

Northern Territory Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:03:19 PM

Insp ID: 1955

Group 5 - Borroloola

Yanyula

Inspection Type:	Shade Structure
Shade Structure Type:	Play ground
Shade Floor Type:	Sand
Roof Type:	Shadecloth
Width (mm):	
Length (mm):	
Appearance:	3
Appearance Comment:	
Condition:	3 - Good
Comment:	



Northern Territory Camps

Civil Infrastructure

Inspection Date 13/12/2016 11:56:37 AM

Insp ID: 1962

Group 5 - Borroloola

Yanyula

Inspection Type:	Shade Structure
Shade Structure Type:	Play ground
Shade Floor Type:	No floor
Roof Type:	Not Covered
Width (mm):	
Length (mm):	
Appearance:	2
Appearance Comment:	
Condition:	3 - Good
Comment:	



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 11:45:25 AM

Insp ID: 1967

Group 5 - Borroloola

Yanyula

Road Name: Yanyula

What are you inspecting: Signs

Type of Sign: 20

Sign Condition: 2 - Poor

Sign Comment: Tree growing in front , sign graffitied

General Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:20:14 PM

Insp ID: 1918

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:19:06 PM

Insp ID: 1919

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:18:12 PM

Insp ID: 1920

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:09:48 PM

Insp ID: 1923

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles , all painted white



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:10:00 PM

Insp ID: 1924

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:08:22 PM

Insp ID: 1925

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:06:47 PM

Insp ID: 1926

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 1:02:45 PM

Insp ID: 1930

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles , bent bollard, covered in grass



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:57:30 PM

Insp ID: 1931

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:56:29 PM

Insp ID: 1933

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:50:48 PM

Insp ID: 1936

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 3 - Good

Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:49:58 PM

Insp ID: 1938

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:49:08 PM

Insp ID: 1939

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:47:57 PM

Insp ID: 1940

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:15:46 PM

Insp ID: 1949

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 3 - Good

Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:14:30 PM

Insp ID: 1950

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:13:45 PM

Insp ID: 1951

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:12:34 PM

Insp ID: 1952

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:10:53 PM

Insp ID: 1953

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 12:03:36 PM

Insp ID: 1956

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 11:53:46 AM

Insp ID: 1960

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 11:54:40 AM

Insp ID: 1961

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 11:55:26 AM

Insp ID: 1963

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 13/12/2016 11:47:26 AM

Insp ID: 1964

Group 5 - Borroloola

Yanyula

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Electrical inspection report

P:\GIS\Projects\253963_NT_Town_Camps\253963_004_Elec_DDP_report.mxd 23/02/2017 12:22
Map by: DMCP



Legend

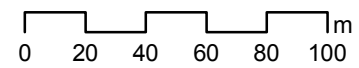
Electrical infrastructure

- 11KV HV/LV Pole
- 11KV Line Pole
- 11KV Pole Mounted Substation
- 11kV Switch Fuse
- LV Metering
- LV Line Pole
- LV Service Pole
- LV switch
- Street Lighting on HV Pole
- Transformer
- Town Camp roads
- NT cadastre
- Town Camp boundary

Electrical survey points

- 1234 Other Values
- 1234 Distribution Panel
- 1234 Overhead Poles
- 1234 Street Light
- 1234 Transformers

A3 scale: 1:2,500



Date: 23/02/2017 Version: 3
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Electrical
278 - Yanyula (Borroloola)

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:49:53 PM

Insp ID: 1105 Group 5 - Borroloola Yanyula

What Comms Category are you capturing: Distribution

What is distribution method to households: Underground

Is it Shared with PWC:

Is there Anti-climb barrier provided for this pole:

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo: No

What is Pit Condition: 2

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:07:27 PM

Insp ID: 1112

Group 5 - Borrooloola

Yanyula

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method:

Outdoor

Is the distribution panel labelled:

No

What is Distribution Panel main CB Rating:

Unknown

What is the main incoming cable type/Size to Distribution Panel:

Unknown

What is the condition of switchboard:

Condition Comments:

What is the condition of cables/glands into switchboard:

Cable/Gland Condition Comments:

Distribution Panels name plate access:

No



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:07:27 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 27/01/2017 12:47:35 PM

Insp ID: 3694

Group 5 - Borroloola

Yanyula

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 3

Meter Condition: 3

Meter Comment:

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 27/01/2017 12:31:08 PM

Insp ID: 3695

Group 5 - Borroloola

Yanyula

What Category are you capturing: Electrical Meters

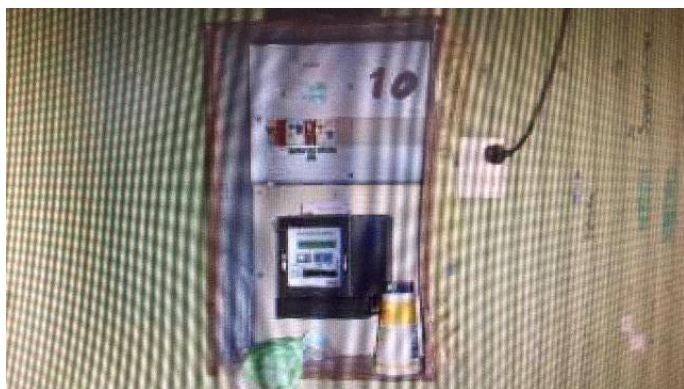
Meter Type: Prepaid

Meter Switchboard Cond: 3

Meter Condition: 3

Meter Comment:

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 27/01/2017 12:18:03 PM

Insp ID: 3696

Group 5 - Borroloola

Yanyula

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition: 3

Meter Comment: Blank plates are missing on CB slot.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 27/01/2017 11:37:54 AM

Insp ID: 3697

Group 5 - Borroloola

Yanyula

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 3

Meter Condition: 3

Meter Comment:

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 27/01/2017 10:55:57 AM

Insp ID: 3698

Group 5 - Borroloola

Yanyula

What Category are you capturing: Electrical Meters

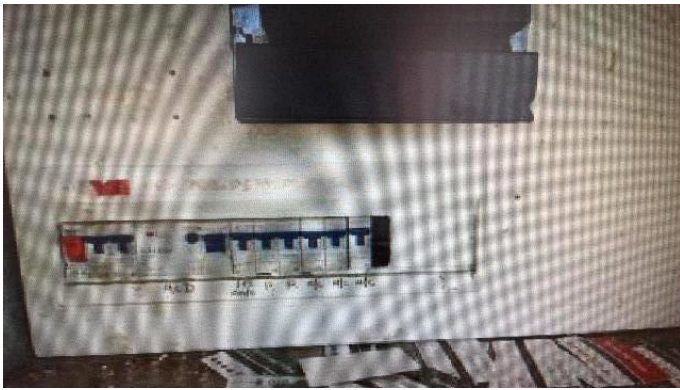
Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition:

Meter Comment: Type & Condition of meter to be confirmed as meter photo not captured. Blank plates a

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 27/01/2017 10:27:25 AM

Insp ID: 3699

Group 5 - Borroloola

Yanyula

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition:

Meter Comment: Type & Condition of meter to be confirmed as meter photo not captured. Blank plates a

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 27/01/2017 9:40:52 AM

Insp ID: 3700

Group 5 - Borroloola

Yanyula

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition: 3

Meter Comment: Blank plates are missing on CB slot.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:49:11 PM

Insp ID: 1106

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 02
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	3
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:49:11 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:46:38 PM

Insp ID: 1107

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	2
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:46:38 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:38:29 PM

Insp ID: 1108

Group 5 - Borroloola

Yanyula

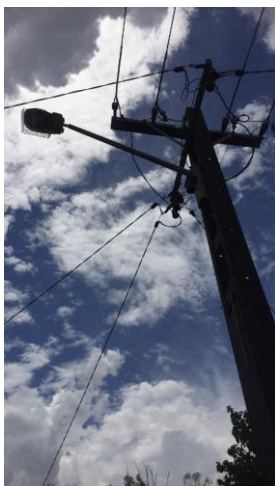
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 02
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	4
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:38:29 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:29:03 PM

Insp ID: 1109

Group 5 - Borroloola

Yanyula

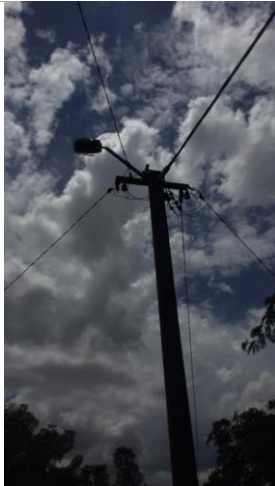
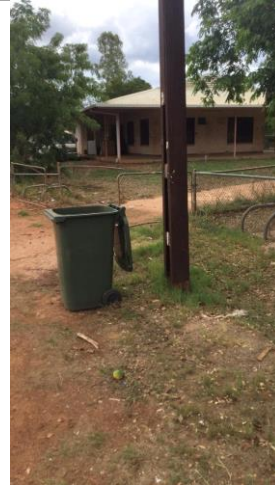
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	Unknown
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	11000
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	4
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:29:03 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:21:03 PM

Insp ID: 1110

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type: Welded

What is the condition of pole: 3

How is the pole planted: Concrete

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Combined

What is the HV voltage level: 11000

What is the arrangement of connected cables: Parallel

Are there isolators on the pole: No

What is the Condition: 3

How many Lots are connected to this pole: 0

Overhead Pole Comments: Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:21:03 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:18:33 PM

Insp ID: 1111

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type: Welded

What is the condition of pole: 3

How is the pole planted: Concrete

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Combined

What is the HV voltage level: 11000

What is the arrangement of connected cables: Parallel

Are there isolators on the pole: No

What is the Condition: 3

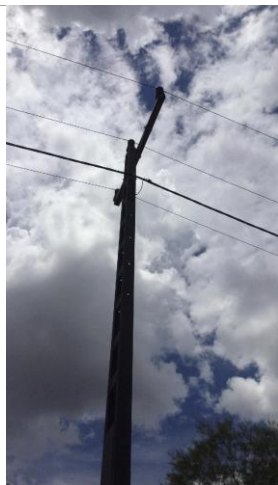
How many Lots are connected to this pole: 0

Overhead Pole Comments: Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:18:33 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:57:27 PM

Insp ID: 1114

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type: Welded

What is the condition of pole: 3

How is the pole planted: Concrete

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Combined

What is the HV voltage level: 11000

What is the arrangement of connected cables: Parallel

Are there isolators on the pole: Yes

What is the Condition: 3

How many Lots are connected to this pole: 0

Overhead Pole Comments: Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:57:27 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:55:11 PM

Insp ID: 1115

Group 5 - Borroloola

Yanyula

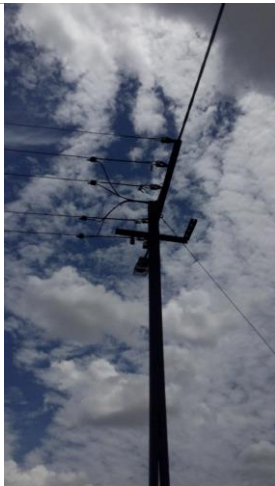
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	0
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:55:11 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:52:29 PM

Insp ID: 1116

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	Unknown
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted . Feeds pump station

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:52:29 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:47:17 PM

Insp ID: 1117

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 02
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:47:17 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:44:36 PM

Insp ID: 1118

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 02
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	4
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:44:36 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:41:34 PM

Insp ID: 1119

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 02
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	2
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:41:34 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:31:01 PM

Insp ID: 1120

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 02
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:31:01 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:28:12 PM

Insp ID: 1121

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 05
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:28:12 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:21:42 PM

Insp ID: 1123

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	Unknown
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:21:42 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:13:13 PM

Insp ID: 1124

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

What is Pole Material type: Welded

What is the condition of pole: 3

How is the pole planted: Concrete

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Three

What is the HV voltage level: 400

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition: 3

How many Lots are connected to this pole: 0

Overhead Pole Comments: Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:13:13 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:25:16 PM

Insp ID: 1125

Group 5 - Borroloola

Yanyula

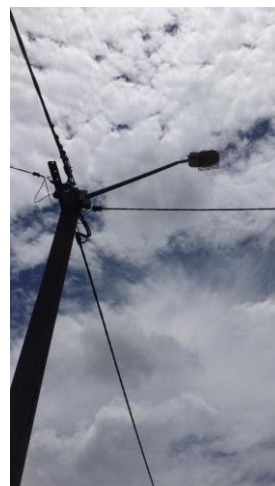
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	2
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:25:16 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:49:11 PM

Insp ID: 1106

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 02

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:49:11 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:38:29 PM

Insp ID: 1108

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 02

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:38:29 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:29:03 PM

Insp ID: 1109 Group 5 - Borroloola Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

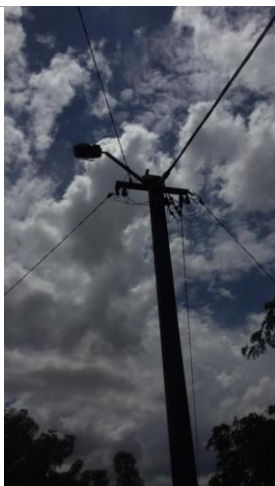
Street Light Power Supply:

Street Light Type Unknown

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:55:11 PM

Insp ID: 1115 Group 5 - Borroloola Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:55:11 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:52:29 PM

Insp ID: 1116 Group 5 - Borroloola Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type Unknown

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:52:29 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:47:17 PM

Insp ID: 1117

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 02

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:47:17 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:44:36 PM

Insp ID: 1118

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 02

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:44:36 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:41:34 PM

Insp ID: 1119

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 02

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:41:34 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:31:01 PM

Insp ID: 1120

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 02

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:31:01 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:28:12 PM

Insp ID: 1121

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 05

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:28:12 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:21:42 PM

Insp ID: 1123

Group 5 - Borroloola

Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type Unknown

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:21:42 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:25:16 PM

Insp ID: 1125 Group 5 - Borroloola Yanyula

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 12:25:16 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:00:36 PM

Insp ID: 1113

Group 5 - Borroloola

Yanyula

What Category are you capturing: Transformers

What is Transformer installation method:

Pole

If method know:

11SS1P

What is the condition of the mounting:

3

What is Transformer Rating:

Unknown

Is there access to transformers name plate to take a photo:

No

What is the condition of transformer:

3

What is cable type to transformer:

PVC insulated black

What is cable size to transformer:

Is there switch gear or fusing associated with the transformer:

Cut out fuse

Transformer Comment:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 13/12/2016 1:00:36 PM



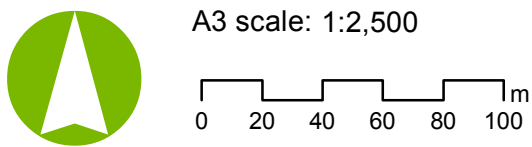
Road map

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Roads_DDP2.mxd 11/02/2017 17:17 Imagery: copyright DigitalGlobe WV 2



Legend

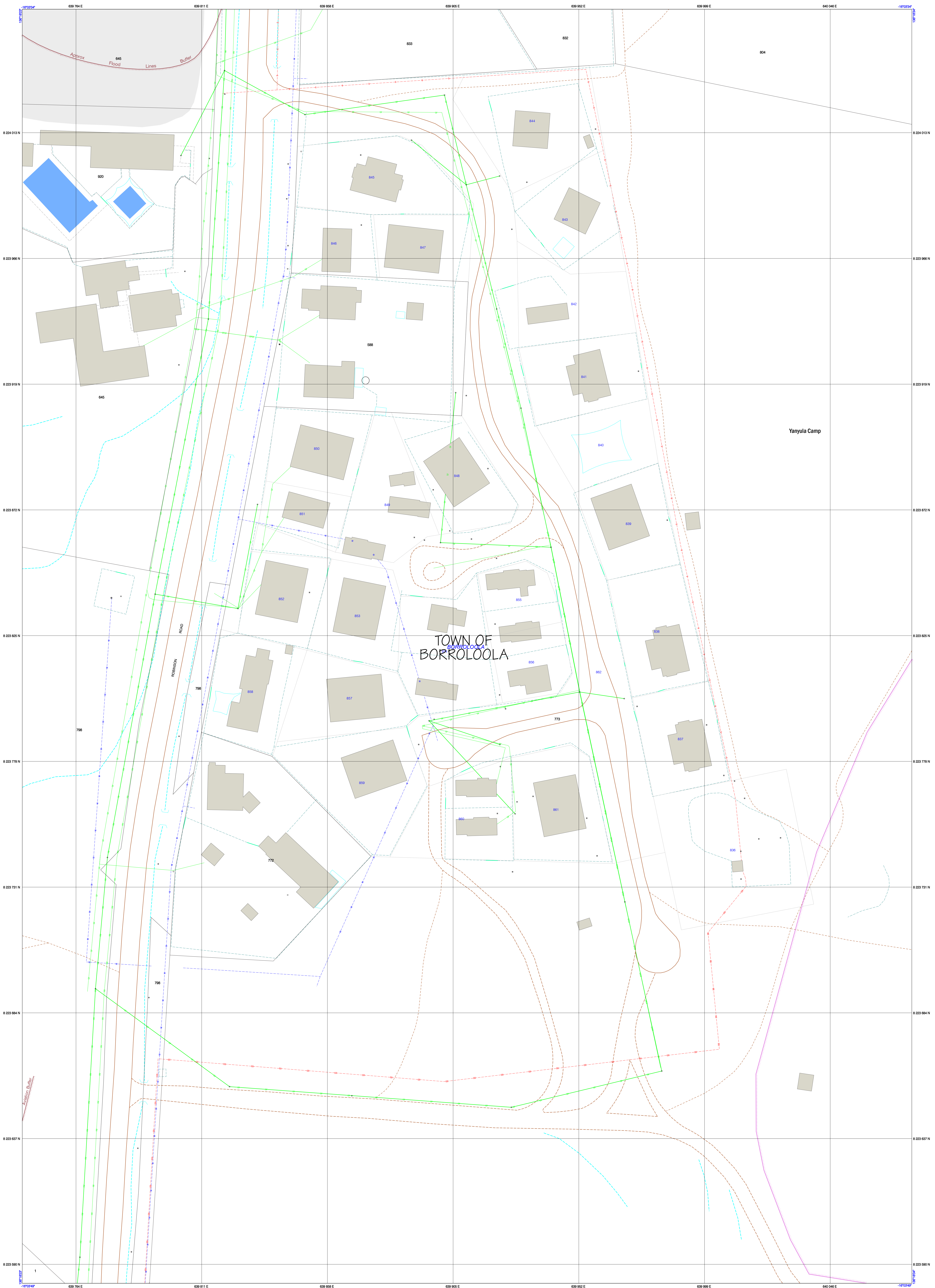
- Start of road
- Road_Condition**
- 1-Very poor
- 2-Poor
- 3-Good
- 4-Very good
- 5-Excellent
- Town Camp boundary



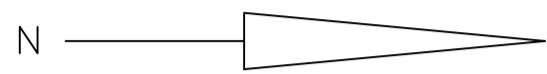
Date: 11/02/2017 Version: 1
Coordinate system: GDA 1994

NT Town Camp Road Assessments
278 - Yanyula (Borroloola)

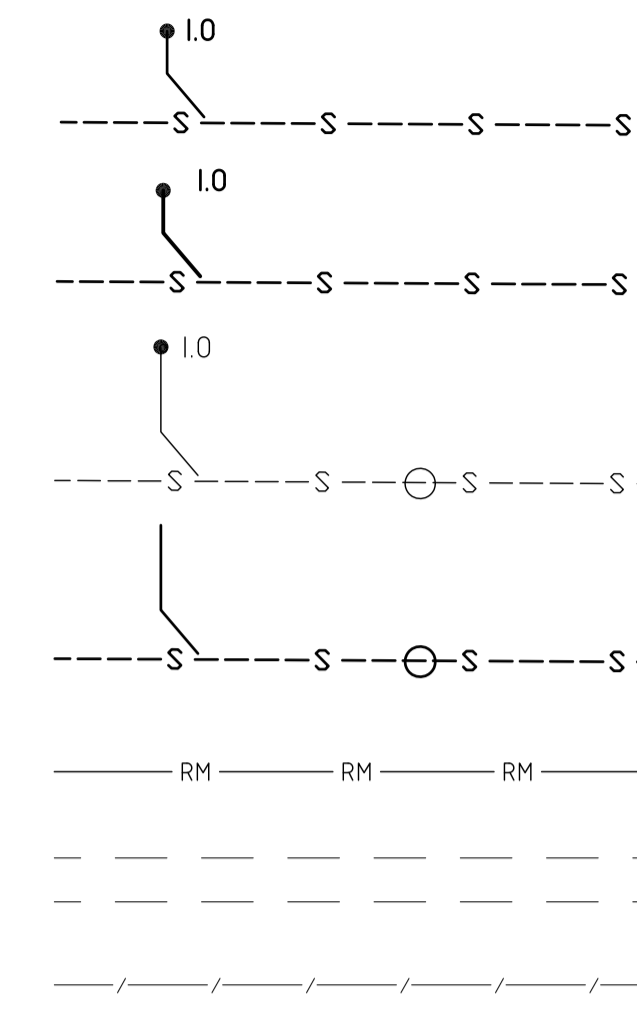
Existing drawings



<p>LAND USE PLANNING</p> <p>APPROX POSITION OF BUILDING constructed on site of property</p> <p>LAND EXCLUDED FROM DEVELOPMENT</p> <p>GENERAL EXCLUSIONS/RESERVED CULTURAL EXCLUSION AREAS</p> <p>Unauthorised entry, works or use of land which may be a matter of offence under the Northern Territory Aboriginal Land Act. For conditions relating to entry or use of land with a Cultural Exclusion Area, contact the Aboriginal Land Protection Authority (ALPA) email: enquiries@alpa.gov.au or Phone 8999 4232</p> <p>This notice does not require the need for entry, works or use which may be required under the Aboriginal Land Rights (PAL) Act. In the case of Aboriginal Land, contact the ALPA.</p>	<p>CADASTRE</p> <p>Proposed 123</p> <p>Locality LOCALITY</p> <p>TOPOGRAPHY</p> <p>Road Subject, Bridge</p> <p>Road Unsealed, Track</p> <p>Footpath, Drain, Culvert</p> <p>Wall, Gate, Fence, Cable Grid</p> <p>Railway, Disused Railway</p> <p>Accessions, Runway, Landing Strip</p> <p>Tel Aviv, Apron</p> <p>Pipeline: Oil, Water, Undetermined Gas, Sewer</p> <p>Building, Building Stage, uncompleted</p> <p>Shade Structures, Incomplete Building</p> <p>Sewage Ponds, Tailings Pond</p> <p>Oval, Area, Swimming Pool</p> <p>High Water Mark, Low Water Mark</p> <p>Mine, Quarry, Surface Elevation</p> <p>Contour, Index, Intermediate</p> <p>Contour, Depression</p>	<p>LEGEND</p> <p>Top of Bank, Bottom of Bank, Cliff</p> <p>Watercourse, Perennial, Intermittent, Channel or Canal</p> <p>Water Body, Perennial, Intermittent</p> <p>Water Body, Reservoir, Water Hole</p> <p>Swamp, Swamp Perennial, Swamp Intermittent</p> <p>Flat, Mud Flat, Clay/Silt/clay, SH</p> <p>Pink, Power, Gas, Light, Cable</p> <p>Tank, Water, Electric, Non Water, Silo</p> <p>Manhole, Pylon, Communication Tower, Pole</p> <p>UTILITY SERVICES</p> <p>ELECTRICITY</p> <p>LOW VOLTAGE LV</p> <p>HIGH VOLTAGE HV</p> <p>WATER RETICULATION</p> <p>WATER MAIN</p> <p>WATER RESERVOIR</p> <p>SEWER</p> <p>SEWER MAIN</p> <p>SEWER RESERVOIR</p>	<p>Locality Diagram</p> <p>AVAILABLE FROM AND PRODUCED BY:</p> <p>Dept Lands, Planning and the Environment Land Information Division 3rd Floor 14th House, Darwin GPO Box 1660 Darwin NT 0801 http://www.lpi.gov.au/dlpe</p> <p>Northern Territory Government</p>	<p>This product is a compilation of data holdings from (but not restricted to) NT Dept of Lands, Planning and the Environment, NT Dept of Housing, Local Government and Regional Services, Power and Water Corporation and Aboriginal Areas Protection Authority.</p> <p>Whilst every effort has been made to ensure the accuracy of this map, errors and omissions may occur. No warranty is given concerning the accuracy of the information herein. Users should refer to the originating bodies or departments regarding the accuracy and currency of the data.</p> <p>General enquiries, corrections, updates, errors and omissions: Indigenous Community Land Use Planning, Dept of Lands, Planning and the Environment TEL: (08) 8999 1300, FAX: (08) 8999 7189, Email: planning@nt.gov.au</p> <p>Topographic Information: Land Information Division Dept of Lands, Planning and the Environment TEL: (08) 8999 5311 FAX: (08) 8999 5306 Email: landinfo@nt.gov.au</p> <p>Power, Water or Sewer Information: Northern Territory Planning Branch Power and Water Corporation TEL: (08) 8999 5304 FAX: (08) 8999 5300 Email: planning@nt.gov.au</p> <p>Aboriginal Areas Protection Authority: The Registrar Aboriginal Areas Protection Authority TEL: (08) 8999 4232 FAX: (08) 8999 5110 Email: enquiries@aaapa.gov.au</p> <p>Cadastral Information: Office of the Survey General Dept of Lands, Planning and the Environment TEL: (08) 8999 5263 FAX: (08) 8999 5262 Email: landinfo@nt.gov.au</p> <p>Planning Information: Indigenous Community Land Use Planning Dept of Lands, Planning and the Environment TEL: (08) 8999 7189 FAX: (08) 8999 7189 Email: planning@nt.gov.au</p> <p>Housing Infrastructure Information: Infrastructure Delivery Branch Dept of Housing, Local Government & Regional Services TEL: (08) 8999 9013 FAX: (08) 8999 5110 Email: info.dh@nt.gov.au</p>	<p>SOURCE INFORMATION</p> <p>CURRENCY OF TOPOGRAPHY: 26 Jun 2012</p> <p>SOURCE MAP SCALE: 474</p> <p>HORIZONTAL DATUM: GDA84</p> <p>VERTICAL DATUM: AHD</p> <p>PROJECTION: Transverse Mercator</p> <p>DATE GENERATED: 24 June 2013</p> <p></p> <p></p> <p>0 8 16 24 32 40 metres</p>	<p>SERVICED LAND AVAILABILITY PROGRAM</p> <p>SLAP Map</p> <p>Yanyula (Borroloola Town Camp)</p> <p>Borroloola Town Camp</p> <p>Roper Gulf Shire Council</p> <p>Community ID : 278</p>
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LEGEND



NEW INSPECTION OPENING ON EXISTING PROPERTY CONNECTION WHERE APPLICABLE

NEW INSPECTION OPENING AND NEW PROPERTY CONNECTION WHERE APPLICABLE

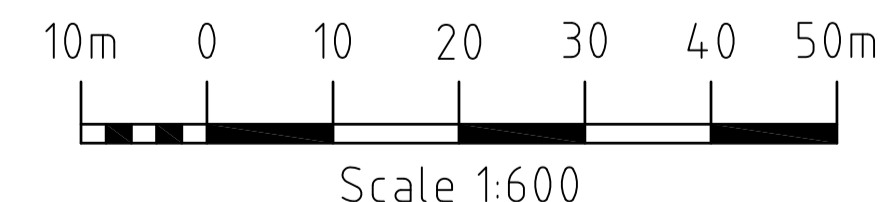
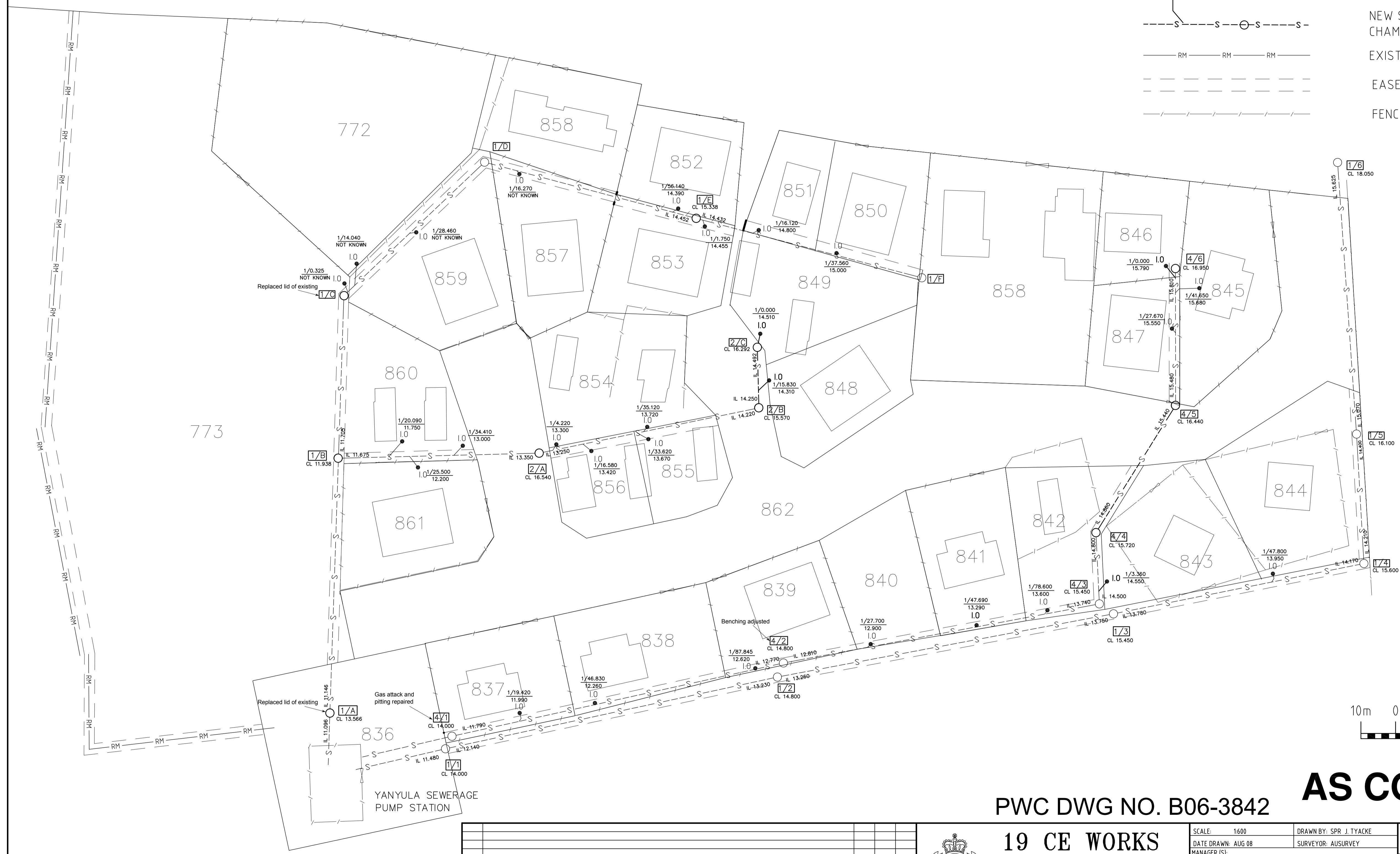
EXISTING SEWER GRAVITY MAIN, ACCESS CHAMBER & HOUSE CONNECTION POINT

NEW SEWER GRAVITY MAIN, ACCESS CHAMBER & HOUSE CONNECTION POINT

EXISTING SEWER RISING MAIN

EASEMENT

FENCE



AS CONSTRUCTED

PWC DWG NO. B06-3842

ALPHA	DESCRIPTION	BY	CHKD	DATE
	AMENDMENTS			



19 CE WORKS
 373a AVOCA STREET RANDWICK NSW 2031
 Telephone (02) 934-90242 Facsimile (02) 934-90243
 Designed and drawn by 19 Chief Engineer Works under a quality system certified as complying with ISO / AS 9001 by an accredited body.

SCALE: 1:600
 DATE DRAWN: AUG 08
 MANAGER (S):
 PROJECT ENGINEER: CAPT D. WALKER
 SENIOR PROJECT ENGINEER: MAJ J. TATE
 CHIEF ENGINEER: LT COL D. COYLE

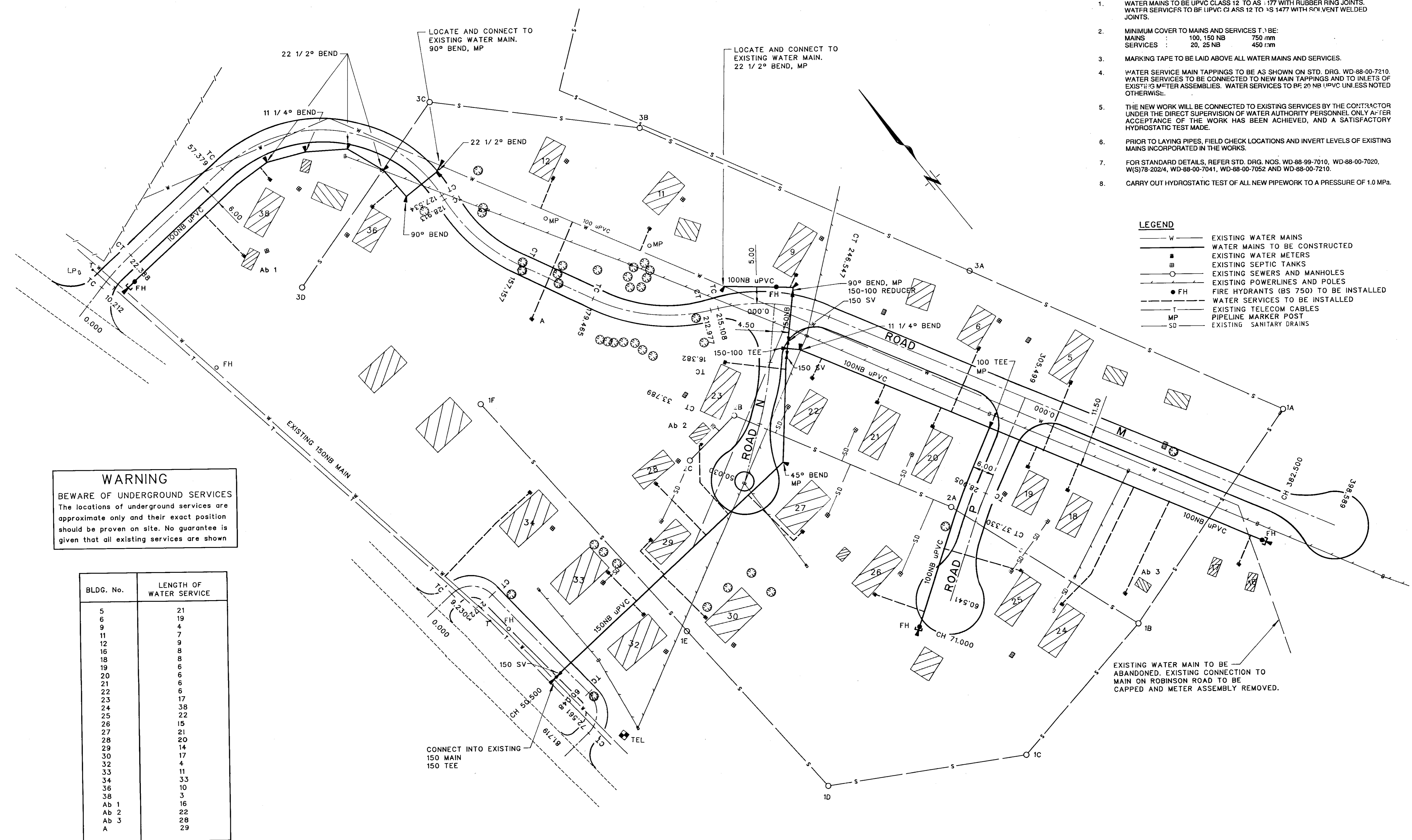
DRAWN BY: SPR J. TYACKE
 SURVEYOR: AUSURVEY
 PROJECT: AACAP 2006 BORROLOOLA, NT
 TITLE: YANULA COMMUNITY SEWER PLAN
 SIZE: A1
 DRAWING NUMBER: 985-148-X04
 DRAWING STATUS: AS CONSTRUCTED

NOTES

1. WATER MAINS TO BE UPVC CLASS 12 TO AS 177 WITH RUBBER RING JOINTS. WATER SERVICES TO BE UPVC CLASS 12 TO AS 1477 WITH RIVET WELDED JOINTS.
2. MINIMUM COVER TO MAINS AND SERVICES TO BE:
 MAINS : 100, 150 NB 750 mm
 SERVICES : 20, 25 NB 450 mm
3. MARKING TAPE TO BE LAID ABOVE ALL WATER MAINS AND SERVICES.
4. WATER SERVICE MAIN TAPPINGS TO BE AS SHOWN ON STD. DRG. WD-88-00-7210. WATER SERVICES TO BE CONNECTED TO NEW MAIN TAPPINGS AND TO INLETS OF EXISTING METER ASSEMBLIES. WATER SERVICES TO BE 20 NB UPVC UNLESS NOTED OTHERWISE.
5. THE NEW WORK WILL BE CONNECTED TO EXISTING SERVICES BY THE CONTRACTOR UNDER THE DIRECT SUPERVISION OF WATER AUTHORITY PERSONNEL ONLY AFTER ACCEPTANCE OF THE WORK HAS BEEN ACHIEVED, AND A SATISFACTORY HYDROSTATIC TEST MADE.
6. PRIOR TO LAYING PIPES, FIELD CHECK LOCATIONS AND INVERT LEVELS OF EXISTING MAINS INCORPORATED IN THE WORKS.
7. FOR STANDARD DETAILS, REFER STD. DRG. NOS. WD-88-89-7010, WD-88-00-7020, W(S)78-202/4, WD-88-00-7041, WD-88-00-7052 AND WD-88-00-7210.
8. CARRY OUT HYDROSTATIC TEST OF ALL NEW PIPEWORK TO A PRESSURE OF 1.0 MPa.

LEGEND

- W — EXISTING WATER MAINS
- W — WATER MAINS TO BE CONSTRUCTED
- EXISTING WATER METERS
- EXISTING SEPTIC TANKS
- EXISTING SEWERS AND MANHOLES
- EXISTING POWERLINES AND POLES
- FH FIRE HYDRANTS (BS 750) TO BE INSTALLED
- WATER SERVICES TO BE INSTALLED
- EXISTING TELECOM CABLES
- MP PIPELINE MARKER POST
- SD EXISTING SANITARY DRAINS



WARNING
 BEWARE OF UNDERGROUND SERVICES
 The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown

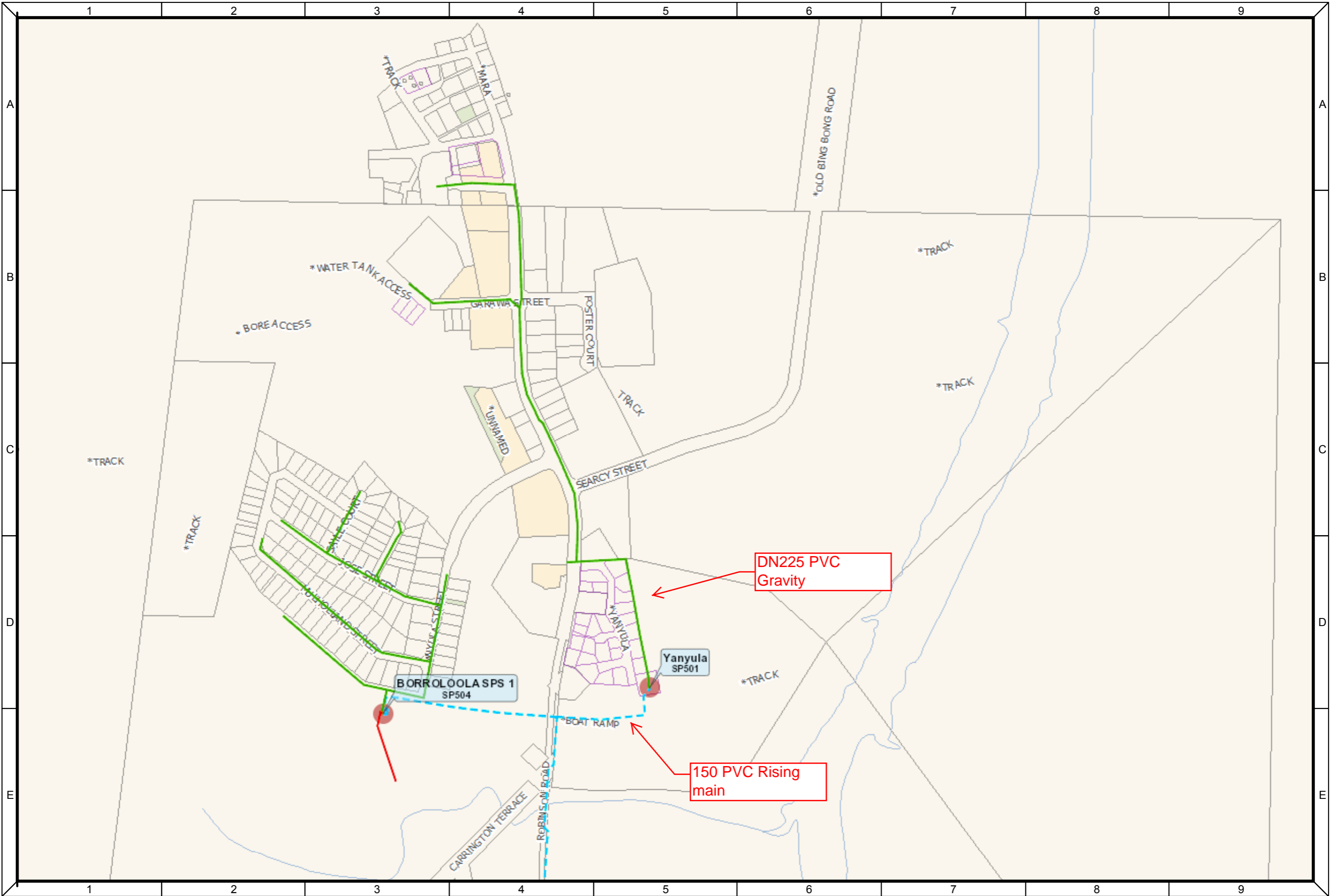
BLDG. No.	LENGTH OF WATER SERVICE
5	21
6	19
9	4
11	7
12	9
16	8
18	8
19	6
20	6
21	6
22	6
23	17
24	38
25	22
26	15
27	21
28	20
29	14
30	17
32	4
33	11
34	33
36	10
38	3
Ab 1	16
Ab 2	22
Ab 3	28
A	29

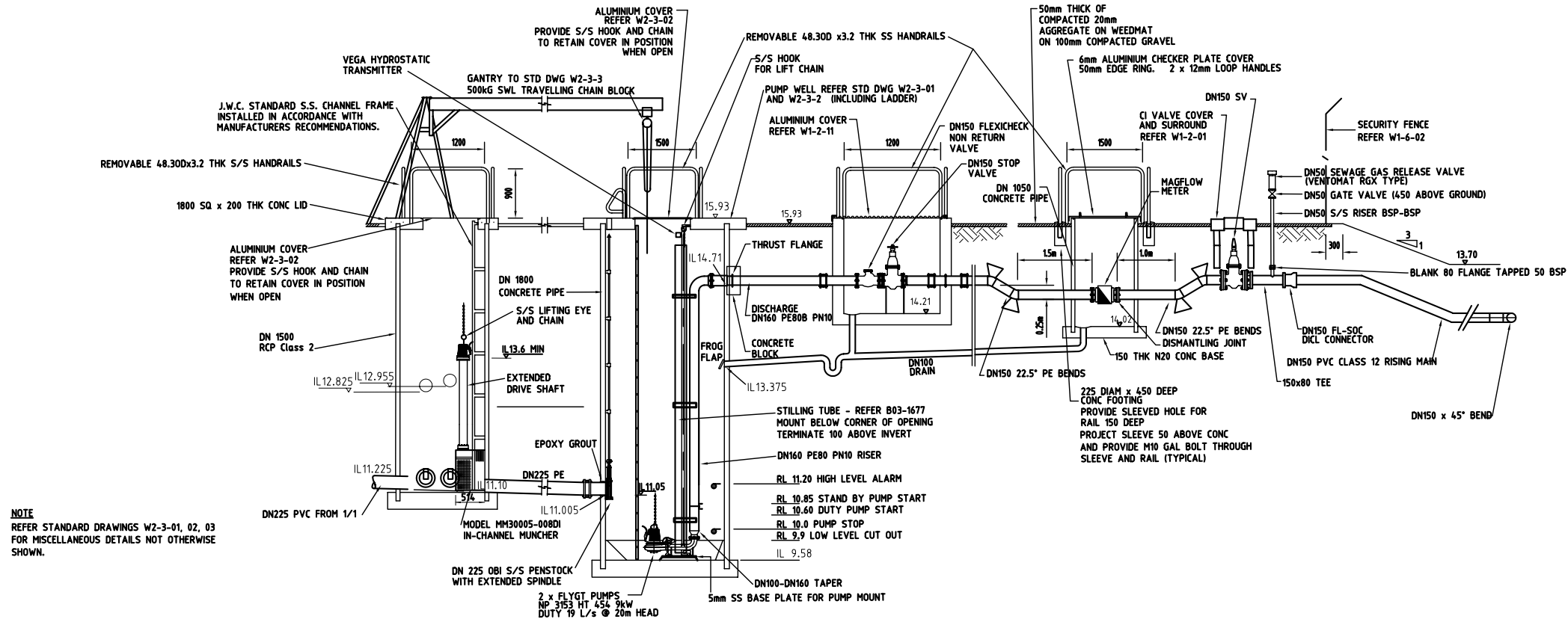
CONNECT INTO EXISTING 150 MAIN 150 TEE

EXISTING WATER MAIN TO BE ABANDONED. EXISTING CONNECTION TO MAIN ON ROBINSON ROAD TO BE CAPPED AND METER ASSEMBLY REMOVED.

<p>WILLING & PARTNERS CONSULTING ENGINEERS INCORPORATED IN THE A.C.T. TEM HOUSE, EDMUNDS STREET, DARWIN 5790 CENTREPOINT, HARTLEY STREET, ALICE SPRINGS, NT 5750</p>			DESIGNED N. R. H.		BORROLOOLA TOWN CAMPS ROADWORKS AND WATER SUPPLY WATER SUPPLY — YANYULA	SCALE IN METRES 1:500	
			DRAWN D. G. P.			COPYRIGHT RESERVED DATUM A.H.D.	SHEET No. 26 OF 29
DRAWING No. _____ SUBJECT _____ AMDT. _____ DESCRIPTION _____ DATE _____ INIT. _____			TRACED _____	CHECKED <i>NEH</i>	DRAWING No. R92-3074 AMEND. _____		SCALE FOR MICROFILM REDUCTION
ASSOCIATED DRAWINGS _____ AMENDMENTS _____			DATE 4/9/91	PRINCIPAL <i>John</i>			0 10 20 30 40 50 60 70 80 90 100

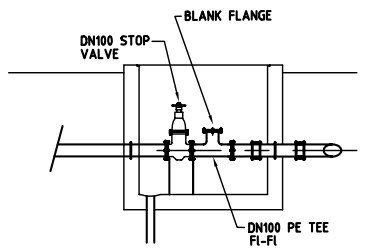
All network data is the property of Power and Water and no warranty as to the accuracy or completeness of information is provided. No liability for any loss or damage arising from the use of this information will be accepted. Content copyright (c) Power and Water Corporation. Maps may include content Copyright (c) NT Government. Restricted Works Areas: Unauthorised entry, works on or use of land where there is a sacred site is an offence under the Northern Territory Aboriginal Sacred Sites Act. Persons contemplating entry, works on or use of land within or in the vicinity of cultural exclusion area must contact AAPA to identify conditions that apply and if necessary make an application for an Authority Certificate for their entry, works or use. Contact: The Registrar - Aboriginal Areas Protection Authority at enquiries.aapa@nt.gov.au.



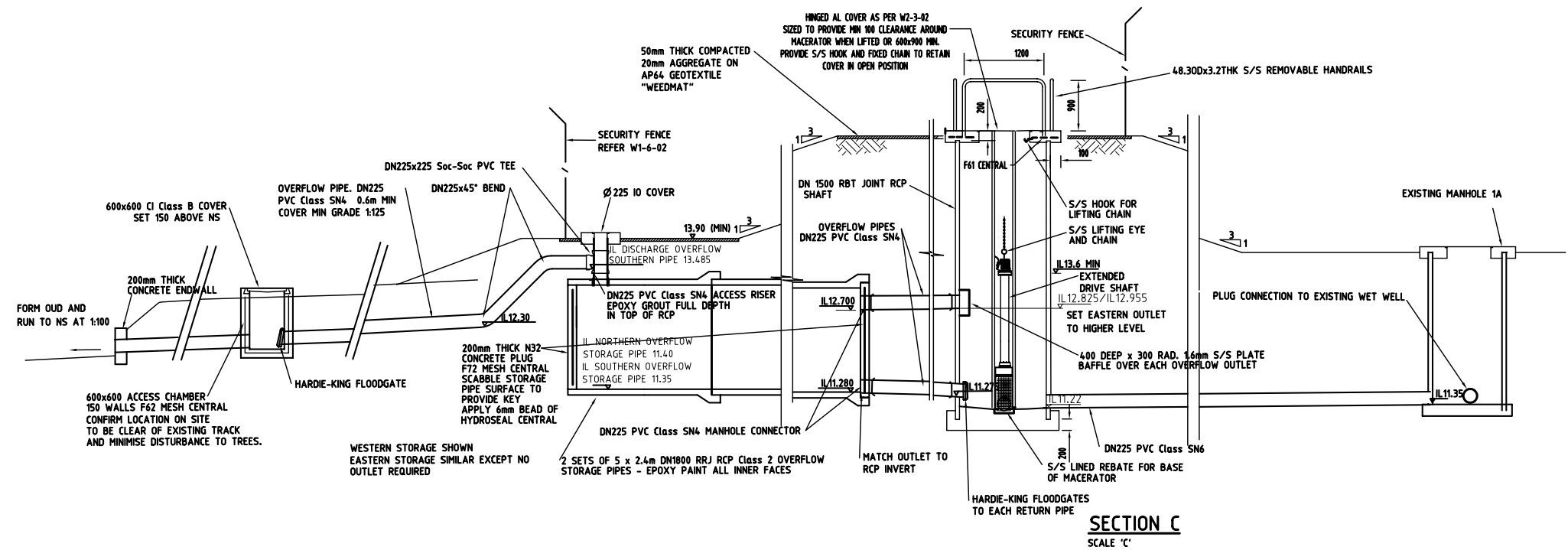


NOTE
REFER STANDARD DRAWINGS W2-3-01, 02, 03
FOR MISCELLANEOUS DETAILS NOT OTHERWISE
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SECTION A
SCALE 'B'



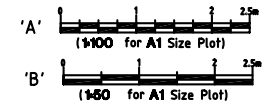
SECTION B
SCALE 'B'



SECTION C
SCALE 'C'

PUMP STATION

REFER B02-4345 FOR LOCATION OF SECTIONS



NOTE : * INDICATES SIGNATURES ON ORIGINAL
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F	ISSUED FOR PAWC APPROVAL (MISC. CHANGES)	MC		6.06.03	
G	ISSUED FOR CONSTRUCTION	MC	*PT	26.06.03	
H	AS CONSTRUCTED AMENDMENTS - AUSURY P/L			26/11/03	
D	ISSUED FOR RE-TENDER	LDM		17.04.03	
E	DN150 PVC RISING MAIN ADDED	LDM		20.05.03	
No.	Revision - Revise on CAD do not amend by hand	Checked	Approved	Date	M/F/In

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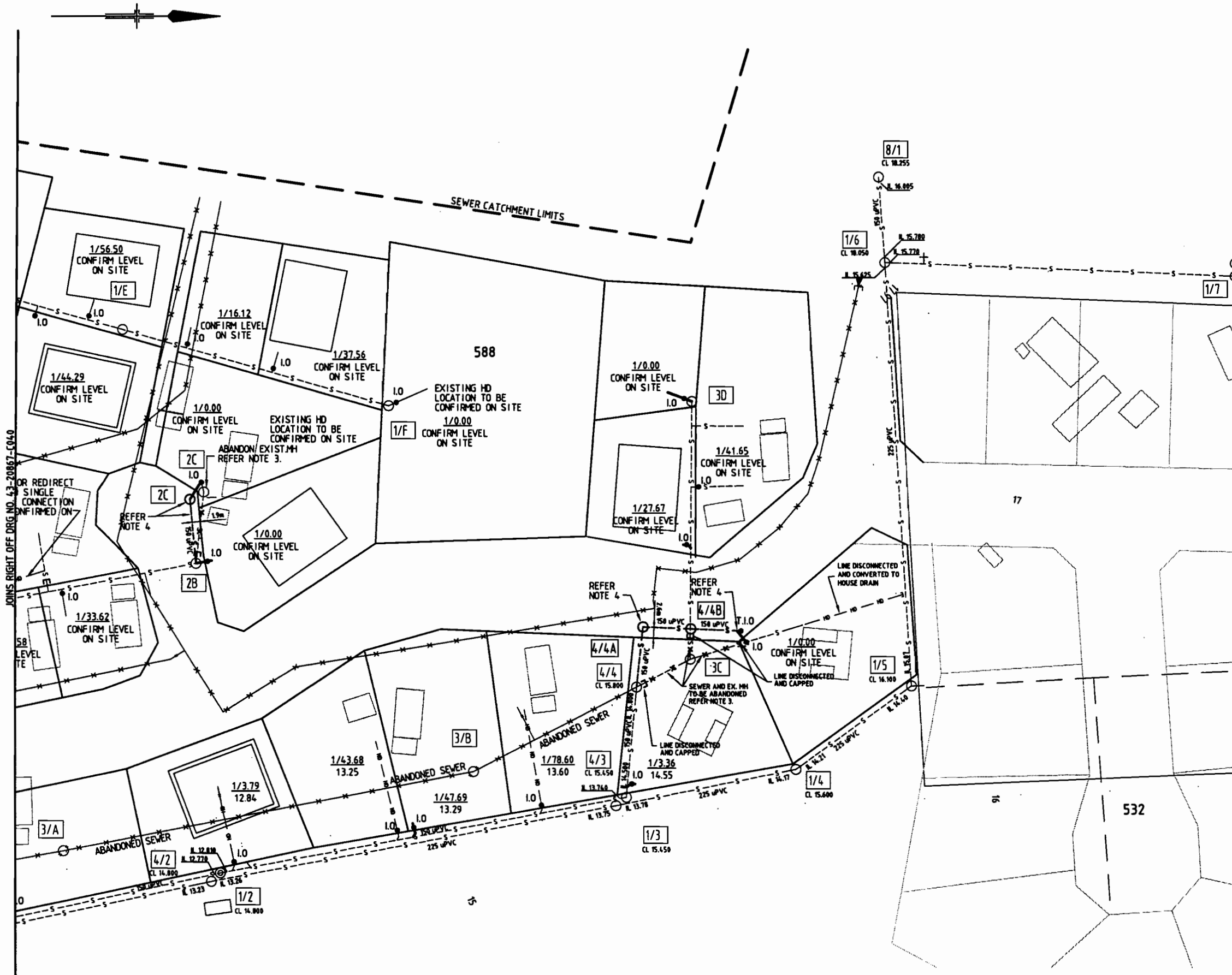
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Client and Job RRUMBURRIYA MALANDARI COUNCIL BOROLOOLA SEWERAGE UPGRADE	Title YANYULA - AS CONSTRUCTED SEWAGE PUMP STATION DETAILS
Size A1	Dwg. No. 20134C11
4598 H	

FOR LEGEND REFER TO
DRG. NO. 43-20867-C040

NOTE

1. FOR LOT BOUNDARY SETOUT COORDINATES FOR YANYULA, REFER TO DRG. NO. 43-20867-C024.
2. CONFIRM CONDITION OF SEWER LINES 1/A TO 1/F, 1/B TO 2/C, 4/4 TO 3/D PRIOR TO INSTALLATION OF INSPECTION OPENINGS.
3. ABANDONED MANHOLE:
CUT TOP 300mm OFF MANHOLE, FILL WITH 3% CEMENT STABILISED SAND AND REINSTATE SURFACE.
4. INVERT LEVEL TO BE DETERMINED BY CONTRACTOR AND APPROVED BY SUPERINTENDENT PRIOR TO WORKS ON SITE.



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PWC DRG No. B06-3843

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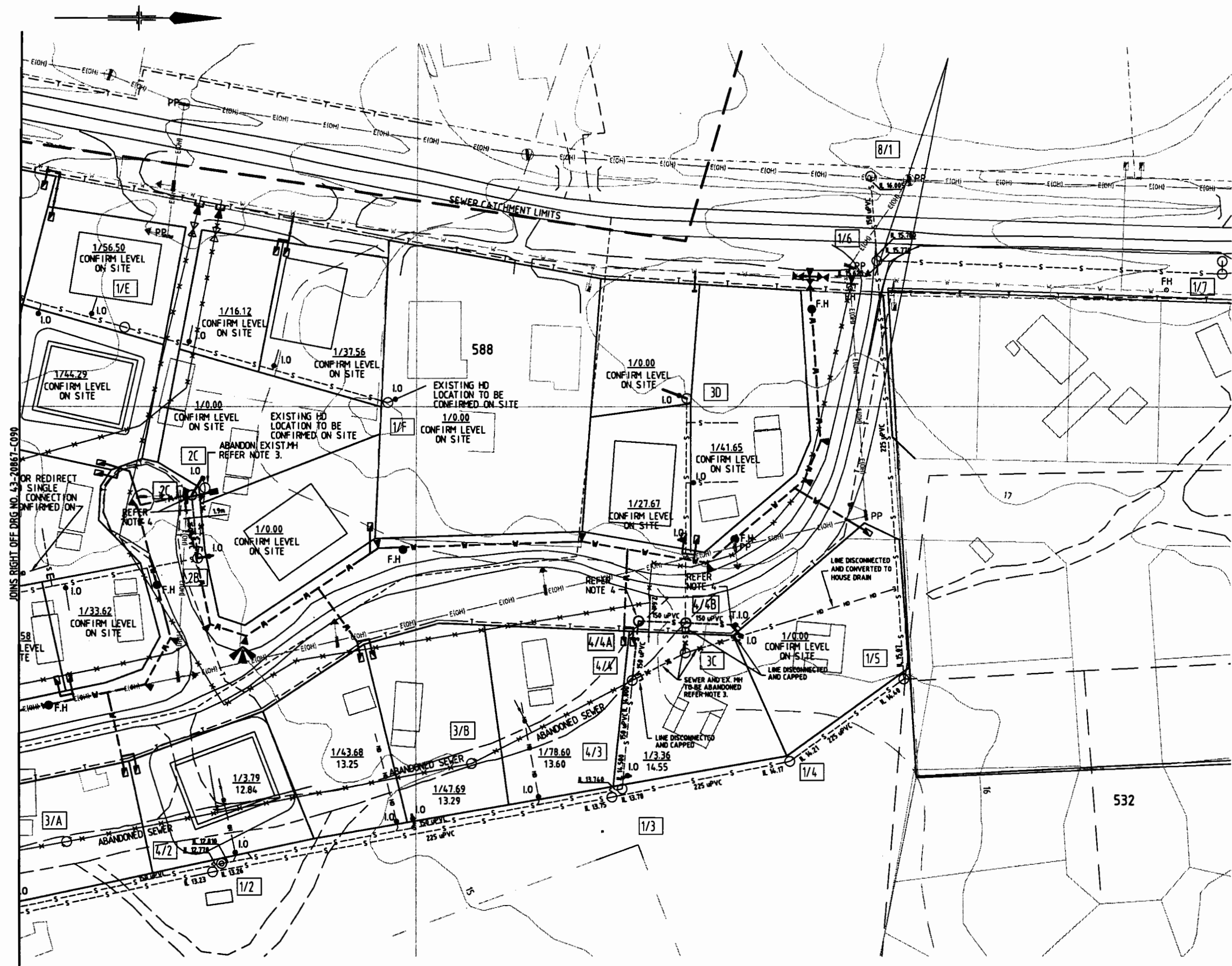
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Client	AUSTRALIAN ARMY 19 CHIEF ENGINEER WORKS
Project	BORROLOOLA NAHS -MARA YANYULA & GARAWA 1
Title	SEWER RETICULATION PLAN FOR YANYULA SHEET 2 OF 2
Original Size	A1
Drawing No:	43-20867-C041
Rev:	4

FOR LEGEND REFER TO
DRG. NO. 43-20867-C090

NOTE

1. FOR LOT BOUNDARY SETOUT COORDINATES FOR YANYULA, REFER TO DRG. NO. 43-20867-C024.
2. CONFIRM CONDITION OF SEWER LINES 1/A TO 1/F, 1/B TO 2/C, 4/4 TO 3/D PRIOR TO INSTALLATION OF INSPECTION OPENINGS.
3. ABANDONED MANHOLE:
CUT TOP 300mm OFF MANHOLE, FILL WITH 3% CEMENT STABILISED SAND AND REINSTATE SURFACE.
4. INVERT LEVEL TO BE DETERMINED BY CONTRACTOR AND APPROVED BY SUPERINTENDENT PRIOR TO WORKS ON SITE.



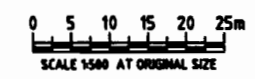
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Client	AUSTRALIAN ARMY 19 CHIEF ENGINEER WORKS
Project	BORROLOOLA NAHS - MARA YANYULA & GARAWA 1
Title	MASTER PLAN FOR YANYULA
	SHEET 2 OF 2
Original Size	A1
Drawing No:	43-20867-C091
Rev:	0

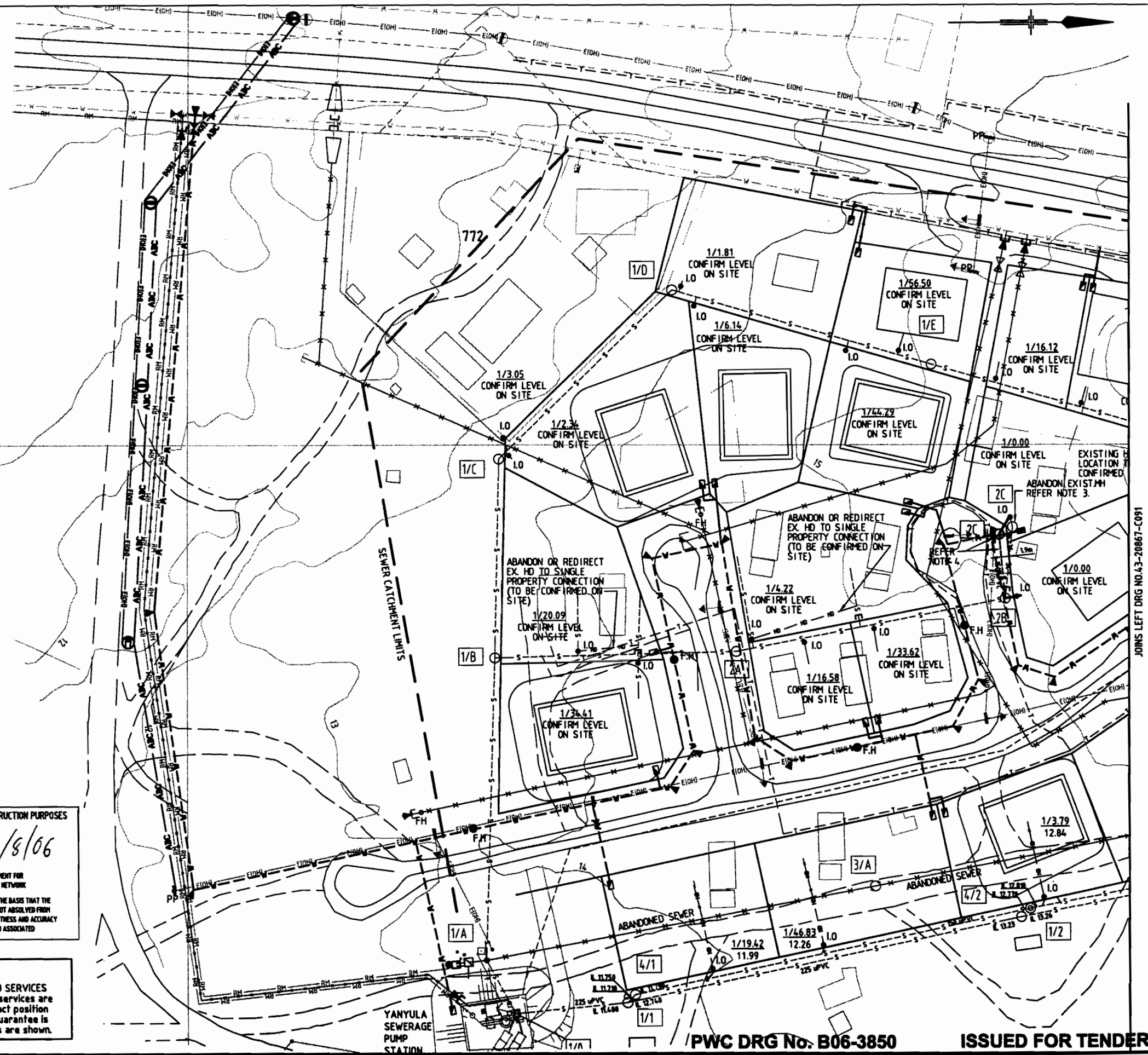
LEGEND FOR MARA, YANYULA & GARAWA 1



- NEW INSPECTION OPENING ON EXISTING PROPERTY CONNECTION WHERE APPLICABLE
- REFER STD DRG W2-1-01, W2-1-02, W2-1-03, W2-1-04 & W2-1-05 FOR TYPE
- NEW INSPECTION OPENING AND NEW PROPERTY CONNECTION WHERE APPLICABLE
- REFER STD DRG W2-1-01, W2-1-02, W2-1-03, W2-1-04 & W2-1-05 FOR TYPE
- NEW WATERMAIN TO BE CONSTRUCTED
- NEW WATER STOP VALVE
- NEW ALLOTMENT BOUNDARY
- PROPERTY SERVICE INCLUDING METER & BACKFLOW PREVENTION DEVICE WHERE APPLICABLE
- NEW WATER CONNECTION TO VACANT LAND. REFER DETAIL 'A' ON DRG NO. C023.
- PROPOSED WATER MAIN AND FUTURE WATER CONNECTION TO VACANT LAND.
- EXISTING SEWER GRAVITY MAIN, ACCESS CHAMBER & HOUSE CONNECTION POINT
- PROPOSED SEWER GRAVITY MAIN & ACCESS CHAMBER
- EXISTING, SANITARY DRAINAGE HOUSE DRAIN CONNECTION TO REMAIN
- EXISTING WATERMAIN TO REMAIN
- FUTURE WATERMAIN AND FIRE HYDRANT
- EXISTING PIPELINE TO BE DISCONNECTED, CAPPED & ABANDONED
- EXISTING ELECTRICAL LINE
- EXISTING TELECOMMUNICATION LINE
- EXISTING, O/HEAD POWER LINE AND POWER POLE
- STN RS09A SURVEY STATION
- SV EXISTING STOP VALVE
- RM EXISTING SEWER RISING MAIN
- RM EXISTING WATER RISING MAIN
- EXISTING CADASTRAL BOUNDARY TO BE SUPERCEDED
- FUTURE CADASTRAL BOUNDARY
- EXISTING FIRE HYDRANT
- NEW FIRE HYDRANT
- NEW SINGLE AIR VALVE. REFER DETAIL ON DRG NO. C036
- EXISTING WATER METER OFF EXISTING WATER MAIN
- PROPERTY CONNECTION TYPE/DIST. TO D/S M/H APPROX. EXISTING SEWER SERVICE HEIGHT OR MAXIMUM SEWER SERVICE HEIGHT FOR NEW SEWERS
- FUTURE SEWER EXTENSION AND PROPERTY CONNECTION - NO WORKS REQUIRED
- EXISTING SEWER, FUTURE PROPERTY CONNECTION CAPPED
- TERMINAL INSPECTION OPENING - REFER STD DRG W2-1-05
- NEW ALLOTMENT BOUNDARY
- EXISTING OVERHEAD POWERLINE
- NEW OVERHEAD, HV LV POWERLINE, REFER TO NOTE 4
- NEW 4 CORE LV ABC 95 mm² A1 XCPE CONDUCTOR
- NEW LV/HV POWER POLE
- EXISTING LV/HV POWER POLE
- NEW LV/HV POWER POLE
- EXISTING LV/HV POWER POLE

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Client **AUSTRALIAN ARMY 19 CHIEF ENGINEER WORKS BORROLOOLA NAHS - MARA YANYULA & GARAWA 1**
 Project **MASTER PLAN FOR YANYULA SHEET 1 OF 2**
 Title
 Original Size
 Drawing No: **43-20867-C090**
 Rev: **0**

Transformer data

Group	Com Id	Location	Community Name	Dwellings No. (Funded Dwellings)	Dwellings No. (Bennett Design)	New Houses ** (Future Demand)	Primary Voltage Level (KV)	PWC Substation ID	PWC Test Number	Transformer size (KVA)	KVA Total dwellings @ 4.5KVA	KVA Total dwellings @ 7KVA	Comments
1	290	Darwin	Bagot	55	55		11	1924	1735	300	247.5	385	
	344	Darwin	Knuckey Lagoons	18	19	2	11	1771	2163	100	85.5	133	
	347	Darwin	Kulaluk	19	19		11	1092	10607	50	85.5	133	
	403	Darwin	Palmerston Town Camp	20	16		22	10196	10245	100	90	140	Two transformers for this Town Camp. Transformers are not in boundary of Town Camp [The nearest transformers data to Town Camp are highlighted in yellow].
							22	265	11645	25			
	412	Darwin	Railway Dam (One Mile Dam)	5	6	2	11	1041	4378	200	27	42	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	427	Adelaide River	Amangal	9	9		22	216	12187	100	40.5	63	Two transformers for this Town Camp.
	687	Jabiru	Manabadurma	10	12		11	5050	11107	200	54	84	
825	Darwin	Minmarama Park	24	24		11	2147	11372	100	108	168		
2	606	Katherine	Warlpiri Transient Camp	9	9		22	6416	4886	100	40.5	63	Two transformers for this Town Camp.
							22	6074	4695	25			
	621	Katherine	Miali Brumby (Kalano)	47	31		22	6133	12247	315	211.5	329	
	640	Pine Creek	Pine Creek Compound	4	4		22	6666	3147	25	18	28	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
971	Mataranka	Mulggan	12	9	4	22	6819	5296	16	54	84		
						22	6818	5297	16				
						22	6384	11028	25				
3	215	Tennant Creek	Blueberry Hill (Munji-Marla)	2	2		22	7079	1868	200	9	14	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	223	Tennant Creek	Dump Camp (Marla-Marla)	7	7		22	7181	11088	200	31.5	49	
	224	Elliott	Elliott South Camp	12	12		11	7504	4718	200	54	84	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	225	Elliott	Elliott North Camp	36	25		11	7505	4715	100	162	252	
	238	Tennant Creek	Kargaru (East Side Camp)	12	12	1	22	7572		200	54	84	
	246	Tennant Creek	Ngalpa Ngalpa	18	21		22	7179		200	94.5	147	Two transformers for this Town Camp.
							22	7033	10904	315			
	271	Tennant Creek	Village Camp	12	12	1	22	7183	11107	200	54	84	
681	Tennant Creek	Tingkarli	12	12		22	7180		200	54	84		
684	Tennant Creek	Wuppa	15	15	1	22	7141	11092	100	67.5	105	Two transformers for this Town Camp.	
						22	7182	11095	200				
4	3	Alice Springs	Akngwertnarre (Morris Soak)	11	15		11	8596	11336	300	67.5	105	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	16	Alice Springs	Anthelk Ewlpaye (Charles Creek)	17	10		11	8569	315	315	76.5	119	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	17	Alice Springs	Anthepe	15	15		22	8598	5874	200	67.5	105	Data extracted from PWC asset information. There was not access to this Town Camp due to ceremony on inspection day.
							22	8597	11244	315			
	19	Alice Springs	Aper Alwerrkng (Palmers)	7	6		11	8405	2939	200	31.5	49	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	35	Alice Springs	Ewyenper Atwatye (Hidden Valley)	47	47		11	8622	11202	100	211.5	329	
							11	8623	11203	100			
							22	8625	11205	63			
							11	8626	11204	100			
	47	Alice Springs	Ilparpa	13	13		22	8611	11702	200	58.5	91	
	48	Alice Springs	Ilperle Tyathe (Walpiri)	10	9		11	8001	11209	315	45	70	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	50	Alice Springs	Ilyperenye (Old Timers)	10	10		22	8145	3323	100	45	70	
	64	Alice Springs	Bassos	2	2		11	8002	10946	50	9	14	
	69	Alice Springs	Karnte	19	19		22	8282	2345	100	85.5	133	
87	Alice Springs	Yarrenty Altere (Larapinta Valley)	34	34		11	8617	11334	100	153	238		
						11	8618	11200	63				
						11	8619	11335	100				
						11	8620	11201	100				
90	Alice Springs	Inarlenge (Little Sisters)	16	22		22	8137	2925	100	99	154	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
108	Alice Springs	Mpwetyerre (Abbotts)	6	6		11	8093	11703	315	27	42	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
113	Alice Springs	Mount Nancy (Nyewente)	11	12		11	8405	2939	200	54	84		
129	Alice Springs	Nyewente (Trucking Yards)	26	26		11	8629	11312	300	117	182		
675	Alice Springs	Hoppys	15	19						85.5	133	There is not any Transformer in boundary of Town Camp. Also it's not shown in PWC asset information.	
676	Alice Springs	Ilpiye Ilpiye (Golders Camp)	15	14		11	8314	369	50	67.5	105		
1029	Alice Springs	Kunoth	4	4		11	8569	315	315	18	28	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
5	222	Borrooloola	Mara	28	29	2	11	6187	12610	100	130.5	203	Two transformers for this Town Camp.
							11	6545	10203				
	229	Borrooloola	Garawa 1	16	14		11	6546	10166	100	72	112	Two transformers for this Town Camp.
							11	6332	4890	100			
	278	Borrooloola	Yanyula	29	29		11	6162	10496	200	130.5	203	Data extracted from PWC asset information. It's outside of Twon Camp, shown only Transformer to this Town Camp.
						11		10167				This transformer is not shown in PWC asset information. It's installed in Boat Ramp Road near to Town Camp and connected to Electrical reticulation of Town Camp.	
992	Borrooloola	Garawa 2	11	11		11	6189	2669	25	49.5	77		

** For New house's demand calculation see section 13.4 "Future Demand".

Garawa 2

Garwa 2

1 Design

The infrastructure reviews have been undertaken against current relevant standards for typical sub-divisions. The following standards have been used in undertaking the reviews.

Sewerage and water supply

- Water Services Association of Australia – Sewerage Code – WSA 02 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 02
- Water Services Association of Australia – Sewerage Pumping Station Code – WSA 04 -2005 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 04
- Water Services Association of Australia – Water Supply Code – WSA 03 2002 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 03
- Power and Water Corporation Indigenous Community Engineering Guidelines (2008)
- Department of Housing and Community Development Indigenous Community Engineering Guidelines (ICEG 2014, updated September 2016)
- Power and Water Corporation Essential Services Infrastructure Assessment and Upgrade Guidelines (for Town Camps in Urban Communities, 2009)
- Power and Water Corporation Standard Drawings
- Australian Standards

Electrical services

Electrical infrastructure has been assessed against AS/NZS3000 Wiring Rules and against PWC Service, Installation and Metering Rules and Urban Residential Development (URD) Design Standards where possible.

With one exception, town camps are each a single lot and compliance with AS/NZS3000 is sufficient to address potential safety concerns.

As such application of PWC URD Design Standards will mainly apply to the incoming supply and bulk or initial multi-metering panels if provided.

URD Design Standards for internal reticulation and street lighting appear to have been applied in many cases for convenience rather than compliance.

For the purposes of this report, the demand per dwelling allowances of URD Design Standards have been used to estimate incoming supply and overall distribution capacity requirements.

The following standards apply:

- Australian Standards
- Power Networks Design and Construction Guidelines, Power and Water Corporation
 - NP001.1_Design and Construction of Network Assets – General Requirements
 - NP001.3_General Specification for Overhead Electrical Reticulation
 - NP001.6_General Specification for URD Subdivisions
 - NP003_Installation Rules_V3
 - NP007_Service Rules
 - NP027_Capture of Newly Installed Street Lighting Information
 - NP041_Guidelines for Electrical Design Consultants

Further referral to the guidelines in this report will be designated by the guidelines number, NP001.1.

Communications

- National Broadband Network Website viewed 21 January 2017 (<http://www.nbnco.com.au/>) – NBN rollout maps

General

It should be noted that if the town camps are proposed to be subdivided and services assets gifted to Power and Water Corporation (PWC) for operation and maintenance, all of these services will need to fully meet PWC standards. With the exception of a few town camps that have recently been upgraded, this will require the full replacement and/or realignment of most services.

2 Condition assessment

2.1 Rating assessment matrix

A condition rating matrix was developed and used to assess all municipal infrastructure. The same rating was used for all services to maintain consistency in assessments. Table 1 Below shows the condition rating and operability.

Table 1 Condition rating

Condition rating	Operability
1	Very Poor Not operational
2	Poor Not fully operational or requires immediate maintenance to keep operational
3	Good Fully operational, may require routine maintenance
4	Very Good Fully operational, may require maintenance in the next six months
5	Excellent New, fully operational

2.2 Civil assessment limitations

The civil infrastructure condition investigations were subject to a number of limitations. These include:

- Only accessible services have been investigated. This includes inspecting the top of sewer manholes, side entry pits, etc., however, does not include opening pits to inspect infrastructure below ground.
- No physical testing of the sewer, water or stormwater network was undertaken.
- No survey or service locating was undertaken.

As there was no survey, potholing or CCTV undertaken on the underground infrastructure there is insufficient information to make determinations on the asset condition. The condition assessments discussed in this report are only for the accessible services and do not necessarily represent the condition of the underground infrastructure. For the majority of the town camps, other than a few that have recently been upgraded it was found that the underground services are generally undersized and it is likely, due to their age, that the these services are in poor condition. Either factor would trigger the need for a complete replacement to meet current relevant standards.

2.3 Electrical assessment limitations

The electrical infrastructure condition investigations were subject to a number of limitations. These include:

- Inspections were carried out without the assistance of an electrical tradesman.
- Only accessible services were investigated. Assessments were of a visual nature and no pit covers were removed.
- Overhead equipment was assessed from ground level.
- Switchboards were not opened and no assessment of the internal connections or bus ratings was made.
- Electrical infrastructure was assessed down to the meter for multi-meter panels and down to the termination, overhead pole or distribution pillar, of the supply cable to a meter located at a dwelling.

3 Current infrastructure issues

Power and Water Corporation (PWC) have advised of the following concerns and issues in regard to the sewerage, water and electrical infrastructure at all town camps.

3.1 Ownership and maintenance

PWC stated there has always been confusion regarding the ownership and responsibilities of the internal sewer, water and electrical infrastructure. PWC have advised that they have no legal tenure on the majority of assets in any town camps and that the owner is essentially that of the land owner or leaseholder. This is further discussed for each type of infrastructure for each town camp.

The ownership and who is responsible for the maintenance of the sewage pump stations and street lighting is a major concern. In most town camps it was found that PWC have been maintaining the assets on an in-kind basis, although there are no maintenance or access agreements in place and the infrastructure is generally not compliant to PWC standards.

3.2 Access to infrastructure

PWC advised that due to the uncertainty surrounding ownership and responsibility of the sewerage, water and electrical infrastructure, each town camp is seen as a single lot with multiple houses on it. There are no formal road reserves or easements where the municipal infrastructure should be located. PWC therefore have no legal right to enter the town camps to work on the infrastructure, nor can PWC stop others from working on the infrastructure. There is a risk that the maintenance undertaken by others may be to a lower standard than PWC.

It should be noted that there are currently no legal services easements within the town camps, except for a few cases where a town service passes through the town camp. Therefore it is recommended that easements are created over any infrastructure owned by PWC and any future assets to be gifted to PWC, to allow the service providers access to the infrastructure.

3.3 Existing infrastructure

PWC have stated that although the existing sewerage and water infrastructure appears to comply with relevant standards in some locations, the capacity cannot be assumed to meet PWC requirements due to the potential for underground substandard condition and/or grading of pipework. It is likely that these assets will need to be fully replaced to PWC standards to ensure sufficient capacity.

The planning process currently allows construction within the town camps on Commonwealth land without requiring service authority (PWC) approvals. This means that there has been no opportunity for PWC to recover contributions towards required upgrades to headworks servicing the developments and these upgrades have been paid for by PWC in the past. This inconsistency needs to be addressed for future developments within the town camps to ensure PWC are able to continue to provide adequate services.

3.4 Safety concerns

PWC have expressed concerns with safety of PWC staff and contractors working within the camps. PWC have employed procedures such as multiple people / vehicles to attend the site, with police or housing safety officers as required. This

generally leads to a delayed response time and increased cost to respond to and remediate emergency situations.

PWC have also raised the concern that if others work on water infrastructure within the town camps and do not apply the correct sanitation procedures they not only risk contaminating the entire water supply network within the town camp, at some town camps with direct connections to the town supply, they risk contaminating the entire town's water supply.

4 Available information

As the site investigations were limited to accessible/visible services, information on below ground services (such as electrical cables, sewer pipes, water supply pipes, etc.) were determined from available information. This information included:

- Serviced Land Availability Program (SLAP) maps,
- Department of Family & Community Services - Connecting Neighbours Program – Essential Services Scoping Study Report Volume 1 April 2005,
- Connecting Neighbours Project – Infrastructure Assessment and Recommendation Report - Arup Pty Ltd, April 2005,
- Connecting Neighbours Program – Borroloola – Design Report and Option Summary, Volume 3, Arup Pty Ltd, April 2005,
- Drawings supplied by NT Department of Infrastructure - Technical Records,
- Drawings supplied by Power and Water Corporation,
- Bennett Design inspection reports and population data.

Aurecon undertook a site investigation of the Garawa 2 on 14 December 2016 to inspect roads, stormwater drainage, electrical services, sewerage and water supply, and community structures. The following sections detail the outcomes of this investigation and the assessments of the infrastructure.

The civil and electrical inspection reports can be found in the Appendices.

5 Sewerage

5.1 Ownership and boundaries

The sewer infrastructure within Garawa 2 community is owned by Garawa No 2 Housing Aboriginal Corporation, but is the responsibility of Mabunji Aboriginal Resource Indigenous Corporation to maintain.

In the past, PWC have undertaken basic maintenance of the wastewater infrastructure in response to requests from the community, in the absence of support from others. PWC advised that they do not own any of the infrastructure in Garawa 2, including the pump station.

PWC advised that the on lot sewage pump station and reticulation has yet to be completed to PWC standards and has not been handed over. The sewer rising main was upgraded through the Connecting Neighbours Program but has not been handed over. PWC advised that the rising main is likely to require upgrading if additional loads are expected for Garawa 2.

5.1.1 Connection methods and billing

The current payment arrangement for sewerage usage is not known as PWC have advised they are currently not involved as a service provider for Garawa 2.

It is not known what contribution the residents make towards the any sewerage bills.

5.2 Existing infrastructure condition assessment

The sewer infrastructure inspection was limited to inspecting the condition of manhole covers, as all other sewerage infrastructure is below ground. A total of three manholes and one pump station were inspected, with condition ratings as follows:

Table 2 Sewer condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Manhole			3			3
Pump station			1			1



Figure 1 Sewage pump station, condition: *good*



Figure 2 Sewer manhole, condition: *good*

The sewer manholes were in good condition. One was noted to be within a property boundary, and another was a steel lid. It appears as though the current sewer network is not located within the road reserve or easements, which is not in accordance with PWC guidelines.

5.3 Current performance and risks

5.3.1 Current sewer network performance

The current capacity of the sewer network was calculated based on the following design assumptions:

- The adopted minimum grade for the pipework is 1.0%, as advised by Power and Water Corporation.
- The Equivalent Population (EP) has been calculated assuming one household equates to 9 EP, based on discussions with Power and Water Corporation.
- The capacity has been assessed by calculating the current flow rate, and the maximum flow rate when the sewer pipe flows full. The result is then a percentage of how much of the pipe is currently being used.
- Manning's roughness coefficient of the pipework is 0.012, as recommended by PWC for PVC pipes.
- Where the sewer pipe grade, size or material is not known, it is assumed to be non-compliant to PWC standards.
- As Garawa 2 camp disposes to a pump station and absorption trench, the capacity of the pump station has also been assessed.

The current number of houses in Garawa 2 camp is 11, this multiplied by 9 EP per house gives a total current EP of 99.

The pipe size could not be determined from existing drawings or from the site inspection so it was assumed to be DN100, which would have been constructed in accordance with AS3500 at the time of construction. Variations between the previous AS3500 standards current standards mean this size of the pipe is undersized and non-compliant to current PWC standards which requires a DN150 pipe.

The capacity of the existing sewer was calculated. The percentage shows how much of the pipe capacity is currently being used.

Table 3 Existing sewer capacity

Catchment	Current total EP	Diameter of connection (mm)	Adopted PWC minimum slope (%)	Q _{full} (L/s)	Current Q (L/s)	Current capacity (%)
Catchment 1	99	100	1.0	5.60	1.34	24%

Table 3 above shows that the capacity of the existing sewer network is adequate for the current peak population.

5.3.2 Current sewage pump station performance

The capacity of the pump station was checked against the following criteria, based on PWC guidelines:

- Less than 12 pump starts per hour (for pumps less than 15kW),
- Minimum velocity 0.9 m/s,
- Maximum velocity 2.5 m/s,
- Overflow storage equal to three hours of peak dry weather flow.

The Garawa 2 pump station does not meet the minimum velocity in the rising main required for self-cleansing. The minimum velocity is 0.8 m/s for the current EP usage at Garawa 2. It is not known whether any additional sewage loads from other catchments also contribute to the flows at Garawa 2 pump station.

The pump station does not appear to have any overflow storage. It is recommended that overflow storage is provided for emergency situations.

PWC have expressed concerns about the infrastructure's ability to continue to meet demand, and to provide an acceptable level of service to Garawa 2 (and Garawa 1). PWC have noted that the existing network does not meet current PWC standards and presents servicing and health risks.

5.4 Future demands

As no new developments are currently planned for the community, there are no additional upgrades required to cater for future demand.

5.5 Recommended works

The sewer network at Garawa 2 is currently not to PWC standards. The following work is recommended to upgrade the network so it does meet current standards;

- 600 m of DN150 PVC gravity main, new connection to pump station, new manholes in road reserve or easements, and new house connections.
- Two new pumps for the pump station to increase the velocity in the rising main
- Emergency overflow storage

6 Water supply

6.1 Ownership and boundaries

The engineering drawings for Garawa 2 show the water main network is a DN150 PVC looped main with a single supply point coming from the elevated storage tank located north of the community, (refer Appendix D). A section of the water reticulation passes through what appears to be a water main easement. It should be noted that there are no formal easement within the community.

The water supply assets within Garawa 2 are believed to be owned by Garawa No. 2 Housing Aboriginal Corporation, but are the responsibility of Mabunji Aboriginal Resource Indigenous Corporation to maintain. It is understood that bore water is pumped to an elevated storage tank and a ground level tank, which supplies Garawa 1 and Garawa 2. The ownership of the bore water supply arrangement (bores, pipes and tanks) is unclear.

6.1.1 Connection methods and bills

The current payment arrangement for water usage is not known as PWC have advised they are currently not involved as a service provider for Garawa 2.

A total of nine residential lot water meters were assessed during the inspection. Bennett Design reported 11 dwellings in the community. Therefore, two additional water meters are required to cover the properties without an existing water meter. Note, some water meters may have been present however, not visible due to overgrown flora or restricted property access. Consequently, water meters may not have been discovered during the inspection.

6.2 Existing infrastructure assessment

The site investigation for the water infrastructure included assessing the condition of any air valves, fire hydrants, tanks, taps, and water meters. The assessment was limited to services that could be accessed above ground; no below ground services were inspected.

The condition of each asset is as follows:

Table 4 Water supply condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Fire hydrants			2			2
Taps			1			1
Water meter (residential lots)		1	5	3		9



Figure 3 Fire hydrant, condition: *good*



Figure 4 Residential lot water meter, condition: *good*



Figure 5 Tap, condition: *good*

The fire hydrants were assessed as being in good condition however, both require painting on the concrete cover. A single residential lot water meter requires a tap handle to be replaced.

6.3 Current demands

The following statement has been provided by PWC regarding Garawa 1 and Garawa 2 water supply. Note, this statement has been provided in an undated word document so it is unclear what date the statement was made.

"PWC has concerns about the infrastructure's ability to continue to meet demand, and to provide an acceptable level of service for the community at Garawa. Currently Garawa town camps 1 and 2 are supplied by a single, low yielding bore on a separate system from the Borroloola town water supply. The water supply infrastructure is in very poor condition, and faces a range of challenges including highly corrosive source water which impacts on water delivery, storage and treatment infrastructure. This also makes the provision of a safe drinking water supply a high risk."

The current demand of the community was calculated based on the following design assumptions:

- The nominal peak day flow is 1100 L/capita/day, based on PWC's supplement to WSA 03 2002. This value is for the northern region of NT. It was assumed that the nominal peak day flow of 1100 L/capita/day also applies to water usage within the community, although it is possible that this value could be higher in real life due to a lack of controls to reduce water usage.
- The Equivalent Population (EP) has been calculated assuming one household equates to 9 EP, based on discussions with Power and Water Corporation.
- The peak hour factors are listed in PWC's Supplement to WSA 03-2002, and they depend on the population range of the community. The peak hour factor of 3.0 has been adopted, for populations less than 500.

Table 5 shows the calculated demand.

Table 5 Current water demand

Total dwellings	EP	Demand (l/s)	Peak hour demand (l/s)
11	99	1.26	3.78

More information is required to determine if the existing network has sufficient capacity to meet peak hour demands. It is expected that the network itself has sufficient capacity, however there are concerns about the supply to the network from the storage tanks.

The assessment of water supply for firefighting has been based on the size of the water mains and the condition of the accessible fire hydrants. Additional hydrants have been recommended where it appears the existing number of hydrants are insufficient. In the case of Garawa 2 no additional fire hydrants are expected to be necessary.

6.4 Future demands

As no new developments are currently planned for the community, there are no additional upgrades required to cater for future demand.

6.5 Recommended works

The infrastructure that was assessed as very poor or poor is recommended to be upgraded to prevent failure in the future. The following maintenance works are recommended;

- Repaint two fire hydrants
- Replace residential lot water meter tap handle

It is proposed that the existing water supply to Garawa 1 and Garawa 2 is abandoned and a new water main is constructed, connecting the two communities to the Borroloola network. It is intended that the water main follows the road and crosses the river at the existing bridge. The required length to service both communities is expected to be approximately 7 km. For cost estimates, the length of the pipeline has been split over the two communities. It is also proposed that the water usage is measured for each of the communities using bulk water meters, rather than at individual lot meters, however individual lot water meters should be located on the connection to each dwelling. The cost estimated for the upgrades at Garawa 2 include;

- Install up to two new residential lot water meters
- Install new water main servicing Garawa 1 and Garawa 2 approximately 3500 m (half the total length allocated to Garawa 2 for cost estimates)

7 Roadworks

7.1 Ownership and boundaries

It is the current understanding that the roads within Garawa 2 are owned by Garawa No. 2 Housing Aboriginal Corporation, but are the responsibility of Mabunji Aboriginal Resource Indigenous Corporation to maintain.

7.2 Existing infrastructure condition assessment

The road network within Garawa 2 community consists of a mix of sealed and unsealed roads. There are also numerous informal tracks which appear to be used frequently but are not covered in this inspection and report.

Table 6 below summarise the condition of a single sign that was inspected at Garawa 2. There were no footpaths or carparks at Garawa 2. As there are no kerbs along the road, the driveways have no layover kerbs and are informal.

Table 6 Roadworks condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Sign	1					1



Figure 6 Sign, condition; *very poor*

The sign was in very poor condition as there was no sign, only a post. It is assumed that the sign was a speed limit sign. It was noted during inspections that speed humps were not painted and no warning signage was installed, it is recommended that these changes are made.



Figure 7 Garawa 2 community road network

Table 7 below details the condition of the roads within Garawa 2 for specific segments. Figure 7 shows a map of the community’s road network with the condition ratings, road name, and chainage direction.

Table 7 Road network condition assessment

Road name	Chainage start (km)	Chainage end (km)	Condition	Defects and associated condition
Garawa Two and 992_3	0.0	end	1	-30% of road has surface cracks (2) -50% of road has edge breaks (2) -30% of road has potholes (2) 20% of road has surfacing failures (1) -Road has drainage issue, road scouring away, no culvert or rock protection
992_1	0.0	0.1	1	-50% of road has edge breaks (2)
992_5	0.0	0.3	2	-cars obstructing road -80% of road has edge breaks (2) -30% of road has surface cracking (3) -two cars and a trailer obstructing road -80% of road has edge breaks (2) -drainage issue, dirt covering road (2)

The roads at Garawa 2 were in poor and very poor condition. There were significant edge breaks, surface cracking, potholes, drainage issues and obstructions. It is recommended that the roads are resealed and the edge breaks repaired. It is also recommended that a stormwater drainage study is undertaken to determine where culverts can be installed.



Figure 8 Road, condition: *very poor*



Figure 9 Garawa Two access road, condition: *very poor*

7.3 Current performance and risks

The road network is sufficient for the current number of houses, although it is in poor and very poor condition. It was noted during the site inspections that a number of unsealed 'short-cuts' had been created and were regularly used. It is not recommended that these paths are formalised.

7.4 Future demands

As no new developments are currently planned for the community, there are no additional upgrades required to cater for future demand.

7.5 Recommended works

The infrastructure that was assessed as very poor or poor is recommended to be upgraded to prevent failure in the future. The following works are recommended to upgrade the current infrastructure;

- Replace speed limit sign (speed limit not known)
- Reseal all roads and repair edge breaks – approximately 700 m

In order to allow for a longer term sustainable road network a significant upgrade would be required. It is recommended that a long term design which incorporates a full two lane road network, with all appropriate road furniture, line-marking, kerbs and gutters is constructed. A cost estimate to reinstate the base and subbase material, reseal with a two coat spray seal surface, construct subsoil drainage, line marking and signage has been included. Note that these works will need to be fully designed, the cost estimate is for budgetary purposes only and only indicates the construction phase. A footpath next to the road is also recommended to provide a safe trail for pedestrians.

As the maximum road width within the Garawa 2 community is 6 m, this means that all 600 m of the road network will need to be upgraded to a 7.2 m wide road. The stormwater drainage infrastructure upgrades that are closely associated with the road upgrade i.e. kerb and gutters, side entry pits and underground drainage pipes are included in the stormwater section of this report.

8 Stormwater drainage

8.1 Ownership and boundaries

There were no stormwater drainage assets inspected at Garawa 2.

8.2 Current performance and risks

The detailed performance of the stormwater network cannot be fully analysed without significant hydraulic and hydrodynamic modelling, which is outside the scope of this project.

The general design philosophy for stormwater drainage is that the design is based on a system of sealed roads, kerb and gutter, entry pits and underground drainage. This infrastructure currently does not exist at Garawa 2 and there would be major headworks required if stormwater drainage is to be incorporated. It is recommended that stormwater drainage infrastructure is constructed at Garawa 2 to reduce flooding and ponding within the community. A cost estimate to provide kerbs and gutters, side entry pits and underground pipes has been included. The location or size of culverts, swales, etc. will require further investigation.

8.3 Future demands

As no new developments are currently planned for the community, there are no additional upgrades required to cater for future demand.

8.4 Recommended works

The following works are recommended to upgrade or improve the current infrastructure:

- Install stormwater infrastructure, including kerbs and gutters, side entry pits and underground pipes.

9 Community structures

9.1 Ownership and boundaries

The community structures within Garawa 2 community is owned by Garawa No 2 Housing Aboriginal Corporation, but is the responsibility of Mabunji Aboriginal Resource Indigenous Corporation to maintain.

9.2 Existing infrastructure condition assessment

The site investigation for the community structures included assessing the condition and features of a playground. The following table shows the condition rating given to the community structures.

Table 8 Community structures condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Playground			1			1



Figure 10 Basketball court, condition: *good*

The playground was in good condition. No immediate maintenance works are required.

9.3 Future demands

As no new developments are currently planned for the community, there are no additional upgrades required to cater for future demand.

9.4 Recommended works

- No works required.

10 Electrical services

10.1 Ownership and boundaries

The following points, from Network Policy NP003 Installation Rules Section3, define the typical shared ownership of electrical infrastructure by Power and Water Corporation (PWC) and customers.

- The point of supply is defined as the point where PWC makes the electrical supply available. For domestic supply, this is normally one of the following:
- A point of attachment of an overhead service on to a building or pole on which a metering panel is fitted.
- A point of attachment of an overhead service on to a pole forming part of unmetered aerial consumer's mains.
- A nominated point on a distribution substation located on the customer's lot.
- A point of connection of an underground service in a metering panel, including underground services originating at an overhead line.
- A point of connection of an underground service in a pillar or junction box forming part of unmetered consumer's mains, located on the customer's lot.
- A point on a Power and Water pillar located on the customer's lot.

Typically, distribution infrastructure upstream of the Point Of Supply is owned and maintained by PWC and infrastructure below the point of supply is owned and maintained by the customer.

In many cases PWC have defined a Point Of Supply to ensure that they retain responsibility for aerial high voltage infrastructure, and aerial low voltage infrastructure where installed with aerial high voltage infrastructure, to minimise the possibility of the community or it's contractors coming into contact, either deliberately or inadvertently, with aerial high voltage infrastructure.

In other cases isolation facilities are present or desired by PWC to define the Point of Supply at or near the boundary of the town camp.

The Garawa 2 community electrical reticulation system is supplied by a transformer to an overhead reticulation scheme to meters of individual houses.

PWC advise that the Point Of Supply is the LV terminals of the substation and that they own and are responsible for the first pole mount substation and upstream infrastructure.

PWC recommend that a GBS (Gas Break Switch) be provided upstream of the first transformer to establish a demarcation point.

PWC advise that street lighting is supplied from unmetered LV infrastructure and is the responsibility of the lot holder and not PWC.

All meters, whether pre- or post-paid are the property of PWC.

Garawa 2 community are responsible for maintain all unmetered and metered LV infrastructure including the main switchboard, metering panel (excluding meter), LV distribution feeders, distribution pillars, consumers mains and consumer switchboards and street lights.

10.2 Existing infrastructure condition assessment

Table 9 shows the condition rating given to the Distribution panels-metering and switchboard in sewage station. The distribution panels had 100% operational rating

Table 9 Distribution panel condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Distribution panels			1			1

Table 10 shows the condition rating given to the street lights. The street lights on the electrical poles were of a low voltage overhead feeder design, mercury lamp type M80, with no lamp covers protected by cages. The street lights have 75% operational rating and 25% inoperable.

Table 10 Street light on O/H pole condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Street light on O/H pole		2	6			8

Table 11 shows the condition rating given to the transformer. The transformer was of pole mount substation design. The transformer was visually accessed to be in good condition.

Table 11 Transformer condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Transformer			1			1

Table 12 shows the condition rating given to the Overhead poles. The overhead poles are of Weld Construction (Universal Pole construction). The overhead poles have 100% operational rating from the visual inspection.

Table 12 Overhead pole condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Overhead pole			14			14

The meters in Garawa 2 community were not inspected by Bennett Design or Aurecon.

The details of the individual inspections and photographs of each piece of infrastructure are in Appendices.

10.3 Current performance and risks

The electrical infrastructure evaluation was conducted against the following criteria

- Number of dwellings on tenure, the higher value of the funded dwelling and as quoted in the population report was utilised.
- Urban area, NP001.1, 4. Definitions.
- General Specification for URD Subdivisions, NP001.6, 4.3 Substation Size.

- Normal ADMD (After Diversity Maximum Demand) of 4.5 kVA and high cost subdivisions at 7 kVA.
- Transformer ratings were assumed to be correct in Dekho (PWC asset information system) and compared against photographs of test or transformer numbers collected.
- Substation loads were compared against transformer sizes only. No load flow analysis was conducted.
- No load calculations were performed or assessment conducted on overhead or underground cable, visual inspection from the ground only.
- Streetlighting loads were ignored as they are not significant.

The calculated maximum demand of the Garawa 2 community transformer is 198% of rated capacity based on 4.5kVA/dwelling.

PWC advise that no damage has occurred to this infrastructure.

Table 13 Garawa 2 current demand load vs transformer ratings

Com Id	Community name	Dwellings	Transformer (kVA)	kVA Total @ 4.5kVA	kVA Total @ 7kVA	Comments
992	Garawa 2	11	25	49.5	77	

A tabulated summary of all community transformers is included in Appendicies.

There is a risk of equipment not being maintained associated with the non-standard division of responsibilities between the customer and PWC.

The following points from the PWC Metering Rules should be noted:

- The routine maintenance of metering installations and the replacement of any faulty meters is the responsibility of PWC.
- The property owners are responsible for the maintenance and upkeep of meter rooms, boxes and panels (including lids, doors and locking mechanisms).
- The installation of pre-paid metering is a cost to the customer, refer NP010 Meter Manual-Maintenance of Metering Installations, Power and Water Corporation.

10.4 Future demands

As no new developments are currently planned for the community, there are no additional upgrades required to cater for future demand.

10.5 Recommended works

The Garawa 2 community transformer is owned by PWC who are aware of the loading of this transformer and have assessed the load does not require that this transformer be upgraded or replaced.

The following maintenance works and upgrades are recommended:

- Replace two street lights 80W
- Install new street lighting - approximately 35 poles
- Since the load on the transformer exceeds 85% it is recommended that power monitoring be undertaken to allow PWC to determine, by assessment, whether the transformer needs to be upgraded or not.

11 Communications

11.1 Ownership and boundaries

Details of Telstra pit and conduit infrastructure within the town camp boundaries were sought but were not forthcoming.

11.2 Existing infrastructure condition assessment

The telecommunications infrastructure assessed included pits and telephone booths.

Appendices contains the individual reports.

Table 14 Telecommunication pit condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Telecommunication Pit		3	4			7

Table 15 Telephone booth condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Phone booth						1 (status unknown)

11.3 Current performance and risks

No details of the performance of communications infrastructure were obtained.

11.4 Future demands

The current availability of broadband services at Garawa 2 is displayed in the Figure 11 below.

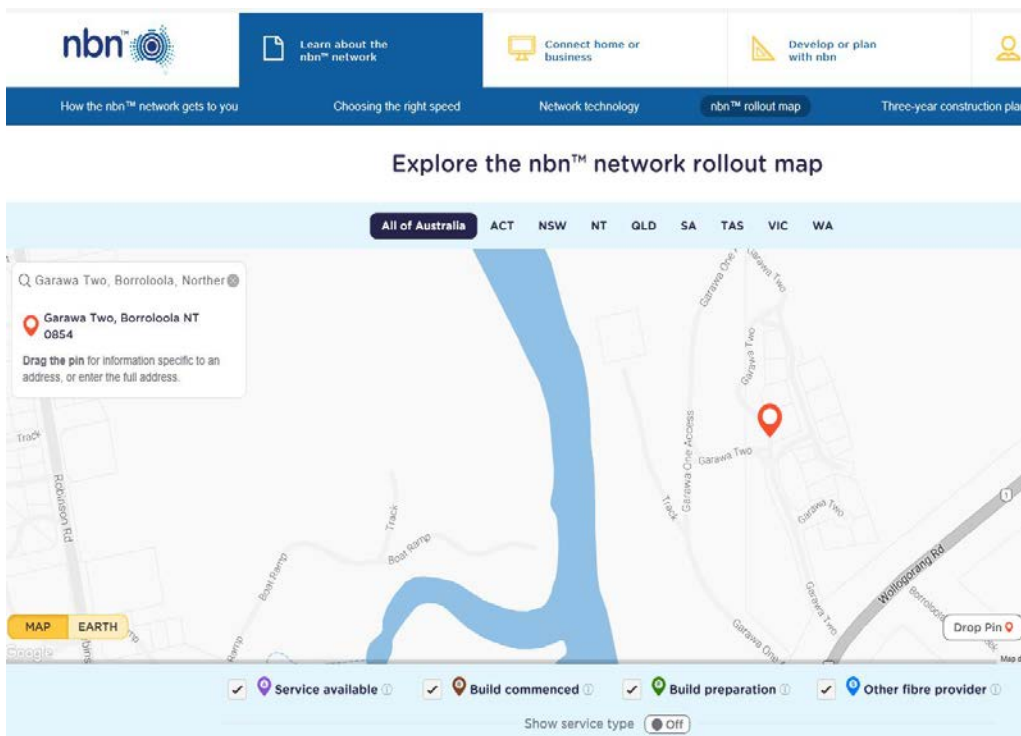


Figure 11 NBN network availability map

NBN is available to residents via satellite on application to an appropriate NBN access provider.

11.5 Recommended works

Representatives from NBN’s Land Access and Stake Holder management teams are currently engaged with NT Housing to look at how camps will be serviced. It is expected that any existing premises in these camps will have some type of NBN service via the NBN brownfields rollout in the future.

No works are required at Garawa 2 because NBN is available to residents via satellite on application to an appropriate NBN access provider.

12 Cost estimates

Table 16 below shows a summary of the cost estimates to undertake the maintenance required to fix the existing infrastructure, to upgrade the existing network to meet current design standards, and to upgrade the existing network to cater for the future design (included in current upgrades). The estimates take into account a 30% contingency, are inclusive of GST. A location factor has been applied to town camps outside of Darwin.

Table 16 Cost estimates

Infrastructure	Maintenance of existing infrastructure	Upgrades to meet current design
Sewerage	\$ 0	\$ 929,000
Water supply	\$ 1,000	\$ 3,619,000
Roadworks	\$ 1,000	\$ 1,441,000
Stormwater drainage	\$ 0	\$ 1,030,000
Community structures	\$ 0	\$ 0
Electrical	\$ 33,000	\$ 966,000
Communications	\$ 0	\$ 0
Miscellaneous provisions	\$ 21,000	\$ 976,000
Total (including GST)	\$ 56,000	\$ 8,961,000
Grand total	\$ 9,017,000	

The cost estimates are a preliminary estimate only. Since Aurecon has no control over the cost of labour, materials, equipment or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, Aurecon cannot guarantee actual costs will not vary from these estimates.

13 Summary

The following works are recommended for Garawa 2 community:

Sewerage

- 600 m of DN150 PVC gravity main, new connection to pump station, new manholes in road reserve or easements, and new house connections.
- Two new pumps for the pump station to increase the velocity in the rising main
- Emergency overflow storage

Water supply

- Repaint two fire hydrants
- Replace residential lot water meter tap handle
- Install up to two new residential lot water meters
- Install new water main servicing Garawa 1 and Garawa 2 approximately 3500 m

Roadworks

- Replace speed limit sign
- It is recommended that the road is upgraded to a two lane network with all appropriate road furniture, line marking, kerbs, footpaths, etc.

Stormwater drainage

- Install stormwater infrastructure, including kerbs and gutters, side entry pits and underground pipes.

Community structures

- No works required

Electrical services

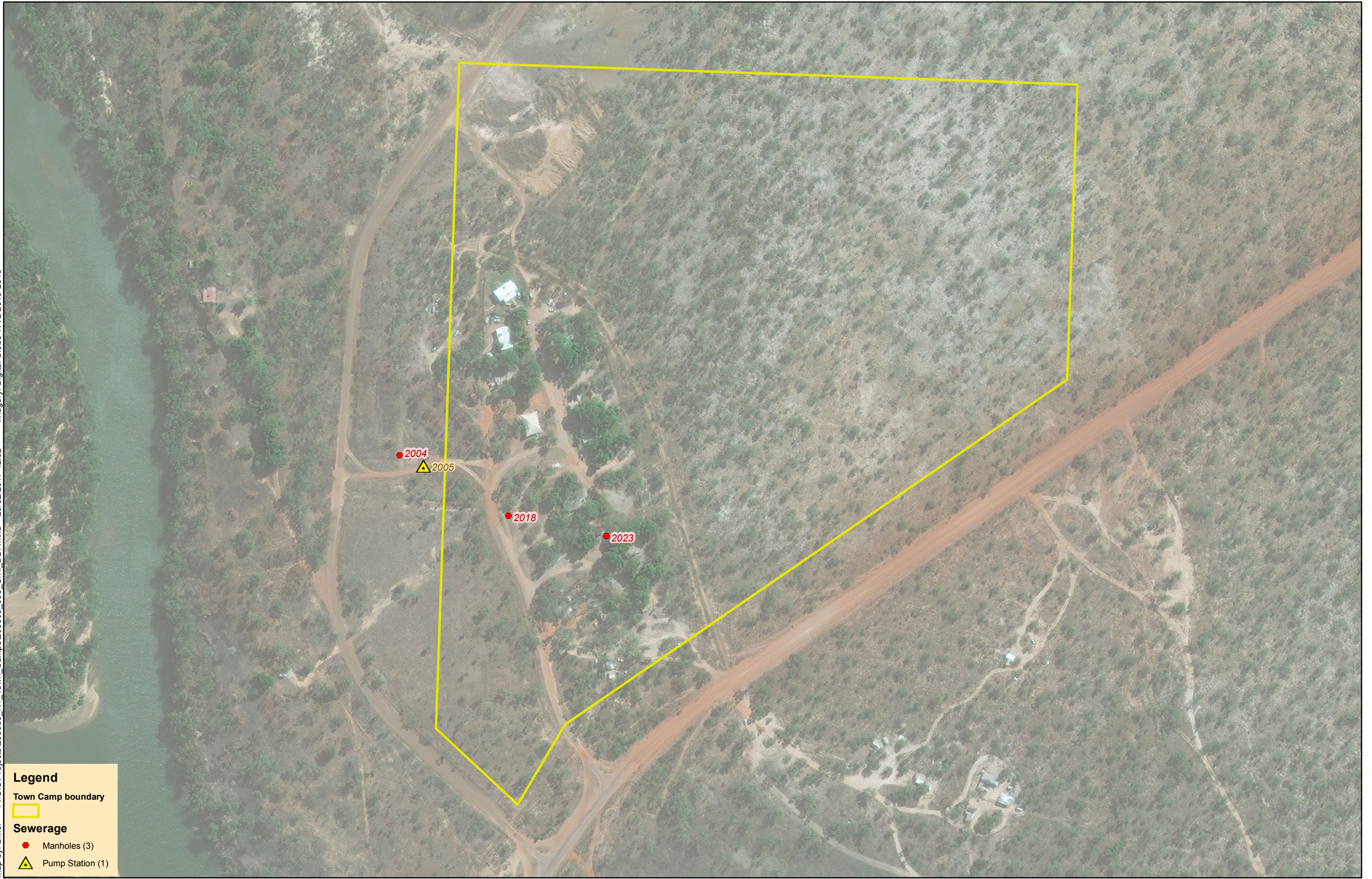
- Replace two street lights 80W
- Install new street lighting - approximately 35 poles
- Since the load on the transformer exceeds 85% it is recommended that power monitoring be undertaken to allow PWC to determine, by assessment, whether the transformer needs to be upgraded or not.

Communications

- No works are required because NBN is available to residents via satellite on application to an appropriate NBN access provider.


Civil inspection reports

Map by: DMcP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016





Legend

Town Camp boundary

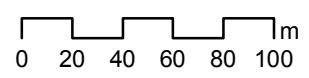
 Town Camp boundary

Sewerage

 Manholes (3)

 Pump Station (1)

A3 scale: 1:3,000



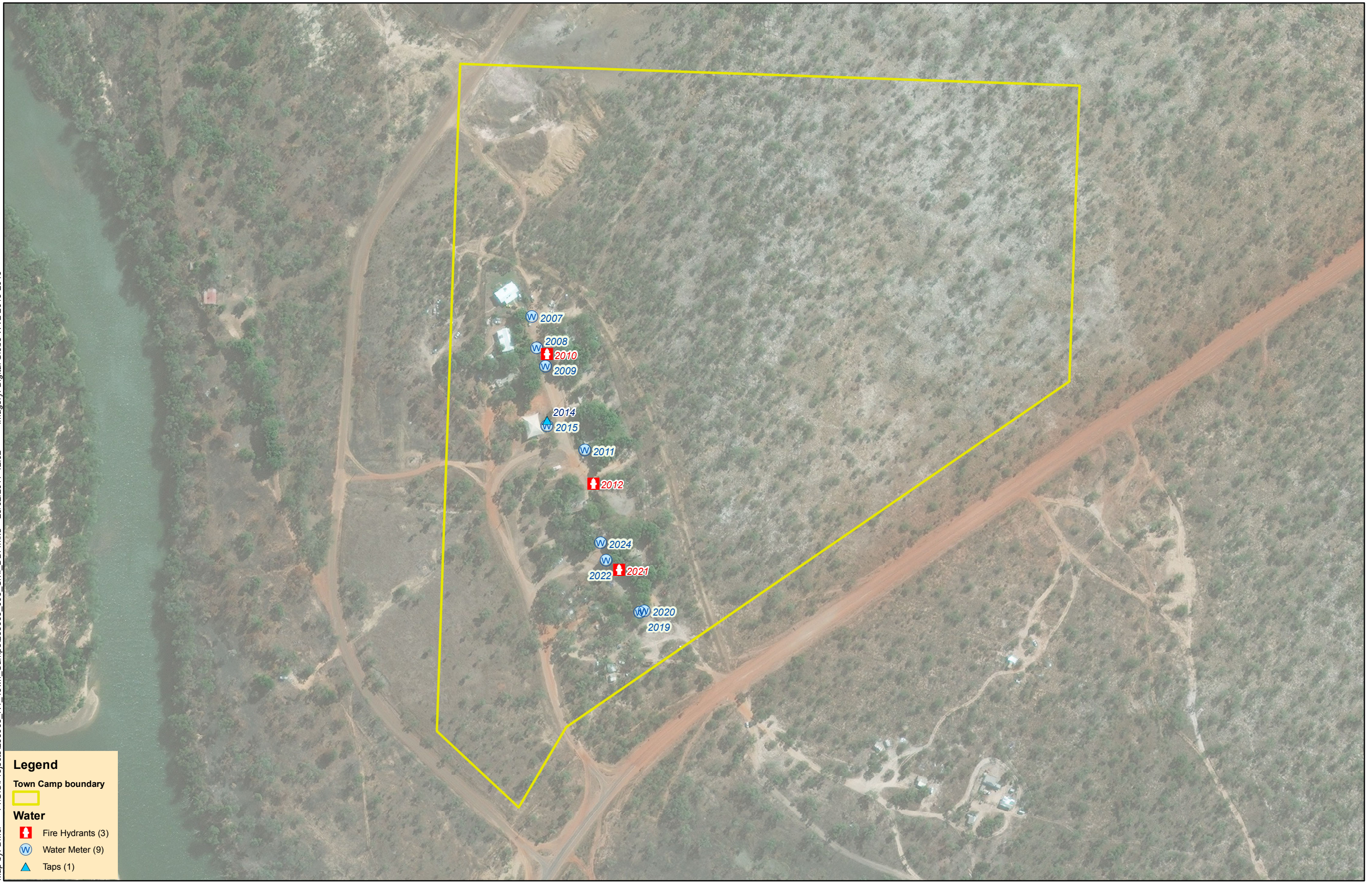
Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Sewerage
992 - Garawa 2 (Borroloola)

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016



Legend

Town Camp boundary

Town Camp boundary

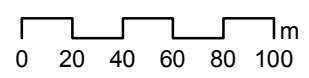
Water

Fire Hydrants (3)

Water Meter (9)

Taps (1)

A3 scale: 1:3,000



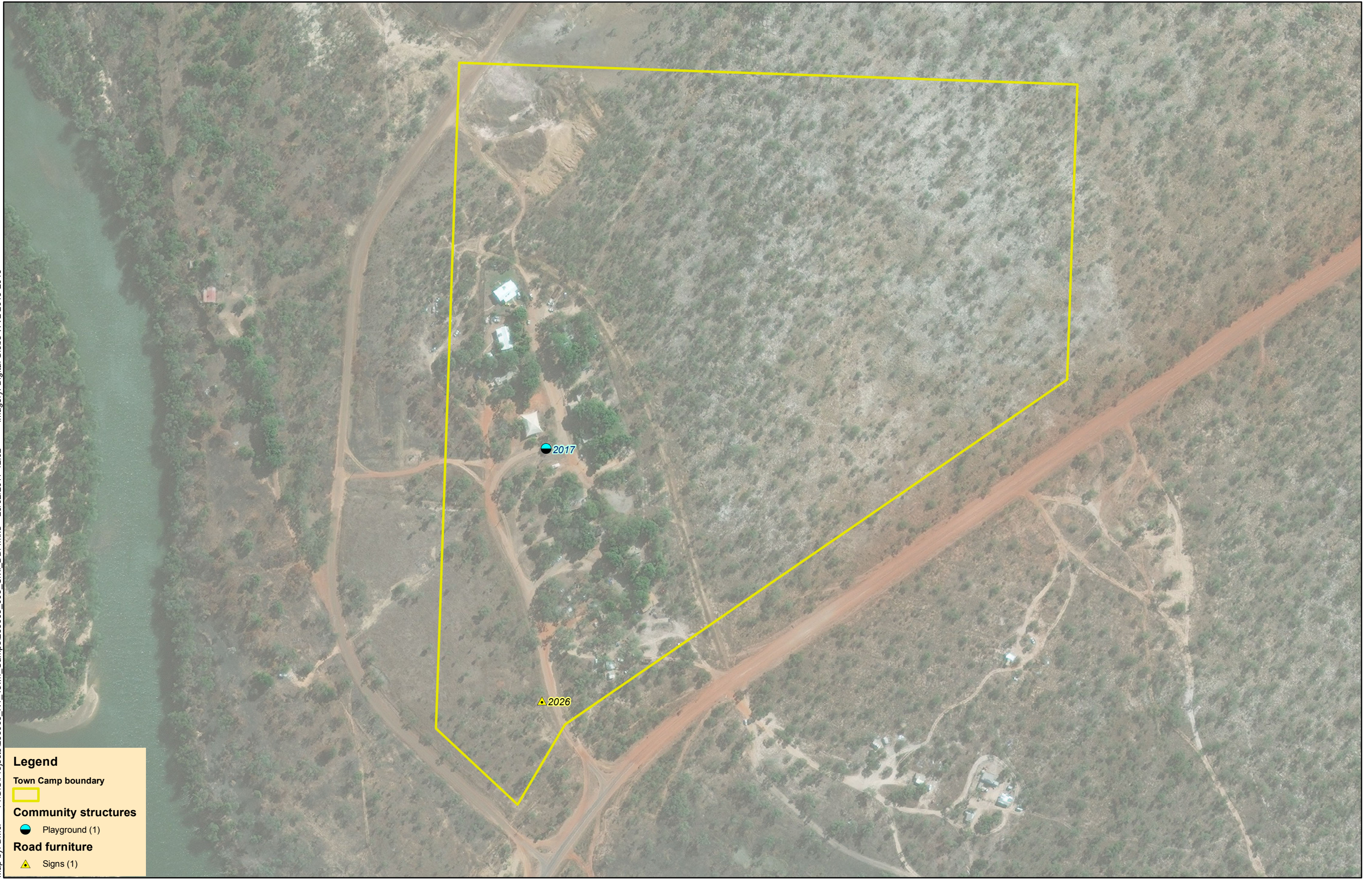
Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Water
992 - Garawa 2 (Borroloola)

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016

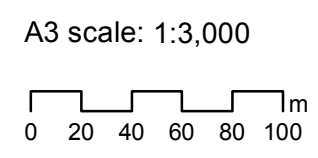


Legend

Town Camp boundary
[Yellow outline]

Community structures
● Playground (1)

Road furniture
▲ Signs (1)



Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments
Road furniture, stormwater drainage & community structures
992 - Garawa 2 (Borroloola)

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:24:09 AM

Insp ID: 2010

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Fire Hydrants

Single or Double:

Sluice Valve: No

Above or Below ground: Below ground

FH Leakage: No

Bollards around hydrant: No

FH Condition: 3 - Good

FH Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:18:26 AM

Insp ID: 2012

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Fire Hydrants

Single or Double:

Sluice Valve: No

Above or Below ground: Below ground

FH Leakage: No

Bollards around hydrant: No

FH Condition: 3 - Good

FH Comment: Not painted red



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:47:24 AM

Insp ID: 2021

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Fire Hydrants

Single or Double:

Sluice Valve: No

Above or Below ground: Below ground

FH Leakage: No

Bollards around hydrant: No

FH Condition: 3 - Good

FH Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:50:56 AM

Insp ID: 2004

Group 5 - Borroloola

Garawa 2

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Square

Manhole Cover Diam (mm):

Manhole Length (mm): 700

Manhole Width (mm): 700

Manhole Condition: 3 - Good

Notes on Lid:

Comments: Steel lid, assumed dimensions



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:59:19 AM

Insp ID: 2018

Group 5 - Borroloola

Garawa 2

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Rectangular

Manhole Cover Diam (mm):

Manhole Length (mm): 1000

Manhole Width (mm): 700

Manhole Condition: 3 - Good

Notes on Lid: A

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:44:00 AM

Insp ID: 2023

Group 5 - Borroloola

Garawa 2

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Rectangular

Manhole Cover Diam (mm):

Manhole Length (mm): 1000

Manhole Width (mm): 700

Manhole Condition: 3 - Good

Notes on Lid:

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:36:03 AM

Insp ID: 2006 Group 5 - Borroloola Garawa 2

Road Name: 992_4
What are you inspecting: Pavements
Ch From (km): 0
Ch To (km): 0.1
Road Type: Sealed - spray seal
Section Width (m): 5
Road Condition: 2 - Poor
General Comment:

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Edge Breaks	80	2 - Poor	
Surfacing Cracks	30	3 - Good	

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Linemarking Section

Obstruction Section

Road Obstruction	Other Road Obstruction
other	Cars in roundabout

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:36:03 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:36:03 AM

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:13:11 AM

Insp ID: 2013 Group 5 - Borroloola Garawa 2

Road Name: 992_3

What are you inspecting: Pavements

Ch From (km): 0

Ch To (km): 0.05

Road Type: Sealed - spray seal

Section Width (m): 5

Road Condition: 1 - Very Poor

General Comment:

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Edge Breaks	80	2 - Poor	
Drainage	1	2 - Poor	Dirt covering road, drainage issue, low spot

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Linemarking Section

Obstruction Section

Road Obstruction Other Road Obstruction

other	Car
other	Trailer
other	Car

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:13:11 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:13:11 AM

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:34:04 AM

Insp ID: 2016 Group 5 - Borroloola Garawa 2

Road Name: Garawa Two

What are you inspecting: Pavements

Ch From (km): 0

Ch To (km):

Road Type: Sealed - spray seal

Section Width (m): 5

Road Condition: 1 - Very Poor

General Comment:

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Surfacing Cracks	30	2 - Poor	
Edge Breaks	50	2 - Poor	
Potholes	30	2 - Poor	
Surfacing Failure	20	1 - Very Poor	20% of road
Drainage	1	2 - Poor	Road scouring away, no culvert or protection

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:34:04 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:34:04 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:40:10 AM

Insp ID: 2025 Group 5 - Borroloola Garawa 2

Road Name: 992_1

What are you inspecting: Pavements

Ch From (km): 0

Ch To (km): 0.1

Road Type: Sealed - spray seal

Section Width (m): 4

Road Condition: 1 - Very Poor

General Comment: Speed bump not painted

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Edge Breaks	50	2 - Poor	% of road

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

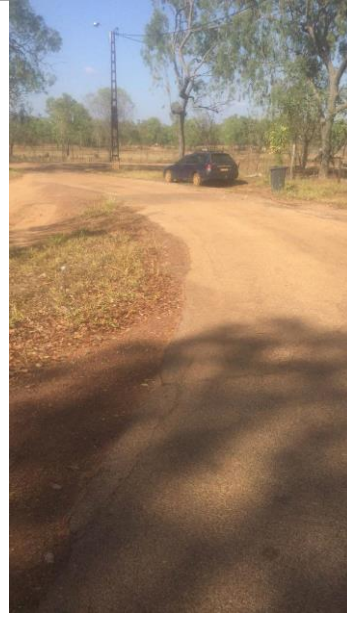
Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:40:10 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:40:10 AM

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:46:58 AM

Insp ID: 2005

Group 5 - Borroloola

Garawa 2

What Sewerage Asset are you capturing: Pump Station

No of Pumps in Pump Station: 2

Cabinet Condition: 4 - Very Good

Cabinet Comment:

Alarm Light: No

Alarm Light Condition:

Overhead Light: Yes

Overhead Light Condition: 1 - Very Poor

Light Comments:

Davit Crane Present: Yes

Davit Crane Capacity (kg):

Davit Crane Condition: 3 - Good

Davit Crane Comments:

Fence TYPE: Standard Security Fence (3 Strands barbed)

PS Fence Height (m): 1.8

PS Gates Locked: Yes

PS Fence Condition: 4 - Very Good

Fence Comment:

Flow meter type:

Flow meter condition:

Flow meter comments:

Macerator Pump Make/Model:

Manufacturers Date:

Macerator Pump:

Macerator Pump Condition:

Macerator Pump Comments:

Outgoing Pipe Diameter (mm):

Valves:

Outgoing Pipe Comments:

Water Supply to pump station: Yes

Fire hose reel: No

Access cover locked: Yes

Safety grid beneath access cover: No Access

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:46:58 AM

Condition:

Cabinet Locked: No Access

Cabinet Lock Condition:

Hand rails around entrance: No

Fixed or removable:

Rail Condition:

Safety Comments:

Pump Station Pumps section



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:46:58 AM



Northern Territory Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:04:25 AM

Insp ID: 2017

Group 5 - Borroloola

Garawa 2

Inspection Type:	Shade Structure
Shade Structure Type:	Play ground
Shade Floor Type:	Sand
Roof Type:	Shadecloth
Width (mm):	
Length (mm):	
Appearance:	3
Appearance Comment:	
Condition:	3 - Good
Comment:	



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:38:03 AM

Insp ID: 2026

Group 5 - Borroloola

Garawa 2

Road Name: Garawa Two

What are you inspecting: Signs

Type of Sign: No sign , perhaps speed limit

Sign Condition: 1 - Very Poor

Sign Comment:

General Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:11:04 AM

Insp ID: 2014

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Taps

Diameter(mm): 20

Tap Leakage: Yes

Tap Condition: 3 - Good

Tap Comment: Water main leaking nearby



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:40:19 AM

Insp ID: 2007

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 2 - Poor

Lot Water Meter Comment: No tap handles



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:38:08 AM

Insp ID: 2008

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 3 - Good

Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:35:14 AM

Insp ID: 2009

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 4 - Very Good

Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:21:35 AM

Insp ID: 2011

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 4 - Very Good

Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 9:09:29 AM

Insp ID: 2015

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 3 - Good

Lot Water Meter Comment: Water to playground lot



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:50:24 AM

Insp ID: 2019

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 3 - Good

Lot Water Meter Comment: In green box, couldn't see.



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:49:17 AM

Insp ID: 2020

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 3 - Good

Lot Water Meter Comment: In property



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:45:49 AM

Insp ID: 2022

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size:

Lot Water Meter Condition: 3 - Good

Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 14/12/2016 8:42:50 AM

Insp ID: 2024

Group 5 - Borroloola

Garawa 2

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size: 25

Lot Water Meter Condition: 4 - Very Good

Lot Water Meter Comment:

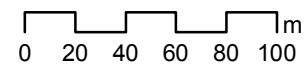


Electrical inspection report

P:\GIS\Projects\253963_NT_Town_Camps\253963_004_Elec_DDP_report.mxd 23/02/2017 12:22
Map by: DMCP



A3 scale: 1:3,000



Date: 23/02/2017 Version: 3
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Electrical
992 - Garawa 2 (Borroloola)

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:22:17 AM

Insp ID: 1178

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method:

Outdoor

Is the distribution panel labelled:

No

What is Distribution Panel main CB Rating:

Unknown

What is the main incoming cable type/Size to Distribution Panel:

Unknown

What is the condition of switchboard:

3

Condition Comments:

What is the condition of cables/glands into switchboard:

3

Cable/Gland Condition Comments:

Distribution Panels name plate access:

No



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:22:17 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:13:03 AM

Insp ID: 1180

Group 5 - Borroloola

Garawa 2

What Comms Category are you capturing: Distribution

What is distribution method to households: Underground

Is it Shared with PWC:

Is there Anti-climb barrier provided for this pole:

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo: No

What is Pit Condition: 3

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:13:03 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:07:43 AM

Insp ID: 1183 Group 5 - Borroloola Garawa 2

What Comms Category are you capturing: Distribution

What is distribution method to households: Underground

Is it Shared with PWC:

Is there Anti-climb barrier provided for this pole:

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo: No

What is Pit Condition: 2

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:58:19 AM

Insp ID: 1185

Group 5 - Borroloola

Garawa 2

What Comms Category are you capturing: Distribution

What is distribution method to households: Overhead

Is it Shared with PWC: No

Is there Anti-climb barrier provided for this pole:

What is Pole construction type: Steel

Is street light fitted: No

Is there concrete collar around the base of pole: No

What is the condition of tap off to house: 3

What is the condition of pole: 3

How many Lots are connected to this pole:

Is there access to Pits to take a photo:

What is Pit Condition:

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:58:19 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:55:25 AM

Insp ID: 1186

Group 5 - Borroloola

Garawa 2

What Comms Category are you capturing: Distribution

What is distribution method to households: Underground

Is it Shared with PWC:

Is there Anti-climb barrier provided for this pole:

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo: No

What is Pit Condition: 2

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:54:23 AM

Insp ID: 1187 Group 5 - Borroloola Garawa 2

What Comms Category are you capturing: Distribution

What is distribution method to households: Underground

Is it Shared with PWC:

Is there Anti-climb barrier provided for this pole:

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo: No

What is Pit Condition: 2

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:16:33 AM

Insp ID: 1199

Group 5 - Borroloola

Garawa 2

What Comms Category are you capturing: Distribution

What is distribution method to households: Underground

Is it Shared with PWC:

Is there Anti-climb barrier provided for this pole:

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo: No

What is Pit Condition: 3

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:15:29 AM

Insp ID: 1200 Group 5 - Borroloola Garawa 2

What Comms Category are you capturing: Distribution

What is distribution method to households: Underground

Is it Shared with PWC:

Is there Anti-climb barrier provided for this pole:

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo: No

What is Pit Condition: 3

Underground Comments:



Northern Territory Town Camps

Communications Infrastructure

Inspection Date 14/12/2016 9:53:23 AM

Insp ID: 1188

Group 5 - Borroloola

Garawa 2

What Comms Category are you capturing:

General

Telstra Comms Drawing Available:

No

Facility upgrade not in drawings:

No

Which telecoms carriers are present in the town camp:

How many Communications Pit(s) are allocated in this town camp:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:18:43 AM

Insp ID: 1179

Group 5 - Borroloola

Garawa 2

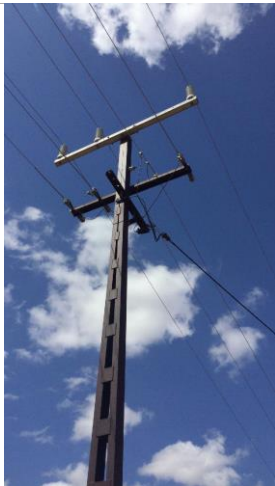
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	11000
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	0
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:18:43 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:11:48 AM

Insp ID: 1181

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:11:48 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:08:43 AM

Insp ID: 1182

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 11
Street Light Watts	80
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	3
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:08:43 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:03:14 AM

Insp ID: 1184

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:03:14 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:52:14 AM

Insp ID: 1189

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:52:14 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:48:42 AM

Insp ID: 1190

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	1
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:48:42 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:40:11 AM

Insp ID: 1192

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type: Welded

What is the condition of pole: 3

How is the pole planted: Concrete

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Combined

What is the HV voltage level: 11000

What is the arrangement of connected cables: Parallel

Are there isolators on the pole: Yes

What is the Condition: 3

How many Lots are connected to this pole: 0

Overhead Pole Comments: Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:40:11 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:36:27 AM

Insp ID: 1193

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Combined
What is the HV voltage level:	11000
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	0
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:36:27 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:32:08 AM

Insp ID: 1194

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	0
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:32:08 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:29:09 AM

Insp ID: 1195

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	0
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:29:09 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:26:39 AM

Insp ID: 1196

Group 5 - Borroloola

Garawa 2

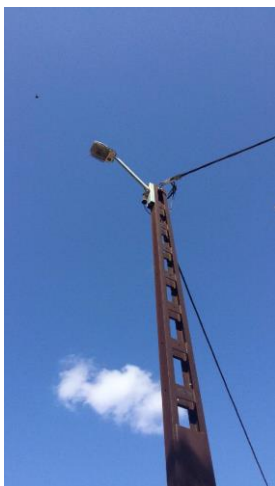
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	0
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:26:39 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:24:06 AM

Insp ID: 1197

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	0
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:24:06 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:21:21 AM

Insp ID: 1198

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	3
How many Lots are connected to this pole:	2
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:21:21 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:14:17 AM

Insp ID: 1201

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80d 06
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	400
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	
How many Lots are connected to this pole:	2
Overhead Pole Comments:	Surface rusted

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:14:17 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:08:43 AM

Insp ID: 1182

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 11

Street Light Watts 80

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 10:08:43 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:52:14 AM

Insp ID: 1189

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

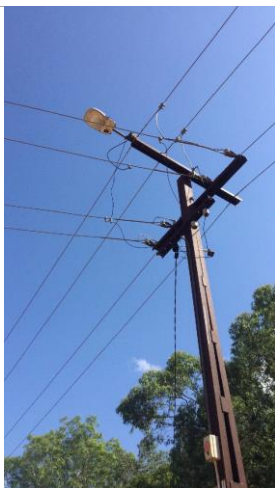
Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:52:14 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:48:42 AM

Insp ID: 1190 Group 5 - Borroloola Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:48:42 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:32:08 AM

Insp ID: 1194 Group 5 - Borroloola Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:32:08 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:29:09 AM

Insp ID: 1195 Group 5 - Borroloola Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:29:09 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:26:39 AM

Insp ID: 1196 Group 5 - Borroloola Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 2

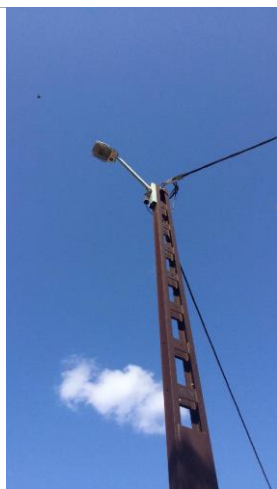
Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:26:39 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:21:21 AM

Insp ID: 1198

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:21:21 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:14:17 AM

Insp ID: 1201 Group 5 - Borroloola Garawa 2

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80d 06

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:14:17 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 14/12/2016 9:43:16 AM

Insp ID: 1202

Group 5 - Borroloola

Garawa 2

What Category are you capturing: Transformers

What is Transformer installation method:

Pole

If method know:

11SS1P

What is the condition of the mounting:

3

What is Transformer Rating:

Unknown

Is there access to transformers name plate to take a photo:

No

What is the condition of transformer:

3

What is cable type to transformer:

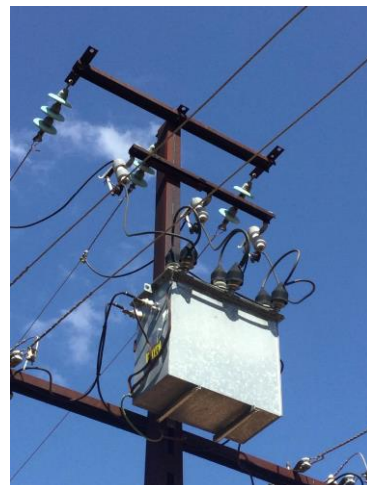
PVC insulated black

What is cable size to transformer:

Is there switch gear or fusing associated with the transformer:

Cut out fuse

Transformer Comment:



Northern Territory Town Camps

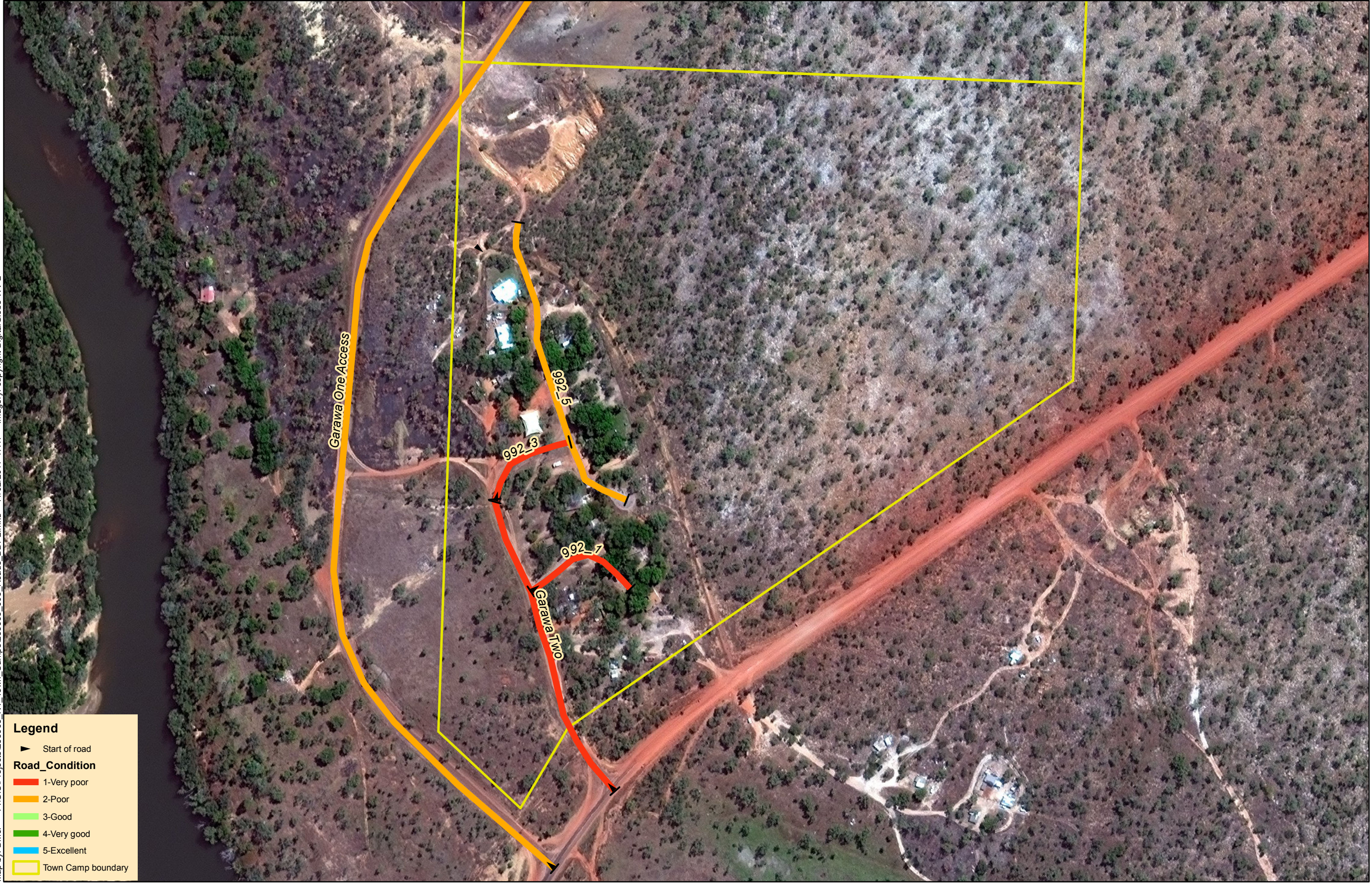
Electrical Infrastructure

Inspection Date 14/12/2016 9:43:16 AM



Road map

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Roads_DDP2.mxd 11/02/2017 17:17 Imagery: copyright DigitalGlobe WV 2



Legend

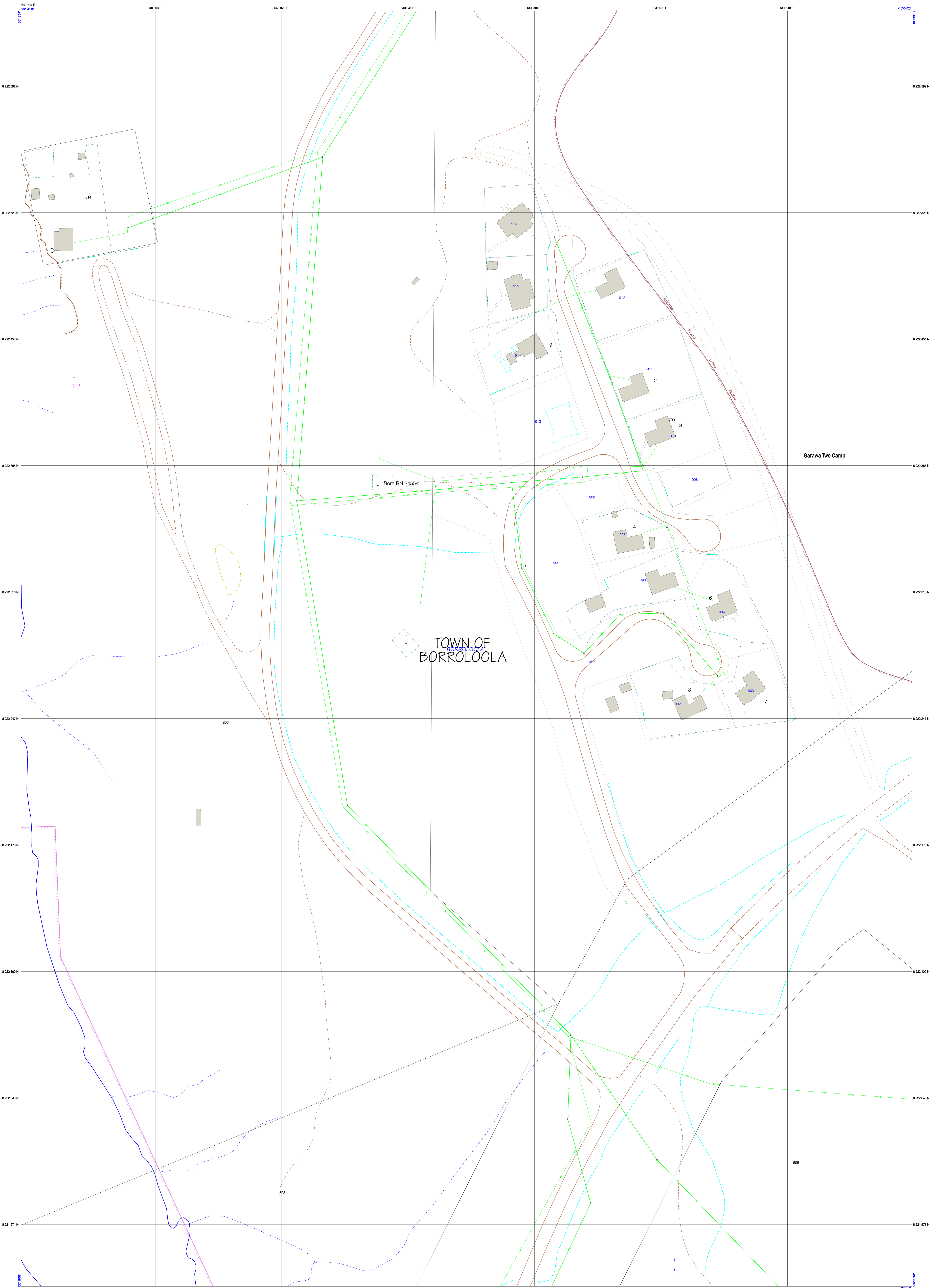
- ▶ Start of road
- Road_Condition**
- 1-Very poor
- 2-Poor
- 3-Good
- 4-Very good
- 5-Excellent
- Town Camp boundary

A3 scale: 1:3,000

Date: 11/02/2017 Version: 1
Coordinate system: GDA 1994

NT Town Camp Road Assessments 992 - Garawa 2 (Borroloola)

Existing drawings



LEGEND

LAND USE PLANNING: APPROX. POSITION OF BUILDING constructed area site of development	CADASTRE: Current 123 Proposed 123 Locality LOCALITY	TOPOGRAPHY: Road Unsealed, Track Footpath, Drain, Culvert Wall, Gate, Fence, Cattle Grid Railway, Cleared Railway Associated Trench, Landing Strip Towpath, Apron Pipeline: Oil, Water, Undetermined Gas, Sewage Building, Building Shape Unconformed Shade Structure, Incomplete Building Sewage Ponds, Saltpans Pond Oval, Arena, Swimming Pool High Water Mark, Low Water Mark Mine: Quarry, Surface Excavation Contour: Index, Intermediate Contour: Depression	UTILITY SERVICES: ELECTRICITY LOW VOLTAGE HIGH VOLTAGE WATER RETICULATION WATER MAIN WATER SERVICE MAIN SEWER SEWER MAIN SEWER SERVICE MAIN
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LOCALITY DIAGRAM

NOTE: POWER POLLS, MANHOLES, SEPTIC TANKS, TOWERPOLES and other similar fixed objects are captured from aerial photography and their location verified from aerial survey techniques. These features are visible as LOCAL SURVEY CONTROL. The ground location is expected to be within 1.0 (1.0m) of their mapped location.
DATE BEFORE 10/10/2018 (pre 1/10/2018) or after 10/10/2018 (post 1/10/2018) for water main and sewer information and construction requirements to developments contact Power and Water Corporation, Indigenous Community Development on 1800 245 383, or visit <http://www.powerwater.com.au>

LOCALITY DIAGRAM

This project is a compilation of data holdings from (but not restricted to) NT Dept of Lands, Planning and the Environment, NT Dept of Housing, Local Government and Regional Services, Power and Water Corporation and Aboriginal Areas Protection Authority. While every effort has been made to ensure the accuracy of the map, errors and omissions may occur. No warranty is given concerning the accuracy of the information herein. Users should refer to the originating bodies or departments regarding the accuracy and currency of the data.

General enquiries, corrections, updates, errors and omissions:
Indigenous Community Land Use Planning, Dept of Lands, Planning and the Environment
TEL: (08) 8999 1300, FAX: (08) 8999 7189, Email: planning@irt.gov.au

Topographic Information:
Land Information Division
Dept of Lands, Planning and the Environment
TEL: (08) 8999 5201
TEL: (08) 8999 5202
FAX: (08) 8999 5203
Email: landinfo@irt.gov.au

Power, Water or Sewer Information:
Regional Operations Planning Branch
Power and Water Corporation
TEL: (08) 8999 5202
FAX: (08) 8999 5203
Email: enquiries.as@irt.gov.au

Aboriginal Areas Protection Authority:
The Registrar
Aboriginal Areas Protection Authority
TEL: (08) 8999 4322
FAX: (08) 8999 4323
Email: enquiries.as@irt.gov.au

Customer Information:
Office of the Survey General
Dept of Lands, Planning and the Environment
TEL: (08) 8999 5203
TEL: (08) 8999 5202
FAX: (08) 8999 5203
Email: landinfo@irt.gov.au

Planning Information:
Indigenous Community Land Use Planning
Dept of Lands, Planning and the Environment
TEL: (08) 8999 5202
FAX: (08) 8999 7189
Email: planning@irt.gov.au

Housing Infrastructure Information:
Infrastructure Delivery Branch
Dept of Housing, Local Government & Regional Services
TEL: (08) 8999 5213
FAX: (08) 8999 5110
Email: inf@irt.gov.au

AVAILABLE FROM AND PRODUCED BY:
Dept Lands, Planning and the Environment
Land Information Division
301 Flinders Mall House, Darwin
GPO Box 1680 Darwin NT 0811
<http://www.irt.gov.au/>
Northern Territory Government

SOURCE INFORMATION

CURRENCY OF TOPOGRAPHY: 26 Jun 2012
SOURCE MAP SCALE: 602
ZONE UTM: 53
CONTIGUOUS INTERNAL: GD44
HORIZONTAL DATUM: AHD
VERTICAL DATUM: AHD
PROJECTION: Transverse Mercator
DATE GENERATED: 24 Jun 2012

GDA

SERVICED LAND AVAILABILITY PROGRAM

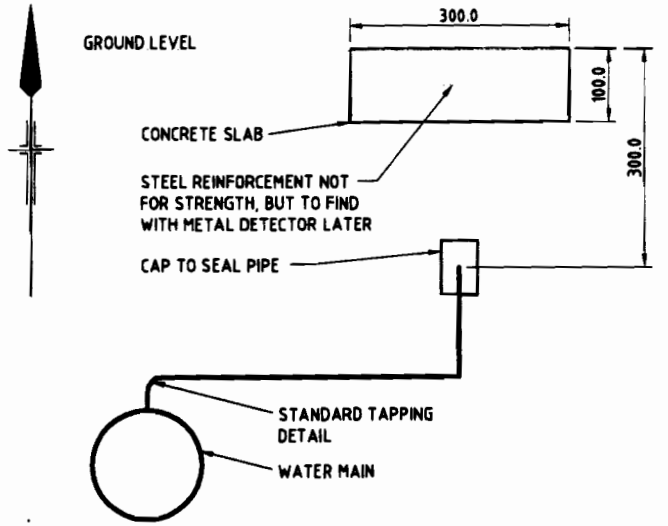
SLAP Map

Garawa 2 (Borroloola Town Camp)

Borroloola Town Camp

Roper Gulf Shire Council

Community ID : 992



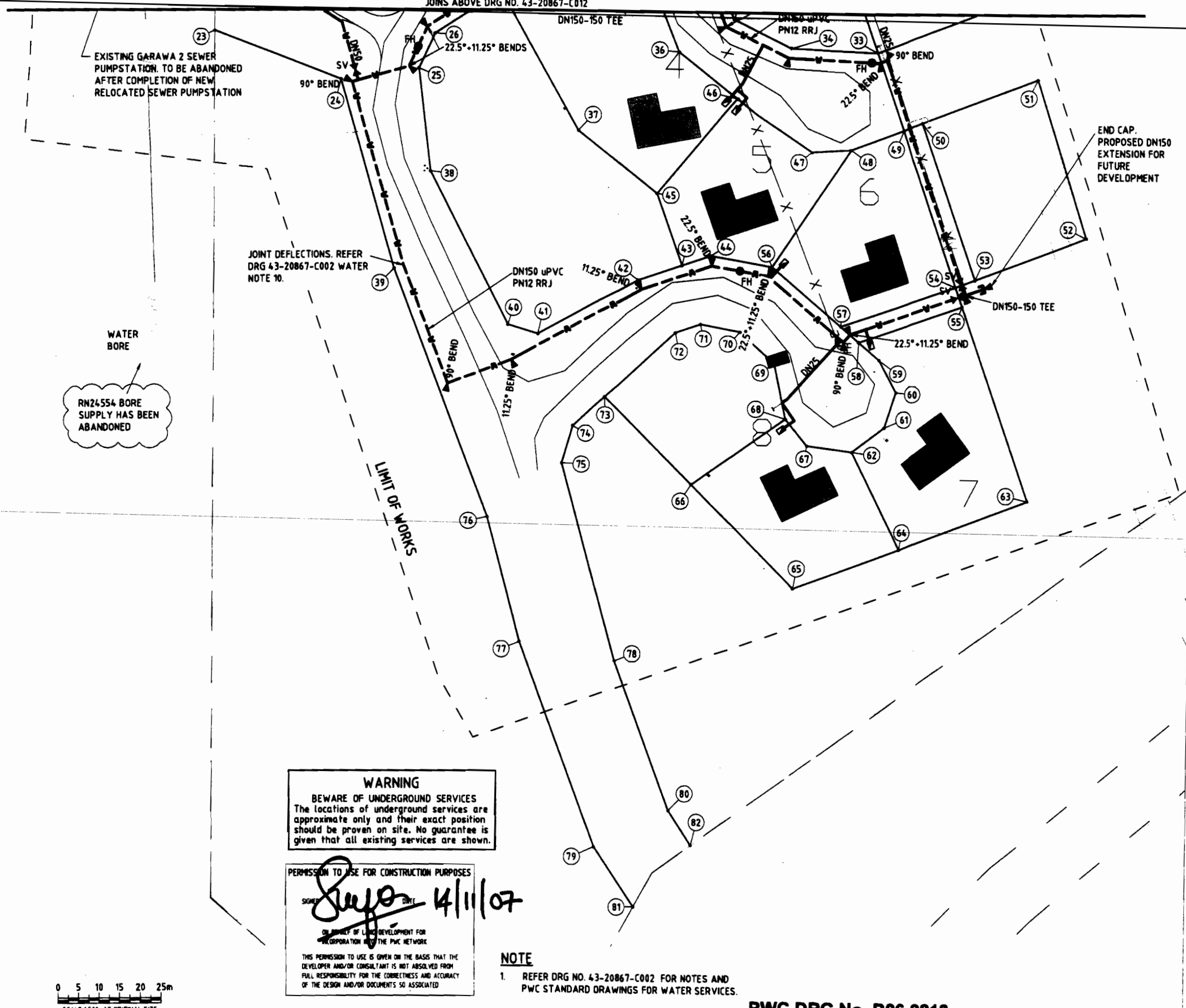
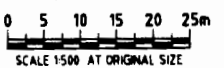
DETAIL A - WATER CONNECTION TO VACANT LOT

GARAWA 2 LOT BOUNDARY SETOUT POINTS

PT	EASTING	NORTHING
1	640881.235	8222374.085
2	640910.565	8222362.417
3	640860.406	8222352.906
4	640900.200	8222351.641
5	640905.700	8222350.189
6	640889.812	8222345.592
7	640860.644	8222342.909
8	640887.250	8222335.886
9	640939.596	8222331.733
10	640909.387	8222321.188
11	640888.038	8222319.280
12	640891.840	8222309.486
13	640861.698	8222298.751
14	640952.758	8222294.047
15	640923.514	8222282.895
16	640906.538	8222271.632
17	640862.642	8222259.182
18	640964.302	8222260.992
19	640935.628	8222250.058
20	640918.168	8222241.680
21	640863.546	8222221.285
22	640828.928	8222218.931
23	640828.848	8222199.264
24	640859.443	8222187.350
25	640878.264	8222190.097
26	640882.248	8222198.585
27	640898.156	8222209.051
28	640933.270	8222212.630
29	640947.741	8222217.221
30	640975.846	8222227.938
31	641008.008	8222240.202
32	641020.284	8222207.440
33	640987.386	8222194.895
34	640966.749	8222195.743
35	640953.147	8222202.569
36	640940.177	8222194.515
37	640916.569	8222175.043
38	640881.072	8222164.988
39	640872.227	8222141.323
40	640899.838	8222127.660
41	640907.093	8222125.457

GARAWA 2 LOT BOUNDARY SETOUT POINTS

PT	EASTING	NORTHING
42	640930.739	8222138.852
43	640941.222	8222142.517
44	640948.133	8222144.933
45	640935.119	8222159.971
46	640954.036	8222183.255
47	640971.931	8222170.496
48	640981.259	8222171.154
49	640993.983	8222176.006
50	640998.657	8222177.788
51	641026.812	8222188.524
52	641039.189	8222150.052
53	641011.969	8222139.673
54	641007.244	8222137.871
55	641008.944	8222133.168
56	640962.647	8222142.438
57	640979.263	8222128.141
58	640983.644	8222124.370
59	640988.627	8222120.082
60	640992.812	8222112.235
61	640990.081	8222103.584
62	640982.323	8222097.583
63	641025.442	8222085.931
64	640994.061	8222073.933
65	640968.499	8222064.759
66	640943.864	8222089.177
67	640971.501	8222098.936
68	640966.248	8222105.354
69	640963.407	8222118.859
70	640955.172	8222126.458
71	640945.811	8222128.231
72	640939.816	8222126.135
73	640923.076	8222110.289
74	640915.507	8222103.126
75	640912.930	8222094.031
76	640894.972	8222080.827
77	640902.810	8222050.464
78	640925.719	8222046.068
79	640921.013	8222000.711
80	640938.986	8222009.778
81	640930.595	8221986.344
82	640944.430	8222001.360



WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown.

PERMISSION TO USE FOR CONSTRUCTION PURPOSES
SIGNED: *[Signature]* DATE: 4/11/07
ON BEHALF OF THE DEVELOPER FOR INCORPORATION INTO THE PWC NETWORK
THIS PERMISSION TO USE IS GIVEN ON THE BASIS THAT THE DEVELOPER AND/OR CONSULTANT IS NOT ABSOLVED FROM FULL RESPONSIBILITY FOR THE CORRECTNESS AND ACCURACY OF THE DESIGN AND/OR DOCUMENTS SO ASSOCIATED

- NOTE**
- REFER DRG NO. 43-20867-C002 FOR NOTES AND PWC STANDARD DRAWINGS FOR WATER SERVICES.
 - REFER DRG NO. 43-20867-C012 FOR LEGEND

PWC DRG No. B06-3813

No.	Revision	Notes	Drawn	Checked	Approved	Date
2		BORE DETAILS AMENDED (KBR)	SL	AW		12/08/07
1		REISSUED FOR PWC APPROVAL	ZV		BJ	8-12-08
0		ISSUED FOR TENDER	ZV		BJ	23-10-08

CLIENTS | PEOPLE | PERFORMANCE

Level 5, 88 Smith Street Darwin NT 0800 Australia
PO Box 381 Darwin NT 0801
T 61 8 8982 0900 F 61 8 8981 1075
E darwin@ghd.com.au W www.ghd.com.au

DO NOT SCALE

Drawn	ZV 04-08-2008	Designated	MG 04-08-2008
Drafting Check		Design Check	B. JONES
Approved		Date	
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

AUSTRALIAN ARMY 19 CHIEF ENGINEER WORKS
BORROLOOLA NAHS - GARAWA 2
WATER RETICULATION PLAN FOR GARAWA 2 - SHEET 2 OF 2

Original Size: **A1**
Drawing No: **43-20867-C013**
Rev: **2**

LEGEND FOR GARAWA 2

- NEW INSPECTION OPENING ON EXISTING PROPERTY CONNECTION WHERE APPLICABLE
- REFER STD DRG W2-1-01, W2-1-02, W2-1-03, W2-1-04 & W2-1-05 FOR TYPE
- NEW INSPECTION OPENING AND NEW PROPERTY CONNECTION WHERE APPLICABLE
- REFER STD DRG W2-1-01, W2-1-02, W2-1-03, W2-1-04 & W2-1-05 FOR TYPE
- NEW WATERMAIN TO BE CONSTRUCTED
- NEW WATER STOP VALVE
- NEW ALLOTMENT BOUNDARY
- PROPERTY SERVICE INCLUDING METER & BACKFLOW PREVENTION DEVICE WHERE APPLICABLE
- NEW WATER CONNECTION TO VACANT LAND
REFER DETAIL 'A' ON DRG NO. C013
- PROPOSED WATER MAIN AND FUTURE WATER CONNECTION TO VACANT LAND
- EXISTING SEWER GRAVITY MAIN, ACCESS CHAMBER & HOUSE CONNECTION POINT
- PROPOSED SEWER GRAVITY MAIN & ACCESS CHAMBER
- EXISTING, SANITARY DRAINAGE HOUSE DRAIN CONNECTION TO REMAIN
- EXISTING WATERMAIN TO REMAIN
- FUTURE WATERMAIN AND FIRE HYDRANT
- EXISTING PIPELINE TO BE DISCONNECTED, CAPPED & ABANDONED
- EXISTING ELECTRICAL LINE
- EXISTING TELECOMMUNICATION LINE
- EXISTING O/HEAD POWER LINE AND POWER POLE
- SURVEY STATION
- EXISTING STOP VALVE
- EXISTING SEWER RISING MAIN
- EXISTING WATER RISING MAIN
- EXISTING CADASTRAL BOUNDARY TO BE SUPERCEDED
- FUTURE CADASTRAL BOUNDARY
- EXISTING FIRE HYDRANT
- NEW FIRE HYDRANT
- NEW SINGLE AIR VALVE
- EXISTING WATER METER OFF EXISTING WATER MAIN
- PROPERTY CONNECTION TYPE/DIST TO D/S M/H
APPROX. EXISTING SEWER SERVICE HEIGHT (OR MAXIMUM SEWER SERVICE HEIGHT FOR NEW SEWERS)
- FUTURE SEWER EXTENSION AND PROPERTY CONNECTION - NO WORKS REQUIRED
- EXISTING SEWER, FUTURE PROPERTY CONNECTION CAPPED
- TERMINAL INSPECTION OPENING - REFER STD DRG W2-1-05

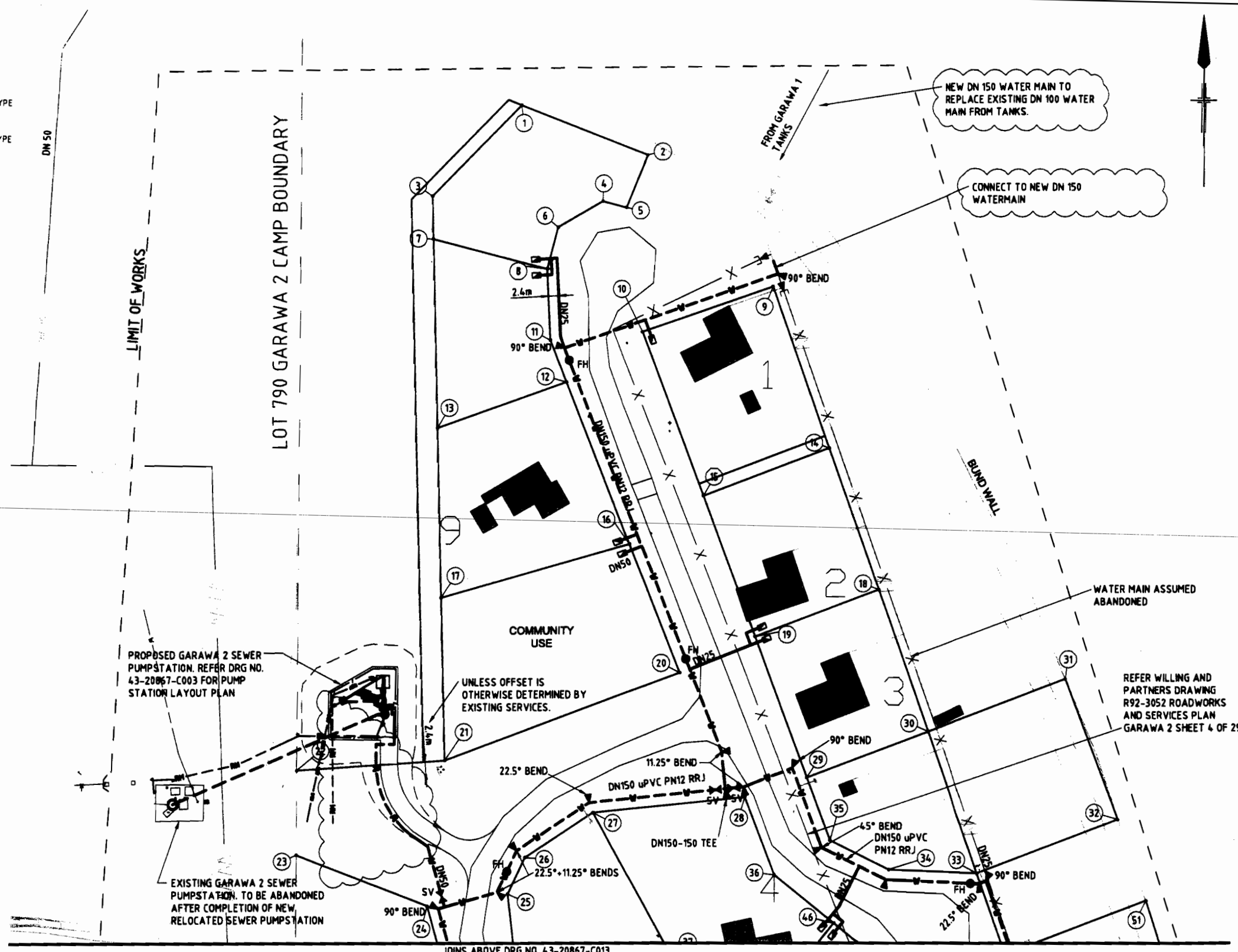
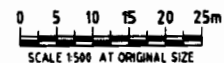
SURVEY CONTROL NOTE

REFER TO GARAWA 2 SURVEY SET OUT PLAN ON DRG NO. 43-20867-V002.

PERMISSION TO USE FOR CONSTRUCTION PURPOSES

Super DATE 14/11/07
 THIS PERMISSION TO USE IS GIVEN ON THE BASIS THAT THE DEVELOPER AND/OR CONSULTANT IS NOT ABSOLVED FROM FULL RESPONSIBILITY FOR THE CORRECTNESS AND ACCURACY OF THE DESIGN AND/OR DOCUMENTS SO ASSOCIATED

WARNING
 BEWARE OF UNDERGROUND SERVICES
 The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown.



NOTE

1. REFER DRG NO. 43-20867-C002 FOR NOTES AND PWC STANDARD DRAWINGS FOR WATER SERVICES
2. FOR LOT BOUNDARY SETOUT COORDINATES FOR GARAWA 2, REFER TO DRG. NO. 43-20867-C013

PWC DRG No. B06-3812

No	Revision	Date	By	Checked	Approved	Date
2	NOTES AMENDED, WATER ALIGNMENT ALTERED (KBR)		SL	AW		12/08/07
1	REISSUED FOR PWC APPROVAL		ZV		BJ*	8-12-08
0	ISSUED FOR TENDER		ZV		BJ*	23/10/06

CLIENTS | PEOPLE | PERFORMANCE

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 E darwin@gnd.com.au W www.gnd.com.au

DO NOT SCALE

Drawn	ZV 04-08-2008	Designed	BJ 04-08-2008
Drafting		Design	B. JONES*
Checked		Approved	
Date		Date	
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

AUSTRALIAN ARMY 19 CHIEF ENGINEER WORKS
BORROLOOLA NAHS - GARAWA 2
WATER RETICULATION PLAN FOR
GARAWA 2 - SHEET 1 OF 2

Client Project Title
 Drawing No: **43-20867-C012** Rev: **2**

Transformer data

Group	Com Id	Location	Community Name	Dwellings No. (Funded Dwellings)	Dwellings No. (Bennett Design)	New Houses ** (Future Demand)	Primary Voltage Level (KV)	PWC Substation ID	PWC Test Number	Transformer size (KVA)	KVA Total dwellings @ 4.5KVA	KVA Total dwellings @ 7KVA	Comments
1	290	Darwin	Bagot	55	55		11	1924	1735	300	247.5	385	
	344	Darwin	Knuckey Lagoons	18	19	2	11	1771	2163	100	85.5	133	
	347	Darwin	Kulaluk	19	19		11	1092	10607	50	85.5	133	
	403	Darwin	Palmerston Town Camp	20	16		22	10196	10245	100	90	140	Two transformers for this Town Camp. Transformers are not in boundary of Town Camp [The nearest transformers data to Town Camp are highlighted in yellow].
							22	265	11645	25			
	412	Darwin	Railway Dam (One Mile Dam)	5	6	2	11	1041	4378	200	27	42	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	427	Adelaide River	Amangal	9	9		22	216	12187	100	40.5	63	Two transformers for this Town Camp.
	687	Jabiru	Manabadurma	10	12		11	5050	11107	200	54	84	
825	Darwin	Minmarama Park	24	24		11	2147	11372	100	108	168		
2	606	Katherine	Warlpiri Transient Camp	9	9		22	6416	4886	100	40.5	63	Two transformers for this Town Camp.
							22	6074	4695	25			
	621	Katherine	Miali Brumby (Kalano)	47	31		22	6133	12247	315	211.5	329	
	640	Pine Creek	Pine Creek Compound	4	4		22	6666	3147	25	18	28	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
971	Mataranka	Mulggan	12	9	4	22	6819	5296	16	54	84		
						22	6818	5297	16				
						22	6384	11028	25				
3	215	Tennant Creek	Blueberry Hill (Munji-Marla)	2	2		22	7079	1868	200	9	14	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	223	Tennant Creek	Dump Camp (Marla-Marla)	7	7		22	7181	11088	200	31.5	49	
	224	Elliott	Elliott South Camp	12	12		11	7504	4718	200	54	84	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	225	Elliott	Elliott North Camp	36	25		11	7505	4715	100	162	252	
	238	Tennant Creek	Kargaru (East Side Camp)	12	12	1	22	7572		200	54	84	
	246	Tennant Creek	Ngalpa Ngalpa	18	21		22	7179		200	94.5	147	Two transformers for this Town Camp.
							22	7033	10904	315			
	271	Tennant Creek	Village Camp	12	12	1	22	7183	11107	200	54	84	
681	Tennant Creek	Tingkarli	12	12		22	7180		200	54	84		
684	Tennant Creek	Wuppa	15	15	1	22	7141	11092	100	67.5	105	Two transformers for this Town Camp.	
						22	7182	11095	200				
4	3	Alice Springs	Akngwertnarre (Morris Soak)	11	15		11	8596	11336	300	67.5	105	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	16	Alice Springs	Anthelk Ewlpaye (Charles Creek)	17	10		11	8569	315	315	76.5	119	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	17	Alice Springs	Anthepe	15	15		22	8598	5874	200	67.5	105	Data extracted from PWC asset information. There was not access to this Town Camp due to ceremony on inspection day.
							22	8597	11244	315			
	19	Alice Springs	Aper Alwerrkng (Palmers)	7	6		11	8405	2939	200	31.5	49	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	35	Alice Springs	Ewyenper Atwatye (Hidden Valley)	47	47		11	8622	11202	100	211.5	329	
							11	8623	11203	100			
							22	8625	11205	63			
							11	8626	11204	100			
	47	Alice Springs	Ilparpa	13	13		22	8611	11702	200	58.5	91	
	48	Alice Springs	Ilperle Tyathe (Walpiri)	10	9		11	8001	11209	315	45	70	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	50	Alice Springs	Ilyperenye (Old Timers)	10	10		22	8145	3323	100	45	70	
	64	Alice Springs	Bassos	2	2		11	8002	10946	50	9	14	
	69	Alice Springs	Karnte	19	19		22	8282	2345	100	85.5	133	
87	Alice Springs	Yarrenty Altere (Larapinta Valley)	34	34		11	8617	11334	100	153	238		
						11	8618	11200	63				
						11	8619	11335	100				
						11	8620	11201	100				
90	Alice Springs	Inarlenge (Little Sisters)	16	22		22	8137	2925	100	99	154	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
108	Alice Springs	Mpwetyerre (Abbotts)	6	6		11	8093	11703	315	27	42	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
113	Alice Springs	Mount Nancy (Nyewente)	11	12		11	8405	2939	200	54	84		
129	Alice Springs	Nyewente (Trucking Yards)	26	26		11	8629	11312	300	117	182		
675	Alice Springs	Hoppys	15	19						85.5	133	There is not any Transformer in boundary of Town Camp. Also it's not shown in PWC asset information.	
676	Alice Springs	Ipiye Ipiye (Golders Camp)	15	14		11	8314	369	50	67.5	105		
1029	Alice Springs	Kunoth	4	4		11	8569	315	315	18	28	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
5	222	Borrooloola	Mara	28	29	2	11	6187	12610	100	130.5	203	Two transformers for this Town Camp.
							11	6545	10203				
	229	Borrooloola	Garawa 1	16	14		11	6546	10166	100	72	112	Two transformers for this Town Camp.
							11	6332	4890	100			
278	Borrooloola	Yanyula	29	29		11	6162	10496	200	130.5	203	Data extracted from PWC asset information. It's outside of Twon Camp, shown only Transformer to this Town Camp.	
						11		10167				This transformer is not shown in PWC asset information. It's installed in Boat Ramp Road near to Town Camp and connected to Electrical reticulation of Town Camp.	
992	Borrooloola	Garawa 2	11	11		11	6189	2669	25	49.5	77		

** For New house's demand calculation see section 13.4 "Future Demand".

Pine Creek Compound

Pine Creek Compound

1 Design

The infrastructure reviews have been undertaken against current relevant standards for typical sub-divisions. The following standards have been used in undertaking the reviews.

Sewerage and water supply

- Water Services Association of Australia – Sewerage Code – WSA 02 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 02
- Water Services Association of Australia – Sewerage Pumping Station Code – WSA 04 -2005 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 04
- Water Services Association of Australia – Water Supply Code – WSA 03 2002 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 03
- Power and Water Corporation Indigenous Community Engineering Guidelines (2008)
- Department of Housing and Community Development Indigenous Community Engineering Guidelines (ICEG 2014, updated September 2016)
- Power and Water Corporation Essential Services Infrastructure Assessment and Upgrade Guidelines (for Town Camps in Urban Communities, 2009)
- Power and Water Corporation Standard Drawings
- Australian Standards

Electrical services

Electrical infrastructure has been assessed against AS/NZS3000 Wiring Rules and against PWC Service, Installation and Metering Rules and Urban Residential Development (URD) Design Standards where possible.

With one exception, town camps are each a single lot and compliance with AS/NZS3000 is sufficient to address potential safety concerns.

As such application of PWC URD Design Standards will mainly apply to the incoming supply and bulk or initial multi-metering panels if provided.

URD Design Standards for internal reticulation and street lighting appear to have been applied in many cases for convenience rather than compliance.

For the purposes of this report, the demand per dwelling allowances of URD Design Standards have been used to estimate incoming supply and overall distribution capacity requirements.

The following standards apply:

- Australian Standards
- Power Networks Design and Construction Guidelines, Power and Water Corporation
 - NP001.1_Design and Construction of Network Assets – General Requirements
 - NP001.3_General Specification for Overhead Electrical Reticulation
 - NP001.6_General Specification for URD Subdivisions
 - NP003_Installation Rules_V3
 - NP007_Service Rules

- NP027_Capture of Newly Installed Street Lighting Information
- NP041_Guidelines for Electrical Design Consultants

Further referral to the guidelines in this report will be designated by the guidelines number, NP001.1.

Communications

- National Broadband Network Website viewed 21 January 2017 (<http://www.nbnco.com.au/>) – NBN rollout maps

General

It should be noted that if the town camps are proposed to be subdivided and services assets gifted to Power and Water Corporation (PWC) for operation and maintenance, all of these services will need to fully meet PWC standards. With the exception of a few town camps that have recently been upgraded, this will require the full replacement and/or realignment of most services.

2 Condition assessment

2.1 Rating assessment matrix

A condition rating matrix was developed and used to assess all municipal infrastructure. The same rating was used for all services to maintain consistency in assessments. Table 1 below shows the condition rating and operability.

Table 1 Condition rating

	Condition rating	Operability
1	Very Poor	Not operational
2	Poor	Not fully operational or requires immediate maintenance to keep operational
3	Good	Fully operational, may require routine maintenance
4	Very Good	Fully operational, may require maintenance in the next six months
5	Excellent	New, fully operational

2.2 Civil assessment limitations

The civil infrastructure condition investigations were subject to a number of limitations. These include:

- Only accessible services have been investigated. This includes inspecting the top of sewer manholes, side entry pits, etc., however, does not include opening pits to inspect infrastructure below ground.
- No physical testing of the sewer, water or stormwater network was undertaken.
- No survey or service locating was undertaken.

As there was no survey, potholing or CCTV undertaken on the underground infrastructure there is insufficient information to make determinations on the asset condition. The condition assessments discussed in this report are only for the accessible services and do not necessarily represent the condition of the underground infrastructure. For the majority of the town camps, other than a few that have recently been upgraded it was found that the underground services are generally undersized and it is likely, due to their age, that these services are in poor condition. Either factor would trigger the need for a complete replacement to meet current relevant standards.

2.3 Electrical assessment limitations

The electrical infrastructure condition investigations were subject to a number of limitations. These include:

- Inspections were carried out without the assistance of an electrical tradesman.
- Only accessible services were investigated. Assessments were of a visual nature and no pit covers were removed.
- Overhead equipment was assessed from ground level.
- Switchboards were not opened and no assessment of the internal connections or bus ratings was made.

- Electrical infrastructure was assessed down to the meter for multi-meter panels and down to the termination, overhead pole or distribution pillar, of the supply cable to a meter located at a dwelling.

3 Current infrastructure issues

Power and Water Corporation (PWC) have advised of the following concerns and issues in regard to the sewerage, water and electrical infrastructure at all town camps.

3.1 Ownership and maintenance

PWC stated there has always been confusion regarding the ownership and responsibilities of the internal sewer, water and electrical infrastructure. PWC have advised that they have no legal tenure on the majority of assets in any town camps and that the owner is essentially that of the land owner or leaseholder. This is further discussed for each type of infrastructure for each town camp.

The ownership and who is responsible for the maintenance of the sewage pump stations and street lighting is a major concern. In most town camps it was found that PWC have been maintaining the assets on an in-kind basis, although there are no maintenance or access agreements in place and the infrastructure is generally not compliant to PWC standards.

3.2 Access to infrastructure

PWC advised that due to the uncertainty surrounding ownership and responsibility of the sewerage, water and electrical infrastructure, each town camp is seen as a single lot with multiple houses on it. There are no formal road reserves or easements where the municipal infrastructure should be located. PWC therefore have no legal right to enter the town camps to work on the infrastructure, nor can PWC stop others from working on the infrastructure. There is a risk that the maintenance undertaken by others may be to a lower standard than PWC.

It should be noted that there are currently no legal services easements within the town camps, except for a few cases where a town service passes through the town camp. Therefore it is recommended that easements are created over any infrastructure owned by PWC and any future assets to be gifted to PWC, to allow the service providers access to the infrastructure.

3.3 Existing infrastructure

PWC have stated that although the existing sewerage and water infrastructure appears to comply with relevant standards in some locations, the capacity cannot be assumed to meet PWC requirements due to the potential for underground substandard condition and/or grading of pipework. It is likely that these assets will need to be fully replaced to PWC standards to ensure sufficient capacity.

The planning process currently allows construction within the town camps on Commonwealth land without requiring service authority (PWC) approvals. This means that there has been no opportunity for PWC to recover contributions towards required upgrades to headworks servicing the developments and these upgrades have been paid for by PWC in the past. This inconsistency needs to be addressed for future developments within the town camps to ensure PWC are able to continue to provide adequate services.

3.4 Safety concerns

PWC have expressed concerns with safety of PWC staff and contractors working within the camps. PWC have employed procedures such as multiple people / vehicles to attend the site, with police or housing safety officers as required. This

generally leads to a delayed response time and increased cost to respond to and remediate emergency situations.

PWC have also raised the concern that if others work on water infrastructure within the town camps and do not apply the correct sanitation procedures they not only risk contaminating the entire water supply network within the town camp, at some town camps with direct connections to the town supply, they risk contaminating the entire town's water supply.

4 Available information

As the site investigations were limited to accessible / visible services, information on below ground services (such as electrical cables, sewer pipes, water supply pipes, etc.) were determined from available information. This information included:

- Serviced Land Availability Program (SLAP) maps,
- Department of Family & Community Services - Connecting Neighbours Program – Essential Services Scoping Study Report Volume 1 April 2005,
- Connecting Neighbours Project – Infrastructure Assessment and Recommendation Report - Arup Pty Ltd, April 2005,
- Drawings supplied by NT Department of Infrastructure - Technical Records,
- Drawings supplied by Power Water Corporation,
- Bennett Design inspection reports and population data.

Aurecon undertook a site investigation of the Pine Creek Compound on Monday 5 December 2016 to inspect roads, stormwater drainage, electrical services, sewerage and water supply, and community structures. The following sections detail the outcomes of this investigation and the assessments of the infrastructure.

The civil and electrical inspection reports can be found in the Appendices.

5 Sewerage

5.1 Ownership and boundaries

Pine Creek Compound is serviced by a DN150 PVC gravity main which disposes to a pump station then to a DN50 PVC rising main. The sewer network is owned and maintained by the Pine Creek Aboriginal Advancement Association.

PWC have advised they currently maintain the sewage pump station and compound, although there is no formal maintenance agreement in place.



Figure 1 Sewer network as shown on the PWC database

5.1.1 Connection methods and billing

It is understood that sewerage bills are charged by PWC to the owner of the town camp, in this case the Pine Creek Aboriginal Advancement Association. The bill is based on number of dwellings within the town camp.

It is not known what contribution the residents make towards the sewerage bills.

5.2 Existing infrastructure condition assessment

The sewer infrastructure inspection was limited to inspecting the condition of manhole covers and sewage pump station compound, as all other sewerage

infrastructure is below ground. A total six manholes and one pump station were inspected, with condition ratings as follows:

Table 2 Sewer condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Manholes	2	1	3			6
Pump station			1			1



Figure 2 Sewer pump station (electrical)



Figure 3 Sewer pump station (access chamber)



Figure 4 Sewer pump station (davit arm)



Figure 5 Sewer manhole, condition: very poor



Figure 6 Sewer manhole, condition: very poor



Figure 7 Sewer manhole, condition: poor

5.3 Current performance and risks

5.3.1 Current sewer network performance

The current capacity of the sewer network was calculated based on the following design assumptions:

- The adopted minimum grade for the pipework is 1.0%, as advised by Power and Water Corporation.
- The Equivalent Population (EP) has been calculated assuming one household equates to 9 EP, based on discussions with Power and Water Corporation.
- The capacity has been assessed by calculating the current flow rate, and the maximum flow rate when the sewer pipe flows full. The result is then a percentage of how much of the pipe is currently being used.
- Manning’s roughness coefficient of the pipework is 0.012, as recommended by PWC for PVC pipes.
- Where the sewer pipe grade, size or material is not known, it is assumed to be non-compliant to PWC standards.

The current number of houses in Pine Creek Compound is 4, this multiplied by 9 EP per house gives a total current EP of 36. The capacity of the existing sewer was then calculated. The percentage shows how much of the pipe capacity is currently being used.

Table 3 Existing sewer capacity

Catchment	Current total EP	Diameter of connection (mm)	Adopted PWC minimum slope (%)	Q _{full} (L/s)	Current Q (L/s)	Current capacity (%)
Catchment 1	36	150	1.0	16.50	0.64	4%

Table 3 above shows that the capacity of the existing sewer network is adequate for the current peak population. As the flows are relatively low, it is likely that the minimum velocity for self-cleansing is not achieved.

5.3.2 Current sewage pump station performance

The capacity of the pump station could not be determined as there were no drawings or information on the pump station available.

It is assumed that the capacity of the pump station is adequate for the current use, due to the low flows, however this would need to be further analysed when more information is available.

It is not known whether the pump station complies with PWC standards as no information was available.

5.4 Future demands

As no new developments are currently planned for Pine Creek Compound, there are no additional upgrades required to cater for future demand.

5.5 Recommended works

The infrastructure that was assessed as very poor or poor condition are recommended to be upgraded to prevent failure in the future. In this case, three sewer manholes require upgrades to be in accordance with PWC requirements. The cost estimates assume three new manholes would be required, however it may be that only a lid needs to be replaced.

Note that the rising main leaving the pump station is also undersized. Cost estimates to upgrade this pipe to meet PWC standards have not been included as the pipe is the responsibility of PWC.

6 Water supply

6.1 Ownership and boundaries

No engineering drawings relating to the water main within Pine Creek Compound were available. It is understood that the internal water reticulation is DN100, or smaller.

The water supply network within Pine Creek Compound is owned and maintained by the Pine Creek Aboriginal Advancement Association. The water is supplied from PWC water mains outside of the community. PWC have advised they currently do not manage maintenance works on any internal water supply infrastructure. The following figure shows water main supply to Pine Creek Compound.



Figure 8 PWC water supply to pine creek

6.1.1 Connection methods and billing

It is understood that water bills are charged by PWC to the owner of the town camp, in this case the Pine Creek Aboriginal Advancement Association. The bill is expected to be based on water usage measured at the bulk water meter located on the community boundary. It is not known what contribution the residents make towards the sewerage bills.

It is proposed that PWC continues to measure the water supply to the entire community with a bulk meter. Individual lot meters to each property are recommended in addition to the proposed continuation of using the bulk water meter. This will assist with the governing body distributing bills to residents, the

identification of any leaks in the network, and meeting PWC standards should the town camp be subdivided in the future.

6.2 Existing infrastructure condition assessment

The site investigation for the water infrastructure included assessing the condition of any air valves, fire hydrants, tanks, taps, and water meters. The assessment was limited to services that could be accessed above ground; no excavation of below ground services was undertaken.

The condition of each asset is as follows:

Table 4 Water asset condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Taps	1					1



Figure 9 Tap, condition: *very poor*

A single tap was the only water infrastructure found within Pine Creek Compound. The tap is in very poor condition and is recommended to be replaced.

6.3 Current performance and risks

The current capacity of the water supply was calculated based on the following design assumptions:

- The nominal peak day flow is 1100 L/capita/day, based on PWC’s supplement to WSA 03 2002. This value is for the northern region of NT. It was assumed that the nominal peak day flow of 1100 L/capita/day also applies to water usage

within the community, although it is possible that this value could be higher in real life due to a lack of controls to reduce water usage.

- The Equivalent Population (EP) has been calculated assuming one household equates to 9 EP, based on discussions with Power and Water Corporation.
- The peak hour factors are listed in PWC’s Supplement to WSA 03-2002, and they depend on the population range of the community. The peak hour factor of 3.0 has been adopted, for populations less than 500.
- The maximum flow velocity used for calculating the incoming flow capacity is 1.4 m/s. PWC supplement to WSA 03-2002 states that flow velocities should generally not exceed 1.4 m/s during peak hour demand.
- The water meter has PWC’s minimum pressure guaranteed value of 15 m.
- The internal main is a DN100 dead end main.

Table 5 shows the properties used to analyse Pine Creek Compound water supply demand.

Table 5 Current water demand

Total dwellings	EP	Demand (l/s)	Peak hour demand (l/s)	Pipe size	Length (m)
4	36	0.46	1.37	DN100	100

Table 6 Current water demand analysis

Demand	Velocity (m/s)	Headloss (m)	Pressure (m)
Peak hour demand	0.18	0.05	14.95
Fire flow demand	3.18	15.49	-0.49

The water reticulation has sufficient capacity under peak hour demands however has insufficient capacity for fire flow demand. Furthermore, the network is non-compliant with PWC standards as it is undersized, believed to be a dead end main and there are currently no fire hydrants within the community.

The existing network requires upgrades to incorporate fire hydrants and supply adequate capacity. It is recommended that the network is upgraded to DN150 PVC with two new fire hydrants, and individual lot meters.

6.4 Future demands

As no new developments are currently planned for Pine Creek Compound, there are no additional upgrades required to cater for future demand.

6.5 Recommended works

The infrastructure that was assessed as very poor or poor is recommended to be upgraded to prevent failure in the future. The following maintenance works are recommended for the current infrastructure;

- Replace one tap

A new DN150 PVC looped main installed to PWC standards is recommended. The new water reticulation should include fire hydrant. A bulk water meter is proposed to measure the usage for the entire community as it is viewed as a singular lot. Additionally, residential lot water meters are recommended to assist with bill distribution to residents and identification of any leaks. The cost estimates for upgrades include;

- Install up to four new residential lot water meters
- Install new DN150 looped water main, approximately 500 m
- Install DN150 bulk water meter
- Install two fire hydrant

7 Roadworks

7.1 Ownership and boundaries

It is the current understanding that the roads within Pine Creek Compound are owned and maintained by the Pine Creek Aboriginal Advancement Association.

7.2 Existing infrastructure condition assessment

The road network within the community consists of a single sealed road circuit. There are also some tracks which appear to be used frequently which are not included in the inspection and report. **Error! Reference source not found.** below summarise the condition of the road furniture as assessed during the site inspection.

Table 7 Roadworks condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Sign		1				1

Aside from one sign in poor condition there was no other road furniture assessed.

It is recommended that the sign be repaired as the post holding it is slightly bent. It is also recommended that a road safety audit is undertaken to determine where signage, line marking, etc. are required.



Figure 10 Sign, condition; *poor*



Figure 11 Pine Creek Compound community road network

Error! Reference source not found. below details the condition of the roads within the community for specific segments. **Error! Reference source not found.** shows a map of the road network with the condition ratings, road name, and chainage direction.

Table 8 Road network condition assessment

Road name	Chainage start (km)	Chainage end (km)	Condition (1 to 5)	Defects and associated condition
Pine Creek Compound	0.55	0.78	1	-10% percent of road has surface cracking (2) -10% of road has significant potholes (1) -10% percent of road has edge breaks (1)

7.3 Current performance and risks

The road network is sufficient for the current number of houses however it is in very poor condition due to having surface cracking, significant potholes, and edge breaks. It is recommended that the road is upgraded to a two lane network with all associated stormwater drainage infrastructure.

7.4 Future demands

As no new developments are currently planned for Pine Creek Compound, there are no additional upgrades required to cater for future demand.

7.5 Recommended works

The infrastructure that was assessed as very poor condition is recommended to be upgraded to prevent failure in the future. The following works are recommended to upgrade the current infrastructure;

- Repair approximately 100 m of edge break
- Repair potholes
- Repair surface cracking
- Replace sign

In order to allow for a longer term sustainable road network a significant upgrade would be required. It is recommended that a long term design which incorporates a full two lane road network, with all appropriate road furniture, line-marking, kerbs and gutters is constructed. A cost estimate to reinstate the base and subbase material, reseal with a two coat spray seal surface, construct subsoil drainage, line marking and signage has been included. Note that these works will need to be fully designed, the cost estimate is for budgetary purposes only and only indicates the construction phase. A footpath next to the road is also recommended to provide a safe trail for pedestrians.

As the maximum road width within the Pine Creek Compound is 2.8 m, this means that all 230 m of the road network will need to be upgraded to a 7.2 m wide road. The stormwater drainage infrastructure upgrades that are closely associated with the road upgrade i.e. kerb and gutters, side entry pits and underground drainage pipes are included in the stormwater section of this report.

8 Stormwater drainage

8.1 Ownership and boundaries

There are currently no stormwater drainage assets within Pine Creek Compound community.

8.2 Current performance and risks

The detailed performance of the stormwater network cannot be fully analysed without significant hydraulic and hydrodynamic modelling, which is outside the scope of this project. Since there are no stormwater drainage assets, the current performance is expected to be insufficient, resulting in ponding and flooding around the community.

The general design philosophy for stormwater drainage is that the design is based on a system of sealed roads, kerb and gutter, entry pits and underground drainage. This infrastructure currently does not exist at Pine Creek Compound and there would be major headworks required if stormwater drainage is to be incorporated. Cost estimates have been provided to include the construction of underground drainage, kerbs and gutters and side entry pits.

8.3 Future demands

As no new developments are currently planned for Pine Creek Compound, there are no additional upgrades required to cater for future demand.

8.4 Recommended works

The following works are recommended to upgrade or improve the current infrastructure:

- Construct stormwater drainage, including underground pipes, kerbs and gutters, and side entry pits. Approximately 250 m required.

9 **Community structures**

9.1 **Ownership and boundaries**

There are no community structures in the Pine Creek Compound community.

9.2 **Future demands**

As no new developments are currently planned for Pine Creek Compound, there are no additional upgrades required to cater for future demand.

10 Electrical services

10.1 Ownership and boundaries

The following points, from Network Policy NP003 Installation Rules Section 3, define the typical shared ownership of electrical infrastructure by Power and Water Corporation (PWC) and customers.

- The point of supply is defined as the point where PWC makes the electrical supply available. For domestic supply, this is normally one of the following:
- A point of attachment of an overhead service on to a building or pole on which a metering panel is fitted.
- A point of attachment of an overhead service on to a pole forming part of unmetered aerial consumer's mains.
- A nominated point on a distribution substation located on the customer's lot.
- A point of connection of an underground service in a metering panel, including underground services originating at an overhead line.
- A point of connection of an underground service in a pillar or junction box forming part of unmetered consumer's mains, located on the customer's lot.
- A point on a Power and Water pillar located on the customer's lot.

Typically, distribution infrastructure upstream of the Point Of Supply is owned and maintained by PWC and infrastructure below the point of supply is owned and maintained by the customer.

In many cases PWC have defined a Point Of Supply to ensure that they retain responsibility for aerial high voltage infrastructure, and aerial low voltage infrastructure where installed with aerial high voltage infrastructure, to minimise the possibility of the community or it's contractors coming into contact, either deliberately or inadvertently, with aerial high voltage infrastructure.

In other cases isolation facilities are present or desired by PWC to define the Point of Supply at or near the boundary of the town camp.

The Pine Creek community electrical reticulation systems is supplied by an overhead reticulation scheme to metering switchboard, then underground to the individual houses. The pump station is feed by overhead LV reticulation.

There are four digital meters and two analogue meters in metering panel. Three analogue meters are dedicated for pump station electrical consumers in this site.

PWC advised that the Point Of Supply is the line side of LV service fuses that they own and are responsible for it and upstream infrastructure.

PWC advise that street lighting is supplied from unmetered LV infrastructure and is the responsibility of the lot holder and not PWC.

All meters, whether pre- or post-paid are the property of PWC.

Pine Creek community are responsible for maintain all unmetered and metered LV infrastructure including the main switchboard, metering panel (excluding meter), LV distribution feeders, distribution pillars, consumers' mains and consumer switchboards and street lights.

10.2 Existing infrastructure condition assessment

Table 9 shows the condition rating given to the distribution switchboards and distribution pillars. The distribution panels have 100% operational rating from the visual inspection

Table 9 Distribution panel condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Distribution panels		0	3			3

No free standing street lights were accessed in the Pine Creek community boundary.

Table 11 shows the condition rating given to the street lights. The street lights were of a low voltage overhead feeder design, mercury lamp, M80. The street lights had a Non-operational rating of 100%.

Table 10 Street light on O/H pole condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Streetlight on O/H pole		2				2

The overhead poles are of Weld Construction (Universal Pole construction) and steel LV distribution construction. Table 13 shows the condition rating given to the overhead poles. The overhead poles have 100% operational rating.

Table 11 Overhead pole condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Overhead pole			3	1		4

Table 12 shows the condition rating given to the metering panels. Three post-paid meters are allocated for pump station.

Table 12 Meter panel condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Pre-paid meter			4			4
Post-paid meter			3			3

Table 13 shows the condition rating given to the switchboards associated to dwellings.

Table 13 Switchboard condition assessment (Housing footprint)

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Switchboard		1	1			2

The details of the individual inspections and photographs of each infrastructure item are included in the Appendices.

10.3 Current performance and risks

The electrical infrastructure evaluation was conducted against the following criteria

- Number of dwellings on tenure, the higher value of the funded dwelling and as quoted in the population report was utilised.
- Urban area, NP001.1, 4. Definitions.
- General Specification for URD Subdivisions, NP001.6, 4.3 Substation Size.
- Normal ADMD (After Diversity Maximum Demand) of 4.5 kVA and high cost subdivisions at 7 kVA.
- Transformer ratings were assumed to be correct in Dekho (PWC asset information system) and compared against photographs of test or transformer numbers collected.
- Substation loads were compared against transformer sizes only. No load flow analysis was conducted.
- No load calculations were performed or assessment conducted on overhead or underground cable, visual inspection from the ground only.
- Street lighting loads were ignored as they are not significant.

The calculated maximum demand of the Pine Creek community transformer is 72% of rated capacity based on 4.5kVA/dwelling.

Table 14 Pine Creek Compound current demand load vs transformer ratings

ComCommunity Id	Community name	Dwellings	Transformer kVA (kVA)	kVA Total @ 4.5kVA	kVA Total @ 7kVA	Comments
640	Pine Creek Compound	4	25	18	28	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].

A tabulated summary of all community transformers is included in Appendices.

There is a risk of equipment not being maintained associated with the non-standard division of responsibilities between the customer and PWC.

The following points from the PWC Metering Rules should be noted:

- The routine maintenance of metering installations and the replacement of any faulty meters is the responsibility of PWC.
- The property owners are responsible for the maintenance and upkeep of meter rooms, boxes and panels (including lids, doors and locking mechanisms).
- The installation of pre-paid metering is a cost to the customer, refer NP010 Meter Manual-Maintenance of Metering Installations, Power and Water Corporation.

10.4 Future demands

As no new developments are currently planned for Pine Creek Compound, there are no additional upgrades required to cater for future demand.

10.5 Recommended works

The following maintenance works and upgrades are recommended:

- Replace two 80W street lights.
- Install new street lighting - approximately 12 poles

11 Communications

11.1 Ownership and boundaries

Details of Telstra pit and conduit infrastructure within the town camp boundaries were sought but were not forthcoming.

11.2 Existing infrastructure condition assessment

The telecommunications infrastructure assessed included pits and telephone booths.

Appendices contains the individual reports.

Table 15 Telecommunication pit condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Telecommunication pit						1 (status unknown)

Table 16 Telephone booth condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Phone booth						1 (status unknown)

11.3 Current performance and risks

No details of the performance of communications infrastructure were obtained.

11.4 Future demands

The current availability of broadband services at Pine Creek Compound is displayed in the Figure 12 below. NBN is available to residents via satellite on application to an appropriate NBN access provider.

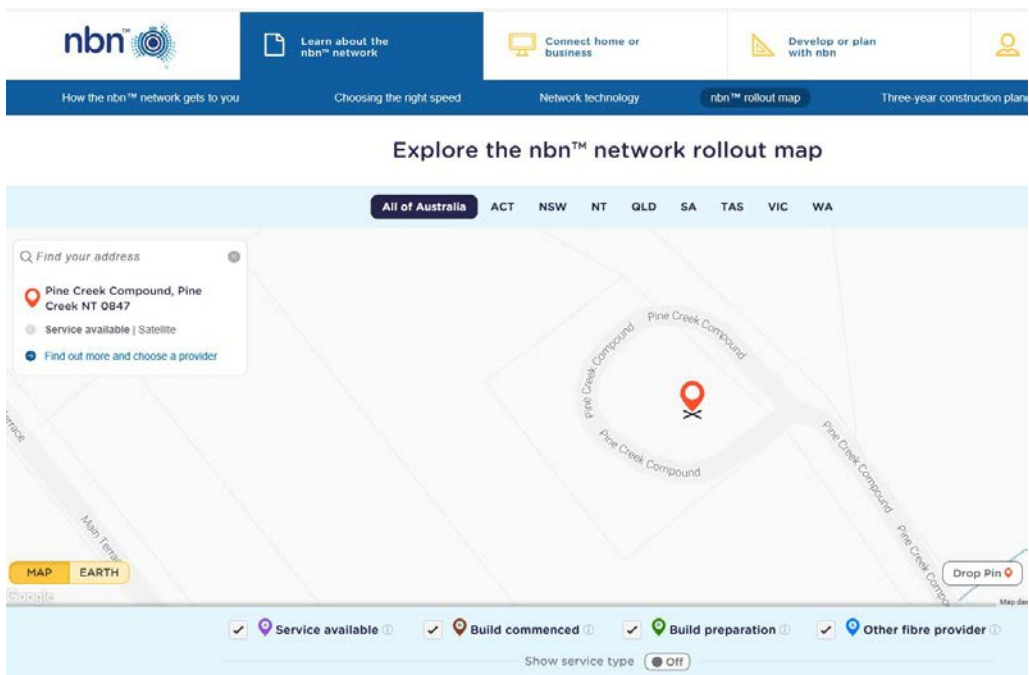


Figure 12 NBN Network Availability map

NBN is available to residents via satellite on application.

11.5 Recommended works

Representatives from NBN’s Land Access and Stake Holder management teams are currently engaged with Yilli Housing and NT Housing to look at how camps will be serviced. It is expected that any existing premises in these camps will have some type of NBN service via the NBN brownfields rollout in the future.

No works are required at Pine Creek Compound because NBN is available to residents via satellite on application to an appropriate NBN access provider.

12 Cost estimates

Table 17 below shows a summary of the cost estimates to undertake the maintenance required to fix the existing infrastructure and to upgrade the existing network to meet current design standards. There are no upgrades required for the future design. The estimates take into account a 30% contingency, are inclusive of GST, and a location factor has been applied to town camps outside of Darwin.

Table 17 Cost estimates

Infrastructure	Maintenance of existing infrastructure	Upgrades to meet current design
Sewerage	\$ 13,000	\$ 0
Water supply	\$ 1,000	\$ 506,000
Roadworks	\$ 36,000	\$ 363,000
Stormwater drainage	\$ 0	\$ 409,000
Community structures	\$ 0	\$ 0
Electrical	\$ 6,000	\$ 223,000
Communications	\$ 0	\$ 0
Miscellaneous provisions	\$ 19,000	\$ 193,000
Total (including GST)	\$ 75,000	\$ 1,694,000
Grand total	\$ 1,769,000	

The cost estimates are a preliminary estimate only. Since Aurecon has no control over the cost of labour, materials, equipment or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, Aurecon cannot guarantee actual costs will not vary from these estimates.

13 Summary

The following works are recommended for Pine Creek;

Sewerage

- Upgrade three sewer manholes

Water supply

- Install up to four new residential lot water meters
- Install new DN150 looped water main, approximately 500 m
- Install DN150 bulk water meter
- Install two fire hydrant

Roadworks

- Repair approximately 100 m of edge break
- Repair potholes
- Repair surface cracking
- Replace sign
- It is recommended that the road is upgraded to a two lane network with all appropriate road furniture, line marking, kerbs, footpaths, etc.

Stormwater drainage

- Construct stormwater drainage, including underground pipes, kerbs and gutters, and side entry pits. Approximately 250 m required.

Community structures

- No upgrades required.

Electrical services

- Replace two 80W street lights.
- Install new street lighting - approximately 12 poles

Communications

- No works are required because NBN is available to residents via satellite on application to an appropriate NBN access provider.

Civil inspection reports

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016



Legend

Town Camp boundary



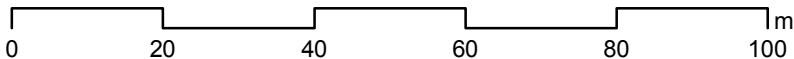
Sewerage

● Manholes (6)

▲ Pump Station (1)

A3 scale: 1:1,000

Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Sewerage
640 - Pine Creek Compound (Pine Creek)

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016



Legend

- Town Camp boundary
- Water
- Taps (1)

A3 scale: 1:1,000

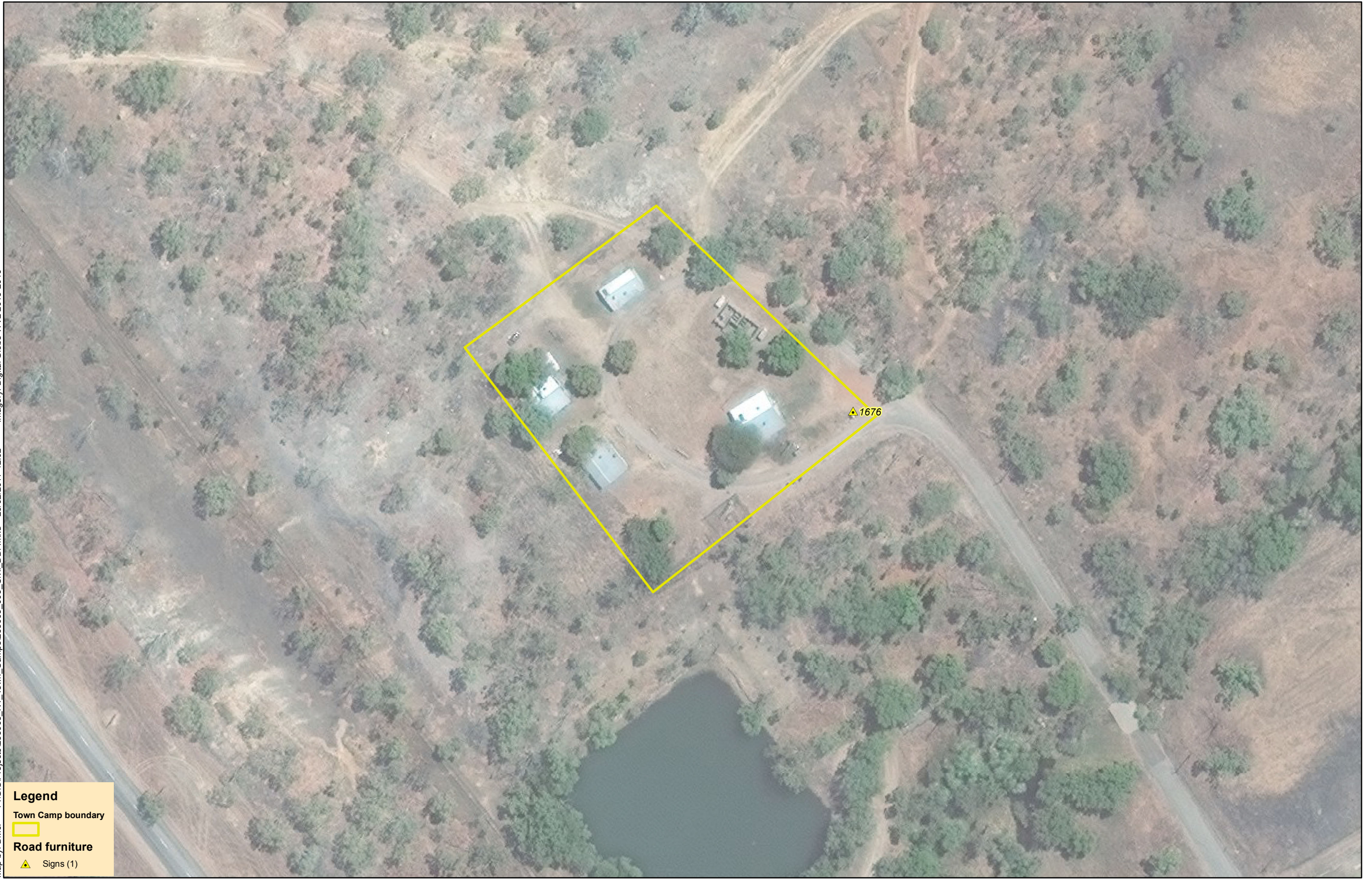
Note:
Label numbers refer to survey IDs

0 20 40 60 80 100 m

Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Water
640 - Pine Creek Compound (Pine Creek)

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016



Legend

Town Camp boundary


Road furniture
 Signs (1)

A3 scale: 1:1,000

Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments
Road furniture, stormwater drainage & community structures
640 - Pine Creek Compound (Pine Creek)

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:58:09 PM

Insp ID: 1677

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Round

Manhole Cover Diam (mm): 700

Manhole Length (mm):

Manhole Width (mm):

Manhole Condition: 3 - Good

Notes on Lid:

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:55:12 PM

Insp ID: 1678

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Square

Manhole Cover Diam (mm):

Manhole Length (mm): 650

Manhole Width (mm): 650

Manhole Condition: 1 - Very Poor

Notes on Lid:

Comments: Lids not sitting in place



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:55:12 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:54:03 PM

Insp ID: 1679

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Round

Manhole Cover Diam (mm): 700

Manhole Length (mm):

Manhole Width (mm):

Manhole Condition: 3 - Good

Notes on Lid:

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:37:27 PM

Insp ID: 1683

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Round

Manhole Cover Diam (mm): 750

Manhole Length (mm):

Manhole Width (mm):

Manhole Condition: 2 - Poor

Notes on Lid:

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:37:27 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:35:10 PM

Insp ID: 1684

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Square

Manhole Cover Diam (mm):

Manhole Length (mm): 450

Manhole Width (mm): 450

Manhole Condition: 1 - Very Poor

Notes on Lid:

Comments: Lid is a steel plate



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:35:10 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 1:11:28 PM

Insp ID: 1686 Group 2 - Katherine, Pine Creek, Mataranka Pine Creek Compound

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Round

Manhole Cover Diam (mm): 700

Manhole Length (mm):

Manhole Width (mm):

Manhole Condition: 3 - Good

Notes on Lid:

Comments: Grass overgrown around manhole



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:41:22 PM

Insp ID: 1680 Group 2 - Katherine, Pine Creek, Mataranka Pine Creek Compound

Road Name: Pine Creek Compound

What are you inspecting: Pavements

Ch From (km): 0.55

Ch To (km): 0.78

Road Type: Sealed - spray seal

Section Width (m): 2.8

Road Condition: 1 - Very Poor

General Comment: Only 0.55 - 0.77 within community

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Surfacing Cracks	10	2 - Poor	10 percent
Potholes	10	1 - Very Poor	A few very significant potholes
Edge Breaks	10	1 - Very Poor	10 percent of road, very condition

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Shoulder Type	Width	Dropoff(mm)	Erosion	Condition	Shoulder Comments
Unsealed		40		3	

Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:41:22 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:41:22 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:41:22 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:29:37 PM

Insp ID: 1685 Group 2 - Katherine, Pine Creek, Mataranka Pine Creek Compound

What Sewerage Asset are you capturing: Pump Station

No of Pumps in Pump Station: 2

Cabinet Condition: 3 - Good

Cabinet Comment: Power meter door open

Alarm Light: Yes

Alarm Light Condition: 3 - Good

Overhead Light: Yes

Overhead Light Condition: 2 - Poor

Light Comments:

Davit Crane Present: Yes

Davit Crane Capacity (kg):

Davit Crane Condition: 3 - Good

Davit Crane Comments: Surface rust

Fence TYPE: Standard Security Fence (3 Strands barbed)

PS Fence Height (m): 1.8

PS Gates Locked: Yes

PS Fence Condition: 2 - Poor

Fence Comment:

Flow meter type:

Flow meter condition:

Flow meter comments:

Macerator Pump Make/Model:

Manufacturers Date:

Macerator Pump:

Macerator Pump Condition:

Macerator Pump Comments:

Outgoing Pipe Diameter (mm):

Valves:

Outgoing Pipe Comments:

Water Supply to pump station: Yes

Fire hose reel: No

Access cover locked: Yes

Safety grid beneath access cover:

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:29:37 PM

Condition:

Cabinet Locked: Yes

Cabinet Lock Condition:

Hand rails around entrance: Yes

Fixed or removable: fixed

Rail Condition: 4

Safety Comments:

Pump Station Pumps section

Pump Capacity	Pump Make	Manufacture Date	Pump Chain	Condition	Comments
			No Access		



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:29:37 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:29:37 PM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:57:52 PM

Insp ID: 1676

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

Road Name: Pine Creek Compound

What are you inspecting: Signs

Type of Sign: Community sign

Sign Condition: 2 - Poor

Sign Comment: Slightly bent post

General Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 5/12/2016 12:39:03 PM

Insp ID: 1682

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Water Asset Are you Capturing: Taps

Diameter(mm): 20

Tap Leakage: Yes

Tap Condition: 1 - Very Poor

Tap Comment:



Electrical inspection report

P:\GIS\Projects\253963_NT_Town_Camps\253963_004_Elec_DDP_report.mxd 23/02/2017 12:22



Legend

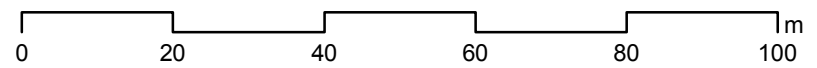
Electrical infrastructure

- 11KV Line Pole
- LV Metering
- Town Camp roads
- NT cadastre
- Town Camp boundary

Electrical survey points

- 1234 Other Values
- 1234 Distribution Panel
- 1234 Overhead Poles
- 1234 Street Light
- 1234 Transformers

A3 scale: 1:1,000



Date: 23/02/2017 Version: 3
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Electrical
640 - Pine Creek Compound (Pine Creek)

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:04:05 PM

Insp ID: 901

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method:

Pole

Is the distribution panel labelled:

Yes

What is Distribution Panel main CB Rating:

What is the main incoming cable type/Size to Distribution Panel:

What is the condition of switchboard:

3

Condition Comments:

Needs to be closed

What is the condition of cables/glands into switchboard:

Cable/Gland Condition Comments:

Distribution Panels name plate access:

NA



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:04:05 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:32:56 PM

Insp ID: 904

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Comms Category are you capturing: Distribution

What is distribution method to households: Telephone

Is it Shared with PWC: Yes

Is there Anti-climb barrier provided for this pole: No

What is Pole construction type:

Is street light fitted:

Is there concrete collar around the base of pole:

What is the condition of tap off to house:

What is the condition of pole:

How many Lots are connected to this pole:

Is there access to Pits to take a photo:

What is Pit Condition:

Underground Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:32:56 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:26:30 PM

Insp ID: 906

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method: Pole

Is the distribution panel labelled: No

What is Distribution Panel main CB Rating: 100

What is the main incoming cable type/Size to Distribution Panel:

What is the condition of switchboard: 3

Condition Comments:

What is the condition of cables/glands into switchboard: 3

Cable/Gland Condition Comments:

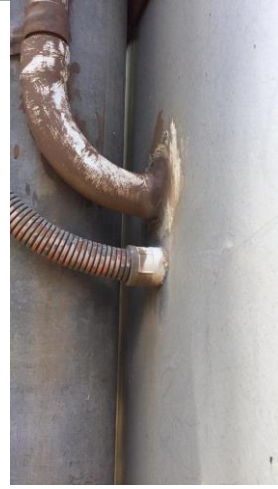
Distribution Panels name plate access: No



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:26:30 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:15:24 PM

Insp ID: 907

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method:

Pole

Is the distribution panel labelled:

No Access

What is Distribution Panel main CB Rating:

What is the main incoming cable type/Size to Distribution Panel:

Twisted Black insulated twisted

What is the condition of switchboard:

3

Condition Comments:

What is the condition of cables/glands into switchboard:

3

Cable/Gland Condition Comments:

Good condition

Distribution Panels name plate access:

No Access



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:15:24 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 29/11/2016 8:49:05 AM

Insp ID: 3479

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Electrical Meters

Meter Type: Electrical

Meter Switchboard Cond:

Meter Condition:

Meter Comment: Indoor SB, Cond 2, Blank plates are missing on CB slot.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 29/11/2016 9:01:56 AM

Insp ID: 3480

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Electrical Meters

Meter Type: Post Paid

Meter Switchboard Cond:

Meter Condition: 3

Meter Comment: 3 Analogue Meters. Condition of CB not assessed. Indoor SB, Cond 3

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 29/11/2016 9:07:40 AM

Insp ID: 3501

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond:

Meter Condition: 3

Meter Comment: 2 Analogue Meters & 4 Digital Meters. Condition of CB not assessed.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:09:23 PM

Insp ID: 900

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 4

How is the pole planted: Unknown ,overgrown and no access

What is the Condition of plant: 3

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80

Street Light Watts

Street Light Condition 2

Street Light Height

What is the type of service: Three

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition:

How many Lots are connected to this pole:

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:09:23 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:48:46 PM

Insp ID: 902

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Overhead Poles

What is Pole Material type: Welded

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant: 3

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80

Street Light Watts

Street Light Condition 2

Street Light Height

What is the type of service: Three

What is the HV voltage level:

What is the arrangement of connected cables: Parallel

Are there isolators on the pole: Yes

What is the Condition: 3

How many Lots are connected to this pole:

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:48:46 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:37:00 PM

Insp ID: 903

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Three

What is the HV voltage level:

What is the arrangement of connected cables: Parallel

Are there isolators on the pole: Yes

What is the Condition: 3

How many Lots are connected to this pole:

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:37:00 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:29:41 PM

Insp ID: 905

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Three

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: Yes

What is the Condition: 3

How many Lots are connected to this pole:

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:29:41 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:09:23 PM

Insp ID: 900

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:09:23 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:48:46 PM

Insp ID: 902

Group 2 - Katherine, Pine Creek, Mataranka

Pine Creek Compound

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 5/12/2016 1:48:46 PM



Road map

Map by: DMcP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Roads_DDP2.mxd 11/02/2017 17:17 Imagery: copyright DigitalGlobe WV 2

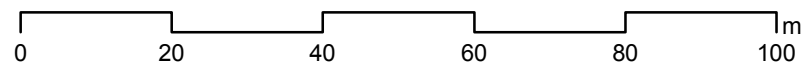


Legend

- Start of road
- Road_Condition**
- 1-Very poor
- 2-Poor
- 3-Good
- 4-Very good
- 5-Excellent
- Town Camp boundary



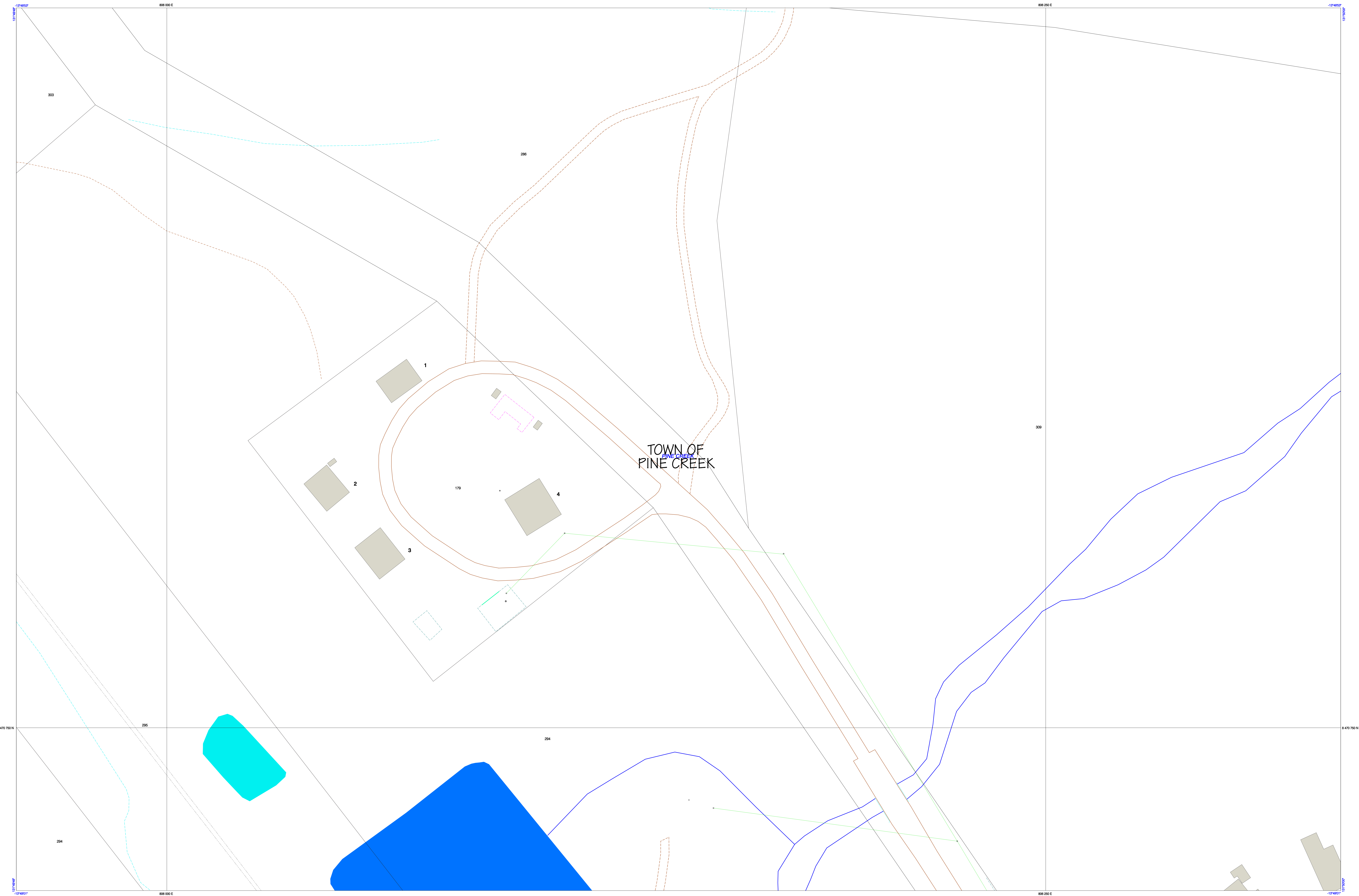
A3 scale: 1:1,000



Date: 11/02/2017 Version: 1
Coordinate system: GDA 1994

NT Town Camp Road Assessments
640 - Pine Creek Compound (Pine Creek)

Existing drawings



LAND USE PLANNING
 APPROXIMATE POSITION OF BUILDING overlaid onto data of photography

LAND EXCLUDED FROM DEVELOPMENT
 GENERAL EXCLUSION/BUFFER

CULTURAL EXCLUSION AREAS
 Unsubstantiated entry, works or an area of land where there is a reasonable belief or opinion that the Northern Territory Aboriginal Sacred Sites Act, for conditions relating to works or an area of land within a Cultural Exclusion Area under the Aboriginal Areas Protection Authority (AAPA) and/or within a National Park or other protected area.

This advice does not replace the need for consent for entry, works or an area of land from the appropriate state or Territory Land Rights (TLR) Act or the state of Aboriginal land, or another statute.

NORTHERN TERRITORY OF AUSTRALIA

CADASTRE
 Current 123
 Proposed 122
 Locality LOCALITY

UTILITY SERVICES
 ELECTRICITY
 LOW VOLTAGE
 HIGH VOLTAGE
 WATER MAIN
 WATER RETICULATION
 WATER MAIN
 WATER RISING MAIN
 SEWER
 SEWER MAIN
 SEWER MANHOLE

TOPOGRAPHY
 Road, Bridge, Bridge
 Road Unsealed, Track
 Footpath, Drain, Culvert
 Wall, Gate, Fence, Cable Grid
 Railway, Disused Railway
 Aerodrome Tarmac, Landing Strip
 Trackway, Apron
 Pipeline: Oil, Water, Underslotted, Gas, Sewage
 Building, Building-Outline unconfined
 Shade Structure, Incomplete Building
 Sewage Ponds, Tailpipe Pond
 Oval, Arena, Swimming Pool

High Water Mark, Low Water Mark
 Mine, Quarry Surface Excavation
 Contour, Index, Intermediate
 Contour, Depression
 Top of Bank, Bottom of Bank, Cliff
 Watercourse, Perennial, Intermittent, Channel or Canal
 WaterBodies, Reservoir, Water Hole
 Swamp, Swampy Perennial, Swamp Intermittent
 Flat, Mud Flat, Clay/Silt/Sand, STI
 Pole, Power, General, Light
 Tank, Water, Elevated, Non-Water, Silo
 Manhole, Pylon, Communication Tower, Bone

AVAILABLE FROM AND PRODUCED BY:
 Northern Territory Government

NOTES:
 1. This product is a compilation of data holdings from (but not restricted to) NT Dept of Lands and Planning, NT Dept of Housing, Local Government and Regional Services, Water and Water Corporation and Aboriginal Areas Protection Authority. It is not intended to be used for any purpose other than the purposes for which it was produced. No warranty is given concerning the accuracy or the completeness of the data.

LOCAL SURVEY CONTROL: This ground is not surveyed. The ground is not surveyed to the order of 1:100,000 or better.

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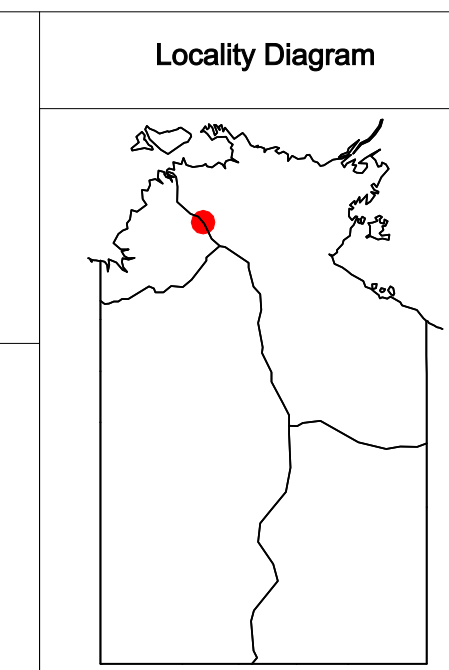
LOCAL SURVEY CONTROL: This ground is not surveyed. The ground is not surveyed to the order of 1:100,000 or better.

SOURCE INFORMATION

CONTOUR INTERVAL: 1:1000
HORIZONTAL DATUM: Transverse Mercator
VERTICAL DATUM: Transverse Mercator

CURRENCY OF TOPOGRAPHY: 6 June 2010
SOURCE MAP SCALE: 2500
ZONE UTM: 52
DATE GENERATED: 21 June 2012

Scale: 0 10 20 30 40 50



SERVICED LAND AVAILABILITY PROGRAM
SLAP Map
Pine Creek Compound (Pine Creek Town Camp)
 Stockade Camp
 Victoria-Daly Shire Council
 Community ID: 640





Transformer data

Group	Com Id	Location	Community Name	Dwellings No. (Funded Dwellings)	Dwellings No. (Bennett Design)	New Houses ** (Future Demand)	Primary Voltage Level (KV)	PWC Substation ID	PWC Test Number	Transformer size (KVA)	KVA Total dwellings @ 4.5KVA	KVA Total dwellings @ 7KVA	Comments
1	290	Darwin	Bagot	55	55		11	1924	1735	300	247.5	385	
	344	Darwin	Knuckey Lagoons	18	19	2	11	1771	2163	100	85.5	133	
	347	Darwin	Kulaluk	19	19		11	1092	10607	50	85.5	133	
	403	Darwin	Palmerston Town Camp	20	16		22	10196	10245	100	90	140	Two transformers for this Town Camp. Transformers are not in boundary of Town Camp [The nearest transformers data to Town Camp are highlighted in yellow].
							22	265	11645	25			
	412	Darwin	Railway Dam (One Mile Dam)	5	6	2	11	1041	4378	200	27	42	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	427	Adelaide River	Amangal	9	9		22	216	12187	100	40.5	63	Two transformers for this Town Camp.
	687	Jabiru	Manabadurma	10	12		11	5050	11107	200	54	84	
825	Darwin	Minmarama Park	24	24		11	2147	11372	100	108	168		
2	606	Katherine	Warlpiri Transient Camp	9	9		22	6416	4886	100	40.5	63	Two transformers for this Town Camp.
							22	6074	4695	25			
	621	Katherine	Miali Brumby (Kalano)	47	31		22	6133	12247	315	211.5	329	
	640	Pine Creek	Pine Creek Compound	4	4		22	6666	3147	25	18	28	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
971	Mataranka	Mulggan	12	9	4	22	6819	5296	16	54	84		
						22	6818	5297	16				
						22	6384	11028	25				
3	215	Tennant Creek	Blueberry Hill (Munji-Marla)	2	2		22	7079	1868	200	9	14	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	223	Tennant Creek	Dump Camp (Marla-Marla)	7	7		22	7181	11088	200	31.5	49	
	224	Elliott	Elliott South Camp	12	12		11	7504	4718	200	54	84	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	225	Elliott	Elliott North Camp	36	25		11	7505	4715	100	162	252	
	238	Tennant Creek	Kargaru (East Side Camp)	12	12	1	22	7572		200	54	84	
	246	Tennant Creek	Ngalpa Ngalpa	18	21		22	7179		200	94.5	147	Two transformers for this Town Camp.
							22	7033	10904	315			
	271	Tennant Creek	Village Camp	12	12	1	22	7183	11107	200	54	84	
	681	Tennant Creek	Tingkarli	12	12		22	7180		200	54	84	
684	Tennant Creek	Wuppa	15	15	1	22	7141	11092	100	67.5	105	Two transformers for this Town Camp.	
						22	7182	11095	200				
4	3	Alice Springs	Akngwertnarre (Morris Soak)	11	15		11	8596	11336	300	67.5	105	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	16	Alice Springs	Anthelk Ewlpaye (Charles Creek)	17	10		11	8569	315	315	76.5	119	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	17	Alice Springs	Anthepe	15	15		22	8598	5874	200	67.5	105	Data extracted from PWC asset information. There was not access to this Town Camp due to ceremony on inspection day.
							22	8597	11244	315			
	19	Alice Springs	Aper Alwerrkng (Palmers)	7	6		11	8405	2939	200	31.5	49	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	35	Alice Springs	Ewyenper Atwatye (Hidden Valley)	47	47		11	8622	11202	100	211.5	329	
							11	8623	11203	100			
							22	8625	11205	63			
							11	8626	11204	100			
	47	Alice Springs	Ilparpa	13	13		22	8611	11702	200	58.5	91	
	48	Alice Springs	Ilperle Tyathe (Walpiri)	10	9		11	8001	11209	315	45	70	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].
	50	Alice Springs	Ilyperenye (Old Timers)	10	10		22	8145	3323	100	45	70	
	64	Alice Springs	Bassos	2	2		11	8002	10946	50	9	14	
	69	Alice Springs	Karnte	19	19		22	8282	2345	100	85.5	133	
	87	Alice Springs	Yarrenty Altere (Larapinta Valley)	34	34		11	8617	11334	100	153	238	
						11	8618	11200	63				
						11	8619	11335	100				
						11	8620	11201	100				
90	Alice Springs	Inarlange (Little Sisters)	16	22		22	8137	2925	100	99	154	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
108	Alice Springs	Mpwetyerre (Abbotts)	6	6		11	8093	11703	315	27	42	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
113	Alice Springs	Mount Nancy (Nyewente)	11	12		11	8405	2939	200	54	84		
129	Alice Springs	Nyewente (Trucking Yards)	26	26		11	8629	11312	300	117	182		
675	Alice Springs	Hoppys	15	19						85.5	133	There is not any Transformer in boundary of Town Camp. Also it's not shown in PWC asset information.	
676	Alice Springs	Ipiye Ipiye (Golders Camp)	15	14		11	8314	369	50	67.5	105		
1029	Alice Springs	Kunoth	4	4		11	8569	315	315	18	28	Transformer is not in boundary of Town Camp [The nearest transformer data to Town Camp is highlighted in yellow].	
5	222	Borrooloola	Mara	28	29	2	11	6187	12610	100	130.5	203	Two transformers for this Town Camp.
							11	6545	10203				
	229	Borrooloola	Garawa 1	16	14		11	6546	10166	100	72	112	Two transformers for this Town Camp.
							11	6332	4890	100			
	278	Borrooloola	Yanyula	29	29		11	6162	10496	200	130.5	203	Data extracted from PWC asset information. It's outside of Twon Camp, shown only Transformer to this Town Camp.
						11		10167				This transformer is not shown in PWC asset information. It's installed in Boat Ramp Road near to Town Camp and connected to Electrical reticulation of Town Camp.	
992	Borrooloola	Garawa 2	11	11		11	6189	2669	25	49.5	77		

** For New house's demand calculation see section 13.4 "Future Demand".

Mulggan

Mulggan

1 Design

The infrastructure reviews have been undertaken against current relevant standards for typical sub-divisions. The following standards have been used in undertaking the reviews.

Sewerage and water supply

- Water Services Association of Australia – Sewerage Code – WSA 02 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 02
- Water Services Association of Australia – Sewerage Pumping Station Code – WSA 04 -2005 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 04
- Water Services Association of Australia – Water Supply Code – WSA 03 2002 Part 1: Planning and Design
- Power and Water Corporation supplement to WSA 03
- Power and Water Corporation Indigenous Community Engineering Guidelines (2008)
- Department of Housing and Community Development Indigenous Community Engineering Guidelines (ICEG 2014, updated September 2016)
- Power and Water Corporation Essential Services Infrastructure Assessment and Upgrade Guidelines (for Town Camps in Urban Communities, 2009)
- Power and Water Corporation Standard Drawings
- Australian Standards

Electrical services

Electrical infrastructure has been assessed against AS/NZS3000 Wiring Rules and against PWC Service, Installation and Metering Rules and Urban Residential Development (URD) Design Standards where possible.

With one exception, town camps are each a single lot and compliance with AS/NZS3000 is sufficient to address potential safety concerns.

As such application of PWC URD Design Standards will mainly apply to the incoming supply and bulk or initial multi-metering panels if provided.

URD Design Standards for internal reticulation and street lighting appear to have been applied in many cases for convenience rather than compliance.

For the purposes of this report, the demand per dwelling allowances of URD Design Standards have been used to estimate incoming supply and overall distribution capacity requirements.

The following standards apply:

- Australian Standards
- Power Networks Design and Construction Guidelines, Power and Water Corporation
 - NP001.1_Design and Construction of Network Assets – General Requirements
 - NP001.3_General Specification for Overhead Electrical Reticulation
 - NP001.6_General Specification for URD Subdivisions
 - NP003_Installation Rules_V3
 - NP007_Service Rules

- NP027_Capture of Newly Installed Street Lighting Information
- NP041_Guidelines for Electrical Design Consultants

Further referral to the guidelines in this report will be designated by the guidelines number, NP001.1.

Communications

- National Broadband Network Website viewed 21 January 2017 (<http://www.nbnco.com.au/>) – NBN rollout maps

General

It should be noted that if the town camps are proposed to be subdivided and services assets gifted to Power and Water Corporation (PWC) for operation and maintenance, all of these services will need to fully meet PWC standards. With the exception of a few town camps that have recently been upgraded, this will require the full replacement and/or realignment of most services.

2 Condition assessment

2.1 Rating assessment matrix

A condition rating matrix was developed and used to assess all municipal infrastructure. The same rating was used for all services to maintain consistency in assessments. Table 1 below shows the condition rating and operability.

Table 1 Condition rating

	Condition rating	Operability
1	Very Poor	Not operational
2	Poor	Not fully operational or requires immediate maintenance to keep operational
3	Good	Fully operational, may require routine maintenance
4	Very Good	Fully operational, may require maintenance in the next six months
5	Excellent	New, fully operational

2.2 Civil assessment limitations

The civil infrastructure condition investigations were subject to a number of limitations. These include:

- Only accessible services have been investigated. This includes inspecting the top of sewer manholes, side entry pits, etc., however, does not include opening pits to inspect infrastructure below ground.
- No physical testing of the sewer, water or stormwater network was undertaken.
- No survey or service locating was undertaken.

As there was no survey, potholing or CCTV undertaken on the underground infrastructure there is insufficient information to make determinations on the asset condition. The condition assessments discussed in this report are only for the accessible services and do not necessarily represent the condition of the underground infrastructure. For the majority of the town camps, other than a few that have recently been upgraded it was found that the underground services are generally undersized and it is likely, due to their age, that these services are in poor condition. Either factor would trigger the need for a complete replacement to meet current relevant standards.

2.3 Electrical assessment limitations

The electrical infrastructure condition investigations were subject to a number of limitations. These include:

- Inspections were carried out without the assistance of an electrical tradesman.
- Only accessible services were investigated. Assessments were of a visual nature and no pit covers were removed.
- Overhead equipment was assessed from ground level.
- Switchboards were not opened and no assessment of the internal connections or bus ratings was made.
- Electrical infrastructure was assessed down to the meter for multi-meter panels and down to the termination, overhead pole or distribution pillar, of the supply cable to a meter located at a dwelling.

3 Current infrastructure issues

Power and Water Corporation (PWC) have advised of the following concerns and issues in regard to the sewerage, water and electrical infrastructure at all town camps.

3.1 Ownership and maintenance

PWC stated there has always been confusion regarding the ownership and responsibilities of the internal sewer, water and electrical infrastructure. PWC have advised that they have no legal tenure on the majority of assets in any town camps and that the owner is essentially that of the land owner or leaseholder. This is further discussed for each type of infrastructure for each town camp.

The ownership and who is responsible for the maintenance of the sewage pump stations and street lighting is a major concern. In most town camps it was found that PWC have been maintaining the assets on an in-kind basis, although there are no maintenance or access agreements in place and the infrastructure is generally not compliant to PWC standards.

3.2 Access to infrastructure

PWC advised that due to the uncertainty surrounding ownership and responsibility of the sewerage, water and electrical infrastructure, each town camp is seen as a single lot with multiple houses on it. There are no formal road reserves or easements where the municipal infrastructure should be located. PWC therefore have no legal right to enter the town camps to work on the infrastructure, nor can PWC stop others from working on the infrastructure. There is a risk that the maintenance undertaken by others may be to a lower standard than PWC.

It should be noted that there are currently no legal services easements within the town camps, except for a few cases where a town service passes through the town camp. Therefore it is recommended that easements are created over any infrastructure owned by PWC and any future assets to be gifted to PWC, to allow the service providers access to the infrastructure.

3.3 Existing infrastructure

PWC have stated that although the existing sewerage and water infrastructure appears to comply with relevant standards in some locations, the capacity cannot be assumed to meet PWC requirements due to the potential for underground substandard condition and/or grading of pipework. It is likely that these assets will need to be fully replaced to PWC standards to ensure sufficient capacity.

The planning process currently allows construction within the town camps on Commonwealth land without requiring service authority (PWC) approvals. This means that there has been no opportunity for PWC to recover contributions towards required upgrades to headworks servicing the developments and these upgrades have been paid for by PWC in the past. This inconsistency needs to be addressed for future developments within the town camps to ensure PWC are able to continue to provide adequate services.

3.4 Safety concerns

PWC have expressed concerns with safety of PWC staff and contractors working within the camps. PWC have employed procedures such as multiple people / vehicles to attend the site, with police or housing safety officers as required. This

generally leads to a delayed response time and increased cost to respond to and remediate emergency situations.

PWC have also raised the concern that if others work on water infrastructure within the town camps and do not apply the correct sanitation procedures they not only risk contaminating the entire water supply network within the town camp, at some town camps with direct connections to the town supply, they risk contaminating the entire town's water supply.

4 Available information

As the site investigations were limited to accessible / visible services, information on below ground services (such as electrical cables, sewer pipes, water supply pipes, etc.) were determined from available information. This information included:

- Serviced Land Availability Program (SLAP) maps,
- Department of Family & Community Services - Connecting Neighbours Program – Essential Services Scoping Study Report Volume 1 April 2005,
- Connecting Neighbours Project – Infrastructure Assessment and Recommendation Report - Arup Pty Ltd, April 2005,
- Drawings supplied by NT Department of Infrastructure - Technical Records,
- Drawings supplied by Power Water Corporation,
- Bennett Design inspection reports and population data.

Aurecon undertook a site investigation of the Mulgga community on Thursday 8 December 2016 to inspect roads, stormwater drainage, electrical services, sewerage and water supply, and community structures. The following sections detail the outcomes of this investigation and the assessments of the infrastructure.

The civil and electrical inspection reports can be found in Appendices.

5 Sewerage

5.1 Ownership and boundaries

Mulggan is serviced by a DN100 PVC sewer gravity main and a sewage pump station which pumps to an evapotranspiration bed towards the east of the community, as advised by PWC. The sewerage infrastructure including the pump station are owned by Mataranka Aboriginal Land Trust, but are the responsibility of Roper Gulf Regional Council to maintain.

The available drawings show that the sewer main ends at the transient camp site, PWC advised that there is an ablution block that services the transient camp area.

5.1.1 Connection methods and billing

PWC have advised there is currently no customer for Mulggan that sewerage bills are charged to.

5.2 Existing infrastructure condition assessment

The sewer infrastructure inspection was limited to inspecting the condition of manhole covers, as all other sewerage infrastructure is below ground. A total of two manholes and one pump station were inspected, with condition ratings as follows:

Table 2 Sewer condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Manholes			1	1		2
Pump station			1			1



Figure 1 Sewer manhole, very good condition



Figure 2 Sewage pump station, good condition

5.3 Current performance and risks

5.3.1 Current sewer network performance

The current capacity of the sewer network was calculated based on the following design assumptions:

- The adopted minimum grade for the pipework is 1.0%, as advised by Power and Water Corporation.
- The Equivalent Population (EP) has been calculated assuming one household equates to 9 EP, based on discussions with Power and Water Corporation.
- The capacity has been assessed by calculating the current flow rate, and the maximum flow rate when the sewer pipe flows full. The result is then a percentage of how much of the pipe is currently being used.
- Manning's roughness coefficient of the pipework is 0.012, as recommended by PWC for PVC pipes.
- Where the sewer pipe grade, size or material is not known, it is assumed to be non-compliant to PWC standards.
- As Mulggan disposes to a pump station, the capacity of the pump station has also been assessed.

The current number of houses in Mulggan is 7, this multiplied by 9 EP per house gives a total current EP of 63. There are two other buildings and a number of tents and caravans in Mulggan, so the total number of dwellings was increased to 23 to more accurately represent the number of people in the community. The capacity of

the existing sewer was then calculated. The percentage shows how much of the pipe capacity is currently being used.

Table 3 Existing sewer capacity

Catchment	Current total EP	Diameter of connection (mm)	Adopted PWC minimum slope (%)	Q _{full} (L/s)	Current Q (L/s)	Current capacity (%)
Catchment 1	207	100	1.0	5.60	2.24	40%

Table 3 above shows that the capacity of the existing sewer network is adequate for the current peak population, although the pipe is undersized and non-compliant.

5.3.2 Current sewage pump station performance

The capacity of the pump station was checked against the following criteria, based on PWC guidelines:

- Less than 12 pump starts per hour (for pumps less than 15kW),
- Minimum velocity 0.9 m/s,
- Maximum velocity 2.5 m/s,
- Overflow storage equal to three hours of peak dry weather flow.

Detailed drawings of the pump station were made available for this assessment. Using the current EP of 207, it appears as though the pump station does not meet the minimum velocity in the rising main for self-cleansing, as the minimum velocity is 0.5 m/s, rather than 0.9 m/s. There also does not appear to be any overflow storage as the sewage is pumped to an absorption trench.

It is recommended that the capacity of the pump station is further analysed to determine what current upgrades are required, and what future upgrades are required.

5.4 Future demands

The future demand analysis showed that four additional houses are required to provide permanent accommodation for residents that are currently living in non-house dwellings. The type and location of house, number of bedrooms, etc. will need to be determined by the Department of Housing and Community Development when this work is undertaken.

An allowance of 9 EP has already been provided for each temporary house (caravans, structures, etc) in the current demand calculations, so the future EP will not increase since the residents from the temporary housing will be living in the new accommodation and the number of tenants will not be increased.

The location of the new house is assumed to be close to the existing houses such that significant extension of the existing sewerage infrastructure would not be required. This means that no additional sewerage infrastructure upgrades would be required to cater for the new house, other than what has already been recommended for the current demand, except for a new house drain and connection to the existing network. The cost estimates for these works have been allowed for in the upgrades for current demand.

5.5 Recommended works

5.5.1 Works required to existing infrastructure for current demand

The infrastructure that was assessed as very poor or poor is recommended to be upgraded to prevent failure in the future. In this case no maintenance work is required on the existing infrastructure, however as the pipe is undersized and the pump station does not meet minimum self-cleansing velocities in the rising main, upgrades are required. The cost estimates have been based on the following work:

- 300 m of DN150 PVC gravity main
- 200 m of DN150 PVC rising main
- Two new pumps (further analysis required to determine duty point of the new pumps).

5.5.2 Works required to existing infrastructure for future demand

The upgrades required for the four new houses include a new house drain and new connections to the existing network.

6 Water supply

6.1 Ownership and boundaries

Drawings provided by Tech Records identify a DN100 PVC servicing Mulgga community, (refer Appendices). The DN100 PVC splits into two branches servicing different areas within the community. Both branches of the water reticulation remain as DN100 PVC and have a dead ends.

The water supply network within Mulgga community is owned by Mataranka Aboriginal Land Trust, but is the responsibility of Roper Gulf Regional Council to maintain. The water is supplied from PWC owned water mains outside of the community. Figure 3 below shows the water services surrounding Mulgga.

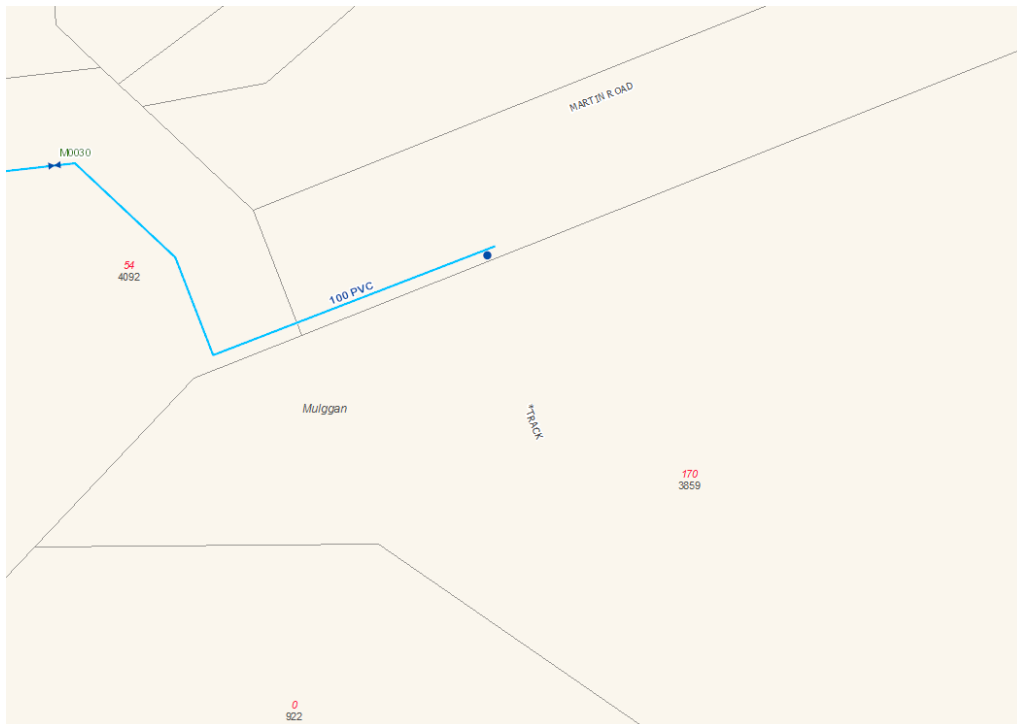


Figure 3 PWC water supply to Mulgga

6.1.1 Connection methods and billing

PWC advised that they currently charge a single water bill to Roper Gulf Regional Council Mataranka. It is not known what contribution the residents make towards the water bills. It is understood that the water usage is measured at the bulk water meter located on the community boundary.

It is proposed that PWC continues to measure the water supply to the entire community with a bulk meter, as opposed to individual lots within the community. Under this scheme, the water bill for the entire community is the responsibility of the governing body, being Mataranka Aboriginal Land Trust for Mulgga. It will be up to governing body to assign bills to residents accordingly.

Individual water meters are recommended to be installed in addition to the bulk water metering. This will assist with the governing body distributing bills to residents, the identification of any leaks in the network, and meeting PWC standards should the town camp be subdivided in the future. Up to eight residential water meters are required to cover the existing house without a water meter. Note, some water meters may have been present however, not visible due to overgrown

flora or restricted property access. Consequently, water meters may not have been discovered during the inspection.

6.2 Existing infrastructure condition assessment

The site investigation for the water infrastructure included assessing the condition of air valves, fire hydrants, tanks, and water meters.

The condition of each asset is as follows:

Table 4 Water asset condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Air valves					1	1
Fire hydrant		1				1
Pump	Not accessible for condition assessment					
Tanks			1			1
Water meter (bulk)					1	1
Water meter (residential lots)	3					3



Figure 4 Air valve, condition: *excellent*



Figure 5 Fire hydrant, condition: *poor*



Figure 6 Pump



Figure 7 Water tank, condition: *good*



Figure 8 Water meter (bulk), condition: *excellent*



Figure 9 Water meter (lot), condition: *very poor*

The fire hydrant was assessed as being in poor condition although no major work is required for this hydrant, simply clearing the area and repainting to ensure visibility is recommended. All three residential water meters found on site require replacing. It is recommended that residential lot meters are added for all lots.

PWC have provided some information on the water pump within Mulggan. The pump is a submersible bore pump which provides non-potable water to the elevated water tank. The tank supplies water for irrigation and is intended to be used for the ablution block located nearby.

6.3 Current performance and risks

The current capacity of the water supply was calculated based on the following design assumptions:

- The nominal peak day flow is 1100 L/capita/day, based on PWC’s supplement to WSA 03 2002. This value is for the northern region of NT. It was assumed that the nominal peak day flow of 1100 L/capita/day also applies to water usage within the community, although it is possible that this value could be higher in real life due to a lack of controls to reduce water usage.
- The Equivalent Population (EP) has been calculated assuming one household equates to 9 EP, based on discussions with Power and Water Corporation.
- The peak hour factors are listed in PWC’s Supplement to WSA 03-2002, and they depend on the population range of the community. The peak hour factor of 3.0 has been adopted, for populations less than 500.
- The maximum flow velocity used for calculating the incoming flow capacity is 1.4 m/s. PWC supplement to WSA 03-2002 states that flow velocities should generally not exceed 1.4 m/s during peak hour demand.
- The water meter has PWC’s minimum pressure guaranteed value of 15 m.

As previously mentioned the internal reticulation has two branches. The length used for the analysis relates to the furthest reach from the bulk water meter.

Table 6 shows the properties used to analyse Mulggan’s water supply demand.

Table 5 Current water demand

Total dwellings	EP	Demand	Peak hour demand (l/s)	Fire flow demand (l/s)	Pipe size and type	Length (m)
23	207	2.64	7.91	25	DN100 PVC	400

Note, non-permanent dwellings have been incorporated into the water demand.

Table 6 Current water demand analysis

Demand	Velocity (m/s)	Headloss (m)	Pressure (m)
Peak hour demand	0.96	4.65	10.35
Fire flow demand	3.18	46.48	-31.48

The analysis of the water supply suggests the current system supplies adequate pressure to the end of the extents of the water main under peak hour conditions. Despite providing sufficient pressures under peak hour demand, the capacity is insufficient for fire flow demands.

The assessment of water supply for firefighting has been based on the size of the water mains and the condition of the accessible fire hydrants. Additional hydrants have been recommended where it appears the existing number of hydrants are insufficient. In the case of Mulgga an additional fire hydrant is required to provide sufficient coverage to the community.

Ultimately the network has insufficient capacity for fire flow demands and is non-compliant with PWC standards.

6.4 Future demands

The future demand analysis showed that four additional houses are required to provide permanent accommodation for residents that are currently living in non-house dwellings. The type and location of house, number of bedrooms, etc. will need to be determined by the Department of Housing and Community Development when this work is undertaken.

An allowance of 9 EP has already been provided for each temporary house (caravans, structures, etc.) in the current demand calculations, so the future EP will not increase since the residents from the temporary housing will be living in the new accommodation and the number of tenants will not be increased.

The location of the new house is assumed to be close to the existing houses such that significant extension of the water mains would not be required. This means that no additional water supply infrastructure upgrades would be required to cater for the new houses, other than recommended for the current demand, except for a new house connections to the existing network. The cost estimates for these works have been allowed for in the upgrades for current demand.

6.5 Recommended works

6.5.1 Works required to existing infrastructure for current demand

The infrastructure that was assessed as very poor or poor is recommended to be upgraded to prevent failure in the future. The following maintenance work is recommended to upgrade the current infrastructure;

- Clear area surrounding fire hydrant.
- Replace three residential lot meters

It is recommended that a DN150 PVC looped main is constructed to PWC standards, replaces the existing water main. All other water supply recommendation should be connected to the new water main, including the water meters and replacement fire hydrants. The cost estimates for upgrades at Mulgga include:

- Install residential lot water meters at all dwellings.
- Replace network with DN150 PVC looped main, approximately 1000 m
- Install new DN150 water meter
- Install two new fire hydrants

It should be noted that the external water main supplying the community is a single DN100 PVC pipe. Cost estimates to upgrade this to meet PWC standards have not been included as it is a PWC asset and is the responsibility of PWC to maintain and upgrade. If this pipe is upgraded, it is expected to result in a valuable improvement to the water supply to Mulgga.

6.5.2 Works required to existing infrastructure for future demand

The upgrades required to supply and monitor water to the new houses include new residential lot meters and connections to the network.

7 Roadworks

7.1 Ownership and boundaries

It is the current understanding that the roads within Mulggan community are owned by Mataranka Aboriginal Land Trust, but are the responsibility of Roper Gulf Regional Council to maintain.

7.2 Existing infrastructure condition assessment

The road network within the Mulggan community consists of spray sealed roads and unsealed roads. There are also numerous tracks which appear to be used frequently which are not included in the inspection and report. Table 7 below summarise the condition of the road furniture as assessed during the site inspection.

Table 7 Roadworks condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Sign		1				1



Figure 10 Sign, condition: *poor*

Aside from one poor condition sign here was no other road furniture. It is recommended that the sign be cleaned to remove any graffiti.

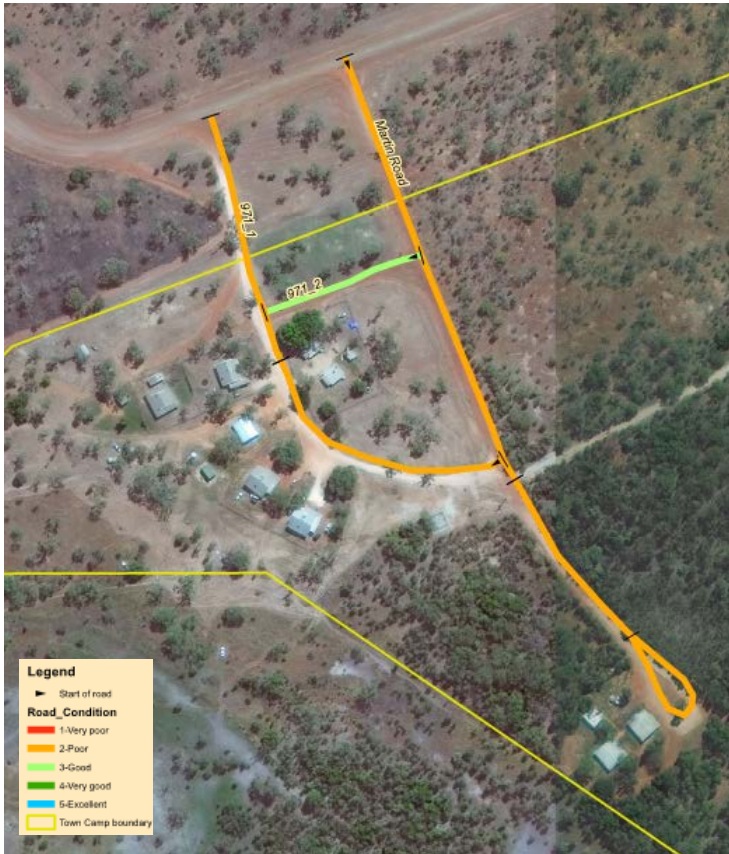


Figure 11 Mulgagan community road network



Figure 12 Pavement, condition: *poor*



Figure 13 Pavement, condition: *good*

The following table shows the road condition and particular defects that were observed during the site inspection. Note that the defects given as a percentage refer to percentage of road for that particular segment.

Table 8 Road network condition assessment

Road name	Chainage start (km)	Chainage end (km)	Condition (1 to 5)	Defects and their condition (1-5)
971_1	0	0.15	2	-15 potholes (2) -significantly rocky road (2)
	0.15	0.29	2	-10% of the road has a rocky surface (2) -5% of the road has undulations, this is occurring at the area crossing the table drain (2)
971_2	0	0.09	3	-2m ² of undulations (3)
Martin Road	0	0.25	2	-5% of the road has undulations (2) -20% of the road has a generally poor appearance with a rocky surface (2)
	0.25	0.47	1	-10% of the road has undulations -20% of the road has loos rocks

7.3 Current performance and risks

The road network is sufficient for the current number of houses. It was noted during the site inspections that a number of unsealed 'short-cuts' had been created and were regularly used. It is not recommended that these paths are formalised.

The roads were generally in poor condition with the exception of one section of unsealed road which was in good condition. It is recommended that the roads are upgraded to a two lane network.

It is also recommended that a road safety audit is undertaken to determine where signage, line marking, etc. are required.

7.4 Future demands

The addition of four new house will not require any upgrades to the road network. The additional house will require minor upgrades to the kerb to provide a layover kerb for a driveway.

7.5 Recommended works

7.5.1 Works required to existing infrastructure for current demand

The infrastructure that was assessed as very poor or poor is recommended to be upgraded to prevent failure in the future. The following works are recommended to upgrade the current infrastructure;

- Fill and repair 15 potholes
- Regrade 1200 m² of road
- Seal 1320 m² of road

In order to allow for a longer term sustainable road network a significant upgrade would be required. It is recommended that a long term design which incorporates a full two lane road network, with all appropriate road furniture, line-marking, kerbs and gutters is constructed. A cost estimate to reinstate the base and subbase material, reseal with a two coat spray seal surface, construct subsoil drainage, line marking and signage has been included. Note that these works will need to be fully designed, the cost estimate is for budgetary purposes only and only indicates the construction phase. A footpath next to the road is also recommended to provide a safe trail for pedestrians.

As the maximum road width within the Mulggan community is 5 m, this means that all 850 m of the road network will need to be upgraded to a 7.2 m wide road. The stormwater drainage infrastructure upgrades that are closely associated with the road upgrade i.e. kerb and gutters, side entry pits and underground drainage pipes are included in the stormwater section of this report.

7.5.2 Works required to existing infrastructure for future demand

Works required to provide for two additional house include upgrading the existing kerb to a layover kerb.

8 Stormwater drainage

8.1 Ownership and boundaries

The stormwater drainage assets within Mulgga community are owned by Mataranka Aboriginal Land Trust, but are the responsibility of Roper Gulf Regional Council to maintain.

8.2 Existing infrastructure condition assessment

The site investigation for the stormwater infrastructure included assessing the condition of swales, culverts, headwalls, and side entry pits (SEP). Only the above ground infrastructure was assessed. As the inspection was undertaken outside of a storm event and no CCTV of the pipes was undertaken, flooding due to blockages or damages to the underground infrastructure could not be assessed. Table 9 below summarises the condition of the stormwater assets as assessed during the inspection.

Table 9 Stormwater condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Culverts			1			1



Figure 14 Twin RCP culvert and headwall, condition: *good*

8.3 Current performance and risks

The detailed performance of the stormwater network cannot be fully analysed without significant hydraulic and hydrodynamic modelling, which is outside the scope of this project. Since there are almost no stormwater drainage assets it appears that the current performance is insufficient.

The general design philosophy for stormwater drainage is that the design is based on a system of sealed roads, kerb and gutter, side entry pits and underground drainage. This infrastructure currently does not exist at Mulggan and there would be major headworks required if stormwater drainage is to be incorporated. Cost estimates have been provided to construct stormwater drainage infrastructure within Mulggan.

8.4 Future demands

The inclusion of four new houses at Mulggan does not affect the stormwater drainage requirements. No further upgrades are required as a result of the new houses.

8.5 Recommended works

8.5.1 Works required to existing infrastructure for current demand

The following works are recommended to upgrade or improve the current infrastructure:

- Construct stormwater drainage, including underground pipes, kerbs and gutters, and side entry pits.

8.5.2 Works required to existing infrastructure for future demand

- No upgrades required.

9 Community structures

9.1 Ownership and boundaries

There are no community structures at Mulgga community.

9.2 Future demands

The population of Mulgga is not expected to increase with the addition of four new houses, as this house will provide permanent accommodation for residents that currently live in temporary housing. No additional community structures are required.

10 Electrical services

10.1 Ownership and boundaries

The following points, from Network Policy NP003 Installation Rules Section 3, define the typical shared ownership of electrical infrastructure by Power and Water Corporation (PWC) and customers.

- The point of supply is defined as the point where PWC makes the electrical supply available. For domestic supply, this is normally one of the following:
- A point of attachment of an overhead service on to a building or pole on which a metering panel is fitted.
- A point of attachment of an overhead service on to a pole forming part of unmetered aerial consumer's mains.
- A nominated point on a distribution substation located on the customer's lot.
- A point of connection of an underground service in a metering panel, including underground services originating at an overhead line.
- A point of connection of an underground service in a pillar or junction box forming part of unmetered consumer's mains, located on the customer's lot.
- A point on a Power and Water pillar located on the customer's lot.

Typically, distribution infrastructure upstream of the Point Of Supply is owned and maintained by PWC and infrastructure below the point of supply is owned and maintained by the customer.

In many cases PWC have defined a Point Of Supply to ensure that they retain responsibility for aerial high voltage infrastructure, and aerial low voltage infrastructure where installed with aerial high voltage infrastructure, to minimise the possibility of the community or its contractors coming into contact, either deliberately or inadvertently, with aerial high voltage infrastructure.

In other cases isolation facilities are present or desired by PWC to define the Point of Supply at or near the boundary of the town camp.

The Mulggan community electrical reticulation system is supplied by an overhead reticulation scheme with one pole mount transformer located outside the town camp and two transformers inside the town camp. Dwellings and the pump station are supplied via overhead LV reticulation.

All meters in this site are pre-paid digital meters.

PWC advise that the Point Of Supply is the LV terminals of the substations and that they own and are responsible for the first pole mount substation and upstream infrastructure.

PWC recommend that a GBS (Gas Break Switch) be provided upstream of the first transformer to establish a demarcation point.

PWC advise that street lighting is supplied from unmetered LV infrastructure and is the responsibility of the lot holder and not PWC.

All meters, whether pre- or post-paid are the property of PWC.

Mulggan community own and are responsible for all unmetered and metered LV infrastructure including the main switchboard, metering panel (excluding meter), LV distribution feeders, distribution pillars, consumers mains and consumer switchboards and street lights.

10.2 Existing infrastructure condition assessment

Table 10 shows the condition rating given to the distribution switchboards and/or distribution pillars. The distribution panels have 100% operational rating from the visual inspection

Table 10 Distribution panel condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Distribution panels			3			3

All street lights within the Mulggan community boundary are mounted on power poles.

Table 11 shows the condition rating given to the street lights. The street lights were of a low voltage overhead feeder design, mercury lamp, M80. The street lights had an operational rating of 50% and 50% non-operational.

Table 11 Street light on O/H pole condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Street light on O/H Pole		4	4			8

Table 12 shows the condition rating given to the transformers. Three transformers were inspected in the Mulggan community boundary. The transformers were visually assessed to be in good condition.

Table 12 Transformer condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Transformer			3			3

The overhead poles are of Welded Construction (Universal Pole construction) and steel consumer service poles.

Table 13 shows the condition rating given to the overhead poles. The overhead poles have 100% operational rating.

Table 13 Overhead pole condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Overhead pole			17			17

Table 14 shows the condition rating given to the metering panels. All assessed meters in this community are prepaid digital meters.

Table 14 Meter panel condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Pre-paid meter	1		7			8
Switchboard		4	4			8

The details of the individual inspections and photographs of each infrastructure item are included in Appendices.

10.3 Current performance and risks

The electrical infrastructure evaluation was conducted against the following criteria

- Number of dwellings on tenure, the higher value of the funded dwelling and as quoted in the population report was utilised.
- Urban area, NP001.1, 4. Definitions.
- General Specification for URD Subdivisions, NP001.6, 4.3 Substation Size.
- Normal ADMD (After Diversity Maximum Demand) of 4.5 kVA and high cost subdivisions at 7 kVA.
- Transformer ratings were assumed to be correct in Dekho (PWC asset information system) and compared against photographs of test or transformer numbers collected.
- Substation loads were compared against transformer sizes only. No load flow analysis was conducted.
- No load calculations were performed or assessment conducted on overhead or underground cable, visual inspection from the ground only.
- Streetlighting loads were ignored as they are not significant.

The calculated maximum demand of the Mulgga community transformers is 95% of the installed capacity based on 4.5kVA/dwelling.

The distribution of load across these transformers could not be determined as there was no access to the load side of the transformers.

PWC advise that no damage has occurred to this infrastructure.

Table 15 Mulgga Current Demand Load vs Transformer ratings

Com Id	Community Name	Dwellings	Transformer (kVA)	kVA Total @ 4.5kVA	kVA Total @ 7kVA
			16		
971	Mulgga	12	16	54	84
			25		

A tabulated summary of all community transformers is included in Appendices.

There is a risk of equipment not being maintained associated with the non-standard division of responsibilities between the customer and PWC.

The following points from the PWC Metering Rules should be noted:

- The routine maintenance of metering installations and the replacement of any faulty meters is the responsibility of PWC.
- The property owners are responsible for the maintenance and upkeep of meter rooms, boxes and panels (including lids, doors and locking mechanisms).
- The installation of pre-paid metering is a cost to the customer, refer NP010 Meter Manual-Maintenance of Metering Installations, Power and Water Corporation.

10.4 Future demands

There are four new dwellings currently planned for Mulgga community.

The calculated future maximum demand of the Mulgga community transformers will be 103% of rated capacity based on 4.5kVA/dwelling.

Table 16 Mulgga future Demand Load vs Transformer ratings

Com Id	Community Name	Dwellings	Transformer (kVA)	kVA Total @ 4.5kVA	kVA Total @ 7kVA
			16		
971	Mulgga	13	16	58.5	91
			25		

10.5 Recommended works

PWC are aware of the loading of the transformers at Mulgga and have determined that the loads on these transformers does not require that any of these transformers be upgraded or replaced.

The following should be carried out at Mulgga:

- Preparation of layout and schematic record drawings of the electrical reticulation system.
- Load monitoring to determine the detailed demand profile of each transformer.
- Modelling of the reticulation system to confirm load flow and voltage drop.
- Preparation of design documentation for modification of existing infrastructure to rectify issues found and incorporate provisions for four additional dwellings.

The following maintenance works and upgrades are recommended:

- Replace four 80W street lights.
- Replace one prepaid digital meter
- Replace four switchboards inside the metering panel
- Install new street lighting - approximately 43 poles

11 Communications

11.1 Ownership and boundaries

Details of Telstra pit and conduit infrastructure within the town camp boundaries were sought but were not forthcoming.

11.2 Existing infrastructure condition assessment

The telecommunications infrastructure assessed included pits. There were no telephone booths found at Mulgga.

Appendices contains the individual reports.

Table 17 Telecommunication pit condition assessment

Asset	1 Very Poor	2 Poor	3 Good	4 Very Good	5 Excellent	Total
Telecommunication pit		2	3			5

11.3 Current performance and risks

No details of the performance of communications infrastructure were obtained.

11.4 Future demands

The current availability of broadband services at Mulgga is displayed in the Figure 16 below. NBN is available to residents via satellite on application to an appropriate NBN access provider.

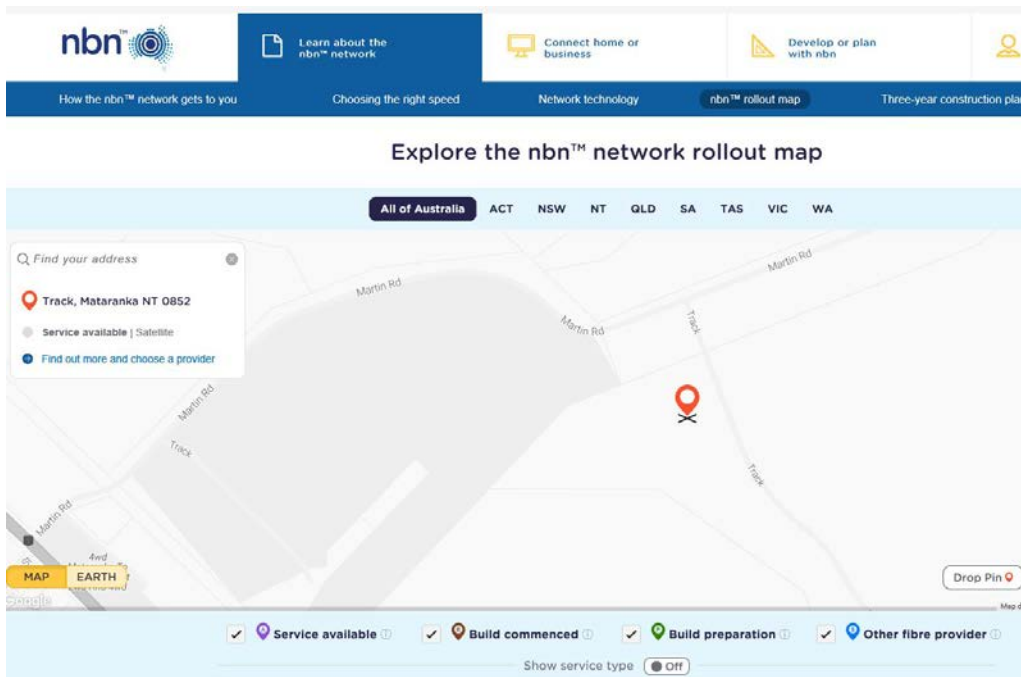


Figure 15 NBN network availability map

NBN is available to residents via satellite on application.

11.5 Recommended works

Representatives from NBN's Land Access and Stake Holder management teams are currently engaged with Yilli Housing and NT Housing to look at how camps will be serviced. It is expected that any existing premises in these camps will have some type of NBN service via the NBN brownfields rollout in the future.

No works are required at Mulgga because NBN is available to residents via satellite on application to an appropriate NBN access provider.

12 Cost estimates

Table 18 below shows a summary of the cost estimates to undertake the maintenance required to fix the existing infrastructure, to upgrade the existing network to meet current design standards, and to upgrade the existing network to cater for the future design (included in current upgrades). The estimates take into account a 30% contingency, are inclusive of GST, and a location factor has been applied to town camps outside of Darwin.

Table 18 Cost estimates

Infrastructure	Maintenance of existing infrastructure	Upgrades to meet current design
Sewerage	\$ 0	\$ 448,000
Water supply	\$ 1,000	\$ 945,000
Roadworks	\$ 331,000	\$ 1,444,000
Stormwater drainage	\$ 0	\$ 601,000
Community structures	\$ 0	\$ 0
Electrical	\$ 21,000	\$ 962,000
Communications	\$ 0	\$ 0
Miscellaneous provisions	\$ 56,000	\$ 542,000
Total (including GST)	\$ 409,000	\$ 4,942,000
Grand total	\$ 5,351,000	

The cost estimates are a preliminary estimate only. Since Aurecon has no control over the cost of labour, materials, equipment or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, Aurecon cannot guarantee actual costs will not vary from these estimates.

13 Summary

A summary of the works required at Mulgga community is as follows;

Sewerage

- 300 m of DN150 PVC gravity main
- 200 m of DN150 PVC rising main
- Two new pumps (further analysis required to determine duty point of the new pumps).

Water Supply

- Clear area surrounding fire hydrant
- Replace three residential lot meters
- Install up to four residential lot water meters
- Replace network with DN150 PVC looped main, approximately 1000 m
- Install new DN150 water meter
- Install two new fire hydrants

Roadworks

- Fill and repair 15 potholes
- Regrade 1200 m² of road
- Seal 1320 m² of road
- It is recommended that the road is upgraded to a two lane network with all appropriate road furniture, line marking, kerbs, footpaths, etc.

Stormwater drainage

- Construct stormwater drainage, including underground pipes, kerbs and gutters, and side entry pits.

Community structures

- No upgrades or new installations of community structures are currently required.

Electrical services

- Replace four 80W street lights.
- Replace one prepaid digital meter
- Replace four switchboards inside the metering panel
- Install new street lighting - approximately 43 poles
- Preparation of layout and schematic record drawings of the electrical reticulation system.
- Load monitoring to determine the detailed demand profile of each transformer.
- Modelling of the reticulation system to confirm load flow and voltage drop.
- Preparation of design documentation for modification of existing infrastructure to rectify issues found and incorporate provisions for four additional dwellings.

Communications

- No works are required because NBN is available to residents via satellite on application to an appropriate NBN access provider.

Civil inspection reports

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016



Legend

Town Camp boundary

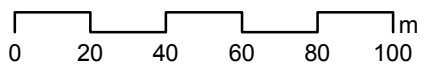
Town Camp boundary

Sewerage

Manholes (3)

Pump Station (1)

A3 scale: 1:2,000



Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Sewerage
971 - Mulggan (Mataranka)

P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016








Legend

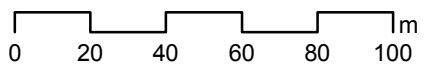
Town Camp boundary



Water

-  Air Valves (1)
-  Fire Hydrants (1)
-  Pumps (1)
-  Tanks (1)
-  Water Meter (4)

A3 scale: 1:2,000



Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Water
971 - Mulgagan (Mataranka)

Map by: DMCP P:\GIS\Projects\253963_NT_Town_Camps\253963_003_Civil_DDP.mxd 23/02/2017 12:02 Imagery: Digital Globe WV2 2013-2016

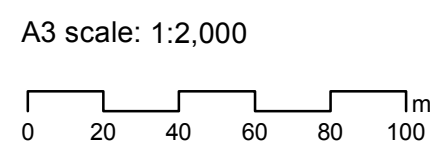


Legend

Town Camp boundary
 Town Camp boundary

Road furniture
 Signs (1)

Stormwater
 Culverts (1)



Note:
Label numbers refer to survey IDs



Date: 23/02/2017 Version: 2
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments
Road furniture, stormwater drainage & community structures
971 - Mulggan (Mataranka)

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:16:42 AM

Insp ID: 1818 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Water Asset Are you Capturing: Air Valves

Air Valve Diameter (mm): 80

Air Valve Make:

Air Valve Leak: No

Air Valve Condition: 5 - Excellent

Air Valve Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:16:42 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:44:57 AM

Insp ID: 1811 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

Stormwater Infrastructure:	Culverts
Culvert Type:	RCP
Diameter (mm):	450
Width (mm):	
Culvert Depth (mm):	
Culvert Length (m):	11
Culvert Condition:	3 - Good
Culvert Blockage (%):	
Culvert Comments:	
Culvert Head Wall:	Yes
Safety Grate:	No
Headwall Blockage:	
Headwall Condition:	3 - Good
Headwall Comment:	
End Wall:	Yes
End Wall condition:	3 - Good
EW Comment:	



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:44:57 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 11:25:49 AM

Insp ID: 1802 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Water Asset Are you Capturing: Fire Hydrants

Single or Double: Single
Sluice Valve: No
Above or Below ground: Below ground
FH Leakage: No Access
Bollards around hydrant: Yes
FH Condition: 2 - Poor
FH Comment: Location bollard



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 11:25:49 AM

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 11:27:44 AM

Insp ID: 1801 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Rectangular

Manhole Cover Diam (mm):

Manhole Length (mm): 1000

Manhole Width (mm): 700

Manhole Condition: 4 - Very Good

Notes on Lid:

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 11:05:53 AM

Insp ID: 1804 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

What Sewerage Asset are you capturing: Manholes

MH Cover Shape: Rectangular

Manhole Cover Diam (mm):

Manhole Length (mm): 1000

Manhole Width (mm): 700

Manhole Condition: 3 - Good

Notes on Lid:

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 11:02:10 AM

Insp ID: 1805 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Sewerage Asset are you capturing: Manholes

MH Cover Shape:

Manhole Cover Diam (mm):

Manhole Length (mm):

Manhole Width (mm):

Manhole Condition:

Notes on Lid:

Comments:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 11:02:10 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:04:24 AM

Insp ID: 1803 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

Road Name: 971_1
What are you inspecting: Pavements
Ch From (km): 0
Ch To (km): 0.15
Road Type: Unsealed
Section Width (m): 4.5
Road Condition: 2 - Poor

General Comment: Side roads to properties are in very poor condition and need to be levelled,as there are several undulations

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Potholes	15	2 - Poor	Number
	10	2 - Poor	Rocky road

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Shoulder Type	Width	Dropoff(mm)	Erosion	Condition	Shoulder Comments
Unsealed					

Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:04:24 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:04:24 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:40:06 AM

Insp ID: 1812 **Group 2 - Katherine, Pine Creek, Mataranka** **Mulggan**

Road Name: Martin Road

What are you inspecting: Pavements

Ch From (km): 0.25

Ch To (km): 0.47

Road Type: Unsealed

Section Width (m): 6

Road Condition: 2 - Poor

General Comment:

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Undulation/Settlement	10	1 - Very Poor	Percent
General Appearance	20	2 - Poor	Loose rocks

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:40:06 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:40:06 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:34:22 AM

Insp ID: 1813 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

Road Name: 971_1

What are you inspecting: Pavements

Ch From (km): 0.15

Ch To (km): 0.29

Road Type: Unsealed

Section Width (m): 5

Road Condition: 2 - Poor

General Comment:

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
General Appearance	10	2 - Poor	Percent, rocky
Undulation/Settlement	5	2 - Poor	Percent, area crossing table drain is in poor cor

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Shoulder Type	Width	Dropoff(mm)	Erosion	Condition	Shoulder Comments
---------------	-------	-------------	---------	-----------	-------------------

Unsealed

Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:34:22 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:34:22 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:20:06 AM

Insp ID: 1817 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

Road Name: Martin Road

What are you inspecting: Pavements

Ch From (km): 0

Ch To (km): 0.25

Road Type: Unsealed

Section Width (m): 6

Road Condition: 2 - Poor

General Comment:

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Undulation/Settlement	5	2 - Poor	Percent
General Appearance	20	2 - Poor	Percent, rocky surface

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Shoulder Type	Width	Dropoff(mm)	Erosion	Condition	Shoulder Comments
---------------	-------	-------------	---------	-----------	-------------------

Unsealed

Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:20:06 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:20:06 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:08:38 AM

Insp ID: 1820 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

Road Name: 971_2
What are you inspecting: Pavements
Ch From (km): 0
Ch To (km): 0.09
Road Type: Unsealed
Section Width (m): 5
Road Condition: 3 - Good

General Comment: Roads could be elevated as residents mention roads often flood

Road Defects Section

Defect Type	Defect QTY	Defect Condition	Defect Comments
Undulation/Settlement	2	3 - Good	Metres squared

Kerbs Section

Kerb Type	Kerb Cond	Kerb Comments
No kerb		

Shoulders Section

Shoulder Type	Width	Dropoff(mm)	Erosion	Condition	Shoulder Comments
Unsealed					

Linemarking Section

Obstruction Section

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:08:38 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:08:38 AM



Northern Territory Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:59:08 AM

Insp ID: 1806

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

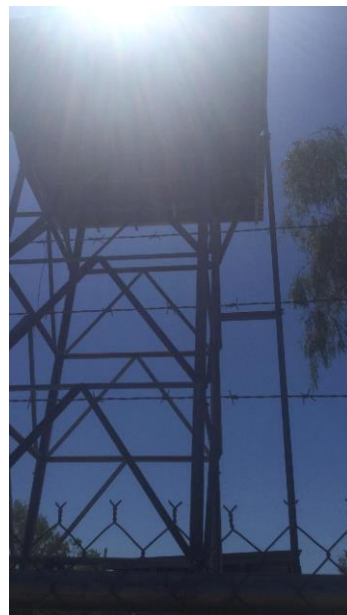
What Water Asset Are you Capturing: Pumps

Water Pump Capacity:

Water pump make:

Qty of Pumps:

Water Pump Conditions:



Northern Territory Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:59:08 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:30:10 AM

Insp ID: 1815 **Group 2 - Katherine, Pine Creek, Mataranka** **Mulggan**

What Sewerage Asset are you capturing: Pump Station

No of Pumps in Pump Station: 1

Cabinet Condition: 3 - Good

Cabinet Comment:

Alarm Light: No

Alarm Light Condition:

Overhead Light: Yes

Overhead Light Condition: 2 - Poor

Light Comments:

Davit Crane Present: No

Davit Crane Capacity (kg):

Davit Crane Condition:

Davit Crane Comments:

Fence TYPE: Standard Security Fence (3 Strands barbed)

PS Fence Height (m): 1.8

PS Gates Locked: Yes

PS Fence Condition: 3 - Good

Fence Comment:

Flow meter type:

Flow meter condition:

Flow meter comments:

Macerator Pump Make/Model:

Manufacturers Date:

Macerator Pump: No

Macerator Pump Condition:

Macerator Pump Comments:

Outgoing Pipe Diameter (mm):

Valves:

Outgoing Pipe Comments:

Water Supply to pump station:

Fire hose reel: No

Access cover locked: NA

Safety grid beneath access cover:

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:30:10 AM

Condition:

Cabinet Locked: No

Cabinet Lock Condition:

Hand rails around entrance: No

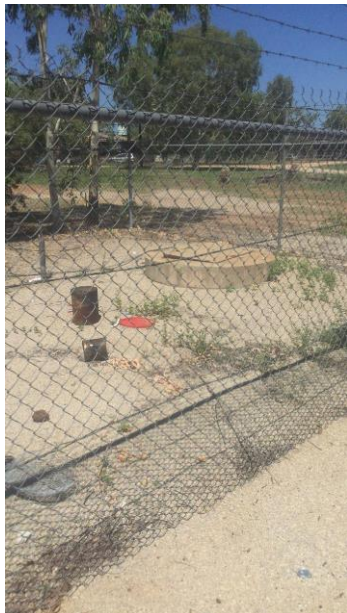
Fixed or removable:

Rail Condition:

Safety Comments:

Pump Station Pumps section

Pump Capacity	Pump Make	Manufacture Date	Pump Chain	Condition	Comments
			Yes		



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:30:10 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:30:10 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:02:59 AM

Insp ID: 1821 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

Road Name: 971_1

What are you inspecting: Signs

Type of Sign: Community signs

Sign Condition: 2 - Poor

Sign Comment:

General Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:54:01 AM

Insp ID: 1807 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Water Asset Are you Capturing: Tanks

Water Tank Material: Plastic

Water Tank Diameter: 2.5

Water Tank Height: 2.5

Water Tank Volume: 10000

Leaking: No

Water Tank Condition: 3 - Good



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:54:01 AM

Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:54:18 AM

Insp ID: 1808

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size:

Lot Water Meter Condition: 1 - Very Poor

Lot Water Meter Comment: Unable to see meter itself,



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:52:09 AM

Insp ID: 1809

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size:

Lot Water Meter Condition: 1 - Very Poor

Lot Water Meter Comment: Water meter size Unknown, only box found. Cannot see meter itself



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:52:09 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:49:40 AM

Insp ID: 1810

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Lot

Bulk Water Meter Size (mm):

Bulk Water Meter Condition:

Bulk Water Meter Comment:

Lot Number:

Lot Water Meter Size:

Lot Water Meter Condition:

Lot Water Meter Comment: Water meter box, Unknown size and condition



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:49:40 AM



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:13:17 AM

Insp ID: 1819

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Water Asset Are you Capturing: Water Meter

Water Meter Type: Bulk
Bulk Water Meter Size (mm): 100
Bulk Water Meter Condition: 5 - Excellent
Bulk Water Meter Comment: RPZD installed

Lot Number:

Lot Water Meter Size:

Lot Water Meter Condition:

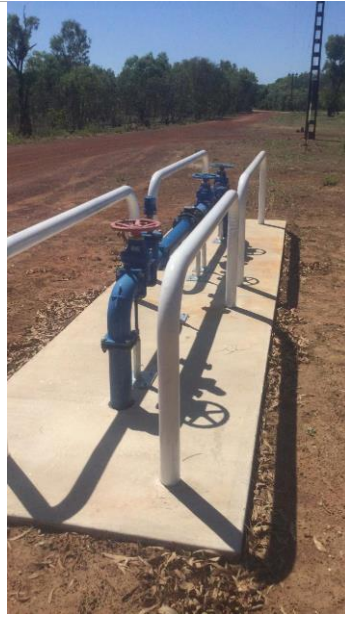
Lot Water Meter Comment:



Northern Territory Town Camps

Civil Infrastructure

Inspection Date 8/12/2016 10:13:17 AM



Northern Territory Town Camps

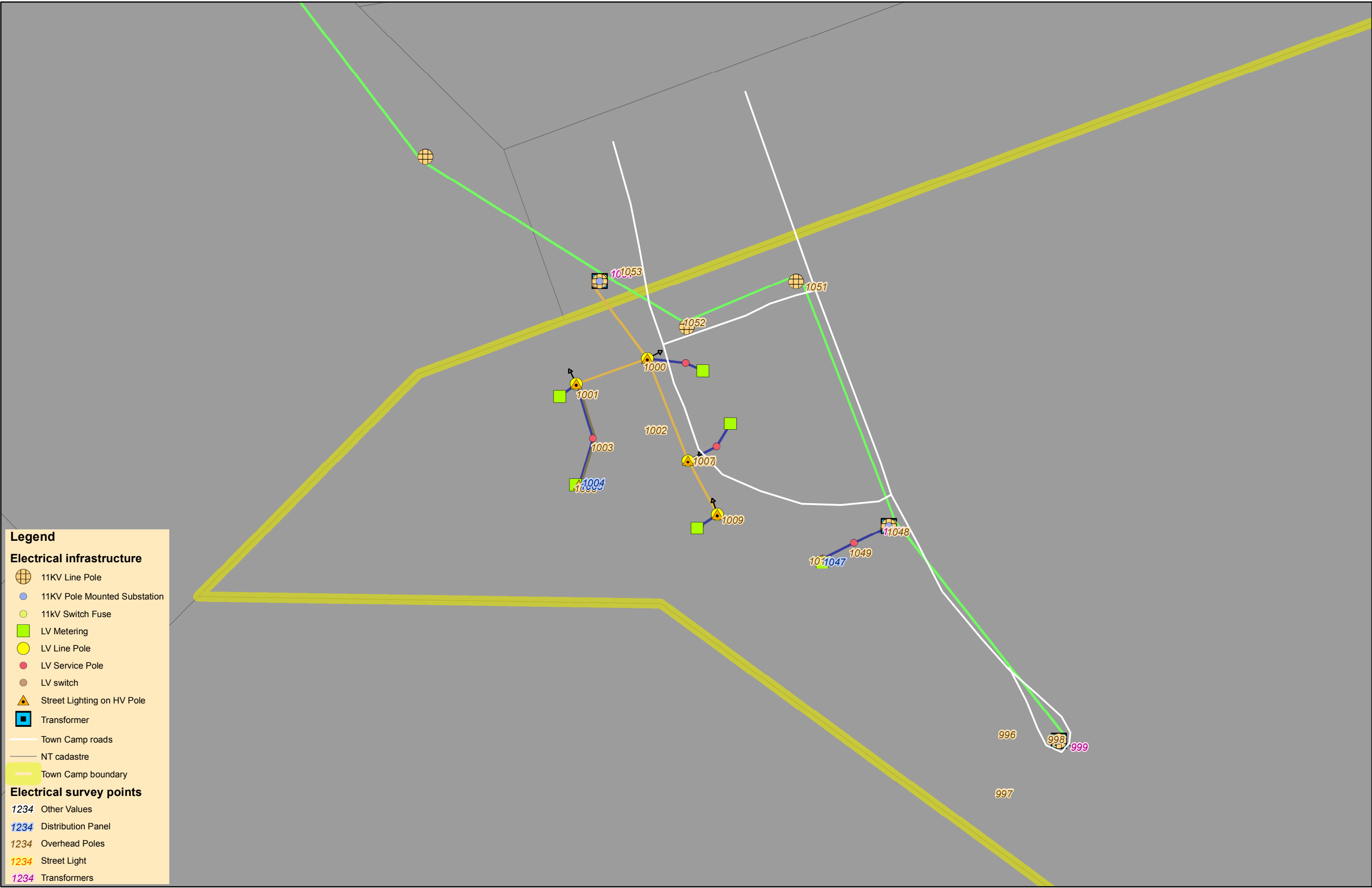
Civil Infrastructure

Inspection Date 8/12/2016 10:13:17 AM

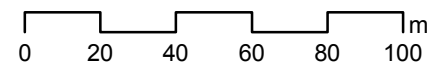


Electrical inspection report

P:\GIS\Projects\253963_NT_Town_Camps\253963_004_Elec_DDP_report.mxd 23/02/2017 12:22
Map by: DMCP



A3 scale: 1:2,000



Date: 23/02/2017 Version: 3
Coordinate system: MGA94 Zone 52

NT Town Camp Infrastructure Assessments: Electrical
971 - Mulggan (Mataranka)

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:37:45 AM

Insp ID: 1004 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method:

Pole

Is the distribution panel labelled:

No

What is Distribution Panel main CB Rating:

What is the main incoming cable type/Size to Distribution Panel:

What is the condition of switchboard:

2

Condition Comments:

Flexi used for meter

What is the condition of cables/glands into switchboard:

3

Cable/Gland Condition Comments:

Distribution Panels name plate access:

No Access



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:37:45 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:34:44 AM

Insp ID: 1005 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method: Pole

Is the distribution panel labelled: No

What is Distribution Panel main CB Rating:

What is the main incoming cable type/Size to Distribution Panel:

What is the condition of switchboard: 3

Condition Comments:

What is the condition of cables/glands into switchboard:

Cable/Gland Condition Comments:

Distribution Panels name plate access: No Access



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:34:44 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:16:15 AM

Insp ID: 1047 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

What Category are you capturing: Distribution Panel

What is Main Distribution Panel installation method: Pole

Is the distribution panel labelled: No

What is Distribution Panel main CB Rating:

What is the main incoming cable type/Size to Distribution Panel:

What is the condition of switchboard: 3

Condition Comments:

What is the condition of cables/glands into switchboard: 3

Cable/Gland Condition Comments:

Distribution Panels name plate access: No Access



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:16:15 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 10:26:18 AM

Insp ID: 3502 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 3

Meter Condition: 3

Meter Comment:

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 10:19:00 AM

Insp ID: 3503

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition: 3

Meter Comment: Blank plates are missing on CB slot.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 9:59:19 AM

Insp ID: 3504

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 3

Meter Condition: 3

Meter Comment:

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 9:46:13 AM

Insp ID: 3505

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 3

Meter Condition: 3

Meter Comment:

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 9:28:39 AM

Insp ID: 3506 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition: 3

Meter Comment: Blank plates are missing on CB slot.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 10:24:43 AM

Insp ID: 3509 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition: 1

Meter Comment: Digital meter is out of service. Blank plates are missing on CB slot.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 10:07:04 AM

Insp ID: 3510 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 2

Meter Condition: 3

Meter Comment: Blank plates are missing on CB slot.

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 30/11/2016 9:50:59 AM

Insp ID: 3511

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Category are you capturing: Electrical Meters

Meter Type: Prepaid

Meter Switchboard Cond: 3

Meter Condition: 3

Meter Comment:

Comments:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:12:49 PM

Insp ID: 996 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Single

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition:

How many Lots are connected to this pole: 1

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:12:49 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:06:13 PM

Insp ID: 997 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Concrete

What is the Condition of plant: 3

Is street light fitted:

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Single

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition:

How many Lots are connected to this pole: 1

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:06:13 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:04:08 PM

Insp ID: 998 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80 D 02
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Combined
What is the HV voltage level:	
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	Yes
What is the Condition:	3
How many Lots are connected to this pole:	3
Overhead Pole Comments:	No ID

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:04:08 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:50:29 AM

Insp ID: 1000 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

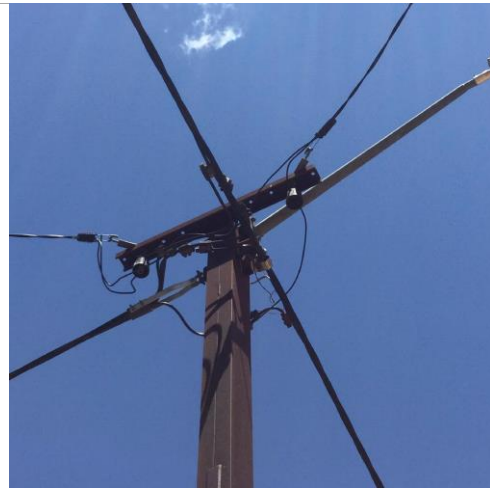
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80 D 02
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	
How many Lots are connected to this pole:	
Overhead Pole Comments:	No ID

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:50:29 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:49:43 AM

Insp ID: 1001 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Direct
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80 D 02
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	
How many Lots are connected to this pole:	1
Overhead Pole Comments:	No ID

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:49:43 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:42:23 AM

Insp ID: 1002 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant:

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Single

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition:

How many Lots are connected to this pole: 1

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:42:23 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:39:29 AM

Insp ID: 1003 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant:

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Three

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition:

How many Lots are connected to this pole:

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:39:29 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:32:07 AM

Insp ID: 1006 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type:	Steel
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80 D 02
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	
How many Lots are connected to this pole:	
Overhead Pole Comments:	

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:32:07 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:26:18 AM

Insp ID: 1007 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant: 3

Is street light fitted:

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Single

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition:

How many Lots are connected to this pole: 1

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:26:18 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:24:11 AM

Insp ID: 1008 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

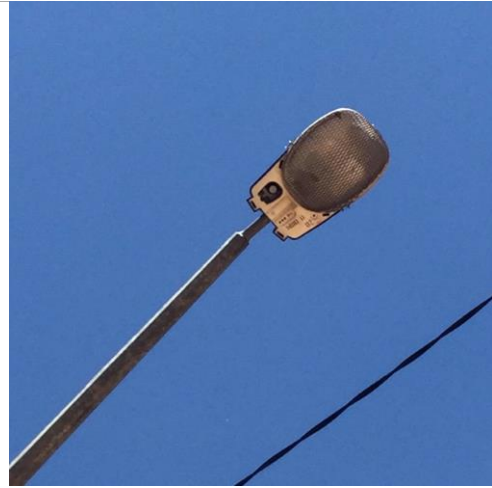
What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Direct
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80 D 02
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	No
What is the Condition:	
How many Lots are connected to this pole:	2
Overhead Pole Comments:	NO ID

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:24:11 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:20:14 AM

Insp ID: 1009 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	M80 D 02
Street Light Watts	
Street Light Condition	3
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	
How many Lots are connected to this pole:	1
Overhead Pole Comments:	

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:20:14 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:58:04 AM

Insp ID: 1011 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type:	Steel
What is the condition of pole:	3
How is the pole planted:	Direct
What is the Condition of plant:	3
Is street light fitted:	Yes
Street Light Power Supply:	
Street Light Type	Unknown
Street Light Watts	
Street Light Condition	2
Street Light Height	
What is the type of service:	Single
What is the HV voltage level:	
What is the arrangement of connected cables:	Twisted
Are there isolators on the pole:	No
What is the Condition:	
How many Lots are connected to this pole:	
Overhead Pole Comments:	

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:58:04 AM

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:54:15 AM

Insp ID: 1048 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Combined
What is the HV voltage level:	
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	Yes
What is the Condition:	3
How many Lots are connected to this pole:	
Overhead Pole Comments:	No ID

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:54:15 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:53:13 AM

Insp ID: 1049 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type: Steel

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Single

What is the HV voltage level:

What is the arrangement of connected cables: Twisted

Are there isolators on the pole: No

What is the Condition:

How many Lots are connected to this pole:

Overhead Pole Comments: Vegetation needs clearing

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:53:13 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:40:02 AM

Insp ID: 1051 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	Yes
What is the Condition:	3
How many Lots are connected to this pole:	
Overhead Pole Comments:	No ID

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:40:02 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:37:04 AM

Insp ID: 1052 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type:	Welded
What is the condition of pole:	3
How is the pole planted:	Concrete
What is the Condition of plant:	3
Is street light fitted:	No
Street Light Power Supply:	
Street Light Type	
Street Light Watts	
Street Light Condition	
Street Light Height	
What is the type of service:	Three
What is the HV voltage level:	
What is the arrangement of connected cables:	Parallel
Are there isolators on the pole:	Yes
What is the Condition:	3
How many Lots are connected to this pole:	
Overhead Pole Comments:	No ID

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:37:04 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:33:42 AM

Insp ID: 1053 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

What is Pole Material type: Welded

What is the condition of pole: 3

How is the pole planted: Direct

What is the Condition of plant: 3

Is street light fitted: No

Street Light Power Supply:

Street Light Type

Street Light Watts

Street Light Condition

Street Light Height

What is the type of service: Combined

What is the HV voltage level:

What is the arrangement of connected cables: Parallel

Are there isolators on the pole: Yes

What is the Condition: 3

How many Lots are connected to this pole:

Overhead Pole Comments:

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:33:42 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:04:08 PM

Insp ID: 998 Group 2 - Katherine, Pine Creek, Mataranka Mulgga

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80 D 02

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:04:08 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:50:29 AM

Insp ID: 1000 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

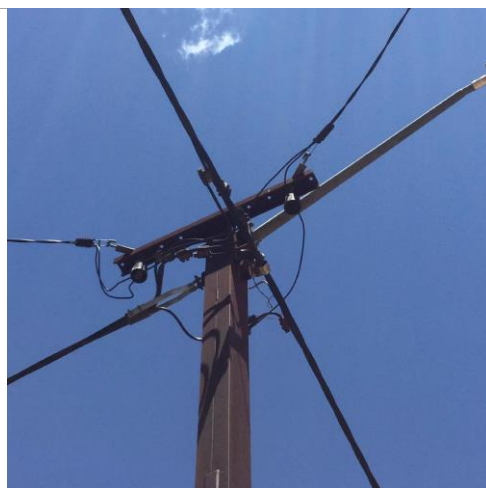
Street Light Power Supply:

Street Light Type M80 D 02

Street Light Watts

Street Light Condition 2

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:49:43 AM

Insp ID: 1001 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80 D 02

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:32:07 AM

Insp ID: 1006 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80 D 02

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:24:11 AM

Insp ID: 1008 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80 D 02

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 11:20:14 AM

Insp ID: 1009 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type M80 D 02

Street Light Watts

Street Light Condition 3

Street Light Height



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:58:04 AM

Insp ID: 1011 **Group 2 - Katherine, Pine Creek, Mataranka** **Mulggan**

What Category are you capturing: Overhead Poles

Is street light fitted: Yes

Street Light Power Supply:

Street Light Type Unknown

Street Light Watts

Street Light Condition 2

Street Light Height

Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:01:16 PM

Insp ID: 999

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Category are you capturing: Transformers

What is Transformer installation method:

Pole

If method know:

11SS1P

What is the condition of the mounting:

3

What is Transformer Rating:

Is there access to transformers name plate to take a photo:

No Access

What is the condition of transformer:

3

What is cable type to transformer:

What is cable size to transformer:

Is there switch gear or fusing associated with the transformer:

Transformer Comment:

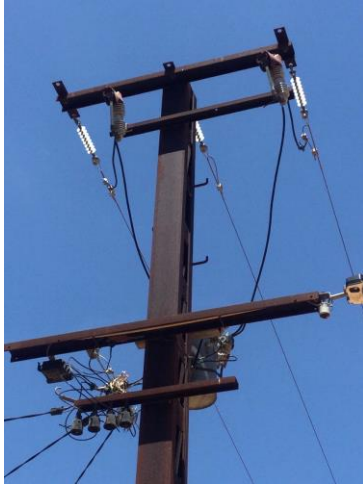
5296



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 12:01:16 PM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:48:18 AM

Insp ID: 1050 Group 2 - Katherine, Pine Creek, Mataranka Mulggan

What Category are you capturing: Transformers

What is Transformer installation method:

Pole

If method know:

11SS1P

What is the condition of the mounting:

3

What is Transformer Rating:

Is there access to transformers name plate to take a photo:

No Access

What is the condition of transformer:

3

What is cable type to transformer:

Black insulated single

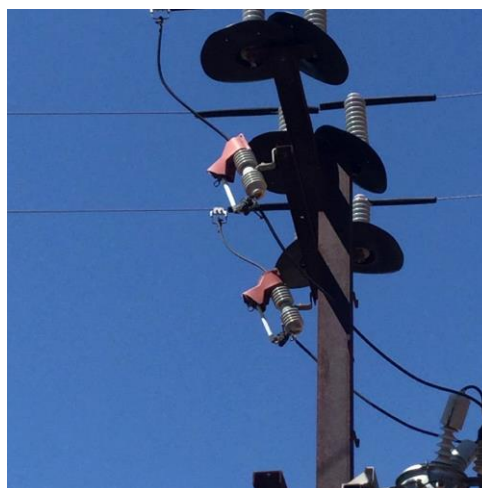
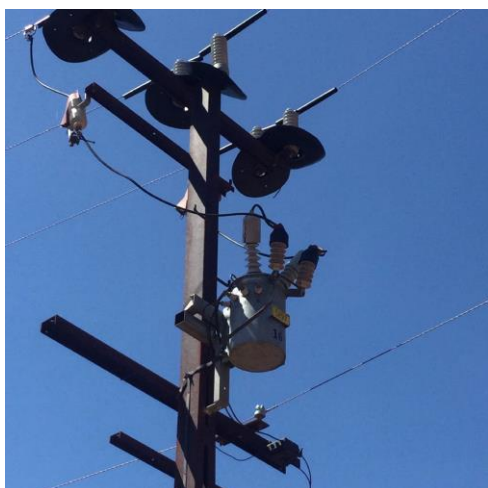
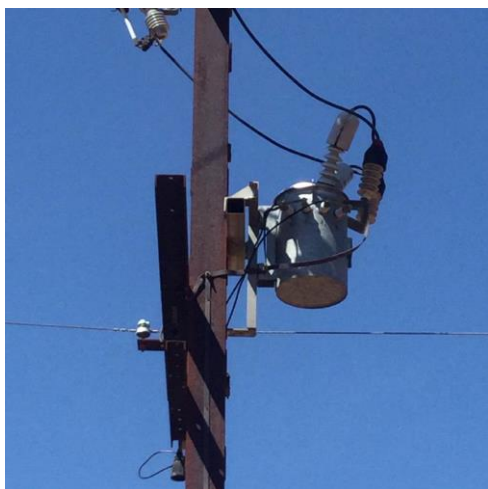
What is cable size to transformer:

Is there switch gear or fusing associated with the transformer:

Drop out fuses

Transformer Comment:

5297



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:48:18 AM



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:29:10 AM

Insp ID: 1054

Group 2 - Katherine, Pine Creek, Mataranka

Mulggan

What Category are you capturing: Transformers

What is Transformer installation method:

Pole

If method know:

11SS1P

What is the condition of the mounting:

3

What is Transformer Rating:

Is there access to transformers name plate to take a photo:

No Access

What is the condition of transformer:

3

What is cable type to transformer:

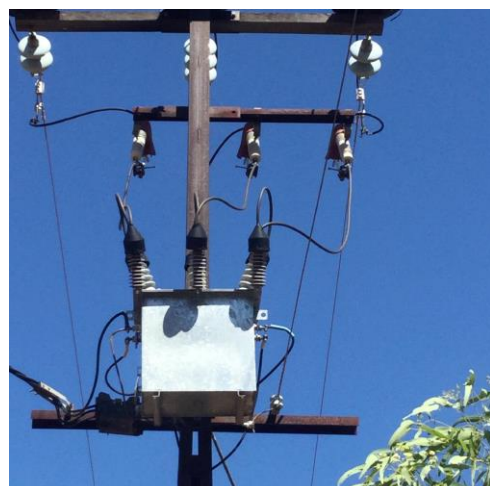
Black single insulated

What is cable size to transformer:

Is there switch gear or fusing associated with the transformer:

Drop out fuses

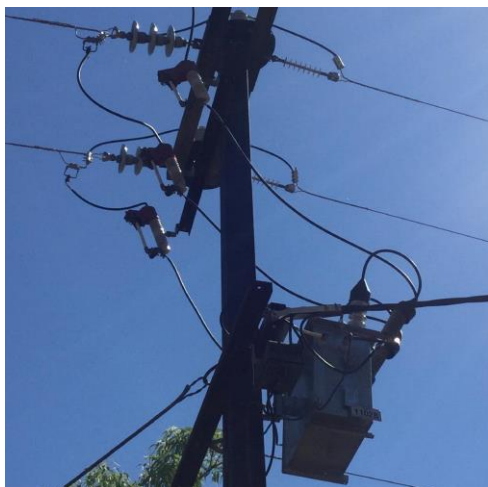
Transformer Comment:



Northern Territory Town Camps

Electrical Infrastructure

Inspection Date 8/12/2016 10:29:10 AM



Road map