Douglas Partners
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REPORT
on
MINE SUBSIDENCE ASSESSMENT OF POTHOLE RISK

PROPOSED PACIFIC NATIONAL DEPOT MANSFIELD STREET, GRETA

Prepared for

PACIFIC NATIONAL PTY LTD

Project 39129.03A

MAY 2010

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11 May 2010

REPORT ON
MINE SUBSIDENCE ASSESSMENT OF POTHOLE RISK
PROPOSED PACIFIC NATIONAL DEPOT
MANSFIELD STREET, GRETA

1. INTRODUCTION

This report presents results of additional subsurface investigations to refine the assessment of pothole subsidence risk at the proposed Pacific National (PN) Depot, located off Mansfield Street, Greta, NSW. The assessment was carried out at the request of Pacific National Pty Ltd. It is understood that this report is to form part of PN's submission to the NSW Department of Planning seeking approval for the development.

The additional investigation was carried out in conjunction with a geotechnical investigation for bulk earthworks, the results of which are presented separately (Ref 1). A potential contamination assessment has also been undertaken at this site (Ref 4).

It is understood that the proposed development includes an access road and a series of rail tracks together with buildings and services.

Parts of the development site are underlain by shallow mine workings, as described in the report on Mine Subsidence Risk Assessment, Ref 3. The proposed developments affected by shallow workings include the access road, the three wagon storage roads and the turnout from the main line.

The purpose of the additional subsurface investigations was to supplement the data on shallow mine workings beneath the southern part of the PN site and to provide a basis for the re-assessment of the risk of pothole subsidence.

The results of the supplementary investigation are presented in this report, together with comments on subsidence risk and remedial works.

2. BACKGROUND

Douglas Partners Pty Ltd (DP) completed a preliminary desk study in relation to Mine Subsidence Risk in December 2004 (Ref 2).

A subsurface investigation, comprising four cored bores, was undertaken in 2009 (Ref 3) to confirm the geotechnical model developed during the desk study. Reports from the Mine Subsidence Board (MSB) of a very large pothole opening on the site, together with the presence of coke in one of the cored bores, led to areas with less than 40 m cover being assessed as high pothole subsidence risk. Remedial grouting was suggested for the mine workings beneath the proposed footprint of structures, roads and tracks in areas with less than 40 m cover.

The client requested additional investigation to refine the risk and lateral extent of the mine subsidence hazard. A study comprising the use of seismic surveys and non core boring was undertaken.

3. SITE DESCRIPTION

The site is located to the north of the Greta Railway Station, off Mansfield Street, Greta. The proposed development is bordered on the north-east by the Great Northern Railway and to the south-west by the proposed Hunter Expressway from the F3 to Branxton.

The proposed development is a railway siding off the main northern line for the routine maintenance of PN trains together with several structures housing maintenance facilities.

The site extends about 2.4 km north from the southern boundary of the lot, near Greta Railway Station, and is about 0.5 km wide at its widest. Site access for road vehicles is proposed to be from Mansfield Street, Greta.

4. REGIONAL GEOLOGY

Reference to the Newcastle Coalfields Regional Geology 1:100,000 Sheet indicates that the site is within the area of outcrop of the Maitland Group and underlain by the Greta Coal Measures. The Greta Coal Measures typically comprise sandstone, conglomerate, siltstone and coal. The Branxton Formation overlies the Greta Coal Measures and typically comprises conglomerate, sandstone and siltstone. The geology encountered in this investigation was consistent with this description.

Although the Greta Coal Measures consists of four seams, the site is underlain by shallow workings in the Greta Seam which is known to consist of two splits in the vicinity of Greta.

5. SCOPE OF WORKS

The scope of works for the investigation was required to address two issues:

- Confirming safe access for drilling equipment working in areas of low cover;
- Refining the risk of pothole subsidence and the lateral extent of that risk.

The investigation further developed the subsurface model developed in the previous phases of the investigation.

The current investigations comprised:

- Discussions with people familiar with the history of mining in the area;
- Ground probing radar (GPR) to search for potholes or open voids at shallow depth;
- Subsurface investigation using non cored bores to assess the presence of open voids or rock rubble at shallow depth.

For the purposes of this investigation, the client supplied a CAD file of the layout of the proposed development and the existing surface level of the site.

6. FIELD WORK

6.1 Field Work Methods

6.1.1 Ground Probing Radar

GPR profiling was undertaken over the footprint of the proposed development with areas of less than 20 m cover. The results of that investigation are given in DP report 39129.03-03 dated 28 January 2010. It was anticipated that the GPR would image the subsurface profile to a depth of about 10 m. However because of constraints such as high clay content in the soil, useful data was restricted to a depth of about 3 m to 4 m in the area south of Sawyers Creek and 6 m to 7 m north of the creek. While no evidence of voids or rubble was identified, the relatively shallow depth of penetration did not allow for a 'clearance' from future pothole subsidence risk.

The results of the GPR in the study area north of the creek were considered adequate to allow drilling operations to commence in areas of about 20 m cover and progress to areas with less cover.

6.1.2 Rotary Air Boreholes

As originally proposed, the drilling was to target potential voids and rubble chimneys identified by the GPR. In view of the limited penetration achieved by the GPR the methodology was varied to comprise line drilling at 4 m centres. The hole spacing was selected based on the dimensions of the bords shown on the record trace (RT). Three areas were selected for line drilling. These were:

- The proposed access road north of Sawyers Creek (Area 2);
- The proposed access road south of Sawyers Creek (Area 1);
- The proposed main siding (turnout) off the Great Northern Railway, which provides rail access to the site (Area 3).

Three lines of percussion bores were drilled, in the period 4 February to 24 February 2010, starting at approximately the 20 m cover depth to the Greta Seam and getting progressively shallower. The results of the drilling were monitored continuously by a geotechnical engineer and were used to assess the advisability of progressing to areas of shallower cover.

The locations of the bores are shown on Drawing 1, 1A and 1B, Appendix B.

The bores were drilled by a Bombadier (track mounted) rig. The bores were advanced by 100 mm solid flight augers to the level of rock below which rotary air drilling with a 95 mm button bit was used. The bores were continued to the depth of the base of the Greta Seam and were logged on the basis of the returned cuttings and penetration rate by experienced geotechnical engineers. Where voids were intersected, air return was lost and no cuttings were returned to the surface for logging.

6.1.3 Down Hole Assessment of Bores

Downhole axial CCTV inspections were undertaken in a number of bores believed to have intersected voids or rubble. The assessment comprised the following:

- Monitoring of gas using a confined spaces gas monitor prior to commencement to confirm the absence of an explosion risk;
- Assessment of the depth to the roof and floor of the mine and the presence of rubble and voids using a down-hole video camera in axial mode for 16 of the boreholes;
- Viewing of selected voids using a tilt up down-hole video camera. The orientation of the camera was obtained by viewing of a magnetic compass card with the camera in vertical orientation prior to tilting up. The camera was rotated at approximately 45^{o} increments (e.g.: N, NE, E etc) prior to tilting up for viewing. The video was recorded to DVD.

6.1.4 Survey

Monteath & Powys set out the test locations prior to the investigation. Co-ordinates and surface levels were provided and are given on the Borehole Logs, Appendix A. As the work proceeded some additional bores were added to the investigation. These bores were in close proximity to the existing bores and were set out by DP using taped distances from the surveyed bores. The co-ordinates and RL's of such bores are approximate.

6.2 Field Work Results

6.2.1 General

The subsurface conditions encountered at the test locations are presented in the borehole logs in Appendix A. These should be read in conjunction with the "Notes Relating to This Report" preceding them, which explain the descriptive terms and classification methods.

A summary of the subsurface conditions from this investigation and the terms used are presented below.

6.2.2 Air Rotary Boreholes

During drilling using the rotary air method the cuttings, air return and water return and drilling rate were used to infer the likely subsurface profile which was logged and assessments made on the presence of zones of rubble and rod fall. The term 'rod fall' was adopted to indicate zones where the drill string fell under its own weight without rotation or vertical pressure from the rig hydraulics. Such zones are either open voids or are infilled with very loose material.

The logging of the strata has been summarised into a number of interpreted categories for the purpose of this investigation as follows:

- *Sand/clay/weathered sandstone* - soil and extremely weathered rock near the surface;
- *Sandstone: highly weathered, orange-brown* – sandstone strata approximated highly weathered to moderately weathered, generally orange-brown, red-brown and pale grey/whitish in colour;
- *Sandstone: grey (fresh, medium to high strength)* – generally grey sandstone strata of medium to high strength and fresh with some conglomerate and pebbly bands;
- *Coal* – black coal with some dark grey siltstone/sandstone interbedded layers;
- *Rubble* – zones of irregular drilling indicating the absence of solid rock, often with sections of rod fall;
- *Rod Fall* – zones where the weight of the rods and air flow was sufficient to proceed.
- *Rock*: Areas where the strata drilled like intact rock but no cuttings were returned to the surface.

Comments on strength are indicative only as the cuttings returned by rotary air drilling are not suitable for visual/tactile assessment of rock strength and point load testing.

Interpretations of the subsurface conditions in each area are given as geological sections on Drawings 2 to 5 in Appendix B.

6.2.3 Down-Hole Assessment of Bores

Bores that were found to have significant sections of rod fall or rubble indicating voids were investigated using down-hole video camera in axial mode. This confirmed the presence of rubble and/or voids and allowed a more accurate assessment of the depth to the roof of the voids and the base of the open void/the top of rubble.

Tilt-up down-hole video camera assessment was undertaken in Bores 112, 216 and 302 as an aid to the assessment of the risk of pothole subsidence. The roof and floor of the open voids were identified, although the latter was masked by rubble. The walls of the voids could not always be identified because of limited penetration of the light and masked by turbidity. The materials comprising the observed walls ranged from coal or rock to rubble.

6.2.4 Groundwater

Free groundwater was observed in the open boreholes during the period they remained open. Free groundwater observations within the rotary air bores in Areas 1, 2 and 3 were found to have reduced levels of 42.8 to 42.9 AHD. It should be noted that groundwater levels are dependent on factors such as climatic conditions and soil permeability and therefore will vary with time.

6.2.5 Borehole Gas Monitoring

Borehole gas monitoring was undertaken during the drilling and down-hole camera inspections. The testing during drilling was undertaken for health and safety purposes, using a personal gas meter and generally indicated the absence of explosive gases.

Reduced levels of oxygen were recorded and carbon monoxide and hydrogen sulphide were detected in the bores shown below in Table 1. The readings were obtained within 0.5 m of the top of the borehole and generally dissipated within a couple of minutes.

Table 1 – Results of Borehole Gas Monitoring

Bore	CH_4 (%)	O_2 (%)	CO ppm	H_2S ppm	Comments
104	0	18.4	7	5	Flowing
112	0	19.2	0	0	Flowing
203A	0	19	0	0	Flowing
301	0	20.9	35	0	Check
302	0	20.0	36	2	Flowing

7. PROPOSED DEVELOPMENT

It is understood that the proposed development is a facility for servicing coal trains. A rail siding will leave the Great Northern Railway near the southern end of the site and will bifurcate to form five tracks running approximately parallel to the existing railway.

An internal access road will enter from the southern boundary of the site and extend across Sawyers Creek and continue the length of the development approximately parallel to the western site boundary.

Other facilities include an administration building, fuel storage area and buildings to accommodate maintenance and refuelling operations. It is understood that these will be towards the northern end of the site where the thickness of cover over the mine workings exceeds 40 m.

8. COMMENTS

8.1 Large Pothole in February 2009

As noted above, a large pothole developed in the PN site in February 2009. This was backfilled by the MSB. It is understood that the MSB measured neither the pothole dimensions nor its co-ordinates. Following informal inquires from DP in August 2009 the District Officer indicated that he estimated the hole at 30 m long by 15 m wide by 3 m to 4 m deep at the shallow end sloping down to 10 m deep at the deep end. He also indicated that there were four other smaller holes running south away from the large hole. Based on the approximate location indicated by the District Officer, the pothole was about 8 m to 12 m east of Bores 101 to 106 in Area 1 (Access Road South of Sawyers Creek). Potholes of this size are unusual over areas of bord and pillar workings where potholes typically range up to about 5 m in diameter on initial collapse.

Two possible mechanisms could result in a pothole of this size:

The pothole could be formed by the collapse of a large mining void with dimensions of a least 15 m wide by 30 m long and 10 m high. This is an unusually large void. A mined void of these plan dimensions would only occur as part of a bord and pillar operation if pillars were extracted and the roof strata failed to collapse. Alternatively, a fire which destroyed several pillars could also result in a void of these plan dimensions;

Or

The pothole could be formed by piping erosion of the clay and clay-like extremely weathered rock. In this model water penetrating into the soils and extremely weathered rock (the soil) drains into subsidence cracks in the top of the bedrock and over time the soil erodes internally by piping until a large area of void develops within the soil under a desiccated clay crust. Eventually the void becomes too large for the clay to span the void and a collapse occurs producing a surface pothole.

The cause of the collapse was not investigated by the MSB who were primarily concerned with backfilling the pothole.

8.2 Meeting with Mr Arthur Beckett

Following an introduction from the Greta Historical Society, the senior engineering geologist met with Mr Arthur Becket, a retired miner. Arthur had been a wheeler (a miner in charge of horses hauling coal wagons in the 1950s). Arthur had not worked in the Anvil Creek/Central Greta Collieries which predated his working life; however Arthur's father had been a miner also and had talked about these earlier mines.

In summary Arthur indicated that:

- The coal in the Central Greta colliery was loaded out using forks so the small coal was left in the mine. The practice was to heap the small coal against the pillars to keep the access clear up the centre of the bord. As the small coal was in a loose condition it had ready contact with the atmosphere and hence would have been at risk of spontaneous combustion. Arthur suggested this was the likely cause of the fires in this colliery;
- In the 1950s there was an open pothole on the north side of Sawyers Creek from which smoke continuously discharged and was thick enough to preclude observation of the floor of the pothole. The fire was extinguished by flooding, possibly in 1955, which also resulted in the abandoned mine workings in this area filling with water;
- Arthur did not know when the pothole had been backfilled but recalled that a number of collapses occurred in the Greta area following the flood and believed that the above pothole was filled as part of the general remediation of collapses that occurred following flooding;
- Arthur could not identify the precise location of the above pothole but said it was definitely near Area 2. Based on landform and variation of vegetation patterns, three possible locations were identified. One was about 14 m west of Bore 211 and 3 m north of Bore 218. The other two possible locations were about 26 m east of Bore 206 and 30 m east of Bore 209 and were under the proposed wagon storage lines.

8.3 Access Road South of Sawyers Creek (Area 1)

8.3.1 General

The proposed access road traverses an area undermined by bord and pillar workings at a depth ranging from 5 m to 15 m. The line bores drilled to investigate this feature were drilled in an area with an estimated 10 m to 15 m cover over the top of the workings. Because of constraints of access and the presence of existing trees, the line bores followed the existing access track and hence are partly within and partly to the west of the proposed access road footprint. The large pothole backfilled in 2009 by the MSB was about 8 m to 12 m east of Bores 101 to 106 in Area 1.

8.3.2 Subsurface Profile

The subsurface profile revealed by the line bores generally indicate a thickness of about 9 m to 12 m of soil and highly weathered rock overlying generally medium strength sandstone, which forms the immediate roof of the coal seam/void/rubble areas. The sandstone ranges in thickness from 4 m to 1 m. Refer to Drawing 2, Appendix B.

Where rod falls (possible open voids) were encountered these ranged in height from about 1 m to 2.6 m but are typically about 2 m thick. The voids are generally associated with rubble thicknesses ranging from 1 m to 6 m in thickness but typically about 3 m to 4 m. This suggests that the void is already substantially filled with rubble either as a consequence of small coal left in the workings or because of the bulking of fallen material.

The total depth of cover over these features ranges from about 11 m to 15 m.

8.3.3 Potential for Future Subsidence

As discussed above there are two modes of surface pothole formation. One is upward migration of the roof of the void by progressive collapse; the other is erosion of clay and extremely low strength rock to produce cavities in the soil which subsequently collapse.

Progressive Roof Collapse

Assuming a bulking factor of about 1.4 (i.e. 30% porosity of rubble) a 1 m high void would choke with rubble prior to reaching a height of 10 m and a 1.5 m high void prior to reaching the height of 15 m. Given the maximum observed void height of about 2.6 m the worse case future pothole subsidence from this mechanism would result in a pothole of up to about 1.6 m deep.

Internal Erosion and Piping

The material removed by such internal erosion is transported by water as fine particles and hence this mechanism is not self limited by bulking as is the case for progressive roof collapse. The potential depth of pothole formation by this method is dependent on the depth of clay and extremely low strength (clay like) weathered rock. The actual depth of such material could not be measured by rotary air drilling but judging by the previous pothole may in some areas be a significant proportion of the highly weathered sandstone material.

8.4 Access Road North of Sawyers Creek (Area 2)

8.4.1 General

The access road north of Sawyers Creek traverses an area of bord and pillar workings which ranges from 10 m to greater than 40 m depth below the surface. In the areas of line drilling the isopachs predict a depth of cover in the range of 10 m to 20 m over the top of the seam. As discussed above it is likely that there was previously an open pothole in the general area which discharged smoke from an underground fire.

8.4.2 Subsurface Profile

The longitudinal subsurface profile interpreted from the bores along the centre line of the proposed access road is given in Drawing 3, Appendix B. Two supplementary bores were drilled approximately 25 m to the west of, and 18 m to the east of Bore 212. This transverse profile is shown on Drawing 4, Appendix B.

The longitudinal section indicates a depth of about 1 m to 2 m of clay overlying highly weathered sandstone to a depth ranging from 4 m to 9 m but typically about 8 m to 9 m. This is generally underlain by grey, typically medium strength or stronger sandstone which ranges in thickness from about 3 m to 18 m. Rod falls indicating possible open voids were generally encountered at the base of the grey sandstone unit at depths ranging from 13 m to 18 m. The height of the voids ranged from about 1 m to 3.5 m.

Anomalous conditions were encountered in Bore 211 where a 1.7 m high void was encountered at a depth of about 8 m.

8.4.3 Potential for Pothole Failure

Progressive Roof Collapse

Voids in adjacent bores at similar elevations are only observed where the void is still within or near the seam and has not migrated upwards. Where voids have propagated upwards the voids in adjacent bores are at different elevations and in some cases the voids have already been choked off by the bulking of rubble. Given that a minimum of 3 m of grey (medium strength) sandstone generally overlies the voids (except for Bore 211) the rate of upward migration of the potholes in most cases will be slow and possibly be terminated by the sandstone. If upward migration is not stopped by the sandstone, the height which the bulking of the rock chimney would choke off the void depends on the diameter of the chimney and the height of the void. Choking heights are given in Table 2 for void heights of 1 m, 2 m and 3 m, and pothole (rock chimney) diameters of 2 m and 5 m.

The strength of the sandstone above the mine void was estimated from the chips and dust returned by air flushing from the drilling and is probably a conservative estimate. Bore 4, drilled in the vicinity of Area 2 in August 2009 (Ref 3) encountered about 14 m of high strength sandstone, with widely spaced joints, over the coal. Conditions in Bore 4 support the basis of the sandstone arresting the upward migration of the pothole.

Table 2 - Height at Which Voids Will Choke Off

Void Height (m)	Pothole (Rock Chimney) Diameter 2 m	Pothole (Rock Chimney) Diameter 5 m
1	10 m	4 m
2	11 m	4 m
3	12.6 m	4 m

Based on the above, any pothole formed by progressive collapse of the rock stratum would not be expected to exceed 2 m diameter and up to about 2 m deep.

Internal Erosion and Piping

The material removed by such internal erosion is transported by water as fine particles and hence this mechanism is no self limited by bulking as is the case for progressive roof collapse. The potential depth of pothole formation by this method is dependent on the depth of clay and extremely low strength (clay like) weathered rock. The actual depth of such material could not be measured by rotary air drilling but, judging by the previous cored bores drilled to the west of this line, may be around 2 to 4 m.

8.5 Wagon Storage Roads

No specific subsurface investigation was conducted along the storage roads, however given its proximity to Area 2, it is likely that conditions in this area are similar to the latter.

8.6 Turnout from Main Line (Area 3)

8.6.1 General

The Mine Plan (RT) indicates limited mining at the northern end of this area in the form of two tunnel headings crossing centrally beneath the section. Line drilling was restricted to the northern 20 m of the area where limited bord and pillar mining was undertaken.

8.6.2 Subsurface Profile

The longitudinal section, shown on Drawing 5, Appendix B, indicates a depth of about 1 m of clay/extremely weathered rock overlying highly weathered sandstone to a depth ranging from 10 m to 11 m. This is generally underlain by grey, typically medium strength or stronger sandstone which ranges in thickness from about 15 m to 21 m, but is typically in the range of 19 m to 21 m. With the exception of Bore 304, the medium strength sandstone forms the immediate roof of the seam/void and ranges from 9 m to 11 m thick. In Bore 304 the grey, medium strength sandstone is about 5 m thick and is underlain by about 5.5 m of weathered sandstone which forms the immediate roof of the coal seam at this location.

The strength of the sandstone above the mine void was estimated from the chips and dust returned by air flushing from the drilling and is probably a conservative estimate. Bore 4, drilled in the vicinity of Area 2 in August 2009 (Ref 3) encountered about 14 m of high strength sandstone, with widely spaced joints, over the coal. Conditions in Bore 4 support the basis of the sandstone arresting the upward migration of the pothole.

Rod falls indicating possible open voids were generally encountered at the base of the grey sandstone unit at depths ranging from 13 m to 18 m. Rod fall heights ranging from 1.5 m to 5.8 m were observed while drilling but subsequence CCTV inspection confirmed that the open void height ranged from 0.9 m to 1.9 m and the remainder of the rod fall was loose rubble. The top of the void ranged from a depth of 23 to 25 m and was at or below the top of the coal seam. Hence there appears to be no previously upward migration of mine voids in Area 3.

8.6.3 Potential for Pothole Subsidence

Progressive Roof Collapse

Given the age of the workings and the present position of the voids it is probable that the rock roof in this location is strong enough to preclude progressive roof collapse and chimney formation. Comparison with Table 2 indicates that if chimneys were to develop in this area they would not be expected to reach the ground surface prior to choking off.

Internal Erosion and Piping

The material removed by such internal erosion is transported by water as fine particles and hence this mechanism is no self limited by bulking as is the case for progressive roof collapse. The potential depth of pothole formation by this method is dependent on the depth of clay and extremely low strength (clay like) weathered rock. The actual depth of such material could not be measured by rotary air drilling.

8.6.4 Tunnel Headings

A pair of tunnel headings crosses the Turnout and Main Line in an area of shallow cover, as indicated on Drawing 1B, Appendix B. The condition of these tunnels and the roof over these tunnels is unknown. Development practice normally required by the MSB and DPI-Minerals is for such features to be located and backfilled during construction and hence these have not been considered during this investigation.

8.7 Remedial Works

8.7.1 General

The geotechnical investigation indicates that progressive roof collapse at the PN site would either choke off prior to reaching the surface or form small potholes with a maximum diameter of about 2 m and a maximum depth of about 2 m but typically less than 1 m. No surface expression of pothole subsidence from progressive roof collapse would be anticipated in areas exceeding 20 m cover.

There is however a risk of significantly larger subsidence potholes forming as a result of internal erosion and piping of clay and erodible weathered rock as a consequence of water inflow into the potholes and choked off debris chimneys, as is interpreted to be the cause of the large pothole observed in 2009.

Having regard to the ground conditions, including the strong sandstone roof and depth of cover, the measures for protection of the structures proposed for the areas of shallow mining and personnel who will use the development are described in the following sections.

8.7.2 Area 1, Access Road

The depth of cover in Area 1 is only about 10 m to 15 m. It is understood that the Access Road, including drainage and other related services, is the only development proposed for Area 1.

The mine voids beneath Area 1 should be fully grouted and any existing piping within the soils should be eliminated by grouting, by over-excavation and recompaction or by forced collapse by means of dynamic compaction.

Grouting and soil improvement works would need to extend at least 5 m each side of the Access Road.

8.7.3 Area 2, Access Road

The use of a continuously reinforced, possibly post-tensioned, concrete pavement designed to span a 5 m void is recommended for Area 2, the Access Road north of Sawyers Creek, where the depth of cover is less than 20 m.

Site improvements to minimise piping erosion, together with monitoring of the access road area for the incidence of pothole subsidence, should include the measures described below:

- Excavation of the footprint of the Access Road, and an additional 5 m each side beyond the footprint, to the top of very low strength, or better, rock. The anticipated depth of excavation in Area 2 is about 1 m to 3 m, based on the logging of the recent non-core bores. The depths would need to be confirmed during construction;
- Over-excavation of any cracks or rubble chimneys and backfilling with dental concrete to seal the rock surface against soil and water inflow;
- Placement of about 150 mm blinding layer of sand;
- Placement of a grid of coax cable for time-domain reflectometry to detect pothole formation at the top of the bedrock. The coax should be covered with a blinding layer of about 150 mm of sand;
- Place heavy duty geotextile filter cloth over the blinding layer prior to placing general filling;
- Three layers of soil reinforcing geogrids should be included in the lower 450 mm to 500 mm of general filling above the sand blinding layer;
- If the monitoring detects the onset of pothole subsidence then remedial grouting would be required to grout the rubble chimney/void.

The risk of piping erosion will be further controlled by drainage measures, including surface grades, to reduce or eliminate infiltration of stormwater into the soil and rock strata.

8.7.4 Area 3, Turnout from Main Line

The abandoned tunnel headings under the central section of the turnout need to be located and backfilled. Depending on the depth of cover this could be undertaken by bulk earthworks or drilling and grouting.

There is little risk of future potholing over the limited bord and pillar workings with less than 20 m cover at the northern end of the siding. It is however noted that any pothole subsidence in this areas, if it occurred, would cause shutdown of the facility. Hence it is suggested that grouting be undertaken to backfill these workings under and within 5 m of the footprint of the siding, notwithstanding that future pothole subsidence is considered very unlikely in this area.

8.7.5 Wagon Storage Roads

The wagon storage roads lie close to the Access Road in the shallow mining area north of Sawyers Creek. Potholes in this area are expected to be less than about 2 m diameter and 2 m deep, provided that drainage measures are in place to control surface runoff and reduce the risk of pothole enlargement by piping erosion.

The following works should be undertaken to prepare the wagon storage roads:

- Excavation of the footprint of the wagon storage roads (where the cover depth is less than 20 m), and an additional 5 m each side beyond the footprint, to the top of very low strength, or better, rock; the anticipated depth of excavation is about 1 m to 3 m, based on the logging of the recent non-core bores; the depths would need to be confirmed during construction;
- Over-excavation of any cracks or rubble chimneys and backfilling with dental concrete to seal the rock surface against soil and water inflow;
- Backfill the excavation up to subgrade level using the excavated soil and weathered rock, placed and compacted under engineering control.

Drainage measures should include lined table drains, sealed pits and adequate surface grades to prevent ponding of water.

9. LIMITATIONS

DP has prepared this report for this project at the proposed Pacific National Depot, Mansfield Street, Greta in accordance with DP's proposal NCL090449-4 dated 22 December 2009. The work was carried out under DP Conditions of Engagement. This report is provided for the exclusive use of Pacific National Pty Ltd for the specific project and purpose as described in the report. It should not be relied upon for other projects or purposes on the same or other site or by a third party.

The results provided in the report are considered to be indicative of the sub-surface conditions on the site only to the depths investigated at the specific sampling and/or testing locations, and only at the time the work was carried out. DP's advice may be based on observations, measurements, and tests or derived interpretations. The accuracy of the advice provided by DP in this report is limited by unobserved features and variations in ground conditions across the site in areas between test locations and beyond the site boundaries or by variations with time. The advice may be limited by restrictions in the sampling and testing which was able to be carried out, as well as by the amount of data that could be collected given the project and site constraints. Actual ground conditions observed or inferred at the test locations may differ from those which may be encountered elsewhere on the site. Should variations in subsurface conditions be encountered, then additional advice should be sought from DP and, if required, amendments made.

This report must be read in conjunction with the attached "Notes Relating to This Report" and any other attached explanatory notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions from review by others of this report or test data, which are not otherwise supported by an expressed statement, interpretation, outcome or conclusion stated in this report. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

DOUGLAS PARTNERS PTY LTD

Reviewed by:

Greg Hawkins
Senior Associate

John Harvey
Principal

REFERENCES

1. Douglas Partners "Geotechnical Investigation for Bulk Earthworks, Pacific National Depot", Project 39129.03, dated March 2010.

2. Douglas Partners "Geotechnical Assessment of Mine Subsidence Risk. Proposed rail facility, Greta", Project 39129, dated 14 December 2004.

3. Douglas Partners "Mine Subsidence Risk Assessment, Proposed Pacific National Depot", Project 39129.01, dated October 2009.

4. Douglas Partners "Contamination Assessment, Proposed Pacific National Depot", Project 39129.02, dated December 2009.

APPENDIX A

Notes Relating to this Report Borehole Logs (101 to 120, 111A, 200 to 219, 203A, 207A and 301 to 306)

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NOTES RELATING TO THIS REPORT

Introduction

These notes have been provided to amplify the geotechnical report in regard to classification methods, specialist field procedures and certain matters relating to the Discussion and Comments section. Not all, of course, are necessarily relevant to all reports.

Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, Geotechnical Site Investigations Code. In general, descriptions cover the following properties - strength or density, colour, structure, soil or rock type and inclusions.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Undrained Shear Strength kPa
Very soft	less than 12
Soft	12—25
Firm	25—50
Stiff	50—100
Very stiff	100—200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300 mm)	CPT Cone Value (q_c — MPa)
Very loose	less than 5	less than 2
Loose	5—10	2—5
Medium dense	10—30	5—15
Dense	30—50	15—25
Very dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing with a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling are given in the report.

Drilling Methods.

The following is a brief summary of drilling methods currently adopted by the Company and some comments on their use and application.

Test Pits — these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3 m for a backhoe and up to 6 m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) — the hole is advanced by a rotating plate or short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling — the hole is advanced by pushing a 100 mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, etc. is only marginally affected.

Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water

table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling — the hole is advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from 'feel' and rate of penetration.

Rotary Mud Drilling — similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. from SPT).

Continuous Core Drilling — a continuous core sample is obtained using a diamond-tipped core barrel, usually 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

Standard penetration tests (abbreviated as SPT) are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" — Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of say 4, 6 and 7

  as 4, 6, 7
  N = 13

- In the case where the test is discontinued short of full penetration, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm

  as 15, 30/40 mm.

The results of the tests can be related empirically to the engineering properties of the soil.

Occasionally, the test method is used to obtain samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

Cone Penetrometer Testing and Interpretation

Cone penetrometer testing (sometimes referred to as Dutch cone — abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in Australian Standard 1289, Test 6.4.1.

In the tests, a 35 mm diameter rod with a cone-tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130 mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20 mm per second) the information is plotted on a computer screen and at the end of the test is stored on the computer for later plotting of the results.

The information provided on the plotted results comprises: —

- Cone resistance — the actual end bearing force divided by the cross sectional area of the cone — expressed in MPa.
- Sleeve friction — the frictional force on the sleeve divided by the surface area — expressed in kPa.
- Friction ratio — the ratio of sleeve friction to cone resistance, expressed in percent.

There are two scales available for measurement of cone resistance. The lower scale (0—5 MPa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main scale (0—50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve friction to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1%—2% are commonly encountered in sands and very soft clays rising to 4%—10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:—

q_c (MPa) = (0.4 to 0.6) N (blows per 300 mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:—

q_c = (12 to 18) c_u

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes, etc. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and where precise information on soil classification is required, direct drilling and sampling may be preferable.

Hand Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150 mm increments of penetration. Normally, there is a depth limitation of 1.2 m but this may be extended in certain conditions by the use of extension rods.

Two relatively similar tests are used.

- Perth sand penetrometer — a 16 mm diameter flat-ended rod is driven with a 9 kg hammer, dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.
- Cone penetrometer (sometimes known as the Scala Penetrometer) — a 16 mm rod with a 20 mm diameter cone end is driven with a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). The test was developed initially for pavement subgrade investigations, and published correlations of the test results with California bearing ratio have been published by various Road Authorities.

Laboratory Testing

Laboratory testing is carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedure used are given on the individual report forms.

Bore Logs

The bore logs presented herein are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable, or possible to justify on economic grounds. In any case, the boreholes represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes, the frequency of sampling and the possibility of other than 'straight line' variations between the boreholes.

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems;

- In low permeability soils, ground water although present, may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Engineering Reports

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building), the information and interpretation may not be relevant if the design proposal is changed (eg. to a twenty storey building). If this happens, the Company will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface condition, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- unexpected variations in ground conditions — the potential for this will depend partly on bore spacing and sampling frequency
- changes in policy or interpretation of policy by statutory authorities
- the actions of contractors responding to commercial pressures.

If these occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the Company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed than at some later stage, well after the event.

Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section

is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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AN ENGINEERING CLASSIFICATION OF SEDIMENTARY ROCKS IN THE SYDNEY AREA

This classification system provides a standardized terminology for the engineering description of the sandstone and shales in the Sydney area, but the terms and definitions may be used elsewhere when applicable.

Under this system rocks are classified by Rock Type, Degree of Weathering, Strength, Stratification Spacing, and Degree of Fracturing. These terms do not cover the full range of engineering properties. Descriptions of rock may also need to refer to other properties (e.g. durability, abrasiveness, etc.) where these are relevant.

ROCK TYPE DEFINITIONS

Rock Type	Definition
Conglomerate:	More than 50% of the rock consists of gravel sized (greater than 2mm) fragments
Sandstone:	More than 50% of the rock consists of sand sized (.06 to 2mm) fragments
Siltstone:	More than 50% of the rock consists of silt-sized (less than 0.06mm) granular particles and the rock is not laminated
Claystone:	More than 50% of the rock consists of clay or sericitic material and the rock is not laminated
Shale:	More than 50% of the rock consists of silt or clay sized particles and the rock is laminated

Rocks possessing characteristics of two groups are described by their predominant particle size with reference also to the minor constituents, e.g. clayey sandstone, sandy shale.

DEGREE OF WEATHERING

Term	Symbol	Definition
Extremely Weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits soil properties - i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately Weathered	MW	Rock substance affected by weathering to the extent that staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is no longer recognisable.
Slightly Weathered	SW	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable.
Fresh	Fs	Rock substance unaffected by weathering, limonite staining along joints.
Fresh	Fr	Rock substance unaffected by weathering.

STRATIFICATION SPACING

Term	Separation of Stratification Planes
Thinly laminated	<6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	>2 m

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics (Reference).

Strength Term	Is(50) MPa	Field Guide	Approx. qu MPa*
Extremely Low:	0.03	Easily remoulded by hand to a material with soil properties	0.7
Very Low:	0.1	May be crumbled in the hand. Sandstone is “sugary” and friable.	2.4
Low:	0.3	A piece of core 150 mm long x 50 mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	7
Medium:	1	A piece of core 150 mm long x 50 mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.	24
High:	3	A piece of core 150 mm long x 50 mm dia. cannot be broken by unaided hands, can be slightly scratched or scored with knife.	70
Very High:	10	A piece of core 150 mm long x 50 mm dia. may be broken readily with hand held hammer. Cannot be scratched with pen knife.	240
Extremely High:		A piece of core 150 mm long x 50 mm dia. is difficult to break with hand held hammer. Rings when struck with a hammer.	

* The approximate unconfined compressive strength (qu) shownin the table is based on an assumed ratio to the point load index of 24:1. This ratio may vary widely.

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks

Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20 mm, and mostly of width less than the core diameter.
Highly Fractured:	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured:	Core lengths are mainly 30 mm - 100 mm with occasional shorter and longer sections.
Slightly Fractured:	Core lengths are generally 300 mm - 1000 mm with occasional longer sections and occasional sections of 100 mm - 300 mm.
Unbroken:	The core does not contain any fracture.

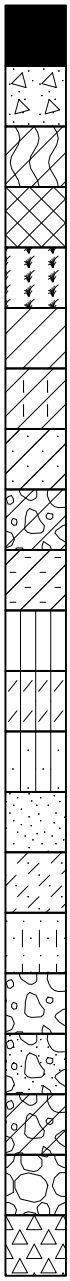
REFERENCE

International Society of Rock Mechanics, Commission on Standardisation of Laboratory and Field Tests, Suggested Methods for Determining the Uniaxial Compressive Strength of Rock Materials and the Point Load Strength Index, Committee on Laboratory Tests Document No. 1 Final Draft October 1972

Log\GRAPHIC-SYMBOLS 24/11/2003 4:38:57 PM

GRAPHIC SYMBOLS FOR SOIL & ROCK

SOIL



BITUMINOUS CONCRETE

CONCRETE

TOPSOIL

FILLING

PEAT

CLAY

SILTY CLAY

SANDY CLAY

GRAVELLY CLAY

SHALY CLAY

SILT

CLAYEY SILT

SANDY SILT

SAND

CLAYEY SAND

SILTY SAND

GRAVEL

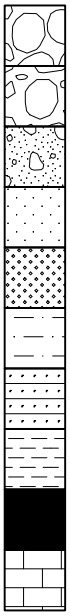
SANDY GRAVEL

CLAYEY GRAVEL

COBBLES/BOULDERS

TALUS

SEDIMENTARY ROCK



BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

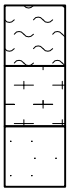
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

COAL

LIMESTONE

METAMORPHIC ROCK

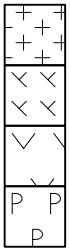


SLATE, PHYLITTE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



GRANITE

DOLERITE, BASALT

TUFF

PORPHYRY

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.11
EASTING: 335644.8
NORTHING: 1381995.3
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 39129.03
DATE: 12 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
51	3.0	SANDSTONE - Highly weathered, orange-brown							
		From 8.25m, whitish bands							
		From 10m, grey bands							
43	10.5	SANDSTONE - Grey (fresh, medium to high strength)						▼	
		From 13.25m, possible rubble bands							
40	14.3	COAL - Black coal (fractured)							
34	20.25	SANDSTONE - Grey (fresh, medium to high strength)							
32	22.4	Bore discontinued at 22.4m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.4m

WATER OBSERVATIONS: Free groundwater observed at 11.2m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.25
EASTING: 335642.5
NORTHING: 1381992
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 39129.03
DATE: 12 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SAND / CLAY / WEATHERED SANDSTONE							
	3.0	SANDSTONE - Highly weathered, orange-brown							
		From 8m, grey-whitish bands							
	10.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
		From 11.3m to 12m, possible rubble bands							
		At 12.9m, coal band ~100mm							
	14.8	COAL - Black coal							
	20.4	SANDSTONE - Grey							
	21.9	Bore discontinued at 21.9m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 21.9m

WATER OBSERVATIONS: Free groundwater observed at 11.4m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.4
EASTING: 335640.2
NORTHING: 1381988.7
DIP/AZIMUTH: 90°/--

BORE No: 103
PROJECT No: 39129.03
DATE: 12 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1								
52	2								
51	3								
	3.0	SANDSTONE - Highly weathered, orange-brown							
50	4								
49	5								
48	6								
47	7								
46	8	From 8m, whitish bands							
		At ~8.2m, possible rubble band							
45	9								
44	10								
		From 10.2m, rubble bands ~50mm							
43	11							▼	
	12.0	SANDSTONE - Grey (fresh, medium to high strength)							
42	12								
41	13	At 13.5m, possible thin rubble band							
40	14	At 14.35m, possible thin rubble band							
	15.1	COAL - Black coal							
39	15								
38	16								
37	17								
36	18								
35	19								
34	20								
	21.0	ROCK							
33	21								
32	22								
	22.6	Bore discontinued at 22.6m, limit of investigation							
31	23								
30	24								
29	25								
28	26								
27	27								
26	28								
25	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.6m

WATER OBSERVATIONS: Free groundwater observed at 11.6m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.55
EASTING: 335637.9
NORTHING: 1381985.4
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 39129.03
DATE: 15 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0	SAND / CLAY / WEATHERED SANDSTONE							
	3.0	SANDSTONE - Highly weathered, orange-brown							
	10.85	SANDSTONE - Grey (fresh, medium to high strength) From 11.5m to 13.2m, some rubble bands						▼	
	13.2	RUBBLE - Loose rubble, voids of up to 0.6m high							
	17.5	ROD FALL							
	19.8	RUBBLE							
	21.1	ROCK							
	21.7	Bore discontinued at 21.7m, cave-in jamming rods							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 21.7m

WATER OBSERVATIONS: Free groundwater observed at 11.7m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 13.9m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.72
EASTING: 335636.1
NORTHING: 1381981.9
DIP/AZIMUTH: 90°/--

BORE No: 105
PROJECT No: 39129.03
DATE: 15 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1								
52	2								
51	3								
	3.0	SANDSTONE - Highly weathered, orange-brown							
50	4								
49	5								
48	6								
47	7								
46	8								
45	9								
44	10								
	10.4	At 10.3m, possible rubble band							
43	11	SANDSTONE - Grey (fresh, medium to high strength)						▼	
42	12	At 12.2m, possible rubble band ~100mm							
	13.2	ROD FALL							
41	13								
40	14								
39	15								
	15.2	RUBBLE with some ROD FALL							
38	16								
37	17								
	17.2	ROCK							
36	18	From 17.5m, soft zones							
	18.5	RUBBLE with some ROD FALL							
35	19								
34	20								
33	21								
	21.3	ROCK							
32	22								
	22.3	Bore discontinued at 22.3m, limit of investigation							
31	23								
30	24								
29	25								
28	26								
27	27								
26	28								
25	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.3m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.72
EASTING: 335635
NORTHING: 1381978
DIP/AZIMUTH: 90°/--

BORE No: 106
PROJECT No: 39129.03
DATE: 15 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1								
52	2								
51	3								
	3.0	SANDSTONE - Highly weathered, orange-brown							
50	4								
49	5								
48	6								
47	7								
46	8								
45	9								
44	10								
	10.5	SANDSTONE - Grey (fresh, medium to high strength) At 10.9m, possible rubble band, ~50mm-100mm						▼	
43	11								
42	12								
41	13								
	13.4	ROD FALL							
40	14								
39	15								
38	16								
	16.2	RUBBLE							
37	17								
	17.2	ROCK From 17.5m to 18.4m, soft band							
36	18								
35	19								
	19.4	RUBBLE							
34	20								
33	21								
	21.0	ROCK							
32	22								
	22.0	Bore discontinued at 22.0m, limit of investigation							
31	23								
30	24								
29	25								
28	26								
27	27								
26	28								
25	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22m

WATER OBSERVATIONS: Free groundwater observed at 11.9m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.76
EASTING: 335634
NORTHING: 1381974.2
DIP/AZIMUTH: 90°/--

BORE No: 107
PROJECT No: 39129.03
DATE: 15 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0	SAND / CLAY / WEATHERED SANDSTONE							
	3.0	SANDSTONE - Highly weathered, orange-brown							
	10.25								
	10.45	RUBBLE							
		SANDSTONE - Grey (fresh, medium to high strength)						▼	
	11.8	SANDSTONE - Weathered							
	12.6	SANDSTONE - Grey							
	13.45	ROD FALL							
	15.0	ROD FALL / LOOSE RUBBLE							
	19.5	RUBBLE							
	20.8	ROCK							
	21.8	Bore discontinued at 21.8m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 21.8m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 15m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.77
EASTING: 335632.8
NORTHING: 1381970.4
DIP/AZIMUTH: 90°/--

BORE No: 108
PROJECT No: 39129.03
DATE: 16 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1								
52	2								
51	3								
	3.0	SANDSTONE - Highly weathered, orange-brown							
50	4								
49	5								
48	6								
47	7								
46	8								
45	9								
	9.7								
44	10	ROD FALL							
	9.8	SANDSTONE - Grey (fresh, medium to high strength)							
43	11								
42	12	From 11.9m to 12.8m, soft zone						▼	
41	13								
	13.6	RUBBLE							
40	14								
	14.9	ROD FALL / LOOSE RUBBLE							
39	15								
38	16								
37	17								
36	18								
35	19								
34	20								
	20.75								
33	21	RUBBLE							
	21.15	ROCK							
32	22								
	22.2	Bore discontinued at 22.2m, limit of investigation							
31	23								
30	24								
29	25								
28	26								
27	27								
26	28								
25	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.2m

WATER OBSERVATIONS: Free groundwater observed at 11.9m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 16.1m, blocked hole

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.78
EASTING: 335631.3
NORTHING: 1381966.7
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 39129.03
DATE: 16 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54 to 25	0 to 3.0	SAND / CLAY / WEATHERED SANDSTONE							
51 to 32	3.0 to 11.0	SANDSTONE - Highly weathered, orange-brown							
43 to 39	11.0 to 15.5	SANDSTONE - Grey (fresh, medium to high strength)						▼	
39 to 34	15.5 to 21.0	COAL - Black coal (fractured to ~18m)							
34 to 32	21.0 to 22.4	ROCK							
32 to 25	22.4	Bore discontinued at 22.4m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.4m

WATER OBSERVATIONS: Free groundwater observed at 12.0m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 55.02
EASTING: 335627.3
NORTHING: 1381964.9
DIP/AZIMUTH: 90°/--

BORE No: 110
PROJECT No: 39129.03
DATE: 16 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
55		SAND / CLAY / WEATHERED SANDSTONE							
50	5.0	SANDSTONE - Highly weathered, orange-brown							
44	11.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
42	13.3	RUBBLE							
41	13.65	SANDSTONE - Grey							
39		At 15.8m, coal band, ~50mm-100mm							
38	16.3	COAL - Black coal							
34	20.7	SANDSTONE - Grey							
33	22.4	Bore discontinued at 22.4m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.4m

WATER OBSERVATIONS: Free groundwater observed at 12.2m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.68
EASTING: 335625.4
NORTHING: 1381960.5
DIP/AZIMUTH: 90°/--

BORE No: 111
PROJECT No: 39129.03
DATE: 16 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SAND / CLAY / WEATHERED SANDSTONE							
	4.0	SANDSTONE - Highly weathered, orange-brown							
		From 7m, greyish bands						▼	
	10.7	SANDSTONE - Grey (fresh, medium to high strength)							
	13.1	RUBBLE							
	13.6	SANDSTONE - Grey							
	16.5	COAL - Black coal							
	21.2	ROCK							
	22.6	Bore discontinued at 22.6m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.4m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.76
EASTING: 335625.9
NORTHING: 1381955.3
DIP/AZIMUTH: 90°/--

BORE No: 111A
PROJECT No: 39129.03
DATE: 17 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1								
52	2								
51	3								
50	4								
50	4.5	SANDSTONE - Highly weathered, orange-brown							
49	5								
48	6								
47	7	From 7m, whitish bands							
46	8								
45	9								
44	10								
44	10.0	SANDSTONE - Grey (fresh, medium to high strength)							
43	11								
42	12							▼	
42	12.8	RUBBLE							
41	13								
41	13.4	SANDSTONE - Grey							
40	14	At 14m, possible rubble band, ~100mm							
40	14.4	At 14.4m, possible rubble band, ~100mm							
39	14.9	RUBBLE							
39	15								
38	15.5	SANDSTONE - Grey							
38	16	At 15.9m, possible rubble band, ~100mm							
37	16.3	At 16.3m, coal band							
37	16.6	At 16.6m, possible rubble band, ~100mm							
36	16.9	COAL - Black coal							
36	17								
35	18								
35	19								
34	19.7	ROD FALL							
34	20								
33	21								
33	21.2	RUBBLE							
33	21.6	ROCK							
32	22								
31	23								
31	23.4	Bore discontinued at 23.4m, limit of investigation							
30	24								
29	25								
28	26								
27	27								
27	28								
26	29								
25									

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22.4m

WATER OBSERVATIONS: Free groundwater observed at 11.9m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.7
EASTING: 335631.2
NORTHING: 1381955
DIP/AZIMUTH: 90°/--

BORE No: 112
PROJECT No: 39129.03
DATE: 17 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
50	4.5	SANDSTONE - Highly weathered, orange-brown							
48	6.7								
47	7.0	RUBBLE							
		SANDSTONE - Highly weathered, orange-brown From 7.2m, whitish bands							
45	9.7	SANDSTONE - Grey (fresh, medium to high strength)							
43	12.1							▼	
42	12.6	RUBBLE							
		SANDSTONE - Grey							
39	14.9	ROD FALL							
37	17.2	ROD FALL / LOOSE RUBBLE							
35	19.5	RUBBLE							
34	20.4	ROCK							
32	22.0	Bore discontinued at 22.0m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 22m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 17.2m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.7
EASTING: 335632.8
NORTHING: 1381951.2
DIP/AZIMUTH: 90°/--

BORE No: 113
PROJECT No: 39129.03
DATE: 17 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54 to 25	0 to 4.5	SAND / CLAY / WEATHERED SANDSTONE							
50 to 45	4.5 to 10.0	SANDSTONE - Highly weathered, orange-brown							
45 to 39	10.0 to 15.2	SANDSTONE - Grey (fresh, medium to high strength)						▼ 11.8m	
39 to 34	15.2 to 20.2	COAL - Black coal							
34 to 33	20.2 to 21.5	ROCK							
33 to 25	21.5	Bore discontinued at 21.5m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 21.5m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.72
EASTING: 335634.1
NORTHING: 1381947.5
DIP/AZIMUTH: 90°/--

BORE No: 114
PROJECT No: 39129.03
DATE: 17 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
50	4.5	SANDSTONE - Highly weathered, orange-brown							
45	9.7	SANDSTONE - Grey (fresh, medium to high strength)							
42	12	At 12.5m to 12.8m, soft band							
41	13	At 13.3m, possible rubble band, ~100mm							
40	14	At 13.45m, possible rubble band, ~50mm							
40	14.5	RUBBLE							
39	14.9	COAL - Black coal							
34	19.8	SANDSTONE - Grey							
33	21.5	Bore discontinued at 21.5m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 21.5m

WATER OBSERVATIONS:

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.66
EASTING: 335635.6
NORTHING: 1381943.8
DIP/AZIMUTH: 90°/--

BORE No: 115
PROJECT No: 39129.03
DATE: 17 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	FILLING / COAL CHITTER - Black / dark brown-grey							
52	2.5	SAND / CLAY / WEATHERED SANDSTONE							
50	4.5	SANDSTONE - Highly weathered, orange-brown							
45	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
41	13.1	RUBBLE							
40	13.8	ROD FALL							
39	14.8	RUBBLE							
35	19.2	ROCK							
34	20.4	Bore discontinued at 20.4m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 20.4m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.67
EASTING: 335637
NORTHING: 1381940.1
DIP/AZIMUTH: 90°/--

BORE No: 116
PROJECT No: 39129.03
DATE: 18 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	FILLING / COAL CHITTER - Black / dark grey-brown							
53	1								
52	2								
	2.4	SAND / CLAY / WEATHERED SANDSTONE							
51	3								
50	4								
	4.5	SANDSTONE - Highly weathered, orange-brown							
49	5								
48	6								
47	7								
46	8								
45	9								
	9.0	SANDSTONE - Grey (fresh, medium to high strength)							
44	10								
	10.55	RUBBLE							
43	11							▼	
	11.1	SANDSTONE - Grey At 11.6m, possible rubble band, ~100mm							
42	12								
	12.8								
41	13								
	13.0	RUBBLE SANDSTONE - Grey							
40	14								
	14.2	At 13.3m, possible rubble band, ~100mm At 13.8m, coal band							
39	15	COAL - Black coal							
38	16								
37	17								
	16.9	ROD FALL							
36	18								
	18.6	RUBBLE							
35	19								
	19.1	ROCK							
34	20								
	20.4	Bore discontinued at 20.4m, limit of investigation							
33	21								
32	22								
31	23								
30	24								
29	25								
28	26								
27	27								
26	28								
25	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-6m

TYPE OF BORING: Solid flight auger to 6m, rotary air from 6m to 20.4m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.7
EASTING: 335638.4
NORTHING: 1381936.3
DIP/AZIMUTH: 90°/--

BORE No: 117
PROJECT No: 39129.03
DATE: 18 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING / COAL CHITTER - Black / dark grey							
	4.0	SAND / CLAY / WEATHERED SANDSTONE							
	6.3	SANDSTONE - Highly weathered, orange-brown From 7.9m, whitish bands From 12m, possible rubble band, ~50mm						▼	
	13.1	ROD FALL							
	14.9	ROD FALL / LOOSE RUBBLE							
	16.1	RUBBLE							
	18.4	SANDSTONE - Grey							
	20.0	Bore discontinued at 20.0m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-6m

TYPE OF BORING: Solid flight auger to 6m, rotary air from 6m to 20m

WATER OBSERVATIONS: Free groundwater observed at 11.8m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client. CCTV to 14.9m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.75
EASTING: 335639.7
NORTHING: 1381932.5
DIP/AZIMUTH: 90°/--

BORE No: 118
PROJECT No: 39129.03
DATE: 18 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54.75	0.0	FILLING / COAL CHITTER - Black / dark grey-brown							
52.25	2.5	SAND / CLAY / WEATHERED SANDSTONE							
48.45	6.3	SANDSTONE - Highly weathered, orange-brown							
45.75	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
42.65	12.1	RUBBLE							
41.05	13.7	COAL - Black coal							
37.55	17.2	ROCK							
36.25	18.5	SANDSTONE - Grey							
35.65	19.1	Bore discontinued at 19.1m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-4.5m

TYPE OF BORING: Solid flight auger to 6m, rotary air from 6m to 19.1m

WATER OBSERVATIONS: Free groundwater observed at 11.9m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.75
EASTING: 335640.7
NORTHING: 1381928.7
DIP/AZIMUTH: 90°/--

BORE No: 119
PROJECT No: 39129.03
DATE: 18 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	FILLING / COAL CHITTER - Black / dark grey-brown							
	1.5	SAND / CLAY / WEATHERED SANDSTONE							
49	5.0	SANDSTONE - Highly weathered, orange-brown							
46	8.5	From 8.5m, whitish bands							
45	9.3	RUBBLE							
	10.0	SANDSTONE - Highly weathered, orange-brown							
	10.3	SANDSTONE - Grey (fresh, medium to high strength)							
43	11.3	RUBBLE							
	11.8	ROD FALL							
40	14.1	RUBBLE							
	15.0	ROCK - Probably coal							
37	17.1	ROCK							
	18.6	Bore discontinued at 18.6m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2.5m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 18.6m

WATER OBSERVATIONS:

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.76
EASTING: 335641.3
NORTHING: 1381924.7
DIP/AZIMUTH: 90°/--

BORE No: 120
PROJECT No: 39129.03
DATE: 19 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	FILLING / COAL CHITTER - Black / dark grey							
53	1.0	SAND / CLAY / WEATHERED SANDSTONE							
52	2								
51	3								
50	4								
49	5.0	SANDSTONE - Highly weathered, orange-brown							
48	6								
47	7	from 7m, whitish bands							
46	8								
45	9								
44	10.0	SANDSTONE - Grey (fresh, medium to high strength)							
43	11							▼	
42	12								
41	13.1	At 12.5m, coal band, ~100mm							
40	13.9	ROD FALL							
39	14	RUBBLE - Loose							
38	15								
37	16.85								
36	17								
35	17.1	ROCK - Firm, possibly coal							
34	18	ROCK							
33	18.4	Bore discontinued at 18.4m, limit of investigation							
32	19								
31	20								
30	21								
29	22								
28	23								
27	24								
26	25								
25	26								
	27								
	28								
	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-3m

TYPE OF BORING: Solid flight auger to 4m, rotary air from 4m to 18.4m

WATER OBSERVATIONS: Free groundwater observed at 11.9m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 53.34
EASTING: 335730.1
NORTHING: 1382263
DIP/AZIMUTH: 90°/--

BORE No: 200
PROJECT No: 39129.03
DATE: 23 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
53	0	SAND / CLAY / WEATHERED SANDSTONE							
52	1								
51	2								
	2.0	SANDSTONE - Highly weathered, orange-brown							
50	3								
49	4								
48	5								
47	6								
46	7								
45	8								
44	9								
	9.5	SANDSTONE - Grey (fresh, medium to high strength)							
43	10							▼	
42	11								
41	12								
40	13								
39	14								
38	15								
37	16								
36	17								
35	18								
34	19								
33	20								
32	21								
31	22								
	22.1	ROD FALL							
	22.6	RUBBLE - Loose							
30	23								
29	24								
28	25								
	25.2	ROCK							
27	26								
26	27								
25	28								
24	29								
	29.45	Bore discontinued at 29.45m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2.8m

TYPE OF BORING: Solid flight auger to 3m, rotary air from 3m to 29.45m

WATER OBSERVATIONS: Free groundwater observed at 10.5m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) interpolated from survey

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 53.26
EASTING: 335731.1
NORTHING: 1382259
DIP/AZIMUTH: 90°/--

BORE No: 201
PROJECT No: 39129.03
DATE: 04 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SAND / CLAY / WEATHERED SANDSTONE							
	2.1	SANDSTONE - Highly weathered, orange-brown From 2.6m, whitish bands							
	4.1	SANDSTONE - Grey (fresh, medium to high strength)						▼	
	21.9 22.0	ROD FALL							
		RUBBLE							
	23.4	Bore discontinued at 23.4m, limit of rods							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 23.4m

WATER OBSERVATIONS: Free groundwater observed at 10.4m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 53.18
EASTING: 335732.1
NORTHING: 1382255
DIP/AZIMUTH: 90°/--

BORE No: 202
PROJECT No: 39129.03
DATE: 05 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
53		SAND / CLAY / WEATHERED SANDSTONE							
52	1								
51	2	2.0 SANDSTONE - Highly weathered, orange-brown							
50	3								
49	4								
48	5								
47	6								
46	7								
45	8								
44	9	9.0 SANDSTONE - Grey (fresh, medium to high strength)							
43	10							▼	
42	11								
41	12								
40	13								
39	14								
38	15								
37	16								
36	17								
35	18	18.2 ROD FALL							
34	19								
33	20	20.0							
		20.2 RUBBLE							
32	21	ROCK							
		21.4 Bore discontinued at 21.4m, limit of investigation							
31	22								
30	23								
29	24								
28	25								
27	26								
26	27								
25	28								
24	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 21.4m

WATER OBSERVATIONS: Free groundwater observed at 10.5m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client. CCTV to 20.1m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 53
EASTING: 335733
NORTHING: 1382250.9
DIP/AZIMUTH: 90°/--

BORE No: 203
PROJECT No: 39129.03
DATE: 05 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
53	0	SAND / CLAY / WEATHERED SANDSTONE							
51	2.0	SANDSTONE - Highly weathered, orange-brown							
45	8.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
36	16.9	ROD FALL							
34	18.4	RUBBLE							
33	19.2	ROCK							
32	20.4	Bore discontinued at 20.4m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 20.4m

WATER OBSERVATIONS: Free groundwater observed at 10.1m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.92
EASTING: 335733.3
NORTHING: 1382248.9
DIP/AZIMUTH: 90°/--

BORE No: 203A
PROJECT No: 39129.03
DATE: 23 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
52.92	0.0	SAND / CLAY / WEATHERED SANDSTONE							
50.92	2.0	SANDSTONE - Highly weathered, orange-brown							
		From 4.0m, whitish bands							
44.92	8.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
37.32	15.6	RUBBLE							
37.02	15.9	SANDSTONE - Grey (Fresh, medium to high strength)							
36.82	16.1	ROD FALL							
35.92	17.0	RUBBLE							
35.72	17.2	ROCK							
34.17	18.75	RUBBLE							
33.92	19.0	SOLID ROCK							
30.57	22.35	RUBBLE							
30.02	22.9	ROD FALL							
29.72	23.2	RUBBLE							
28.52	24.4	ROCK							
24.47	29.45	Bore discontinued at 29.45m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2.85m

TYPE OF BORING: Solid flight auger to 3m, rotary air from 3m to 29.45m

WATER OBSERVATIONS: Free groundwater observed at 10.0m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) interpolated from survey. CCTV to 22.65m, blocked hole

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.85
EASTING: 335733.7
NORTHING: 1382246.8
DIP/AZIMUTH: 90°/--

BORE No: 204
PROJECT No: 39129.03
DATE: 04 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	SAND / CLAY / WEATHERED SANDSTONE							
	2.0	SANDSTONE - Highly weathered, orange-brown							
	8.5	SANDSTONE - Grey (fresh, medium to high strength)						▼	
	15.3	ROD FALL							
	16.9	RUBBLE							
	17.3	ROCK							
	18.4	Bore discontinued at 18.4m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 18.4m

WATER OBSERVATIONS: Free groundwater observed at 10.0m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.7
EASTING: 335734.5
NORTHING: 1382243.3
DIP/AZIMUTH: 90°/--

BORE No: 205
PROJECT No: 39129.03
DATE: 05 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
52	0	SAND / CLAY / WEATHERED SANDSTONE							
51	1.5	SANDSTONE - Highly weathered, orange-brown							
44	8.5	SANDSTONE - Grey (fresh, medium to high strength)						▼	
36	16.2	COAL - Black coal							
36	16.5	ROD FALL							
35	17.5	RUBBLE							
34	17.6	ROCK							
34	18.4	RUBBLE							
33	18.7	ROCK							
32	19.8	Bore discontinued at 19.8m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-1.5m

TYPE OF BORING: Solid flight auger to 1.5m, rotary air from 1.5m to 19.8m

WATER OBSERVATIONS: Free groundwater observed at 9.8m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.56
EASTING: 335735.8
NORTHING: 1382239.6
DIP/AZIMUTH: 90°/--

BORE No: 206
PROJECT No: 39129.03
DATE: 08 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SAND / CLAY / WEATHERED SANDSTONE							
	2.0	SANDSTONE - Highly weathered, orange-brown From 4.0m, some grey/whitish bands							
	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
	19.6	COAL - Black coal							
	19.7	ROD FALL							
	20.0	RUBBLE							
	21.25	ROCK							
	21.85	Bore discontinued at 21.85m, cave-in jamming rods							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 21.85m

WATER OBSERVATIONS: Free groundwater observed at 9.7m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.5
EASTING: 335736.1
NORTHING: 1382235.1
DIP/AZIMUTH: 90°/--

BORE No: 207
PROJECT No: 39129.03
DATE: 24 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
52.5	0.0	SAND / CLAY / WEATHERED SANDSTONE							
50.5	2.0	SANDSTONE - Highly weathered, orange-brown							
43.5	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
36.0	16.5	RUBBLE / FRACTURED COAL							
34.7	17.8	ROCK							
33.7	18.8	Bore discontinued at 18.8m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 18.8m

WATER OBSERVATIONS: Free groundwater observed at 9.6m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.51
EASTING: 335736.4
NORTHING: 1382233.1
DIP/AZIMUTH: 90°/--

BORE No: 207A
PROJECT No: 39129.03
DATE: 24 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
52.51	0.0	SAND / CLAY / WEATHERED SANDSTONE							
50.51	2.0	SANDSTONE - Highly weathered, orange-brown							
43.51	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
		At 15.8m, coal band, ~50mm From 16.3m, pebbly band							
35.21	17.3	COAL							
34.51	18.0	RUBBLE / FRACTURED COAL							
34.31	18.2	COAL							
33.41	19.1	RUBBLE / FRACTURED COAL							
30.51	22.0	ROCK							
28.21	24.3	Bore discontinued at 24.3m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2.8m

TYPE OF BORING: Solid flight auger to 3m, rotary air from 3m to 24.3m

WATER OBSERVATIONS: Free groundwater observed at 9.6m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) interpolated from survey. CCTV to 20.3m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.52
EASTING: 335736.7
NORTHING: 1382231.1
DIP/AZIMUTH: 90°/--

BORE No: 208
PROJECT No: 39129.03
DATE: 09 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SAND / CLAY / WEATHERED SANDSTONE							
	2.0	SANDSTONE - Highly weathered, orange-brown From 4.0m, whitish bands							
	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
	12.1	RUBBLE							
	14.55	ROCK							
	16.4	Bore discontinued at 16.4m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 16.4m

WATER OBSERVATIONS: Free groundwater observed at 9.6m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.59
EASTING: 335737.4
NORTHING: 1382227.2
DIP/AZIMUTH: 90°/--

BORE No: 209
PROJECT No: 39129.03
DATE: 09 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	SAND / CLAY / WEATHERED SANDSTONE							
	2.1	SANDSTONE - Highly weathered, orange-brown							
	7.9	SANDSTONE - Highly weathered, orange-brown, soil-like cuttings							
	8.6	SANDSTONE - Light grey (slightly weathered to moderately weathered, medium strength)						▼	
	9.15	SANDSTONE - Highly weathered, orange-brown, soil-like cuttings							
	10.75	SANDSTONE - Light grey (slightly weathered to moderately weathered, medium strength)							
	11.0	SANDSTONE - Grey (fresh, medium to high strength)							
	16.2	RUBBLE							
	16.95	From 16.2, pebbly band							
	17.5	SANDSTONE - Grey							
		ROD FALL							
	18.9	ROD FALL / LOOSE RUBBLE							
	19.9	RUBBLE							
	21.5	ROCK							
	22.85	Bore discontinued at 22.85m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 22.85m

WATER OBSERVATIONS: Free groundwater observed at 9.7m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client. CCTV to 18.9m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.62
EASTING: 335738.2
NORTHING: 1382223.3
DIP/AZIMUTH: 90°/--

BORE No: 210
PROJECT No: 39129.03
DATE: 09 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
52	0	SAND / CLAY / WEATHERED SANDSTONE							
51	1								
50	2	2.0 SANDSTONE - Highly weathered, orange-brown							
49	3								
48	4	From 4.0m, whitish bands							
47	5								
46	6								
45	7								
44	8								
43	9	9.0 SANDSTONE - Grey (fresh, medium to high strength)						▼	
42	10								
41	11								
40	12	12.15 RUBBLE							
39	13	12.85 SANDSTONE - Grey (fresh, medium to high strength)							
38	14	13.6 13.85 RUBBLE							
37	15	SANDSTONE - Grey (fresh, medium to high strength)							
36	16	15.3 15.5 RUBBLE							
35	17	SANDSTONE - Grey (fresh, medium to high strength)							
34	18	17.25 ROD FALL							
33	19	18.9 RUBBLE							
32	20								
31	21	21.1 ROCK							
30	22	22.1 Bore discontinued at 22.1m, limit of investigation							
29	23								
28	24								
27	25								
26	26								
25	27								
24	28								
23	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 22.1m

WATER OBSERVATIONS: Free groundwater observed at 9.5m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.54
EASTING: 335738.9
NORTHING: 1382219.4
DIP/AZIMUTH: 90°/--

BORE No: 211
PROJECT No: 39129.03
DATE: 10 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SAND / CLAY / WEATHERED SANDSTONE							
	2.0	SANDSTONE - Highly weathered, orange-brown From 4.0m, whitish bands							
	7.85	ROD FALL						▼	
	9.6	RUBBLE: Loose rubble with solid rock up to 0.75m thick							
	21.25	ROCK							
	22.85	Bore discontinued at 22.85m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 22.85m

WATER OBSERVATIONS: Free groundwater observed at 9.6m, 16/3/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client. CCTV to 10.6m, blocked hole

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.44
EASTING: 335739.8
NORTHING: 1382215.2
DIP/AZIMUTH: 90°/--

BORE No: 212
PROJECT No: 39129.03
DATE: 10 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
52	0	SAND / CLAY / WEATHERED SANDSTONE							
51	1.5	SANDSTONE - Highly weathered, orange-brown							
43	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
39	13.1	RUBBLE: Loose rubble with voids up to 0.35m high and solid rock up to 0.65m thick							
32	20.25	ROCK							
30	21.9	Bore discontinued at 21.9m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 21.9m

WATER OBSERVATIONS: Free groundwater observed at 9.6m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client. CCTV to 14.1m, camera jamming

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.19
EASTING: 335739.7
NORTHING: 1382210
DIP/AZIMUTH: 90°/--

BORE No: 213
PROJECT No: 39129.03
DATE: 10 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	SAND / CLAY / WEATHERED SANDSTONE							
	1.5	SANDSTONE - Highly weathered, orange-brown							
	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
	15.2	COAL - Black coal							
	15.6	SANDSTONE - Grey (fresh, medium to high strength)							
	15.9	COAL - Black coal							
	20.0	SANDSTONE - Grey (fresh, medium to high strength)							
	22.1	Bore discontinued at 22.1m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 22.1m

WATER OBSERVATIONS: Free groundwater observed at 9.3m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 51.89
EASTING: 335739.5
NORTHING: 1382206
DIP/AZIMUTH: 90°/--

BORE No: 214
PROJECT No: 39129.03
DATE: 10 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
51	0.0	SAND / CLAY / WEATHERED SANDSTONE							
50	1.0	SANDSTONE - Highly weathered, orange-brown							
49		From 4.0m, whitish bands							
43	9.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
38	14.0	COAL - Black coal							
34	17.7	ROD FALL							
33	18.7	RUBBLE							
32	19.9	ROCK							
30	21.6	Bore discontinued at 21.6m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-1.5m

TYPE OF BORING: Solid flight auger to 1.5m, rotary air from 1.5m to 21.6m

WATER OBSERVATIONS: Free groundwater observed at 9.0m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 51.56
EASTING: 335739.3
NORTHING: 1382202
DIP/AZIMUTH: 90°/--

BORE No: 215
PROJECT No: 39129.03
DATE: 11 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
51	0	SAND / CLAY / WEATHERED SANDSTONE							
	1.0	SANDSTONE - Highly weathered, orange-brown							
43	7.85	RUBBLE						▼	
	8.0	SANDSTONE - Highly weathered, orange-brown							
41	9.85	SANDSTONE - Grey (fresh, medium to high strength)							
38	13.3	COAL - Black coal From 13.8m, fractured							
37	14.6	ROD FALL							
35	16.45	RUBBLE							
33	18.5	ROCK							
32	20.0	Bore discontinued at 20.0m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-1.5m

TYPE OF BORING: Solid flight auger to 1.5m, rotary air from 1.5m to 20m

WATER OBSERVATIONS: Free groundwater observed at 8.7m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 51.29
EASTING: 335739.1
NORTHING: 1382198
DIP/AZIMUTH: 90°/--

BORE No: 216
PROJECT No: 39129.03
DATE: 11 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	SAND / CLAY / WEATHERED SANDSTONE							
	1.0	SANDSTONE - Highly weathered, orange-brown							
	9.1	SANDSTONE - Grey (fresh, medium to high strength)						▼	
	12.9	ROD FALL							
	16.5	ROD FALL / LOOSE RUBBLE							
	17.35	RUBBLE							
	17.75	ROCK							
	19.5	Bore discontinued at 19.5m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-1.5m

TYPE OF BORING: Solid flight auger to 1.5m, rotary air from 1.5m to 19.5m

WATER OBSERVATIONS: Free groundwater observed at 8.4m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client. CCTV to 16.5m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 51.11
EASTING: 335738.9
NORTHING: 1382195.7
DIP/AZIMUTH: 90°/--

BORE No: 217
PROJECT No: 39129.03
DATE: 11 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
51	0.0	SAND / CLAY / WEATHERED SANDSTONE							
50	0.8	SANDSTONE - Highly weathered, orange-brown							
49	1								
48	2								
47	3								
46	4								
45	5								
44	6								
43	7								
42	8							▼	
41	8.9	SANDSTONE - Grey (fresh, medium to high strength)							
40	9								
39	10								
38	11								
37	12								
36	12.7	COAL - Black coal							
35	13	From 13.7m, fractured							
34	14								
33	14.4	ROD FALL							
32	15								
31	16								
30	16.5	RUBBLE							
29	17								
28	17.65	ROCK							
27	18								
26	19								
25	19.5	Bore discontinued at 19.5m, limit of investigation							
24	20								
23	21								
22	22								
21	23								
20	24								
19	25								
18	26								
17	27								
16	28								
15	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-1.4m

TYPE OF BORING: Solid flight auger to 1.4m, rotary air from 1.4m to 19.5m

WATER OBSERVATIONS: Free groundwater observed at 8.1m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 51.9
EASTING: 335724
NORTHING: 1382213
DIP/AZIMUTH: 90°/--

BORE No: 218
PROJECT No: 39129.03
DATE: 24 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
51	0	SAND / CLAY / WEATHERED SANDSTONE							
50	1								
49	2								
48	3								
	3.0	SANDSTONE - Highly weathered, orange-brown							
47	4								
46	5								
45	6								
44	7								
43	8								
42	9	From 8.5m, whitish bands						▼	
41	10								
40	11								
	11.0	SANDSTONE - Grey (fresh, medium to high strength)							
39	12								
38	13								
37	14								
36	15								
35	16								
34	17								
33	18								
	18.8	ROD FALL							
32	19								
31	20								
30	21								
	21.2								
	21.4	RUBBLE							
29	22	ROCK - Probably coal							
28	23								
	24.1								
27	24	ROCK							
	24.6	Bore discontinued at 24.6m, cave-in blocking rods							
26	25								
25	26								
24	27								
23	28								
	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2.15m

TYPE OF BORING: Solid flight auger to 3m, rotary air from 3m to 24.6m

WATER OBSERVATIONS: Free groundwater observed at 9.2m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) determined off plans

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 52.1
EASTING: 335750
NORTHING: 1382216
DIP/AZIMUTH: 90°/--

BORE No: 219
PROJECT No: 39129.03
DATE: 24 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
52		SAND / CLAY / WEATHERED SANDSTONE							
51	1								
50	2	2.0 SANDSTONE - Highly weathered, orange-brown							
49	3								
48	4								
47	5								
46	6								
45	7								
44	8								
43	9							▼	
42	10	10.0 SANDSTONE - Grey (fresh, medium to high strength)							
41	11								
40	12								
39	13								
38	14	13.8 ROD FALL							
37	15								
36	16								
35	17								
34	18	18.1 RUBBLE							
33	19								
32	20	19.6 ROCK							
31	21								
30	22								
29	23								
28	24	23.45 Bore discontinued at 23.45m, limit of investigation							
27	25								
26	26								
25	27								
24	28								
23	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-1.5m

TYPE OF BORING: Solid flight auger to 3m, rotary air from 3m to 23.45m

WATER OBSERVATIONS: Free groundwater observed at 9.5m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) determined off plans

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.63
EASTING: 335787.9
NORTHING: 1382354.4
DIP/AZIMUTH: 90°/--

BORE No: 301
PROJECT No: 39129.03
DATE: 11 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1.2	SANDSTONE - Highly weathered, orange-brown							
52	2								
51	3								
50	4								
49	5								
48	6								
47	7								
46	8								
45	9								
44	10.0	SANDSTONE - Grey (fresh, medium to high strength)							
43	11							▼	
42	12								
41	13								
40	14								
39	15								
38	16								
37	17								
36	18								
35	19								
34	20								
33	20.9	COAL - Black coal From 22m, fractured							
32	22								
31	23								
30	24	From ~24m, cave-in jamming rods							
29	25								
28	25.6	Bore discontinued at 25.6m, cave-in jamming rods							
27	26								
26	27								
25	28								
	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 25.6m

WATER OBSERVATIONS: Free groundwater observed at 11.7m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.55
EASTING: 335789.2
NORTHING: 1382350.6
DIP/AZIMUTH: 90°/--

BORE No: 302
PROJECT No: 39129.03
DATE: 19 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1.0	SANDSTONE - Highly weathered, orange-brown							
52	2								
51	3	From 2.5m, whitish bands							
50	4								
49	5								
48	6								
47	7								
46	8								
45	9								
44	10.0	SANDSTONE - Grey (fresh, medium to high strength)							
43	11							▼	
42	12								
41	13								
40	14								
39	15								
38	16								
37	17								
36	18								
35	19								
	19.45	COAL - Black coal							
34	20.05	ROD FALL							
33	21								
32	22								
	22.6	ROD FALL / LOOSE RUBBLE							
31	23								
30	24								
29	25								
	25.9								
28	26.1	RUBBLE							
27	27	ROCK							
	27.8								
26	28	Bore discontinued at 27.8m, cave-in jamming rods							
25	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 27.8m

WATER OBSERVATIONS: Free groundwater observed at 11.7m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 22.6m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.42
EASTING: 335790.5
NORTHING: 1382346.8
DIP/AZIMUTH: 90°/--

BORE No: 303
PROJECT No: 39129.03
DATE: 22 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54	0	SAND / CLAY / WEATHERED SANDSTONE							
53	1.0	SANDSTONE - Highly weathered, orange-brown							
44	10.0	SANDSTONE - Grey (fresh, medium to high strength)						▼	
33	20.9	ROD FALL							
31	22.75	ROD FALL / LOOSE RUBBLE							
29	25.4								
28	25.7	RUBBLE							
		ROCK							
26	28.0	Bore discontinued at 28.0m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 28m

WATER OBSERVATIONS: Free groundwater observed at 11.6m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 22.75m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.31
EASTING: 335791.8
NORTHING: 1382343.1
DIP/AZIMUTH: 90°/--

BORE No: 304
PROJECT No: 39129.03
DATE: 22 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54		SAND / CLAY / WEATHERED SANDSTONE							
53	1.0	SANDSTONE - Highly weathered, orange-brown							
52		From 8m, whitish bands							
46	10.5	SANDSTONE - Grey (fresh, medium to high strength)						▼	
43		From 12.4m to 12.8m, conglomerate							
41	13.2	SANDSTONE - Grey							
39	15.5	SANDSTONE - Grey (moderately weathered), pebbly bands							
34		From 19.0m, bands of coal							
33	21.25	COAL - Black coal							
29	25.1	ROCK							
27	27.5	COAL - Black							
26	28.0	ROCK							
25	29.45	Bore discontinued at 29.45m, limit of investigation							

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2m

TYPE OF BORING: Solid flight auger to 2m, rotary air from 2m to 29.45m

WATER OBSERVATIONS: Free groundwater observed at 11.5m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 28.65m, blocked hole

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.17
EASTING: 335793.1
NORTHING: 1382339.4
DIP/AZIMUTH: 90°/--

BORE No: 305
PROJECT No: 39129.03
DATE: 22 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54		SAND / CLAY / WEATHERED SANDSTONE							
53	1.0	SANDSTONE - Highly weathered, orange-brown							
52	2								
51	3								
50	4								
49	5	From 5m, whitish bands							
48	6								
47	7								
46	8								
45	9								
44	10.0	SANDSTONE - Grey (fresh, medium to high strength)							
43	11							▼	
42	12								
41	13								
40	14								
39	15								
38	16								
37	17								
36	18								
35	19.1	At 18.7m, coal band, ~100mm							
34	20	COAL - Black coal							
33	21								
32	22								
31	23.1	ROD FALL							
30	24.0	ROD FALL / LOOSE RUBBLE							
	24.6								
29	25.1	RUBBLE							
28	26	ROCK							
27	27								
26	28								
25	28.5	Bore discontinued at 28.5m, limit of investigation							
	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2.6m

TYPE OF BORING: Solid flight auger to 3m, rotary air from 3m to 28.5m

WATER OBSERVATIONS: Free groundwater observed at 11.4m, 24/2/10

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client, CCTV to 24.3m, top of rubble

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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BOREHOLE LOG

CLIENT: Pacific National Pty Ltd
PROJECT: Proposed Pacific National Depot
LOCATION: Mansfield Street, Greta

SURFACE LEVEL: 54.2
EASTING: 335792.6
NORTHING: 1382335.4
DIP/AZIMUTH: 90°/--

BORE No: 306
PROJECT No: 39129.03
DATE: 22 Feb 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
54		SAND / CLAY / WEATHERED SANDSTONE							
53	1.0	SANDSTONE - Highly weathered, orange-brown							
52	2								
51	3								
50	4								
49	5								
48	6	From 5.5m, whitish bands							
47	7								
46	8								
45	9								
44	10.0	SANDSTONE - Grey (fresh, medium to high strength)							
43	11								
42	12								
41	13								
40	14								
39	15								
38	16								
37	17								
36	18								
35	19								
34	20.0	COAL - Black coal							
33	21								
32	22								
31	23								
30	24								
29	25								
28	25.6	ROCK							
27	26								
26	27								
25	28.0	Bore discontinued at 28.0m, limit of investigation							
	29								

RIG: Bombadier **DRILLER:** Total (Curry) **LOGGED:** Bear **CASING:** 100mm diameter PVC-2.6m

TYPE OF BORING: Solid flight auger to 3m, rotary air from 3m to 28m

WATER OBSERVATIONS:

REMARKS: Co-ordinates (ISG 56/1) and Surface Level (AHD) Surveyed by Client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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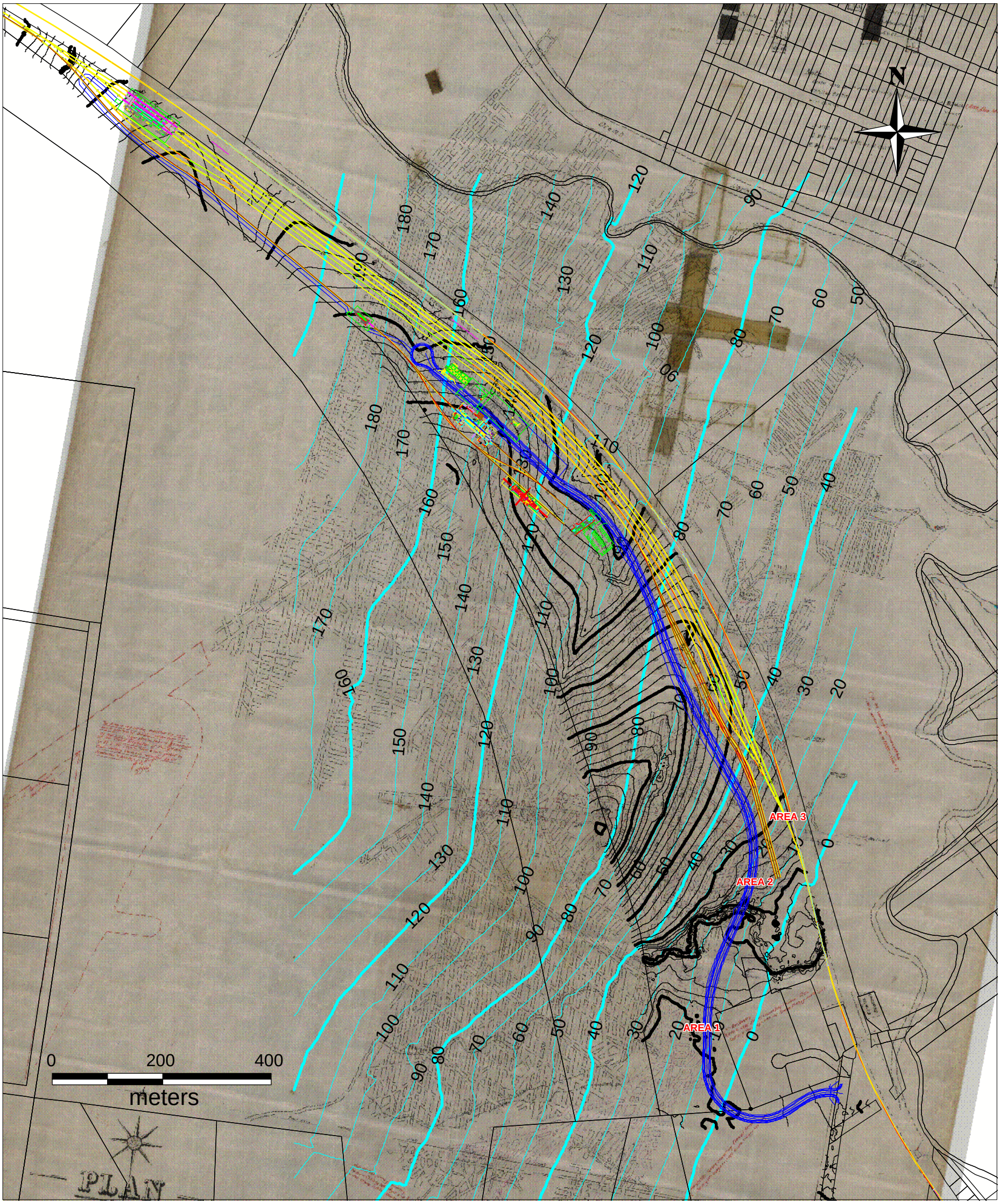
APPENDIX B

Drawing 1 – Site Plan
Drawing 1A – Bore Locations Area 1
Drawing 1B – Bore Locations Areas 2 and 3
Drawings 2 to 5 – Sections Through Boreholes



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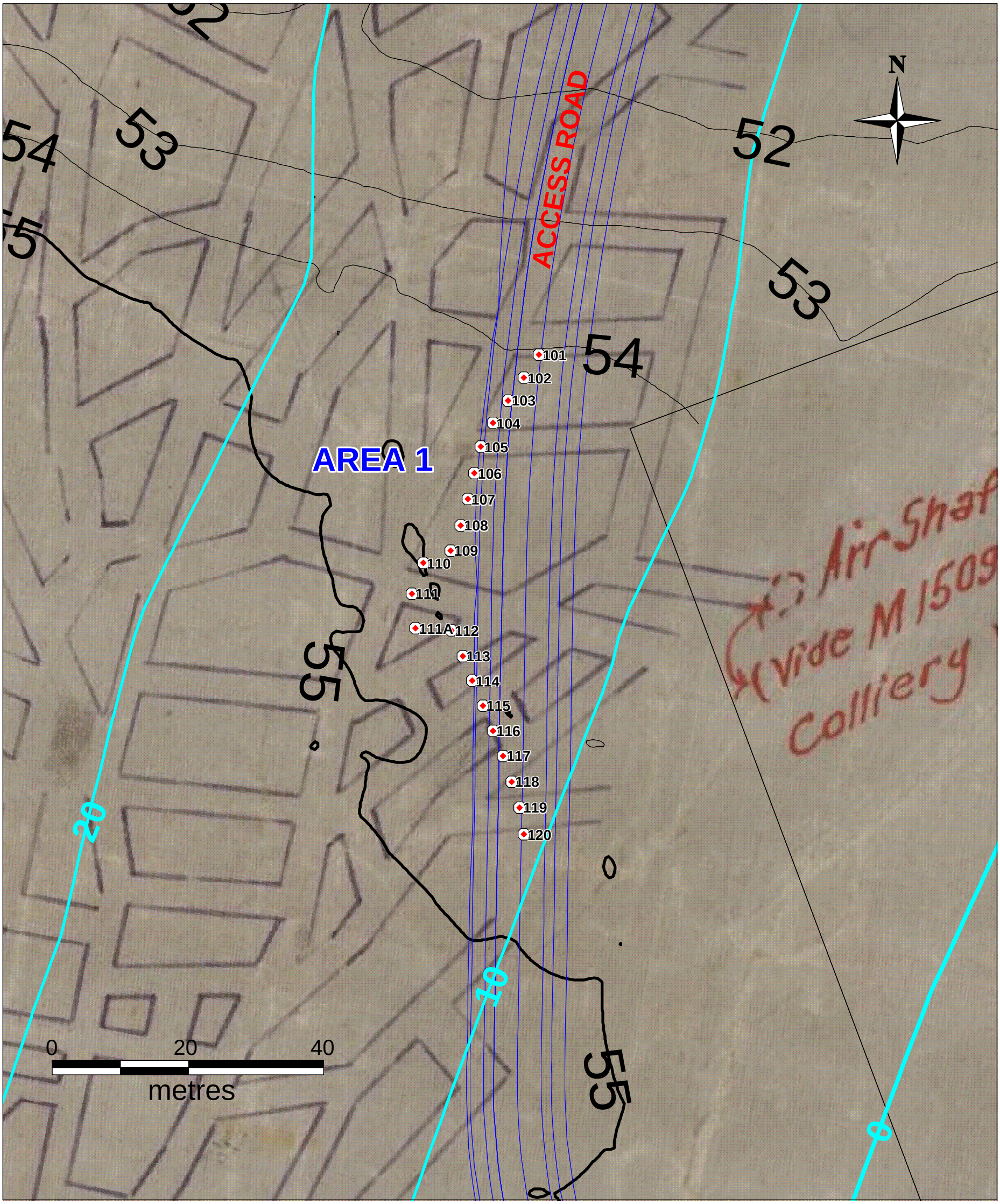
TITLE: PACIFIC NATIONAL DEPOT
MANSFIELD STREET, GRETA
SITE PLAN

CLIENT: PACIFIC NATIONAL

DRAWN BY: JRB	SCALE: AS SHOWN	PROJECT No: 39129.03	OFFICE: NEWCASTLE
APPROVED BY:		DATE: 29 APRIL 2010	DRAWING No: 1



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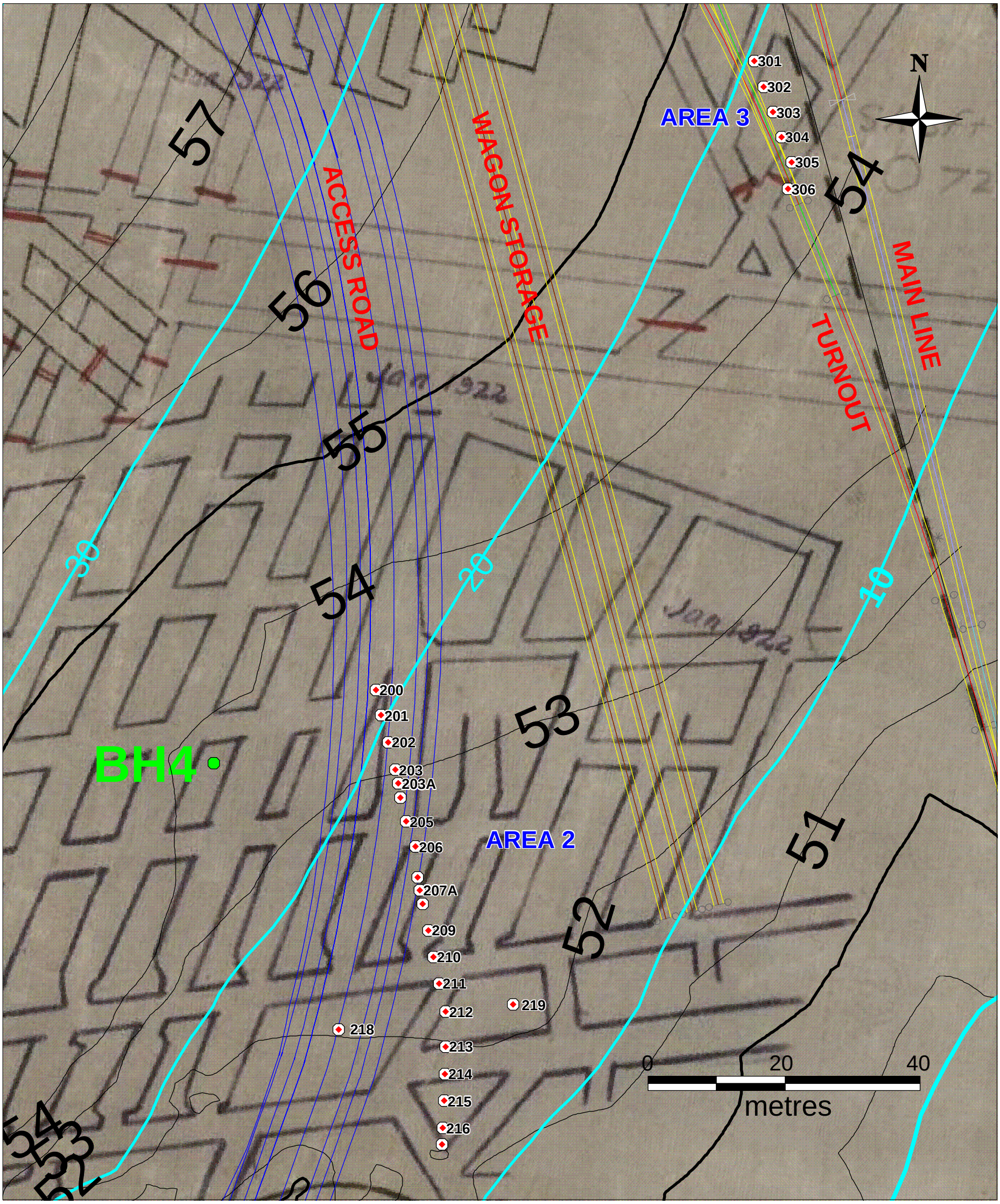
TITLE: PACIFIC NATIONAL DEPOT
MANSFIELD STREET, GRETA
SITE PLAN - AREA 1

CLIENT: PACIFIC NATIONAL

DRAWN BY: JRB	SCALE: 1 : 600 (A3)	PROJECT No: 39129.03	OFFICE: NEWCASTLE
APPROVED BY:		DATE: 29 APRIL 2010	DRAWING No: 1A



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TITLE: PACIFIC NATIONAL DEPOT
MANSFIELD STREET, GRETA
SITE PLAN - AREAS 2 AND 3

CLIENT: PACIFIC NATIONAL

DRAWN BY: JRB	SCALE: 1 : 600 (A3)	PROJECT No: 39129.03	OFFICE: NEWCASTLE
APPROVED BY:		DATE: 29 APRIL 2010	DRAWING No: 1B

A

A'

101 102 103 104 105 106 107 108 109 110 111 111A 112 113 114 115 116 117 118 119 120

ELEVATION (m)

55 50 45 40 35 30 25 20 15 10 5

0 10 20 30 40 50 60 70 80

DISTANCE ALONG PROFILE (m)

LEGEND

- Sand/Clay/Weathered Sandstone
- Sandstone, highly weathered
- Sandstone, grey
- Coal
- Rock
- Rubble
- Rod Fall
- Filling
- Water Level

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Sydney, Newcastle, Brisbane, Melbourne, Perth, Wyong, Campbelltown, Townsville, Cairns, Wollongong, Darwin

TITLE: Section Through Area 1 Bores to Investigate Pothole Subsidence Risk
Pacific National Depot
Mansfield Street, Greta

CLIENT: Pacific National Pty Ltd		Ref: P:\39129.03\Drawings\Air Cross Sections\39129.03 Section A	
DRAWN BY: PLH	SCALE: 1: 250	PROJECT No: 39129.03	
			DRAWING No: 2

B

B'

200 201 202 203 203A 204 205 206 207 207A 208 209 210 211 212 213 214 215 216 217

ELEVATION (m)

50 45 40 35 30 25 20 15 10 5

0 10 20 30 40 50 60 70 80

DISTANCE ALONG PROFILE (m)

LEGEND

- Sand/Clay/Weathered Sandstone
- Sandstone, highly weathered
- Sandstone, grey
- Coal
- Rock
- Rubble
- Rod Fall
- Water Level

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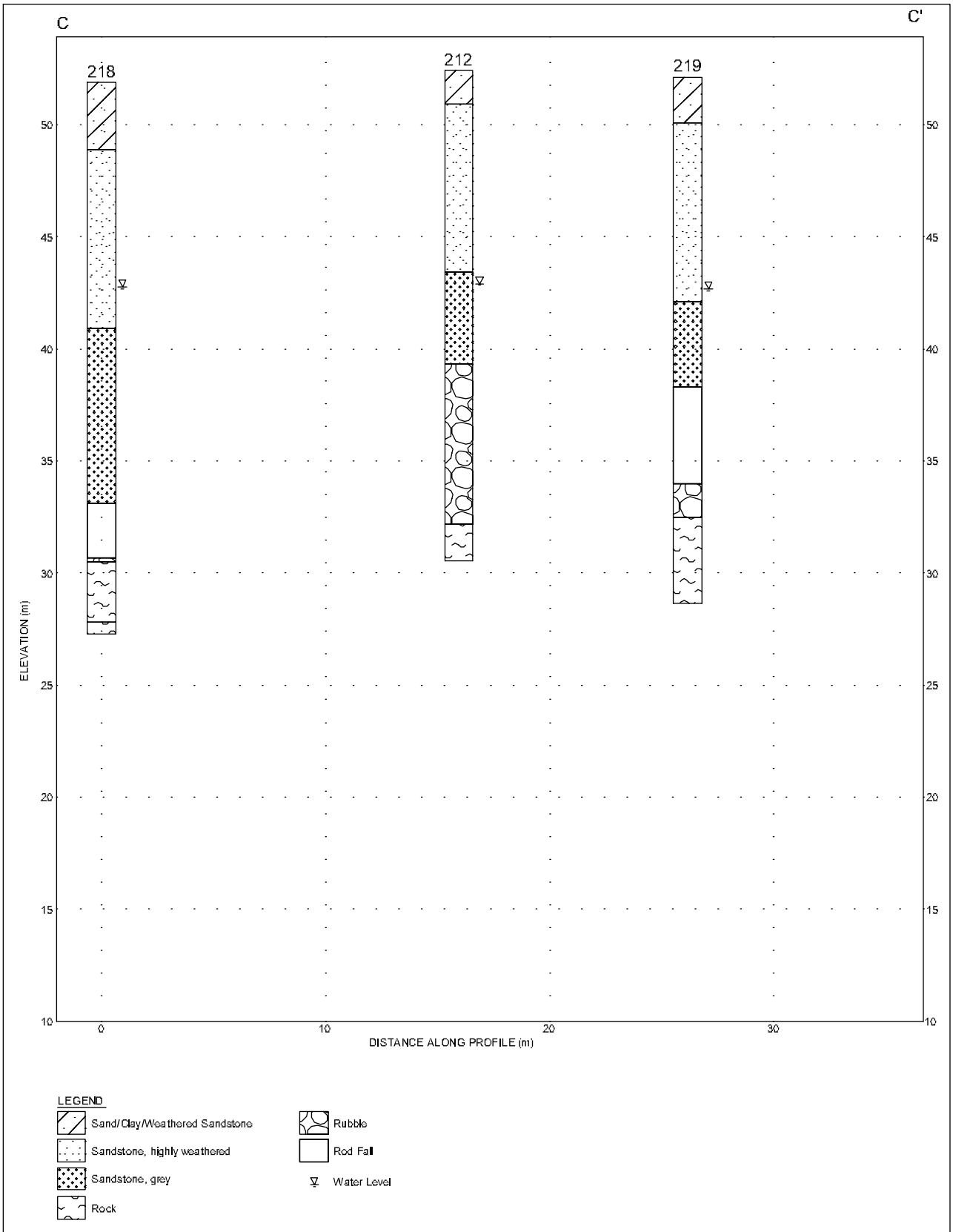
Sydney, Newcastle, Brisbane, Melbourne, Perth, Wyong, Campbelltown, Townsville, Cairns, Wollongong, Darwin

TITLE: Section Through Area 2 Bores to Investigate Pothole Subsidence Risk
Pacific National Depot
Mansfield Street, Greta

CLIENT: Pacific National Pty Ltd
DRAWN BY: PLH
SCALE: 1: 250
Ref: P:\39129.03\Drawings\Air Cross Sections\39129.03 Section B
PROJECT No: 39129.03
DRAWING No: 3



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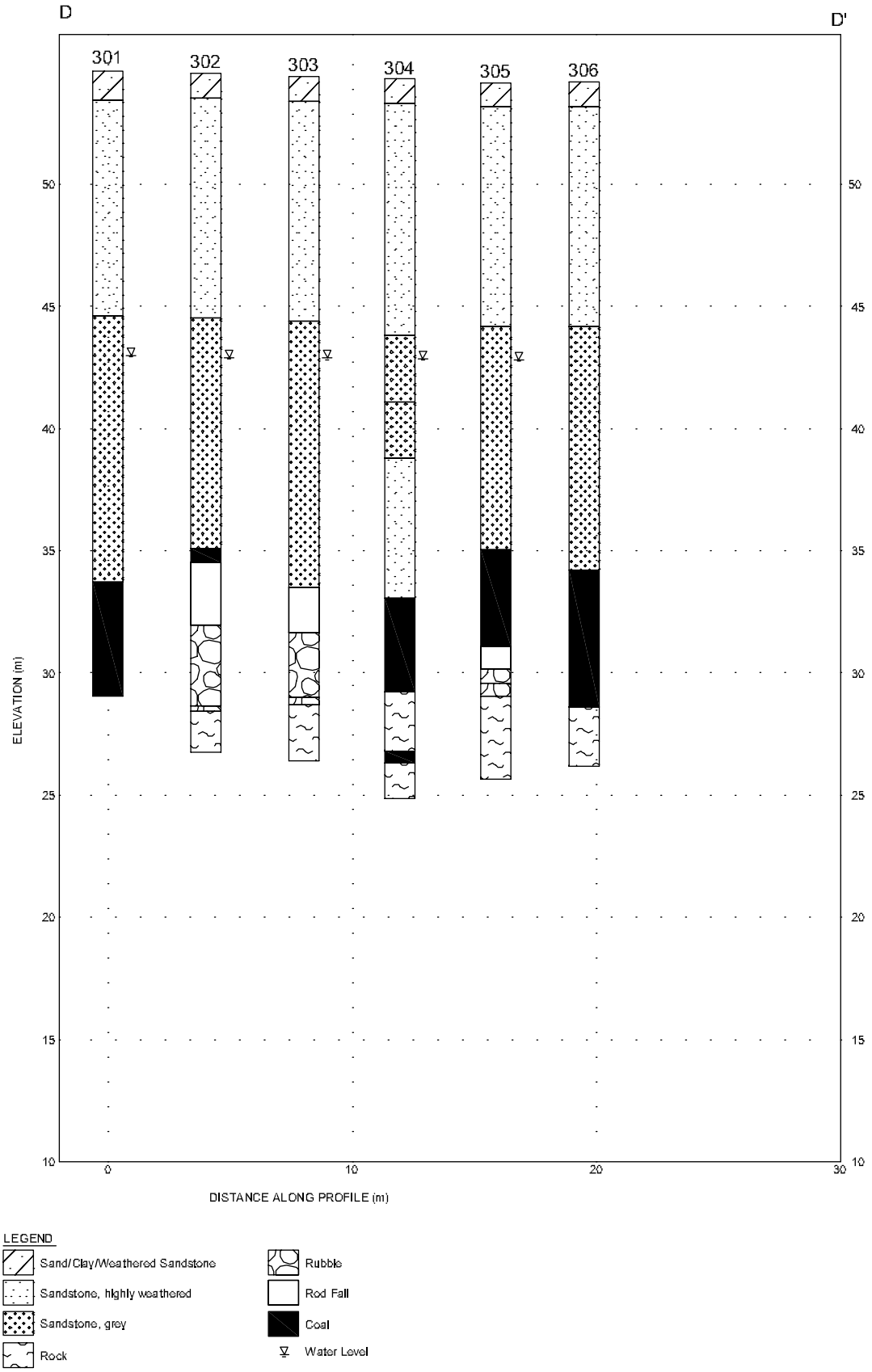
Wollongong, Campbelltown, Townsville, Cairns

TITLE: Section Through Area 2 Bores to Investigate Pothole Subsidence Risk
Pacific National Depot
Mansfield Street, Greta

CLIENT: PACIFIC NATIONAL PTY LTD	Ref: P:\39129.03\Drawings\Air Cross Sections\39129.03 Section C	OFFICE: NEWCASTLE
DRAWN BY: PLH	SCALE: 1:250	PROJECT No: 39129.03
APPROVED BY:	DATE:	DRAWING No: 4



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Wollongong, Campbelltown, Townsville, Cairns

TITLE: Section Through Area 3 Bores to Investigate Pothole Subsidence Risk
Pacific National Depot
Mansfield Street, Greta

CLIENT: PACIFIC NATIONAL PTY LTD	Ref: P:\39129.03\Drawings\Air Cross Sections\39129.03 Section D		OFFICE: NEWCASTLE
DRAWN BY: PLH	SCALE: 1:250	PROJECT No: 39129.03	
APPROVED BY:		DATE:	DRAWING No: 5