

REPORT OF INVESTIGATION ON

**TECHNICAL REPORT TR 62/04
VICTORIA HIGHWAY Ch 184 – 220 km
GRAVEL SEARCH PHASE 2
DETAILED AERIAL SEARCH AND CLEARANCES**

**Department of Infrastructure Planning and Environment
Road Projects Division**



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The information contained in this report has been obtained for design purposes and not for construction purposes or for purposes of determining appropriate plant for construction.

Test results are relevant only to those sites from which they were sampled, they are not necessarily indicative of the total reserve available within the borrow pit.

Before relying on the material contained in this report, users should independently verify its accuracy, currency, completeness and relevance for their purposes, and should obtain any proper professional advice.

In particular, users should seek independent professional advice before making any investment or business decisions.

2.0 OVERVIEW – PROPOSED MATERIAL SOURCES

The purpose of this investigation was to evaluate existing and potential road building material deposits on the Victoria Highway between chainage 184 and 220 km.

The investigation was based on previous known deposits of natural gravels and potential sites of river gravels for crushing and blending with loams.

A Helicopter traverse of the area up to 15 km North and South of the Highway revealed no new additional potential deposits of material.

The majority of the existing deposits were established prior to the declaration of the Gregory National Park; these deposits are now considered as unsuitable for environmental reasons.

Three of the existing deposits outside of the National Park have potential for extension but will not yield sufficient quantity for the project.

Three sites within the Victoria River may be suitable for crushing and blending with loam to produce roadbase. These deposits are extensive and have the potential to produce a sufficient quantity for pavement materials.

2.1 EXISTING STOCKPILES OF NATURAL GRAVELS

There are three deposits of natural gravel which are located outside of the Gregory National Park. These deposits have remnant stockpiles and may be extendable:

- **Site 20 – ch 218.10 km – offset 11.5 km left** via a link road opposite the Fitzroy turnoff.

This is an existing Pit of Sandstone / Laterite gravel that was stockpiled and not used. The CBR values and Plasticity Indices from the stockpiled material show conformance with DIPE Spec 2.

The stockpiled quantities are in the vicinity of 5000m³. The deposit is extendable; no estimate has been made of this quantity.

Access is via an existing Bore Road opposite the Fitzroy turnoff. The bore road terminates at approximately 5.0 km from the Victoria Highway; a new alignment of approximately 6.5 km will be required from this point to the pit.

- **Site 21 – ch 243.46 km – offset 0.35 km right** via a link road from the Victoria Highway.

This is an existing Pit of Chert Gravel that was used in Highway construction in the Skull Creek area.

Samples taken from remnant stockpiles show very high strength CBR values, nominal conformance with DIPE Spec 2 grading but with PI limits of 16.

The stockpiled quantities are less than 500m³. The deposit is extendable; no estimate has been made of this quantity.

Access is via an existing haul road, minor realignment will be necessary to gain direct access.

- **Site 22 – ch 215.19 km – offset 4.35 km left** via a link road opposite The Coolibah Access Road.

This is an existing Pit of Sandstone / Laterite that was used as pavement material on the Victoria Hwy in the Coolibah area.

According to information presented in Report TR61/04 by RMG Geotechnical, CBR values are very high; there is nominal conformance with DIPE Spec 2 grading and a low PI value.

Access is via an existing haul road. The deposit is extendable.

2.2 RIVER GRAVEL AND SAND DEPOSITS

There were three deposits of Victoria River Gravel and Sand which have been nominated as possible deposits. Previous investigation work on these deposits has been presented in Reports TR15/91 and TR01/91 by Acer Vaughan. This work has been expanded upon and re-presented:

- **Site RG2 – ch 202.89 – offset 0.35 km right** via a link road from the Victoria Highway.

This is a river bed deposit of cobbles, sand and gravel. The predominant rock types are Quartz and Basalt.

Test results from the Acer Vaughan report show an excess of oversize and a lack of fines with low to medium PI. The rock particles have medium to high strength.

No samples have been obtained for crushing trials.

Access to the deposit is via an existing track from the Victoria Highway.

- **Site RG3 – ch 215.09 – offset 5.0 km right** via Coolibah Access and a link road to the deposit.

This also a river bed deposit of cobbles, sand and gravel with the same predominant rock types of Quartz and Basalt.

No test results are available for this site.
The deposit is extensive.

There is mention of an objection to this site at one time by Traditional Owners.

Access to the deposit is via the Coolibah Station Access and a link road to the site following the Victoria River for approximately 1.0 km.

- **Site RG7 – ch 218.09 – offset 4.0 km right** via Fitzroy Access and a link road to the deposit.

This also a river bed deposit of cobbles, sand and gravel with the same predominant rock types of Quartz and Basalt.

Test results from the Acer Vaughan report show an excess of oversize and a lack of fines with little or no PI. The rock particles have medium to high strength.

Test results from B & E Laboratories (previously based in Katherine) show similar results to that presented by Acer Vaughan, they also performed CBR testing on screened material which generally showed conformance to DIPE Spec 2.

2.3 LOAM FILLERS FOR CRUSHED RIVER GRAVELS

Five sites have been selected as filler material to bulk up the fines fraction of the River Gravel / Sand after crushing. The materials that have been selected are mostly within close proximity to the River bank and the crusher sites. The loams have been selected on the basis of a low to moderate PI and a fine grading suitable for blending with crushed products.

- **Site RG7 Loam – ch 218.09 km – offset 4.0 km right** via Fitzroy Access and a link road to the deposit.

It is possible to also access the site via the Coolibah Access. The Fitzroy access point is favoured by the Traditional Owners but will require a new alignment of approximate length of 1.0 km to link the deposit with the Fitzroy access road. There will also be the necessity to cut the river bank and install a temporary culvert in the River.

The material is a light brown silty clayey loam.

Samples were taken from the River Banks adjacent to the two existing river accesses. The Eastern Access is nearest the Coolibah Homestead and the Western Access is nearest the Coolibah Crocodile farm.

Both samples were fine grained with the PI varying between 2 and 14. This fluctuation can be attributed to blanket layers of sand, silt and clay which are deposited by the River over time.

There also appeared to be a general tendency for the clay content to increase with distance from the River Bank.

The deposit is at least 2.0m deep.

- **Site 25 Loam – ch 215.09 km – offset 4.0 km right** via Coolibah Access.

This site is immediately adjacent to the Coolibah road crossing over the River and is material that has been pushed down from the river bank to provide a road train alignment for the Station.

This loam is very similar to the RG7 loam with a PI of 18 and has been selected as alternative for the RG7 crusher site.

The deposit is at least 2.0m deep.

- **Site RG3 Loam – ch 215.09 km – offset 5.0 km right** via Coolibah Access and an existing link road to the deposit.

This site is accessible via the Coolibah access road and an existing link road that follows the River on the South side. This link road has an existing cutting into the River Bed at the RG3 crusher site.

The loam is very similar to the RG7 loams with a PI of 9.

The deposit is at least 2.0m deep.

- **Site RG2 Loam – ch 202.89 km offset 0.35 km right** via an existing link road from the Victoria Highway.

This site is easily accessible from the Victoria Highway and is immediately adjacent to the RG2 crusher site.

The loam is very similar to the RG7 loams with a PI of 6.
The deposit is at least 2.0m deep.

- **Site 24 Loam – ch 109.10 km offset 1.0 km left** via the existing access to the Victoria

River Wayside Inn rubbish dump.

This site is easily accessible from the Victoria Highway and was suggested by the Proprietor of the Wayside Inn as an alternative filler material for the RG2 crusher site.

The loam is very similar to the RG7 loams with a PI of 0.

The deposit is at least 2.0m deep. It should be noted that the sample was taken from a depth of 200mm only and most probably accounts for the low PI value.

2.4 UNSUITABLE GRAVELS

A further eight natural gravel sites were investigated for suitability as road building materials. These sites have been classified by DIPE as unsuitable for roadworks due to geological or environmental factors:

- **Site 7A – ch 229.05 km offset 2.20 km left**

The material is a Dolomitic siltstone gravel. The pit is within the Fitzroy range and has no visible access track to the area. An access track would have to be built through AAPA avoidance area 18 and would require crossings over several creeks.

With the poor quality and quantity of gravel as stated in Report TR26/87 and close proximity to an avoidance area this site was deemed unsuitable.

- **Site 8 ch 233.89 km 8.2 km left**

Material within the pit area consists of a Lateritic Sandstone. The area has no access track. An access track would have to be built through low wooded areas and floodout country.

The material does not conform to DIPE specs as per report TR 26/87.

Due to the poor quality and access problems this site is considered not suitable.

- **Site 8A ch 233.89 km 11.0 km left**

Material within the area consists of a Lateritic Sandstone. The material does not conform to DIPE spec 2 and is gap graded, has considerable oversize and low PI as per report TR 40/90. The material would require treatment to adjust these properties.

There is no access track to the area, an access track could be built in conjunction with site 8 but would encounter the same problems.

Due to the poor quality and access problems this site is considered not suitable.

- **Site 11 ch 250.25 km 0.7 km left**

This area consisted of Chert gravel. The material has previously been used on the Victoria Highway.

Access to the area is via an existing haul road approximately 900m long.

The area appears to be exhausted with very low possibility of extension. Several existing stockpiles of approximately 20 m³ are available.

Due to the lack of a viable Pit extension this site is considered unsuitable.

- **Site 17A ch 161.05 km 6.3 km left**

The material within the pit consists of Sandstone gravel.
Access is via an existing track with several creek crossings.

The pit has been rehabilitated and appears to be exhausted.

Due to the lack of a viable Pit extension this site is considered unsuitable.

- **Site Coolibah Plateau ch 215.19 km 2.0 km right**

The material consists of a Lateritic Sandstone of very low plasticity.
There are existing stockpiles with approximately 2500 m³ of material.

There is an existing haul road to the top of the plateau but would require considerable earthworks reinstatement to make it safe for haulage of gravel.

Due to environmental considerations and access problems this site is considered unsuitable.

- **Site Innesvale Plateau ch 166.5 km 18km right**

The material consists of Lateritic Sandstone pea gravel of low plasticity.
The area lies within the Gregory National Park and has possibilities of extension to existing gravel pits.

Access to the Plateau is via an existing telecom/haul road. The road requires considerable earthworks reinstatement to make it safe for haulage of gravel.

Due to environmental issues and access costs, this material is considered not suitable.

- **Site 23 ch 109.60 km 1.8 km left**

This material consists of a Lateritic Sandstone of high plasticity.
It appears that the existing pit is nearly exhausted.

The area has an existing sacred site in close proximity.

Due to material quality and Cultural issues this Pit is considered not suitable.

2.5 RIVER GRAVEL / LOAM BLENDS

Trials of Crushed River Gravel and Loam in varying proportions and from various sites have been performed. The blends were as follows:

RG2 – Crushed River Gravel 95% : 5% Loam
RG3 – Crushed River Gravel 95% : 5% Loam
RG3 – Crushed River Gravel 90% : 10% Loam
RG3 – Crushed River Gravel 85% : 15% Loam
RG7 (Coolibah River Access) – Crushed River Gravel 95% : 5% Loam
RG7 (Croc Farm access) – Crushed River Gravel/ 5% Loam
SITE 25 (Coolibah Stn Access) – Crushed River Gravel 95% : 5% Loam
SITE 25 (Coolibah Stn Access) – Crushed River Gravel 90% : 10% Loam
SITE 25 (Coolibah Stn Access) – Crushed River Gravel 85% : 15% Loam

Test results show the River Gravels from all deposits to contain an excess of oversize material and a lack of medium plasticity fines.

The Blending Trials involved crushing of the River Gravel to 100% passing 37.5mm sieve and blending with loams in the proportions of 5% - 15%.

The most suitable blend appeared to be 90% Crushed River Gravel : 10% Loam. This blend is dependent upon the Loam having a PI in the range of 8 – 15.

The blend can alter subject to the PI of the Loam Filler. An extrapolation can be drawn from the test results supplied by Lintin Geotechnical and Soil testing Services as a guide to suitable blends based on loam filler plasticity :

Loam Plasticity Index	% Loam Filler	% Crushed River Gravel
4 – 8	15%	85%
8 – 15	10%	90%
15 – 20	5%	95%

The above interpretation is a field guide only and should be backed up by Quality Assurance procedures during the crushing and blending process.

3.0 INVESTIGATION METHODS

The investigation was carried out in various stages as set out below.

- Stage one - Desktop Study.

This consisted of studying existing Technical Reports, Geological and Topographical maps. The reports were supplied by DIPE and were as follows TR 26/87, 02/88, 15/90, 17/90, 23/90, 24/90, 25/90, 40/90, 15/91, 16/91, 01/92, 09/92 and 23/96. Contact was also made with field/supervision staff from the Katherine DIPE Regional office of Road Projects Division.

- Stage two - Ground traverse of the area with vehicle.

A ground traverse of all accessible known pit areas was conducted to assess the viability of materials within the pit areas. A number of these areas were inaccessible due to the wet weather.

- Stage three - Aerial search conducted with a Robinson R44 Helicopter.

Known areas from the desktop study were programmed into a Magellan Meridian Gold GPS and located from the air. Additional systematic grid traversing was conducted over the search area to ascertain whether additional gravel deposits were available. No additional areas of gravel were located during the grid traverse. Existing suitable gravel pits were assessed for possible extensions. These areas were mapped with the GPS and have been submitted to the AAPA for Sacred Site Clearance Certificates.

- Stage four - Sampling

Areas that were inaccessible by vehicle were accessed by the helicopter and sampled by hand (geological pick). All other areas were accessed by vehicle and sampled in the same manner.

Tests were performed as follows:

3.1 TABLE 1 – SUMMARY OF TESTS PERFORMED

TESTS	NATURAL GRAVEL	NATURAL LOAMS	LOAMS AND CRUSHED RIVER GRAVEL MIXES
Particle Size Distribution	3	6	11
Atterberg Limits	3	6	15
Linear Shrinkage	3	6	15
Soaked CBR @ 100% MMDD	3	0	0

Site of works plans are located in appendix "A".

Pit area locality plans are located in appendix "B".

Field investigation logs are located in appendix "E".

Field photographs are located in appendix "D".

GPS coordinates are located in appendix "F".

4.0 INVESTIGATION RESULTS AND SUMMARY SHEETS

4.1 SITE 20 – EXISTING STOCKPILES

Site 20 is located at the 218.10 km on the Victoria Highway and 11.5 km in on the left.

Two areas within the stockpiles were sampled.

The stockpiled material is a Sandy Silty Gravel with a low to medium plasticity consisting of Lateritic Sandstone with a USC classification of GM.

Gravel depths vary considerably within the pit and range from 0.2m to 0.8m.

The material within the pit varies in plasticity.

The pit area is covered with medium to thick Savannah woodland

Photographs are located in appendix D.

A summary of test results is located in table 1.

4.2 SITE 21 – EXISTING STOCKPILES

Site 21 is located at the 243.46 km on the Victoria Highway and 350 m right via an existing haul road.

The material within the pit area is a Sandy Silty Gravel with a medium plasticity consisting of Chert with a USC classification of GM.

Gravel depths vary considerably between 0.2 m to 1.1m.

Plasticity appears to be variable throughout the pit area.

Vegetation throughout the pit area is medium to thick Savannah Woodland.

Photographs are located in appendix D.

A summary of test results is located in table 2.

4.3 SITE 22 – EXISTING STOCKPILES

Site 22 is located at the 215.19 km on the Victoria Highway and 4.35 km right along an existing station road.

The material within the pit area is a Sandy Silty Gravel of low plasticity consisting of Lateritic Sandstone with a USC classification of GM.

Vegetation throughout the pit area is medium to thick Savannah Woodland.

Photographs are located in appendix D.

A summary of test results is located in table 2.

Information and results regarding this pit are from Report TR 61/04 – RMG Geotechnical Consultants.

4.4 RG2 – RIVER GRAVEL

Site RG2 is located at the 202.89 km on the Victoria Highway 350 m via an existing track.

Material is Coarse Quartz/Basalt river gravel.

Depths within the deposit are typically 0 – 1500 mm.

Plasticity Indices within the sampled areas range from N.P to 10.

Vegetation is minimal with very sparse small gum trees.

Photographs are located in appendix D.

A summary of test results is located in tables 3 - 5.

Information regarding this area is from reports TR 25/90 Vaughan Hosking Freeman Fox and TR 01/92 Acer Vaughan.

4.5 RG3 – RIVER GRAVELS

Site RG3 is located at the 215.09 km on the Victoria Highway 5.0 km along the Coolibah Station access road.

Material is Coarse Quartz/Basalt river gravel.

Depths within the deposit are typically 0 – 2000 mm.

Plasticity Indices within the sampled areas range from 2 to 11.
Note: test reports are not included in this report.

Vegetation is minimal with very sparse small gum trees.

Photographs are located in appendix D.

A summary of test results is located in tables 3 - 5.

Information for this area was obtained from report TR 25/90 Vaughan Hosking Freeman Fox.

4.6 RG7 – RIVER GRAVEL

This area is located at ch: 218.09 km Victoria Highway, and 4.0 km along the Fitzroy Station access road.

Material is Coarse Quartz/Basalt river gravel.

Depths within the deposit are typically 0 – 2000 mm.

Plasticity Indices within the sampled areas range from 2 to 10.

No vegetation is present on the area.

Photographs are located in appendix D.

A summary of test results is located in table 3.

4.7 RG7 – LOAM

This area is located at ch: 218.09 km Victoria Highway and 4.0 km along the Fitzroy Station access road. The area is adjacent to RG7 River Gravel.

The material is a Silty Sand Clay with low to medium plasticity and having a USC of SM/SC.

Plasticity Indices within the sampled areas range from 2 to 18.

Vegetation is thick Cane Grass with sparse medium to large Gum trees.

Photographs are located in appendix D.

A summary of test results is located in table 6.

4.8 SITE 25 - LOAM

This area is located at ch: 215.09 km Victoria Highway and 4.8 km along the Coolibah Access road.

The material is a Silty Sand Clay of low to medium plasticity and having a USC of SM/SC.

Plastic Index from the sampled area is 8.

Vegetation is thick Cane Grass with sparse medium to large Gum trees.

Photographs are located in appendix D.

A summary of test results is located in table 6.

4.9 RG3 – LOAM

This area is located at ch: 215.09 km 5.0 km along the Coolibah Access road.

This area is adjacent to RG3 River Gravel Deposit.

The material is a Silty Sand Clay of low to medium plasticity and having a USC of SM/SC.

Plastic Index from the sampled area is 9.

Vegetation is thick Cane Grass with medium density large Eucalypt trees.

Photographs are located in appendix D.

A summary of test results is located in table 6.

4.10 RG2 – LOAM

This area is located at ch: 202.89 km Victoria Highway and 350 m right along an existing track.

The material is a Silty Sand Clay of low to medium plasticity and having a USC of SM/SC.

Plasticity Index from the sampled area is 6.

Vegetation is short grasses with medium to dense Savannah Woodland.

Photographs are located in appendix D.

A summary of test results is located in table 6.

4.11 SITE 24 – LOAM

This area is located at ch: 109.10 km Victoria Highway and 1.0 km left along the Victoria River Wayside Inn dump road.

The material is a Silty Sand Clay of low to medium plasticity and having a USC of SM/SC.

Plasticity Index from the sampled area is 0.

Vegetation is thick Cane Grass with some medium Gum trees present.

Photographs are located in appendix D.

A summary of test results is located in table 6.

4.12 UNSUITABLE NATURAL GRAVEL DEPOSITS SITES 7A, 8, 8A, 17A, SITES 11, 23, COOLIBAH PLATEAU AND INNESVALE PLATEAU.

Investigation results and testing summaries of these existing gravel areas have been prepared in previous Geotechnical Investigations and are included in this report.

4.13 TABLE 2

SUMMARY OF TEST RESULTS
NATURAL GRAVELS

LINTIN GEOTECHNICAL – DARWIN LABORATORY

TEST CATERGORY	LABORATORY REF No				DIPE SPEC'S	
	TN 40841 SITE 20 S/PILE 1	TN 40842 SITE 20 S/PILE 2	TN 40843 SITE 21 S/PILE	TN 40641 SITE 2 S/PILE	DIPE SPEC 2	DIPE SPEC 3
PSD SIEVE SIZE mm						
75.0	100	100	100	100		
37.5	98	97	99	86	100	
19.0	89	88	90	70	70-100	100
9.5	70	73	70	54	50-80	70-100
4.75	43	54	58	42	35-65	50-80
2.36	31	38	47	35	25-50	35-65
0.425	27	30	35	30	10-30	15-35
0.075	10	15	22	12	4-16	6-20
ATTERBERG LIMITS						
Liquid Limit	N.O.	27	33	17	30% max	30% max
Plasticity index	N.O.	13	16	2	1 - 10	1 – 10
Linear Shrinkage	0.5	6.5	6.5	1.0	0 – 6%	0 – 6%
PI Pass 0.425 mm	0	390	560	60	300 max	300 max
CBR @ 100% MMDD	170/200	180/150	120/100	240/240	80 min	80 min

4.14 TABLE 3 - SUMMARY OF TEST RESULTS
RIVER GRAVELS - RG2 AND RG7

ULLMAN & NOLAN GEOTECHNICAL – DARWIN
LABORATORY

TEST CATERGORY	LAB REF NO					DIPE SPEC'S	
	ULLMAN AND NOLAN RESULTS REPORT TR 01 / 92						
	11066	11067	11068	11069	11070		
PSD SIEVE SIZE mm	RG2 S/PILE	RG 7A TP7	RG 7B TP 14	RG 7B TP 19	RG 7B TP 25	DIPE SPEC 2	DIPE SPEC 3
75.0	85	74	78	88	75		
37.5	68	58	59	75	62	100	
19.0	57	48	50	61	55	70-100	100
9.5	48	37	41	49	42	50-80	70-100
4.75	38	28	31	39	33	35-65	50-80
2.36	32	22	25	34	26	25-50	35-65
0.425	17	9	12	11	11	10-30	15-35
0.075	4	2	4	1	2	4-16	6-20
ATTERBERG LIMITS							
Liquid Limit	25	25	49	N.O.	22	30% max	30% max
Plasticity Index	10	8	29	N.O.	4	1 – 10	1 – 10
Linear Shrinkage	4.0	4.0	11.0	N.O.	1.5	0 - 6%	0 - 6%
PI Pass 0.425 mm	175	72	348	N.O.	44	300 max	300 max
CBR @ 100%	> 200	170	150	110	180	80 min	80 min

4.14 TABLE 4 - SUMMARY OF TEST RESULTS
RIVER GRAVELS – RG2

B & E LABORATORIES – KATHERINE LABORATORY

TEST CATERGORY	LAB REF NO B & E LABORATORIES REPORT TR 01 / 92				DIPE SPEC'S	
	144	145	144 B MINUS 37.5MM	145 B MINUS 37.5MM		
PSD SIEVE SIZE mm	RG2 S/PILE	RG2 S/PILE	RG2 S/PILE	RG2 S/PILE	DIPE SPEC 2	DIPE SPEC 3
75.0	90	88	100	100		
37.5	72	75	100	100	100	
19.0	58	60	81	79	70-100	100
9.5	48	59	66	65	50-80	70-100
4.75	39	41	54	55	35-65	50-80
2.36	33	36	45	47	25-50	35-65
0.425	17	20	23	26	10-30	15-35
0.075	4	5	5	7	4-16	6-20
ATTERBERG LIMITS						
Liquid Limit	19	18	-	-	30% max	30% max
Plasticity Index	3	3	-	-	1 – 10	1 – 10
Linear Shrinkage	0.5	0.5	-	-	0 - 6%	0 - 6%
PI Pass 0.425 mm	51	60	-	-	300 max	300 max
CBR @ 100%	140 +	110 +	-	-	80 min	80 min

4.14 TABLE 5 - SUMMARY OF TEST RESULTS
RIVER GRAVELS - RG2

B & E LABORATORIES – KATHERINE LABORATORY

TEST CATERGORY	LAB REF NO B & E LABORATORIES REPORT TR 25 / 90				DIPE SPEC'S	
	985	986	987	988		
PSD SIEVE SIZE mm	RG2 A HOLE 1 0-1.8m	RG2 B HOLE 1 0-1.5m	RG2 E HOLE 1 0-0.7m	RG2 E HOLE 2 0-1.5m	DIPE SPEC 2	DIPE SPEC 3
75.0	97	90	96	98		
37.5	85	76	77	83	100	
19.0	64	60	61	62	70-100	100
9.5	50	47	48	46	50-80	70-100
4.75	40	37	39	37	35-65	50-80
2.36	34	30	33	31	25-50	35-65
0.425	17	13	18	14	10-30	15-35
0.075	2	2	4	2	4-16	6-20
ATTERBERG LIMITS						
Liquid Limit	N.O.	21	18	N.O.	30% max	30% max
Plasticity Index	N.O.	3	2	N.O.	1 – 10	1 – 10
Linear Shrinkage	N.O.	1.0	1.0	N.O.	0 - 6%	0 - 6%
PI Pass 0.425 mm	N.O.	39	36	N.O.	300 max	300 max
CBR @ 100%	35	35	35	60	80 min	80 min

4.15 TABLE 6 SUMMARY OF TEST RESULTS
LOAMS

LINTIN GEOTECHNICAL – DARWIN LABORATORY

TEST CATERGORY	LAB REF NO							DIPE SPEC"s
	TN 40835	TN 40836	TN 40837	TN 40838	TN 40839	TN 40840	TN 40664	
PSD SIEVE SIZE mm	RG3 LINK TO COOL	SITE 25 COOL STN MAIN	RG7 COOL ACCESS	RG7 CROC FARM ACCESS	SITE 24 VIC R/HOUS	RG2 ACCESS RD	COOL STN ACCESS G.CLARKE	DIPE S/CLAY SPEC
4.75	100	100	100	100	100	100	100	80 -100
2.36	100	100	100	100	100	100	99	60 –100
0.425	100	99	98	100	98	100	98	30 – 60
0.075	37	46	49	33	30	44	58	14 - 28
ATTERBERG LIMITS								
Plasticity Index	9	8	14	2	N.P	6	15	15
Linear Shrinkage	4.5	3.0	7.0	1.5	0.5	3.0	8.0	1 – 8

4.16 TABLE 7 SUMMARY OF TEST RESULTS
 CRUSHED RIVER GRAVEL – 20mm RIVER GRAVEL
 & LOAM BLENDS

LINTIN GEOTECHNICAL – DARWIN LABORATORY

TEST CATERGORY	LAB REF NUMBER					DIPE SPECS	
	TN 40692	TN 40889	TN 4089 0	TN 40891	TN 40892		
PSD SIEVE SIZE mm	CRUSHED RIVER GRAVEL - 20mm	CRUSHED RIVER GRAVEL -20mm 5% LOAM RG3	CRUSH ED RIVER GRAVE L - 20mm 5% LOAM SITE 25 COOL. MAIN	CRUSHED RIVER GRAVEL - 20mm 5% LOAM RG7 CROC	CRUSHED RIVER GRAVEL - 20mm 5% LOAM RG2	DIPE SPEC 2	DIPE SPEC 3
19.0	100	100	100	100	100	70- 100	100
9.5	63	69	65	64	65	50-80	70- 100
4.75	43	51	46	46	47	35-65	50-80
2.36	35	41	37	37	38	25-50	35-65
0.425	13	18	15	17	16	10-30	15-35
0.075	2	4	3	3	4	4-16	6-20
ATTERBERG LIMITS							
Liquid Limit		N.O.	N.O.	N.O.	N.O.	30% max	30% max
Plasticity Index		N.O.	N.O.	N.O.	N.O.	1 – 10	1 – 10
Linear Shrinkage		0.0	0.0	0.0	0.0	0 - 6%	0 - 6%
PI Pass 0.425 mm		0	0	0	0	300 max	300 max

4.16 TABLE 8 SUMMARY OF TEST RESULTS
RIVER GRAVEL/LOAM BLENDS
RETESTS

LINTIN GEOTECHNICAL – DARWIN LABORATORY

TEST CATERGORY	LAB REF NUMBER					DIPE SPECS	
	TN 40971(1)	TN 40971(2)	TN 41038	TN 41039	TN 41040		
PSD SIEVE SIZE mm	CRUSHED RIVER GRAVEL -20mm 5% LOAM RG3 LINK RD RETEST OF TN 40889	CRUSHED RIVER GRAVEL -20mm 5% LOAM SITE 25 COOL STN MAIN RETEST OF TN 40890	CRUSHED RIVER GRAVEL -20mm 5% LOAM RG7 COOL BACK TRACK	CRUSHED RIVER GRAVEL -20mm 10% LOAM RG3 LINK RD	CRUSHED RIVER GRAVEL -20mm 10% LOAM SITE 25 COOL STN MAIN ACCESS RD	DIPE SPEC 2	DIPE SPEC 3
19.0	-	-	-	-	-	70- 100	100
9.5	-	-	-	-	-	50-80	70- 100
4.75	-	-	-	-	-	35-65	50-80
2.36	-	-	-	-	-	25-50	35-65
0.425	-	-	-	-	-	10-30	15-35
0.075	-	-	-	-	-	4-16	6-20
ATTERBERG LIMITS							
Liquid Limit	N.O	N.O	N.O	20	19	30% max	30% max
Plasticity Index	N.P	N.P	N.P	2	1	1 – 10	1 – 10
Linear Shrinkage	0.0	0.0	0.5	1.5	1.0	0 - 6%	0 - 6%
PI Pass 0.425 mm	N.O	N.O	N.O	N.O	N.O	300 max	300 max

4.16 TABLE 9 SUMMARY OF TEST RESULTS
RIVER GRAVEL/LOAM BLENDS

SOIL TESTING SERVICES – ALICE SPRINGS LABORATORY

TEST CATEGORY	LABORATORY REF NUMBER						DIPE SPECS	
	19992	19993	19994	19995	19996	19997		
PSD SIEVE SIZE mm	CRUSHED RIVER GRAVEL -20mm 5% LOAM RG3	CRUSHED RIVER GRAVEL -20mm 10% LOAM RG3	CRUSHED RIVER GRAVEL -20mm 15% LOAM RG3	CRUSHED RIVER GRAVEL -20mm 5% LOAM RG7	CRUSHED RIVER GRAVEL -20mm 10% LOAM RG7	CRUSHED RIVER GRAVEL -20mm 15% LOAM RG7	DIPE SPEC 2	DIPE SPEC 3
19.0	-	100	100	-	100	100	70 - 100	100
9.5	-	69	65	-	70	60	50 - 80	70 - 100
4.75	-	49	48	-	52	43	35 - 65	50 - 80
2.36	-	41	41	-	43	36	25 - 50	35 - 65
0.425	-	20	23	-	20	21	10 - 30	15 - 35
0.075	-	5	5	-	5	6	4-16	6 - 20
ATTERBERG LIMITS								
Liquid Limit	20	20	22	19	20	22	30% max	30% max
Plasticity Index	2	2	6	15	4	5	1-10	1-10
Linear Shrinkage	1.0	2.0	2.0	4	1.5	3.0	0-6%	0-6%
PI Pass 0.425 mm	N/A	40	138	N/A	80	105	300 max	300 max