTION LOCATION PLANS REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
4. FOR PROPOSED CONTOURS, REFER TO DRAWING BRS-AUK-XX-XXX-CE-100.
5. EXISTING GROUND INFORMATION OUTSIDE DETAILED APPLICATION SITE BOUNDARY TAKEN FROM ORDINANCE SURVEY DATA 10m DIGITAL TERRAIN MODEL, ARE THEREFORE OF REDUCED ACCURACY AND SHOULD BE TREATED AS INDICATIVE ONLY, LEVELS SHOWN MAY ACTUALLY BE TOP OF BUILDING LEVELS. DATA TAKEN FROM AECOM DETAIL APPLICATION CROSS SECTION DRAWINGS PRODUCED IN NOV 2013.

| Rev | Date | Description | Drawn | Check | Approv |
|---|---|---|---|---|---|
| P0 | 13/03/20 | FIRST ISSUE | AK | TF | MD |

Client: British Sugar

PROJECT: British Sugar

Site: Boroughbridge Road, York, Yorkshire, YO26 6AQ

Client: British Sugar

Suitability Description: FOR INFORMATION NOT TO BE USED FOR CONSTRUCTION

| | | | |
|---|---|---|---|
| Designed | A.KHAN | Date 21/02/20 | Signed |
| Drawn | A.KHAN | Date 21/02/20 | Signed |
| Checked | T.FAIRLIE | Date 21/02/20 | Signed |
| Approved | M.DAVIES | Date 21/02/20 | Signed |
| Scale: | AS SHOWN | Datum: | AOD |
| Original Size: | A1 | Grid: | OS |
| Suitability Code: | S2 | Project Number: | 10024487 |

PROJECT: BRITISH SUGAR

TITLE: ADDITIONAL CROSS SECTIONS

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: 2 Glass Wharf, Bristol, BS2 0FR, Tel: 44 (0)117 372 1200
www.arcadis.com

Drawing Number: BRS-AUK-XX-XX-SK-CE-0100 | Revision: P0

100mm on Original

Print Date: 2020-03-13 14:45:27

C:\Users\khana2975\ARCADIS\10024487 - British Sugar York Stage 1 - Documents\09 Drawings\BRS-AUK-XX-XX-DR-CE-0102-0104 Cross Sections.dwg

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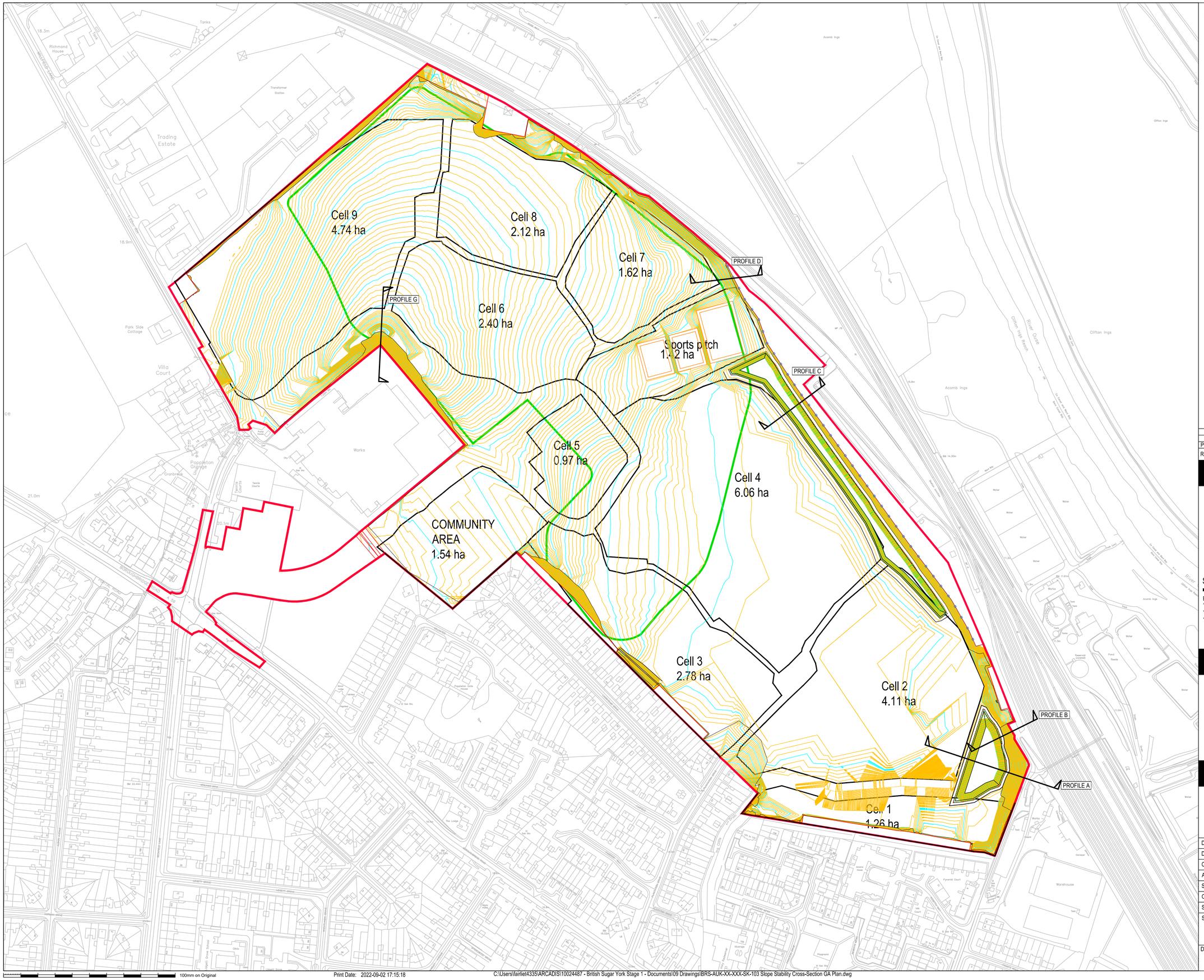
# APPENDIX D

## Output from Slope Stability Assessments




NOTES

| Rev | Date | Description | Drawn | Check | Approv |
|---|---|---|---|---|---|
| P0 | 02/09/22 | FIRST ISSUE | AK | TF | MD |

Client

British Sugar

PROJECT:

British Sugar

Site

Boroughbridge Road
York
Yorkshire
YO26 6AQ

Client

British Sugar

ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way
London
N1 9AB

Coordinating office:
2 Glass Wharf
Bristol
BS2 0FR
Tel: 44 (0)117 372 1200

www.arcadis.com

TITLE:

SLOPE STABILITY
**PROFILES**
GA PLAN

| | | | |
|---|---|---|---|
| Designed | A.KHAN | Signed | Date 02/09/22 |
| Drawn | A.KHAN | Signed | Date 02/09/22 |
| Checked | T.FAIRLIE | Signed | Date 02/09/22 |
| Approved | M DAVIES | Signed | Date 02/09/22 |
| Scale: | AS SHOWN | Datum: | AOD |
| Original Size: | A1 | Grid: | OS |
| Suitability Code: | S2 | Project Number: | 10024487 |

Suitability Description:
SUITABLE FOR INFORMATION

| Drawing Number: | Revision: |
|---|---|
| BRS-AUK-XX-XXX-SK-103 | P1 |

100mm on Original

Print Date: 2022-09-02 17:15:18

C:\Users\fairliet4335\ARCADIS\10024487 - British Sugar York Stage 1 - Documents\09 Drawings\BRS-AUK-XX-XXX-SK-103 Slope Stability Cross-Section GA Plan.dwg

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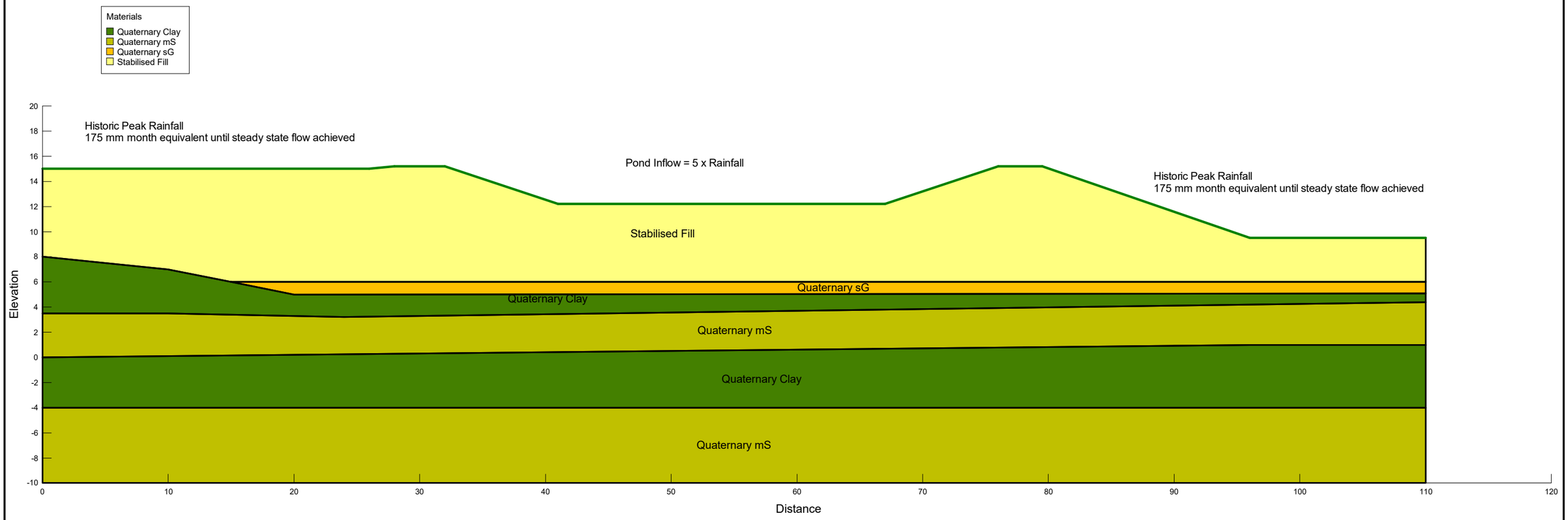
# Profile A

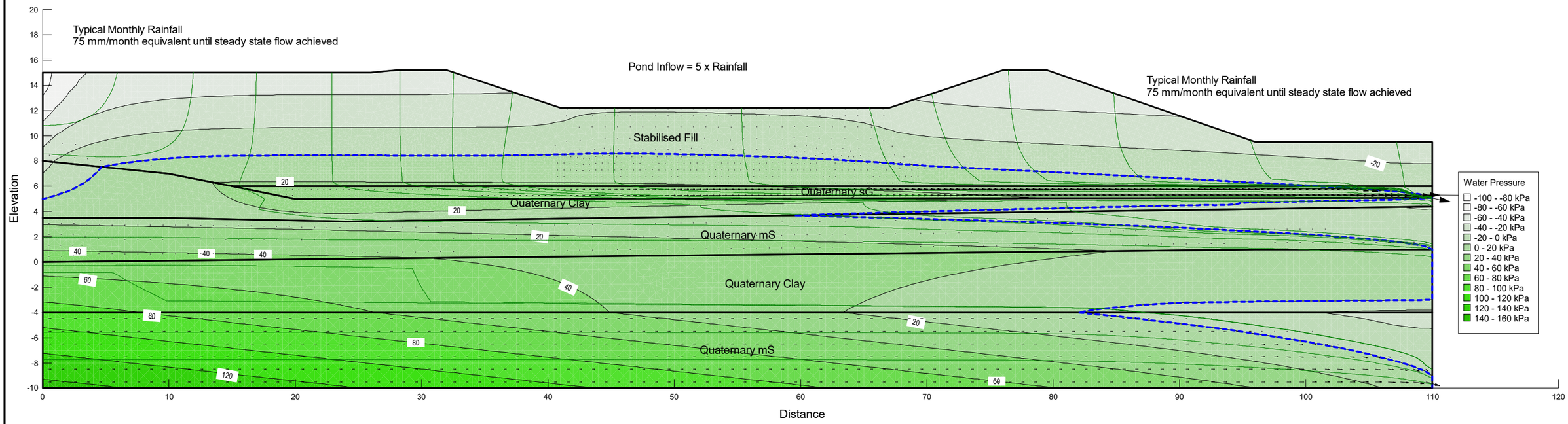



| Name | Model | Vol. WC. Function | K-Function | Ky'/Kx' Ratio | Rotation (°) |
|---|---|---|---|---|---|
| Quaternary Clay | Saturated / Unsaturated | QCLAY VWC FN1 | QClay Hyd FN1 | 0.2 | 0 |
| Quaternary mS | Saturated / Unsaturated | QmSAND VWC FN1 | QmSAND Hyd FN1 | 0.2 | 0 |
| Quaternary sG | Saturated / Unsaturated | QsG VWC FN1 | QsG Hyd FN1 | 1 | 0 |
| Stabilised Fill | Saturated / Unsaturated | FILL water FN1 | FILL Hyd FN1 | 1 | 0 |

SEEP/W Analysis

Profile A Seep_slope - Historic Rain WC1 - slip 2.gsz

18/06/2020 1:318

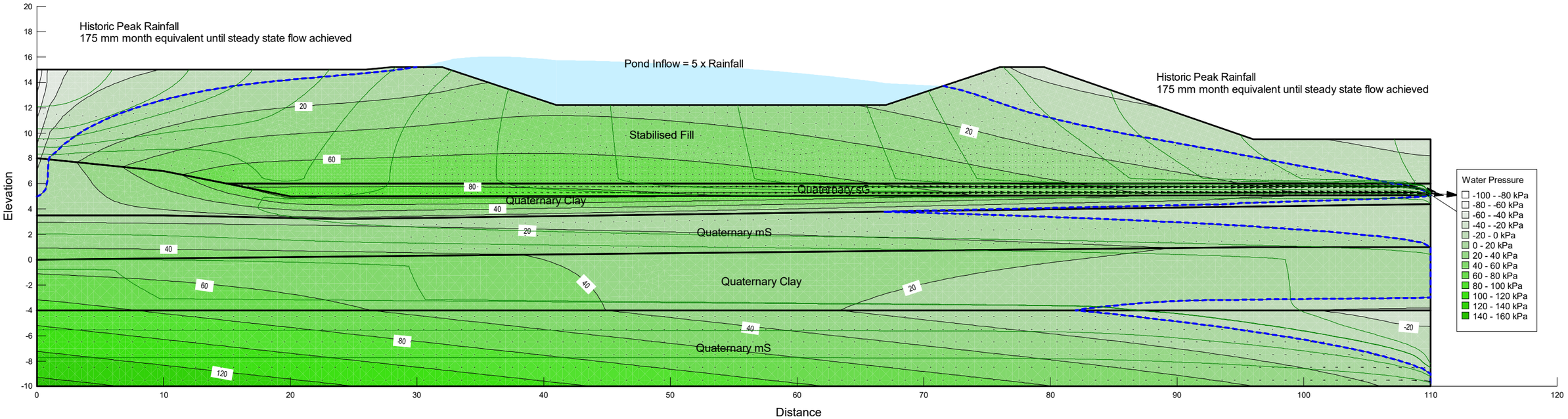



| Name | Model | Vol. WC. Function | K-Function | Ky'/Kx' Ratio | Rotation (°) |
|---|---|---|---|---|---|
| Quaternary Clay | Saturated / Unsaturated | QCLAY VWC FN1 | QClay Hyd FN1 | 0.2 | 0 |
| Quaternary mS | Saturated / Unsaturated | QmSAND VWC FN1 | QmSAND Hyd FN1 | 0.2 | 0 |
| Quaternary sG | Saturated / Unsaturated | QsG VWC FN1 | QsG Hyd FN1 | 1 | 0 |
| Stabilised Fill | Saturated / Unsaturated | FILL water FN1 | FILL Hyd FN1 | 1 | 0 |

Profile A seep-slope

Profile A Seep_slope - Average condition 75 mmper month.gsz

18/06/2020 1:318

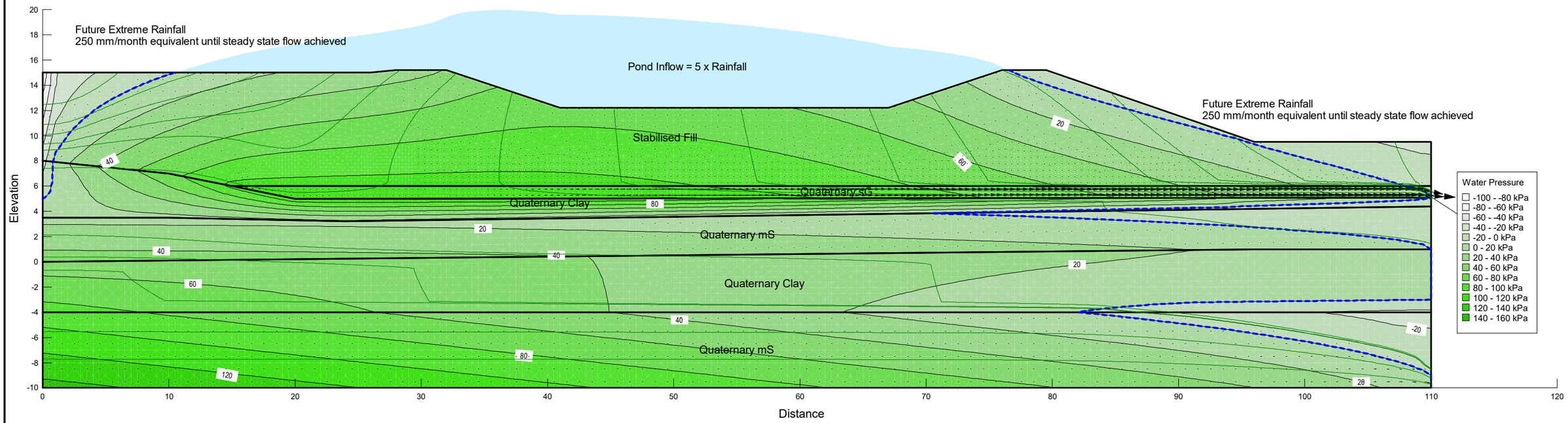



| Name | Model | Vol. WC. Function | K-Function | Ky'/Kx' Ratio | Rotation (°) |
|---|---|---|---|---|---|
| Quaternary Clay | Saturated / Unsaturated | QCLAY VWC FN1 | QClay Hyd FN1 | 0.2 | 0 |
| Quaternary mS | Saturated / Unsaturated | QmSAND VWC FN1 | QmSAND Hyd FN1 | 0.2 | 0 |
| Quaternary sG | Saturated / Unsaturated | QsG VWC FN1 | QsG Hyd FN1 | 1 | 0 |
| Stabilised Fill | Saturated / Unsaturated | FILL water FN1 | FILL Hyd FN1 | 1 | 0 |

SEEP/W Analysis

Profile A Seep_slope - Historic Rain WC1 - slip 2.gsz

18/06/2020 1:318

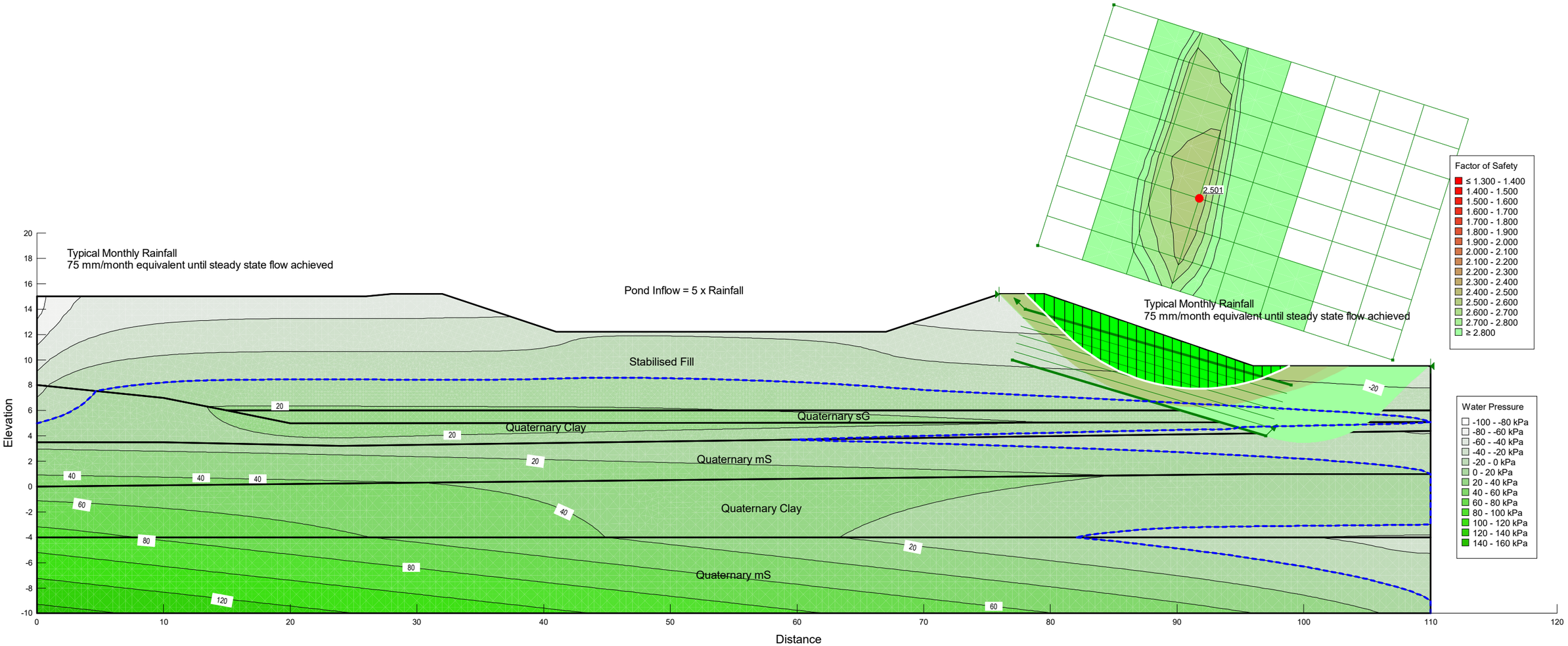



| Name | Model | Vol. WC. Function | K-Function | Ky'/Kx' Ratio | Rotation (°) |
|---|---|---|---|---|---|
| Quaternary Clay | Saturated / Unsaturated | QCLAY VWC FN1 | QClay Hyd FN1 | 0.2 | 0 |
| Quaternary mS | Saturated / Unsaturated | QmSAND VWC FN1 | QmSAND Hyd FN1 | 0.2 | 0 |
| Quaternary sG | Saturated / Unsaturated | QsG VWC FN1 | QsG Hyd FN1 | 1 | 0 |
| Stabilised Fill | Saturated / Unsaturated | FILL water FN1 | FILL Hyd FN1 | 1 | 0 |

SEEP/W Analysis

Profile A Seep_slope - Future WC1 250 mm.gsz

18/06/2020 1:318

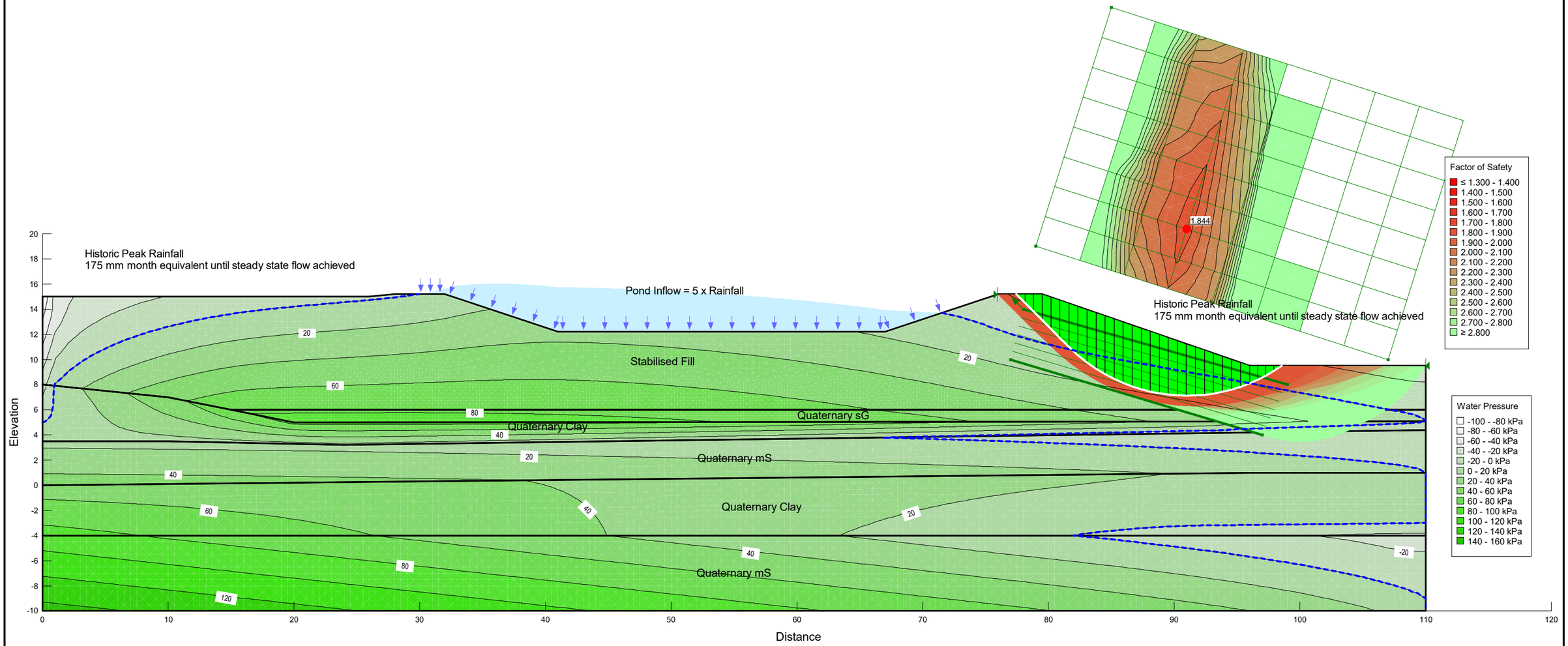



| Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Vol. WC. Function | Residual Water Content (% of Sat WC) (%) | Vol. WC Fn used for Unit Wt. Above Water Table |
|---|---|---|---|---|---|---|---|
| Quaternary Clay | Mohr-Coulomb | 19.6 | 2 | 28 | QCLAY VWC FN1 | 50 | QCLAY VWC FN1 |
| Quaternary mS | Mohr-Coulomb | 18 | 0 | 36 | QmSAND VWC FN1 | 50 | QmSAND VWC FN1 |
| Quaternary sG | Mohr-Coulomb | 18 | 0 | 38 | QsG VWC FN1 | 50 | QsG VWC FN1 |
| Stabilised Fill | Mohr-Coulomb | 17.6 | 1 | 25 | FILL water FN1 | 50 | FILL water FN1 |

Slope Stability Main Slope

Profile A Seep_slope - Average condition 75 mmper month.gsz

18/06/2020 1:318

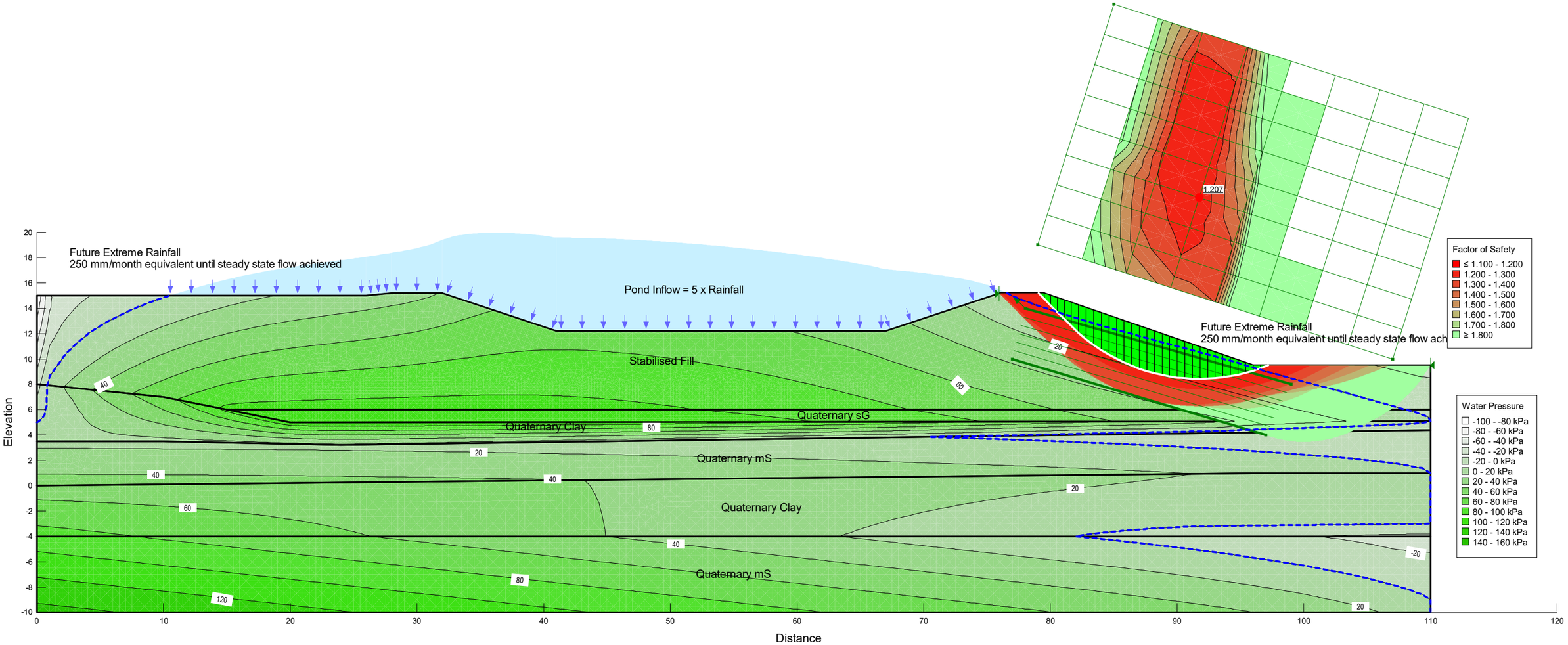



| Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Vol. WC. Function | Residual Water Content (% of Sat WC) (%) | Vol. WC Fn used for Unit Wt. Above Water Table |
|---|---|---|---|---|---|---|---|
| Quaternary Clay | Mohr-Coulomb | 19.6 | 2 | 28 | QCLAY VWC FN1 | 50 | QCLAY VWC FN1 |
| Quaternary mS | Mohr-Coulomb | 18 | 0 | 36 | QmSAND VWC FN1 | 50 | QmSAND VWC FN1 |
| Quaternary sG | Mohr-Coulomb | 18 | 0 | 38 | QsG VWC FN1 | 50 | QsG VWC FN1 |
| Stabilised Fill | Mohr-Coulomb | 17.6 | 1 | 25 | FILL water FN1 | 50 | FILL water FN1 |

Slope Stability Main Slope

Profile A Seep_slope - Historic Rain WC1 - slip 2.gsz

18/06/2020 1:318

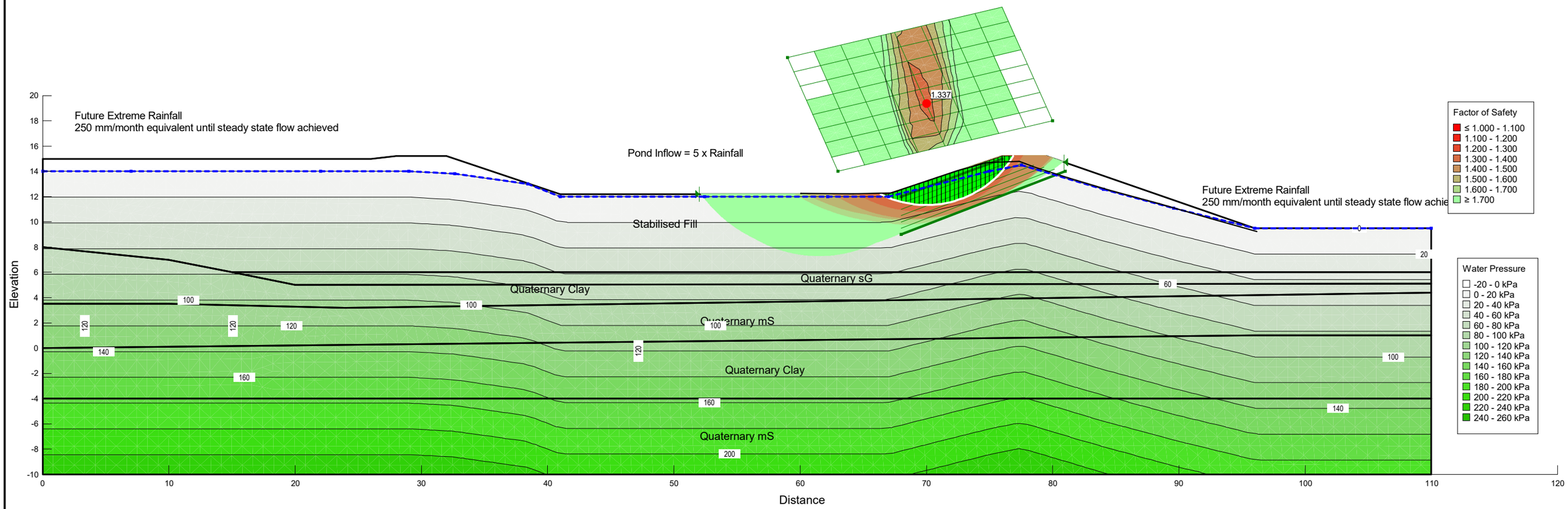



| Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Vol. WC. Function | Residual Water Content (% of Sat WC) (%) | Vol. WC Fn used for Unit Wt. Above Water Table |
|---|---|---|---|---|---|---|---|
| Quaternary Clay | Mohr-Coulomb | 19.6 | 2 | 28 | QCLAY VWC FN1 | 50 | QCLAY VWC FN1 |
| Quaternary mS | Mohr-Coulomb | 18 | 0 | 36 | QmSAND VWC FN1 | 50 | QmSAND VWC FN1 |
| Quaternary sG | Mohr-Coulomb | 18 | 0 | 38 | QsG VWC FN1 | 50 | QsG VWC FN1 |
| Stabilised Fill | Mohr-Coulomb | 17.6 | 1 | 25 | FILL water FN1 | 50 | FILL water FN1 |

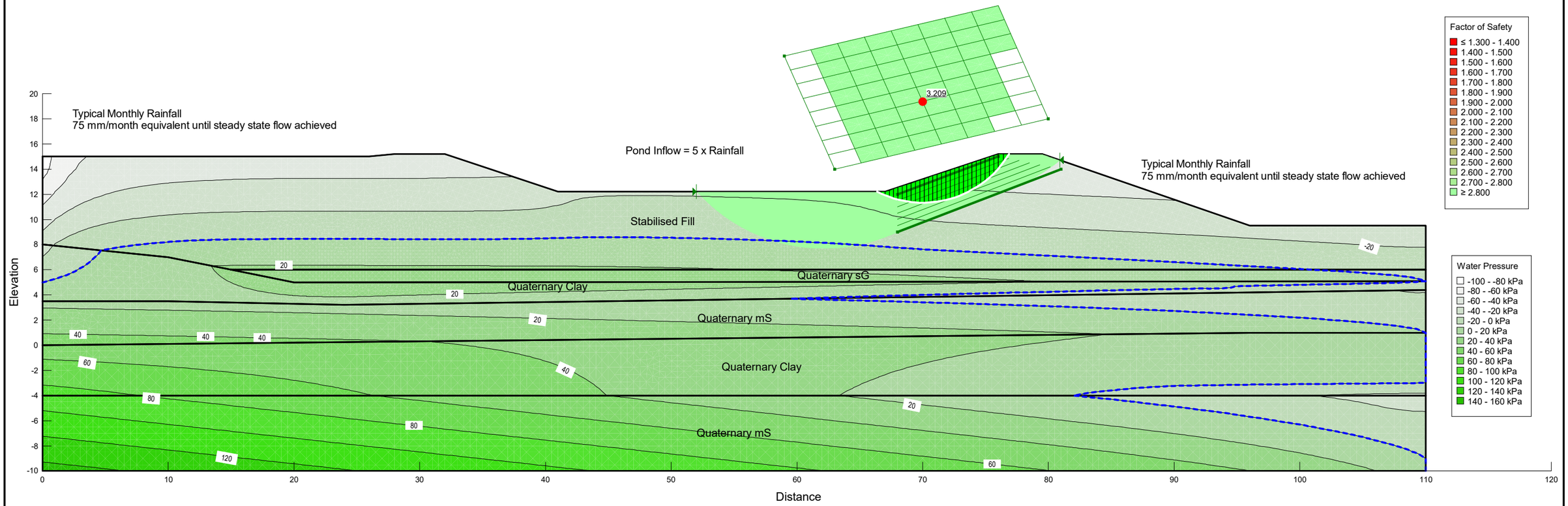
Slope Stability Main Slope

Profile A Seep_slope - Future WC1 250 mm.gsz

18/06/2020 1:318




| | |
|---|---|
| Slope Stability Pond slope 1 | |
| Profile A Seep_slope - Future WC1 250 mm.gsz | |
| 14/07/2020 | 1:325 |

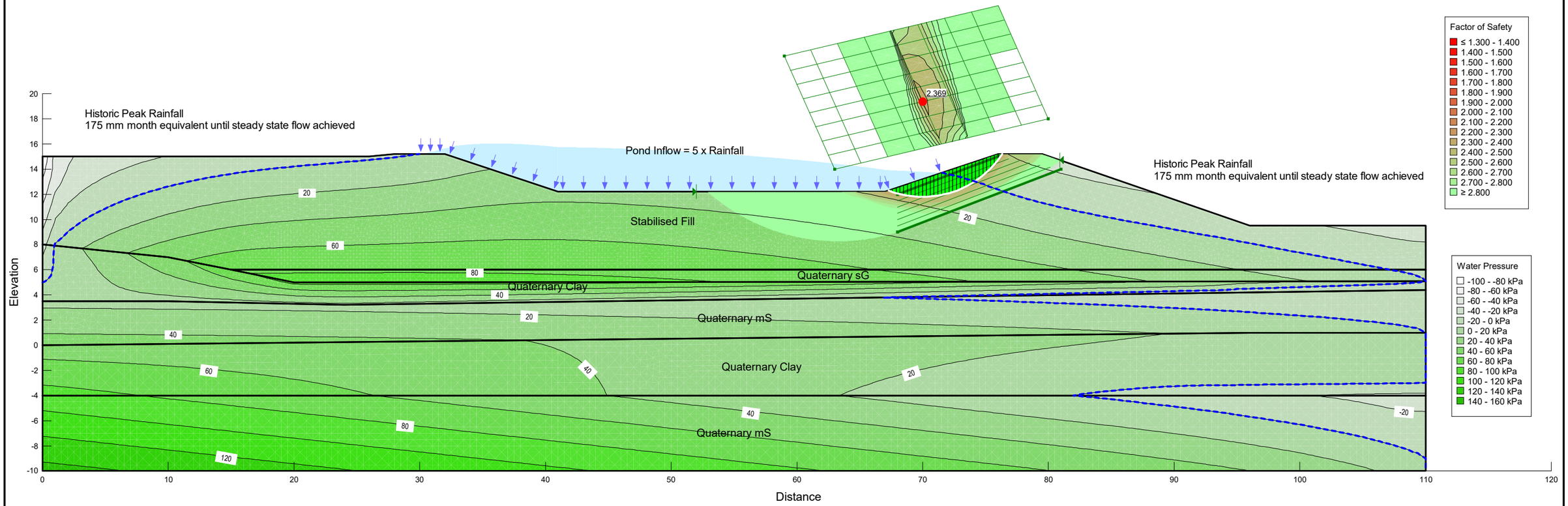



| Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Vol. WC. Function | Residual Water Content (% of Sat WC) (%) | Vol. WC Fn used for Unit Wt. Above Water Table |
|---|---|---|---|---|---|---|---|
| Quaternary Clay | Mohr-Coulomb | 19.6 | 2 | 28 | QCLAY VWC FN1 | 50 | QCLAY VWC FN1 |
| Quaternary mS | Mohr-Coulomb | 18 | 0 | 36 | QmSAND VWC FN1 | 50 | QmSAND VWC FN1 |
| Quaternary sG | Mohr-Coulomb | 18 | 0 | 38 | QsG VWC FN1 | 50 | QsG VWC FN1 |
| Stabilised Fill | Mohr-Coulomb | 17.6 | 1 | 25 | FILL water FN1 | 50 | FILL water FN1 |

Slope Stability Pond slope 1

Profile A Seep_slope - Average condition 75 mmper month.gsz

18/06/2020 1:318

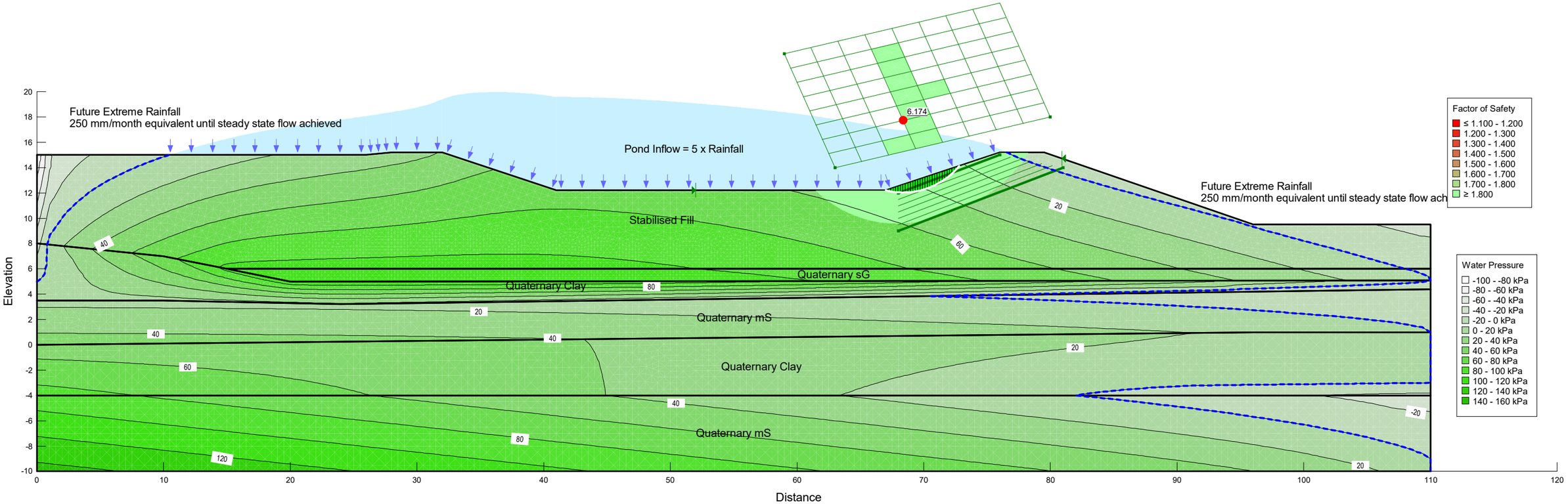



| Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Vol. WC. Function | Residual Water Content (% of Sat WC) (%) | Vol. WC Fn used for Unit Wt. Above Water Table |
|---|---|---|---|---|---|---|---|
| Quaternary Clay | Mohr-Coulomb | 19.6 | 2 | 28 | QCLAY VWC FN1 | 50 | QCLAY VWC FN1 |
| Quaternary mS | Mohr-Coulomb | 18 | 0 | 36 | QmSAND VWC FN1 | 50 | QmSAND VWC FN1 |
| Quaternary sG | Mohr-Coulomb | 18 | 0 | 38 | QsG VWC FN1 | 50 | QsG VWC FN1 |
| Stabilised Fill | Mohr-Coulomb | 17.6 | 1 | 25 | FILL water FN1 | 50 | FILL water FN1 |

Slope Stability Pond slope 1

Profile A Seep_slope - Historic Rain WC1 - slip 2.gsz

18/06/2020 1:318



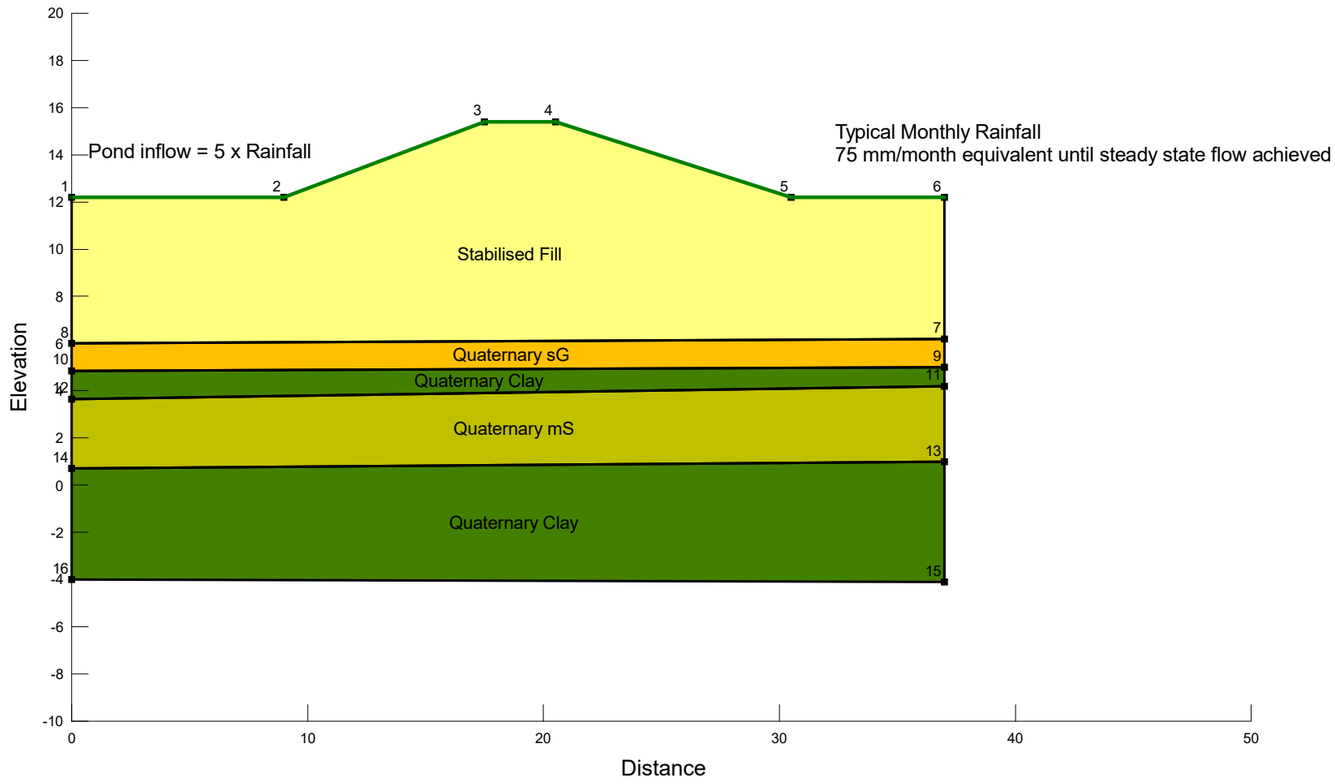

| Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Vol. WC. Function | Residual Water Content (% of Sat WC) (%) | Vol. WC Fn used for Unit Wt. Above Water Table |
|---|---|---|---|---|---|---|---|
| Quaternary Clay | Mohr-Coulomb | 19.6 | 2 | 28 | QCLAY VWC FN1 | 50 | QCLAY VWC FN1 |
| Quaternary mS | Mohr-Coulomb | 18 | 0 | 36 | QmSAND VWC FN1 | 50 | QmSAND VWC FN1 |
| Quaternary sG | Mohr-Coulomb | 18 | 0 | 38 | QsG VWC FN1 | 50 | QsG VWC FN1 |
| Stabilised Fill | Mohr-Coulomb | 17.6 | 1 | 25 | FILL water FN1 | 50 | FILL water FN1 |

Slope Stability Pond slope 1

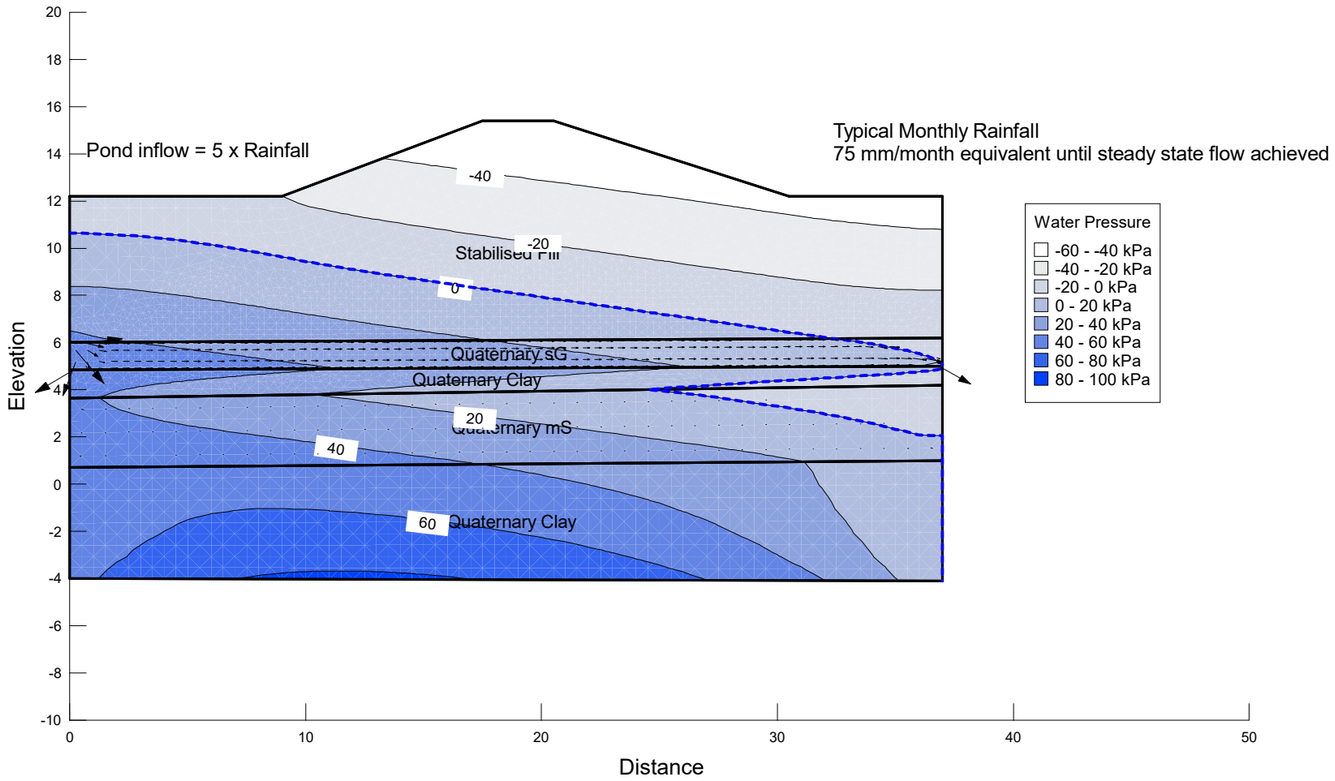
Profile A Seep_slope - Future WC1 250 mm.gsz

18/06/2020 1:318

# Profile B




| | |
|---|---|
| Profile B Seep-Slope | |
| Profile B Average 75 mm_month.gsz | |
| 19/06/2020 | 1:260 |




| | |
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| Profile B Seep-Slope | |
| Profile B Average 75 mm_month.gsz | |
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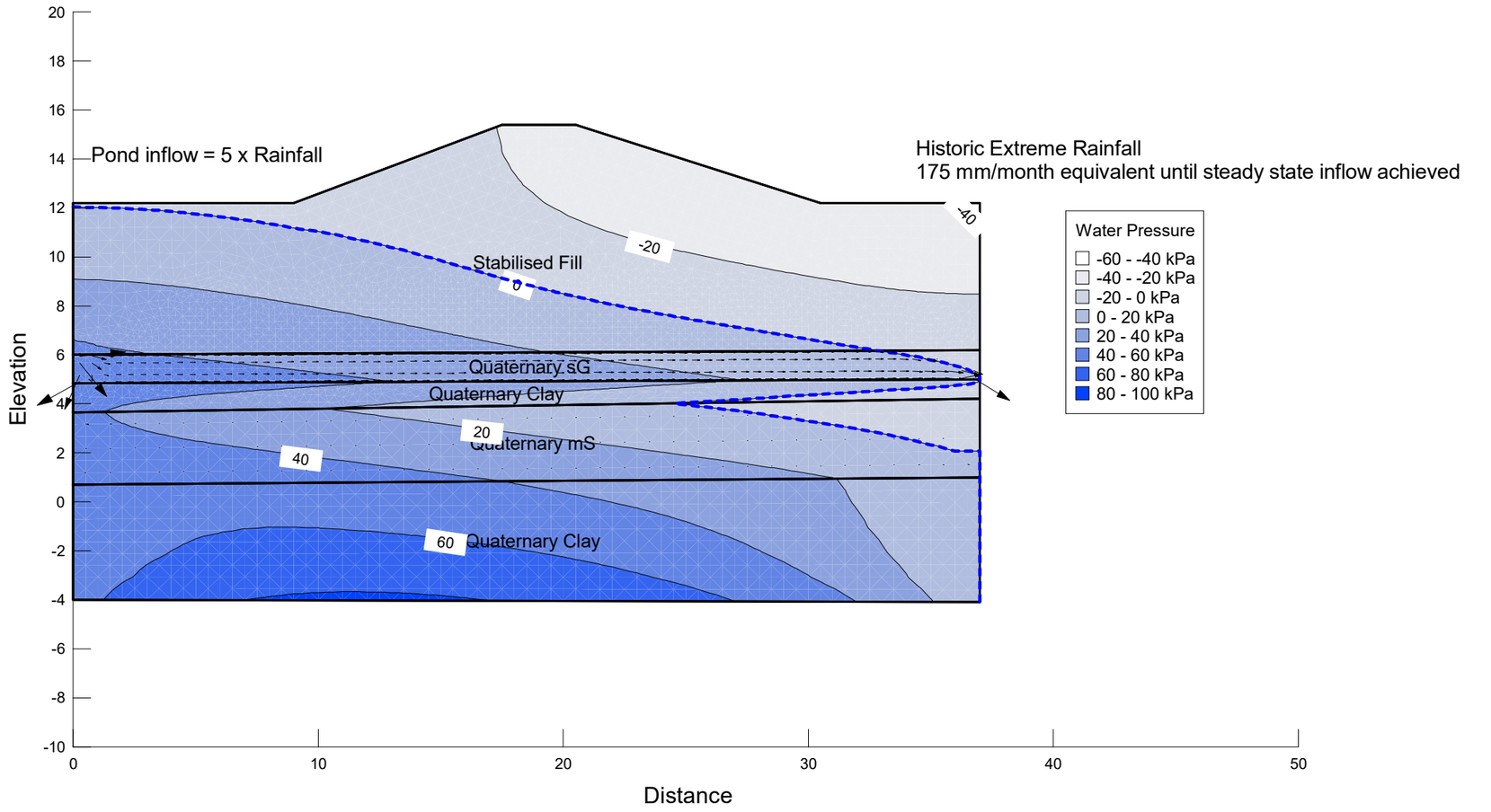
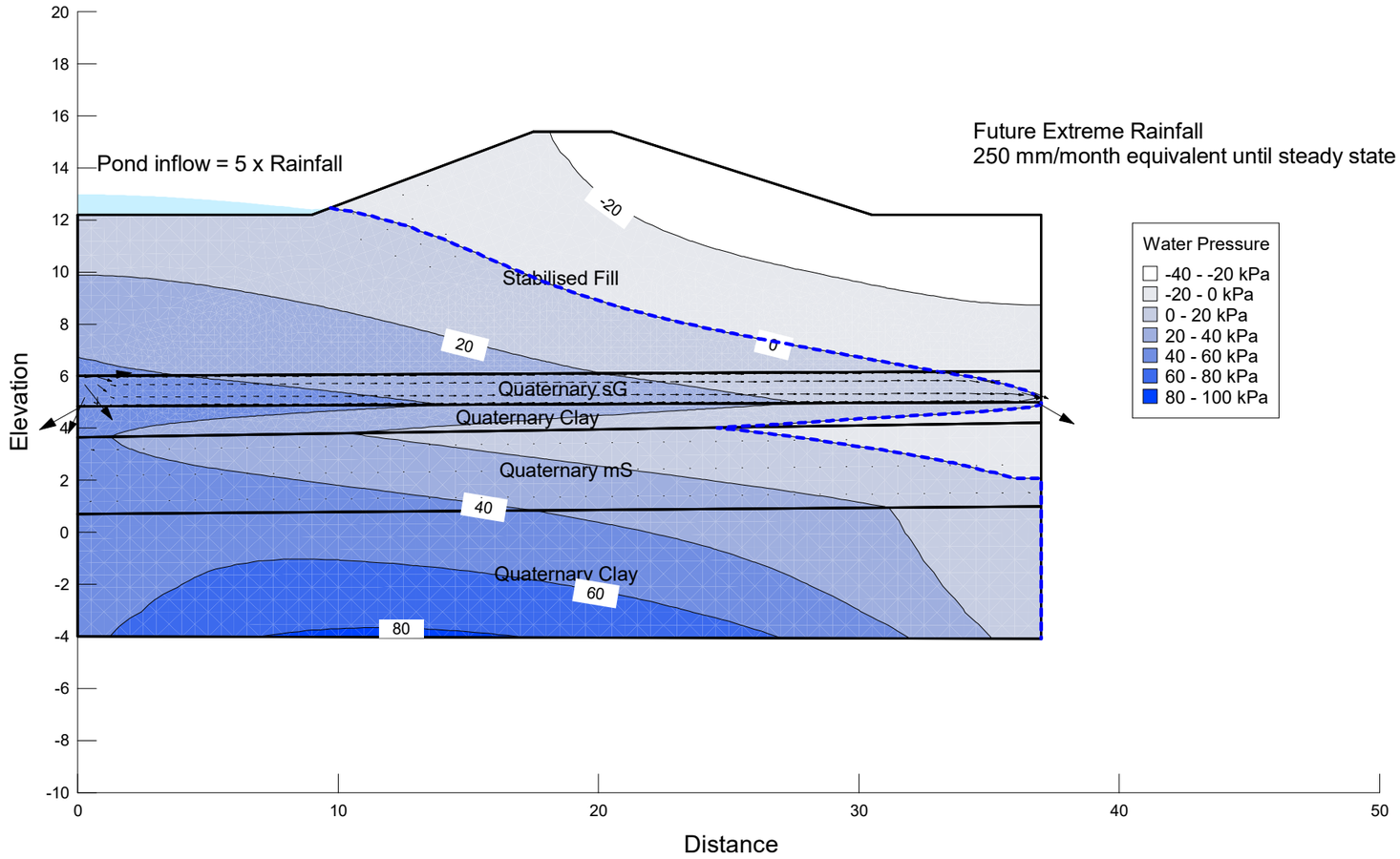
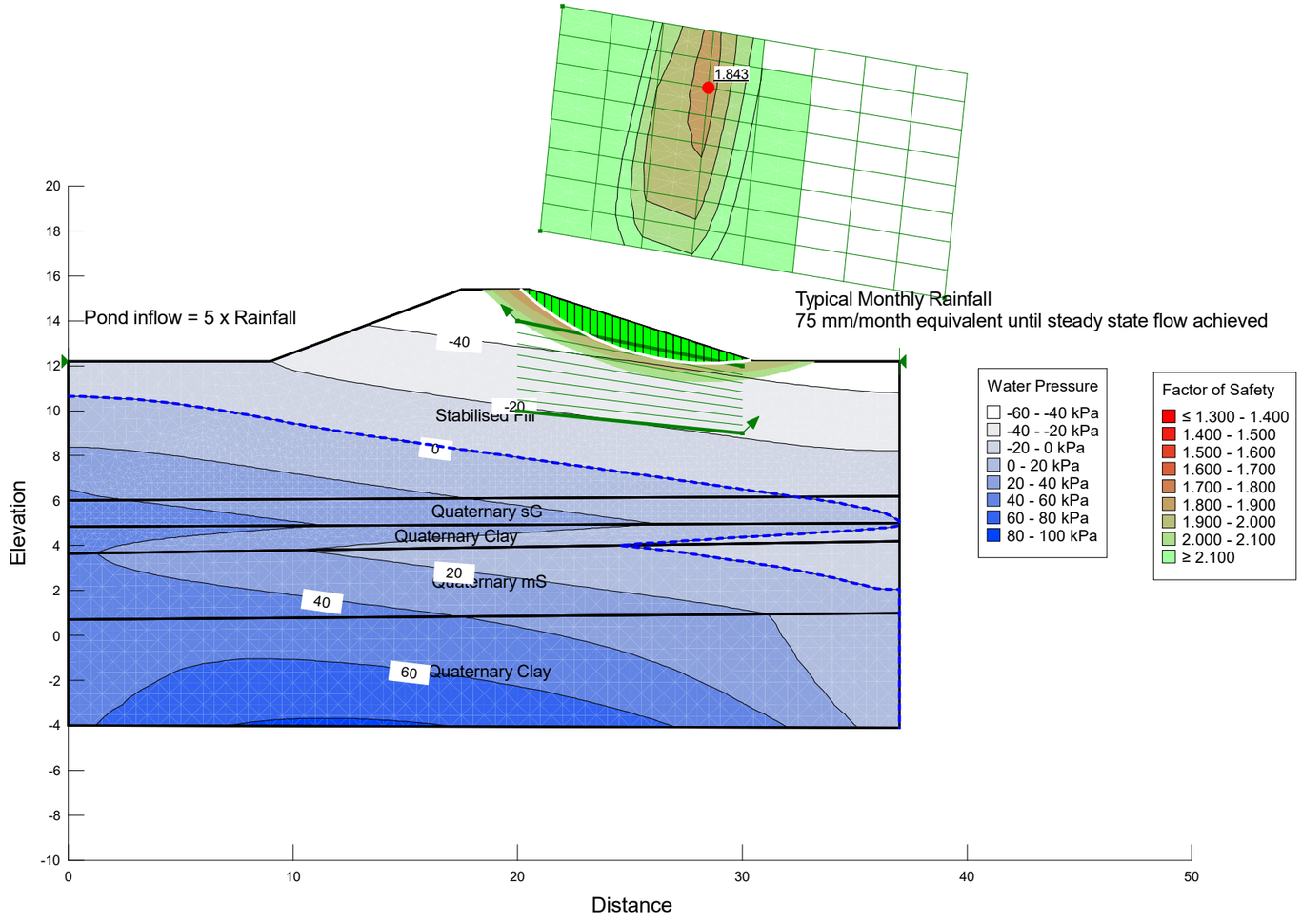



| | |
|---|---|
| Profile B Seep-Slope | |
| Profile B Historic WC1 175 mm_month.gsz | |
| 19/06/2020 | 1:225 |

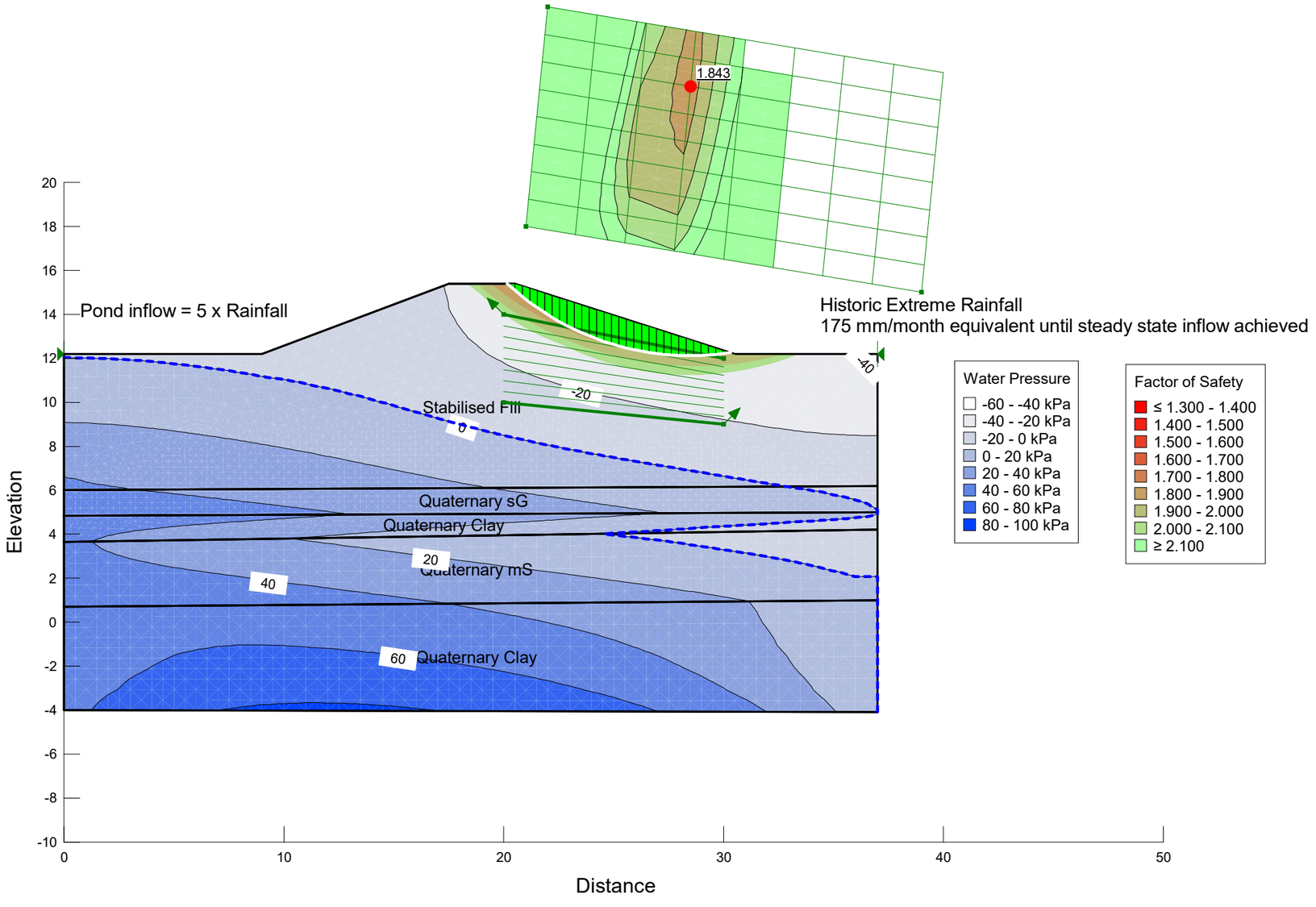
Future Extreme Rainfall
250 mm/month equivalent until steady state inflow achieved



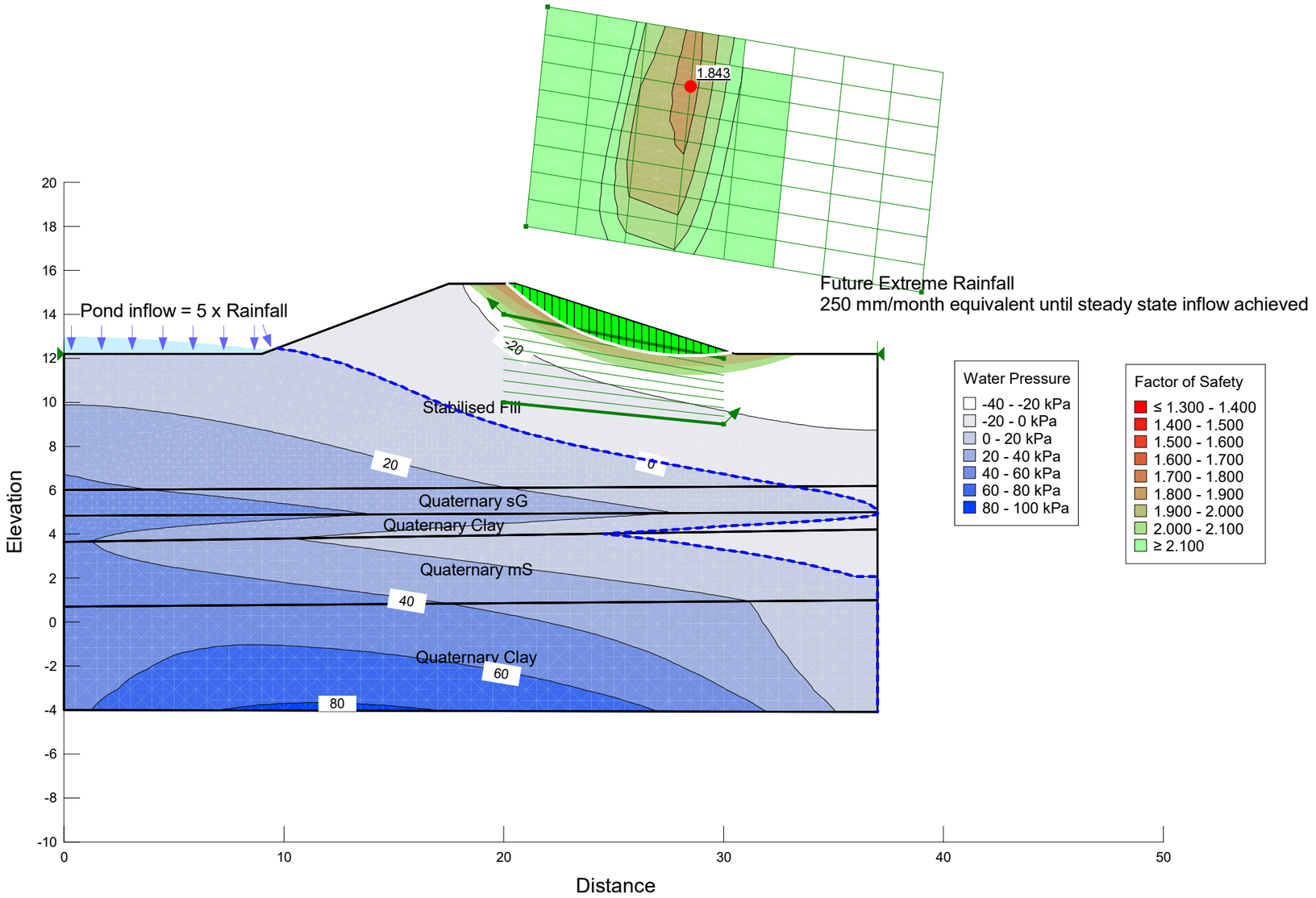

| | |
|---|---|
| Profile B Seep-Slope | |
| Profile B Future WC1 250 mm_month.gsz | |
| 19/06/2020 | 1:225 |



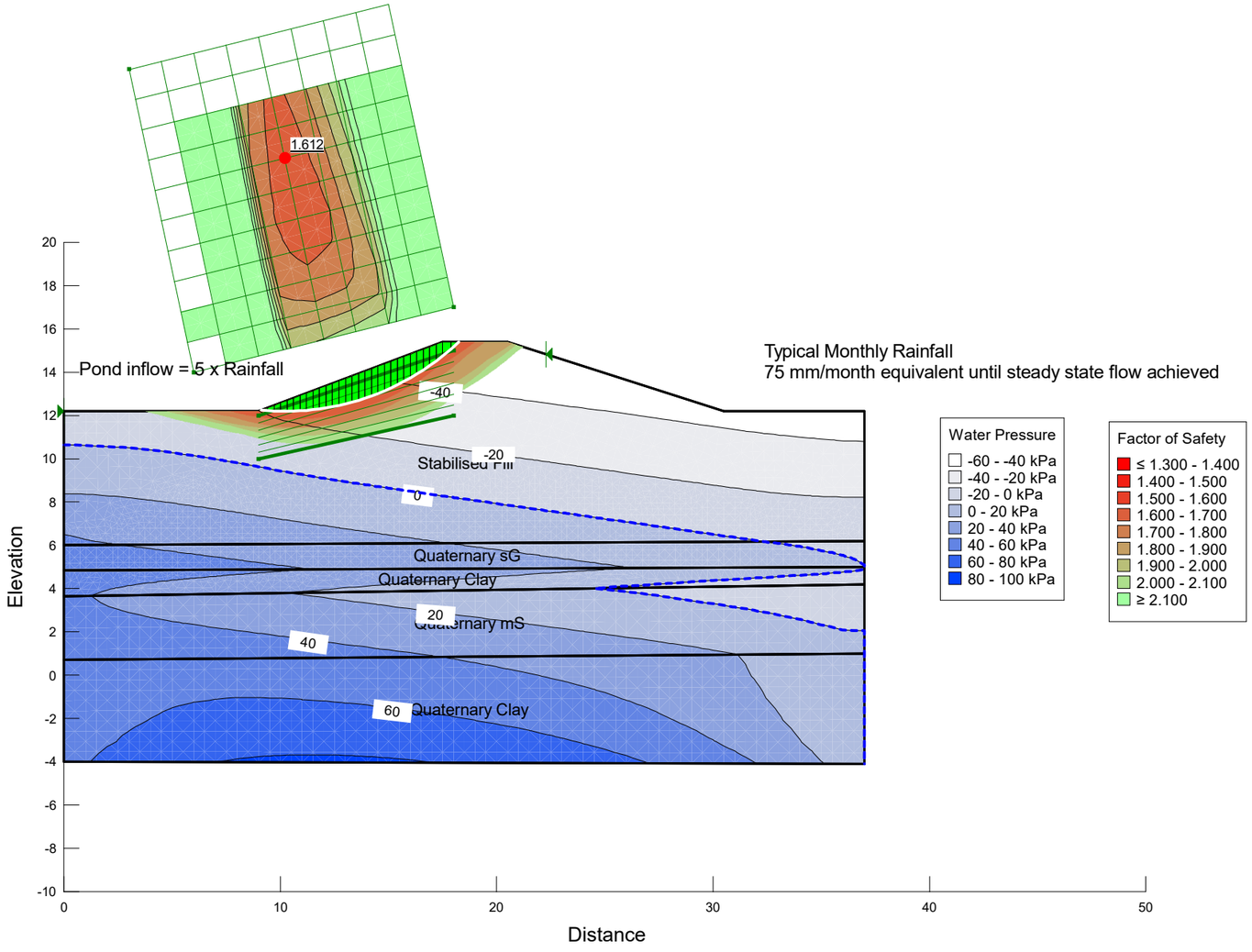

| | |
|---|---|
| Slope Stability | |
| Profile B Average 75 mm_month.gsz | |
| 19/06/2020 | 1:260 |



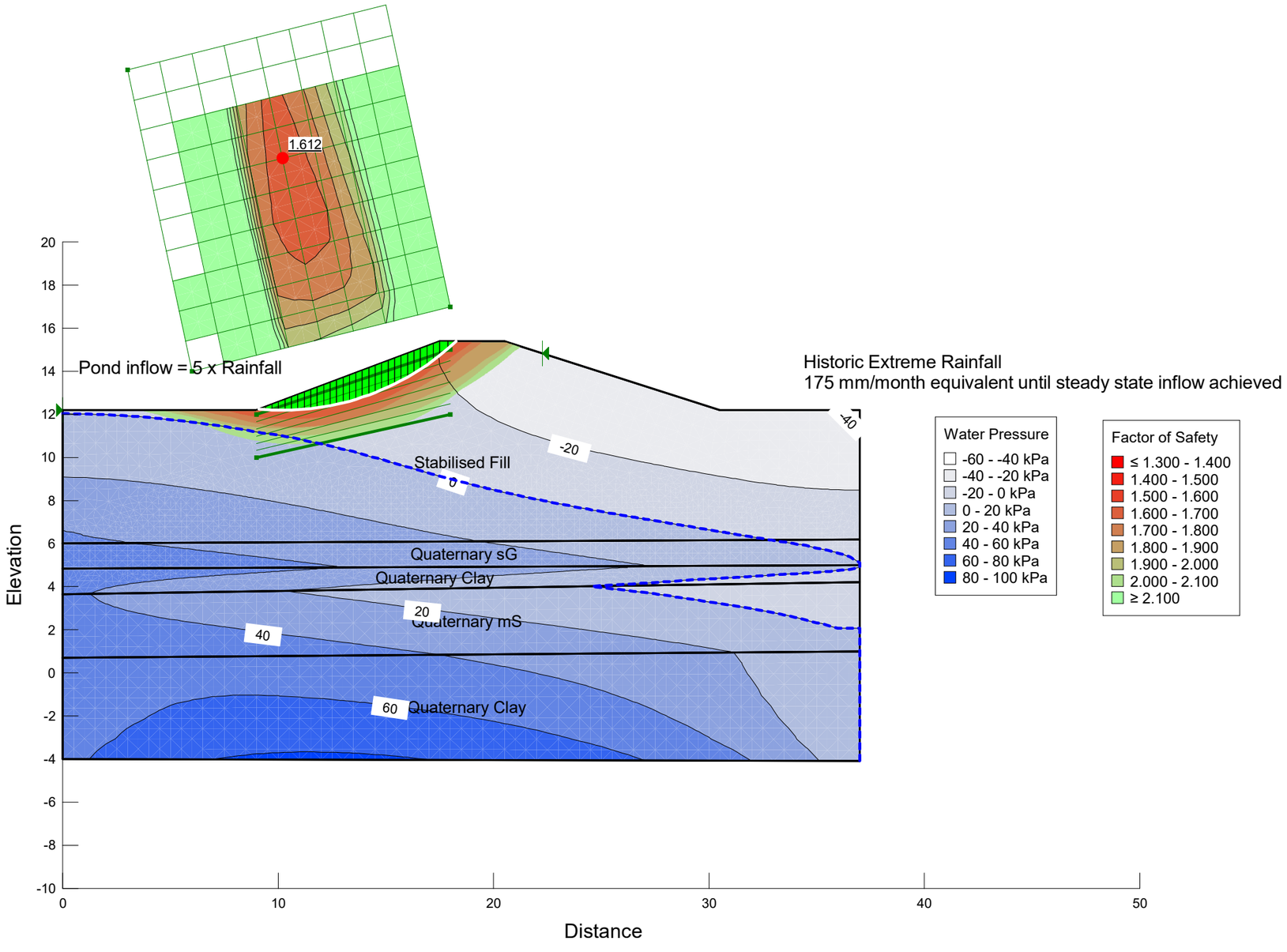

| | |
|---|---|
| Slope Stability | |
| Profile B Historic WC1 175 mm_month.gsz | |
| 19/06/2020 | 1:225 |




| | |
|---|---|
| Slope Stability | |
| Profile B Future WC1 250 mm_month.gsz | |
| 19/06/2020 | 1:225 |




| | |
|---|---|
| Slope Stability (2) | |
| Profile B Average 75 mm_month.gsz | |
| 19/06/2020 | 1:260 |

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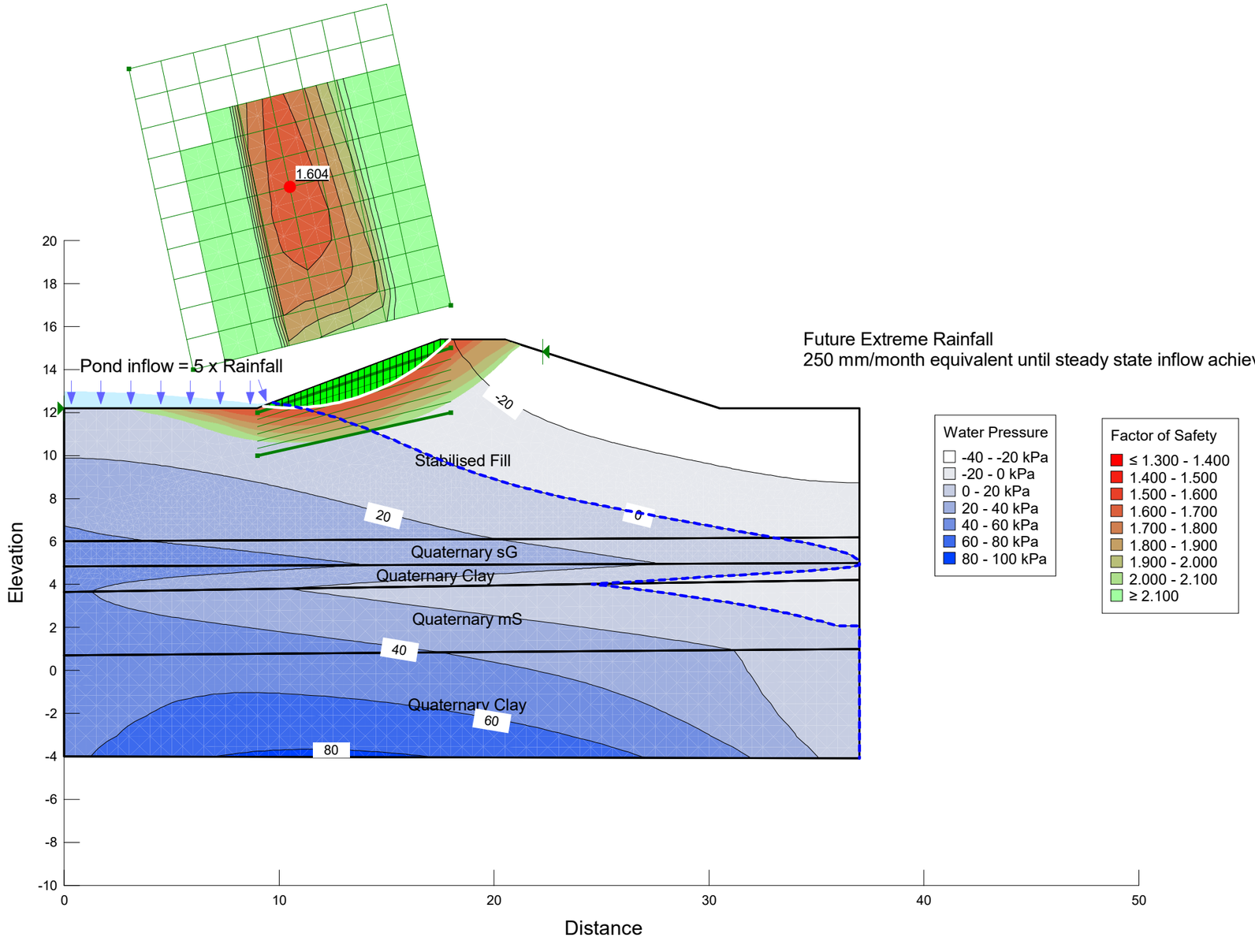
|---|
| Slope Stability (2) |
| Profile B Historic WC1 175 mm_month.gsz |
| 19/06/2020 1:225 |



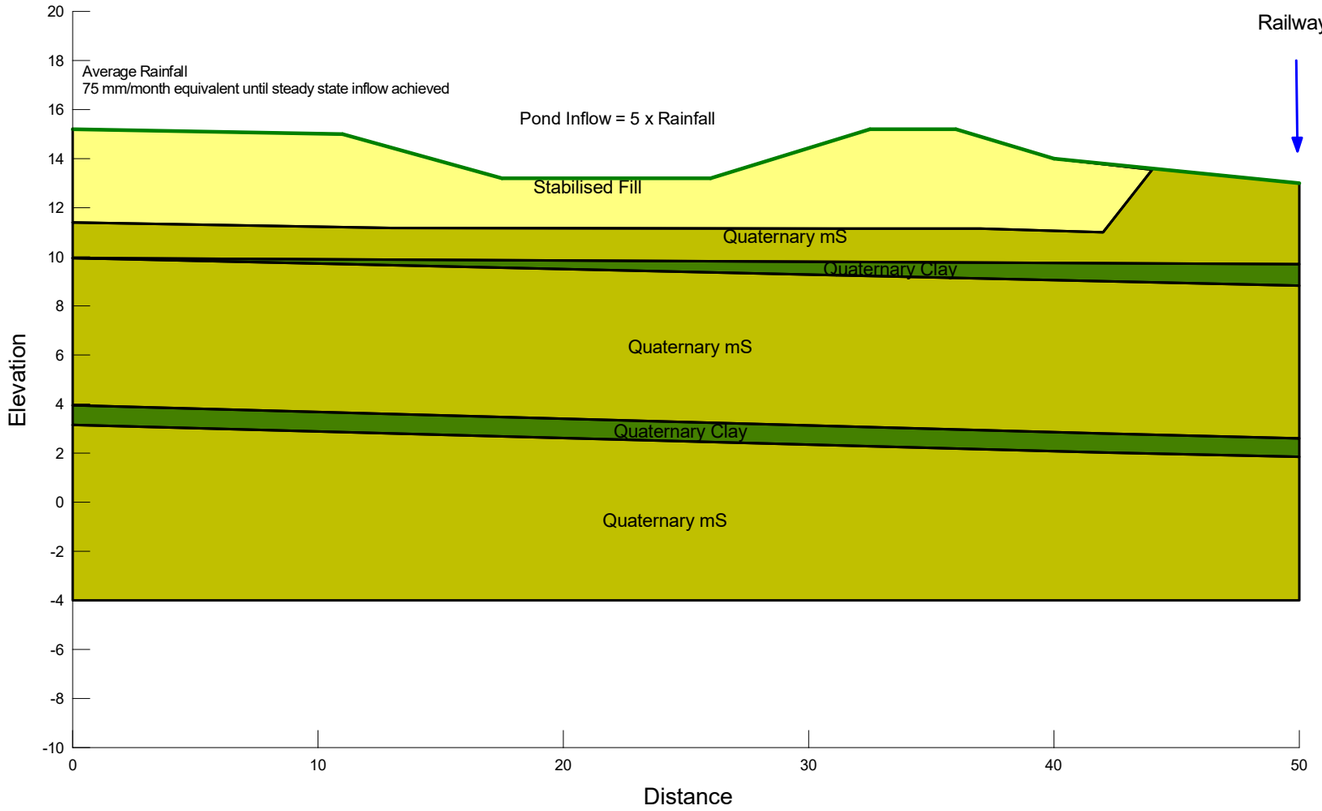

Future Extreme Rainfall
250 mm/month equivalent until steady state inflow achieved

Water Pressure
- -40 - -20 kPa
- -20 - 0 kPa
- 0 - 20 kPa
- 20 - 40 kPa
- 40 - 60 kPa
- 60 - 80 kPa
- 80 - 100 kPa

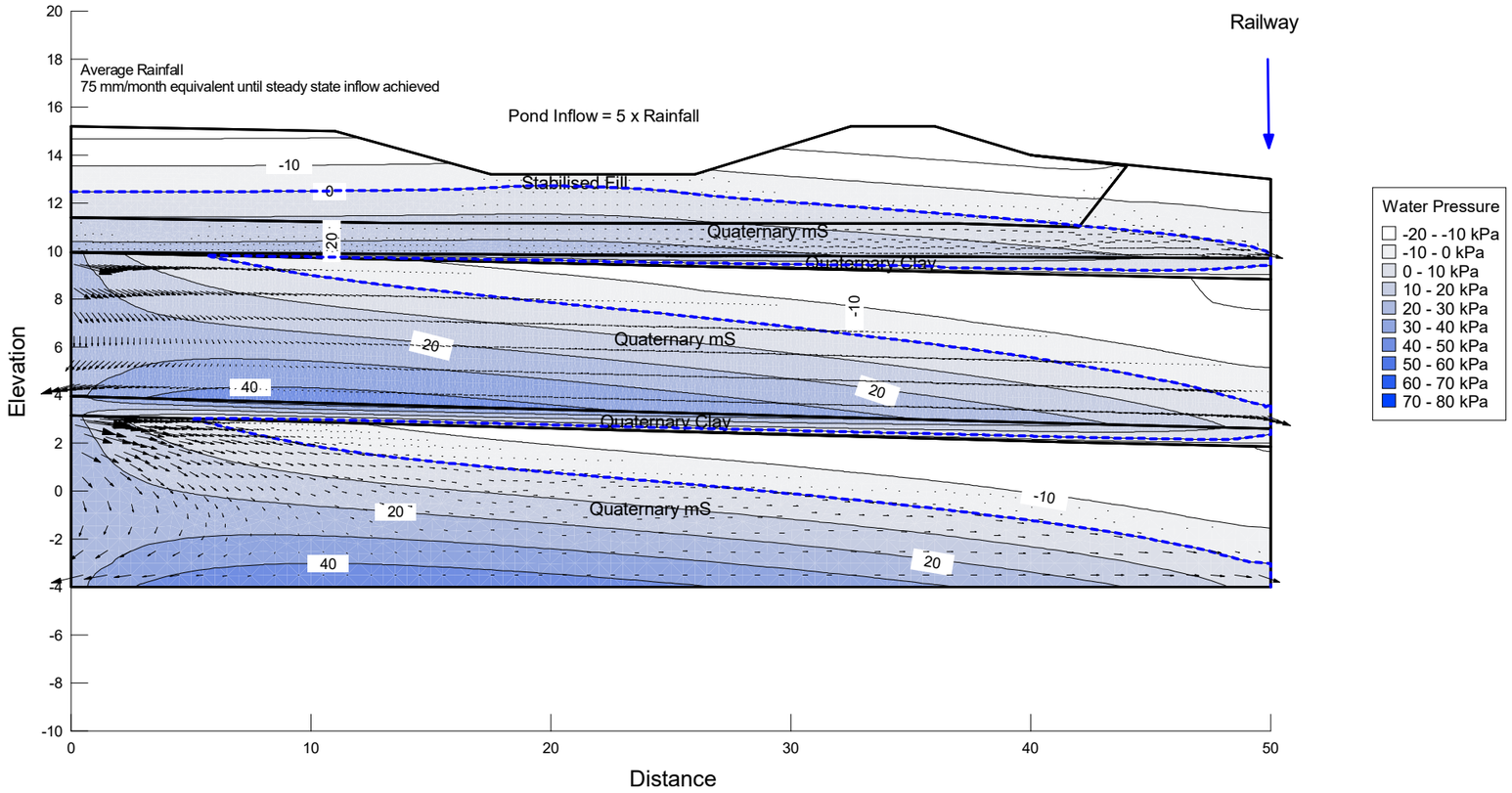
Factor of Safety
- ≤ 1.300 - 1.400
- 1.400 - 1.500
- 1.500 - 1.600
- 1.600 - 1.700
- 1.700 - 1.800
- 1.800 - 1.900
- 1.900 - 2.000
- 2.000 - 2.100
- ≥ 2.100

| | |
|---|---|
| Slope Stability (2) | |
| Profile B Future WC1 250 mm_month.gsz | |
| 14/07/2020 | 1:225 |

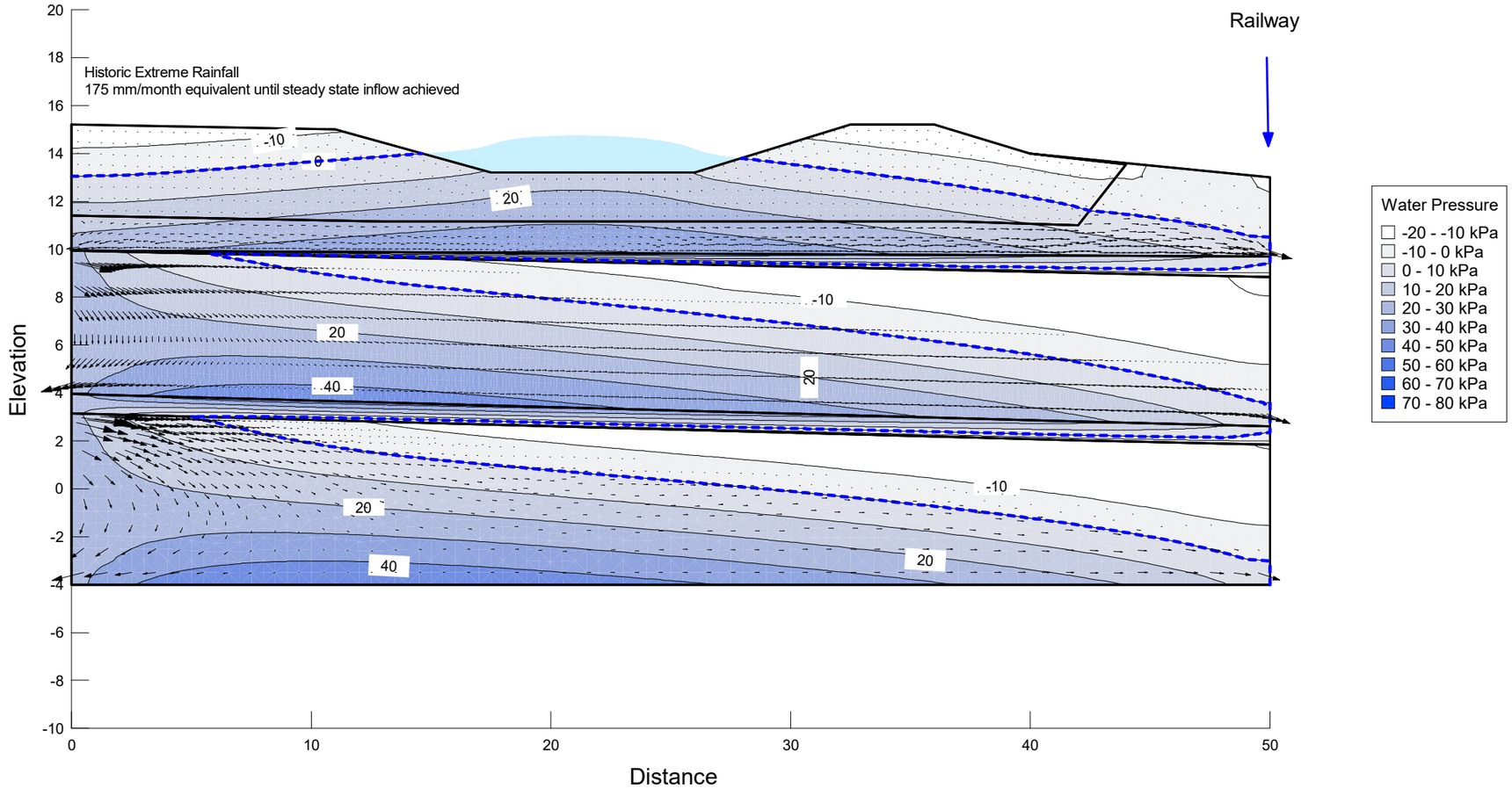
# Profile C



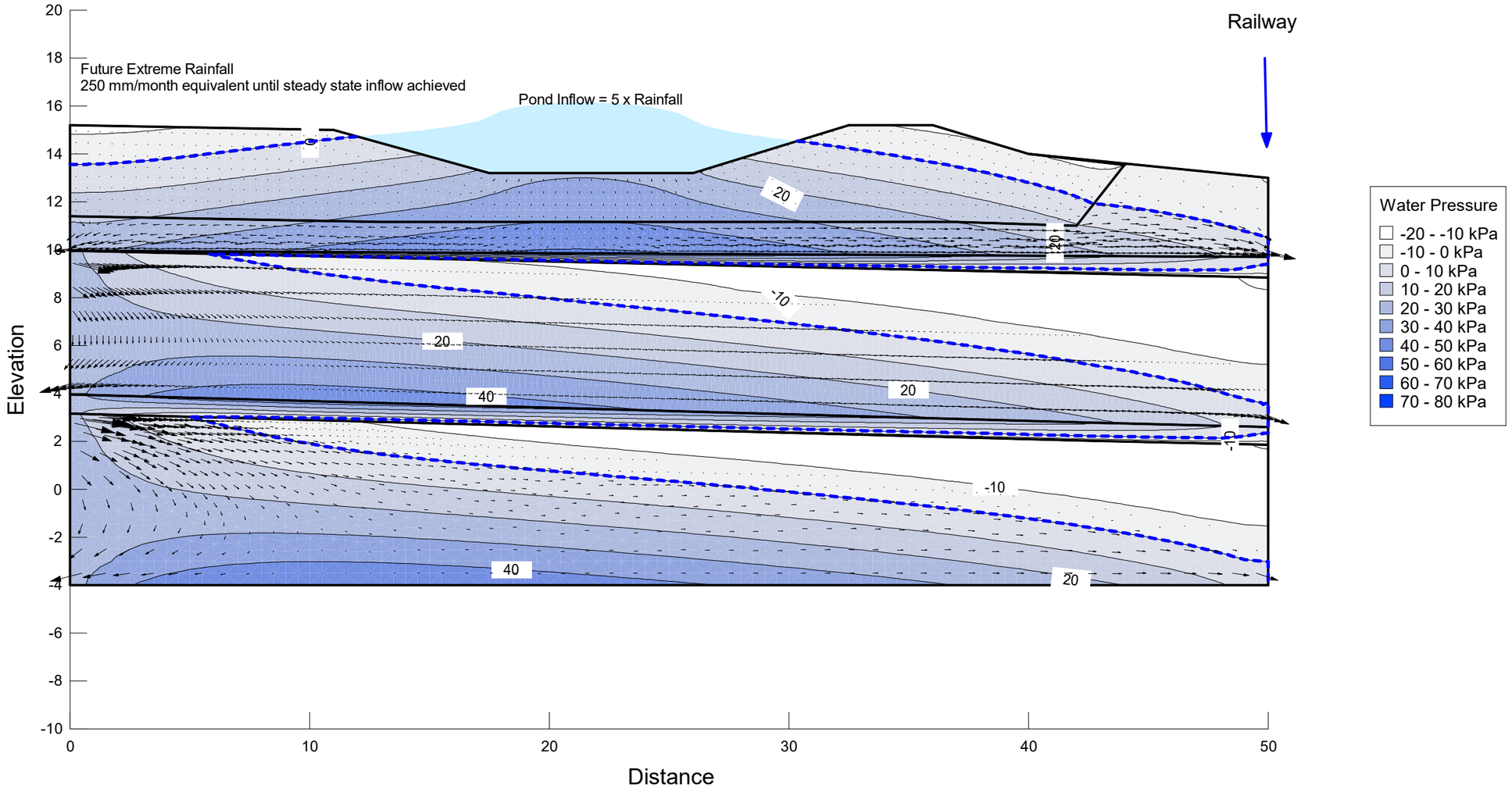

| | |
|---|---|
| Profile C Seep-Slope | |
| Profile C Average Conditions 75 mm_month.gsz | |
| 14/07/2020 | 1:250 |



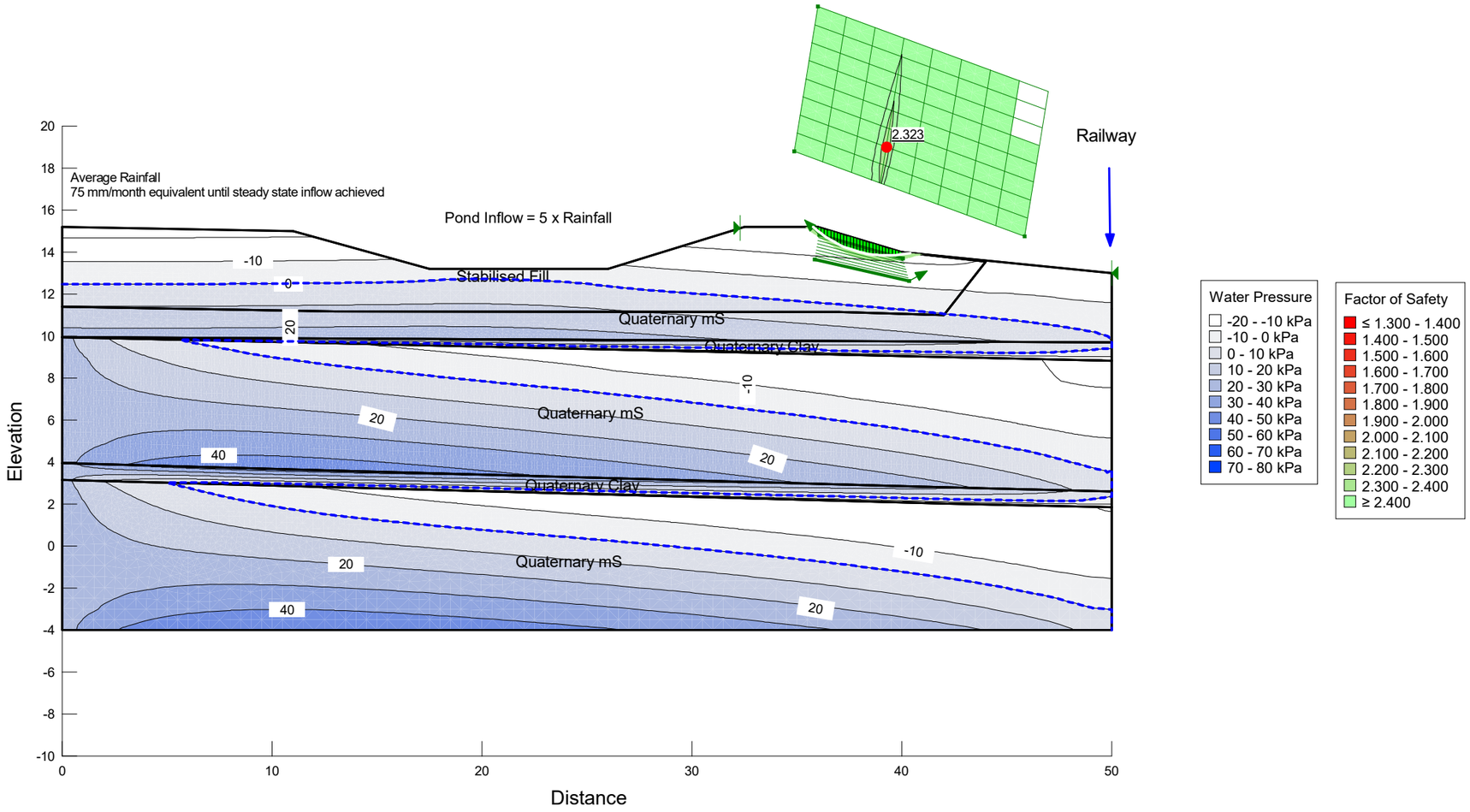

| | |
|---|---|
| Profile C Seep-Slope | |
| Profile C Average Conditions 75 mm_month.gsz | |
| 14/07/2020 | 1:250 |




| | |
|---|---|
| Profile C Seep-Slope | |
| Profile C Historic WC1 175 mm_month.gsz | |
| 14/07/2020 | 1:225 |




| | |
|---|---|
| Profile C Seep-Slope | |
| Profile C Extreme Future 250 mm_month.gsz | |
| 14/07/2020 | 1:200 |



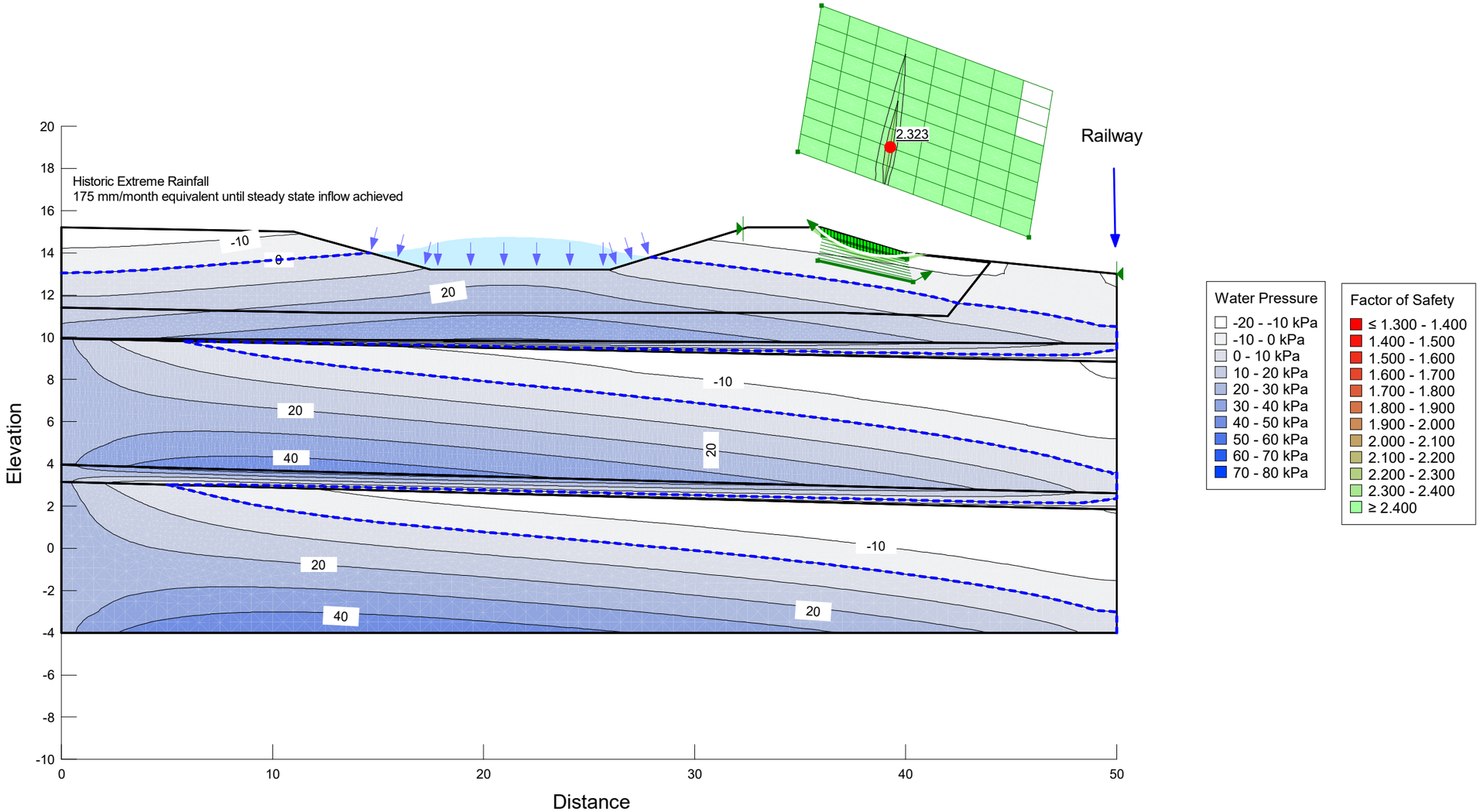

Water Pressure
- -20 - -10 kPa
- -10 - 0 kPa
- 0 - 10 kPa
- 10 - 20 kPa
- 20 - 30 kPa
- 30 - 40 kPa
- 40 - 50 kPa
- 50 - 60 kPa
- 60 - 70 kPa
- 70 - 80 kPa

Factor of Safety
- ≤ 1.300 - 1.400
- 1.400 - 1.500
- 1.500 - 1.600
- 1.600 - 1.700
- 1.700 - 1.800
- 1.800 - 1.900
- 1.900 - 2.000
- 2.000 - 2.100
- 2.100 - 2.200
- 2.200 - 2.300
- 2.300 - 2.400
- ≥ 2.400

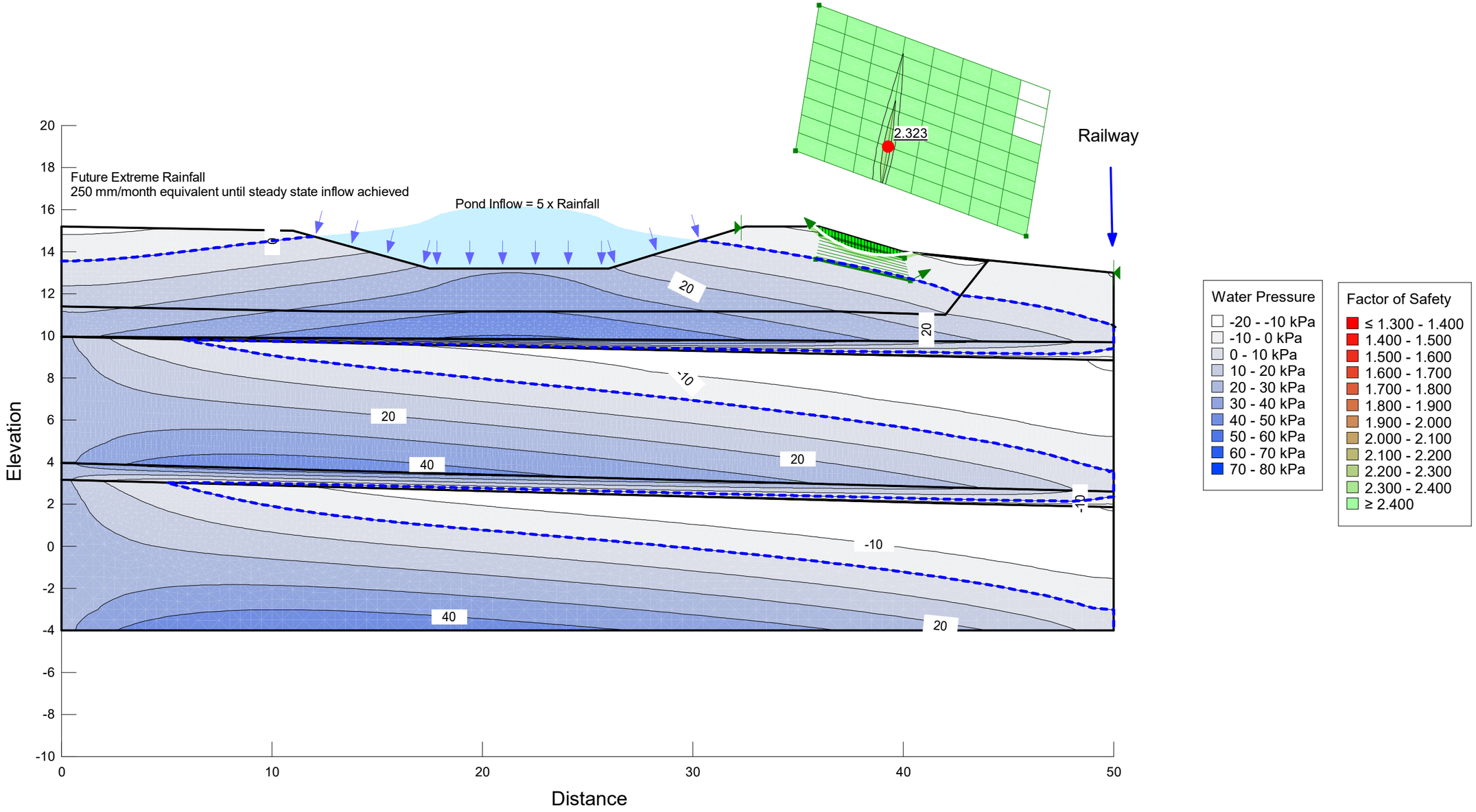
Slope Stability 1 - Railway

Profile C Average Conditions 75 mm_month.gsz

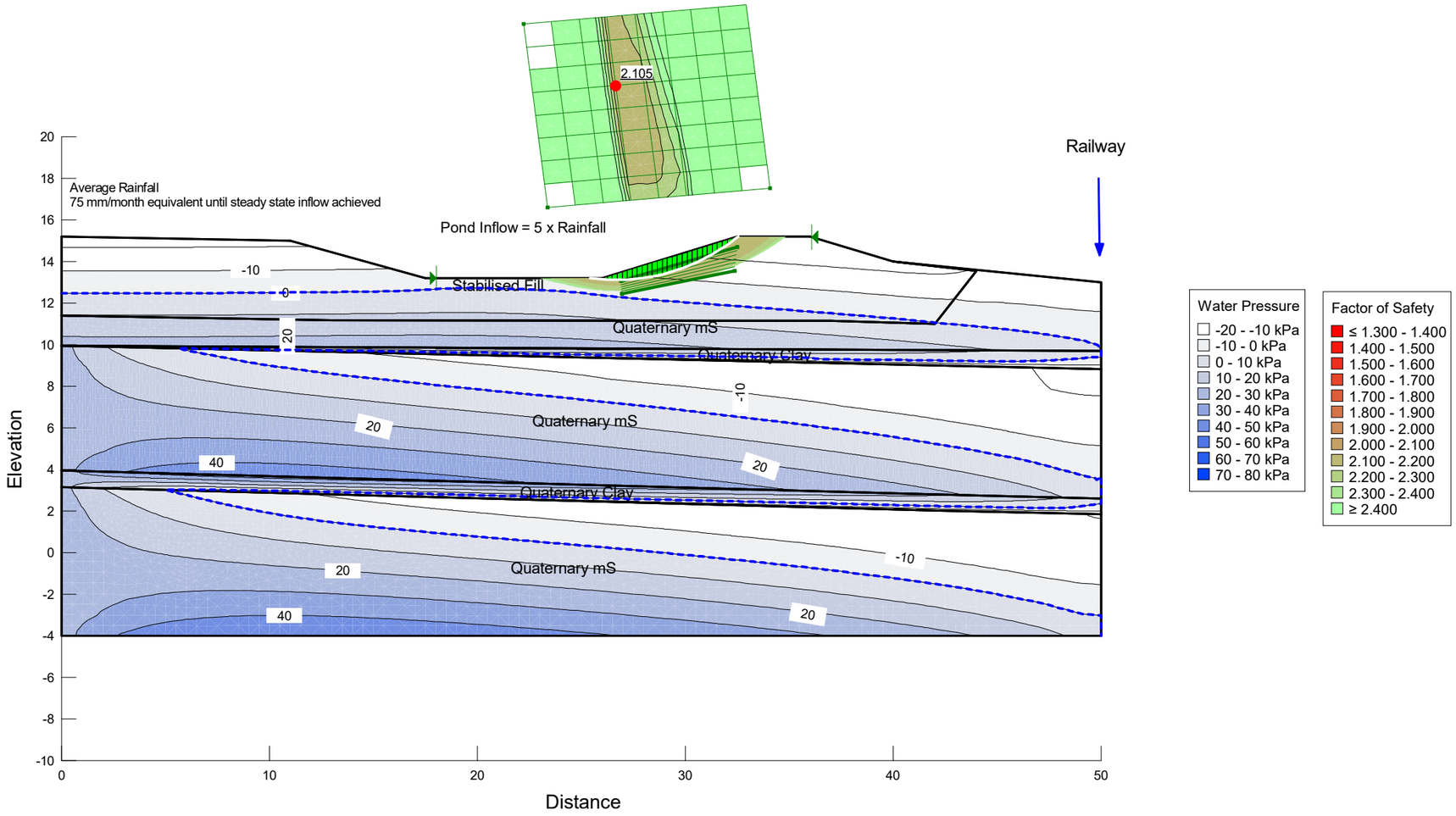
14/07/2020 1:250



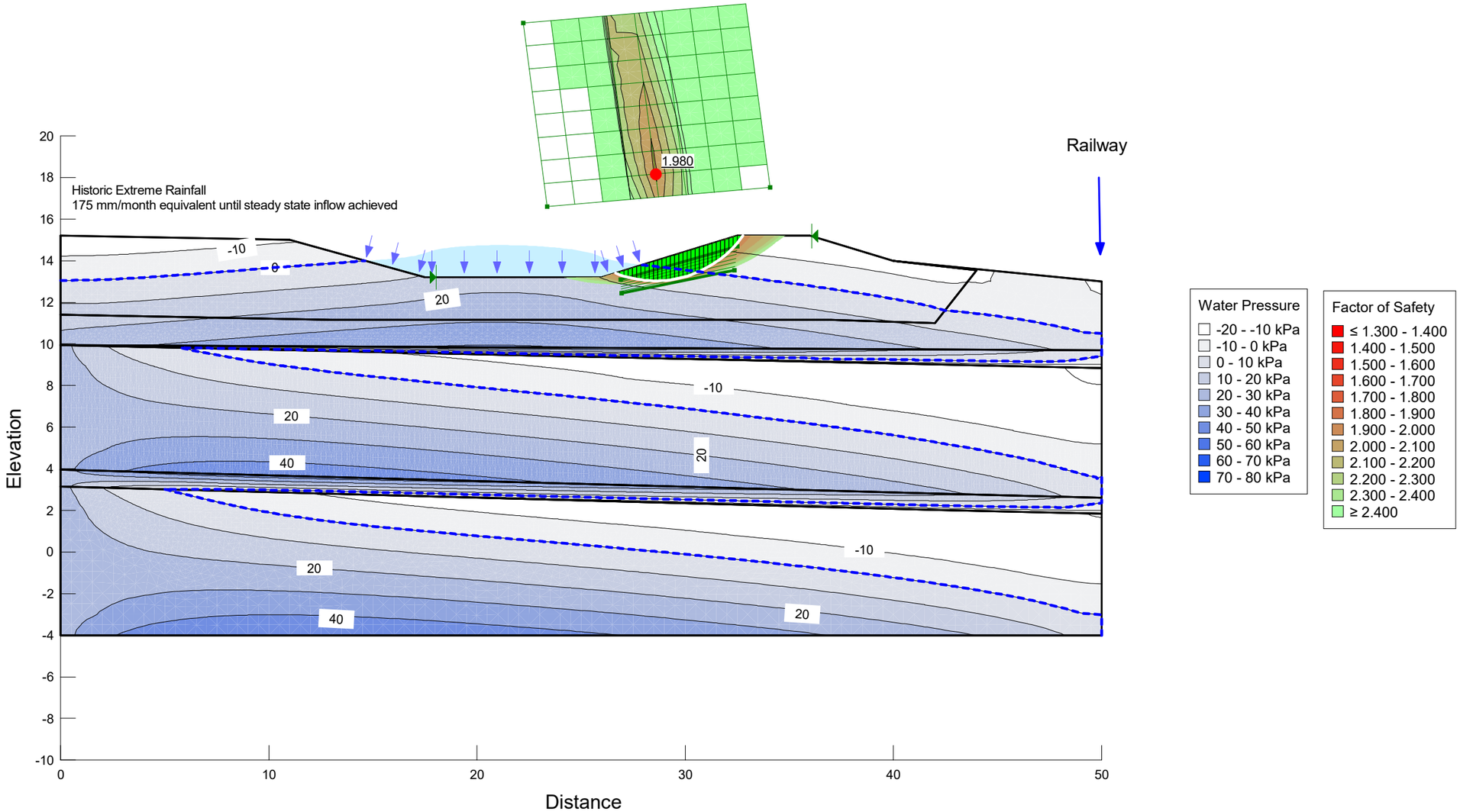

| | |
|---|---|
| Slope Stability 1 - Railway | |
| Profile C Historic WC1 175 mm_month.gsz | |
| 14/07/2020 | 1:225 |



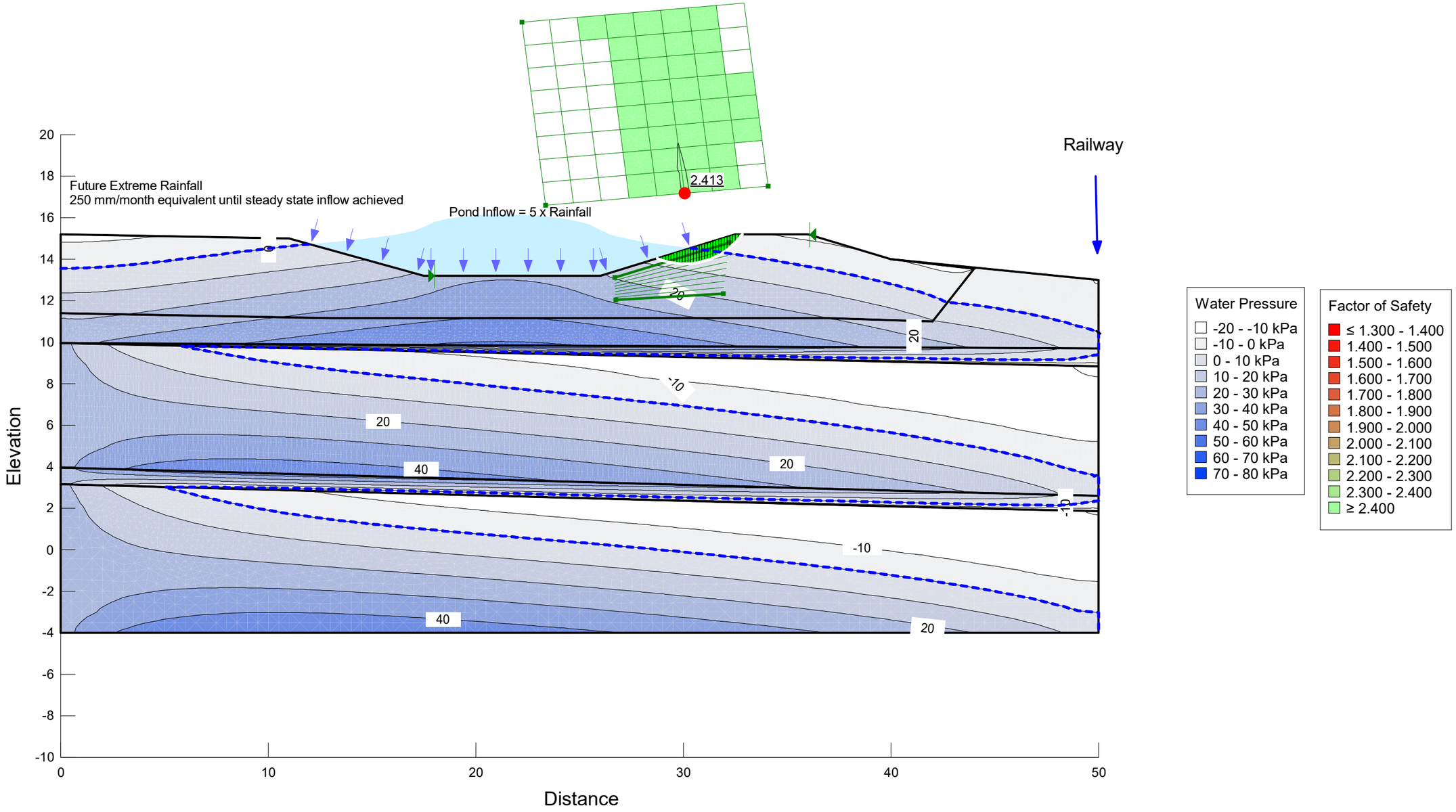

| | |
|---|---|
| Slope Stability 1 - Railway | |
| Profile C Extreme Future 250 mm_month.gsz | |
| 14/07/2020 | 1:200 |



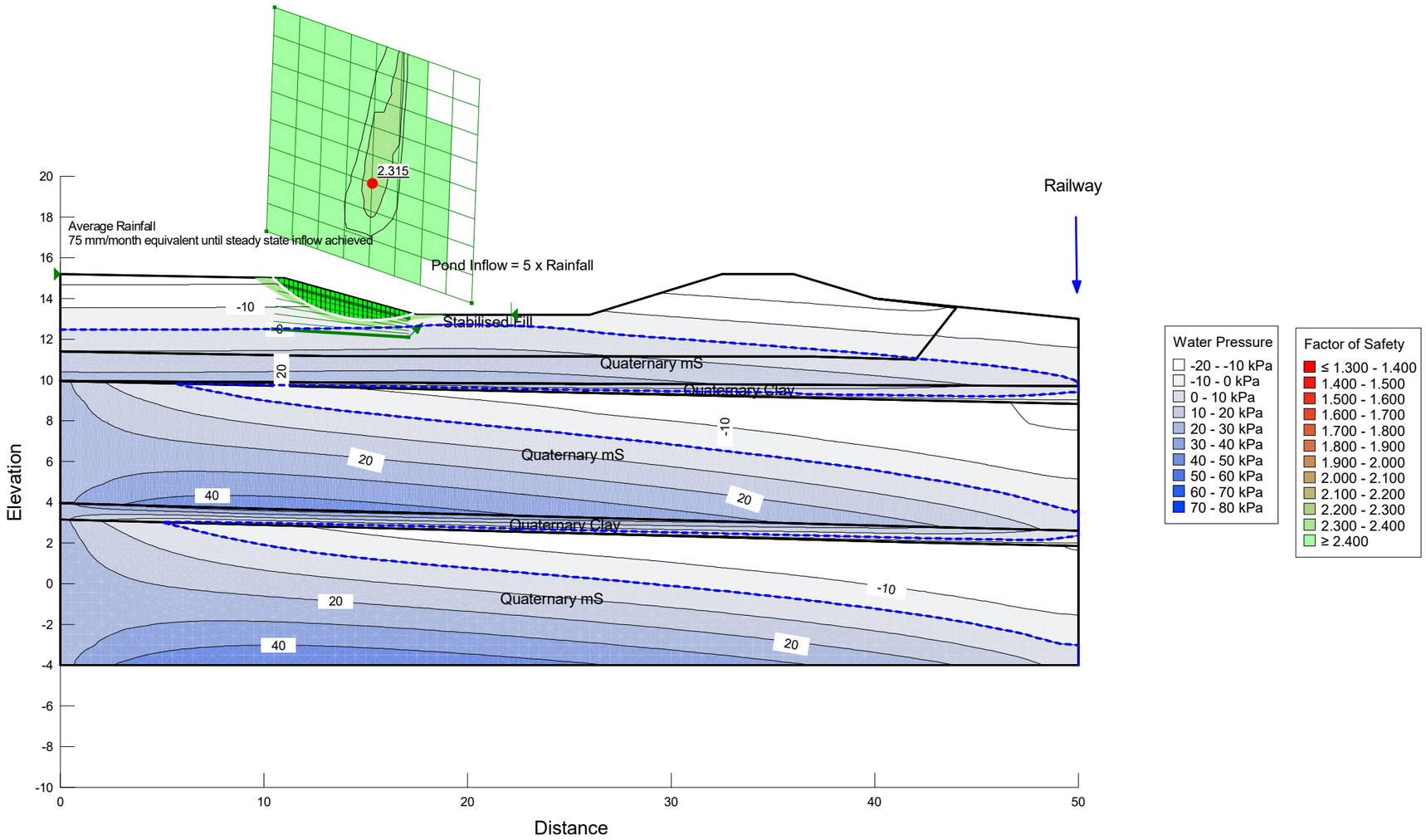

| | |
|---|---|
| Slope Stability 3 - reverse slope | |
| Profile C Average Conditions 75 mm_month.gsz | |
| 14/07/2020 | 1:250 |



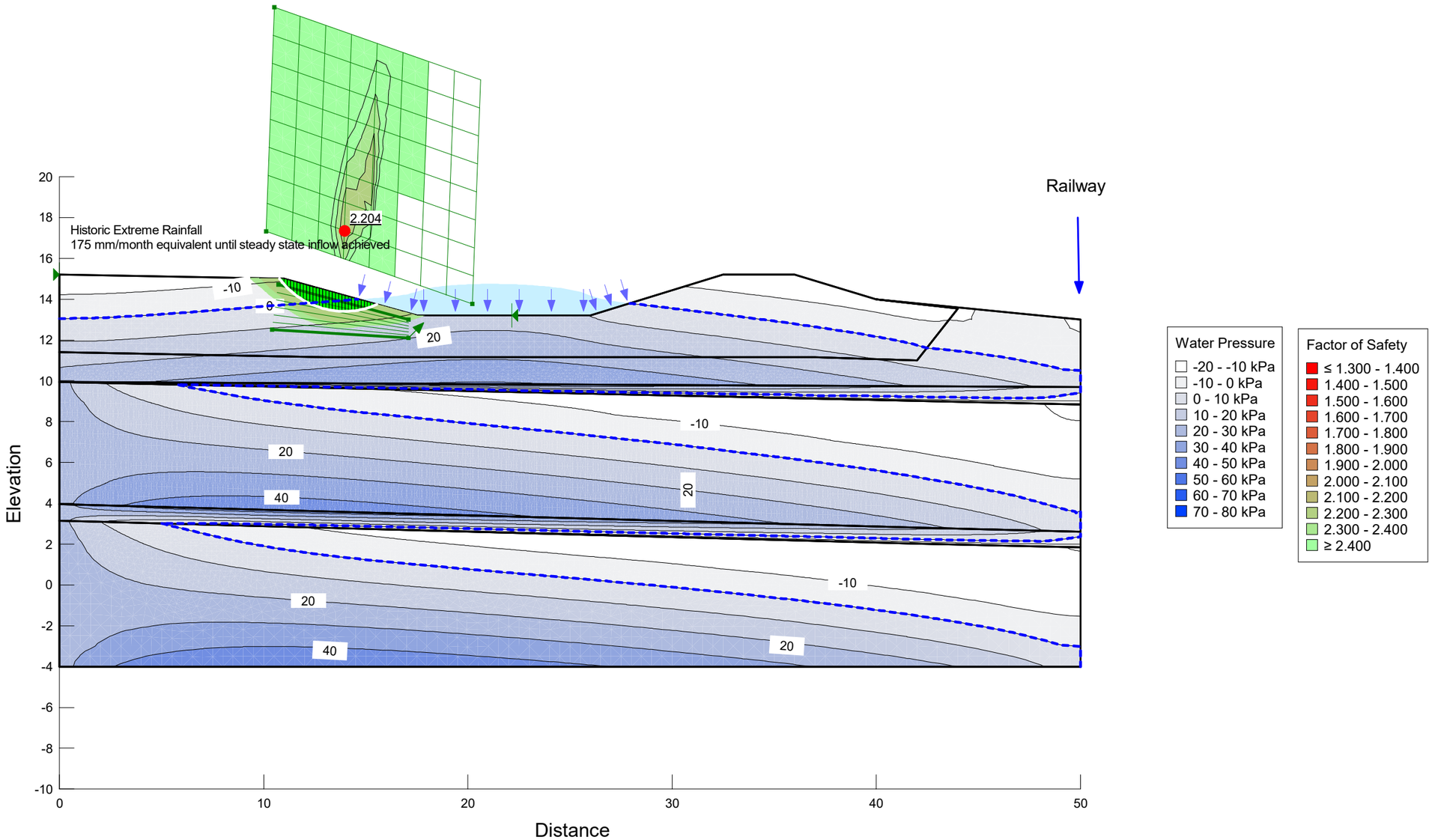

| | |
|---|---|
| Slope Stability 3 - reverse slope | |
| Profile C Historic WC1 175 mm_month.gsz | |
| 14/07/2020 | 1:225 |



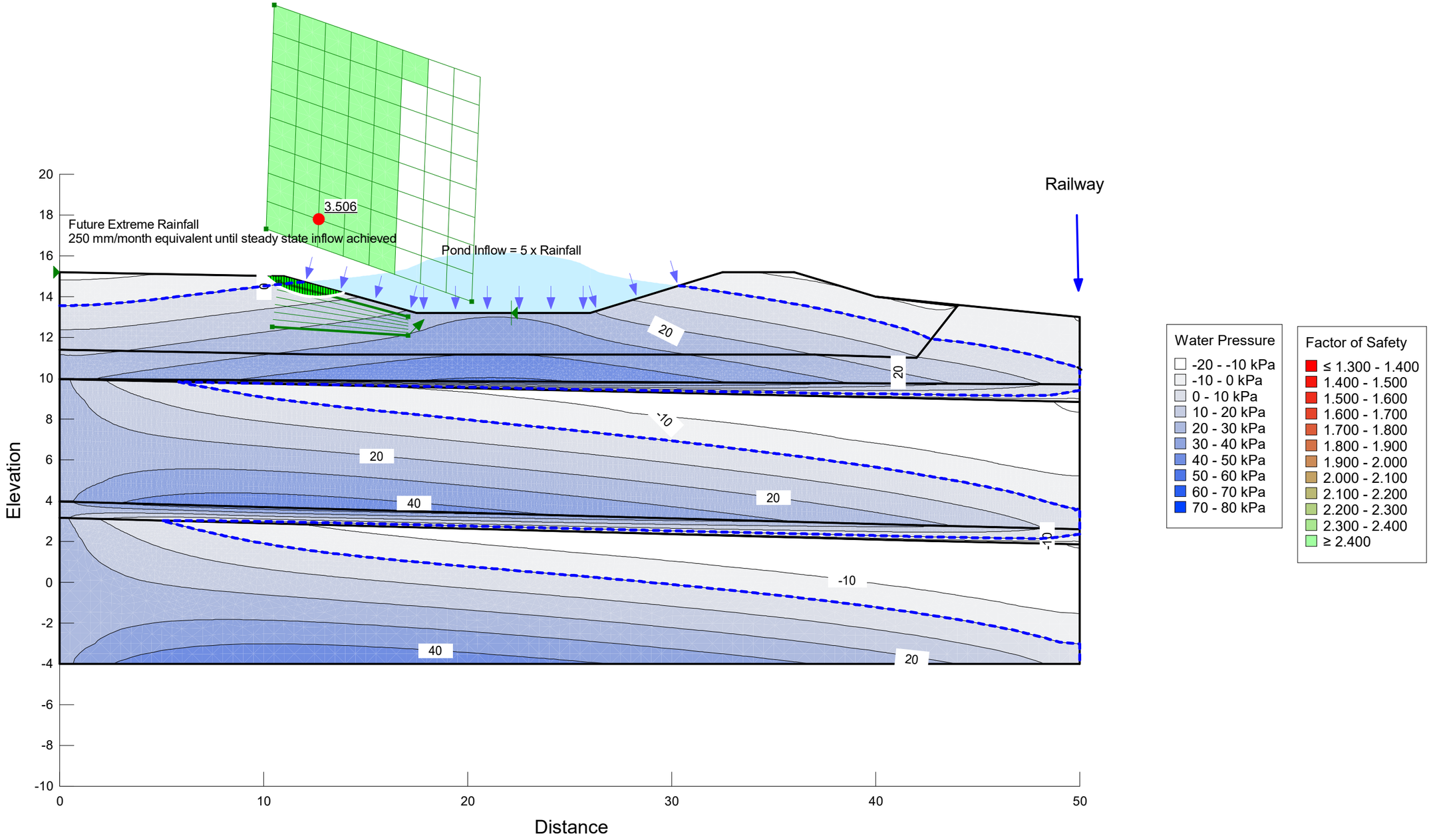

| | |
|---|---|
| Slope Stability 3 - reverse slope | |
| Profile C Extreme Future 250 mm_month.gsz | |
| 14/07/2020 | 1:200 |




| | |
|---|---|
| Slope Stability 2 - inner slope | |
| Profile C Average Conditions 75 mm_month.gsz | |
| 14/07/2020 | 1:250 |

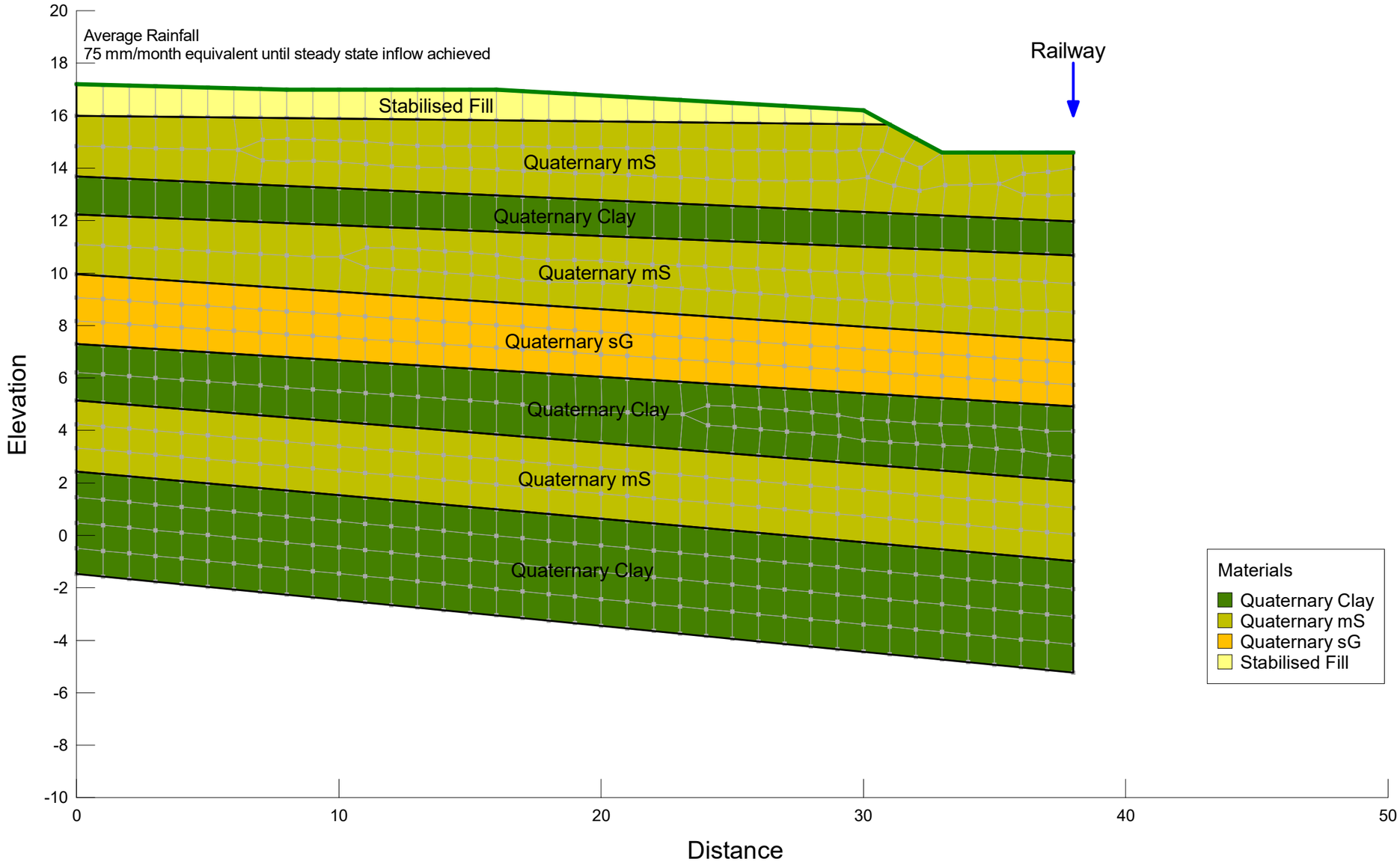



| | |
|---|---|
| Slope Stability 2 - inner slope | |
| Profile C Historic WC1 175 mm_month.gsz | |
| 14/07/2020 | 1:225 |

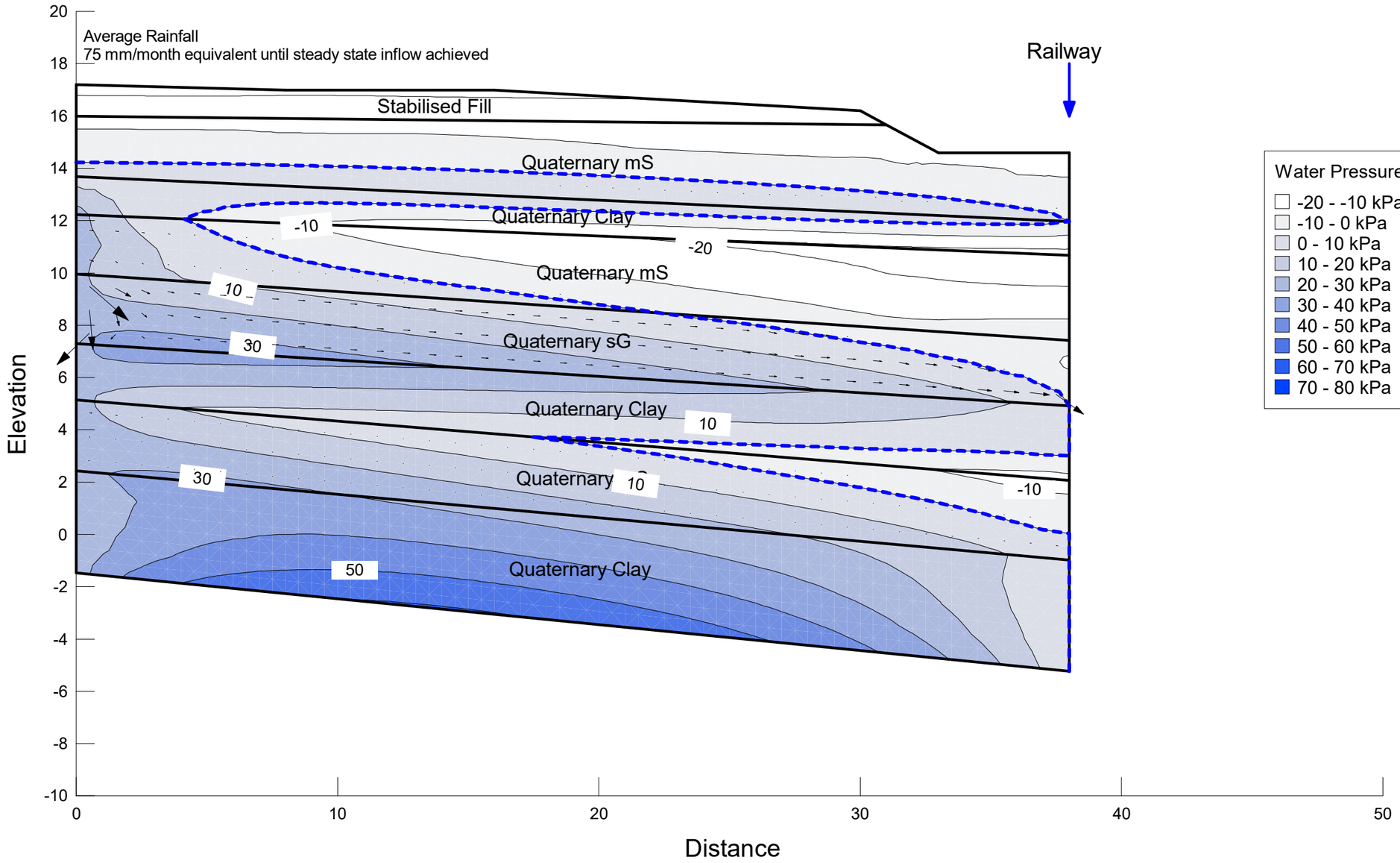



| | |
|---|---|
| Slope Stability 2 - inner slope | |
| Profile C Extreme Future 250 mm_month.gsz | |
| 14/07/2020 | 1:200 |

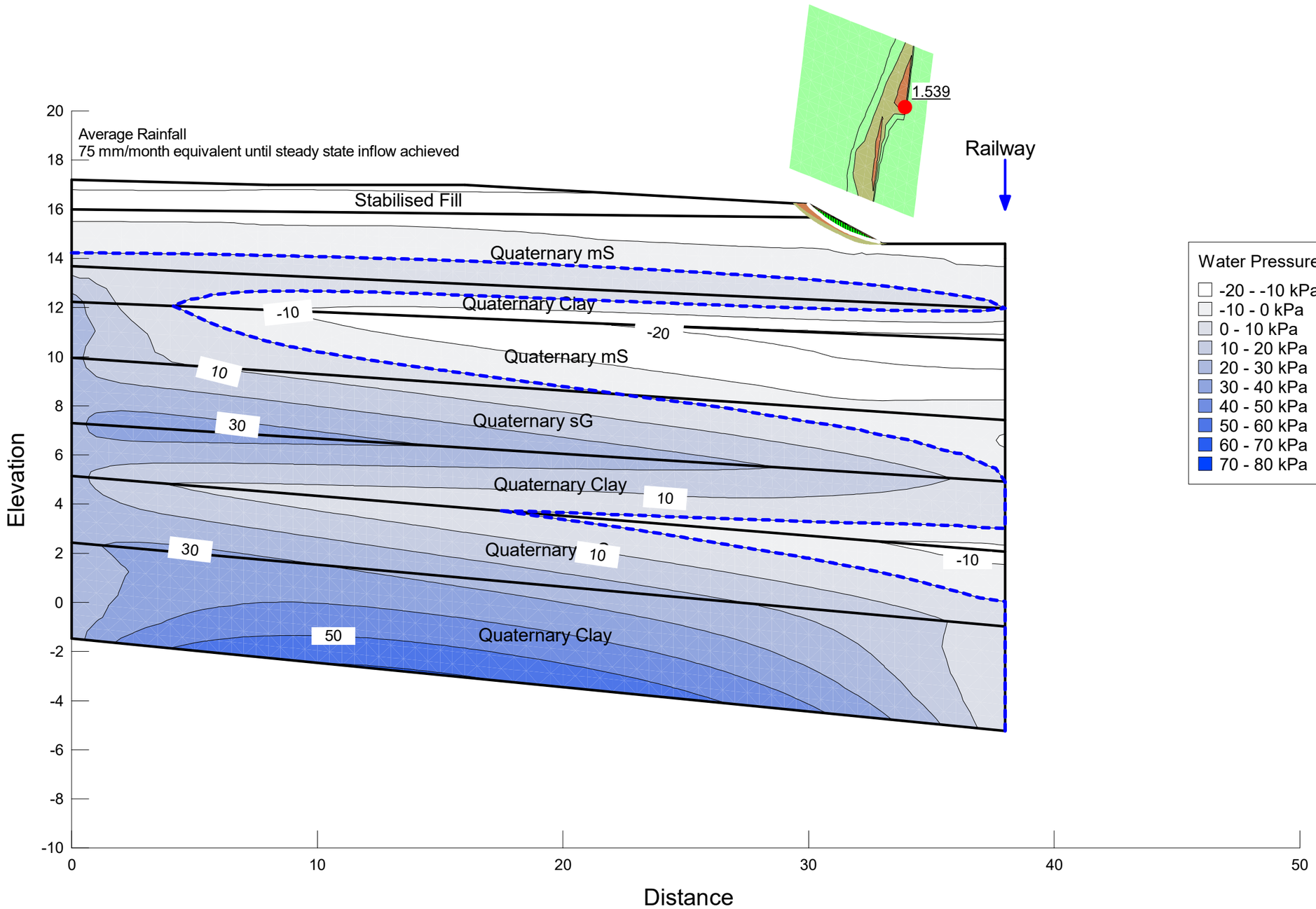
# Profile D




| | |
|---|---|
| Slope Stability 1 - Railway | |
| Profile D Average Conditions.gsz | |
| 19/06/2020 | 1:175 |

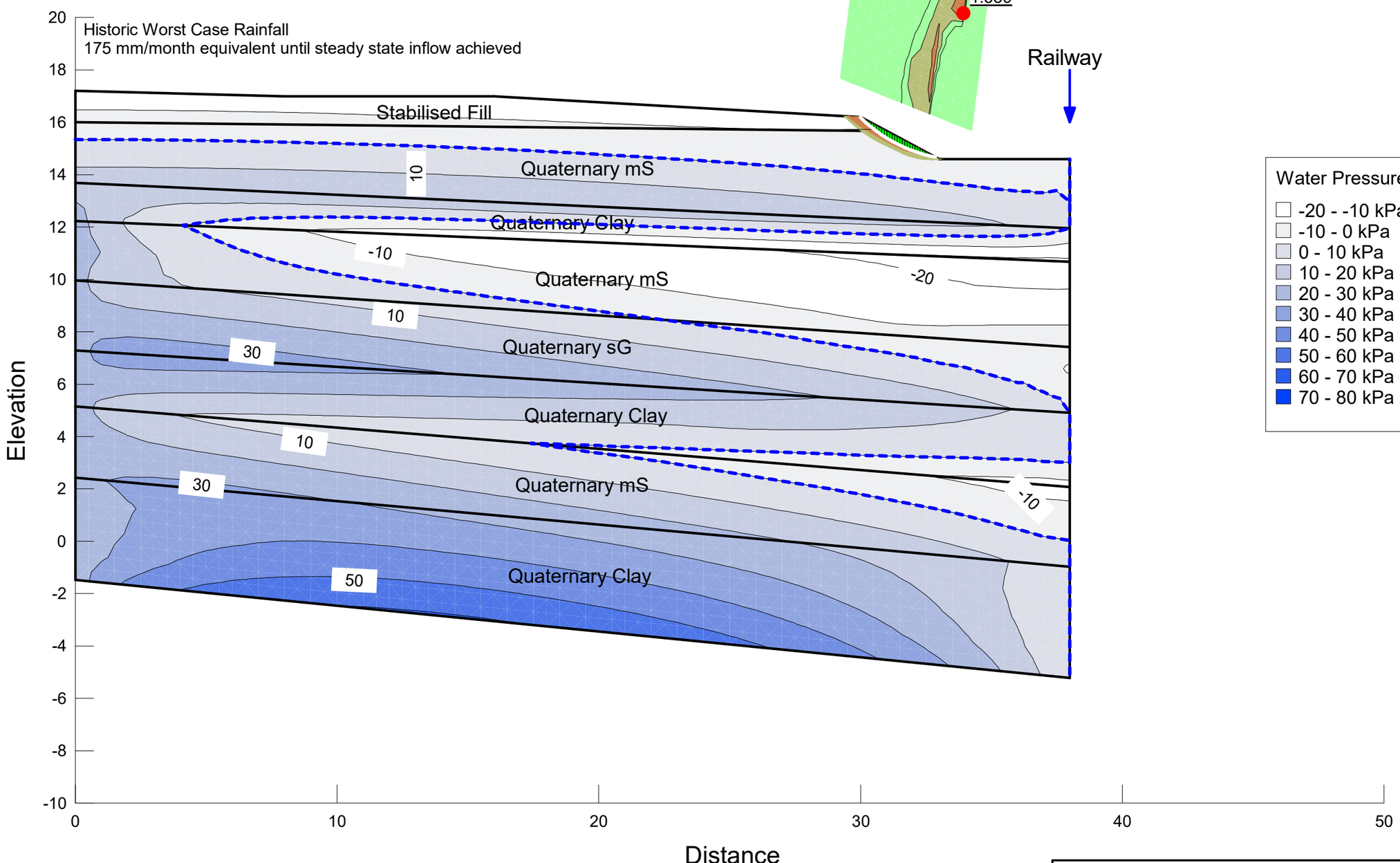



| | |
|---|---|
| Profile D Seep-Slope | |
| Profile D Averge Conditions.gsz | |
| 19/06/2020 | 1:175 |




| | |
|---|---|
| Slope Stability 1 - Railway | |
| Profile D Averge Conditions.gsz | |
| 19/06/2020 | 1:175 |

Historic Worst Case Rainfall
175 mm/month equivalent until steady state inflow achieved




Water Pressure
- -20 - -10 kPa
- -10 - 0 kPa
- 0 - 10 kPa
- 10 - 20 kPa
- 20 - 30 kPa
- 30 - 40 kPa
- 40 - 50 kPa
- 50 - 60 kPa
- 60 - 70 kPa
- 70 - 80 kPa

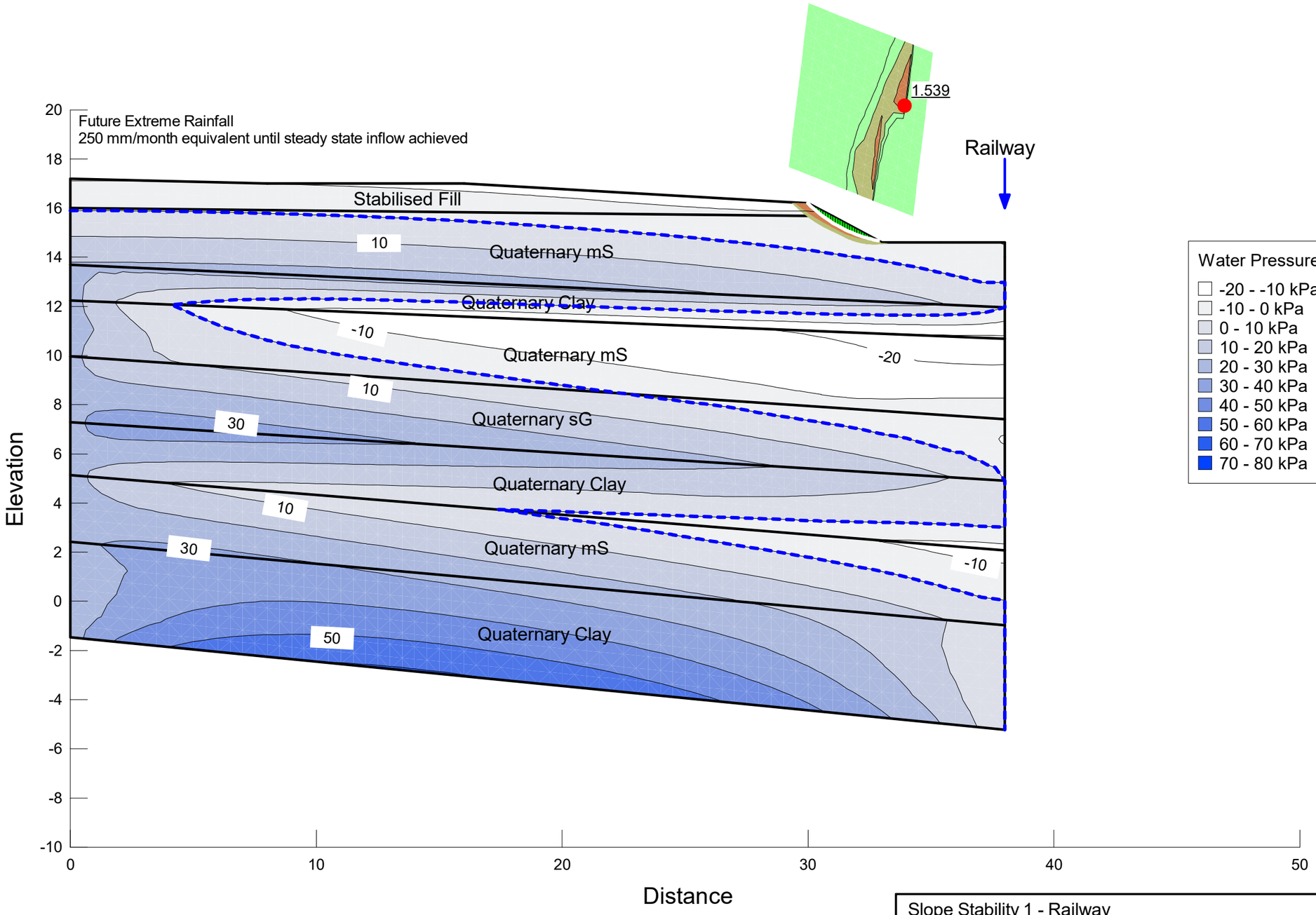
Factor of Safety
- ≤ 1.300 - 1.400
- 1.400 - 1.500
- 1.500 - 1.600
- 1.600 - 1.700
- ≥ 1.700

Slope Stability 1 - Railway

Profile D Historic WC1.gsz

14/07/2020 1:162

Future Extreme Rainfall
250 mm/month equivalent until steady state inflow achieved

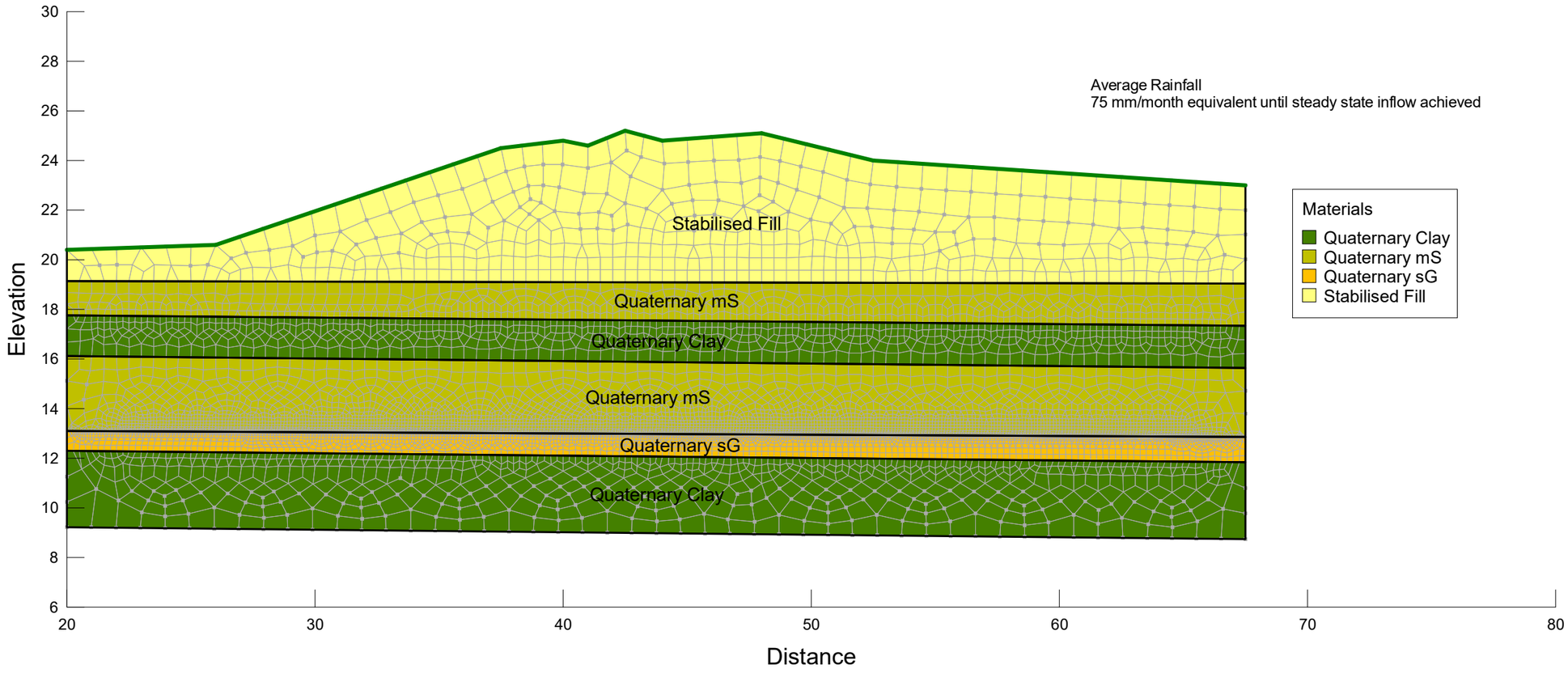



Water Pressure
- -20 - -10 kPa
- -10 - 0 kPa
- 0 - 10 kPa
- 10 - 20 kPa
- 20 - 30 kPa
- 30 - 40 kPa
- 40 - 50 kPa
- 50 - 60 kPa
- 60 - 70 kPa
- 70 - 80 kPa

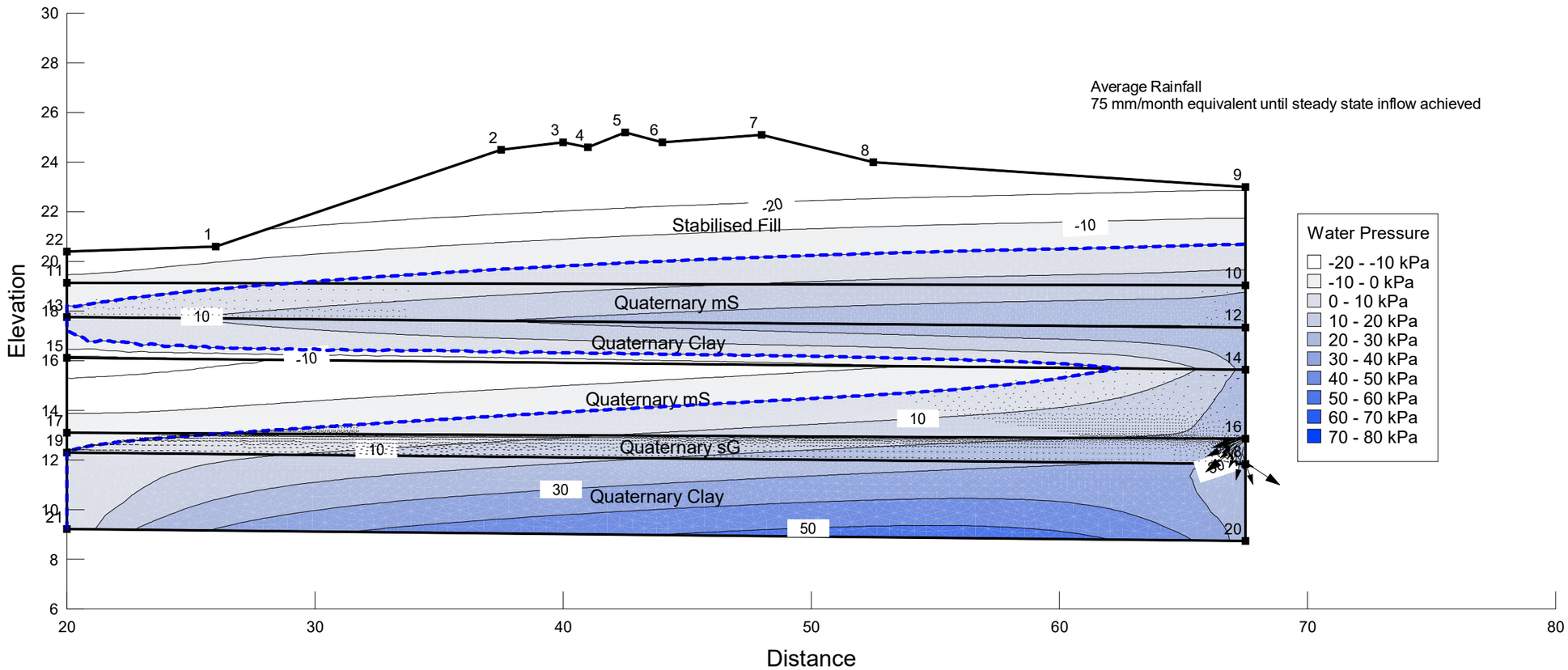
Factor of Safe
- ≤ 1.300 - 1.
- 1.400 - 1.5
- 1.500 - 1.6
- 1.600 - 1.7
- ≥ 1.700

| | |
|---|---|
| Slope Stability 1 - Railway | |
| Profile D Extreme Future 250 mm_month.gsz | |
| 19/06/2020 | 1:175 |

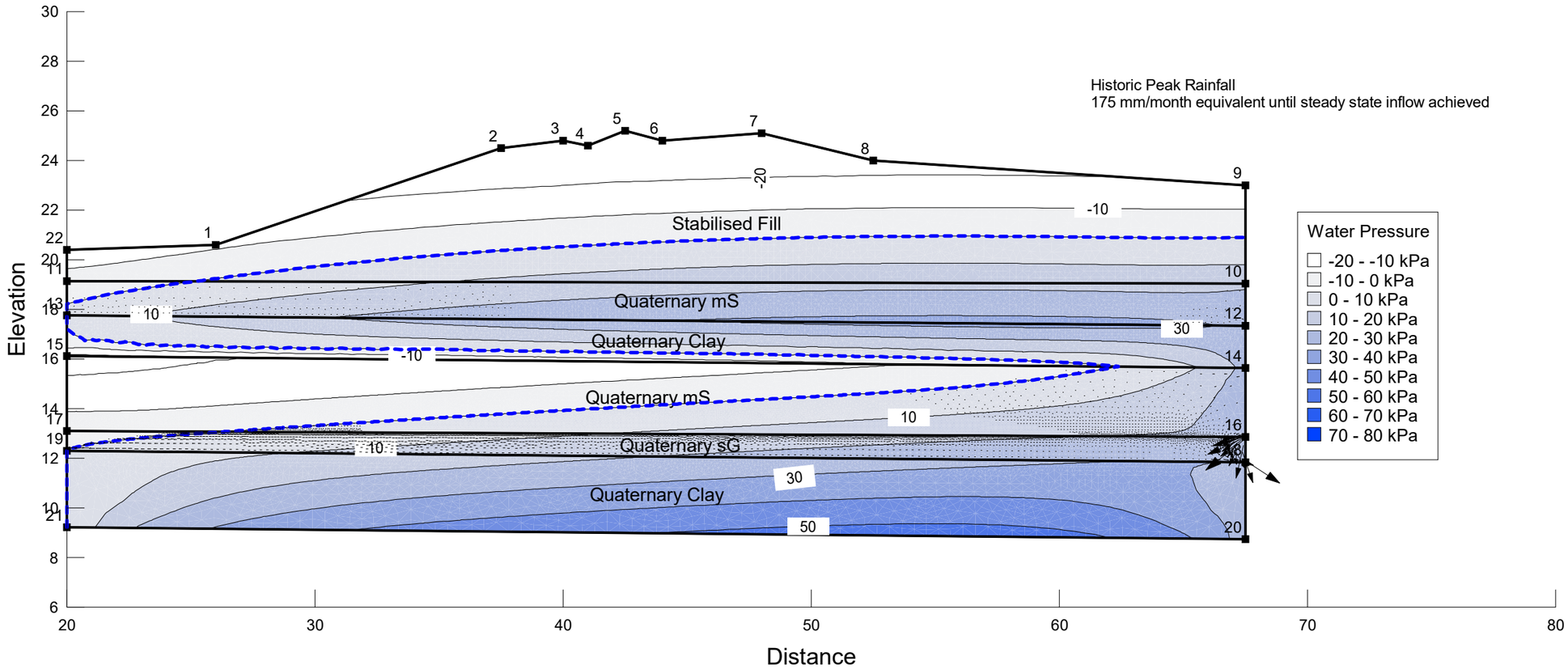
# Profile G



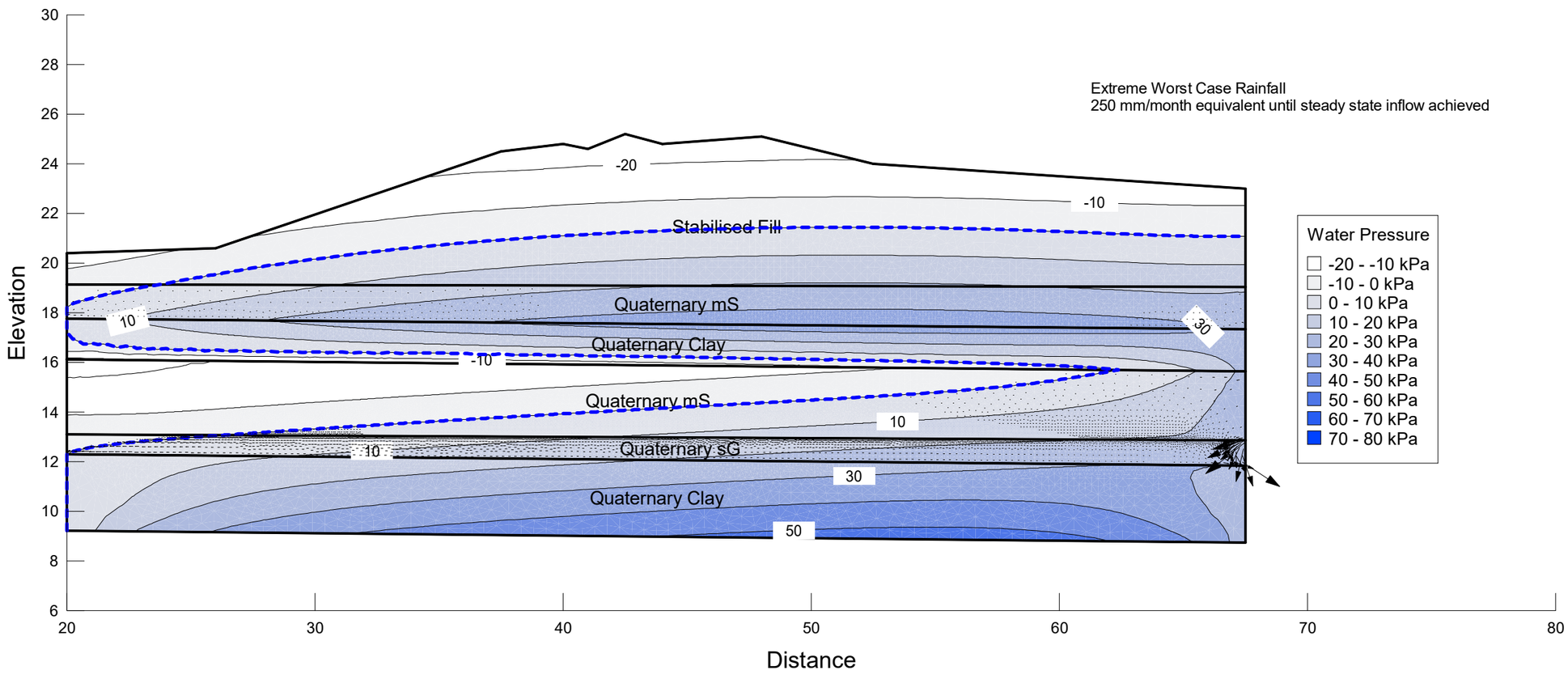

| | |
|---|---|
| Profile G Seep-Slope | |
| Profile G Average Conditions V2.gsz | |
| 14/07/2020 | 1:200 |



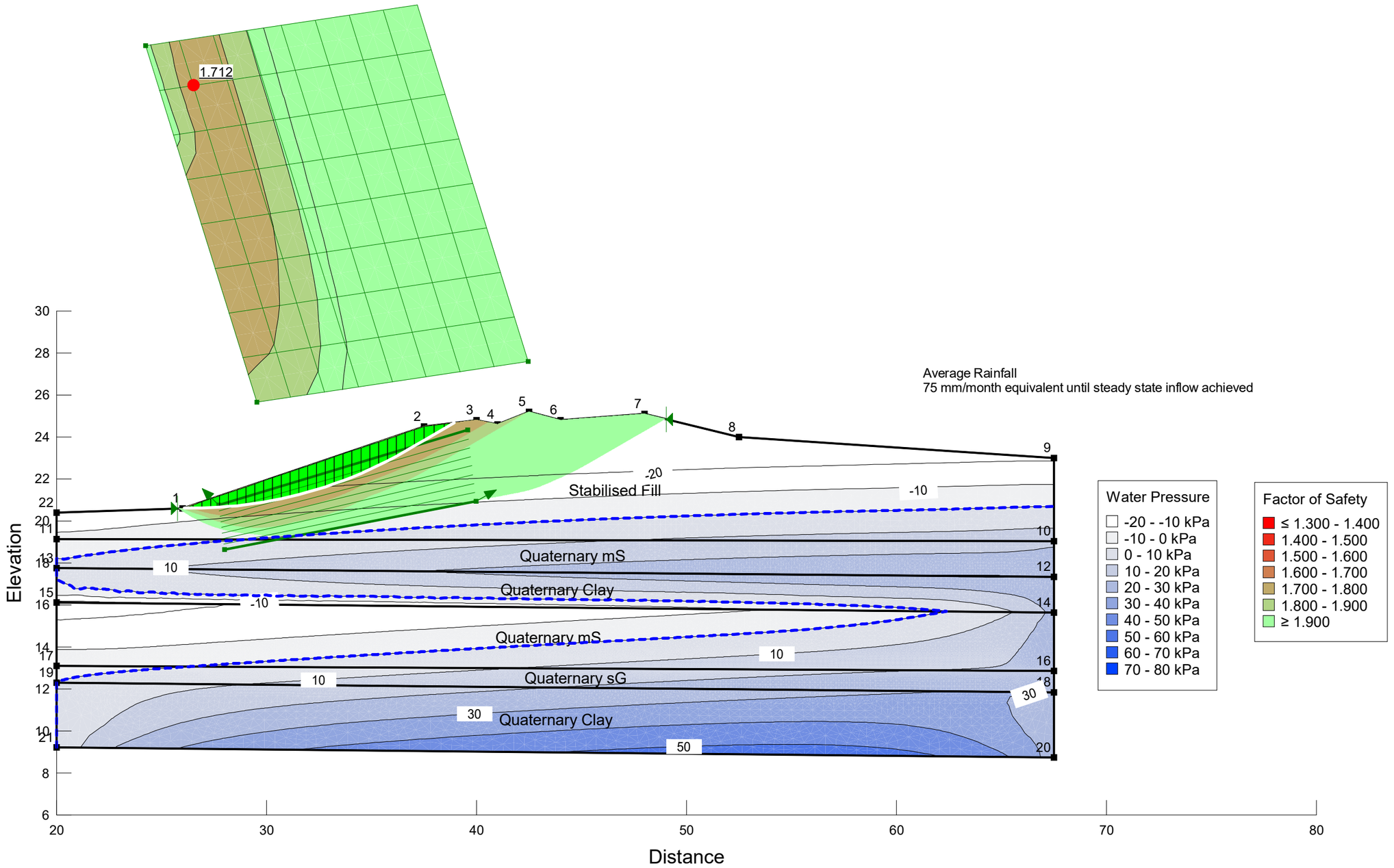

| | |
|---|---|
| Profile G Seep-Slope | |
| Profile G Average Conditions V2.gsz | |
| 14/07/2020 | 1:200 |



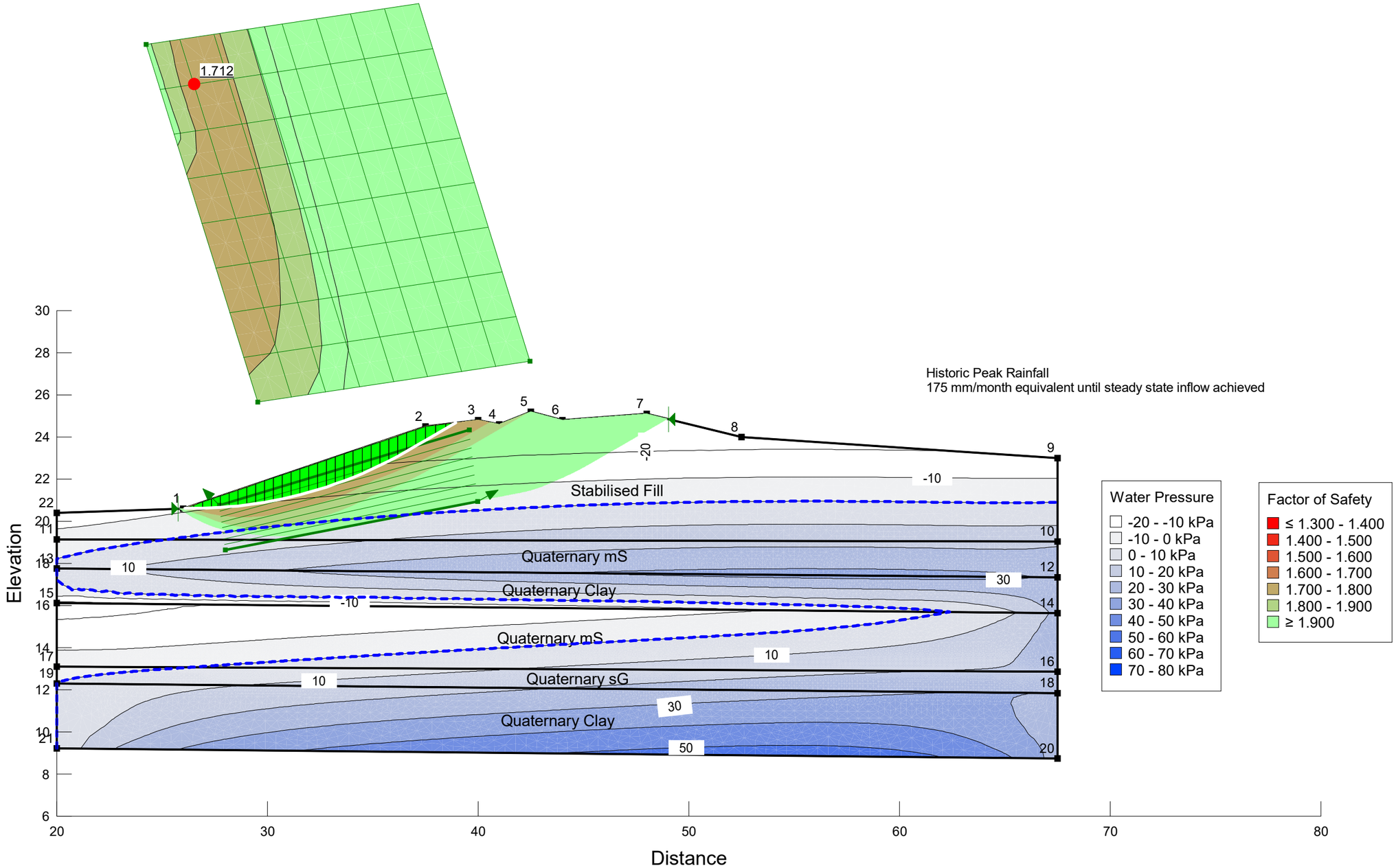

| | |
|---|---|
| Profile G Seep-Slope | |
| Profile G Average Conditions V2.gsz | |
| 14/07/2020 | 1:200 |



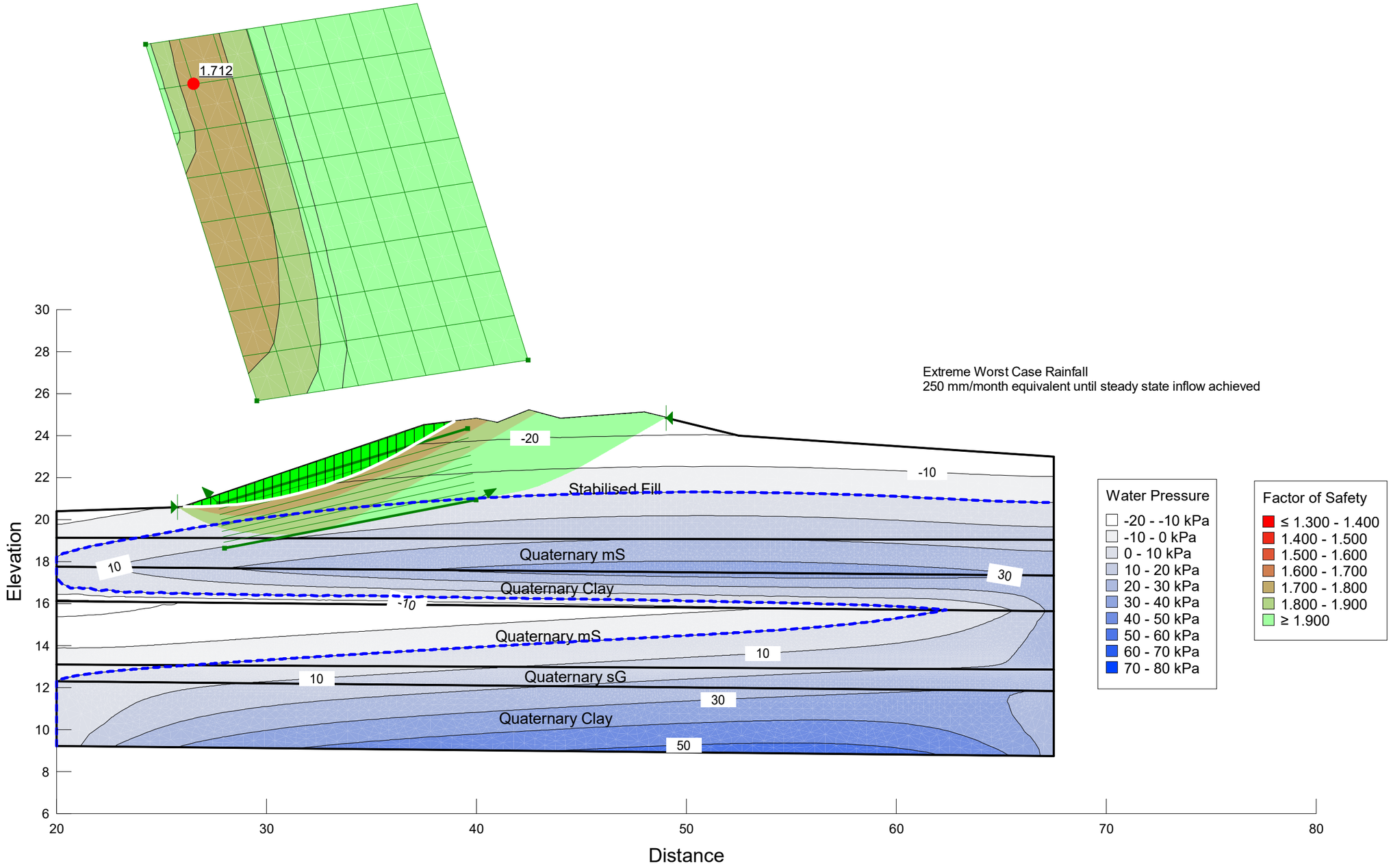

| | |
|---|---|
| Profile Section G Seep-Slope | |
| Profile G Future Extreme.gsz | |
| 14/07/2020 | 1:200 |



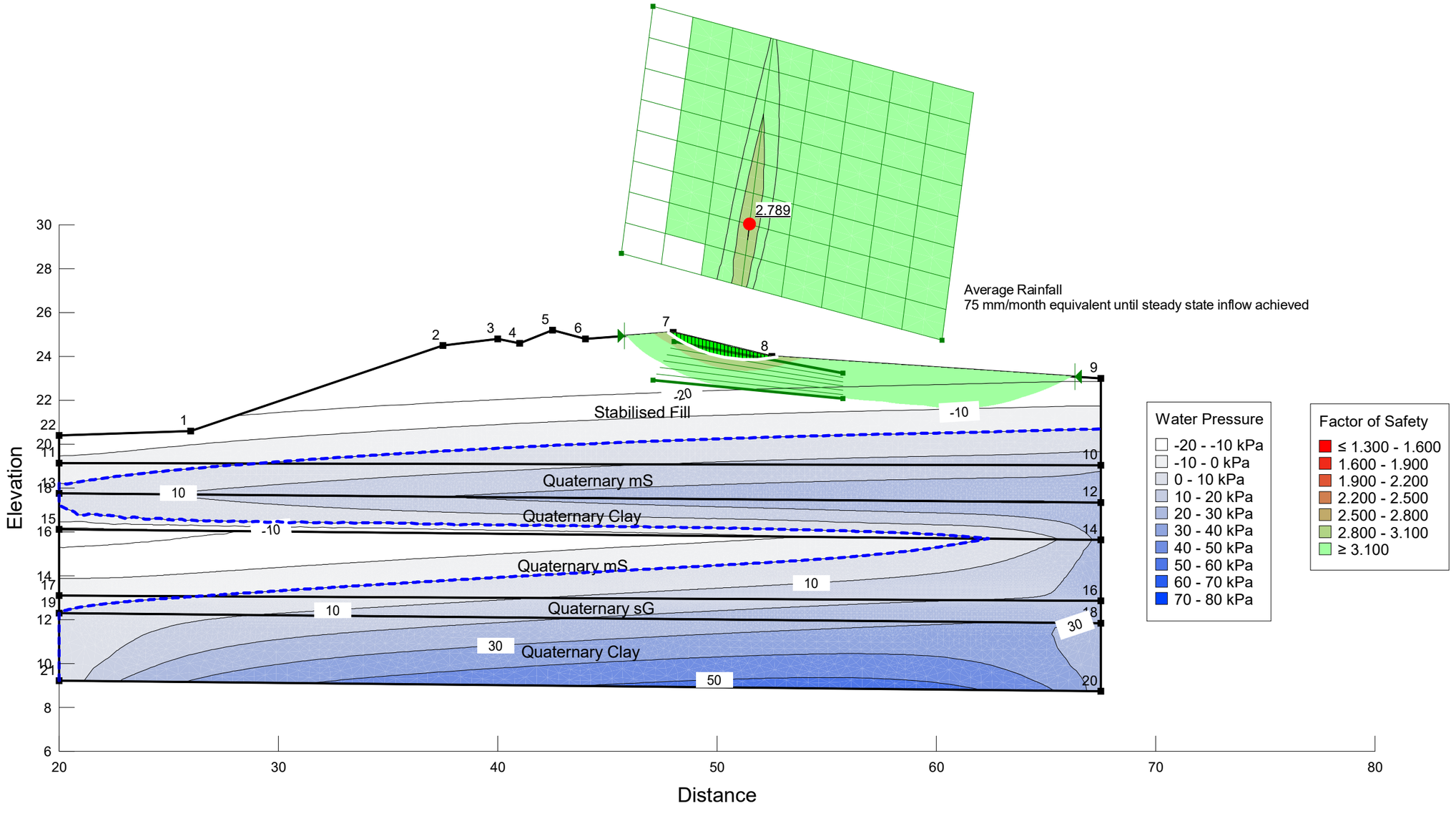

| | |
|---|---|
| Slope Stability 1 west face | |
| Profile G Average Conditions V2.gsz | |
| 14/07/2020 | 1:200 |



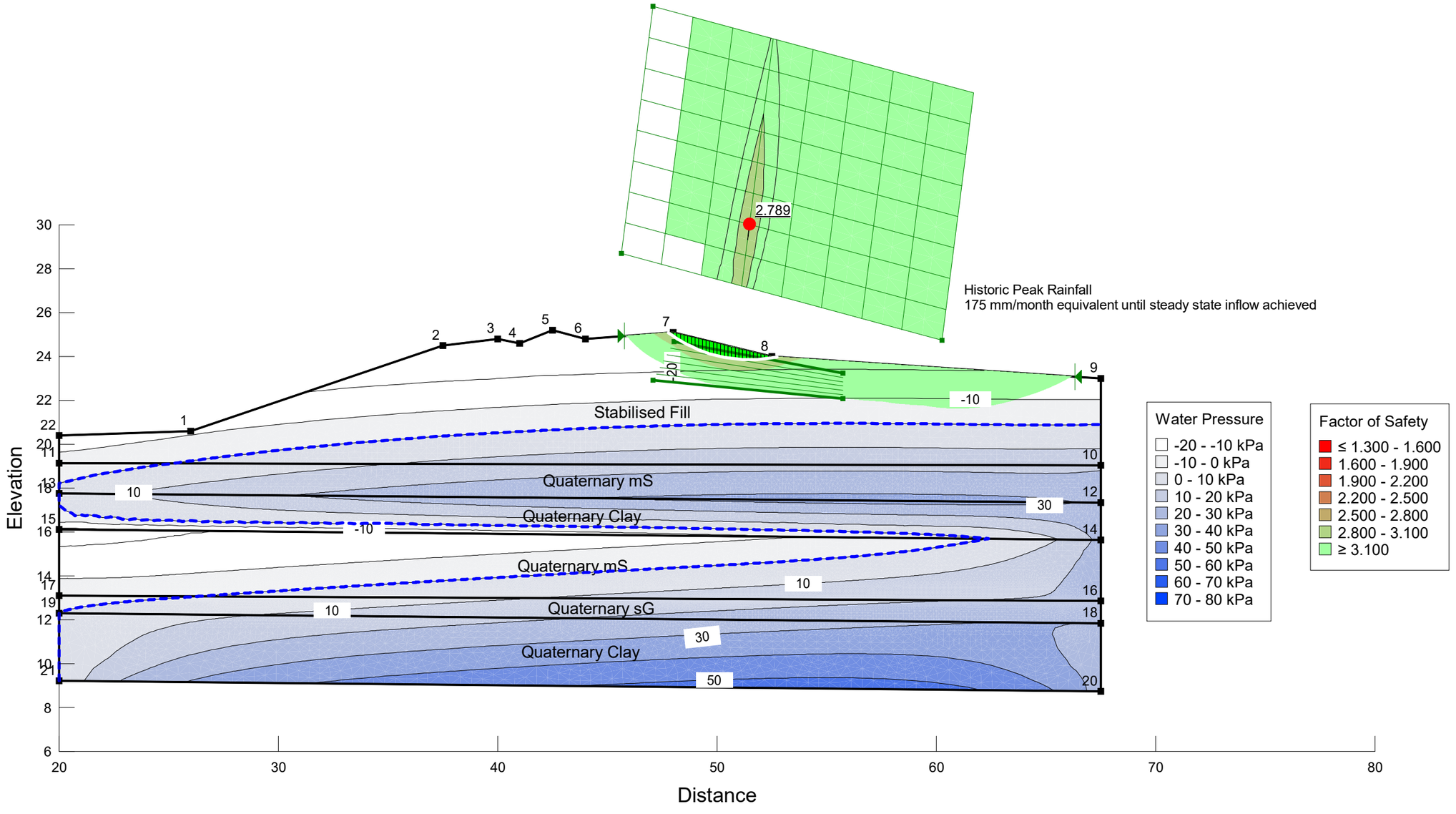

| | |
|---|---|
| Slope Stability 1 west face | |
| Profile G Average Conditions V2.gsz | |
| 14/07/2020 | 1:200 |



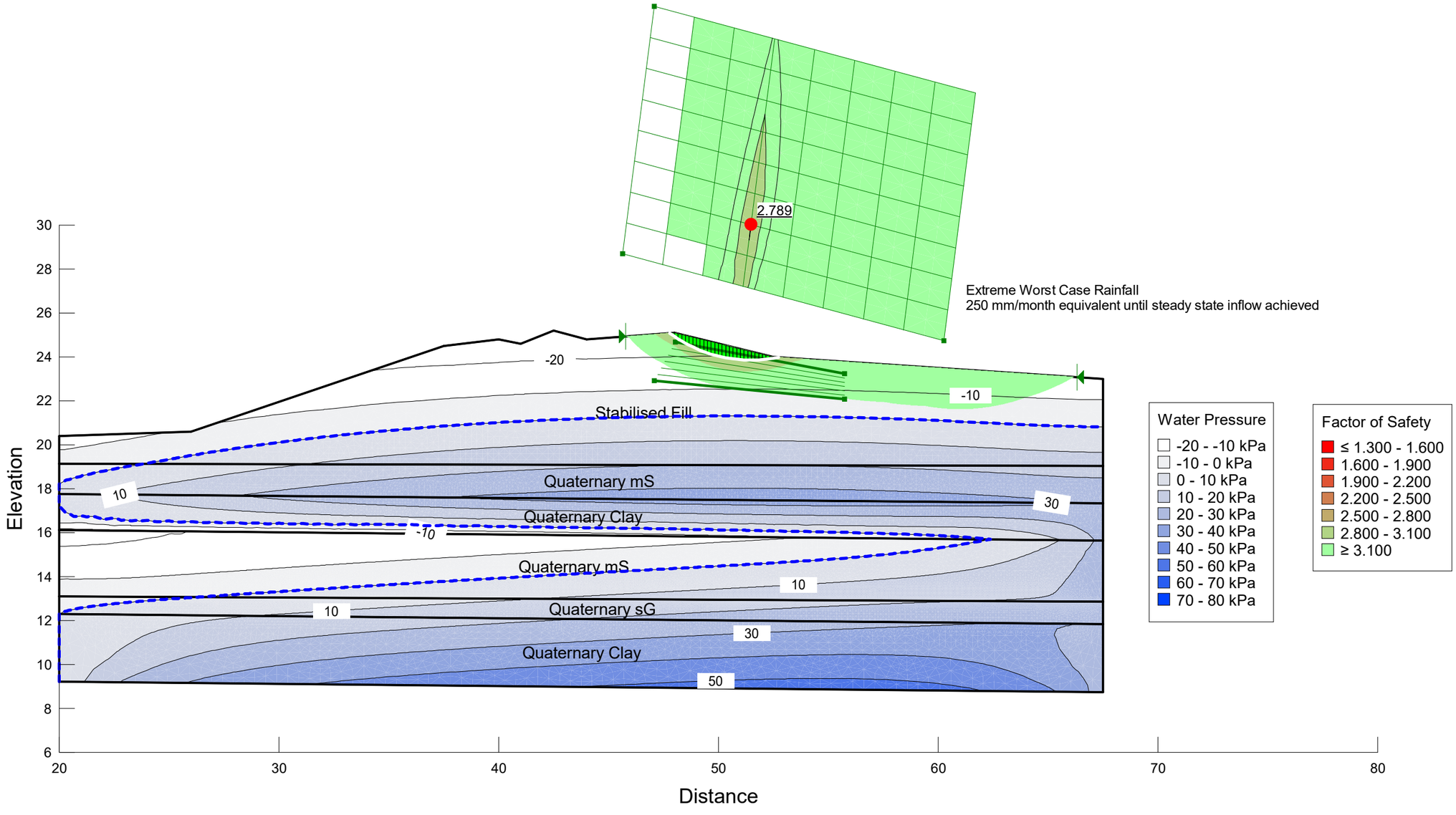

| | |
|---|---|
| Slope Stability 1 west face | |
| Profile G Future Extreme.gsz | |
| 14/07/2020 | 1:200 |




| | |
|---|---|
| Slope Stability east face | |
| Profile G Average Conditions V2.gsz | |
| 14/07/2020 | 1:200 |




| | |
|---|---|
| Slope Stability east face | |
| Profile G Average Conditions V2.gsz | |
| 14/07/2020 | 1:200 |




| | |
|---|---|
| Slope Stability east face | |
| Profile G Future Extreme.gsz | |
| 14/07/2020 | 1:200 |

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