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BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH17B

SHEET 1 OF 5

Client: QUEENSLAND DEPARTMENT OF MAIN ROADS

Project: TUGUN BYPASS GEOTECHNICAL INVESTIGATION

Borehole Location: TUGUN

Project Number: 2134070A

Date Commenced: 14/2/02

Date Completed: 16/2/02

Recorded By: MCM

Log Checked By: *DAW*

Drill Model/Mounting:

Hole Angle: 90°

Surface RL: 1.1 m AHD

Borehole Diameter: 120 mm

Bearing: ---

Co-ords: E 51242 N 86558 PMG

| Borehole Information |         |       |           |          |                  | Field Material Description |             |            |                                                                                    |          |                                |                                                  |
|----------------------|---------|-------|-----------|----------|------------------|----------------------------|-------------|------------|------------------------------------------------------------------------------------|----------|--------------------------------|--------------------------------------------------|
| 1                    | 2       | 3     | 4         | 5        | 6                | 7                          | 8           | 9          | 10                                                                                 | 11       | 12                             | 13                                               |
| METHOD               | SUPPORT | WATER | RL(m) AHD | DEPTH(m) | FIELD TEST       | SAMPLE                     | GRAPHIC LOG | USC SYMBOL | SOIL/ROCK MATERIAL FIELD DESCRIPTION                                               | MOISTURE | RELATIVE DENSITY / CONSISTENCY | STRUCTURE AND ADDITIONAL OBSERVATIONS            |
| WB                   | Nil     |       | 1         |          |                  |                            |             |            |                                                                                    | VS       | FB                             | ESTUARINE/<br>FLOODPLAIN/TIDAL DELTA<br>DEPOSITS |
|                      |         |       | 0         | 1        |                  |                            |             |            |                                                                                    | VL       | ST                             |                                                  |
|                      |         |       |           |          | 3,2,3<br>N=5     | SPT                        |             |            | SAND: medium grained, grey to dark grey, some<br>silt.                             | VS       | VL                             |                                                  |
|                      |         |       | -1        | 2        |                  |                            |             |            |                                                                                    | SL       | MD                             |                                                  |
|                      |         |       | -2        | 3        |                  |                            |             |            |                                                                                    | SL       | MD                             |                                                  |
|                      |         |       | -3        | 4        |                  |                            |             |            |                                                                                    | SL       | MD                             |                                                  |
|                      |         |       | -4        | 5        | 1,0,1<br>N=1     | SPT                        |             |            |                                                                                    | SL       | MD                             |                                                  |
|                      |         |       | -5        | 6        |                  |                            |             |            |                                                                                    | SL       | MD                             |                                                  |
|                      |         |       | -6        | 7        |                  |                            |             |            |                                                                                    | SL       | MD                             |                                                  |
|                      |         |       | -7        | 8        | 10,18,18<br>N=36 | SPT                        |             | SM         | Cemented Silty SAND (Coffee Rock): fine to<br>medium grained, brown to dark brown. | M        |                                |                                                  |
|                      |         |       | -8        | 9        |                  |                            |             |            |                                                                                    |          |                                |                                                  |
|                      |         |       | -9        | 10       |                  |                            |             |            |                                                                                    |          |                                |                                                  |
|                      |         |       | -10       | 11       | R                | SPT                        |             |            | ... grain size increases to medium grained.                                        |          |                                |                                                  |
|                      |         |       | -11       | 12       |                  |                            |             |            |                                                                                    |          |                                | N=R                                              |
|                      |         |       | -12       | 13       |                  |                            |             |            |                                                                                    |          |                                |                                                  |
|                      |         |       | -13       | 14       | R                | SPT                        |             |            |                                                                                    |          |                                | N=R                                              |

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



BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH17B

SHEET 2 OF 5

|                    |                                         |                 |         |
|--------------------|-----------------------------------------|-----------------|---------|
| Client:            | QUEENSLAND DEPARTMENT OF MAIN ROADS     | Date Commenced: | 14/2/02 |
| Project:           | TUGUN BYPASS GEOTECHNICAL INVESTIGATION | Date Completed: | 16/2/02 |
| Borehole Location: | TUGUN                                   | Recorded By:    | MCM     |
| Project Number:    | 2134070A                                | Log Checked By: | DAW     |

|                           |                 |                              |
|---------------------------|-----------------|------------------------------|
| Drill Model/Mounting:     | Hole Angle: 90° | Surface RL: 1.1 m AHD        |
| Borehole Diameter: 120 mm | Bearing: ---    | Co-ords: E 51242 N 86558 PMG |

| Borehole Information |         |       |           |                    |            | Field Material Description |             |            |                                                                                                                                    |          |                                |                                             |
|----------------------|---------|-------|-----------|--------------------|------------|----------------------------|-------------|------------|------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------|---------------------------------------------|
| 1                    | 2       | 3     | 4         | 5                  | 6          | 7                          | 8           | 9          | 10                                                                                                                                 | 11       | 12                             | 13                                          |
| METHOD               | SUPPORT | WATER | RL(m) AHD | DEPTH(m)           | FIELD TEST | SAMPLE                     | GRAPHIC LOG | USC SYMBOL | SOIL/ROCK MATERIAL FIELD DESCRIPTION                                                                                               | MOISTURE | RELATIVE DENSITY / CONSISTENCY | STRUCTURE AND ADDITIONAL OBSERVATIONS       |
| WB                   |         |       | 14        |                    |            |                            |             | SM         | Cemented Silty SAND (Coffee Rock): fine to medium grained, brown to dark brown (continued)                                         | M        |                                |                                             |
|                      |         |       | 15        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 16        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 16.50     |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 17        | 2, 1, 4<br>N=5     | SPT        |                            |             | SC         | Sandy CLAY: dark brown, grey, pale orange-brown to orange-brown, with fine to medium grained sand, interlayered and thinly bedded. |          |                                | INTERBEDDED ESTUARINE AND ALLUVIAL DEPOSITS |
|                      |         |       | 18        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 19        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 19.50     |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 20        | 3, 6, 10<br>N=16   | SPT        |                            |             | SP         | SAND: medium grained, pale grey, trace of silt, minor bioturbation.                                                                |          |                                |                                             |
|                      |         |       | 21        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 22        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 22.50     |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 23        | 7, 12, 6<br>N=18   | SPT        |                            |             | SC         | Clayey SAND: fine to medium grained, dark grey, clay content decreases with depth.                                                 |          |                                |                                             |
|                      |         |       | 24        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 25        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 25.50     |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 26        |                    |            | U50                        |             | SC         | Clayey SAND: medium grained, grey.                                                                                                 |          |                                |                                             |
|                      |         |       | 27        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 28        |                    |            |                            |             |            |                                                                                                                                    |          |                                |                                             |
|                      |         |       | 28        | 11, 13, 15<br>N=28 | SPT        |                            |             |            | ... increase in grain size to medium to coarse grained, with possible trace of shell grit.                                         |          |                                |                                             |

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



BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH17B

SHEET 3 OF 5

|                    |                                         |                 |         |
|--------------------|-----------------------------------------|-----------------|---------|
| Client:            | QUEENSLAND DEPARTMENT OF MAIN ROADS     | Date Commenced: | 14/2/02 |
| Project:           | TUGUN BYPASS GEOTECHNICAL INVESTIGATION | Date Completed: | 16/2/02 |
| Borehole Location: | TUGUN                                   | Recorded By:    | MCM     |
| Project Number:    | 2134070A                                | Log Checked By: | Dmw     |

|                           |                 |                              |
|---------------------------|-----------------|------------------------------|
| Drill Model/Mounting:     | Hole Angle: 90° | Surface RL: 1.1 m AHD        |
| Borehole Diameter: 120 mm | Bearing: ---    | Co-ords: E 51242 N 86558 PMG |

| Borehole Information |         |       |           |          |                    |        |             | Field Material Description                                                                                                                              |          |                                |                         |                                       |
|----------------------|---------|-------|-----------|----------|--------------------|--------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------|-------------------------|---------------------------------------|
| 1                    | 2       | 3     | 4         | 5        | 6                  | 7      | 8           | 9                                                                                                                                                       | 10       | 11                             | 12                      | 13                                    |
| METHOD               | SUPPORT | WATER | RL(m) AHD | DEPTH(m) | FIELD TEST         | SAMPLE | GRAPHIC LOG | SOIL/ROCK MATERIAL FIELD DESCRIPTION                                                                                                                    | MOISTURE | RELATIVE DENSITY / CONSISTENCY | HAND PENETROMETER (kPa) | STRUCTURE AND ADDITIONAL OBSERVATIONS |
| WB                   |         |       | -29       |          |                    |        |             | Clayey SAND: medium grained, grey.<br>(continued)<br>... minor grey-green and brown mottling, contains traces of silt.                                  | M        |                                |                         |                                       |
|                      |         |       | -30       | 31       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -31       | 32       | 4, 11, 20<br>N=31  | SPT    |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -32       | 33       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -33       | 34       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -34       | 35       | 20, 23, 26<br>N=49 | SPT    |             | ... increase in the presence of mottling, visible laminations.                                                                                          |          |                                |                         |                                       |
|                      |         |       | -35       | 36       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -36       | 37       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -37.50    | 38       | 13, 25, 32<br>N=57 | SPT    |             | ARGILLITE: pale green-grey, extremely weathered, extremely low strength, remnant laminations and fractures, iron staining visible on fracture surfaces. |          |                                |                         | WEATHERED ROCK                        |
|                      |         |       | -38       | 39       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -39       | 40       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -40       | 41       | R                  | SPT    |             |                                                                                                                                                         |          |                                |                         | N=R                                   |
|                      |         |       | -41       | 42       |                    |        |             | ARGILLITE: fine to medium grained, dark grey, highly weathered, very low strength, friable.                                                             |          |                                |                         |                                       |
|                      |         |       | -42       | 43       |                    |        |             |                                                                                                                                                         |          |                                |                         |                                       |
|                      |         |       | -43       | 44       | R                  | SPT    |             |                                                                                                                                                         |          |                                |                         | N=R                                   |

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BOREHOLE ENGINEERING LOG

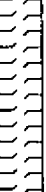
BOREHOLE NO.

BH17B

SHEET 4 OF 5

|                    |                                         |                 |         |
|--------------------|-----------------------------------------|-----------------|---------|
| Client:            | QUEENSLAND DEPARTMENT OF MAIN ROADS     | Date Commenced: | 14/2/02 |
| Project:           | TUGUN BYPASS GEOTECHNICAL INVESTIGATION | Date Completed: | 16/2/02 |
| Borehole Location: | TUGUN                                   | Recorded By:    | MCM     |
| Project Number:    | 2134070A                                | Log Checked By: | DAW     |

|                       |             |          |             |           |                     |
|-----------------------|-------------|----------|-------------|-----------|---------------------|
| Drill Model/Mounting: | Hole Angle: | 90°      | Surface RL: | 1.1 m AHD |                     |
| Borehole Diameter:    | 120 mm      | Bearing: | ---         | Co-ords:  | E 51242 N 86558 PMG |

| Borehole Information |         |       |           |          |            | Field Material Description |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|----------------------|---------|-------|-----------|----------|------------|----------------------------|-----------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------|----------|--------------------------------|-------------------------|---------------------------------------|----|----|----|----|-----|----|---|
| 1                    | 2       | 3     | 4         | 5        | 6          | 7                          | 8                                                                                 | 9          | 10                                                                                                         | 11       | 12                             | 13                      |                                       |    |    |    |    |     |    |   |
| METHOD               | SUPPORT | WATER | RL(m) AHD | DEPTH(m) | FIELD TEST | SAMPLE                     | GRAPHIC LOG                                                                       | USC SYMBOL | SOIL/ROCK MATERIAL FIELD DESCRIPTION                                                                       | MOISTURE | RELATIVE DENSITY / CONSISTENCY | HAND PENETROMETER (kPa) | STRUCTURE AND ADDITIONAL OBSERVATIONS |    |    |    |    |     |    |   |
| WB                   |         |       | 44        |          |            |                            |  |            | ARGILLITE: fine to medium grained, dark grey, highly weathered, very low strength, friable.<br>(continued) |          | VS                             |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       |           |          | FB         | VS                         |                                                                                   |            |                                                                                                            |          | VL                             |                         |                                       | SL | FL | ST | MD | VST | VD | H |
|                      |         |       |           |          |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 45        | 46       |            | R                          | SPT                                                                               |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 46        | 47       |            |                            |                                                                                   |            | REFER TO CORED BOREHOLE LOG                                                                                |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 47        | 48       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 48        | 49       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 49        | 50       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 50        | 51       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 51        | 52       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 52        | 53       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 53        | 54       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 54        | 55       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 55        | 56       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 56        | 57       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 57        | 58       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |
|                      |         |       | 58        | 59       |            |                            |                                                                                   |            |                                                                                                            |          |                                |                         |                                       |    |    |    |    |     |    |   |

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



# CORED BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH17B

SHEET 5 OF 5

Client: QUEENSLAND DEPARTMENT OF MAIN ROADS  
Project: TUGUN BYPASS GEOTECHNICAL INVESTIGATION  
Borehole Location: TUGUN  
Project Number: 2134070A

Date Commenced: 14/2/02  
Date Completed: 16/2/02  
Recorded By: MCM  
Log Checked By: *Jan*

Drill Model/Mounting: Hole Angle: 90° Surface RL: 1.1 m AHD  
Borehole Diameter: 120 mm Bearing: --- Co-ords: E 51242 N 86558 PMG

| Borehole Information |         |       |               |     |           | Field Material Description |             |                                                      |                                                                           |                                        |                                 |                                          |
|----------------------|---------|-------|---------------|-----|-----------|----------------------------|-------------|------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------|---------------------------------|------------------------------------------|
| 1                    | 2       | 3     | 4             | 5   | 6         | 7                          | 8           | 9                                                    | 10                                                                        | 11                                     | 12                              |                                          |
| METHOD               | SUPPORT | WATER | CORE RECOVERY | RQD | RL(m) AHD | DEPTH(m)                   | GRAPHIC LOG | SOIL/ROCK MATERIAL FIELD DESCRIPTION                 | WEATHERING                                                                | INFERRED STRENGTH<br>Is(50)<br>MPa     | AVERAGE DEFECT<br>SPACING<br>mm | STRUCTURE AND ADDITIONAL<br>OBSERVATIONS |
|                      |         |       |               |     | 44        |                            |             |                                                      | EL<br>0.03<br>VL<br>0.1<br>J<br>0.3<br>M<br>1<br>H<br>3<br>VH<br>10<br>EH | TO<br>30<br>100<br>300<br>1000<br>3000 |                                 |                                          |
|                      |         |       |               |     | 45        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 46        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 47        |                            |             | COMMENCE CORING AT 47 m                              |                                                                           |                                        |                                 |                                          |
| NMLC                 | NII     |       | 79            | 0   | 46        |                            |             | ARGILLITE: grey, moderately weathered, low strength. | MW                                                                        |                                        |                                 | WEATHERED ROCK Joints 45-70°             |
| WB                   |         |       |               |     | 47.42     |                            |             | CORE LOSS                                            |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 47.53     |                            |             | WASH BORED                                           |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 47        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 48        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 49.04     |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
| NMLC                 |         |       | 87            | 17  | 48        |                            |             | ARGILLITE: grey, moderately weathered, low strength. | MW                                                                        |                                        |                                 |                                          |
| WB                   |         |       |               |     | 49.52     |                            |             | CORE LOSS                                            |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 49.60     |                            |             | WASH BORED                                           |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 49        |                            |             | END OF BOREHOLE AT 50.00 m                           |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 50        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 51        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 51        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 52        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 52        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 53        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 53        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 54        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 54        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 55        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 55        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 56        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 56        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 57        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 57        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 58        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |
|                      |         |       |               |     | 58        |                            |             |                                                      |                                                                           |                                        |                                 |                                          |

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

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