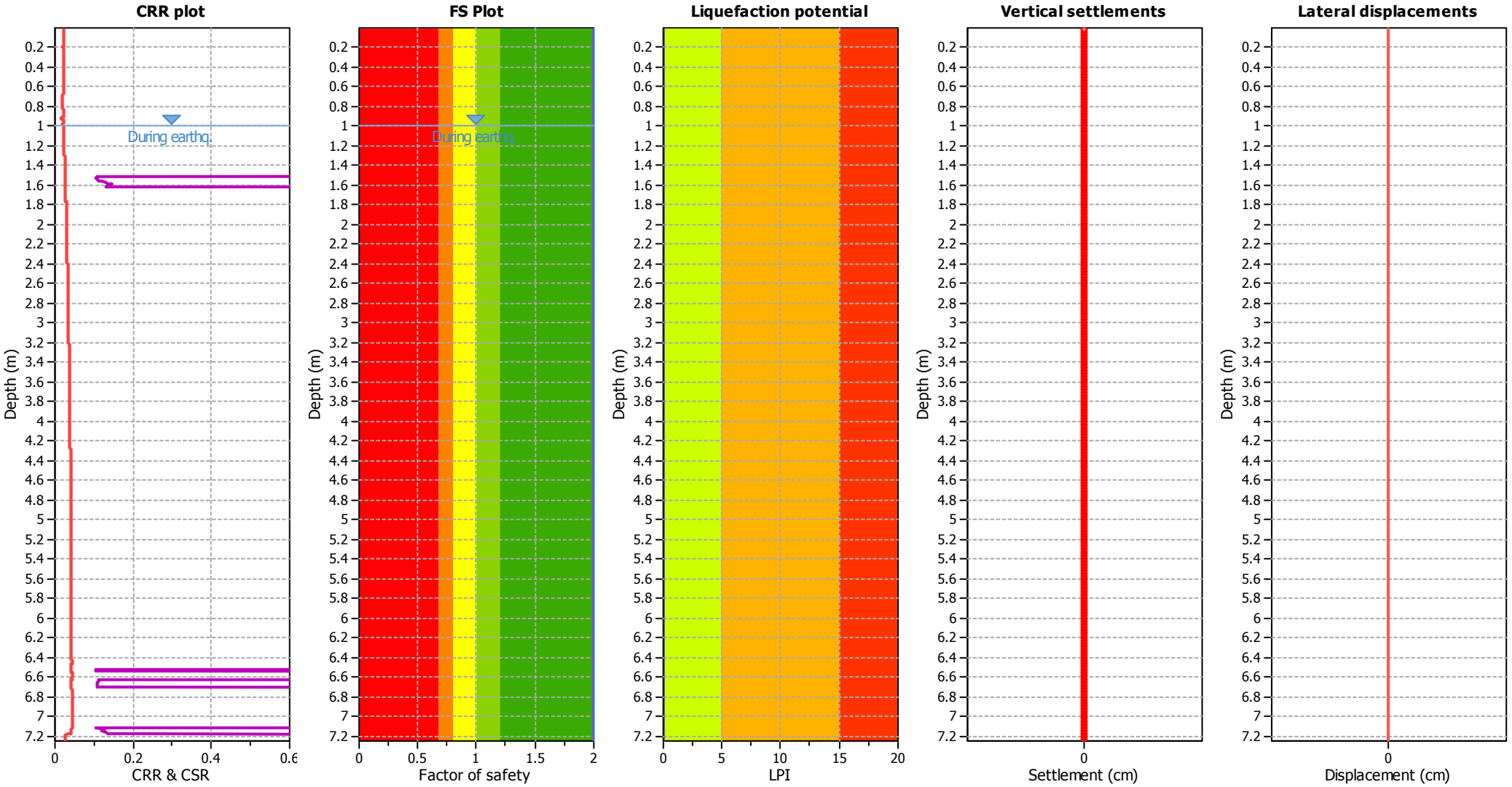
# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.04 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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Christchurch

# LIQUEFACTION ANALYSIS REPORT

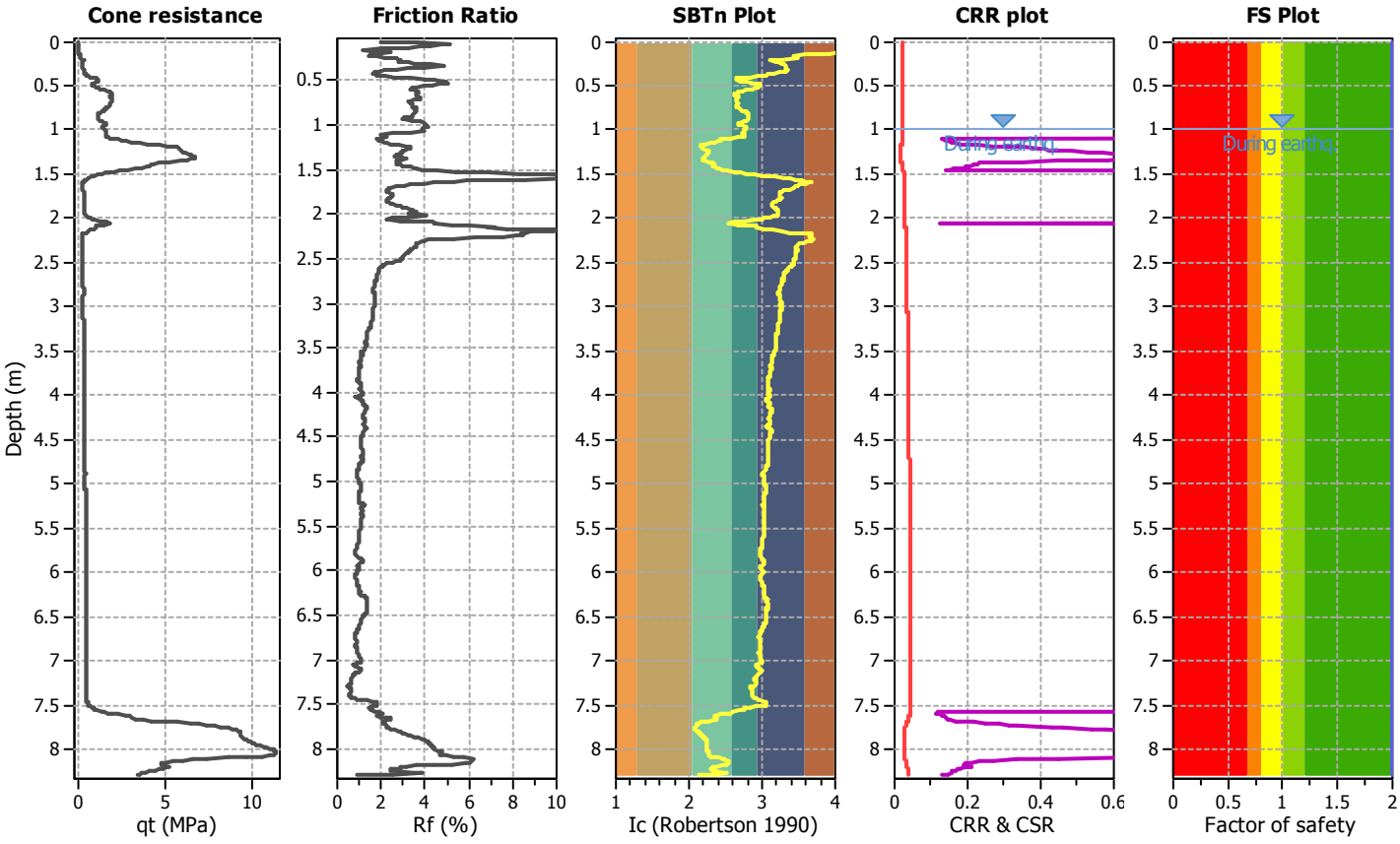
**Project title : K200265**

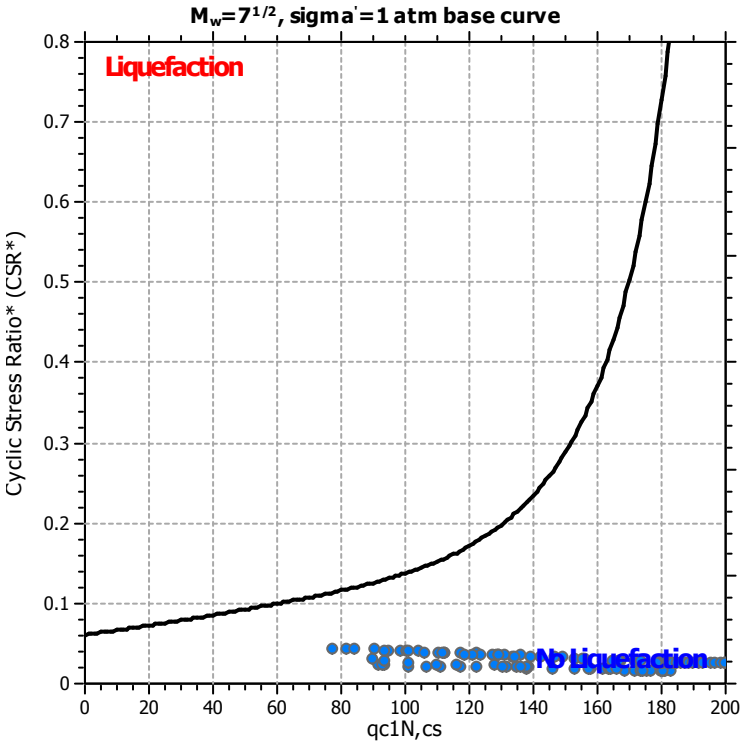
**Location : Bayswater Maritime Village Development**

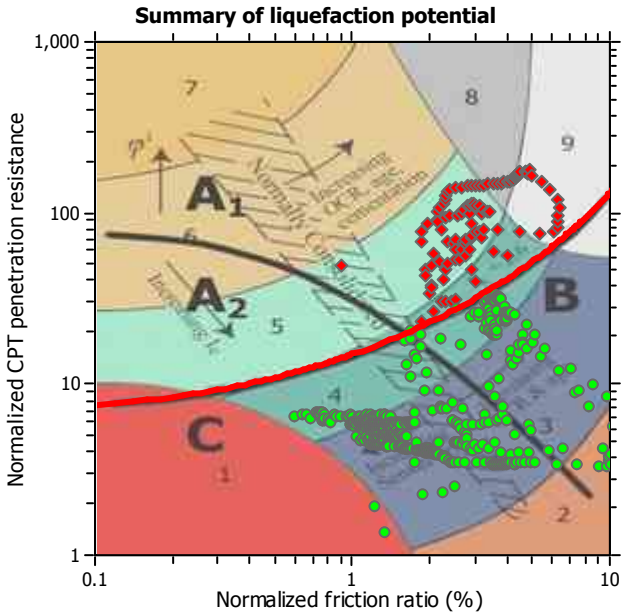
**CPT file : CPT2 SLS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.04 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

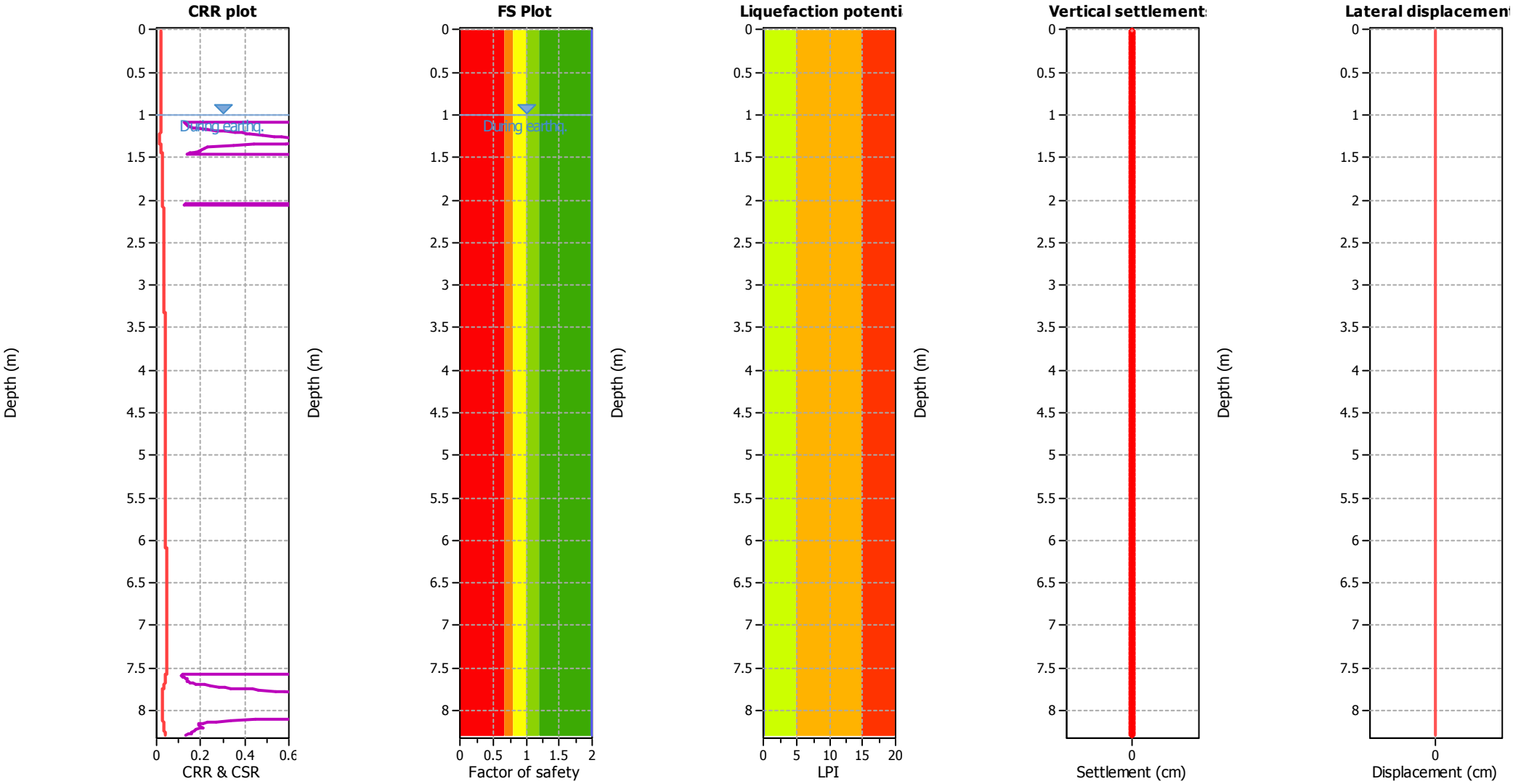



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.04 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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Christchurch

# LIQUEFACTION ANALYSIS REPORT

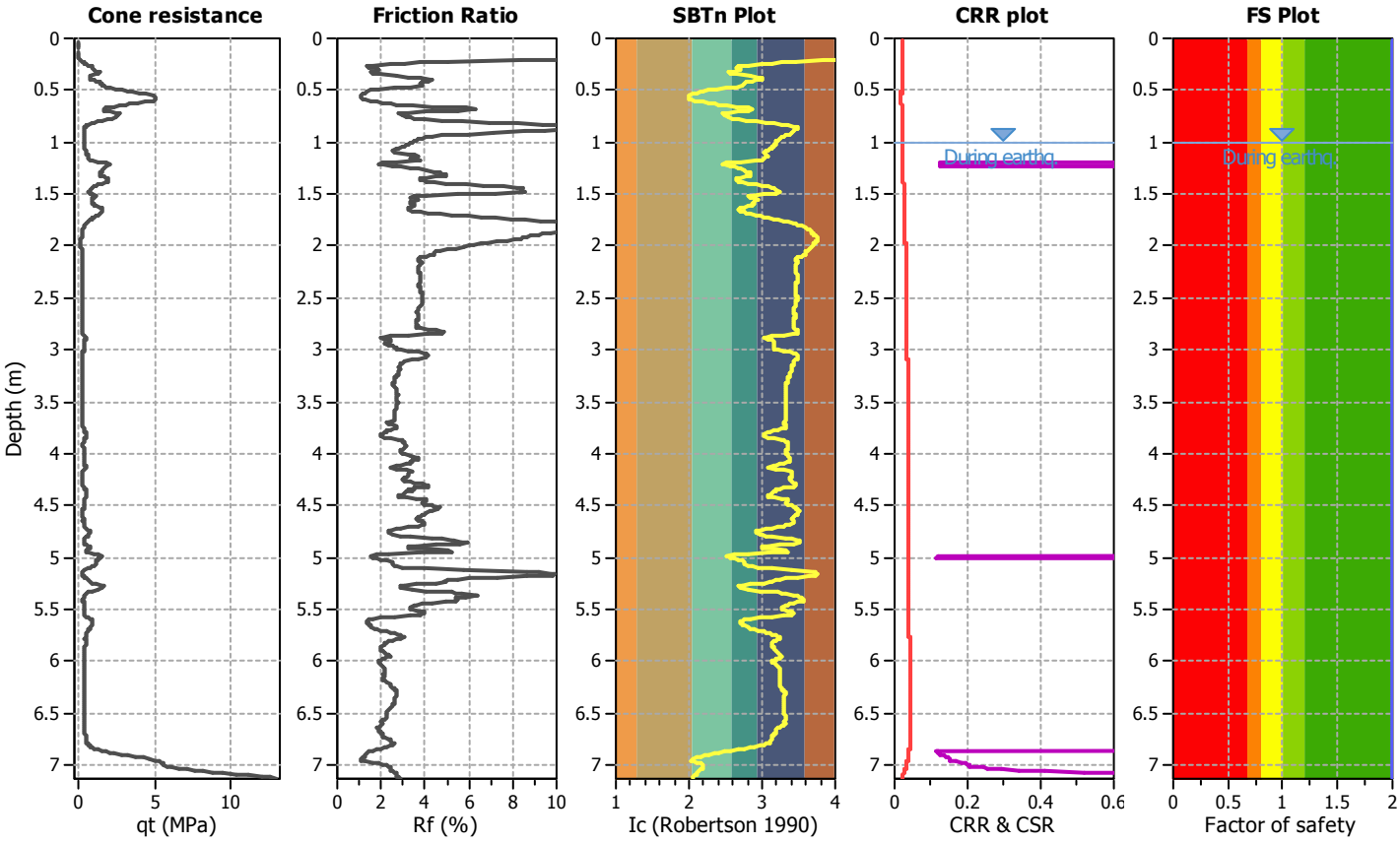
**Project title : K200265**

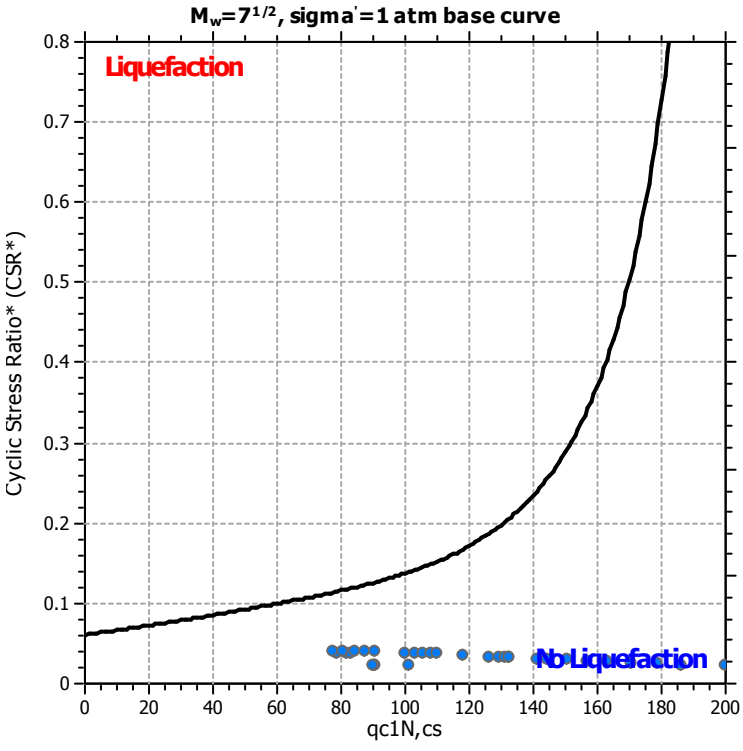
**Location : Bayswater Maritime Village Development**

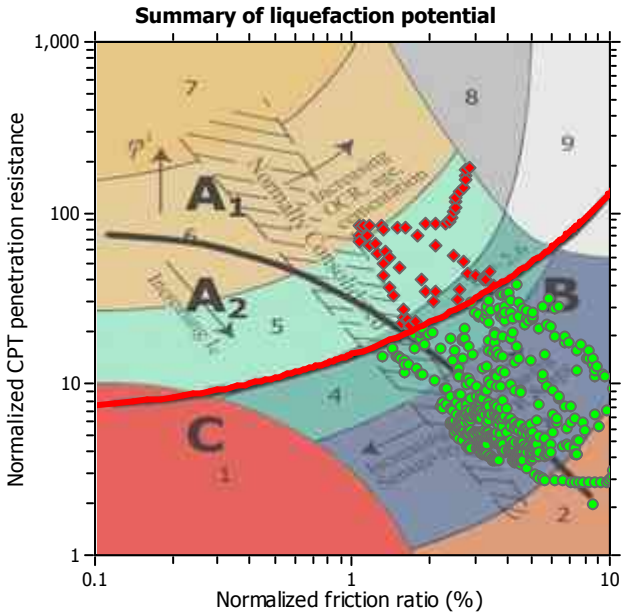
**CPT file : CPT3 SLS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.04 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

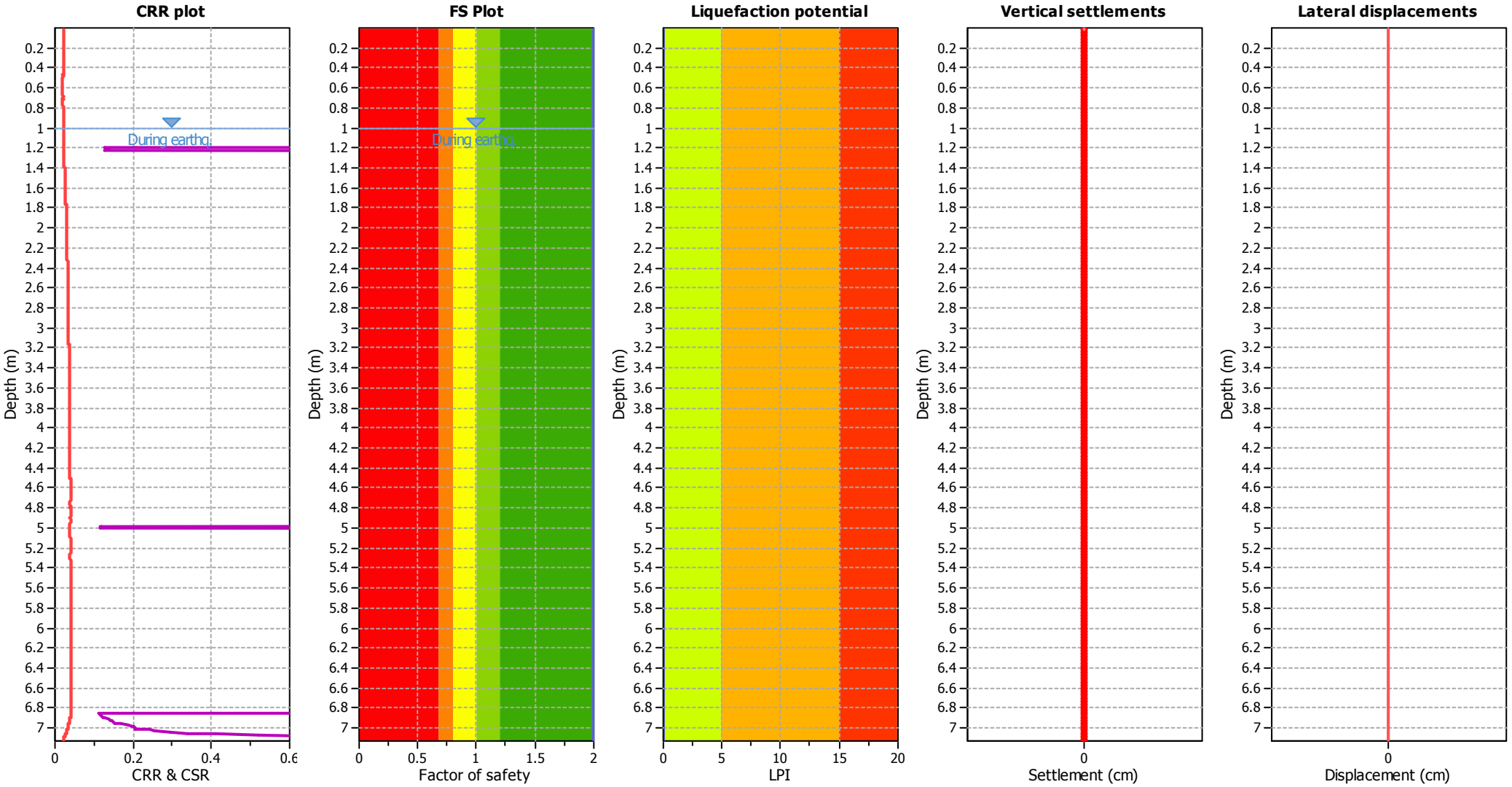



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.04 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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# LIQUEFACTION ANALYSIS REPORT

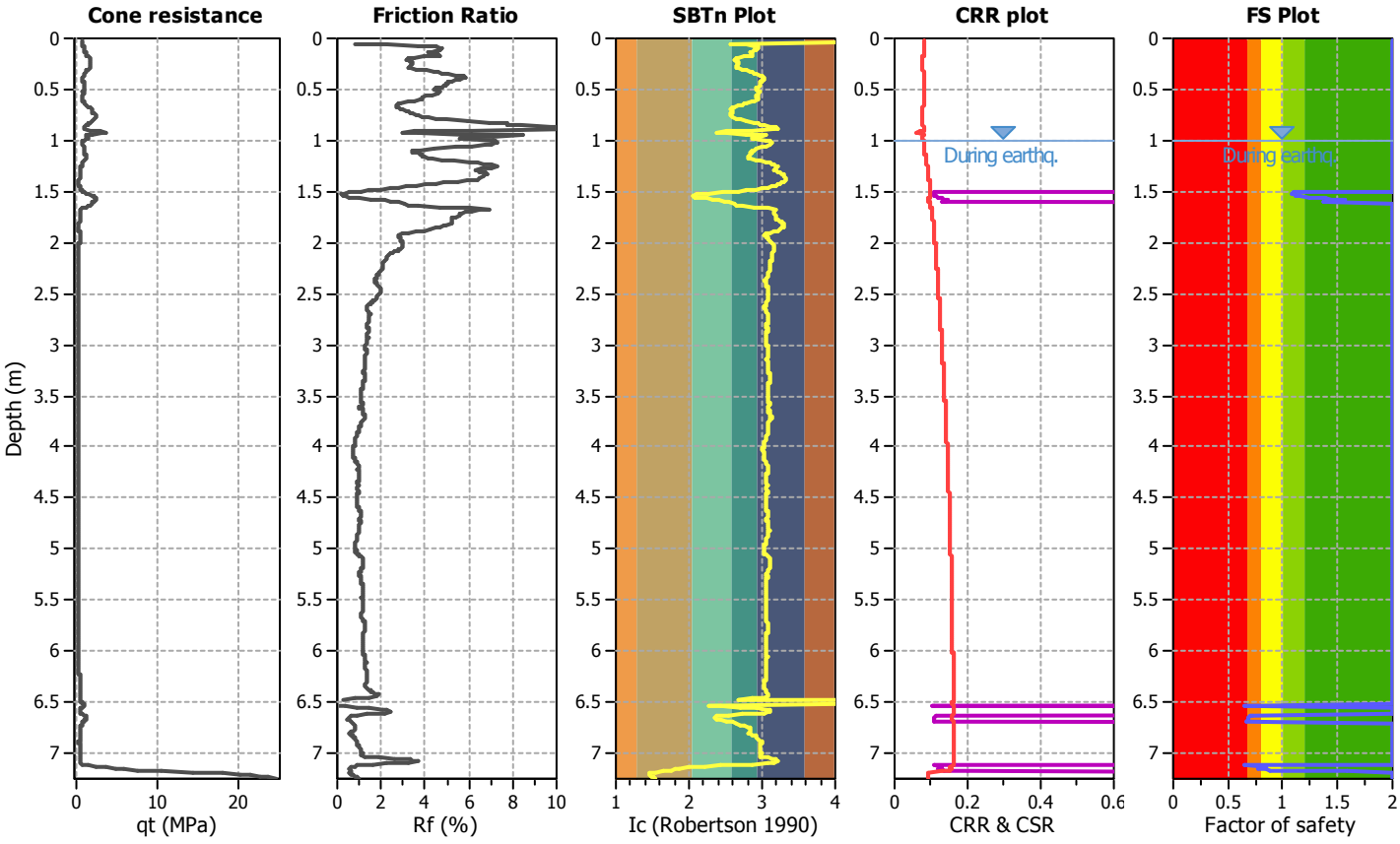
**Project title : K200265**

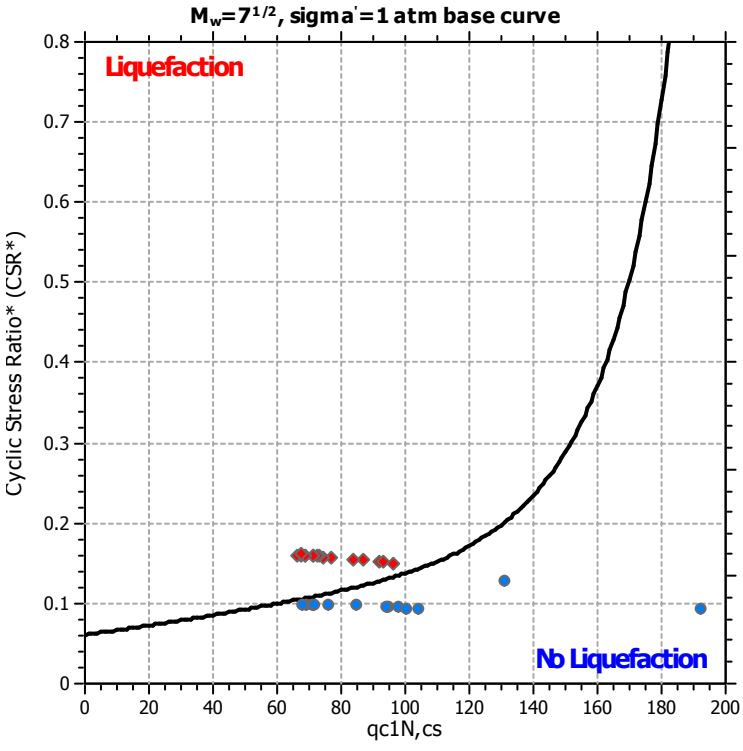
**Location : Bayswater Maritime Village Development**

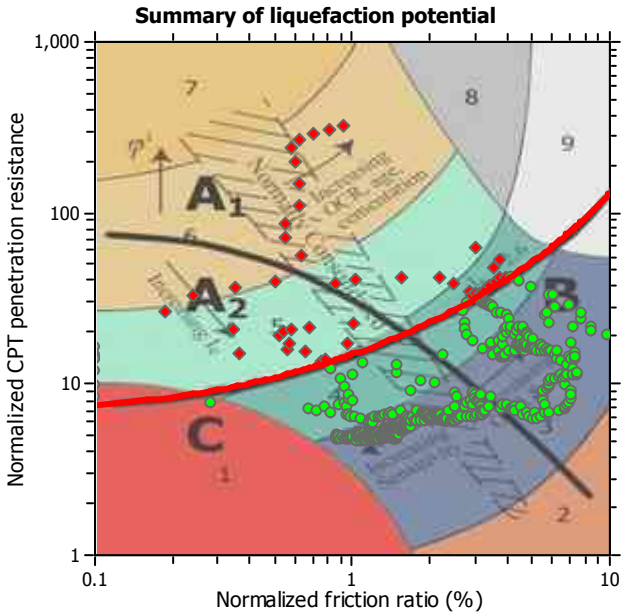
**CPT file : CPT1 ULS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.15 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

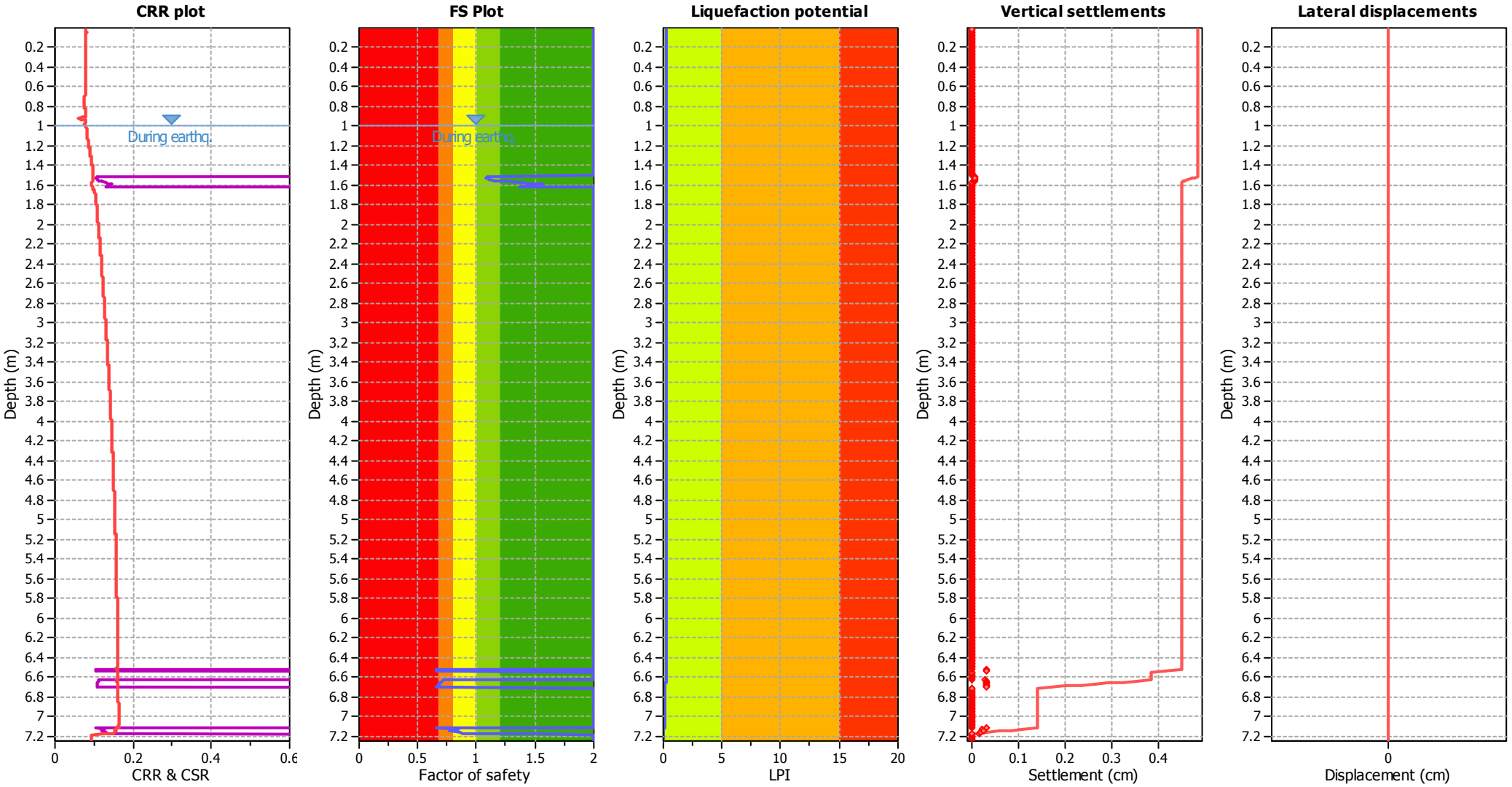



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.15 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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Christchurch

# LIQUEFACTION ANALYSIS REPORT

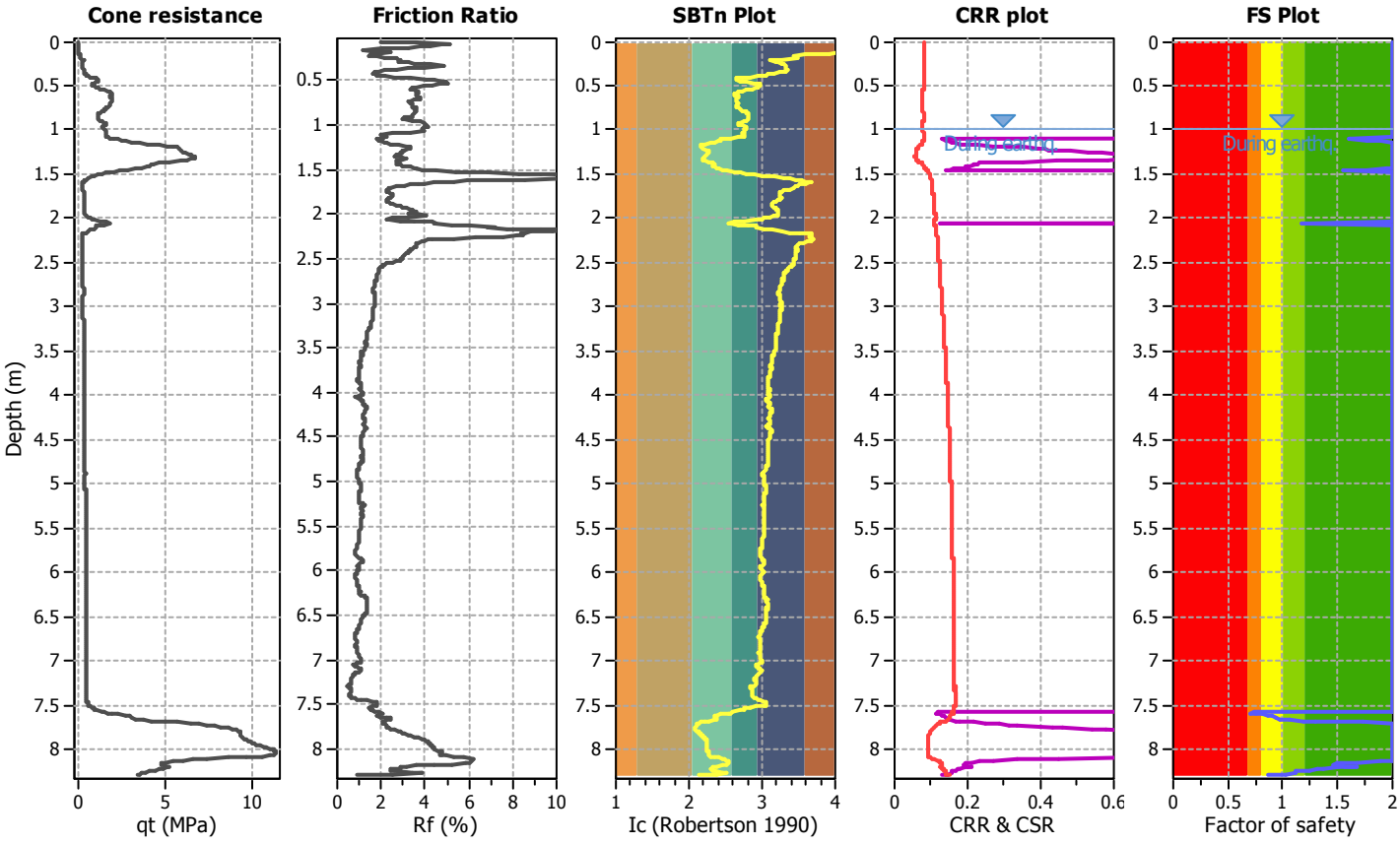
**Project title : K200265**

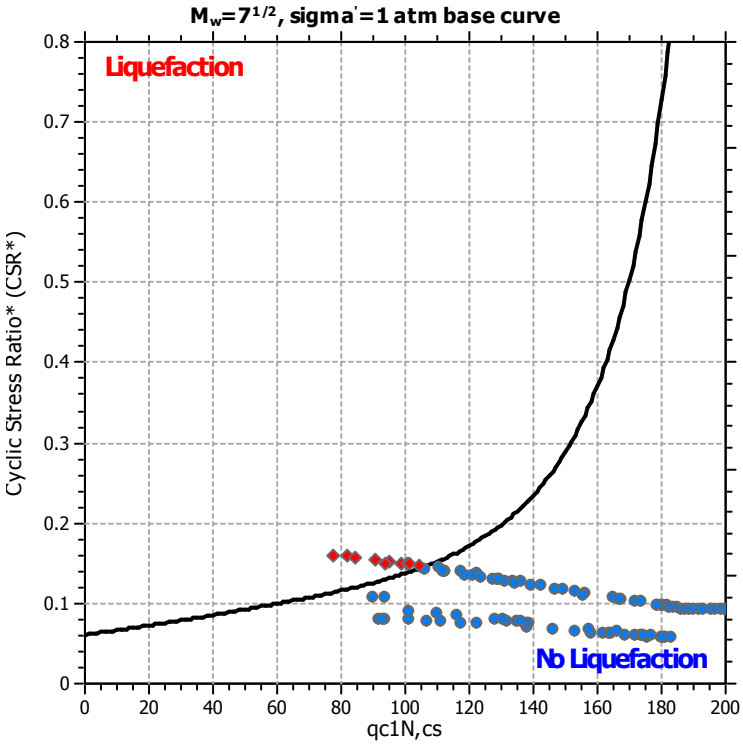
**Location : Bayswater Maritime Village Development**

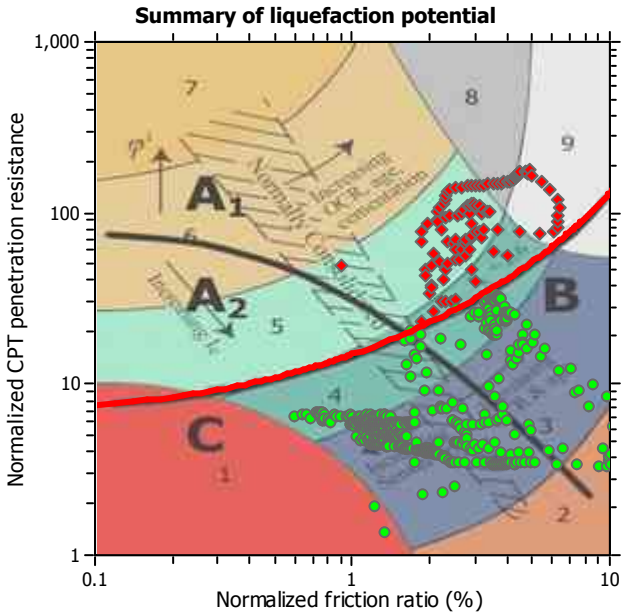
**CPT file : CPT2 ULS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.15 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

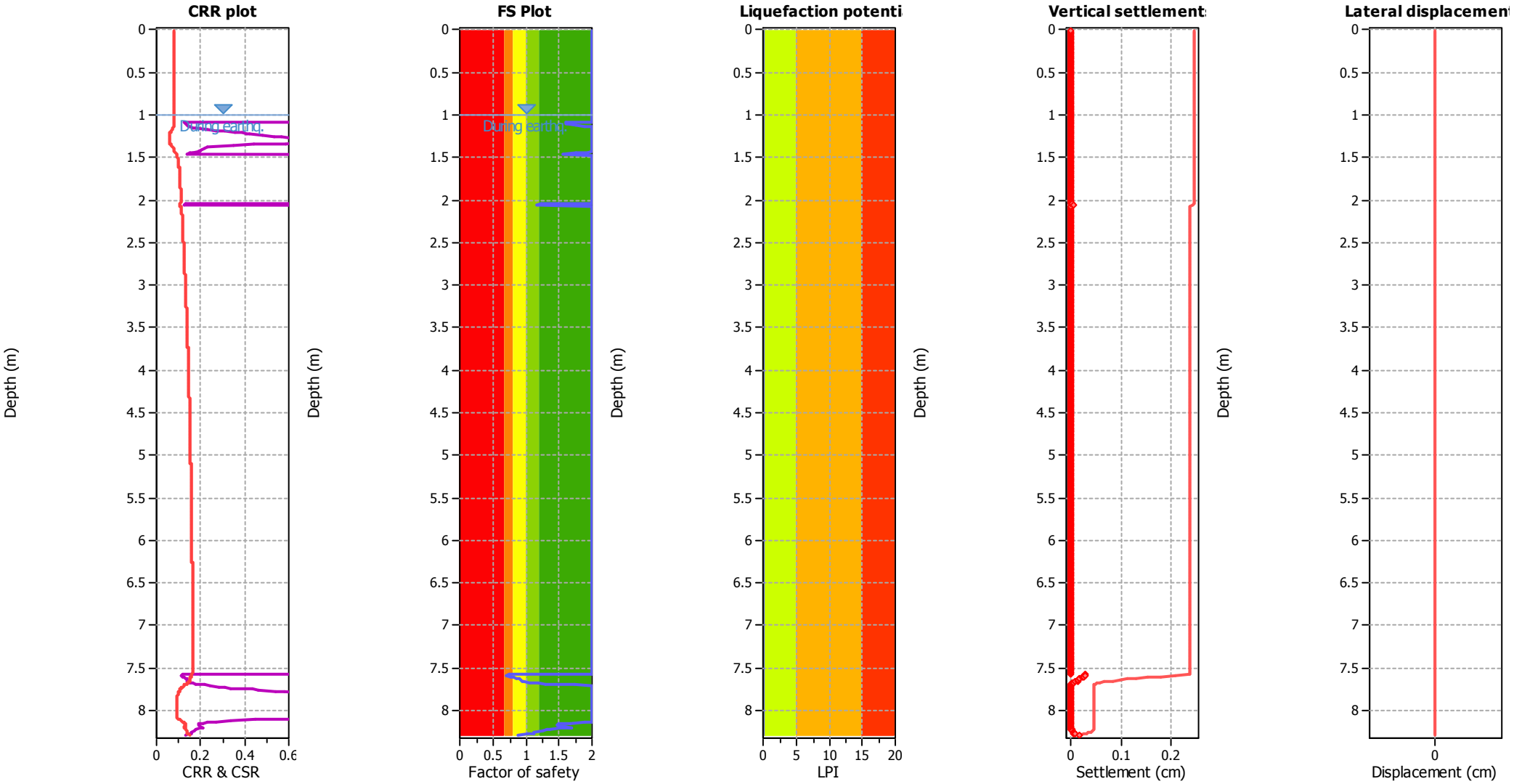



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.15 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
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- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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# LIQUEFACTION ANALYSIS REPORT

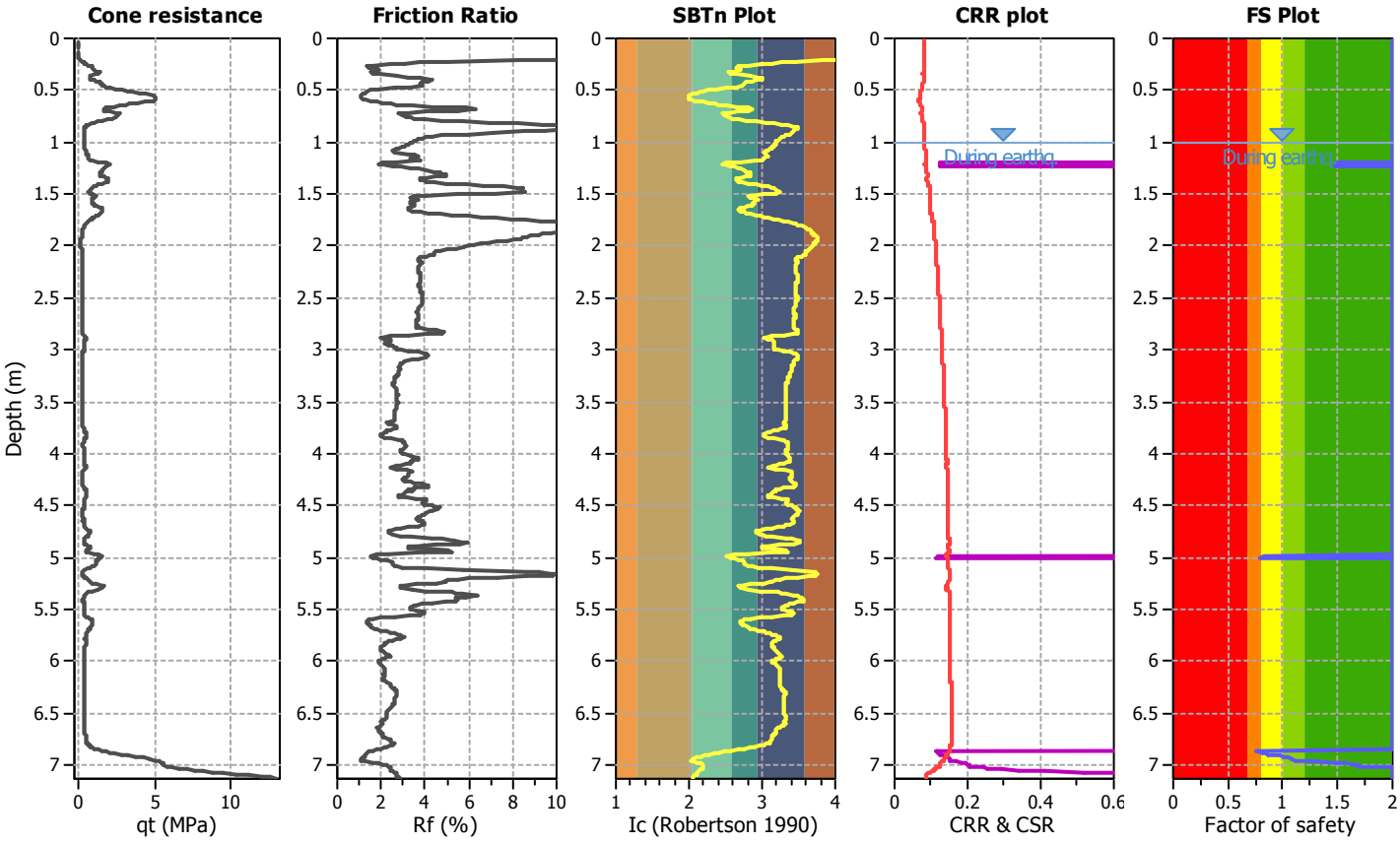
**Project title : K200265**

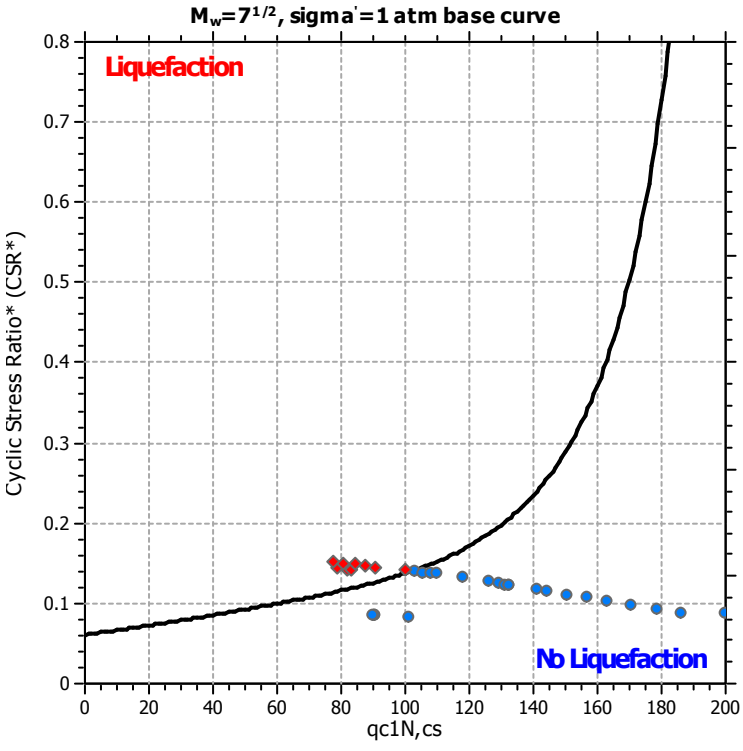
**Location : Bayswater Maritime Village Development**

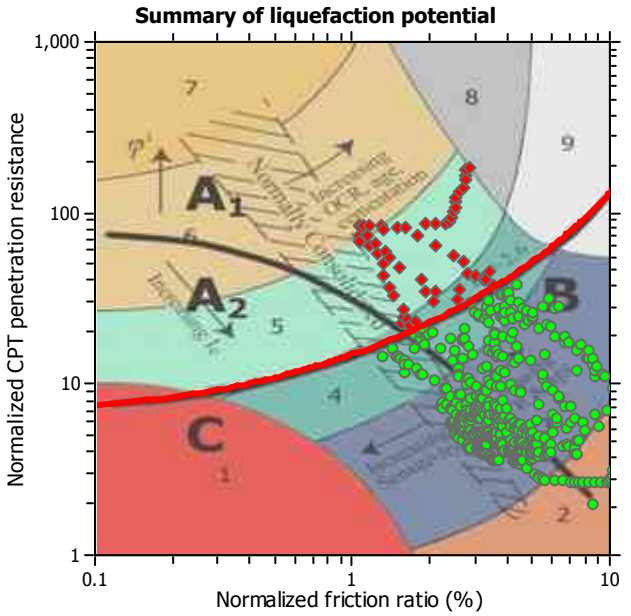
**CPT file : CPT3 ULS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.15 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

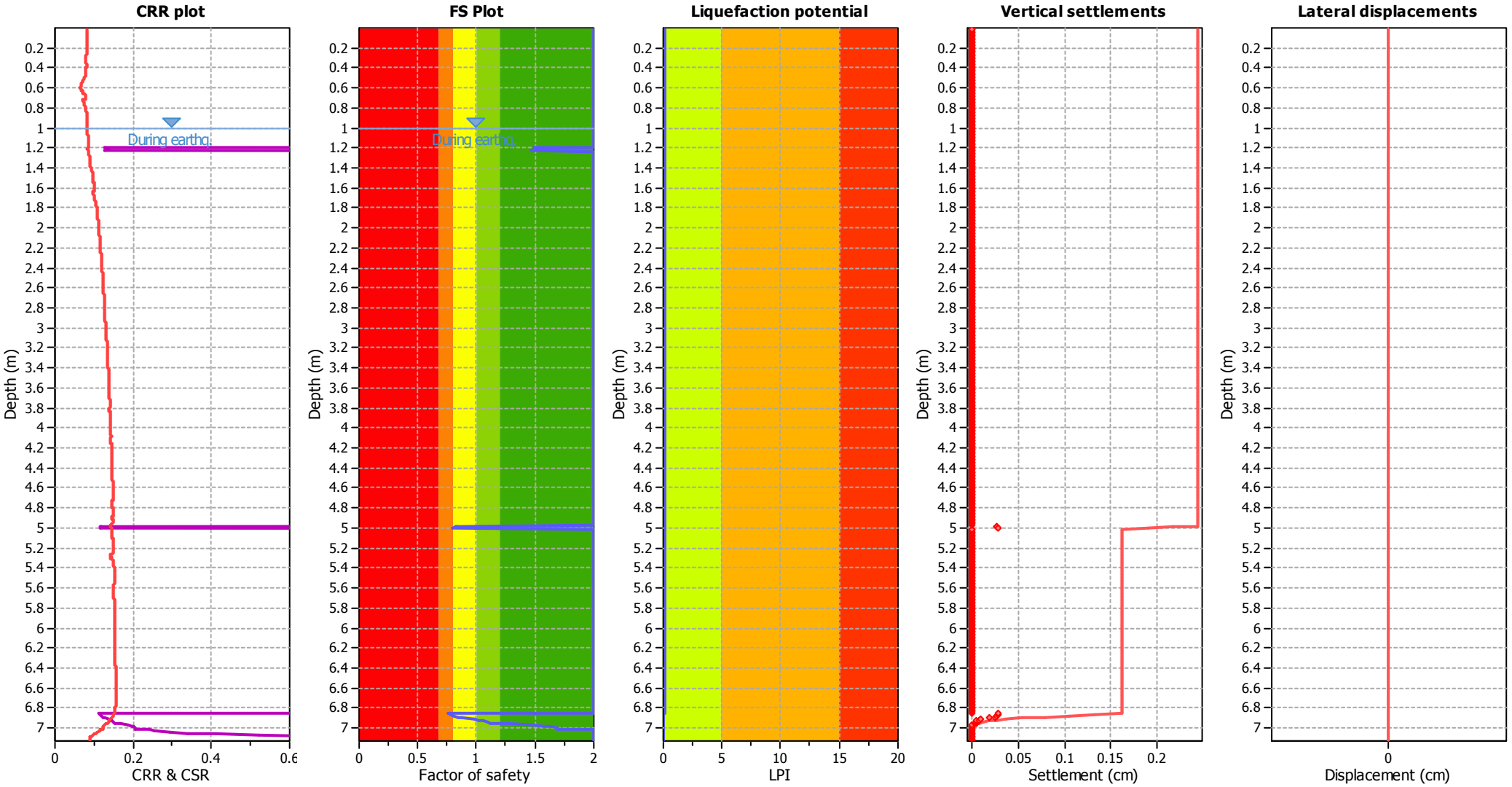



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.15 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
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**LPI color scheme**

- Very high risk
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# LIQUEFACTION ANALYSIS REPORT

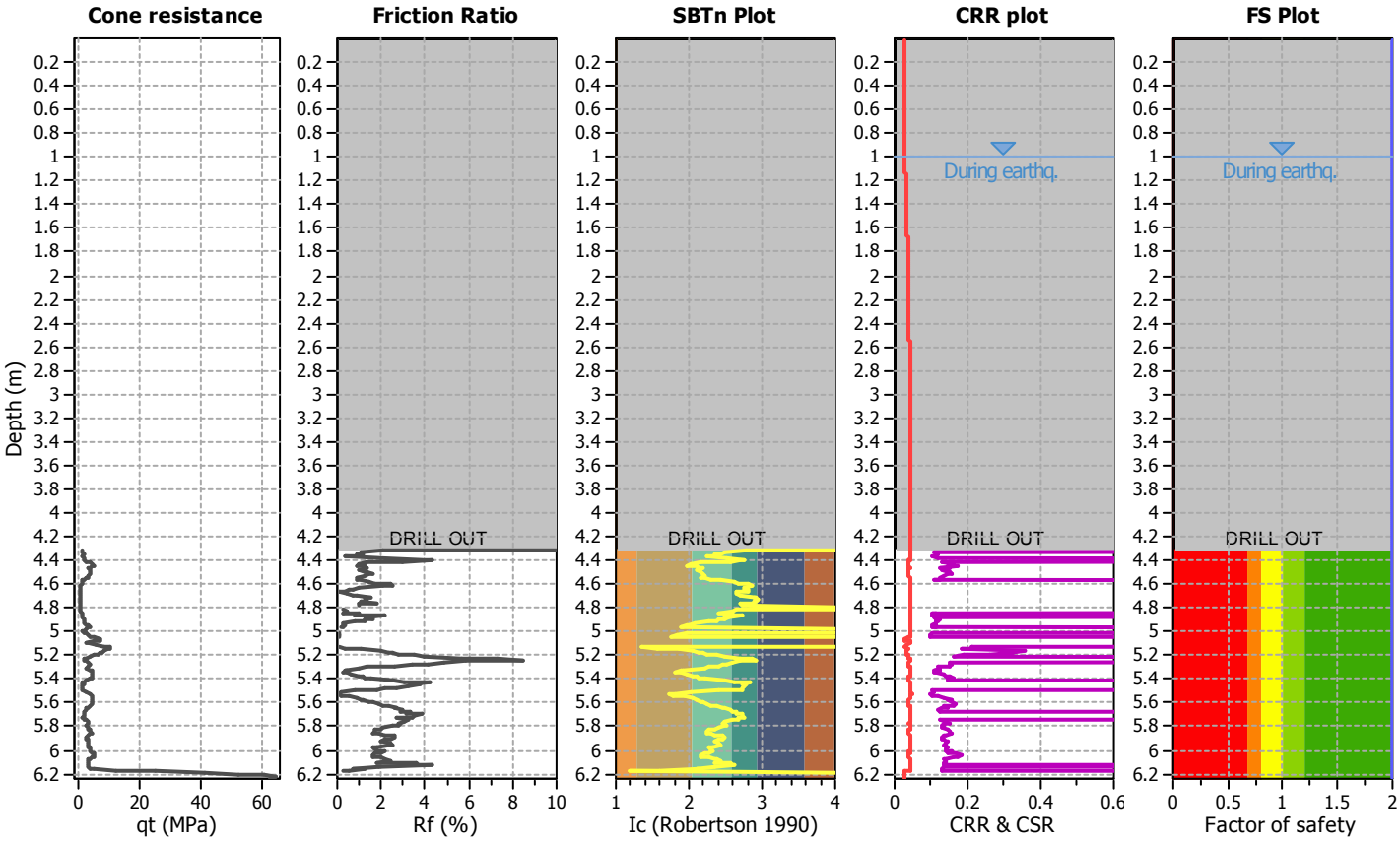
**Project title : K200265**

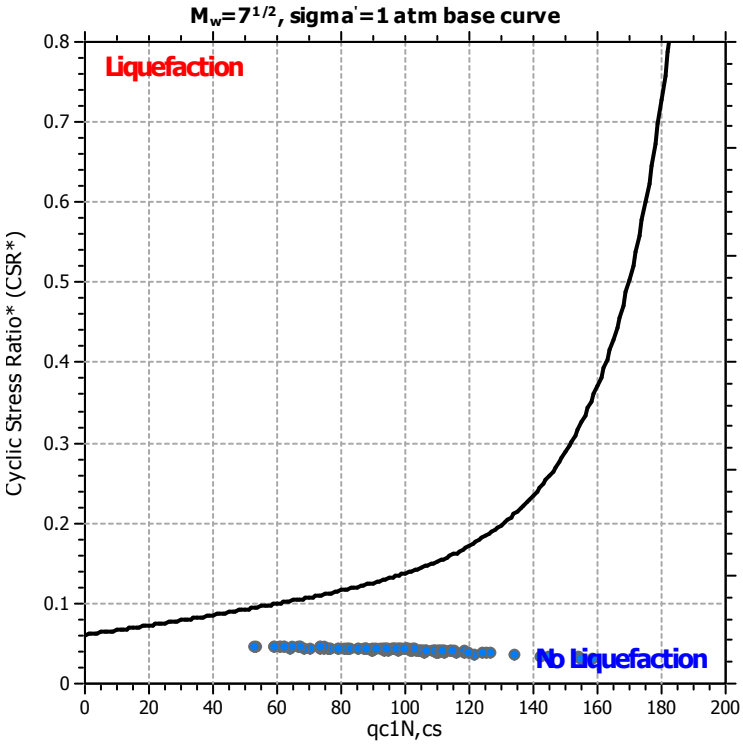
**Location : Bayswater Maritime Village Development**

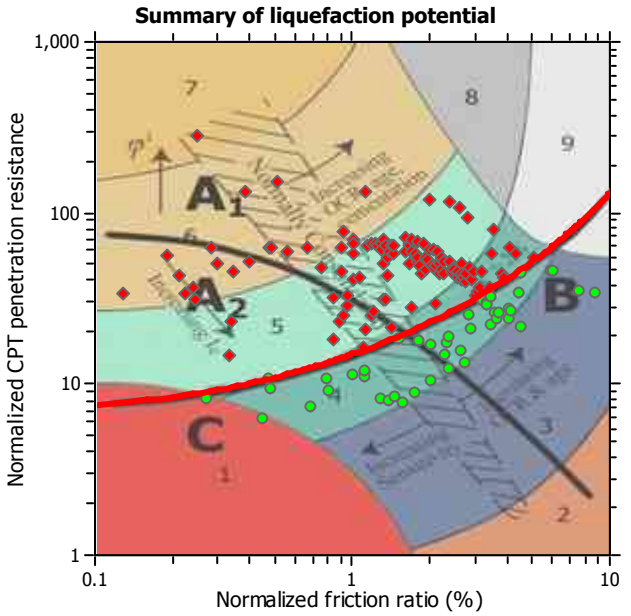
**CPT file : CPT4 (BH13) SLS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.05 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |




Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
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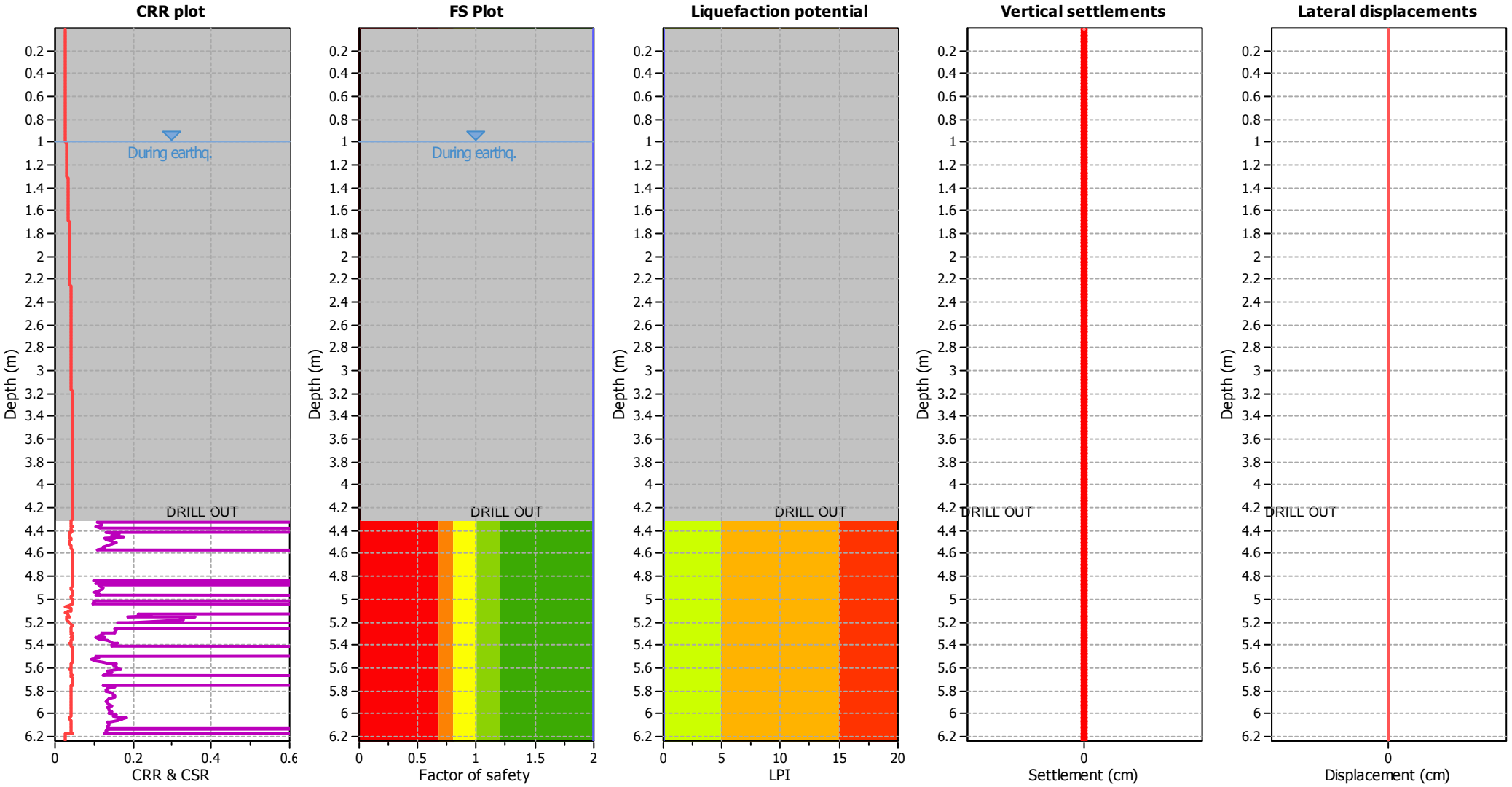
# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.05 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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Christchurch

# LIQUEFACTION ANALYSIS REPORT

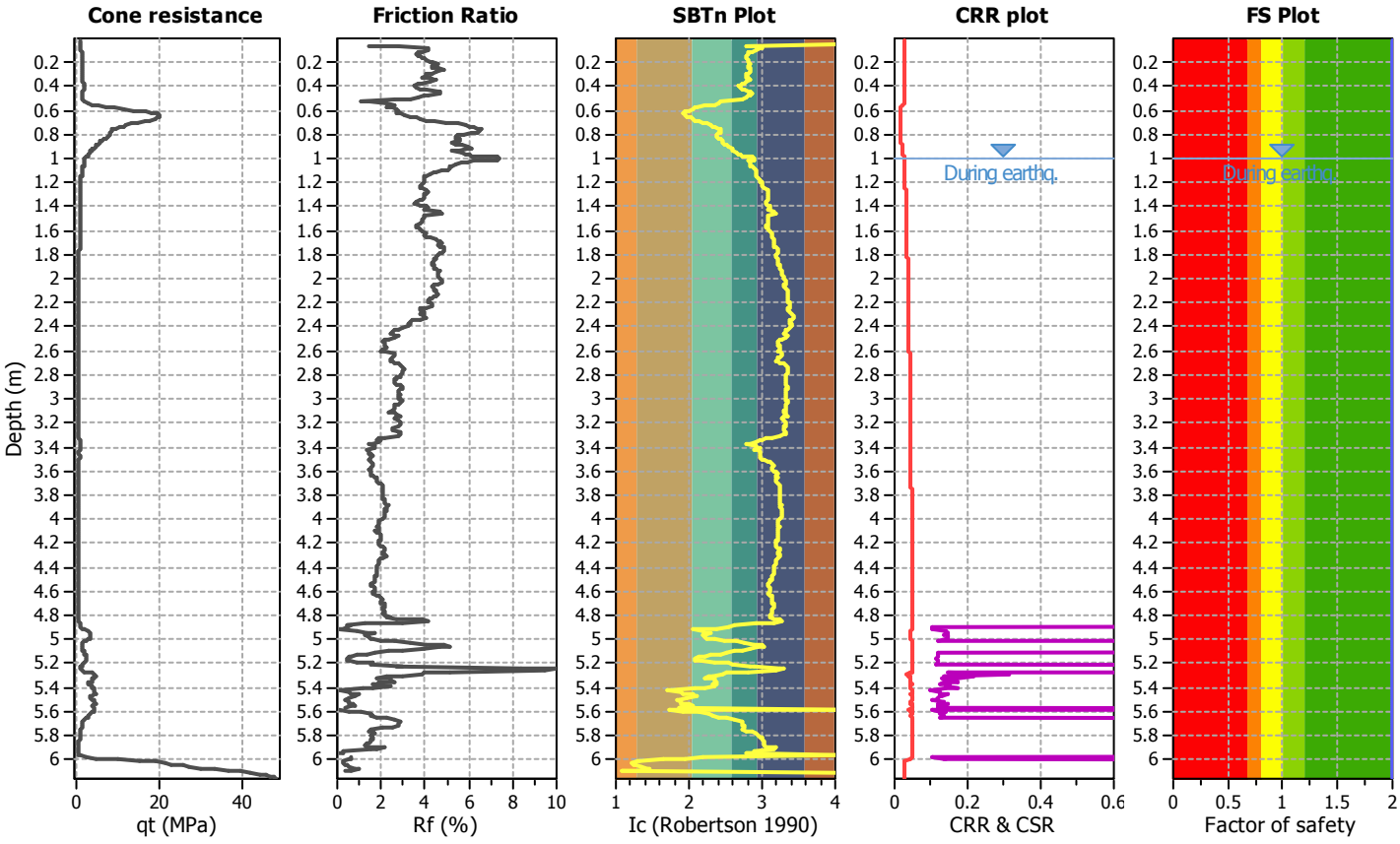
**Project title : K200265**

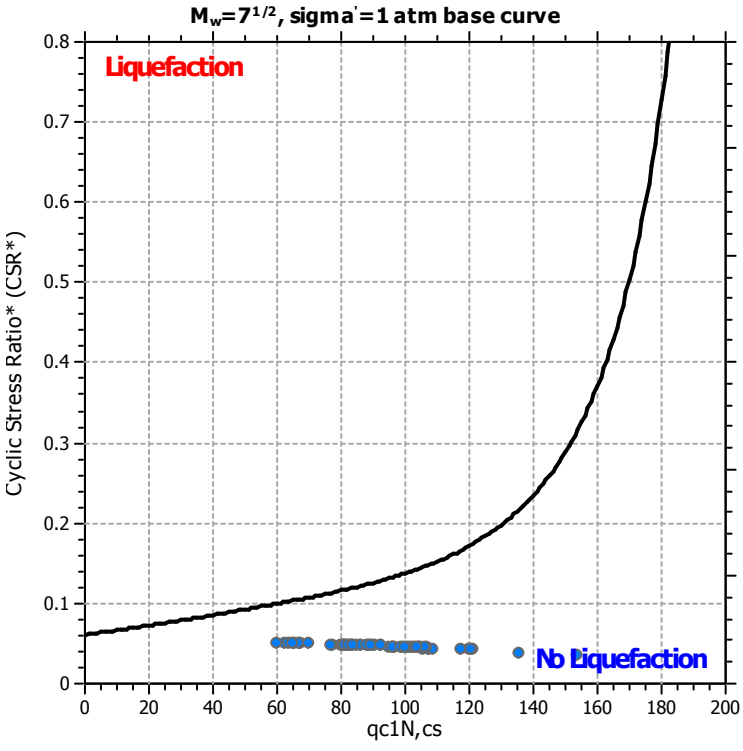
**Location : Bayswater Maritime Village Development**

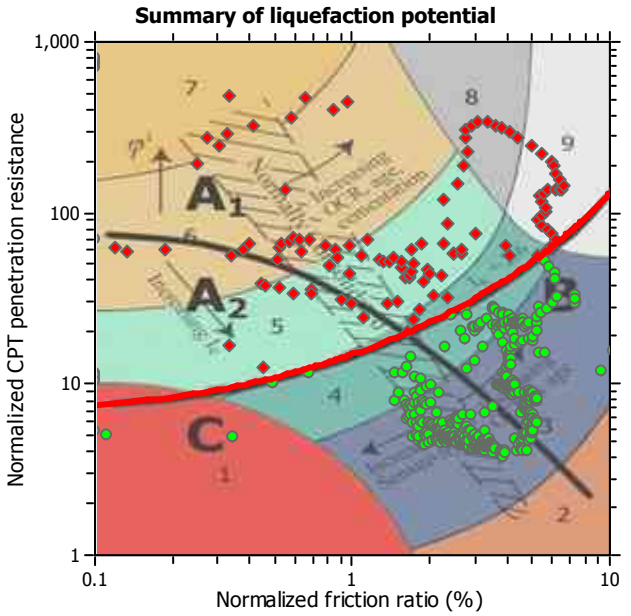
**CPT file : CPT5 (MH09) SLS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.05 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

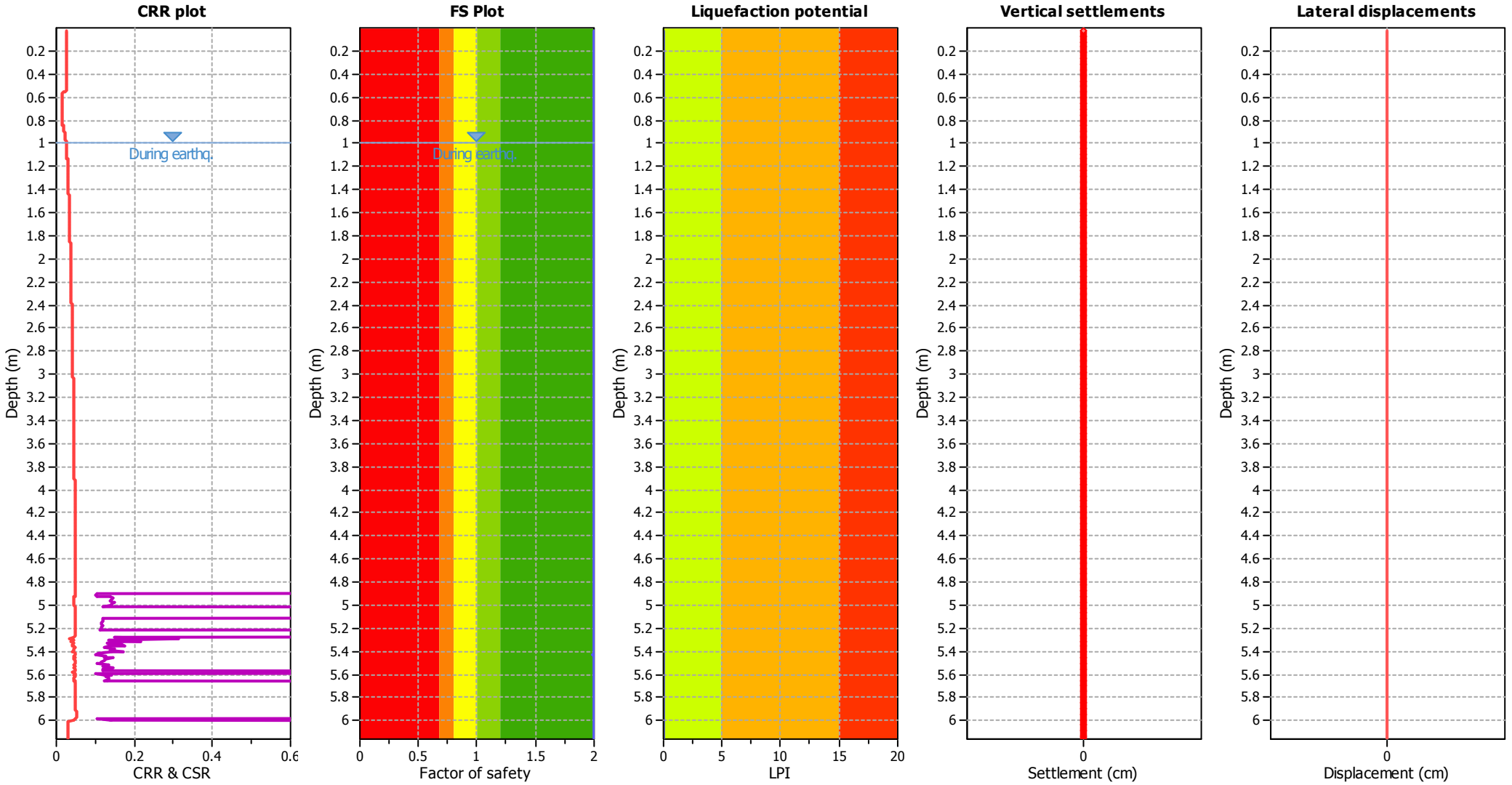



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.05 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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Christchurch

# LIQUEFACTION ANALYSIS REPORT

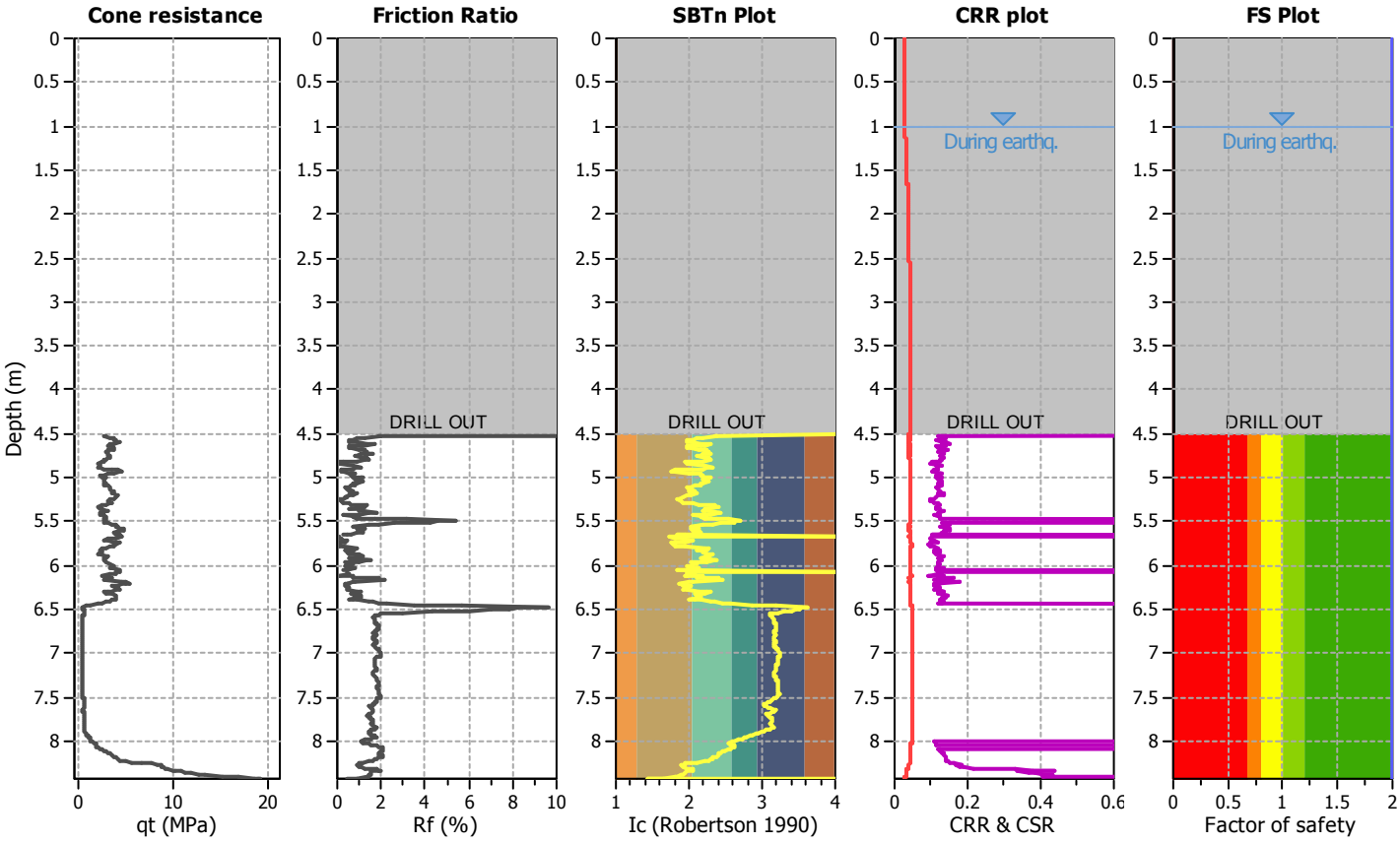
**Project title : K200265**

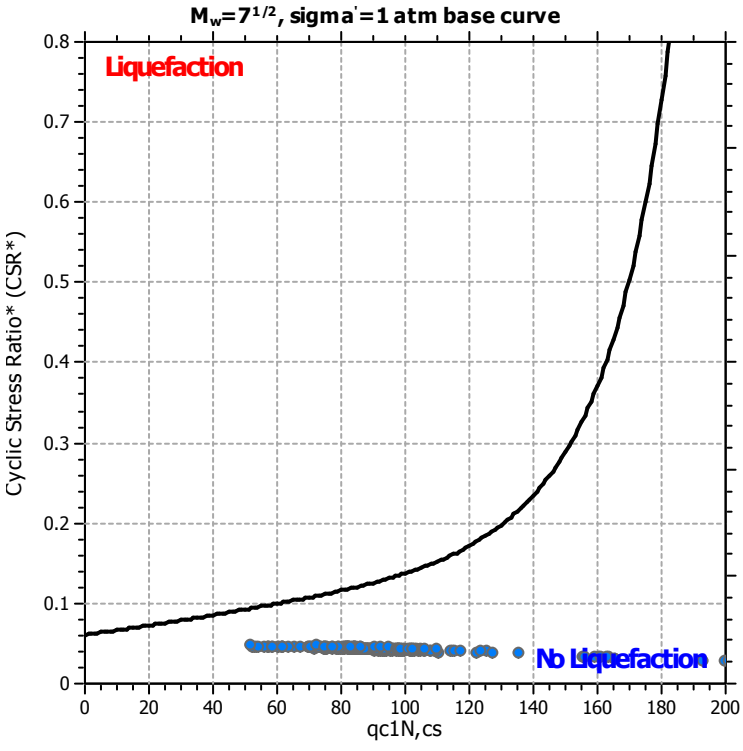
**Location : Bayswater Maritime Village Development**

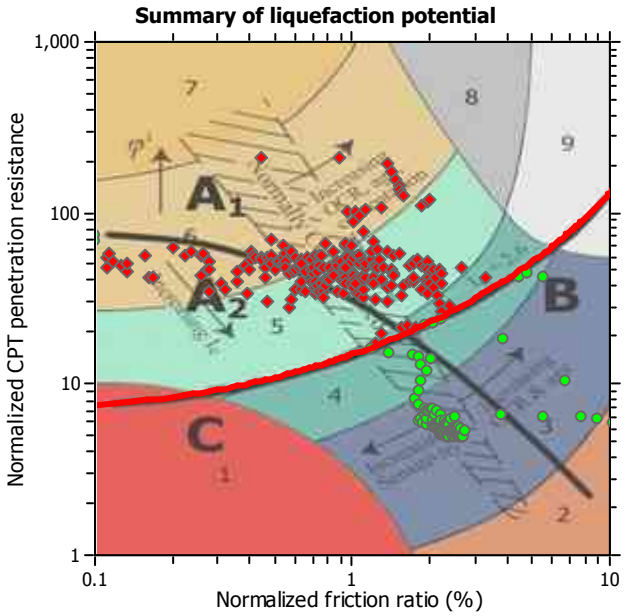
**CPT file : CPT6 (MH11) SLS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.05 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

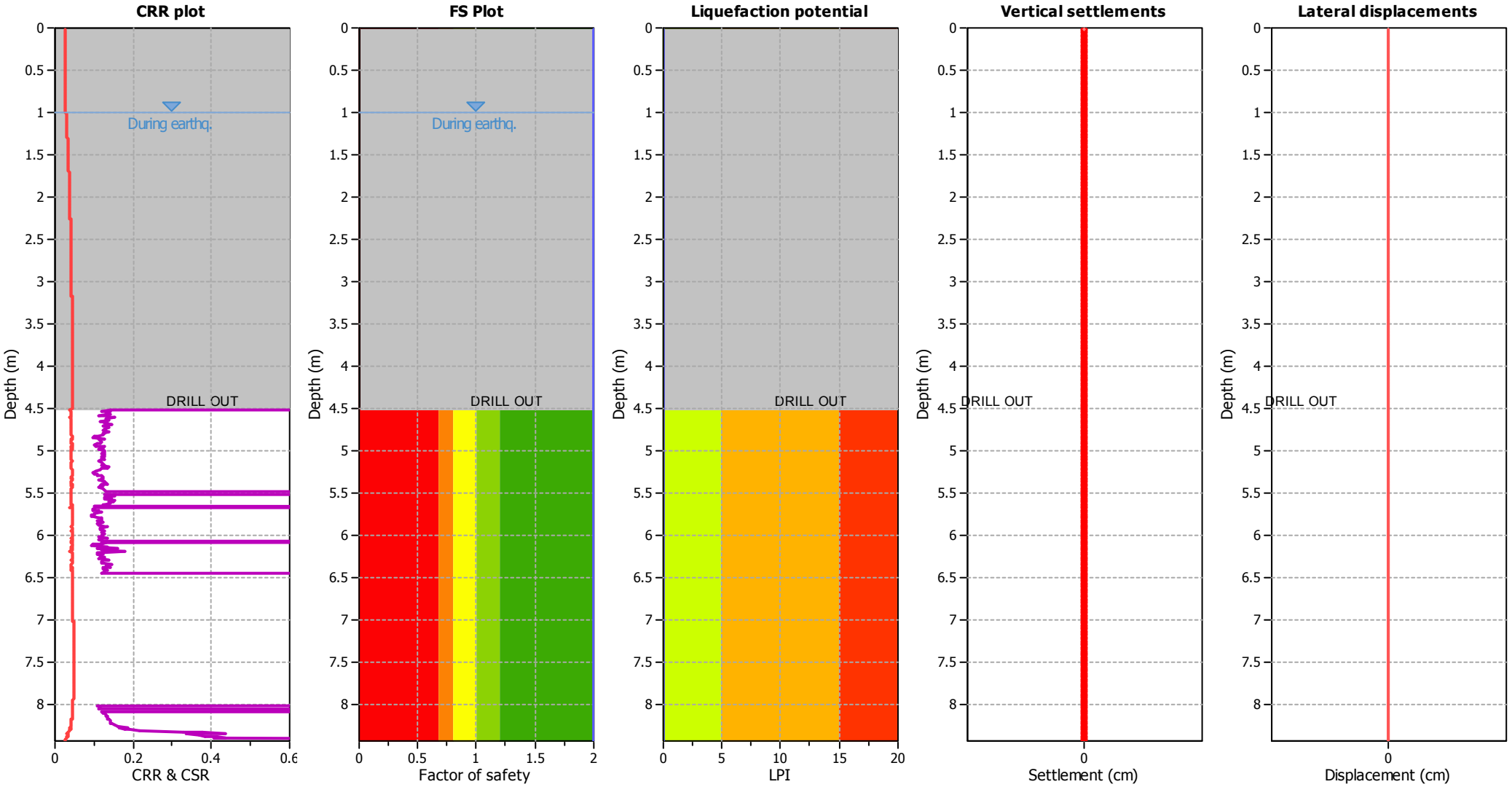



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.05 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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# LIQUEFACTION ANALYSIS REPORT

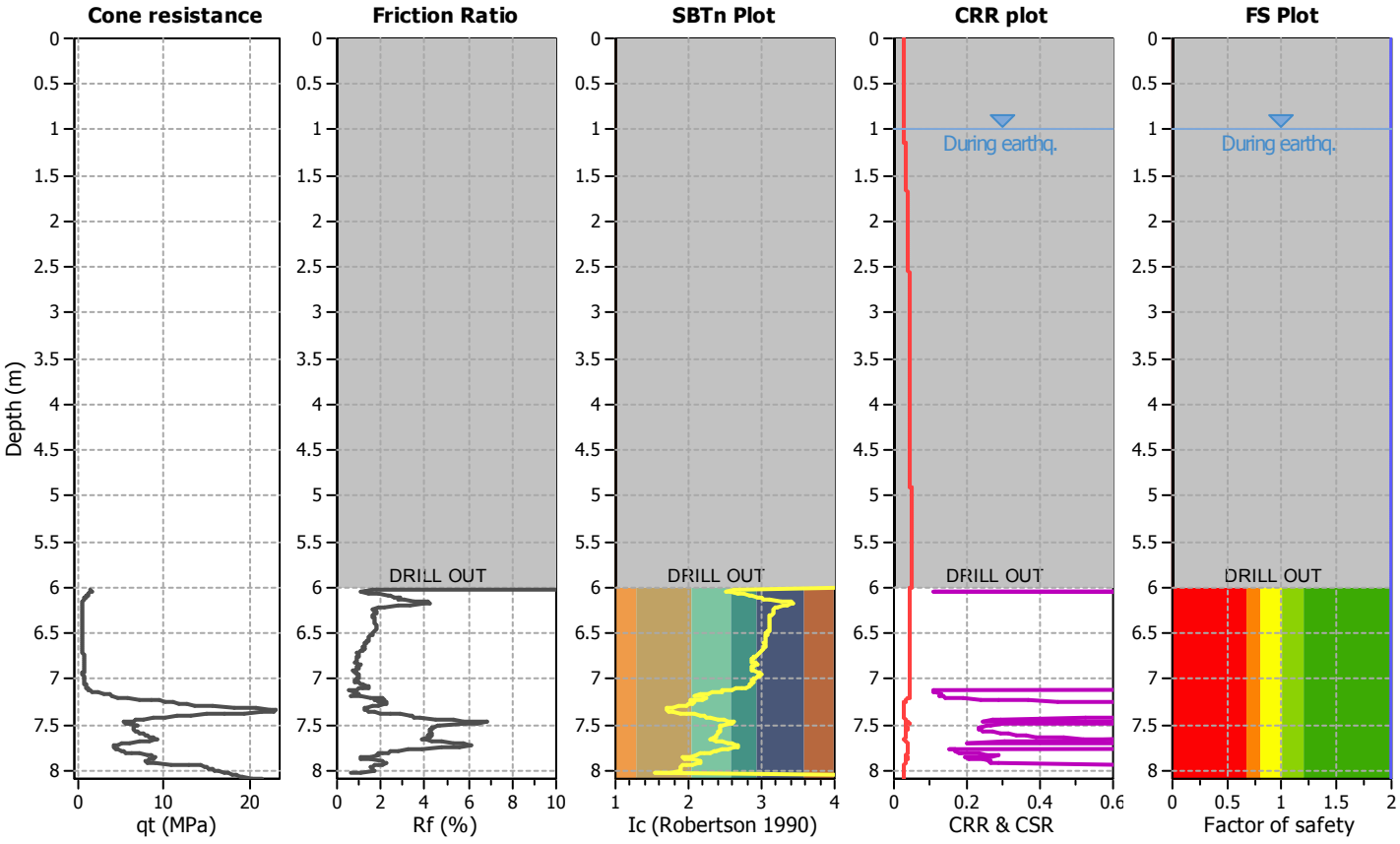
**Project title : K200265**

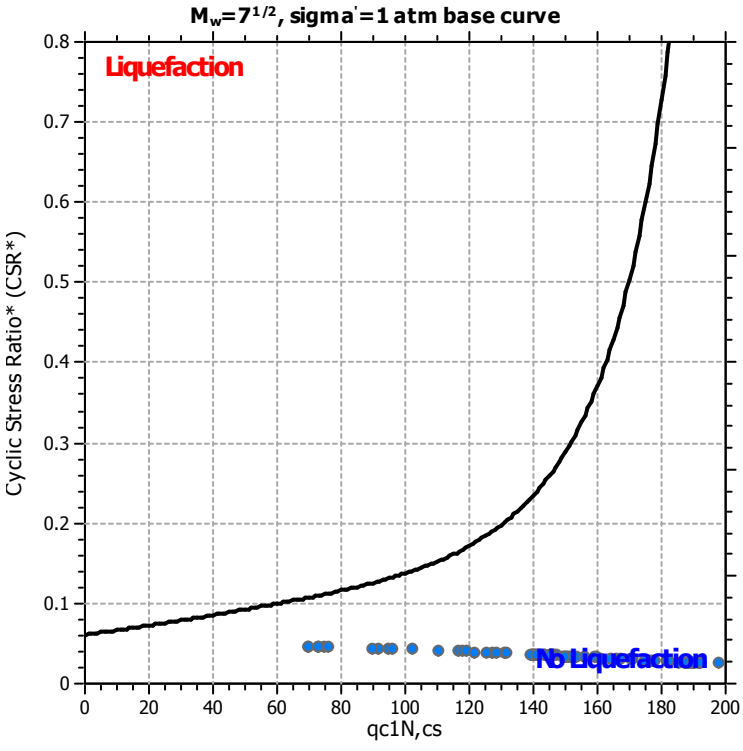
**Location : Bayswater Maritime Village Development**

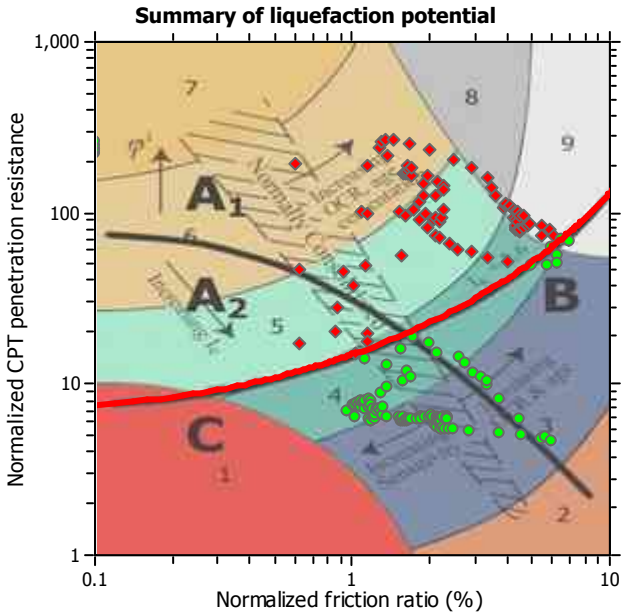
**CPT file : CPT7 (MH15) SLS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.05 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

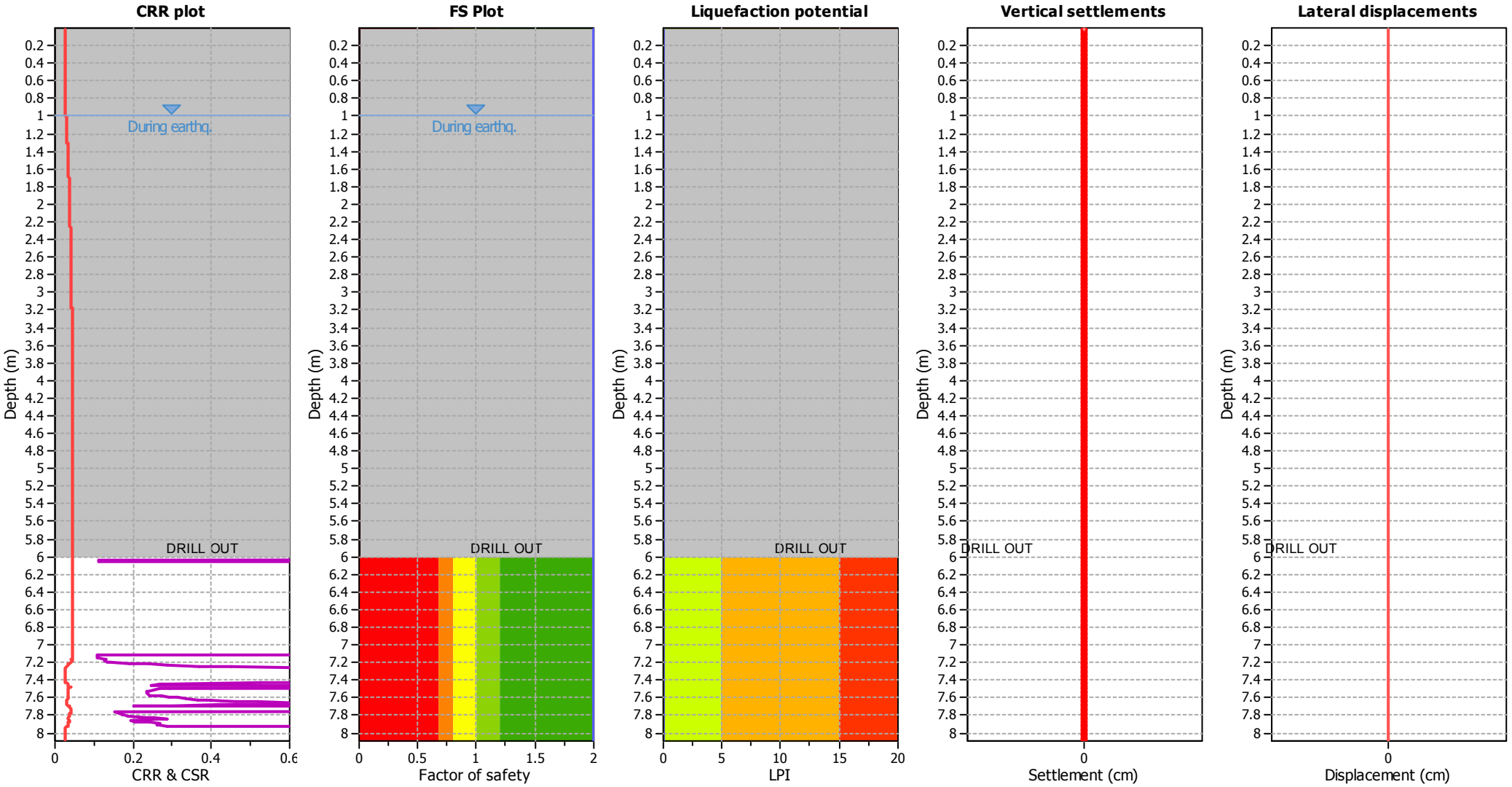



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.05 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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# LIQUEFACTION ANALYSIS REPORT

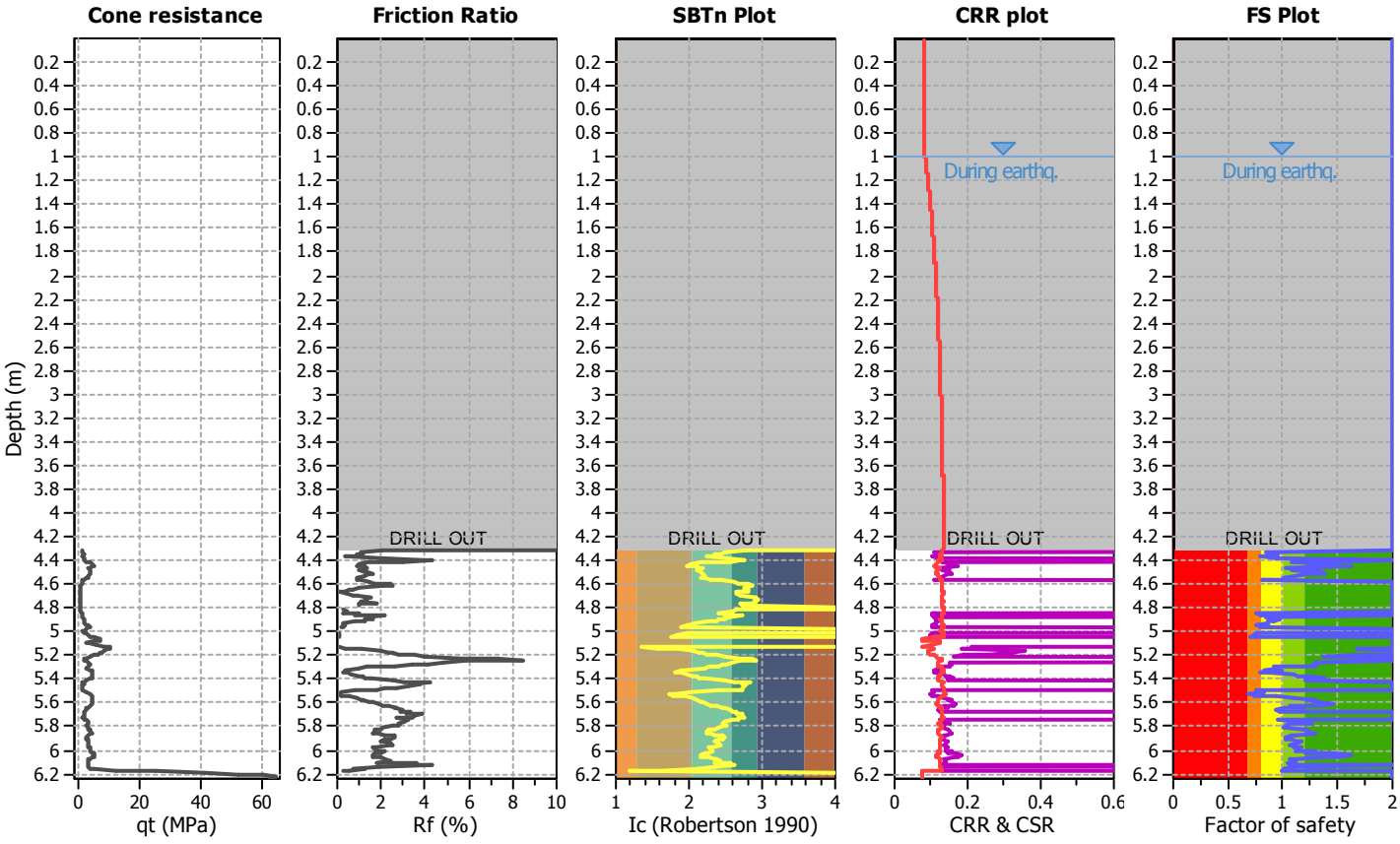
**Project title : K200265**

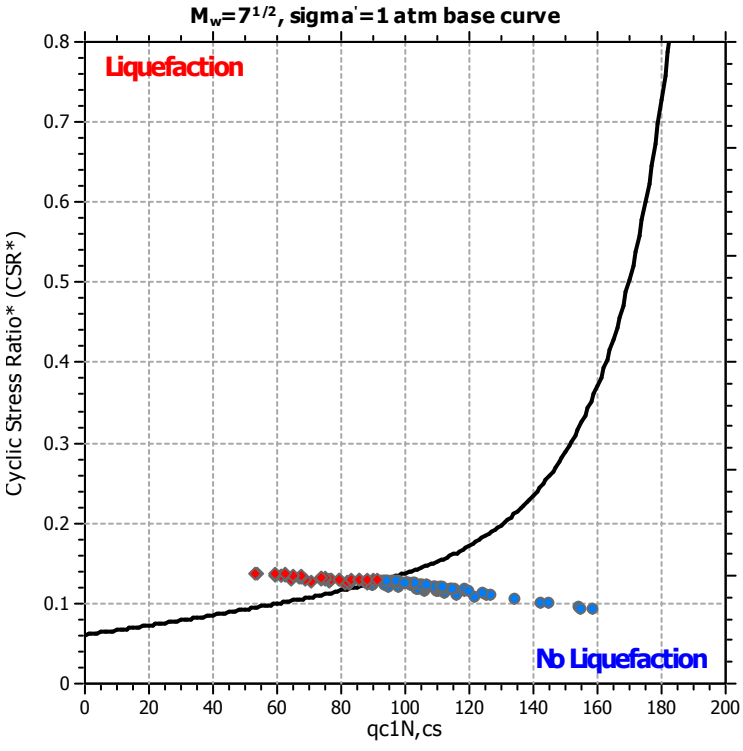
**Location : Bayswater Maritime Village Development**

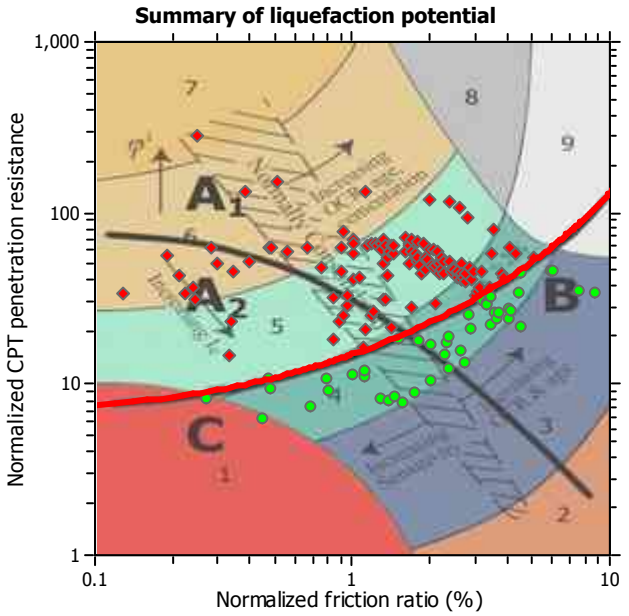
**CPT file : CPT4 (BH13) ULS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.15 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

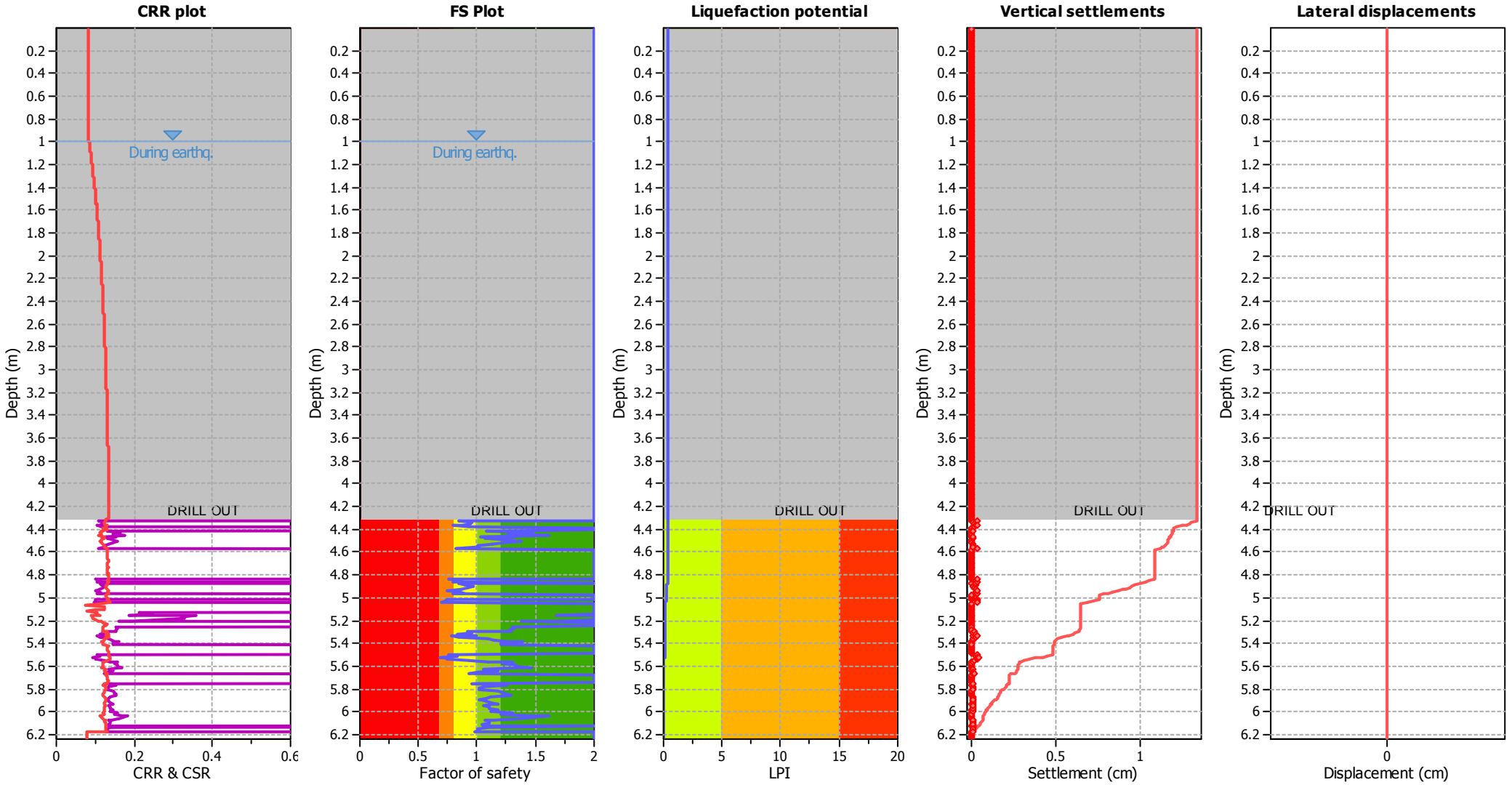



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.15 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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# LIQUEFACTION ANALYSIS REPORT

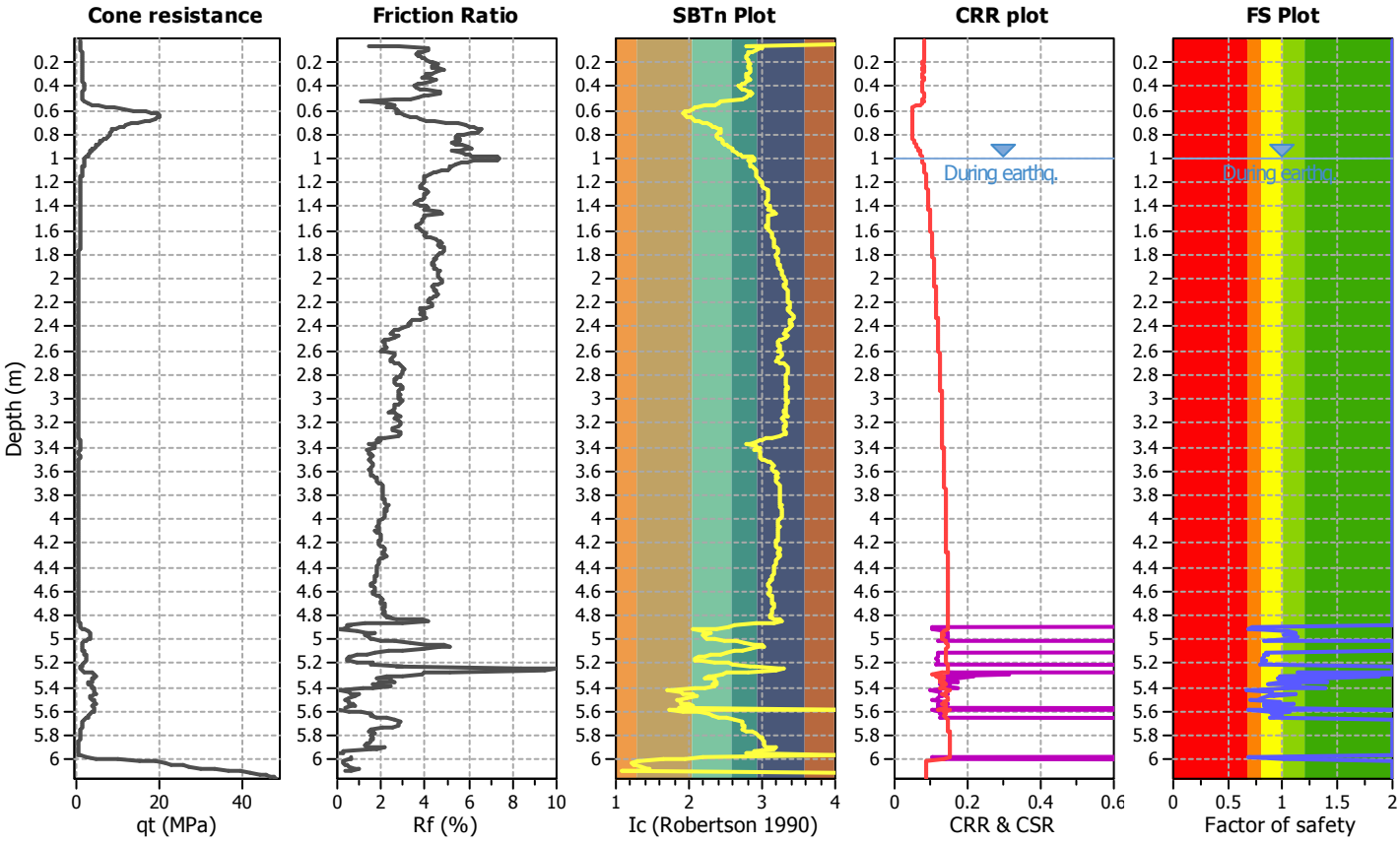
**Project title : K200265**

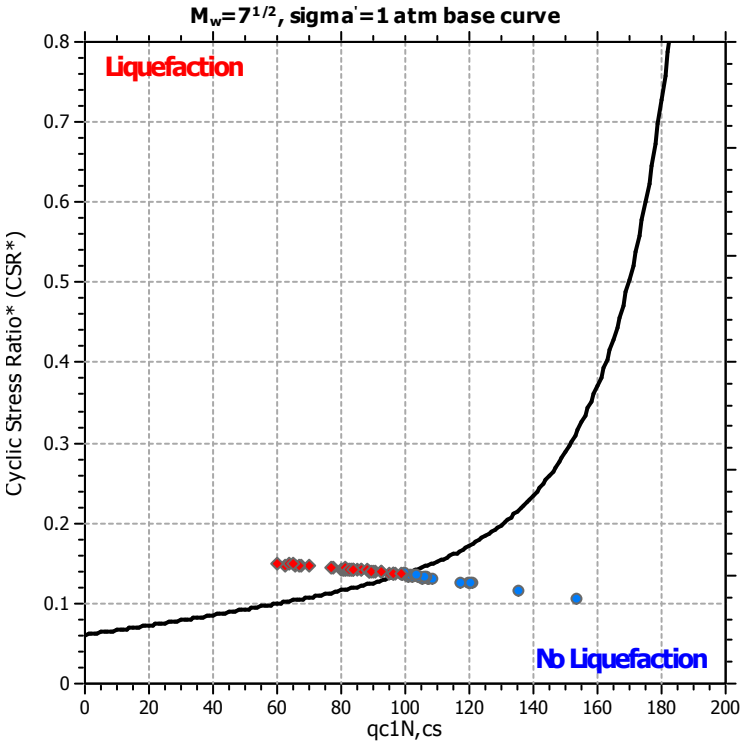
**Location : Bayswater Maritime Village Development**

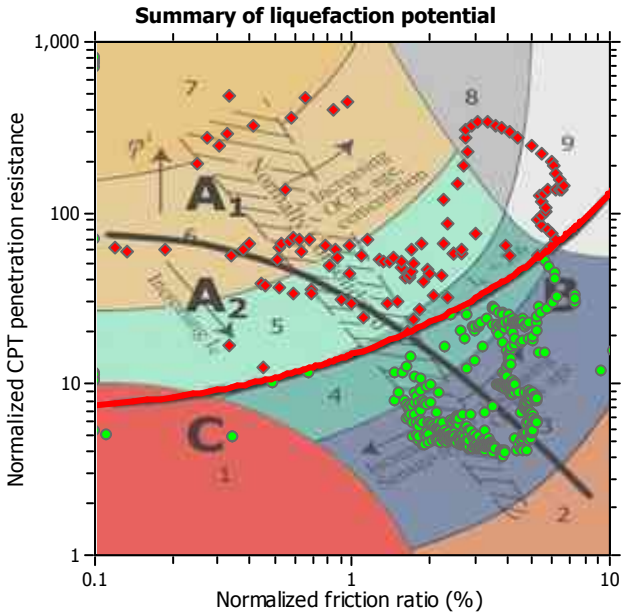
**CPT file : CPT5 (MH09) ULS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.15 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

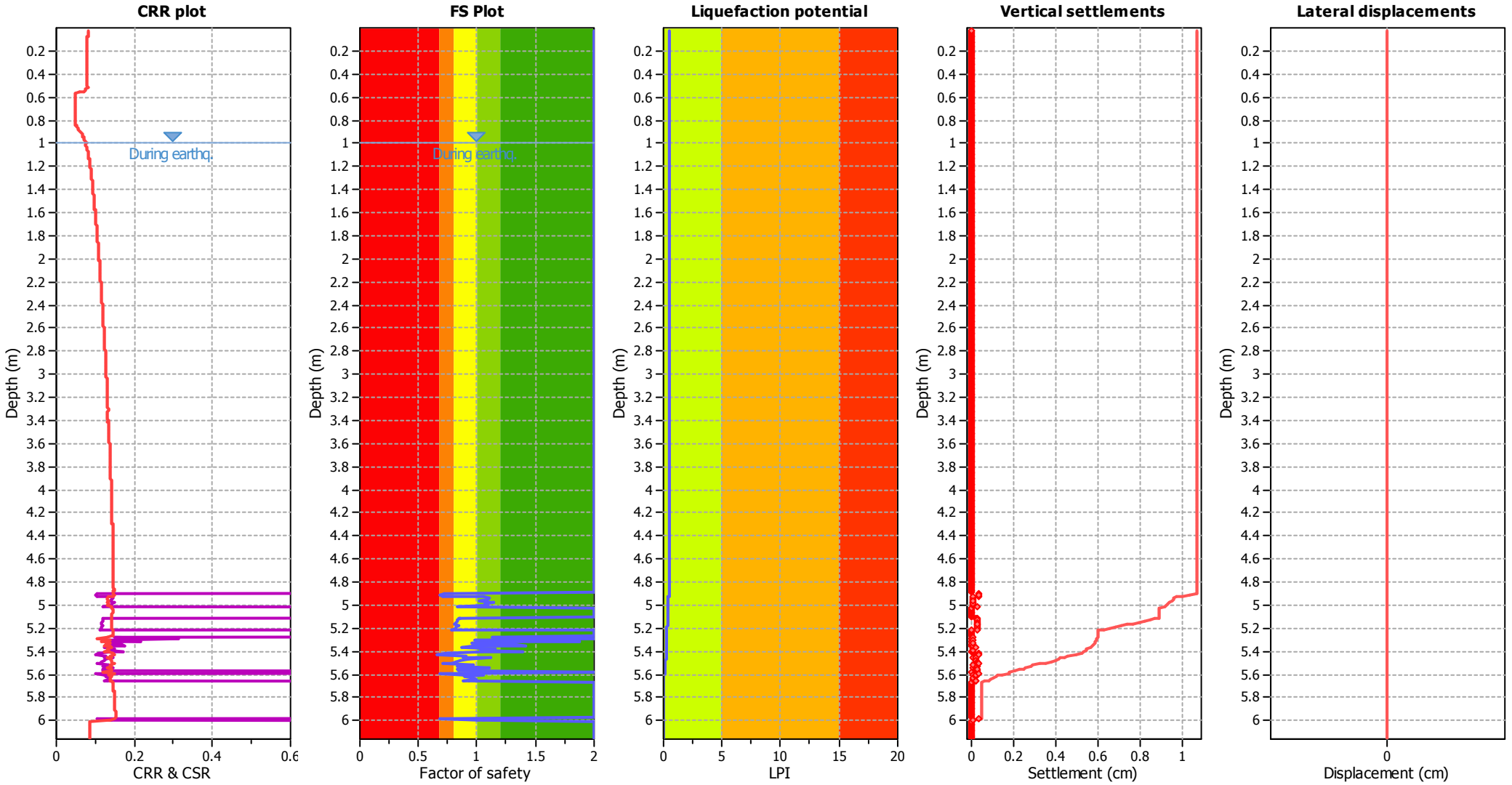



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.15 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
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**LPI color scheme**

- Very high risk
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# LIQUEFACTION ANALYSIS REPORT

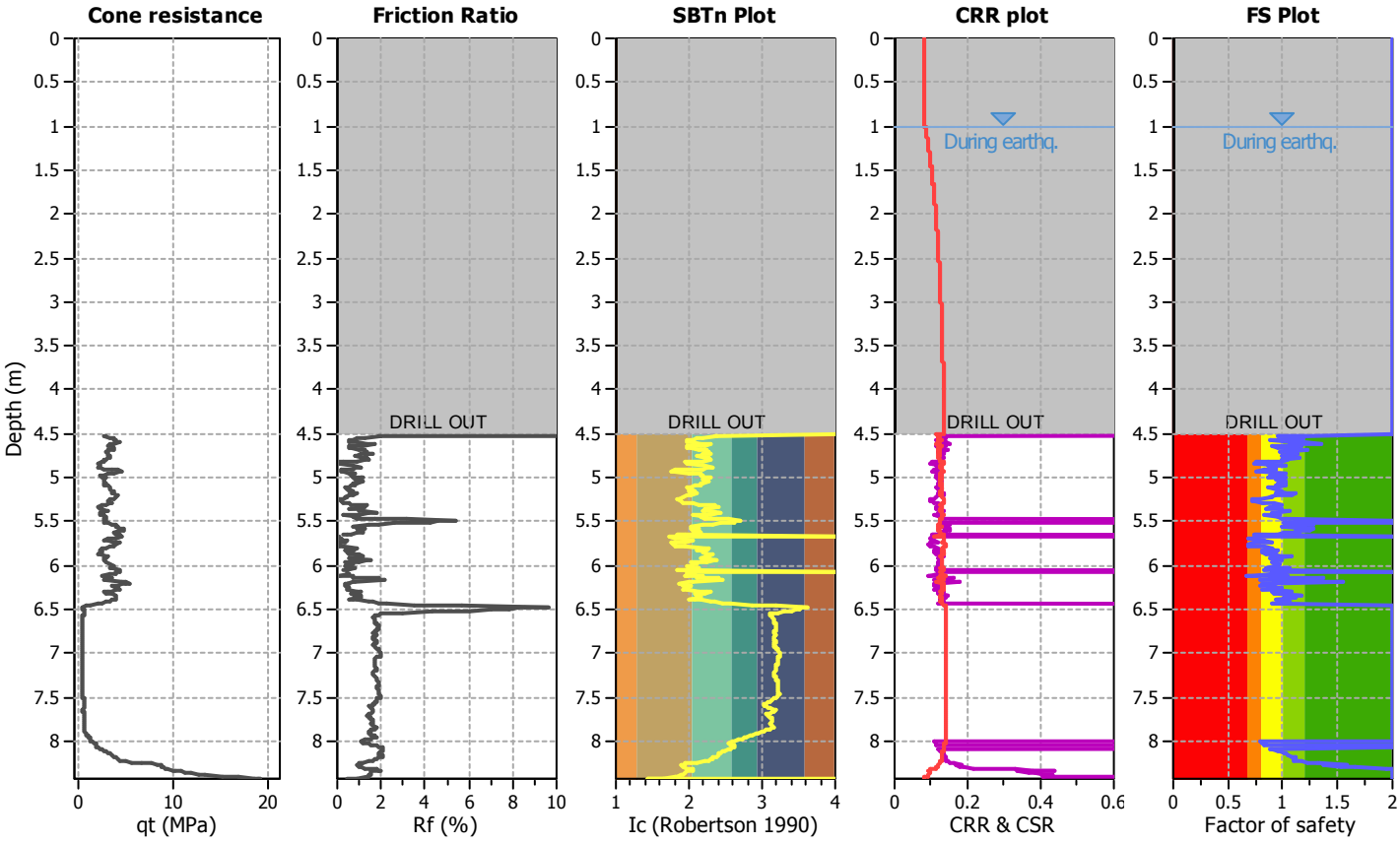
**Project title : K200265**

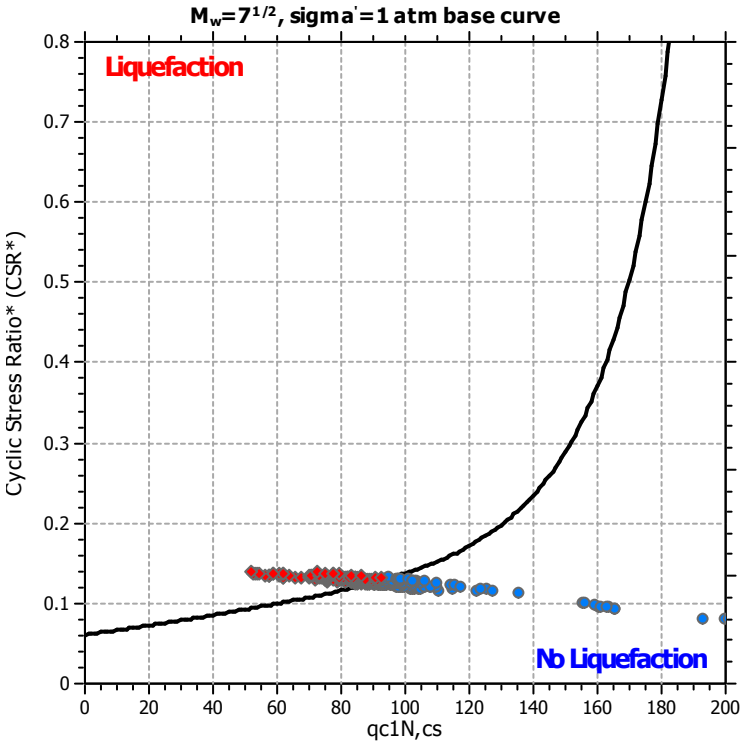
**Location : Bayswater Maritime Village Development**

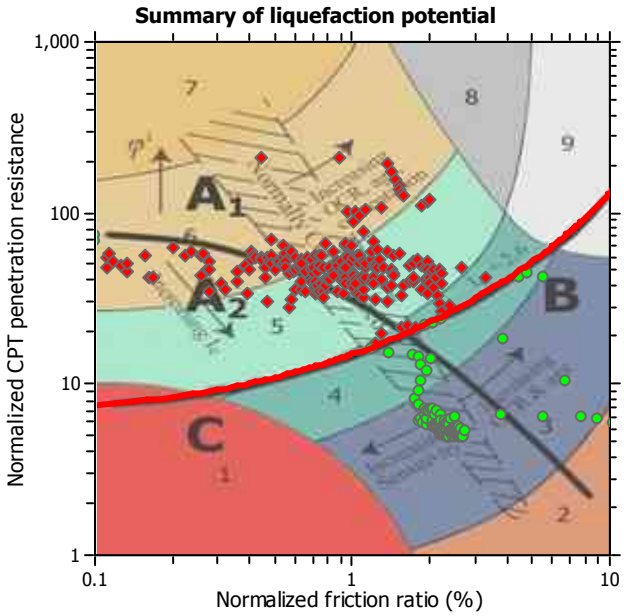
**CPT file : CPT6 (MH11) ULS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.15 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |




Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
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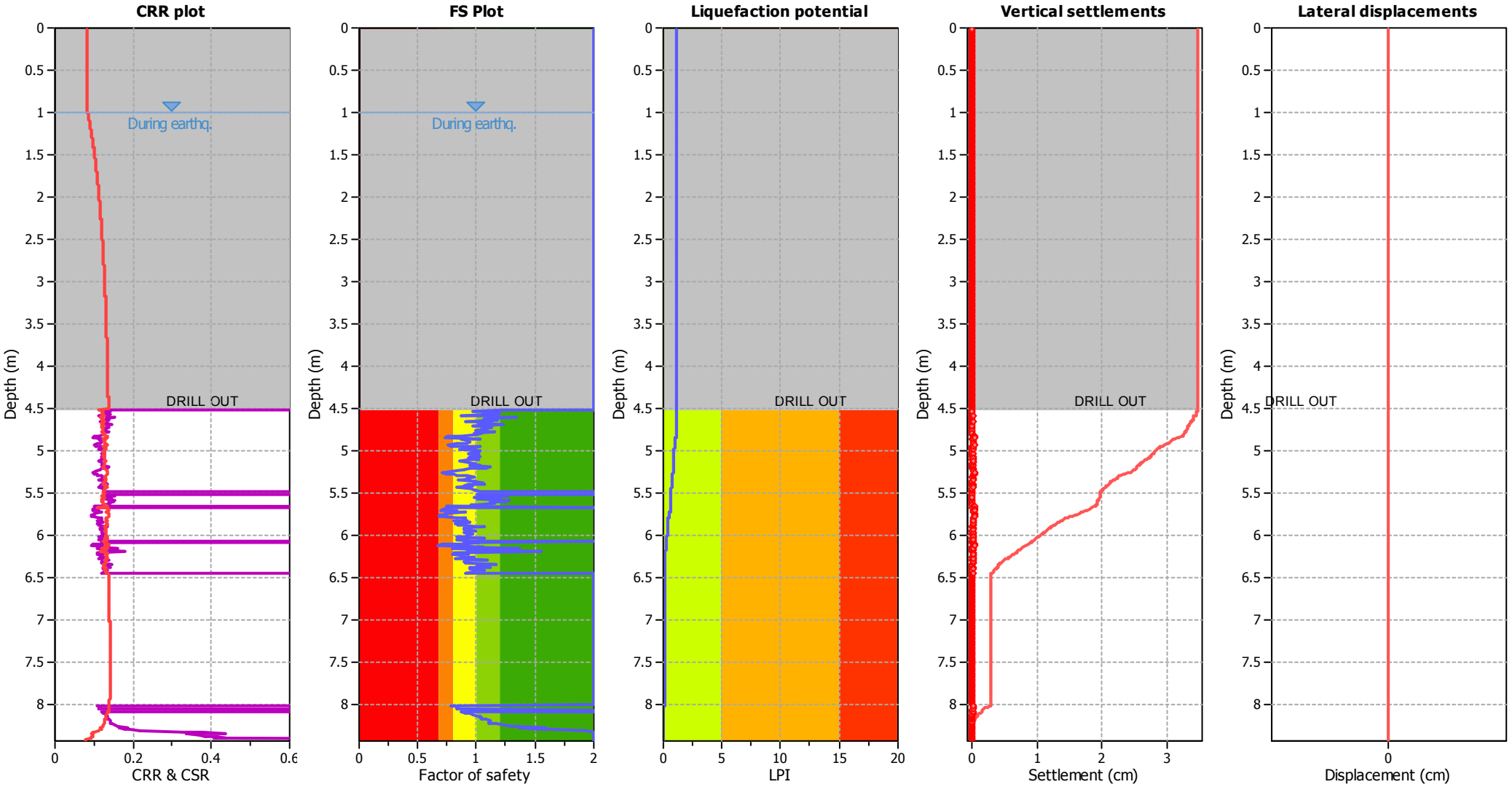
# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.15 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
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- Unlike to liquefy
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**LPI color scheme**

- Very high risk
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# LIQUEFACTION ANALYSIS REPORT

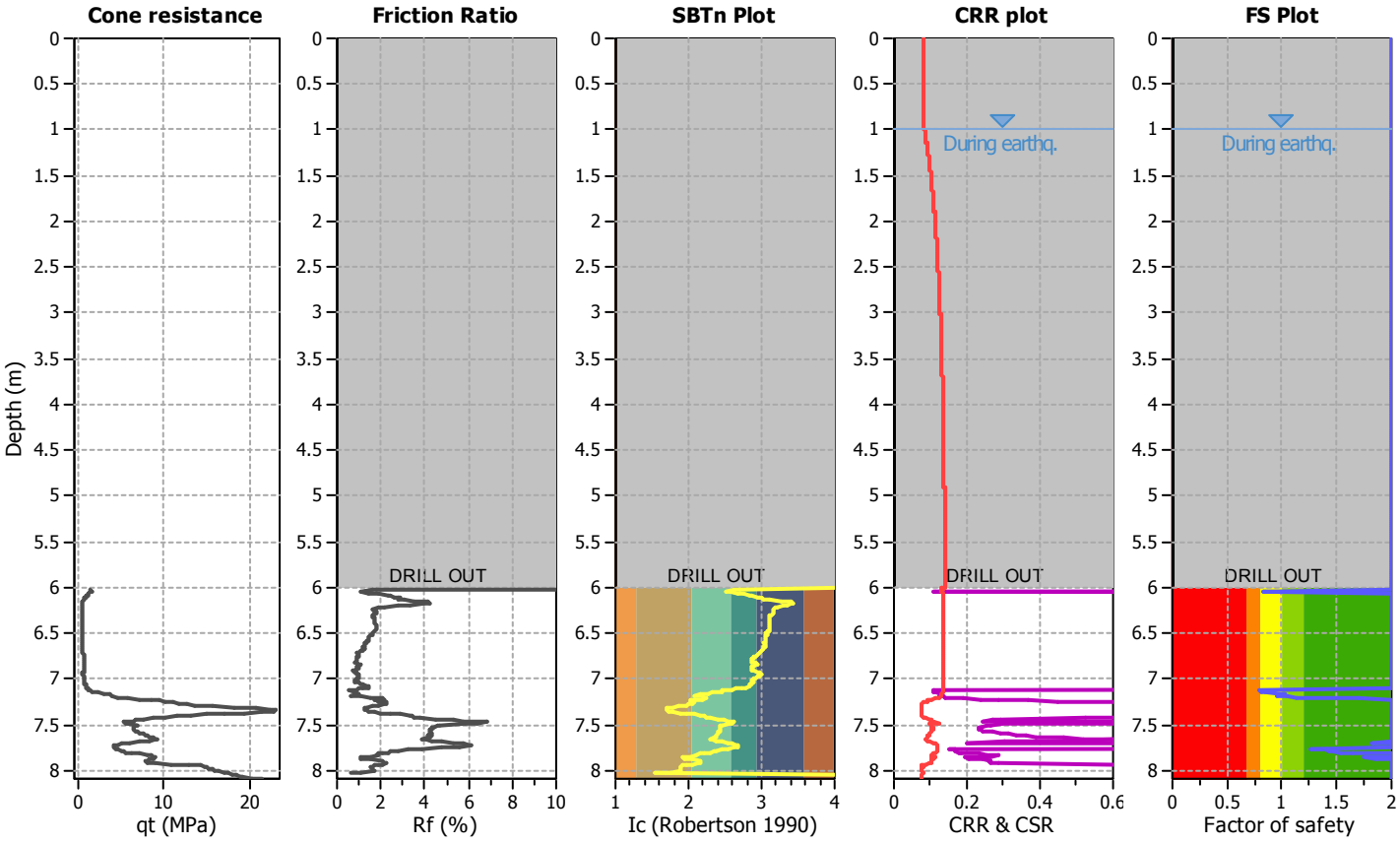
**Project title : K200265**

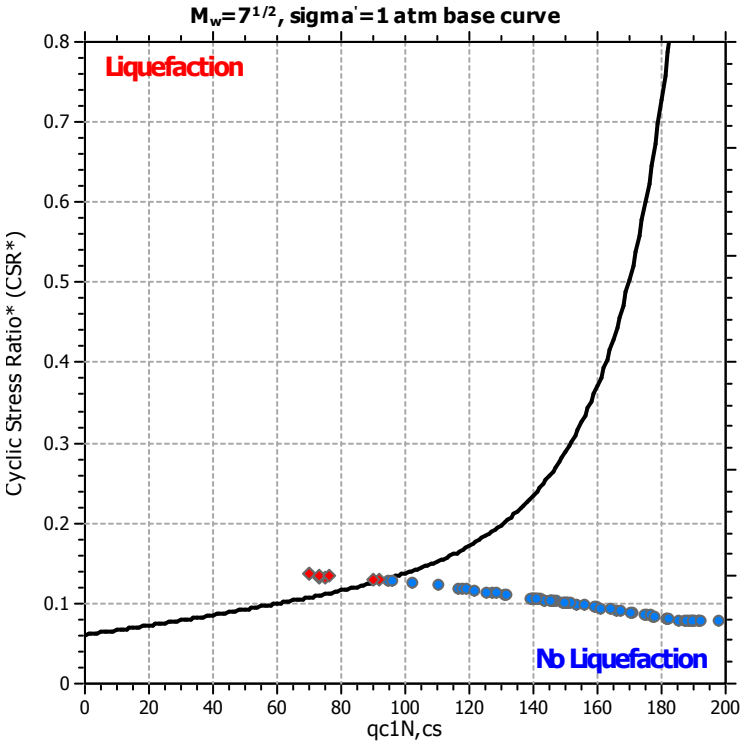
**Location : Bayswater Maritime Village Development**

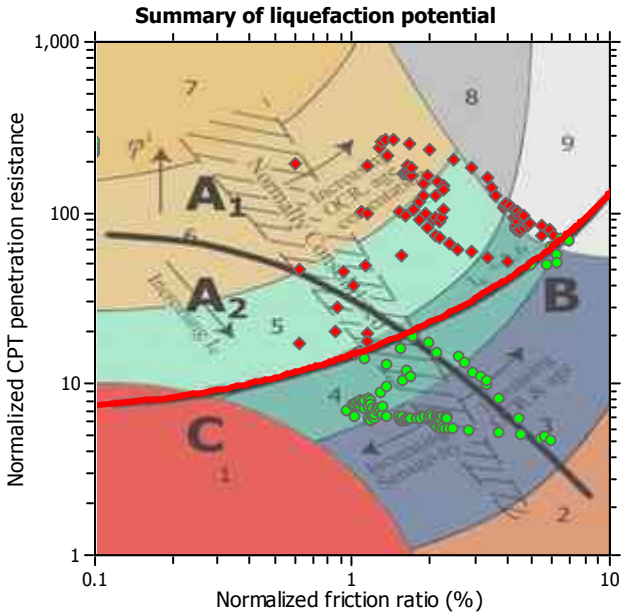
**CPT file : CPT7 (MH15) ULS**

**Input parameters and analysis data**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | G.W.T. (in-situ): | 1.00 m | Use fill: | No | Clay like behavior applied: | Sands only |
| Fines correction method: | B&I (2014) | G.W.T. (earthq.): | 1.00 m | Fill height: | N/A | Limit depth applied: | No |
| Points to test: | Based on Ic value | Average results interval: | 3 | Fill weight: | N/A | Limit depth: | N/A |
| Earthquake magnitude $M_w$: | 5.80 | Ic cut-off value: | 2.60 | Trans. detect. applied: | No | MSF method: | Method based |
| Peak ground acceleration: | 0.15 | Unit weight calculation: | Based on SBT | $K_\sigma$ applied: | Yes | | |

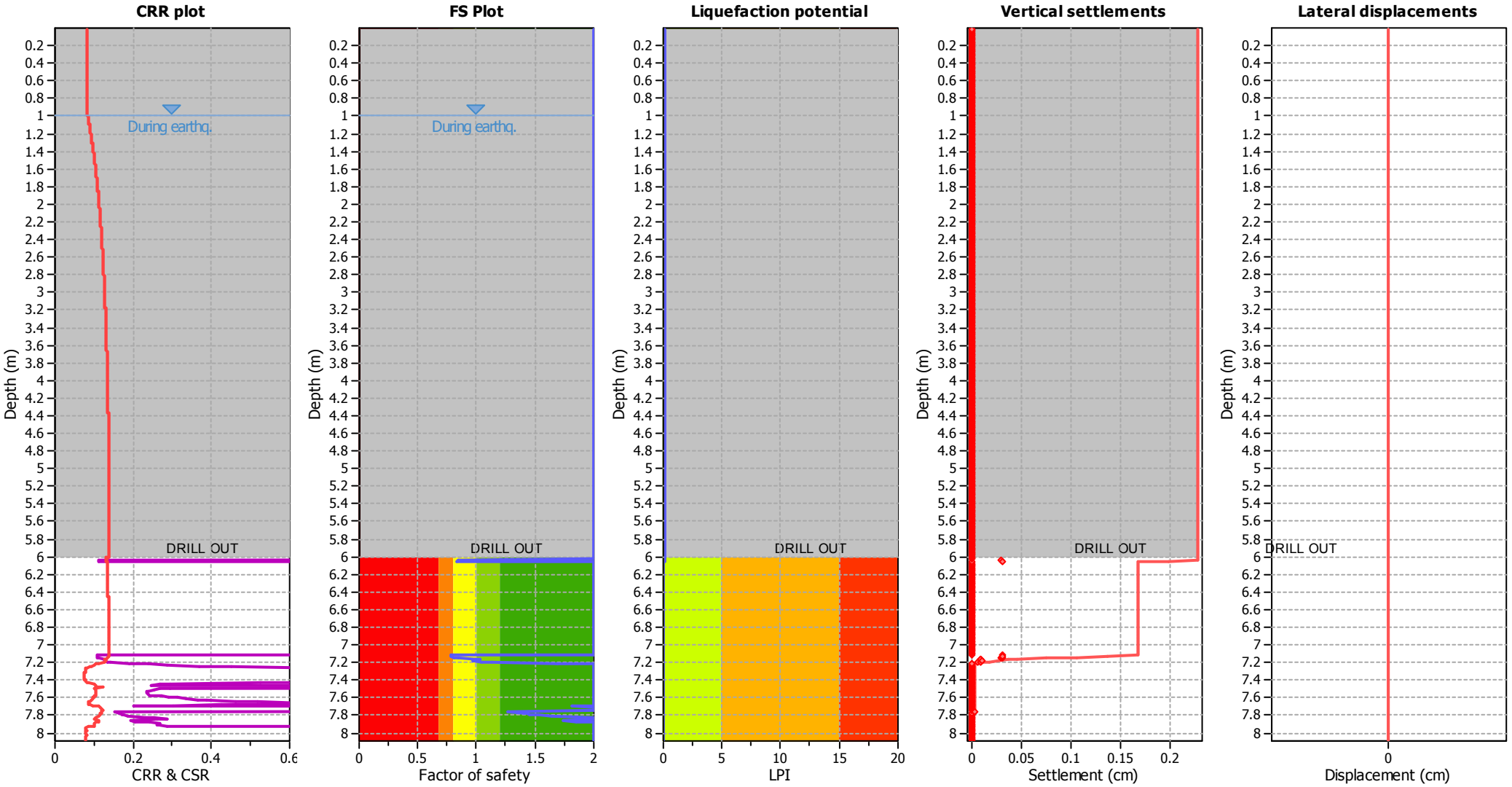



Zone $A_1$: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone $A_2$: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

# Liquefaction analysis overall plots




## Input parameters and analysis data

| | | | | | |
|---|---|---|---|---|---|
| Analysis method: | B&I (2014) | Depth to GWT (erthq.): | 1.00 m | Fill weight: | N/A |
| Fines correction method: | B&I (2014) | Average results interval: | 3 | Transition detect. applied: | No |
| Points to test: | Based on Ic value | Ic cut-off value: | 2.60 | $K_\sigma$ applied: | Yes |
| Earthquake magnitude $M_w$: | 5.80 | Unit weight calculation: | Based on SBT | Clay like behavior applied: | Sands only |
| Peak ground acceleration: | 0.15 | Use fill: | No | Limit depth applied: | No |
| Depth to water table (insitu): | 1.00 m | Fill height: | N/A | Limit depth: | N/A |

**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

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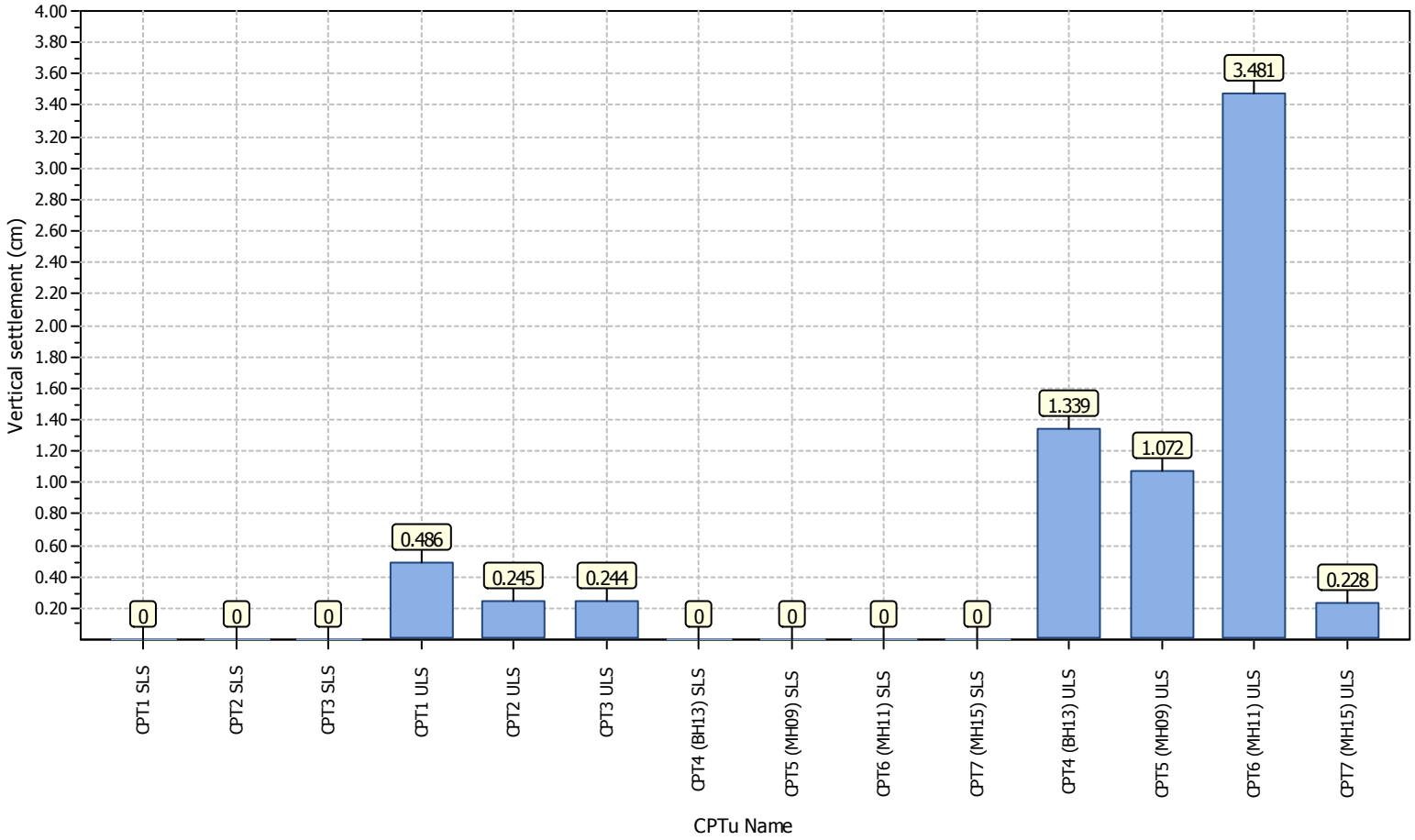
Christchurch

**Project title : K200265**

**Location : Bayswater Maritime Village Development**

## Overall vertical settlements report



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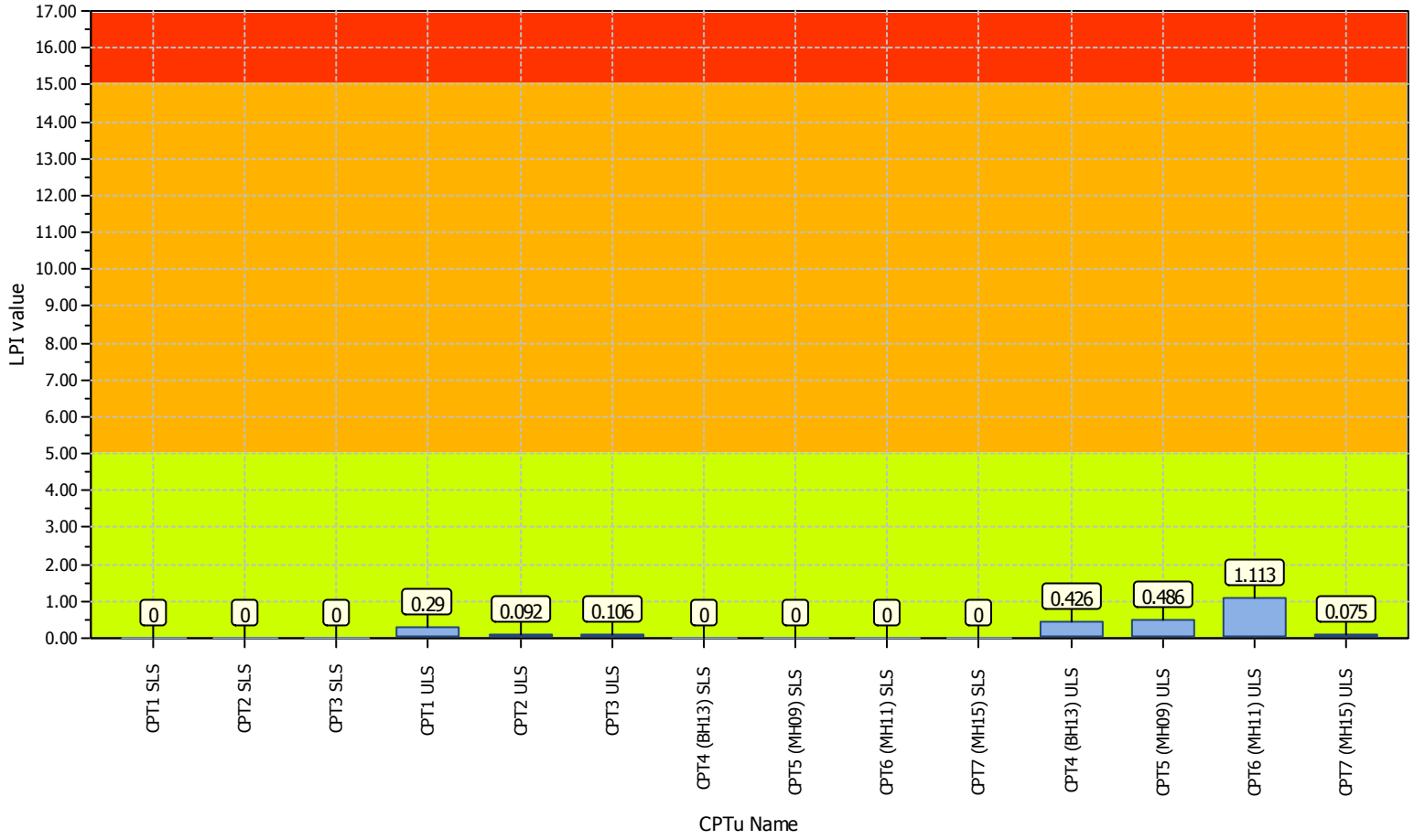
**Location : Bayswater Maritime Village Development**

## Overall Liquefaction Potential Index report




**LPI color scheme**

- Very high risk
- High risk
- Low risk

**Basic statistics**

Total CPT number: 14
100% low risk
0% high risk
0% very high risk

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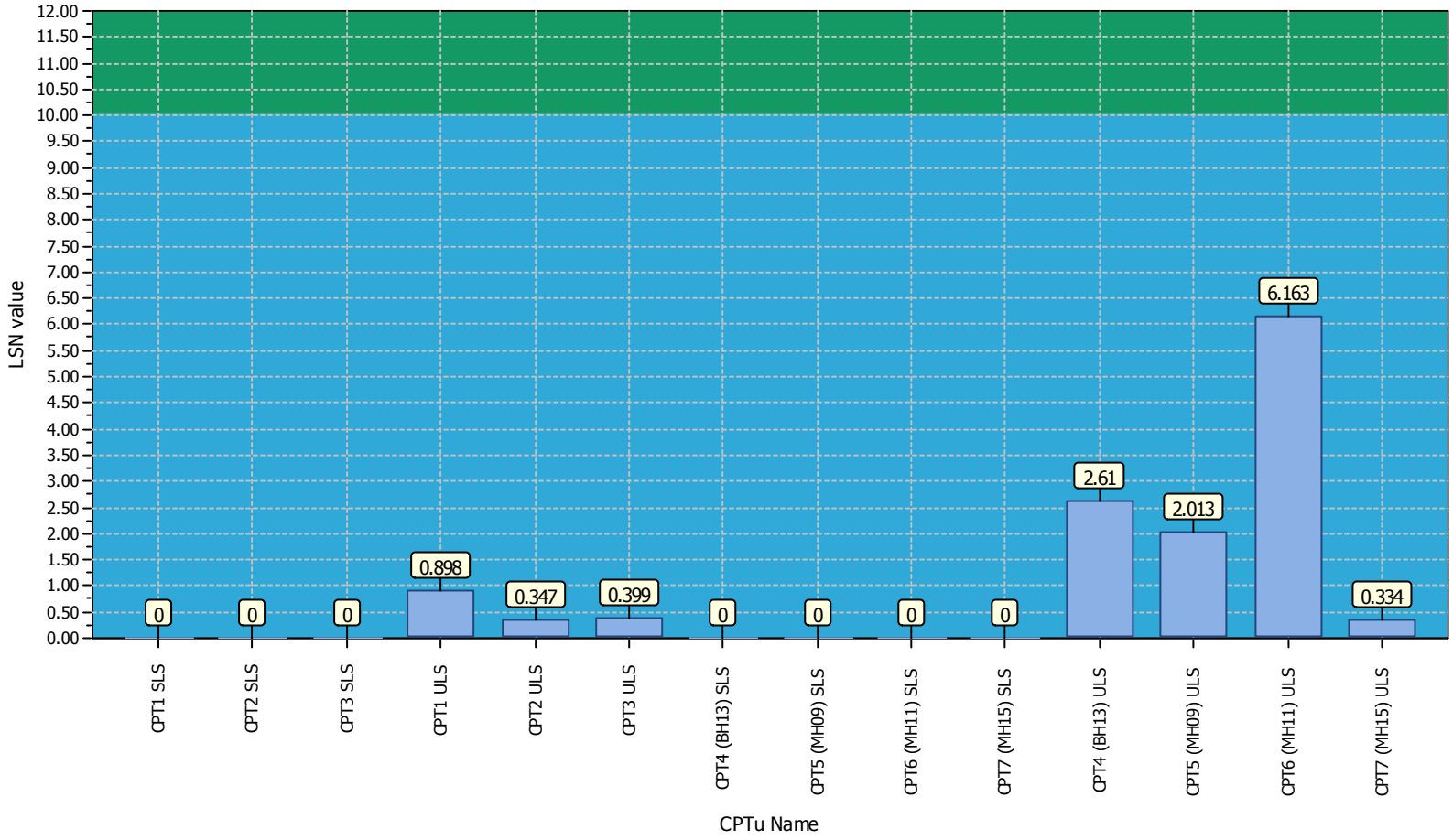
**Location : Bayswater Maritime Village Development**

## Overall Liquefaction Severity Number report




**LSN color scheme**

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

**Basic statistics**

Total CPT number: 14

100% little liquefaction

0% minor liquefaction

0% moderate liquefaction

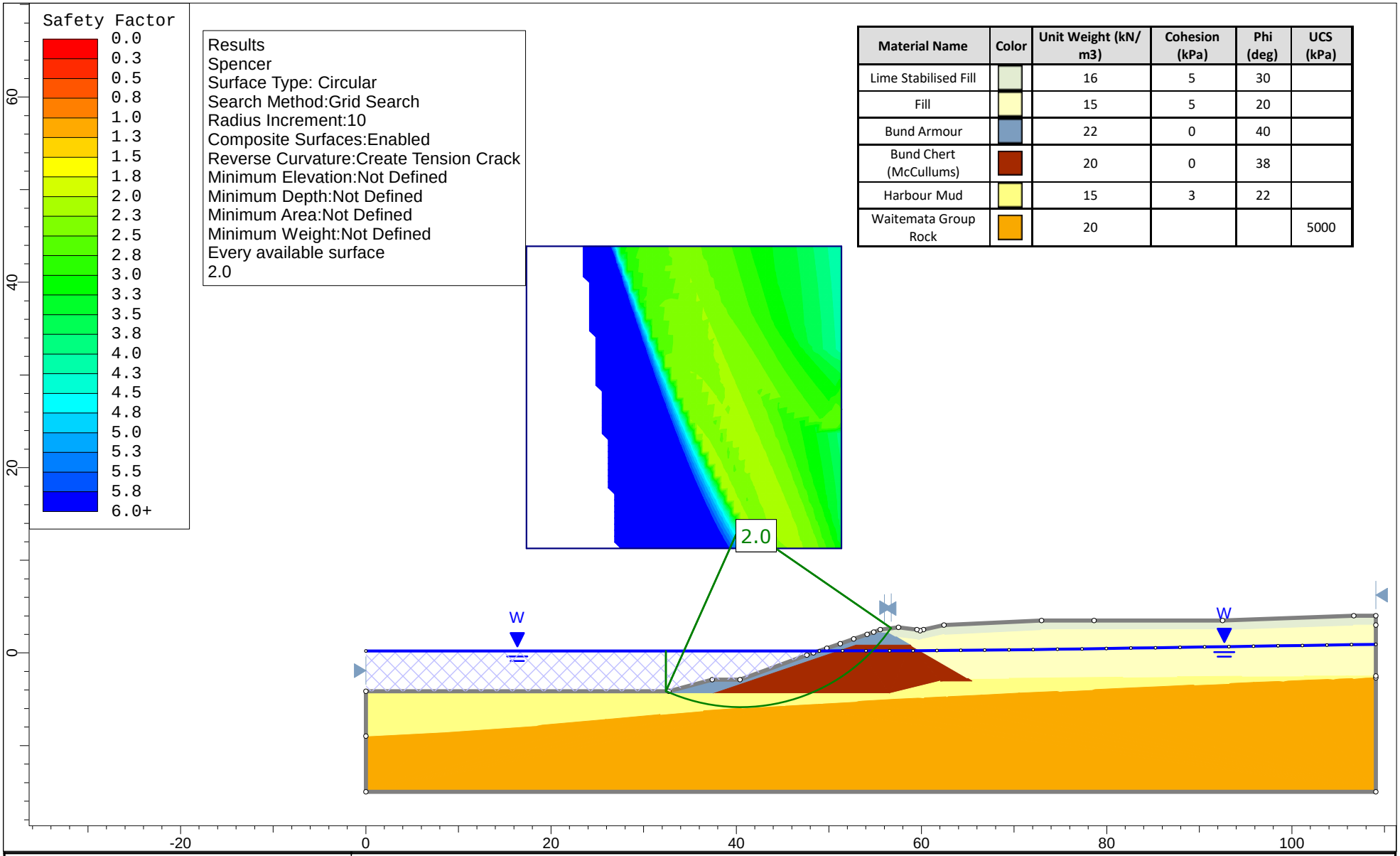
0% moderate to major liquefaction

0% major liquefaction

0% severe liquefaction

# APPENDIX 6

Slope Stability Analysis Results




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Waitemata Group Rock | | 20 | | | 5000 |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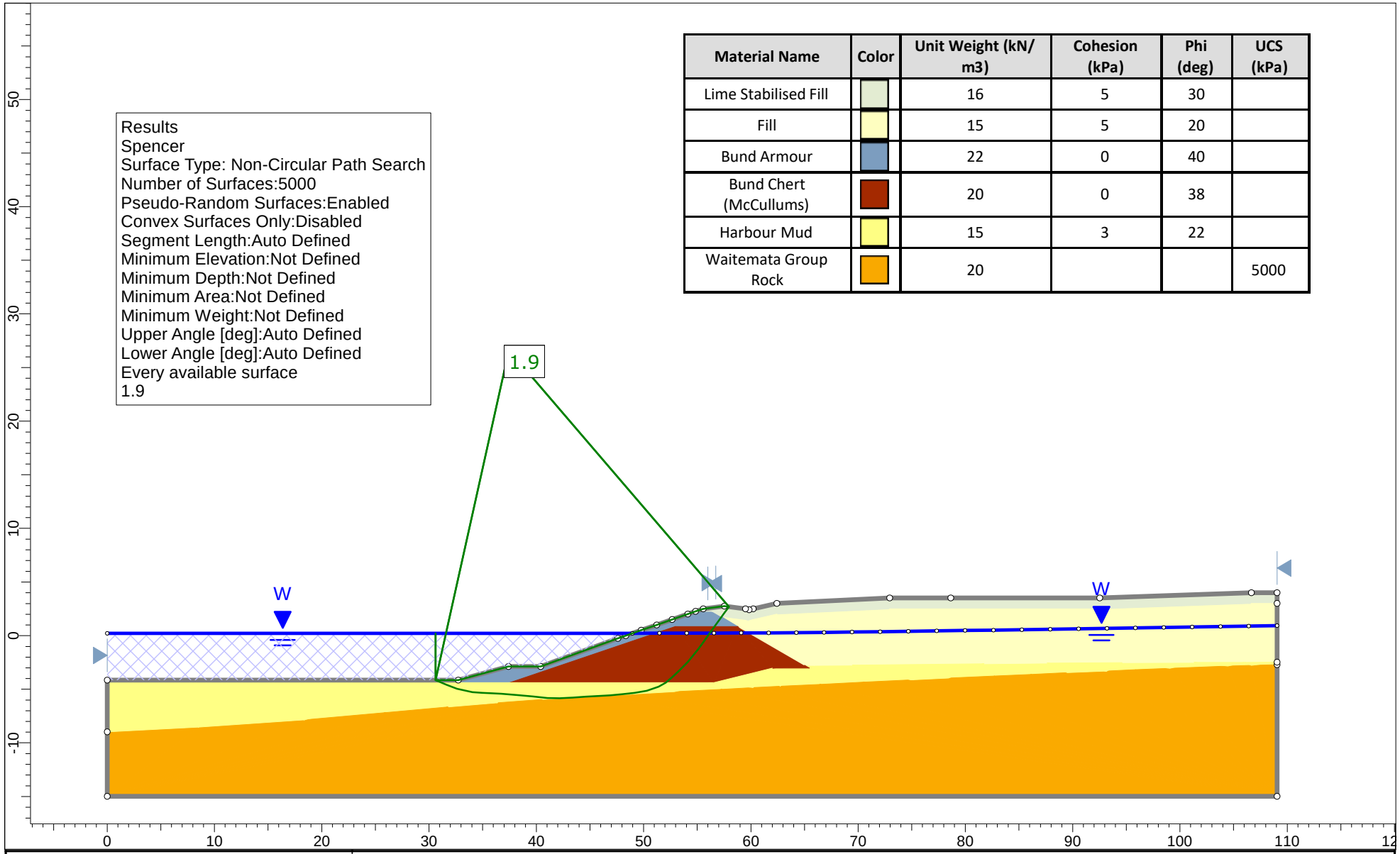
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Static - Existing Profile | *Scenario* | Run 1 - Static, Circ |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section A 1.slmd |

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Waitemata Group Rock | | 20 | | | 5000 |

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.9

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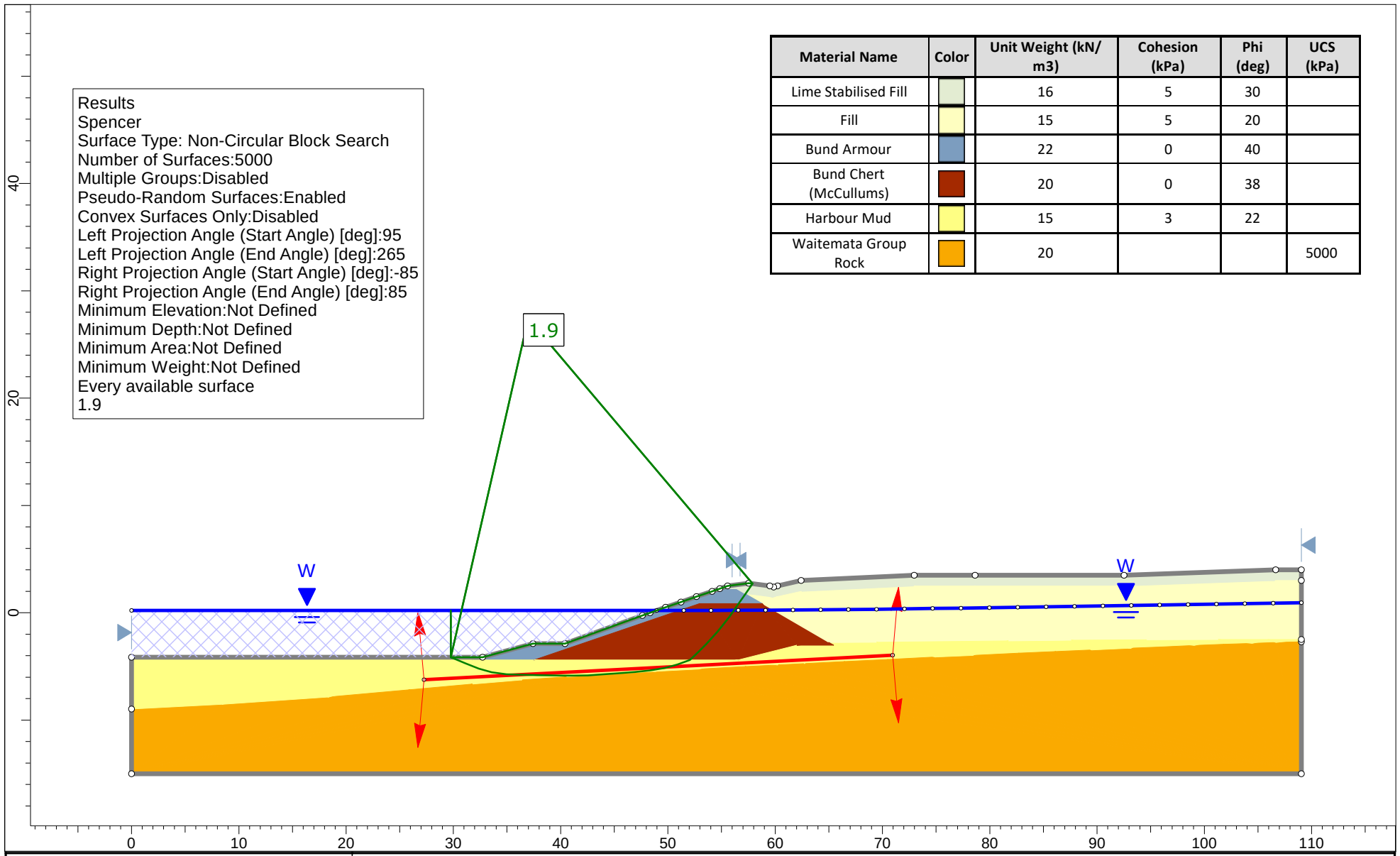
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static - Existing Profile | Scenario | Run 2 - Static, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 1.slmd |

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Waitemata Group Rock | | 20 | | | 5000 |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.9

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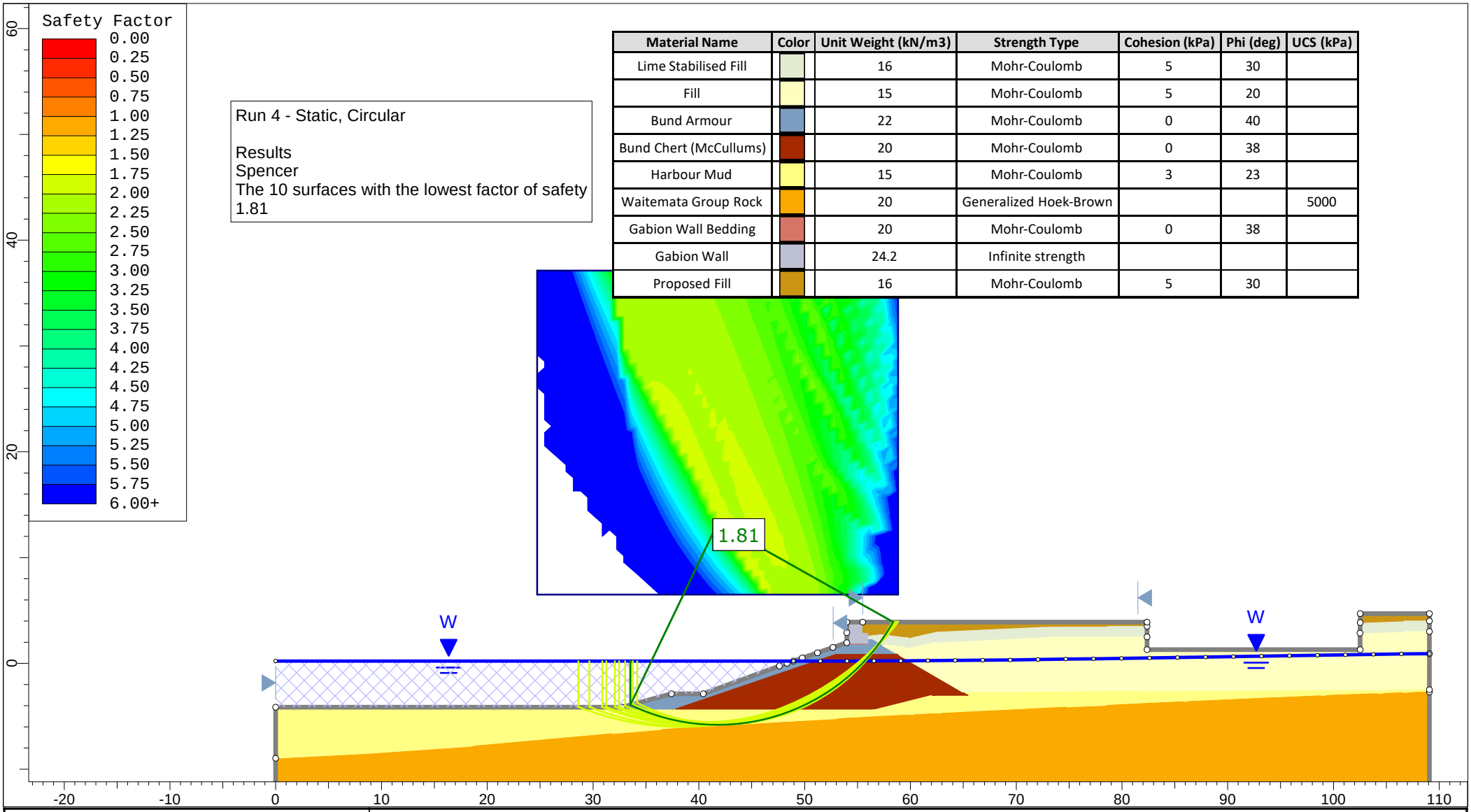
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static - Existing Profile | Scenario | Run 3 - Static, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Mohr-Coulomb | 5 | 30 | |
| Fill | | 15 | Mohr-Coulomb | 5 | 20 | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Mohr-Coulomb | 3 | 23 | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Mohr-Coulomb | 5 | 30 | |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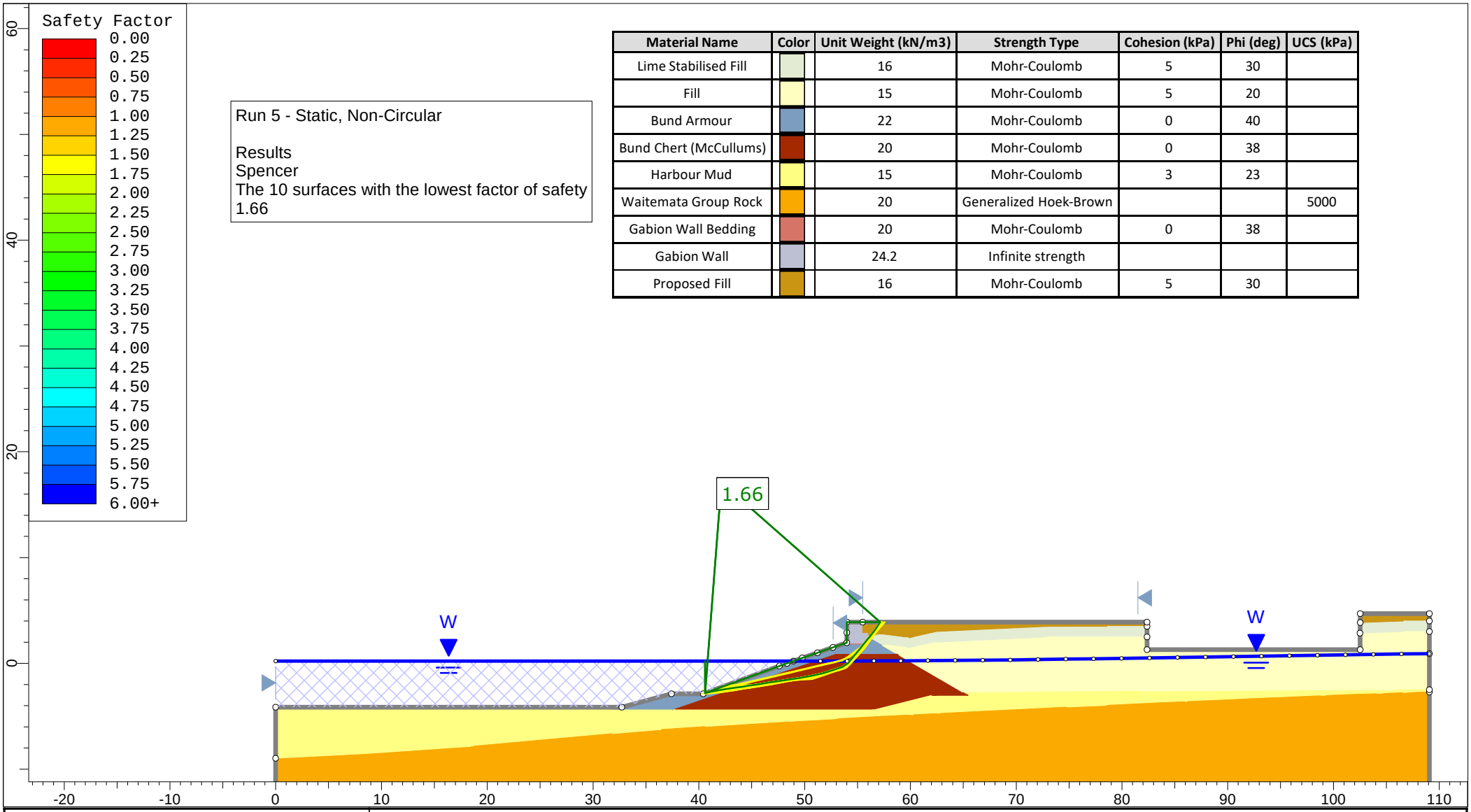
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 4 - Static, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Static Scenarios.slmd |




Run 5 - Static, Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.66

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Mohr-Coulomb | 5 | 30 | |
| Fill | | 15 | Mohr-Coulomb | 5 | 20 | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Mohr-Coulomb | 3 | 23 | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Mohr-Coulomb | 5 | 30 | |

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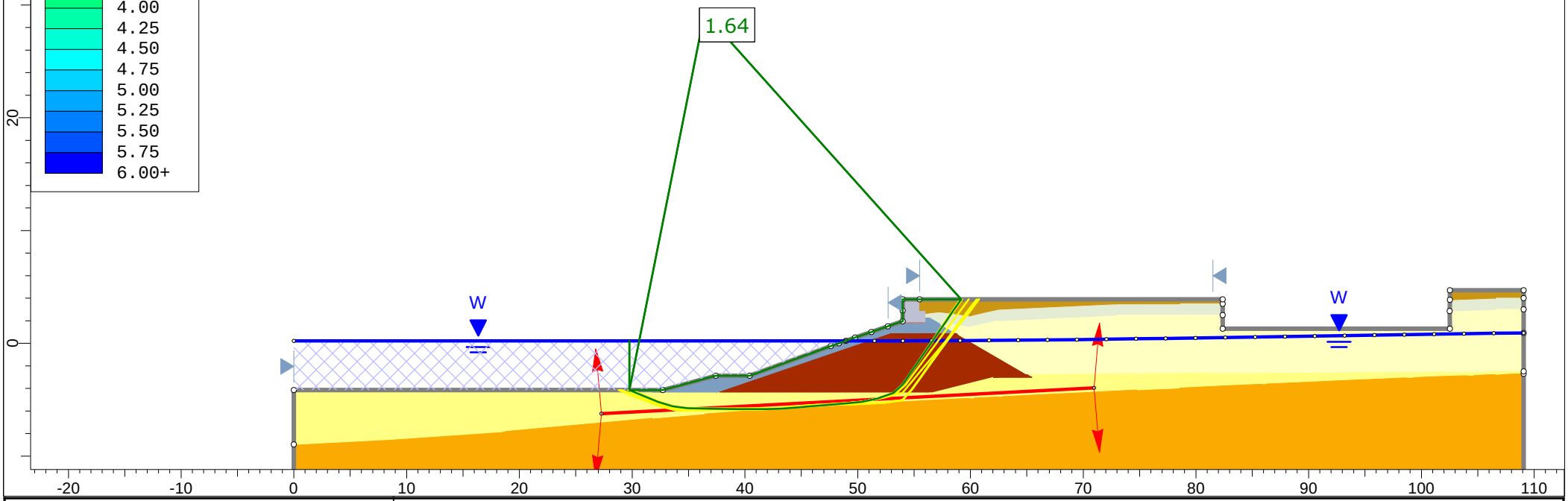
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 5 - Static, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Static Scenarios.slmd |

Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+

Run 6 - Static, Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.64

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Mohr-Coulomb | 5 | 30 | |
| Fill | | 15 | Mohr-Coulomb | 5 | 20 | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Mohr-Coulomb | 3 | 23 | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Mohr-Coulomb | 5 | 30 | |

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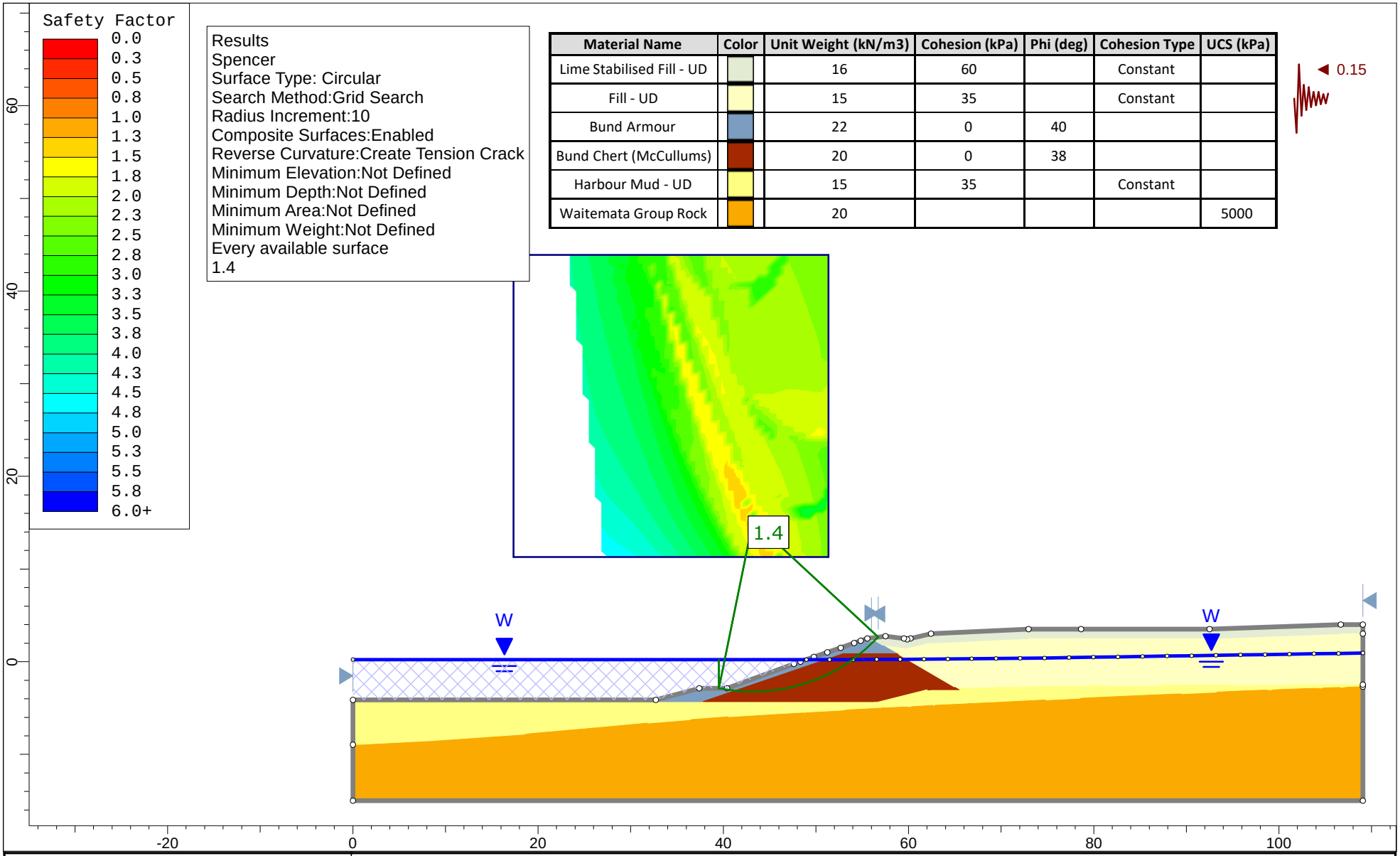
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 6 - Static, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Static Scenarios.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |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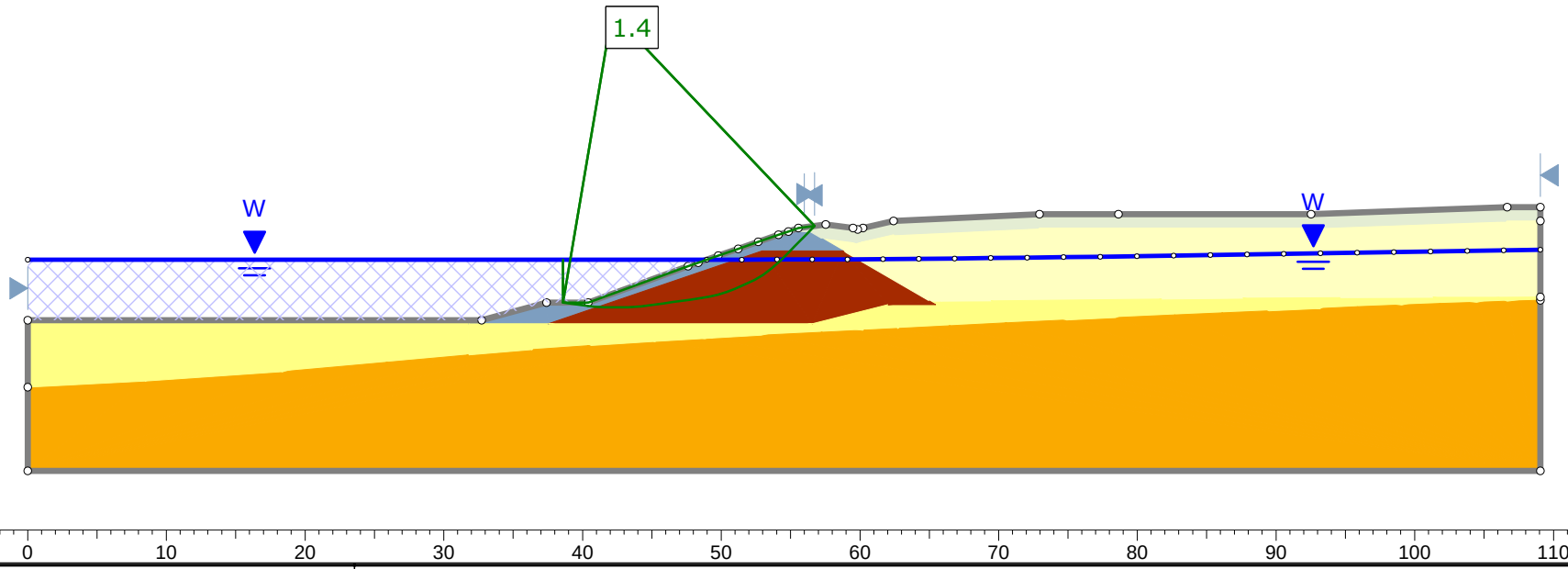
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seismic (NZGS Guidance Module 1) - Ex. Profile | Scenario | Run 7 - Seismic 1, Circ |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 2.slmd |

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

◄ 0.15

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.4

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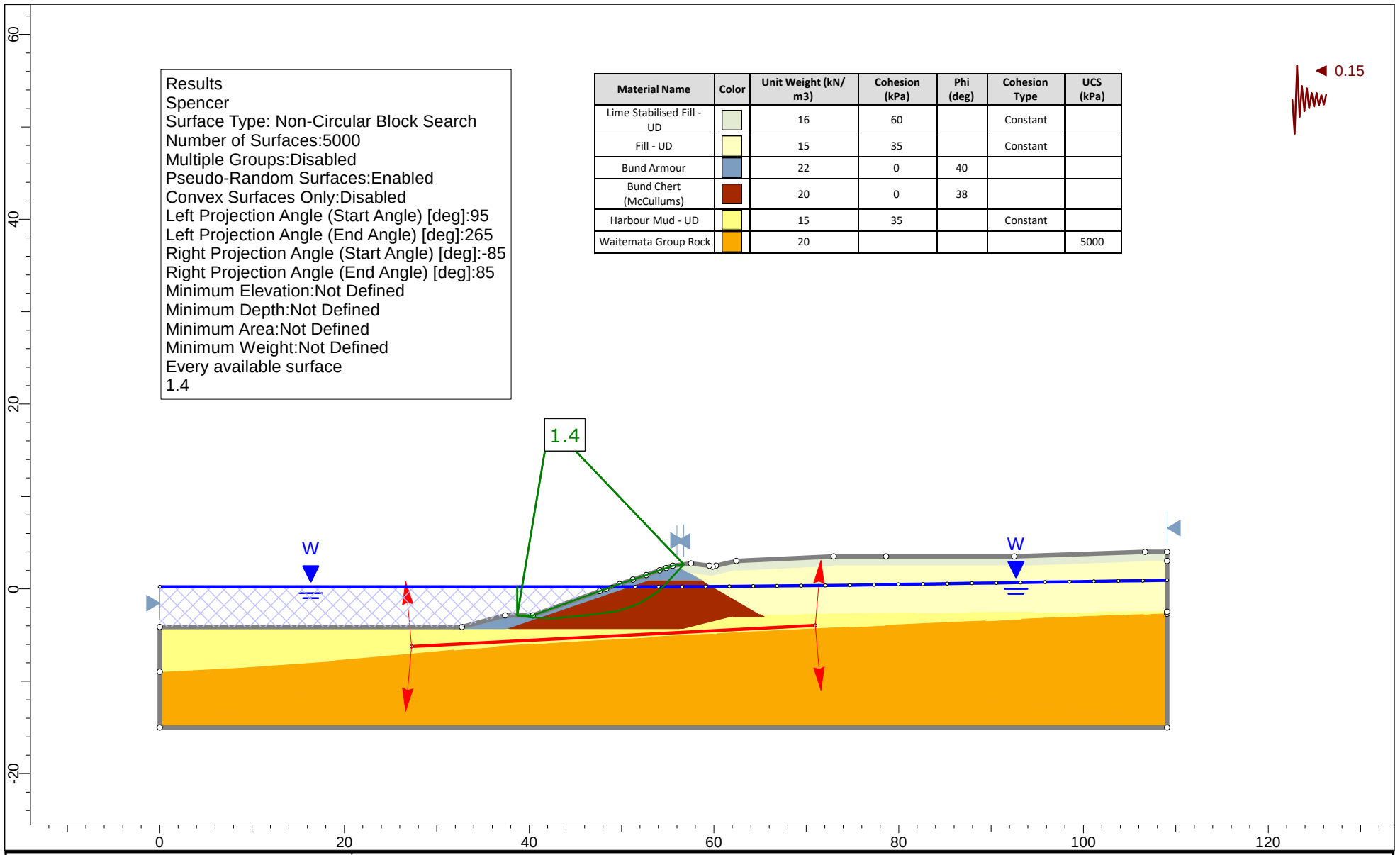
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seismic (NZGS Guidance Module 1) - Ex. Profile | Scenario | Run 8 - Seismic 1, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 2.slmd |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.4

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

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| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seismic (NZGS Guidance Module 1) - Ex. Profile | Scenario | Run 9 - Seismic 1, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 2.slmd |

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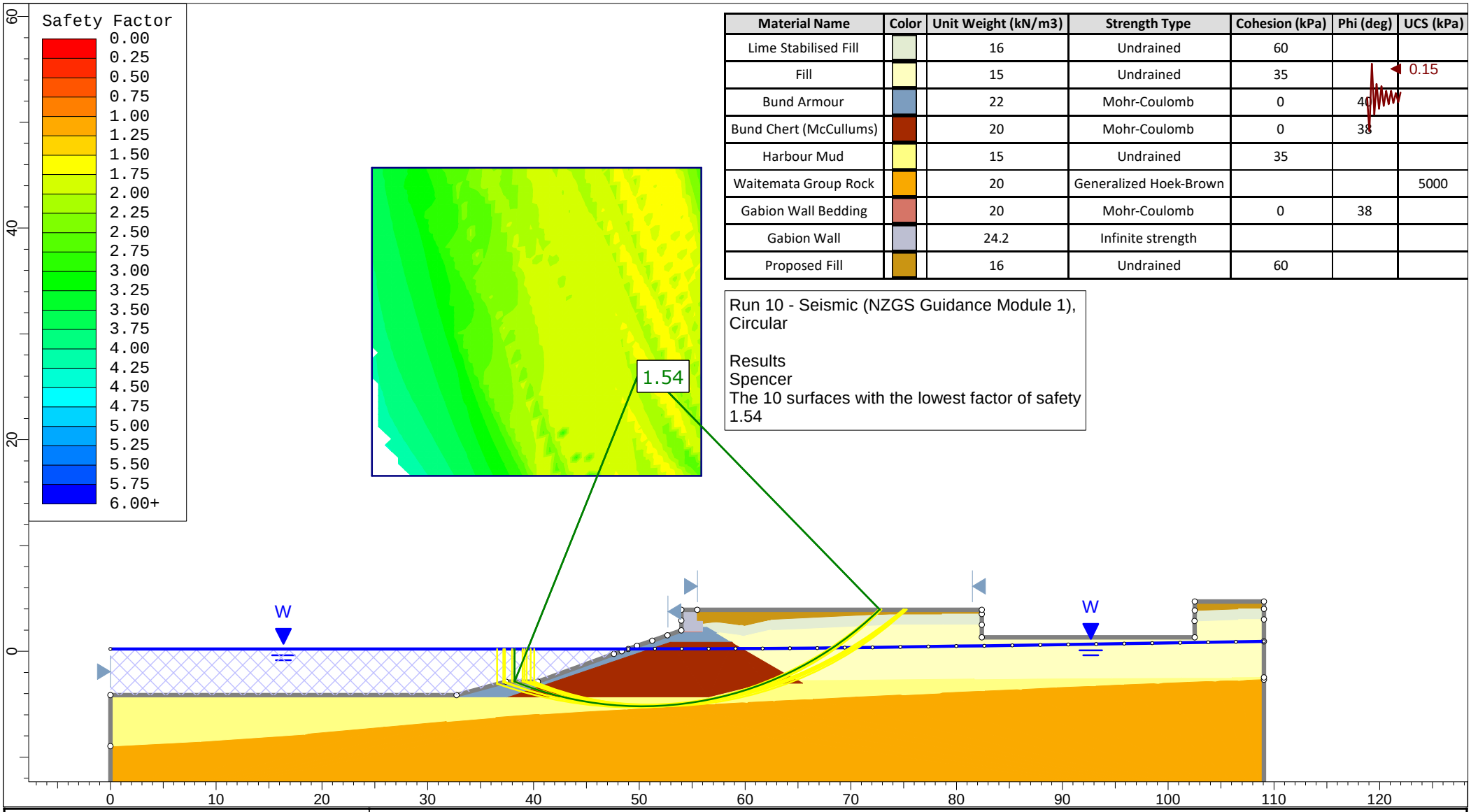


| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 10 - Seismic (NZGS Guidance Module 1), Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.54

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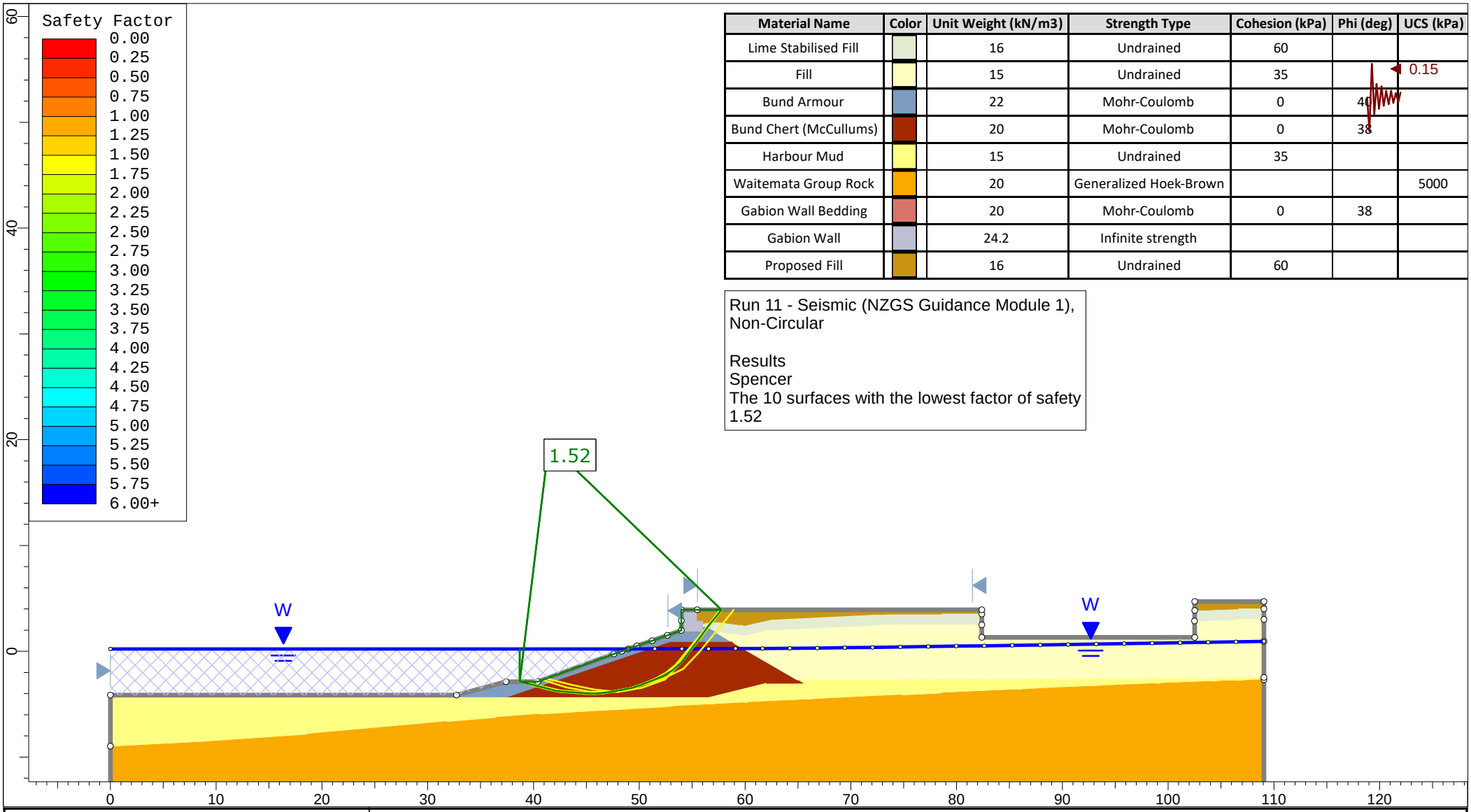
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 10 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 11 - Seismic (NZGS Guidance Module 1), Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.52

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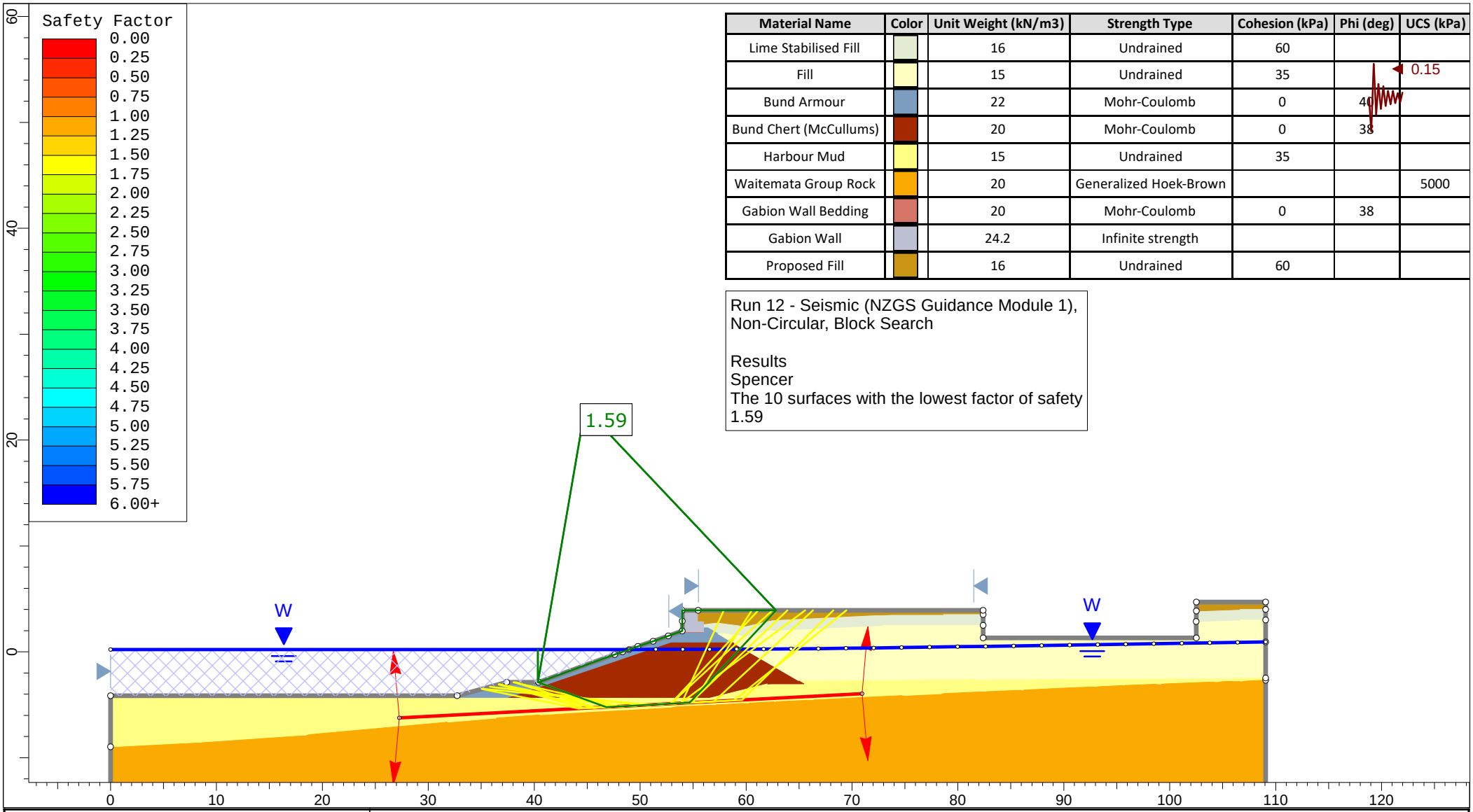
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 11 - Seismic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 12 - Seismic (NZGS Guidance Module 1), Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.59

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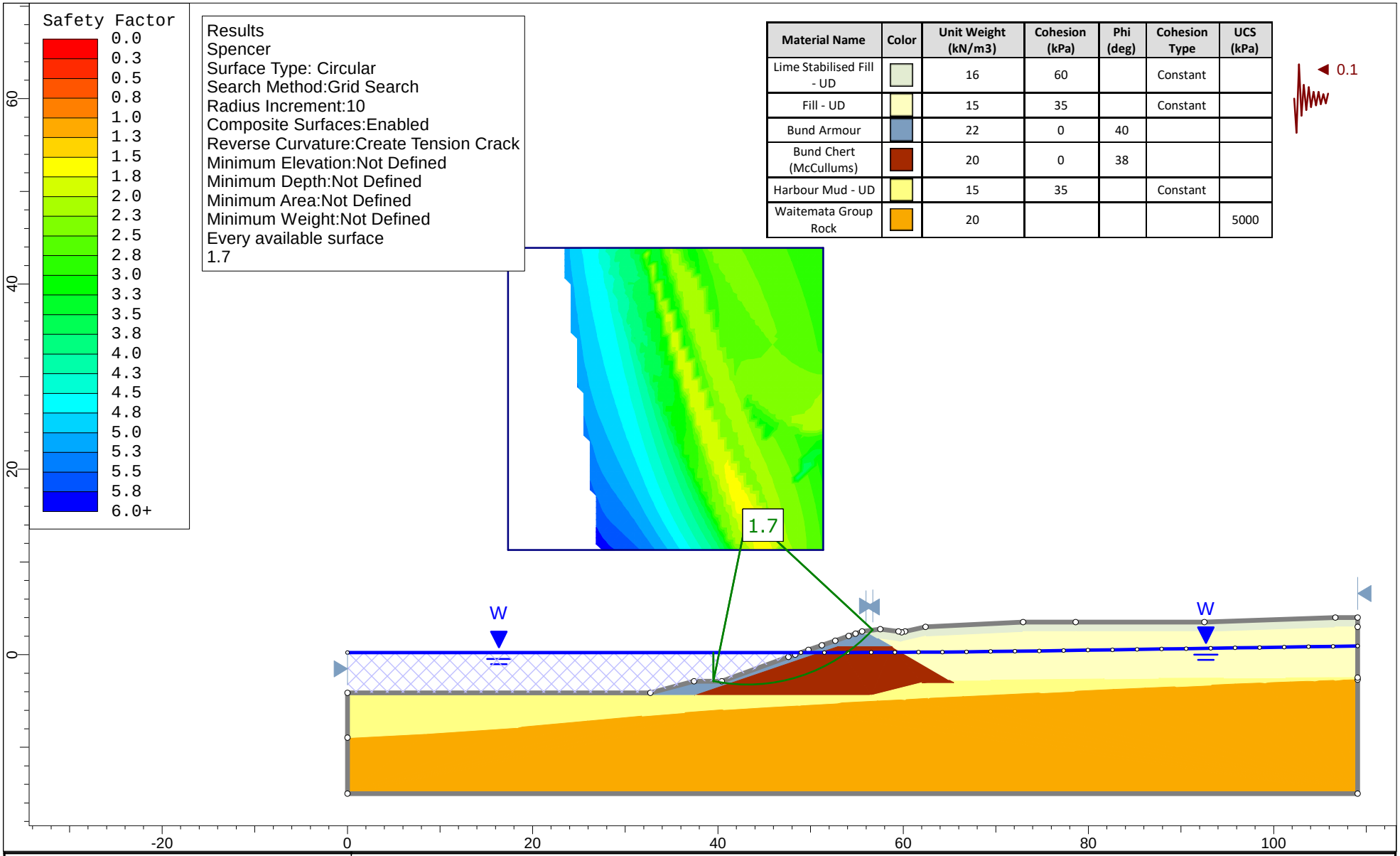
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 12 - Seismic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |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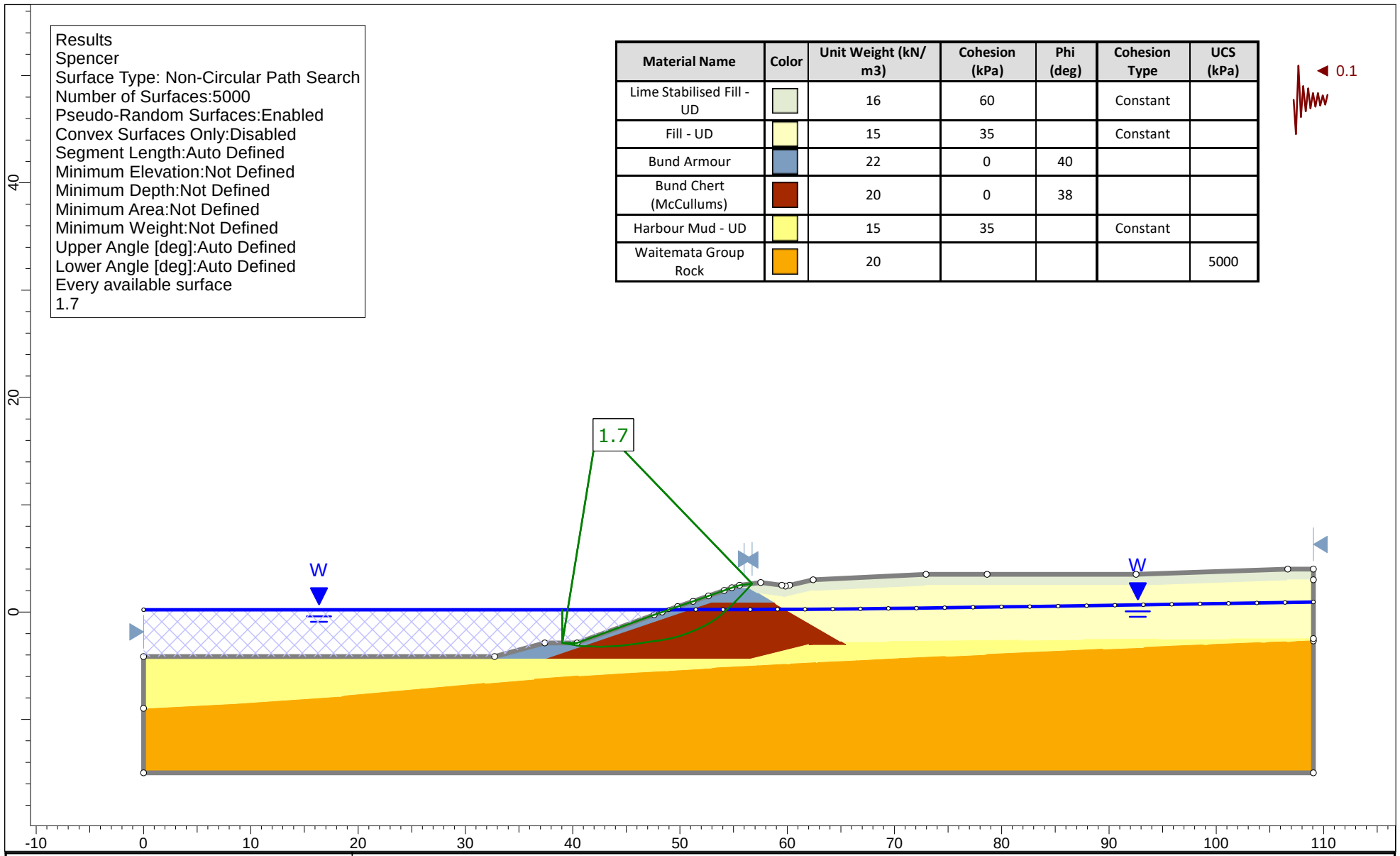
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Seimsic (ACCOP LDS) - Ex. Profile | *Scenario* | Run 13 - Seismic 2, Circ |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section A 3.slmd |

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.7

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

◄ 0.1

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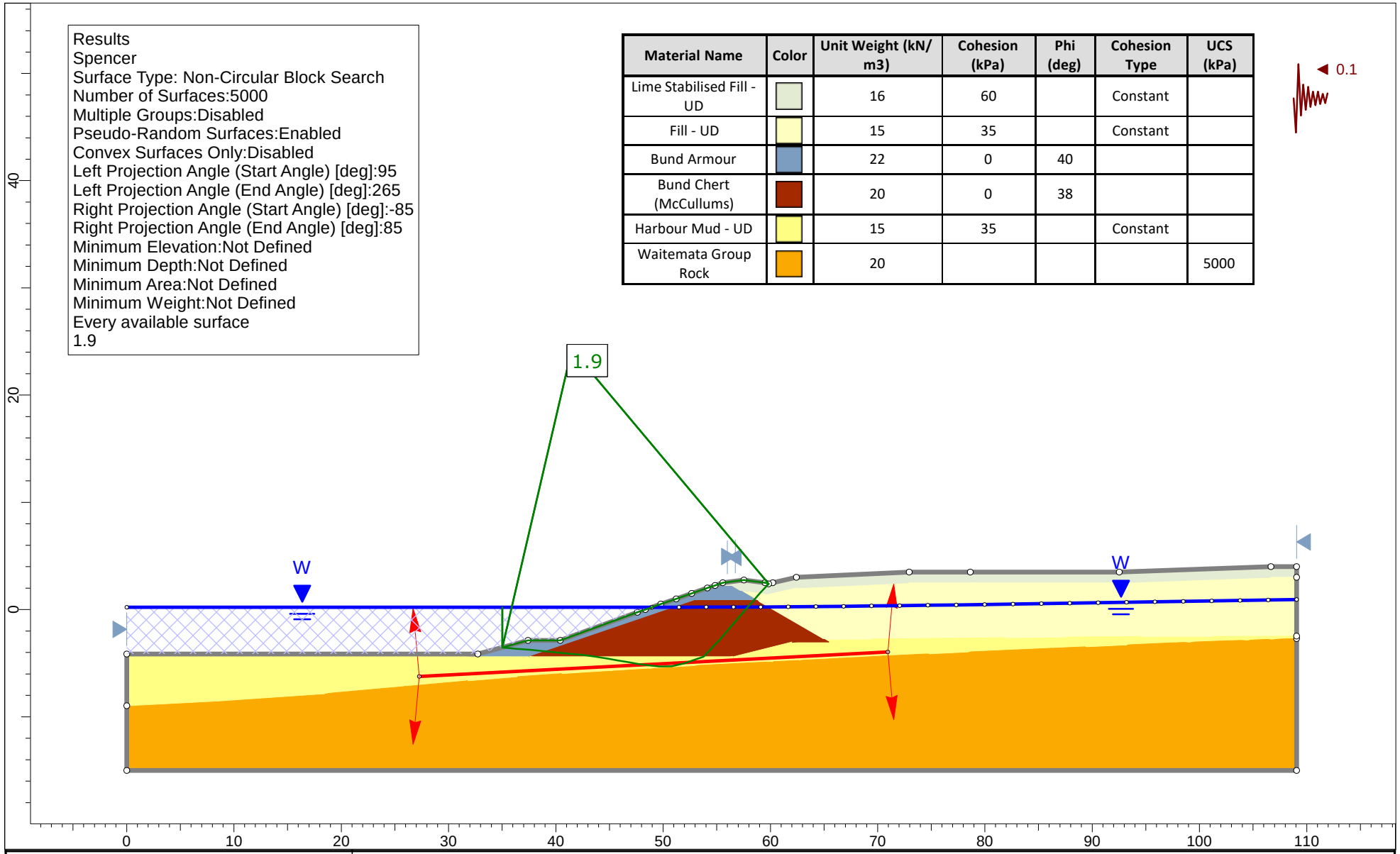
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 14 - Seismic 2, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 3.slmd |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.9

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

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| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 15 - Seismic 2, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 3.slmd |

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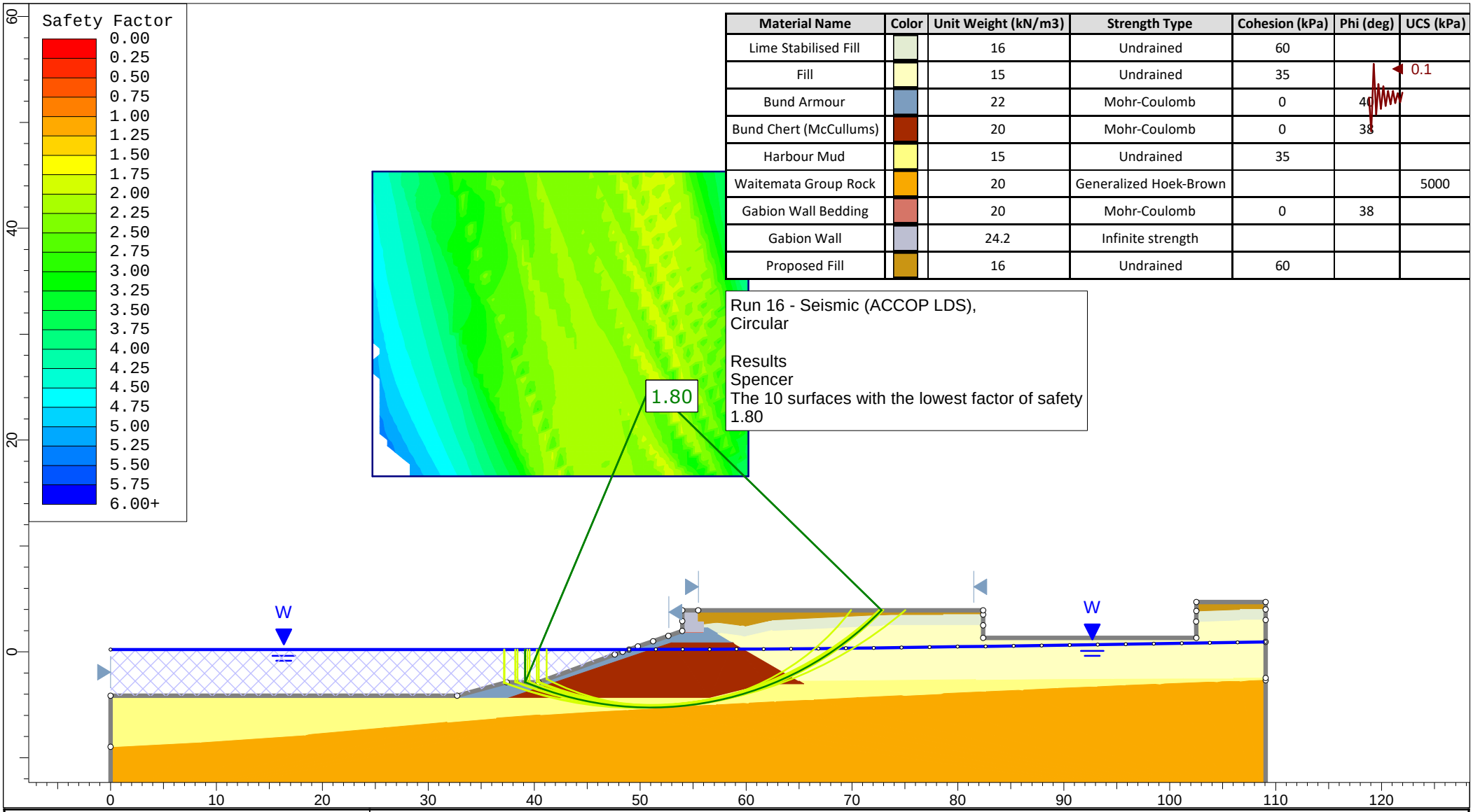


| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.1

Run 16 - Seismic (ACCOP LDS),
Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.80

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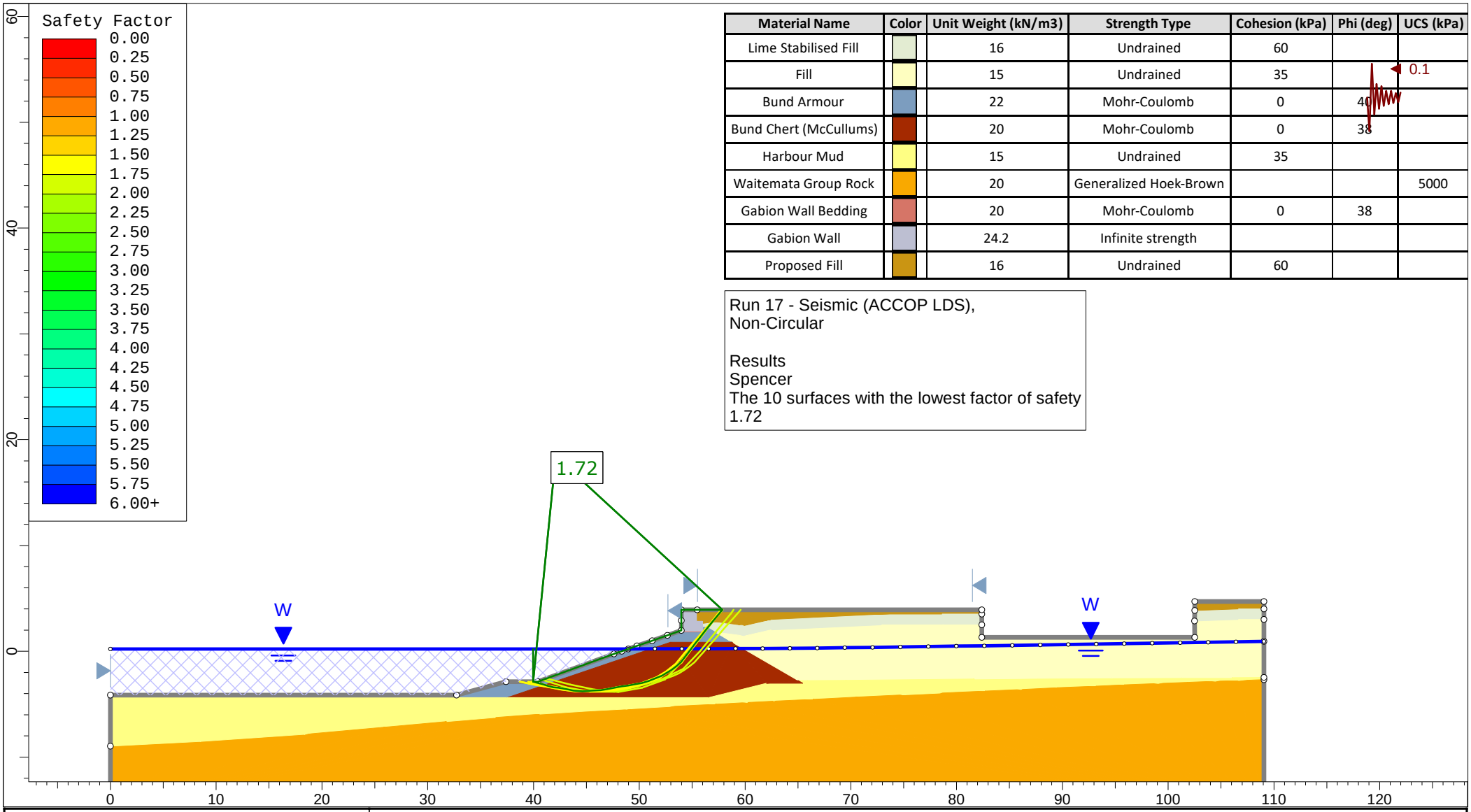
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 16 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

Run 17 - Seismic (ACCOP LDS),
Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.72

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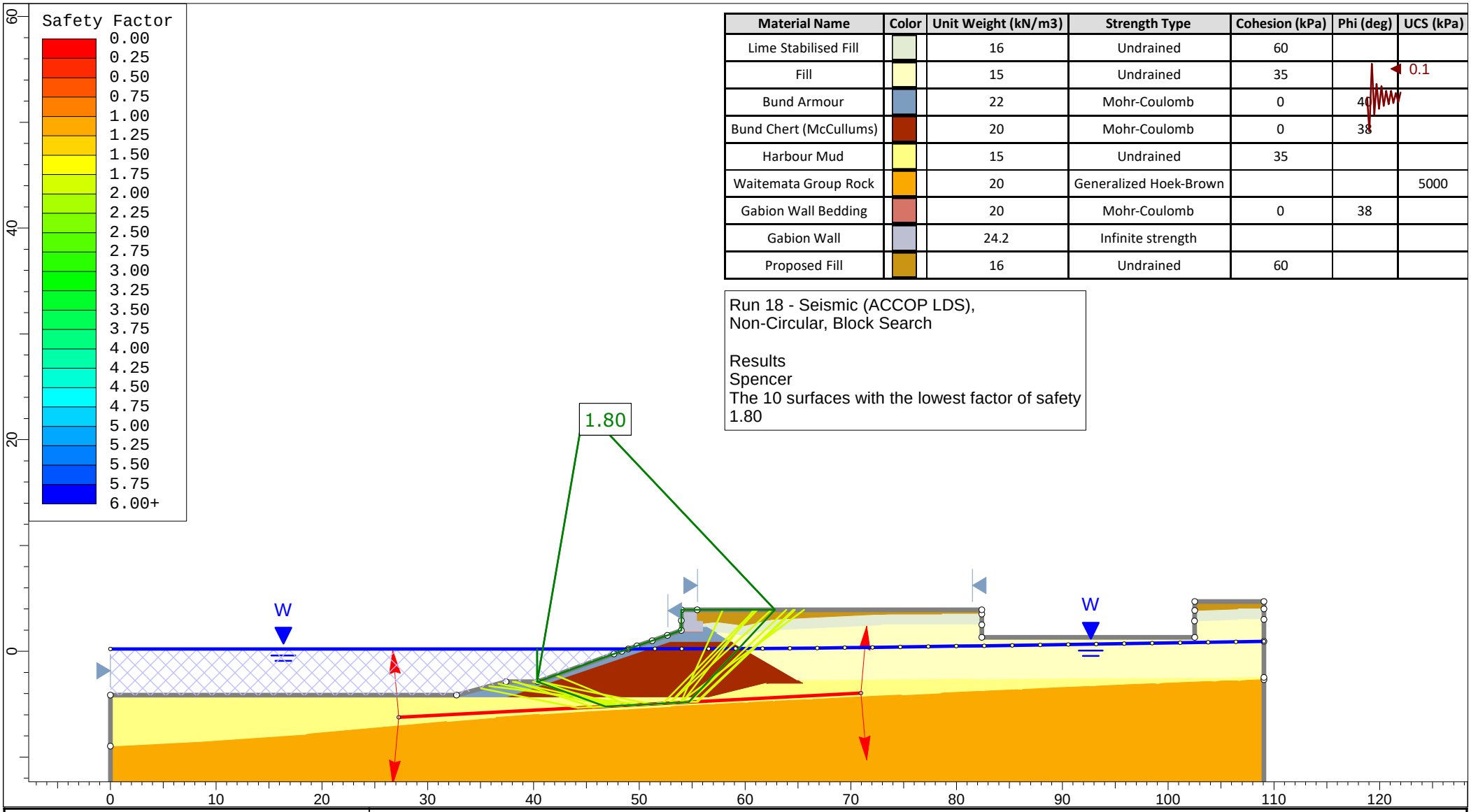
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 17 - Seismic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.1

Run 18 - Seismic (ACCOP LDS),
Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.80

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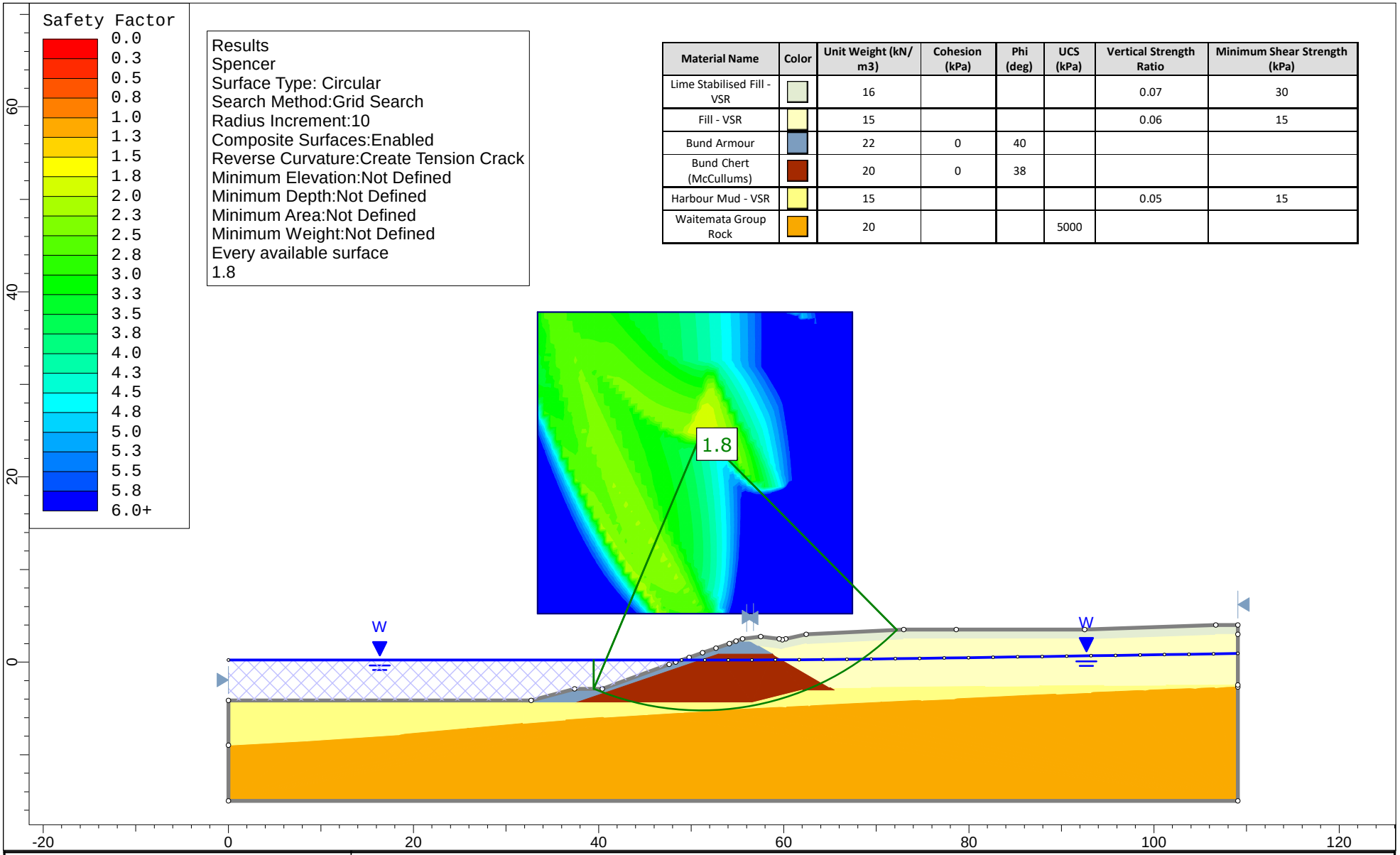
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 18 - Seismic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | | | | 0.07 | 30 |
| Fill - VSR | | 15 | | | | 0.06 | 15 |
| Bund Armour | | 22 | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | | | | 0.05 | 15 |
| Waitemata Group Rock | | 20 | | | 5000 | | |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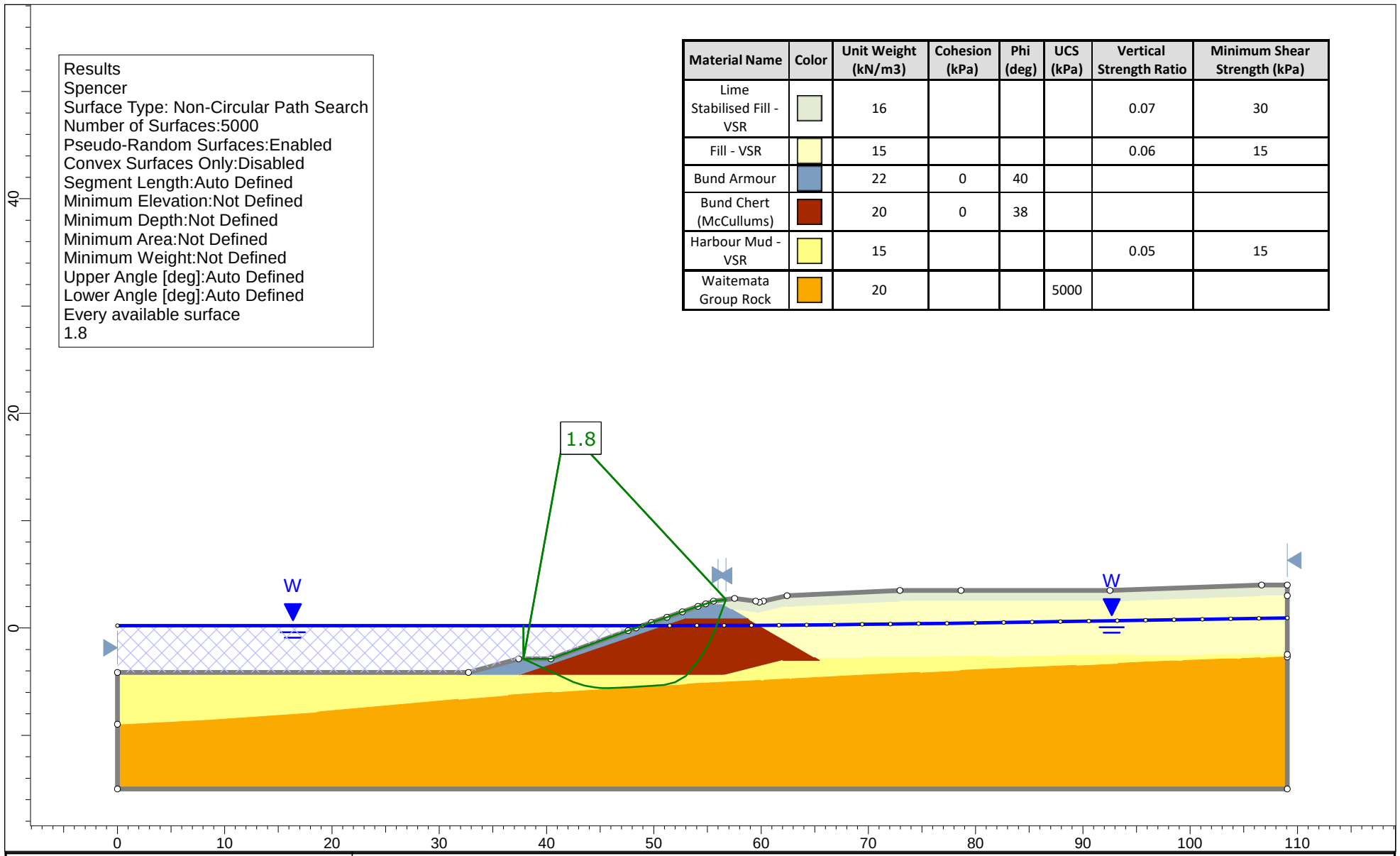
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Static, Seismic Reduced Strengths - Ex. Profile | *Scenario* | Run 19 - Static SR, Circ |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section A 4.slmd |

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.8

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | | | | 0.07 | 30 |
| Fill - VSR | | 15 | | | | 0.06 | 15 |
| Bund Armour | | 22 | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | | | | 0.05 | 15 |
| Waitemata Group Rock | | 20 | | | 5000 | | |

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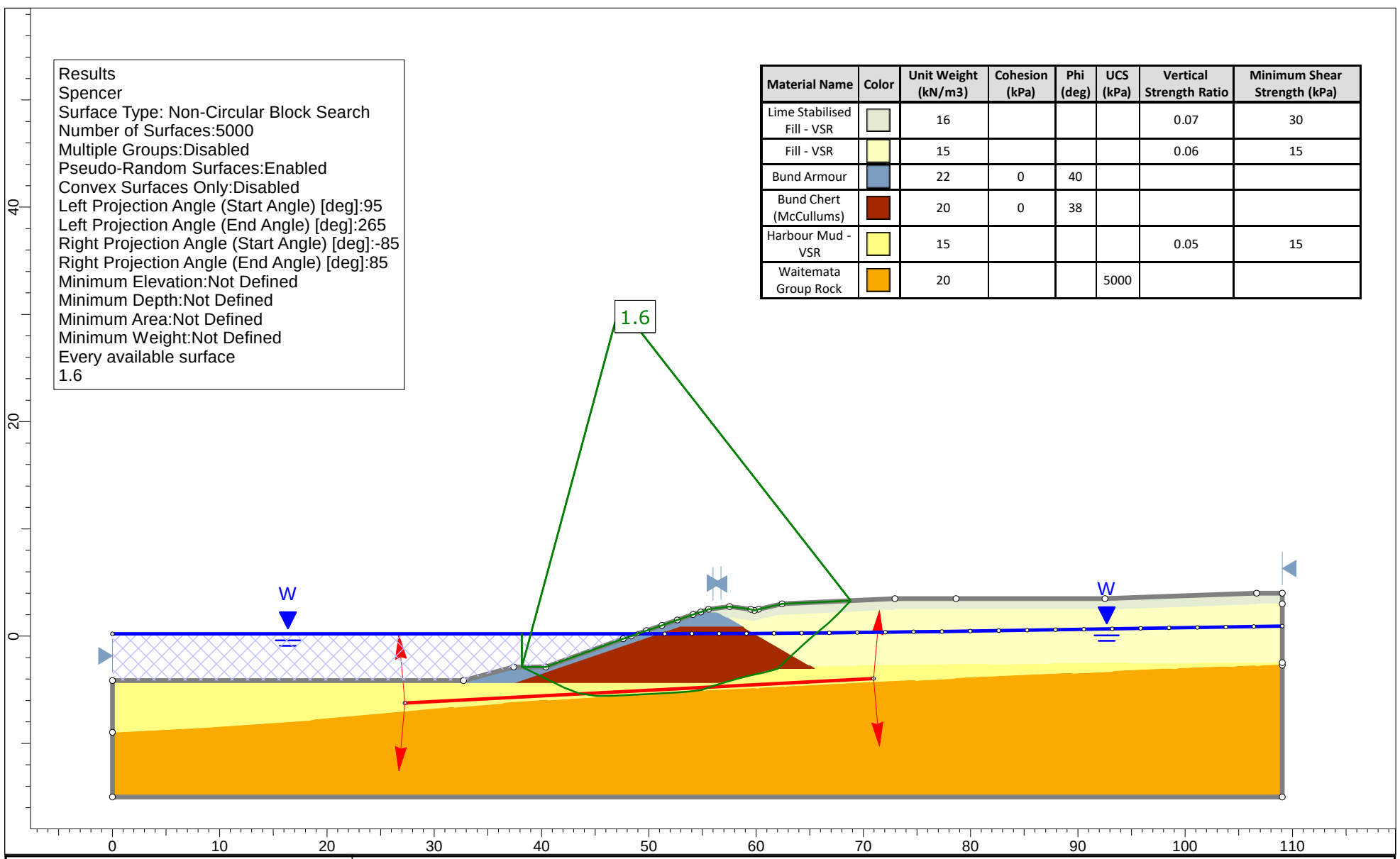
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static, Seismic Reduced Strengths - Ex. Profile | Scenario | Run 20 - Static SR, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 4.slmd |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.6

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | | | | 0.07 | 30 |
| Fill - VSR | | 15 | | | | 0.06 | 15 |
| Bund Armour | | 22 | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | | | | 0.05 | 15 |
| Waitemata Group Rock | | 20 | | | 5000 | | |

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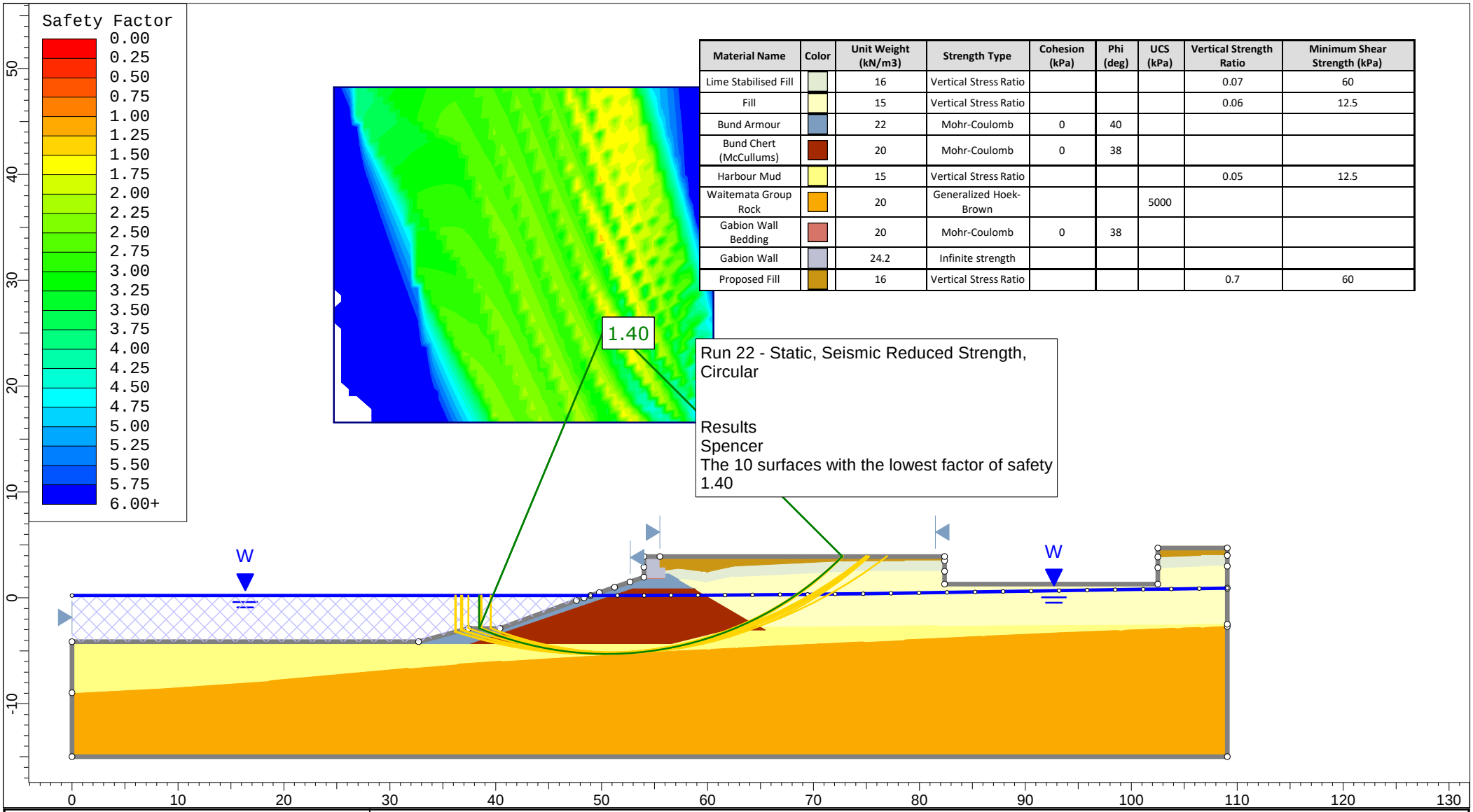
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static, Seismic Reduced Strengths - Ex. Profile | Scenario | Run 21 - Static SR, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section A 4.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

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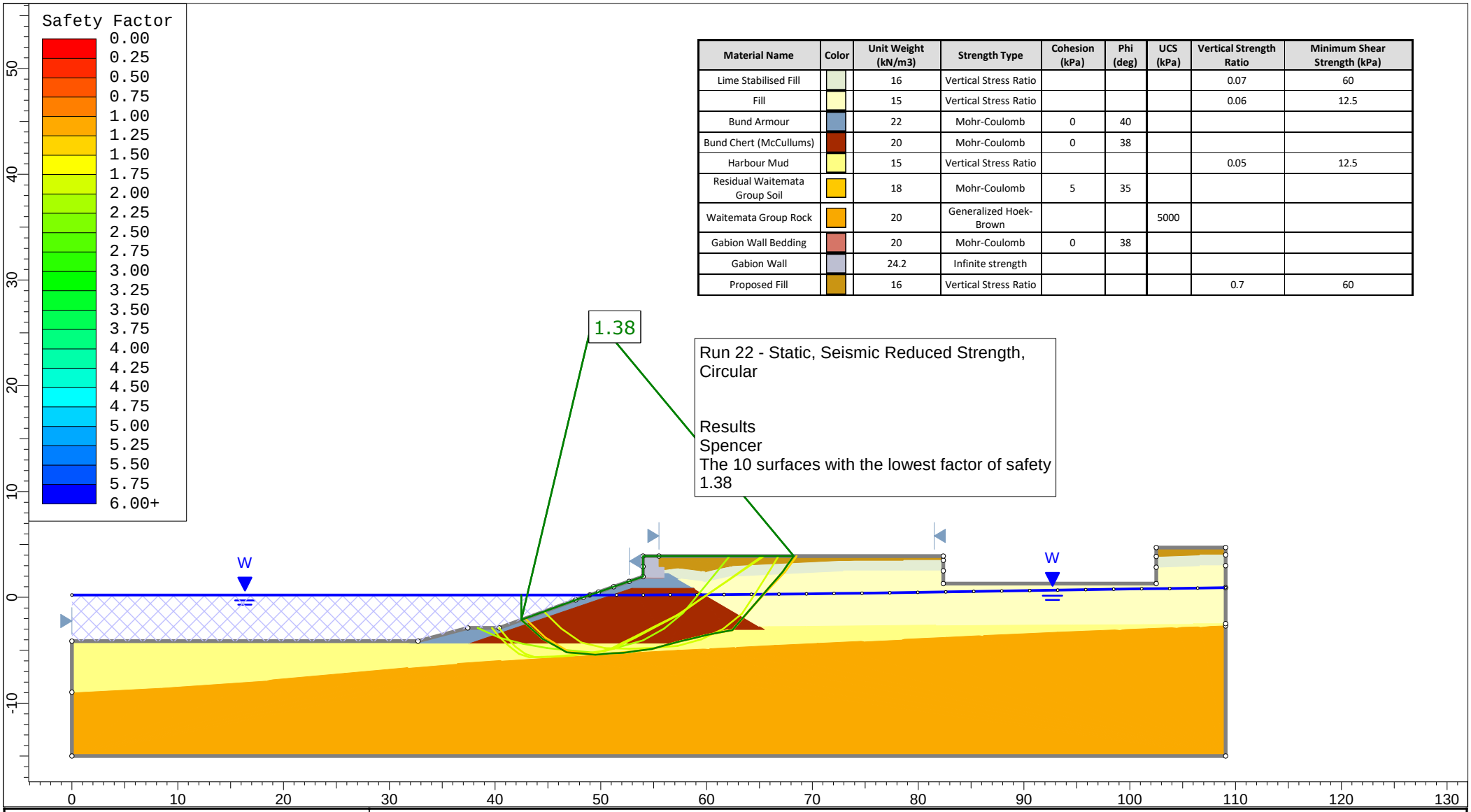
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 22 - Static, Seismic Reduced, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

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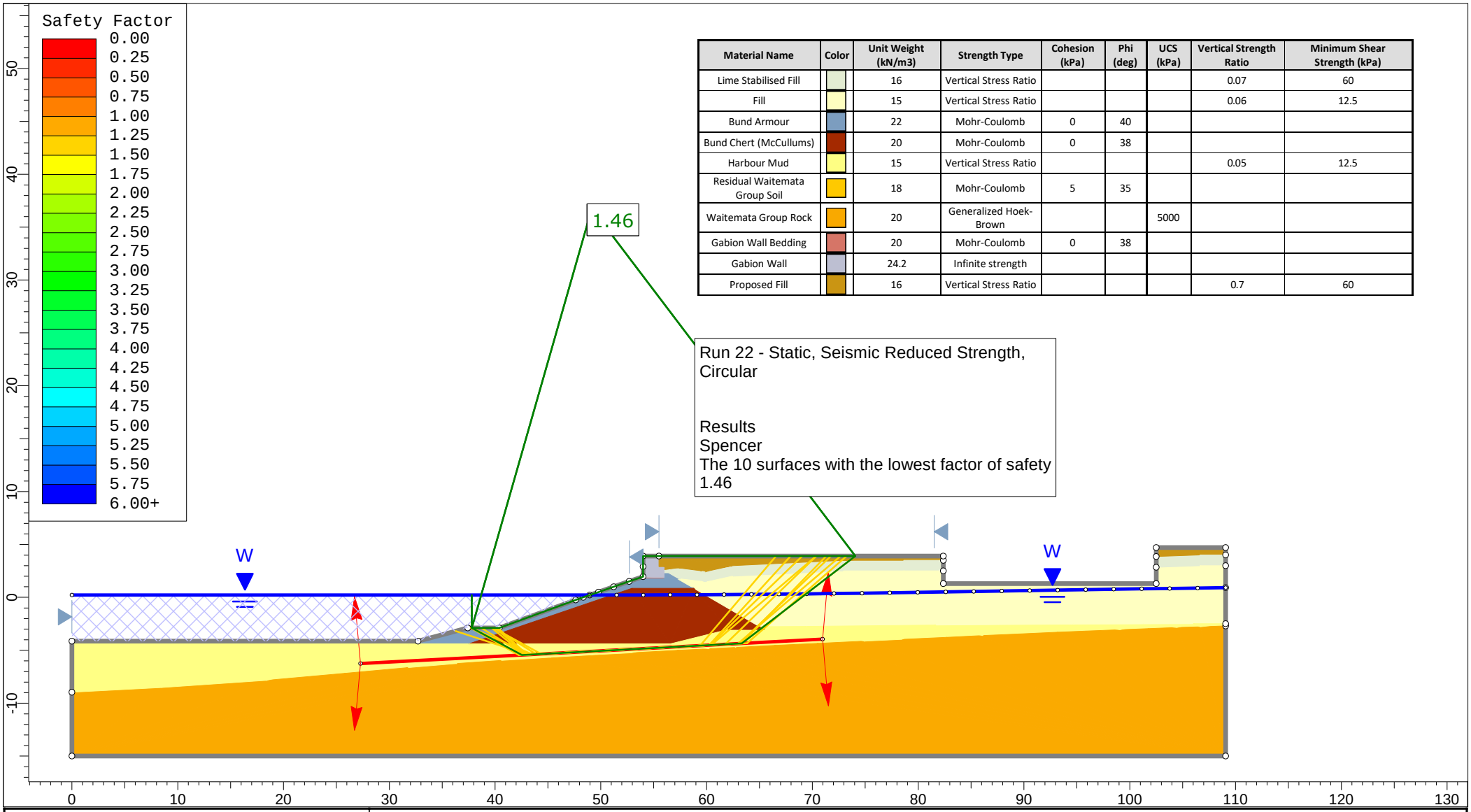
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 23 - Static, Seismic Reduced, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

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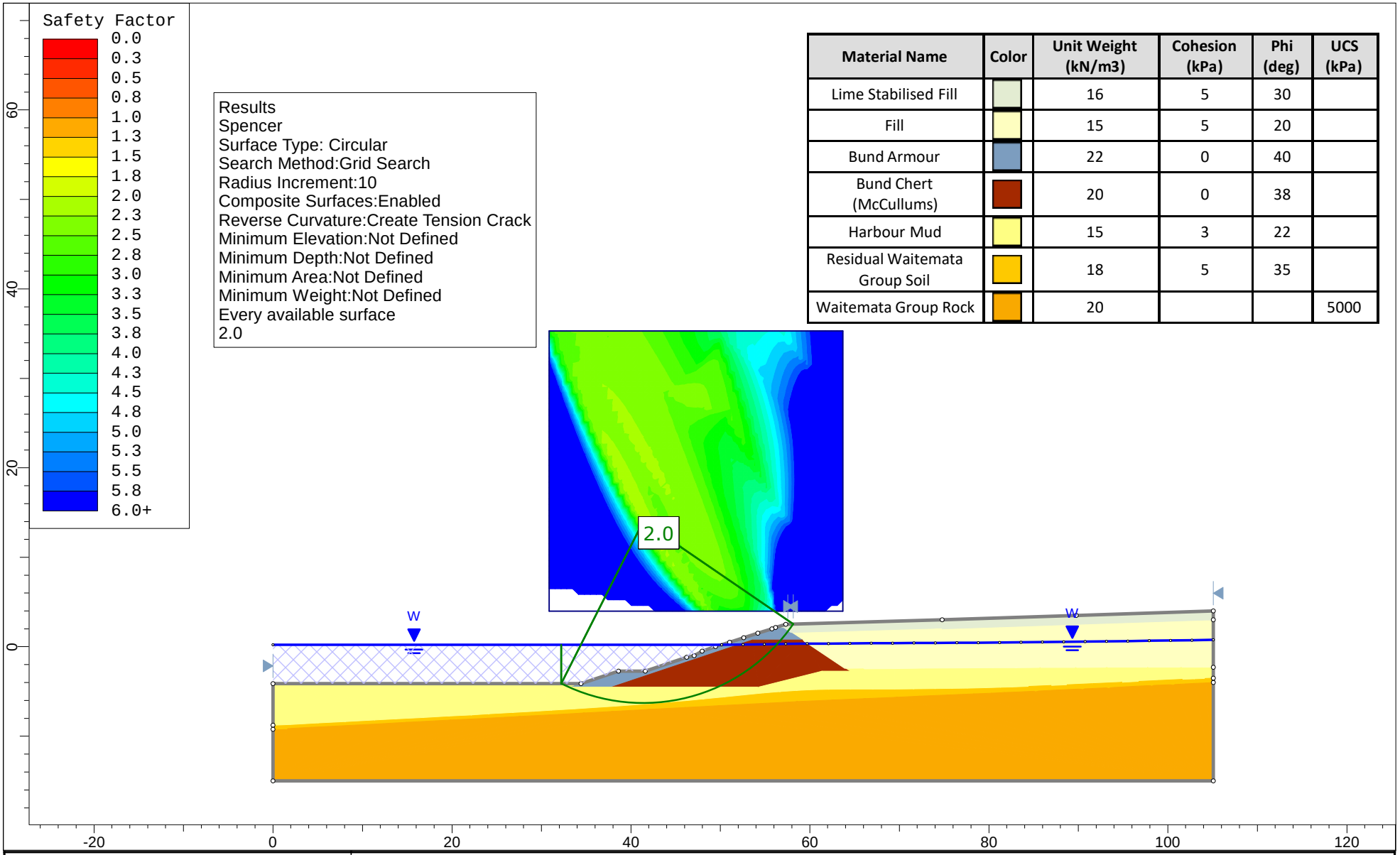
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Section A, Static | Scenario | Run 24 - Static, Seismic Reduced, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section A Proposed - Seismic Scenarios 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | |
| Waitemata Group Rock | | 20 | | | 5000 |

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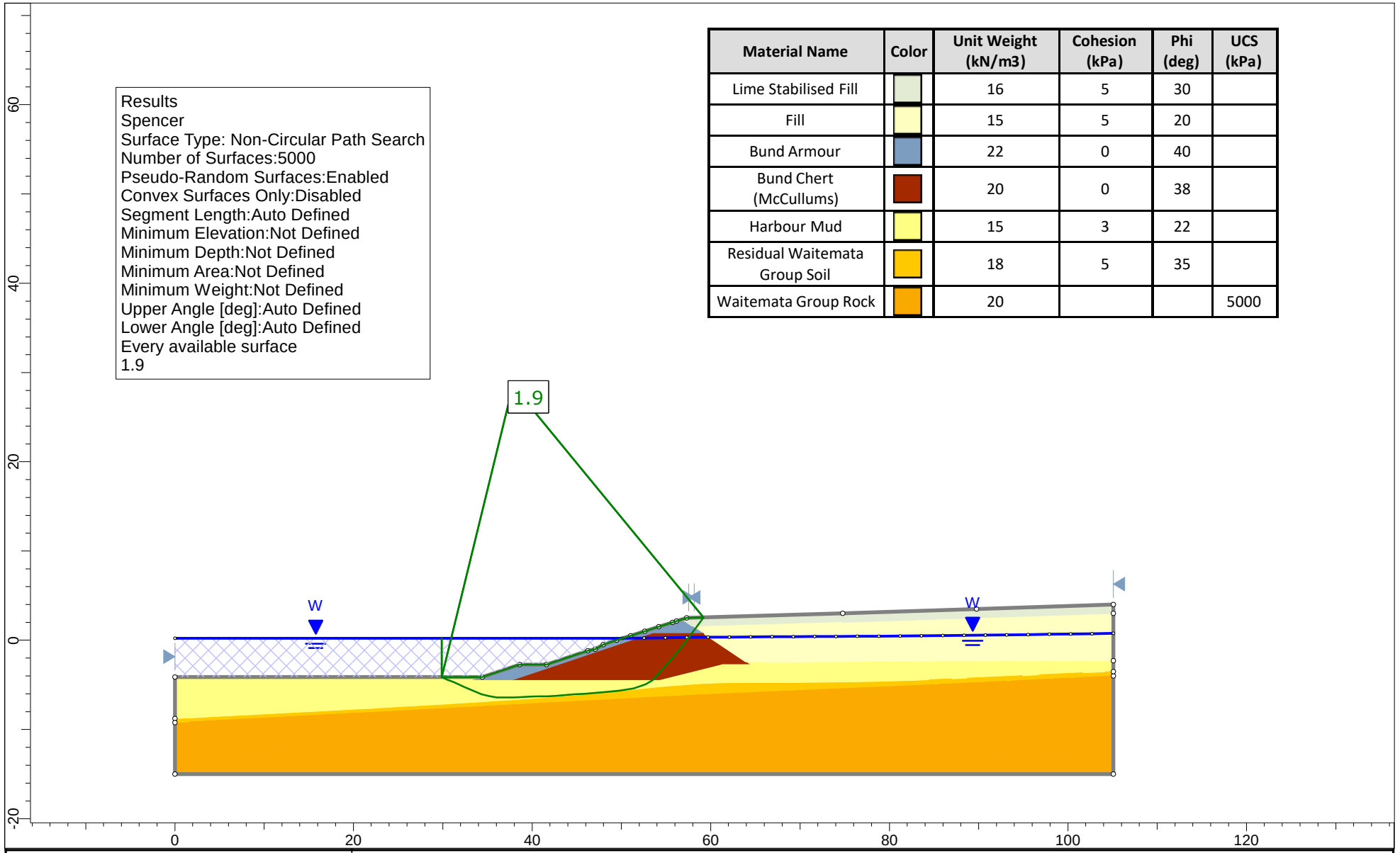
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static - Existing Profile | Scenario | Run 1 - Static, Circ |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 1.slmd |

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | |
| Waitemata Group Rock | | 20 | | | 5000 |

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.9

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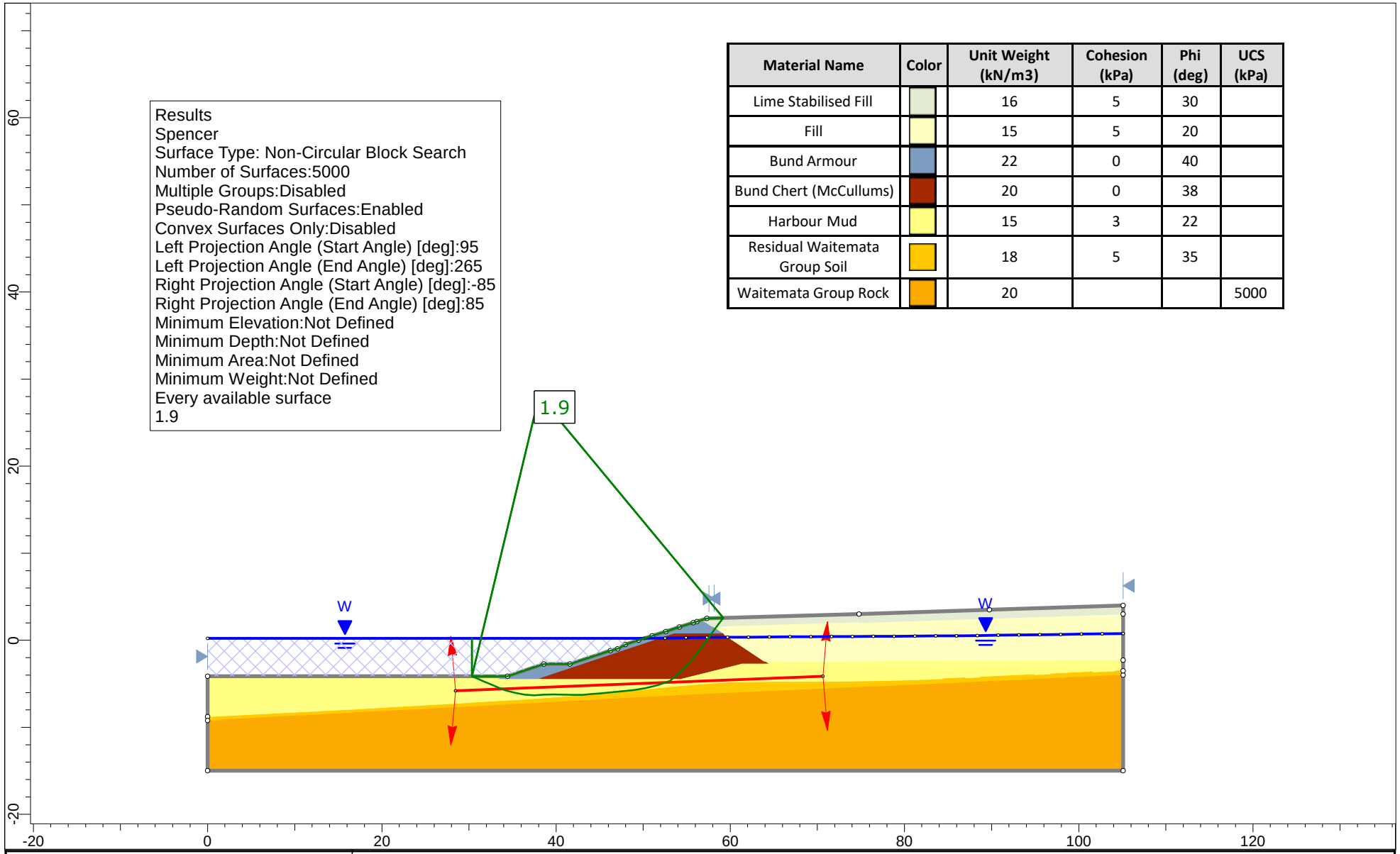
SLIDEINTERPRET 9.008

| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static - Existing Profile | Scenario | Run 2 - Static, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 1.slmd |

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | |
| Waitemata Group Rock | | 20 | | | 5000 |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.9

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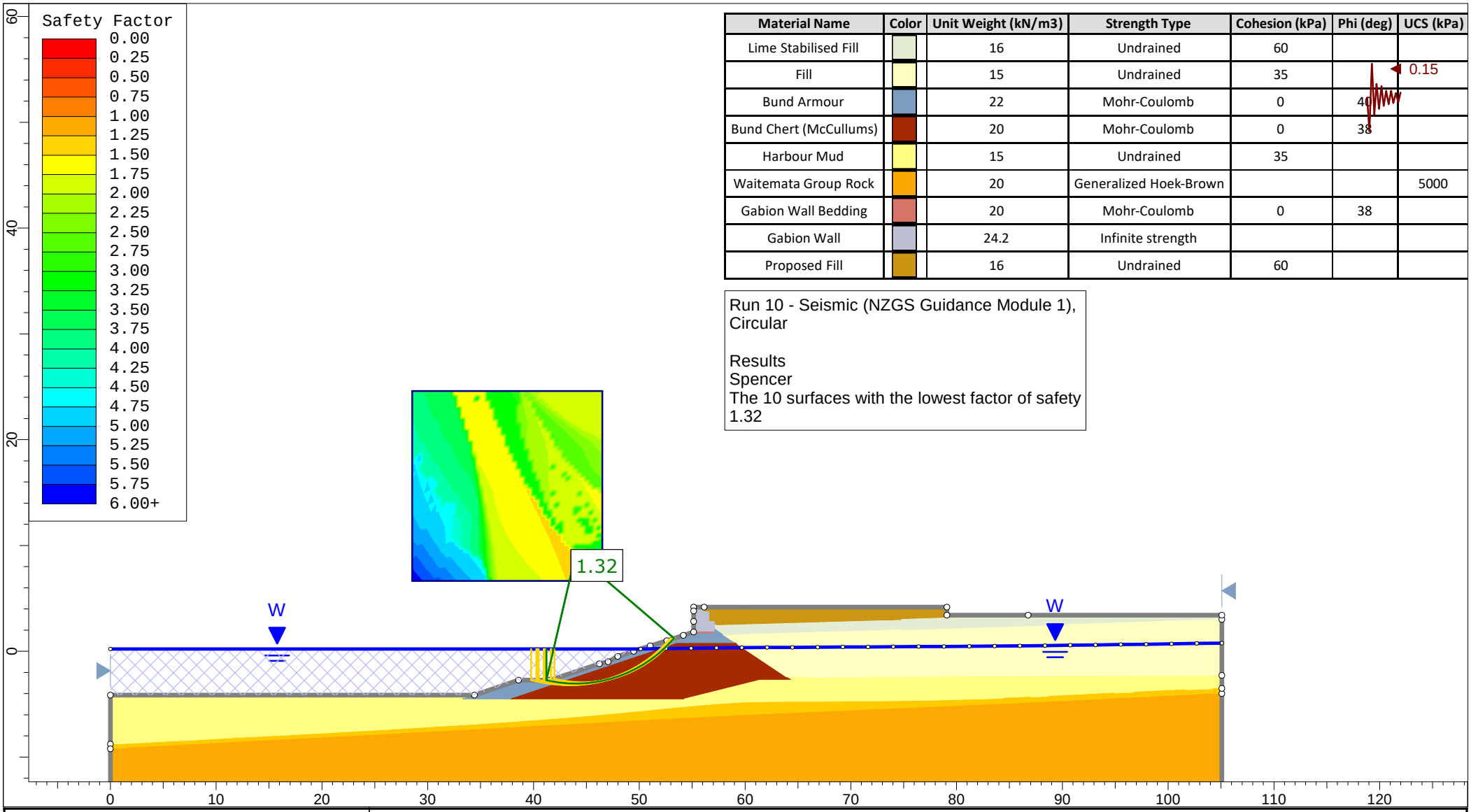
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static - Existing Profile | Scenario | Run 3 - Static, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 10 - Seismic (NZGS Guidance Module 1), Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.32

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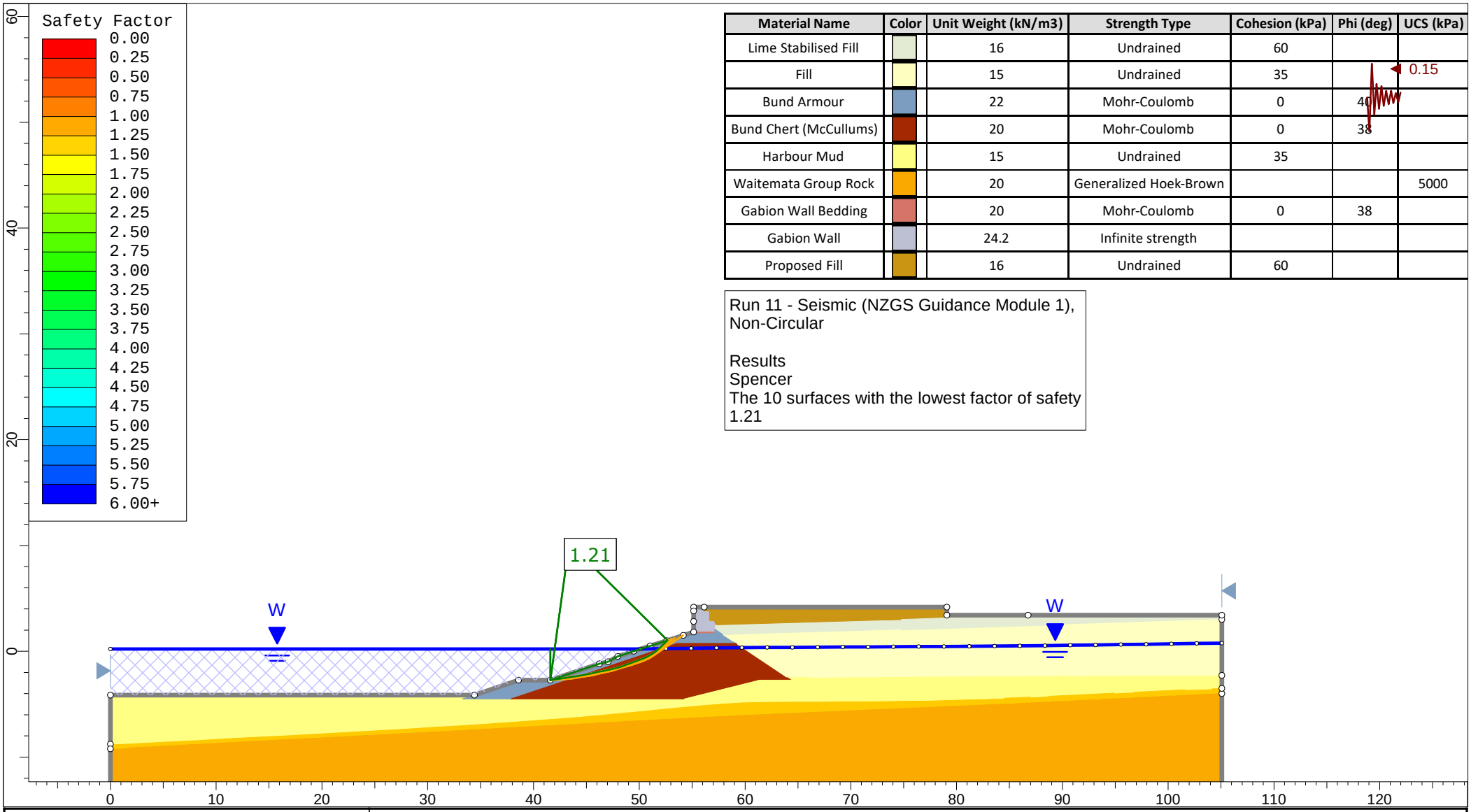
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 10 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 11 - Seismic (NZGS Guidance Module 1), Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.21

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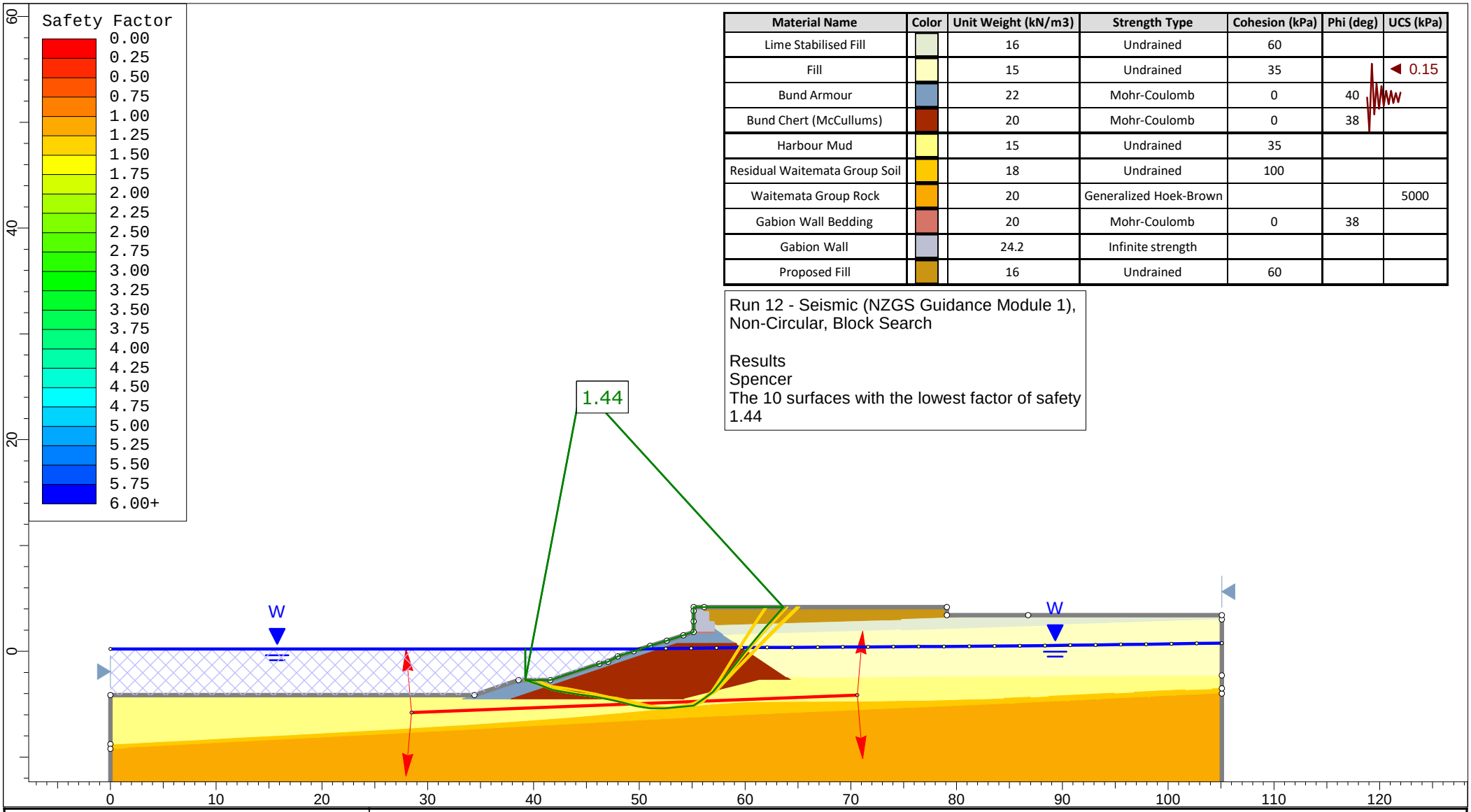
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 11 - Seismic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | ◀ 0.15 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Residual Waitemata Group Soil | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

Run 12 - Seismic (NZGS Guidance Module 1), Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.44

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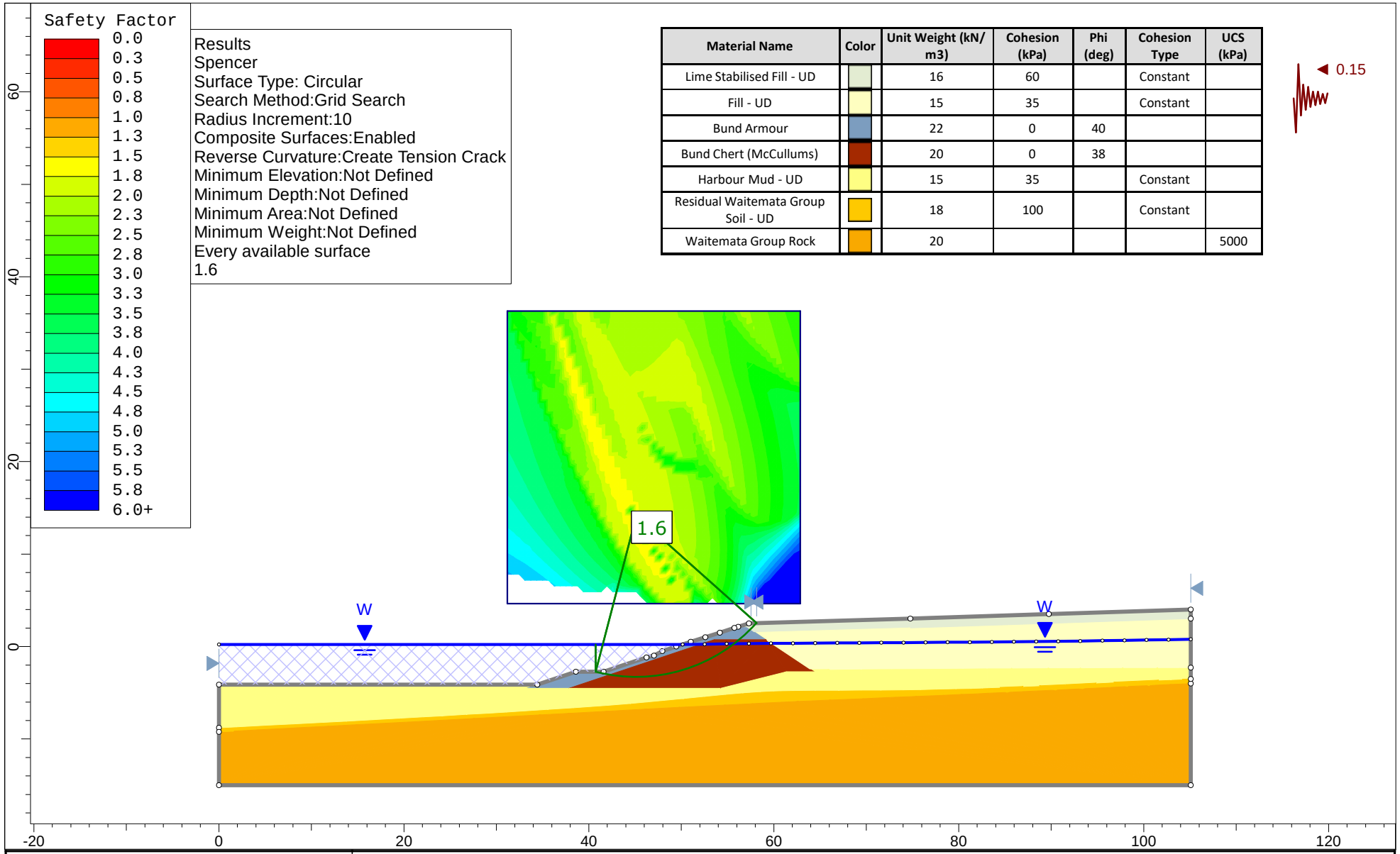
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 12 - Seismic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Residual Waitemata Group Soil - UD | | 18 | 100 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |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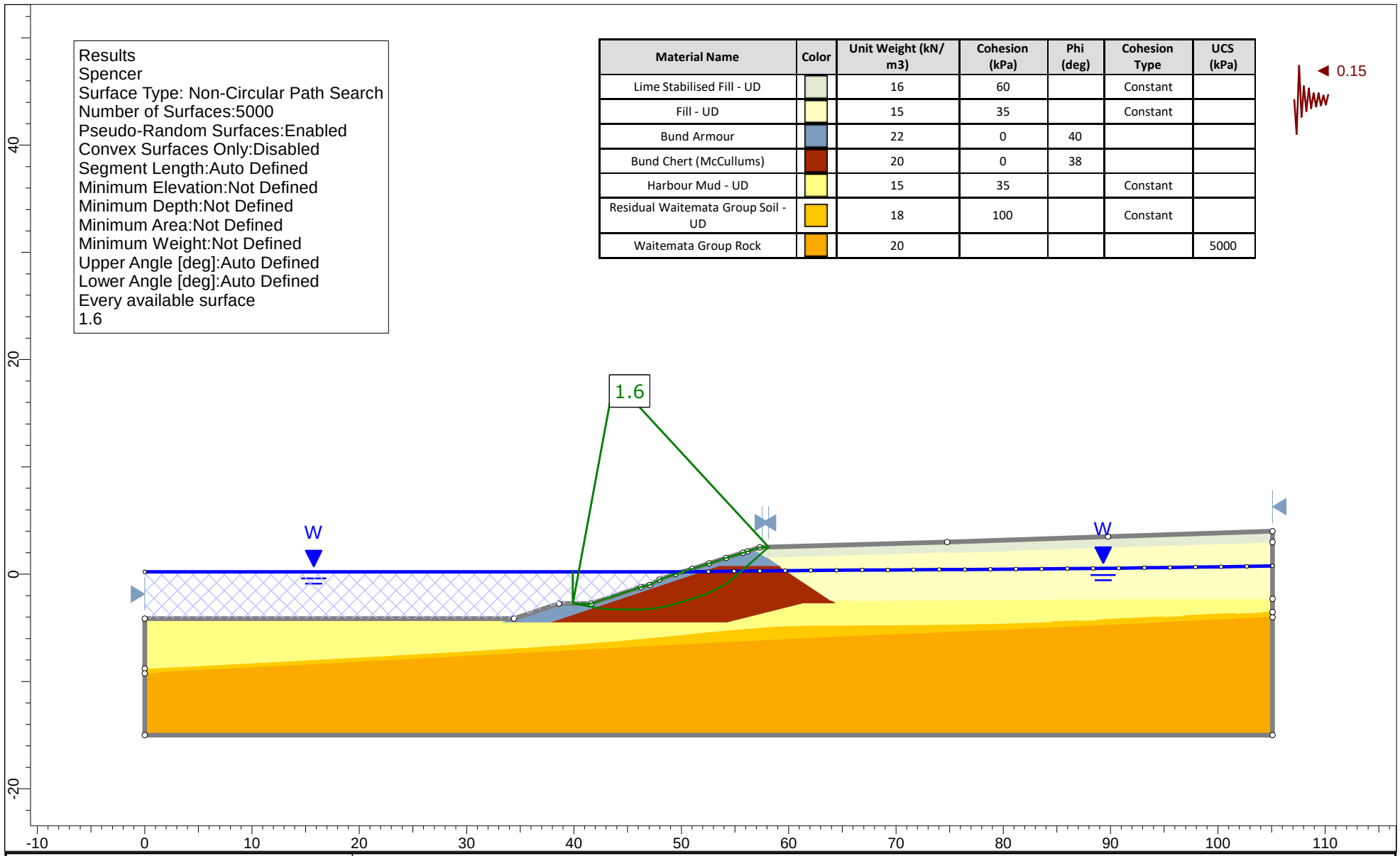
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Seismic (NZGS Guidance Module 1) - Ex. Profile | *Scenario* | Run 7 - Seismic 1, Circ |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section B 2.slmd |

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.6

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Residual Waitemata Group Soil - UD | | 18 | 100 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

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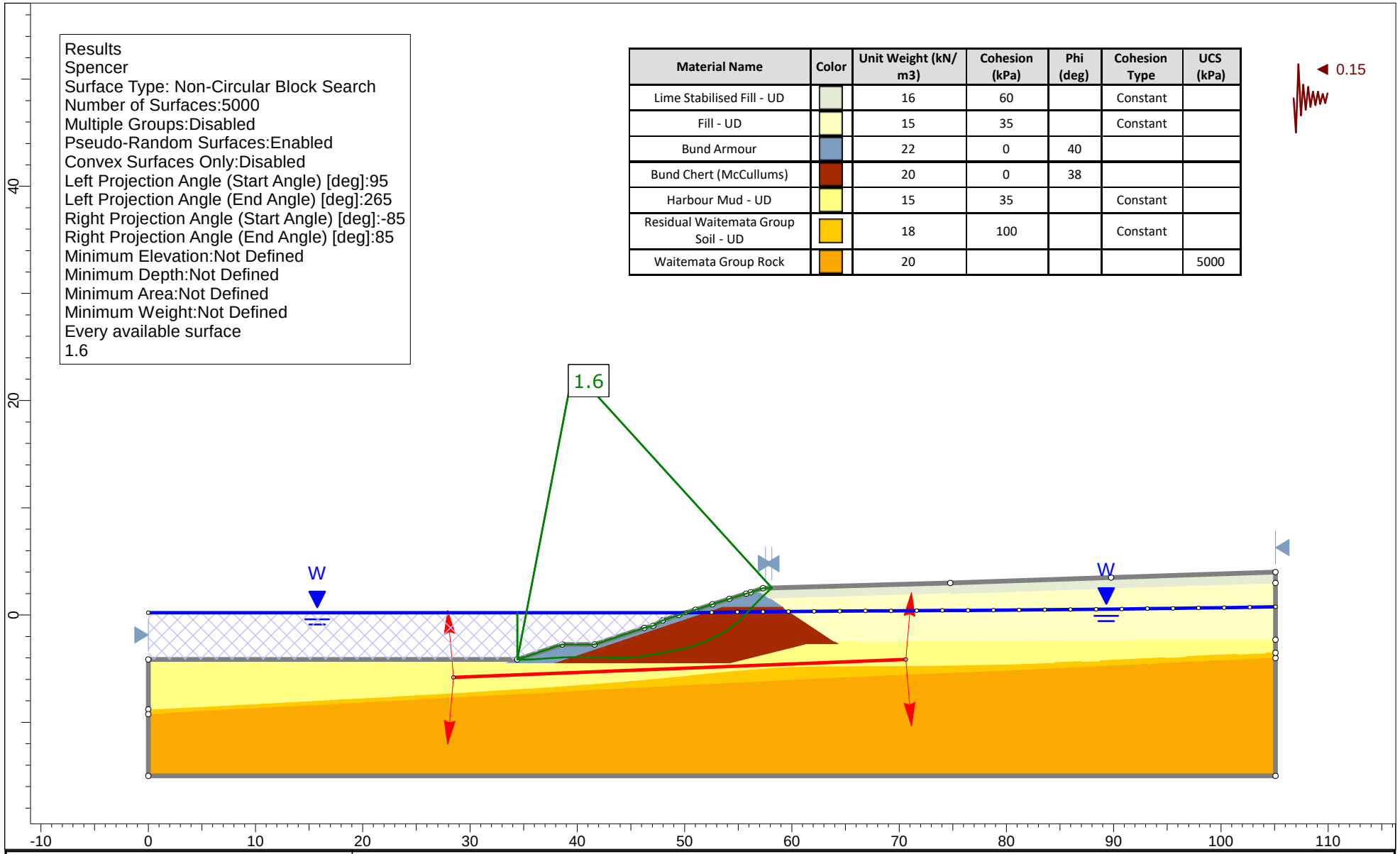
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seismic (NZGS Guidance Module 1) - Ex. Profile | Scenario | Run 8 - Seismic 1, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 2.slmd |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.6

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Residual Waitemata Group Soil - UD | | 18 | 100 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

◄ 0.15

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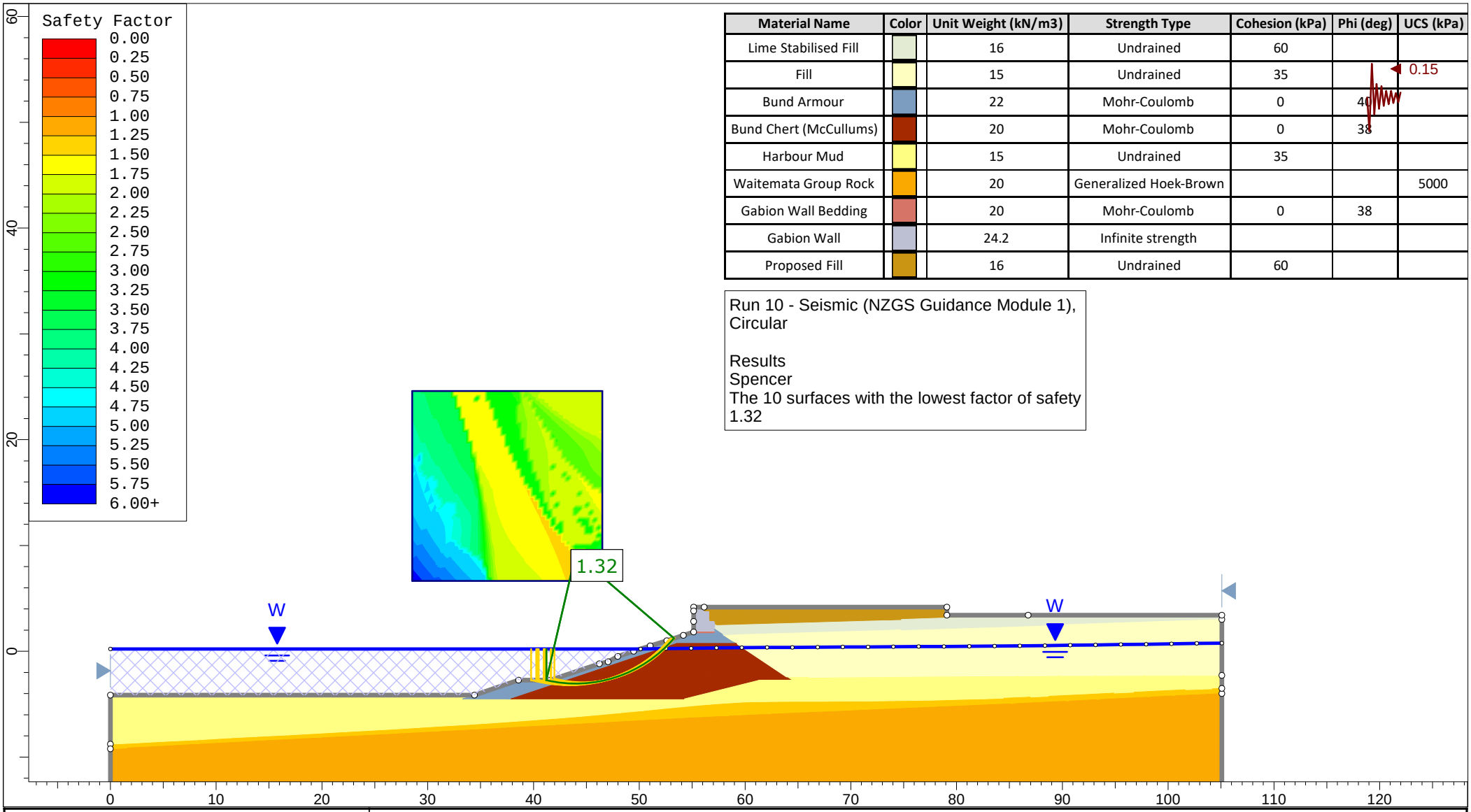
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seismic (NZGS Guidance Module 1) - Ex. Profile | Scenario | Run 9 - Seismic 1, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 10 - Seismic (NZGS Guidance Module 1), Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.32

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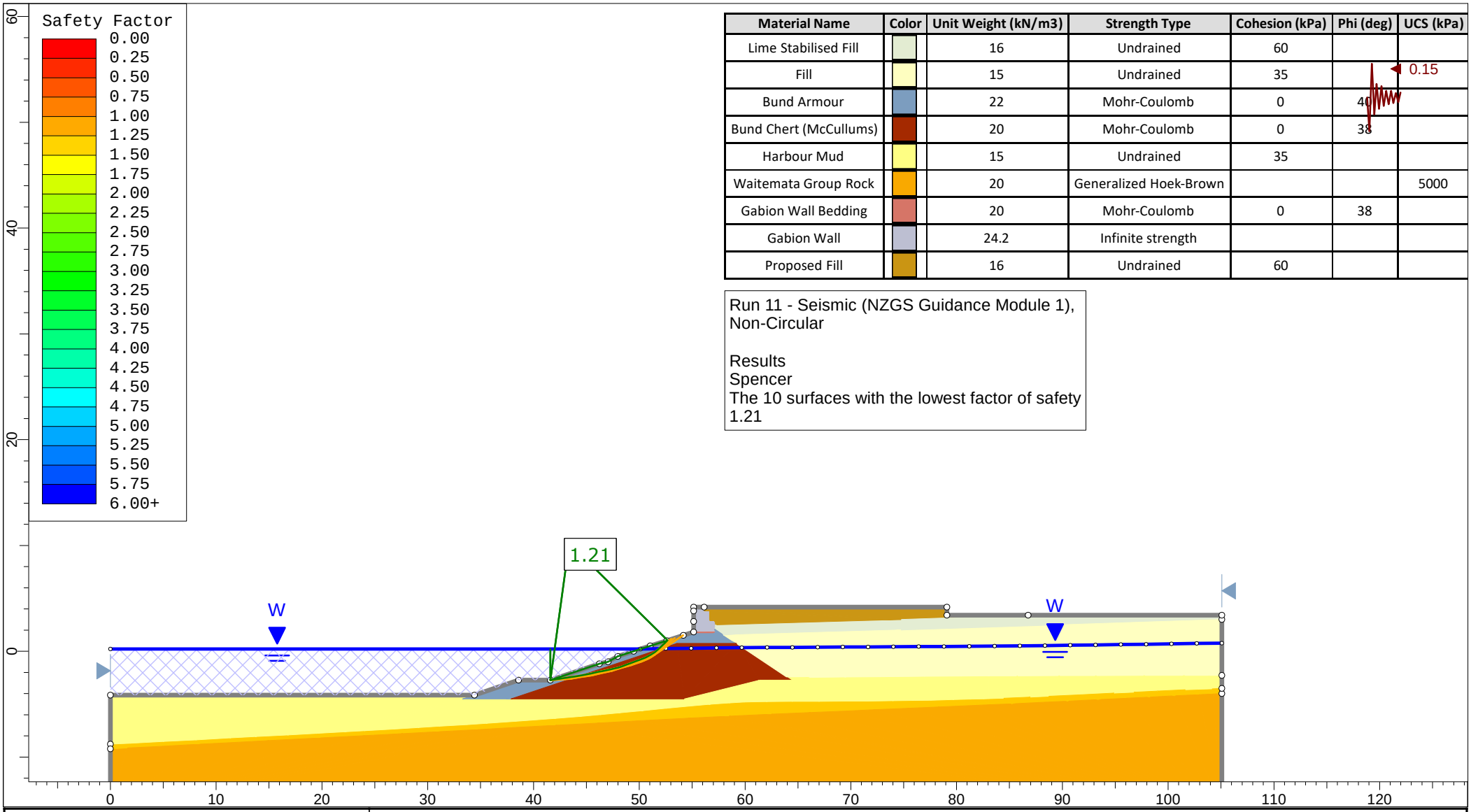
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 10 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 11 - Seismic (NZGS Guidance Module 1), Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.21

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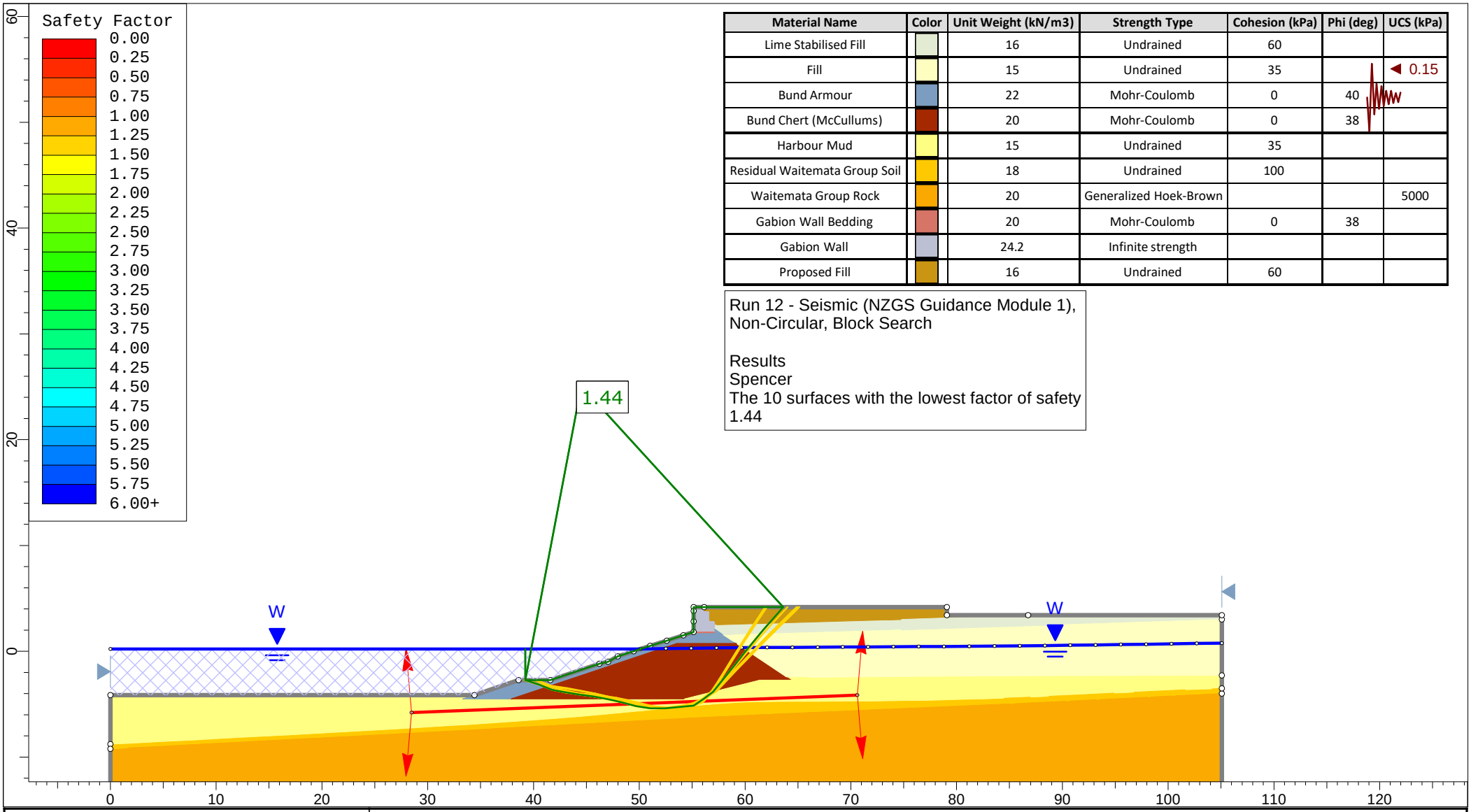
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 11 - Seismic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | ◀ 0.15 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Residual Waitemata Group Soil | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

Run 12 - Seismic (NZGS Guidance Module 1), Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.44

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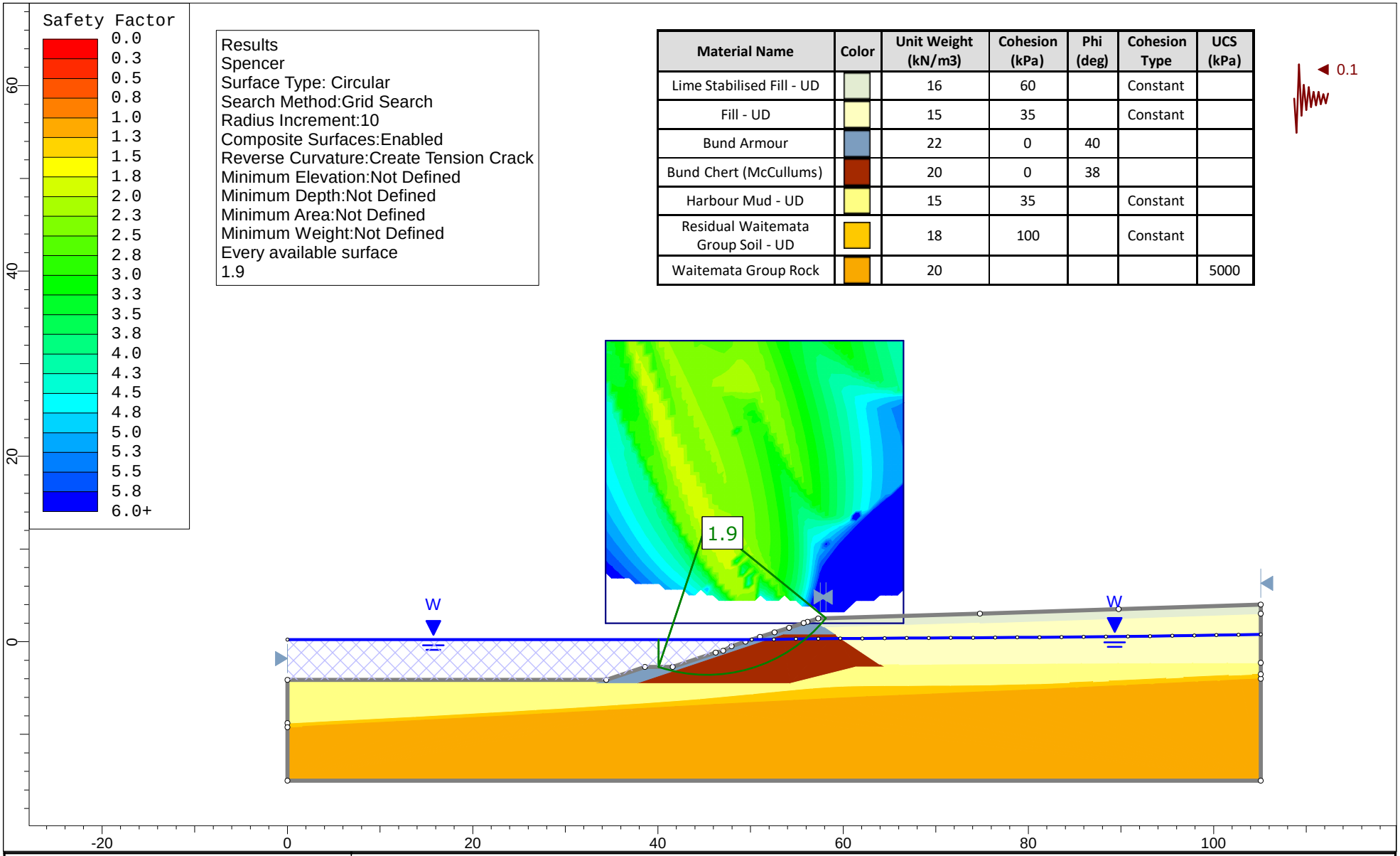
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 12 - Seismic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Residual Waitemata Group Soil - UD | | 18 | 100 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |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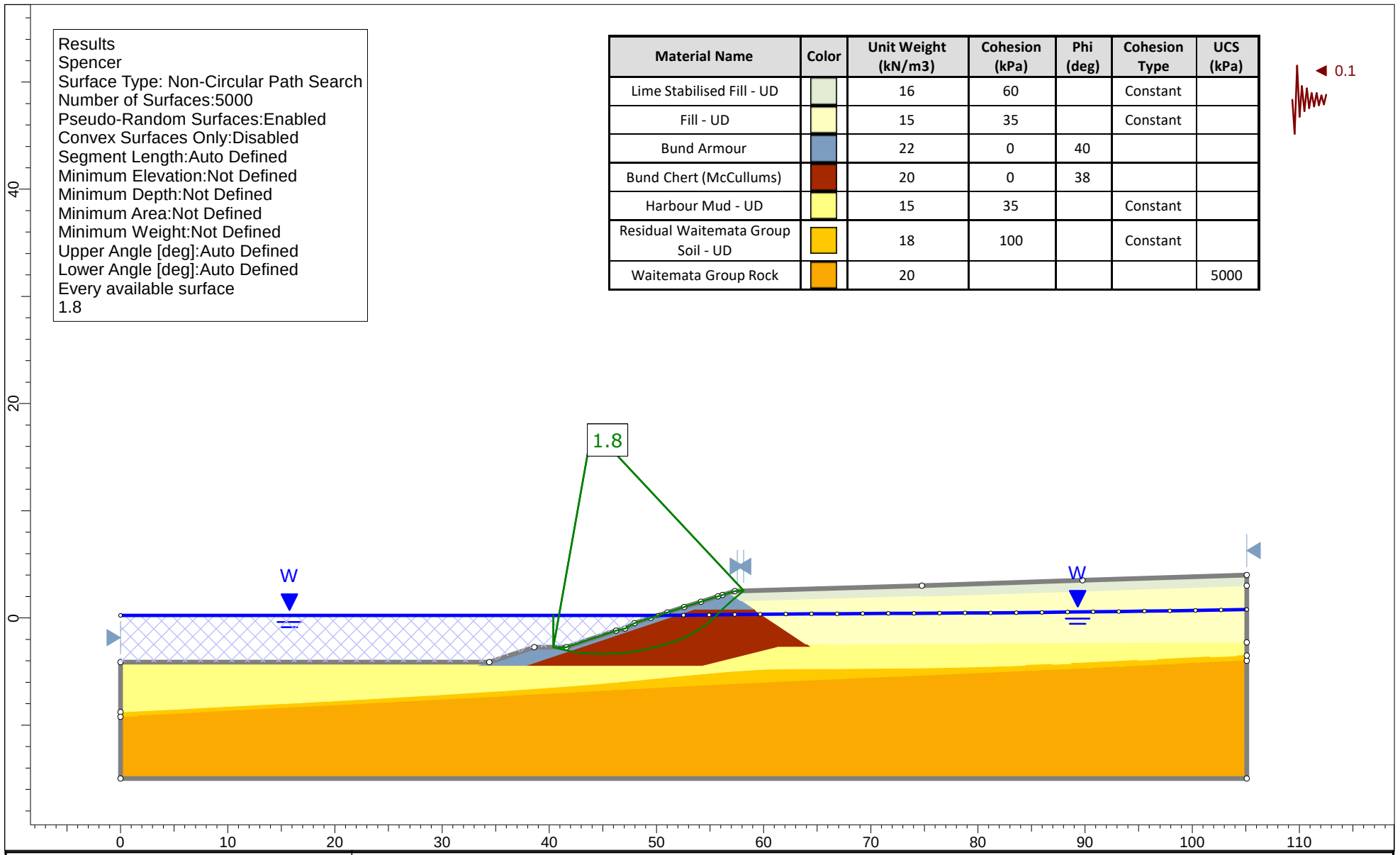
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 13 - Seismic 2, Circ |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 3.slmd |

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.8

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Residual Waitemata Group Soil - UD | | 18 | 100 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

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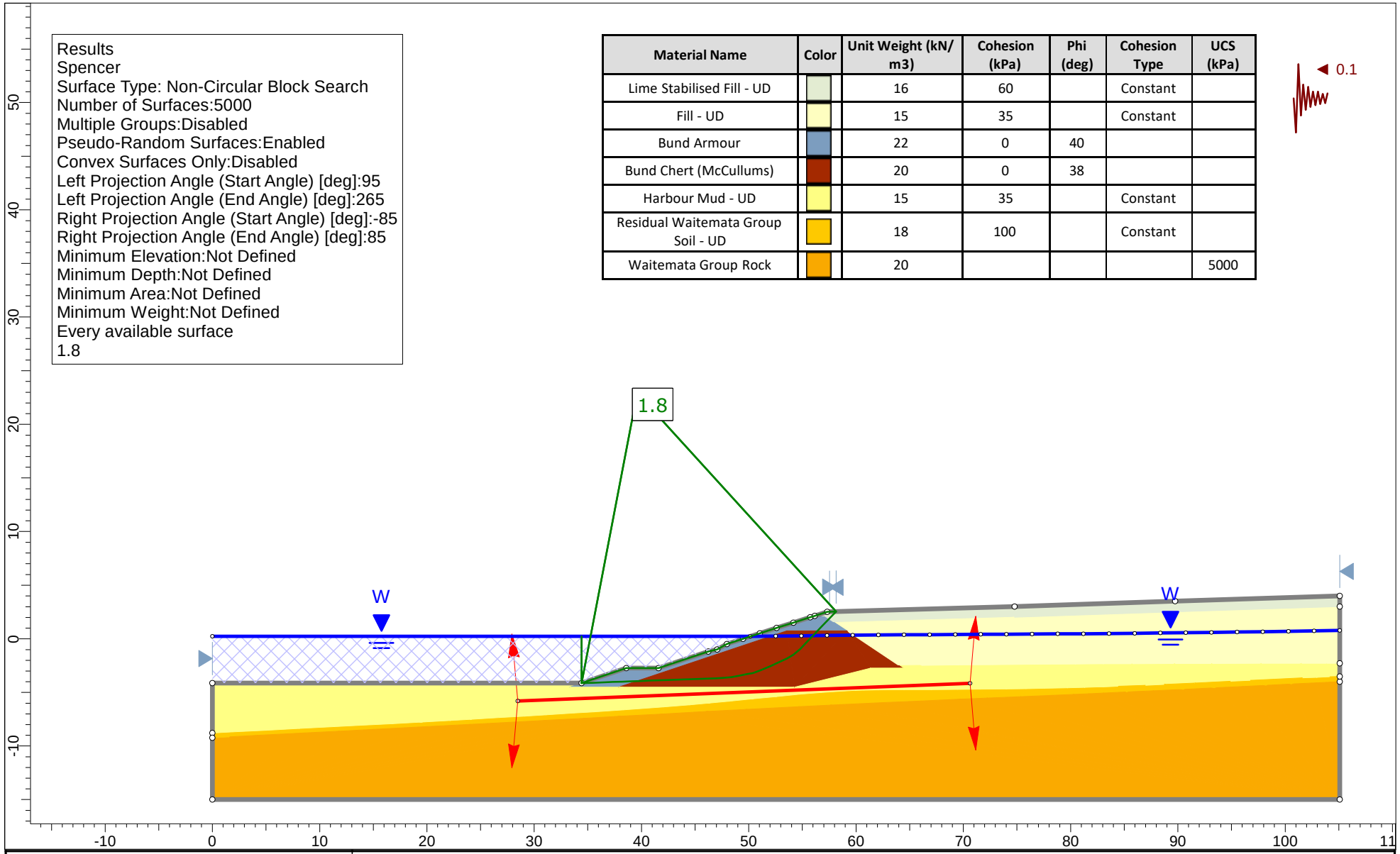
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 14 - Seismic 2, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 3.slmd |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.8

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | 60 | | Constant | |
| Fill - UD | | 15 | 35 | | Constant | |
| Bund Armour | | 22 | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | |
| Harbour Mud - UD | | 15 | 35 | | Constant | |
| Residual Waitemata Group Soil - UD | | 18 | 100 | | Constant | |
| Waitemata Group Rock | | 20 | | | | 5000 |

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| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 15 - Seismic 2, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 3.slmd |

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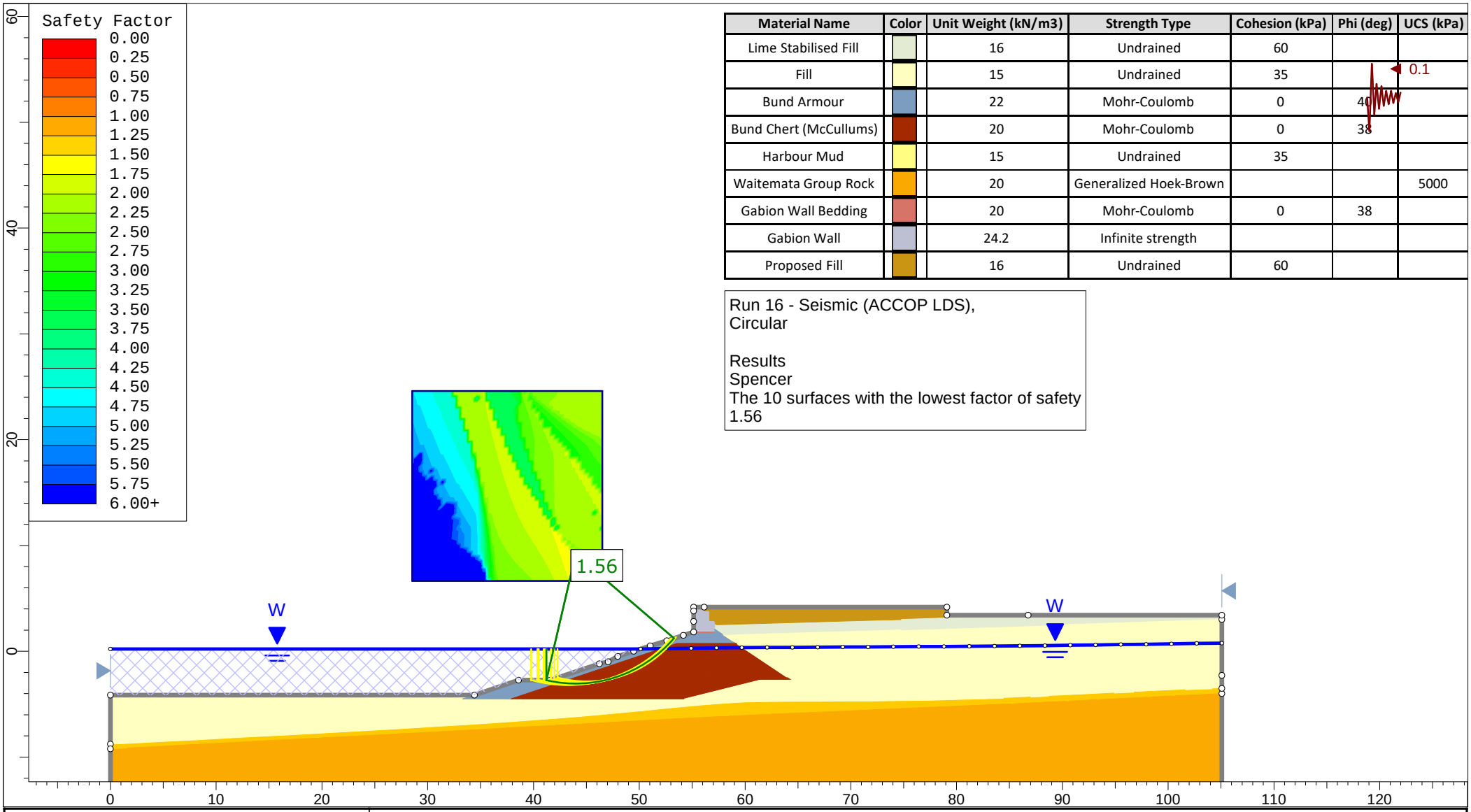


| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |



Run 16 - Seismic (ACCOP LDS),
Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.56

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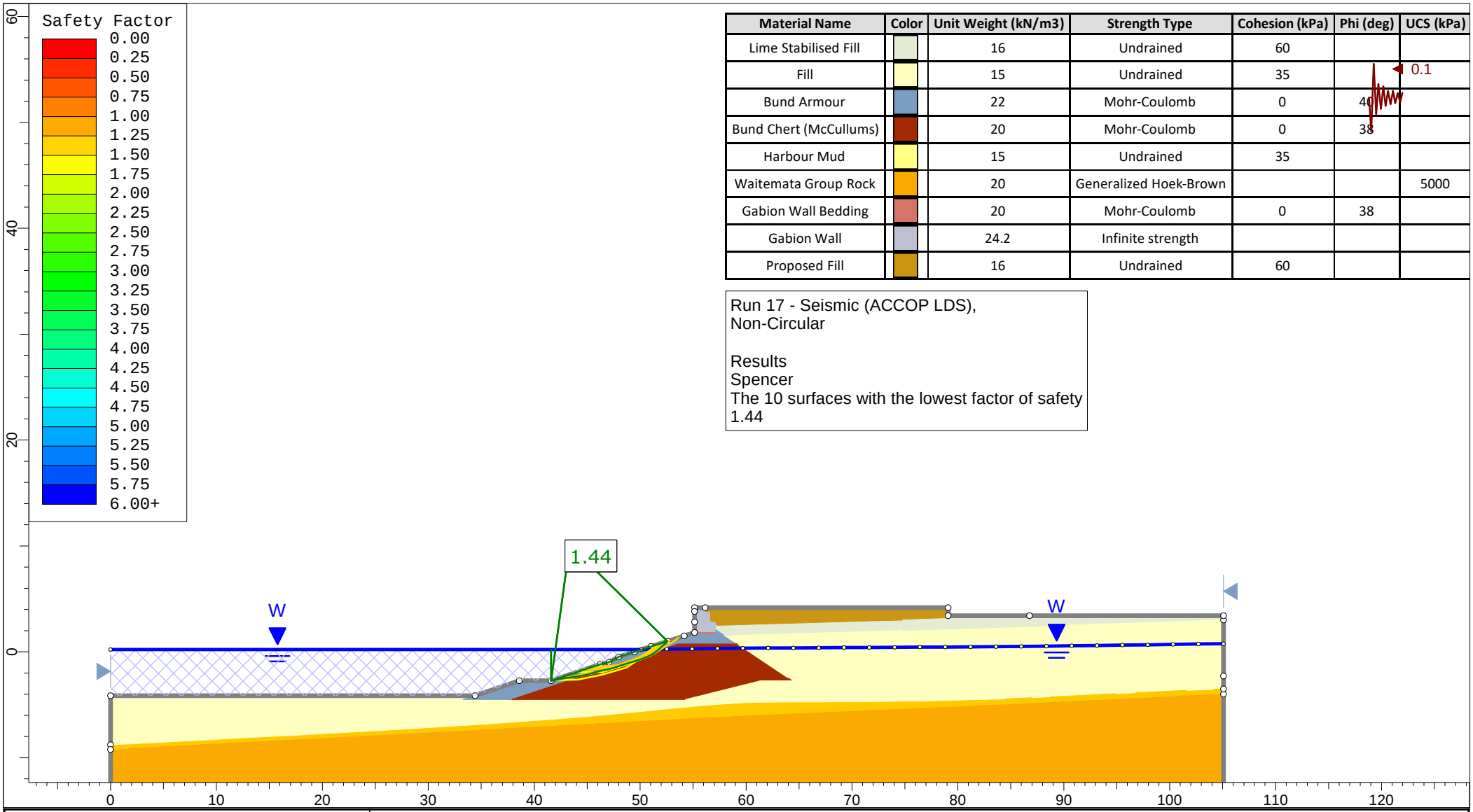
SLIDEINTERPRET 9.008

| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 16 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K20U265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.1

Run 17 - Seismic (ACCOP LDS),
Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.44

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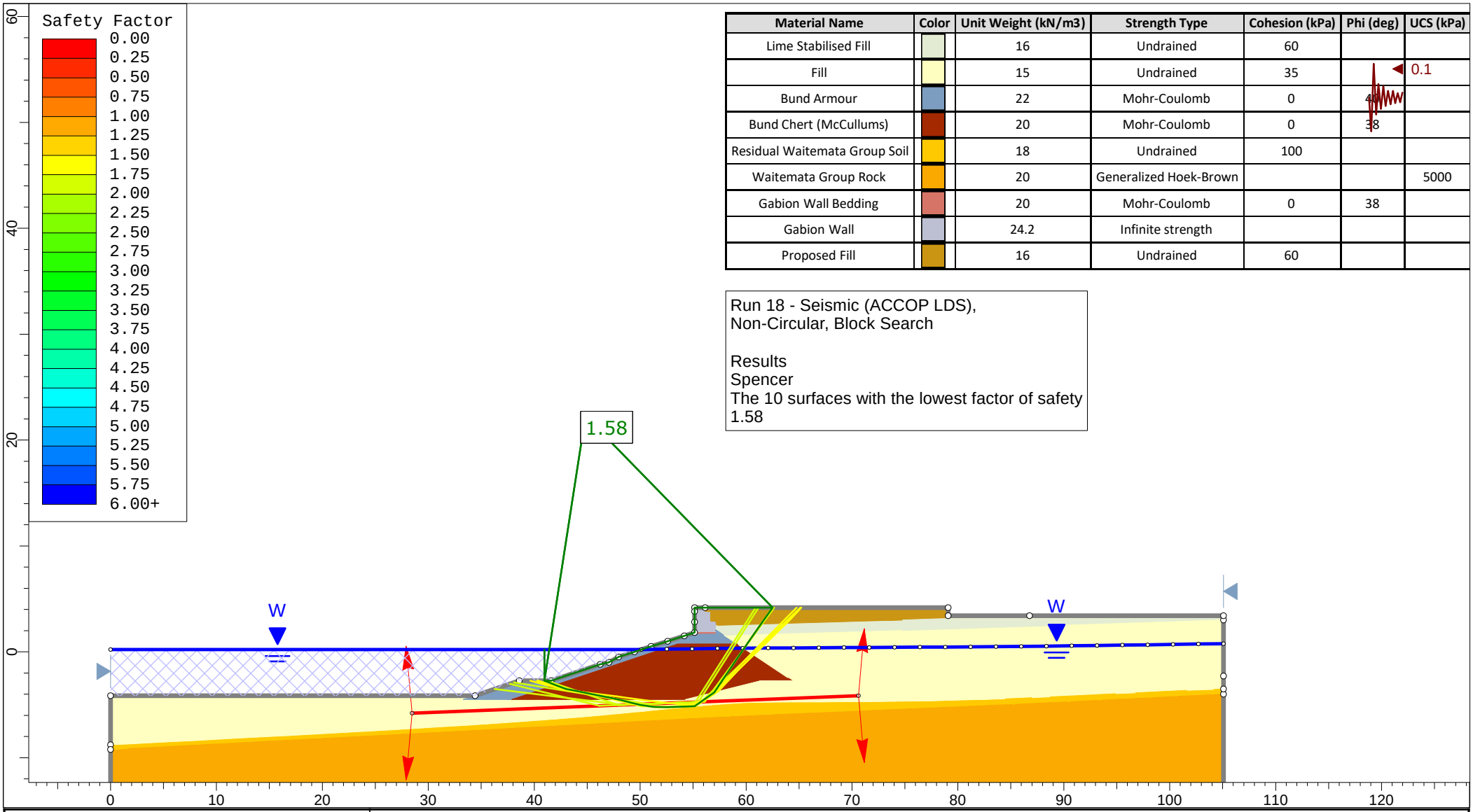
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 17 - Seismic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 2.slmd |

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Residual Waitemata Group Soil | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

Run 18 - Seismic (ACCOP LDS),
Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.58





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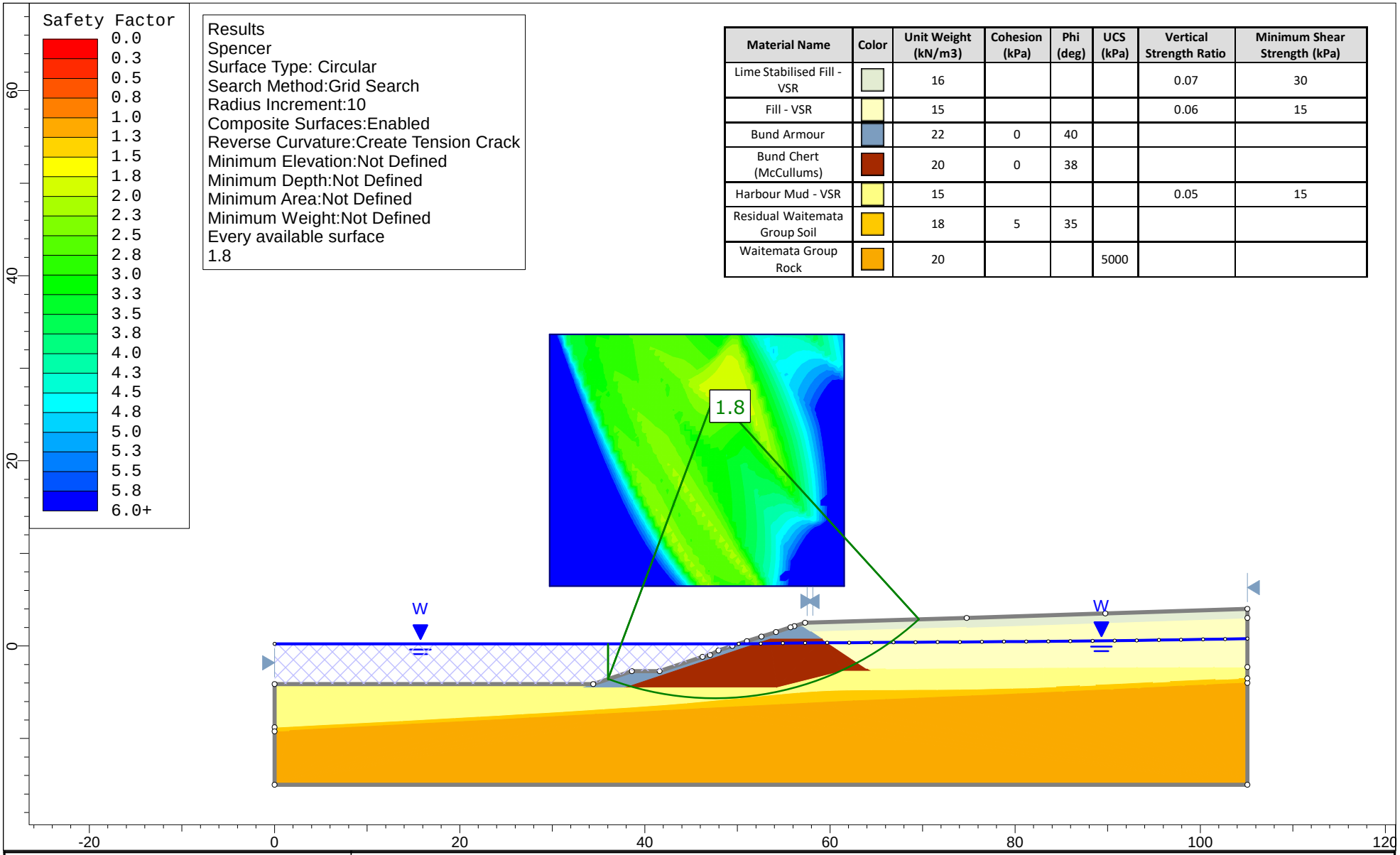
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 18 - Seismic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | | | | 0.07 | 30 |
| Fill - VSR | | 15 | | | | 0.06 | 15 |
| Bund Armour | | 22 | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | | | | 0.05 | 15 |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | | | 5000 | | |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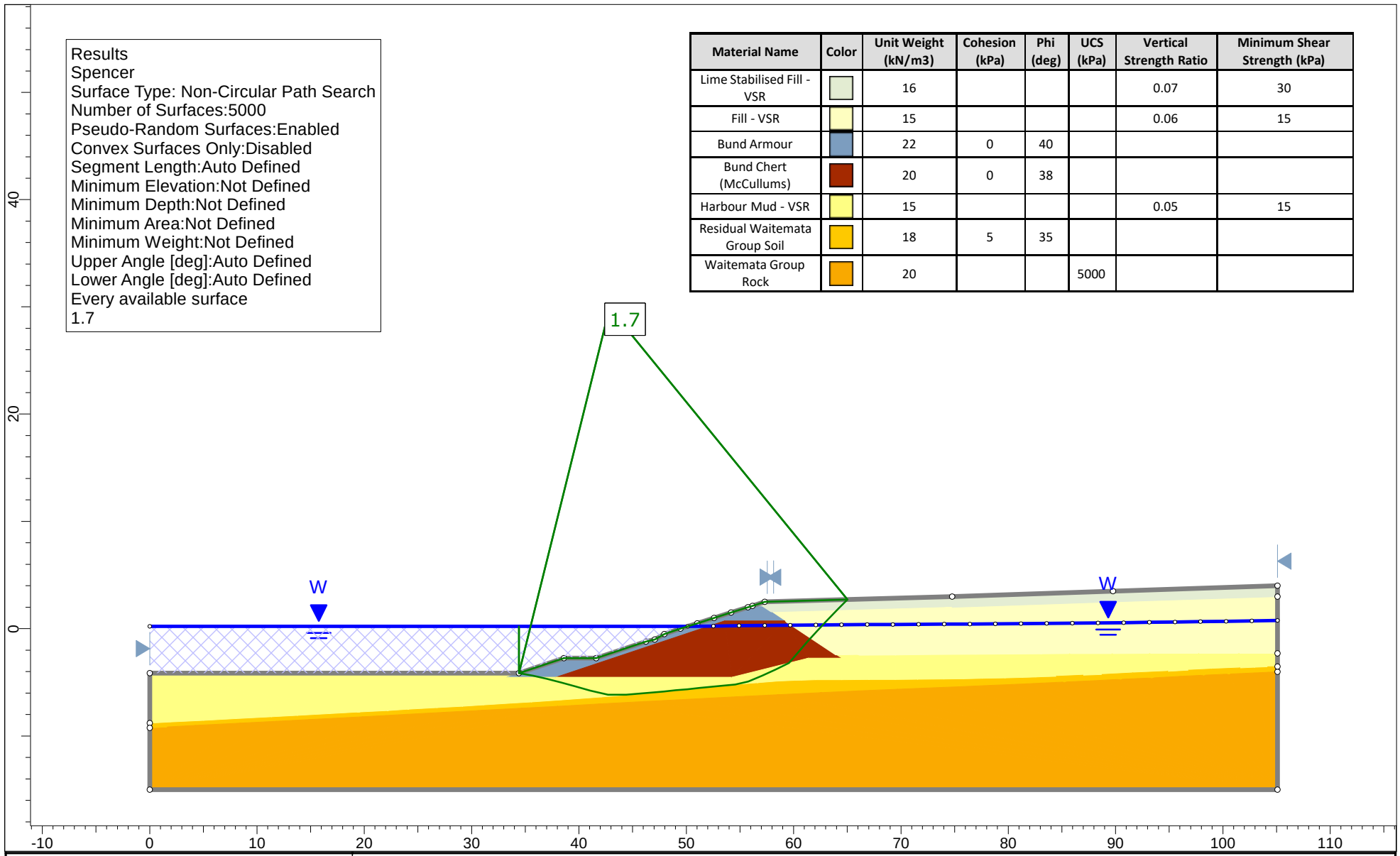
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Static, Seismic Reduced Strengths - Ex. Profile | *Scenario* | Run 19 - Static SR, Circ |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section B 4.slmd |

SLIDEINTERPRET 9.008

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
Every available surface
1.7

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | | | | 0.07 | 30 |
| Fill - VSR | | 15 | | | | 0.06 | 15 |
| Bund Armour | | 22 | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | | | | 0.05 | 15 |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | | | 5000 | | |

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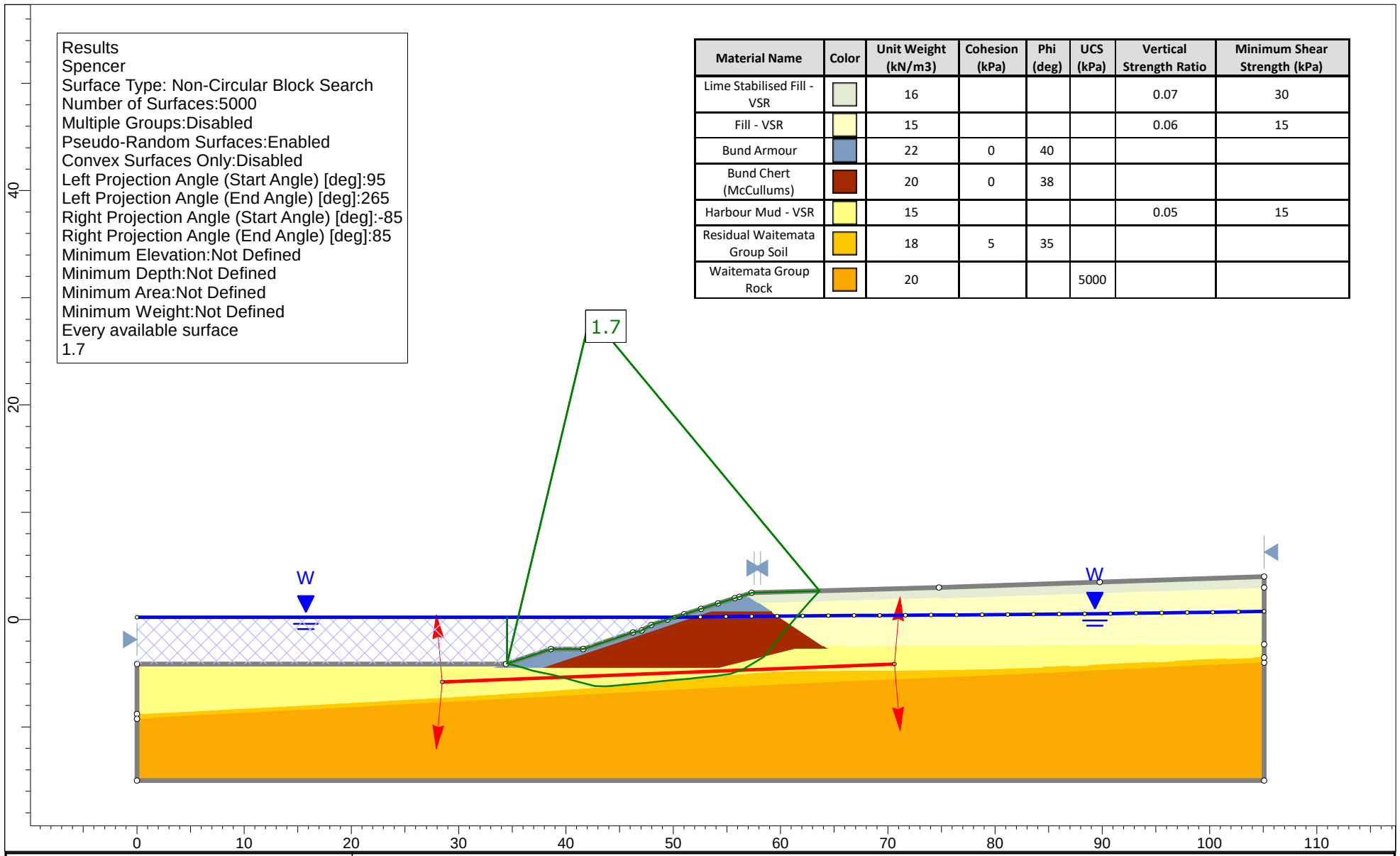
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Static, Seismic Reduced Strengths - Ex. Profile | *Scenario* | Run 20 - Static SR, NC |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section B 4.slmd |

Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Every available surface
1.7

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | | | | 0.07 | 30 |
| Fill - VSR | | 15 | | | | 0.06 | 15 |
| Bund Armour | | 22 | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | | | | 0.05 | 15 |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | | | 5000 | | |

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| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static, Seismic Reduced Strengths - Ex. Profile | Scenario | Run 21 - Static SR, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section B 4.slmd |

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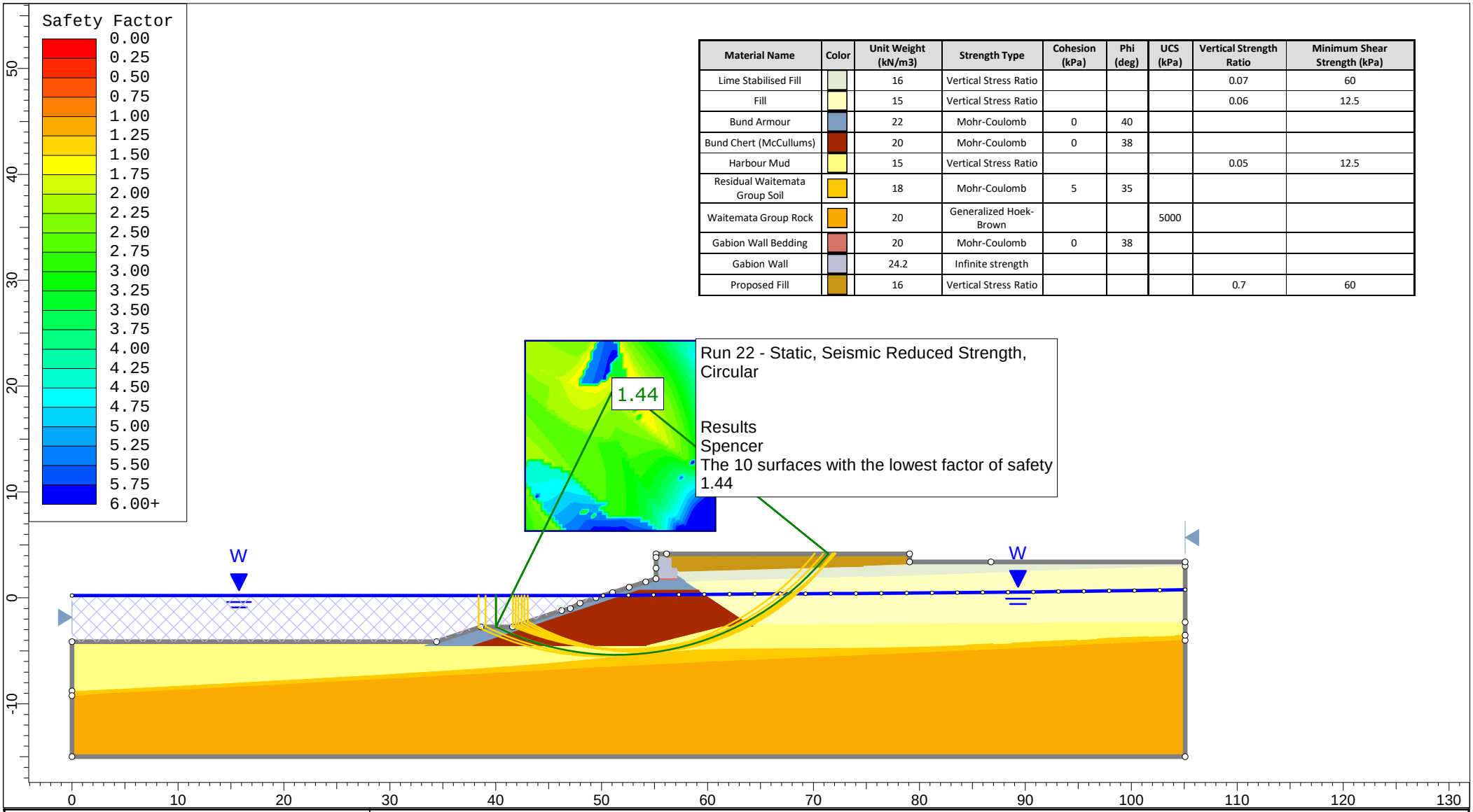


| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

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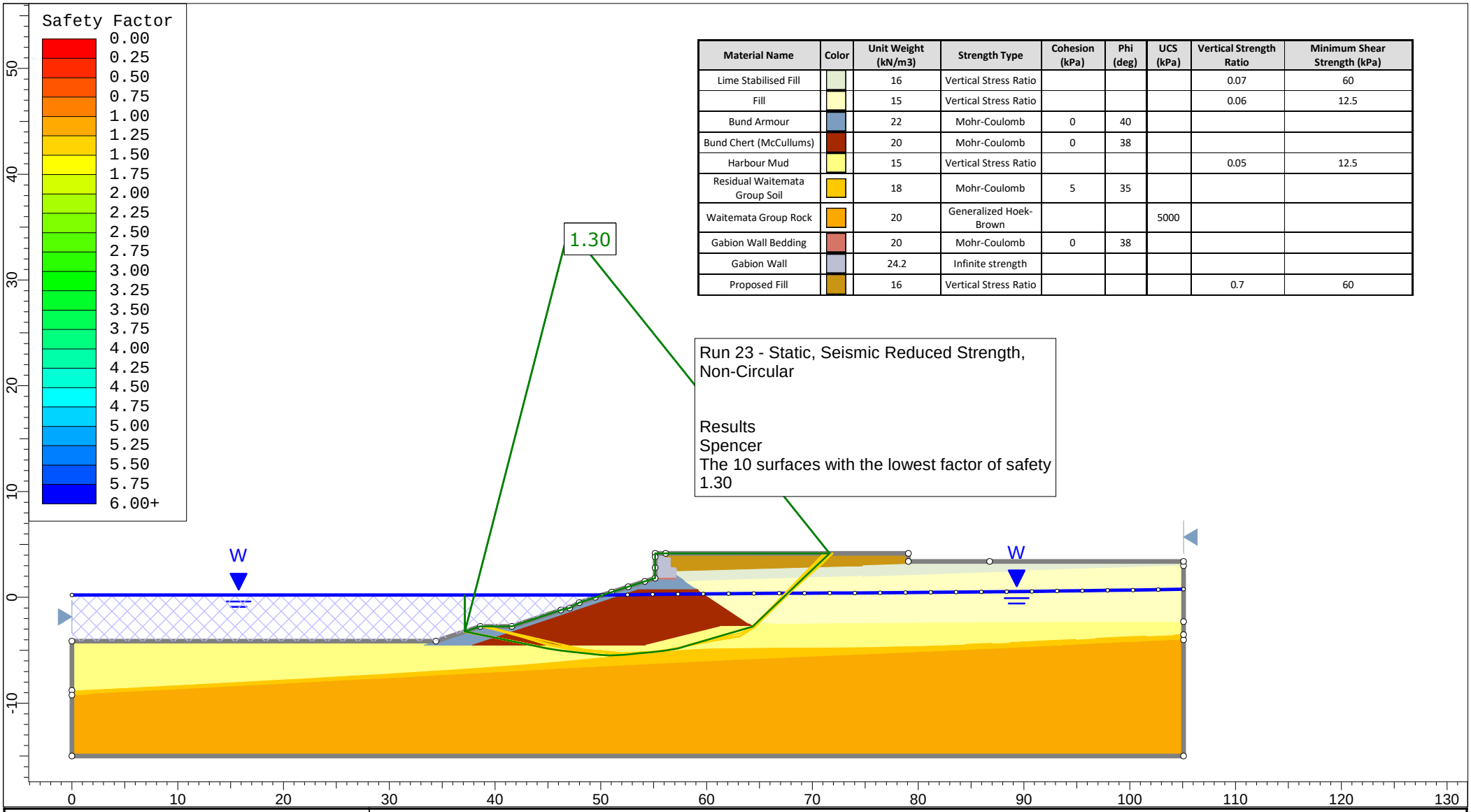
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 22 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

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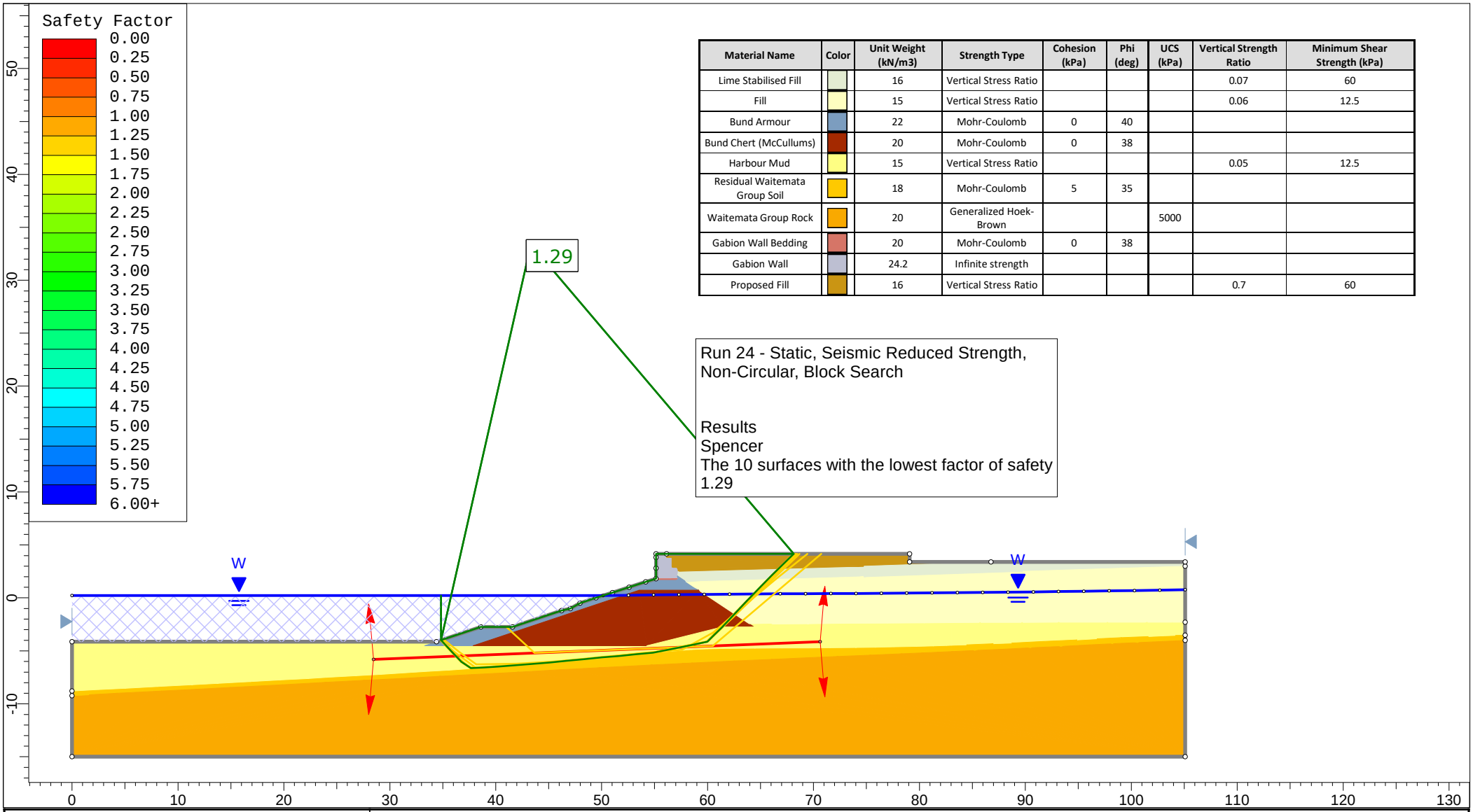
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 23 - Seismic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

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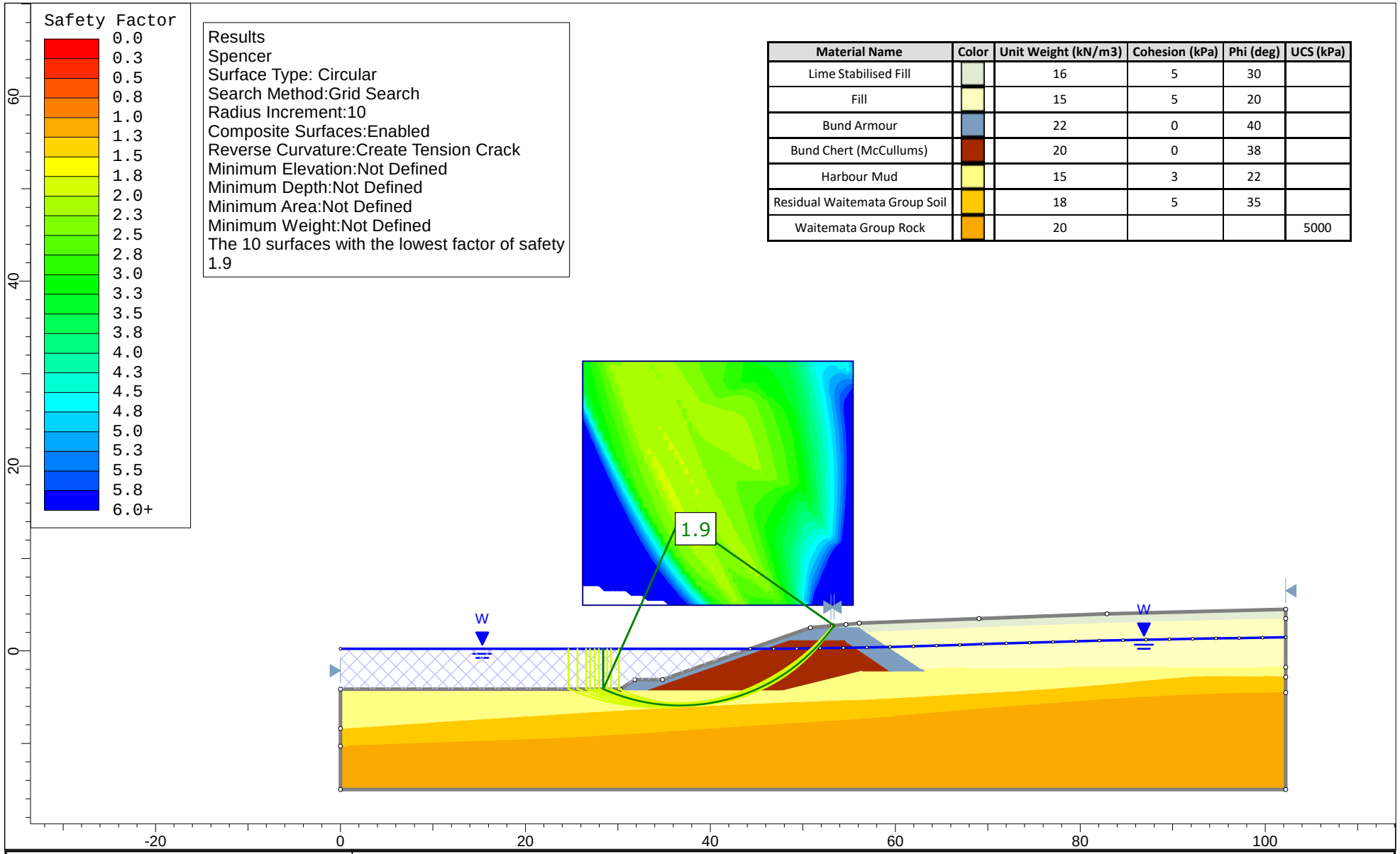
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 24 - Seismic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | KA0265 - Revised Section B Proposed Dec 2020 - Seismic Scenarios 3.slmd |

Safety Factor
0.0
0.3
0.5
0.8
1.0
1.3
1.5
1.8
2.0
2.3
2.5
2.8
3.0
3.3
3.5
3.8
4.0
4.3
4.5
4.8
5.0
5.3
5.5
5.8
6.0+

Results
Spencer
Surface Type: Circular
Search Method:Grid Search
Radius Increment:10
Composite Surfaces:Enabled
Reverse Curvature:Create Tension Crack
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
The 10 surfaces with the lowest factor of safety
1.9

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | |
| Waitemata Group Rock | | 20 | | | 5000 |

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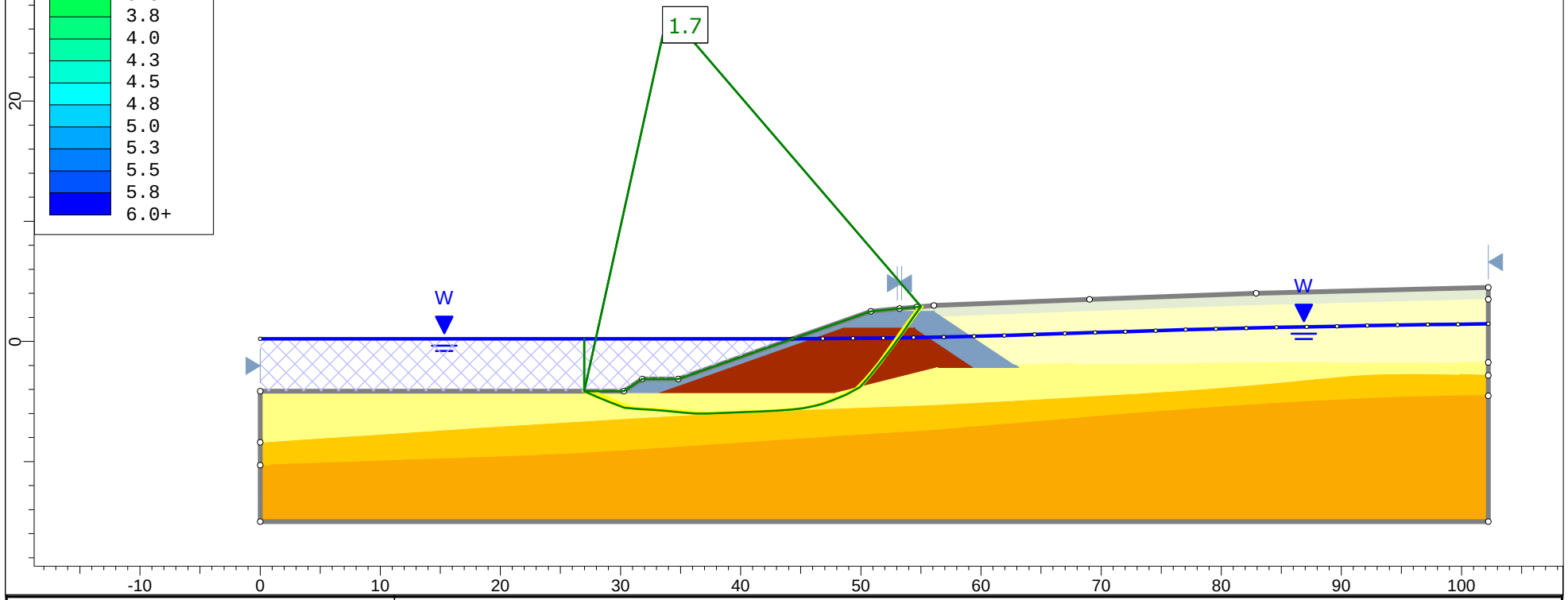
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Section C - Static - Ex. Profile | Scenario | Run 1 - Static, Circ |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section C 1.slmd |

Safety Factor
0.0
0.3
0.5
0.8
1.0
1.3
1.5
1.8
2.0
2.3
2.5
2.8
3.0
3.3
3.5
3.8
4.0
4.3
4.5
4.8
5.0
5.3
5.5
5.8
6.0+

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
The 10 surfaces with the lowest factor of safety
1.7

| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | |
| Waitemata Group Rock | | 20 | | | 5000 |

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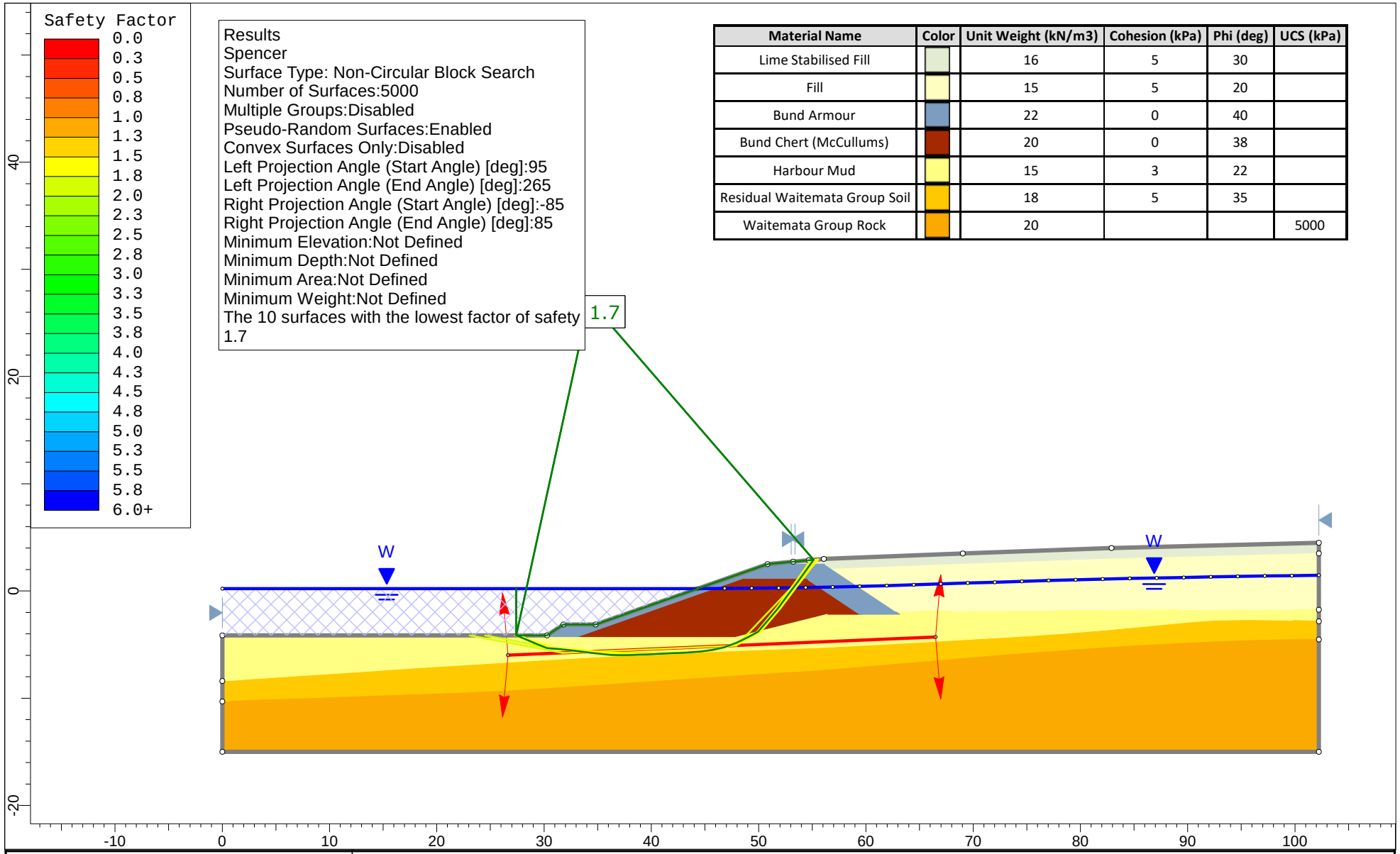
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Section C - Static - Ex. Profile | Scenario | Run 2 - Static, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section C 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | 5 | 30 | |
| Fill | | 15 | 5 | 20 | |
| Bund Armour | | 22 | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | 0 | 38 | |
| Harbour Mud | | 15 | 3 | 22 | |
| Residual Waitemata Group Soil | | 18 | 5 | 35 | |
| Waitemata Group Rock | | 20 | | | 5000 |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| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Section C - Static - Ex. Profile | *Scenario* | Run 3 - Static, NC, BS |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section C 1.slmd |

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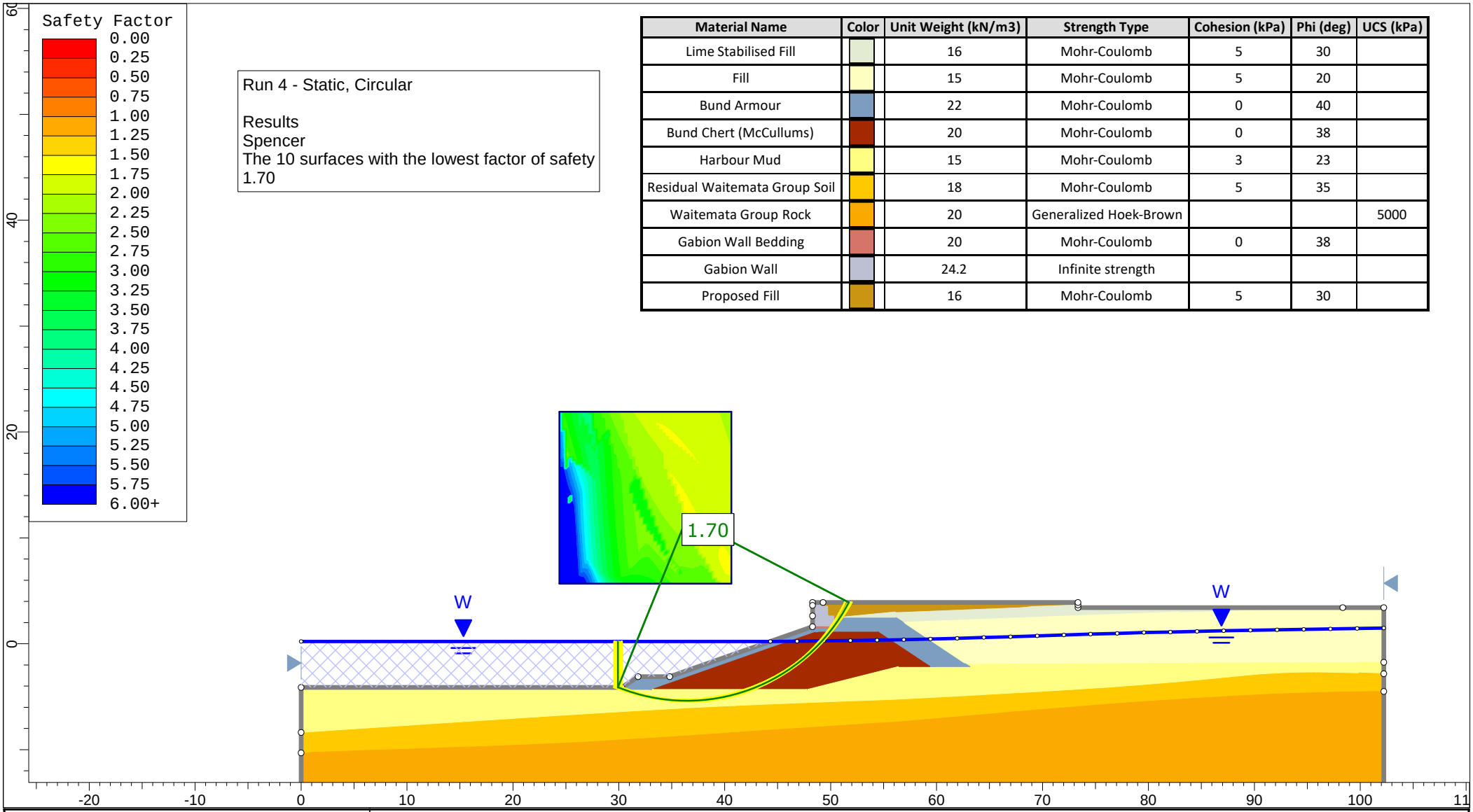


| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Mohr-Coulomb | 5 | 30 | |
| Fill | | 15 | Mohr-Coulomb | 5 | 20 | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Mohr-Coulomb | 3 | 23 | |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Mohr-Coulomb | 5 | 30 | |

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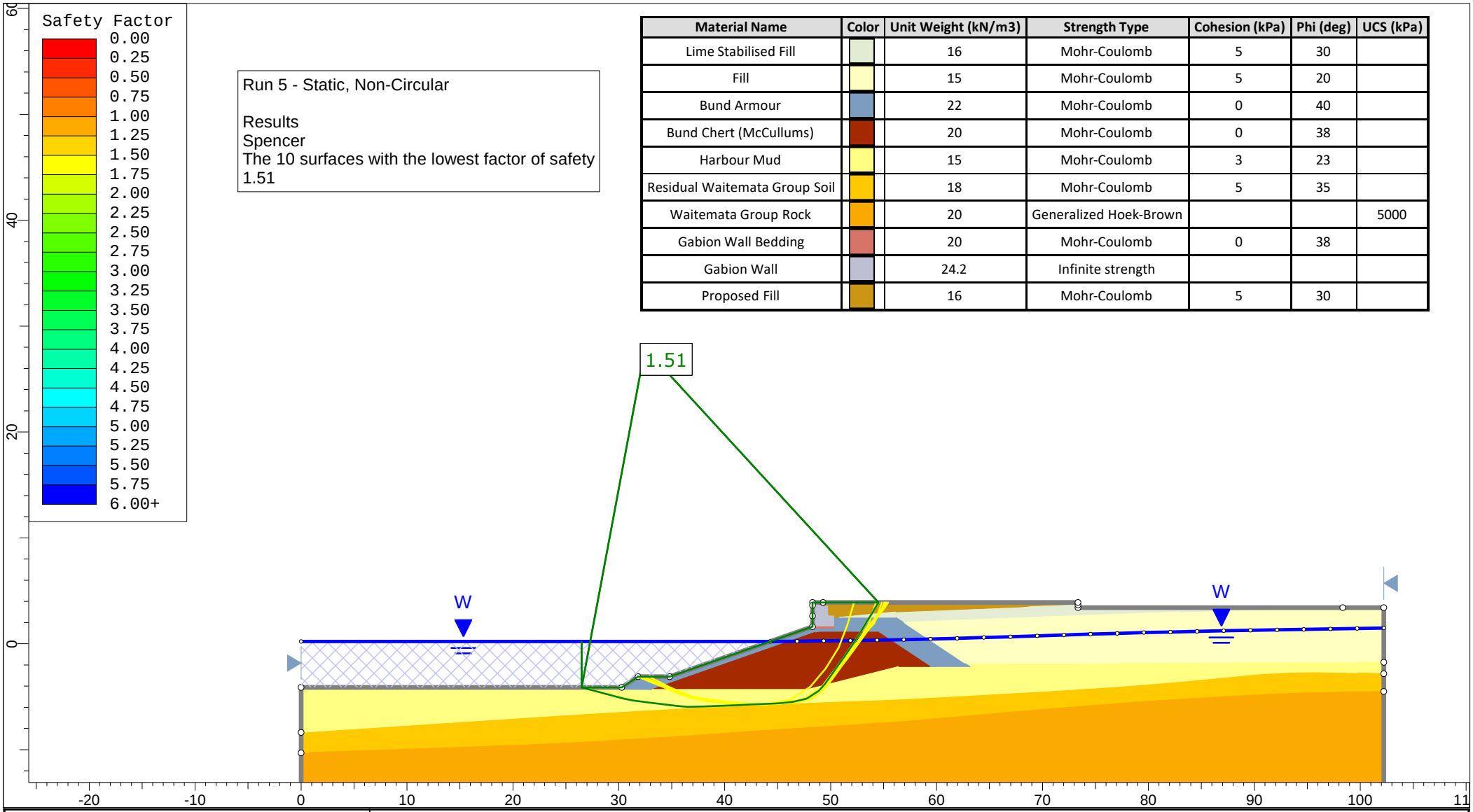
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 4 - Static, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Static Scenarios.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Mohr-Coulomb | 5 | 30 | |
| Fill | | 15 | Mohr-Coulomb | 5 | 20 | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Mohr-Coulomb | 3 | 23 | |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Mohr-Coulomb | 5 | 30 | |

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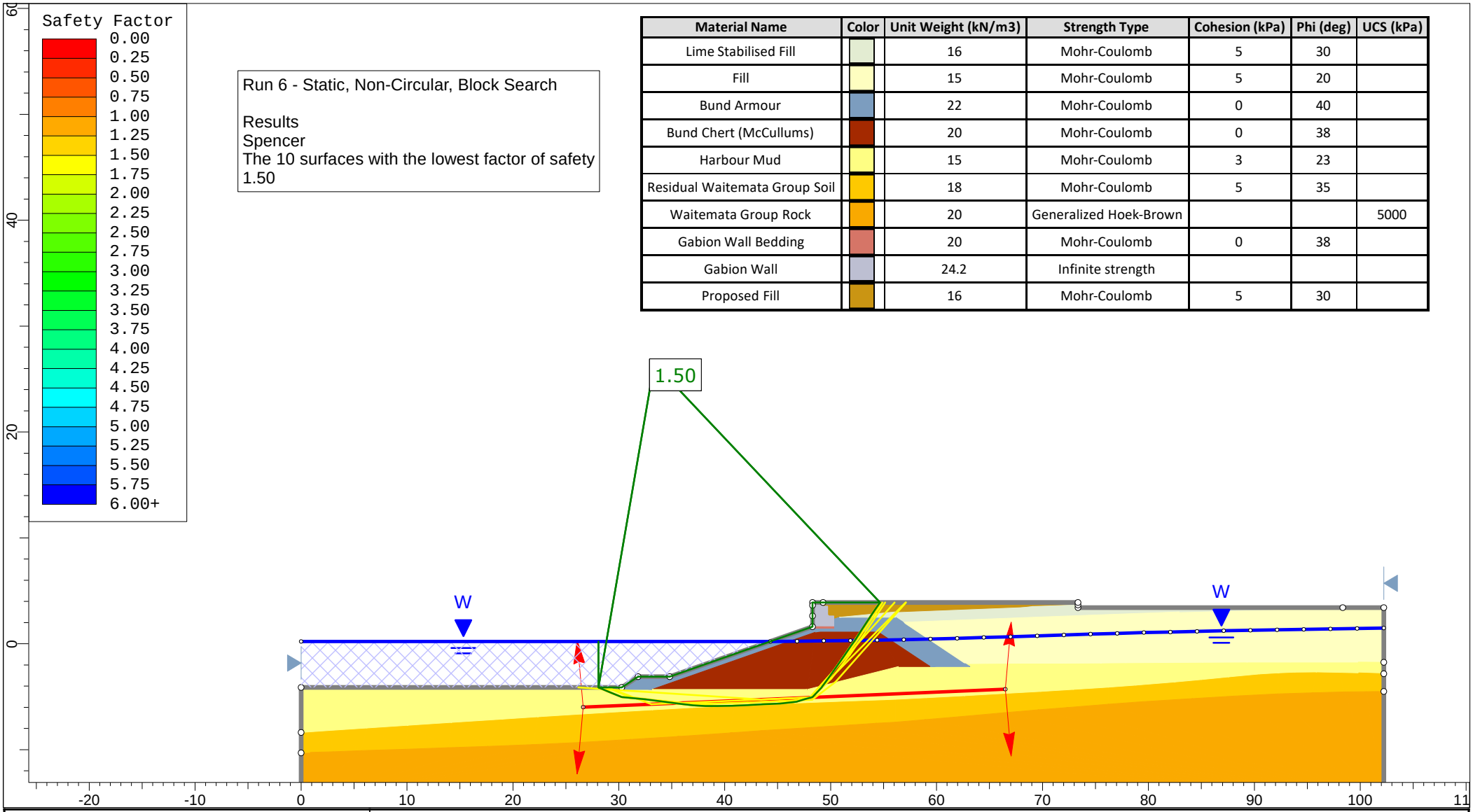
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 5 - Static, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Static Scenarios.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Mohr-Coulomb | 5 | 30 | |
| Fill | | 15 | Mohr-Coulomb | 5 | 20 | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Mohr-Coulomb | 3 | 23 | |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Mohr-Coulomb | 5 | 30 | |

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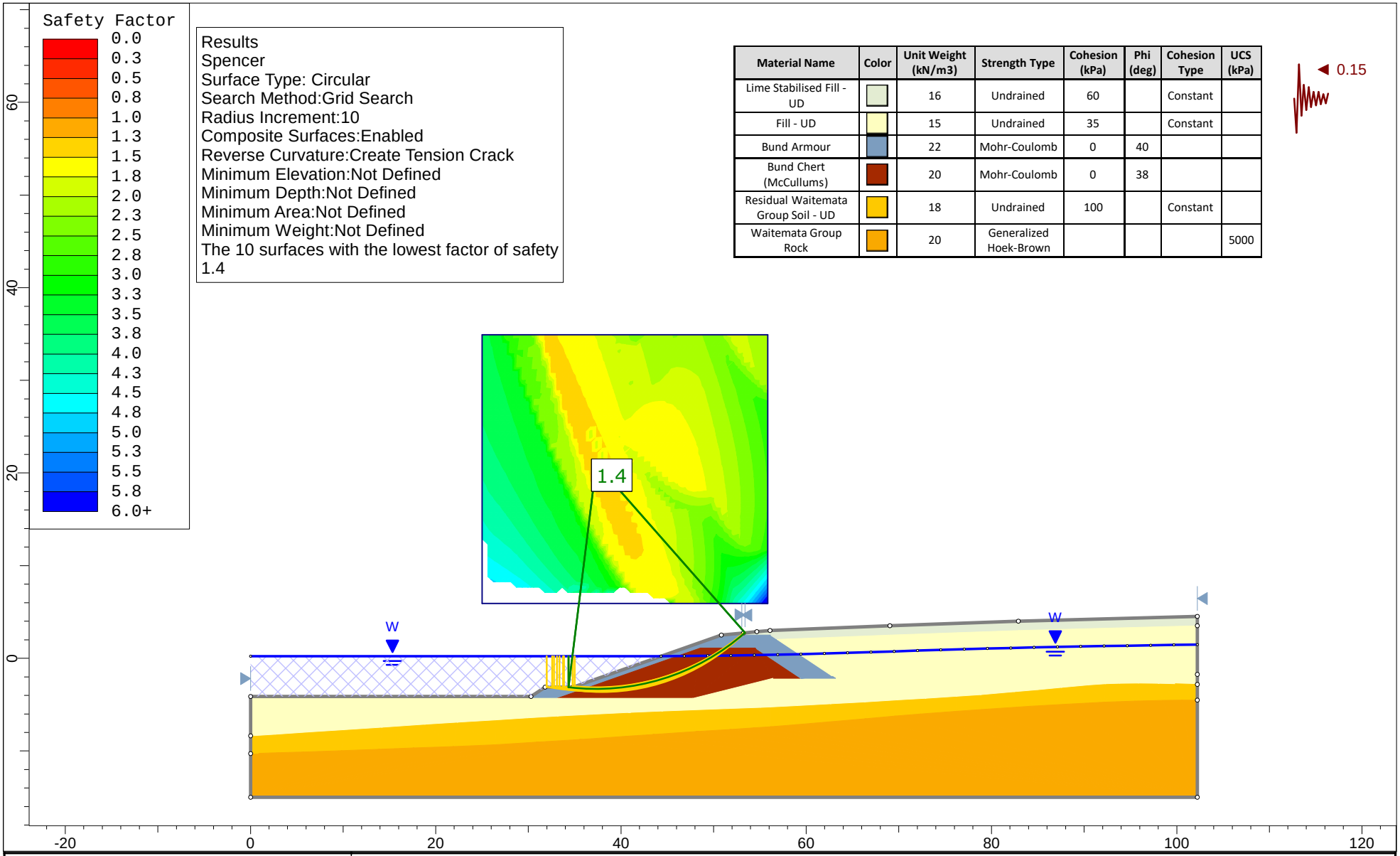
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 6 - Static, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Static Scenarios.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | Undrained | 60 | | Constant | |
| Fill - UD | | 15 | Undrained | 35 | | Constant | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | |
| Residual Waitemata Group Soil - UD | | 18 | Undrained | 100 | | Constant | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | | 5000 |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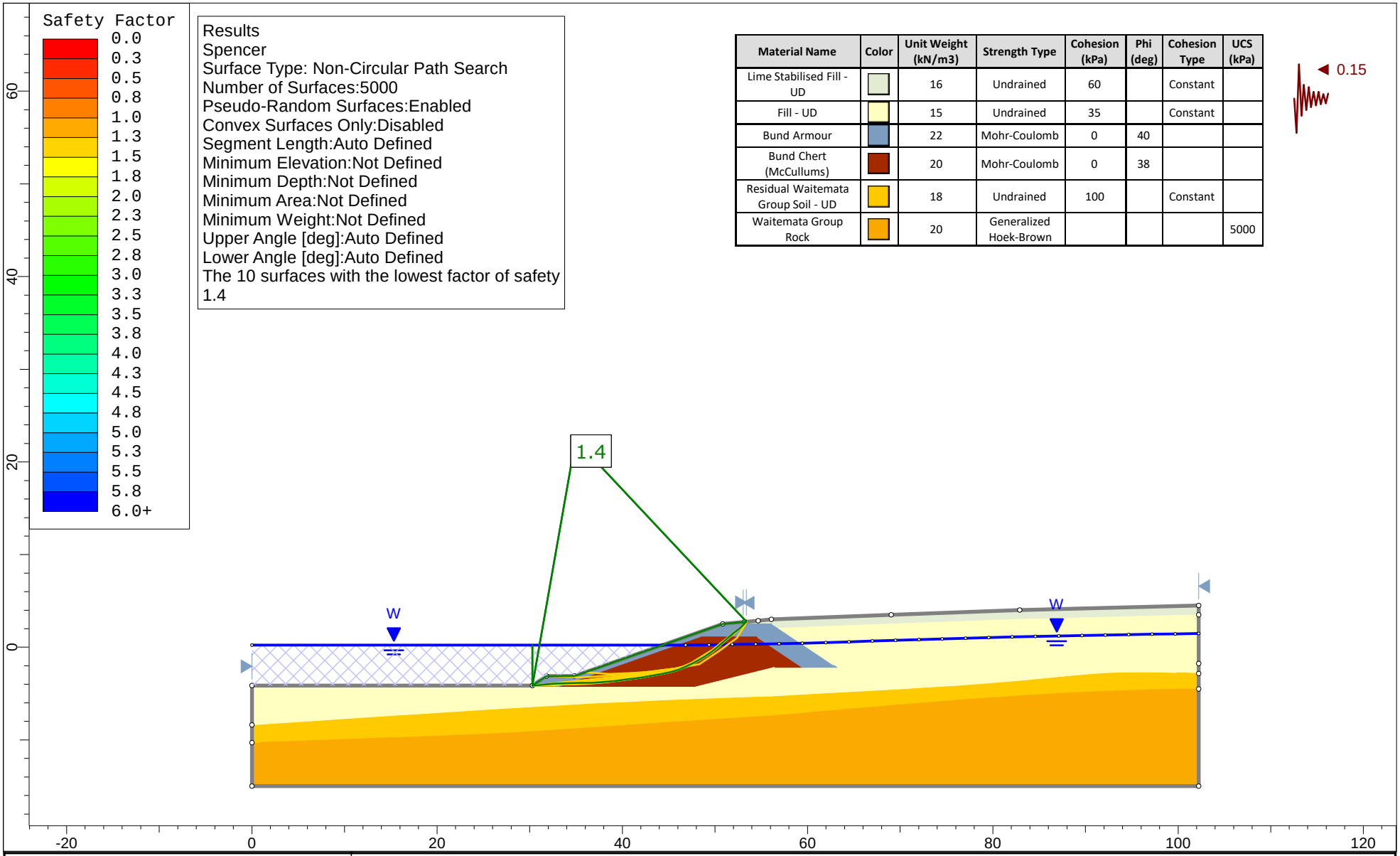
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Seismic (NZGS Guidance Module 1) - Ex. Profile | *Scenario* | Run 7 - Seismic 1, Circ |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section C 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | Undrained | 60 | | Constant | |
| Fill - UD | | 15 | Undrained | 35 | | Constant | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | |
| Residual Waitemata Group Soil - UD | | 18 | Undrained | 100 | | Constant | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | | 5000 |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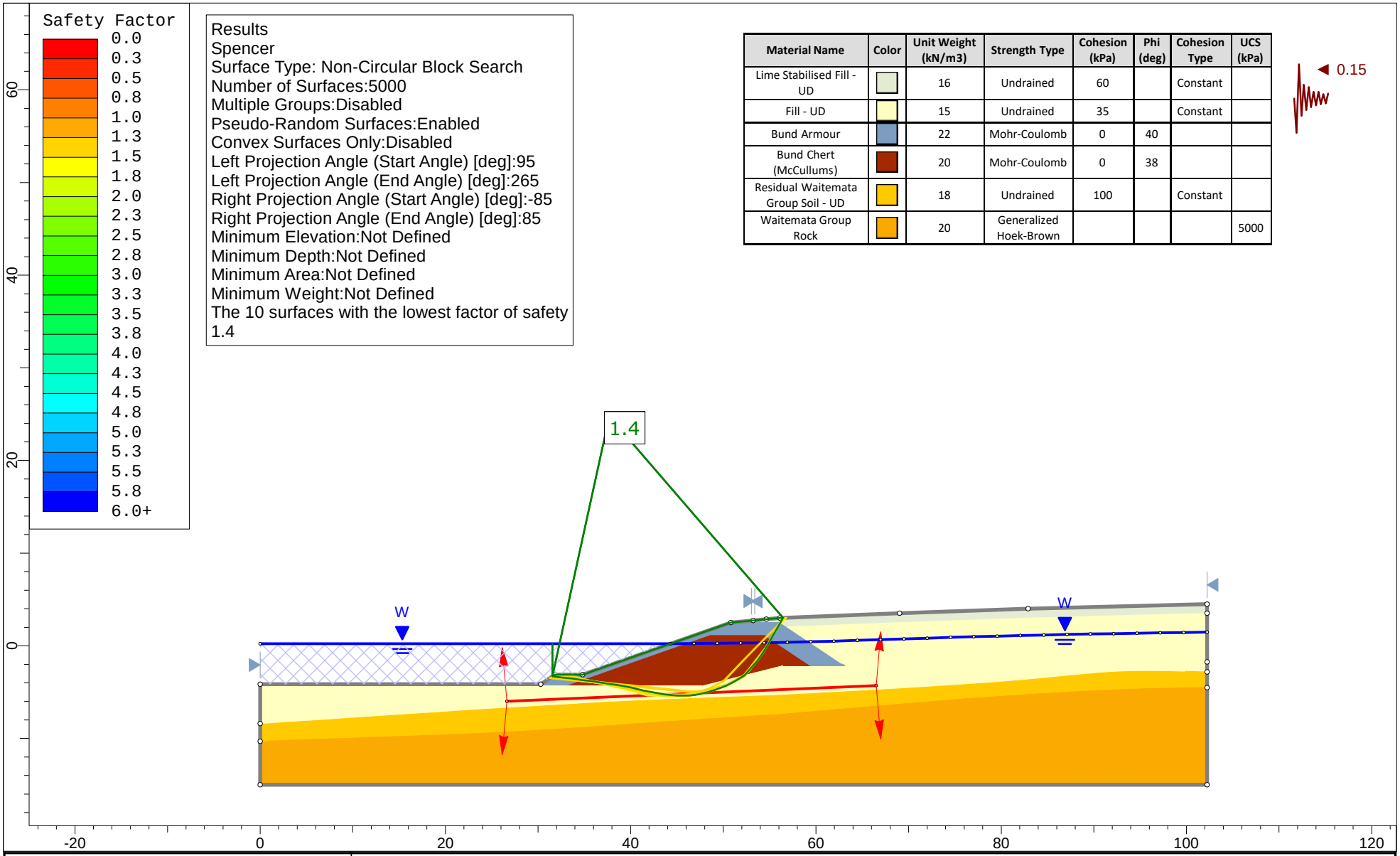
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Seismic (NZGS Guidance Module 1) - Ex. Profile | *Scenario* | Run 8 - Seismic 1, NC |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section C 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | Cohesion Type | UCS (kPa) |
|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | Undrained | 60 | | Constant | |
| Fill - UD | | 15 | Undrained | 35 | | Constant | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | |
| Residual Waitemata Group Soil - UD | | 18 | Undrained | 100 | | Constant | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | | 5000 |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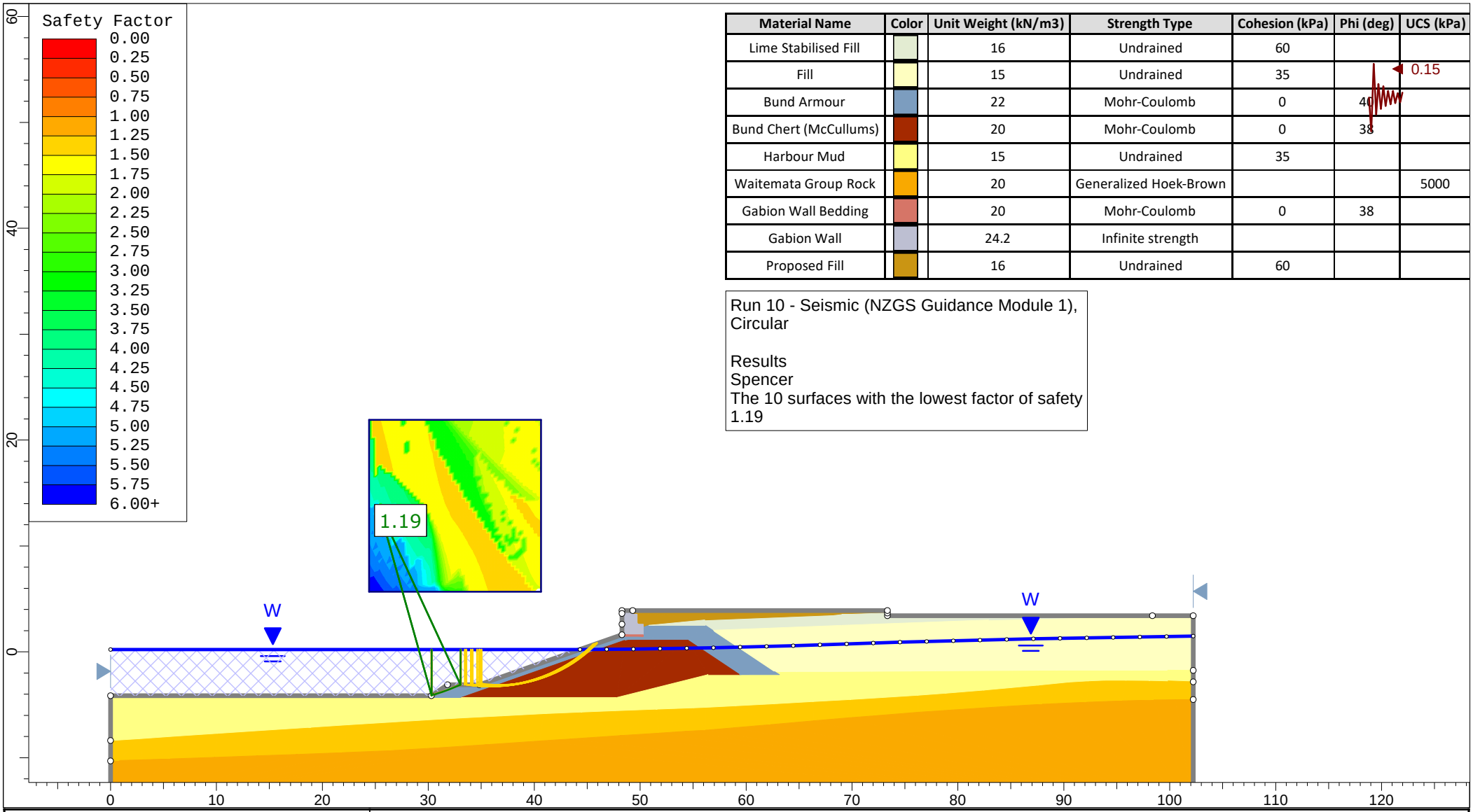
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Seismic (NZGS Guidance Module 1) - Ex. Profile | *Scenario* | Run 9 - Seismic 1, NC, BS |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section C 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 10 - Seismic (NZGS Guidance Module 1), Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.19

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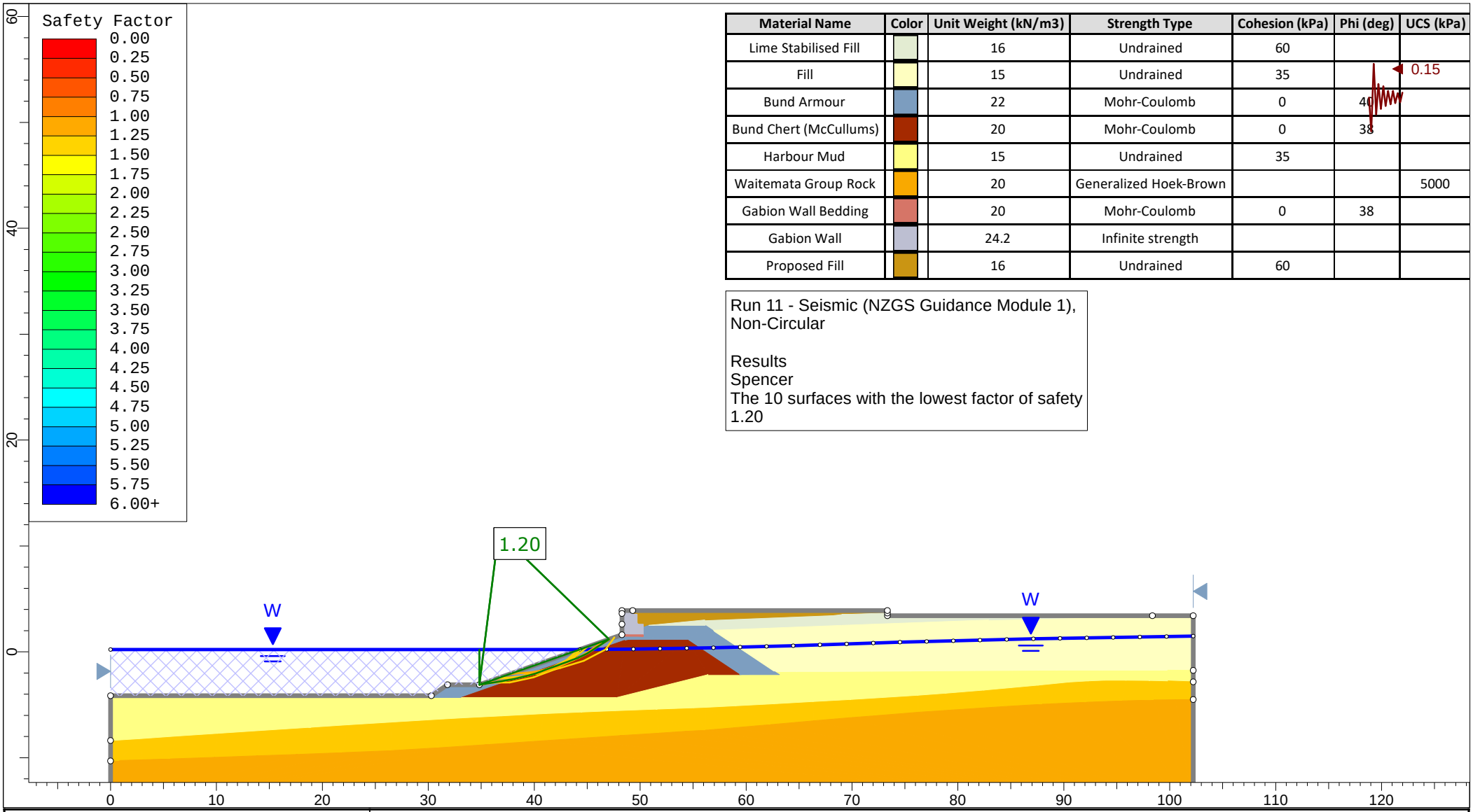
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 10 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.15

Run 11 - Seismic (NZGS Guidance Module 1), Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.20

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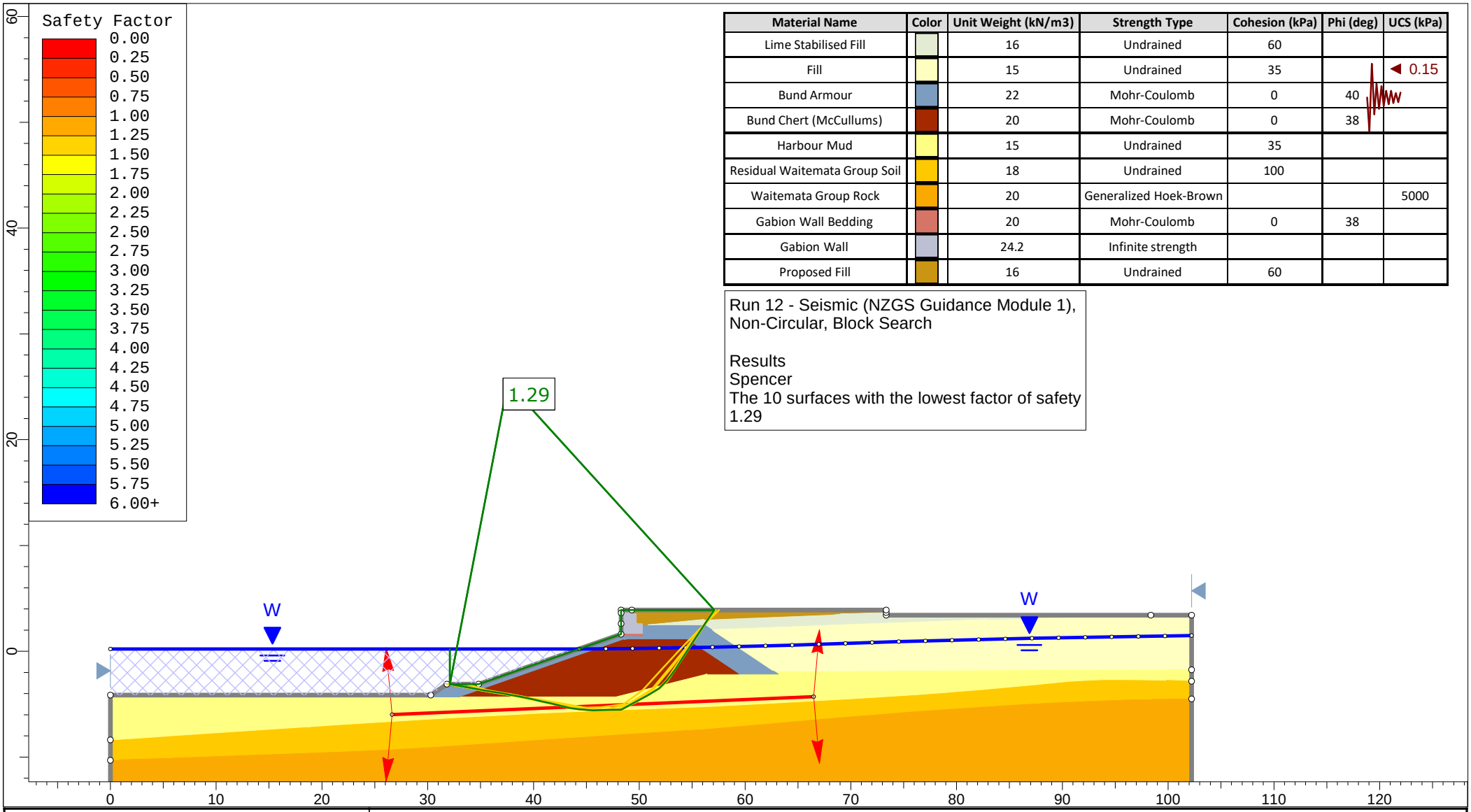
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 11 - Seimsic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | ◀ 0.15 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Residual Waitemata Group Soil | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

Run 12 - Seismic (NZGS Guidance Module 1), Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.29

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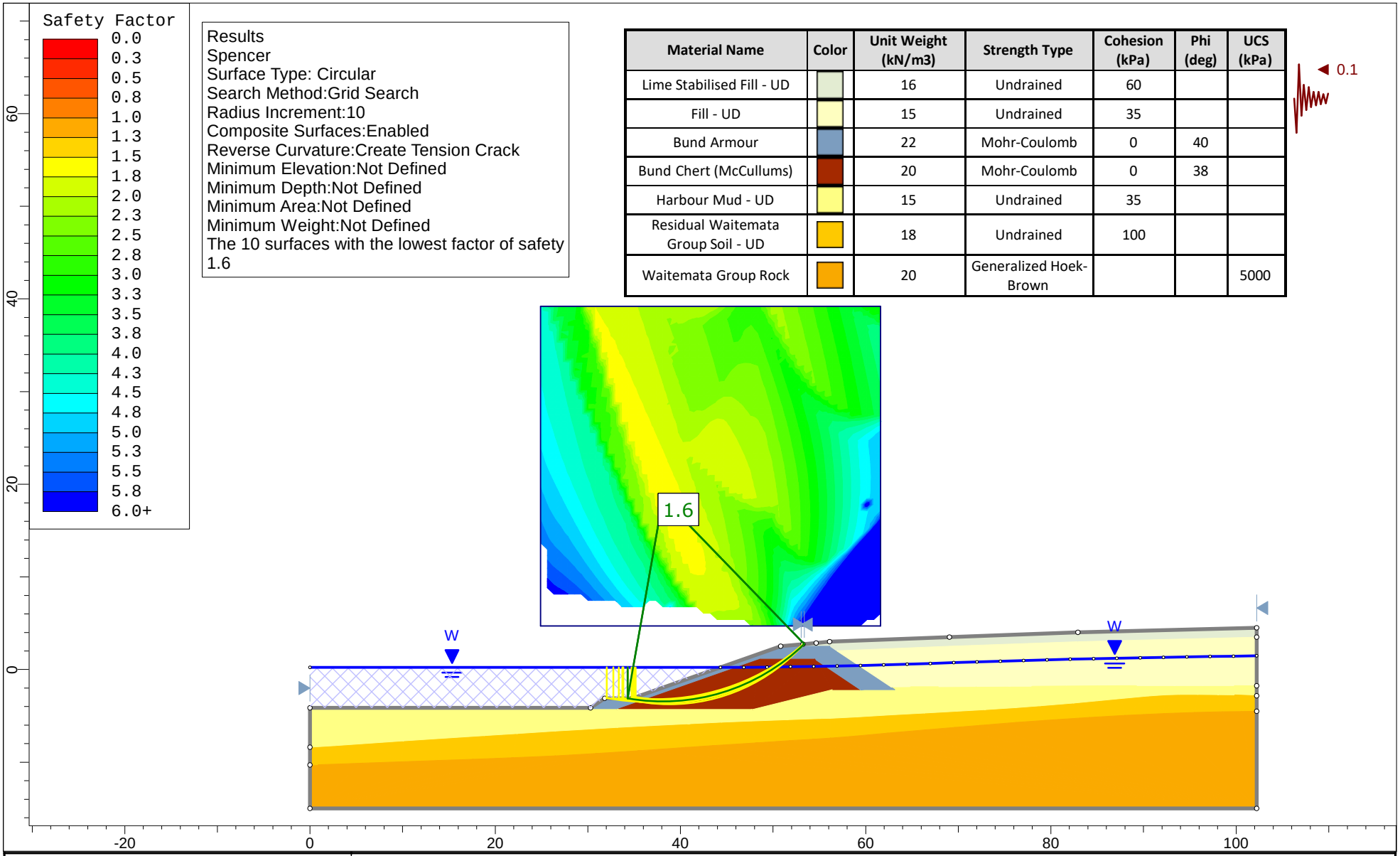
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 12 - Seimic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 1.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | Undrained | 60 | | |
| Fill - UD | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud - UD | | 15 | Undrained | 35 | | |
| Residual Waitemata Group Soil - UD | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |

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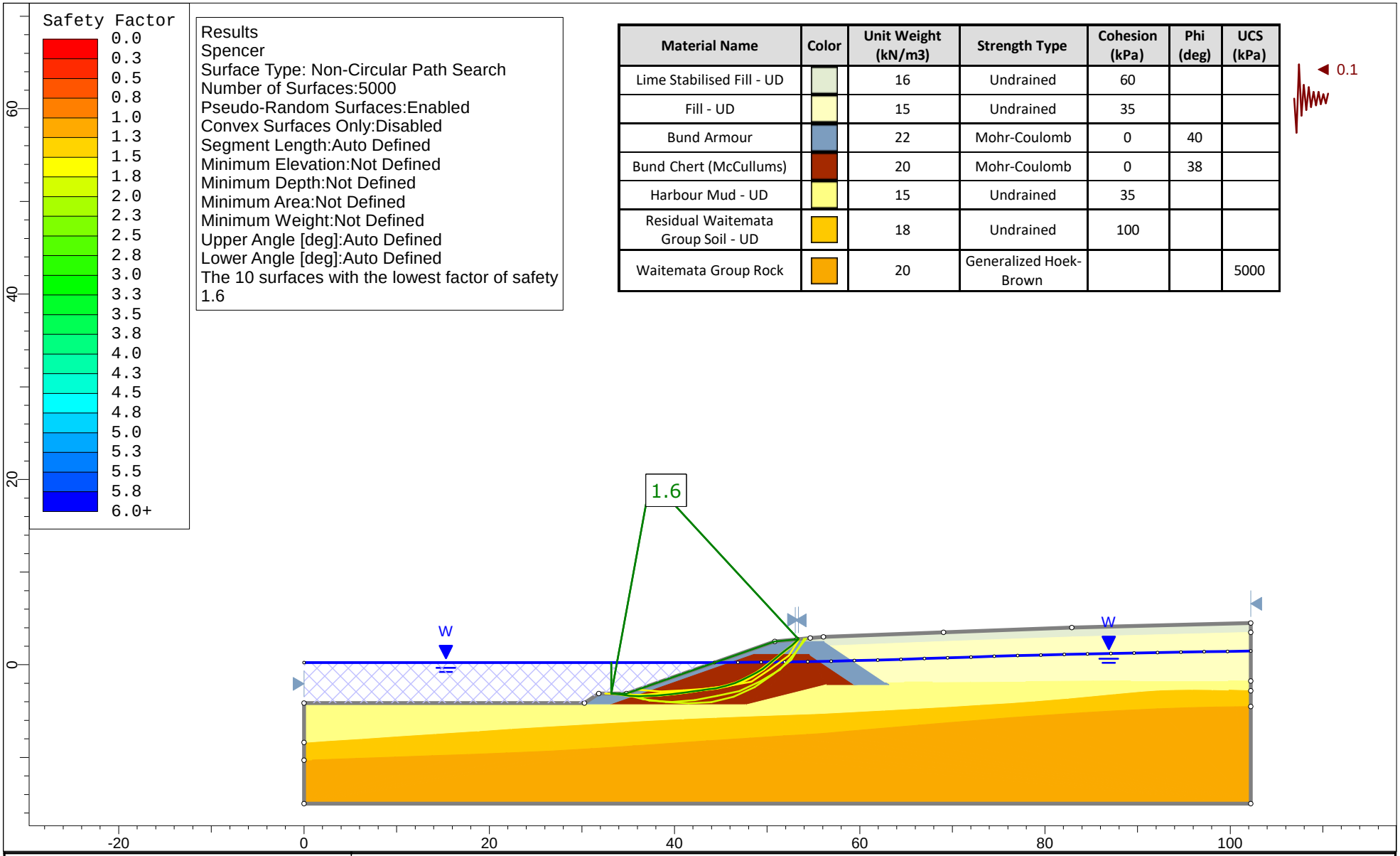
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 13 - Seismic 2, Circ |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section C 3.slmd |




Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
The 10 surfaces with the lowest factor of safety
1.6

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | Undrained | 60 | | |
| Fill - UD | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud - UD | | 15 | Undrained | 35 | | |
| Residual Waitemata Group Soil - UD | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |

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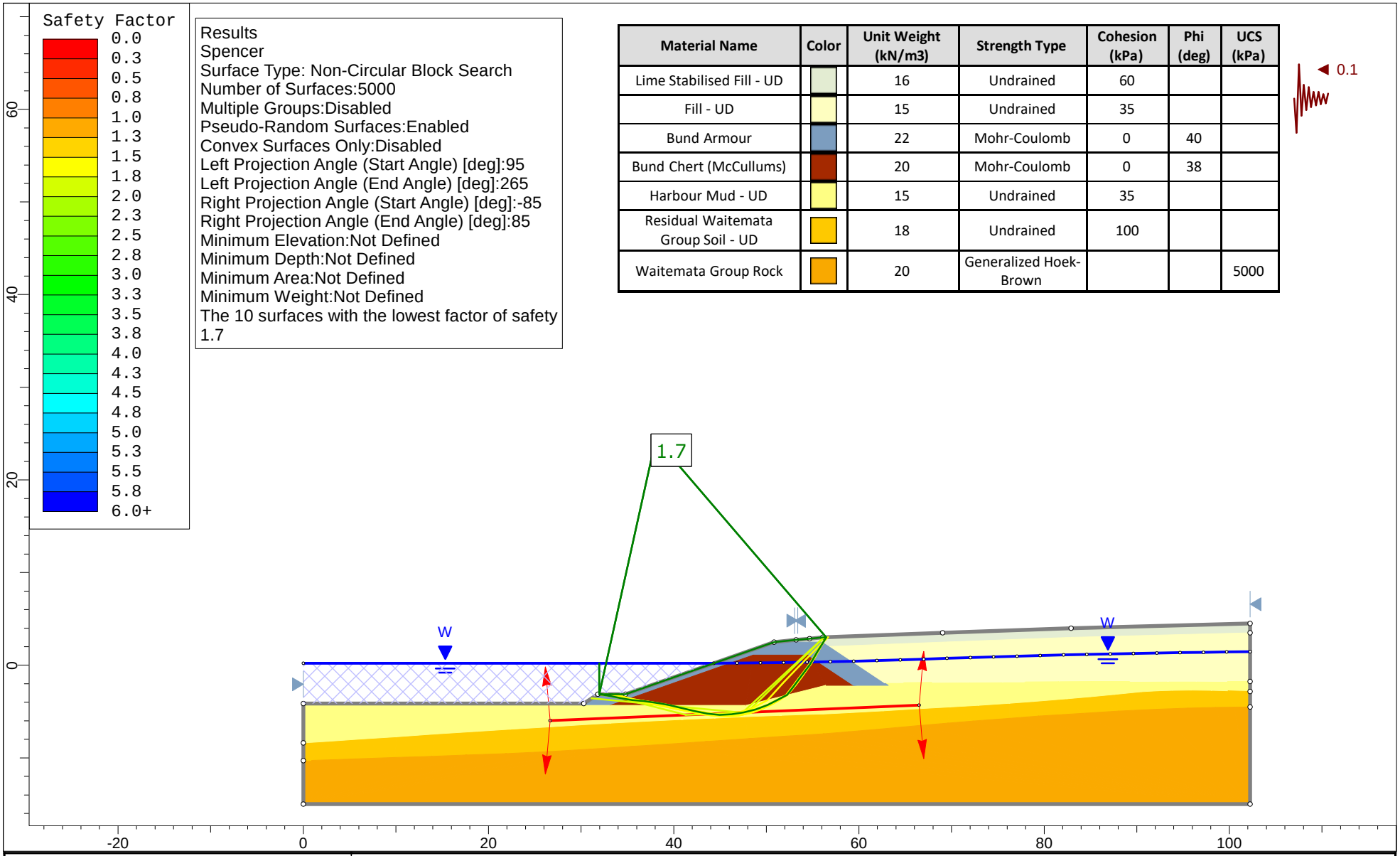
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 14 - Seismic 2, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section C 3.slmd |




Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
The 10 surfaces with the lowest factor of safety
1.7

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill - UD | | 16 | Undrained | 60 | | |
| Fill - UD | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud - UD | | 15 | Undrained | 35 | | |
| Residual Waitemata Group Soil - UD | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |

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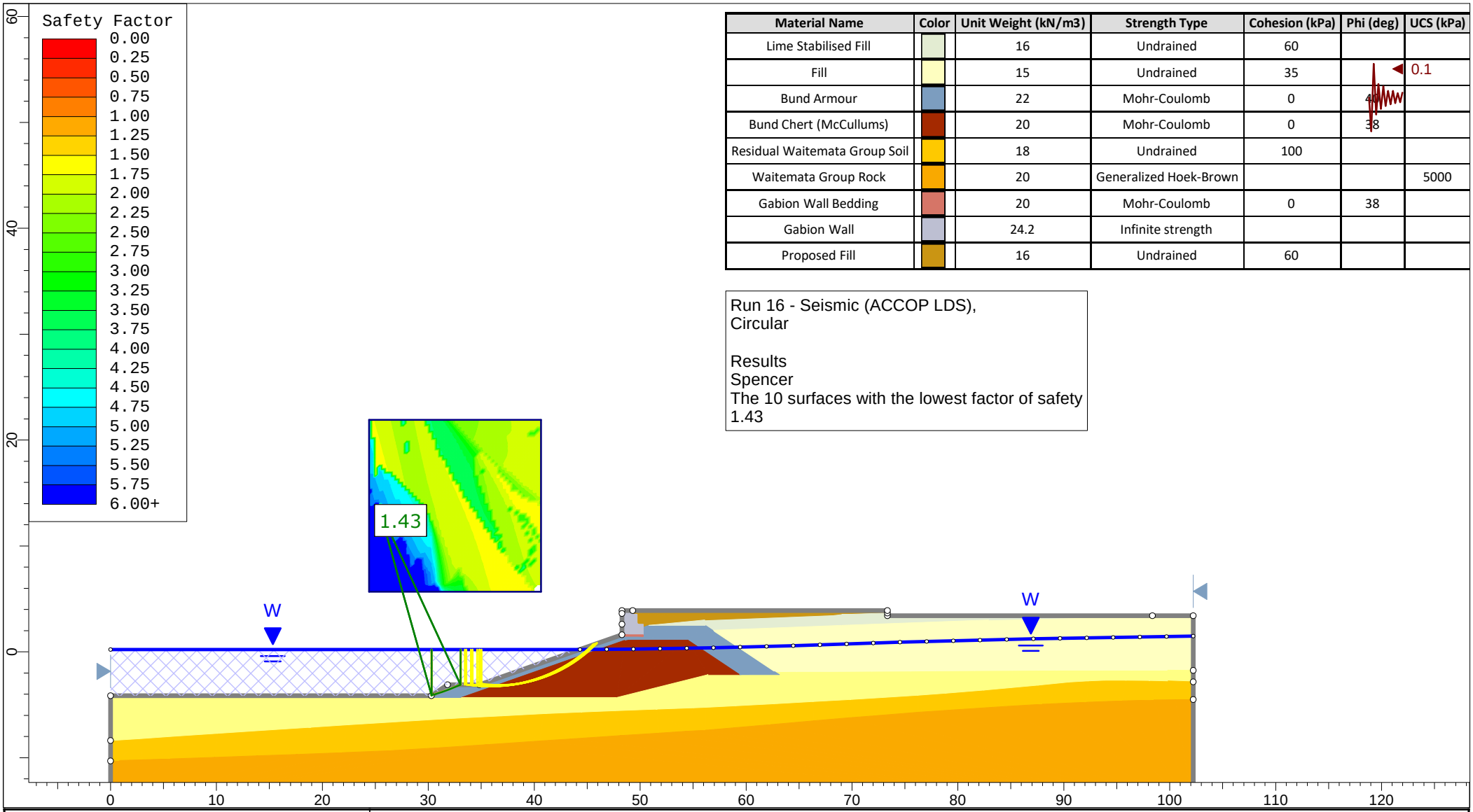
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Seimsic (ACCOP LDS) - Ex. Profile | Scenario | Run 15 - Seismic 2, NC, BS |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section C 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Residual Waitemata Group Soil | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

0.1

Run 16 - Seismic (ACCOP LDS),
Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.43

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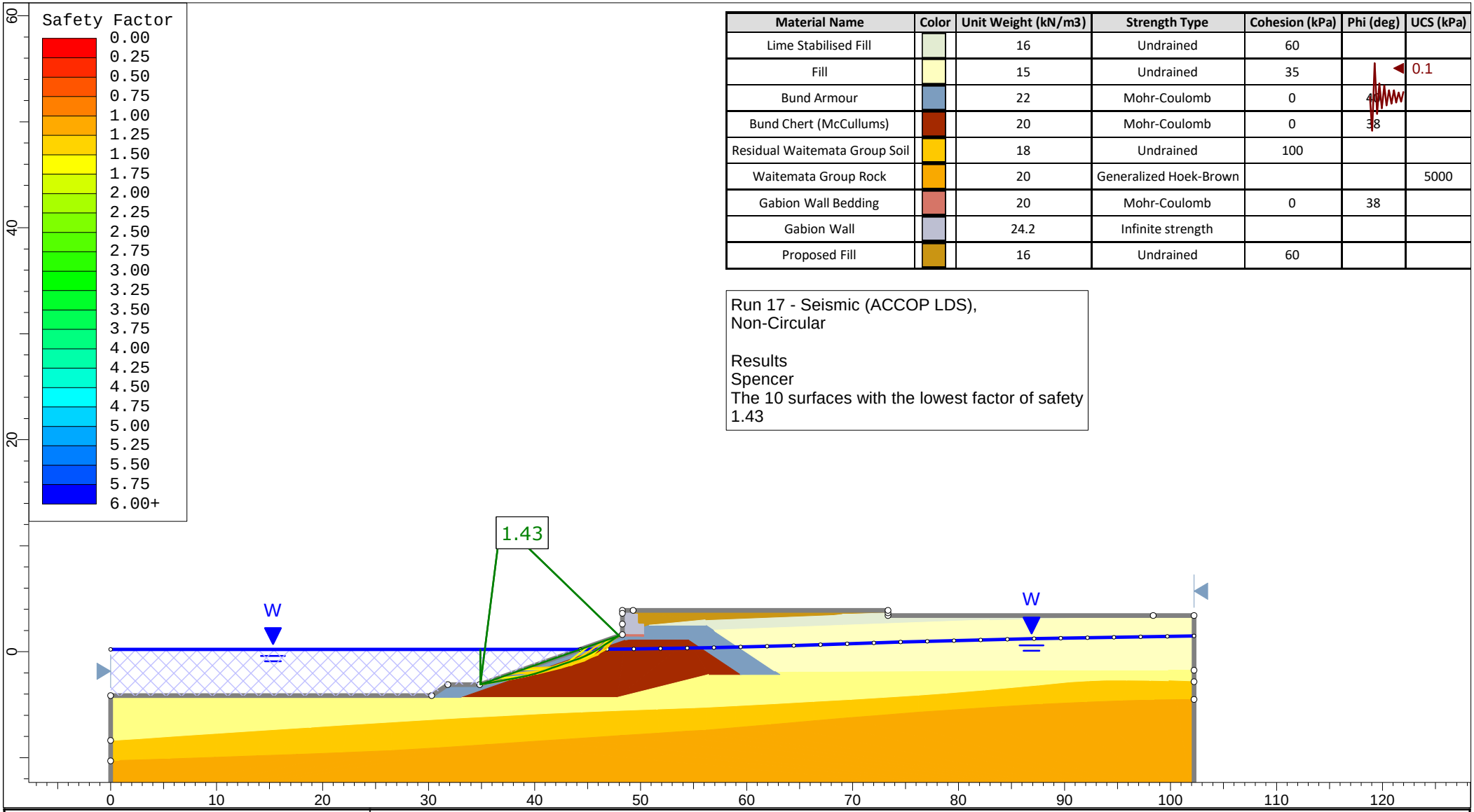
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 16 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | 0.1 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 4 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Residual Waitemata Group Soil | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

Run 17 - Seismic (ACCOP LDS),
Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.43

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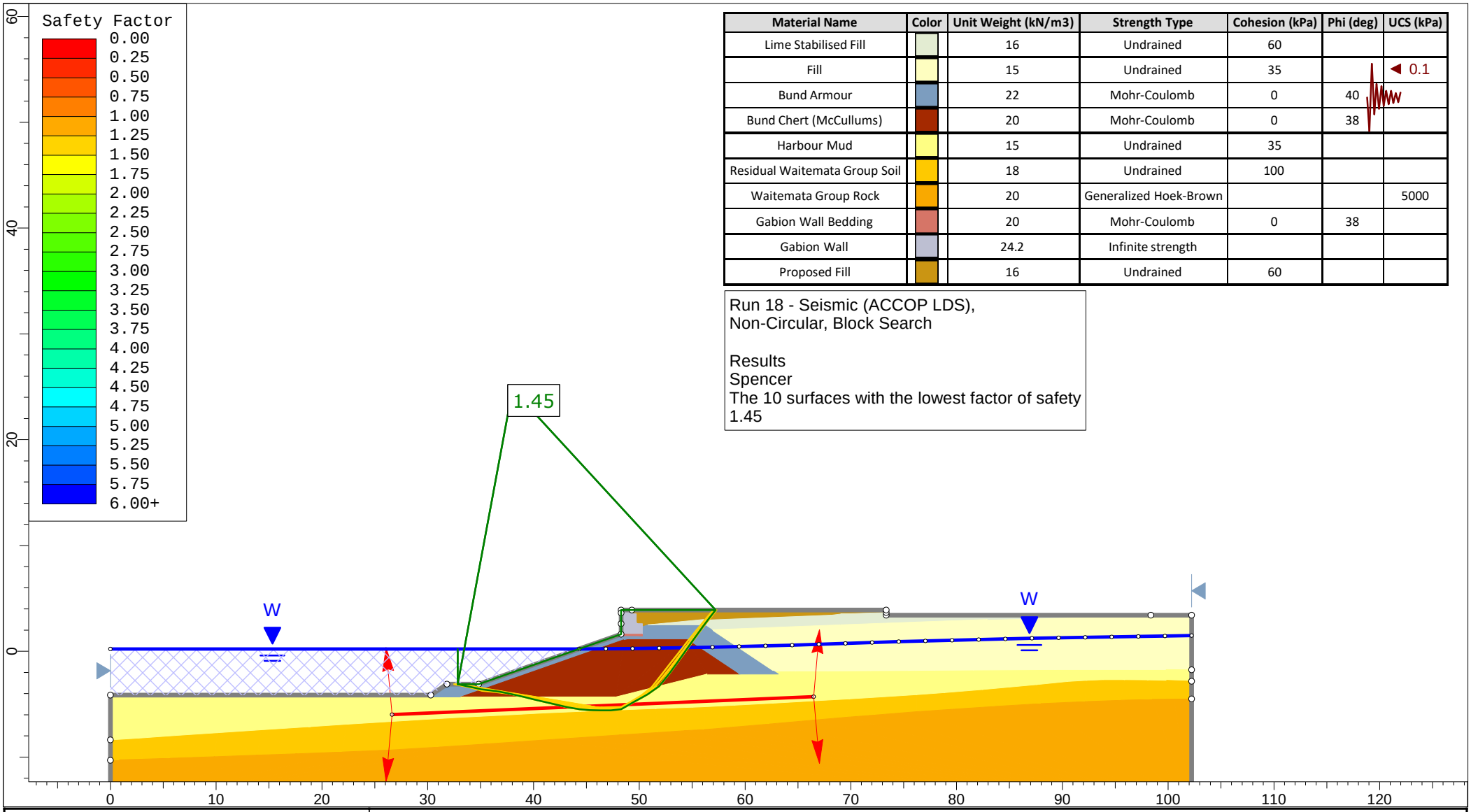
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 17 - Seimsic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 2.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) |
|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Undrained | 60 | | |
| Fill | | 15 | Undrained | 35 | | ◀ 0.1 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | |
| Harbour Mud | | 15 | Undrained | 35 | | |
| Residual Waitemata Group Soil | | 18 | Undrained | 100 | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | |
| Gabion Wall | | 24.2 | Infinite strength | | | |
| Proposed Fill | | 16 | Undrained | 60 | | |

Run 18 - Seismic (ACCOP LDS),
Non-Circular, Block Search

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.45

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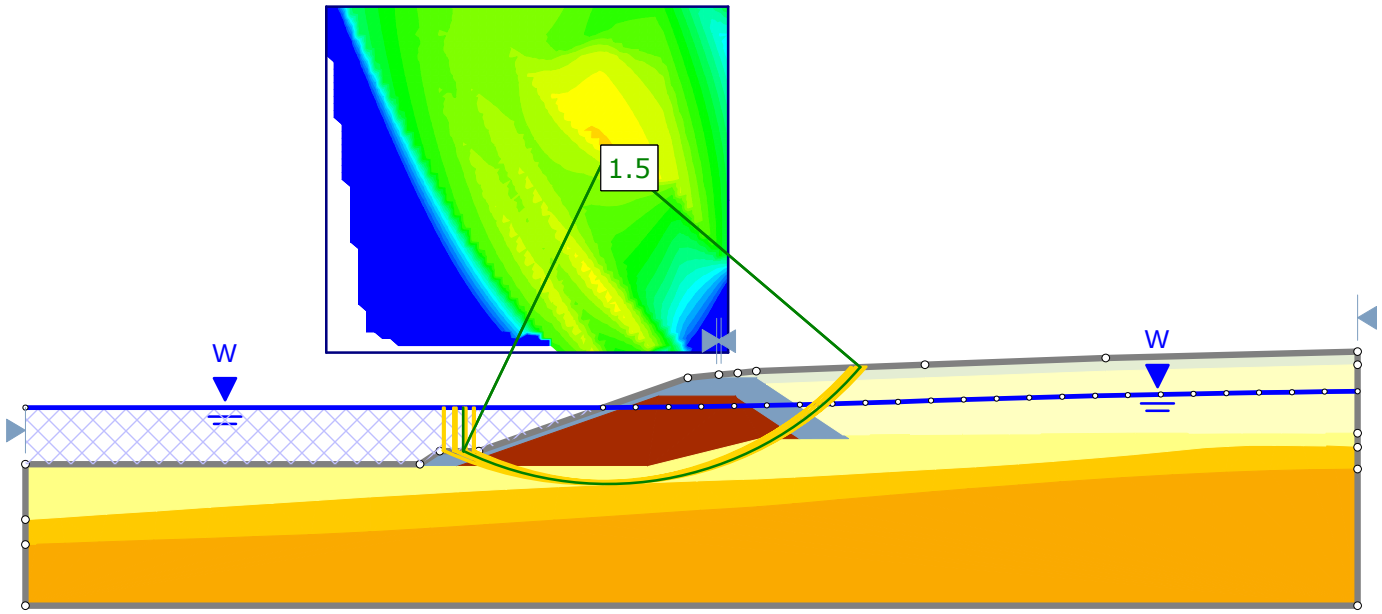
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 18 - Seimic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 2.slmd |

Safety Factor
0.0
0.3
0.5
0.8
1.0
1.3
1.5
1.8
2.0
2.3
2.5
2.8
3.0
3.3
3.5
3.8
4.0
4.3
4.5
4.8
5.0
5.3
5.5
5.8
6.0+

Results
Spencer
Surface Type: Circular
Search Method:Grid Search
Radius Increment:10
Composite Surfaces:Enabled
Reverse Curvature:Create Tension Crack
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
The 10 surfaces with the lowest factor of safety
1.5

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | Vertical Stress Ratio | | | | 0.07 | 30 |
| Fill - VSR | | 15 | Vertical Stress Ratio | | | | 0.06 | 15 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | Vertical Stress Ratio | | | | 0.05 | 15 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |



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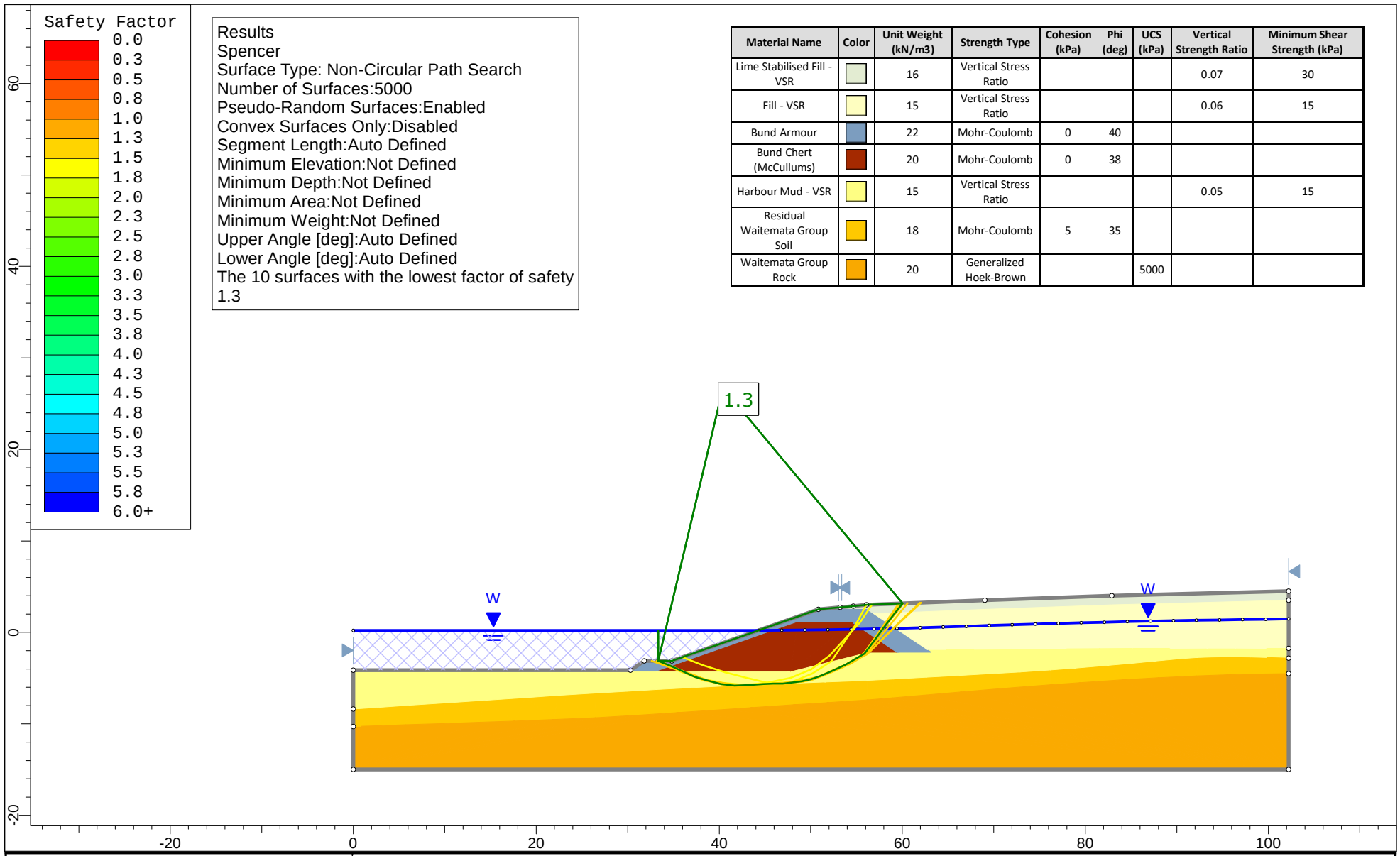
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static, Seismic Reduced Strengths - Ex. Profile | Scenario | Run 19 - Static SR, Circ |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section C 4.slmd |

Safety Factor
0.0
0.3
0.5
0.8
1.0
1.3
1.5
1.8
2.0
2.3
2.5
2.8
3.0
3.3
3.5
3.8
4.0
4.3
4.5
4.8
5.0
5.3
5.5
5.8
6.0+

Results
Spencer
Surface Type: Non-Circular Path Search
Number of Surfaces:5000
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Segment Length:Auto Defined
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
Upper Angle [deg]:Auto Defined
Lower Angle [deg]:Auto Defined
The 10 surfaces with the lowest factor of safety
1.3

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | Vertical Stress Ratio | | | | 0.07 | 30 |
| Fill - VSR | | 15 | Vertical Stress Ratio | | | | 0.06 | 15 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | Vertical Stress Ratio | | | | 0.05 | 15 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |

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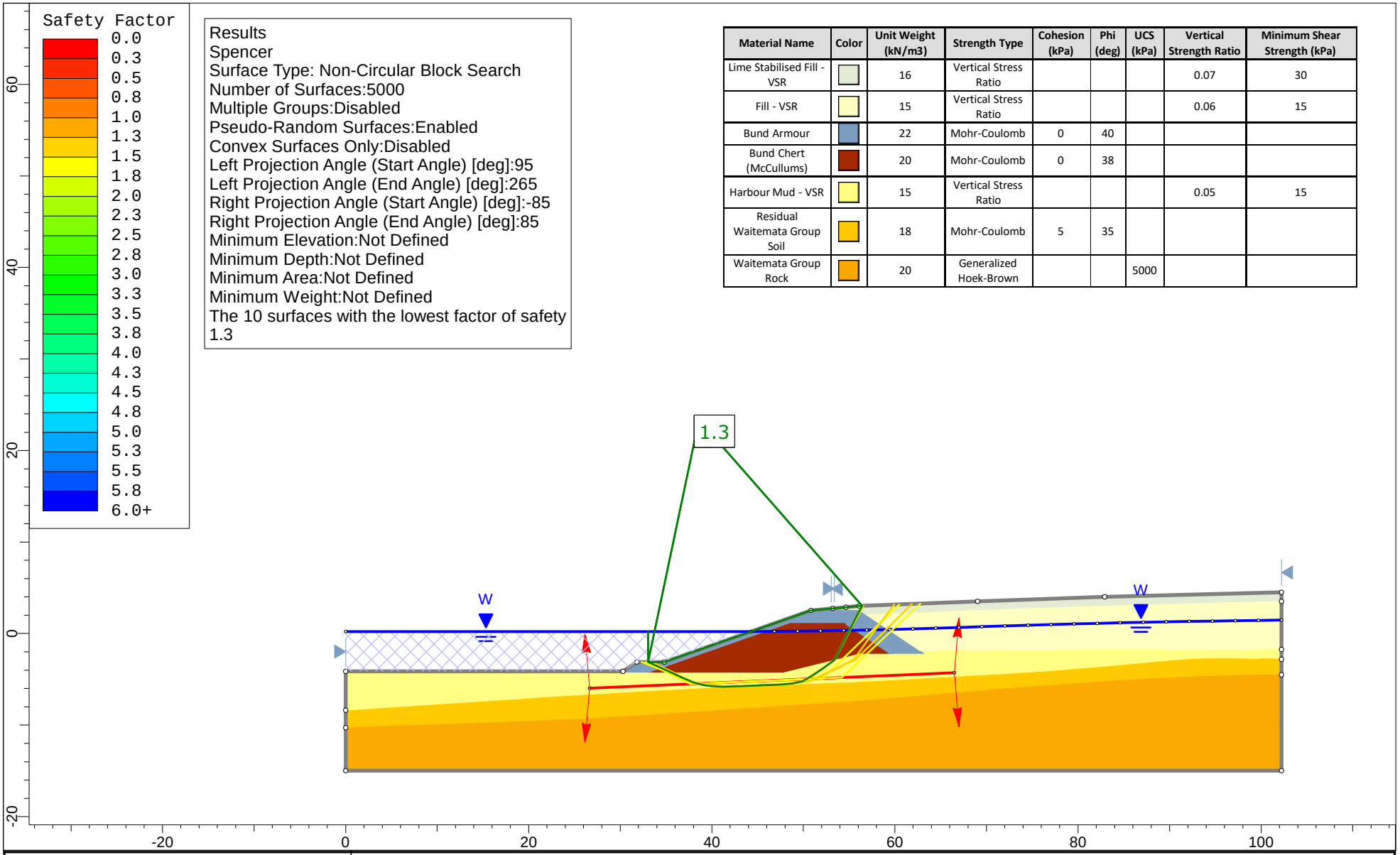
| | | | |
|---|---|---|---|
| Project | K200265 - Bayswater Maritime Village | | |
| Group | Static, Seismic Reduced Strengths - Ex. Profile | Scenario | Run 20 - Static SR, NC |
| Drawn By | PH | Company | KGA |
| Date | 2/08/2020 | File Name | K200265 - Section C 4.slmd |

SLIDEINTERPRET 9.008




Results
Spencer
Surface Type: Non-Circular Block Search
Number of Surfaces:5000
Multiple Groups:Disabled
Pseudo-Random Surfaces:Enabled
Convex Surfaces Only:Disabled
Left Projection Angle (Start Angle) [deg]:95
Left Projection Angle (End Angle) [deg]:265
Right Projection Angle (Start Angle) [deg]:-85
Right Projection Angle (End Angle) [deg]:85
Minimum Elevation:Not Defined
Minimum Depth:Not Defined
Minimum Area:Not Defined
Minimum Weight:Not Defined
The 10 surfaces with the lowest factor of safety
1.3

| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill - VSR | | 16 | Vertical Stress Ratio | | | | 0.07 | 30 |
| Fill - VSR | | 15 | Vertical Stress Ratio | | | | 0.06 | 15 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud - VSR | | 15 | Vertical Stress Ratio | | | | 0.05 | 15 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |

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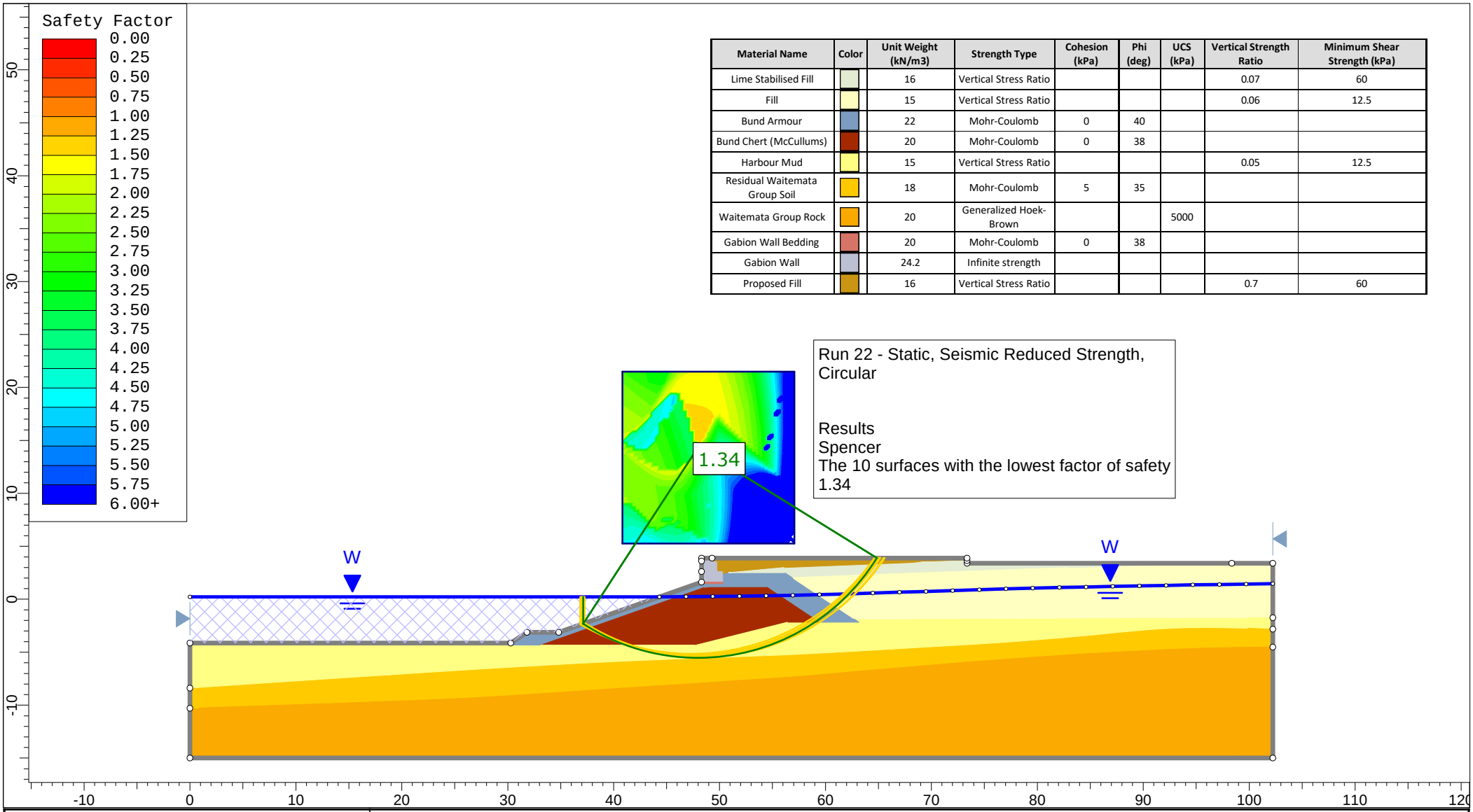
| | | | |
|---|---|---|---|
| *Project* | K200265 - Bayswater Maritime Village | | |
| *Group* | Static, Seismic Reduced Strengths - Ex. Profile | *Scenario* | Run 21 - Static SR, NC, BS |
| *Drawn By* | PH | *Company* | KGA |
| *Date* | 2/08/2020 | *File Name* | K200265 - Section C 4.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

Run 22 - Static, Seismic Reduced Strength, Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.34

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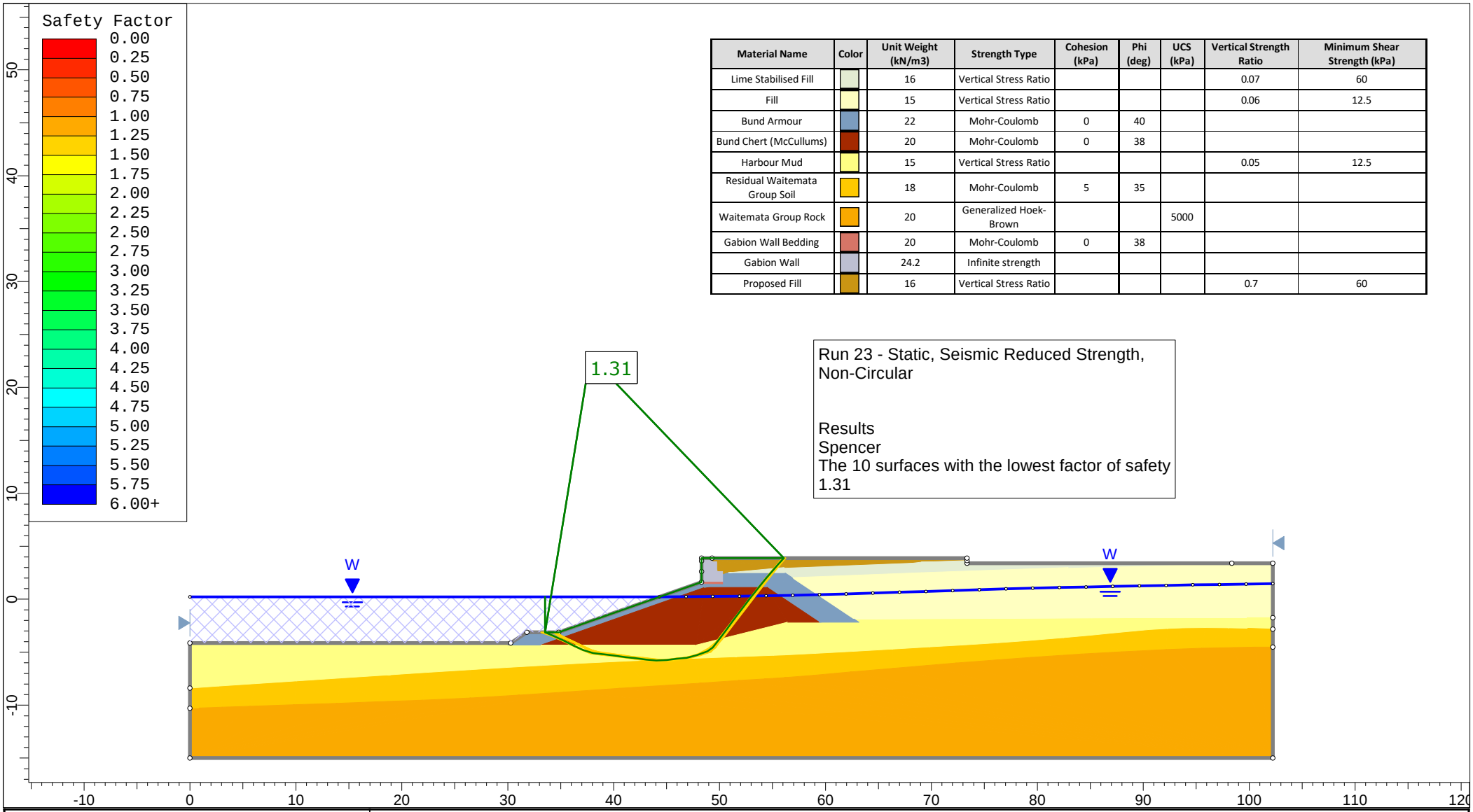
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 22 - Seismic, Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

Run 23 - Static, Seismic Reduced Strength, Non-Circular

Results
Spencer
The 10 surfaces with the lowest factor of safety
1.31

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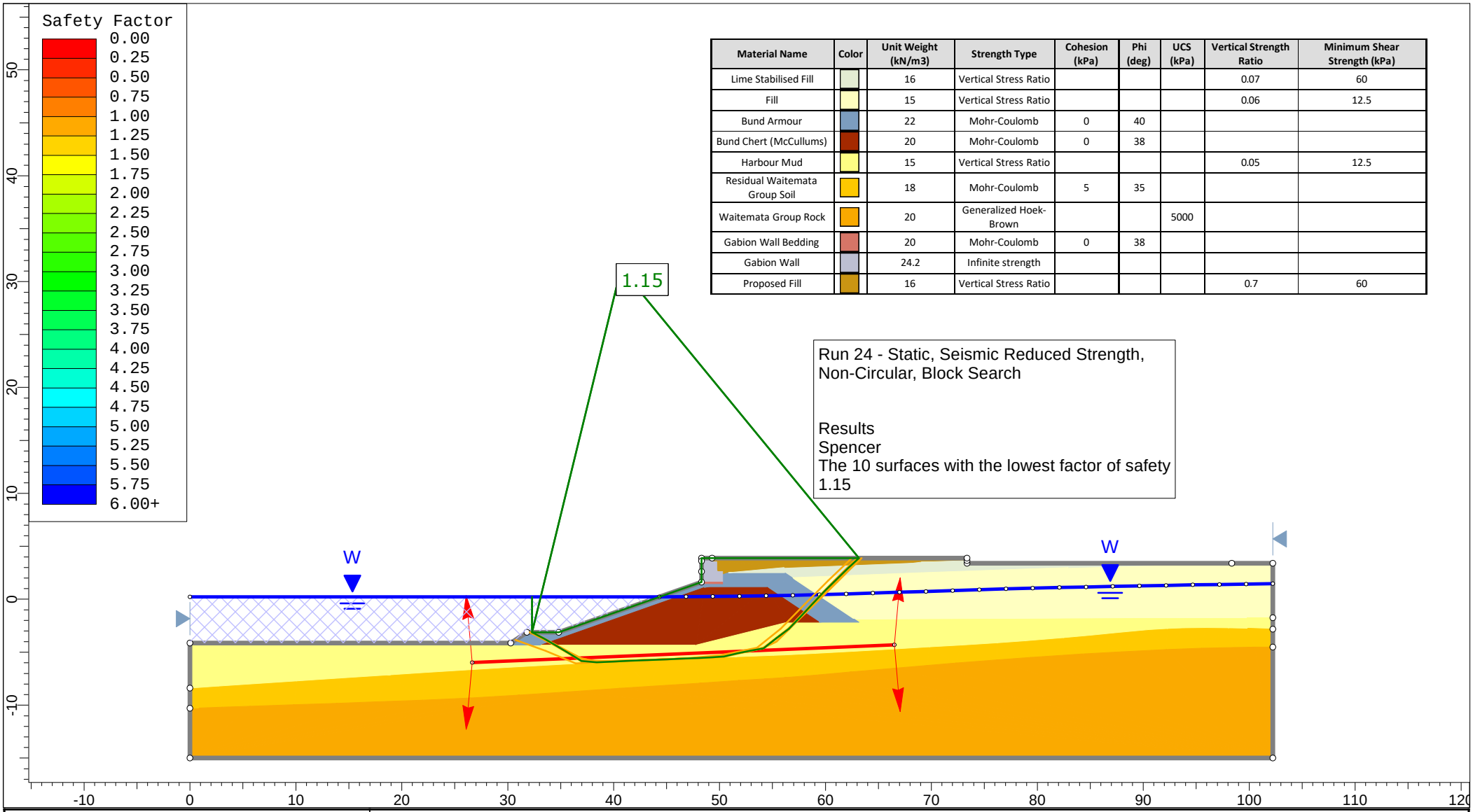
| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 23 - Seimsic, Non-Circular |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 3.slmd |




| Material Name | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (deg) | UCS (kPa) | Vertical Strength Ratio | Minimum Shear Strength (kPa) |
|---|---|---|---|---|---|---|---|---|
| Lime Stabilised Fill | | 16 | Vertical Stress Ratio | | | | 0.07 | 60 |
| Fill | | 15 | Vertical Stress Ratio | | | | 0.06 | 12.5 |
| Bund Armour | | 22 | Mohr-Coulomb | 0 | 40 | | | |
| Bund Chert (McCullums) | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Harbour Mud | | 15 | Vertical Stress Ratio | | | | 0.05 | 12.5 |
| Residual Waitemata Group Soil | | 18 | Mohr-Coulomb | 5 | 35 | | | |
| Waitemata Group Rock | | 20 | Generalized Hoek-Brown | | | 5000 | | |
| Gabion Wall Bedding | | 20 | Mohr-Coulomb | 0 | 38 | | | |
| Gabion Wall | | 24.2 | Infinite strength | | | | | |
| Proposed Fill | | 16 | Vertical Stress Ratio | | | | 0.7 | 60 |

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| | | | |
|---|---|---|---|
| Project | Bayswater Maritime Village | | |
| Group | Group 1 | Scenario | Run 24 - Seimic, Non-Circular, Block Search |
| Drawn By | PH | Scale | 1:500 |
| Company | KGA Geotechnical Group Limited | | |
| Date | Jan-2021 | File Name | K200265 - Revised Section C Proposed - Seismic Scenarios 3.slmd |

# APPENDIX 7

Static Settlement Assessment Results

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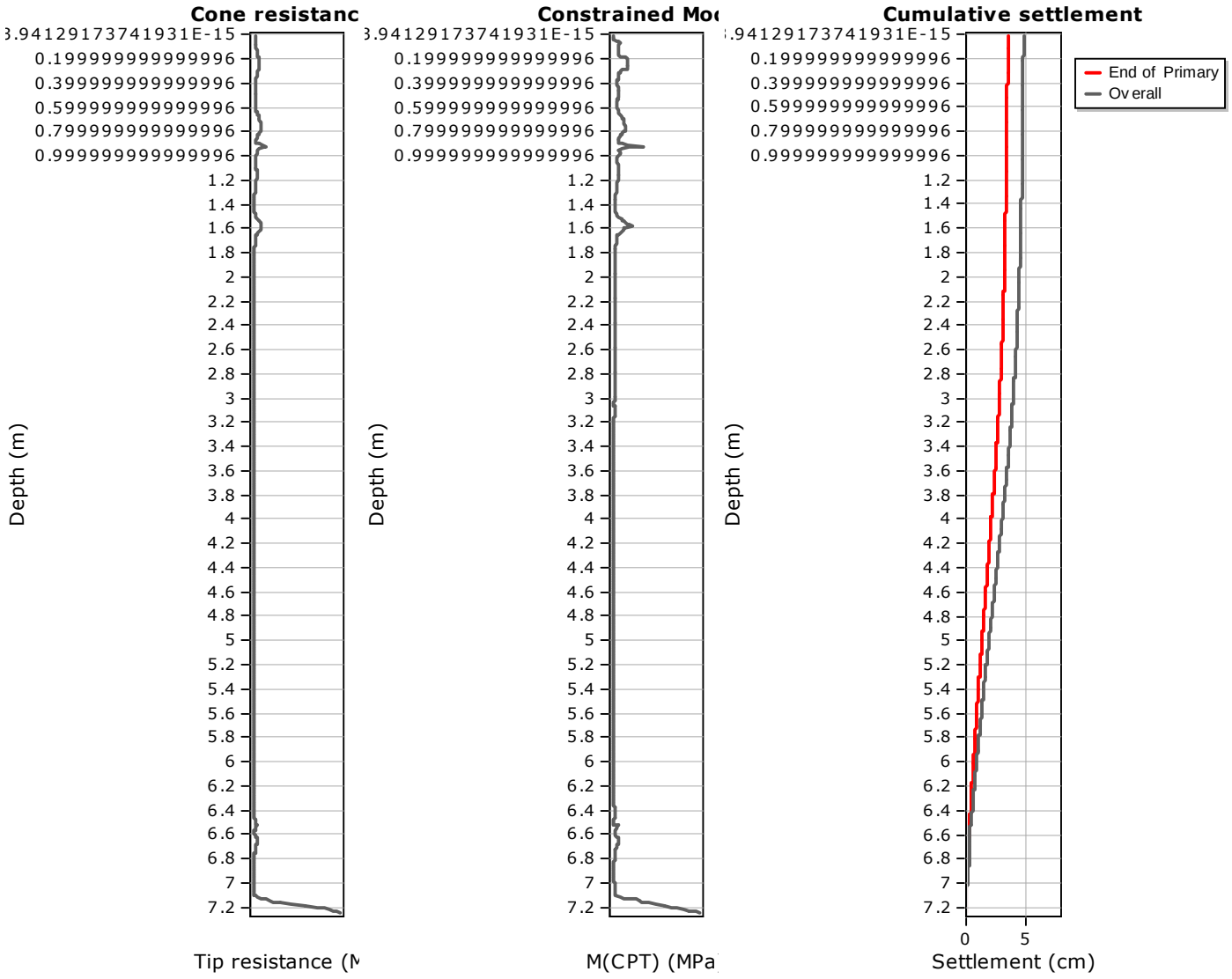
**KGA Geotechnical**
Unit 3 - 201 Opawa Rd
Hillsborough
Christchurch

**CPT: CPT1**
Total depth: 7.25 m, Date: 23/09/2020
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

**Project:** **K200265**
**Location:** **Bayswater Maritime Village Development**

## Settlements calculation according to theory of elasticity*




## Calculation properties

Footing type: Rectangular
Footing width: 50.00 (m)
L/B: 10.0
Footing pressure: 18.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlements calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlements calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where $t_p$ is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | $M_{(CPT)}$ (MPa) | Iz | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 691 | 6.91 | 6.92 | 0.01 | 6.92 | 17.85 | 2.78 | 0.99 | 0.006 | 0.003 | 0.010 |
| 692 | 6.92 | 6.93 | 0.01 | 6.93 | 17.85 | 2.91 | 0.99 | 0.006 | 0.003 | 0.009 |
| 693 | 6.93 | 6.94 | 0.01 | 6.94 | 17.85 | 2.97 | 0.99 | 0.006 | 0.003 | 0.009 |
| 694 | 6.94 | 6.95 | 0.01 | 6.95 | 17.85 | 3.01 | 0.99 | 0.006 | 0.003 | 0.009 |
| 695 | 6.95 | 6.96 | 0.01 | 6.96 | 17.85 | 3.05 | 0.99 | 0.006 | 0.003 | 0.009 |
| 696 | 6.96 | 6.97 | 0.01 | 6.97 | 17.85 | 3.07 | 0.99 | 0.006 | 0.003 | 0.009 |
| 697 | 6.97 | 6.98 | 0.01 | 6.98 | 17.85 | 3.11 | 0.99 | 0.006 | 0.003 | 0.009 |
| 698 | 6.98 | 6.99 | 0.01 | 6.99 | 17.85 | 3.13 | 0.99 | 0.006 | 0.003 | 0.009 |
| 699 | 6.99 | 7.00 | 0.01 | 7.00 | 17.85 | 3.17 | 0.99 | 0.006 | 0.003 | 0.009 |
| 700 | 7.00 | 7.01 | 0.01 | 7.01 | 17.85 | 3.21 | 0.99 | 0.006 | 0.003 | 0.009 |
| 701 | 7.01 | 7.02 | 0.01 | 7.02 | 17.85 | 3.29 | 0.99 | 0.005 | 0.003 | 0.008 |
| 702 | 7.02 | 7.03 | 0.01 | 7.03 | 17.85 | 3.39 | 0.99 | 0.005 | 0.003 | 0.008 |
| 703 | 7.03 | 7.04 | 0.01 | 7.04 | 17.84 | 3.49 | 0.99 | 0.005 | 0.003 | 0.008 |
| 704 | 7.04 | 7.05 | 0.01 | 7.05 | 17.84 | 3.61 | 0.99 | 0.005 | 0.003 | 0.008 |
| 705 | 7.05 | 7.06 | 0.01 | 7.06 | 17.84 | 3.65 | 0.99 | 0.005 | 0.003 | 0.008 |
| 706 | 7.06 | 7.07 | 0.01 | 7.07 | 17.84 | 3.76 | 0.99 | 0.005 | 0.003 | 0.007 |
| 707 | 7.07 | 7.08 | 0.01 | 7.08 | 17.84 | 3.87 | 0.99 | 0.005 | 0.002 | 0.007 |
| 708 | 7.08 | 7.09 | 0.01 | 7.09 | 17.84 | 4.04 | 0.99 | 0.004 | 0.002 | 0.007 |
| 709 | 7.09 | 7.10 | 0.01 | 7.10 | 17.84 | 4.21 | 0.99 | 0.004 | 0.002 | 0.007 |
| 710 | 7.10 | 7.11 | 0.01 | 7.11 | 17.84 | 4.46 | 0.99 | 0.004 | 0.002 | 0.006 |
| 711 | 7.11 | 7.12 | 0.01 | 7.12 | 17.84 | 7.52 | 0.99 | 0.002 | 0.001 | 0.004 |
| 712 | 7.12 | 7.13 | 0.01 | 7.13 | 17.84 | 19.06 | 0.99 | 0.001 | 0.000 | 0.001 |
| 713 | 7.13 | 7.14 | 0.01 | 7.14 | 17.84 | 32.60 | 0.99 | 0.001 | 0.000 | 0.001 |
| 714 | 7.14 | 7.15 | 0.01 | 7.15 | 17.84 | 64.49 | 0.99 | 0.000 | 0.000 | 0.000 |
| 715 | 7.15 | 7.16 | 0.01 | 7.16 | 17.84 | 73.00 | 0.99 | 0.000 | 0.000 | 0.000 |
| 716 | 7.16 | 7.17 | 0.01 | 7.17 | 17.84 | 82.23 | 0.99 | 0.000 | 0.000 | 0.000 |
| 717 | 7.17 | 7.18 | 0.01 | 7.18 | 17.84 | 98.84 | 0.99 | 0.000 | 0.000 | 0.000 |
| 718 | 7.18 | 7.19 | 0.01 | 7.19 | 17.84 | 120.42 | 0.99 | 0.000 | 0.000 | 0.000 |
| 719 | 7.19 | 7.20 | 0.01 | 7.20 | 17.83 | 144.60 | 0.99 | 0.000 | 0.000 | 0.000 |
| 720 | 7.20 | 7.21 | 0.01 | 7.21 | 17.83 | 163.76 | 0.99 | 0.000 | 0.000 | 0.000 |
| 721 | 7.21 | 7.22 | 0.01 | 7.22 | 17.83 | 179.85 | 0.99 | 0.000 | 0.000 | 0.000 |
| 722 | 7.22 | 7.23 | 0.01 | 7.23 | 17.83 | 197.59 | 0.99 | 0.000 | 0.000 | 0.000 |
| 723 | 7.23 | 7.24 | 0.01 | 7.24 | 17.83 | 214.39 | 0.99 | 0.000 | 0.000 | 0.000 |
| 724 | 7.24 | 7.25 | 0.01 | 7.25 | 17.83 | 232.97 | 0.99 | 0.000 | 0.000 | 0.000 |

**Total primary settlement: 3.57**
**Total secondary settlement: 1.31**

**Total calculated settlement: 4.89**

**Abbreviations**

| | |
|---|---|
| Start depth: | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth: | End depth of soil layer (penetration depth measured from ground free surface) |
| Thickness: | Thickness of soil layer |
| Relative depth: | Depth of calculation relative to footing |
| Iz: | Stress influence factor |
| Delta P: | Footing impossed stress: |
| Eff. stress: | Effective stress |
| $M_{(CPT)}$: | Constrained modulus from CPT |
| Settlement: | Primary settlement |
| Second. settlement: | Secondary settlemends due to creep |

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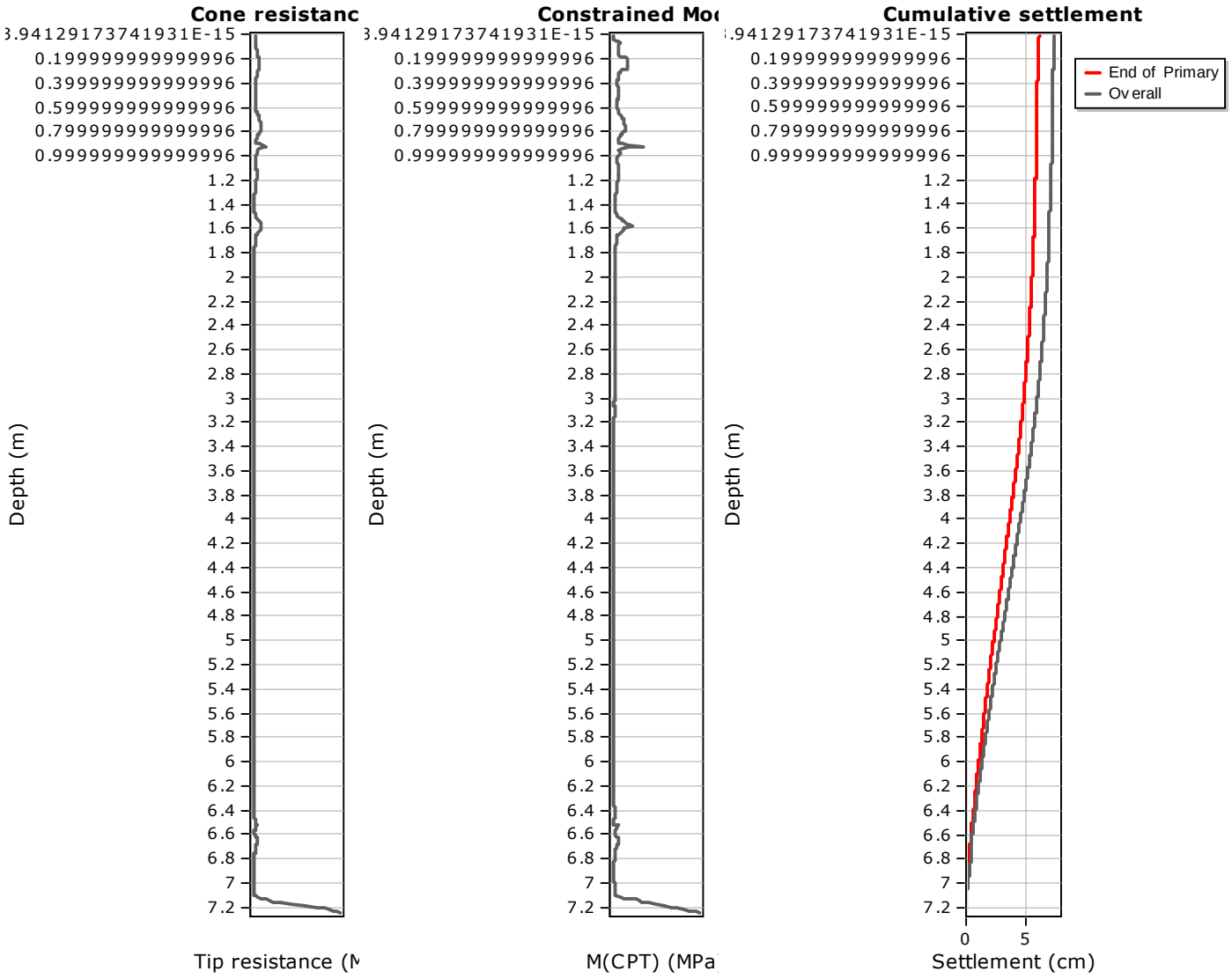
**KGA Geotechnical**
Unit 3 - 201 Opawa Rd
Hillsborough
Christchurch

**CPT: CPT1**
Total depth: 7.25 m, Date: 23/09/2020
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

**Project:** **K200265**
**Location:** **Bayswater Maritime Village Development**

## Settlements calculation according to theory of elasticity*




## Calculation properties

Footing type: Rectangular
Footing width: 50.00 (m)
L/B: 10.0
Footing pressure: 31.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlements calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlements calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where $t_p$ is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | $M_{(CPT)}$ (MPa) | Iz | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 691 | 6.91 | 6.92 | 0.01 | 6.92 | 30.75 | 2.78 | 0.99 | 0.011 | 0.003 | 0.014 |
| 692 | 6.92 | 6.93 | 0.01 | 6.93 | 30.74 | 2.91 | 0.99 | 0.011 | 0.003 | 0.014 |
| 693 | 6.93 | 6.94 | 0.01 | 6.94 | 30.74 | 2.97 | 0.99 | 0.010 | 0.003 | 0.014 |
| 694 | 6.94 | 6.95 | 0.01 | 6.95 | 30.74 | 3.01 | 0.99 | 0.010 | 0.003 | 0.013 |
| 695 | 6.95 | 6.96 | 0.01 | 6.96 | 30.74 | 3.05 | 0.99 | 0.010 | 0.003 | 0.013 |
| 696 | 6.96 | 6.97 | 0.01 | 6.97 | 30.74 | 3.07 | 0.99 | 0.010 | 0.003 | 0.013 |
| 697 | 6.97 | 6.98 | 0.01 | 6.98 | 30.74 | 3.11 | 0.99 | 0.010 | 0.003 | 0.013 |
| 698 | 6.98 | 6.99 | 0.01 | 6.99 | 30.74 | 3.13 | 0.99 | 0.010 | 0.003 | 0.013 |
| 699 | 6.99 | 7.00 | 0.01 | 7.00 | 30.74 | 3.17 | 0.99 | 0.010 | 0.003 | 0.013 |
| 700 | 7.00 | 7.01 | 0.01 | 7.01 | 30.74 | 3.21 | 0.99 | 0.010 | 0.003 | 0.013 |
| 701 | 7.01 | 7.02 | 0.01 | 7.02 | 30.73 | 3.29 | 0.99 | 0.009 | 0.003 | 0.012 |
| 702 | 7.02 | 7.03 | 0.01 | 7.03 | 30.73 | 3.39 | 0.99 | 0.009 | 0.003 | 0.012 |
| 703 | 7.03 | 7.04 | 0.01 | 7.04 | 30.73 | 3.49 | 0.99 | 0.009 | 0.003 | 0.012 |
| 704 | 7.04 | 7.05 | 0.01 | 7.05 | 30.73 | 3.61 | 0.99 | 0.009 | 0.003 | 0.011 |
| 705 | 7.05 | 7.06 | 0.01 | 7.06 | 30.73 | 3.65 | 0.99 | 0.008 | 0.003 | 0.011 |
| 706 | 7.06 | 7.07 | 0.01 | 7.07 | 30.73 | 3.76 | 0.99 | 0.008 | 0.003 | 0.011 |
| 707 | 7.07 | 7.08 | 0.01 | 7.08 | 30.73 | 3.87 | 0.99 | 0.008 | 0.002 | 0.010 |
| 708 | 7.08 | 7.09 | 0.01 | 7.09 | 30.73 | 4.04 | 0.99 | 0.008 | 0.002 | 0.010 |
| 709 | 7.09 | 7.10 | 0.01 | 7.10 | 30.73 | 4.21 | 0.99 | 0.007 | 0.002 | 0.010 |
| 710 | 7.10 | 7.11 | 0.01 | 7.11 | 30.72 | 4.46 | 0.99 | 0.007 | 0.002 | 0.009 |
| 711 | 7.11 | 7.12 | 0.01 | 7.12 | 30.72 | 7.52 | 0.99 | 0.004 | 0.001 | 0.005 |
| 712 | 7.12 | 7.13 | 0.01 | 7.13 | 30.72 | 19.06 | 0.99 | 0.002 | 0.000 | 0.002 |
| 713 | 7.13 | 7.14 | 0.01 | 7.14 | 30.72 | 32.60 | 0.99 | 0.001 | 0.000 | 0.001 |
| 714 | 7.14 | 7.15 | 0.01 | 7.15 | 30.72 | 64.49 | 0.99 | 0.000 | 0.000 | 0.000 |
| 715 | 7.15 | 7.16 | 0.01 | 7.16 | 30.72 | 73.00 | 0.99 | 0.000 | 0.000 | 0.000 |
| 716 | 7.16 | 7.17 | 0.01 | 7.17 | 30.72 | 82.23 | 0.99 | 0.000 | 0.000 | 0.000 |
| 717 | 7.17 | 7.18 | 0.01 | 7.18 | 30.72 | 98.84 | 0.99 | 0.000 | 0.000 | 0.000 |
| 718 | 7.18 | 7.19 | 0.01 | 7.19 | 30.72 | 120.42 | 0.99 | 0.000 | 0.000 | 0.000 |
| 719 | 7.19 | 7.20 | 0.01 | 7.20 | 30.71 | 144.60 | 0.99 | 0.000 | 0.000 | 0.000 |
| 720 | 7.20 | 7.21 | 0.01 | 7.21 | 30.71 | 163.76 | 0.99 | 0.000 | 0.000 | 0.000 |
| 721 | 7.21 | 7.22 | 0.01 | 7.22 | 30.71 | 179.85 | 0.99 | 0.000 | 0.000 | 0.000 |
| 722 | 7.22 | 7.23 | 0.01 | 7.23 | 30.71 | 197.59 | 0.99 | 0.000 | 0.000 | 0.000 |
| 723 | 7.23 | 7.24 | 0.01 | 7.24 | 30.71 | 214.39 | 0.99 | 0.000 | 0.000 | 0.000 |
| 724 | 7.24 | 7.25 | 0.01 | 7.25 | 30.71 | 232.97 | 0.99 | 0.000 | 0.000 | 0.000 |

**Total primary settlement: 6.16**
**Total secondary settlement: 1.31**

**Total calculated settlement: 7.47**

**Abbreviations**

| | |
|---|---|
| Start depth: | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth: | End depth of soil layer (penetration depth measured from ground free surface) |
| Thickness: | Thickness of soil layer |
| Relative depth: | Depth of calculation relative to footing |
| Iz: | Stress influence factor |
| Delta P: | Footing impossed stress: |
| Eff. stress: | Effective stress |
| $M_{(CPT)}$: | Constrained modulus from CPT |
| Settlement: | Primary settlement |
| Second. settlement: | Secondary settlemends due to creep |

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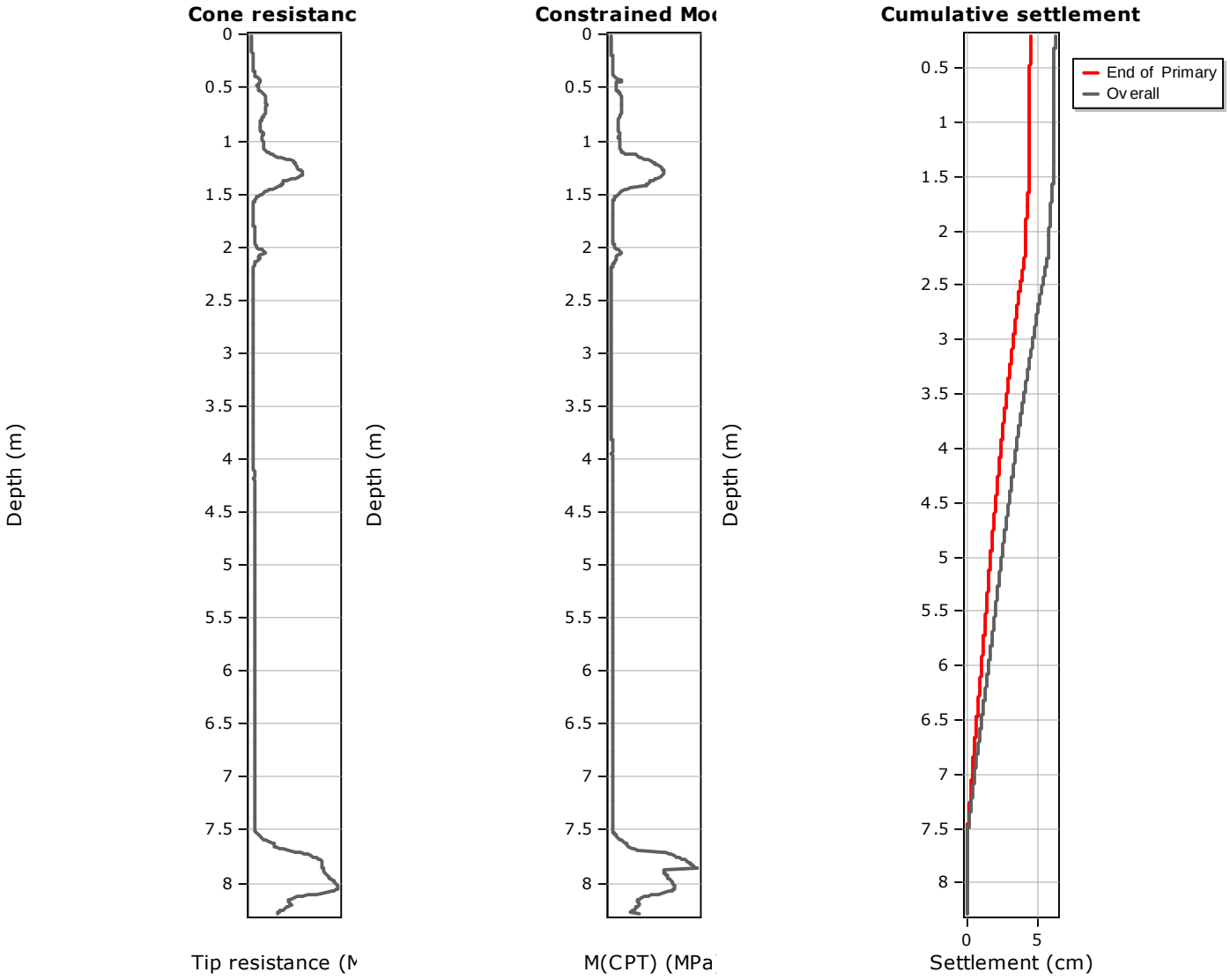
Unit 3 - 201 Opawa Rd
Hillsborough
Christchurch

**CPT: CPT2**
Total depth: 8.29 m, Date: 23/09/2020
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

**Project:** **K200265**
**Location:** **Bayswater Maritime Village Development**

## Settlements calculation according to theory of elasticity*




### Calculation properties

Footing type: Rectangular
Footing width: 50.00 (m)
L/B: 10.0
Footing pressure: 18.00 (kPa)
Embedment depth: 0.20 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlements calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlements calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where $t_p$ is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | $M_{(CPT)}$ (MPa) | Iz | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 783 | 8.02 | 8.03 | 0.01 | 7.83 | 17.79 | 156.53 | 0.99 | 0.000 | 0.000 | 0.000 |
| 784 | 8.03 | 8.04 | 0.01 | 7.84 | 17.79 | 157.44 | 0.99 | 0.000 | 0.000 | 0.000 |
| 785 | 8.04 | 8.05 | 0.01 | 7.85 | 17.79 | 157.80 | 0.99 | 0.000 | 0.000 | 0.000 |
| 786 | 8.05 | 8.06 | 0.01 | 7.86 | 17.79 | 157.42 | 0.99 | 0.000 | 0.000 | 0.000 |
| 787 | 8.06 | 8.07 | 0.01 | 7.87 | 17.79 | 155.72 | 0.99 | 0.000 | 0.000 | 0.000 |
| 788 | 8.07 | 8.08 | 0.01 | 7.88 | 17.79 | 152.28 | 0.99 | 0.000 | 0.000 | 0.000 |
| 789 | 8.08 | 8.09 | 0.01 | 7.89 | 17.79 | 146.51 | 0.99 | 0.000 | 0.000 | 0.000 |
| 790 | 8.09 | 8.10 | 0.01 | 7.90 | 17.79 | 133.89 | 0.99 | 0.000 | 0.000 | 0.000 |
| 791 | 8.10 | 8.11 | 0.01 | 7.91 | 17.78 | 118.72 | 0.99 | 0.000 | 0.000 | 0.000 |
| 792 | 8.11 | 8.12 | 0.01 | 7.92 | 17.78 | 102.74 | 0.99 | 0.000 | 0.000 | 0.000 |
| 793 | 8.12 | 8.13 | 0.01 | 7.93 | 17.78 | 91.52 | 0.99 | 0.000 | 0.000 | 0.000 |
| 794 | 8.13 | 8.14 | 0.01 | 7.94 | 17.78 | 82.38 | 0.99 | 0.000 | 0.000 | 0.000 |
| 795 | 8.14 | 8.15 | 0.01 | 7.95 | 17.78 | 75.07 | 0.99 | 0.000 | 0.000 | 0.000 |
| 796 | 8.15 | 8.16 | 0.01 | 7.96 | 17.78 | 69.25 | 0.99 | 0.000 | 0.000 | 0.000 |
| 797 | 8.16 | 8.17 | 0.01 | 7.97 | 17.78 | 65.72 | 0.99 | 0.000 | 0.000 | 0.000 |
| 798 | 8.17 | 8.18 | 0.01 | 7.98 | 17.78 | 65.08 | 0.99 | 0.000 | 0.000 | 0.000 |
| 799 | 8.18 | 8.19 | 0.01 | 7.99 | 17.78 | 67.13 | 0.99 | 0.000 | 0.000 | 0.000 |
| 800 | 8.19 | 8.20 | 0.01 | 8.00 | 17.78 | 70.68 | 0.99 | 0.000 | 0.000 | 0.000 |
| 801 | 8.20 | 8.21 | 0.01 | 8.01 | 17.78 | 71.86 | 0.99 | 0.000 | 0.000 | 0.000 |
| 802 | 8.21 | 8.22 | 0.01 | 8.02 | 17.78 | 70.21 | 0.99 | 0.000 | 0.000 | 0.000 |
| 803 | 8.22 | 8.23 | 0.01 | 8.03 | 17.78 | 66.73 | 0.99 | 0.000 | 0.000 | 0.000 |
| 804 | 8.23 | 8.24 | 0.01 | 8.04 | 17.77 | 63.50 | 0.99 | 0.000 | 0.000 | 0.000 |
| 805 | 8.24 | 8.25 | 0.01 | 8.05 | 17.77 | 59.74 | 0.99 | 0.000 | 0.000 | 0.000 |
| 806 | 8.25 | 8.26 | 0.01 | 8.06 | 17.77 | 55.58 | 0.99 | 0.000 | 0.000 | 0.000 |
| 807 | 8.26 | 8.27 | 0.01 | 8.07 | 17.77 | 51.97 | 0.99 | 0.000 | 0.000 | 0.001 |
| 808 | 8.27 | 8.28 | 0.01 | 8.08 | 17.77 | 49.78 | 0.99 | 0.000 | 0.000 | 0.001 |
| 809 | 8.28 | 8.29 | 0.01 | 8.09 | 17.77 | 47.93 | 0.99 | 0.000 | 0.000 | 0.000 |

**Total primary settlement: 4.48**
**Total secondary settlement: 1.70**

**Total calculated settlement: 6.18**

**Abbreviations**

| | |
|---|---|
| Start depth: | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth: | End depth of soil layer (penetration depth measured from ground free surface) |
| Thickness: | Thickness of soil layer |
| Relative depth: | Depth of calculation relative to footing |
| Iz: | Stress influence factor |
| Delta P: | Footing impossed stress: |
| Eff. stress: | Effective stress |
| $M_{(CPT)}$: | Constrained modulus from CPT |
| Settlement: | Primary settlement |
| Second. settlement: | Secondary settlemends due to creep |

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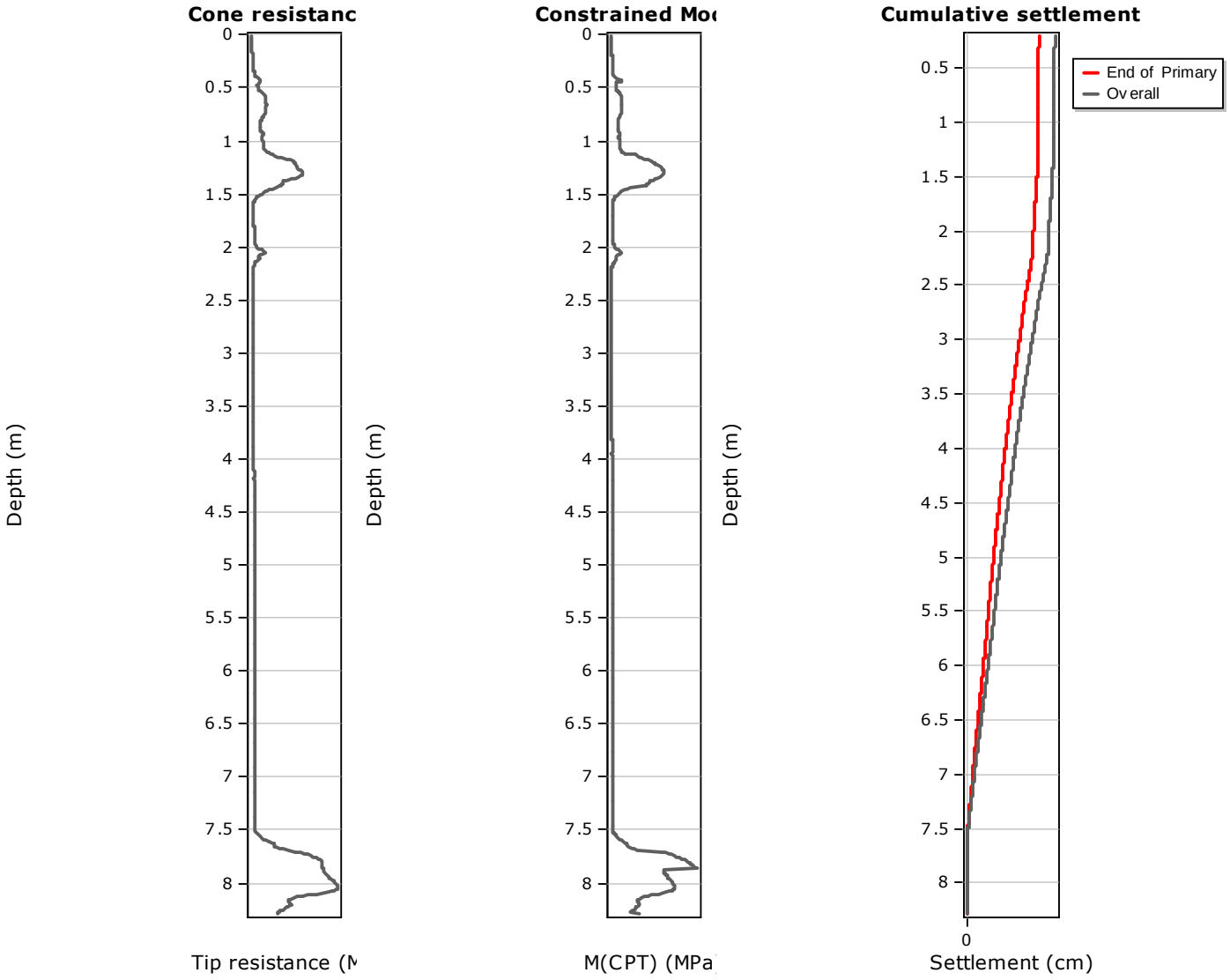
Christchurch

**CPT: CPT2**
Total depth: 8.29 m, Date: 23/09/2020
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

**Project:** **K200265**
**Location:** **Bayswater Maritime Village Development**

## Settlements calculation according to theory of elasticity*




### Calculation properties

Footing type: Rectangular
Footing width: 50.00 (m)
L/B: 10.0
Footing pressure: 31.00 (kPa)
Embedment depth: 0.20 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlements calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlements calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where $t_p$ is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | $M_{(CPT)}$ (MPa) | Iz | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 783 | 8.02 | 8.03 | 0.01 | 7.83 | 30.64 | 156.53 | 0.99 | 0.000 | 0.000 | 0.000 |
| 784 | 8.03 | 8.04 | 0.01 | 7.84 | 30.64 | 157.44 | 0.99 | 0.000 | 0.000 | 0.000 |
| 785 | 8.04 | 8.05 | 0.01 | 7.85 | 30.64 | 157.80 | 0.99 | 0.000 | 0.000 | 0.000 |
| 786 | 8.05 | 8.06 | 0.01 | 7.86 | 30.64 | 157.42 | 0.99 | 0.000 | 0.000 | 0.000 |
| 787 | 8.06 | 8.07 | 0.01 | 7.87 | 30.63 | 155.72 | 0.99 | 0.000 | 0.000 | 0.000 |
| 788 | 8.07 | 8.08 | 0.01 | 7.88 | 30.63 | 152.28 | 0.99 | 0.000 | 0.000 | 0.000 |
| 789 | 8.08 | 8.09 | 0.01 | 7.89 | 30.63 | 146.51 | 0.99 | 0.000 | 0.000 | 0.000 |
| 790 | 8.09 | 8.10 | 0.01 | 7.90 | 30.63 | 133.89 | 0.99 | 0.000 | 0.000 | 0.000 |
| 791 | 8.10 | 8.11 | 0.01 | 7.91 | 30.63 | 118.72 | 0.99 | 0.000 | 0.000 | 0.000 |
| 792 | 8.11 | 8.12 | 0.01 | 7.92 | 30.63 | 102.74 | 0.99 | 0.000 | 0.000 | 0.000 |
| 793 | 8.12 | 8.13 | 0.01 | 7.93 | 30.63 | 91.52 | 0.99 | 0.000 | 0.000 | 0.000 |
| 794 | 8.13 | 8.14 | 0.01 | 7.94 | 30.63 | 82.38 | 0.99 | 0.000 | 0.000 | 0.000 |
| 795 | 8.14 | 8.15 | 0.01 | 7.95 | 30.62 | 75.07 | 0.99 | 0.000 | 0.000 | 0.000 |
| 796 | 8.15 | 8.16 | 0.01 | 7.96 | 30.62 | 69.25 | 0.99 | 0.000 | 0.000 | 0.000 |
| 797 | 8.16 | 8.17 | 0.01 | 7.97 | 30.62 | 65.72 | 0.99 | 0.000 | 0.000 | 0.000 |
| 798 | 8.17 | 8.18 | 0.01 | 7.98 | 30.62 | 65.08 | 0.99 | 0.000 | 0.000 | 0.000 |
| 799 | 8.18 | 8.19 | 0.01 | 7.99 | 30.62 | 67.13 | 0.99 | 0.000 | 0.000 | 0.001 |
| 800 | 8.19 | 8.20 | 0.01 | 8.00 | 30.62 | 70.68 | 0.99 | 0.000 | 0.000 | 0.001 |
| 801 | 8.20 | 8.21 | 0.01 | 8.01 | 30.62 | 71.86 | 0.99 | 0.000 | 0.000 | 0.000 |
| 802 | 8.21 | 8.22 | 0.01 | 8.02 | 30.61 | 70.21 | 0.99 | 0.000 | 0.000 | 0.000 |
| 803 | 8.22 | 8.23 | 0.01 | 8.03 | 30.61 | 66.73 | 0.99 | 0.000 | 0.000 | 0.000 |
| 804 | 8.23 | 8.24 | 0.01 | 8.04 | 30.61 | 63.50 | 0.99 | 0.000 | 0.000 | 0.000 |
| 805 | 8.24 | 8.25 | 0.01 | 8.05 | 30.61 | 59.74 | 0.99 | 0.001 | 0.000 | 0.001 |
| 806 | 8.25 | 8.26 | 0.01 | 8.06 | 30.61 | 55.58 | 0.99 | 0.001 | 0.000 | 0.001 |
| 807 | 8.26 | 8.27 | 0.01 | 8.07 | 30.61 | 51.97 | 0.99 | 0.001 | 0.000 | 0.001 |
| 808 | 8.27 | 8.28 | 0.01 | 8.08 | 30.61 | 49.78 | 0.99 | 0.001 | 0.000 | 0.001 |
| 809 | 8.28 | 8.29 | 0.01 | 8.09 | 30.61 | 47.93 | 0.99 | 0.001 | 0.000 | 0.001 |

**Total primary settlement: 7.72**
**Total secondary settlement: 1.70**

**Total calculated settlement: 9.42**

**Abbreviations**

| | |
|---|---|
| Start depth: | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth: | End depth of soil layer (penetration depth measured from ground free surface) |
| Thickness: | Thickness of soil layer |
| Relative depth: | Depth of calculation relative to footing |
| Iz: | Stress influence factor |
| Delta P: | Footing impossed stress: |
| Eff. stress: | Effective stress |
| $M_{(CPT)}$: | Constrained modulus from CPT |
| Settlement: | Primary settlement |
| Second. settlement: | Secondary settlemends due to creep |

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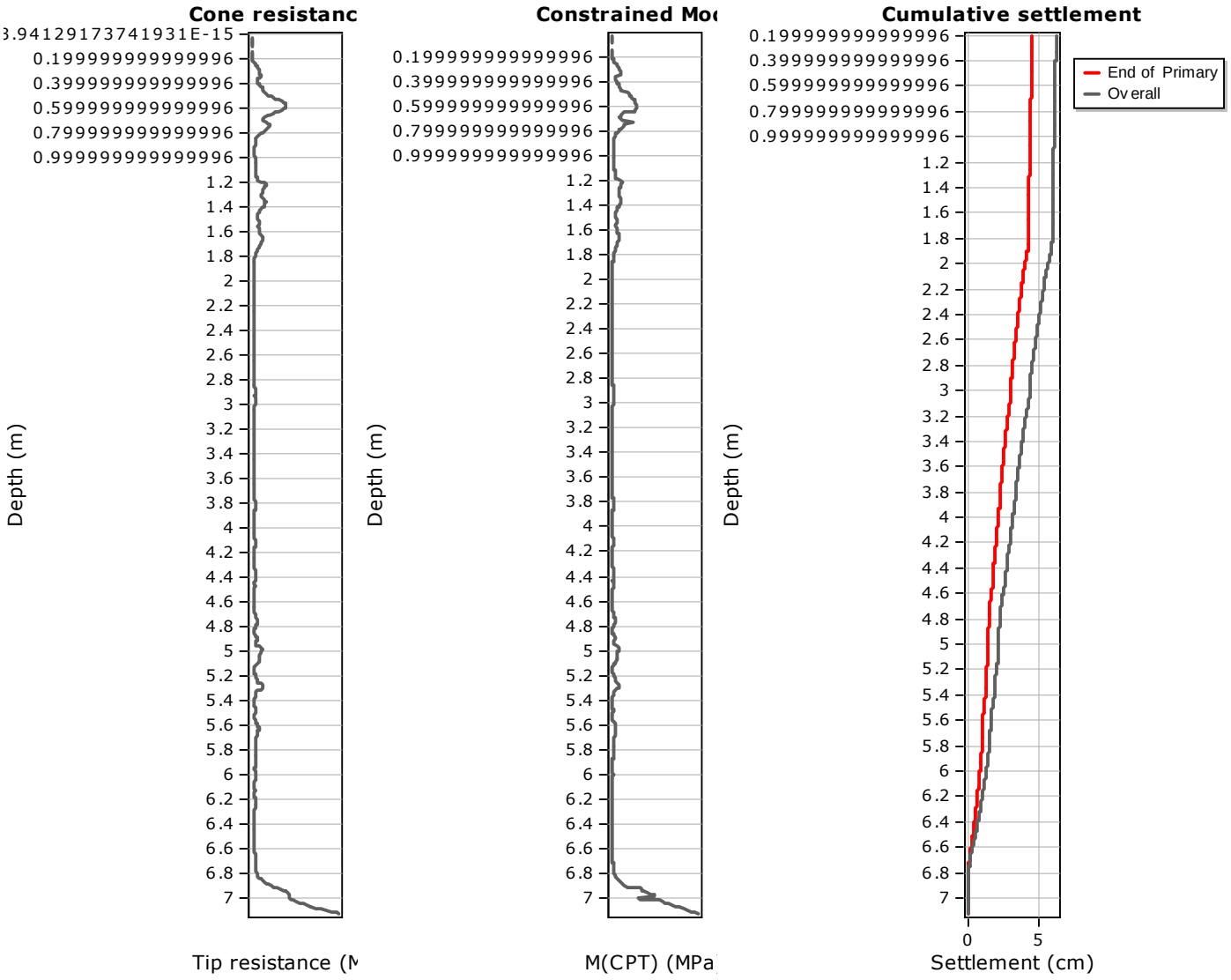
**CPT: CPT3**
Total depth: 7.13 m, Date: 23/09/2020
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

**Project:** **K200265**
**Location:** **Bayswater Maritime Village Development**

## Settlements calculation according to theory of elasticity*




## Calculation properties

Footing type: Rectangular
Footing width: 50.00 (m)
L/B: 10.0
Footing pressure: 18.00 (kPa)
Embedment depth: 0.20 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlements calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlements calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where $t_p$ is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | $M_{(CPT)}$ (MPa) | Iz | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 691 | 7.10 | 7.11 | 0.01 | 6.91 | 17.85 | 219.16 | 0.99 | 0.000 | 0.000 | 0.000 |
| 692 | 7.11 | 7.12 | 0.01 | 6.92 | 17.85 | 231.08 | 0.99 | 0.000 | 0.000 | 0.000 |
| 693 | 7.12 | 7.13 | 0.01 | 6.93 | 17.85 | 242.44 | 0.99 | 0.000 | 0.000 | 0.000 |

**Total primary settlement: 4.50**
**Total secondary settlement: 1.73**

**Total calculated settlement: 6.23**

**Abbreviations**

| | |
|---|---|
| Start depth: | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth: | End depth of soil layer (penetration depth measured from ground free surface) |
| Thickness: | Thickness of soil layer |
| Relative depth: | Depth of calculation relative to footing |
| Iz: | Stress influence factor |
| Delta P: | Footing impossed stress: |
| Eff. stress: | Effective stress |
| $M_{(CPT)}$: | Constrained modulus from CPT |
| Settlement: | Primary settlement |
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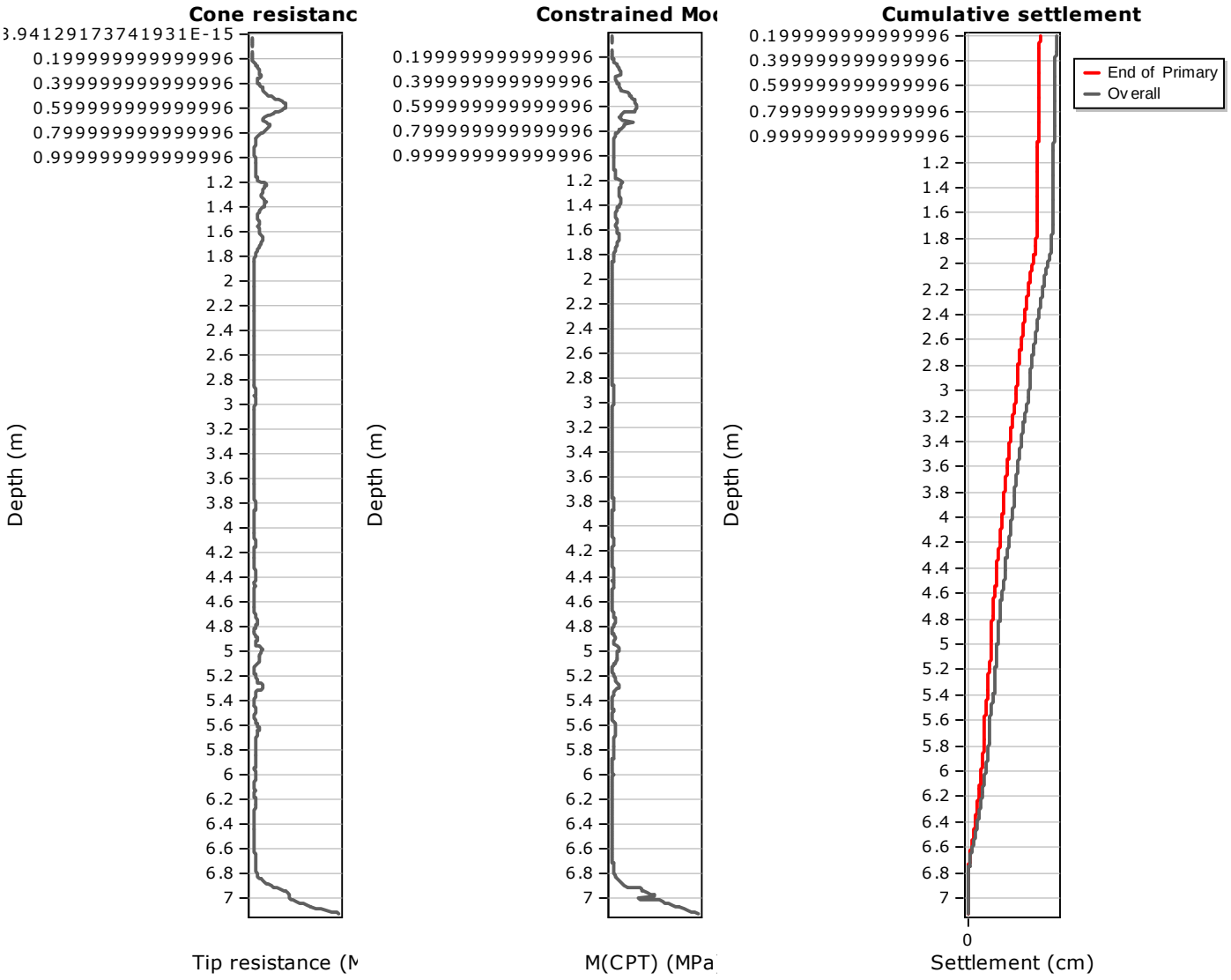
**CPT: CPT3**
Total depth: 7.13 m, Date: 23/09/2020
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

**Project:** **K200265**
**Location:** **Bayswater Maritime Village Development**

## Settlements calculation according to theory of elasticity*




## Calculation properties

Footing type: Rectangular
Footing width: 50.00 (m)
L/B: 10.0
Footing pressure: 31.00 (kPa)
Embedment depth: 0.20 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlements calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlements calculation is performed according to the following formula:

$$S = C_\alpha \cdot \Delta z \cdot \log(t/t_p)$$

where $t_p$ is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | $M_{(CPT)}$ (MPa) | Iz | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 691 | 7.10 | 7.11 | 0.01 | 6.91 | 30.75 | 219.16 | 0.99 | 0.000 | 0.000 | 0.000 |
| 692 | 7.11 | 7.12 | 0.01 | 6.92 | 30.75 | 231.08 | 0.99 | 0.000 | 0.000 | 0.000 |
| 693 | 7.12 | 7.13 | 0.01 | 6.93 | 30.74 | 242.44 | 0.99 | 0.000 | 0.000 | 0.000 |

**Total primary settlement: 7.75**
**Total secondary settlement: 1.73**

**Total calculated settlement: 9.48**

**Abbreviations**

| | |
|---|---|
| Start depth: | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth: | End depth of soil layer (penetration depth measured from ground free surface) |
| Thickness: | Thickness of soil layer |
| Relative depth: | Depth of calculation relative to footing |
| Iz: | Stress influence factor |
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| Eff. stress: | Effective stress |
| $M_{(CPT)}$: | Constrained modulus from CPT |
| Settlement: | Primary settlement |
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