

An MND Statutory Board
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01 March 2022

See **Distribution**

Dear Sir/Madam

SUBMISSION OF SITE INVESTIGATION (SI) DATA IN STANDARDISED ELECTRONIC FORMAT TO COMPLY WITH THE IMPLEMENTATION OF NEW STRATIGRAPHIC FRAMEWORK

Objective

1. This circular is to inform the industry on adopting the geological unit name as established in the new stratigraphic framework of Singapore while submitting SI data both in borehole logs and standardised electronic format protocol AGS(SG).

Background

2. BCA has introduced a new publication for the geology of Singapore on 1st of October 2021 to launch the new stratigraphic framework, which consists of a 1:50,000 scale geological map including a memoir. In this publication, new geological units have been introduced and previous named units of DSTA (2009) Geology of Singapore have been re-classified in accordance with the guidelines of International Commission on Stratigraphy (ICS). Refer to Annex A showing comparison between the current units (DSTA, 2009) and new units of BCA, 2021. The sale and product info of this new publication can be accessed via: <https://go.gov.sg/bundled-geomap-geomemoir>

Requirement for Submission of SI Data in the AGS(SG) Electronic Format

3. We wish to inform the industry that the submission of SI data in the AGS(SG) electronic format based on the new stratigraphic framework will be a requirement **with effect from 1st October 2022 for all SI works carried out**. Examples highlighting on the representation of new geological unit name in borehole log are shown in Annex B. The addendum of the new abbreviations (codes) is presented in the latest edition of 'Guidelines for Electronic Transfer of Site Investigation Data', which can be downloaded from: <https://www1.bca.gov.sg/docs/default-source/docs-corp-regulatory/building-control/electronic-transfer-si-data.pdf>

Circulation and Enquiries

4. Please disseminate the contents of this circular to your members. If you need any clarification, you may contact officer Lau Sze Ghiong (Ms.), email: LAU_sze_ghiong@bca.gov.sg

Yours faithfully



ER. Kiefer Chiam Sing Lih
DIRECTOR
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For COMMISSIONER OF BUILDING CONTROL
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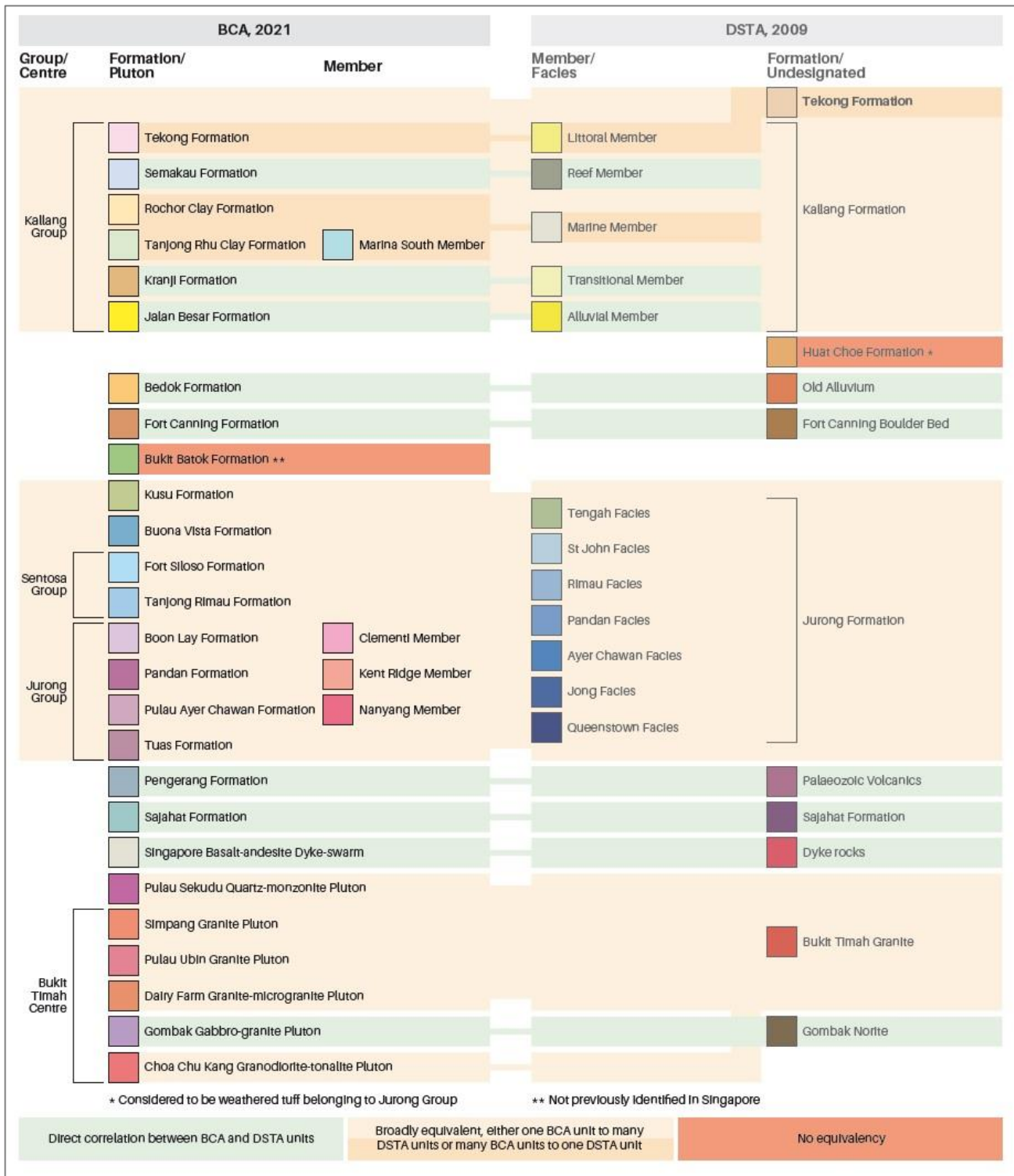
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ANNEX A: NEW GEOLOGICAL UNITS IN COMPARISON WITH DSTA (2009)



ANNEX B: EXAMPLES SHOWING BOREHOLE LOG (OF SI REPORT) IN THE USE OF NEW GEOLOGICAL UNITS WHILE DESCRIBING SOIL AND ROCK PROPERTIES

Item	Soil Description																																														
1.0	<p>Example of borehole log (current practice):</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" data-bbox="331 336 891 475">Location: TUAS (STUDY AREA A)</td> <td colspan="2" data-bbox="902 336 1032 619" rowspan="2">TEST RESULTS (DETAILED TEST RESULTS REPORTED ELSEWHERE)</td> <td data-bbox="611 552 792 580" rowspan="2">● SPT N-VALUE</td> <td data-bbox="804 483 891 619" rowspan="2">SPT N-Value (N / mm) or Fracture Index (Ft, per m)</td> <td data-bbox="902 336 967 619" rowspan="2">BS SOIL / ISO ROCK CLASSIFICATION</td> <td data-bbox="978 336 1032 619" rowspan="2">GEOLOGICAL CLASSIFICATION</td> <td data-bbox="1043 336 1097 619" rowspan="2">ELEVATION (m)</td> <td data-bbox="1108 336 1162 619" rowspan="2">DEPTH (m)</td> <td data-bbox="1173 336 1227 619" rowspan="2">SYMBOLS</td> <td data-bbox="1238 336 1292 619" rowspan="2">GRAPHIC LOG</td> <td data-bbox="1303 336 1357 619" rowspan="2">THICKNESS (m)</td> <td data-bbox="1368 336 1422 619" rowspan="2">WEATHERING GRADE</td> <td data-bbox="1433 336 1487 619" rowspan="2">ROCK STRENGTH</td> <td data-bbox="1498 336 2134 389">BOREHOLE NO. BH1A5</td> </tr> <tr> <td data-bbox="331 475 611 619" rowspan="3"></td> <td data-bbox="611 580 792 619" rowspan="3">20 40 60 80</td> <td data-bbox="804 730 891 759">10/300</td> <td data-bbox="902 643 967 671">SC</td> <td data-bbox="978 643 1032 671">F1</td> <td data-bbox="1043 643 1097 671">-17.26</td> <td data-bbox="1108 711 1162 759">21</td> <td data-bbox="1173 711 1227 759">21.00</td> <td data-bbox="1238 711 1292 759">⊗</td> <td data-bbox="1303 643 1357 671">3.00</td> <td data-bbox="1433 619 1487 671" rowspan="3"></td> <td data-bbox="1498 619 2134 759">Very Loose Light Yellowish Brown (2.5Y 6/3) Clayey SAND Fine to medium grained. With traces of fine grained gravels. [KALLANG FORMATION]</td> </tr> <tr> <td data-bbox="804 979 891 1008">0/300</td> <td data-bbox="902 979 967 1008">C</td> <td data-bbox="978 979 1032 1008">F2</td> <td data-bbox="1043 979 1097 1008">-20.76</td> <td data-bbox="1108 979 1162 1008">24</td> <td data-bbox="1173 979 1227 1008">24.00</td> <td data-bbox="1238 979 1292 1008">⊗</td> <td data-bbox="1303 979 1357 1008">3.50</td> <td data-bbox="1498 759 2134 999">Stiff Light Reddish Brown (2.5YR 6/4) CLAY With traces of organic matter. [KALLANG FORMATION]</td> </tr> <tr> <td data-bbox="804 1098 891 1126"></td> <td data-bbox="902 1098 967 1126">C</td> <td data-bbox="978 1098 1032 1126">M</td> <td data-bbox="1043 1098 1097 1126">-22.06</td> <td data-bbox="1108 1098 1162 1126">25</td> <td data-bbox="1173 1098 1227 1126">24.45</td> <td data-bbox="1238 1098 1292 1126">⊗</td> <td data-bbox="1303 1098 1357 1126">1.30</td> <td data-bbox="1498 999 2134 1126">Very Soft Grey (5Y 5/1) CLAY With traces of organic matter. [KALLANG FORMATION]</td> </tr> </table>	Location: TUAS (STUDY AREA A)		TEST RESULTS (DETAILED TEST RESULTS REPORTED ELSEWHERE)		● SPT N-VALUE	SPT N-Value (N / mm) or Fracture Index (Ft, per m)	BS SOIL / ISO ROCK CLASSIFICATION	GEOLOGICAL CLASSIFICATION	ELEVATION (m)	DEPTH (m)	SYMBOLS	GRAPHIC LOG	THICKNESS (m)	WEATHERING GRADE	ROCK STRENGTH	BOREHOLE NO. BH1A5		20 40 60 80	10/300	SC	F1	-17.26	21	21.00	⊗	3.00		Very Loose Light Yellowish Brown (2.5Y 6/3) Clayey SAND Fine to medium grained. With traces of fine grained gravels. [KALLANG FORMATION]	0/300	C	F2	-20.76	24	24.00	⊗	3.50	Stiff Light Reddish Brown (2.5YR 6/4) CLAY With traces of organic matter. [KALLANG FORMATION]		C	M	-22.06	25	24.45	⊗	1.30	Very Soft Grey (5Y 5/1) CLAY With traces of organic matter. [KALLANG FORMATION]
Location: TUAS (STUDY AREA A)		TEST RESULTS (DETAILED TEST RESULTS REPORTED ELSEWHERE)															● SPT N-VALUE			SPT N-Value (N / mm) or Fracture Index (Ft, per m)	BS SOIL / ISO ROCK CLASSIFICATION	GEOLOGICAL CLASSIFICATION	ELEVATION (m)	DEPTH (m)	SYMBOLS	GRAPHIC LOG	THICKNESS (m)		WEATHERING GRADE	ROCK STRENGTH	BOREHOLE NO. BH1A5																
	20 40 60 80			10/300	SC	F1	-17.26	21	21.00	⊗	3.00		Very Loose Light Yellowish Brown (2.5Y 6/3) Clayey SAND Fine to medium grained. With traces of fine grained gravels. [KALLANG FORMATION]																																		
		0/300	C	F2	-20.76	24	24.00	⊗	3.50	Stiff Light Reddish Brown (2.5YR 6/4) CLAY With traces of organic matter. [KALLANG FORMATION]																																					
			C	M	-22.06	25	24.45	⊗	1.30	Very Soft Grey (5Y 5/1) CLAY With traces of organic matter. [KALLANG FORMATION]																																					
Example of soil description (to include additional features and name of new geological unit):																																															
1.1a	Very loose, light yellowish brown (2.5Y 6/3), clayey SAND, fine to medium grained (subrounded) with traces of fine-grained gravels. [KALLANG GROUP; Jalan Besar Formation]																																														
1.1b	Stiff, light reddish brown (2.5YR 6/4), streaked/mottled , CLAY with traces of organic matter. [KALLANG GROUP; Jalan Besar Formation]																																														
1.1c	Very soft, grey (5Y 5/1), CLAY with traces of organic matter. [KALLANG GROUP; Tanjong Rhu Clay Formation]																																														

Item	Rock Description																																									
2.0	<p data-bbox="324 199 884 231"><u>Example of borehole log (current practice):</u></p> <table border="1" data-bbox="324 236 2105 989"> <tr> <td colspan="2" data-bbox="331 240 884 375">Location: SIMPANG AND SELETAR (STUDY AREA C)</td> <td data-bbox="891 240 952 518" rowspan="4">BS SOIL / ISO ROCK CLASSIFICATION</td> <td data-bbox="958 240 1019 518" rowspan="4">GEOLOGICAL CLASSIFICATION</td> <td data-bbox="1025 240 1086 518" rowspan="4">ELEVATION (m)</td> <td data-bbox="1093 240 1153 518" rowspan="4">DEPTH (m)</td> <td data-bbox="1160 240 1220 518" rowspan="4">SYMBOLS</td> <td data-bbox="1227 240 1288 518" rowspan="4">GRAPHIC LOG</td> <td data-bbox="1294 240 1355 518" rowspan="4">THICKNESS (m)</td> <td data-bbox="1361 240 1422 518" rowspan="4">WEATHERING GRADE</td> <td data-bbox="1429 240 1489 518" rowspan="4">ROCK STRENGTH</td> <td data-bbox="1496 240 2094 295">BOREHOLE NO. BH1C2</td> </tr> <tr> <td colspan="2" data-bbox="331 379 884 518" rowspan="3">TEST RESULTS (DETAILED TEST RESULTS REPORTED ELSEWHERE)</td> <td data-bbox="1496 300 2094 354">NORTHING <input type="text"/></td> </tr> <tr> <td data-bbox="1496 359 2094 413">EASTING <input type="text"/></td> </tr> <tr> <td data-bbox="1496 418 2094 472">ELEVATION <input type="text"/></td> </tr> <tr> <td colspan="11" data-bbox="331 477 2094 518" style="text-align: center;">DESCRIPTION</td> </tr> <tr> <td data-bbox="331 523 604 989"> TCR=100% SCR=11% RQD=11% TCR=100% SCR=55% RQD=52% TCR=100% SCR=44% RQD=34% TCR=100% SCR=22% RQD=10% TCR=100% SCR=81% RQD=68% TCR=100% </td> <td data-bbox="611 523 795 989"> </td> <td data-bbox="801 523 884 989"> SPT N-Value (N/mm) or Fracture Index (FI, per m) FI = N FI = 5 FI = N FI = 10 </td> <td data-bbox="891 523 952 989"></td> <td data-bbox="958 523 1019 989"></td> <td data-bbox="1025 523 1086 989"></td> <td data-bbox="1093 523 1153 989"> 40.00 CR-4 41 41.00 CR-5 42 42.00 CR-6 43 43.00 CR-7 44 44.00 CR-8 45 45.00 </td> <td data-bbox="1160 523 1220 989"> </td> <td data-bbox="1227 523 1288 989"> </td> <td data-bbox="1294 523 1355 989"></td> <td data-bbox="1361 523 1422 989"></td> <td data-bbox="1429 523 1489 989"></td> <td data-bbox="1496 523 2094 989"> Strong to Very Strong Light Greenish Grey (5GY 8/1) spotted with Greyish Black (N2) GRANITE Slightly weathered. Rock consists of Quartz (1-3 mm dia.); Orthoclase (1-5 mm dia.); Biotite (1-3 mm dia.). Discontinuities are very closely to closely spaced. Joint surfaces are undulating rough. Apertures are partly open to open. Three sets of joints; J1=15-30 deg J2=30-35 deg J3=60-75 deg. From 64.00 to 64.30m: Core loss [BUKIT TIMAH GRANITE] <u>Note:</u> Refer to Item 2.1 </td> </tr> </table>	Location: SIMPANG AND SELETAR (STUDY AREA C)		BS SOIL / ISO ROCK CLASSIFICATION	GEOLOGICAL CLASSIFICATION	ELEVATION (m)	DEPTH (m)	SYMBOLS	GRAPHIC LOG	THICKNESS (m)	WEATHERING GRADE	ROCK STRENGTH	BOREHOLE NO. BH1C2	TEST RESULTS (DETAILED TEST RESULTS REPORTED ELSEWHERE)		NORTHING <input type="text"/>	EASTING <input type="text"/>	ELEVATION <input type="text"/>	DESCRIPTION											TCR=100% SCR=11% RQD=11% TCR=100% SCR=55% RQD=52% TCR=100% SCR=44% RQD=34% TCR=100% SCR=22% RQD=10% TCR=100% SCR=81% RQD=68% TCR=100%		SPT N-Value (N/mm) or Fracture Index (FI, per m) FI = N FI = 5 FI = N FI = 10				40.00 CR-4 41 41.00 CR-5 42 42.00 CR-6 43 43.00 CR-7 44 44.00 CR-8 45 45.00						Strong to Very Strong Light Greenish Grey (5GY 8/1) spotted with Greyish Black (N2) GRANITE Slightly weathered. Rock consists of Quartz (1-3 mm dia.); Orthoclase (1-5 mm dia.); Biotite (1-3 mm dia.). Discontinuities are very closely to closely spaced. Joint surfaces are undulating rough. Apertures are partly open to open. Three sets of joints; J1=15-30 deg J2=30-35 deg J3=60-75 deg. From 64.00 to 64.30m: Core loss [BUKIT TIMAH GRANITE] <u>Note:</u> Refer to Item 2.1
Location: SIMPANG AND SELETAR (STUDY AREA C)		BS SOIL / ISO ROCK CLASSIFICATION	GEOLOGICAL CLASSIFICATION										ELEVATION (m)			DEPTH (m)	SYMBOLS	GRAPHIC LOG	THICKNESS (m)	WEATHERING GRADE	ROCK STRENGTH	BOREHOLE NO. BH1C2																				
TEST RESULTS (DETAILED TEST RESULTS REPORTED ELSEWHERE)																						NORTHING <input type="text"/>																				
														EASTING <input type="text"/>																												
				ELEVATION <input type="text"/>																																						
DESCRIPTION																																										
TCR=100% SCR=11% RQD=11% TCR=100% SCR=55% RQD=52% TCR=100% SCR=44% RQD=34% TCR=100% SCR=22% RQD=10% TCR=100% SCR=81% RQD=68% TCR=100%		SPT N-Value (N/mm) or Fracture Index (FI, per m) FI = N FI = 5 FI = N FI = 10				40.00 CR-4 41 41.00 CR-5 42 42.00 CR-6 43 43.00 CR-7 44 44.00 CR-8 45 45.00						Strong to Very Strong Light Greenish Grey (5GY 8/1) spotted with Greyish Black (N2) GRANITE Slightly weathered. Rock consists of Quartz (1-3 mm dia.); Orthoclase (1-5 mm dia.); Biotite (1-3 mm dia.). Discontinuities are very closely to closely spaced. Joint surfaces are undulating rough. Apertures are partly open to open. Three sets of joints; J1=15-30 deg J2=30-35 deg J3=60-75 deg. From 64.00 to 64.30m: Core loss [BUKIT TIMAH GRANITE] <u>Note:</u> Refer to Item 2.1																														
2.1	<p data-bbox="324 1013 1523 1045"><u>Example of rock description (to include additional features and name of new geological unit):</u></p> <p data-bbox="324 1101 2128 1348">Strong to very strong, light greenish grey (5GY 8/1) spotted with greyish black (N2), <i>equigranular, coarse-grained GRANITE</i>, slightly weathered, rock consists of quartz (1-3 mm dia.), orthoclase (1-5 mm dia.), biotite (1-3 mm dia.), mafic minerals ~15%, weak/subtle magmatic lineation, slight discolouration of minerals (along discontinuities), discontinuities are very closely to closely spaced, joint surfaces are undulating rough, apertures are partly open to open, three sets of joints; J1= 15-30 deg, J2= 30-35 deg, J3= 60-75 deg, from 64.00 to 64.30m: core loss. [BUKIT TIMAH CENTRE; Simpang Granite Pluton]</p>																																									

Item	Rock Description																				
3.0	Example of borehole log (current practice):																				
Location: TUAS (STUDY AREA A)		BS SOIL / ISO ROCK CLASSIFICATION		GEOLOGICAL CLASSIFICATION		ELEVATION (m)		DEPTH (m)		SYMBOLS		GRAPHIC LOG		THICKNESS (m)		WEATHERING GRADE		ROCK STRENGTH		BOREHOLE NO. BH1A5	
TEST RESULTS (DETAILED TEST RESULTS REPORTED ELSEWHERE)																				SPT N-VALUE (N / mm) or Fracture Index (FI, per m)	
																				EASTING <input type="text"/>	
																				ELEVATION <input type="text"/>	
																				DESCRIPTION	
TCR=100% SCR=71% RQD=65%		● SPT N-VALUE 20 40 60 80		SI		S(II)		-37.76		41 CR-10		6.00		II		IV		Medium Strong Dark Grey (N3) SILTSTONE Note: Refer to Item 3.1a Slightly weathered. Discontinuities are very closely to closely spaced. Joint surfaces are undulating rough and occasionally smooth slickensided. Joint one set J1=10-20 deg. Thinly to thickly laminated with tuff. Dip of bedding: 20 deg. Vertical fractures are prominent from 36.4 to 41.0m. From 37.60 to 37.70 m: Core loss. From 37.40 to 37.60; 38.20 to 37.55m; 39.90 to 40.00m and 40.50 to 40.70m: Disintegrated. From 49.50 m to 50.20 m: Medium bedded with tuffaceous sandstone. Water loss was observed from 36.00m to 41.00m. [JURONG FORMATION; Ayer Chawan Facies]			
TCR=100% SCR=74% RQD=74%		FI = 8 FI = 2 FI = N FI = N FI = 4						42 42.00		CR-11										Medium strong to Strong Dark Grey (N3) SILTSTONE Fresh. Closely to medium spaced discontinuities. Thinly laminated to thinly bedded with tuff. Dip of bedding 20 deg from 49.50 to 50.20m. Medium bedded with tuffaceous SANDSTONE. Water loss was observed. [JURONG FORMATION; Ayer Chawan Facies]	
TCR=100% SCR=92% RQD=85%		FI = 7 FI = 4						43 43.00										Note: Refer to Item 3.1b			
TCR=100% SCR=91% RQD=83%		FI = N FI = 1 FI = 6						44 CR-12													
TCR=100%		FI = 2 FI = 5 FI = 2 FI = N FI = N						45 45.00													
		FI = 8 FI = 0						46		CR-13											
		FI = 3 FI = 13						47													
		FI = 12						48 48.00													

Example of rock description (to include additional features and name of new geological unit):

3.1a	Medium Strong, Dark Grey (N3), SILTSTONE, Slightly weathered. Discontinuities are very closely to closely spaced. Joint surfaces are undulating rough and occasionally smooth slickensided. Joint one set J1=10-20 deg. Thinly to thickly laminated with tuff. Dip of bedding: 20 deg. Minor folds/soft sediment structures (of distorted features) from ~41.0 (bottom) to ~39.0m (top). Vertical fractures are prominent from 36.4 to 41.0m. From 37.60 to 37.70 m: Core loss. From 37.40 to 37.60; 38.20 to 37.55m; 39.90 to 40.00m and 40.50 to 40.70m: Disintegrated. From 49.50 m to 50.20 m: Medium bedded with tuffaceous sandstone (sand grains are subangular). Water loss was observed from 36.00m to 41.00m. [JURONG GROUP; Pulau Ayer Chawan Formation]
3.1b	Medium strong to Strong, Dark Grey (N3), SILTSTONE, Fresh. Closely to medium spaced discontinuities. Thinly laminated to thinly bedded with tuff. Parallel lamination/bedding. Dip of bedding 20 deg from 49.50 to 50.20m. Medium bedded with tuffaceous SANDSTONE (sand grains typically are subangular to subrounded). Soft sediment structures from ~42.8 (bottom) to ~42.2m (top). Normal graded bedding from ~44.7 (bottom) to ~44.5m (top). Water loss was observed. [JURONG GROUP; Pulau Ayer Chawan Formation]