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BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH61

SHEET 1 OF 4

Client: QUEENSLAND MAIN ROADS

Date Commenced: 23/6/05

Project: TUGUN BYPASS GEOTECHNICAL INVESTIGATION

Date Completed: 24/6/05

Borehole Location: Cut; Chainage 2035 (MC11); on centreline;

Recorded By: AO

Project Number: 2134070C

Log Checked By: DAW

Drill Model/Mounting: EAZE-CAT TRACKED RIG

Hole Angle: 90°

Surface RL: 40.3 m AHD

Borehole Diameter: 80 mm

Bearing: ---

Co-ords: E 48129.2 N 89219.8 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 |    |     |   |   |    |
|                      |         |       |           |          |                  |        | USC SYMBOL  |                                                                                                                                                     | VS       | FB                             | VL                      | ST                                    | MD | VST | D | H | VD |
| TC                   | C       | OWG   |           |          |                  |        | GC          | Gravelly CLAY: medium plasticity, orange-brown, some sand, highly weathered greywacke gravel up to 30mm in size.                                    | D        |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 40        |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 0.80      |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 1         |          | SPT 24,30 /120mm | SPT    |             | GREYWACKE: fine grained, pale grey with orange-brown staining, highly weathered, very low strength, a few pale grey argillite interbeds throughout. |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 39        |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 2         |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 38        |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       |           |          | SPT 30 /120mm    | SPT    |             | ...only a trace of orange-brown staining.                                                                                                           |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 3         |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 37        |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 4         |          |                  |        |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         | Nil   |           |          | SPT 30 /120mm    | SPT    |             |                                                                                                                                                     |          |                                |                         |                                       |    |     |   |   |    |
|                      |         |       | 36        |          |                  |        |             | REFER TO CORED BOREHOLE LOG                                                                                                                         |          |                                |                         |                                       |    |     |   |   |    |

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



CORED BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH61

SHEET 2 OF 4

Client: QUEENSLAND MAIN ROADS

Date Commenced: 23/6/05

Project: TUGUN BYPASS GEOTECHNICAL INVESTIGATION

Date Completed: 24/6/05

Borehole Location: Cut; Chainage 2035 (MC11); on centreline;

Recorded By: AO

Project Number: 2134070C

Log Checked By: *DAW*

Drill Model/Mounting: EAZE-CAT TRACKED RIG

Hole Angle: 90°

Surface RL: 40.3 m AHD

Borehole Diameter: 80 mm

Bearing: ---

Co-ords: E 48129.2 N 89219.8 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>In(S0)<br>MPa                                                  | AVERAGE DEFECT<br>SPACING<br>mm  | STRUCTURE AND ADDITIONAL<br>OBSERVATIONS |
|                      |         |       |               |     |           |          |                                                                                     |                                                                                                                                                | EL<br>VL<br>WL<br>ML<br>HL<br>VH<br>CH | 0.3<br>0.3<br>0.3<br>1<br>3<br>10                                                   | 50<br>100<br>300<br>1000<br>3000 |                                          |
|                      |         |       |               |     | 40        |          |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     |           | 1        |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     | 39        |          |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     |           | 2        |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     | 38        |          |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     |           | 3        |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     | 37        |          |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     |           | 4        |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       |               |     |           |          |                                                                                     | COMMENCE CORING AT 4.22 m<br>CORE LOSS                                                                                                         |                                        |                                                                                     |                                  |                                          |
| NMLC                 | Nil     |       |               |     | 36        |          |                                                                                     |                                                                                                                                                |                                        |                                                                                     |                                  |                                          |
|                      |         |       | 53            | 0   | 4.67      |          |  | GREYWACKE: fine grained, pale grey with orange-brown staining, highly weathered, low strength, a few pale grey argillite interbeds throughout. | HW                                     |  |                                  | 4.67-4.88m: Broken zone, Fe-stained.     |

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



# CORED BOREHOLE ENGINEERING LOG

BOREHOLE NO.

**BH61**

SHEET 3 OF 4

Client: QUEENSLAND MAIN ROADS  
Project: TUGUN BYPASS GEOTECHNICAL INVESTIGATION  
Borehole Location: Cut; Chainage 2035 (MC11); on centreline;  
Project Number: 2134070C

Date Commenced: 23/6/05  
Date Completed: 24/6/05  
Recorded By: AO  
Log Checked By: DAW

Drill Model/Mounting: EAZE-CAT TRACKED RIG      Hole Angle: 90°      Surface RL: 40.3 m AHD  
Borehole Diameter: 80 mm      Bearing: ---      Co-ords: E 48129.2 N 89219.8 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 Is(50) MPa                                           | AVERAGE DEFECT SPACING mm | STRUCTURE AND ADDITIONAL OBSERVATIONS                          |
| NMLC                 |         |       |               |     |           |                            |             | ...argillite band between 4.95-5.1m.                                                                | HW                                                                       | 0.03<br>0.1<br>0.3<br>1<br>3<br>10<br>30<br>100<br>300<br>1000<br>3000 |                           | 5.00-5.17m: Broken zone - drilling induced, some Fe-staining.  |
|                      |         |       |               |     |           | 5.17                       |             | CORE LOSS                                                                                           |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           | 5.37                       |             | GREYWACKE: fine grained, pale grey with orange-brown staining, highly weathered, very low strength. | HW                                                                       |                                                                        |                           | 5.00-5.57m: Crushed zone - drilling induced, some Fe-staining. |
|                      |         |       |               | 64  | 0         | 5.50                       |             | ARGILLITE: very fine grained, pale grey with orange-brown staining.                                 |                                                                          |                                                                        |                           | 5.62, 5.67, 5.72m: 3 x 50°J, planar, smooth.                   |
|                      |         |       |               |     |           | 5.90                       |             | CORE LOSS                                                                                           |                                                                          |                                                                        |                           | 5.72-5.90m: extremely fractured zone, Fe-stained.              |
|                      |         |       |               |     |           | 6.00-6                     |             | ...fine grained greywacke interbeds, highly fractured, iron stained.                                | HW                                                                       |                                                                        |                           | 6.00-6.10m: Broken zone. Fe-stained.                           |
|                      |         |       |               |     |           | 6.40                       |             | ARGILLITE: very fine grained, pale grey with orange-brown staining.                                 | MW                                                                       |                                                                        |                           | 6.10m: 45°J, planar, smooth.                                   |
|                      |         |       |               | 86  | 48        |                            |             |                                                                                                     |                                                                          |                                                                        |                           | 6.33m: 40-80° J, curved, trace of Fe-staining.                 |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           | 6.44m: 65° J, irregular, rough.                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     | XW                                                                       |                                                                        |                           | 6.44-6.76m: Extremely fractured.                               |
|                      |         |       |               |     |           |                            |             |                                                                                                     | HW                                                                       |                                                                        |                           | 6.83m: 80° J, sub-vertical, curved, smooth, Fe-stained.        |
|                      |         |       |               | 100 | 36        |                            | 7           |                                                                                                     |                                                                          | MW                                                                     |                           | 7.02m: 60° J, planar, smooth, Fe-stained.                      |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           | 7.17m: 30° J, planar.                                          |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           | 7.17-7.35m: Highly fractured zone.                             |
|                      |         |       |               |     |           |                            | 7.31        |                                                                                                     | GREYWACKE: fine to medium grained, pale grey with orange-brown staining. | MW                                                                     |                           |                                                                |
|                      |         |       |               |     |           |                            | 7.35        |                                                                                                     | CORE LOSS                                                                |                                                                        |                           |                                                                |
|                      |         |       |               |     |           | 7.69                       |             | GREYWACKE: fine to medium grained, pale grey with orange-brown staining.                            | HW                                                                       |                                                                        |                           | 7.77m: 30° J, planar, rough, Fe-stained.                       |
|                      |         |       | 53            | 14  |           | 8                          |             |                                                                                                     |                                                                          |                                                                        |                           | 7.87m: 60° J, planar, Fe-stained.                              |
|                      |         |       |               |     |           | 8.12                       |             | CORE LOSS                                                                                           |                                                                          |                                                                        |                           | 8.00-8.12m: Broken zone - drilling induced, Fe-stained.        |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
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|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |
|                      |         |       |               |     |           |                            |             |                                                                                                     |                                                                          |                                                                        |                           |                                                                |

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



CORED BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH61

SHEET 4 OF 4

Client: QUEENSLAND MAIN ROADS

Project: TUGUN BYPASS GEOTECHNICAL INVESTIGATION

Borehole Location: Cut; Chainage 2035 (MC11); on centreline;

Project Number: 2134070C

Date Commenced: 23/6/05

Date Completed: 24/6/05

Recorded By: AO

Log Checked By: DAW

Drill Model/Mounting: EAZE-CAT TRACKED RIG

Hole Angle: 90°

Surface RL: 40.3 m AHD

Borehole Diameter: 80 mm

Bearing: ---

Co-ords: E 48129.2 N 89219.8 PMG

| Borehole Information       |         |       |               |     |           |          | Field Material Description |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|----------------------------|---------|-------|---------------|-----|-----------|----------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                          | 2       | 3     | 4             | 5   | 6         | 7        | 8                          | 9                                                                                                                                 | 10         | 11                           | 12                        |                                                                                                                                                                                                            |
| METHOD                     | SUPPORT | WATER | CORE RECOVERY | ROD | RL(m) AHD | DEPTH(m) | GRAPHIC LOG                | SOIL/ROCK MATERIAL FIELD DESCRIPTION                                                                                              | WEATHERING | INFERRED STRENGTH Is(50) MPa | AVERAGE DEFECT SPACING mm | STRUCTURE AND ADDITIONAL OBSERVATIONS                                                                                                                                                                      |
| NMLC                       |         |       | 61            | 0   |           |          |                            | GREYWACKE: fine to medium grained, pale grey, mostly stained orange-brown. (continued)                                            | XW-HW      |                              |                           | 10.05-10.28m: Broken zone with clayey XW bands.                                                                                                                                                            |
|                            |         |       |               |     | 30        | 10.28    |                            | CORE LOSS                                                                                                                         |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       | 76            | 10  |           | 10.52    |                            | GREYWACKE: fine to medium grained, pale grey, mostly stained orange-brown.                                                        | MW         |                              |                           | 10.65m: J, sub-horizontal, Fe-stained.<br>10.75-11.00m: 11 x sub-horizontal J, planar, smooth, Fe-stained.<br>11.00m: 80° J, planar, smooth, Fe-stained.<br>11.17m: 50° J, planar, smooth, 3mm iron crust. |
|                            |         |       |               |     | 11        | 11.20    |                            | ARGILLITE: very fine grained, pale grey, mostly stained orange-brown.                                                             | HW         |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     | 29        | 11.30    |                            | CORE LOSS                                                                                                                         |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     | 11.42     |          |                            | ARGILLITE: very fine grained, pale grey, mostly stained orange-brown.                                                             | MW         |                              |                           | 11.42-11.53m: Crushed zone.<br>11.53m: 50° J, planar, smooth, Fe-stained.<br>11.67, 11.73m: 2x sub-horizontal J's, undulating, rough, Fe-stained.                                                          |
|                            |         |       | 91            | 22  |           | 12       |                            | ...extremely weathered with the consistency of medium plasticity silty clay with highly weathered argillite fragments throughout. | XW         |                              |                           | 11.89m: J, sub-horizontal, undulating, rough, Fe-stained.                                                                                                                                                  |
|                            |         |       |               |     | 28        |          |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           |          |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           |          |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           |          |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
| END OF BOREHOLE AT 12.66 m |         |       |               |     |           |          |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           | 13       |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           | 27       |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           |          |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           | 14       |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |
|                            |         |       |               |     |           | 26       |                            |                                                                                                                                   |            |                              |                           |                                                                                                                                                                                                            |

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

Project: Tugun Bypass Geotechnical Investigation  
Borehole: BH61  
Start Depth: 4.22m  
Finish Depth: 12.66m

