

Ref: 17-524-L3-3
Date: 5th June 2025

M.C.I Developments Ltd

ANALYSIS OF SLOPE STABILITY TRUBS FARM, ROCHDALE

1. BACKGROUND

E3P understands M.C.I Developments Ltd intend to construct a residential development comprising low rise residential housing and two multi-storey apartment blocks with associated gardens, estate roads and infrastructure.

The site is roughly rectangular shaped parcel of land located in Castleton, south west of Rochdale town centre. The site is bound in the east by the Rochdale Canal and in the west by the train line. The site is currently undeveloped and utilised as agricultural land.

An embankment is present along the eastern boundary with the site topographically lower than the adjacent Rochdale Canal. The proposed site redevelopment works and construction of the new development platform to accommodate the residential development will require alteration to the current topography, with due consideration of the anticipated structural and infrastructure loading and altered soil mechanics, in respect to the existing slope along the eastern site boundary.

In light of the identified potential mechanism for slope failure to be induced by the proposed development and addition of structural loading, E3P has been commissioned to undertake an initial slope stability analysis to assess the pertinent / relevant stability and potential failure mechanism. This model will seek to determine the potential for newly imposed loadings to generate a risk of instability or failure within the off-site embankment and the need for any mitigation measures.

At this stage no regrading of the slope has been proposed, as such, the model has utilised current ground levels with development and canal loads incorporated where relevant.

A Proposed Development Plan is shown in Figure 1.



Figure 1 Proposed Development Plan



2. OBJECTIVES

E3P has been commissioned to undertake a detailed slope stability analysis to assess its existing state's pertinent/relevant safety and failure mechanism factors, at this stage no regrading of the slope has been proposed. The model is to be based on the information available to define the slip failure and the risk zones.

This assessment specifically considers the long-term stability of the slope with the Trubs Farm site located to the toe of the slope.

3. GEOMORPHOLOGY AND TOPOGRAPHY

3.1. SUMMARY OF GROUND CONDITIONS

BGS mapping suggests the subject site is underlain by Glaciofluvial deposits of sand and gravel with peat mapped along the west. The underlying bedrock geology comprises the Pennine Lower Coal Measures (Mudstone, Sandstone and Siltstone).

E3P completed a phase of ground investigation between the 15th and 18th April 2024, comprising of the following;

- ✳ 28 x mechanically excavated trial pits,
- ✳ 3 x BRE365 soakaway tests,
- ✳ 12 x window sample boreholes,
- ✳ 3 x cable percussive boreholes,
- ✳ Construction of 12 environmental monitoring locations.

The ground conditions have been described as follows:

3.1.1. MADE GROUND

Made Ground was encountered within seven of the 33 exploratory locations on site to a maximum depth of 1.20 m bgl (TP127).

Made Ground was encountered in the north within TP119 to a recorded proven depth of 0.60 m bgl, in one location in the centre (TP123) to a depth of 0.60 m bgl and along the central eastern boundary in TP109, TP110, TP114, TP127 and WS103, to a maximum depth of 1.20 m bgl, but more generally encountered to depths < 1.00 m bgl.

In all locations Made Ground comprises a reworked topsoil from ground level to a maximum depth of 0.30 m bgl, underlain by a reworked clayey gravelly fine to medium SAND with gravel inclusions of sandstone, mudstone and brick.

Subangular cobbles of whole brick were encountered within TP119.

A Depth of Made Ground Plan is presented as Drawing 13-422-003 at the end of this letter.

3.1.2. SUPERFICIAL DEPOSITS

Drift deposits were encountered within all exploratory locations and are variable across the site comprising interbedded layers of CLAY, SAND and PEAT. Drift deposits were encountered from 0.20 to a maximum proven depth of 15.00 m bgl.

Where encountered, cohesive deposits were encountered as brown soft to stiff, silty sandy CLAY. Granular deposits were encountered as light brown very loose to dense fine to medium SAND.

From depths of 3.00 m bgl and below the sands were encountered as 'blowing sand' within window sample and cable percussive boreholes, likely associated with the high water table.

PEAT was encountered within 22 of 33 locations. In the south of the site brown pseudo fibrous PEAT was encountered within TP101, TP104, TP106-TP109, TP111, TP112, TP126, WS102, WS110-WS112 and CP101 at depths between 0.30 m and 3.00 m bgl, with a thickness ranging from 0.10 m (TP104) to 2.50 m (WS112). In the north of the site brown pseudo fibrous PEAT was encountered within TP103, TP115-TP118, WS106, WS107 and CP103 at depths between 0.25 m and 4.90 m, with a thickness ranging from 0.20 m (TP103) to 3.60 m (CP103).

Additionally, rare plant debris was noted within SAND and CLAY deposits in 10 locations (TP113, TP116-TP118, TP120, TP126, TP128, WS101, WS105 and WS109) at depths between 0.30 m and 2.60 m bgl.

No PEAT or plant debris was encountered within the central eastern sector of the site. With strata in this area of the site comprising interbedded brown slightly clayey gravelly fine to medium SAND and firm to stiff brown mottled grey gravelly sandy CLAY. Gravel is fine to coarse subrounded to rounded of mudstone.

A depth and thickness of peat plan drawing ref: 17-524-014 is attached to the end of this letter.

3.1.3. SOLID GEOLOGY

The solid bedrock geology was not encountered during the site investigation.

3.1.4. GROUNDWATER

Groundwater strikes were encountered across the site at depths between 0.50 m and 13.20 m. Generally, a high water table was encountered with saturated soil arisings noted across the site.

The depths of strikes are summarised in Table 1.

Table 1 Summary of Groundwater Strikes

LOCATION	DEPTH TO STRIKE (m)	NOTES
TP102/SA102	1.8	Strike
TP107	1.0	Saturated Peat
TP115	0.5	Saturated Peat
TP116	1.0	Saturated Peat
TP117	2.0	Saturated Peat
TP118	1.5	Strike
TP119	1.8	Strike
TP120	0.4	Perched water
TP122	1.9	Seepage
TP124	1.0	Strike
TP125	1.7	Seepage
WS112	2.0	Saturated PEAT
WS104	1.0	Strike
WS105	1.1	Strike
WS110	2.0	Saturated PEAT
WS103	2.0	Strike
CP101	0.9	Strike
CP102	13.2	Strike
CP103	10.3	Strike

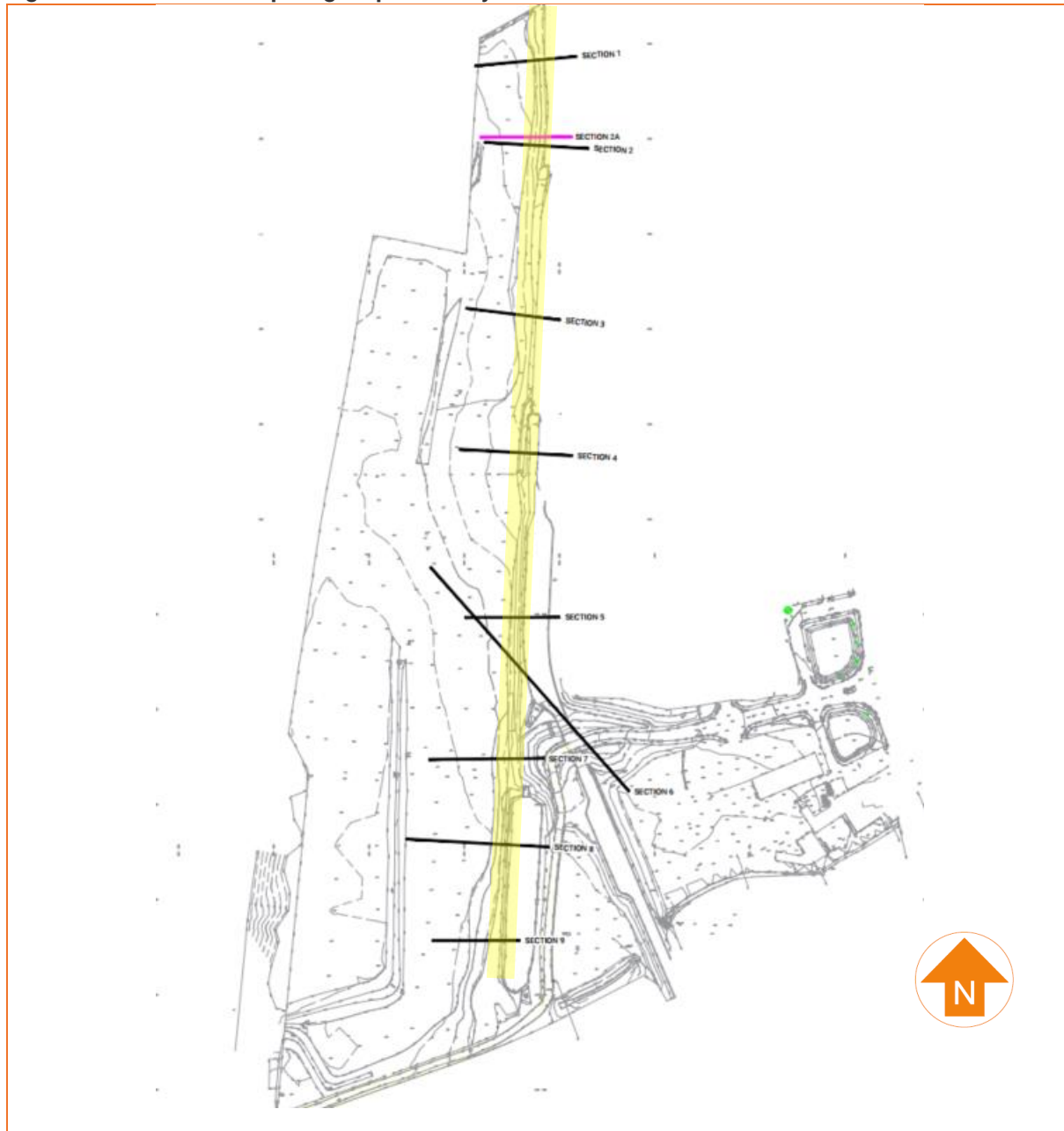
Return monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present. These results generally record a high water table with groundwater encountered between 0.21 m and 1.14 m bgl during the monitoring period undertaken to date.

3.2. AREAS REQUIRING ASSESSMENT

A slope stability assessment is required to ensure that the current site is not at any risk of any failure or slip from the embankment that is present along the eastern boundary before any future development works take place.

Figure 2 shows a snapshot of the area which requires the slope stability assessment, and the location of slope sections modelled as part of this assessment.

Figure 2 **Area Requiring Slope Stability Assessment**



3.3. DERIVATION OF MODEL

E3P has utilised the ground investigation data in conjunction with the topographical survey information to derive a robust ground model that is utilised within the assessment of slope stability within the context of the detailed design.

E3P undertook additional hand excavated trial pits within the embankment to confirm the geology and obtain geotechnical samples inclusive of particle size distribution, dry density and optimum water content relationship (utilising 4.5kg rammer), and shear box testing in order to derive the geotechnical parameters for the modelling. Geotechnical laboratory results are appended to this letter as Murray Rix Report MRN 24005-282 and Soil Engineering report LT1986.

Section models were derived from the recorded geology within hand pits undertaken on the slope and previous exploratory hole locations undertaken at the base of the slope. A summary of the ground conditions modelled for each section is provided within Table 2 (Section 4.2).

3.4. VISUAL ASSESSMENT

The profile of the slope is similar along its entire length, the exception to this is the area adjacent to the Rochdale Canal Towpath and entrance road (section 6/7), where the slope is broadened due to absence of the Rochdale Canal.

No visual evidence of historic failure through slip or slide was noted. Additionally, no tension cracks within the soils were observed.

No retaining features were observed along the entirety of the slope.

In the north of the site no vegetation (with the exception of low grasses) was present. Along the central and southern areas of the slope semi-mature tree's ranging from circa 3 – 10 m are present. No arching of tree's was observed that would indicate a historic failure in these areas. Where the broader section of the slope is present in the central/south no tree's or scrub vegetation are present.

Generally the slope appears in good condition. If the slope is to remain on site, it is recommended that a structural engineer completes a detailed appraisal.

4. GEOTECHNICAL SLIP CIRCLE ANALYSIS

To ensure the perceived risk is fully appraised, E3P has created a slope stability model to assess the perceived location of all slip circles, their zone of influence and Factor of Safety.

This slope stability analysis involves Limit Equilibrium (LE) analysis due to its simplicity and accuracy.

This method consists of cutting the slope into fine slices and applying appropriate equilibrium equations (equilibrium of the forces and/or moments). According to the assumptions made on the efforts between the slices and the equilibrium equations considered, many alternatives were proposed, such as the Bishop and Fellenius methods. In most cases, they are shown to give similar results. For this study, Oasys Slope, EC7 Ultimate Limit State (ULS) scenario slope stability analysis program has been used.

4.1. LIMITATIONS OF THE STUDY

The comments made, and conclusions drawn concerning the proposed slopes within the subject site are appropriate at this point in time only and are based on the information available to E3P at the time of writing. If more information becomes available or the site conditions alter, then the aforementioned comments and conclusions may have to be re-assessed. If any ambiguity exists concerning any point, for the avoidance of doubt, guidance should be sought from E3P, in all instances.

4.2. INPUT PARAMETERS & DATA

Detailed cross-sections of the slope have been generated using ground level topographical survey provided by the client. An assessment of the slope has been undertaken at nine sections as shown in Drawing No. 17-524-031 and Figure 2.

A summary of the ground conditions modelled for each section is provided within Table 2.

Table 2 Ground Conditions Summary Per Section

SECTION LOCATION	DEPTH (M BGL)	STRATA IDENTIFIED	GROUNDWATER STRIKE (M BGL)
1	0.00 – 0.50	MADE GROUND: Sand	2.3
	0.50 – 1.50	SAND	
	1.50 – 1.80	Sandy CLAY	
	>1.80	SAND	
2 and 2A	0.00 – 1.10	MADE GROUND: Sand	2.95
	1.10 – 2.10	SAND	
	2.10 – 2.45	Sandy CLAY	
	>2.45	SAND	
3	0.00 – 1.40	MADE GROUND: Sand	2.40
	1.40 – 2.10	CLAY	
	2.10 – 2.50	SAND	
	2.50 – 3.80	Silty CLAY	
	3.80 – 4.50	SAND	
4	0.00 – 0.85	MADE GROUND: Sand	N/A
	>0.85	SAND	
5	0.00 – 1.20	MADE GROUND: Sand	N/A
	1.20 – 1.70	Sandy CLAY	
	1.70 – 2.30	SAND	
6	0.00 – 1.20	MADE GROUND: Sand	N/A
	1.20 – 1.70	Sandy CLAY	
	1.70 – 2.30	SAND	
7	0.00 – 1.00	SAND	N/A
	1.00 – 1.50	PEAT	
	1.50 – 2.10	SAND	
	2.10 – 2.40	CLAY	
8	0.00 – 1.00	SAND	N/A
	1.00 – 1.50	PEAT	
	1.50 – 2.10	SAND	
	2.10 – 2.40	CLAY	
9	0.00 – 0.40	SAND	N/A
	0.40 – 0.70	CLAY	
	0.70 – 0.90	PEAT	
	0.90 – 1.40	CLAY	
	1.40 – 3.20	SAND	

Further analysis for the assessment will be required if the development levels are updated or changed.

For this assessment, the Bishops method has been utilised.

To ensure a suitably robust assessment, shear box testing of soils within the slope was carried out and has been utilised within the assessment. Where no geotechnical laboratory results are available for a soil type (topsoil), conservative literature values of the soil material property parameters were utilised based on the data obtained from the E3P supplementary ground investigation. The soil parameters used for the assessment are detailed in Table 3.

Table 3 Geotechnical Input Parameters

MATERIAL TYPE	C' – EFFECTIVE COHESION (KPA)	Ø' (°) ANGLE OF EFFECTIVE FRICTION	Γ (KN/M2) BULK UNIT WEIGHT)
MADE GROUND: Sand	11.0*	32.0*	18.0*
SAND	11.0	32.5	20.0

MATERIAL TYPE	C' – EFFECTIVE COHESION (KPA)	ϕ' (°) ANGLE OF EFFECTIVE FRICTION	Γ (KN/M2) BULK UNIT WEIGHT)
Sandy CLAY	20	22.0	19.0
CLAY	20	32.5	21.0
Silty CLAY	20	22.0	20.0
PEAT	1.0	34.0	21.0

* Values have been derived using shear box testing (ref: Murray Rix Laboratory Report – LT1986 dated October 2024). Remaining values derived from published literature values.

For the avoidance of doubt the sections and the limits modelled under each scenario are presented in Table 4.

Table 4 Summary of loadings

SECTION LOCATION	PERMANENT LOAD (CANAL AT TOP) (KN/M ²)	TEMPORARY LOAD (ROAD AT BASE) (KN/M ²)	PERMANENT LOAD (PLOT AT BASE) (KN/M ²)
1	N/A	20	N/A
2	N/A	N/A	120
2A	N/A	N/A	120
3	431	20	N/A
4	120	20	N/A
5	431	20	120
6	N/A	20	120
7	N/A	20	N/A
8	N/A	20	120
9	N/A	N/A	N/A

5. SLOPE ANALYSIS RESULTS

The results of each of the sections are detailed below in Table 5.

Table 5 Summary of Results

SECTION	FACTOR OF SAFETY (FOS) – PROPOSED LEVELS
1	6.446
2	6.719
2A	4.881
3	5.299
4	4.901
5	5.390
6	4.899
7	4.199
8	2.664
9	6.470

Factory of Safety (FoS) as defined within EC7 ULS assessment, suggests that all slopes below '1' demonstrate a failing slope. As such, the results show that the slope is stable within all sections (1-9).

The calculus was performed following the Bishop's Method utilising the calculus for Design Approach 1-2 according to EN 1997:2004 Eurocode 7: Geotechnical Design which requires compliance with the following partial FoS for a ULS analysis for DA1 to be >1.

6. CONCLUSIONS & RECOMMENDATIONS

6.1. SLOPE RESULTS

The results of the slope stability analysis have yielded factor of safety results ranging between 2.664 and 6.719 for the nine sections modelled along the embankment in the east of the site.

A comparison of the required FoS as defined within EC7 ULS assessment requirements would suggest that sections 1 - 9 have a FoS >1 and show the slope to be stable based on the ground conditions, existing topographical levels and proposed development loadings.

The assessment confirms that the eastern slopes are above the required FOS on the proposed levels and inducement of dwellings. As such, mitigation measures are not anticipated to be required in these areas.

Yours sincerely,
For and on behalf of E3P Ltd

Matthew Dee
Senior Geoenvironmental Consultant

Enclosed:

-  E3P Exploratory Hole Logs
-  E3P Drawings: Proposed Development Plan - Drawing No. 17-524-002
Exploratory Hole Location Plan - Drawing No. 17-524-005
Slope Stability Section Location Plan - Drawing No. 17-524-031
-  E3P Slope Stability Analysis (Sections 1-9)
-  Geotechnical Testing: Murray Rix Report MRN 24005-282 and Soil Engineering report LT1986.

				Trial Pit Log				TrialPit No TP101/ SA101 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 15/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.00		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES	6	0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).		1
							Firm brownish grey very sandy CLAY.		
							Brown pseudo fibrous PEAT.		
							Very soft grey sandy CLAY with organic odour.		
	1.00	HVP					Grey clayey fine to medium SAND.		
	1.50	ES		2.00					2
							End of Pit at 2.00m		3
									4
Trial Pit Photographs									
									
Trial Pit 101/ Soakaway 101					Trial Pit 101 Spoil				
Remarks: 1. Complete. 2. BRE365 Soakaway test completed.									
Stability: Stable									
									

				Trial Pit Log			TrialPit No TP102/ SA102 Sheet 1 of 1		
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 15/04/2024	
Location: Rochdale						Dimensions (m): 2.40		Scale 1:30	
Client: MCI Developments						Depth 2.00		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
 1.80	0.10	ES	49	0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).		
							Firm brownish orange gravelly very sandy CLAY. Gravel is fine to medium subangular to subrounded of mudstone.		
	1.20	ES							
	1.50	HVP							
			1.80				Orangish brown fine to medium SAND. (Possible running sand).		
			2.00				End of Pit at 2.00m		
									1
									2
									3
									4
Remarks: 1. Complete. 2. BRE365 Soakaway test completed.									
Stability: Unstable in sand									

Date
15/04/2024

Scale
1:30

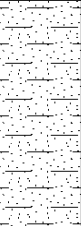
Logged
J.Beer

Trial Pit Photographs



Trial Pit 103 Spoil



				Trial Pit Log			TrialPit No TP104 Sheet 1 of 1		
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 15/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 1.90		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.90	ES		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).		
				1.00			Very soft brown sandy CLAY. Peat band at 0.60 to 0.70 m bgl.		
						1.90		Grey clayey fine to medium SAND.	
	1.50	B						End of Pit at 1.90m	
Trial Pit Photographs									
									
Trial Pit 104				Trial Pit 104 Spoil					
Remarks: 1. Complete.									
Stability: Stable									
									

Project Name: Trubs Farm

Project No.
17524

Co-ords: -
Level:

Date
15/04/2024

Location: Rochdale

Dimensions (m): 2.50

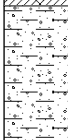
Scale
1:30

Client: MCI Developments

Depth
2.00

0.60

Logged
J.Beer

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	1
							Greyish light brown slightly gravelly very sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone.	
							Grey clayey fine to medium SAND.	
							2.00	
		3						
								4

Trial Pit Photographs



Trial Pit 105



Trial Pit 105 Spoil

Remarks: 1. Complete.

Stability: Unstable below 1.50 m

				Trial Pit Log			TrialPit No TP106 Sheet 1 of 1		
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 15/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.50		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	1.00	D		0.30			Dark brown sandy CLAY with rootlets (TOPSOIL).		
							Brown pseudo fibrous PEAT.		
		ES		2.00			Grey clayey fine to medium SAND.		
						2.50	End of Pit at 2.50m		
Trial Pit Photographs  Trial Pit 106Trial Pit 106 Spoil									
Remarks: 1. Complete.									
Stability: Unstable									

				Trial Pit Log				TrialPit No TP107 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 15/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.00		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
▼ 1.00	0.10	ES		0.30			Dark brown sandy CLAY with rootlets (TOPSOIL).		
	0.40	ES					Brown very sandy CLAY with organic odour.		
							Brown pseudo fibrous PEAT.		
	1.80	B					Grey clayey fine to medium SAND.		
				2.00			End of Pit at 2.00m		
Trial Pit Photographs									
 Trial Pit 107				 Trial Pit 107 Spoil					
Remarks: 1. Complete. 2. Water at 1.00 m bgl in saturated PEAT.									
Stability: Stable									

				Trial Pit Log				TrialPit No TP108 Sheet 1 of 1		
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 15/04/2024		
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30		
Client: MCI Developments						Depth 1.90		Logged J.Beer		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).			1 2 3 4
				0.30			Brown sandy CLAY with organic odour.			
				0.50			Brown pseudo fibrous PEAT.			
				1.50			Firm grey very sandy CLAY.			
				1.70			Grey clayey fine to medium SAND.			
				1.90			End of Pit at 1.90m			
Trial Pit Photographs										
 Trial Pit 108					 Trial Pit 108 Spoil					
Remarks: 1. Complete.										
Stability: Stable										

Project Name: Trubs Farm

Project No.
17524

Co-ords: -
Level:

Date
15/04/2024

Location: Rochdale

Dimensions (m): 2.50

Scale
1:30

Client: MCI Developments

Depth
2.00

0.60

Logged
J.Beer

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30	ES		0.20			MADE GROUND: Dark brown sandy clay with rootlets. (Topsoil).	1 - 2 - 3 - 4 -
				0.70			MADE GROUND: Greyish brown slightly clayey gravelly fine to medium sand (reworked). Gravel is fine to coarse subangular to rounded of mudstone, sandstone and rare brick.	
				1.20			Brown pseudo fibrous PEAT.	
				1.80			Grey gravelly very clayey fine to medium SAND. Gravel is fine to coarse subrounded to rounded of mudstone.	
				2.00			Stiff brown mottled grey gravelly CLAY. Gravel is fine to medium subrounded to rounded of mudstone.	
				End of Pit at 2.00m				

Trial Pit Photographs



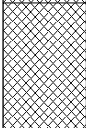
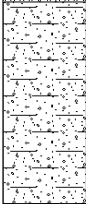
Trial Pit 109

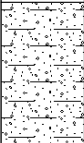
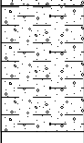


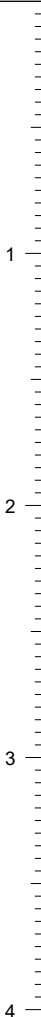
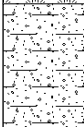
Trial Pit 109 Spoil

Remarks: 1. Complete.

Stability:	Stable
------------	--------

				Trial Pit Log				TrialPit No TP110 Sheet 1 of 1			
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:			Date 15/04/2024		
Location: Rochdale						Dimensions (m): 2.50 0.60 			Scale 1:30		
Client: MCI Developments						Depth 1.60			Logged J.Beer		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
	Depth	Type	Results								
	0.10	ES		0.30			MADE GROUND: Dark brown sandy clay with rootlets. (Topsoil).				1
				0.80			MADE GROUND: Brownish grey gravelly sandy clay (reworked). Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and brick.				
				1.50			Light brown slightly gravelly slightly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded.				
			B	1.60			End of Pit at 1.60m				2
											3
											4
Trial Pit Photographs											
											
Trial Pit 110						Trial Pit 110 Spoil					
Remarks: 1. Complete.											
Stability: Unstable in sand											
											

				Trial Pit Log			TrialPit No TP111 Sheet 1 of 1		
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 15/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.10		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES		0.40			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).		
				1.00			Brown pseudo fibrous PEAT.		
				1.60			Grey gravelly clayey fine to medium SAND. Gravel is fine to coarse subrounded to rounded of mudstone.		
	1.70	ES		2.10			Brownish grey slightly gravelly silty sandy CLAY.		
							End of Pit at 2.10m		
Trial Pit Photographs									
									
Trial Pit 111				Trial Pit 111 Spoil					
Remarks: 1. Complete.									
Stability: Unstable in sand									
									

				Trial Pit Log				TrialPit No TP112 Sheet 1 of 1			
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:			Date 15/04/2024		
Location: Rochdale						Dimensions (m): 2.50			Scale 1:30		
Client: MCI Developments						Depth 2.20			Logged J.Beer		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
	Depth	Type	Results								
	0.10	ES		0.30			Dark brown sandy CLAY with rootlets (TOPSOIL).				
				0.50			Soft brown sandy CLAY.				
							Brown pseudo fibrous PEAT.				
	1.20	D		1.70			Grey gravelly clayey fine to medium SAND. Gravel is fine to coarse subrounded to rounded of mudstone.				
				2.20			End of Pit at 2.20m				
Trial Pit Photographs											
											
Trial Pit 112						Trial Pit 112 Spoil					
Remarks: 1. Complete.											
Stability: Stable											
											

Date
15/04/2024

Scale
1:30

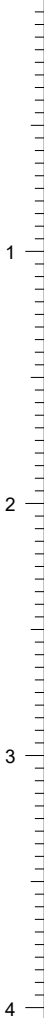
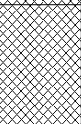
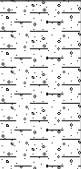
Logged
J.Beer

Trial Pit Photographs



Trial Pit 113 Spoil



				Trial Pit Log				TrialPit No TP114 Sheet 1 of 1			
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:			Date 15/04/2024		
Location: Rochdale						Dimensions (m): 2.50			Scale 1:30		
Client: MCI Developments						Depth 2.40			Logged J.Beer		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
	Depth	Type	Results								
	0.10	ES	158	0.20			MADE GROUND: Dark brown clayey fine to medium sand with rootlets. (Topsoil).				
						MADE GROUND: Brown gravelly clayey fine to medium sand (reworked). Gravel is fine to coarse subangular to rounded of mudstone and brick.					
						Orangish brown very gravelly fine to medium SAND with cobbles. Gravel is fine to coarse subrounded to rounded of mudstone. Cobbles are subrounded to rounded of mudstone.					
	1.20	B				Very stiff brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone.					
	2.00 2.00	ES HVP				End of Pit at 2.40m					
				2.40							
Trial Pit Photographs											
											
Trial Pit 114						Trial Pit 114 Spoil					
Remarks: 1. Complete.											
Stability: Unstable in sand											
											

Project Name: Trubs Farm

Project No.
17524

Co-ords: -
Level:

Date
16/04/2024

Location: Rochdale

Dimensions (m): 2.40

Scale
1:30

Client: MCI Developments

Depth
2.00

0.60

Logged
J.Beer

[illegible]

Trial Pit Photographs



Trial Pit 115/ Soakaway 103



Trial Pit 115/ Soakaway 103 Spoil

Remarks: 1. Complete. 2. BRE365 Soakaway test completed. 3. Water at 0.50 m bgl in saturated PEAT.

Stability:	Stable
------------	--------

Date
16/04/2024

Scale
1:30

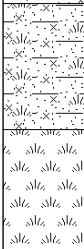
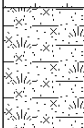
Logged
J.Beer

Trial Pit Photographs



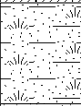
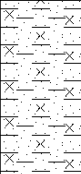
Trial Pit 116 Spoil



				Trial Pit Log			TrialPit No TP117 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30
Client: MCI Developments						Depth 2.60		Logged J.Beer
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.00	0.70 0.80	ES HVP	13	0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
				0.40			Brown clayey fine to medium SAND with plant debris. Very soft brown silty CLAY with plant debris.	
				1.10			Grey slightly clayey silty fine to medium SAND with rare plant debris.	
				1.60			Brown pseudo fibrous PEAT.	
				2.10			Grey slightly clayey silty fine to medium SAND with rare plant debris.	
				2.60			End of Pit at 2.60m	
Trial Pit Photographs								
								
Trial Pit 117				Trial Pit 117 Spoil				
Remarks: 1. Complete. 2. Water at 1.00 m bgl in saturated PEAT.								
Stability: Stable								
								

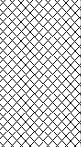
				Trial Pit Log				TrialPit No TP118 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.10		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
▼ 1.50	1.00	ES HVP	41	0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).		
	1.00			0.50			Brown slightly clayey fine to medium SAND with plant debris.		
				0.75			Dark brown pseudo fibrous PEAT.		
							Firm to stiff grey mottled brown slightly gravelly sandy silty CLAY. Gravel is fine to medium subrounded to rounded of mudstone. Light brown sand lens at 1.30 to 1.60 m bgl.		
	2.00	HVP	78	2.10			End of Pit at 2.10m		
Trial Pit Photographs									
									
Trial Pit 118				Trial Pit 118 Spoil					
Remarks: 1. Complete. 2. Water strike encountered at 1.50 m bgl.									
Stability: Unstable in sand									

				Trial Pit Log				TrialPit No TP119 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.00		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
 1.80	0.10	ES		0.30			MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand with rootlets. Gravel is fine to medium subangular of brick. (Topsoil).		
	0.40	ES		0.50			MADE GROUND: Dark brown gravelly clayey fine to medium sand with rare cobbles. Gravel is fine to coarse angular to subrounded of mudstone and brick. Cobbles are subangular of brick.		
	1.00	B					Orangish light brown clayey fine to medium SAND.		
				1.50			Grey mottled light brown very sandy CLAY.		
				1.80			Orangish light brown slightly silty fine to medium SAND.		
				2.00			End of Pit at 2.00m		
Trial Pit Photographs									
									
Trial Pit 119					Trial Pit 119 Spoil				
Remarks: 1. Complete. 2. Water strike encountered at 1.80 m bgl.									
Stability: Very unstable in sand									
									

				Trial Pit Log				TrialPit No TP120 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.10		Logged J.Beer	
Water Strike  0.40	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES	20	0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).		
	0.80	HVP		0.70		Dark brown slightly clayey fine to medium SAND with plant debris.			
				1.00		Soft greyish brown sandy CLAY.			
				1.70		Grey silty clayey fine to medium SAND.			
				2.10		Brownish grey gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.			
				End of Pit at 2.10m					
Trial Pit Photographs									
 Trial Pit 120				 Trial Pit 120 Spoil					
Remarks: 1. Complete. 2. Perched water at 0.40 m bgl.									
Stability: Slightly unstable									

				Trial Pit Log				TrialPit No TP121 Sheet 1 of 1			
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:			Date 16/04/2024		
Location: Rochdale						Dimensions (m): 2.50 0.60 Depth 2.00			Scale 1:30 Logged J.Beer		
Client: MCI Developments											
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
	Depth	Type	Results								
	0.80	ES		0.25			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).				
							Orangish light brown clayey fine to medium SAND.				
										2.00	
										1	
										2	
										3	
										4	
Trial Pit Photographs											
											
Trial Pit 121					Trial Pit 121 Spoil						
Remarks: 1. Terminated due to instability.											
Stability: Very unstable											
											

				Trial Pit Log			TrialPit No TP122 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30
Client: MCI Developments						Depth 2.30		Logged J.Beer
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.90				0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
							Firm brown mottled grey very sandy CLAY.	
	0.70	HVP	71					
	0.80	B						
	1.00	ES		1.10			Stiff brown mottled grey slightly sandy CLAY.	
	1.30	HVP	115					
				1.90			Reddish brown slightly silty fine to medium SAND.	
				2.30			End of Pit at 2.30m	
Trial Pit Photographs								
								
Trial Pit 122				Trial Pit 122 Spoil				
Remarks: 1. Complete. 2. Water encountered as seepage at 1.90m bgl.								
Stability: Slightly unstable								
								

				Trial Pit Log				TrialPit No TP123 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 1.10		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES					MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand with rootlets. Gravel is fine to coarse subangular of brick.		
				0.60			MADE GROUND: Orangish light brown clayey fine to medium sand (reworked).		
				1.10			End of Pit at 1.10m		
Trial Pit Photographs									
									
Trial Pit 123					Trial Pit 123 Spoil				
Remarks: 1. Terminated due to land drain encountered at 1.10 m bgl.									
Stability: Stable									
									

Project Name: Trubs Farm

Project No.
17524

Co-ords: -
Level:

Date
16/04/2024

Location: Rochdale

Dimensions (m): 2.50

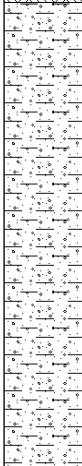
Scale
1:30

Client: MCI Developments

Depth
2.20

0.60

Logged
J.Beer

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.70	0.10	ES		0.35			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	1 -
	0.80	HVP	139				Stiff brown mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone. Firm from 1.60 to 2.00 m bgl	
	1.30	HVP	142	2.20				2 -
	1.60	HVP	71					
	2.00	HVP	123					
	End of Pit at 2.20m						3 - 	
						4 - 		

Trial Pit Photographs



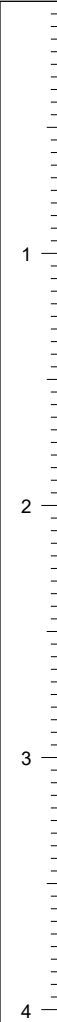
Trial Pit 125

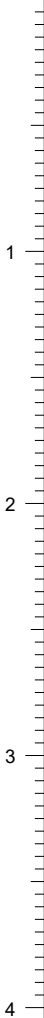


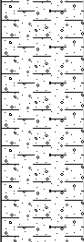
Trial Pit 125 Spoil

Remarks: 1. Complete. 2. Water encountered as seepage at 1.70m bgl.

Stability:	Stable
------------	--------

				Trial Pit Log			TrialPit No TP126 Sheet 1 of 1			
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024		
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30		
Client: MCI Developments						Depth 3.50		Logged J.Beer		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	2.00	D		0.40			Dark brown sandy CLAY with rootlets (TOPSOIL).			
				0.70			Brown clayey fine to medium SAND with plant debris.			
				1.80			Dark brown pseudo fibrous PEAT.			
							Brown pseudo fibrous PEAT.			
		2.60				Brown amorphous PEAT (very wet).				
		3.00				Grey clayey sandy SILT.				
		3.50				End of Pit at 3.50m				
Trial Pit Photographs										
										
Trial Pit 126						Trial Pit 126 Spoil				
Remarks: 1. Complete.										
Stability: Slightly unstable										
										

				Trial Pit Log				TrialPit No TP127 Sheet 1 of 1			
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:			Date 16/04/2024		
Location: Rochdale						Dimensions (m): 2.50			Scale 1:30		
Client: MCI Developments						Depth 2.30			Logged J.Beer		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
	Depth	Type	Results								
	0.60	ES		0.20			MADE GROUND: Dark brown sandy clay with rootlets (Topsoil).				
				0.80			MADE GROUND: Brown slightly gravelly clayey fine to medium sand (reworked). Gravel is fine to medium subangular of brick.				
				1.20			MADE GROUND: Greyish dark brown gravelly clayey fine to medium sand. Gravel is fine to medium subangular of brick.				
				1.70			Firm brown mottled grey very sandy CLAY.				
				2.30			Dark brownish grey clayey fine to medium SAND.				
				End of Pit at 2.30m							
Trial Pit Photographs											
											
Trial Pit 127						Trial Pit 127 Spoil					
Remarks: 1. Complete.											
Stability: Stable											
											

				Trial Pit Log				TrialPit No TP128 Sheet 1 of 1	
Project Name: Trubs Farm				Project No. 17524		Co-ords: - Level:		Date 16/04/2024	
Location: Rochdale						Dimensions (m): 2.50		Scale 1:30	
Client: MCI Developments						Depth 2.20		Logged J.Beer	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES	91	0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).		
	1.00 1.00	B HVP				Firm to stiff orangish brown mottled grey gravelly very sandy CLAY. Gravel is fine to coarse subrounded to rounded of mudstone.			
						Brownish grey gravelly very sandy CLAY with rare cobbles and plant debris. Gravel is fine to coarse subrounded to rounded of mudstone. Cobbles are rounded of mudstone.			
						2.20		End of Pit at 2.20m	
									1
									2
									3
									4
Trial Pit Photographs									
									
Trial Pit 128				Trial Pit 128 Spoil					
Remarks: 1. Complete.									
Stability: Stable									

Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

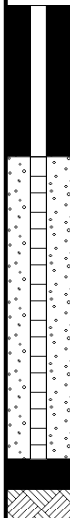
Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00	ES	N=4 (1,0/1,1,1,1)	0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	1
					0.80			Brown sandy CLAY with rare plant debris.	
					1.20			Loose grey slightly clayey fine to medium SAND.	
		1.80		N=15 (1,3/2,4,5,4)	1.70			Loose grey slightly silty fine to medium SAND.	2
		2.00						Medium dense grey gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.	
		3.00		50 (5,8/50 for 285mm)	2.80			Dense greyish brown SAND and GRAVEL. Gravel is fine to medium subrounded to rounded of mudstone	3
					3.44		End of borehole at 3.44 m		
									4
									5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES	N=6 (1,1/1,2,1,2)	0.20			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	1
		0.80			1.00			Grey clayey fine to medium SAND.	
		1.00			1.00				
		2.00			1.90			Dark brown pseudo fibrous PEAT.	
		2.00			1.90				
		3.00		50 (5,7/50 for 295mm)	2.90			Loose grey clayey fine to medium SAND (saturated).	2
		3.00			2.90				3
		3.00			2.90				3
		3.45			3.45			Dense grey SAND and GRAVEL. Gravel is fine to medium subrounded to rounded of mudstone.	3
		3.45			3.45				4
		3.45			3.45				5
		3.45			3.45				6
		3.45			3.45				7
		3.45			3.45				8
		3.45			3.45				9
		3.45			3.45				10
		3.45			3.45				10
		3.45			3.45				10
		3.45			3.45				10
		3.45			3.45				10
		3.45			3.45				10

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 2.00 to 3.00 m bgl.

Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

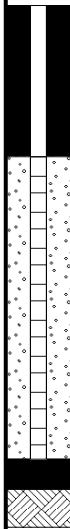
Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES	N=41 (5,9/8,9,11,13)	0.30			MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand with rootlets. Gravel is fine subangular of brick. (Topsoil).	1
		0.80			0.80			MADE GROUND: Brown clayey gravelly fine to medium sand (reworked). Gravel is fine to coarse subangular to rounded of mudstone and brick.	
		1.00						Dense light brown gravelly fine to medium SAND. Gravel is fine to medium subangular to rounded of mudstone.	
		2.00			1.70			Stiff medium strength brownish grey sandy CLAY.	
		2.40			2.40			Dense grey slightly sandy GRAVEL. Gravel is fine to coarse subrounded to rounded of mudstone.	
		3.00		N=50 (6,8/12,14,15,9)	3.00				3
		3.45			3.45			End of borehole at 3.45 m	4
									5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.



Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20			0.20			Dark brown sandy CLAY with rootlets (TOPSOIL).	
		1.00		N=7 (1,1/1,2,2,2)				Loose light brown mottled grey slightly gravelly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.	1
		1.60	ES		1.40				
		2.00 2.00	D	N=10 (2,2/2,2,3,3)				Stiff medium strength brown gravelly very sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone. Sand band 2.20 to 2.40 m bgl.	2
		3.00		50 (8,7/50 for 240mm)	2.60			Dense brown gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.	3
					3.39			End of borehole at 3.39 m	4
									5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.



Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

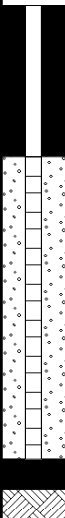
Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
					0.30			Very soft brown very sandy CLAY with plant debris.	
		1.00		N=7 (1,1/1,2,2,2)	1.00			Loose brownish grey clayey fine to medium SAND.	1
					1.40			Stiff medium strength grey sandy silty CLAY.	
		2.00		N=10 (2,2/2,3,3,2)					2
					2.70				
		3.00		50 (8,9/50 for 245mm)				Dense grey slightly gravelly fine to medium SAND.	3
					3.40				
								End of borehole at 3.40 m	4
									5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Borehole No.

WS106

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

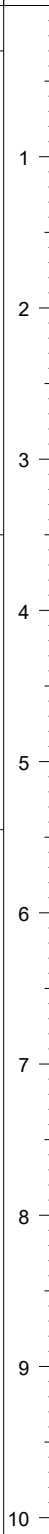
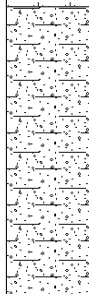
Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
								Brown pseudo fibrous PEAT (saturated).	
		1.00		N=5 (1,1/1,1,1,2)					
		2.00		N=0 (0,0/0,0,0,0)					
		3.00		N=0 (0,0/0,0,0,0)					
		3.70	ES		3.50			Medium dense grey slightly gravelly slightly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.	
		4.00		N=17 (3,3/4,4,4,5)					4
		5.00		N=27 (4,4/4,7,8,8)					5
					5.45			End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed. Response zone 3.50 to 4.50 m bgl.



Borehole Log

Borehole No.

WS107

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
								Brown pseudo fibrous PEAT.	
		1.00		N=7 (1,1/2,2,2,1)	0.90				1
		1.50 - 1.80	U		1.40			Loose greyish brown silty clayey fine to medium SAND.	
		2.00	D						2
		2.00		N=10 (1,1/2,2,2,4)					
		2.70	ES						
		3.00	D						3
		3.00		N=13 (2,2/2,3,4,4)					
		4.00	D						4
		4.00		N=20 (3,3/4,4,6,6)					
		5.00	D						5
		5.00		N=47 (6,8/10,12,12,13)					
					5.45				
								End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed. Response zone 1.00 to 4.00 m bgl.





Borehole Log

Borehole No.

WS108

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25			0.25			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL). Brown mottled grey sandy CLAY.	
		1.00 1.00	D	N=7 (1,1/1,2,2,2)	0.90			Firm low strength brown slightly sandy gravelly CLAY. Gravel is fine subrounded to rounded of mudstone.	1
		1.50 - 2.00	U					Loose brown clayey fine to medium SAND. Clay band 2.50 to 3.00 m bgl. Becoming medium dense at 3.00 m bgl.	2
		2.00 2.00	D	N=9 (1,1/2,2,2,3)	2.00				
		2.50	ES						
		3.00		N=16 (2,2/3,4,4,5)					3
		4.00		N=30 (3,4/6,6,8,10)	4.45				4
								End of borehole at 4.45 m	5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to blowing sands and hole collapse at 4.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.





Borehole Log

Borehole No.

WS109

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

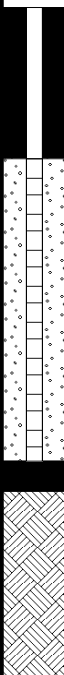
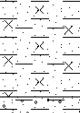
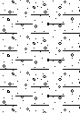
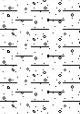
Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES	N=4 (1,1/1,1,1,1)	0.30			Dark brown sandy CLAY with rootlets (TOPSOIL).	1
					0.70			Brown clayey fine to medium SAND with plant debris.	
		1.00	D		1.00			Greyish light brown clayey fine to medium SAND.	
		1.00						Firm low strength greyish brown silty sandy CLAY.	
		1.50 - 2.00	U	N=6 (1,1/1,2,2,1)	2.00			Loose greyish light brown slightly clayey gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone. Becoming medium dense at 3.00 m bgl.	2
		2.00	D						
		2.00							
		3.00							
				N=16 (2,3/3,4,4,5)					3
			N=25 (3,3/4,6,6,9)	4.45				4	
							End of borehole at 4.45 m	5	
								6	
								7	
								8	
								9	
								10	

Remarks

1. Terminated due to blowing sands and hole collapse at 4.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.





Borehole Log

Borehole No.

WS110

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Dark brown sandy CLAY with rootlets (TOPSOIL).	
								Brown pseudo fibrous PEAT (saturated).	1
		1.00		N=1 (1,0/0,0,1,0)					
		2.00		N=7 (1,0/1,1,2,3)	2.20				2
		2.50	ES					Dense grey SAND and GRAVEL. Gravel is fine to medium subrounded to rounded of mudstone.	
		3.00		N=50 (4,8/12,12,13,13)	3.45				3
								End of borehole at 3.45 m	4
									5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 2.20 to 3.00 m bgl.





Borehole Log

Borehole No.

WS111

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

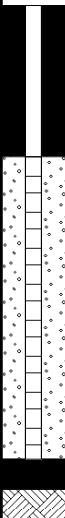
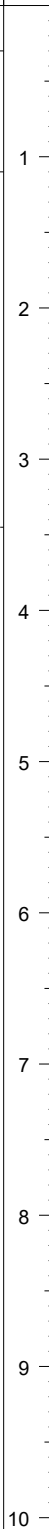
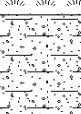
Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
								Brown pseudo fibrous PEAT (saturated).	
		1.00		N=2 (1,0/1,1,0,0)	1.10				
		1.50	ES						
		2.00		N=11 (3,2/3,2,2,4)					
								Very loose grey gravelly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone. Becoming medium dense at 2.00 m bgl.	2
		2.00		N=11 (3,2/3,2,2,4)					
		3.00		N=25 (5,6/5,7,6,7)					
									3
		3.00		N=25 (5,6/5,7,6,7)					
					3.45				4
									5
									6
									7
									8
									9
									10

Remarks

1. Terminated due to blowing sands and hole collapse at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.





Borehole Log

Borehole No.

WS112

Sheet 1 of 1

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
WS

Location: Rochdale

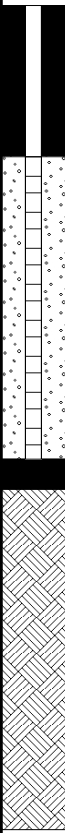
Level:

Scale
1:50

Client: MCI Developments

Dates: 17/04/2024 -

Logged By
J.Beer

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
					0.30			Brown clayey fine to medium SAND.	
					0.50			Dark brown pseudo fibrous PEAT.	
		1.00		N=1 (1,0/0,1,0,0)					1
									
		2.00		N=4 (1,0/1,1,1,1)					2
									
		3.00		N=7 (1,2/1,2,2,2)	3.00			Loose grey silty fine to medium SAND with plant debris.	3
									
		4.00		N=2 (1,0/1,1,0,0)	3.70			Very loose grey fine to medium SAND. Becoming loose at 5.00 m bgl. (Blowing sands).	4
									
		5.00		N=9 (2,1/3,2,2,2)					5
									
					5.45			End of borehole at 5.45 m	
									6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.





Borehole Log

Borehole No.

CP101

Sheet 1 of 2

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
CP

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 15/04/2024 - 18/04/2024

Logged By
JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.50	B					Dark brown sandy CLAY with rootlets (TOPSOIL).	
		0.50 - 1.00	B		0.50				
		1.20		N=11 (1,2/2,3,3,3)					1
		1.20 - 1.65	D						
		1.20 - 1.70	B						
		2.00		N=2 (0,0/1,0,1,0)					2
		2.00 - 2.45	D						
		2.00 - 2.50	B		2.50				
		2.80	D		2.80			Brown pseudo fibrous PEAT.	
		3.00		N=1 (1,0/0,1,0,0)					3
		3.00 - 3.45	D						
		3.00 - 3.50	B						
		3.80	D						4
		4.00		N=1 (0,0/1,0,0,0)					
		4.00 - 4.45	D						
		4.00 - 4.50	B						
		4.80	D						5
		5.00		N=30 (3,3/4,6,10,10)					
		5.00 - 5.45	D						
		5.00 - 5.50	B						
		5.80	D						6
		6.00		N=25 (2,3/3,5,7,10)					
		6.00 - 6.45	D						
		6.00 - 6.50	B						
		7.00	D						7
		7.50		N=34 (1,3/5,7,10,12)					
		7.50 - 7.95	D						
		7.50 - 8.00	B						8
		9.00		N=37 (4,5/7,9,9,12)					9
		9.00 - 9.45	D						
		10.00 - 10.50	B						10

Continued on next sheet

Remarks

1. Complete. 2. Hole originally terminated due to blowing sands at 8.00 m bgl. Re drilled with water from tractor and bowser.





Borehole Log

Borehole No.

CP101

Sheet 2 of 2

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
CP

Location: Rochdale

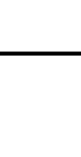
Level:

Scale
1:50

Client: MCI Developments

Dates: 15/04/2024 - 18/04/2024

Logged By
JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50 10.50 - 10.95	D	N=38 (5,5/5,10,10,13)	11.20				11
		12.00 12.00 - 12.45							
		12.50 - 13.00							
		14.00 14.00 - 14.45							
		12.50 - 13.00	B	N=42 (4,5/6,9,12,15)	12.40			Very stiff high strength brown CLAY.	13
		14.00 14.00 - 14.45							
		14.00 14.00 - 14.45	D	N=30 (3,4/7,7,7,9)	15.00				14
								End of borehole at 15.00 m	15
									16
									17
									18
									19
									20

Remarks

1. Complete. 2. Hole originally terminated due to blowing sands at 8.00 m bgl. Re drilled with water from tractor and bowser.





Borehole Log

Borehole No.

CP102

Sheet 1 of 2

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
CP

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 15/04/2024 - 16/04/2024

Logged By
JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.50	B		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
		0.50 - 1.00	B					Greyish brown sandy CLAY.	
		1.20		N=5 (1,1/2,1,1,1)	1.10			Firm low strength grey silty sandy CLAY. Becoming stiff medium strength at 2.00 m bgl. Becoming very soft extremely low strength at 3.00 m bgl. Becoming stiff medium strength 4.00 m bl.	1
		1.20 - 1.65	D						
		1.20 - 1.70	B						
		2.00		N=11 (2,2/2,3,3,3)					2
		2.00 - 2.45	D		4.80				
		2.50 - 3.00	B						
		3.00		N=1 (1,0/0,0,1,0)					3
		3.00 - 3.45	D						
		4.00		N=11 (2,2/2,3,3,3)					4
		4.00 - 4.45	D						
		5.00		N=15 (2,2/3,3,4,5)					5
		5.00 - 5.45	D						
		5.00 - 5.50	B						
		6.00		N=16 (2,3/3,4,4,5)					6
		6.00 - 6.45	D						
		7.50 - 7.95	U						7
		9.00		N=20 (3,3/4,4,5,7)					8
		9.00 - 9.45	D						9
									10

Continued on next sheet

Remarks

1. Terminated due to blowing sands at 13.20 m bgl.

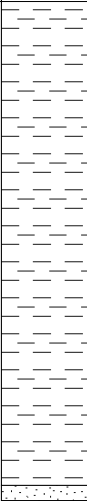




Borehole Log

Borehole No.
CP102
Sheet 2 of 2
Hole Type
CP
Scale
1:50
Logged By
JB Site Investigation

Project Name: Trubs Farm
Project No. 17524
Co-ords: -
Location: Rochdale
Level:
Client: MCI Developments
Dates: 15/04/2024 - 16/04/2024

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50 - 10.95	U						11
		12.00 12.00 - 12.45	D	N=37 (4,5/7,7,9,14)					12
		13.20	D		13.20 13.30			Light brown fine to medium SAND (blowing). End of borehole at 13.30 m	13
									14
									15
									16
									17
									18
									19
									20

Remarks
1. Terminated due to blowing sands at 13.20 m bgl.





Borehole Log

Borehole No.

CP103

Sheet 1 of 2

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
CP

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 16/04/2024 - 17/04/2024

Logged By
JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00 - 0.50	B	N=1 (0,0/0,0,1,0)	0.30		Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	1	
		0.50 - 1.00	B				Dark brown pseudo fibrous PEAT.		
		1.20					N=2 (0,0/1,0,0,1)		
		1.20 - 1.65	D						
		1.20 - 1.70	B						
		2.00		N=2 (1,0/1,0,0,1)				3	
		2.00 - 2.45	D						
		3.00							
		3.00 - 3.45	D	N=3 (1,0/1,0,1,1)				4	
		3.50 - 4.00	B						
		4.00							
		4.00 - 4.45	D	N=12 (2,2/3,3,3,3)	4.90			Stiff medium strength grey silty sandy CLAY.	5
		5.00							
		5.00 - 5.45	D						
		5.50 - 6.00	B	N=17 (2,2/3,4,4,6)					6
		6.00							
		6.00 - 6.45	D						
		7.50 - 7.95	U	N=31 (3,4/6,7,9,9)	8.80			Very stiff high strength greyish brown silty sandy gravelly CLAY.	9
		9.00							
		9.00 - 9.45	D						
		9.50 - 10.00	B						
									Continued on next sheet

Continued on next sheet

Remarks

1. Complete.





Borehole Log

Borehole No.

CP103

Sheet 2 of 2

Project Name: Trubs Farm

Project No.
17524

Co-ords: -

Hole Type
CP

Location: Rochdale

Level:

Scale
1:50

Client: MCI Developments

Dates: 16/04/2024 - 17/04/2024

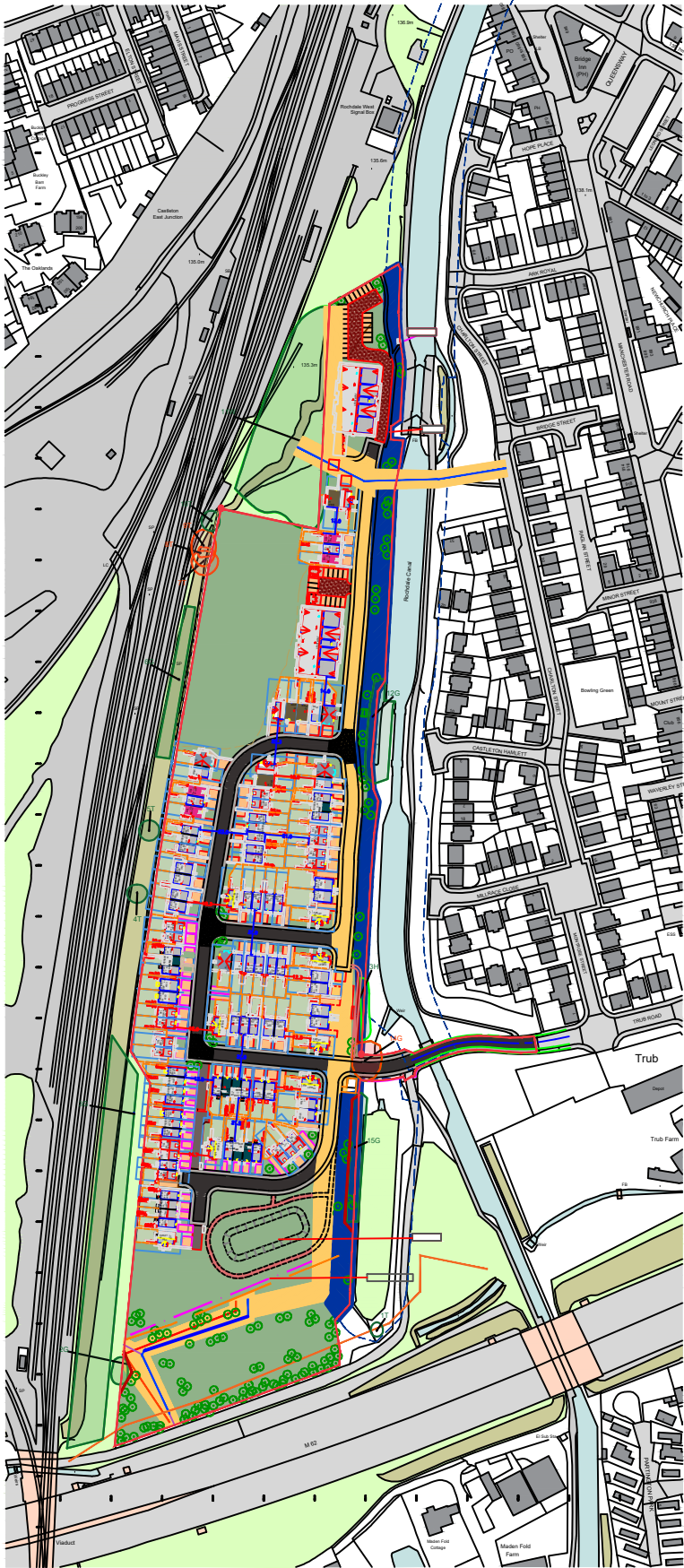
Logged By
JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
		Depth (m)	Type	Results									
		10.50 10.50 - 10.95	D	N=35 (3,5/7,9,10,9)	15.00				11				
		12.00 12.00 - 12.45	D	N=37 (5,5/8,8,11,10)					12				
		13.50 13.50 - 13.95	D	N=38 (5,7/7,9,11,11)					13				
					15.00			End of borehole at 15.00 m	14				
									15				
									16				
									17				
									18				
									19				
									20				

Remarks

1. Complete.





Ordnance Survey. (c) Crown Copyright 2023. All rights reserved. Licence number 100022432



Notes:					
MCI					

Client:	
MCI	

Job No:	17-524
Drawing No:	002

Date:	07.05.2025
Scale:	NTS



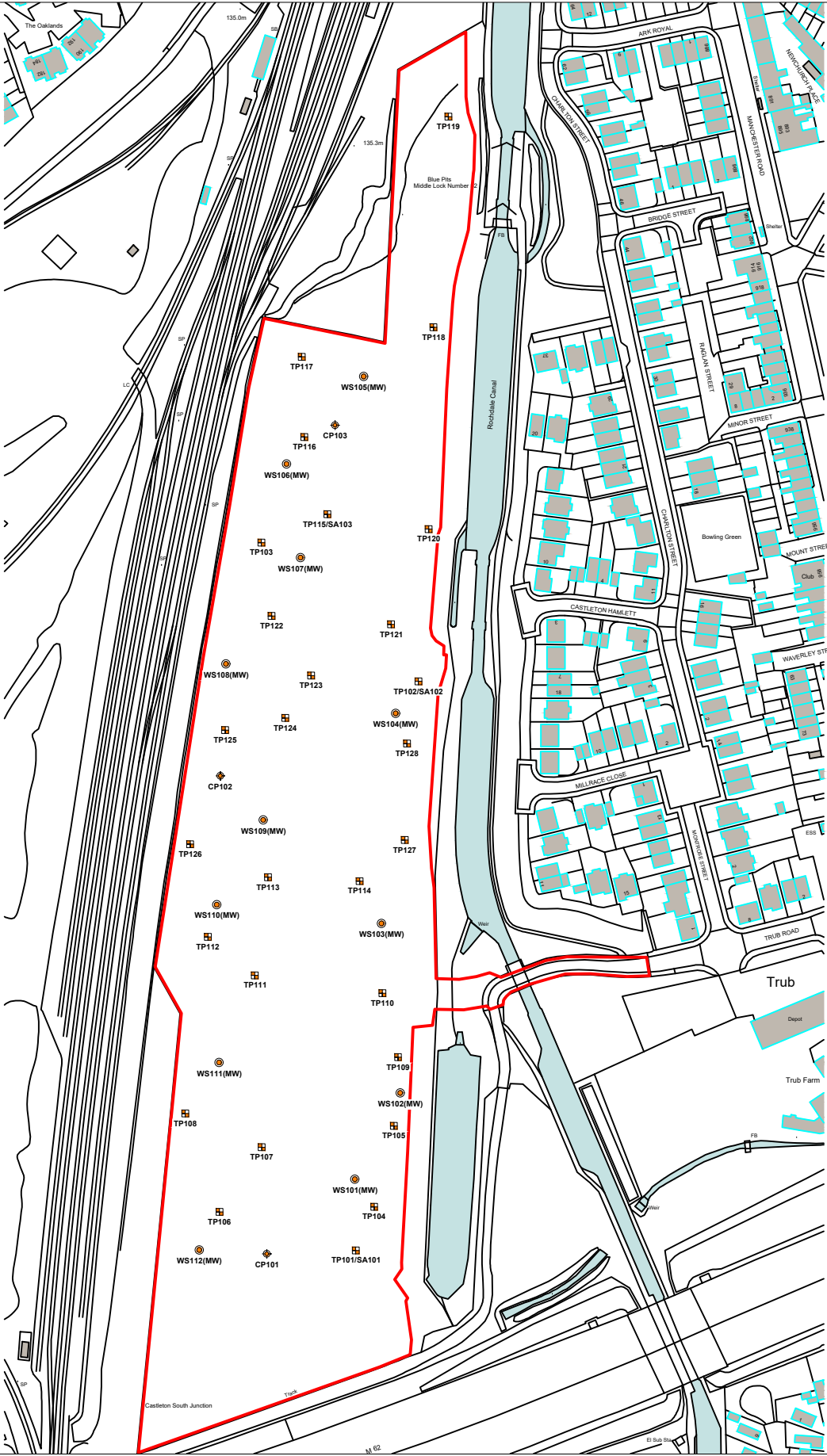
Environmental Engineering
Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

P1	REVB	07.05.2025	TG	MD	MD
P1	REVA	22.03.2024	OW	MD	MD
Phase	Issue	Date	Drawn	Checked	PM

Job Title:
Trubs Farm, Roachdale

Drawing Title:
Proposed Development Plan

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



- Location Symbols
- WS101 Approximate Window Sample Probehole Location (E3P April 2024)
 - WS101(MW) Approximate Window Sample Probehole Location with Install (E3P April 2024)
 - TP101 Approximate Trial Pit Location (E3P April 2024)
 - SA101 Approximate Soakaway Test Location (E3P April 2024)
 - CP101 Approximate Cable Percussive Borehole Location (E3P April 2024)

Notes:					
P1	REVA	22.04.2024	EB	JB	MD
Phase	Issue	Date	Drawn	Checked	PM

Client:

MCI

Job Title:

Trubs Farm, Roachdale

Job No:	17-524	Date:	22.04.2024
Drawing No:	005	Scale:	1:2500 @ A3
Drawing Title:		Exploratory Hole Location Plan	



Environmental Engineering
Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Notes:					
P1	REVC	05.06.2025	CB	MD	MD
P1	REVB	10.12.2024	CB	MD	MD
P1	REVA	08.11.2024	CB	MD	MD
Phase	Issue	Date	Drawn	Checked	PM

Client:	
MCI Developments	
Job Title:	
Trub Farm, Rochdale	

Job No:
17-524
Drawing No:
031

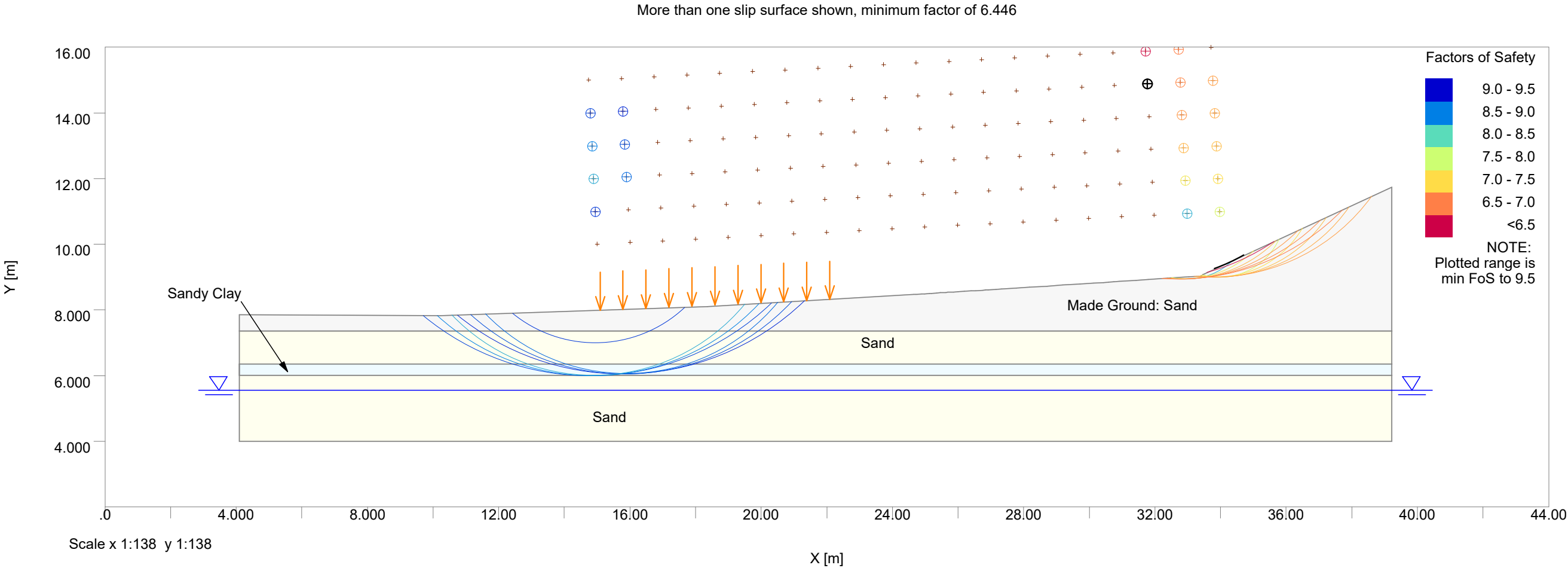
Date:
05.06.2025
Scale:
NTS @ A3



Environmental Engineering
Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 1	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
				Condition	
	or c0'				Phi0 [°]
		[kN/m3]	[kN/m3]		
	[kN/m²]				
1	Made Ground: Sand	18.000	18.000	Undrained	N.A.
11.000					
2	Sand	20.000	20.000	Undrained	N.A.
11.000					
3	Sandy Clay	19.000	19.000	Undrained	N.A.
20.000					

Materials with variable cohesion or non-linear strength

No.	Description	y0	OR b	k OR a	cu/p ratio
		[m]		[kN/m²/m]	
1	Made Ground: Sand	0.25000	3.0000	3.4200	
2	Sand	0.75000	20.000	1.8400	
3	Sandy Clay	-	-	1.0700	

Water Data

Name: 1
Type: Hydrostatic
Unit wt of water [kN/m3]: 10.0000
Max suction [m]: 0.0000
Water Table coordinates:

No	X[m]	Y[m]
1	4.093000	5.560700
2	39.221000	5.560700

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1 X2	Vert Horiz			
	[m] [m]	[kN/m²] [kN/m²]			
1	15.090 22.090	20.000	0.0 Variable	Unfavourable	No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 15.00000 m y = 10.00000 m
Inclination of grid: 3.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.00000m spacing
6 in y direction at 1.00000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 13-May-2025

Page 1
Time 15:12

Oasys E3P Trub Farm Section 1		Job No.		Sheet No.		Rev.	
		17-524					
		Drg. Ref.					
		Made by CB		Date		Checked	

No.	Limits of loaded area				Distributed load		Permanent /		Favourable /		Use in	
							Variable load		Unfavourable		pull-out calc	
	X1	X2	Vert	Horiz					load			

WORST CASE

Centre at (31.767m,14.884m)

Iterations: 5

Net vertical force [kN/m]: 406.90E-9

Net horiz force [kN/m]: 884.08E-9

Radius 6.0000m

Horiz acceleration [%g]: 0.0

Slip weight [kN/m] 0.23300

Disturbing moment [kN/m]: 0.58372

Restoring moment [kNm/m]: 3.7627

Reinf.Rest.Moment [kNm/m]: 0.0

Over-Design Factor: 6.4461

The system of interslice and base forces are in equilibrium

when the strengths available at the bases are divided by the computed

over-design factor. The interslice forces shown in the following table

are in equilibrium with the factored strengths of the soil at the bases of slices.

Slip surface coordinates		Pore Pressure		Interslice forces [kN/m]			
Point	x [m]	y [m]	L	R	T	E	E(u)
			[kN/m²]	[kN/m²]			
1	33.826	9.2490	-	-36.883	0.0	0.0	0.0
2	33.860	9.2610	-37.003	-37.003	28.509E-6	58.588E-6	0.0
3	33.894	9.2740	-37.133	-37.133	84.915E-6	184.40E-6	0.0
4	33.928	9.2870	-37.263	-37.263	173.96E-6	395.98E-6	0.0
5	33.963	9.3000	-37.393	-37.393	290.22E-6	679.02E-6	0.0
6	33.997	9.3140	-37.533	-37.533	382.74E-6	882.55E-6	0.0
7	34.031	9.3280	-37.673	-37.673	489.40E-6	0.0011205	0.0
8	34.065	9.3420	-37.813	-37.813	610.17E-6	0.0013930	0.0
9	34.099	9.3560	-37.953	-37.953	741.54E-6	0.0016913	0.0
10	34.133	9.3700	-38.093	-38.093	883.50E-6	0.0020154	0.0
11	34.168	9.3850	-38.243	-38.243	951.32E-6	0.0021478	0.0
12	34.202	9.4000	-38.393	-38.393	0.0010221	0.0022869	0.0
13	34.236	9.4160	-38.553	-38.553	998.27E-6	0.0022143	0.0
14	34.270	9.4310	-38.703	-38.703	0.0010690	0.0023534	0.0
15	34.304	9.4470	-38.863	-38.863	0.0010445	0.0022792	0.0
16	34.338	9.4630	-39.023	-39.023	0.0010199	0.0022050	0.0
17	34.372	9.4790	-39.183	-39.183	996.14E-6	0.0021325	0.0
18	34.407	9.4960	-39.353	-39.353	879.60E-6	0.0018767	0.0
19	34.441	9.5130	-39.523	-39.523	769.17E-6	0.0016333	0.0
20	34.475	9.5300	-39.693	-39.693	667.90E-6	0.0014082	0.0
21	34.509	9.5470	-39.863	-39.863	575.78E-6	0.0012016	0.0
22	34.543	9.5650	-40.043	-40.043	421.80E-6	888.02E-6	0.0
23	34.577	9.5830	-40.223	-40.223	289.52E-6	615.66E-6	0.0
24	34.612	9.6010	-40.403	-40.403	184.38E-6	394.78E-6	0.0
25	34.646	9.6200	-40.593	-40.593	75.728E-6	178.30E-6	0.0
26	34.680	9.6390	-40.783	-40.783	14.131E-6	46.414E-6	0.0
27	34.714	9.6580	-40.973	-	-406.90E-9	-884.08E-9	0.0

Slice Strength Parameters		Average		Slice		Forces on base [kN/m]	
No.		Pore	Weight				
	c'	Tan phi	Pressure	[kN/m]	Normal	Shear	Shear
	[kN/m²]		[kN/m²]			(capacity)	(mobilised)
1	0.065957	0.0	0.0	922.15E-6	877.49E-6	0.0023877	370.41E-6
2	0.19787	0.0	0.0	0.0027665	0.0025935	0.0072311	0.0011218
3	0.32979	0.0	0.0	0.0046108	0.0043171	0.012052	0.0018696
4	0.43971	0.0	0.0	0.0061477	0.0057535	0.016069	0.0024928
5	0.52766	0.0	0.0	0.0073772	0.0068344	0.019477	0.0030215
6	0.61560	0.0	0.0	0.0086068	0.0079721	0.022723	0.0035251
7	0.70354	0.0	0.0	0.0098363	0.0091098	0.025969	0.0040286
8	0.76950	0.0	0.0	0.010758	0.0099630	0.028404	0.0044063
9	0.83546	0.0	0.0	0.011681	0.010816	0.030838	0.0047840
10	0.90141	0.0	0.0	0.012603	0.011548	0.033625	0.0052163
11	0.94539	0.0	0.0	0.013218	0.012111	0.035265	0.0054708
12	0.94539	0.0	0.0	0.013218	0.011978	0.035656	0.0055314
13	0.94539	0.0	0.0	0.013218	0.012111	0.035265	0.0054708
14	0.96737	0.0	0.0	0.013525	0.012257	0.036485	0.0056600
15	0.96737	0.0	0.0	0.013525	0.012257	0.036485	0.0056600
16	0.94539	0.0	0.0	0.013218	0.011978	0.035656	0.0055314
17	0.90141	0.0	0.0	0.012603	0.011292	0.034390	0.0053349
18	0.85744	0.0	0.0	0.011988	0.010742	0.032712	0.0050747
19	0.79149	0.0	0.0	0.011066	0.0099161	0.030196	0.0046843
20	0.72553	0.0	0.0	0.010144	0.0090906	0.027680	0.0042940
21	0.65957	0.0	0.0	0.0092215	0.0081679	0.025464	0.0039503
22	0.57163	0.0	0.0	0.0079920	0.0070802	0.022069	0.0034236
23	0.46170	0.0	0.0	0.0064551	0.0057205	0.017825	0.0027652

Program Oasys Oasys Slope Version 21.0.54.10

Copyright (C) 1997-2024

Printed

13-May-2025

Page

2

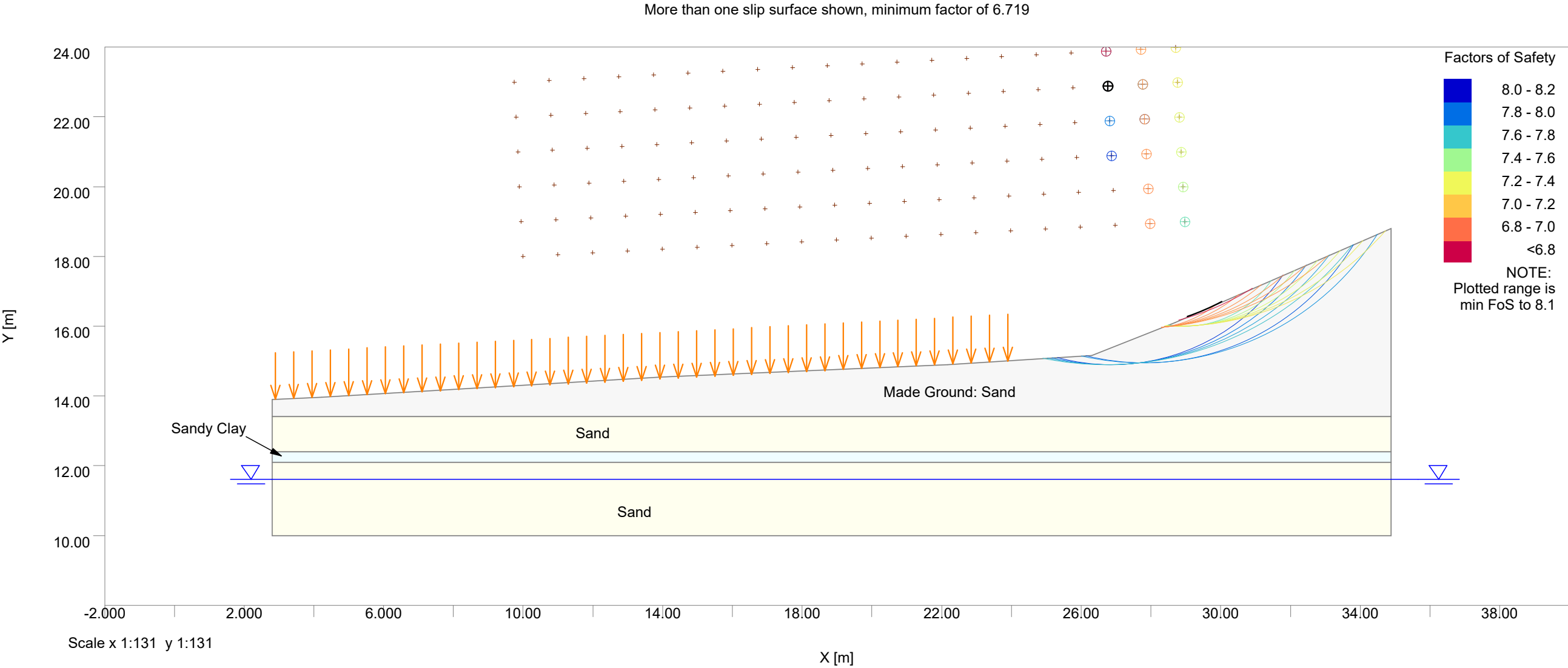
Time

15:12

Slice Strength Parameters			Average		Slice		Forces on base [kN/m]		
No.	Parameters		Pore	Pressure	Weight		Normal	Shear	Shear
	c'	Tan phi		[kN/m ²]		[kN/m]			
24	0.32979	0.0	0.0	0.0	0.0046108	0.0040395	0.012889	0.0019995	
25	0.19787	0.0	0.0	0.0	0.0027665	0.0024278	0.0077334	0.0011997	
26	0.065957	0.0	0.0	0.0	922.15E-6	816.14E-6	0.0025778	399.90E-6	

Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]			
No.	Vert	Horiz	Vert	Horiz	Vert	Horiz	
1	0.0		0.0	0.0	0.0	0.0	0.0
2	0.0		0.0	0.0	0.0	0.0	0.0
3	0.0		0.0	0.0	0.0	0.0	0.0
4	0.0		0.0	0.0	0.0	0.0	0.0
5	0.0		0.0	0.0	0.0	0.0	0.0
6	0.0		0.0	0.0	0.0	0.0	0.0
7	0.0		0.0	0.0	0.0	0.0	0.0
8	0.0		0.0	0.0	0.0	0.0	0.0
9	0.0		0.0	0.0	0.0	0.0	0.0
10	0.0		0.0	0.0	0.0	0.0	0.0
11	0.0		0.0	0.0	0.0	0.0	0.0
12	0.0		0.0	0.0	0.0	0.0	0.0
13	0.0		0.0	0.0	0.0	0.0	0.0
14	0.0		0.0	0.0	0.0	0.0	0.0
15	0.0		0.0	0.0	0.0	0.0	0.0
16	0.0		0.0	0.0	0.0	0.0	0.0
17	0.0		0.0	0.0	0.0	0.0	0.0
18	0.0		0.0	0.0	0.0	0.0	0.0
19	0.0		0.0	0.0	0.0	0.0	0.0
20	0.0		0.0	0.0	0.0	0.0	0.0
21	0.0		0.0	0.0	0.0	0.0	0.0
22	0.0		0.0	0.0	0.0	0.0	0.0
23	0.0		0.0	0.0	0.0	0.0	0.0
24	0.0		0.0	0.0	0.0	0.0	0.0
25	0.0		0.0	0.0	0.0	0.0	0.0
26	0.0		0.0	0.0	0.0	0.0	0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 2	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
				Condition	
	or c0'				
		[kN/m3]	[kN/m3]		Phi0 [°]
	[kN/m²]				
1	Made Ground: Sand	18.000	18.000	Undrained	N.A.
11.000					
2	Sand	20.000	20.000	Undrained	N.A.
11.000					
3	Sandy Clay	19.000	19.000	Undrained	N.A.
20.000					

Materials with variable cohesion or non-linear strength

No.	Description	y0	OR b	k OR a	cu/p ratio
		[m]		[kN/m²/m]	
1	Made Ground: Sand	0.25000	3.0000	3.4200	
2	Sand	0.75000	20.000	1.8400	
3	Sandy Clay	-	-	1.0700	

Water Data

Name: 1
Type: Hydrostatic
Unit wt of water [kN/m3]: 10.0000
Max suction [m]: 0.0000
Water Table coordinates:

No	X[m]	Y[m]
1	2.796000	11.610000
2	35.660000	11.610000

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1 X2	Vert Horiz			
	[m] [m]	[kN/m²] [kN/m²]			
1	2.9000 23.900	120.00 0.0	Permanent	Unfavourable	No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 10.00000 m y = 18.00000 m
Inclination of grid: 3.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.00000m spacing
6 in y direction at 1.00000m spacing
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 13-May-2025

Page 1
Time 15:17

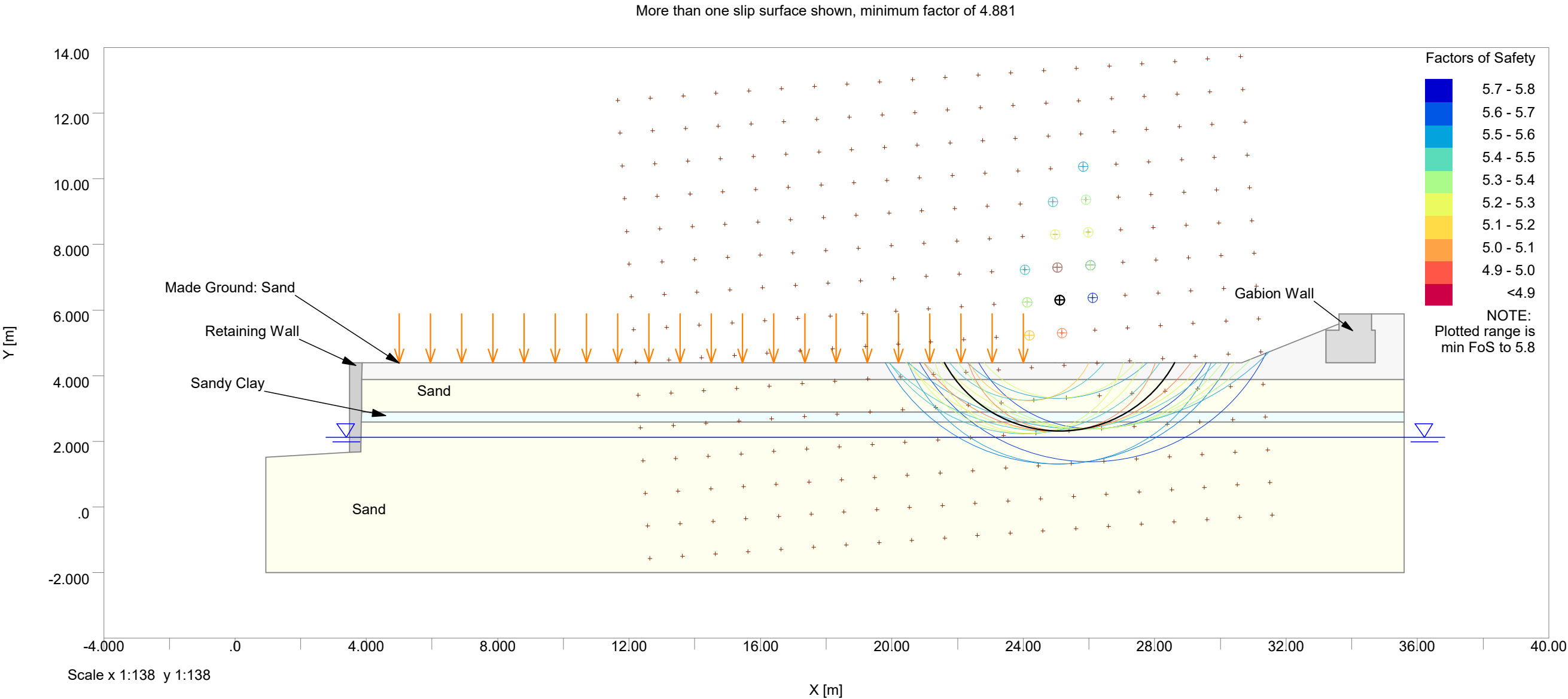
Oasys E3P Trub Farm Section 2				Job No.		Sheet No.		Rev.	
				17-524					
				Drg. Ref.					
				Made by CB		Date		Checked	

No.	Limits of loaded area				Distributed load	Permanent /		Favourable /		Use in	
						Variable load		Unfavourable		pull-out calc	
	X1	X2	Vert	Horiz				load			
WORST CASE											
Centre at (26.767m,22.884m)						Radius 7.0000m					
Iterations: 5						Horiz acceleration [%g]: 0.0					
Net vertical force [kN/m]: 280.89E-9						Slip weight [kN/m] 0.25823					
Net horiz force [kN/m]: 648.70E-9						Disturbing moment [kN/m]: 0.71660					
						Restoring moment [kNm/m]: 4.8146					
						Reinf.Rest.Moment [kNm/m]: 0.0					
						Over-Design Factor: 6.7187					
The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.											
Slip surface coordinates Pore Pressure Interslice forces [kN/m]											
Point	x [m]	y [m]	L	R	T	E	E(u)				
			[kN/m²]	[kN/m²]							
1	29.050	16.267	-	-46.570		0.0	0.0	0.0			
2	29.088	16.280	-46.700	-46.700	26.863E-6	53.434E-6	0.0	0.0			
3	29.125	16.293	-46.830	-46.830	92.414E-6	218.93E-6	0.0	0.0			
4	29.163	16.307	-46.970	-46.970	170.14E-6	403.77E-6	0.0	0.0			
5	29.201	16.321	-47.110	-47.110	271.13E-6	651.20E-6	0.0	0.0			
6	29.238	16.335	-47.250	-47.250	390.74E-6	948.71E-6	0.0	0.0			
7	29.276	16.349	-47.390	-47.390	533.63E-6	0.0013088	0.0	0.0			
8	29.314	16.364	-47.540	-47.540	630.04E-6	0.0015268	0.0	0.0			
9	29.351	16.379	-47.690	-47.690	731.78E-6	0.0017582	0.0	0.0			
10	29.389	16.394	-47.840	-47.840	841.55E-6	0.0020097	0.0	0.0			
11	29.427	16.409	-47.990	-47.990	959.32E-6	0.0022813	0.0	0.0			
12	29.464	16.425	-48.150	-48.150	990.02E-6	0.0023298	0.0	0.0			
13	29.502	16.440	-48.300	-48.300	0.0011131	0.0026148	0.0	0.0			
14	29.539	16.457	-48.470	-48.470	0.0010450	0.0024402	0.0	0.0			
15	29.577	16.473	-48.630	-48.630	0.0010767	0.0024911	0.0	0.0			
16	29.615	16.490	-48.800	-48.800	0.0010103	0.0023203	0.0	0.0			
17	29.652	16.506	-48.960	-48.960	0.0010415	0.0023700	0.0	0.0			
18	29.690	16.524	-49.140	-49.140	876.96E-6	0.0020023	0.0	0.0			
19	29.728	16.541	-49.310	-49.310	817.54E-6	0.0018470	0.0	0.0			
20	29.765	16.559	-49.490	-49.490	677.79E-6	0.0015313	0.0	0.0			
21	29.803	16.577	-49.670	-49.670	550.45E-6	0.0012415	0.0	0.0			
22	29.841	16.595	-49.850	-49.850	435.52E-6	977.60E-6	0.0	0.0			
23	29.878	16.614	-50.040	-50.040	279.84E-6	645.87E-6	0.0	0.0			
24	29.916	16.632	-50.220	-50.220	202.12E-6	459.86E-6	0.0	0.0			
25	29.954	16.651	-50.410	-50.410	99.254E-6	232.77E-6	0.0	0.0			
26	29.991	16.671	-50.610	-50.610	17.555E-6	55.944E-6	0.0	0.0			
27	30.029	16.691	-50.810	-	-280.89E-9	-648.70E-9	0.0	0.0			
Slice Strength Parameters Average Slice Forces on base [kN/m]											
No.	c'		Tan phi		Pore Pressure		Slice Weight				
	[kN/m²]				[kN/m²]		[kN/m]		Normal	Shear	Shear
									(capacity)	(mobilised)	
1	0.065957	0.0	0.0	0.0010167	968.95E-6	0.0026274	391.06E-6				
2	0.19787	0.0	0.0	0.0030500	0.0028909	0.0078822	0.0011732				
3	0.32979	0.0	0.0	0.0050833	0.0047730	0.013248	0.0019719				
4	0.43971	0.0	0.0	0.0067777	0.0063612	0.017664	0.0026291				
5	0.52766	0.0	0.0	0.0081332	0.0076318	0.021197	0.0031550				
6	0.63759	0.0	0.0	0.0098277	0.0092200	0.025613	0.0038122				
7	0.72553	0.0	0.0	0.011183	0.010398	0.029407	0.0043769				
8	0.76950	0.0	0.0	0.011861	0.011028	0.031189	0.0046421				
9	0.83546	0.0	0.0	0.012878	0.011972	0.033862	0.0050400				
10	0.90141	0.0	0.0	0.013894	0.012917	0.036536	0.0054379				
11	0.92340	0.0	0.0	0.014233	0.013109	0.037778	0.0056229				
12	0.94539	0.0	0.0	0.014572	0.013546	0.038318	0.0057032				
13	0.96737	0.0	0.0	0.014911	0.013600	0.039966	0.0059484				
14	0.96737	0.0	0.0	0.014911	0.013733	0.039577	0.0058906				
15	0.94539	0.0	0.0	0.014572	0.013291	0.039057	0.0058132				
16	0.94539	0.0	0.0	0.014572	0.013421	0.038678	0.0057568				
17	0.92340	0.0	0.0	0.014233	0.012851	0.038538	0.0057360				
18	0.85744	0.0	0.0	0.013217	0.012055	0.035424	0.0052725				
19	0.79149	0.0	0.0	0.012200	0.011017	0.033033	0.0049165				
20	0.72553	0.0	0.0	0.011183	0.010100	0.030280	0.0045068				
21	0.65957	0.0	0.0	0.010167	0.0091825	0.027527	0.0040971				
22	0.54964	0.0	0.0	0.0084721	0.0075742	0.023182	0.0034503				
23	0.46170	0.0	0.0	0.0071166	0.0064308	0.019269	0.0028680				
24	0.37376	0.0	0.0	0.0057610	0.0051538	0.015764	0.0023462				

Slice Strength Parameters		Average		Slice		Forces on base [kN/m]		
No.		Pore	Pressure	Weight		Normal	Shear	Shear
	c'	Tan phi	[kN/m²]	[kN/m]				
25	0.21986	0.0	0.0	0.0033888	0.0030037	0.0093738	0.0013952	
26	0.065957	0.0	0.0	0.0010167	908.65E-6	0.0028121	418.55E-6	

Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on	
No.				ground surface [kN/m_hor/m]	
	Vert	Horiz	Vert	Horiz	
1	0.0		0.0	0.0	0.0
2	0.0		0.0	0.0	0.0
3	0.0		0.0	0.0	0.0
4	0.0		0.0	0.0	0.0
5	0.0		0.0	0.0	0.0
6	0.0		0.0	0.0	0.0
7	0.0		0.0	0.0	0.0
8	0.0		0.0	0.0	0.0
9	0.0		0.0	0.0	0.0
10	0.0		0.0	0.0	0.0
11	0.0		0.0	0.0	0.0
12	0.0		0.0	0.0	0.0
13	0.0		0.0	0.0	0.0
14	0.0		0.0	0.0	0.0
15	0.0		0.0	0.0	0.0
16	0.0		0.0	0.0	0.0
17	0.0		0.0	0.0	0.0
18	0.0		0.0	0.0	0.0
19	0.0		0.0	0.0	0.0
20	0.0		0.0	0.0	0.0
21	0.0		0.0	0.0	0.0
22	0.0		0.0	0.0	0.0
23	0.0		0.0	0.0	0.0
24	0.0		0.0	0.0	0.0
25	0.0		0.0	0.0	0.0
26	0.0		0.0	0.0	0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 2A	Job No.		Sheet No.		Rev.	
	17-524					
	Org. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
or c0'					
		[kN/m3]	[kN/m3]		Phi0 [°]
11.000	1 Made Ground: Sand	18.000	18.000	Undrained	N.A.
11.000	2 Sand	20.000	20.000	Undrained	N.A.
20.000	3 Sandy Clay	20.000	20.000	Undrained	N.A.
10000.	4 Retaining Wall	30.000	30.000	Drained	42.000
10000.	5 Gabion Wall	30.000	30.000	Drained	42.000

Materials with variable cohesion or non-linear strength

No.	Description	y0 OR b	k OR a	cu/p ratio
		[m]	[kN/m²/m]	
1	Made Ground: Sand	0.25000	3.0000	3.4200
2	Sand	0.75000	20.000	1.8400
3	Sandy Clay	-	-	1.0700

Water Data

Name: 1
Type: Hydrostatic
Unit wt of water [kN/m3]: 10.0000
Max suction [m]: 0.0000
Water Table coordinates:

No	X[m]	Y[m]
1	4.020000	2.130000
2	35.590000	2.130000

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz	
	[m]	[m]	[kN/m²]	[kN/m²]	
1	5.0000	24.000	120.00	0.0	Permanent Unfavourable No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 12.00000 m y = 7.40000 m
Inclination of grid: 4.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.00000m spacing

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 05-Jun-2025

Page 1
Time 08:29



E3P

Trub Farm

Section 2A

Job No.

Sheet No.

Rev.

17-524

Drg. Ref.

Made by

Date

Checked

Date

CB

No.

Limits of loaded area

Distributed load

Permanent / Variable load

Favourable / Unfavourable load

Use in pull-out calc

X1

X2

Vert

Horiz

6 in y direction at 1.00000m spacing

Grid extended to find minimum FoS

Initial radius of circle 1.00000 m

Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (25.108m,6.3117m)

Iterations: 5

Net vertical force [kN/m]: -1.4411

Net horiz force [kN/m]: 1.3968

Radius 4.0000m

Horiz acceleration [%g]: 0.0

Slip weight [kN/m] 200.68

Disturbing moment [kN/m]: 664.86

Restoring moment [kNm/m]: 3245.2

Reinf.Rest.Moment [kNm/m]: 0.0

Over-Design Factor: 4.8811

The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.

Slip surface coordinates

Pore Pressure

Interslice forces [kN/m]

Point x [m] y [m]

L R

T E

E(u)

[kN/m²] [kN/m²]

1 21.599 4.3920 - -22.620 0.0 0.0 0.0

2 21.761 4.1210 -19.910 -19.910 -3.3611 1.0971 0.0

3 21.923 3.8920 -17.620 -17.620 -5.8356 2.8071 0.0

4 22.201 3.5640 -14.340 -14.340 0.63564 14.853 0.0

5 22.478 3.2980 -11.680 -11.680 5.4623 27.176 0.0

6 22.756 3.0770 -9.4700 -9.4700 8.5297 38.883 0.0

7 23.033 2.8920 -7.6200 -7.6200 9.9220 49.296 0.0

8 23.234 2.7780 -6.4800 -6.4800 11.879 59.053 0.0

9 23.436 2.6780 -5.4800 -5.4800 12.983 67.748 0.0

10 23.637 2.5920 -4.6200 -4.6200 13.298 75.124 0.0

11 23.901 2.4980 -3.6800 -3.6800 11.169 78.050 0.0

12 24.165 2.4240 -2.9400 -2.9400 8.7486 78.508 0.0

13 24.429 2.3700 -2.4000 -2.4000 6.7808 78.130 0.0

14 24.693 2.3330 -2.0300 -2.0300 5.3032 76.924 0.0

15 24.957 2.3150 -1.8500 -1.8500 4.5187 74.822 0.0

16 25.108 2.3120 -1.8200 -1.8200 4.3813 73.298 0.0

17 25.353 2.3190 -1.8900 -1.8900 4.2409 70.332 0.0

18 25.598 2.3420 -2.1200 -2.1200 3.8460 66.691 0.0

19 25.843 2.3800 -2.5000 -2.5000 3.3002 62.422 0.0

20 26.089 2.4340 -3.0400 -3.0400 2.6859 57.518 0.0

21 26.334 2.5040 -3.7400 -3.7400 2.0862 52.050 0.0

22 26.579 2.5920 -4.6200 -4.6200 1.5877 46.040 0.0

23 26.780 2.6780 -5.4800 -5.4800 0.96656 41.566 0.0

24 26.982 2.7780 -6.4800 -6.4800 0.46162 36.818 0.0

25 27.183 2.8920 -7.6200 -7.6200 0.075899 31.909 0.0

26 27.461 3.0770 -9.4700 -9.4700 0.35599 24.143 0.0

27 27.738 3.2980 -11.680 -11.680 0.86539 16.626 0.0

28 28.015 3.5650 -14.350 -14.350 1.4578 9.7135 0.0

29 28.293 3.8920 -17.620 -17.620 1.7529 3.8591 0.0

30 28.455 4.1220 -19.920 -19.920 1.9451 0.84364 0.0

31 28.617 4.3920 -22.620 - 1.4411 -1.3968 0.0

Slice Strength Parameters

Average

Slice

Forces on base [kN/m]

No.

Pore

Weight

c'

Tan phi

Pressure

Normal

Shear

Shear

[kN/m²]

[kN/m²]

[kN/m]

(capacity)

(mobilised)

1 299.10 0.0 0.0 0.39512 12.844 94.435 19.347

2 310.09 0.0 0.0 1.1241 14.701 86.984 17.821

3 173.85 0.0 0.0 3.4077 28.726 74.694 15.303

4 181.66 0.0 0.0 5.0560 32.732 69.830 14.306

5 188.06 0.0 0.0 6.4075 35.955 66.715 13.668

6 193.40 0.0 0.0 7.5341 38.594 64.501 13.214

7 114.75 0.0 0.0 6.0682 29.408 26.549 5.4392

8 116.39 0.0 0.0 6.4990 30.338 26.163 5.3602

9 117.81 0.0 0.0 6.8735 31.146 25.792 5.2840

10 204.95 0.0 0.0 9.4882 41.770 57.434 11.767

11 108.59 0.0 0.0 9.9317 23.456 29.772 6.0994

12 51.126 0.0 0.0 10.270 11.913 13.777 2.8225

13 52.322 0.0 0.0 10.510 11.704 13.948 2.8575

14 53.045 0.0 0.0 10.655 11.270 14.036 2.8756

15 53.321 0.0 0.0 6.1198 6.2256 8.0447 1.6481

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Page

2

Printed

05-Jun-2025

Time

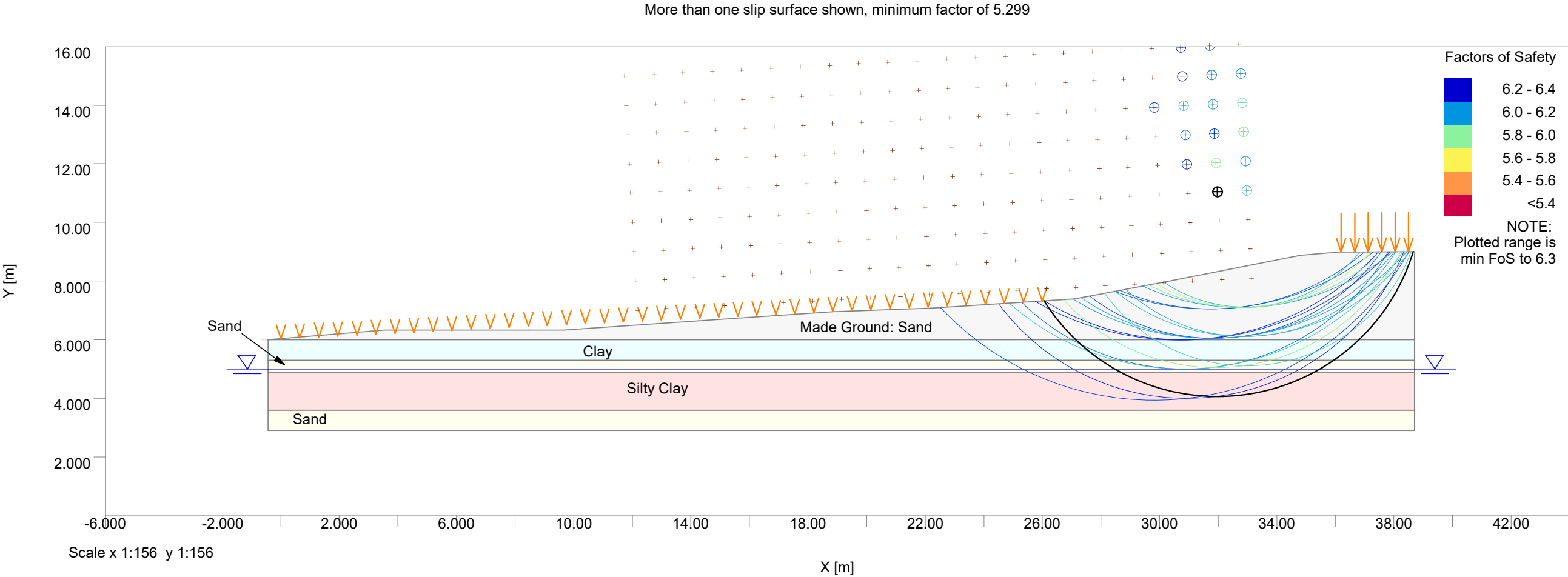
08:29

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

Slice No.	Strength Parameters	Average Pore Pressure	Slice Weight	Forces on base [kN/m]			
	c'	Tan phi	[kN/m ²]	[kN/m]	Normal	Shear	Shear
16	53.268	0.0	0.0	9.9377	10.159	13.066	2.6769
17	52.874	0.0	0.0	9.8641	10.554	13.021	2.6677
18	52.072	0.0	0.0	9.7145	10.793	12.920	2.6470
19	50.863	0.0	0.0	9.4889	10.922	12.770	2.6162
20	49.233	0.0	0.0	9.1849	10.910	12.554	2.5719
21	47.157	0.0	0.0	8.7975	10.780	12.285	2.5168
22	26.093	0.0	0.0	6.8735	8.6497	5.7125	1.1703
23	24.671	0.0	0.0	6.4990	8.3847	5.5461	1.1362
24	23.036	0.0	0.0	6.0682	8.0350	5.3297	1.0919
25	35.683	0.0	0.0	7.5341	10.344	11.901	2.4381
26	30.347	0.0	0.0	6.4075	9.2965	10.766	2.2056
27	23.933	0.0	0.0	5.0533	8.0072	9.2164	1.8882
28	16.126	0.0	0.0	3.4049	6.4759	6.9162	1.4169
29	16.929	0.0	0.0	1.1227	3.0011	4.7626	0.97572
30	5.9361	0.0	0.0	0.39366	2.3830	1.8691	0.38293

Slice No.	Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]			
	Vert	Horiz	Vert	Horiz	Vert	Horiz		
1	120.00		0.0	0.0	0.0	0.0		0.0
2	120.00		0.0	0.0	0.0	0.0		0.0
3	120.00		0.0	0.0	0.0	0.0		0.0
4	120.00		0.0	0.0	0.0	0.0		0.0
5	120.00		0.0	0.0	0.0	0.0		0.0
6	120.00		0.0	0.0	0.0	0.0		0.0
7	120.00		0.0	0.0	0.0	0.0		0.0
8	120.00		0.0	0.0	0.0	0.0		0.0
9	120.00		0.0	0.0	0.0	0.0		0.0
10	120.00		0.0	0.0	0.0	0.0		0.0
11	45.000		0.0	0.0	0.0	0.0		0.0
12	0.0		0.0	0.0	0.0	0.0		0.0
13	0.0		0.0	0.0	0.0	0.0		0.0
14	0.0		0.0	0.0	0.0	0.0		0.0
15	0.0		0.0	0.0	0.0	0.0		0.0
16	0.0		0.0	0.0	0.0	0.0		0.0
17	0.0		0.0	0.0	0.0	0.0		0.0
18	0.0		0.0	0.0	0.0	0.0		0.0
19	0.0		0.0	0.0	0.0	0.0		0.0
20	0.0		0.0	0.0	0.0	0.0		0.0
21	0.0		0.0	0.0	0.0	0.0		0.0
22	0.0		0.0	0.0	0.0	0.0		0.0
23	0.0		0.0	0.0	0.0	0.0		0.0
24	0.0		0.0	0.0	0.0	0.0		0.0
25	0.0		0.0	0.0	0.0	0.0		0.0
26	0.0		0.0	0.0	0.0	0.0		0.0
27	0.0		0.0	0.0	0.0	0.0		0.0
28	0.0		0.0	0.0	0.0	0.0		0.0
29	0.0		0.0	0.0	0.0	0.0		0.0
30	0.0		0.0	0.0	0.0	0.0		0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 3	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
	or c0'			Condition	
		[kN/m3]	[kN/m3]		Phi0 [°]
	[kN/m²]				
1	Made Ground: Sand	18.000	18.000	Undrained	N.A.
2	Clay	21.000	21.000	Undrained	N.A.
3	Sand	20.000	20.000	Undrained	N.A.
4	Silty Clay	20.000	20.000	Undrained	N.A.

Materials with variable cohesion or non-linear strength

No.	Description	y0 OR b	k OR a	cu/p ratio
		[m]	[kN/m²/m]	
1	Made Ground: Sand	0.0	3.0000	3.4200
2	Clay	-	-	1.0700
3	Sand	0.55000	20.000	1.8400
4	Silty Clay	-	-	1.0700

Water Data

Name: 1
Type: Hydrostatic
Unit wt of water [kN/m3]: 10.0000
Max suction [m]: 0.0000
Water Table coordinates:

No	X[m]	Y[m]
1	-0.443000	4.994000
2	38.700000	4.994000

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz	
	[m]	[m]	[kN/m²]	[kN/m²]	
1	0.0	26.000	20.000	0.0	Variable Unfavourable No
2	36.200	38.500	431.00	0.0	Permanent Unfavourable No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 12.00000 m y = 10.00000 m
Inclination of grid: 3.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.00000m spacing

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 13-May-2025

Page 1
Time 15:22



Trub Farm

Section 3

Job No.

Sheet No.

Rev.

17-524

Drg. Ref.

Made by

Date

Checked

Date

CB

No.

Limits of loaded area

Distributed load

Permanent / Variable load

Favourable / Unfavourable load

Use in pull-out calc

X1

X2

Vert

Horiz

6 in y direction at 1.00000m spacing

Grid extended to find minimum FoS

Initial radius of circle 1.00000 m

Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (31.973m,11.047m)

Iterations: 5

Net vertical force [kN/m]: 4.4975

Net horiz force [kN/m]: 5.6404

Radius 7.0000m

Horiz acceleration [%g]: 0.0

Slip weight [kN/m] 740.91

Disturbing moment [kNm/m]: 5841.9

Restoring moment [kNm/m]: 30956.

Reinf.Rest.Moment [kNm/m]: 0.0

Over-Design Factor: 5.2989

The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.

Slip surface coordinates

Pore Pressure

Interslice forces [kN/m]

Point x [m]

y [m]

L

R

T

E

E (u)

[kN/m²]

[kN/m²]

1 26.047

7.3200

-

-23.260

0.0

0.0

0.0

2 26.401

6.8100

-18.160

-18.160

2.0365

7.7917

0.0

3 26.754

6.3810

-13.870

-13.870

1.4672

18.467

0.0

4 27.108

6.0130

-10.190

-10.190

-0.51349

31.441

0.0

5 27.127

5.9950

-10.010

-10.010

-0.63437

32.191

0.0

6 27.555

5.6170

-6.2300

-6.2300

-0.68959

46.702

0.0

7 27.983

5.2950

-3.0100

-3.0100

-1.0723

62.593

0.0

8 28.308

5.0830

-0.89000

-0.89000

-2.2661

76.663

0.0

9 28.633

4.8950

0.99000

0.99000

-3.1878

91.012

0.098010

10 29.059

4.6820

3.1200

3.1200

-2.5503

107.35

0.53572

11 29.485

4.5040

4.9000

4.9000

-1.3135

122.87

1.2495

12 29.911

4.3570

6.3700

6.3700

0.32472

137.26

2.0779

13 30.337

4.2400

7.5400

7.5400

2.1895

150.12

2.8916

14 30.746

4.1550

8.3900

8.3900

3.9883

160.76

3.5686

15 31.155

4.0950

8.9900

8.9900

5.5908

169.65

4.0900

16 31.564

4.0590

9.3500

9.3500

6.8043

176.73

4.4201

17 31.973

4.0470

9.4700

9.4700

7.4246

181.92

4.5331

18 32.444

4.0630

9.3100

9.3100

8.4719

185.53

4.3828

19 32.915

4.1110

8.8300

8.8300

10.783

186.39

3.9474

20 33.387

4.1910

8.0300

8.0300

13.974

184.42

3.2730

21 33.858

4.3050

6.8900

6.8900

17.660

179.48

2.4226

22 34.330

4.4550

5.3900

5.3900

21.397

171.64

1.5016

23 34.801

4.6440

3.5000

3.5000

24.710

161.06

0.66150

24 35.056

4.7630

2.3100

2.3100

26.183

154.41

0.31581

25 35.312

4.8950

0.99000

0.99000

27.346

147.20

0.098010

26 35.637

5.0820

-0.88000

-0.88000

29.764

139.87

0.0

27 35.962

5.2950

-3.0100

-3.0100

31.648

131.77

0.0

28 36.073

5.3730

-3.7900

-3.7900

31.648

128.11

0.0

29 36.445

5.6620

-6.6800

-6.6800

2.6456

80.003

0.0

30 36.818

5.9950

-10.010

-10.010

-49.912

11.561

0.0

31 37.280

6.4830

-14.890

-14.890

-53.202

-2.9446

0.0

32 37.743

7.0840

-20.900

-20.900

-54.809

-13.921

0.0

33 38.206

7.8610

-28.670

-28.670

-43.593

-15.343

0.0

34 38.668

9.0050

-40.110

-

-4.4975

-5.6404

0.0

Slice Strength Parameters

Average Pore Pressure

Slice Weight

Forces on base [kN/m]

No.

c'

Tan phi

[kN/m²]

[kN/m²]

[kN/m]

Normal

Shear

Shear

[kN/m²]

[kN/m]

(capacity)

(mobilised)

1 11.718

0.0

0.0

1.6965

8.5301

7.2728

1.3725

2 33.374

0.0

0.0

4.8318

10.949

18.556

3.5018

3 51.908

0.0

0.0

7.5151

13.189

26.494

4.9998

4 60.966

0.0

0.0

0.47418

0.77196

1.5956

0.30112

5 22.809

0.0

0.0

12.773

19.139

13.025

2.4580

6 29.534

0.0

0.0

16.539

22.464

15.819

2.9852

7 59.697

0.0

0.0

14.762

19.051

23.165

4.3715

8 65.759

0.0

0.49500

16.422

20.602

24.690

4.6594

9 41.083

0.0

2.0550

23.774

29.139

19.567

3.6926

10 43.677

0.0

4.0100

26.053

31.167

20.166

3.8056

11 46.020

0.0

5.6350

28.051

32.758

20.739

3.9138

12 48.136

0.0

6.9550

29.793

33.932

21.265

4.0131

13 50.023

0.0

7.9650

30.019

33.318

20.891

3.9425

Oasys E3P Trub Farm Section 3										Job No.		Sheet No.		Rev.			
										17-524							
										Drg. Ref.							
										Made by CB		Date		Checked		Date	
Slice Strength Parameters										Average		Slice		Forces on base [kN/m]			
No.				Pore		Weight											
		c'		Tan phi		Pressure		[kN/m²]		[kN/m]		Normal		Shear		Shear	
14	51.698		0.0		8.6900	31.212	33.758		21.365		4.0320						
15	53.186		0.0		9.1700	32.204	33.910		21.832		4.1200						
16	54.484		0.0		9.4100	32.997	33.755		22.288		4.2061						
17	55.672		0.0		9.3900	38.764	39.666		26.259		4.9555						
18	56.721		0.0		9.0700	39.260	41.270		26.876		5.0720						
19	57.525		0.0		8.4300	39.454	42.374		27.505		5.1906						
20	58.077		0.0		7.4600	39.338	42.978		28.167		5.3155						
21	58.361		0.0		6.1400	38.891	43.000		28.871		5.4484						
22	58.359		0.0		4.4450	38.090	42.365		29.639		5.5934						
23	57.966		0.0		2.9050	20.120	22.384		16.338		3.0832						
24	57.275		0.0		1.6500	19.568	21.730		16.471		3.1084						
25	96.349		0.0	0.49500	23.986	26.540	36.127		6.8177								
26	92.346		0.0	0.0	22.835	25.117	35.884		6.7718								
27	51.681		0.0	0.0	7.5058	8.2447	7.0113		1.3232								
28	265.92		0.0	0.0	23.793	108.97	125.37		23.659								
29	373.28		0.0	0.0	21.381	142.06	186.51		35.197								
30	1173.9		0.0	0.0	22.923	161.16	789.30		148.95								
31	1150.2		0.0	0.0	18.419	140.52	872.23		164.60								
32	1120.0		0.0	0.0	12.716	115.42	1012.8		191.13								
33	695.51		0.0	0.0	4.7494	55.013	858.23		161.96								
Slice Surface Load [kN/m_hor/m]										Point Load [kN/m]		Water Pressure on					
No.		Vert		Horiz		Vert		Horiz		Vert		Horiz		ground surface [kN/m_hor/m]			
1	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
2	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
3	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
4	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
5	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
6	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
7	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
8	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
9	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
10	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
11	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
12	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
13	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
14	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
15	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
16	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
17	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
18	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
19	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
20	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
21	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
22	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
23	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
24	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
25	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
26	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
27	0.0		0.0		0.0		0.0		0.0		0.0		0.0				0.0
28	284.06		0.0		0.0		0.0		0.0		0.0		0.0				0.0
29	431.00		0.0		0.0		0.0		0.0		0.0		0.0				0.0
30	431.00		0.0		0.0		0.0		0.0		0.0		0.0				0.0
31	431.00		0.0		0.0		0.0		0.0		0.0		0.0				0.0
32	431.00		0.0		0.0		0.0		0.0		0.0		0.0				0.0
33	274.44		0.0		0.0		0.0		0.0		0.0		0.0				0.0

Program Oasys Oasys Slope Version 21.0.54.10

Copyright (C) 1997-2024

Printed

13-May-2025

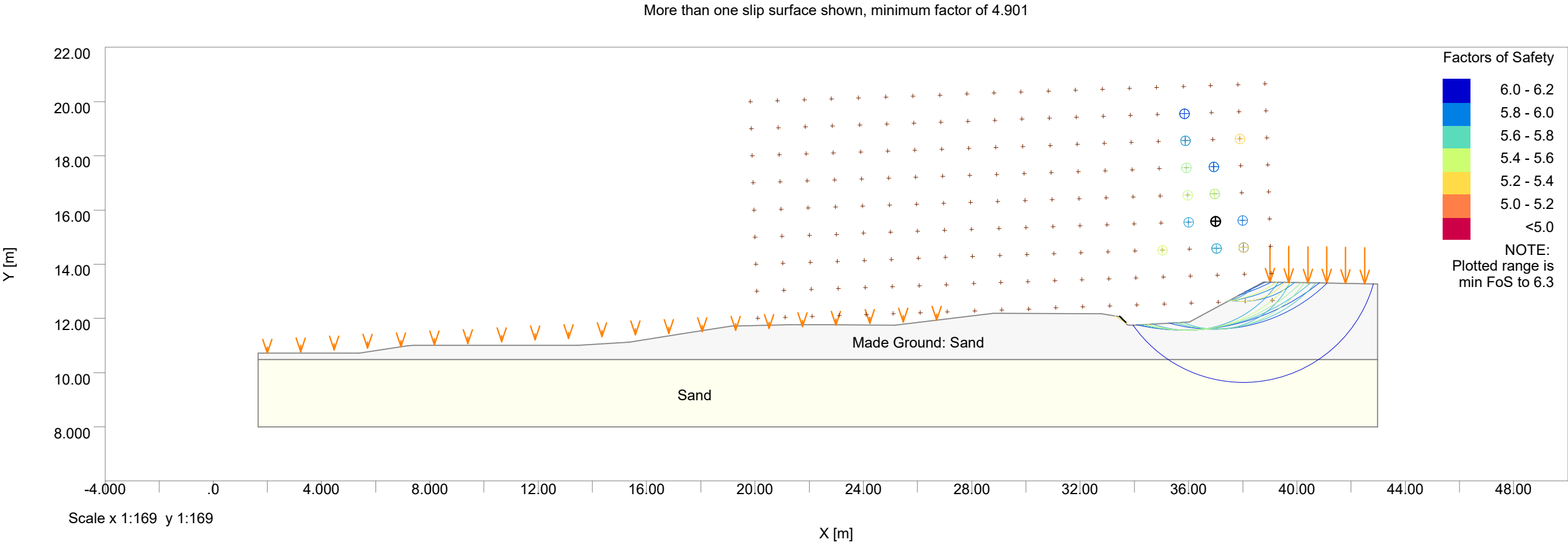
Page

3

Time

15:22

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 4	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop (Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
				Condition	
	or c0'				Phi0 [°]
		[kN/m3]	[kN/m3]		
	[kN/m²]				
1	Made Ground: Sand	18.000	18.000	Undrained	N.A.
11.000					
2	Sand	20.000	20.000	Undrained	N.A.
11.000					

Materials with variable cohesion or non-linear strength

No.	Description	y0 OR b	k OR a	cu/p ratio
		[m]	[kN/m²/m]	
1	Made Ground: Sand	0.11000	3.0000	3.4200
2	Sand	1.3500	20.000	1.8400

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz	
	[m]	[m]	[kN/m²]	[kN/m²]	
1	2.0000	26.700	20.000	0.0	Variable Unfavourable No
2	39.000	42.500	120.00	0.0	Permanent Unfavourable No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 20.00000 m y = 15.00000 m
Inclination of grid: 2.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.00000m spacing
6 in y direction at 1.00000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (36.990m,15.593m)
Iterations: 5
Net vertical force [kN/m]: 22.446E-9
Net horiz force [kN/m]: 23.788E-9

Radius 5.0000m
Horiz acceleration [%g]: 0.0
Slip weight [kN/m] 0.12904
Disturbing moment [kN/m]: 0.44394
Restoring moment [kNm/m]: 2.1756
Reinf.Rest.Moment [kNm/m]: 0.0
Over-Design Factor: 4.9007

The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 13-May-2025

Page 1
Time 15:25

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

No. Limits of loaded area Distributed load Permanent / Variable load Favourable / Unfavourable Use in pull-out calc

X1 X2 Vert Horiz
over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.

Slip surface coordinates		Pore Pressure		Interslice forces [kN/m]			
Point	x [m]	y [m]	L	R	T	E	E(u)
			[kN/m ²]	[kN/m ²]			
1	33.442	12.070	-	0.0	0.0	0.0	0.0
2	33.451	12.061	0.0	0.0	570.85E-9	1.0955E-6	0.0
3	33.460	12.052	0.0	0.0	2.9355E-6	3.9598E-6	0.0
4	33.469	12.043	0.0	0.0	7.2136E-6	8.7110E-6	0.0
5	33.478	12.035	0.0	0.0	2.6124E-6	4.1553E-6	0.0
6	33.486	12.026	0.0	0.0	10.239E-6	12.209E-6	0.0
7	33.495	12.017	0.0	0.0	19.779E-6	22.149E-6	0.0
8	33.504	12.008	0.0	0.0	31.232E-6	33.975E-6	0.0
9	33.513	12.000	0.0	0.0	21.637E-6	23.879E-6	0.0
10	33.522	11.991	0.0	0.0	35.219E-6	38.180E-6	0.0
11	33.531	11.982	0.0	0.0	48.199E-6	51.870E-6	0.0
12	33.540	11.974	0.0	0.0	27.899E-6	29.317E-6	0.0
13	33.549	11.965	0.0	0.0	39.312E-6	41.422E-6	0.0
14	33.559	11.956	0.0	0.0	50.002E-6	52.795E-6	0.0
15	33.568	11.948	0.0	0.0	33.359E-6	34.407E-6	0.0
16	33.577	11.939	0.0	0.0	42.604E-6	44.316E-6	0.0
17	33.586	11.931	0.0	0.0	28.463E-6	28.779E-6	0.0
18	33.595	11.922	0.0	0.0	36.141E-6	37.102E-6	0.0
19	33.604	11.914	0.0	0.0	24.310E-6	24.195E-6	0.0
20	33.613	11.906	0.0	0.0	14.019E-6	13.042E-6	0.0
21	33.622	11.897	0.0	0.0	19.287E-6	18.925E-6	0.0
22	33.631	11.889	0.0	0.0	11.306E-6	10.403E-6	0.0
23	33.641	11.881	0.0	0.0	4.8656E-6	3.6347E-6	0.0
24	33.650	11.872	0.0	0.0	7.6030E-6	6.9563E-6	0.0
25	33.659	11.864	0.0	0.0	3.6645E-6	3.0378E-6	0.0
26	33.668	11.856	0.0	0.0	1.0735E-6	653.89E-9	0.0
27	33.677	11.848	0.0	-	22.446E-9	23.788E-9	0.0

Slice Strength Parameters		Average Pore Pressure		Slice Weight		Forces on base [kN/m]	
No.							
	c'	Tan phi	[kN/m ²]	[kN/m]	Normal	Shear (capacity)	Shear (mobilised)
1	0.15390	0.0	0.0	559.13E-6	392.97E-6	0.0019453	396.94E-6
2	0.48369	0.0	0.0	0.0017573	0.0012342	0.0061137	0.0012475
3	0.83546	0.0	0.0	0.0030353	0.0021316	0.010560	0.0021548
4	1.1433	0.0	0.0	0.0041535	0.0030855	0.013660	0.0027874
5	1.4511	0.0	0.0	0.0052718	0.0037019	0.018341	0.0037426
6	1.8028	0.0	0.0	0.0065497	0.0045993	0.022787	0.0046499
7	2.1546	0.0	0.0	0.0078278	0.0054966	0.027234	0.0055572
8	2.4624	0.0	0.0	0.0089460	0.0066452	0.029422	0.0060037
9	2.5284	0.0	0.0	0.0094300	0.0067092	0.032380	0.0066073
10	2.4184	0.0	0.0	0.0090200	0.0064175	0.030972	0.0063200
11	2.2865	0.0	0.0	0.0085280	0.0064087	0.027724	0.0056571
12	2.1326	0.0	0.0	0.0079540	0.0056591	0.027312	0.0055731
13	2.0007	0.0	0.0	0.0074620	0.0053091	0.025622	0.0052284
14	1.8688	0.0	0.0	0.0069700	0.0052379	0.022659	0.0046236
15	1.7369	0.0	0.0	0.0064780	0.0046090	0.022244	0.0045389
16	1.5830	0.0	0.0	0.0059040	0.0044369	0.019193	0.0039165
17	1.4511	0.0	0.0	0.0054120	0.0038507	0.018583	0.0037920
18	1.3191	0.0	0.0	0.0049200	0.0036975	0.015994	0.0032637
19	1.1433	0.0	0.0	0.0042640	0.0032045	0.013862	0.0028286
20	1.0113	0.0	0.0	0.0037720	0.0026839	0.012952	0.0026429
21	0.87943	0.0	0.0	0.0032800	0.0024651	0.010663	0.0021758
22	0.70354	0.0	0.0	0.0026240	0.0019722	0.0085304	0.0017407
23	0.54964	0.0	0.0	0.0020500	0.0014588	0.0070391	0.0014364
24	0.41773	0.0	0.0	0.0015580	0.0011711	0.0050649	0.0010335
25	0.26383	0.0	0.0	984.00E-6	739.79E-6	0.0031989	652.75E-6
26	0.087943	0.0	0.0	328.00E-6	246.85E-6	0.0010663	217.58E-6

Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]	
No.					
	Vert	Horiz	Vert	Horiz	
1	0.0		0.0	0.0	0.0
2	0.0		0.0	0.0	0.0
3	0.0		0.0	0.0	0.0
4	0.0		0.0	0.0	0.0
5	0.0		0.0	0.0	0.0



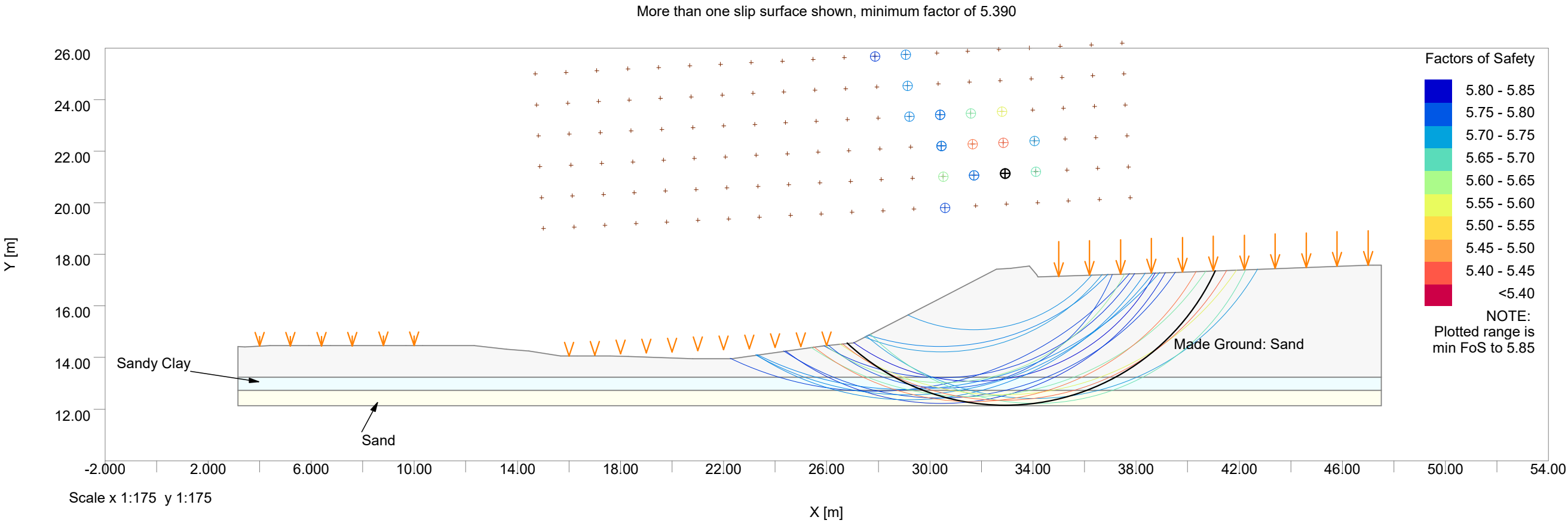
E3P

Trub Farm
Section 4

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

No.	Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]		
	Vert	Horiz	Vert	Horiz	Vert	Horiz	
6	0.0		0.0	0.0	0.0	0.0	0.0
7	0.0		0.0	0.0	0.0	0.0	0.0
8	0.0		0.0	0.0	0.0	0.0	0.0
9	0.0		0.0	0.0	0.0	0.0	0.0
10	0.0		0.0	0.0	0.0	0.0	0.0
11	0.0		0.0	0.0	0.0	0.0	0.0
12	0.0		0.0	0.0	0.0	0.0	0.0
13	0.0		0.0	0.0	0.0	0.0	0.0
14	0.0		0.0	0.0	0.0	0.0	0.0
15	0.0		0.0	0.0	0.0	0.0	0.0
16	0.0		0.0	0.0	0.0	0.0	0.0
17	0.0		0.0	0.0	0.0	0.0	0.0
18	0.0		0.0	0.0	0.0	0.0	0.0
19	0.0		0.0	0.0	0.0	0.0	0.0
20	0.0		0.0	0.0	0.0	0.0	0.0
21	0.0		0.0	0.0	0.0	0.0	0.0
22	0.0		0.0	0.0	0.0	0.0	0.0
23	0.0		0.0	0.0	0.0	0.0	0.0
24	0.0		0.0	0.0	0.0	0.0	0.0
25	0.0		0.0	0.0	0.0	0.0	0.0
26	0.0		0.0	0.0	0.0	0.0	0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 5	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
	or c0'			Condition	
		[kN/m3]	[kN/m3]		Phi0 [°]
	[kN/m²]				
1	Made Ground: Sand	18.000	18.000	Undrained	N.A.
11.000					
2	Sandy Clay	19.000	19.000	Undrained	N.A.
20.000					
3	Sand	20.000	20.000	Undrained	N.A.
11.000					

Materials with variable cohesion or non-linear strength

No.	Description	y0	k	OR a	cu/p
		OR b			ratio
		[m]	[kN/m² /m]		
1	Made Ground: Sand	-	-		3.4200
2	Sandy Clay	-	-		1.0700
3	Sand	-	-		1.8400

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz	
	[m]	[m]	[kN/m²]	[kN/m²]	
1	4.0000	10.000	120.00	0.0	Permanent Unfavourable No
2	16.000	26.000	20.000	0.0	Variable Unfavourable No
3	35.000	47.000	431.00	0.0	Permanent Unfavourable No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 15.00000 m y = 19.00000 m
Inclination of grid: 3.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.20000m spacing
6 in y direction at 1.20000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (32.913m,21.140m)
Iterations: 5
Net vertical force [kN/m]: 1.3319
Net horiz force [kN/m]: -1.6188

Radius 9.0000m
Horiz acceleration [%g]: 0.0
Slip weight [kN/m] 890.04
Disturbing moment [kN/m]: 14423.
Restoring moment [kNm/m]: 77747.
Reinf.Rest.Moment [kNm/m]: 0.0

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 13-May-2025

Page 1
Time 15:07

Oasys E3P Trub Farm Section 5						Job No.		Sheet No.		Rev.	
						17-524					
						Drg. Ref.					
Made by		Date		Checked		Date					
CB											

No.	Limits of loaded area			Distributed load	Permanent /	Favourable /	Use in
	X1	X2	Vert	Horiz	Variable load	Unfavourable	pull-out calc
					load		
	Over-Design Factor: 5.3904						
The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.							
Slip surface coordinates		Pore Pressure		Interslice forces [kN/m]			
Point	x [m]	y [m]	L	R	T	E	E(u)
			[kN/m²]	[kN/m²]			
1	26.782	14.551	-	0.0	0.0	0.0	0.0
2	27.038	14.322	0.0	0.0	2.8242	3.7257	0.0
3	27.564	13.902	0.0	0.0	5.9755	14.979	0.0
4	28.090	13.542	0.0	0.0	6.2475	31.211	0.0
5	28.616	13.232	0.0	0.0	4.8993	51.514	0.0
6	29.157	12.961	0.0	0.0	6.5429	68.357	0.0
7	29.699	12.733	0.0	0.0	8.2882	86.072	0.0
8	30.260	12.540	0.0	0.0	9.3040	108.03	0.0
9	30.725	12.410	0.0	0.0	10.612	126.16	0.0
10	31.190	12.307	0.0	0.0	12.418	143.67	0.0
11	31.654	12.229	0.0	0.0	14.657	160.25	0.0
12	32.119	12.175	0.0	0.0	17.238	175.57	0.0
13	32.584	12.146	0.0	0.0	20.048	189.19	0.0
14	32.913	12.140	0.0	0.0	22.070	197.57	0.0
15	33.149	12.144	0.0	0.0	23.750	202.76	0.0
16	33.507	12.160	0.0	0.0	26.839	209.60	0.0
17	33.865	12.191	0.0	0.0	30.636	214.84	0.0
18	34.135	12.224	0.0	0.0	33.855	217.65	0.0
19	34.200	12.233	0.0	0.0	34.661	218.18	0.0
20	34.681	12.316	0.0	0.0	41.061	220.45	0.0
21	35.163	12.426	0.0	0.0	46.223	222.42	0.0
22	35.645	12.565	0.0	0.0	45.794	216.45	0.0
23	36.126	12.733	0.0	0.0	41.646	199.26	0.0
24	36.667	12.961	0.0	0.0	19.746	138.33	0.0
25	37.209	13.232	0.0	0.0	-11.638	65.605	0.0
26	37.701	13.520	0.0	0.0	-5.1390	67.458	0.0
27	38.193	13.852	0.0	0.0	-2.1373	61.691	0.0
28	38.684	14.235	0.0	0.0	-3.3146	50.404	0.0
29	39.176	14.678	0.0	0.0	-7.6633	35.389	0.0
30	39.668	15.193	0.0	0.0	-14.196	19.627	0.0
31	40.139	15.776	0.0	0.0	-19.700	6.6697	0.0
32	40.611	16.478	0.0	0.0	-19.188	-0.69145	0.0
33	41.082	17.363	0.0	-	-1.3319	1.6188	0.0

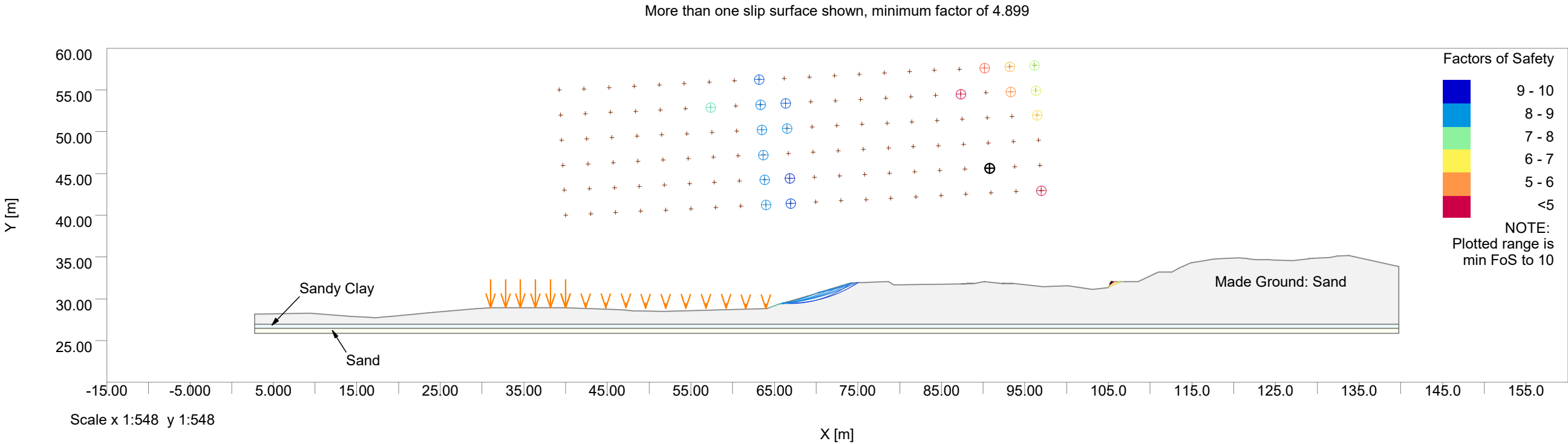
Slice Strength Parameters		Average	Slice	Forces on base [kN/m]		
No.		Pore	Weight			
		Pressure				
	c'	Tan phi	[kN/m²]	[kN/m]	Normal	Shear
	[kN/m²]				(capacity)	(mobilised)
1	7.8571	0.0	0.0	0.58982	5.0284	2.6988
2	26.339	0.0	0.0	5.6713	13.916	17.729
3	55.206	0.0	0.0	11.887	19.202	35.188
4	81.655	0.0	0.0	17.582	24.294	49.855
5	33.361	0.0	0.0	23.637	30.145	20.201
6	40.761	0.0	0.0	28.880	35.100	23.949
7	82.090	0.0	0.0	35.040	41.238	48.702
8	92.557	0.0	0.0	32.733	37.665	44.672
9	101.36	0.0	0.0	35.845	40.548	48.253
10	109.47	0.0	0.0	38.715	43.133	51.594
11	116.93	0.0	0.0	41.353	45.409	54.716
12	123.76	0.0	0.0	43.768	47.335	57.635
13	127.35	0.0	0.0	31.834	34.004	41.847
14	127.84	0.0	0.0	23.002	24.591	30.235
15	128.25	0.0	0.0	34.935	37.681	45.961
16	128.58	0.0	0.0	35.025	38.224	46.205
17	124.29	0.0	0.0	25.533	28.200	33.807
18	118.84	0.0	0.0	5.8773	6.5461	7.7981
19	116.85	0.0	0.0	42.808	48.109	57.092
20	306.45	0.0	0.0	42.018	114.04	151.36
21	678.25	0.0	0.0	40.957	239.98	339.91
22	674.61	0.0	0.0	39.622	235.10	344.03
23	389.60	0.0	0.0	42.647	257.86	228.91
24	386.22	0.0	0.0	40.255	249.19	233.87
25	1222.6	0.0	0.0	34.175	217.07	696.80
26	1209.7	0.0	0.0	31.577	207.57	717.81

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

Slice Strength Parameters			Average	Slice	Forces on base [kN/m]		
No.			Pore	Weight			
	c'	Tan phi	Pressure		Normal	Shear	Shear
			[kN/m ²]	[kN/m]			
27	1194.7	0.0	0.0	28.558	195.77	744.72	138.16
28	1177.3	0.0	0.0	25.048	182.92	779.25	144.56
29	1157.0	0.0	0.0	20.954	167.75	823.87	152.84
30	1133.6	0.0	0.0	15.568	144.12	849.82	157.65
31	1106.1	0.0	0.0	10.266	125.36	935.25	173.50
32	1072.0	0.0	0.0	3.6821	103.58	1074.8	199.40

Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]	
No.					
	Vert	Horiz	Vert	Horiz	
1	0.0		0.0	0.0	0.0
2	0.0		0.0	0.0	0.0
3	0.0		0.0	0.0	0.0
4	0.0		0.0	0.0	0.0
5	0.0		0.0	0.0	0.0
6	0.0		0.0	0.0	0.0
7	0.0		0.0	0.0	0.0
8	0.0		0.0	0.0	0.0
9	0.0		0.0	0.0	0.0
10	0.0		0.0	0.0	0.0
11	0.0		0.0	0.0	0.0
12	0.0		0.0	0.0	0.0
13	0.0		0.0	0.0	0.0
14	0.0		0.0	0.0	0.0
15	0.0		0.0	0.0	0.0
16	0.0		0.0	0.0	0.0
17	0.0		0.0	0.0	0.0
18	0.0		0.0	0.0	0.0
19	0.0		0.0	0.0	0.0
20	145.90		0.0	0.0	0.0
21	431.00		0.0	0.0	0.0
22	431.00		0.0	0.0	0.0
23	431.00		0.0	0.0	0.0
24	431.00		0.0	0.0	0.0
25	431.00		0.0	0.0	0.0
26	431.00		0.0	0.0	0.0
27	431.00		0.0	0.0	0.0
28	431.00		0.0	0.0	0.0
29	431.00		0.0	0.0	0.0
30	431.00		0.0	0.0	0.0
31	431.00		0.0	0.0	0.0
32	431.00		0.0	0.0	0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 6	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
	or c0'			Condition	
		[kN/m3]	[kN/m3]		Phi0 [°]
	[kN/m²]				
1	Made Ground: Sand	18.000	18.000	Undrained	N.A.
11.000					
2	Sandy Clay	19.000	19.000	Undrained	N.A.
20.000					
3	Sand	20.000	20.000	Undrained	N.A.
11.000					

Materials with variable cohesion or non-linear strength

No.	Description	y0	OR b	k	OR a	cu/p ratio
		[m]		[kN/m²/m]		
1	Made Ground: Sand	0.60000		3.0000		3.4200
2	Sandy Clay	-		-		1.0700
3	Sand	1.1900		20.000		1.8400

Surface loads

No.	Limits of loaded area		Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz		
	[m]	[m]	[kN/m²]	[kN/m²]		
1	31.000	40.000	40.000	120.00	0.0 Permanent	Unfavourable No
2	40.000	64.000	64.000	20.000	0.0 Variable	Unfavourable No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 40.00000 m y = 40.00000 m
Inclination of grid: 3.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 3.00000m spacing
6 in y direction at 3.00000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (90.773m,45.665m)
Iterations: 5
Net vertical force [kN/m]: 69.023E-9
Net horiz force [kN/m]: 65.358E-9

Radius 20.000m
Horiz acceleration [%g]: 0.0
Slip weight [kN/m] 0.22992
Disturbing moment [kN/m]: 3.3437
Restoring moment [kNm/m]: 16.381
Reinf.Rest.Moment [kNm/m]: 0.0
Over-Design Factor: 4.8990

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 13-May-2025

Page 1
Time 15:29

Oasys E3P Trub Farm Section 6						Job No.		Sheet No.		Rev.	
						17-524					
						Drg. Ref.					
						Made by CB		Date		Checked	
No. Limits of loaded area Distributed load Permanent / Favourable / Use in Variable load Unfavourable pull-out calc load X1 X2 Vert Horiz The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices. Slip surface coordinates Pore Pressure Interslice forces [kN/m] Point x [m] y [m] L R T E E (u)											



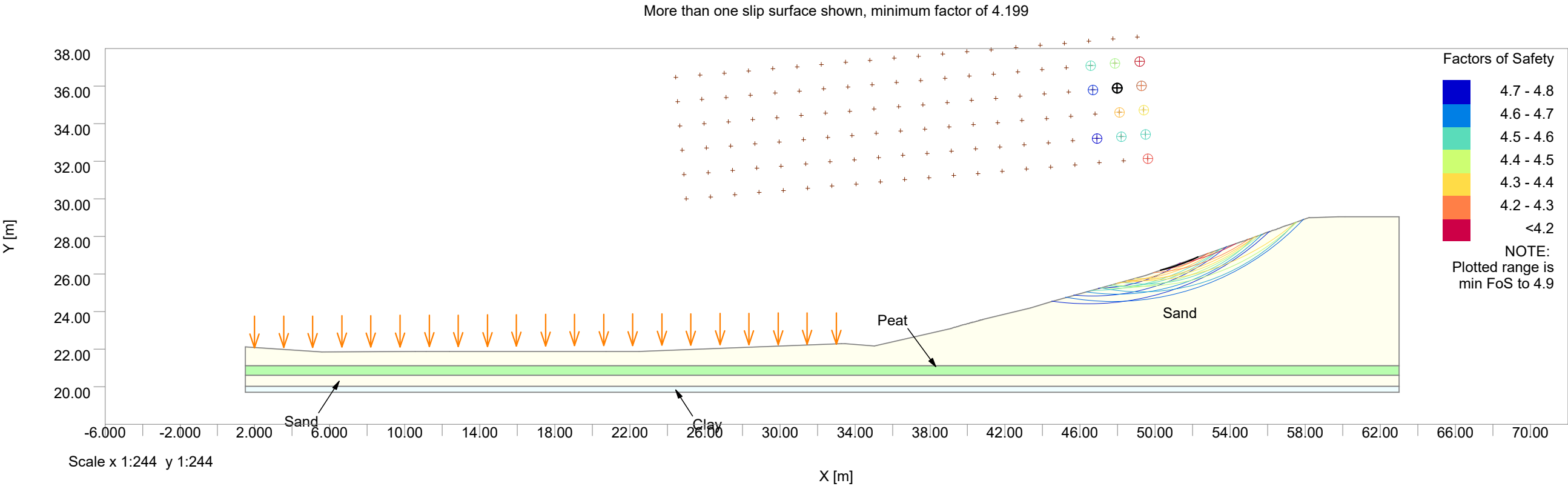
E3P

Trub Farm
Section 6

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

No.	Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]		
	Vert	Horiz	Vert	Horiz	Vert	Horiz	
4	0.0		0.0	0.0	0.0	0.0	0.0
5	0.0		0.0	0.0	0.0	0.0	0.0
6	0.0		0.0	0.0	0.0	0.0	0.0
7	0.0		0.0	0.0	0.0	0.0	0.0
8	0.0		0.0	0.0	0.0	0.0	0.0
9	0.0		0.0	0.0	0.0	0.0	0.0
10	0.0		0.0	0.0	0.0	0.0	0.0
11	0.0		0.0	0.0	0.0	0.0	0.0
12	0.0		0.0	0.0	0.0	0.0	0.0
13	0.0		0.0	0.0	0.0	0.0	0.0
14	0.0		0.0	0.0	0.0	0.0	0.0
15	0.0		0.0	0.0	0.0	0.0	0.0
16	0.0		0.0	0.0	0.0	0.0	0.0
17	0.0		0.0	0.0	0.0	0.0	0.0
18	0.0		0.0	0.0	0.0	0.0	0.0
19	0.0		0.0	0.0	0.0	0.0	0.0
20	0.0		0.0	0.0	0.0	0.0	0.0
21	0.0		0.0	0.0	0.0	0.0	0.0
22	0.0		0.0	0.0	0.0	0.0	0.0
23	0.0		0.0	0.0	0.0	0.0	0.0
24	0.0		0.0	0.0	0.0	0.0	0.0
25	0.0		0.0	0.0	0.0	0.0	0.0
26	0.0		0.0	0.0	0.0	0.0	0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 7	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters		Phi or c
		Above GWL	Below GWL	Condition		
or c0'						
		[kN/m3]	[kN/m3]			Phi0 [°]
	[kN/m²]					
1	Sand	20.000	20.000	Undrained		N.A.
11.000						
2	Peat	21.000	21.000	Undrained		N.A.
1.0000						
3	Clay	21.000	21.000	Undrained		N.A.
20.000						

Materials with variable cohesion or non-linear strength

No.	Description	y0 OR b	k OR a	cu/p ratio
		[m]	[kN/m²/m]	
1	Sand	0.50000	20.000	1.8400
2	Peat	-	-	1.6600
3	Clay	-	-	1.0700

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz	
	[m]	[m]	[kN/m²]	[kN/m²]	
1	2.0000	33.000	20.000	0.0	Variable Unfavourable No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 25.00000 m y = 30.00000 m
Inclination of grid: 5.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.30000m spacing
6 in y direction at 1.30000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (47.971m,35.925m) Radius 10.000m
Iterations: 5 Horiz acceleration [%g]: 0.0
Net vertical force [kN/m]: 9.4037E-6 Slip weight [kN/m] 1.5685
Net horiz force [kN/m]: 26.621E-6 Disturbing moment [kN/m]: 5.2130
Restoring moment [kNm/m]: 21.892
Reinf.Rest.Moment [kNm/m]: 0.0
Over-Design Factor: 4.1995

The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed

Oasys E3P Trub Farm Section 7				Job No.		Sheet No.	Rev.
				17-524			
				Drg. Ref.			
				Made by CB	Date	Checked	Date
No.	Limits of loaded area		Distributed load		Permanent / Variable load	Favourable / Unfavourable	Use in pull-out calc
	X1	X2	Vert	Horiz			
over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.							
Slip surface coordinates		Pore Pressure		Interslice forces [kN/m]			
Point	x [m]	y [m]	L	R	T	E	E(u)
			[kN/m ²]	[kN/m ²]			
1	50.293	26.198	-	0.0	0.0	0.0	0.0
2	50.373	26.217	0.0	0.0	232.16E-6	603.30E-6	0.0
3	50.412	26.227	0.0	0.0	444.00E-6	0.0012621	0.0
4	50.452	26.237	0.0	0.0	717.06E-6	0.0021643	0.0
5	50.492	26.248	0.0	0.0	992.31E-6	0.0029768	0.0
6	50.532	26.258	0.0	0.0	0.0013725	0.0043053	0.0
7	50.571	26.269	0.0	0.0	0.0017341	0.0054301	0.0
8	50.611	26.279	0.0	0.0	0.0022214	0.0071847	0.0
9	50.691	26.302	0.0	0.0	0.0030409	0.0096545	0.0
10	50.731	26.313	0.0	0.0	0.0035629	0.011359	0.0
11	50.770	26.324	0.0	0.0	0.0041219	0.013198	0.0
12	50.810	26.336	0.0	0.0	0.0045573	0.014459	0.0
13	50.850	26.348	0.0	0.0	0.0050101	0.015779	0.0
14	50.890	26.360	0.0	0.0	0.0054805	0.017156	0.0
15	50.929	26.372	0.0	0.0	0.0059683	0.018592	0.0
16	50.969	26.385	0.0	0.0	0.0062586	0.019299	0.0
17	51.009	26.397	0.0	0.0	0.0067727	0.020822	0.0
18	51.049	26.410	0.0	0.0	0.0070769	0.021572	0.0
19	51.089	26.423	0.0	0.0	0.0073856	0.022336	0.0
20	51.128	26.436	0.0	0.0	0.0076989	0.023114	0.0
21	51.168	26.449	0.0	0.0	0.0080192	0.023913	0.0
22	51.208	26.463	0.0	0.0	0.0080723	0.023885	0.0
23	51.248	26.477	0.0	0.0	0.0081254	0.023856	0.0
24	51.327	26.505	0.0	0.0	0.0082316	0.023799	0.0
25	51.367	26.519	0.0	0.0	0.0082847	0.023771	0.0
26	51.407	26.533	0.0	0.0	0.0083378	0.023742	0.0
27	51.447	26.548	0.0	0.0	0.0080953	0.022921	0.0
28	51.486	26.563	0.0	0.0	0.0078579	0.022113	0.0
29	51.526	26.578	0.0	0.0	0.0076256	0.021319	0.0
30	51.566	26.593	0.0	0.0	0.0073986	0.020539	0.0
31	51.606	26.609	0.0	0.0	0.0068853	0.019086	0.0
32	51.646	26.624	0.0	0.0	0.0066737	0.018347	0.0
33	51.685	26.640	0.0	0.0	0.0061924	0.016974	0.0
34	51.725	26.656	0.0	0.0	0.0057270	0.015640	0.0
35	51.765	26.672	0.0	0.0	0.0052776	0.014346	0.0
36	51.805	26.689	0.0	0.0	0.0045923	0.012567	0.0
37	51.844	26.705	0.0	0.0	0.0041961	0.011405	0.0
38	51.884	26.722	0.0	0.0	0.0035931	0.0098186	0.0
39	51.964	26.756	0.0	0.0	0.0025352	0.0069923	0.0
40	52.004	26.774	0.0	0.0	0.0019016	0.0054182	0.0
41	52.043	26.791	0.0	0.0	0.0015125	0.0043323	0.0
42	52.083	26.809	0.0	0.0	0.0010367	0.0031070	0.0
43	52.123	26.827	0.0	0.0	651.13E-6	0.0020809	0.0
44	52.163	26.845	0.0	0.0	355.73E-6	0.0012542	0.0
45	52.202	26.864	0.0	0.0	90.904E-6	527.34E-6	0.0
46	52.242	26.883	0.0	0.0	-29.627E-6	102.58E-6	0.0
47	52.282	26.901	0.0	-	-9.4037E-6	-26.621E-6	0.0
Slice No.	Strength Parameters		Average Pore Pressure	Slice Weight	Forces on base [kN/m]		
	c'	Tan phi	[kN/m ²]	[kN/m]	Normal	Shear (capacity)	Shear (mobilised)
1	0.11829	0.0	0.0	0.0071604	0.0070502	0.0096754	0.0023040
2	0.28914	0.0	0.0	0.0087516	0.0085324	0.011860	0.0028241
3	0.39429	0.0	0.0	0.011934	0.011619	0.016173	0.0038511
4	0.48629	0.0	0.0	0.014719	0.014235	0.020070	0.0047792
5	0.57829	0.0	0.0	0.017503	0.017020	0.023720	0.0056483
6	0.67029	0.0	0.0	0.020288	0.019603	0.027665	0.0065876
7	0.76229	0.0	0.0	0.023072	0.022421	0.031267	0.0074455
8	0.89371	0.0	0.0	0.054101	0.052074	0.074015	0.017625
9	1.0120	0.0	0.0	0.030631	0.029571	0.041768	0.0099460
10	1.0909	0.0	0.0	0.033017	0.031872	0.045023	0.010721
11	1.1566	0.0	0.0	0.035006	0.033567	0.048056	0.011443
12	1.2091	0.0	0.0	0.036598	0.035091	0.050241	0.011963
13	1.2617	0.0	0.0	0.038189	0.036614	0.052425	0.012484
14	1.3143	0.0	0.0	0.039780	0.038137	0.054609	0.013004
15	1.3537	0.0	0.0	0.040973	0.039003	0.056653	0.013491
16	1.3931	0.0	0.0	0.042167	0.040422	0.057886	0.013784
17	1.4326	0.0	0.0	0.043360	0.041271	0.059954	0.014276

**E3P****Trub Farm
Section 7**

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

Slice Strength Parameters			Average	Slice	Forces on base [kN/m]		
No.			Pore	Weight			
	c'	Tan phi	Pressure		Normal	Shear	Shear
			[kN/m ²]	[kN/m]			
18	1.4589	0.0	0.0	0.044156	0.042028	0.061054	0.014538
19	1.4851	0.0	0.0	0.044951	0.042784	0.062154	0.014800
20	1.5246	0.0	0.0	0.046145	0.043918	0.063804	0.015193
21	1.5509	0.0	0.0	0.046940	0.044338	0.065402	0.015574
22	1.5509	0.0	0.0	0.046940	0.044338	0.065402	0.015574
23	1.5509	0.0	0.0	0.093881	0.088676	0.13080	0.031148
24	1.5509	0.0	0.0	0.046940	0.044338	0.065402	0.015574
25	1.5509	0.0	0.0	0.046940	0.044338	0.065402	0.015574
26	1.5377	0.0	0.0	0.046543	0.043612	0.065375	0.015567
27	1.5114	0.0	0.0	0.045747	0.042868	0.064257	0.015301
28	1.4851	0.0	0.0	0.044951	0.042123	0.063140	0.015035
29	1.4589	0.0	0.0	0.044156	0.041379	0.062022	0.014769
30	1.4194	0.0	0.0	0.042962	0.039925	0.060861	0.014492
31	1.3800	0.0	0.0	0.041769	0.039146	0.058669	0.013971
32	1.3406	0.0	0.0	0.040576	0.037711	0.057480	0.013687
33	1.3011	0.0	0.0	0.039382	0.036603	0.055789	0.013285
34	1.2617	0.0	0.0	0.038189	0.035496	0.054099	0.012882
35	1.1960	0.0	0.0	0.036200	0.033356	0.051739	0.012320
36	1.1303	0.0	0.0	0.034211	0.031806	0.048463	0.011540
37	1.0646	0.0	0.0	0.032222	0.029698	0.046054	0.010966
38	0.94629	0.0	0.0	0.057283	0.052813	0.081873	0.019496
39	0.81486	0.0	0.0	0.024664	0.022542	0.035579	0.0084722
40	0.72286	0.0	0.0	0.021879	0.020188	0.031271	0.0074464
41	0.63086	0.0	0.0	0.019094	0.017468	0.027545	0.0065591
42	0.52571	0.0	0.0	0.015912	0.014569	0.022954	0.0054660
43	0.42057	0.0	0.0	0.012730	0.011669	0.018363	0.0043728
44	0.30229	0.0	0.0	0.0091494	0.0083303	0.013326	0.0031733
45	0.17086	0.0	0.0	0.0051714	0.0047408	0.0075322	0.0017936
46	0.052571	0.0	0.0	0.0015912	0.0015214	0.0022954	546.60E-6

Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on	
No.				ground surface [kN/m_hor/m]	
	Vert	Horiz	Vert	Horiz	
1	0.0		0.0	0.0	0.0
2	0.0		0.0	0.0	0.0
3	0.0		0.0	0.0	0.0
4	0.0		0.0	0.0	0.0
5	0.0		0.0	0.0	0.0
6	0.0		0.0	0.0	0.0
7	0.0		0.0	0.0	0.0
8	0.0		0.0	0.0	0.0
9	0.0		0.0	0.0	0.0
10	0.0		0.0	0.0	0.0
11	0.0		0.0	0.0	0.0
12	0.0		0.0	0.0	0.0
13	0.0		0.0	0.0	0.0
14	0.0		0.0	0.0	0.0
15	0.0		0.0	0.0	0.0
16	0.0		0.0	0.0	0.0
17	0.0		0.0	0.0	0.0
18	0.0		0.0	0.0	0.0
19	0.0		0.0	0.0	0.0
20	0.0		0.0	0.0	0.0
21	0.0		0.0	0.0	0.0
22	0.0		0.0	0.0	0.0
23	0.0		0.0	0.0	0.0
24	0.0		0.0	0.0	0.0
25	0.0		0.0	0.0	0.0
26	0.0		0.0	0.0	0.0
27	0.0		0.0	0.0	0.0
28	0.0		0.0	0.0	0.0
29	0.0		0.0	0.0	0.0
30	0.0		0.0	0.0	0.0
31	0.0		0.0	0.0	0.0
32	0.0		0.0	0.0	0.0
33	0.0		0.0	0.0	0.0
34	0.0		0.0	0.0	0.0
35	0.0		0.0	0.0	0.0
36	0.0		0.0	0.0	0.0
37	0.0		0.0	0.0	0.0
38	0.0		0.0	0.0	0.0
39	0.0		0.0	0.0	0.0



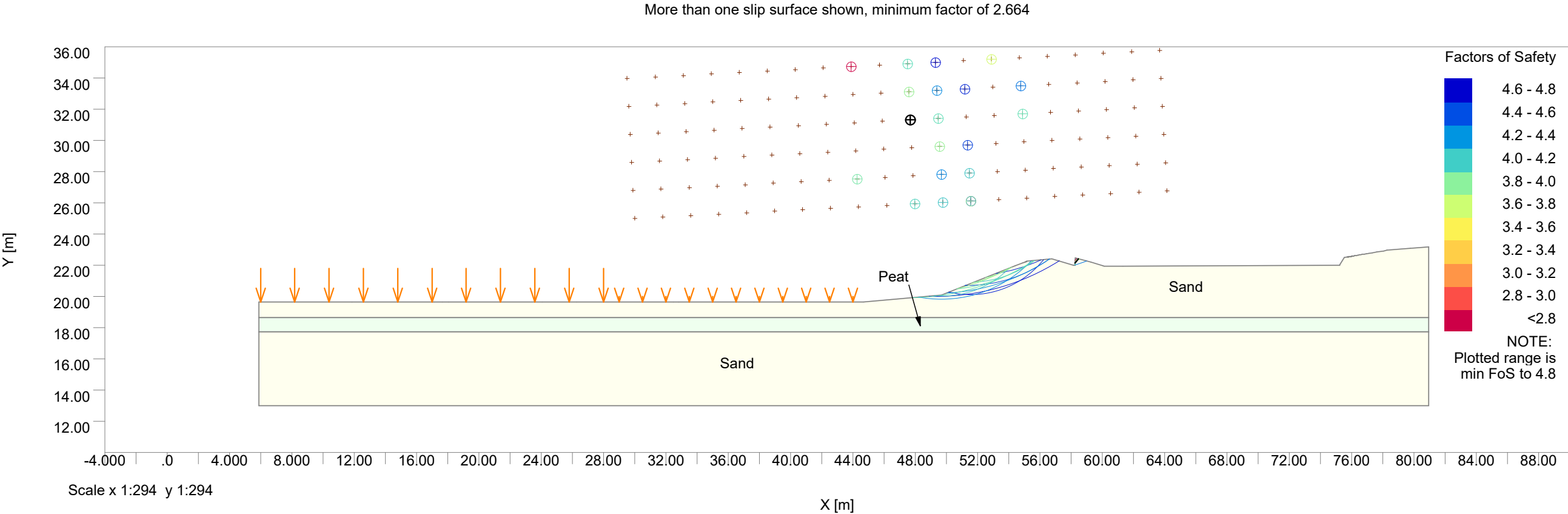
E3P

Trub Farm
Section 7

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

Slice No.	Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]	
	Vert	Horiz	Vert	Horiz	Vert	Horiz
40	0.0		0.0	0.0	0.0	0.0
41	0.0		0.0	0.0	0.0	0.0
42	0.0		0.0	0.0	0.0	0.0
43	0.0		0.0	0.0	0.0	0.0
44	0.0		0.0	0.0	0.0	0.0
45	0.0		0.0	0.0	0.0	0.0
46	0.0		0.0	0.0	0.0	0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys

E3P

Trub Farm

Section 8

Job No.

17-524

Sheet No.

Rev.

Drg. Ref.

Made by

CB

Date

Checked

Date

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight	Shear Strength Parameters	Phi or c
		Above GWL	Below GWL	Condition
	or c0'			
		[kN/m3]	[kN/m3]	Phi0 [°]
	[kN/m²]			
1	Sand	20.000	20.000	Undrained
11.000				
2	Peat	21.000	21.000	Undrained
1.0000				

Materials with variable cohesion or non-linear strength

No.	Description	y0 OR b	k OR a	cu/p ratio
		[m]	[kN/m²/m]	
1	Sand	0.50000	20.000	1.8400
2	Peat	-	-	1.6600

Surface loads

No.	Limits of loaded area	Distributed load	Permanent / Variable load	Favourable / Unfavourable load	Use in pull-out calc
	X1	X2	Vert	Horiz	
	[m]	[m]	[kN/m²]	[kN/m²]	
1	6.0000	28.000	120.00	0.0	Permanent Unfavourable No
2	29.000	44.000	20.000	0.0	Variable Unfavourable No

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 30.00000 m y = 25.00000 m
Inclination of grid: 3.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.80000m spacing
6 in y direction at 1.80000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (47.693m,31.335m)
Iterations: 5
Net vertical force [kN/m]: -659.18E-9

Radius 14.000m
Horiz acceleration [%g]: 0.0
Slip weight [kN/m] 0.74131
Disturbing moment [kN/m]: 7.8950
Restoring moment [kNm/m]: 21.035
Reinf.Rest.Moment [kNm/m]: 0.0
Over-Design Factor: 2.6644

Net horiz force [kN/m]: -559.02E-9

The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Page 1

Printed 13-May-2025

Time 15:35

Oasys E3P Trub Farm Section 8					Job No.		Sheet No.		Rev.	
					17-524					
					Drg. Ref.					
Made by CB		Date		Checked		Date				

No.	Limits of loaded area Distributed load				Permanent / Variable load		Favourable / Unfavourable		Use in pull-out calc	
	X1	X2	Vert	Horiz						
are in equilibrium with the factored strengths of the soil at the bases of slices.										
Slip surface coordinates		Pore Pressure		Interslice forces [kN/m]						
Point	x [m]	y [m]	L	R	T	E	E (u)			
			[kN/m²]	[kN/m²]						
1	58.258	22.149	-	0.0	0.0	0.0	0.0			
2	58.267	22.159	0.0	0.0	-41.440E-6	-34.371E-6	0.0			
3	58.276	22.170	0.0	0.0	63.488E-6	54.334E-6	0.0			
4	58.285	22.181	0.0	0.0	239.42E-6	201.13E-6	0.0			
5	58.294	22.191	0.0	0.0	-66.530E-6	-77.859E-6	0.0			
6	58.303	22.202	0.0	0.0	-4.6239E-6	-23.044E-6	0.0			
7	58.313	22.212	0.0	0.0	-286.76E-6	-280.09E-6	0.0			
8	58.322	22.223	0.0	0.0	-230.54E-6	-230.03E-6	0.0			
9	58.331	22.234	0.0	0.0	-177.37E-6	-182.54E-6	0.0			
10	58.340	22.245	0.0	0.0	-127.15E-6	-137.52E-6	0.0			
11	58.350	22.255	0.0	0.0	-355.09E-6	-344.60E-6	0.0			
12	58.359	22.266	0.0	0.0	-310.55E-6	-304.34E-6	0.0			
13	58.368	22.277	0.0	0.0	-268.96E-6	-266.55E-6	0.0			
14	58.377	22.288	0.0	0.0	-230.43E-6	-231.32E-6	0.0			
15	58.386	22.299	0.0	0.0	-194.85E-6	-198.57E-6	0.0			
16	58.396	22.310	0.0	0.0	-162.22E-6	-168.28E-6	0.0			
17	58.405	22.321	0.0	0.0	-132.54E-6	-140.47E-6	0.0			
18	58.414	22.332	0.0	0.0	-105.81E-6	-115.13E-6	0.0			
19	58.423	22.343	0.0	0.0	-82.131E-6	-92.347E-6	0.0			
20	58.432	22.354	0.0	0.0	-61.405E-6	-72.038E-6	0.0			
21	58.442	22.365	0.0	0.0	-43.629E-6	-54.201E-6	0.0			
22	58.451	22.376	0.0	0.0	-28.801E-6	-38.835E-6	0.0			
23	58.460	22.387	0.0	0.0	-16.924E-6	-25.941E-6	0.0			
24	58.469	22.398	0.0	0.0	-8.1041E-6	-15.609E-6	0.0			
25	58.479	22.409	0.0	0.0	-2.2339E-6	-7.7484E-6	0.0			
26	58.488	22.420	0.0	0.0	687.30E-9	-2.3590E-6	0.0			
27	58.497	22.431	0.0	-	659.18E-9	559.02E-9	0.0			

Slice Strength Parameters		Average Pore Pressure		Slice Weight		Forces on base [kN/m]	
No.							
	c'	Tan phi	[kN/m²]	[kN/m]	Normal	Shear (capacity)	Shear (mobilised)
	[kN/m²]						
1	1.3274	0.0	0.0	0.0090900	0.0060787	0.017859	0.0067027
2	3.9954	0.0	0.0	0.027360	0.017323	0.056786	0.021313
3	6.6634	0.0	0.0	0.045630	0.028892	0.094705	0.035545
4	7.8989	0.0	0.0	0.055397	0.037543	0.10742	0.040319
5	7.6229	0.0	0.0	0.053461	0.034334	0.10940	0.041059
6	7.2811	0.0	0.0	0.051064	0.034607	0.099024	0.037166
7	6.9394	0.0	0.0	0.048668	0.031256	0.099590	0.037378
8	6.5714	0.0	0.0	0.046087	0.029598	0.094309	0.035396
9	6.2166	0.0	0.0	0.043598	0.028000	0.089216	0.033485
10	5.8749	0.0	0.0	0.041202	0.027922	0.079898	0.029987
11	5.5331	0.0	0.0	0.038805	0.024921	0.079408	0.029803
12	5.1783	0.0	0.0	0.036317	0.023323	0.074315	0.027892
13	4.8103	0.0	0.0	0.033736	0.021665	0.069034	0.025910
14	4.4554	0.0	0.0	0.031247	0.020067	0.063941	0.023998
15	4.1006	0.0	0.0	0.028758	0.018468	0.058849	0.022087
16	3.7457	0.0	0.0	0.026270	0.016870	0.053756	0.020176
17	3.3909	0.0	0.0	0.023781	0.015271	0.048663	0.018264
18	3.0229	0.0	0.0	0.021200	0.013614	0.043382	0.016282
19	2.6680	0.0	0.0	0.018711	0.012015	0.038289	0.014371
20	2.3131	0.0	0.0	0.016223	0.010417	0.033197	0.012459
21	1.9583	0.0	0.0	0.013734	0.0088186	0.028104	0.010548
22	1.6034	0.0	0.0	0.011245	0.0072202	0.023011	0.0086366
23	1.2354	0.0	0.0	0.0086643	0.0055626	0.017730	0.0066544
24	0.88057	0.0	0.0	0.0061757	0.0039642	0.012637	0.0047431
25	0.52571	0.0	0.0	0.0036870	0.0023658	0.0075447	0.0028317
26	0.17086	0.0	0.0	0.0011983	767.35E-6	0.0024520	920.30E-6

Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]			
No.							
	Vert	Horiz	Vert	Horiz	Vert	Horiz	
1	0.0		0.0	0.0	0.0	0.0	0.0
2	0.0		0.0	0.0	0.0	0.0	0.0
3	0.0		0.0	0.0	0.0	0.0	0.0
4	0.0		0.0	0.0	0.0	0.0	0.0
5	0.0		0.0	0.0	0.0	0.0	0.0
6	0.0		0.0	0.0	0.0	0.0	0.0



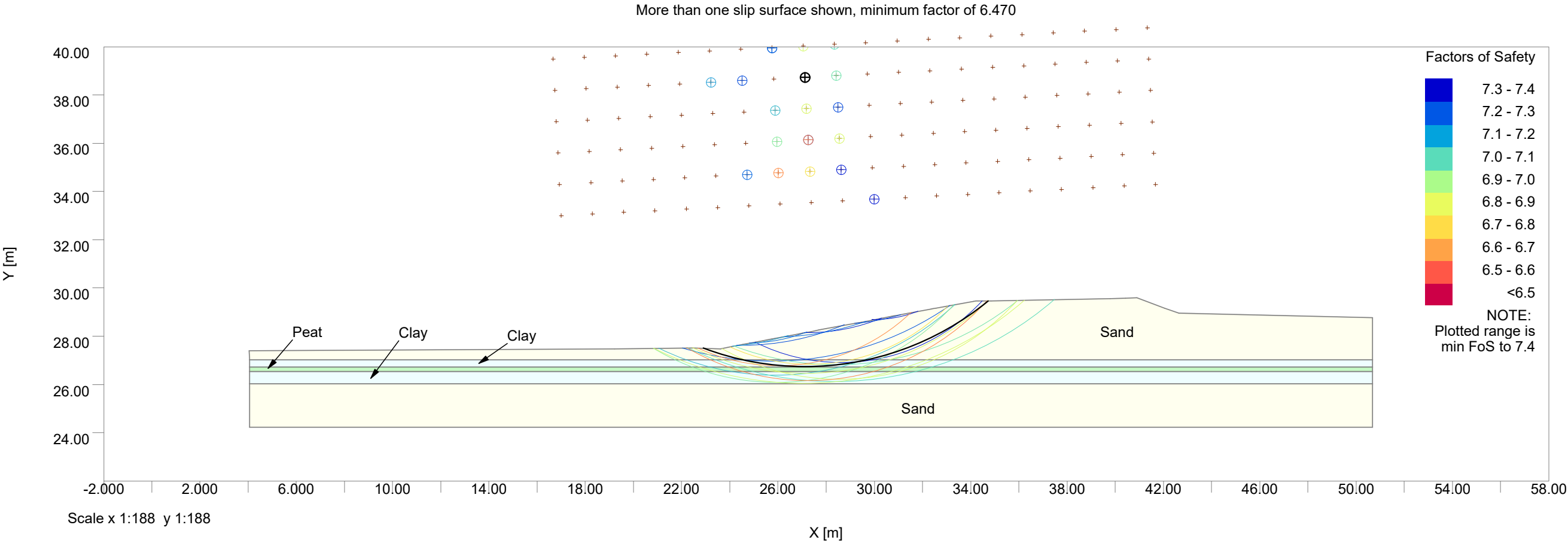
E3P

Trub Farm
Section 8

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date

No.	Slice Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]		
	Vert	Horiz	Vert	Horiz	Vert	Horiz	
7	0.0		0.0	0.0	0.0	0.0	0.0
8	0.0		0.0	0.0	0.0	0.0	0.0
9	0.0		0.0	0.0	0.0	0.0	0.0
10	0.0		0.0	0.0	0.0	0.0	0.0
11	0.0		0.0	0.0	0.0	0.0	0.0
12	0.0		0.0	0.0	0.0	0.0	0.0
13	0.0		0.0	0.0	0.0	0.0	0.0
14	0.0		0.0	0.0	0.0	0.0	0.0
15	0.0		0.0	0.0	0.0	0.0	0.0
16	0.0		0.0	0.0	0.0	0.0	0.0
17	0.0		0.0	0.0	0.0	0.0	0.0
18	0.0		0.0	0.0	0.0	0.0	0.0
19	0.0		0.0	0.0	0.0	0.0	0.0
20	0.0		0.0	0.0	0.0	0.0	0.0
21	0.0		0.0	0.0	0.0	0.0	0.0
22	0.0		0.0	0.0	0.0	0.0	0.0
23	0.0		0.0	0.0	0.0	0.0	0.0
24	0.0		0.0	0.0	0.0	0.0	0.0
25	0.0		0.0	0.0	0.0	0.0	0.0
26	0.0		0.0	0.0	0.0	0.0	0.0

Job No.	Sheet No.	Rev.
17-524		
Drg. Ref.		
Made by CB	Date	Checked Date



Oasys E3P Trub Farm Section 9	Job No.		Sheet No.		Rev.	
	17-524					
	Drg. Ref.					
	Made by CB		Date		Checked Date	

Specification

General

Slip Type: CIRCULAR
Direction of slip: Downhill
Minimum slip weight [kN/m] :0.00000
Maximum number of iterations: 300
Minimum number of slices 25
Horizontal acceleration [% of g]: 0.00

Analysis Parameters

Method: Bishop(Variably inclined interslice forces)
Partial factor analysis

Pore Pressure Data

Type: Specified

Reinforcement

Reinforcement: NONE

Material Properties

No	Description	Unit Weight		Shear Strength Parameters	Phi or c
		Above GWL	Below GWL		
				Condition	
		[kN/m3]	[kN/m3]		Phi0 [°]
		[kN/m²]			
1	Sand	20.000	20.000	Undrained	N.A.
2	Clay	21.000	21.000	Undrained	N.A.
3	Peat	21.000	21.000	Undrained	N.A.

Materials with variable cohesion or non-linear strength

No.	Description	y0 OR b	k OR a	cu/p ratio
		[m]	[kN/m²/m]	
1	Sand	0.20000	20.000	1.8400
2	Clay	-	-	1.0700
3	Peat	-	-	1.6600

Slip Surface Specification

Circle centre specification:
Bottom left of grid: x = 17.00000 m y = 33.00000 m
Inclination of grid: 3.00000 deg
(positive anticlockwise direction about bottom left of grid)
Centres on grid: 20 in x direction at 1.30000m spacing
6 in y direction at 1.30000m spacing
Grid extended to find minimum FoS
Initial radius of circle 1.00000 m
Incremented by 1.00000 m until all possible circles considered

WORST CASE

Centre at (27.114m,38.737m)
Iterations: 5
Net vertical force [kN/m]: 0.17092
Net horiz force [kN/m]: 1.0596

Radius 12.000m
Horiz acceleration [%g]: 0.0
Slip weight [kN/m] 256.02
Disturbing moment [kN/m]: 512.99
Restoring moment [kNm/m]: 3319.2
Reinf.Rest.Moment [kNm/m]: 0.0
Over-Design Factor: 6.4702

The system of interslice and base forces are in equilibrium when the strengths available at the bases are divided by the computed over-design factor. The interslice forces shown in the following table are in equilibrium with the factored strengths of the soil at the bases of slices.

Slip surface coordinates		Pore Pressure		Interslice forces [kN/m]		
Point	x [m]	y [m]	L	R	T	E
			[kN/m²]	[kN/m²]		
1	22.900	27.501	-	0.0	0.0	0.0
2	23.616	27.258	0.0	0.0	0.57494	1.0784

Program Oasys Oasys Slope Version 21.0.54.10 Copyright (C) 1997-2024

Printed 13-May-2025

Page 1
Time 15:40

Oasys E3P Trub Farm Section 9		Job No.		Sheet No.		Rev.	
		17-524					
		Drg. Ref.					
		Made by CB		Date		Checked	Date
Slip surface coordinates Point x [m] y [m] Pore Pressure L R T E [kN/m²] [kN/m²] Interslice forces [kN/m] E (u)							
3	24.060	27.132	0.0	0.0	0.65372	2.5465	0.0
4	24.082	27.126	0.0	0.0	0.65194	2.6398	0.0
5	24.481	27.030	0.0	0.0	0.57756	4.5338	0.0
6	24.554	27.013	0.0	0.0	0.55695	4.9128	0.0
7	25.373	26.864	0.0	0.0	0.38656	9.1401	0.0
8	25.540	26.841	0.0	0.0	0.36293	9.9871	0.0
9	25.742	26.816	0.0	0.0	0.33716	11.014	0.0
10	26.153	26.776	0.0	0.0	0.30282	13.037	0.0
11	26.863	26.740	0.0	0.0	0.29311	16.123	0.0
12	27.019	26.738	0.0	0.0	0.29400	16.690	0.0
13	27.114	26.737	0.0	0.0	0.29445	17.034	0.0
14	27.378	26.740	0.0	0.0	0.31516	17.850	0.0
15	27.707	26.752	0.0	0.0	0.39019	18.651	0.0
16	28.000	26.770	0.0	0.0	0.49004	19.160	0.0
17	28.520	26.820	0.0	0.0	0.71443	19.517	0.0
18	28.740	26.848	0.0	0.0	0.81237	19.454	0.0
19	29.252	26.929	0.0	0.0	1.0153	18.806	0.0
20	29.478	26.972	0.0	0.0	1.0795	18.296	0.0
21	29.746	27.030	0.0	0.0	1.1199	17.483	0.0
22	29.871	27.058	0.0	0.0	1.2100	17.420	0.0
23	30.802	27.318	0.0	0.0	1.6409	15.543	0.0
24	30.955	27.369	0.0	0.0	1.6577	15.040	0.0
25	31.222	27.462	0.0	0.0	1.6606	14.088	0.0
26	32.349	27.939	0.0	0.0	1.1117	8.8391	0.0
27	32.430	27.979	0.0	0.0	1.0389	8.4154	0.0
28	32.572	28.050	0.0	0.0	0.91284	7.6803	0.0
29	32.977	28.267	0.0	0.0	0.50728	5.5664	0.0
30	34.117	28.993	0.0	0.0	-0.45272	0.41037	0.0
31	34.213	29.062	0.0	0.0	-0.47270	0.087251	0.0
32	34.274	29.107	0.0	0.0	-0.47571	-0.10272	0.0
33	34.334	29.152	0.0	0.0	-0.47009	-0.27695	0.0
34	34.449	29.240	0.0	0.0	-0.43214	-0.57302	0.0
35	34.506	29.284	0.0	0.0	-0.39795	-0.69947	0.0
36	34.561	29.328	0.0	0.0	-0.35679	-0.81045	0.0
37	34.669	29.414	0.0	0.0	-0.24384	-0.98815	0.0
38	34.721	29.457	0.0	0.0	-0.17528	-1.0567	0.0
39	34.724	29.459	0.0	-	-0.17092	-1.0596	0.0
Slice Strength Parameters No. c' [kN/m²] Tan phi Average Pore Pressure [kN/m²] Slice Weight [kN/m] Forces on base [kN/m] Normal Shear (capacity) Shear (mobilised)							
1	2.8651	0.0	0.0	1.5609	2.3691	2.1664	0.33482
2	8.5034	0.0	0.0	2.8727	3.2401	3.9246	0.60657
3	11.408	0.0	0.0	0.19096	0.20705	0.26014	0.040206
4	13.826	0.0	0.0	4.1975	4.4518	5.6741	0.87697
5	14.286	0.0	0.0	0.91823	0.96018	1.0708	0.16549
6	14.286	0.0	0.0	13.138	13.515	11.892	1.8380
7	15.077	0.0	0.0	3.2945	3.3558	2.5417	0.39283
8	15.990	0.0	0.0	4.2261	4.2947	3.2546	0.50302
9	17.398	0.0	0.0	9.3560	9.4738	7.1844	1.1104
10	19.644	0.0	0.0	18.248	18.372	13.965	2.1584
11	21.217	0.0	0.0	4.3307	4.3385	3.3102	0.51161
12	21.601	0.0	0.0	2.6736	2.6776	2.0435	0.31584
13	22.097	0.0	0.0	7.6442	7.6552	5.8427	0.90303
14	22.832	0.0	0.0	9.8285	9.8678	7.5168	1.1618
15	23.501	0.0	0.0	9.0095	9.0610	6.8988	1.0662
16	24.148	0.0	0.0	16.429	16.543	12.615	1.9497
17	24.592	0.0	0.0	7.0787	7.1273	5.4538	0.84292
18	24.749	0.0	0.0	16.579	16.677	12.829	1.9828
19	24.808	0.0	0.0	7.3358	7.3649	5.7073	0.88209
20	24.716	0.0	0.0	8.6669	8.6822	6.7773	1.0475
21	42.320	0.0	0.0	4.0250	4.0294	5.4211	0.83786
22	41.124	0.0	0.0	29.131	28.977	39.751	6.1438
23	39.691	0.0	0.0	4.6206	4.5584	6.4013	0.98935
24	38.863	0.0	0.0	7.8952	7.7719	10.988	1.6983
25	34.789	0.0	0.0	29.832	29.013	42.575	6.5801
26	30.925	0.0	0.0	1.9059	1.8312	2.7937	0.43179
27	30.018	0.0	0.0	3.2433	3.1169	4.7657	0.73657
28	27.574	0.0	0.0	8.4969	8.1304	12.669	1.9581
29	18.926	0.0	0.0	16.416	15.806	25.579	3.9534
30	11.250	0.0	0.0	0.82176	0.83964	1.3301	0.20557
31	9.7651	0.0	0.0	0.45323	0.47508	0.74022	0.11441
32	8.6086	0.0	0.0	0.39300	0.42344	0.64564	0.099788

Slice No.	Strength Parameters	Average Pore Pressure	Slice Weight	Forces on base [kN/m]			
	c'	Tan phi	[kN/m ²]	[kN/m]	Normal	Shear	Shear
33	6.8869	0.0	0.0	0.60260	0.68862	0.99726	0.15413
34	5.1520	0.0	0.0	0.22344	0.28121	0.37098	0.057337
35	3.9954	0.0	0.0	0.16720	0.23203	0.28142	0.043494
36	2.3000	0.0	0.0	0.18900	0.34691	0.31753	0.049077
37	0.61771	0.0	0.0	0.024440	0.11536	0.041681	0.0064420
38	0.026286	0.0	0.0	60.000E-6	0.0053008	94.775E-6	14.648E-6

Slice No.	Surface Load [kN/m_hor/m]		Point Load [kN/m]		Water Pressure on ground surface [kN/m_hor/m]	
	Vert	Horiz	Vert	Horiz	Vert	Horiz
1	0.0		0.0	0.0	0.0	0.0
2	0.0		0.0	0.0	0.0	0.0
3	0.0		0.0	0.0	0.0	0.0
4	0.0		0.0	0.0	0.0	0.0
5	0.0		0.0	0.0	0.0	0.0
6	0.0		0.0	0.0	0.0	0.0
7	0.0		0.0	0.0	0.0	0.0
8	0.0		0.0	0.0	0.0	0.0
9	0.0		0.0	0.0	0.0	0.0
10	0.0		0.0	0.0	0.0	0.0
11	0.0		0.0	0.0	0.0	0.0
12	0.0		0.0	0.0	0.0	0.0
13	0.0		0.0	0.0	0.0	0.0
14	0.0		0.0	0.0	0.0	0.0
15	0.0		0.0	0.0	0.0	0.0
16	0.0		0.0	0.0	0.0	0.0
17	0.0		0.0	0.0	0.0	0.0
18	0.0		0.0	0.0	0.0	0.0
19	0.0		0.0	0.0	0.0	0.0
20	0.0		0.0	0.0	0.0	0.0
21	0.0		0.0	0.0	0.0	0.0
22	0.0		0.0	0.0	0.0	0.0
23	0.0		0.0	0.0	0.0	0.0
24	0.0		0.0	0.0	0.0	0.0
25	0.0		0.0	0.0	0.0	0.0
26	0.0		0.0	0.0	0.0	0.0
27	0.0		0.0	0.0	0.0	0.0
28	0.0		0.0	0.0	0.0	0.0
29	0.0		0.0	0.0	0.0	0.0
30	0.0		0.0	0.0	0.0	0.0
31	0.0		0.0	0.0	0.0	0.0
32	0.0		0.0	0.0	0.0	0.0
33	0.0		0.0	0.0	0.0	0.0
34	0.0		0.0	0.0	0.0	0.0
35	0.0		0.0	0.0	0.0	0.0
36	0.0		0.0	0.0	0.0	0.0
37	0.0		0.0	0.0	0.0	0.0
38	0.0		0.0	0.0	0.0	0.0

TEST REPORT

Client e3p

Address Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

Contract 17-524 -
Trub Farm

Job Number MRN 24005/282
Date of Issue 07 November 2024
Page 1 of 5

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016

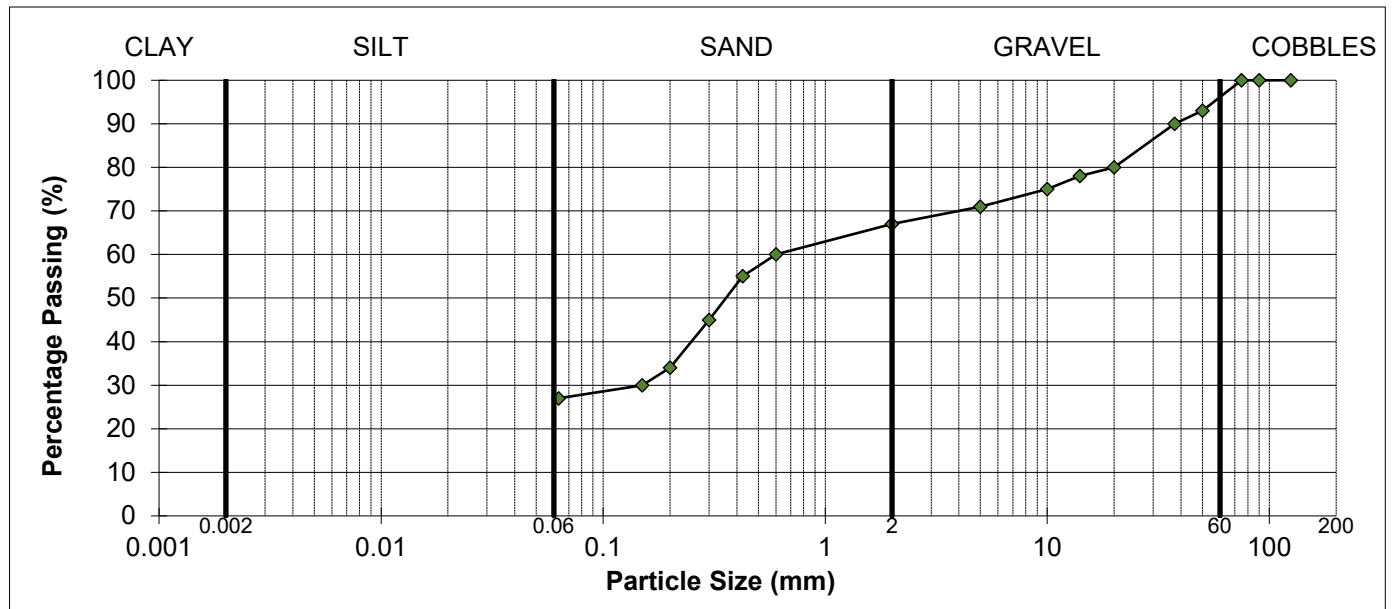
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	17-524 - Trub Farm
JOB NUMBER	MRN 24005/282

SAMPLE LABEL	SAND (Base Slope)	DATE SAMPLED	Not advised
LAB SAMPLE No	574901	DATE RECEIVED	16-Oct-24
DATE TESTED	18-Oct-24	SAMPLED BY	Client

MATERIAL	Brown silty very gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	71	
90	100		2	67	15-80
75	100		0.6	60	
50	93		0.425	55	
37.5	90		0.3	45	
20	80		0.2	34	
14	78		0.15	30	
10	75		0.063	27	15-80



SOIL FRACTIONS			
COBBLES	4%	SAND	40%
GRAVEL	30%	SILT / CLAY	27%
As received water content		14.5%	

REMARKS

Sample complies with the advised grading specification for a 2C material (SHW, Feb 2017)

SIGNED



NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

07-Nov-24

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016

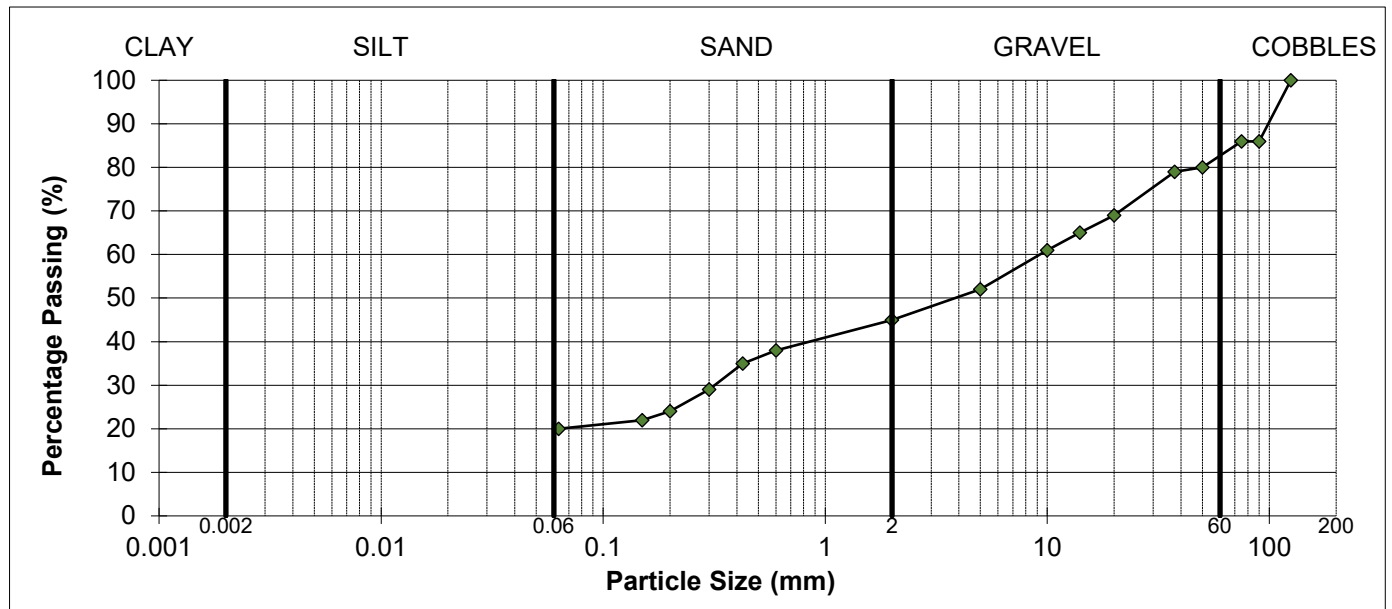
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	17-524 - Trub Farm
JOB NUMBER	MRN 24005/282

SAMPLE LABEL	MADE GROUND (Top Slope)	DATE SAMPLED	Not advised
LAB SAMPLE No	574902	DATE RECEIVED	16-Oct-24
DATE TESTED	18-Oct-24	SAMPLED BY	Client

MATERIAL	MADE GROUND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	52	
90	86		2	45	15-80
75	86		0.6	38	
50	80		0.425	35	
37.5	79		0.3	29	
20	69		0.2	24	
14	65		0.15	22	
10	61		0.063	20	15-80



SOIL FRACTIONS			
COBBLES	17%	SAND	25%
GRAVEL	38%	SILT / CLAY	20%
As received water content		10.0%	

REMARKS

Sample complies with the advised grading specification for a 2C material (SHW, Feb 2017)

SIGNED



NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

07-Nov-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

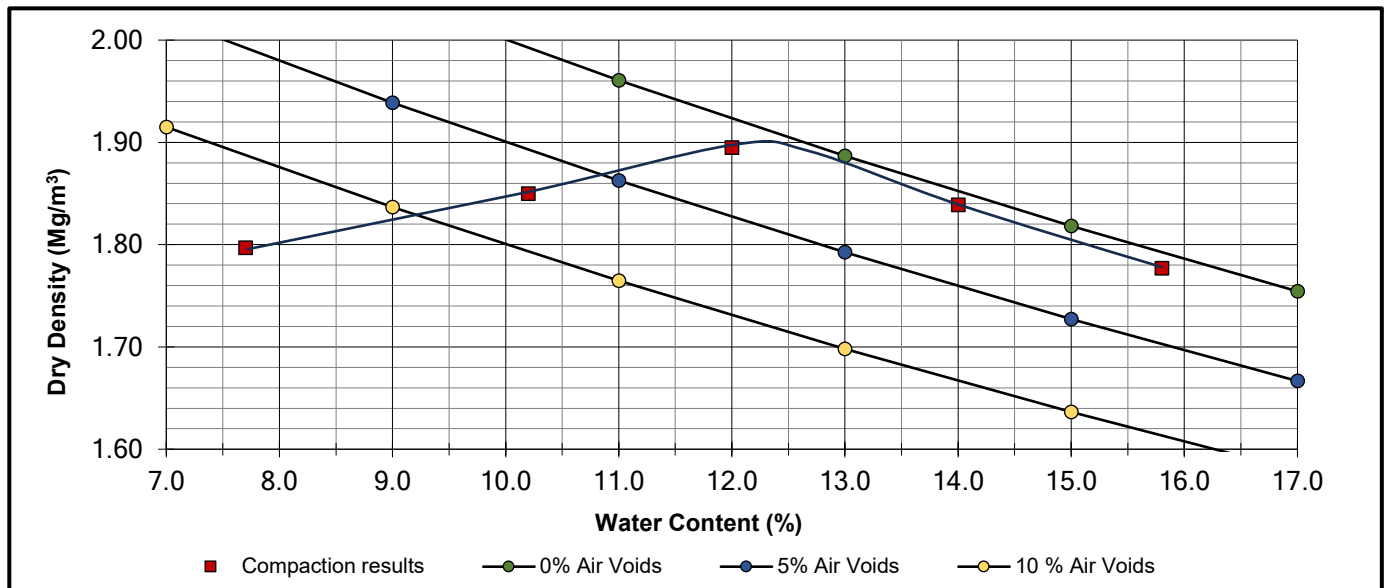
CLIENT	e3p
SITE	17-524 - Trub Farm
JOB NUMBER	MRN 24005/282

SAMPLE LABEL	SAND (Base Slope)	DATE SAMPLED	Not advised
SAMPLE NUMBER	574901	DATE RECEIVED	16-Oct-24
DATE TESTED	18-Oct-24	SAMPLED BY	Client

MATERIAL	Brown silty very gravelly SAND
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	10 %	GRADING ZONE	Zone 5
RETAINED 20mm	20 %	PARTICLE DENSITY	2.50 Mg/m ³ (Assumed)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	7.7	1.797
2	10.2	1.850
3	12.0	1.895
4	14.0	1.839
5	15.8	1.777



OPTIMUM WATER CONTENT	12	(%)
MAXIMUM DRY DENSITY	1.90	(Mg/m ³)

REMARKS

NAME O.P. Davies BA (Hons)
(Director / Head of Laboratory)

SIGNED

DATE 07-Nov-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

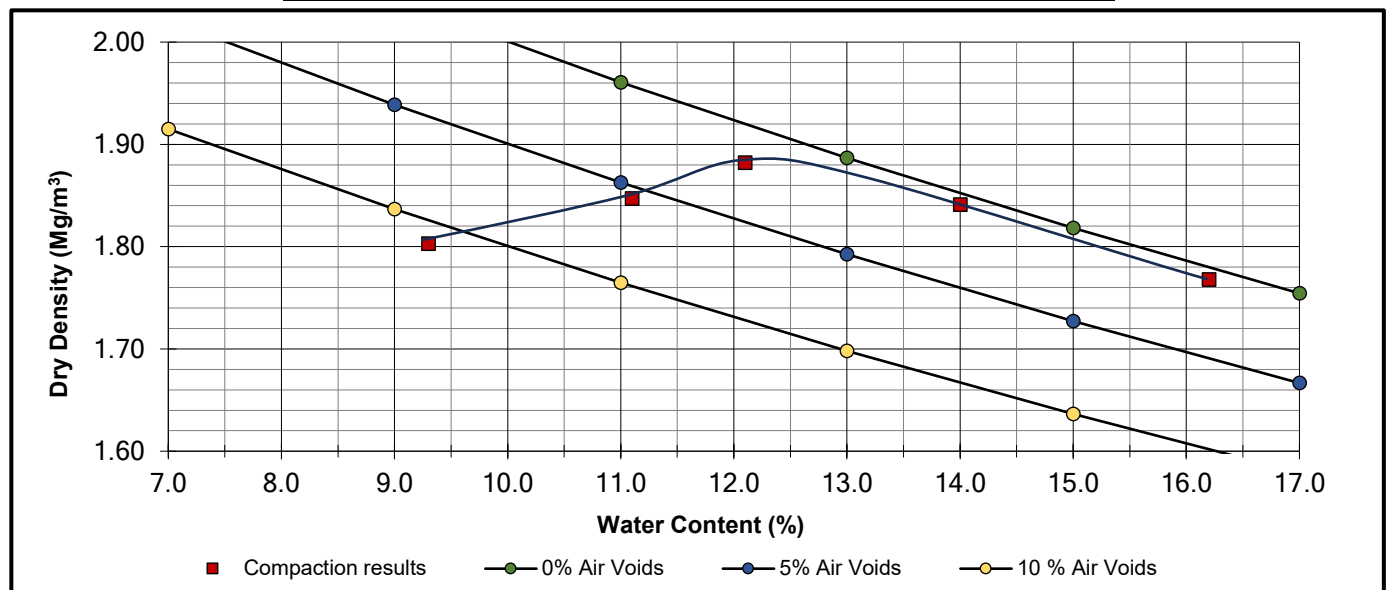
CLIENT	e3p
SITE	17-524 - Trub Farm
JOB NUMBER	MRN 24005/282

SAMPLE LABEL	MADE GROUND (Top Slope)	DATE SAMPLED	Not advised
SAMPLE NUMBER	574902	DATE RECEIVED	16-Oct-24
DATE TESTED	18-Oct-24	SAMPLED BY	Client

MATERIAL	MADE GROUND
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	21 %	GRADING ZONE	Zone X
RETAINED 20mm	31 %	PARTICLE DENSITY	2.50 Mg/m ³ (Assumed)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	9.3	1.803
2	11.1	1.847
3	12.1	1.882
4	14.0	1.841
5	16.2	1.768



OPTIMUM WATER CONTENT	12	(%)
MAXIMUM DRY DENSITY	1.88	(Mg/m ³)

REMARKS

NAME O.P. Davies BA (Hons)
(Director / Head of Laboratory)

SIGNED

DATE 07-Nov-24

Issued by Soil Engineering Geoservices Limited,
Parkside Lane,
Dewsbury Road,
Leeds
LS11 5SX.
Tel: 0113 2711111
Fax: 0113 2760472
Email: enquiries@soil-engineering.co.uk

Authorised signatory



P. A. Rogers (Technical Manager)
S. D. Harper (Laboratory Production Manager)
K. A. Walker v (Laboratory Manager)

Customer name Murray Rix (Northern) Ltd
Address Andrew House
 Hadfield Street
 Dukinfield
 Cheshire
 SK16 4QX

Contract name Trub Farm
Your reference 17-524

Dates of receipt of samples 17/10/2024

Dates of testing 21/10/2024 to 25/10/2024

Sampling was not performed by the Laboratory of Soil Engineering.

Testing was performed on 2 number of samples received in good condition.

Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

Results reported relate only to the samples tested.

Tests marked 'Not UKAS' in this report are not included in the UKAS accreditation schedule for our laboratory. These results will appear in italics on any summary of tests.

Samples will be retained for 28 days from date of issue of this report and then be disposed of, unless we receive written instruction to the contrary

Key to Laboratory Summary Sheets

Common to all summaries

Sample Type	U	Undisturbed sample	D	Small disturbed sample
	P	Piston sample	B	Bulk disturbed sample
	TW	Thin walled sample	BLK	Block sample
	L	Liner sample	C	Rock core
	AMAL	Amalgamated sample		

Test status Any result in *italics* indicates a test that is not within the scope of the UKAS accreditation for this laboratory.

Summary of Laboratory Soil Tests: Index / Classification Tests

Particle density	p	Small pyknometer method	g	Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested		
Particle size (PSD)	¹	Following value in silt column denotes combined clay and silt fraction		
	p	Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.		

Summary of Laboratory Soil Tests: Strength and Permeability Tests

Triaxial	UU	Single stage unconsolidated quick undrained	UUM	Multi stage unconsolidated quick undrained
	UU3	Set of 3 unconsolidated quick undrained	CU	Single stage consolidated undrained
	CUM	Multi stage consolidated undrained	CU3	Set of 3 consolidated undrained
	CD	Single stage consolidated drained	CDM	Multi stage consolidated drained
	CD3	Set of 3 consolidated drained		
	Note that single stage tests are reported assuming $f = 0$ for total stress and $c' = 0$ for effective stress			
Consol	Oed	One-dimensional oedometer	Hyd	Hydraulic cell consolidation
	m_v	coefficient of compressibility quoted for p_0 to $p_0 + 100\text{kPa}$, where determined		
Permeability	C	Constant head permeability	T	Triaxial permeability
Shearbox	SSB	Small shear box	LSB	Large shear box
	p	Peak value	r	Residual value
	RS	Ring shear		

Summary of Laboratory Soil Re-Use Test

MCV	s	MCV value at natural or specified moisture content	int	Intercept of calibration line in MCV calibration
-----	---	--	-----	--

Summary of Laboratory Rock Strength Tests

Point Load	Type	D	Diametral	A	Axial
(Combination of)		I	Irregular lump	B	Block
		L	Test performed parallel to planes of weakness		
		P	Test performed perpendicular to planes of weakness		
		X	Invalid failure of point load (not broken between points of load application)		

Summary of Laboratory Rock Materials Tests

Ten% fines	w	Soaked test	d	Dry test
------------	---	-------------	---	----------

Point Load Index Result

Point Load	Type	D	Diametral	A	Axial
(Combination of)		I	Irregular lump	B	Block
		L	Parallel to planes of weakness		
		X	Invalid failure of point load (not broken between points of load application)		
Dimensions		W	Diameter of core or average smallest width perpendicular to axis of loading in a block or irregular lump		
		D	Distance between platens when just in contact with specimen		
		D'	Distance between platens at point of failure		
		De	Equivalent core diameter	Is	P/De^2
		Is(50)	$F \times Is$	F	$(De/50)^{0.45}$
		Is(50) point load strength index corrected for a diametral test of core diameter 50mm			
		For Axial/Lump tests $De^2 = (4/\pi) \times (W \times D')$		For Diametral tests $De^2 = D \times D'$	

Important note: summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.

Report number LT1986



Form No. LAB001

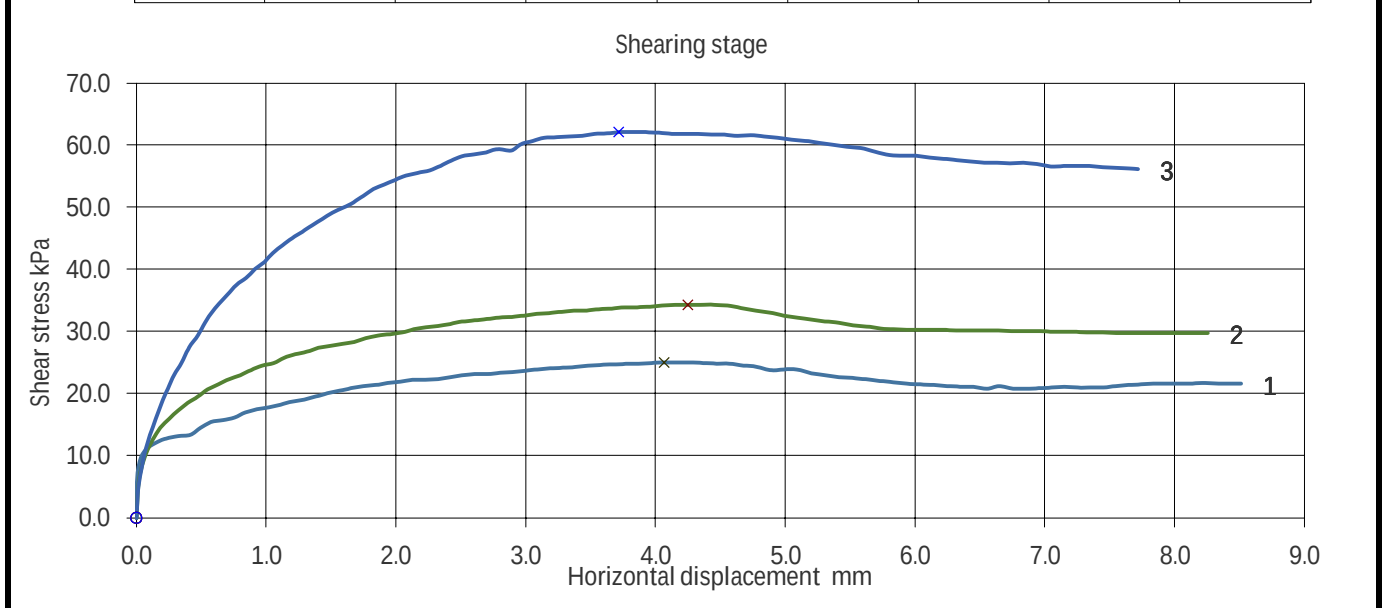
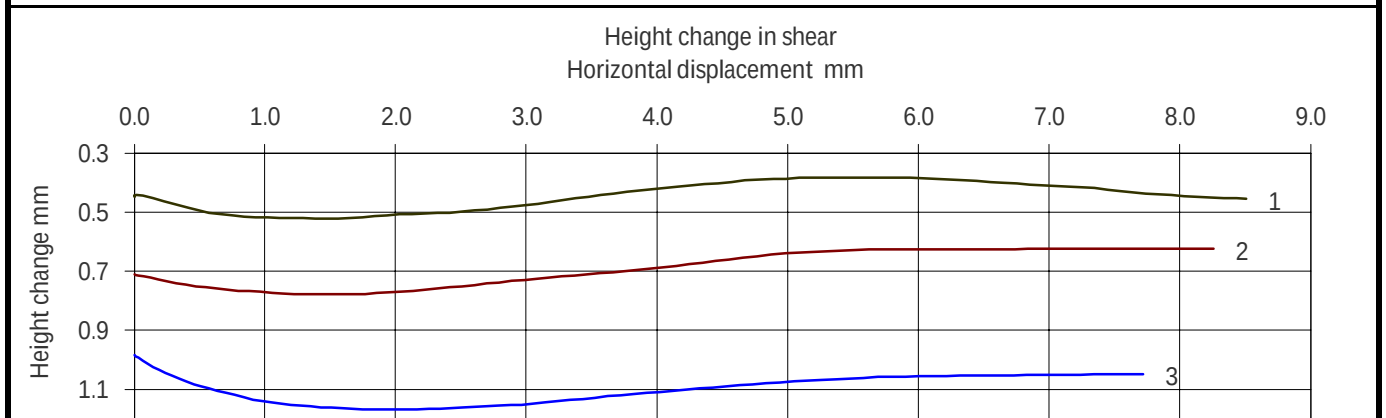
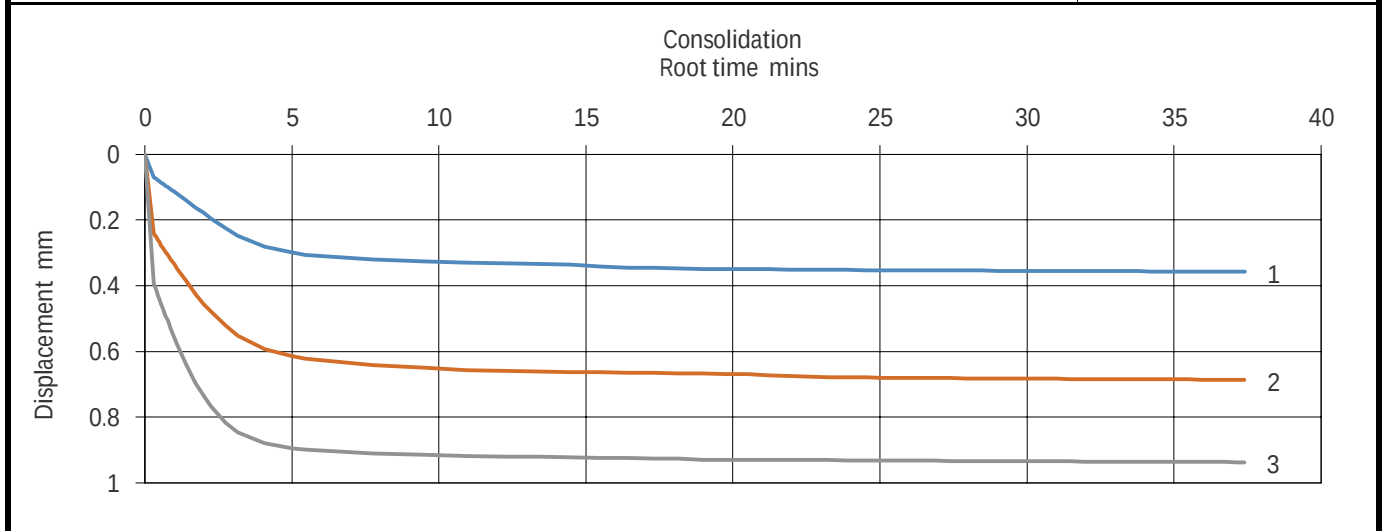
Revision No. 2.02

Issue Date 29/07/2010

Part of the Bachy Soletanche Group

Project Name Trub Farm						Strength and Permeability Summary													
Project No. LT1986																			
Engineer Murray Rix Ltd																			
Employer Murray Rix Ltd																			
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	Moisture Content	Bulk Density	Triaxial			Consol		Permeability		Shearbox				
						%	Mg/m³	Type	cu / c / c'	° φ / φ'	Type	mv	Type	K	Type	c'	° φ'		
								kPa			m²/MN	m/s	kPa						
574901	0.00		B		1									SSB	p11	p32.5			
574902	0.00		B		1									SSB	p11	p32			
Approved by:			Leeds Laboratory				Results apply to samples as received.										 SOIL engineering		
Kevin Walker							Print date 28/10/2024												
							Issue Date 01/05/2024												
Revision No.			3.05																

Project Name	Trub Farm	Shear Strength Using The Small Shearbox BS1377: Part 7: 1990: Clause 4 with Water Content to BS EN ISO 17892-1: 2014	Hole ID 574901
Project No.	LT1986		Sample Depth 0.00m
Engineer	Murray Rix Ltd		Sample Number
Employer	Murray Rix Ltd		Sample Type B
Description	Brown gravelly clayey SAND.		Specimen Depth
			Specimen Number 1



Approved by:	Leeds Laboratory	Results apply to samples as received.	 SOIL engineering
Kevin Walker		Print date 28/10/2024	
Revision No. 3.04	Issue Date 01/05/2024		

Project Name Trub Farm Project No. LT1986 Engineer Murray Rix Ltd Employer Murray Rix Ltd	Shear Strength Using The Small Shearbox BS1377: Part 7: 1990: Clause 4 with Water Content to BS EN ISO 17892-1: 2014	Hole ID 574901 Sample Depth 0.00m Sample Number Sample Type B
Description Brown gravelly clayey SAND.		Specimen Depth Specimen Number 1

Coulomb envelope

Peak

c' 11 kPa

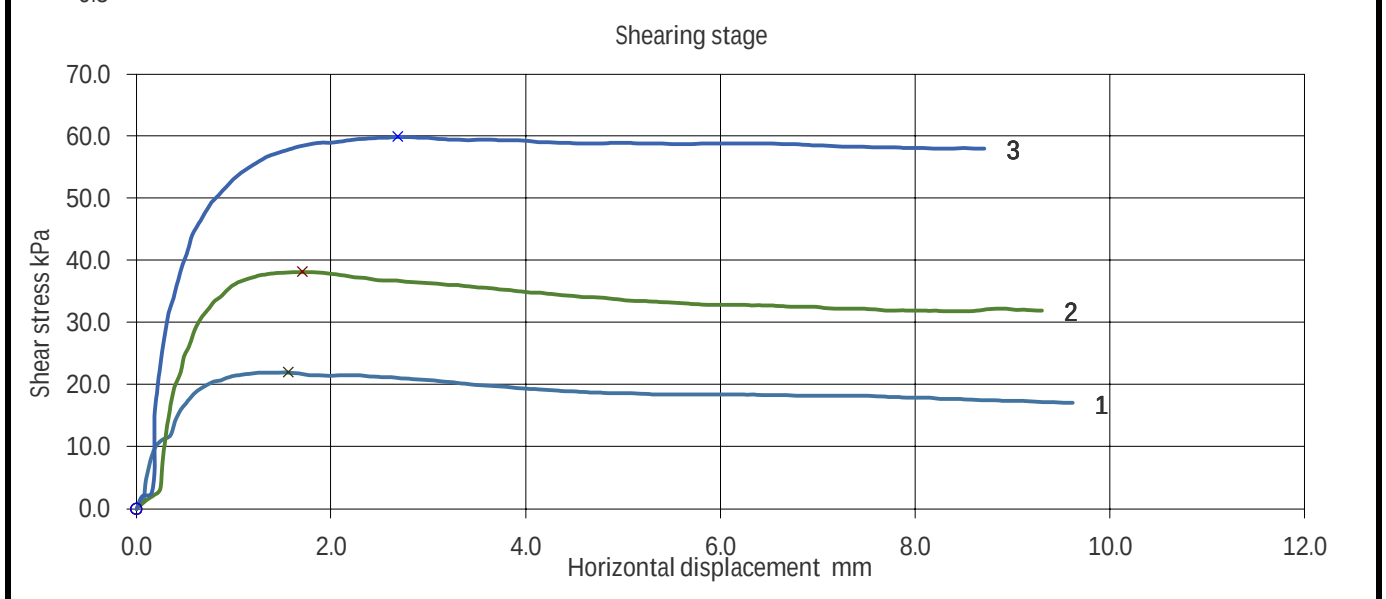
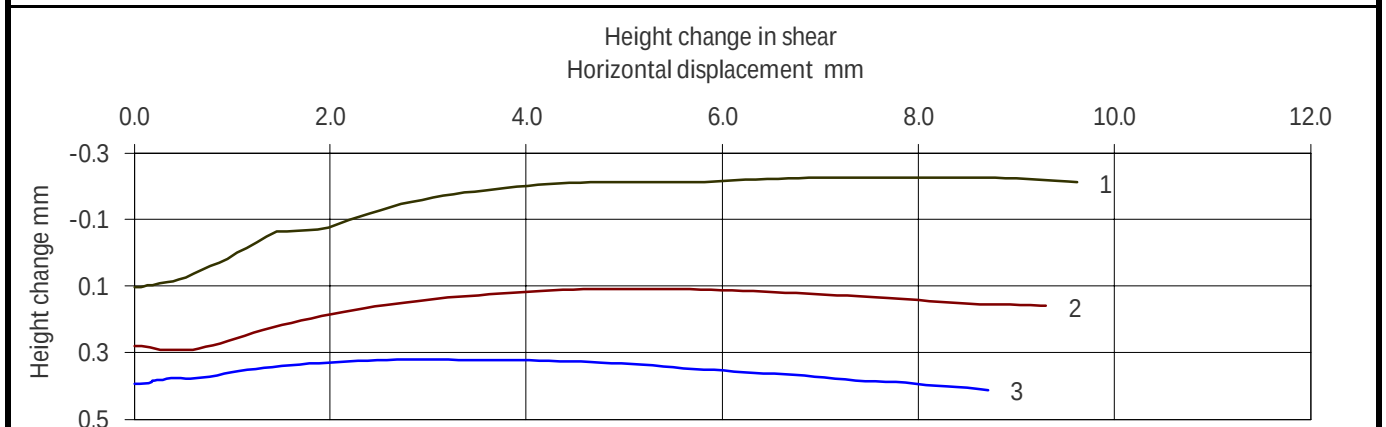
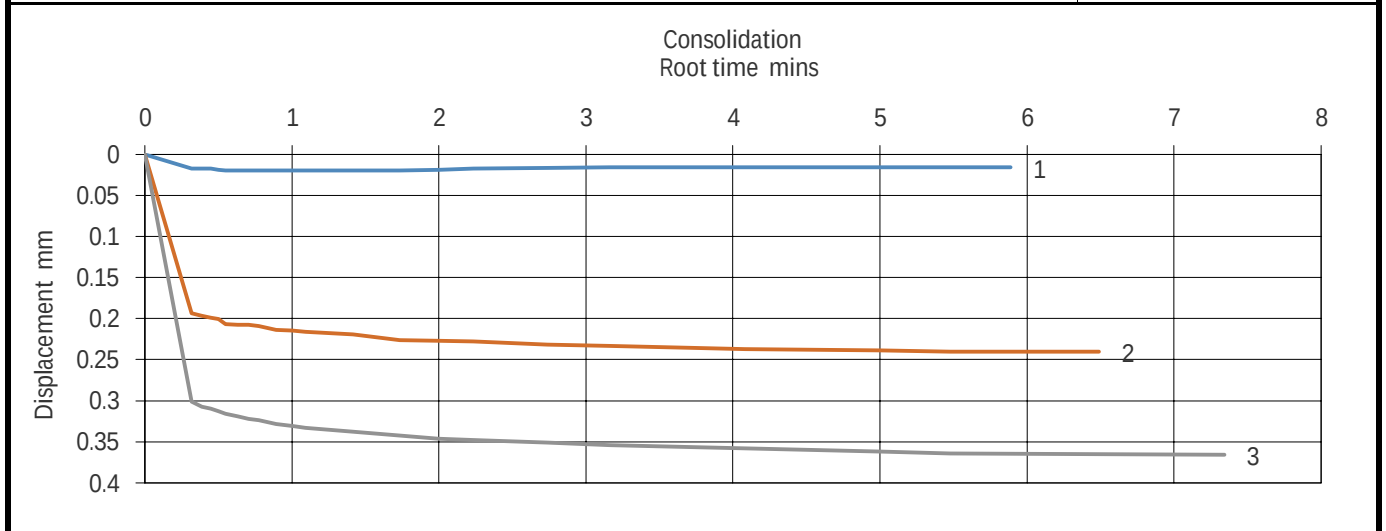
ϕ' 32 1/2 °

× Peak shear strength ○ Residual shear strength

Test run number		1	2	3
Normal stress	kPa	20.3	40.4	79.7
Particle density	Assumed Mg/m3	2.65	2.65	2.65
Trimming moisture content	%	20.9	21.1	21
Water content of specimen before test	%	21.0	21.0	21.4
Water content of specimen after test	%	19.6	18.7	18.1
Specimen dimensions				
Side 1	mm	60.14	60.14	60.10
Side 2	mm	60.12	60.10	60.14
Height	mm	19.56	19.54	19.52
Bulk density	Mg/m3	2.01	2.03	2.03
Dry density	Mg/m3	1.66	1.67	1.67
Saturation	%	93.0	95.5	96.8
Initial voids ratio		0.60	0.58	0.59
Voids ratio after consolidation		0.57	0.53	0.51
Voids ratio after shear		0.56	0.53	0.50
Rate of displacement	mm/min	0.024	0.024	0.024
Displacement at peak	mm	4.1	4.3	3.7
Shear strength at peak	kPa	25.0	34.3	62.1
Displacement at residual	mm			
Shear strength at residual	kPa			
Final displacement	mm	8.5	8.3	7.7
Method of reversal		Peak only		
Remarks Specimen tested submerged. Specimen compacted using 2.5 kg effort.				
Deviations from test method:				

Approved by:	Leeds Laboratory	Results apply to samples as received.	
Kevin Walker		Print date 28/10/2024	
Revision No. 3.04		Issue Date 01/05/2024	

Project Name	Trub Farm	Shear Strength Using The Small Shearbox BS1377: Part 7: 1990: Clause 4 with Water Content to BS EN ISO 17892-1: 2014	Hole ID 574902
Project No.	LT1986		Sample Depth 0.00m
Engineer	Murray Rix Ltd		Sample Number
Employer	Murray Rix Ltd		Sample Type B
Description	MADE GROUND: Brown gravelly sand.		Specimen Depth
			Specimen Number 1



Approved by:	Leeds Laboratory	Results apply to samples as received.	 SOIL engineering
Kevin Walker		Print date 28/10/2024	
Revision No. 3.04	Issue Date 01/05/2024		

Project Name Trub Farm Project No. LT1986 Engineer Murray Rix Ltd Employer Murray Rix Ltd		Shear Strength Using The Small Shearbox BS1377: Part 7: 1990: Clause 4 with Water Content to BS EN ISO 17892-1: 2014		Hole ID 574902 Sample Depth 0.00m Sample Number Sample Type B	
Description MADE GROUND: Brown gravelly sand.				Specimen Depth Specimen Number 1	

Coulomb envelope

Peak

c' 11 kPa

ϕ' 32 °

× Peak shear strength ○ Residual shear strength

		1	2	3
Test run number		20.3	40.5	80.3
Normal stress	kPa			
Particle density	Assumed Mg/m3	2.65	2.65	2.65
Trimming moisture content	%	21.6	21.6	21.6
Water content of specimen before test	%	22.2	22.3	22.3
Water content of specimen after test	%	28.2	27.8	26.2
Specimen dimensions				
Side 1	mm	60.07	60.14	60.16
Side 2	mm	60.04	60.10	60.12
Height	mm	22.28	22.54	22.17
Bulk density	Mg/m3	1.81	1.79	1.81
Dry density	Mg/m3	1.48	1.46	1.48
Saturation	%	74.3	72.5	74.9
Initial voids ratio		0.79	0.81	0.79
Voids ratio after consolidation		0.79	0.79	0.76
Voids ratio after shear		0.79	0.80	0.75
Rate of displacement	mm/min	0.900	0.900	0.900
Displacement at peak	mm	1.6	1.7	2.7
Shear strength at peak	kPa	22.0	38.2	59.9
Displacement at residual	mm			
Shear strength at residual	kPa			
Final displacement	mm	9.6	9.3	8.7
Method of reversal		Peak only		
Remarks Specimen tested submerged. Specimen lightly tamped into shearbox.				
Deviations from test method:				

Approved by: Kevin Walker	Leeds Laboratory	Results apply to samples as received.	
		Print date 28/10/2024	
Revision No. 3.04		Issue Date 01/05/2024	