

Appendix

A

Bore logs





GROUNDWATER BOREHOLE LOG

BORE NO.

GW1

SHEET 1 OF 1

| | | | |
|-----------------|---------------------------|-----------------|--------------|
| Client: | CMC Pty Ltd | Date Commenced: | 24/9/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 24/9/09 |
| Bore Location: | Jacksons | Recorded By: | Nick Bryant |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|--------------------|--------------------|--------------------------|
| Drilling Method: | Air Rotary - Blade | Surface RL: | 355.43 mAHD |
| Drilling Company: | Impax Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707529.25 N 6442593.57 |

| Bore Information | | | Field Material Description | | | |
|------------------|----------------------------|-----------|----------------------------|-------------|--|-----------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing to 7 mbgl | 355 | | | SANDY CLAY - light brown sandy clay loam | Alluvium |
| | | | 1 | | SANDY CLAY - orange/brown slightly sandy slightly gravelly clay, gravel of med angular quartz | |
| | | 354 | 2 | | GRAVELLY CLAY - very clayey gravel, clay soft, gravel fine-med well rounded to angular quartz and chert some minor mixed lithologies present | |
| | | 353 | 3 | | | |
| | | 352 | 4 | | CLAY - grey brown slightly gravelly clay fine to coarse well rounded quartz, some lithic sandstone present | |
| | | 351 | 5 | | | |
| | | 350 | 6 | | SANDY GRAVEL - brown clayey sandy gravel, clay soft grey, gravel med angular to well rounded quartz | |
| | bentonite | 349 | 7 | | GRAVEL - brown very clayey clay soft, gravel med angular-well rounded quartz | |
| | 50 mm slotted PVC casing | 348 | 8 | | GRAVEL - light brown clay gravel, clay mottled brown/grey/dark red, gravel coarse of med angular-rounded quartz | |
| | | 347 | 9 | | GRAVEL - light brown clayey gravel, clay soft and sandy, gravel med-coarse angular/subrounded quartz and lithic sandstone | |
| | | 346 | 10 | | CLAY - light brown-orange gravelly clay, clay soft brown/grey, gravel fine-medium angular quartz and mixed lithologies | |
| | sump | 345 | | | | |
| | | | 11 | | | |
| | | 344 | 12 | | | |
| | | 343 | 13 | | | |
| | | 342 | | | | |

Airlift = 1 L/s

END OF BOREHOLE AT 10.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW2A

SHEET 1 OF 1

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 12/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 12/8/09 |
| Bore Location: | Mt Dapper | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 454.66 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 717366.98 N 6430846.57 |

| Bore Information | | | Field Material Description | | | |
|------------------|-----------------------------|-----------|----------------------------|-------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing | 454 | 1 | | SAND - light brown sand with minor gravel | Alluvium |
| | | 453 | 2 | | SILTSTONE - dark brown/black, light organic material/oxidised coal with siltstone | Tomcat Gully Sandstone |
| | | 452 | 3 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels | |
| | | 451 | 4 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels (dark red rock) wet | |
| | | 450 | 5 | | COARSE SANDSTONE - yellow/orange coarse grained sandstone | |
| | | 449 | 6 | | COARSE SANDSTONE - dull red/brown coarse grained sandstone | |
| | 50 mm PVC casing | 448 | 7 | | COAL - interbedded coal with red claystone | Upper Ulan Seam |
| | | 447 | 8 | | COAL | |
| | | 446 | 9 | | | |
| | | 445 | 10 | | | |
| | | 444 | 11 | | CLAYSTONE - light grey claystone/tuff | C-Marker Claystone |
| | | 443 | 12 | | | |
| | | 442 | 13 | | | |
| | | 441 | 14 | | | |
| | bentonite | 440 | 15 | | COAL | Lower Ulan Seam |
| | gravel pack | 439 | 16 | | | |
| | | 438 | 17 | | | |
| | 50 mm slotted PVC casing | 437 | 18 | | | |
| | | 436 | 19 | | MUDSTONE - dark brown carbonaceous mudstone | |
| | sump | 435 | 20 | | | |
| | | 434 | 21 | | | |
| | | 433 | | | | |

EC = 2.53 mS/cm
pH = 6.98

END OF BOREHOLE AT 20.60 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW2B

SHEET 1 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 12/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 12/8/09 |
| Bore Location: | Mt Dapper | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 454.61 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 717360.63 N 6430846.62 |

| Bore Information | | | | Field Material Description | | |
|------------------|-----------------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing | 454 | 1 | | SAND - light brown sand with minor gravel | Alluvium |
| | | 453 | 2 | | SILTSTONE - dark brown/black, light organic material/oxidised coal with siltstone | Tomcat Gully Sandstone |
| | | 452 | 3 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels | |
| | | 451 | 4 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels (dark red rock) wet | |
| | | 450 | 5 | | COARSE SANDSTONE - yellow/orange coarse grained sandstone | |
| | | 449 | 6 | | COARSE SANDSTONE - dull red/brown coarse grained sandstone | |
| | 50 mm PVC casing | 448 | 7 | | COAL - interbedded coal with red claystone | Upper Ulan Seam |
| | | 447 | 8 | | COAL | |
| | | 446 | 9 | | | |
| | | 445 | 10 | | | |
| | | 444 | 11 | | CLAYSTONE - light grey claystone/tuff | C-Marker Claystone |
| | | 443 | 12 | | | |
| | | 442 | 13 | | | |
| | | 441 | 14 | | | |
| | | 440 | | | COAL | Lower Ulan Seam |

EC = 1.72 mS/cm
pH = 7.24

END OF BOREHOLE AT 28.32 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW2C

SHEET 1 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 11/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 11/8/09 |
| Bore Location: | Mt Dapper | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|-------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 454.52 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 717354.63 N 6430846.5 |

| Bore Information | | | | Field Material Description | | |
|------------------|-----------------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing | 454 | 1 | | SAND - light brown sand with minor gravel | Alluvium |
| | | 453 | 2 | | SILTSTONE - dark brown/black, light organic material/oxidised coal with siltstone | Tomcat Gully Sandstone |
| | | 452 | 3 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels | |
| | | 451 | 4 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels (dark red rock) wet | |
| | | 450 | 5 | | COARSE SANDSTONE - yellow/orange coarse grained sandstone | |
| | | 449 | 6 | | COARSE SANDSTONE - dull red/brown coarse grained sandstone | |
| | 50 mm PVC casing | 448 | 7 | | COAL - interbedded coal with red claystone | Upper Ulan Seam |
| | | 447 | 8 | | COAL | |
| | | 446 | 9 | | | |
| | | 445 | 10 | | | |
| | | 444 | 11 | | CLAYSTONE - light grey claystone/tuff | |
| | | 443 | 12 | | | C-Marker Claystone |
| | | 442 | 13 | | | |
| | | 441 | 14 | | | |
| | | 440 | 15 | | COAL | |
| | | 439 | 16 | | | |
| | | 438 | 17 | | | Lower Ulan Seam |
| | | 437 | 18 | | | |
| | | 436 | 19 | | MUDSTONE - dark brown carbonaceous mudstone | |
| | | 435 | | | | |

EC = 1.407 mS/cm
pH = 7.36

END OF BOREHOLE AT 33.30 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW2C

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 11/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 11/8/09 |
| Bore Location: | Mt Dapper | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|-------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 454.52 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 717354.63 N 6430846.5 |

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|--|------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | MUDSTONE - dark brown carbonaceous mudstone (<i>continued</i>) | |
| | | 434 | 21 | | SANDSTONE - dark grey becoming grey medium to coarse grained sandstone, becoming coarser with depth, wet | Dapper Formation |
| | | 433 | 22 | | | |
| | | 432 | 23 | | | |
| | bentonite | 431 | 24 | | | |
| | | 430 | 25 | | | |
| | gravel pack | 429 | 26 | | SILTSTONE - grey siltstone | |
| | | 428 | 27 | | SANDSTONE - grey fine to medium grained sandstone | |
| | | 427 | 28 | | | |
| | 50 mm slotted PVC casing | 426 | 29 | | | |
| | | 425 | 30 | | SILTSTONE - grey siltstone with interbedded mudstone | |
| | | 424 | 31 | | SILTSTONE - dark grey siltstone with interbedded mudstone | |
| | sump | 423 | 32 | | SANDSTONE - sandstone with interbedded siltstone and large gravels to cobbles of quartz | |
| | | 422 | 33 | | | |
| | | 421 | 34 | | | |
| | | 420 | 35 | | | |
| | | 419 | 36 | | | |
| | | 418 | 37 | | | |
| | | 417 | 38 | | | |
| | | 416 | 39 | | | |
| | | 415 | | | | |

END OF BOREHOLE AT 33.30 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW2D

SHEET 1 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Mt Dapper**
Project Number: **2114426E & 2162570B**

Date Commenced: **10/8/09**
Date Completed: **10/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **454.42 mAHD**
Co-ords: **E 717348.56 N 6430846.94**

| Bore Information | | | | Field Material Description | | |
|------------------|-----------------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing | 454 | 1 | | SAND - light brown sand with minor gravel | Alluvium |
| | | 453 | 2 | | SILTSTONE - dark brown/black, light organic material/oxidised coal with siltstone | Tomcat Gully Sandstone |
| | | 452 | 3 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels | |
| | | 451 | 4 | | SANDSTONE - light grey, fine to medium grained sandstone with gravels (dark red rock) wet | |
| | | 450 | 5 | | COARSE SANDSTONE - yellow/orange coarse grained sandstone | |
| | | 449 | 6 | | COARSE SANDSTONE - dull red/brown coarse grained sandstone | |
| | 50 mm PVC casing | 448 | 7 | | COAL - interbedded coal with red claystone | Upper Ulan Seam |
| | | 447 | 8 | | COAL | |
| | | 446 | 9 | | | |
| | | 445 | 10 | | | |
| | | 444 | 11 | | CLAYSTONE - light grey claystone/tuff | |
| | | 443 | 12 | | | C-Marker Claystone |
| | | 442 | 13 | | | |
| | | 441 | 14 | | | |
| | | 440 | 15 | | COAL | |
| | | 439 | 16 | | | |
| | | 438 | 17 | | | Lower Ulan Seam |
| | | 437 | 18 | | | |
| | | 436 | 19 | | MUDSTONE - dark brown carbonaceous mudstone | |
| | | 435 | 20 | | | |
| | | 434 | 21 | | SANDSTONE - dark grey becoming grey medium to coarse grained sandstone, becoming coarser with depth, wet | |
| | | 433 | 22 | | | Dapper Formation |
| | | 432 | 23 | | | |
| | | 431 | 24 | | | |
| | | 430 | | | | |

END OF BOREHOLE AT 49.12 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW2D

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 10/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 10/8/09 |
| Bore Location: | Mt Dapper | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 454.42 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 717348.56 N 6430846.94 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 429 | | SILTSTONE - grey siltstone | Dapper Formation |
| | | | 26 | | | |
| | | | 428 | | SANDSTONE - grey fine to medium grained sandstone | |
| | | | 27 | | | |
| | | | 427 | | | |
| | | | 28 | | | |
| | | | 426 | | | |
| | | | 29 | | | |
| | | | 425 | | SILTSTONE - grey siltstone with interbedded mudstone | |
| | | | 30 | | | |
| | | | 424 | | SILTSTONE - dark grey siltstone with interbedded mudstone | |
| | | | 31 | | | |
| | | | 423 | | SANDSTONE - sandstone with interbedded siltstone and large gravels to cobbles of quartz | |
| | | | 32 | | | |
| | | | 422 | | | |
| | | | 33 | | | |
| | | | 421 | | | |
| | | | 34 | | | |
| | | | 420 | | | |
| | | | 35 | | | |
| | | | 419 | | | |
| | | | 36 | | | |
| | | | 418 | | SILTSTONE - grey siltstone | |
| | | | 37 | | | |
| | | | 417 | | MUDSTONE - dark grey brown carbonaceous mudstone | |
| | | | 38 | | | |
| | | | 416 | | SANDSTONE - coarse grained quartz sandstone with minor siltstone | |
| | | | 39 | | | |
| | | | 415 | | | |
| | | | 40 | | | |
| | | | 414 | | | |
| | | | 41 | | | |
| | | | 413 | | | |
| | | | 42 | | | |
| | | | 412 | | | |
| | | | 43 | | | |
| | | | 411 | | | |
| | | | 44 | | | |
| | | | 410 | | | |
| | | | 45 | | | |
| | | | 409 | | | |
| | | | 46 | | | |
| | | | 408 | | SILTSTONE - grey siltstone with quartz | |
| | | | 47 | | | |
| | | | 407 | | SANDSTONE - quartz sandstone with siltstone | |
| | | | 48 | | | |
| | | | 406 | | | |
| | | | 49 | | | |
| | | | 405 | | | |

END OF BOREHOLE AT 49.12 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3_TPB

SHEET 1 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 South**
Project Number: **2114426E & 2162570B**

Date Commenced: **27/8/09**
Date Completed: **31/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **203 mm**

Surface RL: **375.31 mAHD**
Co-ords: **E 709120.02 N 6437874.58**

| Bore Information | | | Field Material Description | | | Geophysical Log | | |
|------------------|----------------------------------|-----------|----------------------------|-------------|--|----------------------|--|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) 0 62.5 125.0 187.5 250 | HYDROGEOLOGY |
| | 254 mm steel surface casing | | 375 | | SANDY CLAY - orange/brown sandy gravelly clay, med - coarse gravel of quartz and mixed lithologies | Alluvium | | |
| | | | 374 | 1 | SANDY CLAY - yellow/brown sandy gravelly clay, gravel of quartz and mixed lithologies | | | |
| | | | 373 | 2 | | | | |
| | | | 372 | 3 | GRAVELLY CLAY - yellow/brown gravelly clay, med - coarse gravel of quartz and mixed lithologies | | | |
| | | | 371 | 4 | | | | |
| | | | 370 | 5 | CONGLOMERATE - red/brown weathered conglomerate, clasts medium well rounded of quartz and mixed lithologies | Digby Formation | | |
| | | | 369 | 6 | CONGLOMERATE - light-brown weathered conglomerate, clasts medium well rounded of quartz and mixed lithologies | | | |
| | | | 368 | 7 | | | | |
| | | | 367 | 8 | | | | |
| | bentonite | | 366 | 9 | CONGLOMERATE - grey conglomerate medium well rounded quartz dominant some clasts of mixed lithologies | | | |
| | | | 365 | 10 | CONGLOMERATE - cream quartz rich conglomerate large well rounded quartz clasts in a clay matrix - wet | | | |
| | | | 364 | 11 | | | | |
| | gravel pack, 203 mm steel casing | | 363 | 12 | MEDIUM SANDSTONE - interbedded medium grained sandstone quartz rich with brown claystone | | | |
| | | | 362 | 13 | CLAYSTONE - interbedded brown claystone 80%, quartz rich sandstone | Ellismayne Formation | | |
| | | | 361 | 14 | CLAYSTONE - interbedded brown claystone 80%, quartz rich sandstone | | | |
| | | | 360 | 15 | | | | |
| | | | 359 | 16 | FINE SANDSTONE - interbedded Fine grained sandstone 50%, coarse quartz rich sandstone 45%, brown/cream claystone | | | |
| | | | 358 | 17 | | | | |
| | | | 357 | 18 | COARSE SANDSTONE - coarse quartz rich sandstone, quartz angular 70% mixed lithologies 30% | | | |
| | | | 356 | 19 | SHALE - interbedded brown shale/tuff 65%, dark grey carbonaceous shale 35%, occasional coaly fragments | | | |
| | | | 355 | 20 | SHALE - dark Grey shale 90% with some brown mudstone tuff bands ~10% | | | |
| | | | 354 | 21 | SHALE - dark grey shale with light grey sandstone bands between 24-25mbgl | | | |
| | | | 353 | 22 | | | | |
| | | | 352 | 23 | | | | |
| | | | 351 | 24 | | | | |

END OF BOREHOLE AT 73.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3_TPB

SHEET 2 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 South**
Project Number: **2114426E & 2162570B**

Date Commenced: **27/8/09**
Date Completed: **31/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **203 mm**

Surface RL: **375.31 mAHD**
Co-ords: **E 709120.02 N 6437874.58**

| Bore Information | | | | Field Material Description | | Geophysical Log | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|--|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) 0 62.5 125.0 187.5 250 | HYDROGEOLOGY |
| | | | 350 | | COAL - coal with occasional brown mudstone/tuff bands | Whaka Formation | | |
| | | | 26 | | MUDSTONE - dark grey mudstone/siltstone | | | |
| | | | 349 | | | | | |
| | | | 27 | | COAL - bright coal 95% tuff/claystone layers ~5% | | | |
| | | | 348 | | | | | |
| | | | 28 | | | | | |
| | | | 347 | | | | | |
| | | | 29 | | | | | |
| | | | 346 | | | | | |
| | | | 30 | | | | | |
| | | | 345 | | | | | |
| | | | 31 | | | | | |
| | | | 344 | | | | | |
| | | | 32 | | COAL - coal 60% interbedded with claystone (soft and potentially weathered) 35%, tuff/claystone layers 5% | | | |
| | | | 343 | | | | | |
| | | | 33 | | COAL - coal 95% interbedded with tuff/claystone | | | |
| | | | 342 | | | | | |
| | | | 34 | | | | | |
| | | | 341 | | | | | |
| | | | 35 | | | | | |
| | | | 340 | | | | | |
| | | | 36 | | FINE SANDSTONE - cream fine grained sandstone 75% interbedded with white claystone 15% and cream light brown mudstone/shale | Avymore Claystone | | |
| | | | 339 | | | | | |
| | | | 37 | | FINE SANDSTONE - cream fine grained sandstone 50% interbedded with coal 47% and a light brown mudstone/shale 3% | | | |
| | | | 338 | | | | | |
| | | | 38 | | COAL - coal 85% interbedded with light brown tuff/mudstone 15%, coal proportion increasing to 98% with depth. | Flyblowers Creek Seam | | |
| | | | 337 | | | | | |
| | | | 39 | | | | | |
| | | | 336 | | | | | |
| | | | 40 | | | | | |
| | | | 335 | | | | | |
| | | | 41 | | | | | |
| | | | 334 | | | | | |
| | | | 42 | | COAL - coal 75% interbedded with a cream siltstone 25% and occasional white claystone (soft) | | | |
| | | | 333 | | | | | |
| | | | 43 | | COAL - coal 65% interbedded with dark grey shale 35% with depth | | | |
| | | | 332 | | | | | |
| | | | 44 | | FINE SANDSTONE - grey/brown fine grained to medium grained sandstone, interbedding of cream sandstone increases between 46-47m | Tomcat Gully Sandstone | | |
| | | | 331 | | | | | |
| | | | 45 | | | | | |
| | | | 330 | | | | | |
| | | | 46 | | | | | |
| | | | 329 | | | | | |
| | | | 47 | | | | | |
| | | | 328 | | | | | |
| | | | 48 | | FINE SANDSTONE - grey/cream fine grained sandstone | | | |
| | | | 327 | | | | | |
| | | | 49 | | COARSE SANDSTONE - Coarse quartz rich sandstone, with some mixed lithologies. | | | |
| | | | 326 | | | | | |

END OF BOREHOLE AT 73.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3_TPB

SHEET 3 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 South**
Project Number: **2114426E & 2162570B**

Date Commenced: **27/8/09**
Date Completed: **31/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **203 mm**

Surface RL: **375.31 mAHD**
Co-ords: **E 709120.02 N 6437874.58**

| Bore Information | | | Field Material Description | | | Geophysical Log | | |
|------------------|-------------------|-----------|----------------------------|-------------|---|------------------------|------------------------|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) | HYDROGEOLOGY |
| | | | | | | | 0 62.5 125.0 187.5 250 | |
| | | | 325 | | COARSE SANDSTONE - Coarse quartz rich sandstone, with some mixed lithologies. (continued) | Tomcat Gully Sandstone | | |
| | | | 51 | | | | | |
| | | | 324 | | | | | |
| | | | 52 | | | | | |
| | | | 323 | | | | | |
| | | | 53 | | COARSE SANDSTONE - coarse sandstone 60% interbedded with carbonaceous mudstone 30% some coal bands 10% | | | |
| | | | 322 | | | | | |
| | | | 54 | | COAL - coal 90% interbedded with cream shale 5% and occasional grey fine grained sandstone, coal increasing to 95% with depth | Upper Ulan Seam | | |
| | | | 321 | | | | | |
| | | | 55 | | | | | |
| | | | 320 | | | | | |
| | | | 56 | | | | | |
| | | | 319 | | | | | |
| | | | 57 | | | | | |
| | | | 318 | | | | | |
| | | | 58 | | FINE SANDSTONE - cream/grey fine grained sandstone with occasional coaly fragments | C-Marker Claystone | | |
| | | | 317 | | | | | |
| | | | 59 | | MUDSTONE - cream mudstone 50% interbedded with dark grey carbonaceous shale 50% | | | |
| | | | 316 | | | | | |
| | | | 60 | | COAL - hard shaley coal grading to coal interbedded with light brown tuff 5% with depth | Lower Ulan Seam | | |
| | | | 315 | | | | | |
| | | | 61 | | | | | |
| | | | 314 | | | | | |
| | | | 62 | | | | | |
| | | | 313 | | | | | |
| | | | 63 | | | | | |
| | | | 312 | | | | | |
| | | | 64 | | COARSE SANDSTONE - coal grading quickly to coarse quartz rich sandstone containing angular quartz 70%. | Dapper Formation | | |
| | | | 311 | | | | | |
| | | | 65 | | COARSE SANDSTONE - coarse quartz rich sandstone, occasional mixed lithologies | | | |
| | | | 310 | | | | | |
| | | | 66 | | CONGLOMERATE - quartz rich conglomerate rounded to angular 70%/30% lithic clasts | | | |
| | | | 309 | | | | | |
| | | | 67 | | | | | |
| | | | 308 | | | | | |
| | | | 68 | | COARSE SANDSTONE - coarse quartz rich sandstone 70%/30% lithic clasts, sandstone becomes significantly finer below 70m depth | | | |
| | | | 307 | | | | | |
| | | | 69 | | | | | |
| | | | 306 | | | | | |
| | | | 70 | | MEDIUM SANDSTONE - medium grained quartz rich sandstone | | | |
| | | | 305 | | | | | |
| | | | 71 | | | | | |
| | | | 304 | | | | | |
| | | | 72 | | | | | |
| | | | 303 | | | | | |
| | | | 73 | | END OF BOREHOLE AT 73.00 m | | | |
| | | | 302 | | | | | |
| | | | 74 | | | | | |
| | | | 301 | | | | | |

END OF BOREHOLE AT 73.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3B

SHEET 3 OF 3

| | | | |
|-----------------|---------------------------|-----------------|--------------|
| Client: | CMC Pty Ltd | Date Commenced: | 26/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 27/8/09 |
| Bore Location: | GW3 Central South | Recorded By: | Nick Bryant |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 375.24 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 709117.18 N 6437880.81 |

| Bore Information | | | Field Material Description | | | |
|------------------|-------------------|-----------|----------------------------|-------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 335 | | | COAL - coal 85% interbedded with light brown tuff/mudstone 15%, coal proportion increasing to 98% with depth (<i>continued</i>) | Flyblowers Creek Seam |
| | | | 41 | | COAL - coal 75% interbedded with a cream siltstone 25% and occasional white claystone (soft) | |
| | | 334 | | | | |
| | | | 42 | | | |
| | | 333 | | | | |
| | | | 43 | | FINE SANDSTONE - grey/brown fine grained to medium grained sandstone, interbedding of cream sandstone | Tomcat Gully Sandstone |
| | | 332 | | | | |
| | | | 44 | | | |
| | | 331 | | | | |
| | | | 45 | | FINE SANDSTONE - grey/cream fine grained sandstone | |
| | | 330 | | | | |
| | | | 46 | | | |
| | | 329 | | | | |
| | | | 47 | | | |
| | | 328 | | | | |
| | | | 48 | | | |
| | | 327 | | | | |
| | | | 49 | | | |
| | | 326 | | | | |
| | | | 50 | | | |
| | | 325 | | | | |
| | | | 51 | | | |
| | | 324 | | | | |
| | | | 52 | | | |
| | | 323 | | | | |
| | | | 53 | | | |
| | | 322 | | | | |
| | | | 54 | | | |
| | | 321 | | | | |
| | | | 55 | | | |
| | | 320 | | | | |
| | | | 56 | | | |
| | | 319 | | | | |
| | | | 57 | | | |
| | | 318 | | | | |
| | | | 58 | | | |
| | | 317 | | | | |
| | | | 59 | | | |
| | | 316 | | | | |

END OF BOREHOLE AT 46.10 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3C

SHEET 2 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 Central**
Project Number: **2114426E & 2162570B**

Date Commenced: **25/8/09**
Date Completed: **25/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **375.15 mAHD**
Co-ords: **E 709114.87 N 6437885.98**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|-----------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 360 | | | CLAYSTONE - interbedded brown claystone 80%, interbedded with tuff | Digby Formation |
| | | 359 | 16 | | | |
| | | 358 | 17 | | MUDSTONE - light brown interbedded brown claystone 80%, quartz rich sandstone | |
| | | 357 | 18 | | COARSE SANDSTONE - coarse quartz rich sandstone 75%, dominantly angular quartz, interbedded with light brown cream mudstone mixed lithologies 25% | |
| | | 356 | 19 | | SHALE - dark grey shale 90% with some brown mudstone tuff bands ~10% | |
| | | 355 | 20 | | SILTSTONE - dark grey mudstone/siltstone | Whaka Formation |
| | | 354 | 21 | | | |
| | | 353 | 22 | | | |
| | | 352 | 23 | | SILTSTONE - very dark grey mudstone/siltstone | |
| | | 351 | 24 | | | |
| | | 350 | 25 | | SILTSTONE - very dark grey mudstone/siltstone 70% coal/carbonaceous shale 25% light brown fine grained sandstone 5% | |
| | | 349 | 26 | | SILTSTONE - very dark grey mudstone/siltstone 99% - light brown fine grained sandstone 1% | |
| | | 348 | 27 | | SILTSTONE - very dark grey mudstone/siltstone 95% - light brown fine grained sandstone 5% | |
| | | 347 | 28 | | COAL - coal with occasional brown mudstone/tuff bands | |
| | | 346 | 29 | | | |

END OF BOREHOLE AT 53.84 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3C

SHEET 3 OF 4

| | | | |
|-----------------|---------------------------|-----------------|--------------|
| Client: | CMC Pty Ltd | Date Commenced: | 25/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 25/8/09 |
| Bore Location: | GW3 Central | Recorded By: | Nick Bryant |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 375.15 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 709114.87 N 6437885.98 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 345 | | | COAL - coal with occasional brown mudstone/tuff bands (<i>continued</i>) | Whaka Formation |
| | | 344 | 31 | | COAL - bright coal 95% tuff/claystone layers ~5% | |
| | | 343 | 32 | | COAL - coal 85% interbedded, tuff/claystone layers 10%, with claystone (soft and potentially weathered) 5% | |
| | | 342 | 33 | | | |
| | | 341 | 34 | | | |
| | | 340 | 35 | | COAL - coal 95% interbedded with tuff/claystone | Avymore Claystone |
| | | 339 | 36 | | FINE SANDSTONE - cream fine grained sandstone 60% interbedded with dark grey shale/coal 28% white claystone 1% and cream light brown mudstone/shale 1% | |
| | | 338 | 37 | | | |
| | | 337 | 38 | | COAL - coal 70% interbedded with very dark carbonaceous shale/stony coal 29% brown fine grained sandstone 1% | Flyblowers Creek Seam |
| | | 336 | 39 | | | |
| | | 335 | 40 | | COAL - coal 90% with distinct pyritization 2% interbedded with very dark carbonaceous shale 8% large rock fragments and increase in water indicating fracture zone | |
| | | 334 | 41 | | | |
| | | 333 | 42 | | COAL - coal 55% interbedded with cream mudstone/tuff dark grey shale 32%, dark grey carbonaceous shale 1%, white/cream very fine grained sandstone | Tomcat Gully Sandstone |
| | | 332 | 43 | | SHALE - very dark grey carbonaceous shale 70% white/cream very fine grained sandstone 10% cream tuff/mudstone 20% | |
| | | 331 | 44 | | SHALE - dark grey carbonaceous shale 95% cream/pale brown mudstone 5% | |

END OF BOREHOLE AT 53.84 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3C

SHEET 4 OF 4

| | | | |
|-----------------|---------------------------|-----------------|--------------|
| Client: | CMC Pty Ltd | Date Commenced: | 25/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 25/8/09 |
| Bore Location: | GW3 Central | Recorded By: | Nick Bryant |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 375.15 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 709114.87 N 6437885.98 |

| Bore Information | | | Field Material Description | | | |
|------------------|---|-----------|----------------------------|-------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | <div> <div></div> <div>bentonite</div> <div></div> <div>50 mm slotted PVC casing</div> <div></div> <div>sump</div> </div> | 330 | | | SHALE - grey/brown shale mudstone | Tomcat Gully Sandstone |
| | | 329 | 46 | | SHALE - grey shale/mudstone 60%, 40 % light brown mudstone/shale | |
| | | 328 | 47 | | | |
| | | 327 | 48 | | FINE SANDSTONE - cream/light brown 65% grey mudstone 29% carbonaceous shale | |
| | | 326 | 49 | | COARSE SANDSTONE - coarse quartz rich sandstone, with some mixed lithologies including pyritization | |
| | | 325 | 50 | | COARSE SANDSTONE - coarse quartz rich sandstone 98%, lithic clasts of mudstone/shale | Upper Ulan Seam |
| | | 324 | 51 | | | |
| | | 323 | 52 | | COAL - coal 95% interbedded with cream shale 5% and occasional grey fine grained sandstone, coal increasing to 95% with depth | |
| | | 322 | 53 | | | |
| | | 321 | 54 | | | |
| | | 320 | 55 | | | |
| | | 319 | 56 | | | |
| | | 318 | 57 | | | |
| | | 317 | 58 | | | |
| | | 316 | 59 | | | |

END OF BOREHOLE AT 53.84 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3D

SHEET 1 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 Central North**
Project Number: **2114426E & 2162570B**

Date Commenced: **25/8/09**
Date Completed: **27/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **375.09 mAHD**
Co-ords: **E 709111.91 N 6437893.34**

| Bore Information | | | | Field Material Description | | |
|--|---------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel casing | | 374 | 1 | SANDY CLAY - orange/brown sandy gravelly clay, med - coarse gravel of quartz and mixed lithologies | Alluvium |
| | | | 373 | 2 | SANDY CLAY - yellow/brown sandy gravelly clay, gravel of quartz and mixed lithologies | |
| | | | 372 | 3 | GRAVELLY CLAY - yellow/brown gravelly clay, med - coarse gravel of quartz and mixed lithologies | |
| | | | 371 | 4 | CONGLOMERATE - weathered light-brown conglomerate, clasts medium well rounded of quartz and mixed lithologies | Digby Formation |
| | | | 370 | 5 | | |
| | | | 369 | 6 | CONGLOMERATE - grey conglomerate medium well rounded quartz dominant some clasts of mixed lithologies | |
| | | | 368 | 7 | CONGLOMERATE - cream quartz rich conglomerate large well rounded quartz clasts in a clay matrix - wet | |
| | | | 367 | 8 | CONGLOMERATE - cream quartz rich conglomerate large well rounded quartz clasts in a clay matrix | |
| | | | 366 | 9 | MEDIUM SANDSTONE - interbedded medium grained sandstone quartz rich with brown claystone | |
| | | | 365 | 10 | MEDIUM SANDSTONE - interbedded medium grained sandstone quartz rich and chert | |
| | | | 364 | 11 | MEDIUM SANDSTONE - interbedded medium grained sandstone quartz rich with brown claystone | |
| | | | 363 | 12 | | |
| | | | 362 | 13 | SILTSTONE - interbedded brown claystone 80%, quartz rich sandstone 20% | Ellismayne Formation |
| | | | 361 | 14 | SILTSTONE - interbedded brown claystone 75%, quartz rich sandstone 25% | |
| | | | 360 | 15 | SILTSTONE - interbedded brown claystone 70%, quartz rich sandstone 30% | |
| | | | 359 | 16 | SILTSTONE - interbedded brown claystone 80%, cream fine grained sandstone 20% | |
| | | | 358 | 17 | SILTSTONE - interbedded brown claystone 80%, quartz rich sandstone | |
| | | | 357 | 18 | SANDSTONE - grey/brown fine grained sandstone 50% very dark shale 49% <1% brown mudstone | |
| | | | 356 | 19 | | |
| | | | 355 | 20 | SHALE - dark grey shale 90% with some brown mudstone bands ~10% | |
| | | | 354 | 21 | SHALE - dark grey shale with light grey sandstone bands between | |
| | | | 353 | 22 | | |
| | | | 352 | 23 | | |
| | | | 351 | 24 | SHALE - dark grey calcareous mudstone ~1% grey/light grey mudstone | Whaka Formation |
| END OF BOREHOLE AT 64.82 m | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | |

Airlift = 0.5 L/s
EC = 1.38 mS/cm
pH = 7.22



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3D

SHEET 2 OF 3

| | | | |
|-----------------|---------------------------|-----------------|--------------|
| Client: | CMC Pty Ltd | Date Commenced: | 25/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 27/8/09 |
| Bore Location: | GW3 Central North | Recorded By: | Nick Bryant |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 375.09 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 709111.91 N 6437893.34 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 349 | 26 | SHALE - dark grey calcareous mudstone ~1% grey/light grey mudstone (continued) | Whaka Formation |
| | | | 348 | 27 | SHALE - very dark grey mudstone shale 98% interbedded with light grey/cream mudstone 2% | |
| | | | 347 | 28 | COAL - very dark grey stony coal/shale 95% interbedded with light grey/cream mudstone 5% | |
| | | | 346 | 29 | COAL - 75% interbedded with dark grey shale 23% tuff and mudstone bands 2% | |
| | | | 345 | 30 | | |
| | | | 344 | 31 | FINE SANDSTONE - 98% interbedded with coal 2% | |
| | | | 343 | 32 | COAL - 60% interbedded with claystone 35% tuff mudstone 5% | |
| | | | 342 | 33 | COAL - 90% interbedded with pale brown/brown shale 10% | |
| | | | 341 | 34 | | |
| | | | 340 | 35 | | |
| | | | 339 | 36 | SHALE - very dark grey carbonaceous shale/stony coal 60% interbedded with fine grained sandstone 40% | Avymore Claystone |
| | | | 338 | 37 | FINE SANDSTONE - dark grey fine grained sandstone/siltstone with minor tuff making up <1% | |
| | | | 337 | 38 | FINE SANDSTONE - grey fine grained sandstone 90% with dark grey fine grained sandstone 10% some coaly fragments | |
| | | | 336 | 39 | SHALE - dark grey shale 85% brown mudstone 15% | Flyblowers Creek Seam |
| | | | 335 | 40 | COAL - with some claystone tuff 1% | |
| | | | 334 | 41 | | |
| | | | 333 | 42 | MUDSTONE - dark grey mudstone/siltstone 70% interbedded with fine grained sandstone 25%, 5% white claystone | Tomcat Gully Sandstone |
| | | | 332 | 43 | COAL - coal with some shale | |
| | | | 331 | 44 | FINE SANDSTONE - grey/cream fine grained sandstone | |
| | | | 330 | 45 | | |
| | | | 329 | 46 | | |
| | | | 328 | 47 | | |
| | | | 327 | 48 | | |
| | | | 326 | 49 | COARSE SANDSTONE - coarse sandstone to conglomeratic quartz rich with mixed lithologies making up <5%, some grey shale laminations noted between 50-51m including some coaly fragments between 52-53m | |

END OF BOREHOLE AT 64.82 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3E

SHEET 1 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 North**
Project Number: **2114426E & 2162570B**

Date Commenced: **24/8/09**
Date Completed: **25/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **375.04 mAHD**
Co-ords: **E 709109.17 N 6437900.51**

| Bore Information | | | | Field Material Description | | |
|------------------|---------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel casing | | 374 1 | | SANDY CLAY - orange/brown sandy gravelly clay, med - coarse gravel of quartz and mixed lithologies | Alluvium |
| | | | 373 2 | | SANDY CLAY - yellow/brown sandy gravelly clay, gravel of quartz and mixed lithologies | |
| | | | 372 3 | | GRAVELLY CLAY - yellow/brown gravelly clay, med - coarse gravel of quartz and mixed lithologies | |
| | | | 371 4 | | CONGLOMERATE - light-brown weathered conglomerate, clasts medium well rounded of quartz and mixed lithologies | Digby Formation |
| | | | 370 5 | | | |
| | | | 369 6 | | CONGLOMERATE - grey conglomerate medium well rounded quartz dominant some clasts of mixed lithologies | |
| | | | 368 7 | | CONGLOMERATE - cream quartz rich conglomerate large well rounded quartz clasts in a clay matrix - wet | |
| | | | 367 8 | | CONGLOMERATE - cream quartz rich conglomerate large well rounded quartz clasts in a clay matrix | |
| | | | 366 9 | | MEDIUM SANDSTONE - interbedded medium grained sandstone quartz rich with brown claystone | |
| | | | 365 10 | | MEDIUM SANDSTONE - interbedded medium grained sandstone quartz rich and chert | |
| | | | 364 11 | | MEDIUM SANDSTONE - interbedded medium grained sandstone quartz rich with brown claystone | |
| | 50 mm PVC casing | | 363 12 | | MUDSTONE - grey/brown mudstone | Ellismayne Formation |
| | | | 362 13 | | CLAYSTONE - interbedded brown claystone 80%, quartz rich sandstone 20% | |
| | | | 361 14 | | CLAYSTONE - interbedded brown claystone 75%, quartz rich sandstone 25% | |
| | | | 360 15 | | CLAYSTONE - interbedded brown claystone 70%, quartz rich sandstone 30% | |
| | | | 359 16 | | CLAYSTONE - interbedded brown claystone 80%, cream fine grained sandstone 20% | |
| | | | 358 17 | | CLAYSTONE - interbedded brown claystone 80%, quartz rich sandstone | |
| | | | 357 18 | | SANDSTONE - cream fine grained sandstone 50% very dark shale 49% <1% brown mudstone | |
| | | | 356 19 | | SANDSTONE - cream fine grained sandstone 50% very dark shale 49% <1% brown mudstone | |
| | | | 355 20 | | SHALE - dark grey shale 90% with some brown mudstone bands ~10% | Whaka Formation |
| | | | 354 21 | | SHALE - dark grey shale with light grey sandstone bands between | |
| | | | 353 22 | | | |
| | | | 352 23 | | | |
| | | | 351 24 | | SHALE - dark grey calcareous mudstone ~1% grey/light grey mudstone | |

END OF BOREHOLE AT 73.23 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3E

SHEET 2 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 North**
Project Number: **2114426E & 2162570B**

Date Commenced: **24/8/09**
Date Completed: **25/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **375.04 mAHD**
Co-ords: **E 709109.17 N 6437900.51**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | SHALE - dark grey calcareous mudstone ~1% grey/light grey mudstone (continued) | Whaka Formation |
| | | 349 | 26 | | | |
| | | 348 | 27 | | SHALE - very dark grey mudstone shale 98% interbedded with light grey/cream mudstone 2% | |
| | | 347 | 28 | | SHALE - very dark grey mudstone shale 95% interbedded with light grey/cream mudstone 5% | |
| | | 346 | 29 | | | |
| | | 345 | 30 | | | |
| | | 344 | 31 | | SHALE - very dark grey mudstone shale 50% interbedded with light grey/cream mudstone 45%, light grey weathered mudstone 5% | |
| | | 343 | 32 | | SHALE - dark grey carbonaceous shale 95% cream/pale brown mudstone 5% | |
| | | 342 | 33 | | | |
| | | 341 | 34 | | | |
| | | 340 | 35 | | | Avymore Claystone |
| | | 339 | 36 | | COAL - 65% interbedded with a cream/light grey mudstone 35% | |
| | | 338 | 37 | | FINE SANDSTONE - 98% interbedded with Coal 2% | Flyblowers Creek Seam |
| | | 337 | 38 | | COAL - 98% interbedded with pale brown/brown shale 2% | |
| | | 336 | 39 | | | |
| | | 335 | 40 | | COAL - 99% interbedded with pale brown/brown shale 1% | |
| | | 334 | 41 | | | |
| | | 333 | 42 | | SHALE - very dark grey carbonaceous shale/stony coal 60% interbedded with fine grained sandstone 40% | Tomcat Gully Sandstone |
| | | 332 | 43 | | | |
| | | 331 | 44 | | FINE SANDSTONE - dark grey fine grained sandstone/siltstone with minor tuff making up <1% | |
| | | 330 | 45 | | FINE SANDSTONE - grey fine grained sandstone 90% with dark grey fine grained sandstone 10% some coaly fragments | |
| | | 329 | 46 | | | |
| | | 328 | 47 | | | |
| | | 327 | 48 | | | |
| | | 326 | 49 | | | |

END OF BOREHOLE AT 73.23 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW3E

SHEET 3 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **GW3 North**
Project Number: **2114426E & 2162570B**

Date Commenced: **24/8/09**
Date Completed: **25/8/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **375.04 mAHD**
Co-ords: **E 709109.17 N 6437900.51**

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | COARSE SANDSTONE - coarse sandstone to conglomeratic quartz rich with mixed lithologies making up <5%, some grey shale laminations noted between 50-51m including some coaly fragments between 52-53m | Tomcat Gully Sandstone |
| | | 324 | 51 | | | |
| | | 323 | 52 | | | |
| | | 322 | 53 | | COAL - 70% dark grey/brown shale 15% cream fine grained sandstone 15% | Upper Ulan Seam |
| | | 321 | 54 | | COAL - 80% dark grey shale 15% fine grained shale sandstone 5% | |
| | | 320 | 55 | | COAL - 90% dark grey shale 8% fine grained shale sandstone 2% | |
| | | 319 | 56 | | COAL - 95% dark grey shale 4%, <1% cream fine grained sandstone | |
| | | 318 | 57 | | FINE SANDSTONE - grey fine grained sandstone 50% grey shale containing coaly fragments | C-Marker Claystone |
| | | 317 | 58 | | FINE SANDSTONE - cream fine grained sandstone 50% grey shale/mudstone 40% coaly fragments 10% | |
| | | 316 | 59 | | COAL - coal 90%, carbonaceous shale 10% | Lower Ulan Seam |
| | | 315 | 60 | | | |
| | | 314 | 61 | | | |
| | | 313 | 62 | | COAL - coal 90%, carbonaceous shale 7%, some minor fine grained mudstone and or tuff 3% | |
| | | 312 | 63 | | FINE SANDSTONE - light brown fine grained sandstone 75%, coal carbonaceous shale 25%, coarse quartz rich sandstone (large drill chips and increase in water indicating fracturing) | Dapper Formation |
| | bentonite | 311 | 64 | | COARSE SANDSTONE - coarse grained quartz rich sandstone with 80% large rounded quartz clasts and 20% lithic clasts | |
| | 50 mm slotted PVC casing | 310 | 65 | | | |
| | | 309 | 66 | | | |
| | | 308 | 67 | | | |
| | | 307 | 68 | | | |
| | | 306 | 69 | | | |
| | | 305 | 70 | | | |
| | sump | 304 | 71 | | | |
| | | 303 | 72 | | | |
| | | 302 | 73 | | | |
| | | 301 | 74 | | | |

END OF BOREHOLE AT 73.23 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

| Bore Information | | | | Field Material Description | | | |
|--|--|-----------|--------------|----------------------------|---|-----------|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | 203 mm steel surface casing and 150 mm PVC casing to 30 mbgl | | 349 | 1 | CLAY - red brown clay | Alluvium | |
| | | | 348 | 2 | CLAY - yellow brown clay | | |
| | | | 347 | 3 | GRAVELLY CLAY - red brown gravelly clay with iron stone | | |
| | | | 346 | 4 | | | |
| | | | 345 | 5 | | | |
| | | | 344 | 6 | SANDY CLAY - red brown sandy clay | | |
| | | | 343 | 7 | | | |
| | | | 342 | 8 | SANDY CLAY - red brown becoming yellow grey sandy clay | | |
| | | | 341 | 9 | | | |
| | | | 340 | 10 | SAND - alluvial sands with gravels | | |
| | | | 339 | 11 | GRAVEL - alluvial gravels with coarse sands | | |
| | | | 338 | 12 | | | |
| | | | 337 | 13 | | | |
| | | | 336 | 14 | | | |
| | | | 335 | 15 | | | |
| | | | 334 | 16 | | | |
| | | | 333 | 17 | | | |
| | | | 332 | 18 | CLAY - grey brown clay with minor sand | | |
| | | | 331 | 19 | | | |
| | | | 330 | | | | |
| END OF BOREHOLE AT 54.00 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW5A

SHEET 1 OF 1

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Mates 1**
Project Number: **2114426E & 2162570B**

Date Commenced: **19/8/09**
Date Completed: **19/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Tubex**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **349.58 mAHD**
Co-ords: **E 707019.42 N 6446611.78**

| Bore Information | | | | Field Material Description | | | |
|--|--|-----------|--------------|----------------------------|---|-----------|------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | 152 mm steel surface casing and 50 mm PVC casing | 349 | 1 | | CLAY - red brown clay | Alluvium | EC = 5.68 mS/cm pH = 9.71 |
| | | 348 | 2 | | CLAY - yellow brown clay | | |
| | | 347 | 3 | | GRAVELLY CLAY - red brown gravelly clay with iron stone | | |
| | | 346 | 4 | | | | |
| | | 345 | 5 | | SANDY CLAY - red brown sandy clay | | |
| | | 344 | 6 | | | | |
| | | 343 | 7 | | | | |
| | | 342 | 8 | | SANDY CLAY - red brown becoming yellow grey sandy clay | | |
| | | 341 | 9 | | | | |
| | | 340 | 10 | | SAND - alluvial sands with gravels | | |
| | bentonite | 339 | 11 | | GRAVEL - alluvial gravels with coarse sands | | |
| | | 338 | 12 | | | | |
| | gravel pack | 337 | 13 | | | | |
| | | 336 | 14 | | | | |
| | | 335 | 15 | | | | |
| | 50 mm slotted PVC casing | 334 | 16 | | | | |
| | | 333 | 17 | | | | |
| | | 332 | 18 | | CLAY - grey brown clay with minor sand | | |
| | sump | 331 | 19 | | | | |
| | | 330 | | | | | |
| END OF BOREHOLE AT 19.75 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |

EC = 5.68 mS/cm
pH = 9.71



GROUNDWATER BOREHOLE LOG

BORE NO.

GW5B

SHEET 1 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 19/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 19/8/09 |
| Bore Location: | Mates 1 | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Tubex | Surface RL: | 349.63 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707020.52 N 6446617.82 |

| Bore Information | | | | Field Material Description | | |
|--|--|-----------|--------------|----------------------------|---|-----------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing and 50 mm PVC casing | | | | | |
| | | 349 | 1 | | CLAY - red brown clay | Alluvium |
| | | 348 | 2 | | CLAY - yellow brown clay | |
| | | 347 | 3 | | GRAVELLY CLAY - red brown gravelly clay with iron stone | |
| | | 346 | 4 | | | |
| | | 345 | 5 | | SANDY CLAY - red brown sandy clay | |
| | | 344 | 6 | | | |
| | | 343 | 7 | | | |
| | | 342 | 8 | | SANDY CLAY - red brown becoming yellow grey sandy clay | |
| | | 341 | 9 | | | |
| | | 340 | 10 | | SAND - alluvial sands with gravels | |
| | | 339 | 11 | | GRAVEL - alluvial gravels with coarse sands | |
| | | 338 | 12 | | | |
| | | 337 | 13 | | | |
| | | 336 | 14 | | | |
| | | 335 | 15 | | | |
| | | 334 | | | | |
| END OF BOREHOLE AT 30.64 m | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | |

EC = 0.899 mS/cm
pH = 8.55



GROUNDWATER BOREHOLE LOG

BORE NO.

GW5B

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 19/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 19/8/09 |
| Bore Location: | Mates 1 | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Tubex | Surface RL: | 349.63 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707020.52 N 6446617.82 |

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | GRAVEL - alluvial gravels with coarse sands <i>(continued)</i> | Alluvium |
| | | 333 | 17 | | | |
| | | 332 | 18 | | CLAY - grey brown clay with minor sand | |
| | | 331 | 19 | | | |
| | | 330 | 20 | | SAND - yellow grey becoming grey fine, poorly consolidated sands with 0.5 to 2cm gravel | |
| | | 329 | 21 | | | |
| | | 328 | 22 | | | |
| | bentonite | 327 | 23 | | | |
| | | 326 | 24 | | SANDY CLAY - grey sandy clay | Tomcat Gully Sandstone |
| | | 325 | 25 | | SANDSTONE - grey sandstone with conglomerate | |
| | gravel pack | 324 | 26 | | SANDSTONE - grey sandstone with gravel | |
| | 50 mm slotted PVC casing | 323 | 27 | | SANDSTONE - grey fine becoming coarse quartz sandstone | |
| | | 322 | 28 | | | |
| | | 321 | 29 | | | |
| | sump | 320 | 30 | | | |
| | | 319 | 31 | | | |
| | | 318 | | | | |

END OF BOREHOLE AT 30.64 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW5C

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 19/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 19/8/09 |
| Bore Location: | Mates 1 | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|--------------------|--------------------|------------------------|
| Drilling Method: | Tubex & Air Hammer | Surface RL: | 349.51 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707021.8 N 6446624.4 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | | 324 | | SANDSTONE - grey sandstone with conglomerate (<i>continued</i>) | Tomcat Gully Sandstone |
| | | | 26 | | SANDSTONE - grey sandstone with gravel | |
| | | | 323 | | | |
| | | | 27 | | SANDSTONE - grey fine becoming coarse quartz sandstone | |
| | | | 322 | | | |
| | | | 28 | | | |
| | | | 321 | | | |
| | | | 29 | | | |
| | | | 320 | | | |
| | | | 30 | | | |
| | | | 319 | | | |
| | | | 31 | | SANDSTONE - grey coarse sandstone | |
| | | | 318 | | | |
| | | | 32 | | | |
| | | | 317 | | | |
| | | | 33 | | | |
| | | | 316 | | | |
| | | | 34 | | | |
| | | | 315 | | | |
| | | | 35 | | COAL | Upper Ulan Seam |
| | | | 314 | | | |
| | | | 36 | | | |
| | | | 313 | | COAL - coal with light grey mudstone/claystone | C-Marker Claystone |
| | | | 37 | | | |
| | | | 312 | | | |
| | | | 38 | | | |
| | | | 311 | | | |
| | | | 39 | | COAL | Lower Ulan Seam |
| | | | 310 | | | |
| | | | 40 | | | |
| | | | 309 | | | |
| | | | 41 | | | |
| | | | 308 | | | |
| | | | 42 | | | |
| | | | 307 | | | |
| | | | 43 | | | |
| | | | 306 | | | |
| | | | 44 | | | |
| | | | 305 | | | |
| | | | 45 | | | |
| | | | 304 | | | |
| | | | 46 | | | |
| | | | 303 | | | |
| | | | 47 | | | |
| | | | 302 | | | |
| | | | 48 | | | |
| | | | 301 | | | |
| | | | 49 | | | |
| | | | 300 | | | |

END OF BOREHOLE AT 43.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW5D

SHEET 1 OF 3

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 17/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 17/8/09 |
| Bore Location: | Mates 1 | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|--------------------|--------------------|--------------------------|
| Drilling Method: | Tubex & Air Hammer | Surface RL: | 349.29 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707023.18 N 6446631.55 |

| Bore Information | | | | Field Material Description | | |
|------------------|--|-----------|--------------|----------------------------|---|-----------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing and 50 mm PVC casing | 349 | 1 | | CLAY - red brown clay | Alluvium |
| | | 348 | 2 | | CLAY - yellow brown clay | |
| | | 347 | 3 | | GRAVELLY CLAY - red brown gravelly clay with iron stone | |
| | | 346 | 4 | | | |
| | | 345 | 5 | | SANDY CLAY - red brown sandy clay | |
| | | 344 | 6 | | | |
| | | 343 | 7 | | | |
| | | 342 | 8 | | SANDY CLAY - red brown becoming yellow grey sandy clay | |
| | | 341 | 9 | | | |
| | | 340 | 10 | | SAND - alluvial sands with gravels | |
| | | 339 | 11 | | GRAVEL - alluvial gravels with coarse sands | |
| | | 338 | 12 | | | |
| | | 337 | 13 | | | |
| | | 336 | 14 | | | |
| | | 335 | 15 | | | |
| | | 334 | 16 | | | |
| | | 333 | 17 | | | |
| | | 332 | 18 | | CLAY - grey brown clay with minor sand | |
| | | 331 | 19 | | | |
| | | 330 | | | | |

END OF BOREHOLE AT 54.60 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW5D

SHEET 2 OF 3

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 17/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 17/8/09 |
| Bore Location: | Mates 1 | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|--------------------|--------------------|--------------------------|
| Drilling Method: | Tubex & Air Hammer | Surface RL: | 349.29 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707023.18 N 6446631.55 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 329 | | SAND - yellow grey becoming grey fine, poorly consolidated sands with 0.5 to 2cm gravel | Alluvium |
| | | | 21 | | | |
| | | | 328 | | | |
| | | | 22 | | | |
| | | | 327 | | | |
| | | | 23 | | | |
| | | | 326 | | | |
| | | | 24 | | SANDY CLAY - grey sandy clay | Tomcat Gully Sandstone |
| | | | 325 | | | |
| | | | 25 | | SANDSTONE - grey sandstone with conglomerate | |
| | | | 324 | | | |
| | | | 26 | | SANDSTONE - grey sandstone with gravel | |
| | | | 323 | | | |
| | | | 27 | | SANDSTONE - grey fine becoming coarse quartz sandstone | |
| | | | 322 | | | |
| | | | 28 | | | |
| | | | 321 | | | |
| | | | 29 | | | |
| | | | 320 | | | |
| | | | 30 | | | |
| | | | 319 | | | |
| | | | 31 | | SANDSTONE - grey coarse sandstone | |
| | | | 32 | | | |
| | | | 33 | | | |
| | | | 34 | | | |
| | | | 35 | | COAL | Upper Ulan Seam |
| | | | 314 | | | |
| | | | 36 | | | |
| | | | 313 | | | |
| | | | 37 | | COAL - coal with light grey mudstone/claystone | C-Marker Claystone |
| | | | 312 | | | |
| | | | 38 | | | |
| | | | 311 | | | |
| | | | 39 | | COAL | Lower Ulan Seam |
| | | | 310 | | | |

END OF BOREHOLE AT 54.60 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6_TPB

SHEET 1 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **16/8/09**
Date Completed: **16/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **203 mm**

Surface RL: **411.32 mAHD**
Co-ords: **E 713476.75 N 6435365.2**

| Bore Information | | | Field Material Description | | | Geophysical Log | | |
|------------------|--|-----------|----------------------------|-------------|--|----------------------------------|--|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) 0 62.5 125.0 187.5 250 | HYDROGEOLOGY |
| | 254 mm and 203 mm steel surface casing | 411 | 1 | | CLAY - Red brown clay | Ellismayne Formation (weathered) | | |
| | | 410 | 2 | | GRAVELLY CLAY - red brown gravelly clay (minor laterite) | | | |
| | | 409 | 3 | | GRAVELLY CLAY - yellow brown gravelly sandy clay | | | |
| | | 408 | 4 | | CLAY - light grey/cream light clay | | | |
| | | 407 | 5 | | CLAY - brown grey clay/weathered sandstone | | | |
| | 203 mm steel casing | 405 | 6 | | CLAY - light brown grey clay/weathered sandstone | Ellismayne Formation | | |
| | bentonite | 404 | 7 | | FINE SANDSTONE - moderately weathered, grey/brown fine grained sandstone | | | |
| | | 403 | 8 | | SILTSTONE - cream siltstone | | | |
| | | 402 | 9 | | SILTSTONE - brown cream clay/siltstone | | | |
| | gravel pack | 401 | 10 | | CLAYSTONE - cream claystone | | | |
| | | 400 | 11 | | SILTSTONE - dark grey siltstone | | | |
| | | 399 | 12 | | CLAYSTONE - white claystone | | | |
| | | 398 | 13 | | SILTSTONE - light grey siltstone, with interbedded coal (moist) | | | |
| | 203 mm slotted steel casing | 397 | 14 | | CLAYSTONE - cream claystone with interbedded coal (water at 24m) | | | |
| | | 396 | 15 | | CLAYSTONE - cream claystone with interbedded coal (water at 24m) | | | |
| | | 395 | 16 | | | Whaka Formation | | |
| | | 394 | 17 | | | | | |
| | | 393 | 18 | | | Avymore Claystone | | |
| | | 392 | 19 | | | | | |
| | | 391 | 20 | | | | | |
| | | 390 | 21 | | | | | |
| | | 389 | 22 | | | | | |
| | | 388 | 23 | | | | | |
| | | 387 | 24 | | | | | |

EC = 2.3 mS/cm
pH = 5.96

END OF BOREHOLE AT 61.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6_TPB


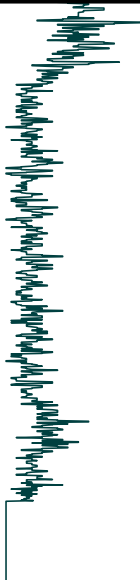
SHEET 3 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **16/8/09**
Date Completed: **16/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **203 mm**

Surface RL: **411.32 mAHD**
Co-ords: **E 713476.75 N 6435365.2**

| Bore Information | | | Field Material Description | | | Geophysical Log | | | |
|--|-------------------|-----------|----------------------------|-------------|---|------------------|--|--------------|--|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) | HYDROGEOLOGY | |
| | | | | | | | 0 62.5 125.0 187.5 250 | | |
|  | sump | 361 | | | COAL - coal with grey siltstone | Lower Ulan Seam |  | | |
| | | 51 | | | SILTSTONE - grey/brown carbonaceous siltstone | Dapper Formation | | | |
| | | 360 | | | | | | | |
| | | 52 | | | SANDSTONE - grey fine to medium grained quartz sandstone | | | | |
| | | 359 | | | | | | | |
| | | 53 | | | SANDSTONE - grey coarse to medium grained sandstone | | | | |
| | | 358 | | | | | | | |
| | | 54 | | | | | | | |
| | | 357 | | | | | | | |
| | | 55 | | | CONGLOMERATE - grey fine to coarse grained subrounded conglomerate with clay matrix | | | | |
| | | 356 | | | | | | | |
| | | 56 | | | | | | | |
| | | 355 | | | | | | | |
| | | 57 | | | | | | | |
| | | 354 | | | | | | | |
| | | 58 | | | | | | | |
| | | 353 | | | | | | | |
| | | 59 | | | | | | | |
| | | 352 | | | | | | | |
| | | 60 | | | | | | | |
| 351 | | | | | | | | | |
| | | 61 | | | END OF BOREHOLE AT 61.00 m | | | | |
| | | 350 | | | | | | | |
| | | 62 | | | | | | | |
| | | 349 | | | | | | | |
| | | 63 | | | | | | | |
| | | 348 | | | | | | | |
| | | 64 | | | | | | | |
| | | 347 | | | | | | | |
| | | 65 | | | | | | | |
| | | 346 | | | | | | | |
| | | 66 | | | | | | | |
| | | 345 | | | | | | | |
| | | 67 | | | | | | | |
| | | 344 | | | | | | | |
| | | 68 | | | | | | | |
| | | 343 | | | | | | | |
| | | 69 | | | | | | | |
| | | 342 | | | | | | | |
| | | 70 | | | | | | | |
| | | 341 | | | | | | | |
| | | 71 | | | | | | | |
| | | 340 | | | | | | | |
| | | 72 | | | | | | | |
| | | 339 | | | | | | | |
| | | 73 | | | | | | | |
| | | 338 | | | | | | | |
| | | 74 | | | | | | | |
| | | 337 | | | | | | | |

END OF BOREHOLE AT 61.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6A

SHEET 1 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **16/8/09**
Date Completed: **16/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **411.42 mAHD**
Co-ords: **E 713475.57 N 6435359.34**

| Bore Information | | | | Field Material Description | | | |
|--|--|-----------|--------------|----------------------------|--|----------------------------------|------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | 152 mm steel surface casing and 50 mm PVC casing | 411 | 1 | | CLAY - red brown clay | Ellismayne Formation (weathered) | EC = 1.84 mS/cm pH = 7.88 |
| | | 410 | 2 | | GRAVELLY CLAY - red brown gravelly clay (minor laterite) | | |
| | | 409 | 3 | | GRAVELLY CLAY - yellow brown gravelly sandy clay | | |
| | | 408 | 4 | | | | |
| | | 407 | 5 | | CLAY - light grey/cream light clay | | |
| | 50 mm PVC casing | 406 | 6 | | CLAY - brown grey clay/weathered sandstone | | |
| | | 405 | 7 | | CLAY - light brown grey clay/weathered sandstone | | |
| | | 404 | 8 | | FINE SANDSTONE - moderately weathered, grey/brown fine grained sandstone | | |
| | bentonite | 403 | 9 | | SILTSTONE - cream siltstone | Ellismayne Formation | |
| | | 402 | 10 | | SILTSTONE - brown cream clay/siltstone | | |
| | | 401 | 11 | | CLAYSTONE - cream claystone | | |
| | | 400 | 12 | | SILTSTONE - dark grey siltstone | | |
| | gravel pack | 399 | 13 | | | | |
| | | 398 | 14 | | CLAYSTONE - white claystone | | |
| | 50 mm slotted PVC casing | 397 | 15 | | SILTSTONE - light grey siltstone, with interbedded coal (moist) | | |
| | | 396 | 16 | | | | |
| | | 395 | 17 | | | | |
| | | 394 | 18 | | | | |
| | | 393 | 19 | | SILTSTONE - light grey siltstone | | |
| | | 392 | | | COAL | Whaka | |
| END OF BOREHOLE AT 34.50 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |

EC = 1.84 mS/cm
pH = 7.88



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6A

SHEET 2 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **16/8/09**
Date Completed: **16/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **411.42 mAHD**
Co-ords: **E 713475.57 N 6435359.34**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|--|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 391 | | SILTSTONE - light grey siltstone with interbedded coal | Formation Avymore Claystone |
| | | | 21 | | | |
| | | | 390 | | | |
| | | | 22 | | | |
| | | | 389 | | | |
| | | | 23 | | | Flyblowers Creek Seam |
| | | | 388 | | CLAYSTONE - cream claystone with interbedded coal (water at 24m) | |
| | | | 24 | | | |
| | | | 387 | | | |
| | | | 25 | | SILTSTONE - grey siltstone | |
| | | | 386 | | | |
| | | | 26 | | | |
| | | | 385 | | | |
| | | | 27 | | | |
| | | | 384 | | | |
| | | | 28 | | | |
| | | | 383 | | | END OF BOREHOLE AT 34.50 m This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. |
| | | | 29 | | | |
| | | | 382 | | | |
| | | | 30 | | COAL | |
| | | | 381 | | | |
| | | | 31 | | COAL - coal with interbedded claystone and clay | |
| | | | 380 | | | |
| | | | 32 | | | |
| | | | 379 | | | |
| | | | 33 | | COAL - coal with interbedded light brown claystone | |
| | | | 378 | | | |
| | | | 34 | | COAL - coal with interbedded light brown claystone and grey siltstone | |
| | | | 377 | | | |
| | | | 35 | | | |
| | | | 376 | | | |
| | | | 36 | | | |
| | | | 375 | | | |
| | | | 37 | | | |
| | | | 374 | | | |
| | | | 38 | | | |
| | | | 373 | | | |
| | | | 39 | | | |
| | | | 372 | | | |



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6B

SHEET 1 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **16/8/09**
Date Completed: **16/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **411.44 mAHD**
Co-ords: **E 713474.49 N 6435353.41**

| Bore Information | | | | Field Material Description | | | |
|--|--|-----------|--------------|----------------------------|--|----------------------------------|------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | 152 mm steel surface casing and 50 mm PVC casing | 411 | 1 | | CLAY - red brown clay | Ellismayne Formation (weathered) | EC = 2.43 mS/cm pH = 7.17 |
| | | 410 | 2 | | GRAVELLY CLAY - red brown gravelly clay (minor laterite) | | |
| | | 409 | 3 | | GRAVELLY CLAY - yellow brown gravelly sandy clay | | |
| | | 408 | 4 | | | | |
| | | 407 | 5 | | CLAY - light grey-cream light clay | | |
| | 50 mm PVC casing | 406 | 6 | | CLAY - brown grey clay/weathered sandstone | | |
| | | 405 | 7 | | CLAY - light brown grey clay/weathered sandstone | | |
| | | 404 | 8 | | FINE SANDSTONE - moderately weathered, grey/brown fine grained sandstone | | |
| | | 403 | 9 | | SILTSTONE - cream siltstone | Ellismayne Formation | |
| | | 402 | 10 | | SILTSTONE - brown cream clay/siltstone | | |
| | | 401 | 11 | | CLAYSTONE - cream claystone | | |
| | | 400 | 12 | | SILTSTONE - dark grey siltstone | | |
| | | 399 | 13 | | | | |
| | | 398 | 14 | | CLAYSTONE - white claystone | | |
| | | 397 | 15 | | SILTSTONE - light grey siltstone, with interbedded coal (moist) | | |
| | | 396 | 16 | | | | |
| | | 395 | 17 | | | | |
| | | 394 | 18 | | | | |
| | | 393 | 19 | | SILTSTONE - light grey siltstone | | |
| | | 392 | | | COAL | Whaka | |
| END OF BOREHOLE AT 38.00 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |

EC = 2.43 mS/cm
pH = 7.17



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6B

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 16/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 16/8/09 |
| Bore Location: | Glencross 2 | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 411.44 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 713474.49 N 6435353.41 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|-----------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 391 | | SILTSTONE - light grey siltstone with interbedded coal | Formation Avymore Claystone |
| | | | 21 | | | |
| | | | 390 | | | |
| | | | 22 | | | |
| | | | 389 | | | |
| | | | 23 | | | Flyblowers Creek Seam |
| | | | 388 | | CLAYSTONE - cream claystone with interbedded coal (water at 24m) | |
| | | | 24 | | | |
| | | | 387 | | | |
| | | | 25 | | SILTSTONE - grey siltstone | |
| | | | 386 | | | Tomcat Gully Sandstone |
| | | | 26 | | | |
| | | | 385 | | | |
| | | | 27 | | | |
| | | | 384 | | | |
| | | | 28 | | | Tomcat Gully Sandstone |
| | | | 383 | | | |
| | | | 29 | | | |
| | | | 382 | | | |
| | | | 30 | | COAL | |
| | | | 381 | | | Tomcat Gully Sandstone |
| | | | 31 | | COAL - coal with interbedded claystone and clay | |
| | | | 380 | | | |
| | | | 32 | | | |
| | | | 379 | | | |
| | | | 33 | | COAL - coal with interbedded light brown claystone | Tomcat Gully Sandstone |
| | | | 378 | | | |
| | | | 34 | | COAL - coal with interbedded light brown claystone and grey siltstone | |
| | | | 377 | | | |
| | | | 35 | | SANDSTONE - grey medium grained sandstone | |
| | | | 376 | | | Tomcat Gully Sandstone |
| | | | 36 | | | |
| | | | 375 | | | |
| | | | 37 | | SANDSTONE - grey coarse grained and pebbly sandstone (subrounded gravel) | |
| | | | 374 | | | |
| | | | 38 | | SANDSTONE - grey medium quartz sandstone with grey siltstone | Tomcat Gully Sandstone |
| | | | 373 | | | |
| | | | 39 | | | |
| | | | 372 | | | |
| | | | | | | |

END OF BOREHOLE AT 38.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6C

SHEET 1 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **15/8/09**
Date Completed: **15/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **411.45 mAHD**
Co-ords: **E 713473.31 N 6435347.53**

| Bore Information | | | | Field Material Description | | |
|------------------|--|-----------|--------------|----------------------------|--|----------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing and 50 mm PVC casing | 411 | 1 | | CLAY - red brown clay | Ellismayne Formation (weathered) |
| | | 410 | 2 | | GRAVELLY CLAY - red brown gravelly clay (minor laterite) | |
| | | 409 | 3 | | GRAVELLY CLAY - yellow brown gravelly sandy clay | |
| | | 408 | 4 | | | |
| | | 407 | 5 | | CLAY - light grey/cream light clay | |
| | | 406 | 6 | | CLAY - brown grey clay/weathered sandstone | |
| | 50 mm PVC casing | 405 | 7 | | CLAY - light brown grey clay/weathered sandstone | |
| | | 404 | 8 | | FINE SANDSTONE - moderately weathered, grey/brown fine grained sandstone | |
| | | 403 | 9 | | SILTSTONE - cream siltstone | Ellismayne Formation |
| | | 402 | 10 | | SILTSTONE - brown cream clay/siltstone | |
| | | 401 | 11 | | CLAYSTONE - cream claystone | |
| | | 400 | 12 | | SILTSTONE - dark grey siltstone | |
| | | 399 | 13 | | | |
| | | 398 | 14 | | CLAYSTONE - white claystone | |
| | | 397 | 15 | | SILTSTONE - light grey siltstone, with interbedded coal (moist) | |
| | | 396 | 16 | | | |
| | | 395 | 17 | | | |
| | | 394 | 18 | | | |
| | | 393 | 19 | | SILTSTONE - light grey siltstone | Whaka |
| | | 392 | | | COAL | |

EC = 1.69 mS/cm
pH = 7.76

END OF BOREHOLE AT 50.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6C

SHEET 2 OF 3

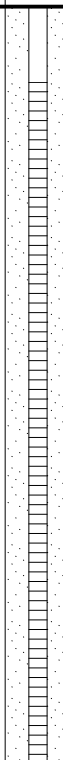
| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 15/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 15/8/09 |
| Bore Location: | Glencross 2 | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 411.45 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 713473.31 N 6435347.53 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|-----------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 391 | | SANDSTONE - light grey siltstone with interbedded coal | Formation Avymore Claystone |
| | | | 21 | | | |
| | | | 390 | | | |
| | | | 22 | | | |
| | | | 389 | | | |
| | | | 23 | | | Flyblowers Creek Seam |
| | | | 388 | | CLAYSTONE - cream claystone with interbedded coal (water at 24m) | |
| | | | 24 | | | |
| | | | 387 | | | |
| | | | 25 | | SILTSTONE - grey siltstone | |
| | | | 386 | | | Tomcat Gully Sandstone |
| | | | 26 | | | |
| | | | 385 | | | |
| | | | 27 | | | |
| | | | 384 | | | |
| | | | 28 | | | Upper Ulan Seam |
| | | | 383 | | | |
| | | | 29 | | | |
| | | | 382 | | | |
| | | | 30 | | COAL | |
| | | | 381 | | | Upper Ulan Seam |
| | | | 31 | | COAL - coal with interbedded claystone and clay | |
| | | | 380 | | | |
| | | | 32 | | | |
| | | | 379 | | | |
| | | | 33 | | COAL - coal with interbedded light brown claystone | Upper Ulan Seam |
| | | | 378 | | | |
| | | | 34 | | COAL - coal with interbedded light brown claystone and grey siltstone | |
| | | | 377 | | | |
| | | | 35 | | SANDSTONE - grey medium grained sandstone | |
| | | | 376 | | | Upper Ulan Seam |
| | | | 36 | | | |
| | | | 375 | | | |
| | | | 37 | | SANDSTONE - grey coarse grained and pebbly sandstone (subrounded gravel) | |
| | | | 374 | | | |
| | | | 38 | | SANDSTONE - grey medium quartz sandstone with grey siltstone | Upper Ulan Seam |
| | | | 373 | | | |
| | | | 39 | | COAL - dark brown with interbedded carbonaceous siltstone and claystone | |
| | | | 372 | | | |
| | | | | | | |

END OF BOREHOLE AT 50.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

| Bore Information | | | | Field Material Description | | | |
|------------------|---|-----------|--------------|----------------------------|--|-----------------------|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| |  50 mm slotted PVC casing | 371 | | | COAL - dark brown with interbedded carbonaceous siltstone and claystone (<i>continued</i>) | Upper Ulan Seam | |
| | | 41 | | | COAL | | |
| | | 370 | | | | | |
| | | 42 | | | | | |
| | | 369 | | | | | |
| | | 43 | | | COAL - coal with interbedded grey siltstone | | |
| | | 368 | | | | | |
| | | 44 | | | SANDSTONE - grey fine grained sandstone with interbedded siltstone | C-Marker Claystone | |
| | | 367 | | | | | |
| | | 45 | | | | | |
| | | 366 | | | | | |
| | | 46 | | | | | |
| | | 365 | | | | | |
| | | 47 | | | | | |
| | | 364 | | | | | |
| | | 48 | | | COAL | Lower Ulan Seam | |
| | | 363 | | | | | |
| | | 49 | | | | | |
| | | 362 | | | | | |
| | | 50 | | | | | |
| | 361 | | | | | | |
| | 51 | | | | | | |
| | 360 | | | | | | |
| | 52 | | | | | | |
| | 359 | | | | | | |
| | 53 | | | | | | |
| | 358 | | | | | | |
| | 54 | | | | | | |
| | 357 | | | | | | |
| | 55 | | | | | | |
| | 356 | | | | | | |
| | 56 | | | | | | |
| | 355 | | | | | | |
| | 57 | | | | | | |
| | 354 | | | | | | |
| | 58 | | | | | | |
| | 353 | | | | | | |
| | 59 | | | | | | |
| | 352 | | | | | | |

END OF BOREHOLE AT 50.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6D

SHEET 1 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **15/8/09**
Date Completed: **15/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **411.44 mAHD**
Co-ords: **E 713472.12 N 6435341.06**

| Bore Information | | | | Field Material Description | | |
|--|--|-----------|--------------|----------------------------|--|--------------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 152 mm steel surface casing and 50 mm PVC casing | 411 | 1 | | CLAY - red brown clay | Ellismayne Formation (weathered) |
| | | 410 | 2 | | GRAVELLY CLAY - red brown gravelly clay (minor laterite) | |
| | | 409 | 3 | | GRAVELLY CLAY - yellow brown gravelly sandy clay | |
| | | 408 | 4 | | | |
| | | 407 | 5 | | CLAY - light grey/cream light clay | |
| | | 406 | 6 | | | |
| | 50 mm PVC casing | 405 | 7 | | CLAY - brown grey clay/weathered claystone | Ellismayne Formation |
| | | 404 | 8 | | CLAY - light brown grey clay/weathered claystone | |
| | | 403 | 9 | | FINE SANDSTONE - light brown fine sandstone | |
| | | 402 | 10 | | SILTSTONE - cream siltstone | |
| | | 401 | 11 | | SILTSTONE - brown cream clay/siltstone | |
| | | 400 | 12 | | CLAYSTONE - cream claystone | |
| | | 399 | 13 | | SILTSTONE - dark grey siltstone | |
| | | 398 | 14 | | | |
| | | 397 | 15 | | CLAYSTONE - white claystone | |
| | | 396 | 16 | | SILTSTONE - light grey siltstone, with interbedded coal (moist) | |
| | | 395 | 17 | | | |
| | | 394 | 18 | | | |
| | | 393 | 19 | | SILTSTONE - light grey siltstone | |
| | | 392 | 20 | | COAL | Whaka Formation Avymore Claystone |
| | | 391 | 21 | | SILTSTONE - light grey siltstone with interbedded coal | |
| | | 390 | 22 | | | |
| | | 389 | 23 | | | |
| | | 388 | 24 | | CLAYSTONE - cream claystone with interbedded coal (water at 24m) | |
| | | 387 | | | | |
| END OF BOREHOLE AT 61.00 m | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | |

EC = 1.83 mS/cm
pH = 7.82



GROUNDWATER BOREHOLE LOG

BORE NO.

GW6D

SHEET 2 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Glencross 2**
Project Number: **2114426E & 2162570B**

Date Commenced: **15/8/09**
Date Completed: **15/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **411.44 mAHD**
Co-ords: **E 713472.12 N 6435341.06**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 386 | 26 | | SILTSTONE - grey siltstone | Avymore Claystone |
| | | 385 | 27 | | | |
| | | 384 | 28 | | | |
| | | 383 | 29 | | | |
| | | 382 | 30 | | COAL | Flyblowers Creek Seam |
| | | 381 | 31 | | COAL - coal with interbedded claystone and clay | |
| | | 380 | 32 | | | |
| | | 379 | 33 | | COAL - coal with interbedded light brown claystone | |
| | | 378 | 34 | | COAL - coal with interbedded light brown claystone and grey siltstone | |
| | | 377 | 35 | | SILTSTONE - grey siltstone | Tomcat Gully Sandstone |
| | | 376 | 36 | | SILTSTONE - grey siltstone with coarse quartz sandstone | |
| | | 375 | 37 | | SANDSTONE - grey coarse quartz sandstone | |
| | | 374 | 38 | | SANDSTONE - grey medium quartz sandstone with grey siltstone | |
| | | 373 | 39 | | SILTSTONE - dark grey carbonaceous siltstone | Upper Ulan Seam |
| | | 372 | 40 | | | |
| | | 371 | 41 | | COAL | |
| | | 370 | 42 | | | |
| | | 369 | 43 | | COAL - coal with interbedded grey siltstone | |
| | | 368 | 44 | | SILTSTONE - grey siltstone | C-Marker Claystone |
| | | 367 | 45 | | | |
| | | 366 | 46 | | | |
| | | 365 | 47 | | | |
| | | 364 | 48 | | COAL | Lower Ulan Seam |
| | | 363 | 49 | | | |
| | | 362 | | | | |

END OF BOREHOLE AT 61.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7_TPB

SHEET 1 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 14/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 14/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.47 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 203 mm |
| | | Co-ords: | E 707836.34 N 6442769.92 |

| Bore Information | | Field Material Description | | | Geophysical Log | |
|------------------|--|----------------------------|--------------|---|----------------------|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | LITHOLOGY | Formation | GAMMA (API-GR) |
| | | | | | | 0 62.5 125.0 187.5 250 |
| | 304 mm, 254 mm and 203 mm steel surface casing | 358 | 1 | CLAY - pale yellow brown clay | Alluvium | |
| | | 357 | 2 | CLAY - yellow brown clay with quartz gravel | | |
| | | 356 | 3 | CLAY - yellow brown gravelly clay laterite and unknown metamorphic rock | | |
| | | 355 | 4 | CLAY - yellow brown clay | | |
| | | 354 | 5 | CLAY - yellow brown clay with minor gravel | | |
| | | 353 | 6 | SANDY GRAVEL - red brown sandy gravel with clay matrix | | |
| | | 352 | 7 | GRAVELLY SAND - yellow brown gravelly sand with clay matrix | | |
| | | 351 | 8 | CLAYSTONE - yellow brown claystone (samples contaminated from falling alluvium) | Ellismayne Formation | |
| | | 350 | 9 | | | |
| | | 349 | 10 | | | |
| | | 348 | 11 | | | |
| | | 347 | 12 | | | |
| | 254 mm and 203 mm steel surface casing | 346 | 13 | SILTSTONE - grey siltstone | | |
| | | 345 | 14 | | | |
| | | 344 | 15 | SILTSTONE - grey siltstone and coarse grey siltstone | | |
| | | 343 | 16 | | | |
| | | 342 | 17 | | | |
| | | 341 | 18 | SANDSTONE - light grey sandstone (quartz medium grained) and siltstone | | |
| | 203 mm steel casing | 340 | 19 | | | |
| | | 339 | 20 | | | |
| | | 338 | 21 | SANDSTONE - fine grained sandstone and light brown mudstone | | |
| | | 337 | 22 | SANDSTONE - brown mudstone and quartz sandstone | | |
| | bentonite | 336 | 23 | | | |
| | | 335 | 24 | | | |
| | | 334 | | | | |

END OF BOREHOLE AT 85.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7_TPB

SHEET 2 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 14/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 14/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.47 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 203 mm |
| | | Co-ords: | E 707836.34 N 6442769.92 |

| Bore Information | | | | Field Material Description | | Geophysical Log | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|----------------------|------------------------|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) | HYDROGEOLOGY |
| | | | | | | | 0 62.5 125.0 187.5 250 | |
| | | | 333 | | SILTSTONE - light grey siltstone | Ellismayne Formation | | |
| | | | 26 | | | | | |
| | | | 332 | | | | | |
| | | | 27 | | SILTSTONE - light grey to grey siltstone | | | |
| | | | 331 | | | | | |
| | | | 28 | | | | | |
| | | | 330 | | | | | |
| | | | 29 | | SILTSTONE - grey siltstone | | | |
| | | | 329 | | | | | |
| | | | 30 | | | | | |
| | | | 328 | | | | | |
| | | | 31 | | | | | |
| | | | 327 | | | | | |
| | | | 32 | | SILTSTONE - dark grey carbonaceous mudstone and siltstone | Whaka Formation | | |
| | | | 326 | | | | | |
| | | | 33 | | | | | |
| | | | 325 | | | | | |
| | | | 34 | | | | | |
| | | | 324 | | | | | |
| | | | 35 | | COAL - stony coal | | | |
| | | | 323 | | | | | |
| | | | 36 | | | | | |
| | | | 322 | | | | | |
| | | | 37 | | CLAYSTONE - light brown claystone and dark grey siltstone | Avymore Claystone | | |
| | | | 321 | | | | | |
| | | | 38 | | SILTSTONE - dark grey siltstone | | | |
| | | | 320 | | | | | |
| | | | 39 | | | | | |
| | | | 319 | | | | | |
| | | | 40 | | | | | |
| | | | 318 | | | | | |
| | | | 41 | | | | | |
| | | | 317 | | | | | |
| | | | 42 | | | | | |
| | | | 316 | | | | | |
| | | | 43 | | | | | |
| | | | 315 | | | | | |
| | | | 44 | | | | | |
| | | | 314 | | | | | |
| | | | 45 | | | | | |
| | | | 313 | | | | | |
| | | | 46 | | SILTSTONE - dark grey to light grey siltstone and cream claystone | | | |
| | | | 312 | | | | | |
| | | | 47 | | | | | |
| | | | 311 | | | | | |
| | | | 48 | | | | | |
| | | | 310 | | | | | |
| | | | 49 | | CLAYSTONE - cream claystone and dark grey siltstone | | | |
| | | | 309 | | | | | |

END OF BOREHOLE AT 85.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7_TPB

SHEET 3 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 14/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 14/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.47 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 203 mm |
| | | Co-ords: | E 707836.34 N 6442769.92 |

| Bore Information | | | Field Material Description | | Geophysical Log | |
|------------------|-------------------|-----------|----------------------------|--|------------------------|--|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | LITHOLOGY | Formation | HYDROGEOLOGY |
| | | | | | | GAMMA (API-GR) 0 62.5 125.0 187.5 250 |
| | | 308 | 51 | COAL - stony coal and dark grey siltstone | Flyblowers Creek Seam | |
| | | 307 | 52 | | | |
| | | 306 | 53 | | | |
| | | 305 | 54 | | | |
| | | 304 | 55 | | | |
| | | 303 | 56 | SANDSTONE - quartz sandstone and siltstone | Tomcat Gully Sandstone | |
| | | 302 | 57 | | | |
| | | 301 | 58 | | | |
| | | 300 | 59 | | | |
| | | 299 | 60 | | | |
| | | 298 | 61 | COAL - coal and siltstone | Upper Ulan Seam | |
| | | 297 | 62 | | | |
| | | 296 | 63 | | | |
| | | 295 | 64 | | | |
| | | 294 | 65 | | | |
| | | 293 | 66 | COAL - coal and siltstone | | |
| | | 292 | 67 | CLAYSTONE - coal and cream claystone | C-Marker Claystone | |
| | | 291 | 68 | COAL - coal | Lower Ulan Seam | |
| | | 290 | 69 | | | |
| | | 289 | 70 | | | |
| | | 288 | 71 | | | |
| | | 287 | 72 | | | |
| | | 286 | 73 | SANDSTONE - coarse quartz sandstone and coal | Dapper Formation | |
| | | 285 | 74 | SANDSTONE - coarse to fine grey quartz sandstone | | |
| | | 284 | | | | |

END OF BOREHOLE AT 85.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7A

SHEET 1 OF 1

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 10/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 10/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.41 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707835.22 N 6442785.11 |

| Bore Information | | | Field Material Description | | | |
|--|---|-----------|----------------------------|-------------|--|-----------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing bentonite | 358 | 1 | | CLAY - yellow brown clay | Alluvium |
| | | 357 | 2 | | GRAVELLY CLAY - yellow brown gravelly clay | |
| | | 356 | 3 | | GRAVELLY CLAY - yellow brown gravelly clay (increased % of gravel) | |
| | | 355 | 4 | | GRAVELLY CLAY - brown sandy gravelly clay | |
| | gravel pack 50 mm slotted PVC casing | 354 | 5 | | | |
| | | 353 | 6 | | CLAYEY GRAVEL - brown clayey gravel | |
| | | 352 | 7 | | CLAYEY GRAVEL - alluvium with a clay matrix - water at 9.5m | |
| | | 351 | 8 | | | |
| | | 350 | 9 | | | |
| | | 349 | 10 | | | |
| | | 348 | 11 | | | |
| | sump | 347 | | | | |
| END OF BOREHOLE AT 11.68 m | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | |

EC = 4.73 mS/cm
pH = 7



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7B

SHEET 1 OF 3

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **9/8/09**
Date Completed: **9/8/09**
Recorded By: **Angus McFarlane**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Hammer**
Drilling Company: **Highland Drilling** Borehole Diameter: **50 mm**

Surface RL: **358.36 mAHD**
Co-ords: **E 707835.1 N 6442792.59**

| Bore Information | | | | Field Material Description | | |
|------------------|--|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 203 mm, 152 mm steel surface casing and 50 mm PVC casing | 358 | 1 | | CLAY - pale yellow brown clay | Alluvium |
| | | 357 | 2 | | CLAY - yellow brown clay with quartz gravel | |
| | | 356 | 3 | | CLAY - yellow brown gravelly clay laterite and unknown metamorphic rock | |
| | | 355 | 4 | | CLAY - yellow brown clay | |
| | | 354 | 5 | | CLAY - yellow brown clay with minor gravel | |
| | | 353 | 6 | | SANDY GRAVEL - red brown sandy gravel with clay matrix | |
| | | 352 | 7 | | GRAVELLY SAND - yellow brown gravelly sand with clay matrix | Ellismayne Formation |
| | | 351 | 8 | | CLAYSTONE - yellow brown claystone (samples contaminated from falling alluvium) | |
| | | 350 | 9 | | | |
| | | 349 | 10 | | | |
| | | 348 | 11 | | | |
| | | 347 | 12 | | | |
| | | 346 | 13 | | SILTSTONE - grey siltstone | |
| | | 345 | 14 | | | |
| | | 344 | 15 | | | |
| | | 343 | 16 | | | |
| | | 342 | 17 | | | |
| | | 341 | 18 | | | |
| | 152 mm steel surface casing and 50 mm PVC casing | 340 | 19 | | SILTSTONE - grey siltstone/claystone | |
| | 50 mm PVC casing | 339 | | | | |

END OF BOREHOLE AT 53.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7B

SHEET 2 OF 3

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 9/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 9/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|-------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.36 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707835.1 N 6442792.59 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 338 | 21 | | SANDSTONE - grey fine becoming coarse quartz sandstone | Ellismayne Formation |
| | | 337 | 22 | | | |
| | | 336 | 23 | | CLAYSTONE - red brown claystone | |
| | | 335 | 24 | | | |
| | | 334 | 25 | | SILTSTONE - grey siltstone | |
| | | 333 | 26 | | | Whaka Formation |
| | | 332 | 27 | | | |
| | | 331 | 28 | | | |
| | | 330 | 29 | | SILTSTONE - dark grey siltstone, water at 29m | |
| | | 329 | 30 | | | |
| | | 328 | 31 | | | Avymore Claystone |
| | | 327 | 32 | | | |
| | | 326 | 33 | | SILTSTONE - dark grey siltstone/carbonaceous mudstone | |
| | | 325 | 34 | | | |
| | | 324 | 35 | | COAL - stony coal | |
| | | 323 | 36 | | MUDSTONE - dark grey carbonaceous mudstone | Avymore Claystone |
| | | 322 | 37 | | | |
| | | 321 | 38 | | SILTSTONE - dark grey siltstone/mudstone, water at 42m | |
| | | 320 | 39 | | | |
| | | 319 | | | | |

END OF BOREHOLE AT 53.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7B

SHEET 3 OF 3

| | | | |
|-----------------|----------------------------------|-----------------|------------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 9/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 9/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|--------------------------|--------------------|--------------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.36 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707835.1 N 6442792.59 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|-----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 318 | 41 | | SILTSTONE - dark grey siltstone/mudstone, water at 42m <i>(continued)</i> | Avymore Claystone |
| | | 317 | 42 | | | |
| | | 316 | 43 | | | |
| | | 315 | 44 | | | |
| | | 314 | 45 | | | |
| | | 313 | 46 | | | |
| | | 312 | 47 | | SILTSTONE - dark grey siltstone with clay | |
| | | 311 | 48 | | CLAYSTONE - light grey claystone with clay | |
| | | 310 | 49 | | CLAYSTONE - off white claystone | |
| | | 309 | 50 | | COAL - stony coal | Flyblowers Creek Seam |
| | | 308 | 51 | | | |
| | | 307 | 52 | | | |
| | | 306 | 53 | | | |
| | | 305 | 54 | | | |
| | | 304 | 55 | | | |
| | | 303 | 56 | | | |
| | | 302 | 57 | | | |
| | | 301 | 58 | | | |
| | | 300 | 59 | | | |
| | | 299 | | | | |

END OF BOREHOLE AT 53.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7C

SHEET 3 OF 3

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 9/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 9/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.38 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707835.98 N 6442799.39 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 308 | | | COAL - stony coal | Flyblowers Creek Seam |
| | | | 51 | | | |
| | | 307 | | | | |
| | | | 52 | | | |
| | | 306 | | | | |
| | | | 53 | | | |
| | | 305 | | | | |
| | | | 54 | | | |
| | | 304 | | | SILTSTONE - dark grey siltstone | Tomcat Gully Sandstone |
| | | | 55 | | SILTSTONE - dark grey with layers of light grey siltstone | |
| | | 303 | | | | |
| | | | 56 | | | |
| | | 302 | | | | |
| | | | 57 | | SILTSTONE - dark grey with layers of light grey siltstone with quartz | |
| | | 301 | | | | |
| | | | 58 | | | |
| | | 300 | | | | |
| | | | 59 | | SANDSTONE - coarse sandstone with grey siltstone | |
| | | 299 | | | | |
| | | | 60 | | | |
| | | 298 | | | | |
| | | | 61 | | | |
| | | 297 | | | | |
| | | | 62 | | | |
| | | 296 | | | | |
| | | | 63 | | | |
| | | 295 | | | | |
| | | | 64 | | | |
| | | 294 | | | | |
| | | | 65 | | | |
| | | 293 | | | | |
| | | | 66 | | | |
| | | 292 | | | | |
| | | | 67 | | | |
| | | 291 | | | | |
| | | | 68 | | | |
| | | 290 | | | | |
| | | | 69 | | | |
| | | 289 | | | | |
| | | | 70 | | | |
| | | 288 | | | | |
| | | | 71 | | | |
| | | 287 | | | | |
| | | | 72 | | | |
| | | 286 | | | | |
| | | | 73 | | | |
| | | 285 | | | | |
| | | | 74 | | | |
| | | 284 | | | | |

END OF BOREHOLE AT 61.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7D

SHEET 3 OF 3

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 7/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 7/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|-------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.42 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707836.34 N 6442806.2 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 308 | | | COAL - stony coal | Flyblowers Creek Seam |
| | | 51 | | | | |
| | | 307 | | | | |
| | | 52 | | | | |
| | | 306 | | | | |
| | | 53 | | | | |
| | | 305 | | | | |
| | | 54 | | | | |
| | | 304 | | | SILTSTONE - dark grey siltstone | Tomcat Gully Sandstone |
| | | 55 | | | SILTSTONE - dark grey with layers of light grey siltstone | |
| | | 303 | | | | |
| | | 56 | | | | |
| | | 302 | | | | |
| | | 57 | | | SILTSTONE - dark grey with layers of light grey siltstone with quartz | |
| | | 301 | | | | |
| | | 58 | | | | |
| | | 300 | | | | |
| | | 59 | | | SANDSTONE - coarse sandstone with grey siltstone | |
| | | 299 | | | | |
| | | 60 | | | | |
| | | 298 | | | | |
| | | 61 | | | SANDSTONE - coarse sandstone with grey siltstone (fine grained) water at 61 | |
| | | 297 | | | | |
| | | 62 | | | COAL - coal with claystone | Upper Ulan Seam |
| | | 296 | | | | |
| | | 63 | | | | |
| | | 295 | | | | |
| | | 64 | | | | |
| | | 294 | | | | |
| | | 65 | | | | |
| | | 293 | | | | |
| | | 66 | | | | |
| | | 292 | | | | |
| | | 67 | | | CLAYSTONE - light cream claystone with dark carbonaceous mudstone | C-Marker Claystone |
| | | 291 | | | | |
| | | 68 | | | COAL | Lower Ulan Seam |
| | | 290 | | | | |
| | | 69 | | | | |
| | | 289 | | | | |
| | | 70 | | | | |
| | | 288 | | | | |
| | | 71 | | | | |
| | | 287 | | | | |
| | | 72 | | | | |
| | | 286 | | | | |
| | | 73 | | | | |
| | | 285 | | | | |
| | | 74 | | | | |
| | | 284 | | | | |

END OF BOREHOLE AT 72.72 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7E

SHEET 2 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 7/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 7/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.31 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707836.65 N 6442812.96 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 333 | | SILTSTONE - grey siltstone | Ellismayne Formation |
| | | | 26 | | | |
| | | | 332 | | | |
| | | | 27 | | | |
| | | | 331 | | | |
| | | | 28 | | | |
| | | | 330 | | | |
| | | | 29 | | SILTSTONE - dark grey siltstone, water at 29m | |
| | | | 329 | | | |
| | | | 30 | | | |
| | | | 328 | | | Whaka Formation |
| | | | 31 | | | |
| | | | 327 | | | |
| | | | 32 | | | |
| | | | 326 | | | |
| | | | 33 | | SILTSTONE - dark grey siltstone/carbonaceous mudstone | Avymore Claystone |
| | | | 325 | | | |
| | | | 34 | | | |
| | | | 324 | | | |
| | | | 35 | | COAL - stony coal | |
| | | | 323 | | | Whaka Formation |
| | | | 36 | | MUDSTONE - dark grey carbonaceous mudstone | |
| | | | 322 | | | |
| | | | 37 | | SILTSTONE - dark grey siltstone/mudstone, water at 42m | |
| | | | 321 | | | |
| | | | 38 | | | Avymore Claystone |
| | | | 320 | | | |
| | | | 39 | | | |
| | | | 319 | | | |
| | | | 40 | | | |
| | | | 318 | | | |
| | | | 41 | | | |
| | | | 317 | | | |
| | | | 42 | | | |
| | | | 316 | | | |
| | | | 43 | | | Avymore Claystone |
| | | | 315 | | | |
| | | | 44 | | | |
| | | | 314 | | | |
| | | | 45 | | | |
| | | | 313 | | | Avymore Claystone |
| | | | 46 | | | |
| | | | 312 | | | |
| | | | 47 | | SILTSTONE - dark grey siltstone with clay | |
| | | | 311 | | | |
| | | | 48 | | CLAYSTONE - light grey claystone with clay | Avymore Claystone |
| | | | 310 | | | |
| | | | 49 | | CLAYSTONE - off white claystone | |
| | | | 309 | | | |

END OF BOREHOLE AT 85.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW7E

SHEET 3 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-----------------|
| Client: | CMC Pty Ltd | Date Commenced: | 7/8/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 7/8/09 |
| Bore Location: | Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|-------------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 358.31 mAHD |
| Drilling Company: | Highland Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707836.65 N 6442812.96 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 308 | | | COAL - stony coal | Flyblowers Creek Seam |
| | | | 51 | | | |
| | | 307 | | | | |
| | | | 52 | | | |
| | | 306 | | | | |
| | | | 53 | | | |
| | | 305 | | | | |
| | | | 54 | | SILTSTONE - dark grey siltstone | Tomcat Gully Sandstone |
| | | 304 | | | | |
| | | | 55 | | SILTSTONE - dark grey with layers of light grey siltstone | |
| | | 303 | | | | |
| | | | 56 | | | |
| | | 302 | | | | |
| | | | 57 | | SILTSTONE - dark grey with layers of light grey siltstone with quartz | |
| | | 301 | | | | |
| | | | 58 | | | |
| | | 300 | | | | |
| | | | 59 | | SANDSTONE - coarse sandstone with grey siltstone | |
| | | 299 | | | | |
| | | | 60 | | | |
| | | 298 | | | | |
| | | | 61 | | SANDSTONE - coarse sandstone with grey siltstone (fine grained) water at 61 | |
| | | 297 | | | | |
| | | | 62 | | COAL - coal with claystone | Upper Ulan Seam |
| | | 296 | | | | |
| | | | 63 | | | |
| | | 295 | | | | |
| | | | 64 | | | |
| | | 294 | | | | |
| | | | 65 | | | |
| | | 293 | | | | |
| | | | 66 | | | |
| | | 292 | | | | |
| | | | 67 | | CLAYSTONE - light cream claystone with dark carbonaceous mudstone | C-Marker Claystone |
| | | 291 | | | | |
| | | | 68 | | COAL | Lower Ulan Seam |
| | | 290 | | | | |
| | | | 69 | | | |
| | | 289 | | | | |
| | | | 70 | | | |
| | | 288 | | | | |
| | | | 71 | | | |
| | | 287 | | | | |
| | | | 72 | | | |
| | | 286 | | | | |
| | | | 73 | | | |
| | | 285 | | | | |
| | | | 74 | | SANDSTONE - grey sandstone with layers of siltstone/carbonaceous mudstone, water at 75m | Dapper Formation |
| | | 284 | | | | |

END OF BOREHOLE AT 85.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW8A

SHEET 1 OF 1

| | | | |
|-----------------|---------------------------|-----------------|--------------|
| Client: | CMC Pty Ltd | Date Commenced: | 24/9/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 24/9/09 |
| Bore Location: | Mates Sth Hwy | Recorded By: | Nick Bryant |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|--------------------|--------------------|-----------------------|
| Drilling Method: | Air Rotary - Blade | Surface RL: | 351.28 mAHD |
| Drilling Company: | Impax Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707491 N 6444296.65 |

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|--|-----------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing | 351 | | | LOAM - brown slightly clayey sandy loam, occasional gravel of fine angular quartz | Alluvium |
| | | | 1 | | SAND - coarse quartz sand with some minor lithic fragments occasional quartz fine and angular | |
| | bentonite | 350 | | | | |
| | | | 2 | | SAND - gravelly coarse sand, gravel fine to medium well rounded dominantly of quartz, some angular lithic clasts present | |
| | | 349 | | | | |
| | 50 mm slotted PVC casing | | 3 | | GRAVEL - clayey sandy gravel, sand dominantly coarse and quartz rich, gravel medium-coarse some large 6-8cm tabular clasts of fine sandstone | |
| | | 348 | | | | |
| | | | 4 | | GRAVEL - clayey sandy gravel, sand dominantly quartz, gravel of angular medium quartz, clay content increasing with depth | |
| | | 347 | | | | |
| | | | 5 | | | |
| | | 346 | | | | |
| | sump | | 6 | | SANDY CLAY - purple soft sandy clay with yellow-orange mottling, sand is quartz dominant | |
| | | 345 | | | | |
| | | | 7 | | | |
| | | 344 | | | | |

END OF BOREHOLE AT 6.54 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW8B

SHEET 1 OF 1

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Mates Sth Hwy**
Project Number: **2114426E & 2162570B**

Date Commenced: **24/9/09**
Date Completed: **24/9/09**
Recorded By: **Nick Bryant**
Log Checked By: **Leah Gleeson**

Drilling Method: **Air Rotary - Blade**
Drilling Company: **Impax Drilling**

Borehole Diameter: **50 mm**

Surface RL: **351.33 mAHD**
Co-ords: **E 707488.99 N 6444300.39**

| Bore Information | | | Field Material Description | | | |
|------------------|---|-----------|----------------------------|-------------|--|-----------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | 100 mm PVC casing to 5 mbgl, 50 mm PVC casing from 5 - 6 mbgl | 351 | 1 | | LOAM - brown slightly clayey sandy loam, occasional gravel of fine angular quartz | Alluvium |
| | | 350 | 2 | | SAND - coarse quartz sand with some minor lithic fragments occasional quartz fine and angular | |
| | | 349 | 3 | | SAND - gravelly coarse sand, gravel fine to medium well rounded dominantly of quartz, some angular lithic clasts present. | |
| | | 348 | 4 | | GRAVEL - clayey sandy gravel, sand dominantly coarse and quartz rich, gravel medium-coarse some large 6-8cm tabular clasts of fine sandstone | |
| | bentonite | 347 | 5 | | GRAVEL - clayey sandy gravel, sand dominantly quartz, gravel of angular medium quartz, clay content increasing with depth | |
| | | 346 | 6 | | SANDY CLAY - purple soft sandy clay with yellow-orange mottling, sand is quartz dominant | |
| | 50 mm slotted PVC casing | 345 | 7 | | MEDIUM SANDSTONE - weathered quartz rich medium sandstone | Digby Formation |
| | | 344 | 8 | | COARSE SANDSTONE - coarse sandstone-conglomerate, weathered to start but increasing in competency with depth | |
| | sump | 342 | 9 | | MEDIUM SANDSTONE - quartz dominant fine-medium grained sandstone | |
| | | 341 | 10 | | COAL | Trinkey Seam |
| | | 340 | 11 | | | |
| | | | | | | |

END OF BOREHOLE AT 10.46 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW9

SHEET 1 OF 1

| | | | |
|-----------------|---------------------------|-----------------|--------------|
| Client: | CMC Pty Ltd | Date Commenced: | 21/9/09 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 21/9/09 |
| Bore Location: | Glencross | Recorded By: | Nick Bryant |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Leah Gleeson |

| | | | |
|-------------------|----------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 377.48 mAHD |
| Drilling Company: | Impax Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 708772.31 N 6438896.68 |

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|--|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing | 377 | 1 | | MEDIUM SANDSTONE - weathered red/brown medium grained Sandstone | Digby Formation |
| | | 376 | 2 | | FINE SANDSTONE - weathered grey/brown fine grained sandstone with clay | |
| | | 375 | 3 | | FINE SANDSTONE - weathered light brown fine grained sandstone with clay | |
| | | 374 | 4 | | FINE SANDSTONE - weathered red/light brown fine grained sandstone with clay | |
| | | 373 | 5 | | CLAY - grey brown clay with minor weathered sandstone | |
| | bentonite | 371 | 6 | | MEDIUM SANDSTONE - weathered white/cream sandstone containing dominantly angular quartz | Digby Formation |
| | | 370 | 7 | | COARSE SANDSTONE - medium to coarse sandstone dominantly quartz rich clastic lithology, also layered with fine grained sandstone | |
| | gravel pack | 369 | 8 | | COARSE SANDSTONE - coarse grained sandstone containing angular to rounded clasts of mixed lithologies | |
| | 50 mm slotted PVC casing | 368 | 9 | | MEDIUM SANDSTONE - interbedded medium grained sandstone interbedded with fine grained sandstone | |
| | | 367 | 10 | | MEDIUM SANDSTONE - medium to fine grained cream sandstone, dominantly quartz rich with some mixed lithologies | |
| | sump | 366 | 11 | | COARSE SANDSTONE - coarse grained quartz rich sandstone also some mixed lithologies, some small laminations of light grey shaley sandstone | |
| | backfill | 365 | 12 | | FINE SANDSTONE - fine grained grey sandstone | |
| | | 364 | 13 | | | Ellismayne Formation |

END OF BOREHOLE AT 12.89 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW12

SHEET 1 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **E Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **25/2/10**
Date Completed: **26/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **393.7 mAHD**
Co-ords: **E 703106.1 N 6438882.75**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------------------------|-----------|--------------|----------------------------|--|--------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing gypset in alluvium | 393 | 1 | | CLAYEY SAND - yellow brown medium to large grained | Alluvium |
| | | 392 | 2 | | GRAVELLY CLAYEY SAND - orange brown, increased clay content, fine gravel 2-4mm | |
| | | 391 | 3 | | CLAYEY SAND - light brown with 10% 3-4mm gravel, sand coarse grained | |
| | | 390 | 4 | | CLAYEY SAND - brown, sand coarse grained with 5% gravel 10-15 mm quartz, coal and siltstone, sub angular | |
| | | 389 | 5 | | CLAYEY SAND - dark brown sand coarse grained with 5% gravel 4-5 mm quartz, coal and siltstone, angular | |
| | | 388 | 6 | | CLAYEY SAND - brown, sand coarse grained, decreasing clay content, angular quartz, claystone gravel 20% 5-10mm sand angular | |
| | | 387 | 7 | | GRAVELLY SAND - light brown, sand very coarse grained with a clay matrix, gravel 25% sub angular to angular, quartz, siltstone | |
| | | 386 | 8 | | CLAYEY SAND - light orange brown, sand medium grained with 15% angular and semi rounded gravel, quartz, claystone 7-15mm | |
| | | 385 | 9 | | CLAYEY SAND - light brown, sand medium grained with a band of white/ grey clay with 10% 5-7mm gravel, quartz and claystone | |
| | | 384 | 10 | | CLAYEY SAND - brown cream, fine grained sand with 30% clay and 5% quartz gravel | |
| | 50 mm PVC casing | 383 | 11 | | SANDSTONE - yellow cream, weathered fine to medium grained with a clay matrix 10% 2-3mm quartz gravel | Early Permian Undifferentiated |
| | | 382 | 12 | | | |
| | | 381 | 13 | | SANDSTONE - cream fine grained 1-2mm with 5% 2-3mm rounded quartz with a clay matrix | |
| | | 380 | 14 | | SANDSTONE - grey cream fine to medium grained 1-2mm with 5% 5-6mm rounded quartz | |
| | | 379 | 15 | | SANDSTONE - yellow cream medium grained 5% 5-10mm sub angular quartz | |
| | | 378 | 16 | | SANDSTONE - cream red medium grained 2mm uniform grains with 10% 3-4mm quartz grains | |
| | | 377 | 17 | | SANDSTONE - light yellow brown medium to coarse grained 2-4mm with 10% 5-7mm angular quartz | |
| | | 376 | 18 | | SANDSTONE - yellow orange fine to medium grained 1-2mm with a clay matrix | |
| | | 375 | 19 | | SILTSTONE - grey, powder with semi rounded 4-5mm chips | |
| | | 374 | 20 | | SILTSTONE - orange grey, powder with 5% semi rounded 3-4mm chips | |
| | | 373 | 21 | | SILTSTONE/MUDSTONE - light grey, fine powder | |
| | | 372 | 22 | | | |
| | | 371 | 23 | | SILTSTONE/MUDSTONE - light grey, fine powder with bands of brown siltstone | |
| | | 370 | 24 | | SILTSTONE - grey, fine powder | |
| | | 369 | 25 | | | |
| | | 368 | 26 | | SILTSTONE - grey, coarse powder | |
| | | 367 | 27 | | SILTSTONE - grey, powder and semi rounded chips 3-6mm | |
| | | 366 | 28 | | | |
| | | 365 | 29 | | | |
| | | 364 | 30 | | SANDSTONE - dark grey fine grained with a clay matrix, with quartz and grey siltstone | |
| | | 363 | 31 | | | |
| | | 362 | 32 | | SILTSTONE - dark grey with fine to coarse 1-5mm quartz angular grains | |
| | | 361 | 33 | | | |
| | | 360 | 34 | | | |
| | | 359 | | | | |

END OF BOREHOLE AT 122.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW12

SHEET 2 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 25/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 26/2/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|-------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 393.7 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 703106.1 N 6438882.75 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|--|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | | 358 | 36 | SILTSTONE - grey brown powder with <5% fine quartz grains | Early Permian Undifferentiated |
| | | | 357 | 37 | SILTSTONE - grey brown powder | |
| | | | 356 | 38 | SILTSTONE - grey, powder with 2mm rounded chips with 10% fine quartz grains | EC = 1.78 mS/cm pH = 9.16 |
| | | | 355 | 39 | SILTSTONE - dark grey, powder with 2mm rounded chips with 10% fine quartz grains | |
| | | | 354 | 40 | SILTSTONE - dark grey powder and semi rounded 3-4mm chips with 15% angular to semi rounded 5-7mm quartz chips | |
| | | | 353 | 41 | | |
| | | | 352 | 42 | SILTSTONE - dark grey powder and semi rounded 3-4mm chips with 25% angular to semi rounded 5-7mm quartz chips | |
| | | | 351 | 43 | SANDSTONE - grey fine to coarse grained, fine fraction 40% siltstone 60% quartz, coarse fraction 60% sub angular quartz | |
| | | | 350 | 44 | | |
| | | | 349 | 45 | | |
| | | | 348 | 46 | SANDSTONE - grey fine to medium grained quartz, semi rounded 3-4mm grains with 20% siltstone and a clay matrix | |
| | | | 347 | 47 | SANDSTONE - grey fine to medium grained quartz, semi rounded 3-4mm grains with 20% siltstone and a clay matrix with 15% 5-15mm quartz gravel | |
| | | | 346 | 48 | SANDSTONE - grey medium to coarse grained 2-6mm quartz with a fine clay matrix and a dark brown claystone band | |
| | | | 345 | 49 | SANDSTONE - grey medium grained 1-2mm | |
| | | | 344 | 50 | SANDSTONE - grey medium to coarse grained 1-5mm semi rounded quartz | |
| | | | 343 | 51 | | |
| | | | 342 | 52 | SANDSTONE - grey medium to coarse grained 1-5mm semi rounded quartz with 10% 5-7mm semi rounded quartz and 20% semi rounded siltstone and clay matrix | |
| | | | 341 | 53 | | |
| | | | 340 | 54 | CLAYSTONE - light grey/cream, fine powder and semi rounded 4-6mm planar chips | |
| | | | 339 | 55 | | CLAYSTONE - light grey/cream, fine powder and 15% sub angular 2-3mm chips |
| | | | 338 | 56 | | |
| | | | 337 | 57 | | |
| | | | 336 | 58 | | |
| | | | 335 | 59 | | |
| | | | 334 | 60 | | |
| | | | 333 | 61 | | |
| | | | 332 | 62 | | |
| | | | 331 | 63 | | |
| | | | 330 | 64 | CLAYSTONE - light grey/cream, fine powder and 15% sub angular 2-5mm chips | |
| | | | 329 | 65 | | CLAYSTONE - light grey/cream, fine powder and 15% semi rounded 3-6mm chips |
| | | | 328 | 66 | | |
| | | | 327 | 67 | | |
| | | | 326 | 68 | | |
| | | | 325 | 69 | | |
| | | | 324 | | | |

END OF BOREHOLE AT 122.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW12

SHEET 3 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **E Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **25/2/10**
Date Completed: **26/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **393.7 mAHD**
Co-ords: **E 703106.1 N 6438882.75**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|--------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | | 323 | 71 | CLAYSTONE - light grey/cream, fine powder and 15% semi rounded 3-6mm chips (continued) | Early Permian Undifferentiated |
| | | | 322 | 72 | CLAYSTONE - light grey/cream with 20% semi rounded 2-7mm chips with a fine powder | |
| | | | 321 | 73 | | |
| | | | 320 | 74 | | |
| | | | 319 | 75 | | |
| | | | 318 | 76 | | |
| | | | 317 | 77 | | |
| | | | 316 | 78 | CLAYSTONE - light yellow cream grey 15% rounded 2-7mm chips with powder | |
| | | | 315 | 79 | CLAYSTONE - light yellow cream grey 25% rounded 2-7mm chips with powder | |
| | | | 314 | 80 | | |
| | | | 313 | 81 | CLAYSTONE - light yellow cream grey fine powder | |
| | | | 312 | 82 | CLAYSTONE - light yellow cream grey fine powder with 5% 4-6mm semi rounded chips | |
| | | | 311 | 83 | CLAYSTONE - light grey/cream fine powder with 10% 4-6mm semi rounded chips | |
| | | | 310 | 84 | | |
| | | | 309 | 85 | | |
| | | | 308 | 86 | | |
| | | | 307 | 87 | | |
| | | | 306 | 88 | | |
| | | | 305 | 89 | | |
| | | | 304 | 90 | CLAYSTONE - light grey sub angular planar 3-30mm chips | |
| | | | 303 | 91 | CLAYSTONE - light grey sub angular planar 3-30mm chips with 5% angular quartz grains | |
| | | | 302 | 92 | CLAYSTONE - light grey sub angular planar 3-30mm chips | |
| | | | 301 | 93 | | |
| | | | 300 | 94 | CLAYSTONE - light grey semi rounded to sub angular 2-6mm chips <5% 25mm semi rounded chips | |
| | | | 299 | 95 | CLAYSTONE - light grey and green grey sub angular 2-4mm with <5% angular quartz | |
| | | | 298 | 96 | CLAYSTONE - light grey and green grey slightly fractured semi rounded chips 20-25mm with <5% angular quartz | |
| | | | 297 | 97 | CLAYSTONE - light grey/green grey semi rounded (evidence of water weathering and fractures) 5% brown claystone | |
| | | | 296 | 98 | | |
| | | | 295 | 99 | SILTSTONE - grey red siltstone sub angular to semi rounded 3-4mm chips with light grey/green claystone | |
| | | | 294 | 100 | SILTSTONE - dark green grey, angular planar 2-8mm chips and larger 10mm semi rounded chips | |
| | | | 293 | 101 | | |
| | | | 292 | 102 | SILTSTONE - dark green grey, angular 3-4mm chips with 40% red grey siltstone | |
| | | | 291 | 103 | SILTSTONE - light grey angular 4-12mm chips with 10% grey siltstone | |
| | | | 290 | 104 | SILTSTONE - light grey semi rounded fractured chips 3-15mm | |
| | | | 289 | | | |

END OF BOREHOLE AT 122.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW12

SHEET 4 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **E Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **25/2/10**
Date Completed: **26/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **393.7 mAHD**
Co-ords: **E 703106.1 N 6438882.75**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|--------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 288 | 106 | | SILTSTONE - light grey semi rounded fractured chips 3-15mm (<i>continued</i>) | Early Permian Undifferentiated |
| | | 287 | 107 | | SILTSTONE - light grey semi rounded fractured chips 3-10mm | |
| | | 286 | 108 | | SILTSTONE - light grey angular 2-20mm chips | |
| | | 285 | 109 | | SILTSTONE - grey and red angular 3-10mm chips with <5% angular quartz chips | |
| | | 284 | 110 | | SILTSTONE - grey angular 3-10mm chips | |
| | | 283 | 111 | | | |
| | | 282 | 112 | | | |
| | | 281 | 113 | | | |
| | | 280 | 114 | | SILTSTONE - light grey semi rounded and angular 2-10mm with red grey and green grey siltstone | |
| | | 279 | 115 | | | |
| | | 278 | 116 | | | |
| | | 277 | 117 | | | |
| | | 276 | 118 | | SILTSTONE - light grey semi rounded and angular 3-12mm with green grey siltstone | |
| | | 275 | 119 | | | |
| | | 274 | 120 | | | |
| | | 273 | 121 | | | |
| | | 272 | 122 | | | |
| | | 271 | 123 | | | |
| | | 270 | 124 | | | |
| | | 269 | 125 | | | |
| | | 268 | 126 | | | |
| | | 267 | 127 | | | |
| | | 266 | 128 | | | |
| | | 265 | 129 | | | |
| | | 264 | 130 | | | |
| | | 263 | 131 | | | |
| | | 262 | 132 | | | |
| | | 261 | 133 | | | |
| | | 260 | 134 | | | |
| | | 259 | 135 | | | |
| | | 258 | 136 | | | |
| | | 257 | 137 | | | |
| | | 256 | 138 | | | |
| | | 255 | 139 | | | |
| | | 254 | | | | |

END OF BOREHOLE AT 122.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13A

SHEET 1 OF 6

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 9/3/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 10/3/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|-------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 408.3 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 704679.17 N 6437233.3 |

| Bore Information | | | Field Material Description | | | |
|------------------|--------------------------------------|-----------|----------------------------|-------------|---|------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing 50 mm PVC casing | 408 | 1 | | CLAY - red brown clay with 3-4mm rounded ironstone gravel | Napperby Formation |
| | | 407 | 2 | | CLAY - red brown clay with 20% angular ironstone 3-25mm chips | |
| | | 406 | 3 | | CLAY - red brown clay with bands of fractured ironstone, angular 4-12mm | |
| | | 405 | 4 | | CLAY - yellow brown clay with minor silt | |
| | | 404 | 5 | | CLAY - yellow brown clay with minor silt with 5% angular 5-7mm ironstone gravel | |
| | | 403 | 6 | | SILTY CLAY - light red brown silty clay | |
| | | 402 | 7 | | CLAY - red brown clay | |
| | | 401 | 8 | | SILTY CLAY - dark red brown silty clay | |
| | | 400 | 9 | | SANDY CLAY - yellow brown/red brown mottled sandy clay | |
| | | 399 | 10 | | SANDY CLAY - red brown sandy clay | |
| | | 398 | 11 | | SANDY CLAY - light brown sandy clay | |
| | | 397 | 12 | | SANDY CLAY - light brown sandy clay | |
| | | 396 | 13 | | SANDY CLAY - light brown sandy clay | |
| | | 395 | 14 | | SANDY CLAY - light brown sandy clay | |
| | | 394 | 15 | | SANDY CLAY - light brown sandy clay | |
| | | 393 | 16 | | SILTSTONE - light grey siltstone, fine powder | |
| | | 392 | 17 | | SILTSTONE - light grey siltstone, fine powder with 10% fine quartz grains | |
| | | 391 | 18 | | | EC = 5.83 mS/cm pH = 8.45 |
| | | 390 | 19 | | | |
| | | 389 | | | | |

END OF BOREHOLE AT 119.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

| Bore Information | | | | Field Material Description | | | |
|--|-------------------|-----------|--------------|----------------------------|--|--------------------|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | | | 388 | | SILTSTONE - grey siltstone, fine powder angular chips layered with dark grey siltstone | Napperby Formation | |
| | | | 21 | | | | |
| | | | 387 | | | | |
| | | | 22 | | | | |
| | | | 386 | | | | |
| | | | 23 | | | | |
| | | | 385 | | | | |
| | | | 24 | | | | |
| | | | 384 | | | | |
| | | | 25 | | | | |
| | | | 383 | | | | |
| | | | 26 | | | | |
| | | | 382 | | | | |
| | | | 27 | | SILTSTONE - grey siltstone, angular chips with fine powder | | |
| | | | 381 | | | | |
| | | | 28 | | SILTSTONE - grey siltstone, powder and semi rounded chips | | |
| | | | 380 | | | | |
| | | | 29 | | MUDSTONE - grey brown mudstone, fine powder with angular planar 3-10mm chips | | |
| | | | 379 | | | | |
| | | | 30 | | | | |
| | | | 378 | | | | |
| | | | 31 | | | | |
| | | | 377 | | | | |
| | | | 32 | | | | |
| | | | 376 | | | | |
| | | | 33 | | | | |
| | | | 375 | | | | |
| | | | 34 | | | | |
| | | | 374 | | | | |
| | | | 35 | | | | |
| | | | 373 | | | | |
| | | | 36 | | | | |
| | | | 372 | | | | |
| | | | 37 | | MUDSTONE - grey brown mudstone sub angular 4-6mm chips with 10% inter-layered grey siltstone | | |
| | | | 371 | | | | |
| | | | 38 | | | | |
| | | | 370 | | | | |
| | | | 39 | | | | |
| | | | 369 | | | | |
| END OF BOREHOLE AT 119.00 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13A

SHEET 6 OF 6

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 9/3/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 10/3/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|-------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 408.3 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 704679.17 N 6437233.3 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 308 | | SILTSTONE - dark grey and light grey sub angular planar 5-10mm 50/50 mix | Ellismayne Formation |
| | | | 101 | | | |
| | | | 307 | | | |
| | | | 102 | | SILTSTONE - grey semi rounded 2-6mm chips | |
| | | | 306 | | | |
| | | | 103 | | | |
| | | | 305 | | | |
| | | | 104 | | SILTSTONE - light grey with 30% dark grey chips | |
| | | | 304 | | | |
| | | | 105 | | SILTSTONE - dark grey/black angular 5-6mm chips | |
| | | | 303 | | | |
| | | | 106 | | SILTSTONE - light and dark grey 3-6mm semi rounded chips | Whaka Formation |
| | | | 302 | | | |
| | | | 107 | | | |
| | | | 301 | | | |
| | | | 108 | | COAL/CARBONACEOUS MUDSTONE - dark black/grey brown with coarse grey brown siltstone, coal angular 3-4mm | |
| | | | 109 | | SILTSTONE - dark grey sub angular 5-7mm chips with 15% light grey siltstone | |
| | | | 110 | | | |
| | | | 298 | | | |
| | | | 111 | | SILTSTONE - light grey with a layer of carbonaceous mudstone/stoney coal | |
| | | | 297 | | | |
| | | | 112 | | COAL/CARBONACEOUS MUDSTONE - dull stoney angular 2-3mm with <10% light grey siltstone | Whaka Formation |
| | | | 296 | | | |
| | | | 113 | | COAL/CARBONACEOUS MUDSTONE - dull stoney sub angular 4-5mm with <10% light grey claystone | |
| | | | 295 | | | |
| | | | 114 | | COAL/CARBONACEOUS MUDSTONE - dull stoney sub angular 4-5mm with 20% light grey claystone | |
| | | | 294 | | | |
| | | | 115 | | CARBONACEOUS MUDSTONE - angular 3-4mm with 20% cream claystone/clay matrix | |
| | | | 293 | | | |
| | | | 116 | | | Whaka Formation |
| | | | 292 | | | |
| | | | 117 | | SILTSTONE/CARBONACEOUS MUDSTONE - dark grey and grey interlayered mudstone and siltstone with 30% cream claystone | |
| | | | 291 | | | |
| | | | 118 | | CARBONACEOUS MUDSTONE - angular 3-7mm with 10% light grey brown claystone | Whaka Formation |
| | | | 290 | | | |
| | | | 119 | | | |
| | | | 289 | | | |

END OF BOREHOLE AT 119.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13B

SHEET 1 OF 5

| | | | |
|-----------------|----------------------------------|-----------------|--------------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 5/3/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 8/3/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|-------------------|--------------------|---------------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 408.2 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 704684.63 N 6437237.27 |

| Bore Information | | | Field Material Description | | | |
|------------------|--------------------------------------|-----------|----------------------------|-------------|--|------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing 50 mm PVC casing | 408 | | | CLAY - red brown clay with 3-4mm rounded ironstone gravel | Napperby Formation |
| | | 407 | 1 | | CLAY - red brown clay with 20% angular ironstone 3-25mm chips | |
| | | 406 | 2 | | CLAY - red brown clay with bands of fractured ironstone, angular 4-12mm | |
| | | 405 | 3 | | CLAY - yellow brown clay with minor silt | |
| | | 404 | 4 | | CLAY - yellow brown clay with minor silt with 5% angular 5-7mm ironstone gravel | |
| | | 403 | 5 | | SILTY CLAY - light red brown silty clay | |
| | | 402 | 6 | | CLAY - red brown clay | |
| | | 401 | 7 | | | |
| | | 400 | 8 | | SILTY CLAY - dark red brown silty clay | |
| | | 399 | 9 | | SANDY CLAY - yellow brown/red brown mottled sandy clay | |
| | | 398 | 10 | | SANDY CLAY - red brown sandy clay | |
| | | 397 | 11 | | SANDY CLAY - light brown sandy clay | |
| | | 396 | 12 | | | |
| | | 395 | 13 | | | |
| | | 394 | 14 | | | |
| | | 393 | 15 | | | |
| | | 392 | 16 | | SILTSTONE - light grey siltstone, fine powder | |
| | | 391 | 17 | | SILTSTONE - light grey siltstone, fine powder with 10% fine quartz grains | |
| | | 390 | 18 | | | |
| | | 389 | 19 | | | |
| | | 388 | 20 | | SILTSTONE - grey siltstone, fine powder angular chips layered with dark grey siltstone | |
| | | 387 | 21 | | | |
| | | 386 | 22 | | | |
| | | 385 | 23 | | | |
| | | 384 | 24 | | | |
| | | 383 | 25 | | | |
| | | 382 | 26 | | | |
| | | 381 | 27 | | SILTSTONE - grey siltstone, angular chips with fine powder | |
| | | 380 | 28 | | SILTSTONE - grey siltstone, powder and semi rounded chips | |
| | | 379 | 29 | | MUDSTONE - grey brown mudstone, fine powder with angular planar 3-10mm chips | |
| 08/03/2010 | | | | | | EC = 2.01 mS/cm pH = 8.78 |

END OF BOREHOLE AT 136.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

| Bore Information | | | | Field Material Description | | | |
|--|-------------------|-----------|--------------|----------------------------|--|--------------------|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | | | 378 | | MUDSTONE - grey brown mudstone, fine powder with angular planar 3-10mm chips <i>(continued)</i> | Napperby Formation | |
| | | | 377 | | | | |
| | | | 376 | | | | |
| | | | 375 | | | | |
| | | | 374 | | | | |
| | | | 373 | | | | |
| | | | 372 | | | | |
| | | | 371 | | MUDSTONE - grey brown mudstone sub angular 4-6mm chips with 10% interlayered grey siltstone | | |
| | | | 370 | | | | |
| | | | 369 | | | | |
| | | | 368 | | | | |
| | | | 367 | | | | |
| | | | 366 | | | | |
| | | | 365 | | | | |
| | | | 364 | | | | |
| | | | 363 | | | | |
| | | | 362 | | MUDSTONE - dark grey brown mudstone fine powder semi rounded 3-10mm chip with 10% interlayered grey siltstone | | |
| | | | 361 | | | | |
| | | | 360 | | | | |
| | | | 359 | | | | |
| | | | 358 | | | | |
| | | | 357 | | MUDSTONE - dark grey brown mudstone sub angular 4-6mm chips with 10% interlayered grey siltstone | | |
| | | | 356 | | MUDSTONE - dark grey brown mudstone, fine powder with sub angular 4-12mm chips | | |
| | | | 355 | | | | |
| | | | 354 | | MUDSTONE - dark grey brown mudstone, fine powder with semi rounded 4-12mm chips with 30% interlayered grey siltstone | | |
| | | | 353 | | | | |
| | | | 352 | | | | |
| | | | 351 | | | | |
| | | | 350 | | MUDSTONE - dark grey brown mudstone, fine powder with semi rounded 4-12mm chips with 10% interlayered grey siltstone | | |
| | | | 349 | | | | |
| END OF BOREHOLE AT 136.00 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13B

SHEET 4 OF 5

| | | | |
|-----------------|----------------------------------|-----------------|--------------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 5/3/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 8/3/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|-------------------|--------------------|---------------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 408.2 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 704684.63 N 6437237.27 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 318 | | | SILTSTONE - grey siltstone with 20% light grey siltstone semi rounded chips 4-7mm | Napperby Formation |
| | | 317 | 91 | | | |
| | | 316 | 92 | | | |
| | | 315 | 93 | | | |
| | | 314 | 94 | | | |
| | | 313 | 95 | | SILTSTONE - grey siltstone angular planar 3-7mm with 10% light grey siltstone 2-4mm chips | Digby Formation |
| | | 312 | 96 | | FINE SANDSTONE - grey fine grained quartz sandstone 1-2mm uniform with 40% grey siltstone | |
| | | 311 | 97 | | SILTSTONE - light grey siltstone angular 5mm chips with 20% quartz 2mm grains | |
| | | 310 | 98 | | SANDSTONE - light grey, fine to medium (1-2mm) grains, quartz and siltstone 3mm | |
| | | 309 | 99 | | SILTSTONE/COAL - light grey angular 3-5mm chips with a band of coal, shiny stoney black | Trinkeby Seam |
| | | 308 | 100 | | SILTSTONE - dark grey and light grey sub angular planar 5-10mm 50/50 mix | Ellismayne Formation |
| | | 307 | 101 | | | |
| | | 306 | 102 | | SILTSTONE - grey semi rounded 2-6mm chips | |
| | | 305 | 103 | | | |
| | | 304 | 104 | | SILTSTONE - light grey with 30% dark grey chips | |
| | | 303 | 105 | | SILTSTONE - dark grey/black angular 5-6mm chips | |
| | | 302 | 106 | | | |
| | | 301 | 107 | | SILTSTONE - light and dark grey 3-6mm semi rounded chips | |
| | | 300 | 108 | | COAL/CARBONACEOUS MUDSTONE - dark black/grey brown with coarse grey brown siltstone, coal angular 3-4mm | |
| | | 299 | 109 | | SILTSTONE - dark grey sub angular 5-7mm chips with 15% light grey siltstone | |
| | | 298 | 110 | | | Whaka Formation |
| | | 297 | 111 | | SILTSTONE - light grey with a layer of carbonaceous mudstone/stoney coal | |
| | | 296 | 112 | | COAL/CARBONACEOUS MUDSTONE - dull stoney angular 2-3mm with <10% light grey siltstone | |
| | | 295 | 113 | | COAL/CARBONACEOUS MUDSTONE - dull stoney sub angular 4-5mm with <10% light grey claystone | |
| | | 294 | 114 | | COAL/CARBONACEOUS MUDSTONE - dull stoney sub angular 4-5mm with 20% light grey claystone | |
| | | 293 | 115 | | CARBONACEOUS MUDSTONE - angular 3-4mm with 20% cream claystone/clay matrix | |
| | | 292 | 116 | | | |
| | | 291 | 117 | | SILTSTONE/CARBONACEOUS MUDSTONE - dark grey and grey interlayered mudstone and siltstone with 30% cream claystone | |
| | | 290 | 118 | | CARBONACEOUS MUDSTONE - angular 3-7mm with 10% light grey brown claystone | |
| | | 289 | 119 | | | |

END OF BOREHOLE AT 136.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13B

SHEET 5 OF 5

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 5/3/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 8/3/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 408.2 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 704684.63 N 6437237.27 |

| Bore Information | | | Field Material Description | | | |
|------------------|-------------------|-----------|----------------------------|-------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 288 | | | SILTSTONE - grey semi rounded to sub angular 3-4mm chips with 30% cream claystone | Avymore Claystone |
| | | 287 | 121 | | CLAYSTONE - cream sub angular planar chips with 20% carbonaceous mudstone | |
| | | 286 | 122 | | COAL/CARBONACEOUS MUDSTONE- dull black stoney 3-4mm angular chips with 10% cream claystone | Flyblowers Creek Seam |
| | | 285 | 123 | | COAL/CARBONACEOUS MUDSTONE- dull black stoney 3-4mm angular chips with <5% cream claystone | |
| | | 284 | 124 | | CARBONACEOUS MUDSTONE - dull black grey sub angular planar 3-6mm | |
| | | 283 | 125 | | | |
| | | 282 | 126 | | COAL/CARBONACEOUS MUDSTONE/SILTSTONE - interlayered shiny black coal with dull black mudstone and grey siltstone | |
| | | 281 | 127 | | CARBONACEOUS MUDSTONE/SILTSTONE - sub angular 3-10mm chips with 15% light grey cream claystone | |
| | | 280 | 128 | | SILTSTONE - dark grey sub angular 3-7mm chips | |
| | | 279 | 129 | | COARSE SILTSTONE - grey semi rounded 3-4mm chips | Tomcat Gully Sandstone |
| | | 278 | 130 | | MEDIUM TO COARSE SANDSTONE - grey quartz with 30% grey siltstone | |
| | | 277 | 131 | | MEDIUM TO COARSE SANDSTONE - grey quartz with 5% grey siltstone | |
| | | 276 | 132 | | | |
| | | 275 | 133 | | | |
| | | 274 | 134 | | | |
| | | 273 | 135 | | COAL - black shiny angular 3-4mm | |
| | | 272 | 136 | | | |
| | | 271 | 137 | | | |
| | | 270 | 138 | | | |
| | | 269 | 139 | | | |
| | | 268 | 140 | | | |
| | | 267 | 141 | | | |
| | | 266 | 142 | | | |
| | | 265 | 143 | | | |
| | | 264 | 144 | | | |
| | | 263 | 145 | | | |
| | | 262 | 146 | | | |
| | | 261 | 147 | | | |
| | | 260 | 148 | | | |
| | | 259 | 149 | | | |

END OF BOREHOLE AT 136.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13C

SHEET 4 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **E Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **3/3/10**
Date Completed: **4/3/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **408.2 mAHD**
Co-ords: **E 704690.17 N 6437241.12**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 288 | | | SILTSTONE - grey semi rounded to sub angular 3-4mm chips with 30% cream claystone | Avymore Claystone |
| | | 287 | 121 | | CLAYSTONE - cream sub angular planar chips with 20% carbonaceous mudstone | |
| | | 286 | 122 | | COAL/CARBONACEOUS MUDSTONE - dull black stoney 3-4mm angular chips with 10% cream claystone | Flyblowers Creek Seam |
| | | 285 | 123 | | COAL/CARBONACEOUS MUDSTONE - dull black stoney 3-4mm angular chips with <5% cream claystone | |
| | | 284 | 124 | | CARBONACEOUS MUDSTONE - dull black grey sub angular planar 3-6mm | |
| | | 283 | 125 | | | |
| | | 282 | 126 | | COAL/CARBONACEOUS MUDSTONE/SILTSTONE - interlayered shiny black coal with dull black mudstone and grey siltstone | |
| | | 281 | 127 | | CARBONACEOUS MUDSTONE/SILTSTONE - sub angular 3-10mm chips with 15% light grey cream claystone | |
| | | 280 | 128 | | SILTSTONE - dark grey sub angular 3-7mm chips | Tomcat Gully Sandstone |
| | | 279 | 129 | | COARSE SILTSTONE - grey semi rounded 3-4mm chips | |
| | | 278 | 130 | | MEDIUM TO COARSE SANDSTONE - grey quartz with 30% grey siltstone | |
| | | 277 | 131 | | MEDIUM TO COARSE SANDSTONE - grey quartz with 5% grey siltstone | |
| | | 276 | 132 | | | |
| | | 275 | 133 | | | Upper Ulan Seam |
| | | 274 | 134 | | | |
| | | 273 | 135 | | COAL - black shiny angular 3-4mm | |
| | | 272 | 136 | | COAL - grey black angular 3-4mm | |
| | | 271 | 137 | | COAL/CARBONACEOUS MUDSTONE - dull black stoney with 10% grey claystone | |
| | | 270 | 138 | | COAL/CARBONACEOUS MUDSTONE - dull black stoney with 20% grey claystone | C-Marker Claystone |
| | | 269 | 139 | | COAL - shiny black 2-4mm angular chips | |
| | | 268 | 140 | | | |
| | | 267 | 141 | | CLAYSTONE - light grey with 30% grey siltstone semi rounded planar chips 3-6mm | |
| | | 266 | 142 | | | Lower Ulan Seam |
| | | 265 | 143 | | CLAYSTONE - light grey with 30% coal dull stoney | |
| | | 264 | 144 | | COAL - shiny black 3-5mm angular chips | |
| | | 263 | 145 | | CARBONACEOUS MUDSTONE - dull grey black 3-7mm sub angular planar chips with <5% grey brown claystone | |
| | | 262 | 146 | | SILTSTONE - dark grey siltstone, 3-12mm chips with a band of shiny black coal | |
| | | 261 | 147 | | CARBONACEOUS MUDSTONE - dark grey brown semi rounded planar 3-5mm chips | |
| | | 260 | 148 | | | |
| | | 259 | 149 | | | |
| | | 258 | 150 | | | |
| | | 257 | 151 | | | |
| | | 256 | 152 | | | |
| | | 255 | 153 | | | |
| | | 254 | 154 | | | |
| | | 253 | 155 | | | |
| | | 252 | 156 | | | |
| | | 251 | 157 | | | |
| | | 250 | 158 | | | |
| | | 249 | 159 | | | |

END OF BOREHOLE AT 150.20 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13D

SHEET 1 OF 5

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **E Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **26/2/10**
Date Completed: **3/3/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **408.1 mAHD**
Co-ords: **E 704695.92 N 6437244.88**

| Bore Information | | | | Field Material Description | | | |
|--|--|-----------|--------------|---|---|-----------------------|-----------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | 50 mm PVC casing 50 mm PVC casing | | 407 | 1 | CLAY - red brown clay with 3-4mm rounded ironstone gravel | Napperby Formation | EC = 1.61 mS/cm pH = 6.7 |
| | | 406 | 2 | CLAY - red brown clay with 20% angular ironstone 3-25mm chips | | | |
| | | 405 | 3 | CLAY - red brown clay with bands of fractured ironstone, angular 4-12mm | | | |
| | | 404 | 4 | CLAY - yellow brown clay with minor silt | | | |
| | | 403 | 5 | CLAY - yellow brown clay with minor silt with 5% angular 5-7mm ironstone gravel | | | |
| | | 402 | 6 | SILTY CLAY - light red brown silty clay | | | |
| | | 401 | 7 | CLAY - red brown clay | | | |
| | | 400 | 8 | CLAY - yellow brown/grey/red mottled clay with angular 12-15mm ironstone pieces | | | |
| | | 399 | 9 | CLAY - yellow brown/brown mottled clay | | | |
| | | 398 | 10 | CLAY - red brown clay | | | |
| | | 397 | 11 | IRONSTONE - red brown ironstone band, powder and 3-4mm angular chips | | | |
| | | 396 | 12 | CLAY - light grey clay with yellow brown mottles | | | |
| | | 395 | 13 | CLAY - light grey clay with very fine sand highly plastic | | | |
| | | 394 | 14 | CLAY - light grey clay with very fine sand highly plastic with a band of brown siltstone | | | |
| | | 393 | 15 | SANDY CLAY - light grey sandy clay with fine to medium sand | | | |
| | | 392 | 16 | | | | |
| | | 391 | 17 | | | | |
| | | 390 | 18 | | | | |
| | | 389 | 19 | | | | |
| | | 388 | 20 | | | | |
| | | 387 | 21 | SILTSTONE - grey siltstone, powder and 30% 4-10mm sub angular planar chips | | | |
| | | 386 | 22 | | | | |
| | | 385 | 23 | | | | |
| | | 384 | 24 | MUDSTONE - grey mudstone/siltstone (fine material) powder and angular planar 3-12mm chips | | | |
| | | 383 | 25 | | | | |
| | | 382 | 26 | SILTSTONE - light grey siltstone, powder and larger angular 2-15mm chips some semi rounded | | | |
| | | 381 | 27 | | | | |
| | | 380 | 28 | | | | |
| | | 379 | 29 | MUDSTONE - dark grey brown mudstone, powder and semi rounded 2-7mm chips | | | |
| | | 378 | 30 | | | | |
| | | 377 | 31 | | | | |
| | | 376 | 32 | MUDSTONE - dark grey brown mudstone, powder and semi rounded 3-15mm chips | | | |
| | | 375 | 33 | MUDSTONE - dark grey brown mudstone, very fine powder, semi rounded 3-7mm chips, chips becoming sub angular 4-10mm at 36m | | | |
| | | 374 | 34 | | | | |
| | | 373 | 35 | | | | |
| | | 372 | 36 | | | | |
| | | 371 | 37 | | | | |
| | | 370 | 38 | MUDSTONE - dark grey brown mudstone powder and angular 15-25mm chips | | | |
| | | 369 | 39 | MUDSTONE - dark grey brown mudstone powder and semi rounded and angular 3-6mm chips | | | |
| END OF BOREHOLE AT 162.00 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |

EC = 1.61 mS/cm
pH = 6.7



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13D

SHEET 2 OF 5

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **E Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **26/2/10**
Date Completed: **3/3/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **408.1 mAHD**
Co-ords: **E 704695.92 N 6437244.88**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 367 | 41 | | MUDSTONE - dark grey brown mudstone powder and semi rounded and angular 3-6mm chips (continued) | Napperby Formation |
| | | 366 | 42 | | MUDSTONE - dark grey brown mudstone fine powder semi rounded planar chips 5-7mm | |
| | | 365 | 43 | | MUDSTONE - dark grey brown mudstone fine powder semi rounded planar chips 5-7mm with interlayered light grey siltstone | |
| | | 364 | 44 | | | |
| | | 363 | 45 | | MUDSTONE - dark grey brown mudstone, fine powder and semi rounded planar 3-10mm chips | |
| | | 362 | 46 | | | |
| | | 361 | 47 | | | |
| | | 360 | 48 | | | |
| | | 359 | 49 | | MUDSTONE - dark grey brown mudstone, fine powder and semi rounded planar 5-15mm chips with <5% angular | |
| | | 358 | 50 | | | |
| | | 357 | 51 | | | |
| | | 356 | 52 | | | |
| | | 355 | 53 | | | |
| | | 354 | 54 | | | |
| | | 353 | 55 | | MUDSTONE - interlayered dark grey brown mudstone with light grey siltstone | |
| | | 352 | 56 | | | |
| | | 351 | 57 | | MUDSTONE - dark grey brown mudstone, fine powder and semi rounded planar chips 4-12mm chips | |
| | | 350 | 58 | | | |
| | | 349 | 59 | | | |
| | | 348 | 60 | | MUDSTONE - interlayered dark grey brown mudstone with grey siltstone 70% mudstone, subangular 5-7mm chips | |
| | | 347 | 61 | | | |
| | | 346 | 62 | | | |
| | | 345 | 63 | | | |
| | | 344 | 64 | | | |
| | | 343 | 65 | | MUDSTONE - dark grey brown mudstone, fine powder 30% 5-12mm sub angular planar chips | |
| | | 342 | 66 | | | |
| | | 341 | 67 | | | |
| | | 340 | 68 | | MUDSTONE - dark grey brown mudstone, fine powder 40% 5-12mm semi rounded planar chips | |
| | | 339 | 69 | | | |
| | | 338 | 70 | | MUDSTONE - interlayered dark grey brown mudstone with light grey siltstone 50% chips 3-5mm semi rounded 70% mudstone | |
| | | 337 | 71 | | | |
| | | 336 | 72 | | MUDSTONE - dark grey brown mudstone, fine powder, 3-15 semi rounded planar chips | |
| | | 335 | 73 | | MUDSTONE - dark grey brown mudstone, fine powder, 3-5 semi rounded planar chips | |
| | | 334 | 74 | | | |
| | | 333 | 75 | | | |
| | | 332 | 76 | | | |
| | | 331 | 77 | | MUDSTONE - dark grey brown mudstone, fine powder, 10-55 angular planar chips | |
| | | 330 | 78 | | MUDSTONE - dark grey mudstone 5-20mm angular chips and powder | |
| | | 329 | 79 | | MUDSTONE - dark grey mudstone angular planar 5-15mm | |

END OF BOREHOLE AT 162.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13D

SHEET 3 OF 5

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **E Darlington**
Project Number: **2114426E & 2162570B**

Date Commenced: **26/2/10**
Date Completed: **3/3/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **408.1 mAHD**
Co-ords: **E 704695.92 N 6437244.88**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | MUDSTONE - dark grey mudstone angular planar 5-15mm (continued) | Napperby Formation |
| | | | 327 81 | | | |
| | | | 326 82 | | | |
| | | | 325 83 | | CLAYSTONE - cream/light grey claystone | |
| | | | 324 84 | | SILTSTONE - grey siltstone, powder and angular 4-8mm chips | |
| | | | 323 85 | | SILTSTONE - grey siltstone, powder and angular 4-8mm chips with a band of light grey cream claystone | |
| | | | 322 86 | | MUDSTONE - dark grey mudstone/siltstone angular planar 5-7mm chips and powder | |
| | | | 321 87 | | | |
| | | | 320 88 | | SILTSTONE - light grey coarse siltstone, powder no chips | |
| | | | 319 89 | | MUDSTONE - grey 10mm mudstone, powder and semi rounded planar 5-7mm chips <5% black mudstone specks | |
| | | | 318 90 | | | |
| | | | 317 91 | | | |
| | | | 316 92 | | | |
| | | | 315 93 | | | |
| | | | 314 94 | | | |
| | | | 313 95 | | SILTSTONE - grey siltstone, powder semi rounded chips 3-10mm | Digby Formation |
| | | | 312 96 | | SANDSTONE - grey fine grained sandstone, powder 2-3mm rounded chips 30% fine quartz grains | |
| | | | 311 97 | | SANDSTONE - light grey fine grained sandstone, powder with 45% fine quartz grains | |
| | | | 310 98 | | SANDSTONE - light grey fine grained sandstone, powder with 30% fine quartz grains | Trinkey Seam |
| | | | 309 99 | | SILTSTONE - grey siltstone, powder with 2-5mm angular chips with a 15cm dull coal band | |
| | | | 308 100 | | CLAYSTONE - cream claystone interlayered with grey siltstone, powder 2-4mm semi rounded chips | Ellismayne Formation |
| | | | 307 101 | | SILTSTONE - light grey siltstone semi rounded to sub angular 3-6mm chips and powder | |
| | | | 306 102 | | SILTSTONE - grey siltstone, coarse powder and semi rounded 7-12mm chips | |
| | | | 305 103 | | | |
| | | | 304 104 | | SILTSTONE - grey siltstone, coarse powder and angular 2-4mm chips | |
| | | | 303 105 | | SILTSTONE - light grey and grey siltstone, angular 3-10mm chips, coarse grains | |
| | | | 302 106 | | | |
| | | | 301 107 | | SILTSTONE - light grey siltstone rounded to sub angular 2-4mm chips | |
| | | | 300 108 | | MUDSTONE - dark grey carbonaceous mudstone/coal, stony black/grey angular 2-7mm chips with 20% grey siltstone | |
| | | | 299 109 | | SILTSTONE - dark grey siltstone with 25% light grey siltstone, planar 5-15mm chips | |
| | | | 298 110 | | | Whaka Formation |
| | | | 297 111 | | SILTSTONE - light grey and dark grey siltstone, semi rounded 3-7mm chips | |
| | | | 296 112 | | COAL - coal, dull black/grey stony with a band of light grey brown claystone | |
| | | | 295 113 | | COAL - coal/dull grey black carbonaceous mudstone, 4-5mm chips with <5% fines of light grey brown claystone | |
| | | | 294 114 | | MUDSTONE - dark grey black carbonaceous mudstone/coal, angular 3-5mm chips with 20% grey brown claystone, <5% orange brown claystone | |
| | | | 293 115 | | | |
| | | | 292 116 | | CLAYSTONE - light cream grey claystone, angular 4-6mm chips with 40% 5-7mm dark grey siltstone | |
| | | | 291 117 | | MUDSTONE - black/dark grey mudstone/siltstone angular 3-7mm chips with 20% cream grey claystone | |
| | | | 290 118 | | MUDSTONE - black/dark grey mudstone/siltstone angular 3-7mm chips with 10% cream grey claystone | |
| | | | 289 119 | | SILTSTONE - dark grey black siltstone/carbonaceous mudstone, angular 3-8mm chips with 5% light grey siltstone | |

END OF BOREHOLE AT 162.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW13D

SHEET 4 OF 5

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 26/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 3/3/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 408.1 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 704695.92 N 6437244.88 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | SILTSTONE - light grey and cream siltstone, semi rounded 3-5mm chips | Avymore Claystone |
| | | 287 | 121 | | CLAYSTONE - cream claystone, semi rounded 3-5mm chips with dark grey carbonaceous mudstone | |
| | | 286 | 122 | | MUDSTONE - dark grey carbonaceous mudstone, angular 3-7mm chips with 10% grey siltstone | Flyblowers Creek Seam |
| | | 285 | 123 | | COAL - coal, stony dull black/carbonaceous mudstone angular 3-5mm chips with 10% dark brown claystone | |
| | | 284 | 124 | | | |
| | | 283 | 125 | | | |
| | | 282 | 126 | | SILTSTONE - dark grey siltstone, angular 4-15mm chips with 15% red brown claystone | |
| | | 281 | 127 | | CLAYSTONE - cream/light grey claystone interlayered with grey siltstone, semi rounded 3-7mm, equal mix | |
| | | 280 | 128 | | SILTSTONE - dark grey siltstone angular 3-10mm chips 10% rounded red brown 3mm claystone | |
| | | 279 | 129 | | SILTSTONE - light grey siltstone, angular to semi rounded 4-7mm chips with 20% siltstone | Tomcat Gully Sandstone |
| | | 278 | 130 | | SANDSTONE - grey medium to coarse grained sandstone, quartz 2-5mm norm uniform with 10% grey siltstone angular 2mm | |
| | | 277 | 131 | | | |
| | | 276 | 132 | | SANDSTONE - grey medium to coarse grained quartz sandstone 2-4mm with 10% white and brown claystone and 10% 2-3mm angular siltstone/coal | |
| | | 275 | 133 | | SANDSTONE - grey coarse grained quartz sandstone 3-5mm with 15% siltstone/coal 2mm sub angular and some larger 20mm pieces | |
| | | 274 | 134 | | SANDSTONE - grey medium grained quartz sandstone with 10% grey siltstone and stony coal and <5% larger 5-7mm quartz grains some claystone chips | |
| | | 273 | 135 | | COAL - coal, stony angular 3-7mm with <5% clay/claystone 2-3mm chips | Upper Ulan Seam |
| | | 272 | 136 | | COAL - coal, stony angular planar 3-10mm chips with a band of light grey siltstone | |
| | | 271 | 137 | | COAL - coal, stony angular planar 3-6mm with 20% light grey claystone and brown claystone | |
| | | 270 | 138 | | COAL - coal, stony angular 3-10mm <10% grey brown claystone | |
| | | 269 | 139 | | | |
| | | 268 | 140 | | SILTSTONE - grey, light grey and dark grey siltstone, sub angular 2-7mm | |
| | | 267 | 141 | | SILTSTONE - interlayered slightly fractured grey siltstone with light grey cream claystone, semi rounded to sub angular 3-20mm chips equal mix | C-Marker Claystone |
| | | 266 | 142 | | SILTSTONE - interlayered slightly fractured grey siltstone with light grey cream claystone, semi rounded to sub angular 3-15mm chips equal mix | |
| | | 265 | 143 | | SILTSTONE - light grey siltstone angular planar 2-6mm with 30% angular 3-5mm chips | |
| | | 264 | 144 | | COAL - coal, stony/black/grey angular 3-6mm with a band of light grey/cream claystone | Lower Ulan Seam |
| | | 263 | 145 | | SILTSTONE - dark grey siltstone semi rounded planar 3-8mm chips with minor fine quartz grains and <5% 1-2mm brown claystone | |
| | | 262 | 146 | | SILTSTONE - dark grey siltstone semi rounded planar 3-8mm chips with minor fine quartz grains and <5% light grey siltstone | |
| | | 261 | 147 | | | |
| | | 260 | 148 | | SILTSTONE - dark grey siltstone, sub angular planar 3-7mm chips with 5% brown clay/claystone | |
| | | 259 | 149 | | | |
| | | 258 | 150 | | SILTSTONE - dark grey siltstone, angular planar 4-6mm with 5% light grey siltstone | |
| | | 257 | 151 | | SANDSTONE - grey conglomerate sandstone, 50% 3-5mm quartz 3-6mm non uniform, 30% dark grey siltstone and 20% light grey siltstone 1-2mm chips | Dapper Formation |
| | | 256 | 152 | | SANDSTONE - grey coarse grained sandstone with 10% larger conglomerate 5-10mm quartz and 30% 1-2mm light grey siltstone, non uniform | |
| | | 255 | 153 | | SANDSTONE - grey conglomerate sandstone with medium to coarse grains 2-15mm non uniform with 15% light and dark grey siltstone, large quartz angular, siltstone semi rounded/sub angular | |
| | | 254 | 154 | | | |
| | | 253 | 155 | | | |
| | | 252 | 156 | | SANDSTONE - grey conglomerate sandstone with medium to coarse grains 2-15mm non uniform with 15% light and dark grey siltstone, large quartz angular, siltstone semi rounded/sub angular with some white cream claystone, larger conglomerate fraction rest 2-10mm | |
| | | 251 | 157 | | | |
| | | 250 | 158 | | | |
| | | 249 | 159 | | SANDSTONE - grey white conglomerate quartz sandstone 3-12mm angular with 40% grey 2-3mm and dark grey 4-7mm siltstone | |

END OF BOREHOLE AT 162.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG



BORE NO.

GW13D

SHEET 5 OF 5

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 26/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 3/3/10 |
| Bore Location: | E Darlington | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 408.1 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 704695.92 N 6437244.88 |

| Bore Information | | | | Field Material Description | | |
|------------------|--|-----------|--------------|---|---|------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| |  sump | 247 | 161 |  | SANDSTONE - grey medium to coarse grained 2-4mm quartz sandstone with 30% grey siltstone SILTSTONE - dark grey/grey siltstone, semi rounded planar chips 3-8mm | Dapper Formation |
| | | 246 | 162 | | | |
| | | 245 | 163 | | | |
| | | 244 | 164 | | | |
| | | 243 | 165 | | | |
| | | 242 | 166 | | | |
| | | 241 | 167 | | | |
| | | 240 | 168 | | | |
| | | 239 | 169 | | | |
| | | 238 | 170 | | | |
| | | 237 | 171 | | | |
| | | 236 | 172 | | | |
| | | 235 | 173 | | | |
| | | 234 | 174 | | | |
| | | 233 | 175 | | | |
| | | 232 | 176 | | | |
| | | 231 | 177 | | | |
| | | 230 | 178 | | | |
| | | 229 | 179 | | | |
| | | 228 | 180 | | | |
| | | 227 | 181 | | | |
| | | 226 | 182 | | | |
| | | 225 | 183 | | | |
| | | 224 | 184 | | | |
| | | 223 | 185 | | | |
| | | 222 | 186 | | | |
| | | 221 | 187 | | | |
| | | 220 | 188 | | | |
| | | 219 | 189 | | | |
| | | 218 | 190 | | | |
| | | 217 | 191 | | | |
| | | 216 | 192 | | | |
| | | 215 | 193 | | | |
| | | 214 | 194 | | | |
| | | 213 | 195 | | | |
| | | 212 | 196 | | | |
| | | 211 | 197 | | | |
| | | 210 | 198 | | | |
| | | 209 | 199 | | | |

END OF BOREHOLE AT 162.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW14

SHEET 1 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 24/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 24/2/10 |
| Bore Location: | Hays - Wallandra | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 429.0 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 716052.88 N 6441091.14 |

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing 50 mm PVC casing | 428 | 1 | | CLAY - light brown with 10% angular quartz and ironstone gravel | Ellismayne Formation |
| | | | | | CLAY - brown with <5% quartz 5mm angular gravel | |
| | | 427 | 2 | | CLAY - brown with brown/white claystone chips and 20% quartz 4-10mm angular/sub angular planar gravel | |
| | | 426 | 3 | | SILTY CLAY - brown with some grey mottles | |
| | | 425 | 4 | | | |
| | | 424 | 5 | | | |
| | | 423 | 6 | | | |
| | | 422 | 7 | | | |
| | | 421 | 8 | | COARSE SILTSTONE - orange, fine powder | |
| | | 420 | 9 | | SILTSTONE - light orange, powder with <5% semi rounded 4-5mm chips | |
| | | 419 | 10 | | FINE SANDSTONE - light brown orange, quartz 5% 2mm rounded grains with a band 10% of dark brown siltstone | Whaka Formation |
| | | 418 | 11 | | CLAYSTONE - white/cream fine powder | |
| | | 417 | 12 | | | |
| | | 416 | 13 | | | |
| | | 415 | 14 | | MEDIUM SANDSTONE - light grey 1-2mm clayey matrix | |
| | | 414 | 15 | | COAL - black/grey smutty powder with 10% 5-7mm angular planar chips | |
| | | 413 | 16 | | COAL - black fine powder 5% 3-4mm sub angular chips | |
| | bentonite | 412 | 17 | | OXIDISED COAL | |
| | gravel pack | 411 | 18 | | MUDSTONE - dark brown/black carbonaceous | |
| | | 410 | 19 | | | |

EC = 6.06 mS/cm
pH = 7.79

END OF BOREHOLE AT 32.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW14

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 24/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 24/2/10 |
| Bore Location: | Hays - Wallandra | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 429.0 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 716052.88 N 6441091.14 |

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|---|-----------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | MUDSTONE - dark brown/black carbonaceous <i>(continued)</i> | Whaka Formation |
| | | 408 | 21 | | | |
| | | 407 | 22 | | SILTSTONE - light grey | Lachlan Orogen |
| | | 406 | 23 | | | |
| | | 405 | 24 | | | |
| | | 404 | 25 | | | |
| | 50 mm slotted PVC casing | 403 | 26 | | SILTSTONE - interbedded grey, green and brown semi rounded to angular chips | |
| | | 402 | 27 | | | |
| | | 401 | 28 | | | |
| | | 400 | 29 | | | |
| | | 399 | 30 | | | |
| | sump | 398 | 31 | | | |
| | | 397 | 32 | | | |
| | | 396 | 33 | | | |
| | | 395 | 34 | | | |
| | | 394 | 35 | | | |
| | | 393 | 36 | | | |
| | | 392 | 37 | | | |
| | | 391 | 38 | | | |
| | | 390 | 39 | | | |

END OF BOREHOLE AT 32.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW15

SHEET 2 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Inder**
Project Number: **2114426E & 2162570B**

Date Commenced: **16/2/10**
Date Completed: **17/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **431.6 mAHD**
Co-ords: **E 707063.06 N 6431211.79**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 411 | | SILTSTONE - grey siltstone, fine powder and semi rounded 4-5mm chips (<i>continued</i>) | Napperby Formation |
| | | | 21 | | CLAYSTONE - light grey/cream claystone, very fine powder, chips <2mm | |
| | | | 410 | | | |
| | | | 22 | | SILTSTONE - grey siltstone, fine powder with 10% 5mm rounded chips | |
| | | | 409 | | | |
| | | | 23 | | CLAYSTONE - light grey claystone, very fine powder, 20% 4-7mm rounded chips | Digby Formation |
| | | | 408 | | | |
| | | | 24 | | CLAYSTONE - light grey claystone, fine powder and 15% sub angular 5mm chips | |
| | | | 407 | | | |
| | | | 25 | | | |
| | | | 406 | | | |
| | | | 26 | | SILTSTONE - grey brown siltstone, fine powder and 30% 5mm rounded 5mm chips | |
| | | | 405 | | | |
| | | | 27 | | | |
| | | | 404 | | | |
| | | | 28 | | SILTSTONE - grey brown coarse siltstone, 20% 3-5mm angular chips. | Ellismayne Formation |
| | | | 403 | | | |
| | | | 29 | | | |
| | | | 402 | | | |
| | | | 30 | | SILTSTONE - grey siltstone, semi rounded and angular 4-7mm chips | |
| | | | 401 | | | |
| | | | 31 | | SILTSTONE - light grey cream coarse siltstone, powder and 3-5mm chips | |
| | | | 400 | | | |
| | | | 32 | | | |
| | | | 399 | | | |
| | | | 33 | | | Ellismayne Formation |
| | | | 398 | | | |
| | | | 34 | | CLAYSTONE - red claystone, fine powder with 2-4mm angular and semi rounded chips | |
| | | | 397 | | | |
| | | | 35 | | SILTSTONE - grey siltstone, fine powder, 10% sub angular 5-10mm chips | |
| | | | 396 | | | |
| | | | 36 | | SILTSTONE - light grey siltstone, fine powder and sub angular 5mm chips | |
| | | | 395 | | | Ellismayne Formation |
| | | | 37 | | SILTSTONE - light grey coarse siltstone, powder | |
| | | | 394 | | | |
| | | | 38 | | SILTSTONE - grey brown siltstone, fine powder and rounded 5-7mm chips | |
| | | | 393 | | | Ellismayne Formation |
| | | | 39 | | SILTSTONE - dark brown siltstone, fine powder and 2-3mm rounded chips | |
| | | | 392 | | | |

END OF BOREHOLE AT 70.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW15

SHEET 3 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 16/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 17/2/10 |
| Bore Location: | Inder | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 431.6 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707063.06 N 6431211.79 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | MUDSTONE - coal, dull/carbonaceous mudstone, fine powder, 5% semi rounded 3-4mm grey siltstone | Ellismayne Formation |
| | | 391 | 41 | | MUDSTONE - dark grey carbonaceous mudstone, fine powder, sub angular 4-5mm chips | |
| | | 390 | 42 | | COAL - coal, dull/carbonaceous mudstone, powder and semi rounded 5-7mm chips | Whaka Formation |
| | bentonite | 389 | 43 | | SILTSTONE - dark brown coarse siltstone, powder | |
| | gravel pack | 388 | 44 | | COAL - coal, shiny powder and 4-5mm sub angular and rounded chips | |
| | | 387 | 45 | | MUDSTONE - dark brown carbonaceous mudstone with a band of cream claystone | |
| | | 386 | 46 | | | |
| | | 385 | 47 | | COAL - coal, dull fine powder and 2-3mm sub angular chips with a band of cream claystone | |
| | | 384 | 48 | | COAL - coal, angular chips 5-7mm with a band of brown siltstone | |
| | | 383 | 49 | | SILTSTONE - grey siltstone, powder and angular 4mm chips with a band of cream claystone | Avymore Claystone |
| | | 382 | 50 | | COAL - coal, fine powder and angular planar 4mm chips | Flyblowers Creek Seam |
| | | 381 | 51 | | COAL - coal shiny black powder and semi rounded 3-4mm chips | |
| | | 380 | 52 | | | |
| | | 379 | 53 | | COAL - coal, shiny angular 3-10mm chips with 5% brown claystone rounded 2mm chips | |
| | | 378 | 54 | | COAL - coal, angular 4-8mm chips, with 30% grey claystone bands | |
| | | 377 | 55 | | | |
| | | 376 | 56 | | SILTSTONE - dark grey siltstone, angular and planar 3-10mm chips with <5% brown claystone | |
| | | 375 | 57 | | | |
| | | 374 | 58 | | COAL - coal, stony coal, semi angular/rounded 5mm chips with 10% grey brown claystone | |
| | | 373 | 59 | | SILTSTONE - dark grey siltstone, angular planar 3-8mm chips | Tomcat Gully Sandstone |
| | | 372 | | | | |

END OF BOREHOLE AT 70.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW15

SHEET 4 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 16/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 17/2/10 |
| Bore Location: | Inder | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 431.6 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 707063.06 N 6431211.79 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|----------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 371 | 61 | | SANDSTONE - grey coarse grained quartz sandstone, 3mm grains with 5% grey siltstone | Tomcat Gully Sandstone |
| | | 370 | 62 | | COAL - coal, angular 2-4mm chips with 10% red brown 2mm claystone | Upper and Lower Ulan Seams |
| | | 369 | 63 | | COAL - coal, stony with fractured grey siltstone pieces 5-45mm at 63.5 | |
| | | 368 | 64 | | COAL - coal, stony with angular 5-12mm pieces with 40% grey siltstone and 55 brown claystone | |
| | | 367 | 65 | | COAL - coal, stony 2-3mm angular chips with 20% 3-25mm grey siltstone and brown claystone | |
| | | 366 | 66 | | | |
| | | 365 | 67 | | COAL - coal, angular 4-10mm chips with <5% brown claystone | Dapper Formation |
| | | 364 | 68 | | SILTSTONE - dark grey siltstone, angular planar 5-7mm chips with <5% brown claystone | |
| | | 363 | 69 | | SANDSTONE - grey coarser grained quartz sandstone, 2-3mm grains with larger 5-6mm white quartz gravel | |
| | | 362 | 70 | | | |
| | | 361 | 71 | | | |
| | | 360 | 72 | | | |
| | | 359 | 73 | | | |
| | | 358 | 74 | | | |
| | | 357 | 75 | | | |
| | | 356 | 76 | | | |
| | | 355 | 77 | | | |
| | | 354 | 78 | | | |
| | | 353 | 79 | | | |
| | | 352 | | | | |

END OF BOREHOLE AT 70.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

| Bore Information | | | | Field Material Description | | | |
|--|--------------------------------------|-----------|--------------|----------------------------|--|--------------------|--------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | 50 mm PVC casing 50 mm PVC casing | 601 | | | SANDY CLAY - yellow brown/red brown mottled sandy clay | Napperby Formation | |
| | | 600 | 1 | | SANDSTONE - white weathered fine grained clayey sandstone, quartz rich, uniform grain size | | |
| | | 599 | 2 | | SANDSTONE - white fine grained quartz sandstone, uniform 1-2mm grain size, hard to drill | | |
| | | 598 | 3 | | | | |
| | | 597 | 4 | | SANDSTONE - creamy light red fine grained quartz sandstone, uniform 1-2mm grain size | | |
| | | 596 | 5 | | | | |
| | | 595 | 6 | | SANDSTONE - light red/white fine grained quartz sandstone with <5% 3mm sub angular quartz grains | | |
| | | 594 | 7 | | SANDSTONE - light red/white fine grained quartz sandstone with <5% 4mm sub angular quartz grains | | |
| | | 593 | 8 | | | | |
| | | 592 | 9 | | SANDSTONE - brown fine grained sandstone with claystone and ironstone layers, angular 3-5mm chips | | |
| | | 591 | 10 | | CLAYSTONE - yellow brown claystone band very fine not hard slightly weathered | | |
| | | 590 | 11 | | CLAYSTONE/MUDSTONE - dark grey light purple claystone/mudstone, powder and semi rounded chips 3-6mm slightly weathered | | |
| | | 589 | 12 | | CLAYSTONE/MUDSTONE - dark green grey purple weathered mudstone/claystone | | |
| | | 588 | 13 | | CLAYSTONE/MUDSTONE - dark grey/black claystone/mudstone, fine powder and semi rounded 3-7mm chips | | |
| | | 587 | 14 | | | | |
| | | 586 | 15 | | | | |
| | | 585 | 16 | | | | |
| | | 584 | 17 | | | | |
| | | 583 | 18 | | | | |
| | | 582 | 19 | | | | |
| | | 581 | 20 | | SILTSTONE - dark grey siltstone, sub angular 4-7mm chips | | |
| | | 580 | 21 | | CLAYSTONE/MUDSTONE - grey/black claystone/mudstone sub angular 4-6mm chips | | |
| | | 579 | 22 | | | | |
| | | 578 | 23 | | | | |
| | | 577 | 24 | | | | |
| | | 576 | 25 | | CLAYEY SILTSTONE grey clay/siltstone very hard, angular chips, colloidal fractures | | |
| | | 575 | 26 | | CLAYSTONE/MUDSTONE - grey/black claystone/mudstone | | |
| | | 574 | 27 | | SILTSTONE - grey siltstone sub angular chips <1mm grain size, interlayered with fine darker material | | |
| | | 573 | 28 | | | | |
| | | 572 | 29 | | CLAYSTONE - grey black claystone, sub angular 4-9mm chips | | |
| | | 571 | 30 | | SILTSTONE - grey siltstone <1mm grain size 20% quartz | | |
| | | 570 | 31 | | | | |
| | | 569 | 32 | | SANDSTONE - light grey brown very fine grained uniform sandstone, quartz with a clay matrix | | |
| | | 568 | 33 | | SILTSTONE - grey siltstone, fine <1mm sub angular 3-5mm chips | | |
| | | 567 | 34 | | CLAYSTONE - red brown claystone with <5% ironstone | | |
| | | 566 | 35 | | SANDSTONE - light red cream fine grained uniform quartz sandstone with a clay matrix | | |
| | | 565 | 36 | | | | |
| | | 564 | 37 | | SANDSTONE - red fine grained uniform 1-2mm sandstone | | |
| | | 563 | 38 | | SILTSTONE - grey siltstone coarse grained becoming finer 20% grading to 10% quartz | | |
| | | 562 | 39 | | | | |
| END OF BOREHOLE AT 150.00 m | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | |



GROUNDWATER BOREHOLE LOG

BORE NO.

GW16

SHEET 2 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Hayley**
Project Number: **2114426E & 2162570B**

Date Commenced: **11/3/10**
Date Completed: **12/3/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **601.2 mAHD**
Co-ords: **E 720907.26 N 6429063.23**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|--------------------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 561 | | | SILTSTONE - grey siltstone coarse grained becoming finer 20% grading to 10% quartz (continued) | Napperby Formation |
| | | 560 | 41 | | SANDSTONE - light grey fine grained quartz uniform sandstone 1-2mm grains | |
| | | 559 | 42 | | SILTSTONE - light grey siltstone with 20% interlayered dark siltstone | |
| | | 558 | 43 | | CLAYSTONE/MUDSTONE - dark grey claystone/mudstone sub angular 4-7mm | |
| | | 557 | 44 | | SILTSTONE - grey siltstone with 10% fine quartz grains | |
| | | 556 | 45 | | | |
| | | 555 | 46 | | SILTSTONE - grey siltstone | |
| | | 554 | 47 | | SILTSTONE - red brown coarse siltstone with some quartz grains, powder and 7-10mm chips | |
| | | 553 | 48 | | SANDSTONE - light red brown fine grained quartz uniform sandstone 2mm | |
| | | 552 | 49 | | SANDSTONE - light cream fine to medium grained quartz sandstone 1-2mm, high clay content | Digby Formation |
| | | 551 | 50 | | | |
| | | 550 | 51 | | | |
| | | 549 | 52 | | | |
| | | 548 | 53 | | | |
| | | 547 | 54 | | SILTSTONE - grey coarse siltstone with 30% coarse quartz grains | |
| | | 546 | 55 | | SANDSTONE - light grey fine grained quartz uniform sandstone 1-2mm grains high clay content | |
| | | 545 | 56 | | SILTSTONE - grey siltstone sub angular 3-6mm chips | |
| | | 544 | 57 | | SANDSTONE - red fine grained sandstone, quartz and red clay 1-2mm uniform | |
| | | 543 | 58 | | SANDSTONE - white fine grained quartz sandstone 1-2mm uniform | |
| | | 542 | 59 | | SANDSTONE - yellow brown fine to medium grained sandstone with 5% 7-9mm quartz grains, brown clay matrix, non uniform | Trinkey Seam Ellismayne Formation |
| | | 541 | 60 | | SILTSTONE - grey siltstone with <15% interlayered red siltstone, sub angular 3-6mm chips | |
| | | 540 | 61 | | | |
| | | 539 | 62 | | | |
| | | 538 | 63 | | SANDSTONE - light grey fine grained sandstone, 1-2mm 50% quartz uniform | |
| | | 537 | 64 | | | |
| | | 536 | 65 | | SANDSTONE - light grey red fine medium grained sandstone with 10% 3-4mm quartz grains non uniform | |
| | | 535 | 66 | | SANDSTONE - dark grey red medium 2mm grained uniform sandstone | |
| | | 534 | 67 | | COAL - oxidised coal, dark brown black powdery and 2-4mm sub angular chips | |
| | | 533 | 68 | | SILTSTONE - grey siltstone sub angular planar 3-10mm chips | |
| | | 532 | 69 | | SILTSTONE - dark grey siltstone planar 4-7mm chips with 20% quartz 1-2mm grains | Trinkey Seam Ellismayne Formation |
| | | 531 | 70 | | SILTSTONE - dark grey siltstone planar 4-7mm chips | |
| | | 530 | 71 | | | |
| | | 529 | 72 | | SILTSTONE - dark grey siltstone sub angular 3-7mm with 5% quartz 1-2mm grains | |
| | | 528 | 73 | | | |
| | | 527 | 74 | | | |
| | | 526 | 75 | | SANDSTONE - grey fine grained sandstone 60% quartz, high clay content 1-2mm grains | |
| | | 525 | 76 | | SANDSTONE - grey fine to medium sandstone 70% quartz 2-3mm grains non uniform | |
| | | 524 | 77 | | SANDSTONE - grey fine to medium sandstone 70% quartz 2-3mm grains non uniform with 3-5mm black coal fragments | |
| | | 523 | 78 | | SILTSTONE - dark grey siltstone 1mm with 5% claystone chips 2-3mm sub angular chips | |
| | | 522 | 79 | | SILTSTONE - grey coarse siltstone, semi rounded to sub angular 3-5mm chips | |

END OF BOREHOLE AT 150.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW16

SHEET 3 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Hayley**
Project Number: **2114426E & 2162570B**

Date Commenced: **11/3/10**
Date Completed: **12/3/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **601.2 mAHD**
Co-ords: **E 720907.26 N 6429063.23**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 521 | | SILTSTONE - grey coarse siltstone, semi rounded to sub angular 3-5mm chips (continued) | Ellismayne Formation |
| | | | 520 | 81 | SANDSTONE - grey fine grained quartz sandstone 1-2mm grains, high clay content | |
| | | | 519 | 82 | COAL - oxidised coal, dark brown powder smutty with 30% light grey claystone | Whaka Formation |
| | | | 518 | 83 | COAL - oxidised coal/coal and carbonaceous mudstone with grey claystone and clay | |
| | | | 517 | 84 | CLAYSTONE - light grey/cream claystone with minor fine quartz grains | Avymore Claystone |
| | | | 516 | 85 | COAL - coal, hard black with dark brown powder, 3-4mm sub angular chips | |
| | | | 515 | 86 | SILTSTONE - grey siltstone sub angular planar 3-10mm chips | Flyblowers Creek Seam |
| | | | 514 | 87 | | |
| | | | 513 | 88 | MUDSTONE - dark brown black carbonaceous mudstone with a 20cm coal band | Tomcat Gully Sandstone |
| | | | 512 | 89 | SILTSTONE - dark grey siltstone interlayered with light grey coarse siltstone and 20% quartz | |
| | | | 511 | 90 | SANDSTONE - brown/ yellow brown fine to medium grained sandstone 40% quartz 1-3mm with high clay content | Tomcat Gully Sandstone |
| | | | 510 | 91 | SANDSTONE - yellow fine to medium grained sandstone 2-3mm high clay content | |
| | | | 509 | 92 | SANDSTONE - pale yellow medium grained sandstone, 30% quartz high clay content | Tomcat Gully Sandstone |
| | | | 508 | 93 | SANDSTONE - light grey becoming dark grey red fine to medium grained quartz sandstone 50% quartz | |
| | | | 507 | 94 | | Tomcat Gully Sandstone |
| | | | 506 | 95 | SANDSTONE - dark grey red fine grained sandstone 30% quartz very poorly cemented uniform (possible blow out/cavity, drill rods weren't advancing yet sand continued to flow out of the hole) | |
| | | | 505 | 96 | SANDSTONE - light brown medium grained quartz sandstone very poorly cemented uniform | Tomcat Gully Sandstone |
| | | | 504 | 97 | SANDSTONE - grey large to coarse grained sandstone 80% quartz with siltstone, non uniform 2-4mm | |
| | | | 503 | 98 | SANDSTONE - grey very coarse conglomerate rounded and angular quartz sandstone 2-6mm non uniform | Tomcat Gully Sandstone |
| | | | 502 | 99 | SANDSTONE - grey large grained quartz sandstone 3-4mm, 20% siltstone, uniform | |
| | | | 501 | 100 | SANDSTONE - grey large to coarse grained sandstone 80% quartz grain size 3-5mm with 10% >7mm semi rounded to angular | Tomcat Gully Sandstone |
| | | | 500 | 101 | SANDSTONE - dark red brown fine grained quartz uniform sandstone 3mm interlayered with yellow coarse grained quartz sandstone 40% quartz 2-4mm non uniform | |
| | | | 499 | 102 | SILTSTONE - grey siltstone 10% quartz fine grains 4-5mm chips with layers of dark and light grey siltstone | Tomcat Gully Sandstone |
| | | | 498 | 103 | | |
| | | | 497 | 104 | SILTSTONE - dark grey very fine siltstone sub angular 3-5mm chips | Tomcat Gully Sandstone |
| | | | 496 | 105 | SILTSTONE - dark grey and light grey interlayered siltstone 3-7mm planar chips with 15% fine black 2-3mm angular chips | |
| | | | 495 | 106 | | Tomcat Gully Sandstone |
| | | | 494 | 107 | | |
| | | | 493 | 108 | MUDSTONE - dark grey black carbonaceous mudstone 2mm with interlayered grey siltstone 3-5mm | Tomcat Gully Sandstone |
| | | | 492 | 109 | SILTSTONE - dark grey and light grey siltstone 40% light grey 2-4mm semi rounded planar chips | |
| | | | 491 | 110 | SILTSTONE - dark grey and light grey siltstone 40% light grey with 10% carbonaceous mudstone 2-4mm semi rounded planar chips | Tomcat Gully Sandstone |
| | | | 490 | 111 | COAL - coal, stony black 3-5mm angular chips with 10% light grey claystone | |
| | | | 489 | 112 | SILTSTONE - grey siltstone with 30% coal/carbonaceous mudstone 2-3mm chips with 5% sub angular 3mm grains | Upper Ulan Seam |
| | | | 488 | 113 | SANDSTONE - grey large to coarse grained quartz sandstone 3-4mm uniform with 5% coal/siltstone mix | |
| | | | 487 | 114 | COAL - coal/carbonaceous mudstone, stony black angular 4-5mm with 30% light grey claystone | Upper Ulan Seam |
| | | | 486 | 115 | MUDSTONE - dark grey black carbonaceous mudstone with 10% light grey clay and claystone | |
| | | | 485 | 116 | COAL - coal angular, stony black 3-10mm with 5% light grey claystone | Upper Ulan Seam |
| | | | 484 | 117 | COAL - coal angular 3-10mm interlayered 20% with grey siltstone | |
| | | | 483 | 118 | | Upper Ulan Seam |
| | | | 482 | 119 | SILTSTONE - light grey/grey siltstone fine claystone layers 2-5mm semi rounded chips, light grey has 15% fine quartz grains | |

END OF BOREHOLE AT 150.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW16

SHEET 4 OF 4

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Hayley**
Project Number: **2114426E & 2162570B**

Date Commenced: **11/3/10**
Date Completed: **12/3/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **601.2 mAHD**
Co-ords: **E 720907.26 N 6429063.23**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 481 | | | SILTSTONE - light grey/grey siltstone 70% light grey fine claystone layers 2-5mm semi rounded chips, light grey has 15% fine quartz grains | C-Marker Claystone |
| | | 480 | 121 | | SILTSTONE - light grey siltstone and claystone with fine layers of dark grey siltstone | |
| | | 479 | 122 | | | |
| | | 478 | 123 | | COAL - coal, black shiny sub angular 5-7mm with 50% light grey claystone | Lower Ulan Seam |
| | | 477 | 124 | | COAL - coal, shiny black angular 3-5mm with <5% light grey claystone | |
| | | 476 | 125 | | | |
| | | 475 | 126 | | MUDSTONE - carbonaceous mudstone dull grey black 2-7mm sub angular chips with <5% light grey claystone | |
| | | 474 | 127 | | | |
| | | 473 | 128 | | SILTSTONE - grey brown carbonaceous siltstone very fine grain size 4-5mm chips | |
| | | 472 | 129 | | | |
| | | 471 | 130 | | MUDSTONE - grey brown carbonaceous mudstone very fine grain size 4-5mm chips | |
| | sump | 470 | 131 | | SILTSTONE - grey coarse grained siltstone interlayered with 10% dark brown mudstone, sub angular 4-10mm chips | |
| | bentonite | 469 | 132 | | | |
| | | 468 | 133 | | SANDSTONE - grey coarse conglomerate sandstone quartz 80% angular to semi rounded with 20% siltstone mainly semi rounded 3-12mm chips non uniform | Dapper Formation |
| | | 467 | 134 | | | |
| | backfill | 466 | 135 | | SILTSTONE - dark grey siltstone sub angular 4-6mm with minor light grey siltstone bands | |
| | | 465 | 136 | | | |
| | | 464 | 137 | | | |
| | | 463 | 138 | | SILTSTONE - dark grey siltstone sub angular 4-6mm with 5% 3mm quartz grains | |
| | | 462 | 139 | | SILTSTONE - dark grey siltstone sub angular 3-6mm chips | |
| | | 461 | 140 | | | |
| | | 460 | 141 | | | |
| | | 459 | 142 | | | |
| | | 458 | 143 | | | |
| | | 457 | 144 | | | |
| | | 456 | 145 | | SILTSTONE - grey siltstone sub angular 3-6mm chips | |
| | | 455 | 146 | | | |
| | | 454 | 147 | | | |
| | | 453 | 148 | | | |
| | | 452 | 149 | | | |
| | | 451 | 150 | | | |
| | | 450 | 151 | | | |
| | | 449 | 152 | | | |
| | | 448 | 153 | | | |
| | | 447 | 154 | | | |
| | | 446 | 155 | | | |
| | | 445 | 156 | | | |
| | | 444 | 157 | | | |
| | | 443 | 158 | | | |
| | | 442 | 159 | | | |

END OF BOREHOLE AT 150.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW17

SHEET 1 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **S O'Leary**
Project Number: **2114426E & 2162570B**

Date Commenced: **10/2/10**
Date Completed: **10/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Air Hammer**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **363.4 mAHD**
Co-ords: **E 697401.6 N 6441667.07**

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing 50 mm PVC casing | 363 | 1 | | CLAY - yellow brown clay with ironstone cobbles 20mm and chips 5mm | Alluvium |
| | | 362 | 2 | | CLAY - yellow grey clay with manganese nodules, <5% ironstone chips 5-7mm and a white tuffaceous clay band at 1.8m | |
| | | 361 | 3 | | CLAYSTONE - tuffaceous creamy mud/claystone | Digby Formation |
| | | 360 | 4 | | SANDSTONE - yellow orange clayey sandstone, fine to medium grained 1-4mm | |
| | | 359 | 5 | | SANDSTONE - grey brown clayey sandstone, fine to medium grained 2-6mm | |
| | | 358 | 6 | | SANDSTONE - brown clayey sandstone medium grained 3-5mm with minor gravel (<5%) with a band of tuffaceous creamy claystone | |
| | | 357 | 7 | | CLAYSTONE - creamy claystone with 5% sand | |
| | | 356 | 8 | | COAL - coal, smutty grey grading to a shiny black, fine pieces with 30% 5mm chips | Trinkey Seam |
| | | 355 | 9 | | COAL - carbonaceous mudstone/coal ranging from a fine power to 10mm angular chips, with a band of light grey claystone | |
| | | 354 | 10 | | COAL - coal, shiny black powder with 5mm planar chips and angular 10mm pieces, slightly damp | |
| | | 353 | 11 | | CLAYSTONE - grey claystone, fine power and <5% rounded 7mm pieces | Ellismayne Formation |
| | | 352 | 12 | | CLAYSTONE - darker grey claystone, fine power and <5% rounded 7mm pieces | |
| | | 351 | 13 | | CLAYSTONE - grey claystone, fine powder grading to a grey red clay stone | |
| | | 350 | 14 | | CLAYSTONE - grey claystone fine powder | |
| | | 349 | 15 | | SANDSTONE - grey fine grained sandstone with sub angular 8mm pieces mostly 1-2mm quartz matrix, fine powder with 5% | |
| | | 348 | 16 | | SANDSTONE - grey fine to medium grained sandstone with sub angular 8mm pieces mostly 2-3mm quartz matrix, fine powder with 5% | |
| | | 347 | 17 | | | |
| | | 346 | 18 | | SANDSTONE - grey fine to medium large grained quartz sandstone, fine fraction 1-2mm, larger fraction 4-5mm | |
| | | 345 | 19 | | | |
| | | 344 | 20 | | SANDSTONE - light grey fine to medium large quartz sandstone, fine fraction 1-2mm, larger fraction 4mm, with a clay matrix | |
| | | 343 | 21 | | SANDSTONE - light grey fine grained 1-2mm sandstone | |
| | | 342 | 22 | | | |
| | | 341 | 23 | | CLAYSTONE - dark grey carbonaceous mud/claystone, fine power with 10% 2-3mm chips with a red grey medium grained sandstone band, pieces 2-3mm | Whaka Formation |
| | | 340 | 24 | | | |
| | | 339 | | | SILTSTONE - dark grey siltstone, fine to medium pieces, 3-4mm chips | |

EC = 2.77 mS/cm
pH = 8.84

END OF BOREHOLE AT 42.30 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW18

SHEET 1 OF 1

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 17/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 18/2/10 |
| Bore Location: | I & C O'Leary | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Mud rotary | Surface RL: | 337.9 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 702230.54 N 6444415.91 |

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing | | | | CLAY - brown with 30% large 20-30mm angular gravels, ironstone, quartz, conglomerate sandstone | Alluvium |
| | 50 mm PVC casing | 337 | 1 | | CLAYEY SAND - brown with 40% large gravels 20-35mm, ironstone, quartz, siltstone, claystone | |
| | | 336 | 2 | | CLAYEY SAND - red brown, coarse grained sand with alluvial sub angular gravels 20-40mm, ironstone, quartz, siltstone, claystone | |
| | | 335 | 3 | | GRAVEL - alluvial, angular gravel 15-30mm, quartz, ironstone, claystone with 30% coarse grained sand | |
| | bentonite | 334 | 4 | | GRAVEL - alluvial, angular gravel 15-30mm, quartz, claystone. Ironstone is angular planar 30-50mm, with 30% coarse grained sand | |
| | gravel pack | 333 | 5 | | CLAYEY SAND - brown, coarse grained, damp | |
| | | 332 | 6 | | SANDY CLAY - brown, damp | Purlawaugh Formation |
| | | 331 | 7 | | | |
| | | 330 | 8 | | | |
| | | 329 | 9 | | | |
| | 50 mm slotted PVC casing | 328 | 10 | | SANDSTONE - brown, medium to coarse grained, 2-3mm, contains quartz, ironstone, claystone | |
| | | 327 | 11 | | | |
| | | 326 | 12 | | | |
| | sump | 325 | 13 | | | |
| | | 324 | 14 | | | |
| | | 323 | | | | |

EC = 0.969 mS/cm
pH = 8.58

END OF BOREHOLE AT 13.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW19

SHEET 1 OF 1

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Craft**
Project Number: **2114426E & 2162570B**

Date Commenced: **12/2/10**
Date Completed: **15/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Mud rotary**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **330.1 mAHD**
Co-ords: **E 698984.91 N 6445305.7**

| Bore Information | | | | Field Material Description | | |
|------------------|--------------------------|-----------|--------------|----------------------------|--|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | 50 mm PVC casing | 330 | | | CLAYEY SILT - brown sandy clayey silt, sand coarse | Alluvium |
| | 50 mm PVC casing | 329 | 1 | | SANDSTONE - yellow brown medium grained clayey sandstone | Napperby Formation |
| | | 328 | 2 | | SILTSTONE - dark grey siltstone, chips square angular and planar, 7-12mm with 10% brown claystone | |
| | | 327 | 3 | | SILTSTONE - dark grey siltstone, chips square angular and planar, 7-12mm with 30% layers of brown claystone and ironstone, chips 5-7mm | |
| | | 326 | 4 | | | |
| | | 325 | 5 | | SILTSTONE - brown siltstone with 20% grey siltstone and minor sand, chips 5-7mm | |
| | | 324 | 6 | | CLAYSTONE - light grey claystone, fine powder to sub angular chips 5-15mm | |
| | | 323 | 7 | | | |
| | | 322 | 8 | | | |
| | | 321 | 9 | | MUDSTONE - dark grey mudstone sub angular chips 7-12mm | |
| | | 320 | 10 | | SILTSTONE - grey brown siltstone, fine powder to rounded chips 5mm | |
| | | 319 | 11 | | | |
| | bentonite | 318 | 12 | | SILTSTONE - grey siltstone, fine powder to semi rounded chips 5-15mm | |
| | gravel pack | 317 | 13 | | SANDSTONE - light grey fine to medium grained quartz sandstone, 1-3mm grains, moist | |
| | 50 mm slotted PVC casing | 316 | 14 | | SANDSTONE - light grey medium grained quartz sandstone, 2-3mm with 10% grey siltstone | |
| | | 315 | 15 | | SANDSTONE - grey medium to coarse grained quartz sandstone, 2-4mm with 10% grey siltstone | |
| | | 314 | 16 | | SANDSTONE - grey very coarse grained sandstone 3-4mm, 80% quartz and 20% orthoclase and brown claystone | |
| | sump | 313 | 17 | | CLAYSTONE - bright red claystone, sub angular chips 3-7mm | |
| | | 312 | 18 | | | |
| | | 311 | 19 | | | |

EC = 1.56 mS/cm
pH = 8.93

END OF BOREHOLE AT 18.30 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW20

SHEET 3 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 18/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 23/2/10 |
| Bore Location: | M O'Leary | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 326.9 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 697211.51 N 6445662.35 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | COAL - angular 2-3mm chips | Whaka Formation |
| | | 286 | 41 | | | |
| | | 285 | 42 | | COAL - angular 2-7mm chips with bands of light grey claystone | |
| | | 284 | 43 | | MUDSTONE - dark grey, with bands of light claystone 3-4mm chips | |
| | | 283 | 44 | | COAL - stony angular planar 3-5mm chips with 5% brown claystone | |
| | | 282 | 45 | | MUDSTONE - dark grey, carbonaceous, semi rounded 4-6mm chips | Avymore Claystone |
| | | 281 | 46 | | SILTSTONE - grey, semi rounded planar 4-5mm chips | |
| | | 280 | 47 | | | |
| | | 279 | 48 | | | |
| | | 278 | 49 | | | |
| | | 277 | 50 | | SILTSTONE - grey, 2-5mm sub angular chips with 3mm square/rounded quartz grains | Flyblowers Creek Seam |
| | | 276 | 51 | | SANDSTONE - brown fine grained sandstone with 20% 3mm quartz grains and 10% grey siltstone | |
| | | 275 | 52 | | COAL - angular 3-4mm chips with light grey claystone | |
| | | 274 | 53 | | COAL - angular planar 3-5mm chips with <5% light grey claystone | |
| | | 273 | 54 | | COAL - angular 3-5mm chips with cream claystone | |
| | | 272 | 55 | | COAL - angular 3-7mm chips with <5% light grey siltstone | Tomcat Gully Sandstone |
| | | 271 | 56 | | SILTSTONE - light grey and dark grey, semi rounded planar 4-6mm chips | |
| | | 270 | 57 | | SILTSTONE - light grey, fractured, 2-4mm semi rounded planar chips with larger 5-45mm planar chips | |
| | | 269 | 58 | | | |
| | | 268 | 59 | | SILTSTONE - light grey, planar 3-5mm chips with 10% coal angular 3-4mm | |
| | | 267 | | | | |

END OF BOREHOLE AT 78.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW20

SHEET 4 OF 4

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 18/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 23/2/10 |
| Bore Location: | M O'Leary | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 326.9 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 697211.51 N 6445662.35 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 266 | 61 | | COAL - angular 3-4mm chips | Upper Ulan Seam |
| | | 265 | 62 | | | |
| | | 264 | 63 | | SILTSTONE - grey, semi rounded planar 3-4mm chips | C-Marker Claystone |
| | | 263 | 64 | | SANDSTONE - grey medium grained quartz sandstone 3mm | |
| | | 262 | 65 | | | |
| | | 261 | 66 | | SILTSTONE - grey, 3-4mm semi rounded chips with 5% grey siltstone | |
| | | 260 | 67 | | SANDSTONE - grey fine to medium grained quartz sandstone <1-3mm | |
| | | 259 | 68 | | | |
| | | 258 | 69 | | | |
| | | 257 | 70 | | | |
| | | 256 | 71 | | SANDSTONE - grey medium grained sandstone 2-4mm with <5% coal and dark grey siltstone chips | |
| | | 255 | 72 | | MUDSTONE - dark grey, carbonaceous, semi rounded 2-4mm chips | |
| | | 254 | 73 | | COAL - planar 4-5mm planar chips with 30% medium grained quartz sandstone | Lower Ulan Seam |
| | | 253 | 74 | | SANDSTONE - grey medium grained quartz sandstone 2mm grain size with 5% grey siltstone | Dapper Formation |
| | | 252 | 75 | | | |
| | | 251 | 76 | | SANDSTONE - grey fine grained quartz sandstone 1mm grain size | |
| | | 250 | 77 | | | |
| | | 249 | 78 | | | |
| | | 248 | 79 | | | |
| | | 247 | | | | |

END OF BOREHOLE AT 78.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW21

SHEET 1 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Craft**
Project Number: **2114426E & 2162570B**

Date Commenced: **11/2/10**
Date Completed: **12/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Mud rotary**
Drilling Company: **Intertech**

Borehole Diameter: **50 mm**

Surface RL: **328.7 mAHD**
Co-ords: **E 696528.65 N 6445489.93**

| Bore Information | | | | Field Material Description | | |
|------------------|----------------------------|-----------|--------------|----------------------------|--|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50 mm PVC casing bentonite | 328 | 1 | | SAND - dark red brown clay with minor sand | Alluvium |
| | | 327 | 2 | | SANDY CLAY - red brown sandy clay with 15% gravel (sandstone and ironstone) | |
| | 50 mm PVC casing | 326 | 3 | | GRAVEL - alluvial gravels with a red brown sandy clay matrix, gravels size from 2-4mm consisting of ironstone, sandstone and claystone, damp | |
| | | 325 | 4 | | GRAVEL - alluvial gravels with a grey brown medium grained clayey sand, gravels size from 2-4mm consisting of ironstone, sandstone, quartz and claystone | |
| | | 324 | 5 | | GRAVEL - alluvial gravels, consisting of angular/sub angular planar 5-45mm ironstone, claystone, quartz and sandstone, with a grey coarse clayey sand | |
| | | 323 | 6 | | GRAVEL - alluvial gravels 5-10mm with a yellow brown clayey sand | |
| | | 322 | 7 | | SANDY CLAY - yellow and grey coarse sandy clay | |
| | | 321 | 8 | | SANDY CLAY - yellow grey fine sandy clay | |
| | | 320 | 9 | | CLAY - grey brown clay | |
| | | 319 | 10 | | CLAY - light brown yellow clay with 5% coarse sand | |
| | | 318 | 11 | | CLAY - light brown yellow clay with fine sand | |
| | | 317 | 12 | | SANDY CLAY - red brown sandy clay with layers of ironstone | |
| | | 316 | 13 | | CLAY - yellow grey clay | |
| | 50 mm slotted PVC casing | 315 | 14 | | MUDSTONE/CLAYSTONE - black grey mud/claystone, chips angular 3-7mm | Napperby Formation |
| | | 314 | | | | |

END OF BOREHOLE AT 20.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW21

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 11/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 12/2/10 |
| Bore Location: | Craft | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Mud rotary | Surface RL: | 328.7 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 696528.65 N 6445489.93 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 313 | 16 | | SILTSTONE - grey siltstone, chips 6mm planar | Napperby Formation |
| | | 312 | 17 | | SILTSTONE - layers of grey siltstone and dark grey mudstone, 2-6mm | |
| | | 311 | 18 | | SILTSTONE - grey siltstone, fine pieces | |
| | | 310 | 19 | | SILTSTONE - grey siltstone, fine pieces to 10mm angular planar chips | |
| | | 309 | 20 | | SILTSTONE - grey siltstone, chips 7-15mm planar angular | |
| | | 308 | 21 | | | |
| | | 307 | 22 | | | |
| | | 306 | 23 | | | |
| | | 305 | 24 | | | |
| | | 304 | 25 | | | |
| | | 303 | 26 | | | |
| | | 302 | 27 | | | |
| | | 301 | 28 | | | |
| | | 300 | 29 | | | |
| | | 299 | | | | |

END OF BOREHOLE AT 20.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW22_TPB

SHEET 1 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Mates**
Project Number: **2114426E & 2162570B**

Date Commenced: **1/2/10**
Date Completed: **10/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Mud rotary/Air Hammer**
Drilling Company: **Intertech** Borehole Diameter: **136 mm**

Surface RL: **349.7 mAHD**
Co-ords: **E 707014 N 6446584.4**

| Bore Information | | | Field Material Description | | | Geophysical Log | | | |
|------------------|---------------------|-----------|----------------------------|-------------|--|---|---|-------------------------------|--|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) 0 62.5 125.0 187.5 250 | HYDROGEOLOGY | |
| 10002/2010 | 150 mm steel casing | | 349 | | SANDY CLAY - brown sandy clay with 2-3 cm peds | Alluvium | | EC = 0.903 mS/cm pH = 7.96 | |
| | bentonite | | 1 | | CLAY - yellow brown clay with minor sand | | | | |
| | | | 348 | 2 | | | GRAVEL - red brown sandy clayey gravel, 20% quartz, 10% orthoclase, 10% other gravel | | |
| | | | 347 | 3 | | | GRAVEL - red brown alluvial gravel with clay. Gravel 2-5mm, consisting of orthoclase, quartz, ironstone, siltstone and claystone | | |
| | | | 346 | 4 | | | GRAVELLY CLAY - red brown gravelly clay, 10% gravel, consisting of orthoclase, quartz, ironstone, siltstone and claystone | | |
| | | | 345 | 5 | | | | | |
| | | | 344 | 6 | | | CLAYEY GRAVEL - red brown clayey gravel, consisting of orthoclase, quartz, ironstone, siltstone and claystone. gravel are angular 5mm pieces in a 10% clay matrix | | |
| | | | 343 | 7 | | | | | |
| | | | 342 | 8 | | | CLAYEY GRAVEL - brown clayey gravel, consisting of orthoclase, quartz, ironstone, siltstone and claystone pieces are >5mm, in a 10% clay matrix | | |
| | | | 341 | 9 | | | GRAVEL - brown alluvial gravel, small to medium, rounded and angular gravel (2-10mm), 40% quartz | | |
| | | | 340 | 10 | | | | | |
| | | | 339 | 11 | | | | | |
| | | | 338 | 12 | | | GRAVEL - brown alluvial gravel, small to medium, rounded and angular gravel (2-10mm), 40% quartz with 2mm coal pieces | | |
| | | | 337 | 13 | | | GRAVEL - brown alluvial gravel, quartz, ironstone, siltstone, brown claystone 2-10mm pieces, well rounded | | |
| | | | 336 | 14 | | | | | |
| | | | 335 | 15 | | | | | |
| | | | 334 | 16 | | | CLAYEY GRAVEL - brown alluvial gravel with a clay matrix, consisting of rounded quartz, ironstone and planar chips of brown claystone pieces 5-10mm with 10% clay | | |
| | | | 333 | 17 | | | | | |
| | | | 332 | 18 | | | GRAVEL - brown alluvial gravel, 5-15mm, consisting of grey siltstone, ironstone and quartz and smaller 2mm quartz pieces with a 5% clay matrix | | |
| | | | 331 | 19 | | | GRAVELLY CLAY - brown grey gravelly clay, 10mm gravel with grey clay | | |
| | | | 330 | 20 | | SAND - light brown large grained quartz sand with gravel up to 10mm | Tomcat Gully Sandstone | | |
| | | | 329 | 21 | | CLAYEY GRAVEL - grey alluvial gravel 10mm rounded and angular pieces, consisting of quartz, ironstone and grey siltstone with a 10% clay matrix | | | |
| | | | 328 | 22 | | | | | |
| | | | 327 | 23 | | | | | |
| | | | 326 | 24 | | GRAVEL - brown alluvial gravel 2-5mm mostly quartz with some coal fines | | | |
| | | | 325 | 25 | | SANDSTONE - weathered grey sandstone, medium grained quartz with larger 10-15mm alluvial gravel (30%) | | | |
| | | | 324 | 26 | | | | | |
| | | | 323 | 27 | | SANDSTONE - weathered grey sandstone/quartz gravel, 2-10mm pieces with the smaller fraction being rounded and the larger angular | | | |
| | | | 322 | 28 | | | | | |
| | | 321 | 29 | | SANDSTONE - grey medium grained sandstone, mostly quartz | | | | |
| | | 320 | | | SANDSTONE - dark grey sandstone with a clay matrix | | | | |

EC = 0.903 mS/cm
pH = 7.96

END OF BOREHOLE AT 52.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW22_TPB

SHEET 2 OF 2

Client: **CMC Pty Ltd**
Project: **Cobbora Coal Mine Project**
Bore Location: **Mates**
Project Number: **2114426E & 2162570B**

Date Commenced: **1/2/10**
Date Completed: **10/2/10**
Recorded By: **Angus McFarlane**
Log Checked By: **Kimberley Saflian**

Drilling Method: **Mud rotary/Air Hammer**
Drilling Company: **Intertech** Borehole Diameter: **136 mm**

Surface RL: **349.7 mAHD**
Co-ords: **E 707014 N 6446584.4**

| Bore Information | | | | Field Material Description | | Geophysical Log | | | |
|------------------|--|--|-----------|----------------------------|-------------|---|------------------------|--|--------------|
| WATER | WELL CONSTRUCTION | | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | Formation | GAMMA (API-GR) 0 62.5 125.0 187.5 250 | HYDROGEOLOGY |
| | <div><div>150 mm steel casing</div><div>136 mm slotted steel casing</div><div>sump</div></div> | | 319 | 31 | | SANDSTONE - dark grey sandstone with a clay matrix (continued) SANDSTONE - dark grey sandstone with fine grains approximately 2mm and larger grains 4mm with a clay matrix | Tomcat Gully Sandstone | | |
| | | | 318 | 32 | | SANDSTONE - dark grey medium to large grained quartz sandstone with pieces 3-5mm, 5% grey siltstone and coal | | | |
| | | | 317 | 33 | | SANDSTONE - grey, medium becoming medium to fine quartz sandstone, 5% siltstone and coal pieces 2mm | | | |
| | | | 316 | 34 | | | | | |
| | | | 315 | 35 | | | | | |
| | | | 314 | 36 | | COAL/SILTSTONE - coal, stony hard, pieces 5-10mm, some 5% larger pieces 15-20mm, 5% grey siltstone | Upper Ulan Seam | | |
| | | | 313 | 37 | | | | | |
| | | | 312 | 38 | | COAL/SILTSTONE - coal, chips 2-5mm with 10% grey siltstone some larger coal chips 10mm | | | |
| | | | 311 | 39 | | COAL/MUDSTONE - coal/dark grey carbonaceous mudstone, 20% light grey claystone, coal chips 5mm, claystone chips <2mm | C-Marker Claystone | | |
| | | | 310 | 40 | | COAL - coal with fine (2mm) and larger pieces (10mm) with 5% light grey claystone | Lower Ulan Seam | | |
| | | | 309 | 41 | | COAL - coal with fine (2mm) and larger pieces (10-15mm) with 5% light grey claystone | | | |
| | | | 308 | 42 | | COAL - large slightly fractured larger pieces, 10-25mm, pieces square and angular | | | |
| | | | 307 | 43 | | COAL/MUDSTONE - dark grey carbonaceous mudstone/coal, large angular planar chips 25mm with 5% light grey fine sandstone | | | |
| | | | 306 | 44 | | SANDSTONE - dark grey conglomerate sandstone, smaller quartz grains 3mm, larger quartz grains 5-7mm, sub-angular, 40% dark grey siltstone planar chips 10-12mm | Dapper Formation | | |
| | | | 305 | 45 | | SANDSTONE - grey sandstone, large quartz grains 5mm and smaller quartz grains 2mm and finer sandstone chips with 20% dark grey siltstone | | | |
| | | | 304 | 46 | | SANDSTONE - grey fine to medium grained quartz sandstone 2-5mm with 10% larger quartz grains and 5% grey siltstone | | | |
| | | | 303 | 47 | | MUDSTONE/SILTSTONE - dark grey mud/siltstone, planar chips 5-10mm with 10% 3mm quartz grains | | | |
| | | | 302 | 48 | | | | | |
| | | | 301 | 49 | | SANDSTONE - grey fine grained sandstone consisting of quartz and other darker mudstone, 30% grey siltstone | | | |
| | | | 300 | 50 | | SANDSTONE - light grey fine grained sandstone with chips in planar and sub angular form, with 20% conglomerate quartz angular chips 5-7mm | | | |
| | | | 299 | 51 | | SANDSTONE - grey medium to large grained sandstone, smaller grains 3mm, larger grains (35%) 5-10mm | | | |
| | | | 298 | 52 | | END OF BOREHOLE AT 52.00 m | | | |
| | | | 297 | 53 | | | | | |
| | | | 296 | 54 | | | | | |
| | | | 295 | 55 | | | | | |
| | | | 294 | 56 | | | | | |
| | | | 293 | 57 | | | | | |
| | | | 292 | 58 | | | | | |
| | | | 291 | 59 | | | | | |
| | | | 290 | | | | | | |

END OF BOREHOLE AT 52.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

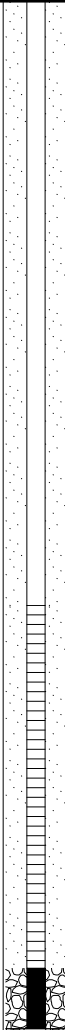
GW23

SHEET 2 OF 2

| | | | |
|-----------------|---------------------------|-----------------|-------------------|
| Client: | CMC Pty Ltd | Date Commenced: | 23/2/10 |
| Project: | Cobbora Coal Mine Project | Date Completed: | 23/2/10 |
| Bore Location: | Roberts | Recorded By: | Angus McFarlane |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Kimberley Saflian |

| | | | |
|-------------------|------------|--------------------|--------------------------|
| Drilling Method: | Air Hammer | Surface RL: | 405.9 mAHD |
| Drilling Company: | Intertech | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 705786.22 N 6436148.65 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 380 | 26 | | MUDSTONE - dark grey semi rounded and angular becoming harder with depth (continued) | Napperby Formation |
| | | 379 | 27 | | | |
| | | 378 | 28 | | | |
| | | 377 | 29 | | | |
| | | 376 | 30 | | MUDSTONE/SILTSTONE - dark grey interbedded mudstone and siltstone | |
| | | 375 | 31 | | | |
| | | 374 | 32 | | SILTSTONE - dark grey and grey bedded siltstone 4-8mm chips | |
| | | 373 | 33 | | | |
| | | 372 | 34 | | | |
| | | 371 | 35 | | | |
| | | 370 | 36 | | | |
| | | 369 | 37 | | | |
| | | 368 | 38 | | | |
| | | 367 | 39 | | | |
| | | 366 | 40 | | | |
| | | 365 | 41 | | | |
| | | 364 | 42 | | | |
| | | 363 | 43 | | | |
| | | 362 | 44 | | | |
| | | 361 | 45 | | | |
| | | 360 | 46 | | | |
| | | 359 | 47 | | | |
| | | 358 | 48 | | | |
| | | 357 | 49 | | | |
| | | 356 | | | | |



END OF BOREHOLE AT 42.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

| Bore Information | | | | Field Material Description | | | | | |
|--|-------------------|--|-----|----------------------------|--------------|-------------|---|-----------------|--------------|
| WATER | WELL CONSTRUCTION | | | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | | 200mm PVC surface casing and 50mm PVC casing | 388 | 1 | | | CLAY. Yellow-brown & grey clay with minor dark red-brown, slightly oxidised and weathered fine to coarse grained sandstone. | Regolith | |
| | | | 387 | 2 | | | SILTY CLAY. Light grey silty clay, with 20-40% medium grey and yellow orange, weathered fine to coarse grained sandstone and minor yellow clay. | | |
| | | | 386 | 3 | | | | Digby Formation | |
| | | | 385 | 4 | | | SANDSTONE. Dark red, medium grey and yellow slightly weathered and oxidised fine to coarse grained sandstone. | | |
| | | | 384 | 5 | | | | | |
| | | 50mm PVC casing | 383 | 6 | | | SILTY CLAY. Light grey, yellow and brown silty clay. 10-50% dark red, grey, yellow and brown fine to coarse grained sandstone. | | |
| | | | 382 | 7 | | | | | |
| | | | 381 | 8 | | | | | |
| | | | 380 | 9 | | | | | |
| | | | 379 | 10 | | | | | |
| | | | 378 | 11 | | | SANDSTONE and CLAY. 50% weathered light to medium grey fine to coarse grained sandstone with 50% light to medium grey silty, sandy clay. | | |
| | | | 377 | 12 | | | SANDSTONE and CLAY. Light to dark grey fine to coarse grained sandstone with 40% light grey silty sandy clay. | | |
| | | | 376 | 13 | | | CLAY. Medium grey and brown clay with minor yellow-brown to brown-red fine to coarse grained sandstone or siltstone. | | |
| | | | 375 | 14 | | | | | |
| | | | 374 | 15 | | | SANDSTONE. Dark grey fine sandstone with minor dark grey clay and light grey coarse sandstone. | | |
| | | | 373 | 16 | | | | | |
| | | | 372 | 17 | | | CLAY. Dark grey clay, 30% light grey coarse sandstone. 20% dark grey sandstone or siltstone. | | |
| | | | 371 | 18 | | | SANDSTONE and SILT. Fine to very fine sandstone and silt with minor lithic quartz sandstone and light grey clay. | | |
| | | | 370 | 19 | | | SANDSTONE. Dark grey fine sandstone. 40% yellow to dark brown quartz, coarse sandstone. | | |
| END OF BOREHOLE AT 47.50 m | | | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | | | |



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24A

SHEET 2 OF 3

| | | | |
|-----------------|----------------------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 18/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 19/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 388.96 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710440.83 N 6445279.99 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|-----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | SANDSTONE. Light grey fine to coarse grained quartz sandstone in a light grey clay matrix. | Digby Formation |
| | | 368 | 21 | | | |
| | | 367 | 22 | | | |
| | | 366 | 23 | | CLAY. Light grey clay with minor light grey, friable coarse grained quartz sandstone. | |
| | | 365 | 24 | | SANDSTONE. Light grey to yellow fine to coarse grained quartz sandstone. | Whaka Formation |
| | | 364 | 25 | | SANDSTONE. Medium to dark grey fine sandstone in light grey silty clay. Minor light grey to brown siltstone and quartz. | |
| | | 363 | 26 | | | |
| | | 362 | 27 | | SANDSTONE. Yellow-brown to pink fine grained subrounded quartz sandstone. | |
| | | 361 | 28 | | SANDSTONE. Pink and yellow very coarse grained, quartz sandstone. 40% light grey-brown siltstone. 30% light grey coarse grained sandstone. | |
| | | 360 | 29 | | COAL and SANDSTONE. 40% black coal, 30% orange-brown coarse grained quartz sandstone. 20% pink and grey angular siltstone. 10% light grey coarse grained sandstone. | |
| | | 359 | 30 | | COAL. Black coal. | |
| | | 358 | 31 | | COAL. 75% black coal, 25% light grey to brown angular siltstone. | Avymore Claystone |
| | | 357 | 32 | | | |
| | | 356 | 33 | | SILTSTONE. Dark grey to black carbonaceous siltstone with minor light grey clay and dark grey fine to coarse grained grey sandstone. | |
| | | 355 | 34 | | | |
| | | 354 | 35 | | CLAYSTONE. Light grey claystone, 40% dark grey to black carbonaceous siltstone and minor medium grey, moderate to coarse grained sandstone. | Flyblowers Creek Seam |
| | | 353 | 36 | | | |
| | | 352 | 37 | | CLAYSTONE. Light grey claystone with minor dark grey sandstone and light grey to brown siltstone. | |
| | | 351 | 38 | | SANDSTONE. Medium grey fine to coarse grained sandstone in light grey clay. | Flyblowers Creek Seam |
| | | 350 | 39 | | SANDSTONE. Medium to dark grey sandstone in light grey clay. | |

END OF BOREHOLE AT 47.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

| Bore Information | | | | Field Material Description | | | | | |
|--|-------------------|--|-----|----------------------------|--------------|-------------|---|-----------------|--------------|
| WATER | WELL CONSTRUCTION | | | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | | 200mm PVC surface casing and 50mm PVC casing | 389 | | | | CLAY. Red-brown, light grey and yellow mottled clay with minor red-brown and medium grey, oxidised, fine to coarse grained sandstone. | Regolith | |
| | | | 388 | 1 | | | | | |
| | | | 387 | 2 | | | CLAY. Light grey and yellow silty, sandy, moderately to well cemented clay. | | |
| | | | 386 | 3 | | | SANDSTONE. Light grey, red and yellow, moderately weathered and oxidised fine to coarse grained sandstone with minor light grey, red and yellow sandy silt with some clay. | Digby Formation | |
| | | | 385 | 4 | | | | | |
| | | | 384 | 5 | | | | | |
| | | 50mm PVC casing | 383 | 6 | | | | | |
| | | | 382 | 7 | | | SANDSTONE. Light grey and minor red fine to coarse grained sandstone. 10% light yellow-grey clayey sandy silt. | | |
| | | | 381 | 8 | | | CLAYSTONE. Light grey and yellow silty, sandy claystone. 5-20% light grey and some yellow fine to coarse grained quartz sandstone. | | |
| | | | 380 | 9 | | | | | |
| | | | 379 | 10 | | | | | |
| | | | 378 | 11 | | | | | |
| | | | 377 | 12 | | | SILTSTONE. Light grey and light red-orange clayey, sandy siltstone. 5-20% light to medium grey and orange to dark red oxidised and moderately weathered fine to coarse grained sandstone. | | |
| | | | 376 | 13 | | | | | |
| | | | 375 | 14 | | | SANDSTONE. Light to medium grey and red-orange moderately weathered, fine to coarse grained sandstone. 30-50% light grey clayey, sandy silt. | | |
| | | | 374 | 15 | | | | | |
| | | | 373 | 16 | | | SILTSTONE. Light grey and yellow sandy, clayey siltstone and minor light grey and light yellow-orange fine to coarse grained quartz sandstone. 0-5% light grey sticky clay. | | |
| | | | 372 | 17 | | | | | |
| | | | 371 | 18 | | | | | |
| | | | 370 | 19 | | | | | |
| END OF BOREHOLE AT 52.70 m | | | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | | | |



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24B

SHEET 2 OF 3

| | | | |
|-----------------|----------------------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 17/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 18/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.13 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710441.97 N 6445268.01 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|-----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 369 | | | SANDSTONE. Light to medium grey fine to coarse grained sandstone in a light grey silty clay matrix. | Digby Formation |
| | | 368 | 21 | | | |
| | | 367 | 22 | | | |
| | | 366 | 23 | | | |
| | | 365 | 24 | | | |
| | | 364 | 25 | | | |
| | | 363 | 26 | | SANDSTONE. Light grey fine sandstone. 40% light to dark grey, green and red-brown siltstone. 20% medium red-brown medium to coarse grained quartz sandstone in a light grey clay matrix. | Ellismayne Formation |
| | | 362 | 27 | | | |
| | | 361 | 28 | | | |
| | | 360 | 29 | | COAL. Black coal. | Whaka Formation |
| | | 359 | 30 | | SILTSTONE. Interbedded black carbonaceous siltstone and minor light brown and grey claystone. | |
| | | 358 | 31 | | | |
| | | 357 | 32 | | | |
| | | 356 | 33 | | | |
| | | 355 | 34 | | | |
| | | 354 | 35 | | | |
| | | 353 | 36 | | | |
| | | 352 | 37 | | CLAYSTONE. Light grey, clay with minor medium grey, medium to coarse grained sandstone. | Avymore Claystone |
| | | 351 | 38 | | SANDSTONE. Medium to dark grey, fine to coarse grained poorly sorted sandstone. | Flyblowers Creek Seam |
| | | 350 | 39 | | | |

END OF BOREHOLE AT 52.70 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24B

SHEET 3 OF 3

| | | | |
|-----------------|----------------------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 17/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 18/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.13 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710441.97 N 6445268.01 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|-------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 349 | 41 | | SANDSTONE. Medium to dark grey, fine to coarse grained poorly sorted sandstone. (continued) | Flyblowers Creek Seam |
| | | 348 | 42 | | | |
| | | 347 | 43 | | SILTSTONE. Interbedded black carbonaceous siltstone and minor light to dark grey clay. | |
| | | 346 | 44 | | | |
| | | 345 | 45 | | | |
| | | 344 | 46 | | SILTSTONE. Black carbonaceous siltstone and minor medium grey fine to medium grained sandstone in a medium dark grey clay matrix. | |
| | | 343 | 47 | | | |
| | | 342 | 48 | | | |
| | | 341 | 49 | | | |
| | | 340 | 50 | | SILTSTONE. Interbedded black carbonaceous siltstone in a medium to dark grey clay matrix and minor light brown and grey claystone. | |
| | | 339 | 51 | | | Tom Cat Gully Sandstone |
| | | 338 | 52 | | SANDSTONE. Light grey fine to coarse grained sandstone in a light grey clay matrix. | |
| | | 337 | 53 | | | |
| | | 336 | 54 | | | |
| | | 335 | 55 | | | |
| | | 334 | 56 | | | |
| | | 333 | 57 | | | |
| | | 332 | 58 | | | |
| | | 331 | 59 | | | |
| | | 330 | | | | |

Airlift <0.05L/s
EC=0.570mS/cm
pH=6.85

END OF BOREHOLE AT 52.70 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24C

SHEET 1 OF 3

| | | | |
|-----------------|----------------------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 14/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 16/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.22 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710444.88 N 6445237.89 |

| Bore Information | | | | Field Material Description | | |
|------------------|--|-----------|--------------|----------------------------|--|-----------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 200mm PVC surface casing and 50mm PVC casing | 389 | 1 | | CLAY. Red-brown, yellow-brown and light grey mottled clay with minor angular red-brown and yellow-brown oxidised, slightly weathered, siltstone or fine grained sandstone. | Regolith |
| | | 388 | 2 | | SANDSTONE. Light grey, light brown, light red and light yellow weathered fine to coarse grained sandstone in a light grey and light yellow sandy silty clay matrix. | Digby Formation |
| | | 387 | 3 | | | |
| | | 386 | 4 | | | |
| | | 385 | 5 | | | |
| | | 384 | 6 | | | |
| | 50mm PVC casing | 383 | 7 | | | |
| | | 382 | 8 | | | |
| | | 381 | 9 | | | |
| | | 380 | 10 | | | |
| | | 379 | 11 | | | |
| | | 378 | 12 | | | |
| | | 377 | 13 | | | |
| | | 376 | 14 | | SANDSTONE. Medium grey, medium to coarse grained sandstone in a medium grey sandy silt matrix. | |
| | | 375 | 15 | | | |
| | | 374 | 16 | | | |
| | | 373 | 17 | | CLAYSTONE. Light grey and light yellow silty, sandy claystone and minor dark red and yellow medium to coarse grained quartz sandstone. | |
| | | 372 | 18 | | | |
| | | 371 | 19 | | SANDSTONE. Light to medium grey fine to coarse grained sandstone and light to medium grey clay, sand and silt. | |
| | | 370 | | | | |

END OF BOREHOLE AT 57.10 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24C

SHEET 2 OF 3

| | | | |
|-----------------|----------------------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 14/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 16/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.22 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710444.88 N 6445237.89 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 369 | 21 | | SANDSTONE. Light to medium grey fine to coarse grained sandstone and light to medium grey clay, sand and silt. <i>(continued)</i> | Digby Formation |
| | | 368 | 22 | | | |
| | | 367 | 23 | | | |
| | | 366 | 24 | | | |
| | | 365 | 25 | | | |
| | | 364 | 26 | | | |
| | | 363 | 27 | | SANDSTONE. Light grey fine to medium grained sandstone and minor light grey, yellow and red sandy, silty clay. | Ellismayne Formation |
| | | 362 | 28 | | | |
| | | 361 | 29 | | | |
| | | 360 | 30 | | SANDSTONE. Light grey silty fine to coarse grained sandstone in a light grey clay matrix. | |
| | | 359 | 31 | | COAL. Black coal. | Whaka Formation |
| | | 358 | 32 | | SILTSTONE. Black carbonaceous siltstone with minor light grey claystone. | |
| | | 357 | 33 | | | |
| | | 356 | 34 | | | |
| | | 355 | 35 | | SILTSTONE. Black carbonaceous siltstone with minor moderate to coarse white clay. | |
| | | 354 | 36 | | | |
| | | 353 | 37 | | COAL and CLAY. 50% black coal. 50% white clay. | |
| | | 352 | 38 | | SANDSTONE. Medium to dark grey, fine to medium grained sandstone with minor light grey and white clay. | Avymore Claystone |
| | | 351 | 39 | | | |
| | | 350 | | | | |

END OF BOREHOLE AT 57.10 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24C

SHEET 3 OF 3

| | | | |
|-----------------|---|-----------------|-------------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 14/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 16/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|------------------------|--------------------|---------------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.22 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710444.88 N 6445237.89 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|-------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | 349 | | SANDSTONE. Medium to dark grey, fine to medium grained sandstone with minor light grey and white clay. (continued) | Avymore Claystone |
| | | | 41 | | | |
| | | | 348 | | | Flyblowers Creek Seam |
| | | | 42 | | SILTSTONE. Dark grey-black carbonaceous siltstone and minor medium to dark grey, fine to medium grained sandstone and white clay. | |
| | | | 43 | | | |
| | | | 44 | | | |
| | | | 45 | | | |
| | | | 46 | | SANDSTONE. Medium to dark grey, fine to coarse grained sandstone in a medium grey clay matrix. | |
| | | | 47 | | SILTSTONE. Dark grey-black carbonaceous siltstone with minor medium grey clay. | |
| | | | 48 | | SANDSTONE. Medium to dark grey and black, fine to coarse grained carbonaceous sandstone with minor medium grey clay. | |
| | | | 49 | | SILTSTONE. Black carbonaceous siltstone with minor light brown and grey claystone. | |
| | | | 50 | | | |
| | | | 51 | | | Tom Cat Gully Sandstone |
| | | | 52 | | | |
| | | | 53 | | | |
| | | | 54 | | | |
| | | | 55 | | SANDSTONE. Light to medium grey, fine to coarse grained sandstone with minor medium grey clay. | |
| | | | 56 | | | |
| | | | 57 | | | |
| | | | 58 | | SILTSTONE. Black carbonaceous siltstone with minor light brown and grey claystone. | |
| | | | 59 | | | |
| | | | 330 | | | |

Airlift <0.05L/s
EC=1.872mS/cm
pH=8.72

END OF BOREHOLE AT 57.10 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24D

SHEET 2 OF 4

| | | | |
|-----------------|----------------------------------|-----------------|-----------------|
| Client: | CHC Pty Ltd | Date Commenced: | 13/10/11 |
| Project: | Cobbora Coal Project | Date Completed: | 14/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | James Dommissie |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.30 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710445.78 N 6445227.26 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|----------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 369 | 21 | | CLAYSTONE. Medium grey, silty, sandy claystone and minor light to dark grey and yellow fine to coarse grained sandstone. (continued) | Digby Formation |
| | | 368 | 22 | | | |
| | | 367 | 23 | | | |
| | | 366 | 24 | | | |
| | | 365 | 25 | | SILTSTONE. Light grey, clayey, sandy siltstone and minor light grey fine to coarse grained quartz sandstone. | Ellismayne Formation |
| | | 364 | 26 | | | |
| | | 363 | 27 | | SILTSTONE. Light grey, clayey, sandy siltstone with minor light grey medium to fine grained sandstone and dark red, vuggy, fine to coarse grained sandstone. | |
| | | 362 | 28 | | | |
| | | 361 | 29 | | | |
| | | 360 | 30 | | SANDSTONE. Light grey fine to coarse grained quartz sandstone. 20% black coal. | |
| | | 359 | 31 | | COAL. Black coal. | Whaka Formation |
| | | 358 | 32 | | SILTSTONE. Black carbonaceous siltstone with minor light grey claystone and white clay. | |
| | | 357 | 33 | | | |
| | | 356 | 34 | | | |
| | | 355 | 35 | | | |
| | | 354 | 36 | | | |
| | | 353 | 37 | | SILTSTONE. Black carbonaceous siltstone with minor white clay and light grey fine to coarse grained sandstone. | Avymore Claystone |
| | | 352 | 38 | | | |
| | | 351 | 39 | | SANDSTONE. Light to dark grey sandstone with minor white and medium grey clay and black carbonaceous siltstone. | Flyblowers Creek Formation |
| | | 350 | | | | |

END OF BOREHOLE AT 70.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24E

SHEET 2 OF 5

| | | | |
|-----------------|----------------------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 25/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 26/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.29 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710446.25 N 6445216.68 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|-----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 369 | 21 | | SANDSTONE. Light grey-brown medium to coarse grained lithic quartz sandstone in a light grey to white sandy clay matrix. | Digby Formation |
| | | 368 | 22 | | | |
| | | 367 | 23 | | | |
| | | 366 | 24 | | | |
| | | 365 | 25 | | | |
| | | 364 | 26 | | | |
| | | 363 | 27 | | SILTSTONE. Light brown to grey and medium brown hard, partly laminated siltstone in a grey to white sandy clay matrix. | Ellismayne Formation |
| | | 362 | 28 | | SANDSTONE. Light to dark grey, brown-grey and red-yellow medium grained lithic quartz sandstone in a light grey clay matrix. | |
| | | 361 | 29 | | | |
| | | 360 | 30 | | SANDSTONE. Light grey and pink coarse grained lithic quartz sandstone, with minor coal. | |
| | | 359 | 31 | | COAL. Coal with minor light grey-brown fine siltstone and a trace of light grey coarse sandstone. | Whaka Formation |
| | | 358 | 32 | | | |
| | | 357 | 33 | | | |
| | | 356 | 34 | | SILTSTONE. Dark grey-black carbonaceous siltstone. | |
| | | 355 | 35 | | SILTSTONE. Dark grey-black carbonaceous siltstone and light grey clay, with minor light brown-grey siltstone. | |
| | | 354 | 36 | | | |
| | | 353 | 37 | | SILTSTONE. Dark grey-black carbonaceous siltstone interbedded with light to medium grey, fine to coarse sandstone and grey clay. | Avymore Claystone |
| | | 352 | 38 | | | |
| | | 351 | 39 | | | |
| | | 350 | | | SANDSTONE. Light to medium grey fine to coarse grained sandstone interbedded with dark grey-black carbonaceous siltstone and light to dark grey clay. | Flyblowers Creek Seam |

END OF BOREHOLE AT 88.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW24E

SHEET 5 OF 5

| | | | |
|-----------------|----------------------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 25/9/11 |
| Project: | Cobbora Coal Project | Date Completed: | 26/9/11 |
| Bore Location: | Cnr Golden Hwy & Spring Ridge Rd | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 389.29 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710446.25 N 6445216.68 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 309 | 81 | | SANDSTONE. Medium to dark grey fine to coarse grained quartz sandstone. <i>(continued)</i> | Dapper Formation |
| | | 308 | 82 | | | |
| | | 307 | 83 | | | |
| | | 306 | 84 | | | |
| | | 305 | 85 | | SANDSTONE. Light grey coarse grained lithic quartz sandstone. | |
| | | 304 | 86 | | | |
| | | 303 | 87 | | | |
| | | 302 | 88 | | | |
| | | 301 | 89 | | | |
| | | 300 | 90 | | | |
| | | 299 | 91 | | | |
| | | 298 | 92 | | | |
| | | 297 | 93 | | | |
| | | 296 | 94 | | | |
| | | 295 | 95 | | | |
| | | 294 | 96 | | | |
| | | 293 | 97 | | | |
| | | 292 | 98 | | | |
| | | 291 | 99 | | | |
| | | 290 | | | | |

9/11/11

sump

Airlift=0.125L/s
EC=2.74mS/cm
pH=6.03

END OF BOREHOLE AT 88.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW25

SHEET 1 OF 2

Client: **CHC Pty Ltd**
 Project: **Cobbora Coal Project**
 Bore Location: **Darlington**
 Project Number: **2114426E & 2162570B**

Date Commenced: **9/11/11**
 Date Completed: **10/11/11**
 Recorded By: **Chiara Callipari**
 Log Checked By: **Stuart Brown**

Drilling Method: **Air hammer**
 Drilling Company: **Gricks Drilling**

Borehole Diameter: **50 mm**

Surface RL: **370.39 mAHD**
 Co-ords: **E 709138.98 N 6443789.37**

| Bore Information | | | | Field Material Description | | | | |
|--|-------------------|--|-----------|----------------------------|-------------|---|--|---|
| WATER | WELL CONSTRUCTION | | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION | HYDROGEOLOGY |
| | | 200mm PVC surface casing and 50mm PVC casing 50mm PVC casing | 370 | 1 | | SANDY CLAY. Red-brown and grey sandy clay. | Tom Cat Gully Sandstone | |
| | | | 369 | 2 | | SANDSTONE. Pink, cream, yellow, red, grey and brown friable fine to medium grained lithic quartz sandstone with minor grey clay clasts. | | |
| | | | 368 | 3 | | | | |
| | | | 367 | 4 | | | | |
| | | | 366 | 5 | | | | |
| | | | 365 | 6 | | CLAYSTONE. Black, cream, yellow and brown carbonaceous claystone. | Ulan Coal Seams | |
| | | | 364 | 7 | | SILTY CLAYSTONE. Light to dark grey and black carbonaceous silty claystone. | | |
| | | | 363 | 8 | | | | |
| | | | 362 | 9 | | | | |
| | | | 361 | 10 | | | | SILTSTONE and SANDSTONE. 50% brown-grey siltstone. 50% medium grey fine to medium grained sandstone with carbonaceous flecks. |
| | | | 360 | 11 | | SILTY CLAYSTONE. Dark brown and black carbonaceous silty claystone. | | |
| | | | 359 | 12 | | CLAYSTONE and SANDSTONE. 50% soft grey claystone. 50% grey and brown fine to medium grained quartz sandstone. | Dapper Formation | |
| | | | 358 | 13 | | SANDSTONE. Grey, brown and red mottled medium to coarse grained lithic sandstone. | | |
| | | | 357 | 14 | | SANDSTONE. Light yellow-cream to yellow-orange oxidised fine to medium grained lithic quartz sandstone. | | |
| | | | 356 | 15 | | | | |
| | | | 355 | 16 | | | | |
| | | | 354 | 17 | | | | SANDSTONE. Light brown and grey fine to coarse grained lithic quartz sandstone in a cream clay matrix. |
| | | | 353 | 18 | | | | |
| | | | 352 | 19 | | | | |
| | | | 351 | 20 | | SANDSTONE. Medium grey moderately friable fine grained sandstone. | | |
| | | | 350 | 21 | | SANDSTONE. Cream fine to medium grained lithic quartz sandstone in a cream clay matrix. | | |
| | | | 349 | 22 | | | | |
| | | | 348 | 23 | | | | |
| | | | 347 | 24 | | | | |
| | | | 346 | 25 | | SANDSTONE. Medium grey friable fine quartz sandstone. | | |
| | | | 345 | 26 | | | | |
| | | | 344 | 27 | | | | |
| | | | 343 | 28 | | | SANDSTONE. Light to dark grey fine to coarse grained carbonaceous sandstone, coarsening with depth, in light grey silty clay matrix. | |
| | | | 342 | 29 | | | | |
| | | | 341 | 30 | | | | |
| | | | 340 | 31 | | | | |
| | | | 339 | 32 | | | | |
| | | | 338 | 33 | | | | |
| | | | 337 | 34 | | | | |
| | | | 336 | | | | | |
| END OF BOREHOLE AT 61.00 m | | | | | | | | |
| This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes. | | | | | | | | |

END OF BOREHOLE AT 61.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW26

SHEET 1 OF 3

| | | | |
|-----------------|----------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 27/10/11 |
| Project: | Cobbora Coal Project | Date Completed: | 27/10/11 |
| Bore Location: | Timbertop | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 434.95 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 711780.37 N 6443721.05 |

| Bore Information | | | | Field Material Description | | |
|------------------|--|-----------|--------------|----------------------------|---|----------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 200mm PVC surface casing and 50mm PVC casing | 434 | 1 | | SANDSTONE. Red-brown weathered fine to coarse grained sandstone with red-brown clay. | Digby Formation |
| | 50mm PVC casing | 433 | 2 | | CLAYSTONE. Dark red-pink, dark yellow and light grey mottled claystone. | |
| | | 432 | 3 | | SANDSTONE. Light grey, dark yellow, red-brown and pink coarse sandstone and fine to coarse grained quartz sandstone. | |
| | | 431 | 4 | | SANDSTONE. Light brown-white and dark brown-orange, hard, fine to coarse grained lithic quartz sandstone with minor light grey clay. | |
| | | 430 | 5 | | | |
| | | 429 | 6 | | SANDSTONE and SILTSTONE. 50% light brown-white and dark brown-orange, hard, fine to coarse grained lithic quartz sandstone with minor light grey clay. 50% light grey hard siltstone. | |
| | | 428 | 7 | | SANDSTONE. Orange, pink, red and light grey mottled and moderately friable, fine to coarse grained quartz sandstone. | |
| | | 427 | 8 | | | |
| | | 426 | 9 | | SANDSTONE and SILTSTONE. Interbedded light grey and yellow medium to coarse grained lithic sandstone and dark grey, planar, fine to coarse carbonaceous siltstone. | Ellismayne Formation |
| | | 425 | 10 | | | |
| | | 424 | 11 | | | |
| | | 423 | 12 | | | |
| | | 422 | 13 | | | |
| | | 421 | 14 | | COAL. Coal. | Whaka Formation |
| | | 420 | 15 | | SILTSTONE. Dark grey-black to light grey-brown carbonaceous siltstone. | |
| | | 419 | 16 | | SILTSTONE and CLAYSTONE. Dark grey-black to light grey-brown carbonaceous siltstone and light grey-white carbonaceous claystone. | |
| | | 418 | 17 | | | |
| | | 417 | 18 | | | |
| | | 416 | 19 | | | |

END OF BOREHOLE AT 57.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW26

SHEET 2 OF 3

| | | | |
|-----------------|----------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 27/10/11 |
| Project: | Cobbora Coal Project | Date Completed: | 27/10/11 |
| Bore Location: | Timbertop | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 434.95 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 711780.37 N 6443721.05 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|---|-------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | SILTSTONE and CLAYSTONE. Dark grey-black to light grey-brown carbonaceous siltstone and light grey-white carbonaceous claystone. <i>(continued)</i> | Whaka Formation |
| | | 414 | 21 | | | |
| | | 413 | 22 | | | |
| | | 412 | 23 | | | |
| | | 411 | 24 | | SANDSTONE. Light grey medium to coarse grained sandstone with minor light grey clay. | |
| | | 410 | 25 | | CLAYSTONE. Light grey claystone. | Avymore Claystone |
| | | 409 | 26 | | COAL and SILTSTONE. Black stoney coal with minor medium brown carbonaceous siltstone. | Flyblowers Creek Seam |
| | | 408 | 27 | | SILTSTONE. Dark grey-black carbonaceous siltstone. | |
| | | 407 | 28 | | | |
| | | 406 | 29 | | | |
| | | 405 | 30 | | | |
| | | 404 | 31 | | | |
| | | 403 | 32 | | SILTSTONE. Dark grey-black carbonaceous siltstone with minor medium grey medium to coarse grained sandstone. | Tom Cat Gully Sandstone |
| | | 402 | 33 | | SANDSTONE. Light to medium grey fine to coarse grained quartz sandstone. | |
| | | 401 | 34 | | | |
| | | 400 | 35 | | | |
| | | 399 | 36 | | | |
| | | 398 | 37 | | | |
| | | 397 | 38 | | COAL. Coal. | Upper Ulan Seam |
| | | 396 | 39 | | SILTSTONE. Dark grey-black carbonaceous siltstone with minor light brown and medium grey siltstone. | |

END OF BOREHOLE AT 57.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW27

SHEET 2 OF 2

| | | | |
|-----------------|----------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 28/10/11 |
| Project: | Cobbora Coal Project | Date Completed: | 29/10/11 |
| Bore Location: | Woolandra | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 436.79 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 715660.22 N 6438900.47 |

| Bore Information | | | Field Material Description | | | |
|------------------|-------------------|-----------|----------------------------|-------------|---|------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | 416 | 21 | | SANDSTONE. Light yellow, slightly oxidised, coarse grained lithic quartz sandstone in silty, sandy, clay matrix. <i>(continued)</i> | Dapper Formation |
| | | 415 | 22 | | CLAY and SILTSTONE. Minor brown-red clay becoming dark grey-black carbonaceous siltstone. | |
| | | 414 | 23 | | SANDSTONE. Light to medium grey medium to coarse grained sandstone in light grey clay matrix. | |
| | | 413 | 24 | | SANDSTONE and SILTSTONE. 50% light grey fine to medium grained sandstone in a light grey clay matrix. 50% dark grey carbonaceous siltstone. Trace of orange-brown clay (possibly collapsed material from near surface). | |
| | | 412 | 25 | | SANDSTONE. Light pink and light to medium grey fine to medium grained sandstone in light grey and pink clay matrix. | |
| | | 411 | 26 | | SILTSTONE. Finely bedded light to medium grey carbonaceous siltstone, partly iron-stained. | Dry |
| | | 410 | 27 | | CLAYSTONE. Medium grey moderately friable claystone with minor iron-stained siltstone. | |
| | | 409 | 28 | | SANDSTONE. Yellow-brown coarse grained lithic quartz sandstone in a light brown clay matrix. | |
| | | 408 | 29 | | | |
| | | 407 | 30 | | | |
| | | 406 | 31 | | | |
| | | 405 | 32 | | | |
| | | 404 | 33 | | | |
| | | 403 | 34 | | | |
| | | 402 | 35 | | | |
| | | 401 | 36 | | | |
| | | 400 | 37 | | | |
| | | 399 | 38 | | | |
| | | 398 | 39 | | | |
| | | 397 | | | | |

END OF BOREHOLE AT 29.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW28C

SHEET 1 OF 2

Client: **CHC Pty Ltd**
 Project: **Cobbora Coal Project**
 Bore Location: **Darlington**
 Project Number: **2114426E & 2162570B**

Date Commenced: **1/11/11**
 Date Completed: **2/11/11**
 Recorded By: **Chiara Callipari**
 Log Checked By: **Stuart Brown**

Drilling Method: **Air hammer**
 Drilling Company: **Gricks Drilling**

Borehole Diameter: **50 mm**

Surface RL: **375.88 mAHD**
 Co-ords: **E 710542.14 N 6439176.71**

| Bore Information | | | Field Material Description | | | |
|------------------|--|-----------|----------------------------|-------------|---|-------------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 200mm PVC surface casing and 50mm PVC casing | 375 | 1 | | SILTY CLAY. Brown silty clay. | Alluvium |
| | | 374 | 2 | | SANDY CLAY. Brown, grey and orange sandy clay. | |
| | | 373 | 3 | | | |
| | | 372 | 4 | | GRAVEL. Brown-orange coarse subrounded gravel of mixed lithologies in brown-grey sandy clay. | |
| | | 371 | 5 | | CLAYEY GRAVEL. Red-brown sandy clayey gravel with subangular to angular clasts of mixed lithologies, up to 30mm diameter, in a mottled grey-brown clay matrix. | |
| | | 370 | 6 | | CLAYEY GRAVEL. Brown-orange subrounded gravels of mixed lithologies from 5-50mm diameter in a brown-orange silty clay matrix. | |
| | | 369 | 7 | | CLAYEY SANDY GRAVEL. Light grey-brown clayey sandy gravel of angular to subrounded mixed lithologies (approximately 50% quartz) up to 12mm in diameter, in a sandy clay matrix. | |
| | | 368 | 8 | | CLAYEY SANDY GRAVEL. Light grey-brown clayey sandy gravel of angular to rounded mixed lithologies (approximately 50% quartz) up to 12mm in diameter, in a sandy clay matrix. Becoming black carbonaceous siltstone. | |
| | | 367 | 9 | | SILTSTONE and CLAYSTONE. 50% black carbonaceous siltstone. 50% light grey-white siltstone and claystone. | Flyblowers Creek Seam |
| | | 366 | 10 | | SILTSTONE. Dark grey-black carbonaceous siltstone. Minor clasts of mixed lithologies (contamination from above). | |
| | | 365 | 11 | | SILTSTONE and SANDSTONE. Medium grey carbonaceous siltstone and fine sandstone, with minor coal. Minor clasts of mixed lithologies (contamination from above). | Tom Cat Gully Sandstone |
| | | 364 | 12 | | | |
| | | 363 | 13 | | | |
| | | 362 | 14 | | | |
| | | 361 | 15 | | | |
| | | 360 | 16 | | SANDSTONE. Coarse quartz sandstone. | Upper Ulan Seam |
| | | 359 | 17 | | | |
| | | 358 | 18 | | SILTSTONE. Coal and dark grey carbonaceous siltstone. | |
| | | 357 | 19 | | SILTSTONE and CLAYSTONE. 50% dark grey carbonaceous siltstone. 50% light grey-white claystone and siltstone of platy chips. | |
| | | 356 | | | | |

END OF BOREHOLE AT 29.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW28C

SHEET 2 OF 2

Client: **CHC Pty Ltd**
 Project: **Cobbora Coal Project**
 Bore Location: **Darlington**
 Project Number: **2114426E & 2162570B**

Date Commenced: **1/11/11**
 Date Completed: **2/11/11**
 Recorded By: **Chiara Callipari**
 Log Checked By: **Stuart Brown**

Drilling Method: **Air hammer**
 Drilling Company: **Gricks Drilling**

Borehole Diameter: **50 mm**

Surface RL: **375.88 mAHD**
 Co-ords: **E 710542.14 N 6439176.71**

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------------|-----------|--------------|----------------------------|---|--|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | 50mm slotted PVC casing | 355 | 21 | | SILTSTONE. Dark grey-black carbonaceous siltstone with minor coal. | Upper Ulan Seam |
| | | 354 | 22 | | SILTSTONE. Dark grey-black carbonaceous siltstone with minor coal, interbedded with light grey claystone and siltstone. | |
| | | 353 | 23 | | | |
| | | 352 | 24 | | SILTSTONE and SANDSTONE. Light to medium grey siltstone and fine sandstone with carbonaceous bands. | |
| | | 351 | 25 | | SILTSTONE. Dark grey-black carbonaceous siltstone. | C-Marker Claystone Lower Ulan Seam |
| | | 350 | 26 | | CLAYSTONE. Light to medium grey, moderately friable, claystone. | |
| | | 349 | 27 | | SILTSTONE. Dark grey carbonaceous siltstone with minor coal. | |
| | | 348 | 28 | | | |
| | sump | 347 | 29 | | | Airlift=0.35L/s EC=2.77mS/cm pH=6.81 |
| | | 346 | 30 | | | |
| | | 345 | 31 | | | |
| | | 344 | 32 | | | |
| | | 343 | 33 | | | |
| | | 342 | 34 | | | |
| | | 341 | 35 | | | |
| | | 340 | 36 | | | |
| | | 339 | 37 | | | |
| | | 338 | 38 | | | |
| | | 337 | 39 | | | |
| | | 336 | | | | |

END OF BOREHOLE AT 29.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW28D

SHEET 2 OF 2

| | | | |
|-----------------|----------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 31/10/11 |
| Project: | Cobbora Coal Project | Date Completed: | 1/11/11 |
| Bore Location: | Darlington | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 375.80 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 710538.12 N 6439165.79 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------------|-----------|--------------|----------------------------|---|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | SILTSTONE. Dark grey siltstone with minor white claystone and minor light grey siltstone with carbonaceous flecks. <i>(continued)</i> | Upper Ulan Seam |
| | | 355 | 21 | | | |
| | | 354 | 22 | | COAL. Coal. | |
| | | 353 | 23 | | SILTSTONE and SANDSTONE. 50% dark grey-black carbonaceous siltstone and light brown siltstone with carbonaceous flecks. 50% light to medium grey friable, fine to medium grained sandstone. | |
| | | 352 | 24 | | CLAYSTONE. Light to medium grey-white claystone with carbonaceous flecks. | C-Marker Claystone |
| | | 351 | 25 | | | |
| | | 350 | 26 | | SILTSTONE. Interbedded dark grey-black siltstone, minor coal, light to medium brown mudstone with carbonaceous flecks and medium grey siltstone. | Lower Ulan Seam |
| | | 349 | 27 | | | |
| | | 348 | 28 | | | |
| | | 347 | 29 | | | |
| | | 346 | 30 | | | |
| | bentonite | | | | | |
| | | 345 | 31 | | SANDSTONE. Light to medium grey friable, fine to medium grained thinly bedded sandstone. | Dapper Formation |
| | gravel pack | | | | | |
| | | 344 | 32 | | SILTSTONE. 50% light grey fine grained sandstone with carbonaceous flecks. 50% medium grey siltstone. | |
| | | 343 | 33 | | SANDSTONE. Coarse sandstone in sandy matrix with minor dark grey mudstone. | |
| | 50mm slotted PVC casing | | | | | |
| | | 342 | 34 | | CONGLOMERATE. Coarse quartz sandstone with poorly sorted quartz grains (medium to coarse sand and 10mm pebbles) with minor medium to dark grey siltstone. | |
| | | 341 | 35 | | CONGLOMERATE. 50% coarse quartz sandstone with poorly sorted quartz grains (medium to coarse sand and 10mm pebbles) with minor medium to dark grey siltstone. 50% light grey-brown fine sandstone with carbonaceous flecks. | |
| | sump | | | | | |
| | | 340 | 36 | | SANDSTONE. Light grey fine grained thinly bedded sandstone with carbonaceous flecks. | |
| | | 339 | 37 | | SANDSTONE. Light grey fine to medium grained sandstone with carbonaceous flecks. Minor quartz granules (possible contamination from above). | |
| | | 338 | 38 | | | |
| | | 337 | 39 | | | |
| | | 336 | | | | |

Airlift=0.05L/s
EC=2.11mS/cm
pH=6.87

END OF BOREHOLE AT 38.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW29B

SHEET 2 OF 4

| | | | |
|-----------------|----------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 14/11/11 |
| Project: | Cobbora Coal Project | Date Completed: | 14/11/11 |
| Bore Location: | Mates | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 348.29 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 705751.25 N 6446154.55 |

| Bore Information | | | | Field Material Description | | |
|------------------|-------------------|-----------|--------------|----------------------------|--|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | 323 | | | SILTSTONE. Light grey siltstone in a light grey clay matrix. <i>(continued)</i> | Napperby Formation |
| | | 322 | 26 | | SILTSTONE. Light grey and light brown siltstone in a light grey clay matrix. | |
| | | 321 | 27 | | SILTSTONE. Light to medium grey siltstone with some carbonaceous flecks in a light grey clay matrix. | |
| | | 320 | 28 | | | |
| | | 319 | 29 | | | |
| | | 318 | 30 | | | |
| | | 317 | 31 | | SILTSTONE. Light to medium grey siltstone with some carbonaceous flecks in a light grey clay matrix. | |
| | | 316 | 32 | | | |
| | | 315 | 33 | | | |
| | | 314 | 34 | | | |
| | | 313 | 35 | | | |
| | | 312 | 36 | | | |
| | | 311 | 37 | | | |
| | | 310 | 38 | | | |
| | | 309 | 39 | | | |
| | | 308 | 40 | | | |
| | | 307 | 41 | | | |
| | | 306 | 42 | | | |
| | | 305 | 43 | | | |
| | | 304 | 44 | | | |
| | | 303 | 45 | | | |
| | | 302 | 46 | | | |
| | | 301 | 47 | | | |
| | | 300 | 48 | | | |
| | | 299 | 49 | | SILTSTONE. Medium to dark grey siltstone with some carbonaceous flecks in a light grey clay matrix. | |

END OF BOREHOLE AT 83.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.



GROUNDWATER BOREHOLE LOG

BORE NO.

GW29B

SHEET 4 OF 4

| | | | |
|-----------------|----------------------|-----------------|------------------|
| Client: | CHC Pty Ltd | Date Commenced: | 14/11/11 |
| Project: | Cobbora Coal Project | Date Completed: | 14/11/11 |
| Bore Location: | Mates | Recorded By: | Chiara Callipari |
| Project Number: | 2114426E & 2162570B | Log Checked By: | Stuart Brown |

| | | | |
|-------------------|-----------------|--------------------|--------------------------|
| Drilling Method: | Air hammer | Surface RL: | 348.29 mAHD |
| Drilling Company: | Gricks Drilling | Borehole Diameter: | 50 mm |
| | | Co-ords: | E 705751.25 N 6446154.55 |

| Bore Information | | | Field Material Description | | | |
|------------------|-------------------|-----------|----------------------------|-------------|---|--------------------|
| WATER | WELL CONSTRUCTION | RL (mAHD) | DEPTH (mBGL) | GRAPHIC LOG | LITHOLOGY | FORMATION |
| | | | | | | |
| | | | 273 | | SILTSTONE. Dark grey siltstone in a dark grey clay matrix. <i>(continued)</i> | Napperby Formation |
| | | | 76 | | SILTSTONE. Dark grey and medium brown siltstone in a dark grey clay matrix. | |
| | | | 272 | | | |
| | | | 77 | | SANDSTONE. Light to dark fine to medium grained sandstone with carbonaceous flecks, in a dark grey clay matrix. | Digby Formation |
| | | | 271 | | | |
| | | | 78 | | SANDSTONE. Light to dark fine to medium grained sandstone with carbonaceous flecks, in a dark grey clay matrix, with minor quartz and light brown-grey siltstone. | |
| | | | 270 | | | |
| | | | 79 | | | |
| | | | 269 | | | |
| | | | 80 | | SANDSTONE. Light grey-brown fine to medium grained quartz sandstone with minor dark grey siltstone in a medium grey clay matrix. | |
| | | | 268 | | | |
| | | | 81 | | SANDSTONE. Light to dark fine to medium grained sandstone with carbonaceous flecks, in a dark grey clay matrix, with minor quartz and light brown-grey siltstone. | |
| | | | 267 | | | |
| | | | 82 | | | |
| | | | 266 | | | |
| | | | 83 | | SANDSTONE. Light grey fine to medium grained sandstone with carbonaceous flecks in minor light grey clay. | |
| | | | 265 | | | |
| | | | 84 | | | |
| | | | 264 | | | |
| | | | 85 | | | |
| | | | 263 | | | |
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| | | | 251 | | | |
| | | | 98 | | | |
| | | | 250 | | | |
| | | | 99 | | | |
| | | | 249 | | | |

Airlift=0.1L/s
EC=2.40mS/cm
pH=7.39

END OF BOREHOLE AT 83.50 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.