Technical Services Committee

Business Paper for March 2020

Monday, 16 March 2020
Council Chamber, Civic Centre

Councillor Eli Melky
(Chair)

(08) 8950 0500
alicesprings.nt.gov.au

ALICE SPRINGS TOWN COUNCIL

TECHNICAL SERVICES COMMITTEE AGENDA

FOR THE MEETING TO BE HELD ON MONDAY 16 MARCH 2020

IN THE COUNCIL CHAMBER, CIVIC CENTRE, ALICE SPRINGS

1. APOLOGIES
2. WELCOME TO THE PUBLIC AND VISITORS AND PUBLIC QUESTION TIME
3. DISCLOSURE OF INTEREST
4. MINUTES OF THE PREVIOUS MEETING
   - 4.1. UNCONFIRMED Minutes - Technical Services Committee - 10 February 2020
   - 4.2. Business Arising
5. IDENTIFICATION OF ITEMS FOR DISCUSSION
   - 5.1. Identification of items for discussion
   - 5.2. Identification of items to be raised in General Business by Elected Members and Officers
6. DEPUTATIONS
7. PETITIONS
8. NOTICE OF MOTION
9. REPORTS OF OFFICERS
   - 9.1. Technical Services Directorate Update
     Report No: 35 / 20 ts (DTS)
   - 9.2. TIO Traeger Park Oval - Boxing Shed Upgrades
     Report No: 36 / 20 ts (EO)
   - 9.3. Bicycle Repair Stations
     Report No: 37 / 20 ts (EO)
   - 9.4. NT Subdivision Guidelines
     Report No: 38 / 20 ts (EO)
   - 9.5. Handover of Infrastructure Asset Package Deal
     Report No: 42 / 20 ts (DTS)
10. REPORTS OF ADVISORY AND EXECUTIVE COMMITTEES
    - 10.1. UNCONFIRMED Minutes - Parks Advisory Committee - 25 February 2020
    - 10.2. UNCONFIRMED Minutes - Regional Waste Management Facility Committee - 26 February 2020
    - 10.3. UNCONFIRMED Minutes - Sport Facilities Advisory Committee - 27 February 2020

10.4. UNCONFIRMED Minutes - Development Committee - 2 March 2020

11. GENERAL BUSINESS

12. NEXT MEETING: **Monday 14 April 2020**

CONFIDENTIAL SECTION

13. APOLOGIES - CONFIDENTIAL

14. DISCLOSURE OF INTEREST - CONFIDENTIAL

15. MINUTES OF THE PREVIOUS MEETING – CONFIDENTIAL

15.1. UNCONFIRMED CONFIDENTIAL Minutes - Technical Services Committee - 10 February 2020

15.2. Business Arising

16. IDENTIFICATION OF ITEMS FOR DISCUSSION – CONFIDENTIAL

16.1. Identification of items for discussion

16.2. Identification of items to be raised in General Business by Elected Members and Officers

17. DEPUTATIONS - CONFIDENTIAL

18. PETITIONS - CONFIDENTIAL

19. NOTICE OF MOTION - CONFIDENTIAL

20. REPORTS OF OFFICERS – CONFIDENTIAL

20.1. Rimfire Virtual Power Plant
Report No: 40 / 20 ts (DTS)

20.2. Street Lighting Infrastructure
Report No: 41 / 20 ts (DTS)

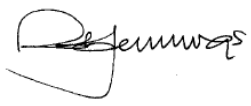
21. REPORTS OF ADVISORY AND EXECUTIVE COMMITTEES – CONFIDENTIAL

21.1. CONFIDENTIAL UNCONFIRMED Minutes - Development Committee - 2 March 2020

22. GENERAL BUSINESS - CONFIDENTIAL

23. MOVING CONFIDENTIAL ITEMS INTO OPEN

24. CLOSURE OF MEETING



Robert Jennings
CHIEF EXECUTIVE OFFICER
9 March 2020

Note: A recording of the Open section of this Technical Services Committee meeting can be found on Council's website from the Wednesday after the meeting. Go to: www.alicesprings.nt.gov.au then to Council meetings.

MINUTES OF THE MEETING OF THE TECHNICAL SERVICES COMMITTEE HELD ON MONDAY 10 FEBRUARY 2020, IN THE COUNCIL CHAMBER, CIVIC CENTRE, ALICE SPRINGS

PRESENT: His Worship the Mayor D. Ryan (phone in)
Councillor G. Auricht
Councillor M. Banks
Councillor J. Cocking
Councillor J. de Brenni
Councillor E. Melky (Chair)
Councillor M. Paterson
Councillor C. Satour

OFFICERS: Mr R. Jennings - Chief Executive Officer
Mr T. Charlie - Acting Director Technical Services
Mr S. Duke - Acting Director Community Development
Ms S. Taylor - Director Corporate Services
Mrs T. Ociones - Executive Assistant (Minutes)

The meeting was declared open at 7:20pm

1. APOLOGIES

Councillor J. Price
Mr S. Allen, Director Technical Services - annual leave

Councillor Banks returned to the Chamber at 7:21pm

2. WELCOME TO THE PUBLIC, VISITORS AND PUBLIC QUESTION TIME

Nil

3. DISCLOSURE OF INTEREST

Nil

4. MINUTES OF PREVIOUS MEETING

4.1 Minutes - Technical Services Committee - 11 November 2019

RESOLVED
That it be a recommendation to Council

That the minutes of the open section of the Technical Services Committee meeting held on 11 November 2019 be taken as read and confirmed as a true and correct record of the proceedings of that meeting

(4641 ts)
CARRIED

4.2 Business Arising

4.2.1 Councillor Cocking - Agenda Item 9.7, Road Reseal Tender

Councillor Cocking followed up an action item that asked Council officers to approach the NT Government to establish if any opportunities exist to undertake a joint operation with Council to schedule road reseal projects.

UNCONFIRMED

The Acting Director Technical Services advised that Council officers are still waiting on a response from NT Government.

4.2.2 Councillor Cocking - Agenda Item 10.1.4, Shade Structure over the Todd River Fitness Stations

Councillor Cocking followed up on the action item that asked Council officers to ensure correct processes are followed in regard to including items on the Agenda for Advisory Committees and that sufficient reports are provided for Committee members to make appropriate recommendations.

The CEO advised that this was discussed in the Directors meeting. A new business template was circulated which will allow a more informed report.

4.2.3 Councillor Banks - Agenda Item 9.5, Ban on Single Use Plastics at Council Run Events

Councillor Banks received feedback about some food stallholders who are left with a lot of single use plastics and did not have the opportunity to utilise their stocks when Council rolled out the ban. Is Council able to give assistance to these food stallholders to recycle their stocks?

The Acting Director Community Development advised that food stallholders can apply to Council for an extension if they need to get rid of old stock, which will be looked at on a case by case basis. In terms of recycling, all these items can be used in the Library's craft program over the year.

5. IDENTIFICATION OF ITEMS FOR DISCUSSION

5.1 Identification of items for discussion

The following items were withdrawn for discussion:

9.1, 9.2

5.2 Identification of items to be raised in General Business by Elected Members and Officers

- Deputy Mayor Paterson - National Indigenous Cricket Carnival and Imparja Cup
- Councillor Cocking - Fence along Stuart Highway - Mayor Ryan advised that he had already raised this issue with DIPL and have asked the CEO to follow this up
- Councillor de Brenni - Solar Power at the Basketball Stadium

6. DEPUTATIONS

6.1 Alice Springs Home School Group - Mark Gepp
Bike path through the gap proposal

This deputation was postponed to the next Standing Committee meetings.

7. PETITIONS

Nil

UNCONFIRMED

8. NOTICE OF MOTIONS

Nil

9. REPORTS OF OFFICERS

9.1 Technical Services Directorate Update
Report No. 17 / 20ts (DTS)

This report provides an update of current Technical Services projects, programs and events.

RESOLVED
That it be a recommendation to Council

That the February 2020 Technical Services Directorate Update be received and noted.

(4642 ts)

The following questions were raised by Elected Members for clarification including:

- Councillor Banks - Attachment A: Kwatja Water play area – will the final concept work come back to Council?

  The CEO advised that once the costings are confirmed, the final concept will be presented to Elected Members.

- Councillor Banks - Attachment A: Library and Snow Kenna Park bike repair stations constantly vandalised being repaired daily. Is there a way to improve design of the equipment to limit repair? Is it worthwhile to look into the cost of repair vs design improvement?

  The Acting Technical Services advised that the Infrastructure department could research on the relocation of the bike stations or find a similar design to limit vandalism on the equipment. Based on the town's cycling popularity, this is something worth investigating.

  Councillor Banks requested a report on the bike repair stations that may include how they are being utilised and the cost of repair to Council, to come back in due course.

- Councillor Banks - Attachment B: Sporting Facilities – update on the hand-over of the netball stadium from NTG to ASTC.

  The CEO advised that Council is waiting on further information from DIPL which will provide Council officers with the next step of negotiations.

- Councillor Cocking - Attachment C: Sprinkler vandalism - 51 'kick offs' reported. Does the high number correlate with the high water bill this month?

  The Acting Director Technical Services advised that it depends on the reporting period, there could be a correlation.

- Councillor Cocking - Attachment D, Table 9: Asked for clarification as to whether there is a misallocation of clean fill (8,985.59 tonnes), as the high increase in waste collected is due to demolition materials from Anzac High School.

  The Acting Director Technical advised that when demolition wastes are compacted to a specific size they are accepted as clean fill through the weighbridge.

UNCONFIRMED

9.2 Climate Action Plan 2018-2021
Report No. 18/20 ts (DTS)

This report is in regard to the progress of the Climate Action Plan 2018 – 2021.

RESOLVED
That it be a recommendation to Council

That the Climate Action Plan report be received and noted.

(4643 ts)

Councillor Cocking commented that it is good to see the Climate Action Plan come into fruition.

Mayor Ryan enquired about Item 6.5.39 and asked why the Youth Recycled Art Prize theme is solely focused on climate change vs recycled art.

The Acting Director Community Development took the question on notice and will follow up with Council officers.

Mayor Ryan enquired about Item 6.5.38 - ALEC to conduct education sessions at the TM markets and Andy McNeill room.

Cr Cocking left the Chamber at 7:47pm due to conflict of interest

Mayor Ryan advised that there are more organisers than just ALEC to be able to help our community progress actions on climate change initiatives.

The Acting Director Technical Services took the question on notice.

Mayor Ryan enquired about Item 6.1.24: who is developing the PV information booklet, display on website and running workshop? How did Council arrive at the budget of $6,300?

The Acting Director Technical Services advised that at the moment, Council officers are still writing the scope of works to find someone who has the relevant skills and qualifications to provide this service. The Acting Technical Services and Environment Officer did research and cost estimates to ensure Council can achieve all the climate action plan initiatives for FY2020/21.

Mayor Ryan advised that Professor Rolf Gerritsen had written a report on the Alice Solar City project. Could most of the PV information required under the climate action plan be already included in this publication?

The Acting Technical Services took the item on notice.

Councillor Cocking returned to the Chamber at 7:50pm

Mayor Ryan enquired about Item 6.3.35: Home composting program implemented (240 staff hours). Some of the lines in Table 3 (p.34) are in staff hours and dollar amount. Mayor Ryan asked for consistency in the report, so that Elected Members can understand the dollar value, especially when working with the budget.

The Acting Director Technical Services advised this can be improved in future reporting.

UNCONFIRMED

5 – TS – 10/02/20

10. REPORTS OF ADVISORY & EXECUTIVE COMMITTEES

10.1 Minutes - Special Meeting of the Regional Waste Management Facility Committee - 30 January 2020

RESOLVED
That it be a recommendation to Council

That the minutes from the special meeting of the Regional Waste Management Facility Committee held 30 January 2020 be received and noted.

(4644 ts)

10.2 Minutes - Development Committee - 3 February 2020

RESOLVED
That it be a recommendation to Council

That the minutes of the Development Committee meeting held on 3 February 2020 be received and noted.

(4645 ts)

10.3 Minutes - Cemeteries Advisory Committee - 4 February 2020

RESOLVED
That it be a recommendation to Council

That the minutes of the Cemeteries Advisory Committee meeting held on 4 February 2020 be received and noted.

(4646 ts)

11. GENERAL BUSINESS

11.1 Deputy Mayor Paterson - National Indigenous Cricket Carnival & Imparja Cup

Deputy Mayor Paterson would like to pass on his thanks and congratulations to the CEO, Acting Director Technical Services and Technical Services staff regarding the two tournaments held in the last two weeks, which were very well received.

There were 59 teams who played in the four competitions.

Councillor Satour added that the two events were very well attended. She would like to congratulate the Council for the wonderful cricket pitch and oval and the upgrade to the change rooms.

11.2 Councillor Cocking - Fence along Stuart Highway

Mayor Ryan gave a brief update on this item. Councillor Cocking requested a report to Council on how this matter proceeds.

11.3 Councillor de Brenni - Solar Panel at the Basketball Stadium

Councillor de Brenni requested that the issue regarding solar panels at the basketball stadium should be progressed quickly in order to reduce costs. Can any update be passed on to the Basketball Committee?

UNCONFIRMED

6 – TS – 10/02/20

The Acting Director Technical Services advised that Council has already engaged a consultant and electrician to work on the issue. Any update will be relayed to the Basketball Committee.

12. NEXT MEETING: **Monday, 16 March 2020**

The meeting stands adjourned and resumes in the Confidential Section.

The meeting adjourned at 7:58pm

Confirmed on _____

CHAIRPERSON _____

Date _____

UNCONFIRMED

Agenda Item 9.1

REPORT

Report No 35 / 20 ts

TO: **TECHNICAL SERVICES COMMITTEE - MONDAY 16 MARCH 2020**

SUBJECT: **TECHNICAL SERVICES DIRECTORATE UPDATE**

AUTHOR: **DIRECTOR TECHNICAL SERVICES - SCOTT ALLEN**

EXECUTIVE SUMMARY

This report provides an update of current Technical Services Directorate programs, projects and events.

RECOMMENDATION

That it be a recommendation to Council

That the March 2020 Technical Services Directorate Update be received and noted.

REPORT

1. DISCUSSION

The attached reports summarise activities that occurred within the Technical Services Department for the month of February 2020

1.1 SUMMARY OF BUSINESS ARISING FROM PREVIOUS MINUTES OF THE ORDINARY COUNCIL 24 FEBRUARY 2020

All matters actioned.

2. POLICY IMPACTS

All projects relate to and reflect the appropriate policies and components of the ***Alice Springs Town Council Strategic Plan 2018 - 2021***

3. FINANCIAL IMPACTS

All committed projects are working within their approved budget and funding agreements

4. SOCIAL IMPACTS

As per individual projects and plans

5. ENVIRONMENTAL IMPACTS

As per the projects and relevant plans

6. PUBLIC RELATIONS

As per individual projects and plans

Report No 35 / 20 ts

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7. ATTACHMENTS

Attachment A: Manager Infrastructure Report
Attachment B: Sports Officer Report
Attachment C: Manager Works Report
Attachment D: Manager Regional Waste Management Facility Report
Attachment E: Manager Developments Report
Attachment F: Environment Officer Report



Scott Allen
DIRECTOR TECHNICAL SERVICES

ATTACHMENT A

TO: **DIRECTOR TECHNICAL SERVICES - SCOTT ALLEN**

AUTHOR: **MANAGER INFRASTRUCTURE - STEPHEN BALOBAN**

SUBJECT: **REPORT FROM INFRASTRUCTURE UNIT FOR THE MONTH OF FEBRUARY 2020**

This report provides an update of current infrastructure and engineering projects for February 2020

1. PROJECTS:

PROJECT	LOCATION	STATUS	UPDATE
A. Informal Crossing in Hartley Street	Hartley Street	Works to be carried out at night and commence in early February 2020, anticipated 5 days construction	Completed March 2020
B. RWMF Wash Down Bay	RWMF	Looking at alternate options	June 2020
C. Railway Crossing Audit	Alice Springs	Council requesting lighting to be included in report and scope of works to enable us to estimate funding required $1.2m to $1.9m Works have started with Road Safety Interface Agreement 95% complete The Interface Agreement document is with the Railway Authority for final additions Report to Council when interface agreement is signed by all parties	May 2020
D. Boxing Shed	Traeger Park	Refer separate Council Report	March 2020
E. CCTV	CBD	Works 99% complete. Waiting on optic fibre from Traeger Park to Civic centre	Completion Date March 2020
F. New Solar System at ASALC Stormwater compliance	ASALC	New design works to commence, dependent upon Depot availability	Completion Date May 2020
G. Sport Lighting Upgrade Albrecht Oval	Albrecht Oval	EMP has been approved, Tender closes 26th March	Completion Date November 2020
H. Kwatja Water Play Area	Anzac Oval beside Todd river before Totem theatre	Concept work completed with costings for 3 options $5m or $4m or $3.6	May 2020
I. Albrecht Oval	New toilets, change rooms and grand stand	Waiting on Part 5 clearance from PowerWater	Completion Date March 2020
J. Skate Park Repairs	Test products for repairing Skate park	Test repairs successful Obtaining 3 quotes to complete works	April 2020

Attachment A

K. Rhonda Diano Athletics Facilities Upgrades	Design of the synthetic running track	Part of the $6.2M Facilities Upgrades - 10% complete	April 2020
L. Ross Park, Jim McConville, Flynn Drive and Albrecht Oval	4 new 33kw solar systems to be installed at the 4 new sporting facilities	Tender to be assessed Mid-March	May 2020
M. Library, Snow Kenna Park	Bike Repair stations	Refer separate report	Ongoing



Stephen Baloban
MANAGER INFRASTRUCTURE

ATTACHMENT B

TO: DIRECTOR TECHNICAL SERVICES – SCOTT ALLEN

AUTHOR: MANAGER TECHNICAL SERVICES – TAKUDZWA CHARLIE

SUBJECT: REPORT FROM SPORTS DEPARTMENT FOR FEBRUARY 2020

This report provides an update of current sport activities:

1. Sporting Bodies

- CARFL clubs are requesting Pre-Season Training, have approved permits for week commencing 1 April after the CARU season
- Winter 2019 Sports Participation Levy invoicing commenced

2. Events

1 February - 6 February 2020
Imparja Cup at TIO Traeger Park, Albrecht Oval, Jim McConville Oval, Rhonda Diano Oval, CDU Oval and Ross Park Oval – NT Cricket

14 March 2020
AFL Women's (AFLW) game at TIO Traeger Park Oval - between Melbourne Demons and Carlton Blues

16 May 2020
Concert- One Tropical Day at Anzac Oval

17 May 2020
AFL game at TIO Traeger Park Oval - between Melbourne Demons and Adelaide Crows

27 June – 28 June 2020
Cancer Council relay for life at Albrecht oval

3. Sporting Facilities

- *2019-2029 Sports Facilities Master Plan – Executive Summary and Strategy* endorsed by Council at the 28 January 2020 Ordinary Meeting moved to Council Website as permanent document after public comment period finished on 28 February 2020.
- Weekly/monthly facility inspections
- Albrecht Oval Facility Officially opened on the 25th of February 2020
- Discussion around the hand-over of the Netball Stadium from NTG to ASTC are ongoing
- Rhonda Diano works for Athletics Track are ongoing

4. Reviews and Reports

- SFAC Terms of Reference adopted by Council in January Ordinary meeting
- Still discussing Alice Springs Netball Associations Deed of Licence



Takudzwa Charlie
MANAGER TECHNICAL SERVICES

ATTACHMENT C

TO: **DIRECTOR TECHNICAL SERVICES - SCOTT ALLEN**

AUTHOR: **MANAGER WORKS - BEN FITZGERALD**

SUBJECT: **WORKS DEPARTMENT REPORT - FEBRUARY 2020**

This report provides an update of some of the completed and current Depot works projects:

1. PROJECTS

- Ilparpa Footpath – 550m of Stage 1 completed
- CBD Pram ramps – 72 to be completed

2. DEPOT IN KIND SUPPORT OF EVENTS - February 2020

- No Depot in-kind support for February 2020

3. STAFF TRAINING - February 2020

- Traffic Management training throughout the depot

4. LITTER / KIDDIE SCRIBBLE / GRAFFITI REMOVAL / VANDALISM

Litter	Above Average	
Kiddie Scribble	Above Average	
Graffiti Removal	Above Average	
Vandalism	Above Average	
Irrigation Infrastructure	Above Average (32 sprinklers)	
Facilities	Anzac Oval:	Average
	Traeger Complex:	Average
	Jim McConville Complex:	Average
	Albrecht Oval:	Above Average
Infrastructure	Sign vandalism in CBD - Above average	
Playgrounds	High vandalism recorded	
Bike Repair Stations	Minor vandalism recorded	

Attachment C

5. NEAT STREETS

- **Notifications:** 229 Neat Street notifications were received in February 2020 with 137 completed.
  - ❖ **129** ASTC Depot Responsibility
  - ❖ **55** Ranger Responsibility
  - ❖ **12** NT Government Responsibility
  - ❖ **1** Telstra Responsibility
  - ❖ **0** Power & Water
  - ❖ **32** Private Property

6. VEHICLE PLANT REPLACEMENT

53106 - Hyundai Santa Fe Elite (TBA)
52709 - Flusher Isuzu FVD1000 (New plant delivered 28/02/2020)
52775 - Woodchipper Bandit 250 XP

7. TREES - February 2020

- 76 trees were removed throughout the municipality
- 0 trees were planted during this time to avoid the loss of trees in extreme heat of the Summer months. Tree planting to resume from March – November 2020



Ben Fitzgerald
MANAGER WORKS

ATTACHMENT D

TO: **DIRECTOR TECHNICAL SERVICES - SCOTT ALLEN**

AUTHOR: **ACTING MANAGER REGIONAL WASTE MANAGEMENT FACILITY - JAMES SANDERS**

SUBJECT: **REGIONAL WASTE MANAGEMENT FACILITY REPORT FEBRUARY 2020**

This report provides an update of current waste management projects.

Voucher system:

410 vouchers were redeemed in February 2020 at a cost of $8494.31 to Council (Table 1).

Table 1: Total monthly vouchers redeemed

Month	*Voucher*	*Cost*
February 2020 (*Cars non-weighted)*	***42***	***$ 154.50***
February 2020 *(Utes non-weighted)*	***179***	***$ 2098.00***
February 2020 *(Utes weighted)*	***189***	***$ 6241.81***

Recycling Initiatives:

A comparison of recycling initiatives by financial year and month.

Cardboard:

Table 2: Total monthly and financial year recycled cardboard

Month	*Total Cardboard*
February 2020	**41.56 *Tonnes***
July 2019 to February 2020	**184.18 *Tonnes***
Income received from cardboard (February)	***Total***
$50.00/tonne	***$ 2078.00***

Steel:

Table 3: Total monthly and financial year recycled steel

Month	*Total Steel*
February 2020	**282.18 *Tonnes***
July 2019 to February 2020	***1118.98 Tonnes***
Income received from Steel (February)	***Total***
$50.00/ tonne	***$14,109.00***

Envirobank:

Table 4: Total monthly and financial year recycled 10cc containers

Month	*Total 10c Containers*
February 2020	***1.70 Tonnes***
July 2019 to February 2020	***30.65 Tonnes***
Income received from Envirobank (February)	***Total***
$103/tonne	***$175.10***

Attachment D

Tube Terminator:

Table 5: Total monthly recycled fluorescent lights

Month	*Total Tubes*
February 2020	***164 Tubes***
July 2019 to February 2020	***3623 Tubes***

Weighbridge Waste and Recycling Totals – Financial Year:

A total of 23314.79 tonnes of waste (excluding clean fill) were collected at the RWMF for the period of July 2019 to June 2020 (Tables 6). A total of 9610.62 tonnes recycled (Table 8).

Table 6: Waste totals through the weighbridge (not including clean fill) during the financial year (See Figure 1)

Month	*Tonnes*
***July 2018 to* February 2019**	**23,619.43**
***July 2019 to* February 2020**	**23,314.79**

Table 7: Recycling totals through the weighbridge during the financial year (see also Figure 2)

Month	*Tonnes*
***July 2018 to* February 2019**	**1,541.13**
***July 2019 to* February 2020**	**9,610.62**

Attachment D

Weighbridge Waste and Recycling Totals – Monthly Data:

Table 8: Accumulated data for July / February 2019 in comparison July / February 2020

	July 2018-February 2019		July 2019-February 2020	
	Tonnes IN	Tonnes OUT	Tonnes IN	Tonnes OUT
Animal Carcass	4.85	0.00	6.73	0.00
Asbestos	72.46	0.00	406.13	0.00
Building Material	0.00	79.96	0.00	75.27
Cardboard & Paper	185.46	19.99	379.23	184.18
Chemicals	0.00	0.00	0.00	0.00
Clean Fill	5985.46	8.76	20028.27	3293.16
Concrete	2093.11	31.53	1782.40	3472.20
Container Deposit	590.96	303.44	0.00	30.65
Council Supported	0.00	0.00	0.00	0.00
Demolition Materials	4098.12	0.06	4099.02	0.00
Domestic Bins	4566.10	0.00	4597.98	0.00
Drop off Zone* (Shop)	7.57	86.69	0.00	78.55
Electronic waste	42.30	27.78	75.24	13.52
Glass **	76.61	18.10	80.76	61.16
Green Waste	1558.89	911.58	1422.04	207.18
Household Goods	0.00	48.20	0.00	55.95
Liquid Waste	755.10	0.00	758.15	0.00
Mattresses	869.40	1.66	133.27	0.00
Metals ***	441.88	1.90	360.07	1118.98
Mixed Waste ****	7853.52	1.48	8719.06	0.00
Timber & Pallets	347.43	0.00	479.66	1009.65
Tyres	55.67	0.00	15.05	0.61
Total	29604.89	1541.13	43343.06	9610.62
Total minus clean fill	23619.43		23314.79	0.00
Percentage recycled		6.52	0.00	41.22

Key:

* Drop off Zone – Goods dropped off by the public at the Rediscovery Centre

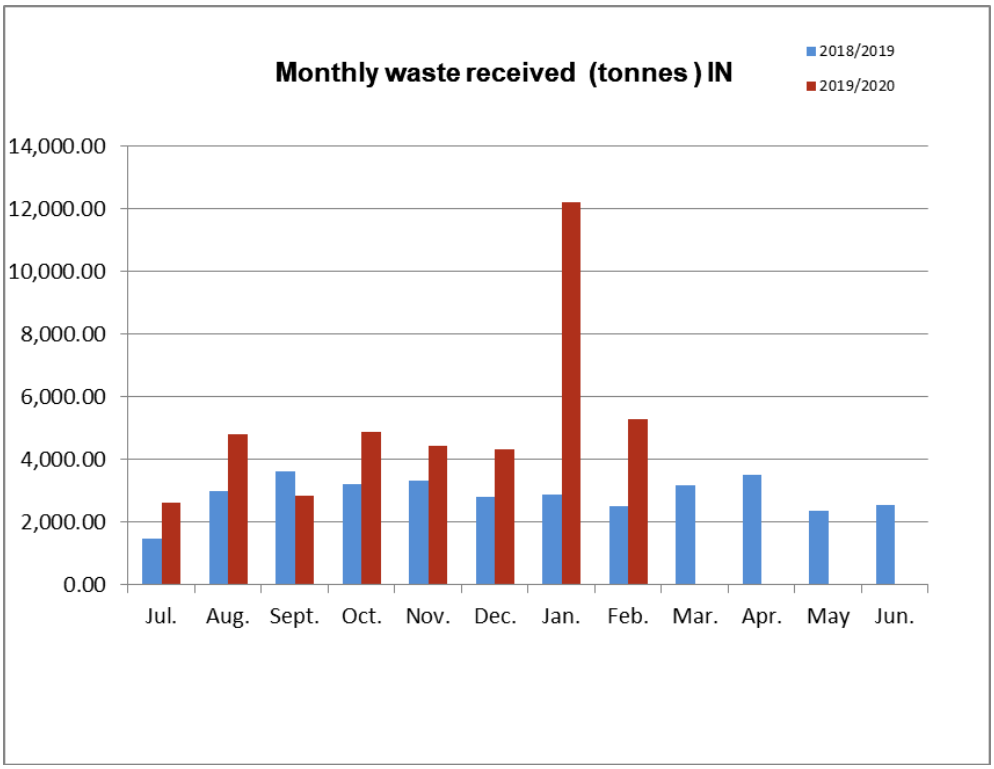
** Glass categories

*** Metal categories - include other categories (e.g. whitegoods etc.)

**** Mixed Waste - includes other categories (e.g. confidential burial; food surrender; transfer station, general waste; street clean, contaminated rocks)

Attachment D

Figure 1: Monthly waste comparison by financial year (tonnes) received (IN)



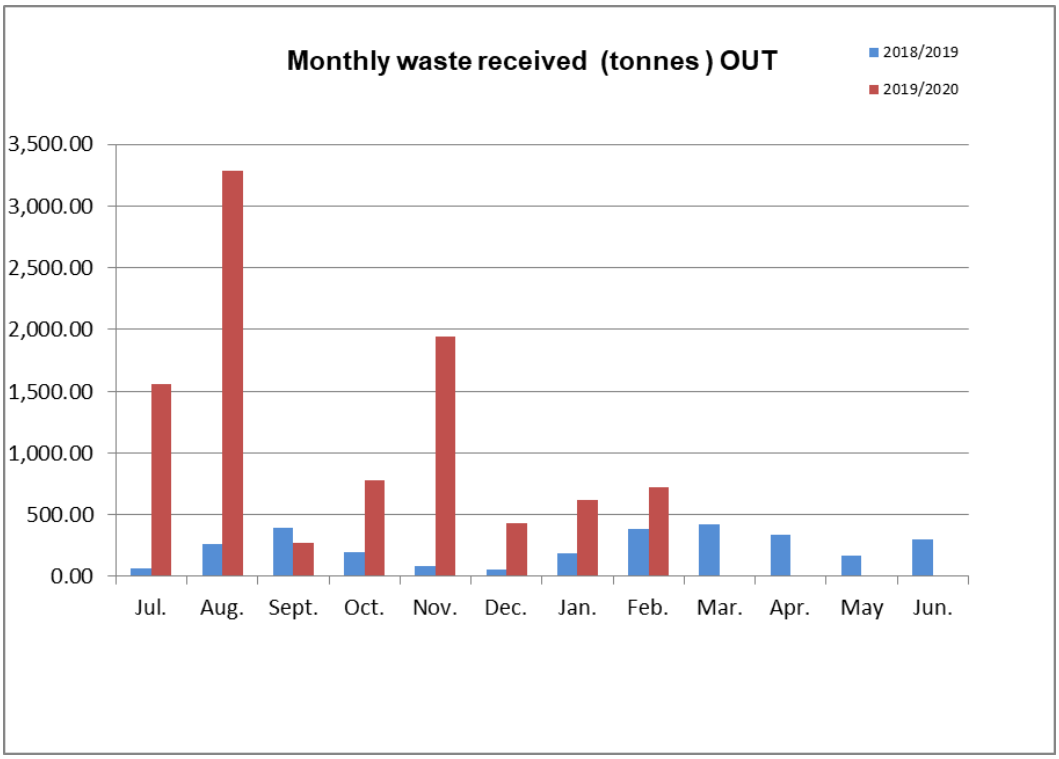
Year	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
2018/2019	1,460.80	2,975.40	3,629.13	3,205.74	3,324.48	2,820.97	2,893.79	2,518.22	3,192.13	3,517.19	2,343.98	2,552.37
2019/2020	2,621.74	4,789.72	2,837.04	4,889.56	4437.63	4,309.37	12,226.80	5,280.30				

Monthly waste received IN (year to date):

2018 /19 22,828.53 tonnes
2019 /20 41,392.16 tonnes

Attachment D

Figure 2: Monthly waste comparison by financial year (tonnes) recycled (OUT)



Year	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
2018/2019	68.60	259.74	390.74	197.85	80.15	59.84	188.50	385.91	421.92	342.20	165.08	301.93
2019/2020	1,558.13	3,288.76	272.77	774.47	1944.96	430.48	617.12	724.39				

Monthly waste recycled OUT (year to date): 2018 / 19 1,631.39 tonnes
2019 / 20 9,610.98 tonnes

Attachment D

Table 9: Monthly comparison of waste totals February 2019 and 2020.

A total of 5280.30 tonnes of waste (including clean fill) was collected, of which 24.01% of waste was recycled out February 2020.

	Feb-19		Feb-20	
	Tonnes IN	Tonnes OUT	Tonnes IN	Tonnes OUT
Animal Carcass	1.15		0.51	
Asbestos	3.80		35.58	
Building Material		6.72		15.86
Cardboard & Paper	14.48	0.00	55.05	41.56
Chemical				
Clean Fill	1088.87		2263.44	338.98
Concrete	151.64		236.62	
Container Deposit		286.00		1.70
Council Supported				
Demolition Materials	422.15		787.75	
Domestic Bins	520.90		549.70	
Drop off Zone* (Shop)		5.87		8.55
Electronic waste		14.82	12.19	
Glass **	9.08	1.20	8.66	0.50
Green Waste	178.69	58.00	185.51	
Household Goods		9.44		6.77
Liquid Waste	79.24		120.92	
Mattresses	11.46		20.25	
Metals ***	14.77	2.36	68.22	282.18
Mixed Waste ****	1084.26		869.75	
Timber & Pallets	22.10	1.50	62.24	28.00
Tyres	4.50		3.91	0.29
Total	**3607.09**	**385.91**	5280.30	724.39
Total minus clean fill	**2518.22**		3016.86	
Percentage recycled		**15.32%**		24.01%

Key:

* Drop off Zone – Goods dropped off by the public at the Rediscovery Centre

** Glass categories

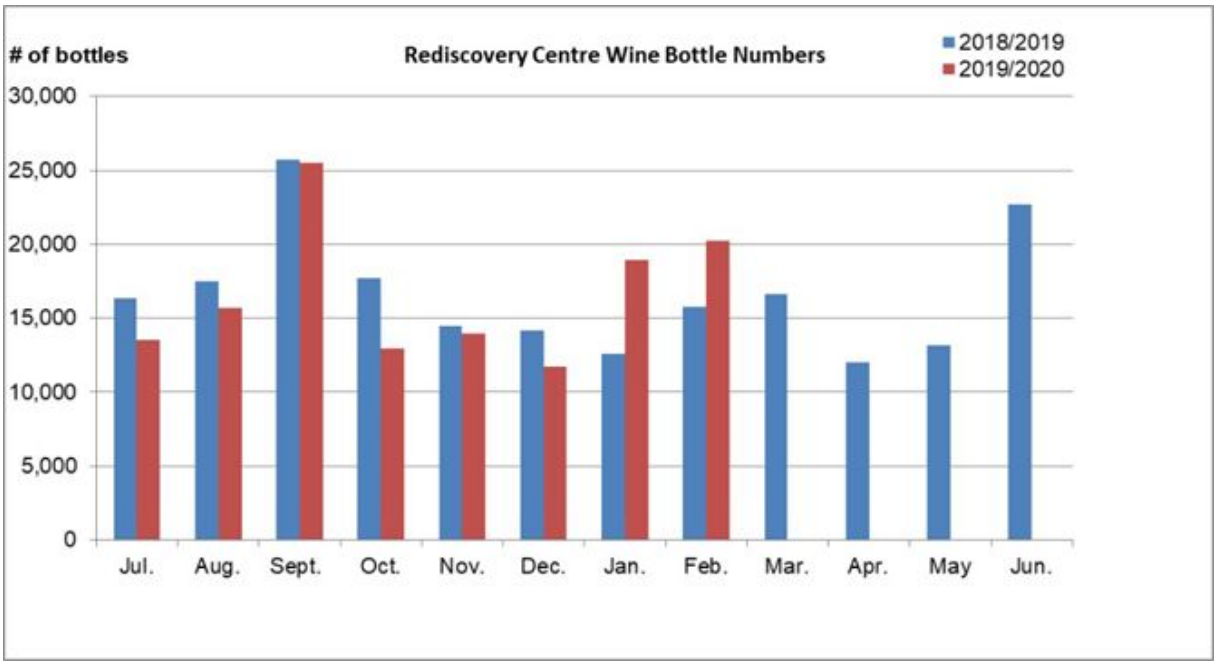
*** Metal categories - include other categories (e.g. whitegoods etc.)

**** Mixed Waste - includes other categories (e.g. confidential burial; food surrender; transfer station, general waste; street clean, contaminated rocks)

Cash-for-Containers total:

A total of 132,563 bottles were collected from July 2019 to February 2020 (Figure 3). The bottles are crushed at the Regional Waste Management Facility (RWMF) and are used as part of Council's projects.

Figure 3: Monthly totals of wine and spirit bottles collected at the RWMF



Year	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
2018/2019	16,352	17,531	25,752	17,732	14,438	14,189	12,596	15,782	16,611	12,002	13,200	22,692
2019/2020	13,540	15,720	25,497	12,960	13,960	11,750	18,909	20,227				

Bottles Collected (year to date):

2018 / 19 134,372 bottles
2019 / 20 132,563 bottles

Attachment D

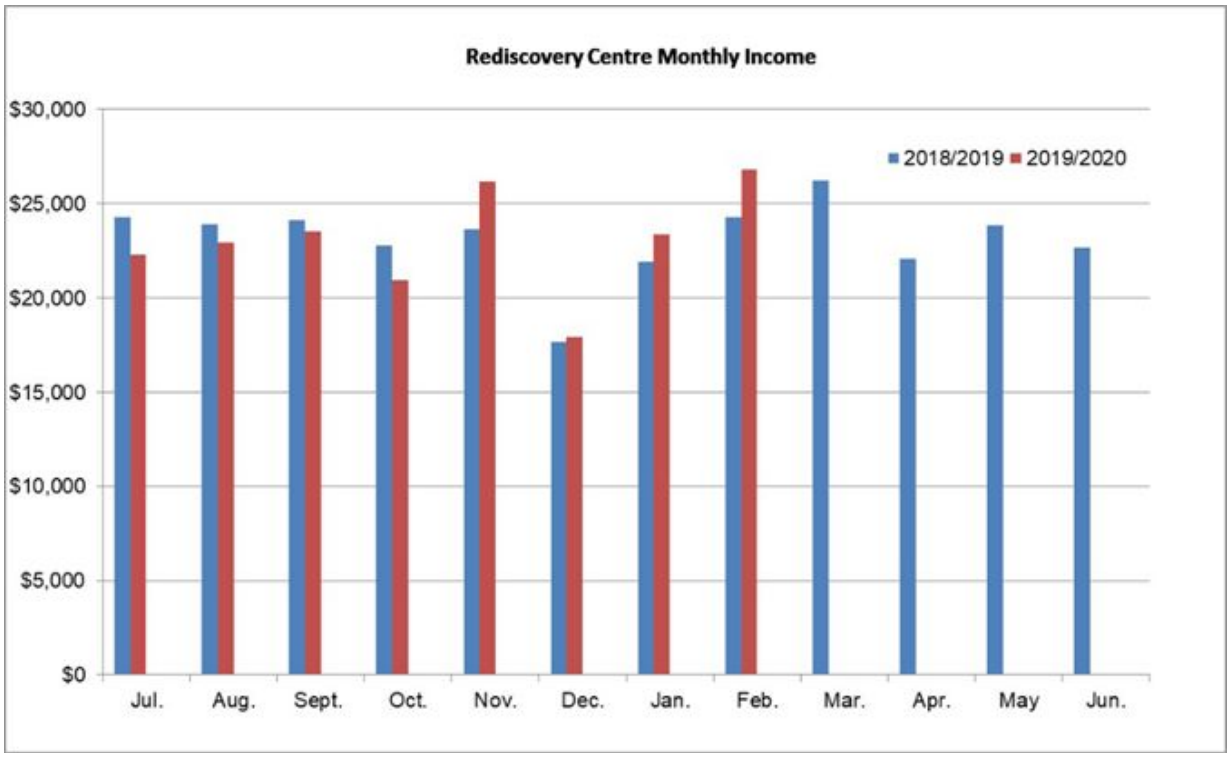
Rediscovery Centre:

For the period July 2019 to February 2020, the total stock intake at the Rediscovery Centre was 209.77 tonnes.

Rediscovery Centre Income:

During February 2020, The Rediscovery Centre had $27,577 income, compared to $24,257 in February 2019 (Figure 4).

Figure 4: Income from the Rediscovery Centre



Year	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
2018/2019	$24,299	$23,923	$24,098	$22,778	$23,631	$17,656	$21,879	$24,257	$26,219	$22,051	$23,823	$22,674
2019/2020	$22,294	$22,934	$23,496	$20,951	$23,756	$17,915	21,401	$27,577				

Income from the Rediscovery Centre (year to date) 2018 / 19 $ 182,521
2019 / 20 $ 180,774

James Sanders
ACTING MANAGER REGIONAL WASTE MANAGEMENT FACILITY

ATTACHMENT E

TO: DIRECTOR TECHNICAL SERVICES – SCOTT ALLEN

AUTHOR: MANAGER DEVELOPMENTS – DILIP NELLIKAT

SUBJECT: DEVELOPMENT REPORT FOR FEBRUARY 2020

This report provides an update of current development activity.

1. Correspondence

Development Applications	5
Exceptional Development Applications	2
Development Permits	7
Exceptional Development Permits	0
Part 5 Clearances	8
Proposed Planning Scheme Amendments	0
Certificate of Compliance	1
Deferred, Refused, Concurrent/ Others	0

2. Major Development Works - currently under construction

2.1 Ilpeye Ilpeye Subdivision – Defects identified in February 2017 are yet to be rectified by DIPL. Greenhills have highlighted a number of issues in the Stormwater report from SDA endorsed by BTO on behalf of DIPL. Further to a comprehensive report on the expected lifespan of the compromised assets, Council is negotiating a proposal with conditional acceptance of some of these assets with DIPL.

2.2 Kilgariff Subdivision – Stage 1C work is about to commence. Future work on the improvement of the Norris Bell intersection to prevent flooding at the Cemetery is being considered by DIPL. Further to a report on the expected lifespan of the compromised assets, Council is negotiating a proposal with conditional acceptance of some of these assets with DIPL.

2.3 Lot 288, 69 Ross Highway – To use and develop the land for the purpose of a motel with 76 single rooms and caravan park with 25 two bedroom self-contained cabins and 6 camping sites including a communal kitchen, dining area, ablutions, laundry, recreation area and office. Part 5 has been issued for Stage 1 and 2. Awaiting overall completion.

2.4 Lot 4565, 10 Speed Street - Construct solar array (including associated land-filling) within a Defined Flood Area. The array installation is complete. Stormwater works is being undertaken by Council's Depot.

2.5 Lot 666, 667, 668 – 43, 45, 47 Gap Road – 36 x 2 bed room multiple dwellings in 6 x 3 storey buildings to be constructed in 2 stages

2.6 Lot 2663 – 19 South Terrace - development permit application for 22 x 2 bedroom, 2x3 bedroom and 3 x 1 bedroom single storey multiple dwellings. Construction is underway.

3. Major Development Works – completed recently

3.1 Lot 766, 8 Harvey Place – The building has an OP. Defective works are still being rectified by Dep. of Sports and Recreation, before handover can be considered complete.

All the above developments have been discussed in past Development Committee meetings. This advice is for the information of Council.



Dilip Nellikat
MANAGER DEVELOPMENTS

ATTACHMENT F

TO: **DIRECTOR TECHNICAL SERVICES - SCOTT ALLEN**

AUTHOR: **ENVIRONMENT OFFICER - CHARLOTTE KLEMPIN**

SUBJECT: **REPORT FROM ENVIRONMENT OFFFICER FOR THE MONTH OF FEBRUARY**

This report provides an update on environmental projects for the month of February 2020.

Waste Management

Recycling	Total
Household Batteries	**78.6 kg**
Cartridge recycling	**20 kg**
Mobile Phones	**2.4 kg**
Tubes	**164**
Bottles	**11 tonnes**

School Tours	Total
Nil	

Cities Power Partnership

Pledge	Action	Progress	CAP Actions
Energy Policy	Climate Action Plan	Implementing and monitoring CAP	5.1.1 5.2.1
Renewable Energy	Increasing solar across all of Council's facilities	Energy Efficiency Grant application successful, 4 new PV systems on sports change rooms	5.1.1
Education Program	FOGO Trial	Internal trial start date 4th of November	5.4.1 5.4.16 5.4.18 6.3.34
Land Use	Open up land at the land fill and road reserves for renewable energy		
Fast charging infrastructure	Purchase electric vehicle	1 slow and 1 fast (50%)	5.3.10

Climate Action Plan

11 actions in progress

5 actions to be completed prior to June 2020

16.67% of CAP completed

Action #	Action	Progress
5.2.9	Install pool blanket	**100%**
5.3.12	Ensure bicycles and electric bicycles are available for transport during work hours	**100%**
5.3.13	Reduce fuel use at landfill by adopting GPS monitoring for compactor at landfill	**100%**
5.4.18	Identify cost-effective measures to reduce food waste and garden waste going to landfill.	**100%**
5.5.21	Collaborate with other Councils to share and contribute advice through the Cities Power Partnership.	**100%**
6.4.36	Lobby Power Water Corporation to reduce emissions from wastewater by investigating water	**100%**
6.5.40	Establish an environmental grant under Council's Community Grants Program.	**100%**
In Progress		
5.1.1	Source 50% of renewable energy by 2021	**50%**
5.1.4	Replace all inefficient lights in Council buildings with LEDs.	**10%**
5.3.10	Replace one Council vehicle with an electric vehicle per year (when vehicles are due for renewal). Provide a charge point for the electric vehicle.	**25%**
5.4.16	Trial commercial food waste composting systems.	**15%**
6.1.23	Lead, advocate for or assist with community-owned solar.	
6.1.26	Engage with and lobby the Northern Territory Government, electricity generators and retailers and other relevant stakeholders to ensure a smooth transition to a renewable energy powered network is feasible. Transition to include innovative technologies to support renewable energy such as peer to peer trading.	
6.2.32	Install electric vehicle charging stations in a central location.	**50%**
6.3.34	Pending outcome of business case (action item 3), implement a food and garden organics kerbside collection service.	**15%**
6.5.37	Lobby the NT Government to provide strong leadership on climate action.	**33%**
6.5.38	Partner with key local organisations to develop or progress action on climate change initiatives.	**15%**
6.5.39	Engage with and support the community on climate change issues through the arts and through community events.	
Actions to be completed prior to June 2020		
5.1.1	Source 50% of renewable energy by 2021	
5.1.8	Establish a rolling fund for financing energy efficiency projects and renewable energy.	
5.3.11	Introduce an active transport policy for Council staff. Incentivise active transport	
6.1.24	Provide information on household and business solar.	
6.3.35	Home composting program implemented.	

FOGO Weights

Month	Weight (tonnes)
February 2020	0.34

Energy

Graphs showing the energy use and solar produced at **ASALC, Civic Centre, Depot, RWMF and Library**. In January, 27% of the energy use from these facilities was provided by rooftop solar.

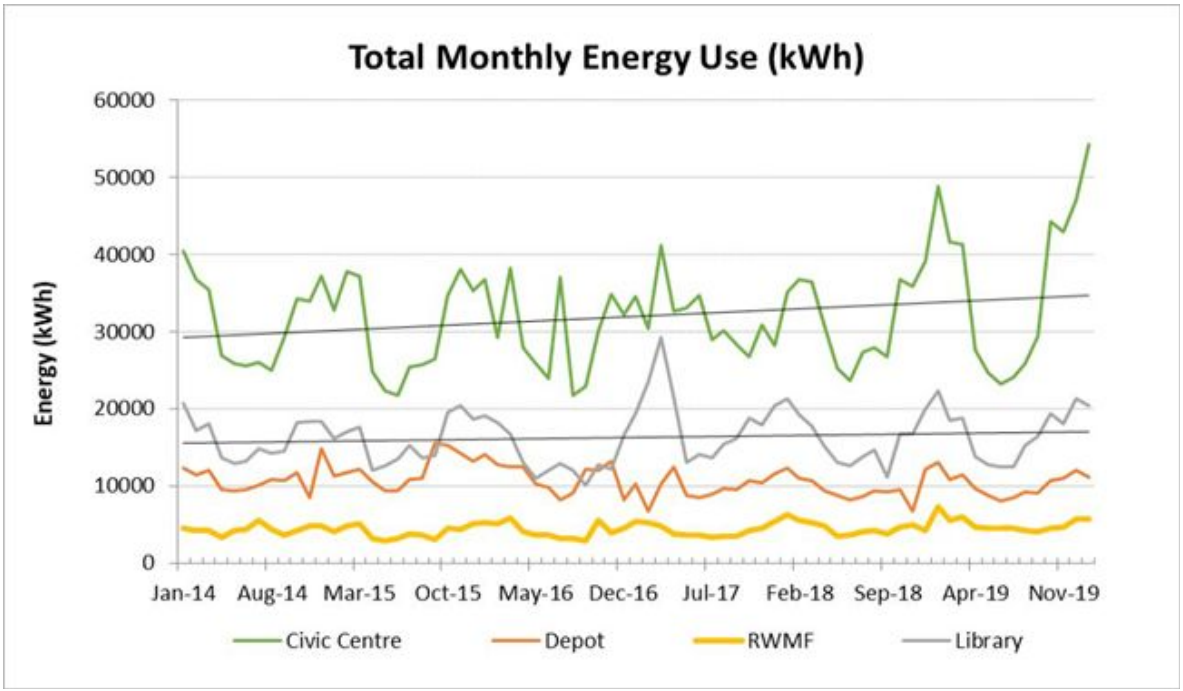


Figure 1. Monthly grid-supplied energy (kWh) for the Civic Centre, Depot, RWMF and Library

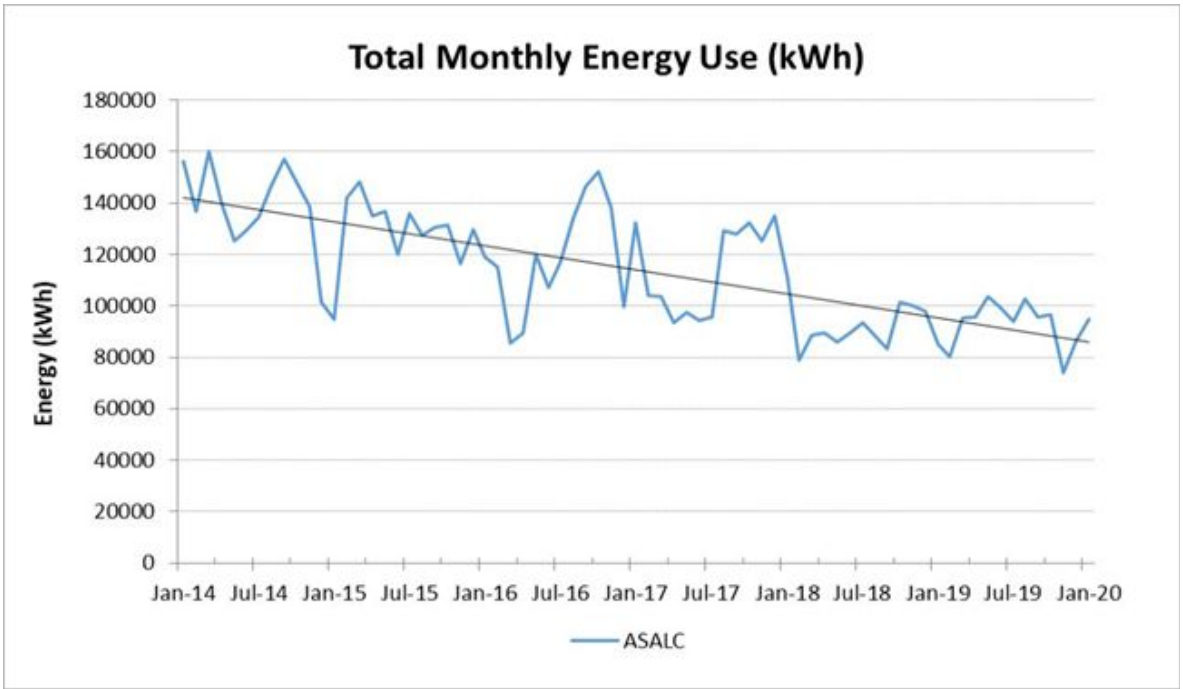


Figure 2. Monthly grid-supplied energy (kWh) for ASALC
Note: VSDs were installed mid-January 2018.
All previous major drops in energy use at ASALC were due to indoor pool closure.

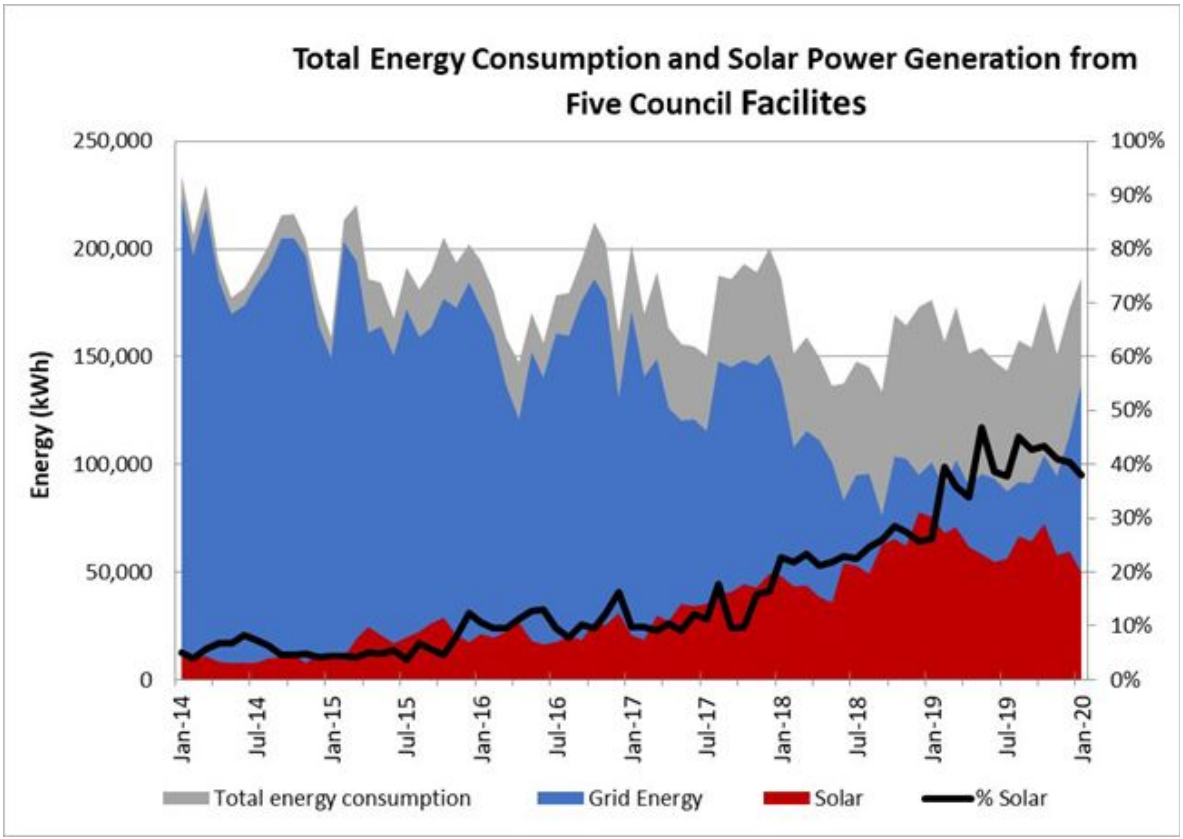


Figure 3. Total energy consumption, grid energy supplied, and solar energy produced combined for the ASALC, Civic Centre, Depot, RWMF and Library

C. Klempin

Charlotte Klempin
ENVIRONMENT OFFICER

9.1

Agenda Item 9.2

Report No: 36 / 20 ts

TO: TECHNICAL SERVICES COMMITTEE - MONDAY 16 MARCH 2020

SUBJECT: TIO TRAEGER PARK PROPOSED BOXING SHED REPLACEMENT

AUTHOR: PROJECT ADMINISTRATION OFFICER - KAITLYN WEEKES

EXECUTIVE SUMMARY

This report provides a proposal to replace the TIO Traeger Park Boxing Shed with a multifunctional complex, storage shed and a new sports facility.

RECOMMENDATION

That it be a recommendation to Council:

That Council support and approve the TIO Traeger Park Oval - Boxing Shed Replacement project by commencing a feasibility study.

REPORT

1. BACKGROUND

The existing Boxing Shed is a single storey building which is being used as a general storage shed for the Alice Springs Town Council. A compliance audit report was conducted in October 2019 and discovered many safety issues which will require major renovations to bring the building up to current Australian Standards. A report was presented to Council on 9 December 2019 on the current condition of the Boxing Shed. (*Refer Attachment A*)

At the 9 December 2019 - Ordinary Council Meeting, Council endorsed the Technical Services Department in investigate the demolition of the existing building and replacement it with a modern multifunctional complex that will accommodate the needs of the community.

Ordinary Council Meeting – 9 December 2019 (excerpt)

14.4.3 TIO Traeger Park – Boxing Shed Structural Integrity and Compliance
Report No. 211/19cncl

Council approve the Technical Service department to compile a business case for the demolition of the existing boxing shed and associated buildings and replace with a multi-purpose facility including storage.



Report No: 36 / 20 ts

CARRIED (20752)

2. DISCUSSION

Currently the Boxing Shed has a Lawful Letter from the NT Building Branch which enables it to be used as a storage shed but does not guarantee its safety.

With the growing need for better sporting and storage facilities within Alice Springs, it is important that TIO Traeger Park stadium is capable of hosting large events and accommodating to professional needs of athletes. This project is classed as a low priority project.

Through the years Alice Springs has started to host specialized games at TIO Traeger Park and has even broadcast these events on National Television. A large Recovery Centre for athletes after games will provide state of the art amenities and deliver a platform for both professional and amateurs to recover after various sporting activities.

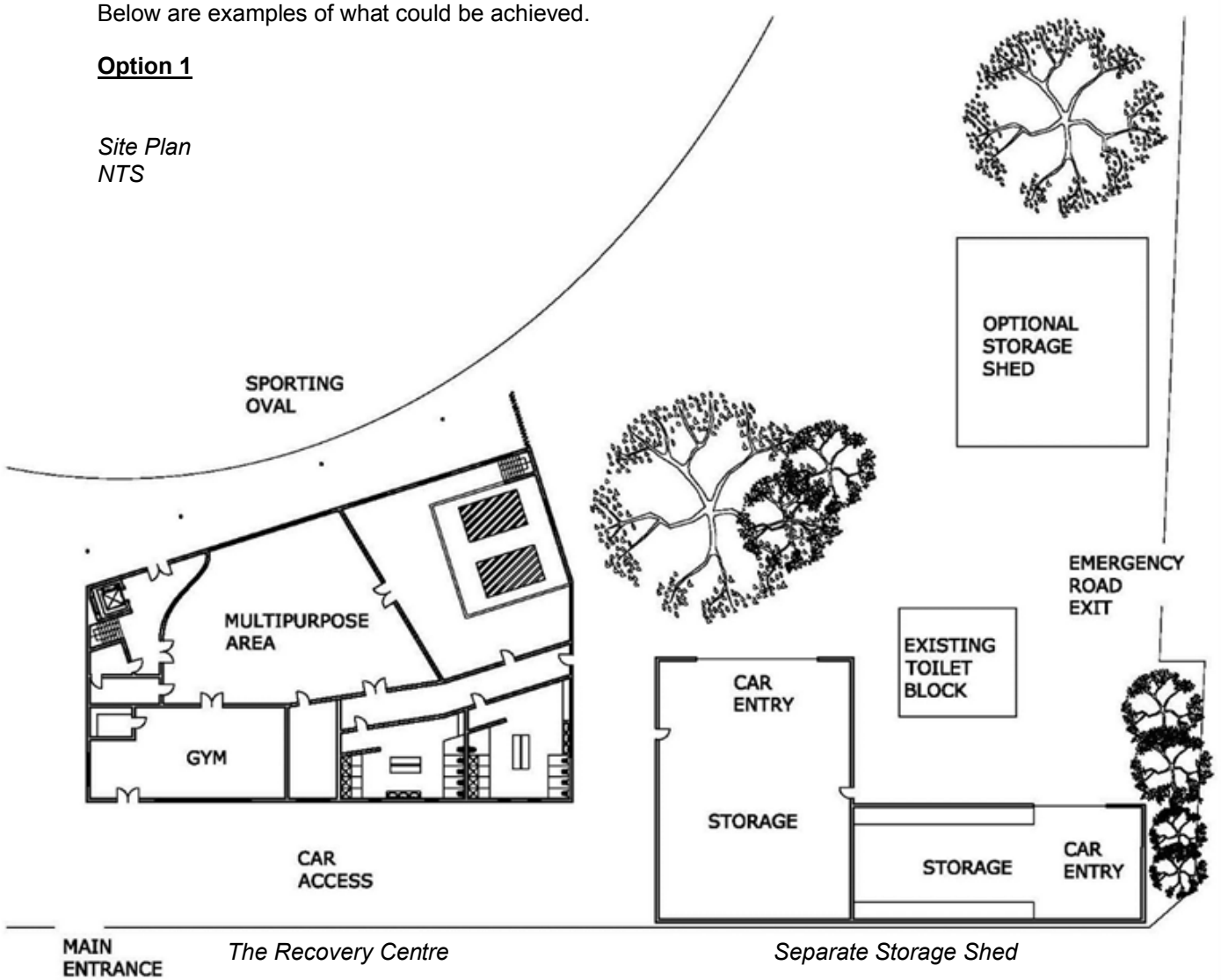
The Technical Service Department has proposed 2 options:

- Option 1: a single story Multifunctional Complex complete with storage shed and sports facility
- Option 2: a multi-story Multifunctional Complex complete with a storage shed and sports facility on the ground floor with a grandstand on top

Below are examples of what could be achieved.

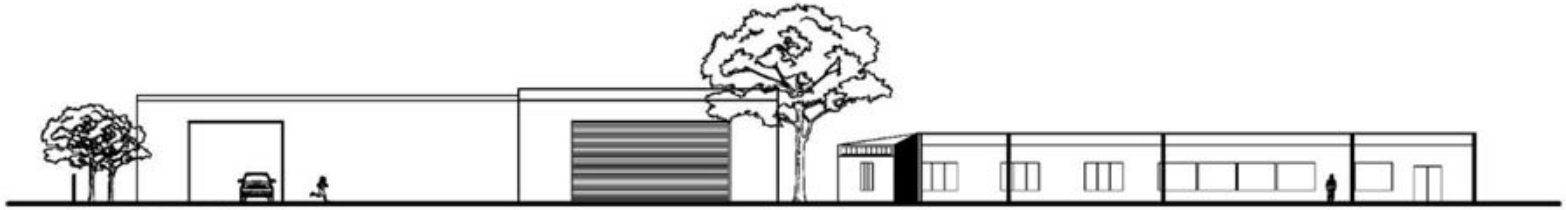
Option 1

Site Plan
NTS

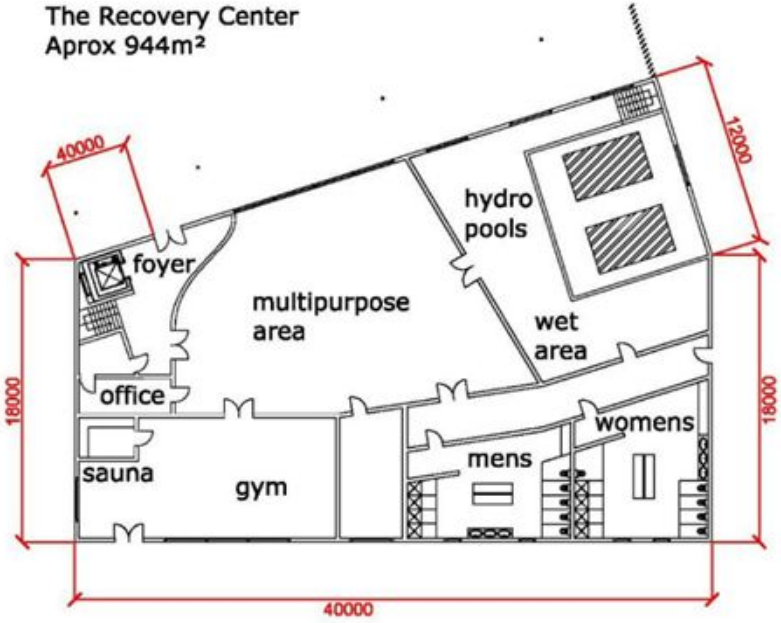


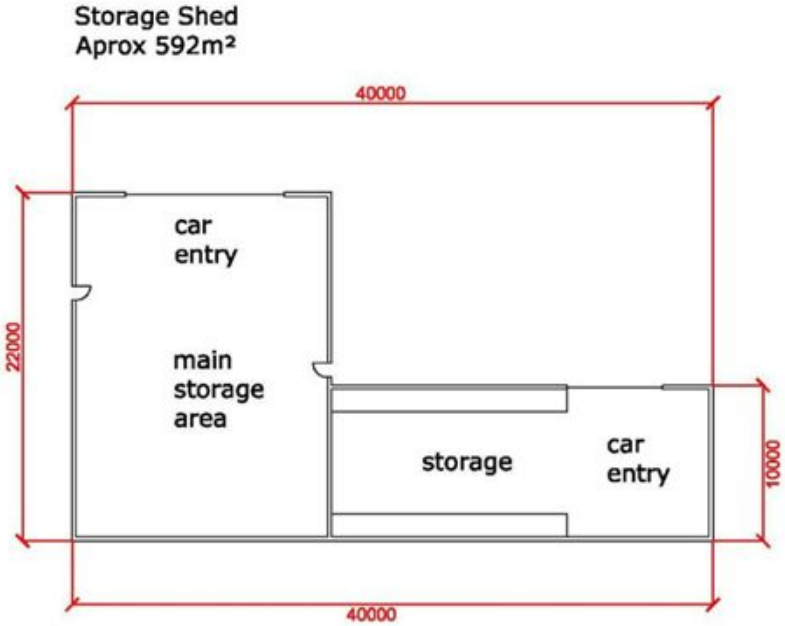
The Recovery Centre *Separate Storage Shed*

Report No: 36 / 20 ts



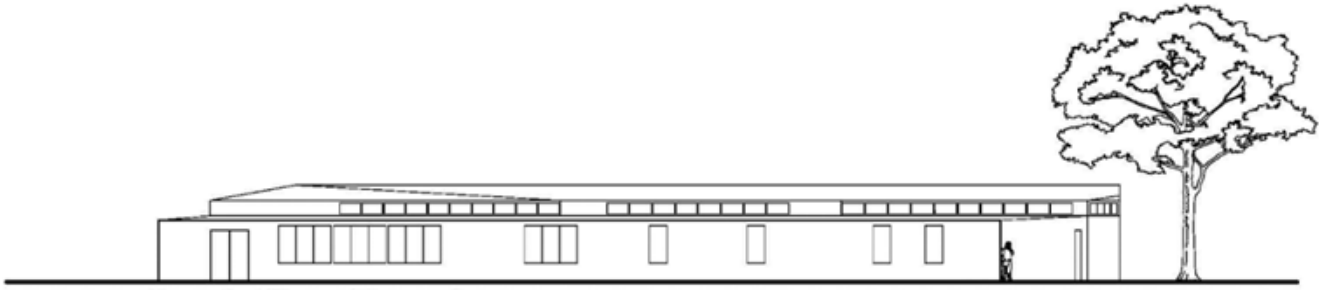
North East Elevation
NTS



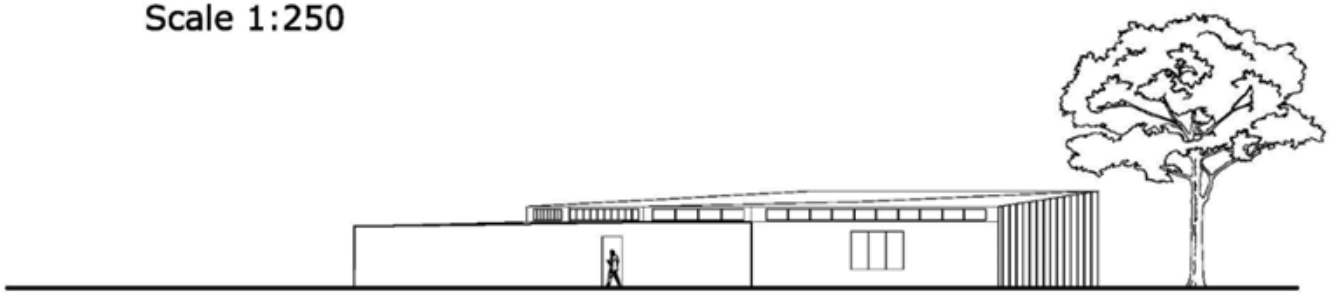


9.2

Report No: 36 / 20 ts



South West Elevation
Scale 1:250



South East Elevation
Scale 1:250



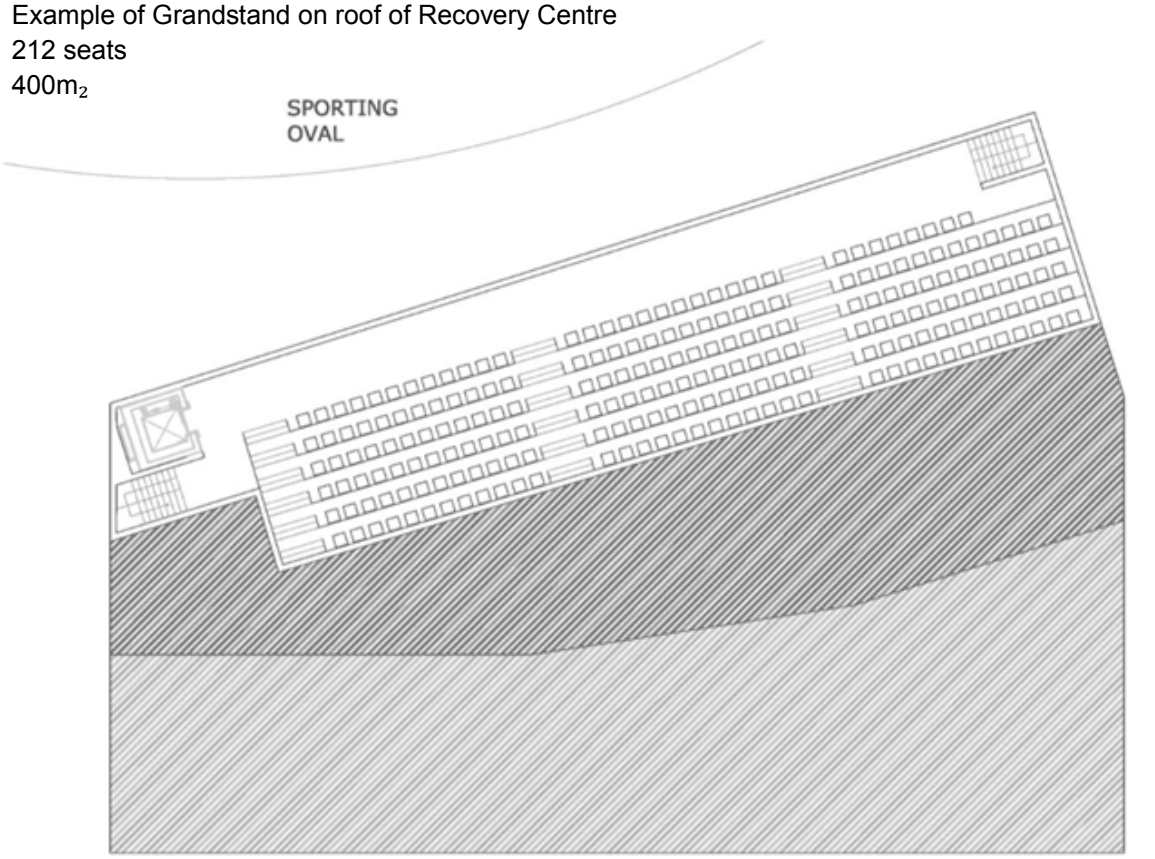
North West Elevation
Scale 1:250

Report No: 36 / 20 ts

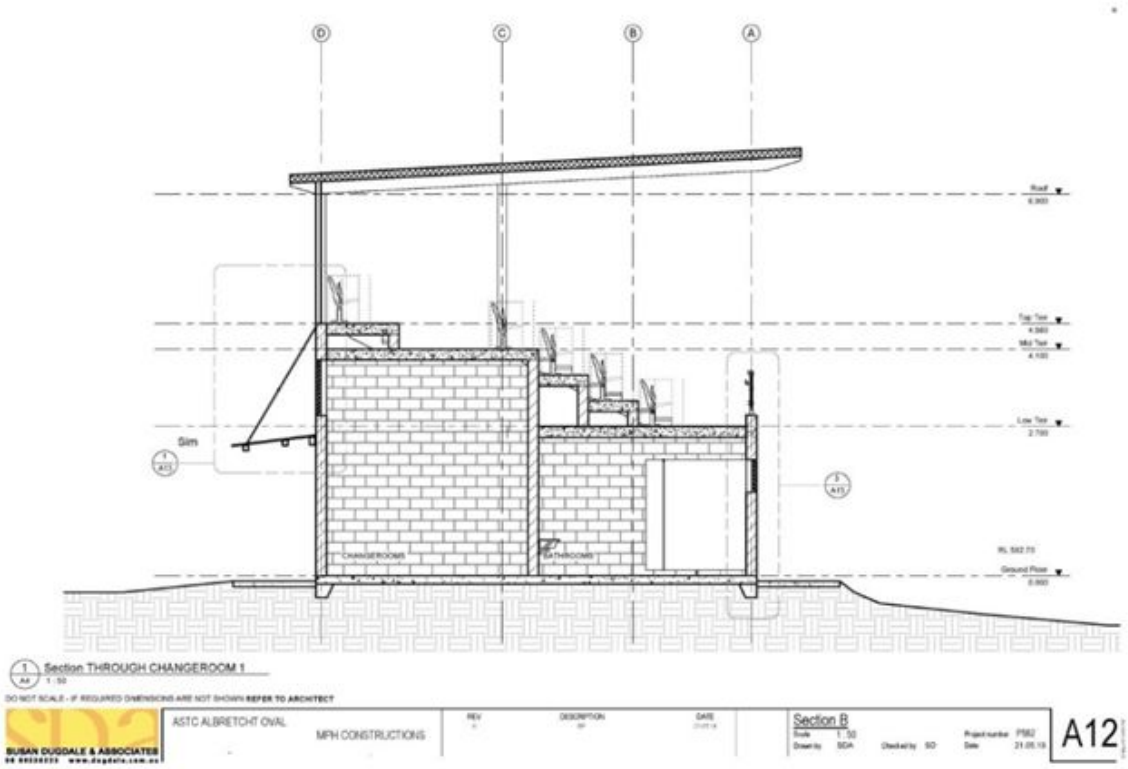
9.2

Option 2

Example of Grandstand on roof of Recovery Centre
212 seats
400m$_2$



Albrecht Oval Grandstand
Example of side elevation using second floor for seating



Report No: 36 / 20 ts

3. POLICY IMPACTS

All projects relate to and reflect the appropriate policies and components of the ***Alice Springs Town Council Strategic Plan 2018 – 2021***

Objective 1: A dynamic community

1.2 Economic growth and prosperity

1.2.3 Support ongoing tourism development and prosperity

1.3: Safe and reliable infrastructure

1.3.3 Maintain and improve council buildings

Objective 2: A great place to live

2.1: Community life, promoting a healthy, vibrant culture

2.1.1: Provide sport, recreation and leisure opportunities, which maximise social capital.

4. FINANCIAL IMPACTS

If Council was to pursue the proposal to demolish the existing Boxing Shed and build a new multifunctional sporting and storage facility, Council would have to seek funding through:

1. Funding from Council Reserves to the value of $1M
2. Alternate funding opportunities
    - NTG
    - Federal funding
    - AFL NT
    - AFL
    - Cricket Australia
    - NT Cricket

Option 1 Costs: No grandstand
Costs per m_2 average $3500 for Recovery Centre
Costs per m_2 average $2300 for Storage Shed

Building	**m_2**	**Cost**
Demolition		$30,000.00
Recovery Centre	944m_2	$3,304,000.00
Storage Shed	592m_2	$1,361,600.00
	Total	**$4,695,600.00**

Option 2 Costs: Grandstand
Costs per m_2 average $3500 for Recovery Centre
Costs per m_2 average $2300 for Storage Shed
Cost per m_2 average $2500 for Grandstand

Building	**m_2**	**Cost**
Demolition		$30,000.00
Recovery Centre	944m_2	$3,304,000.00
Storage Shed	592m_2	$1,361,600.00
Grandstand	400m_2	$ 1,000,000.00
Elevator		$25,000.00
	Total	**$5,720,600.00**

Report No: 36 / 20 ts

5. SOCIAL IMPACTS

TIO Traeger Park Stadium has provided a platform for a range of activities and programs that have encouraged professionals to travel from all around Australia. If TIO Traeger Park had better facilities for its athletes it would promote tourism and community growth within Alice Springs and the broader community.

6. ENVIRONMENTAL IMPACTS

A well maintained and inviting purpose-built facility will encourage increased use by community members and athletes to utilise the park more frequently.

7. PUBLIC RELATIONS

Improvements to the facility would be of value to the community. It would also show the Alice Springs community another way Council is committed to supporting sporting activities and tourism.

8. ATTACHMENTS

Attachment A: Report to Council December 2019

Kaitlyn Weekes
PROJECT ADMINISTRATION OFFICER

Scott Allen
DIRECTOR OF TECHNICAL SERVICES

ATTACHMENT A
Agenda Item 14.4.3

REPORT Report No. 211 / 19 cncl

TO: **TECHNICAL SERVICES COMMITTEE - MONDAY 9 DECEMBER 2019**

SUBJECT: **TIO TRAEGER PARK - BOXING SHED STRUCTURAL INTEGRITY AND COMPLIANCE**

AUTHOR: **STEPHEN BALOBAN – MANAGER INFRASTRUCTURE**

EXECUTIVE SUMMARY

This document reports on the structural integrity and compliance of the Boxing Shed at the TIO Traeger Park complex and provides options for Council to consider in regard to the structure moving forward.

9.2

IT IS RECOMMENDED that Council provides direction on the following options:

Option 1: Grant Funding is sought to bring the boxing shed up to compliance for the purpose of continuing the use of the structure as a storage facility

Option 2: Council approve the Technical Service Department to compile a business case for the demolition of the existing boxing shed and associated buildings and replace with a multi-purpose facility including storage

Option 3: Develop the business case as a shovel ready project

REPORT

1. BACKGROUND

At its 26 August 2019 Ordinary Council Meeting, Council resolved:

> *13.3.4 TIO Traeger Park – Boxing Shed Condition Report (Agenda Item 9.3) Report No. 126/19ts (DTS)*
>
> ***That the Technical Service Department recommends that the existing boxing shed at TIO Traeger Park remains a storage facility.***
>
> ***That a report on structural integrity and usage of the existing boxing shed at TIO Traeger Park be presented to Council.***
>
> *(4588ts)*
> *CARRIED (20539)*

The boxing shed is located at the TIO Traeger Park Facility. The facility is used for the following purposes:

- Storage of black soil for cricket wicket
- Curators shed
- Storage of sporting equipment for the following sports:
  - AFL
  - Rugby
  - Cricket
- Storage of Council Christmas Tree
- Storage of Council infrastructure e.g. traffic bollards
- Storage of Council Sports Field Mower

Council currently has a Lawful Letter of approval from the NT Building Branch to use the boxing shed for storage purposes only. This letter provides no guarantee of the structures safety.

The replacement facility could include the following:

- Offices
- Gym and Recovery Area
- Meeting Rooms
- Ablution Facilities
- Grandstand
- Corporate Boxes
- Storage Capabilities – sports, Council, etc.
- Curators Shed
- Car Parking
- Video Screen



2. DISCUSSION

As per Council resolution 20539, Officers were requested to investigate the condition of the existing boxing shed at TIO Traeger Park for structural integrity and compliance of the building with the aim to continue to use the structure as a storage shed.

The Technical Service Department engaged Central Building Surveyors to inspect the Boxing Shed for compliance:

- Refer Attachment A for *Central Building Surveyors* report
- Refer Attachment B for *Structural Engineering Consultants Australia* report
- Refer Attachment C for *BCA Engineers* report

The boxing shed as highlighted in green has 2 other buildings attached: (Refer Attachment E)

- The yellow highlighted building in was constructed 1962, and
- The pink highlighted building in 1968. The building identified in pink this is where Council's Christmas tree is stored.

Neither of these additional buildings have a building permit or certificate of compliance.

Council would have to go out to Tender for the upgrade/repair of the Boxing shed with the winning tenderer to carry out the works which would cost around $235K (Refer Attachment D)

After these works were completed an Occupancy Permit would be issued to Council which would enable Council to use the building for storage only.

3. POLICY IMPACTS

All projects relate to and reflect the appropriate policies and components of the ***Alice Springs Town Council Strategic Plan 2018 – 2021***

Objective 1: A dynamic community
1.3: Safe and reliable infrastructure
1.3.3 Maintain and improve council buildings

Objective 2: A great place to live
2.1: Community life, promoting a healthy, vibrant culture
2.1.1: Provide sport, recreation and leisure opportunities, which maximise social capital.

4. FINANCIAL IMPACTS

The Technical Service Department has estimated the cost to bring the boxing shed + the other 2 buildings up to compliance for storage facility only (Refer Attachment D)

5. SOCIAL IMPACTS

A new purpose built facility will offer other sports the opportunity to utilise a Council facility

6. ENVIRONMENTAL IMPACTS

The environmental impacts are unknown at this stage and are dependent upon the direction from Council

7. PUBLIC RELATIONS

A new purpose built facility will offer other sports the opportunity to utilise a Council facility

8. ATTACHMENTS

Attachment A: *Central Building Surveyors* report
Attachment B: *Structural Engineering Consultants Australia* report
Attachment C: *BCA Engineers* report
Attachment D: Estimated Costs
Attachment E: Building Map

Stephen Baloban
MANAGER INFRASTRUCTURE

Scott Allen
DIRECTOR OF TECHNICAL SERVICES

ATTACHMENT A

CENTRAL BUILDING SURVEYORS

ABN 88 161 231 438

9.2

Compliance report

For

Lot 8128 (5) Traeger Avenue

Alice Springs



November 2019.

PO Box 8840 Alice Springs NT 0871 | M: 0400 936 598 | P: 8952 1177
admin@centralbuildingsurveyors.com.au | www.centralbuildingsurveyors.com.au

Overview of report

This report is based on a request for inspection by Alice Springs Town Council for boxing shed Lot 8128 (5) Traeger Avenue, The Gap, Alice Springs (known as Traeger Park)

This report in conjunction with "Compliance Audit Report" Reference 6056.191011.G.1 by BCA Engineers and "Engineering Report" SECA Job #19441 by SECA Structural Engineering Consulting Australia for compliance on conversion to shed to storage space.

Overview of site and building

The property at Lot 8128 (5) Traeger Avenue, The Gap Alice Springs consist of the following properties:

The allotment of 109900m² of flat land has been created from several different allotments over the years and comprises several different building structures. The building in review is known as the boxing shed and is located in the south eastern corner of the allotment. The boxing shed was originally constructed on Lot 1606 (5) Speed Street, Alice Springs prior to the consolidation of allotments forming Lot 8128 (5) Traeger Avenue, The Gap.

From review of Building files, historic photographs, ILIS and google earth along with site investigation the building consisting of block building to the western end, central section of two sheds with central box gutter and eastern extension where all constructed separately. The original sheds and block building where occupied by the Alice Springs Show Society (known as Rumble Hall).

The original shed (currently the middle section) was constructed prior to 1962 (exact date unknown), the block addition to the west of the original shed was constructed in 1962, and the shed addition to the west in 1968. Note the original shed and addition have not been issued a building permit, classification or type of construction (Table 2 identifies proposed classification and type of construction).

The original shed construction of 2 truss roofs abutting at the centre forms the area where the existing box gutter is located this box gutter is approximately 37.8m long and has 2 downpipes one at each end. The existing downpipes are in poor condition. New and additional downpipes are required to confirm with the requirements for stormwater discharge.

Compliance

A review of the building file for Lot 8128 (5) Traeger Avenue, The Gap, Alice Springs along with Google earth and site observations of the property are outlined in the following tables;

Table 1 Construction time frame
Table 2 Areas, classification and construction
Table 3 BCA performance requirements (NCC Volume One 2019)

Table 1 – Construction time frame

Lot	Description	Comments	Permit No.	BP issue date	OP issue date
1606	Office	Registered	010/1606/01	09/11/1965	
	Toilet	Registered	010/1606/02	19/12/1978	
	Show display	Registered	010/1606/03	23/06/1980	
	Recreational club	Expired	010/1606/04	15/03/1988	
8128		Reserved	010/8128/01		
	Baseball clubhouse	Expired	010/8128/02	23/11/1994	
	Additions to basketball stadium	Expired	010/8128/03	27/07/1995	
	New canteen, demolish exist cante	Occupancy certification –issue A	010/8128/04	04/03/1997	27/06/1997
	(Football) retaining wall	Occupancy certification –issue A	010/8128/05	05/05/1998	02/11/1998
	(Tennis) shed	Occupancy certification –issue A	010/8128/06	05/05/1998	20/10/1998
	Screen wall	Occupancy certification –issue A	010/8128/07	25/02/1999	25/06/1999

8128	Score box	Occupancy certification –issue A	010/8128/08	08/03/2002	08/05/2002
	Upgrade cricket club rooms	Occupancy certification –issue A	010/8128/09	10/07/2002	09/08/2004
	Upgrade cricket club rooms	Occupancy certification –issue A	010/8128/09/A1		
	Basketball stadium	Cancelled	010/8128/10		
	4 x 252m high lighting towers and footings	Occupancy certification –issue A	010/8128/11	19/12/2003	02/03/2004
	Sign for A/S tennis association	Occupancy certification –issue A	010/8128/12	26/05/2005	19/02/2007
	Demolition of grandstand	Occupancy certification –issue A	010/8128/13	09/08/2005	29/09/2005
	New grandstand & multi-purpose facility	Occupancy certification –issue A	010/8128/14	27/09/2005	24/09/2006
	New grandstand & multi-purpose facility	Deleted – unable to cancel reserved permit	010/8128/14/A1		24/09/2008
	Shade structure	Occupancy certification –issue A	010/8128/15	13/02/2006	09/04/2008
	Fire safety compliance for monas bar & under	Occupancy certification –issue A	010/8128/16	05/03/2007	17/03/2008
	Shade structure and verandah	Occupancy certification –issue A	010/8128/17	22/08/2008	01/04/2009
	Shade structure and verandah	Occupancy certification –issue A	010/8128/17/A1	31/03/2009	01/04/2009
	Telecommunication tower and equipment hut on platform	Expired	010/8128/18	30/09/2008	
	Telecommunication tower and equipment hut on platform	Expired	010/8128/18/A1	16/10/2008	
	Creating room on the second floor of the traeger park grandstand	Expired	010/8128/19	31/05/2010	
	New toilet block	Occupancy certification –issue A	010/8128/20	28/05/2010	02/04/2013
	Alterations/modifications – mezzanine seating E side of basketball stadium	Occupancy certification –issue A	010/8128/21	20/07/2010	06/03/2012
	Ablution alterations	Occupancy certification –issue A	010/8128/22	10/03/2011	18/05/2015
	4 shade structures	Occupancy certification –issue A	010/8128/23	20/04/2011	25/05/2011
	Basketball stadium & fire services upgrade	Occupancy certification –issue A	010/8128/24	02/09/2011	06/03/2012
	Installation of electronic scoreboard at sporting oval	Expired	010/8128/25	29/01/2013	
	Shade structure	Occupancy certification –issue A	010/8128/26	24/09/2013	24/10/2013
	Mounting brackets for WiFi device to existing lighting post	Expired	010/8128/27	14/11/2013	
	Retaining wall	Occupancy certification –issue A	010/8128/28	15/11/2013	29/09/2015
	Stage 1: cantilever 1800mm 6000mm shade structure. Stage 2: 3 x free standing shade structures 3000mm x 8000mm	Occupancy certification –issue A	010/8128/29	25/11/2013	13/10/2015
	New concrete footings and 4 of flag poles	Occupancy certification –issue A	010/8128/30	15/05/2014	20/03/2016
	Alterations and additions to existing tennis clubhouse	Occupancy certification –issue A	010/8128/31	26/06/2014	22/09/2014
	Extensions to existing viewing balcony, to be used by guest at mona's lounge	Occupancy certification –issue A	010/8128/32	10/11/2015	26/02/2016
	New sliding door to balcony and upgrade door hardware to existing front door	Occupancy certification issued	010/8128/33	01/08/2016	07/10/2016
	Install a 30Kw solar system	Occupancy certification issued	010/8128/34	25/06/2017	24/08/2017
	Installation of new scoreboard to traeger park	Occupancy certification issued	010/8128/35	05/02/2019	13/02/2019
	Demolition of existing building and build new toilet block	Registered	010/812836	29/07/2019	

Table 2 – Areas, classification and construction

Lot	Description	Classification	Floor area (m^2)	Type of construction
1606	Original shed	7b (proposed)	699.30	C (proposed)
	Block addition	7b (proposed)	140.72	C (proposed)
	Shed addition	7b (proposed)	278.24	C(proposed)
			1,118.24	

Table 3 – BCA performance requirements

Section	Performance requirement & Acceptable construction practice	Compliance
D Access & Egress	**DP4 Exits** *Exits* must be provided from a building to allow occupants to evacuate safety, with their number, location and dimensions being appropriate to- (a) The travel distance; and (b) The number, mobility and other characteristics of occupants; and (c) The function or use of the building; and (d) The height of the building; and (e) Whether the *exit* is from above or below ground level	Non-compliant
	DP6 Paths of travel to exits So the occupants can safely evacuate the building, path of travel to *exits* must have dimensions appropriate to – (a) The number, mobility and other characteristics of occupants; and (b) The function or use of the building.	Non-compliant
F Health and Amenity	**FP1.3 Rainwater discharge system** A discharge system for the disposal of *surface water* resulting from a storm having an average *recurrence interval* of – (a) 20 years must – (i) Convey *surface water* to an appropriate *outfall*; and (ii) Avoid *surface water* damaging the building; and (b) 100 years must avoid the entry of *surface water* into the building.	Non-compliant
	FP1.4 Weatherproofing A roof and *external wall* (including openings around *windows* and doors) must prevent the penetration of water that could cause – (a) Unhealthy or dangerous conditions, or loss of amenity for occupants; and (b) Undue dampness or determination of the building elements.	Non-compliant

9.2

Summary

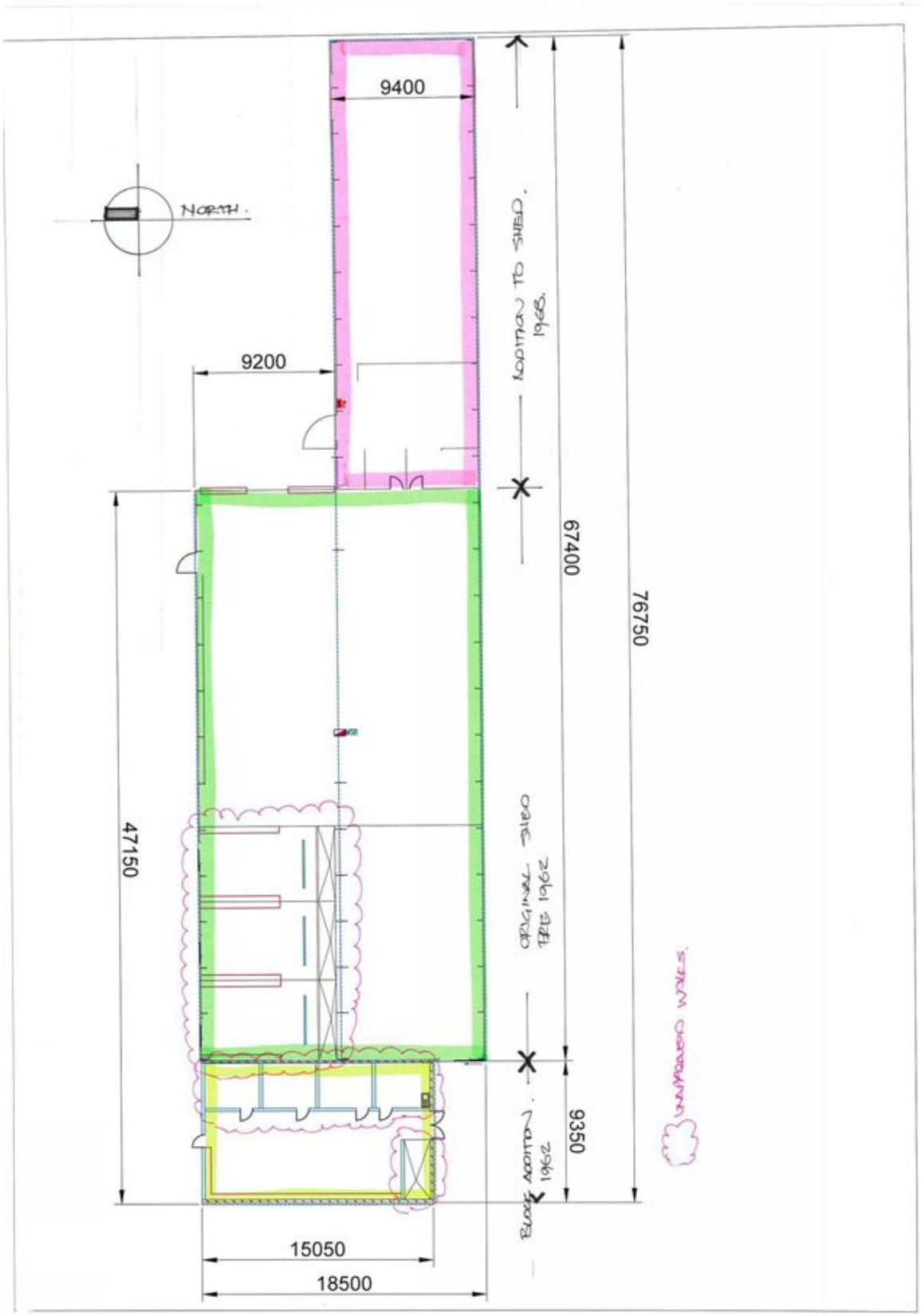
Review of the building files, ILIS and site observations along with reports "Compliance Audit Report" Reference 6056.191011.G.1 by BCA Engineers and "Engineering Report" SECA Job #19441 by SECA Structural Engineering Consulting Australia for compliance on conversion to shed to storage space identified various issues with the existing building which require approval for conversion of existing building into storage facility.

Existing central box gutter to the original sheds needs conformation the current size is adequate for the area of roof surface which it supports. The existing downpipe scenario is inadequate for the length of gutter, with additional downpipes and rain water heads required for compliance, the existing downpipes prevent the rainwater from being discharged to the external of the building.

The existing buildings require installation of compliant stormwater discharge from the building, installation of compliant egress, fire safety measures, rectification works to the structure as outlined in consultant's reports.

During the review of building files, ILIS and site observations there are structures which have not been finalized with occupancy permits and structures which have not been issued a building permit that are not identified on the building files or ILIS. It is highly recommended these structures be finalized along with required work to the boxing shed (Rumble Hall) for conversion to storage facility.

Plans


9400
NORTH.
9200
ADDITIONS TO SHED. 1968.
67400
76750
47150
ORIGINAL SHED 1962
UNROOFED WALLS.
9350
BLOCK ADDITION. 1962
15050
18500

Photos



Photo 1 north western corner – block addition (1962)



Photo 2 north eastern corn of original shed (date unknown)



Photo 3 northern elevation of shed addition (1968)



Photo 4 internal of shed addition (1968)



Photo 5 internal of original shed (date unknown)



Photo 6 downpipe to eastern end of box gutter to southern wall



Photo 7 downpipe eastern end at box gutter junction northern wall



Photo 8 downpipe to western end of box gutter to southern wall



Photo 9 downpipe western end at box gutter junction



Photo 10 downpipe western end at box gutter junction

ATTACHMENT B

UNIT 2 / 662 Stuart Highway NT 0828
PO Box 2393 Palmerston NT 0830
Ph: 08 89474999 seca@secaust.com.au

9.2

ENGINEERING REPORT

For: Treager Park Shed

SECA Job # 19441

Site Address: Lot 8128 (5) TREAGER AVENUE, The Gap, Alice Springs

Prepared By: Ray Colley
of Structural Engineering Consultants Australia

10th October 2019

Description of Treager Park Shed

The shed is approximately 50 years old. it is measured approximately 68 m in length with roof trusses portal frame spaced at 3.05 m centres. The first 10 bays roof trusses are 9 m span supported by 250 mm wide external webbed columns & continued with 13 bays of two x 9 m span identical roof trusses supported by the same 250 mm wide external webbed columns & 600 mm wide intermediate webbed columns. The gable end has two intermediate 115 mm wide webbed mullions typical. The roof trusses span 9 m with 20 deg pitch approximately. The roof truss has no roof bracings and no bottom chord restraints. There is cross bracing at ceiling level installed at grid 1 to 2, 5 to 6, 11 to 12 & 22 to 23. The shed has only one side wall bracing located at grid A-11 to 12. The roof purlins are 150x50 Timber spaced at approximately 900 mm cts & The wall girts are 75x45 timber. The girts are located at 100 mm above the finished slab level then 895, 800, 900 & 800 cts approximately. The roof and wall claddings are corrugate profile fixed with combinations of screw and nails. Refer to SECA Dwg # D00 to D06 for existing shed drawings.



Perspective view of the shed from Speed Street



Typical section from inside shed



Elevation view of the adjacent identical shed

Scope of work

The purpose of this report is to provide a structural assessment of the completed structure and not a stage by stage inspections during the course of the construction of the building. This inspection is limited to areas of access to carry out a visual inspection and no destructive testing was undertaken. As there were no structural drawings or details of the construction of this building were provided or available during the inspection. Visual Inspection was carried out on accessible area only for the purpose of determining the existing structural performance and if the building is structurally sound for the occupant.

Items inspected

1.0 **Footings**

We were unable to inspect the footing as they are under the ground slab however from our visual inspection, we found no major cracking and the slab to be in good condition. No evidence of movement of the footing at the columns supporting the roof trusses except at 2 locations.

2.0 **Ground slab**

We were only able to inspect some part of the ground slab as most area of the slab is covered. The visual inspection of the ground slab reveals some minor cracking at general areas. The ground slab was in good condition for its age, except; There was evidence of movement to the concrete slab located at grid C–12 & C-16. The Slab had deformed and fallen apart due to excessive movement of the intermediate webbed columns supporting the 2x200UB beams. We believed its due to the excessive load applied to these two intermediate columns. The bottom horizontal web of the column is cast at slab finish level and is subjected to high tension and compression during strong wind in different directions.



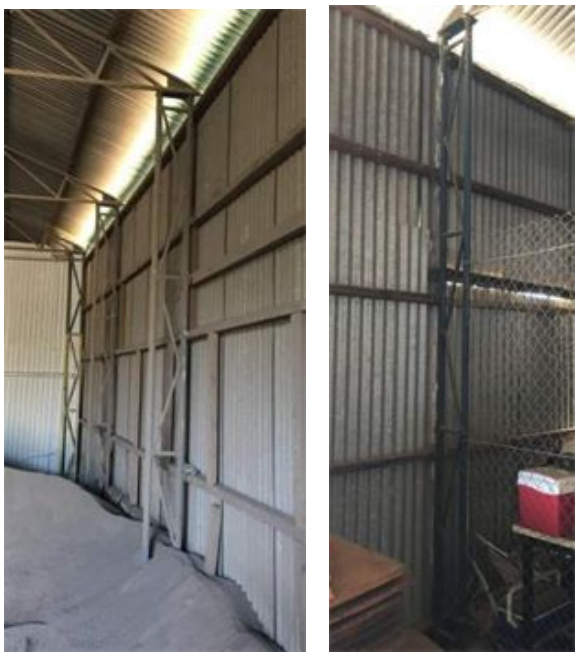
Typical area of slab covered



Slab deformed and fallen apart due to excessive movement

3.0 **External 250 mm wide webbed columns**

The external webbed column is measured 250 mm wide approximately. It is constructed of 2x 42 mm Dia CHS vertical chords with 33 mm dia CHS horizontal web spaced at 1150 mm cts approximately and 27 mm dia CHS diagonal web. All the joints are fully welded. Most of the external columns are in good condition, except; three external webbed columns located at grid A-4, A-5 & A-8 had repairs but the webbing had not been reinstated to match existing and we believed it does not comply with the design intend**.** There is also a visible hole to the top of a vertical cord which will required a minor repair or maintenance.



Typical External truss column



Repaired External webbed columns at grid A-4 & A-5

The webbings are not reinstatted to match existing.



External webbed column at Grid A-8



Top of the vertical chord member has visible hole

4.0 **Intermediate 600 mm wide webbed columns**

The intermediate webbed column is measured 115 mm depth x 600 mm width approximately. It consists of double verticals webbed frame welded together with 33 mm dia CHS x 75 mm long spacers at 750 mm centres. The webbed columns is constructed of 4x 42 mm Dia CHS vertical chords, 5x33 mm dia. CHS horizontal web spaced at 900 mm cts approximately and 4x27 mm dia CHS diagonal web. All the joints are fully welded. Three intermediate webbed columns located at Grid C – 13 to 15 had been removed and 2x200UB beams were installed to support the roof trusses.

There was evidence of movement to the concrete slab located at grid C–12 & C-16. The Slab had deformed and fallen apart due to excessive movement of the intermediate webbed columns supporting the 2x200UB beams. We believed its due to the excessive load applied to these two intermediate columns. The bottom horizontal web of the column is cast at slab finish level and is subjected to high tension and compression during strong wind in different directions.



Typical intermediate webbed columns



2x200UB roof beam and the intermediate webbed columns supporting the beams





The intermediate webbed column supporting the 2x200Ub beams
The beams are spanning some 12.0m supporting 3 pairs of roof trusses.



Slab deformed and fallen apart due to excessive movement of the intermediate webbed columns



Slab deformed and fallen apart due to excessive movement of the intermediate webbed columns

5.0 **The gable end wall intermediate mullions**

The gable end has two intermediate 115 mm wide webbed mullions. The mullion is constructed 2x 42 mm dia CHS vertical chords with 33 mm dia x 70 mm long packers weld to the vertical chords at 750 mm centres approximately. All intermediate mullions are in good condition.



Typical Gable end wall intermediate mullions



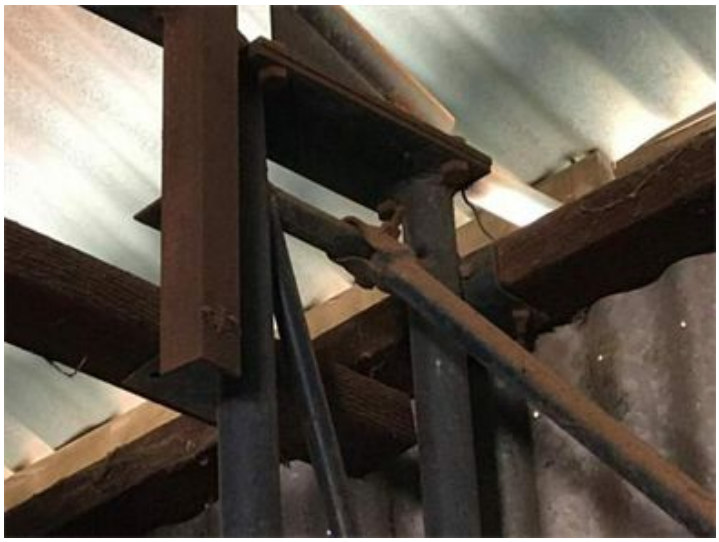
Typical location of intermediate mullion at gable end wall

6.0 **Side wall cross bracing**

The whole shed has only one cross brace located at grid (A – 11 to 12). There is visible evidence that some cross bracing may have been removed during the life span of the shed. In our opinion the shed requires cross bracing perpendicular to the columns to transfer total lateral load of 75 kN approximately in which the existing shed bracing in this direction is not sufficient to do so. Hence we recommend to install 12x more cross bracings to this direction across the whole shed.



Side wall cross bracing



Side wall brace to External webbed column connection

7.0 **Roof truss and purlin structure and its cladding**

The roof sheeting is fixed to purlins spaced at approximately 900 mm apart. There is visible light through some of the roof sheeting. In our opinion, the roof sheeting is in fair condition for its age. The roof purlins are 150x50 timber spaced at 900 mm centres & fix to the angle bracket welded to the truss top chord with 2xM12 cup head bolts typical.

The roof trusses span 9 m with 20 deg pitch approximately. The roof truss has no roof bracings and no bottom chord restraints. There is cross bracing at ceiling level installed at grid 1 to 2, 5 to 6, 11 to 12 & 22 to 23. In our opinion the bottom chord binders were removed at some stage and they are required to be reinstated. The roof purlins and trusses are in fairy good conditions.



Visible light through the roof cladding from inside the shed



150x50 timber roof purlin with its fixing to truss top chord



9 m span roof truss without bottom chord restraint and roof frame bracing



9 m span roof truss without bottom chord restraint and roof frame bracing



Cross bracing to bottom chord of roof truss at ceiling level



Cross bracing to bottom chord of roof truss at ceiling level



Roof truss bolted apex connection



Roof truss to external 250 mm wide webbed column heel connection



Roof truss to intermediate 600 mm wide webbed column heel connection



Roof truss to 2x200UB beam connection



Roof truss to intermediate 600 mm wide webbed column supporting UB heel connection



Roof truss bottom chord splice & ceiling level cross bracing to bottom chord connection



Visible evidence remains of bottom chord restraint being removed



Visible evidence remains of side wall bracing being removed

Conclusion

We have formed this opinion, from visual inspection that the overall structure of this building is structurally sound and is safe for the occupants.

We could not see any structural damage to the main structure of the main building.

However, there were couple of rectification / maintenance work required listed below.

three external webbed columns located at grid A-4, A-5 & A-8 had repairs but the webbing had not been reinstated to match existing and we believed it does not comply with the design intend**.** There is also a visible hole to the top of a vertical cord which required a minor repair or maintenance.

There was evidence of movement to the concrete slab located at grid C–12 & C-16. The Slab had deformed and fallen apart due to excessive movement of the intermediate webbed columns supporting the 2x200UB beams. We believed its due to the excessive load applied to these two intermediate columns. The bottom horizontal web of the column is cast at slab finish level and is subjected to high tension and compression during strong wind in different directions. We have concerns with the excessive load imposed to the intermediate webbed columns has compromise the structural strength of the intermediate webbed columns. In our opinion the roof trusses at grid C-13 & C15 shall be supported with intermediate webbed columns to reduce the excessive loads.

The whole shed has only one cross brace located at grid (A – 11 to 12) and there is visible evidence that some cross bracing may have been removed during the life span of the shed. In our opinion the

shed requires cross bracing perpendicular to the columns to transfer total lateral load of 75 kN approximately in which the existing shed bracing in this direction is not sufficient to do so. Hence, we recommend to install 12x more cross bracings to this direction across the whole shed.

There is visible light through some of the roof sheeting. In our opinion, the roof sheeting is in fair condition for its age. We recommend replaced the damaged roof sheeting.

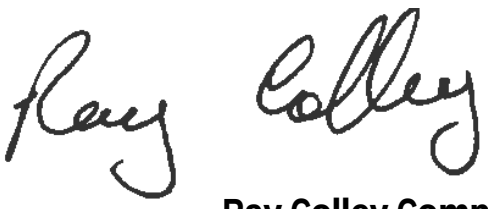
The roof truss has no roof bracings and no bottom chord restraints. In our opinion the bottom chord binders were removed at some stage or not installed and they are required to be reinstated. Roof Diagonal Bracing is to be provided at last two bays from each of the gable end. (Grids 1-3, 11-13, 21-23.)

We recommend the above issues be addressed as soon as possible.

Refer to SECA dwg # D07 to D14 for the above-mentioned proposed remedial works required to reinstate the existing shed back to the original engineered design.

This work will need a suitably qualified builder to be employed to carry out the required works and as per the current N.T. Building Act 1993 Regulations, a building certifier be engaged to provide a building permit, undertake the mandatory inspections and issue an permit to occupy as specified in the N.T. Building Act and in accordance with the 2006 Building Industry Reform requirements.

Should any questions or further clarification be required please do hesitate to contact myself,



Ray Colley CompIEAust.
Director

SECA STRUCTURAL ENGINEERING CONSULTANTS AUSTRALIA PTY LTD

ATTACHMENT C

Report: **Compliance Audit Report**

Project: Traeger Park - Boxing Shed Compliance Audit Report

Issue: Preliminary

Revision: 1

Reference: 6056.191011.G.1

Dated: October 2019

BCA Engineers / Darwin
L1/66 Smith Street, Darwin NT 0800
PO BOX 4000, Darwin NT 0801
T +61 8 8169 8901
enquiry@bcaengineers.com
bcaengineers.com

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Report Details

Details	Name
Author(s)	Usman Shakeel/Mitchell Tonkin
Reviewer	Kelvin Loi/Nathan Brown
Report File Reference	6056.191011.G.1
Revision	1 – Preliminary Issue

1.0 Introduction

BCA Engineers were engaged by Central Building Surveyors on 24th September 2019, to undertake an assessment of existing electrical and fire services, for the building located at 5 Traeger Avenue, Alice Springs, NT 0870 based on National Australian Code (NCC) 2019 and relevant Australian standards. There is no mechanical system and minimal hydraulic system, which are not being assessed in this report.

The scope of the report is as per the following:

(i) Description and condition of electrical and fire services infrastructure

(ii) Assessment of current condition versus NCC 2019 deemed-to-satisfy provisions and relevant Australian Standards

As such we provide commentary to that of the relevant NCC and Australian Standards in Sections 4, Section 5 and Appendices of this Report.

2.0 Executive Summary

Electrical Services (BCA Engineers – Usman Shakeel)

BCA Engineers conducted a visual non-invasive visual inspection of Electrical Services of Boxing Shed building at Traeger Park (Lot 8128), Alice Springs on 24th September 2019. Based upon our review, the following electrical items require rectification:

- Existing emergency lighting system does not comply with current NCC and AS2293
- Some of the existing switchboards do not comply with AS3000

Fire Safety (BCA Engineers – Nathan Brown)

BCA Engineers conducted a non-invasive, visual inspection of the fire safety of the building at Traeger Park on the 24th September 2019. In general, the building is in a poor condition and has several fire safety issues that will require rectification works.

The following summarises the non-compliant fire safety items requiring rectification:

- Lack of fire extinguishers
- Lack of fire hose reels
- Lack of fire hydrant coverage
- Non-compliant exit door types, door hardware and locking devices
- Lack of exit signage
- Stored goods in path of travel to exits and fire services

3.0 Basis of Report

The information and subsequent recommendations presented within this report are based on:

a) Visual, non-invasive inspections undertaken on 24th September 2019
b) Some existing architectural drawings for the site were obtained. This report is fundamentally based on a combination of visual inspection and existing documentation where available

3.1 Limitations

Please be aware of the following limitations and exclusions associated with this report:

a) Invasive inspections of plant and equipment (such as dismantlement and inspection of internal components etc.) have not been conducted;
b) Functional or performance testing of existing Building Services has not been performed;
c) Those areas of the building inaccessible for inspection (due to services concealed within false ceilings, wall cavities, roof spaces and the like);
d) Existing building structural adequacy and fire ratings;
e) Discussions have not been held with current maintenance contractors for the Building Services;
f) Accessing live parts of existing electrical installations was not possible. These works need to be undertaken by licensed tradespersons as WHS legislation prevents our employees from undertaking such works.

3.2 Reference Legislation and Building Standards

This report is intended to bench mark the existing conditions against NCC 2019 and relevant Australian Standards. Additionally, the following standards and guidelines may be referenced within this report:

3.3 Electrical Standards

General Electrical Installations: AS/NZS 3000

Emergency Lighting and Exit Signs System design, installation and operation: AS 2293.1

Emergency Lighting Inspection and maintenance: AS/NZS 2293.2

3.4 Fire Services Standards

Deemed-to-satisfy provisions – NCC 2019.

AS/NZS 2293	Emergency evacuation lighting in buildings
	Part 1 System design, installation and operation
AS 2419	Fire hydrant installations
	Part 1 System design, installation and commissioning
AS 2441	Installation of fire hose reels
AS 2444	Portable fire extinguishers and fire blankets - Selection and location
AS 1851	Routine services of fire protection systems and equipment
AS 3000	Electrical Installations

4.0 Compliance Assessment (Electrical)

4.1 Description of Existing Electrical Services

The 'Boxing Shed' is a single storey building which is being used as a general storage building and has been separated into several tenancies. The tenancies are being supplied by six (6) separate Power and Water (PWC) meters and has 4 unlabelled distribution boards as shown in Figure 1 below. The distributions boards are in poor condition while metering panel is in good condition.

The emergency lighting system in the building is standalone type and consists of two exit signs only. There was no emergency lighting test facility located on site.

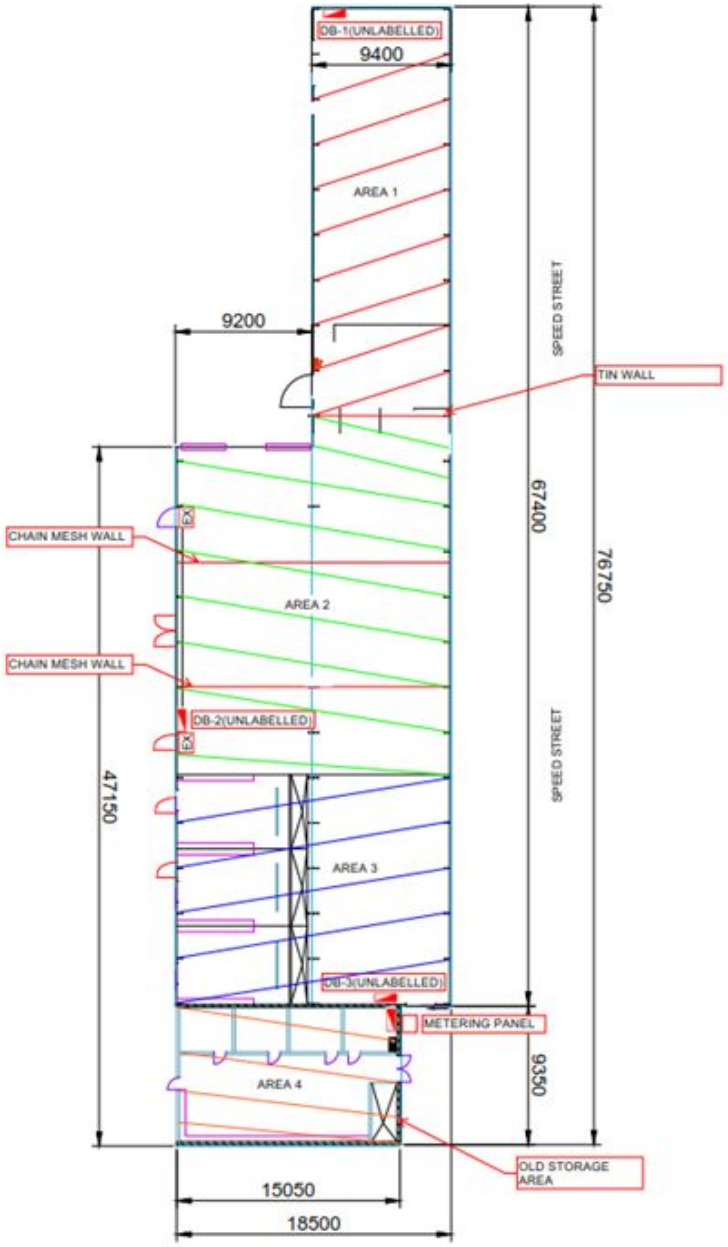


Figure 1: Existing distribution boards and emergency lighting layout

4.2 Emergency Lighting System and Distribution Boards

The current condition of the emergency lighting system and distribution boards is summarised as below:

Area	Non-Compliances
AREA 1	• Exit signs are not installed • Switchboard is not equipped with emergency lighting test facility • Green warning traffolyte label is not provided as per AS2293 for emergency lighting circuit • Cables are bunched together, which indicates possible derating issues • Switchboard is in poor condition and is recommended to be replaced
AREA 2	• Insufficient exit signs • Ensure non-working exit signs are replaced • Switchboard is not equipped with emergency lighting test facility • Green warning traffolyte label is not provided as per AS2293 for emergency lighting circuit • Switchboard is not smoke sealed and is recommended to be replaced
AREA 3	• Exit signs are not installed • Switchboard is not equipped with emergency lighting test facility • Green warning traffolyte label is not provided as per AS2293 for emergency lighting circuit • RCDs are not installed for lighting and power circuit • Switchboard is not smoke sealed and it cannot be provided with smoke seal. Therefore, it is recommended to replace the switchboard
AREA 4	• Emergency lighting and exit signs are not installed • Switchboard is not equipped with emergency lighting test facility • Green warning traffolyte label is not provided as per AS2293 for emergency lighting circuit
Metering Panel	• Metering panel is not smoke sealed and is recommended to be smoke sealed

5.0 Compliance Assessment (Fire)

5.1 Fire Safety Systems

5.1.1 Site and Building Details

The 'Boxing Shed' is a single storey building which has been generally constructed from sheet metal and masonry. The building is being used for general storage and has been separated into several tenancies. The storage use observed on-site is considered to be low hazard and does not warrant any special fire safety considerations.

Occupancy: Class 7b (Storage)

Fire Compartment Size: approximately 1210 m^2

Fire Compartment Volume: approximately 7260 m^3 (maximum)

Type of Construction: C

Storeys: 1

5.1.2 Egress

All points of the floor are required to be within 20m of a single exit or 20m to a choice of two exits and the nearest of those 2 exits be no more than 20m from that choice.

From our desktop review it appears the egress arrangement within the building is compliant.

However, in some cases egress and access to fire services is restricted by stored goods. Tenants should be advised to ensure storage is kept well clear of all exit doors and fire services.

5.1.3 Exit Doors and Hardware

It was found that several of the exit doors serving the building do not comply with the BCA. The issues mainly resolved around non-compliant door hardware, including the installation of deadbolts to doors and non-complying latch devices.

It is required by the NCC that all doors serving as exit doors or doors in the path of travel to an exit, be readily openable without a key from the side that faces the occupant seeking egress, via a latch with a single hand downward action. The non-compliant door hardware should be upgraded throughout the building as required.

All deadbolt and other non-compliant locking devices are required to be removed.

Several of the exit doors serving the building are sliding doors. Sliding exit doors are only permitted when the doorway leads directly to open space and the door is able to be opened manually under a force of not more than 110N. Due to the age and condition of the building, it is unlikely the sliding doors comply with BCA requirements and therefore would require that additional personal exit doors be provided to tenancies with sliding doors. Additional exit doors will require exit signage to be provided to the doorway.

Refer to Appendix A3 for drawing illustrating sliding doors rectification works.

5.2 Fire Services

The building is provided with the following fire services:

- Street Fire Hydrant Coverage
- Fire Hose Reels
- Fire Extinguishers
- Exit Signage

5.2.1 Fire Hydrants

Fire hydrants are required to serve any building over 500 m^2 in accordance with AS 2419.1. The Boxing Shed building is currently served by street plugs located on Speed Street and Gap Road.

Based upon the hydrant arrangement and building size, the fire water supply requirement of the street plug would be 20 L/s at 200 kPa (or 2 hydrants flowing simultaneously at 10 L/s at 200kPa). Alice Springs Power and Water Corporation are the water authority for the town and based upon recent flow tests of the town mains in similar locations, the water supply is considered adequate. We recommend that a hydrant flow test be conducted on the street hydrants to ensure supply is adequate.

The hydrant coverage to the building is considered to be non-compliant. Based upon the current arrangement, all floor areas are not within reach of 60m hydrant hose length and 10m water spray as required by AS 2419.1.

One possible means to rectify the fire hydrant shortfall is to provide additional gate entrances to the site and additional doorways to the rear of the building for fire brigade access. It would be necessary to check the available clear space between the rear of the building and the boundary gate, to ensure sufficient space is provided to install and operate the proposed access doors. Refer to Appendix A3 for example NTFRS access arrangement.

The NTFRS, who are the local fire authority, should also be consulted to ensure operational requirements are met when addressing the non-compliant fire hydrant coverage.

5.2.2 Fire Hose Reels

The building is not currently provided with fire hose reels.

Fire hose reels are considered a requirement for the building as it exceeds 500m^2 according to the BCA.
As such fire hose reels should be provided to the serve the entire building. Fire hose reels should be installed within 4m of an exit, and all areas should be in reach of 36m fire hose length and 4m spray.

5.2.3 Fire Extinguishers

The building has been provided with fire extinguishers.

Portable fire extinguishers are required in all buildings to the BCA and AS 2444. Generally, extinguishers are required to be located in paths of escape or adjacent exits. The coverage of extinguisher's varies on the type (Water, CO2, Dry Chemical) and size.

The building has significant deficiencies in the number of extinguishers provided.

Only one tenancy has been provided with a fire extinguisher. We are unsure whether the extinguisher is currently being maintained in accordance with AS 1851.

The fire extinguisher coverage does not comply, and additional fire extinguishers are required for each tenancy.

5.2.4 Emergency and Exit Lighting

The building is not provided with any emergency lighting. Only two of the tenancies have been provide with exit signage.

Refer to Electrical Services section for details regarding compliance and requirements of emergency and exit signage for the building.

5.3 Summary of Required Fire Rectification Works

- Provide additional fire extinguishers throughout the building in accordance with AS 2444 including to serve switchboards
- Provide additional fire hose reels to serve entire building in accordance with AS 2441
- Replace non-compliant door hardware including removal of deadbolt devices, replacing non-compliant door latch devices and provide new exit doors to serve tenancies which currently utilise sliding doors as exit doors
- Rectify fire hydrant shortfall to ensure all areas of the building are provided with fire hydrant coverage in accordance with AS 2419.1. Refer to Appendix A3 for potential NTFRS access arrangement for consideration
- Engage contractor to provide fire services maintenance and testing for the building in accordance with AS 1851. The fire services testing required should be extended to include the street plugs serving the building in accordance with AS 1851 i.e. the street plugs shall be flow tested yearly.
- Refer to Electrical section of this report for emergency lighting and exiting signage rectification works

6.0 Cost estimate

The following cost estimates for the required works are preliminary only and have been provided for indicative purposes.

	Compliance Cost
Electrical Services	$25,400
Fire Protection Services	$47,500
TOTAL	**$ 72,900**

6.1 BASIS OF ESTIMATE

- Issues identified during the visual inspection
- BCA Engineers compliance audit report
- Cost estimates are preliminary only
- Cost estimate is strictly nett and includes 15% margin. However, it excludes GST, contingencies, allowances for escalation and staging penalties.
- The cost estimate is based upon October 2019 rates and market conditions for Alice Springs. We have allowed for 15% contractor profit margin
- Accepted systems will meet the 'Deemed to Satisfy' provisions of the Building Code of Australia unless noted otherwise
- Fees for Professional Services are excluded from this estimate

6.2 ELECTRICAL SERVICES

Included Works

- New main distributions switchboards (3off)
- New exit and emergency lighting
- New emergency lighting test facilities
- New smoke seal to metering panel

6.3 FIRE PROTECTION SERVICES

Included Works

- Provision of new fire hose reels to serve the building, located external to the building to be shared between tenants where practical.
- Provision of new fire extinguishers to serve building
- Provision to rectify non-compliant door hardware and door type
- Provision to provide additional doorways and gate for NTFRS access to permit fire hydrant coverage

Excluded Works

- Replacement of existing underground fire pipework
- Flow testing of street hydrants
- Fire services maintenance

7.0 Appendices

Appendix A1 – Electrical Services

Level	Ground	Tenancy /Shop	DB-1 UNLABELLED
Photograph			Issue Identified
 			• Exit signs are not installed • Emergency lighting test facility is not installed • Green warning traffolyte label as per AS2293 for emergency lighting circuit is not installed • Cables are bunched together, which indicates possible derating issues • Switchboard is in poor condition and is recommended to be replaced

Level	Ground	Tenancy /Shop	DB-2 UNLABELLED
Photograph			Issue Identified
			• Insufficient exit signs • Ensure non-working exits signs are replaced • Emergency lighting test facility is not installed • Green warning traffolyte label as per AS2293 for emergency lighting circuit is not installed • Switchboard is not smoke sealed

Level	Ground	Tenancy /Shop	DB-3 UNLABELLED
Photograph			Issue Identified
			• Exit signs are not installed • Emergency lighting test facility is not installed • Green warning traffolyte label as per AS2293 for emergency lighting circuit is not installed • RCD protection for lighting and power circuits is not installed • Switchboard is not smoke sealed. It is not in good condition and is recommended to be replaced

Level	Ground	Tenancy /Shop	DB-4 UNLABELLED
Photograph			Issue Identified
			• Emergency lights and exit signs are not installed • Emergency lighting test facility is not installed • Green warning traffolyte label as per AS2293 for emergency lighting circuit is not installed

Level	Ground	Tenancy /Shop	Metering Panel
Photograph			Issue Identified
			• Metering panel is not smoke sealed and is recommended to be smoke sealed

Appendix A2 – Fire Protection Services

Level	Ground	Tenancy	General – common to several tenancies

Photograph	Issue Identified
	Non-compliant door hardware. Door requires to be openable by a single hand down action handle.

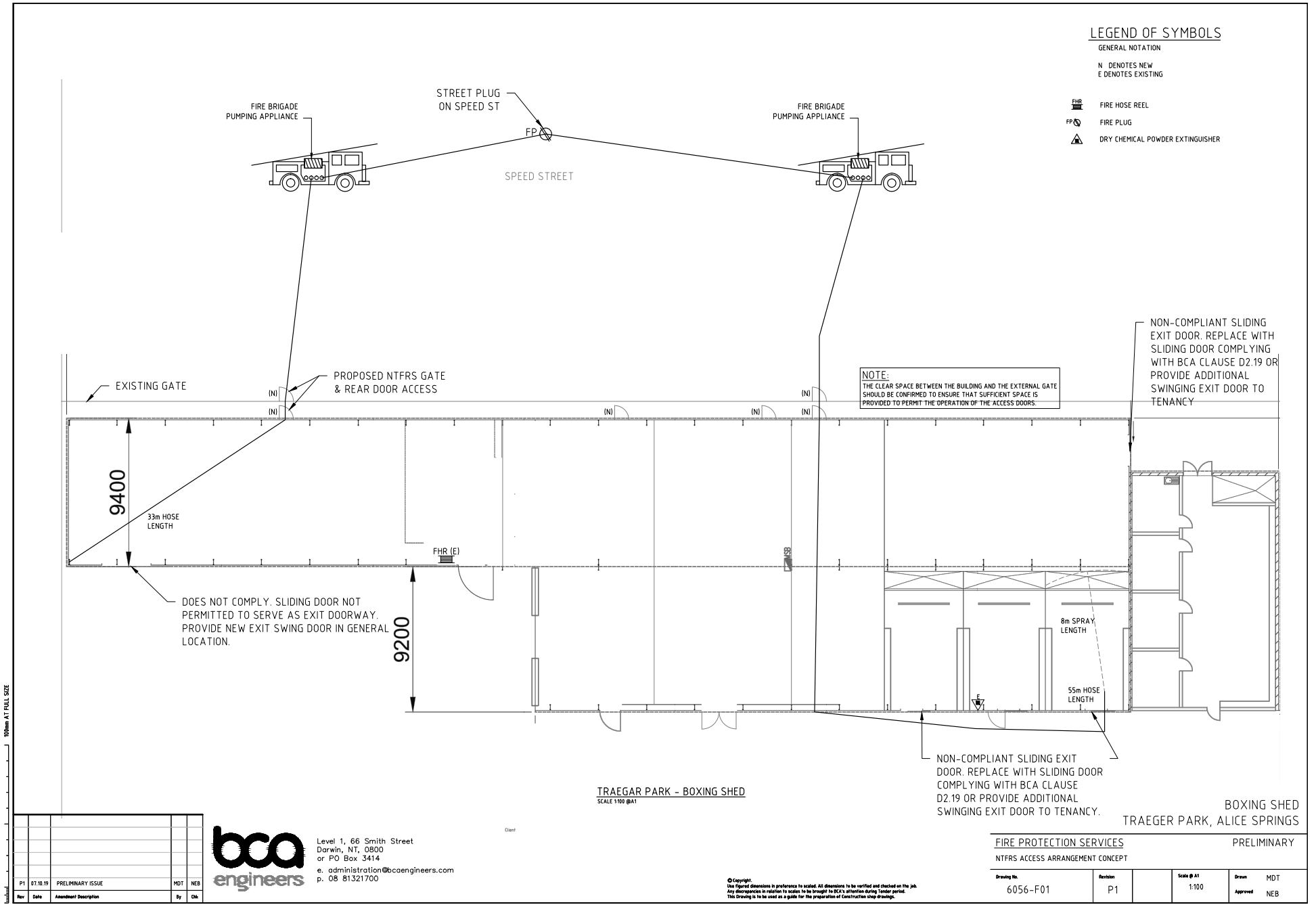
Level	Ground	Tenancy /Shop	General – common to several tenancies
Photograph			Issue Identified
			Sliding exit door serving as required exit. Sliding door not compliant and not readily openable.

Level	Ground	Tenancy	
Photograph			Issue Identified
			Access to doorway and fire hose reel restricted by stored goods. Fire hose reel signage missing. Fire hose reel unlikely to be maintained in accordance with AS 1851.

Level	Ground	Tenancy /Shop	General

Photograph	Issue Identified
	Location of street plug on Speed Street. Fire hydrant coverage not provided to the building in accordance with AS 2419.1.

Appendix A3 –Example NTFRS Access Arrangement

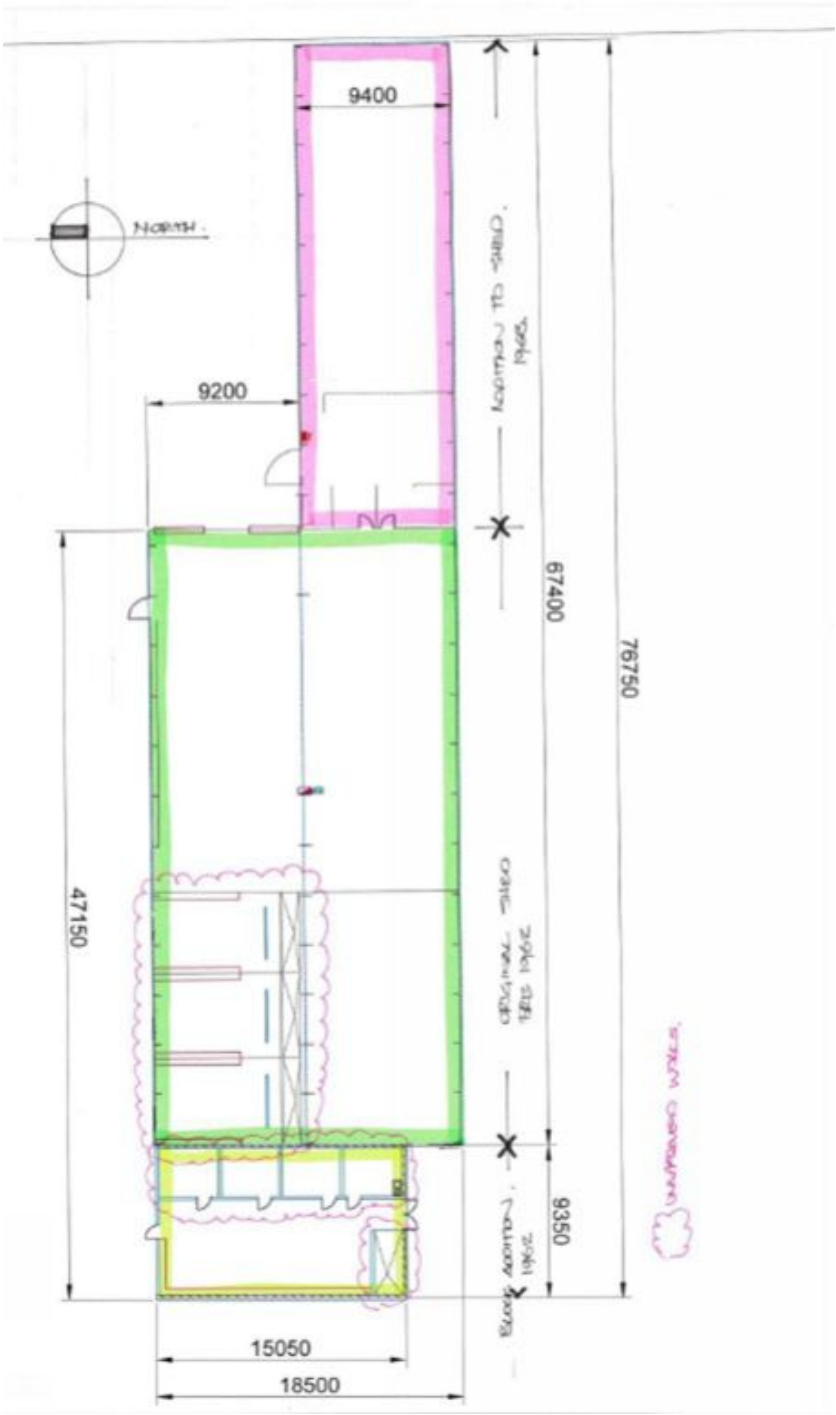

LEGEND OF SYMBOLS
GENERAL NOTATION
N DENOTES NEW
E DENOTES EXISTING
FHR FIRE HOSE REEL
FP FIRE PLUG
DRY CHEMICAL POWDER EXTINGUISHER
FIRE BRIGADE PUMPING APPLIANCE
STREET PLUG ON SPEED ST
FP
SPEED STREET
FIRE BRIGADE PUMPING APPLIANCE
EXISTING GATE
PROPOSED NTFRS GATE & REAR DOOR ACCESS
(N)
NOTE:
THE CLEAR SPACE BETWEEN THE BUILDING AND THE EXTERNAL GATE SHOULD BE CONFIRMED TO ENSURE THAT SUFFICIENT SPACE IS PROVIDED TO PERMIT THE OPERATION OF THE ACCESS DOORS.
NON-COMPLIANT SLIDING EXIT DOOR. REPLACE WITH SLIDING DOOR COMPLYING WITH BCA CLAUSE D2.19 OR PROVIDE ADDITIONAL SWINGING EXIT DOOR TO TENANCY
9400
33m HOSE LENGTH
FHR (E)
DOES NOT COMPLY. SLIDING DOOR NOT PERMITTED TO SERVE AS EXIT DOORWAY. PROVIDE NEW EXIT SWING DOOR IN GENERAL LOCATION.
9200
8m SPRAY LENGTH
55m HOSE LENGTH
NON-COMPLIANT SLIDING EXIT DOOR. REPLACE WITH SLIDING DOOR COMPLYING WITH BCA CLAUSE D2.19 OR PROVIDE ADDITIONAL SWINGING EXIT DOOR TO TENANCY.
TRAEGAR PARK - BOXING SHED
SCALE 1:100 @A1
BOXING SHED
TRAEGER PARK, ALICE SPRINGS
FIRE PROTECTION SERVICES
PRELIMINARY
NTFRS ACCESS ARRANGEMENT CONCEPT
Drawing No. 6056-F01
Revision P1
Scale @ A1 1:100
Drawn MDT
Approved NEB
P1 07.10.19 PRELIMINARY ISSUE MDT NEB
Rev Date Amendment Description By Chk
100mm AT FULL SIZE
bca engineers
Level 1, 66 Smith Street
Darwin, NT, 0800
or PO Box 3414
e. administration@bcaengineers.com
p. 08 81321700
© Copyright.
Use figured dimensions in preference to scaled. All dimensions to be verified and checked on the job.
Any discrepancies in relation to scales to be brought to BCA's attention during Tender period.
This Drawing is to be used as a guide for the preparation of Construction shop drawings.

BCA Engineers / Darwin
L1/66 Smith Street, Darwin NT 0800
PO BOX 4000, Darwin NT 0801
T +61 8 8169 8901
enquiry@**bca**engineers.com
bcaengineers.com

ATTACHMENT D

Description	Cost
Building Permit + inspections	$10,000.00
Fire & Electrical upgrade	$73,000.00
Structural upgrade	$30,085.00
Storm water upgrade + roof sheets+ concrete	$35,000.00
buildings brought up to building compliance extra doors+ other requirements	$40,000.00
Painting & Public Art	$15,000.00
Replace sliding doors with roller doors	$30,000.00
Contingency	$15,000.00
Total	$233,085.00

ATTACHMENT E



Agenda Item 9.3

Report No. 37 / 20 ts

TO: **TECHNICAL SERVICES COMMITTEE - MONDAY 16 MARCH 2020**

SUBJECT: **BICYCLE REPAIR STATIONS**

AUTHOR: **KAITLYN WEEKES - PROJECT ADMINISTRATION OFFICER**

EXECUTIVE SUMMARY

This report is regarding the existing bike repair stations out the front of the ASTC Public Library and outside the Senior Citizens Centre along the Todd River.

RECOMMENDATION

That it be a recommendation to Council:

That Council provide direction in regard to the Bicycle Repair Stations

REPORT

1. BACKGROUND

Council installed two bicycle repair stations. One at the front of the ASTC Public Library and one outside the Senior Citizens Centre along the Todd River. Over the past three months, both bike repair stations have been repaired three times due to vandalism.

2. DISCUSSION

Current Bike Stations

The current bike repair stations sit approximately 600m apart along the Todd River, over the past three months they have had to be repaired three times due to vandalism.

Outside the ASTC Public Library



Outside the Senior Citizens Centre



The bike repair stations were installed in October 2019 and since then have been targeted for vandalism on multiple occasions. The public still use the repair stations frequently however almost every two weeks they need repair.

Report No. 37 / 20 ts

Below is a graph conducted over the time period starting from 27/11/20 to the present showing costs and defaults. Original capital investment was $5000.00.

REPAIR STATION	REPAIR DATE	JOB/ITEM	DEFAULT	COST
Library / Todd River	27/11/19	Allen keys, Stainless steel wire rope and fittings	Cut hose, missing Allan keys, bike pump handle missing	$350.68
	27/11/19	Braided hose	Missing hose/replaced with braided hose	$174.56
	20/02/20	Allen Keys, Handles	Missing Allen keys	$442.00
	24/02/20		Hose not working due to missing latch	New incident not yet fixed
			Total	**$967.24**

ITEM	COST
Supply and Install 2 Bike Repair Stations	$3845.45
Total repairs of bike stations	$967.24
Bike Repair signs x 2	$108.00
TOTAL	$4920.69
TOTAL BUDGET REMAINING	**$79.31**

The Technical Service Department has three options and is seeking direction from Council:

1. That the bike repair stations stay as they are and be repaired accordingly
2. That Council builds a cage around both bike repair stations and rangers lock them up at night
3. That Council remove both repair stations

3. POLICY IMPACTS

This project relates to the following components of the ***Alice Springs Town Council Strategic Plan 2018 – 2021:***

Objective 1: A dynamic Community

1.1 Community life, promoting a healthy, vibrant culture

1.1: Inclusiveness and support

1.1.1: Develop and enhance programmes, as well as services

1.3: Safe and reliable public infrastructure

1.3.2: Maintain and improve local footpaths and cycle networks

4. FINANCIAL IMPACTS

Funding is from the Parks budget line 227

5. SOCIAL IMPACTS

The bike repairs stations provide a free bike repair option for the community

Report No. 37 / 20 ts

6. ENVIRONMENTAL IMPACTS

The bike repair stations have a minimal impact on the environment

7. PUBLIC RELATIONS

The bike stations are a positive for the community



Kaitlyn Weekes
PROJECT ADMINISTRATION OFFICER



Scott Allen
DIRECTOR OF TECHNICAL SERVICES

Agenda Item 9.4

REPORT

Report No. 38 / 20 ts

TO: **TECHNICAL SERVICES COMMITTEE – MONDAY 16 MARCH 2020**

SUBJECT: **NT UNIFORM SUBDIVISION GUIDELINES AND ASTC VARIATIONS**

AUTHOR: **MANAGER DEVELOPMENTS – DILIP NELLIKAT**

EXECUTIVE SUMMARY

This report provides information on the variations proposed under Section 14 of the NT Uniform Subdivision Guidelines (NTUSG) which will allow the adoption of these guidelines, including the regional specific differences that mandate the relevant Council's requirements.

RECOMMENDATION:
That it be a recommendation to Council

That Council receives this report and endorses the NT Uniform Subdivision Guidelines inclusive of the variations.

REPORT

1. BACKGROUND

The NTUSG was created by the NT Government (NTG) in order to provide developers and all stakeholders, with a common platform for reference to help with developments proposed within the NT. As a result of the ongoing discussions that the NTG has been having with local government authorities and various stakeholders within the NT, a section incorporating regional specific differences was introduced within the NTUSG under Section 14.

This report summarises the variations proposed under Section 14 of this guideline and provides an overview of the proposed variation, to enable an informed Council endorsement.

2. DISCUSSION

Since 2014, the NT Subdivision Guidelines was gradually put together to form a useful document, as presented today. As you may be aware, the creation of this document included processes that were very involving and time consuming. The process included ongoing meetings and conferences that were attended by Council's representatives over the last 5 years. These Guidelines have been prepared by the NTG - Department of Infrastructure, Planning and Logistics involving significant engagement with Developers, Contractors, Consultants, NT Government agencies, Regulatory Authorities, Local Authorities, Service Authorities and other stakeholders. The Alice Springs Town Council, is a prominent stakeholder representing the Central Australian region accompanied by regional Councils such as Central Desert, Mac Donnell and Barkly regional Councils.

It was recognised through the process that, as the Councils service different regions with varying climatic conditions, adjustments were required to be incorporated within this guideline to allow it to be relevant for a proposed region. Wherever possible, most of the requirements have been captured and outlined in Table 1. The Category A (Set 2) and Category D area specific requirements are applicable to the Alice Springs region. Section 14, was introduced to allow the inclusion of requirements (as variations) that have not been specified under the various categories already introduced, to suit relevant Council requirements. Section 14.4 is the section that specifically applies to Alice Springs region. Once endorsed this variation will form a part of NTUSG.

Council (ASTC) has been reassured by the facilitator of this process, that the requirements can be changed in the future, if found to be impractical to Council's operations. A Disclaimer has however been introduced within the variation, to ensure that in the event of any disagreement standard Council requirements will apply.

Report No. 38 / 20 ts

The following attachments have been included in this report to enable a better understanding of the impacts, to allow for an informed endorsement.

Attachment A - Description of impact and Comparison of NTUSG with ASTC proposed Variations under section 14

Attachment B - SDG 14-4 Alice Springs Variation - schedule of variations

Attachment C - Subdivision Development Guidelines Document Set (Includes Part 1 to 4 of NTUSG)

Attachments B and C require Council endorsement prior to being adopted by the NTG.

3. POLICY IMPACTS

Alice Springs Town Council Strategic Plan: 2018 to 2021

Objective 1: A dynamic community

1.3: Safe and reliable public infrastructure

1.3.1: Maintain and improve local road network

1.3.2: Maintain and improve local footpaths and cycle networks

4. FINANCIAL IMPACTS

The impacts vary with the type of variation and is listed in Attachment A, for better understanding.

5. SOCIAL IMPACTS

The impacts vary with the type of variation and is listed in Attachment A, for better understanding.

6. ENVIRONMENTAL IMPACTS

The impacts vary with the type of variation and is listed in Attachment A, for better understanding.

7. PUBLIC RELATIONS

Providing the developer with a commonly used document that incorporates only the regional specific variations is expected to be beneficial to everyone.

8. ATTACHMENTS

Attachment A:	Description of impact and Comparison of NTUSG with ASTC proposed Variations under section 14
Attachment B:	SDG 14-4 Alice Springs Variation - schedule of variations
Attachment C:	Subdivision Development Guidelines Document Set (Includes Part 1 to 4 of NTUSG)



Dilip Nellikat
MANAGER DEVELOPMENTS

Ref. to proposed NT Uniform Subdivision Guidelines	Proposed Variation to NTG Uniform Subdivision Guidelines	Description of impact	Financial impact (yes/no)	ASTC Recommendation *
NT Subdivision Design Guidelines				
2.1 - Table 2 Note 3	A "surface drainage only" design is not acceptable to Alice Springs Town Council.	A surface only drainage philosophy causes following issues: • Reduced service levels, • Potential damage to pavement leading to reduced asset life, • Increased future maintenance cost	Yes	Support sought through endorsement
4.2.2 (b)	The choice of traffic control treatment method, must be to the requirement and satisfaction of the relevant authority and is very much site specific.	Having traffic lights where a round about will suffice affects maintenance costs	Yes	Support sought through endorsement
4.5.1 (a) (ii) Note 1	A "surface drainage only" design is not acceptable to Alice Springs Town Council. Above ground networks are not acceptable.	A surface only drainage philosophy causes following issues: • Reduced service levels, • Potential damage to pavement leading to reduced asset life, • Increased future maintenance cost	Yes	Support sought through endorsement
4.5.1 – Table 7	Minor Street/cul-de-sac minimum carriageway width to be 8m	A 7.5 wide Cul-de-sac will cause traffic bottlenecks due to the nature of on-street parking and large vehicles being used in the NT. This will also cause inconvenience to the road user.	No	Support sought through endorsement
4.7.3 (a)	Minimum pavement thickness is expected to be 200mm	• Reduction in the current proposed thickness of the pavement reduces the available tolerance for likely marginal errors often caused by poor workmanship. • Climatic conditions in Alice springs, dictate huge variations in temperature thereby leading to surface cracking. A thicker pavement reduces the chance	Yes	Support sought through endorsement

Ref. to proposed NT Uniform Subdivision Guidelines	Proposed Variation to NTG Uniform Subdivision Guidelines	Description of impact	Financial impact (yes/no)	ASTC Recommendation *
		of pavement failure caused specifically due to cracking and rutting.		
4.9.3 (c)	The requirements of AS1428.4.1 shall be met in all cases	Removal of the words "should be considered on a case by case basis" reduces ambiguity and introduces certainty to the application of the standard	No	Support sought through endorsement
5.9.2 (d)	Internal LED lighting must be provided to primary pathways and play areas, including pocket parks where they can be sufficiently lit from adjacent street lighting.	Pocket parks although small (upto 3000 sq. m), depending upon the infrastructure installed could lead to crime if not properly lit. These concerns align with CPTED principles and objectives not being met.	No	Support sought through endorsement
7.0 (b)	Adverse impacts on upstream and downstream environments, including both built environments and natural ecosystems, must be mitigated.	Removal of the words "as far as practicable" reduces ambiguity and introduces certainty to the intent that these impacts must be mitigated.	Yes. Will be an added maintenance cost to Council in future	Support sought through endorsement
7.2.1 (a)	All materials and components of the stormwater drainage system must be durable and Fit for Purpose with a minimum design life of 50 years.	A 40 year design life is reduced life expectancy for the asset and not desirable in order to prevent an early future capital investment to Council	Yes	Support sought through endorsement
7.2.3 (iii)	Changed to: "Stormwater detention shall be provided to detain the post development flow rates to pre-development flow rates where required by the Relevant Authority. Infrastructure required to achieve this requirement shall be provided to the reasonable satisfaction of the Relevant Authority"	Change in paragraph description removes ambiguity and brings the developer to council for discussion allowing Council to set clear expectations.	No. There is a financial impact to the developer but this is a legal requirement anyway	Support sought through endorsement
7.2.5 (ii) A	Remove "A) All lots smaller than 600 sq. m;"	NTSDG states:" The following allotments must collect all stormwater	No. Allows home owners	Support sought through endorsement

Ref. to proposed NT Uniform Subdivision Guidelines	Proposed Variation to NTG Uniform Subdivision Guidelines	Description of impact	Financial impact (yes/no)	ASTC Recommendation *
		on the Development Site during the minor storm event and discharge via a Lot Connection into a Lawful Point of Discharge: A) All lots smaller than 600 sq. m;" NT SDG standard drawing shows pits required to be connected to SEP. This is not required. Council adopts this as a variation by deleting A allowing for discharge into Kerb and gutter system.	and small developers to connect to the Kerb and gutter system	
7.5 – Table 19	Residential Zone – Minor Storm to be 0.2 EY (18.13% AEP or 5 year ARI)	NTG have adopted a Q2 event for minor storm water calculations, instead of a Q5 event, thus reducing the capacity of the stormwater system to carry water without reducing serviceability of the road	Yes. Reduces the life span of the pavement over a period of time.	Support sought through endorsement
7.5 – Table 19	All Other Land Use Zone – Minor Storm to be 0.2 EY (18.13% AEP or 5 year ARI)	NTG have adopted a Q2 event for minor storm water calculations, instead of a Q5 event, thus reducing the capacity of the stormwater system to carry water without reducing serviceability of the road	Yes. Reduces the life span of the pavement over a period of time.	Support sought through endorsement
7.5 – Table 20	Table Drains – Minor storm to be 0.2 EY (18.13% AEP or 5 year ARI)	NTG have adopted a Q2 event for minor storm water calculations, instead of a Q5 event, thus reducing the capacity of the stormwater system to carry water without reducing serviceability of the road	Yes. Reduces the life span of the pavement over a period of time.	Support sought through endorsement
7.9.1 – Table 23	Minimum Reinforced Concrete Pipe class to be Class 3	Class 2 pipes require higher clearance from the surface and are low in strength.	Yes. Reduces damage due to	Support sought through endorsement

Ref. to proposed NT Uniform Subdivision Guidelines	Proposed Variation to NTG Uniform Subdivision Guidelines	Description of impact	Financial impact (yes/no)	ASTC Recommendation *
			compaction and provides a better product	
7.9.2 (f)	Pit depths must be a maximum of 3.0 metres, unless otherwise approved by the Relevant Authority.	Modified (f) by removing "pit depths to be a minimum of 1.2 m". This introduces additional constraints to the developer when not needed and creates more wet sumps, potential mosquito breeding spots etc.	No	Support sought through endorsement
7.4.3 (Section Added)	ADD SECTION: 7.4.3: Sag Points and Overland Flow Sag points and land locked catchments will not be accepted in a new development. All new roads must drain, with a defined overland flow path located in public land (road reserve or public open space) to convey the 1%AEP storm event and any emergency overflows.	Sag points and land locked catchments are not addressed in the NTG subdivision guidelines	No	Support sought through endorsement
7.9.10 – Table 24	Maximum Velocity - Not to exceed scour velocity	Removed "as determined by the designer" to remove ambiguity, as Scour velocity is the determining factor	No	Support sought through endorsement
7.9.11 – Table 25	Minimum Freeboard: Freeboard to be the greater of: • 300mm; and • 20% of Channel Depth;	Removed "• Velocity Head (V2/2g)" as this factor is currently unfamiliar	No	Support sought through endorsement
7.9.12 – Table 26	Reinforced Concrete box culverts: Designed in accordance with Australian Standards Provide sealed joints with mortar and external seals	Removed "minimum height – 450mm" to avoid clashing with other services unless actually required.	No	Support sought through endorsement
7.9.14 (d)	Detention basins must be modelled using DRAINS software and designed to ensure pre-development flow rates are not exceeded for all storm events ranging from 1EY to 1% AEP, and all storm durations ranging from	Replaced "…Modelled using runoff routing software…" with "…Modelled using DRAINS software…" as DRAINS is more widely used	No	Support sought through endorsement

Ref. to proposed NT Uniform Subdivision Guidelines	Proposed Variation to NTG Uniform Subdivision Guidelines	Description of impact	Financial impact (yes/no)	ASTC Recommendation *
	10min to 72 hours.			
12 (a) (i)	Local Authority in relation to street lighting is Power and Water Authority. Lighting to other public parks and places to be vested under the authority with relevant land ownership.	Removed reference to Council being the local authority in charge of Street lighting	No	Support sought through endorsement
Inclusion of ASTC Section 2.0 - Flowchart	The Flow Chart is an information on the process here in Alice Springs and may not be relevant to the NTG Uniform Subdivision Guideline. The ASTC document continues to be available for reference.	Provides clear guidance on the existing process in Alice Springs	No	Support sought through endorsement
Inclusion of specific Parking requirements	Design of off-street parking proposed to be under Council ownership has to be designed as per section 4.8, Figure 2 of ASTC Subdivision Requirements	Provides wider parking to accommodate the larger type vehicles used in Alice Springs	No	Support sought through endorsement

**Note: This document requires Council endorsement prior to being forwarded to DIPL for acceptance into the NT Subdivision Guidelines.*

SCHEDULE OF VARIATIONS

14.4. ALICE SPRINGS TOWN COUNCIL

DISCLAIMER: WHILE ALL DUE CARE AND DILIGENCE HAS BEEN UNDERTAKEN TO ENSURE THAT THE VARIATIONS TO THE NT SUBDIVISION GUIDELINES AND SUPPORTING DOCUMENT HAS BEEN UNDERTAKEN, IN THE EVENT OF ANY DISPUTE OR DISAGREEMENT BETWEEN NEGOTIATING PARTIES, THE ALICE SPRINGS TOWN COUNCIL TECHNICAL REQUIREMENTS WILL APPLY.

Document Reference	Detail of Variation (under NT SDG Part 1)	Variation Date
2.1 - Table 2 Note 3	A "surface drainage only" design is not acceptable to Alice Springs Town Council.	2 March 2020
4.2.2 (b)	The choice of traffic control treatment method, must be to the requirement and satisfaction of the relevant authority and is very much site specific.	2 March 2020
4.5.1 (a) (ii) Note 1	A "surface drainage only" design is not acceptable to Alice Springs Town Council. Above ground networks are not acceptable.	2 March 2020
4.5.1 – Table 7	Minor Street/cul-de-sac minimum carriageway width to be 8m	2 March 2020
4.7.3 (a)	Minimum pavement thickness is expected to be 200mm	2 March 2020
4.9.3 (c)	The requirements of AS1428.4.1 shall be met in all cases	2 March 2020
5.9.2 (d)	Internal LED lighting must be provided to primary pathways and play areas, including pocket parks where they can be sufficiently lit from adjacent street lighting.	2 March 2020
7.0 (b)	Adverse impacts on upstream and downstream environments, including both built environments and natural ecosystems, must be mitigated.	2 March 2020
7.2.1 (a)	All materials and components of the stormwater drainage system must be durable and Fit for Purpose with a minimum design life of 50 years.	2 March 2020
7.2.3 (iii)	Changed to: "Stormwater detention shall be provided to detain the post development flow rates to pre-development flow rates where required by the Relevant Authority. Infrastructure required to achieve this requirement shall be provided to the reasonable satisfaction of the Relevant Authority"	2 March 2020
7.2.5 (ii) A	Remove "A) All lots smaller than 600 sq. m;"	2 March 2020
7.5 – Table 19	Residential Zone – Minor Storm to be 0.2 EY (18.13% AEP or 5-year ARI)	2 March 2020
7.5 – Table 19	All Other Land Use Zone – Minor Storm to be 0.2 EY	2 March 2020
7.5 – Table 20	Table Drains – Minor storm to be 0.2 EY	2 March 2020

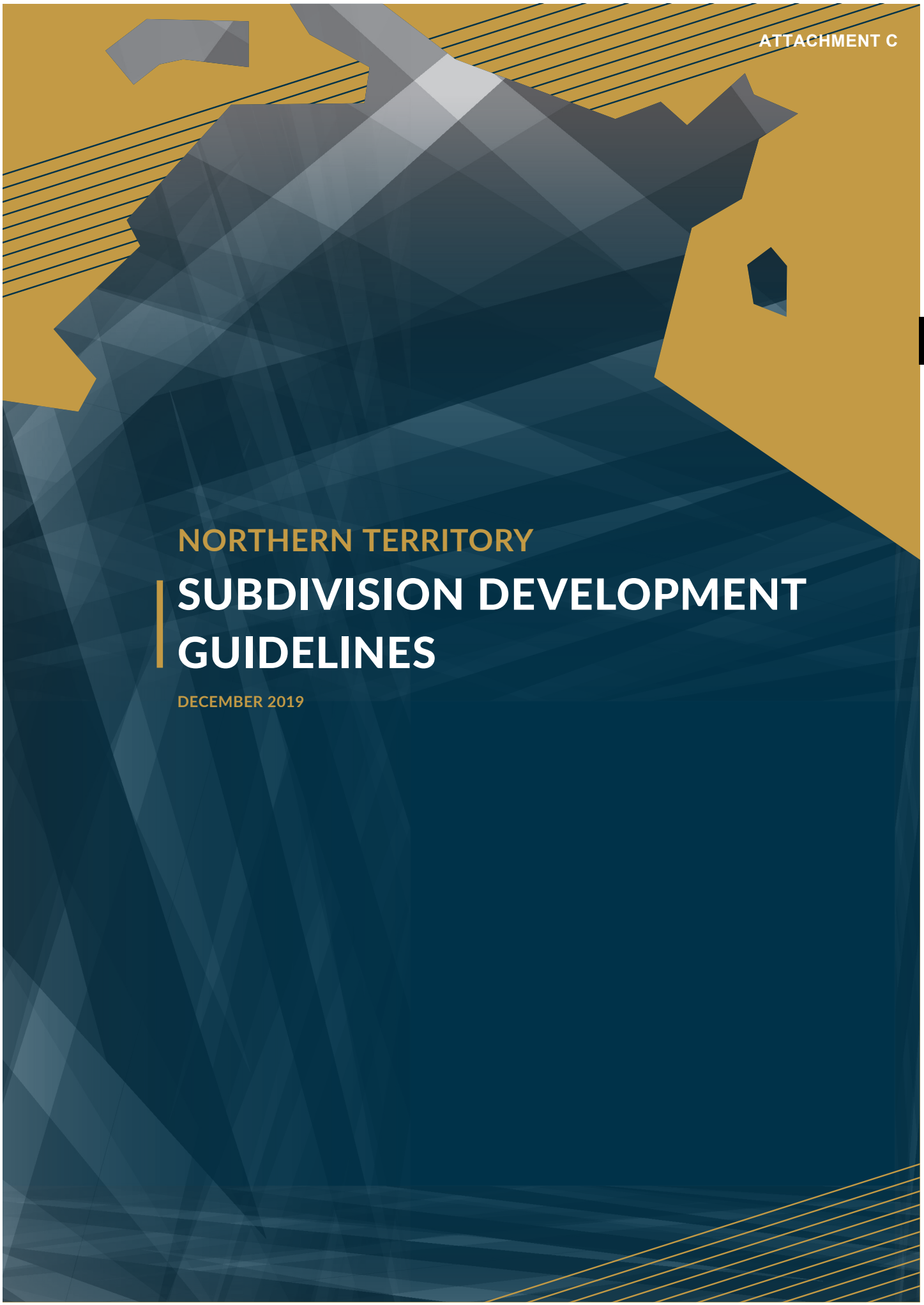
7.9.1 – Table 23	Minimum Reinforced Concrete Pipe class to be Class 3	2 March 2020
7.9.2 (f)	Pit depths must be a maximum of 3.0 metres, unless otherwise approved by the Relevant Authority.	2 March 2020
7.4.3 (Section Added)	ADD SECTION: 7.4.3: Sag Points and Overland Flow Sag points and land locked catchments will not be accepted in a new development. All new roads must drain, with a defined overland flow path located in public land (road reserve or public open space) to convey the 1%AEP storm event and any emergency overflows.	2 March 2020
7.9.10 – Table 24	Maximum Velocity - Not to exceed scour velocity	2 March 2020
7.9.11 – Table 25	Minimum Freeboard: Freeboard to be the greater of: 300mm; and 20% of Channel Depth;	2 March 2020
7.9.12 – Table 26	Reinforced Concrete box culverts: Designed in accordance with Australian Standards Provide sealed joints with mortar and external seals	2 March 2020
7.9.14 (d)	Detention basins must be modelled using DRAINS software and designed to ensure pre-development flow rates are not exceeded for all storm events ranging from 1EY to 1% AEP, and all storm durations ranging from 10min to 72 hours.	2 March 2020
12 (a) (i)	Local Authority in relation to street lighting is Power and Water Authority. Lighting to other public parks and places to be vested under the authority with relevant land ownership.	2 March 2020
Inclusion of ASTC Section 2.0 - Flowchart	The Flow Chart provides information on the process adopted in Alice Springs and is not relevant to the NTG Uniform Subdivision Guidelines. The ASTC document continues to be available for reference.	2 March 2020
Inclusion of specific Parking requirements	Design of off-street parking proposed to be under Council ownership has to be designed as per section 4.8, Figure 2 of ASTC Subdivision Requirements	2 March 2020

PROPOSED CORRECTIONS

4.6.4(c) (i)	Reference to “Soft Landscaping: to be Section 6.	2 March 2020

ATTACHMENT C

9.4



NORTHERN TERRITORY

SUBDIVISION DEVELOPMENT GUIDELINES

DECEMBER 2019

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ABOUT THESE GUIDELINES

USE OF THIS DOCUMENT

These Guidelines are for developers, planners, engineers, technical consultants and contractors involved in Subdivision design and construction in the Northern Territory. They apply to all Subdivisions regardless of land use zoning, locality, size and existing site conditions. Given the variable context of Subdivisions in the Northern Territory, it is acknowledged that some elements of these Guidelines will not always be required and the Developer should consult with the Relevant Authorities to confirm expectations for their Subdivision.

These Guidelines have been prepared by the Northern Territory Government Department of Infrastructure, Planning and Logistics involving significant engagement with Developers, Contractors, Consultants, NT Government agencies, Regulatory Authorities, Local Authorities, Service Authorities and other stakeholders.

These Guidelines provide best practice engineering design and construction standards for important Public Infrastructure such as streets and pathways, public open space and landscaping, stormwater drainage, and utility services. They set out the minimum standards required by Relevant Authorities to facilitate clearance of Development Permit conditions imposed on a Subdivision by the Northern Territory Development Consent Authority; the approval authority under the *Planning Act 1999 (NT)*.

SCOPE EXCLUSIONS

Limited guidance is provided on subdivision planning processes. For detailed requirements, the Developer must refer to the Planning Scheme.

Planning, design and construction of all works within Northern Territory Government Controlled Road Reserves must be undertaken in accordance with the Department of Infrastructure, Planning and Logistics Performance and design Standards for Northern Territory Roads.

Planning, design and construction of utilities including water, sewer, electrical and communications infrastructure must be undertaken in accordance with the applicable Service Authority's requirements. General guidance is provided within this document; however, all such works must be undertaken to the satisfaction of the applicable Service Authority.

This document does not address commercial matters including, but not limited to, fees which may be imposed by Relevant Authorities for review/approval of documentation, issuing of permits, site inspections, acceptance of assets, security bonds etc. The Developer must liaise with the Relevant Authorities to inform themselves of applicable expenses.

STRUCTURE OF THESE GUIDELINES

This document forms Part 1 of the Northern Territory Subdivision Development Guidelines and must be read in conjunction with the following parts:

- Part 2 - Reference Documents;
- Part 3 - Standard Drawings; and
- Part 4 - Standard Specifications.

PRECEDENCE

In the event of an inconsistency, conflict, discrepancy, error, or omission between or among the provisions of these Guidelines and the Reference Documents above, the Developer must immediately notify the Relevant Authority for direction on how to remedy such inconsistency, conflict, discrepancy, error, or omission.

DISCLAIMER

Reasonable efforts have been made to ensure that material in these Guidelines is accurate and up to date at the date of publication, however, these Guidelines in no way constitute the provision of professional advice, and should not be relied upon as or in substitution for independent professional advice.

The Territory and each Relevant Authority does not guarantee, and accepts no legal liability whatsoever arising from or connected to, the accuracy, reliability, currency or completeness of any material contained in these Guidelines, Standard Drawings, Standard Specifications, any Reference Document, Base Standard or any linked website. Developers must seek and rely upon appropriate independent professional advice for all aspects of any Subdivision or Development Works.

SCHEDULE OF VARIATIONS

Refer to the Schedule of Variations in Section 14 for variations to these Guidelines imposed by Relevant Authorities.

INFORMATION

These Guidelines are available electronically in PDF from the Northern Territory Subdivision Development Guidelines Online Platform.

For further information regarding these Guidelines contact:-

Manager Specification Services
Department of Infrastructure, Planning and Logistics
PO Box 61
Palmerston NT 0831

Telephone: (08) 8946 5021
Email: DocumentationServicesDIPL@nt.gov.au

First edition - December 2019

PROPONENTS AND CONTRIBUTORS TO THE GUIDELINES:

NORTHERN TERRITORY SUBDIVISION DEVELOPMENT GUIDELINES

December 2019

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DEFINITIONS

Definitions	
AAPA	Aboriginal Areas Protection Authority – the authority established under the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* for the management of Sacred Sites records and the issue of Authority Certificates under that Act.
Adjacent Land	Land adjacent to but not forming part of the Development Site upon which any works in relation to a subdivision development are, or are to be, undertaken.
Areas of Significance	Include (but are not limited to) important public facilities such as hospitals, police stations, fire stations, cyclone shelters, schools, shopping centres and medical clinics.
As-Constructed Drawings	Detailed drawings showing the completed works and any variation to the approved Construction Drawings carried out during the construction phase, signed and certified as complete and accurate by: • a Certifying Engineer having undertaken appropriate regular inspections and having made appropriate enquiries in respect of the state of completion of the relevant component of Public Infrastructure; and • the Developer. Detailed requirements for the format of As-Constructed Drawings is provided in the Standard Specification for Subdivisions (Refer Part 4).
As-Constructed Survey	Detailed survey plans recording any variations between the approved Construction Drawings and as-constructed works, signed and C ertified as complete and accurate by: • a Licensed Surveyor who is currently registered under the provisions of Part IV of the *Licensed Surveyors Act 1983 (NT).*; and • the Developer. Detailed requirements for the format of As-Constructed Survey is provided in the Standard Specification for Subdivisions (Refer Part 4).
AS/NZS	Australian Standard / New Zealand Standard
Authorised Connection	An approved connection between Public Infrastructure constructed (or to be constructed) as part of a subdivision development and any existing Public Infrastructure owned, or to be owned, by a Relevant Authority (e.g. a connection to an existing power, water or sewer main).
Average Daily Traffic	Average Daily Traffic (ADT) is the unadjusted average number of vehicles passing in both directions at a specified location of a roadway (i.e. the total volume of vehicle traffic on a street for a year divided by 365 days). ADT is a useful and simple measurement of how busy a street is, used primarily in transportation planning and engineering.
Base Standards	The minimum design and construction standards, and the requirements under them. Set out in Part 2 - Reference documents.

Definitions	
Business Day	A day other than a Saturday, Sunday or public holiday in the place in which the Development Site is situated, also excluding: • 27th, 28th, 29th, 30th and 31st December; and • any day officially registered by Bureau of Meteorology on 'Cyclone Warning' in the place in which the Development is situated.
CCTV Inspection	Closed Circuit Television camera inspection carried out by a suitably qualified professional on underground pipes, culverts and/or conduits to report on obstructions and/or defects.
Certification	A written acknowledgment by a Certifying Engineer that the design and/or construction of each component of Development Works has been completed in accordance with the requirements of all laws and approvals, these Guidelines, all Base Standards and any other relevant documentation. Approved deviations from these requirements should be clearly stated. The Term "Certified" has a corresponding meaning.
Certifying Engineer	A Consultant and/or their duly authorised representative(s) appointed by the Developer to undertake design and/or construction Certification associated with each component of the Development Works. The Certifying Engineer must be an independent, professional engineer who is competent in the relevant component of the Development Works. The Certifying Engineer must be a Chartered Professional Engineer, unless noted otherwise. The Certifying Engineer, or their employing organisation, must hold an appropriate level of Professional Indemnity Insurance for the component of the Development Works being Certified.
Clearance Letter	A letter issued by a Relevant Authority advising that the relevant works required as a condition of a Development Permit have been completed to the satisfaction of the Relevant Authority.
Completion Certificate	A letter prepared, signed, and submitted to a Relevant Authority by the Certifying Engineer certifying that a component of the Development Works has been completed in accordance with the requirements of all laws and approvals, these Guidelines and all Base Standards; and there are no outstanding work elements or uncorrected and/or unsatisfactory work. This document should include a listing of all design variations, construction non-conformances (with approvals obtained for corrective actions) and other non-compliances.
Consultant	Any person or entity appointed or engaged by the Developer to undertake various planning, design, construction, and/or Certification activities associated with a subdivision development, including the employees, agents or representatives of those Consultants.
Construction Cost	The actual cost to construct a component of the Development Works, as reported and certified by the project manager or a quantity surveyor engaged by the Developer. Typically reported for assets to be handed over to Relevant Authorities and should reflect the replacement value of the assets. Individual Relevant Authorities may have their own Asset Valuation forms and processes to be used by the Developer.

Definitions	
Construction Drawings	'Issued For Construction' Drawings, approved for use by a Relevant Authority pursuant to Section 2.5 of these Guidelines.
Construction Report	A consolidated report containing all construction information relevant to the Development Works, including as a minimum: • a description of the Development Works and construction program; • copies of all relevant permits, approvals and/or Clearance Letters obtained for the Development Works, including approved mix designs; • details of all actions taken in respect of meeting conditions imposed by relevant permits, approvals and/or Clearance Letters; • a statement of compliance with environmental protection measures; • a register of design changes made during construction to the approved Construction Drawings, including copies of approval by the Certifying Engineer and Relevant Authority. • photographs of key construction phases; • a summary of all inspections and testing carried out, identifying: ◦ non-conforming works removed and replaced; ◦ nonconforming works where it has been reworked and retested; and ◦ non-conforming works where corrective actions have been approved. • a summary of compliance testing results in a table format, demonstrating compliance with the required test frequencies in the Standard Specification for Subdivisions (Refer Part 4); and • copies of full inspection and testing records, including NATA endorsed certificates for all conformance testing as set out in the approved Inspection and Test Plan(s) and the Standard Specification for Subdivisions (Refer Part 4). Inspection and Test Plan(s) must be signed to confirm the release of Inspection Points and be supported with lot testing plans for easy identification of testing locations.
Contractor	Each person or entity bound by a contract with the Developer to execute the Development Works (including that person or entity's employees, agents, subcontractors or representatives) on behalf of the Developer.
Defect	Any item of work or materials which is incomplete, defective, deficient, unsafe, failing, non-complying or not Fit For Purpose in respect of any component of Public Infrastructure constructed as part of or in connection with any Development Works. This includes errors and omissions from design and/or construction works. Includes Major Defects and Minor Defects, as defined separately.

DEFINITIONS

Definitions

Defects Liability Period	Means the period of time the Developer is liable for any Defect occurring in relation to Public Infrastructure to be handed over to the Relevant Authority, commencing on the Practical Completion Date for that component of Public Infrastructure and expiring at the end of the relevant period defined below:

Type of Development Works	Initial Defects Liability Period	Extended Defects Liability Period for the Development Works subject of rectification works
Public Infrastructure (excluding Landscaping)	24 months	24 months from the date of completion of the rectification works
Landscaping works, including grassing and planting	12 months	12 months from the date of completion of the rectification works
Any defect caused or contributed to by groundwater seepage	36 months	36 months from the date of completion of the rectification works

Design Documentation	Technical specifications, plans, drawings, calculations, reports and other documents required to satisfactorily detail all aspects of the Development Works.
Design Report	A report describing the intent, criteria, assumptions, and considerations involved in the design that is to be submitted for approval by the Relevant Authority.
Developer	The owner of the land the subject of a subdivision development, including the Developer's Representative(s).
Developer's Representative	A person or entity (and each of their employees, agents, Contractors, subcontractors and consultants) appointed, authorised or otherwise engaged by the Developer to act on their behalf in communications with any Relevant Authority or Regulatory Authority for the purpose of or in connection with undertaking a component of the Development Works.
Development Application	An application for approval of a proposed Subdivision lodged pursuant to the *Planning Act 1999 (NT)*.
Development Consent Authority	Has the meaning given to it in the *Planning Act 1999 (NT)*
Development Permit	Any permit issued by a Development Consent Authority, pursuant to the *Planning Act 1999 (NT)*.
Development Site	The parcel or parcels of land (including any part of any parcel) on which Development Works are being, have been or are to be undertaken and includes: • Adjacent Land for the time and to the extent of any works on Adjacent Land; and • any other land affected by External Works for the time and to the extent of any works on that land.

Definitions	
Development Works	All and any works that are to be undertaken on the Development Site, or Adjacent Land, and any External Works, as part of or in furtherance of the Subdivision (including works to complete the conditions of any Development Permit, or any conditions necessary to satisfy the requirements of any Relevant Authority or Regulatory Authority).
Dilapidation Report	A report on the condition of Public Infrastructure at a given point in time. Typically completed on existing Public Infrastructure prior to Development Works commencing, recording any existing damage and the state of any particular assets that may be affected by the Development Works.
Dry Season Base Flows	Low flows resulting from groundwater seepage due to drawdown of the wet season groundwater table, or irrigation in urban catchments.
External Works	All Development Works external to the Development Site (including, but not limited to, any works on Adjacent Land) and necessary for proper subdivision or development including, but not limited to, the construction, reconstruction or upgrade of Public Infrastructure, private infrastructure, or public or privately owned lands affected by, or having effect on, the proposed Subdivision.
Fit For Purpose	Appropriate, and of the necessary standard and quality, for its intended use or purpose.
Guidelines	Means all four parts of this document, being: Part 1 – Design Guidelines Part 2 – Reference Documents Part 3 – Standard Drawings Part 4 – Technical Specifications
Inspection and Test Plan	Any plan, approved by each Relevant Authority, setting out the minimum inspection and testing requirements for Public Infrastructure to demonstrate conformance with the Standard Specification and the requirements of each Relevant Authority.
Inspection Point	Any component of the Public Infrastructure requiring inspection by the Certifying Engineer and/or Relevant Authority to demonstrate conformance with the Standard Specification and the requirements of each Relevant Authority.
Lawful Point of Discharge	An approved connection between stormwater drainage Public Infrastructure constructed (or to be constructed) as part of a Subdivision and any existing Public Infrastructure owned, or to be owned, by a Relevant Authority.
Local Authority	The council constituted under the *Local Government Act 2008 (NT)* in respect of the area in which the Development Site is situated.
Major Defects	Defects which prohibit safe operation of Public Infrastructure and/or safe use of public areas, or cause significant loss of amenity.
Master Services Plan	Means a Rural Master Services Plan or an Urban Master Services Plan.
Minor Defects	Defects which do not prohibit safe operation of Public Infrastructure and/or safe use of public areas, and do not cause significant loss of amenity.

DEFINITIONS

Definitions	
Northern Territory Government Controlled Roads	The roads, including Road Reserves, under the care, control and management of the Northern Territory Government and its relevant Department(s).
Northern Territory Land Suitability Guidelines	The document by that name referenced in the Planning Scheme.
Nuisance	Any interference with a public or private right including, without limitation, any hazard, annoyance, interference, harm, loss (including expense) or damage caused by dust, fumes, heat, sound, vibration, escape of gases or liquids causing damage to land or other property or interfering with the use and enjoyment of them.
Planning Scheme	The Northern Territory Planning Scheme under the *Planning Act 1999 (NT)*.
Practical Completion	In relation to each component of the Development Works intended to be handed over to a Relevant Authority, when: • The Developer has provided the Relevant Authority with all items required under Section 13 - Practical Completion, Defects, Securities, Handover and Acceptance; and • The Relevant Authority is satisfied that the works are complete in accordance with these Guidelines and the Design Documentation except for Minor Defects which: ◦ do not individually or in the aggregate prevent the Development Works from being used for their intended purpose; ◦ are of the type that the Relevant Authority is satisfied there are reasonable grounds for not promptly rectifying them; and ◦ can be rectified without affecting the convenient use of the works or any other affected Public Infrastructure.
Practical Completion Date	The date that Practical Completion has been achieved, as Certified by a Relevant Authority in a Practical Completion Letter.
Practical Completion Letter	A letter issued by a Relevant Authority to the Developer for a component of the Development Works acknowledging Practical Completion has been reached. This marks the commencement of the Defects Liability Period for that component of the Development Works.
Project Specific Requirements	Means any variation of the requirements of the Standard Specification documented using the template provided and submitted to, and approved in writing by, each Relevant Authority in respect of a particular Subdivision.
Public Infrastructure	Any infrastructure currently, or proposed to be, owned and maintained by a Relevant Authority. Includes any component of the Development Works that is intended to be handed over to and accepted, and thereafter owned and maintained, by a Relevant Authority.
Registered Member	Means a person or entity that has applied for and been allocated a user ID and password in respect of the online version of these Guidelines.

Definitions	
Regulatory Authority	Any governmental, semi-governmental, public, statutory or judicial body, entity, department or authority responsible for exercising statutory powers, rights or other authority under any legislation, subordinate legislation, or other legislative instrument in force from time to time in the Northern Territory and, for each component of Public Infrastructure, means any such body that regulates the design, construction, use, discharge to or from the infrastructure (whether or not that body will or is intended to own that Public Infrastructure upon completion of a Subdivision). Regulatory Authorities include, but are not limited to, the Development Consent Authority and the Power and Water Corporation in its capacity as regulator for electricity, water, and sewerage infrastructure.
Relevant Authority	Means, for a component of Public Infrastructure constructed as part of the Development Works, any governmental, semi-governmental, public, statutory body, statutory corporation or government owned corporation, entity, department or authority that is intended to accept handover of, own and maintain that Public Infrastructure after Practical Completion. Includes Service Authority and Local Authority as applicable.
Request for Amendment	Means a request by a stakeholder for an amendment to these Guidelines (other than in relation to Section 14 - Schedule of Variations), pursuant to the requirements of Section 1.8.
Request for Variation	Means a request by a Relevant Authority or Regulatory Authority for a new or amended Variation in Section 14 - Schedule of Variations, pursuant to the requirements of Section 1.7.
Road Reserve(s)	Means any area of land reserved or dedicated, or to be reserved or dedicated, to the Northern Territory of Australia or a Local Authority as a road or street under the *Control of Roads Act 1953 (NT)*, *Local Government Act 2008 (NT)*, or the *Planning Act 1999 (NT)* and includes a road reserve in respect of a street as referred to in these Guidelines.
Rural Master Services Plan	Means a plan or plans showing the locations of all proposed water, sewer, electrical, gas, communications and associated infrastructure. Rural Master Services Plans must include locations of all proposed bores and septic systems, and all constrained land, demonstrating feasible bore and septic locations for every lot in the proposed Subdivision having regard to all constraints and all required separations. Rural Master Services Plans must have all of the features and details depicted on the example Rural Master Services Plan at Part 3.
Sacred Site	Any site that is sacred to Aboriginals or is otherwise of significance according to Aboriginal tradition, and includes any land that, under a law of the Northern Territory, is declared to be sacred to Aboriginals or of significance according to Aboriginal tradition.
Security Bond	Cash or a monetary guarantee lodged or to be lodged by the Developer in accordance with Section 13.3.
Service Authority	Has the meaning given to it in the *Planning Act 1999 (NT)*.
Standard Drawings	The Standard Drawings, as referenced in Part 3 of these Guidelines.

DEFINITIONS

Definitions	
Standard Specification	A document that specifies the minimum technical standards for construction of Development Works, as referenced in Part 4 of these Guidelines.
Subdivision	Has the meaning given to it in the *Planning Act 1999 (NT)*.
Subdivision Masterplan	A plan featuring the requirements as outlined in Section 2.3 for all stages of the Development Works.
Trade Waste	Has the meaning given to it in the *Water Supply and Sewerage Services Act 2000 (NT)*.
Urban Master Services Plan	Means a plan showing the locations of all proposed water, sewer, electrical, gas, communications and associated infrastructure. Urban Master Services Plans must have all of the features and details depicted on the example Urban Master Services Plan at Part 3.
Waterway	Has the meaning given to it in the *Water Act 1992 (NT)*.

GLOSSARY

AAPA	Aboriginal Areas Protection Authority
ADT	Average Daily Traffic
AEP	Annual Exceedance Probability
ARI	Annual Reoccurrence Interval
ARRB	Australian Road Research Board
BAS	Building Advisory Services
BPESC	Best Practice Erosion and Sediment Control
CBR	California Bearing Ratio
COP	Code of Practice
CPESC	Certified Professional in Erosion and Sediment Control
CPTED	Crime Prevention through Environmental Design
DAS	Development Assessment Services
DCA	Development Consent Authority
DCP	Developer Contribution Plan
DENR	Department of Environment and Natural Resources
DIPL	Department of Infrastructure, Planning and Logistics
DOH	Department of Health
EIA	Environmental Impact Assessment
ERA	Environmental Risk Assessment
ESCP	Erosion and Sediment Control Plan
EY	Exceedances per Year
ICEG	Indigenous Community Engineering Guidelines
IECA	International Erosion Control Association
ISO	International Organisation for Standardisation
LTO	Land Titles Office
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NATA	National Association of Testing Authorities
NBN	National Broadband Network
NEMA	National Electrical Manufacturer's Association
NT EPA	Northern Territory Environment Protection Authority
Planning Scheme	NT Planning Scheme
OWMS	On-site Wastewater Management System
QUDM	Queensland Urban Drainage Manual
SEP	Side Entry Pit
TIA	Traffic Impact Assessment
VPD	Vehicles per Day
WPZ	Wellhead Protection Zones
WSAA	Water Services Association of Australia
WSUD	Water Sensitive Urban Design

PART 1

DESIGN GUIDELINES

1. INTRODUCTION

(a) These Guidelines provide the technical framework for the design and construction of new Public Infrastructure for Subdivisions in the Northern Territory of Australia (NT).

(b) These Guidelines have been developed as a reference for Developers and their planners, design engineers, Consultants and Contractors. They set out a range of minimum design and construction standards accepted by Relevant Authorities and Regulatory Authorities. These Guidelines also set out a model for productive early engagement with Relevant Authorities and Regulatory Authorities.

(c) These Guidelines assume technical subdivision design will be undertaken by suitably qualified professionals and therefore do not restate in full the technical design and construction principles included in the Base Standards.

1.1. PURPOSE

(a) This document provides a clear and concise approach to design, construction and maintenance requirements for Subdivisions. These Guidelines represent the required standard of design and construction of Public Infrastructure to facilitate the handover of such infrastructure to Relevant Authorities. These Guidelines aim to:

  (i) consolidate the Subdivision design guidelines, reference documents, standard drawings and technical standards of Relevant Authorities and Regulatory Authorities responsible for Public Infrastructure in a single location.

  (ii) balance the requirement to provide robust Public Infrastructure with an appropriate life expectancy and the need for cost effective, affordable land development.

  (iii) coordinate infrastructure delivery across catchments, networks and precincts throughout the Northern Territory.

  (iv) promote best practice safety and environmental management.

  (v) encourage engagement of Relevant Authorities and Regulatory Authorities early in the design process.

(b) These Guidelines are intended to be read in conjunction with the Planning Scheme, NT and Commonwealth legislation, all Base Standards and other relevant approved policies.

(c) These Guidelines are subject to all laws (and any legislative instruments under them) in force in the Northern Territory and do not in any way limit the operation of those laws or instruments. Despite anything in these Guidelines, Developers and their designers, planners, Consultants and Contractors must comply with all laws in force in the Northern Territory.

1.2. FUNCTION

(a) These Guidelines apply to Subdivisions under the *Planning Act 1999 (NT)*. Development Permits issued under the *Planning Act 1999 (NT)* may include conditions relating to the requirements for the design, construction and maintenance requirements of Public Infrastructure outlined in these Guidelines. Clearance of Development Permit conditions issued under Part V of the *Planning Act 1999 (NT)* will rely on Relevant Authorities and Regulatory Authorities being satisfied that:

  (i) Public Infrastructure has been designed in accordance with these Guidelines and relevant Base Standards;

  (ii) Public Infrastructure has been delivered Fit For Purpose and constructed in accordance with the approved Design Documentation, Standard Drawings and Standard Specification; and

  (iii) the requirements of Section 13. Practical Completion, Defects, Securities, Handover and Acceptance have been met.

(b) Design and construction of Subdivisions in accordance with these Guidelines will facilitate the efficient handover of Public Infrastructure to Relevant Authorities.

(c) These Guidelines are broken into the following four parts.

(i) Part 1 – Design Guidelines that establish the key principles for the design of Subdivision Public Infrastructure.

(ii) Part 2 - Reference Documents that are relevant to Public Infrastructure design, construction and maintenance from Relevant Authorities and Regulatory Authorities.

(iii) Part 3 – Standard Drawings that set out specific design and/or construction requirements for the delivery of Public Infrastructure.

(iv) Part 4 – Technical Specifications that provide standards for the construction of Public Infrastructure.

1.3. PLANNING AND INFRASTRUCTURE CONTEXT

(a) The Department of Infrastructure Planning and Logistics has developed an integrated approach to planning and infrastructure delivery for land development in the Northern Territory. Figure 1 and Figure 2 provide a framework for the steps required, from regional planning to completion of liveable neighbourhoods supported by services and social infrastructure.

(b) The identification of Regional, Sub-Regional and District and Neighbourhood planning stages facilitates an orderly progression from high level planning through to detailed planning of enabling infrastructure down to the neighbourhood level.

(c) At the regional level the Planning Scheme sets out Regional Land Use Frameworks for Darwin, Alice Springs, Katherine and Tennant Creek.

(d) At the Sub-Regional level planning studies provide a detailed guide for land use within a region supported by detailed land suitability and infrastructure investigations. Sub-Regional planning includes provision for social infrastructure such as schools, medical centres, post office, library, local courthouse, and police and emergency services headquarters. Associated enabling infrastructure includes sub-arterial roads, wastewater treatment plants, power zone substations and elevated water tanks.

(e) The Planning Scheme includes Area Plans for urban areas, Litchfield and major remote towns. Enabling infrastructure for a district includes power distribution lines, trunk sewer, water main and collector streets and social infrastructure includes facilities such as a school, football oval, fire station, doctor's clinic and library. Neighbourhood planning is at the level of individual suburbs and streets and requires enabling infrastructure such as power, water, sewerage, communications and local streets. Neighbourhood social infrastructure includes shops, parks and playgrounds.

(f) The stages in the overall development process are outlined in Figure 3 which indicates that the development of a subdivision, the subject of these Guidelines, is dependent on significant prior enabling works being undertaken before land is development ready.

1.4. WHEN TO USE THESE GUIDELINES

(a) These Guidelines will apply to the planning, design and construction of all Subdivisions that require consent under the *Planning Act 1999 (NT)*, where these Guidelines are the adopted standard of any Relevant Authority or Regulatory Authority. A list of authorities can be found via the Subdivision Development Guidelines Online Platform.

(b) The Planning Scheme establishes provisions for the assessment of Development Applications relating to Subdivision, including minimum lot sizes, general layout, the provision of open space etc. and must be read in conjunction with these Guidelines and the requirements of Relevant Authorities. The requirements of the Planning Scheme prevail to the extent of any inconsistency with these Guidelines.

(c) All subdivisions, whether of zoned or unzoned land, require a Development Permit.

(d) Common types of Subdivision that occur in the Northern Territory and considered by these Guidelines include:

(i) Residential (and mixed use) – subdivisions of predominantly residential lots often developed as planned suburbs, which may include commercial, community and open space lots. Typical zones include Zone FD (Future Development), Zone SD (Single Dwelling), Zone MD (Multiple Dwelling), Zone MR (Medium Density), Zone HR (High Density) and Zone CL (Community Living). May also include non-residential zones such as Zone C (Commercial), Zone TC (Tourist Commercial), Zone CP (Community Purposes) or other zones.

(ii) Rural – subdivisions of large rural lots, often located on the fringes of Residential areas. Typical zones include Zone RR (Rural Residential), Zone RL (Rural Living) and Zone R (Rural). May also include other zones such as Zone H (Horticulture) or Zone A (Agriculture).

(iii) Industrial – subdivisions of large lots serviced to provide for the needs of manufacturing, treatment, storage or processing of goods, equipment and materials. Typical zones include Zone LI (Light Industry), Zone G (General Industry) and Zone DV (Development). May include zones such as Zone SC (Service Commercial) or others.

(e) To the extent that Development Permit conditions require clearance by, or the construction of any Public Infrastructure to the standards or requirements of, any Relevant Authority or Regulatory Authority, those Authorities will have regard to these Guidelines as well as to the broader context in which the relevant Subdivision is proposed to take place.

1.5. GREENFIELD AND BROWNFIELD SUBDIVISIONS

(a) Greenfield Subdivisions occur on land that has not previously been developed to any significant extent, typically taking the form of new residential or industrial estates. In the absence of prior development, it is often necessary for the Developer to establish external Public Infrastructure (or headworks) to service the Development Site based on the highest density of land use allowable under the proposed zoning and Planning Scheme. Greenfield Subdivisions typically involve the provision of new streets, pathways, driveways, public open space (where applicable), soft landscaping, stormwater drainage, utility infrastructure (water, wastewater, electrical, communications), and lighting.

(b) Brownfield Subdivisions typically involve re-subdivision of land that has already been developed and may include the subdivision or consolidation of residential/mixed use, industrial, or rural zoned land. This type of Subdivision often occurs following a successful rezoning application, which allows for a change in land use to facilitate higher density living. Brownfield Subdivisions may therefore require the provision of new or upgraded Public Infrastructure to support the proposed change in land use and density of living.

1.6. SUBDIVISION WORKS INCONSISTENT WITH THESE GUIDELINES

(a) These Guidelines are not intended to limit innovation and high quality outcomes. Developers are encouraged to engage with the Relevant Authorities and Regulatory Authorities to seek approval for:

(i) introducing new elements of Public Infrastructure that provide a demonstrated improvement in terms of environmental impact, amenity, lifespan, efficiency, or cost; and/or

(ii) project-specific variations from these Guidelines to address a specific constraint or opportunity.

1.7. VARIATIONS TO THESE GUIDELINES

(a) As much as possible these Guidelines seek to promote consistency across Relevant Authorities and their jurisdictions. However, there are clear differences between the Relevant Authorities and the jurisdictions in which they operate that necessitate certain variations.

(b) Variations to these Guidelines and associated documents for each Relevant Authority are set out in Section 14 – Schedule of Variations.

(c) Relevant Authorities may add to, delete or amend their sections of the Schedule of Variations from time to time by submitting a Request for Variation via the Subdivision Development Guidelines Online Platform.

(d) Registered Members will be notified of adjustments to Section 14 – Schedule of Variations by email and noticeboard.

1.8. AMENDMENTS TO THESE GUIDELINES

(a) As circumstances require it from time to time, amendments to these Guidelines may be required to address, among other things:

(i) Changes in legal and regulatory requirements;

(ii) Changes in community expectations;

(iii) Advances in industry best practice;

(iv) Adjustments to environmental, economic, and/or social objectives; and

(v) Addition or cancellation of Reference Documents.

(b) Requests for Amendment must be submitted via the Subdivision Development Guidelines Online Platform.

(c) Amendments can only be sought by Local Government Authorities, the Local Government Association NT (LGANT), NTG Agencies, Service Authorities, Property Council of Australia, the Urban Development Institute of Australia NT (UDIA) and the Civil Contractors Federation NT (CCFNT). Amendments proposed by individuals must be endorsed and submitted by one of the above entities or any other relevant industry representative body.

(d) Requests for Amendment must be made in respect of the general or global application of these Guidelines, noting that the following requests will not be considered:

(i) departures from or variations to these Guidelines on a project-specific basis; and

(ii) changes to the standards set out in the Reference Documents, which are the remit of the Relevant Authorities and Regulatory Authorities.

(e) Registered Members will be notified of adopted Amendments to these Guidelines including associated Reference Documents, Standard Drawings, and Technical Specifications, by email and noticeboard.

1.9. INTERPRETATION

(a) In These Guidelines:

(i) a reference to a person includes a body corporate;

(ii) “including” and similar words are not words of limitation;

(iii) a reference to a statute or other law includes regulations, by-laws and other instruments under it and consolidations, amendments, re enactments or replacements of any of them;

(iv) a reference to any document or instrument not set out in these Guidelines includes any variation or replacement of it;

(v) a reference to any document or instrument included in these Guidelines means the document set out in Part 2, Part 3 or Part 4 (as the case may be);

(vi) a reference to clauses, sections, parts, annexures or schedules is a reference to the clauses, sections, parts, annexures or schedules of these Guidelines; and

(vii) a reference to any authority, association or body whether statutory or otherwise must, if that authority, association or body ceases to exist or is re constituted, re named or replaced or its powers or functions are transferred to any other authority, association or body, be thereafter taken to refer respectively to the authority, association or body established or constituted in its place or as nearly as may be succeeding to its powers or functions.

(b) Part 1 of these Guidelines is to be read in conjunction with all Reference Documents, Standard Drawings and Technical Specifications. Where there is any inconsistency, conflict, discrepancy, error, or omission between Part 1 of these Guidelines and any Reference Document, Standard Drawing or Technical Specification the Developer must notify the Relevant Authority for direction.

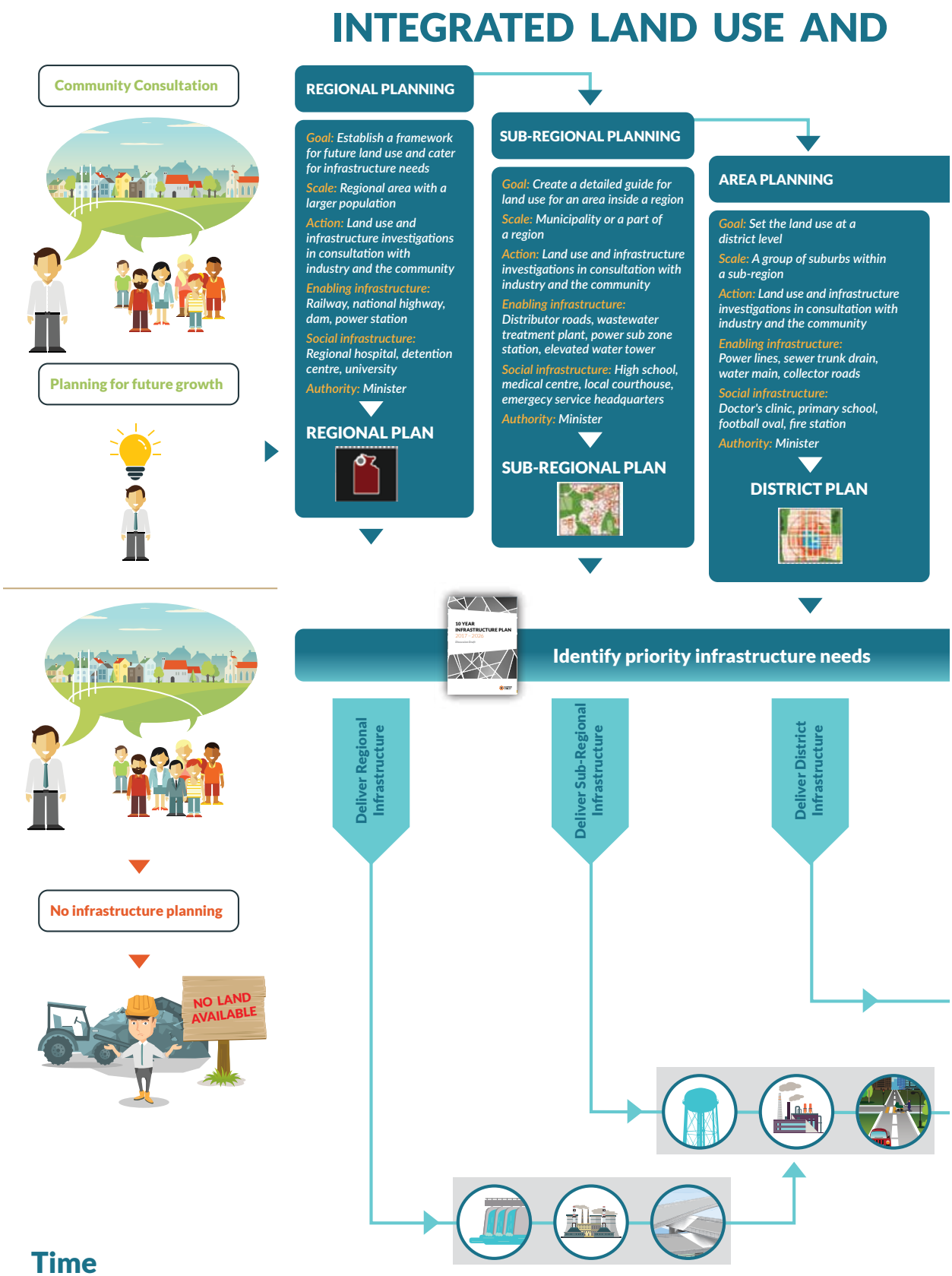


Figure 1 — Integrated Land Use and Infrastructure Planning

INFRASTRUCTURE PLANNING

Goal: Design reticulation services to connect house blocks

Scale: Neighbourhood, suburb and street

Action: Local area network and site design in consultation with industry and the community

Enabling infrastructure: Power, water, sewerage, local roads

Social infrastructure: Shops, playground, park

Authority: Development Consent Authority

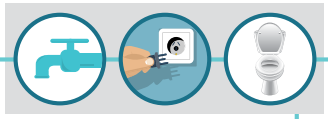
NEIGHBOURHOOD PLAN

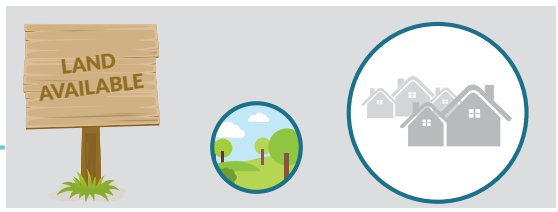


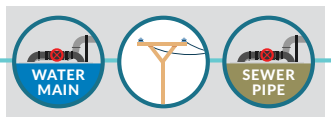
POPULATION



Deliver Subdivision infrastructure













Enabling infrastructure *Social infrastructure*

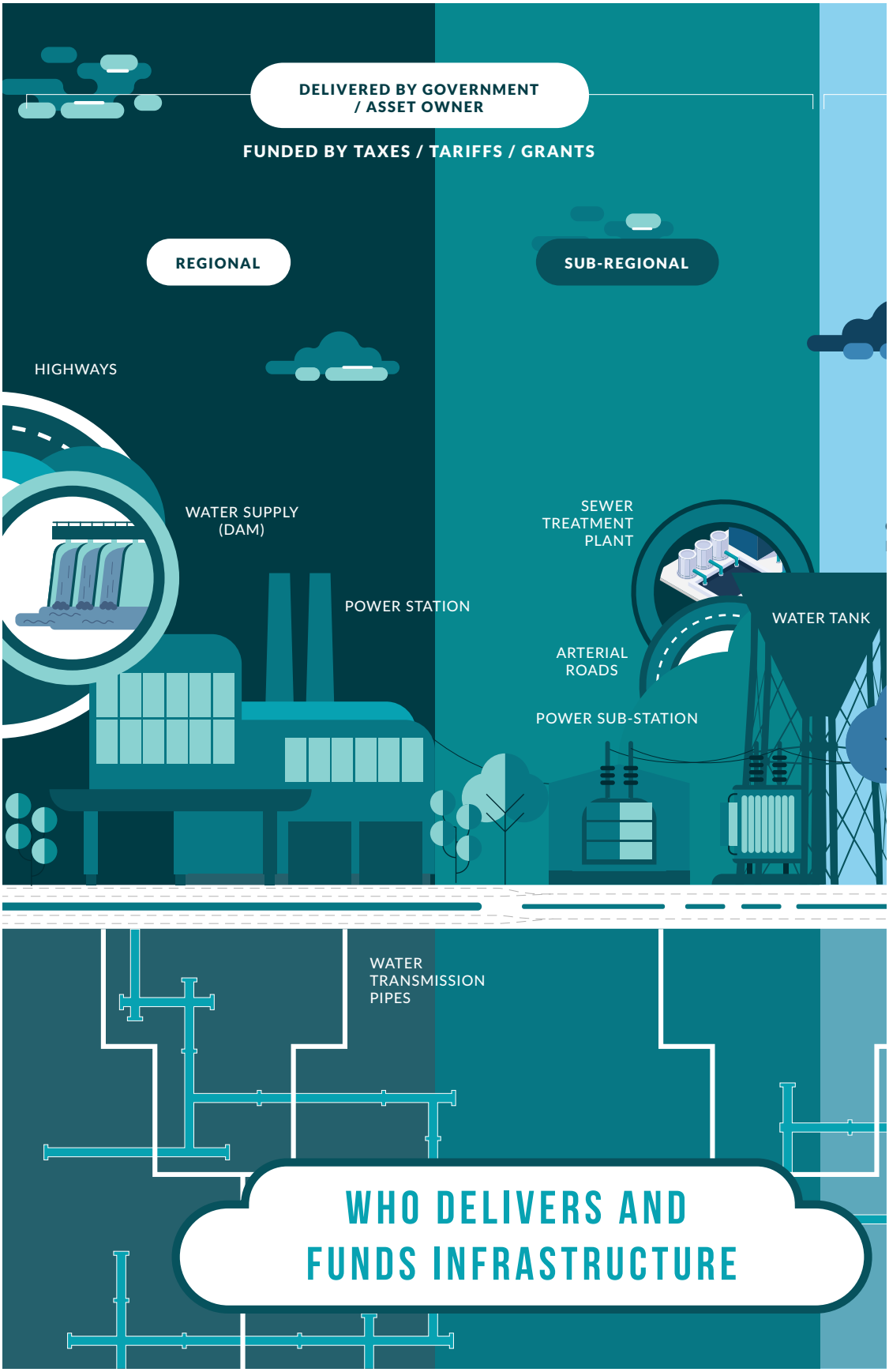
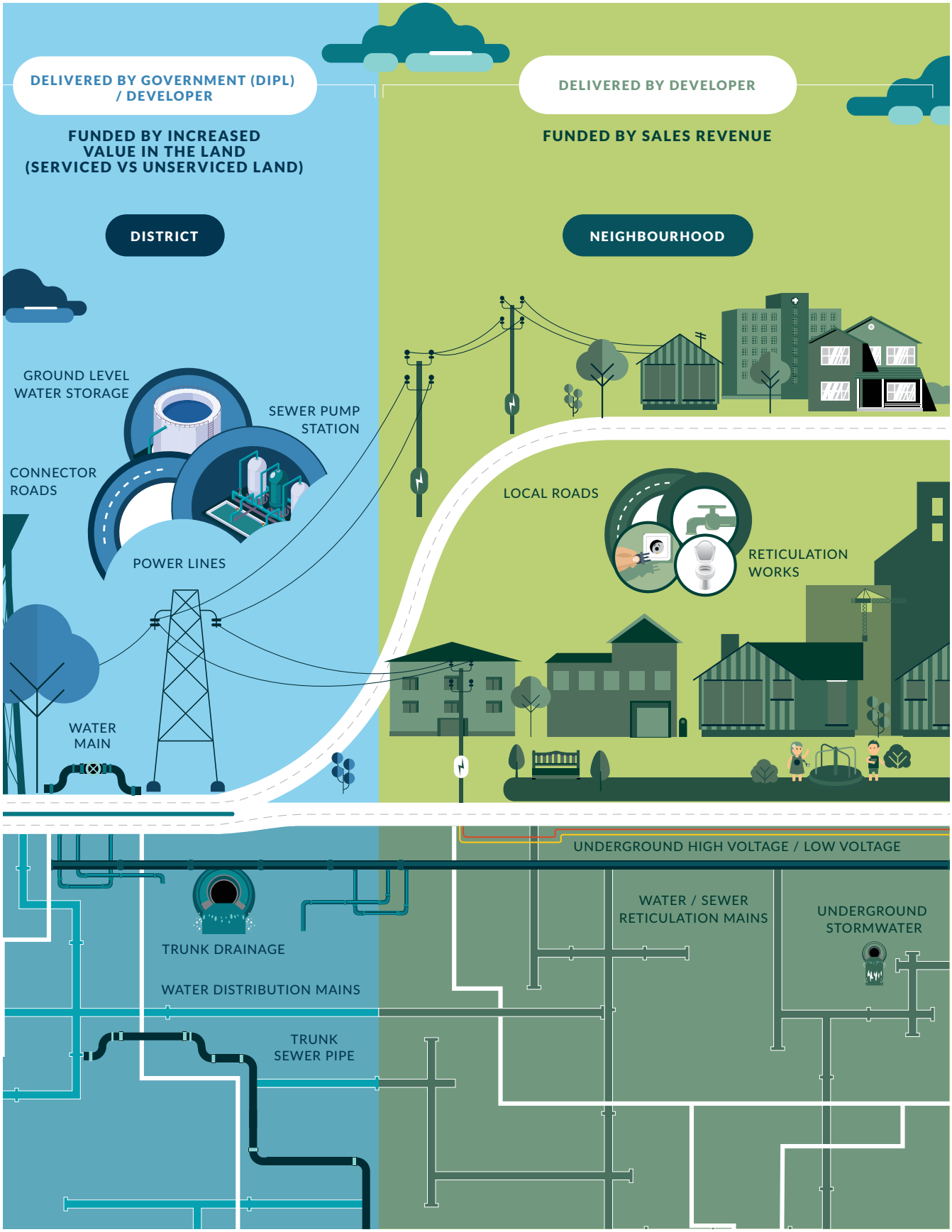


Figure 2 — Infrastructure Delivery and Funding


DELIVERED BY GOVERNMENT (DIPL) / DEVELOPER
FUNDED BY INCREASED VALUE IN THE LAND (SERVICED VS UNSERVICED LAND)
DISTRICT
DELIVERED BY DEVELOPER
FUNDED BY SALES REVENUE
NEIGHBOURHOOD
GROUND LEVEL WATER STORAGE
SEWER PUMP STATION
CONNECTOR ROADS
POWER LINES
WATER MAIN
LOCAL ROADS
RETICULATION WORKS
UNDERGROUND HIGH VOLTAGE / LOW VOLTAGE
WATER / SEWER RETICULATION MAINS
UNDERGROUND STORMWATER
TRUNK DRAINAGE
WATER DISTRIBUTION MAINS
TRUNK SEWER PIPE

2. BEST PRACTICE DESIGN IN THE NORTHERN TERRITORY

2.1. SUBDIVISION TYPE AND INFRASTRUCTURE

(a) Depending on both the Subdivision land use zoning and locality, a Subdivision is expected to meet varying infrastructure requirements. This is nominated via Infrastructure Categories in Table 1. While all best endeavours have been made to provide an exhaustive list of localities, the Relevant Authority should be consulted to confirm applicable Infrastructure Categories where a locality is not listed.

(b) Typical infrastructure expectations for each Infrastructure Categories are provided in Table 2.

Table 1 — Subdivision Infrastructure Categories

Proposed Land Use Zoning (Refer Planning Scheme for Detail)	Localities (Refer Figure 3)	Infrastructure Categories
Residential / Mixed Use[1]	Darwin, Jabiru, Katherine, Litchfield, Nhulunbuy (Gove), Palmerston	Category A (Set 1)
Industrial	Alice Springs, Tennant Creek	Category A (Set 2)
	Adelaide River, Ali Curung, Alpurrarulam, Ampilatwaja, Angurugu, Batchelor, Beswick, Borroloola, Daguragu, Elliott, Galiwinku (Echo Island), Gapuwiyak (Lake Evella), Gunbalanya (Oenpelli), Hermannsburg, Kalkarindji (Wave Hill), Kintore, Lajamanu, Maningrida, Mataranka, Milikapiti (Snake Bay), Milingimbi, Milyakburra (Bickerton Island), Minyerri, Ngukurr, Numbulwar, Papunya, Pine Creek, Raminginning, Santa Teresa, Ti Tree (Pmara Jutunta), Timber Creek, Umbakumba, Wadeye, Wagait, Wurrumiyanga (Nguiu), Yirrkala, Yuendumu.	Category B
	Acacia Larrakia, Amanbidji (Kildirk), Amoonguna, Areyonga, Arlparra, Atitjere (Hart Range), Belyuen, Bulla, Barunga, Binjari, Bulman, Canteen Creek (Owaitilla), Engawala, Eva Valley (Manyallaluk), Finke (Aputula), Gunyangara (Marngarr, Ski Beach), Haasts Bluff (Ikuntji), Imangara (Murray Downs), Imanpa, Jilkminggan (Duck Creek), Kaltukatjara (Docker River), Kybrook Farm, Laramba, Minjilang (Croker Island), Mt Liebig, Nauiyu (Daly River), Newcastle Waters, Nganmarriyanga (Palumpa), Nyirripi, Orrtipa Thurra, Peppimenarti, Pigeon Hole, Pirlangimpi, Rittarangu, Robinson River, Tara, Titjikala, Urlampe, Wallace Rockhole, Warruwi, Weemol, Willowra, Wilora, Wutunugurra (Epenarra), Yarralin, Yuelamu.	Category C
Rural Zones[2]	Alice Springs, Darwin, Jabiru, Katherine, Litchfield, Nhulunbuy (Gove), Palmerston, Tennant Creek	Category D
	All other Localities	Category E

1. Mixed Uze includes Commercial Zones, Recreation Zones and Other Zones as defined in Part 3 of the Planning Scheme.

2. Rural Residential (RR) allotments residing in Residential / Mixed Use Subdivisions are to be provide with the same infrastructure category as the associated Residential/Mixed Use areas (Category A, B, or C).

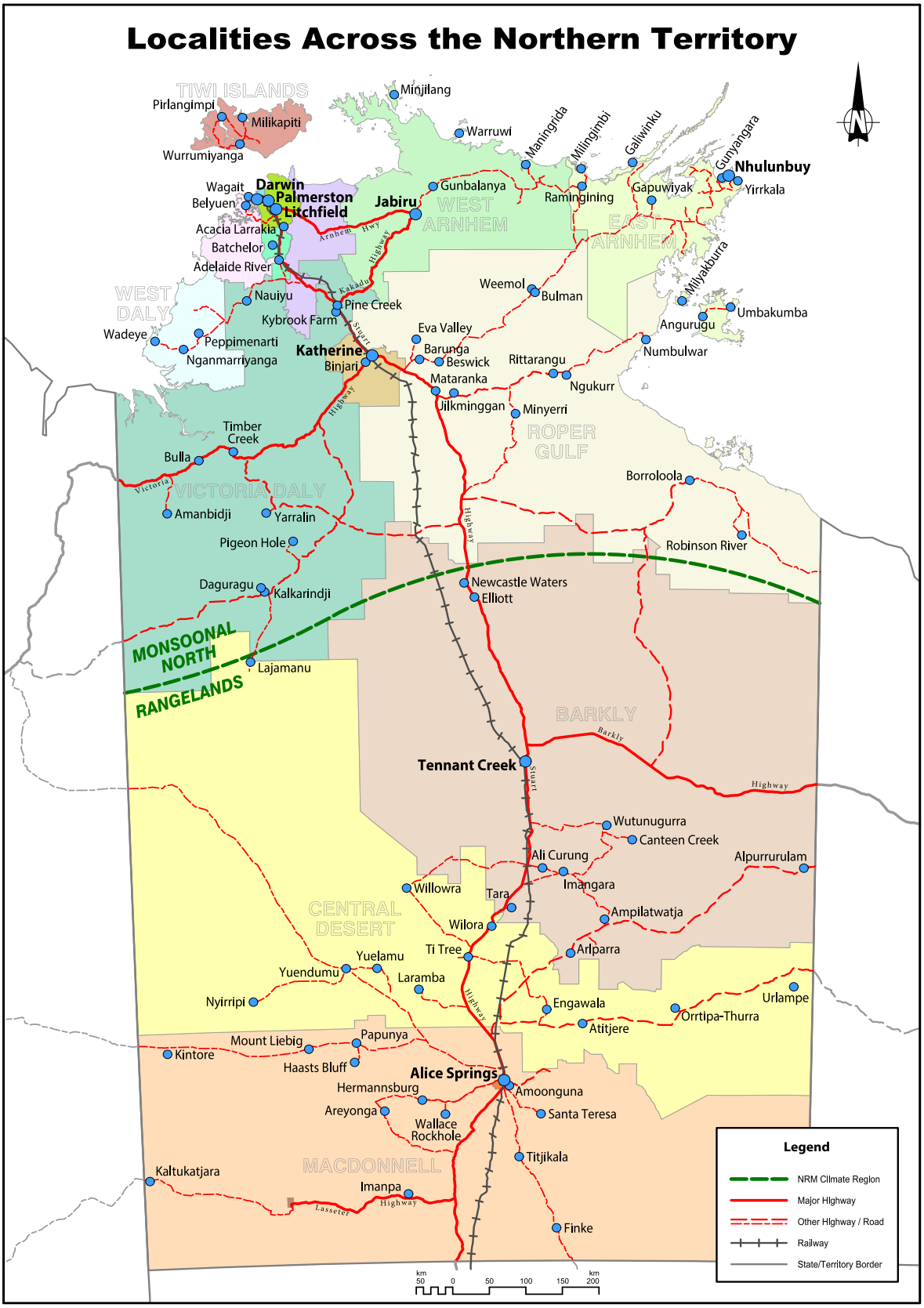


Figure 3 — Localities Across the Northern Territory

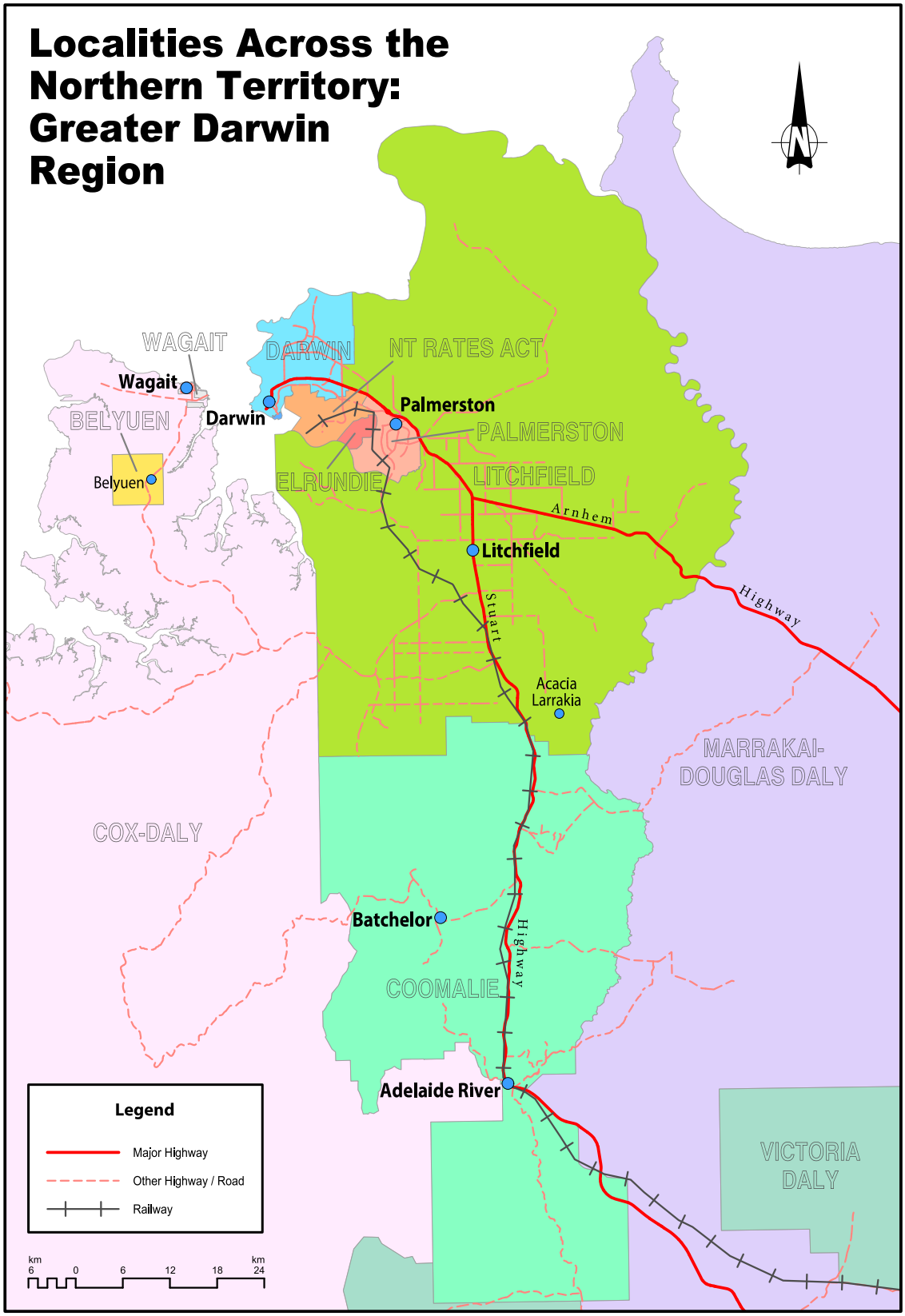


Figure 4 — Localities Across the Northern Territory: Greater Darwin Region

Table 2 — Typical Public Infrastructure Expectations

Public Infrastructure	Infrastructure Categories				
	Category A	**Category B**	**Category C**	**Category D**	**Category E**
Street Cross-Section	Sealed carriageway. Kerb and gutter. Verges.	Sealed carriageway. Kerb and gutter with table drains. No verges.	Sealed carriageway. Shoulders generally, with kerbing at intersections. Table drains. No verges.	Sealed carriageway. Shoulders. Table drains. No verges.	
Pavement Structure	Fine crushed rock pavement. Asphalt wearing course.	Natural gravel pavement. Spray seal.		Natural Gravel or Fine crushed rock pavement. Spray seal / Asphalt wearing course.	Natural gravel pavement. Spray seal.
Driveways	Concrete	Spray sealed or concrete		Spray sealed or concrete	
Pathways	Concrete footpaths and shared paths	Spray sealed or concrete footpaths	Footpath corridors only[1]	Footpath corridors only	
Public Open Space and Soft Landscaping	Planting and Grassing within Road Reserves. Public Open Spaces, where applicable.	Grassing of streetscape, including batters and table drains. Public Open Spaces, where applicable.		Grassing of streetscape, including batters and table drains.	
Stormwater Drainage	Underground pit/pipe network[3].	Kerbed discharge into aboveground open drain network.	Aboveground open drain network.	Aboveground open drain network.	
Water Supply	Reticulated water.			Reticulated water where available, otherwise on-site bore.	
Wastewater Management	Reticulated sewer.	Reticulated sewer where available, otherwise on-site wastewater management.			
Electrical	Underground[2].	Overhead.			
Lighting	Street lights with stand-alone poles.	Street lights mounted to overhead power poles.		Flag lighting where required by Relevant Authority.	

1. Footpaths may be required for Infrastructure Category C, subject to local planning objectives.

2. Overhead Electrical may be suitable in Industrial Subdivisions, subject to approval by the Relevant Authority.

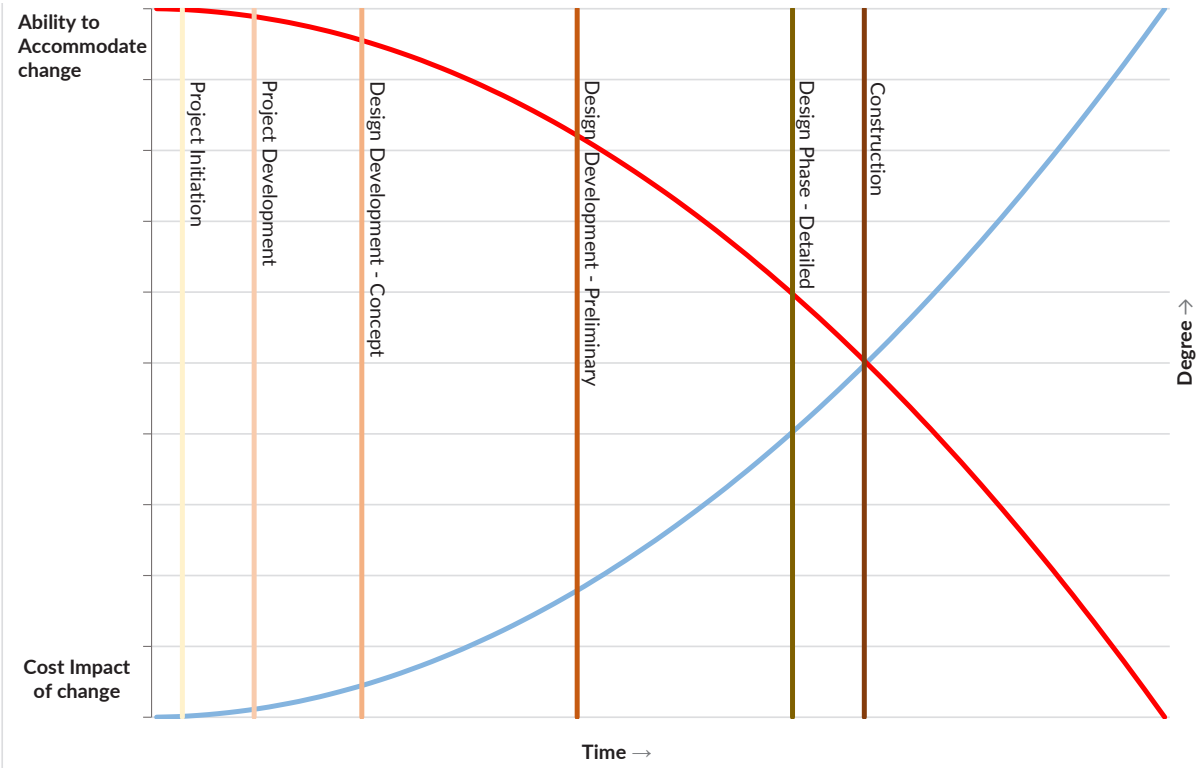
3. Aboveground open drain networks may be required in some project specific circumstances where topography is very flat, subject to approval by the Relevant Authority.

2.2. DESIGN AND DEVELOPMENT PROCESS

(a) These Guidelines recommend a pathway for Subdivision design and engagement between Developers and the various Relevant Authorities and Regulatory Authorities. Early engagement with stakeholders allows for identification of the broader context, constraints, opportunities and potential risks which apply to a Subdivision. This early identification allows for changes with minimal impact to cost, meanwhile building confidence between the Developer and the Relevant Authorities about the project outcomes.

(b) The ability to accommodate design changes without significantly impacting cost is highest at the start of the project and decreases as the project progresses. Figure 5 represents this relationship in reference to the design phases.

Figure 5 — Ability to Accommodate Change vs. Cost Impact of Change



(c) Table 3 establishes a recommended Subdivision planning, design and approvals process that seeks to provide an increasing level of certainty commensurate with design maturity. The process identifies the increasingly comprehensive investigations required to identify land use constraints and opportunities, and methods to resolve them through engagement with Relevant Authorities and Regulatory Authorities.

(d) These Guidelines assume that the zoning of the land is appropriate for a proposed Subdivision. Where the zone of the land is not appropriate, an application to rezone will be required and can be considered as a separate application, or as a concurrent application with the Subdivision development proposal. A similar process as outlined at Table 3 below may be considered to prepare a rezoning application to demonstrate the capability of the land to support a proposed rezone.

(e) Advice on proposals to change land use zones can be provided by Lands Planning at:

Contacts

Address
Level 1, Energy House
18-20 Cavenagh Street, Darwin

Email:
planning.ntg@nt.gov.au

Phone:
(08) 8999 8963

Table 3 — Design, Construction and Handover Process

	GUIDANCE NOTES	TYPICAL DETAIL
PROJECT INITIATION	Compile all necessary information to make an informed decision about proceeding with a Development Application. It is recommended that the Developer engages a Planner for support with the Subdivision process. The Developer may also book a meeting to get advice from either a Development Assessment Services (DAS) Planner, or the Development Consent Authority (DCA), in relation to preparing an application. Once a decision is made to proceed with a Subdivision, prepare a Draft Subdivision Masterplan and document project constraints, risks and opportunities. It is recommended that the Developer book a Pre-Application Planning Forum meeting to obtain early feedback from various Relevant Authorities and identify potential issues. **Milestones:** Meet with a DAS Planner or DCA (Optional). Develop a Subdivision Masterplan and supporting documents on project constraints, risks and opportunities. Pre-Application Planning Forum Meeting (Optional).	Prepare a Draft Subdivision Masterplan, as outlined in Section 2.3, including: • Existing land use zoning and locality. • Proposed land use, including public open space areas and mixed use precincts. • Proposed Public Infrastructure classification to be adopted (Refer Table 1). • Indicative street network and hierarchy, including planned bus routes. • Indicative stormwater management practices including flow directions and assigned areas for stormwater quality treatment devices. • Indicative servicing arrangements, including identification of existing infrastructure. • Proposed staging of the works (if applicable). • Evidence of compliance with Area Plans provided under the Planning Scheme (if applicable).

Table 3 — Design, Construction and Handover Process

	GUIDANCE NOTES	TYPICAL DETAIL
PROJECT DEVELOPMENT	Update the Subdivision Masterplan and conduct Subdivision Suitability Assessments. Once the Subdivision Masterplan and Suitability Assessments are completed, it is recommended that the Developer consult with the Relevant Authorities to seek advice on any particular constraints, risks and opportunities. This information can be used to support the Development Application. Prepare a Development Application and submit to Development Assessment Services for conditional approval to proceed with the proposed Subdivision. Prior to submission, it is recommended that the Developer books a Pre-Application Briefing with the Development Consent Authority (DCA) to present the Subdivision proposal and receive feedback. This will help ensure the information provided is relevant and adequate, and minimise delays and formal revision requests later in the assessment process. Once the Development Application is submitted, it will be put on exhibition and distributed to the various Relevant Authorities and Regulatory Authorities for comment which may inform permit conditions. Typically each Relevant Authority will request any works, to be handed over to them, are completed to their satisfaction in accordance with these Guidelines. Once satisfied with the Development Application and comments received, the DCA will issue the Developer with a Development Permit including conditions to be met. This will include 'Conditions Precedent' which need to be signed off prior to commencing construction works, as well as 'General Conditions' which must be met to facilitate Part V Clearance. **Milestones:** Subdivision Masterplan updated. Subdivision Suitability Assessments completed. Pre-Application Briefing held (optional). Development Application submitted. Development Permit issued, with listed Conditions imposed upon the Subdivision.	Conduct Subdivision Suitability Assessments, as outlined in Section 3, considering: • Land Suitability • Environmental Risk • Aboriginal Areas Protection Authority (AAPA) certificates • Heritage Assessments • Contaminated Land • Biting Insect Constraints • Land Use Separation Zones • Wellhead Protection Zones • Pre-feasibility Infrastructure Capacity Assessment Update Subdivision Masterplan, as outlined in Section 2.3. In addition to the information presented in the project initiation phase, the Draft Subdivision Masterplan must include: • Site constraints imposed by Subdivision Suitability Assessments and how they have been considered/ addressed. • Refined street network and hierarchy design, supported by a separate Traffic Impact Assessment/Statement if applicable (Refer Section 4.3). Identify the following: ◦ bus routes/stops and associated catchment areas; ◦ emergency/service vehicle access provisions or limitations; ◦ allotment access arrangements; ◦ formalised parking; and ◦ footpath / shared path networks. • Refined extent of Open Space and Landscaping provisions, supported by a separate Public Open Space Masterplan if applicable (Refer Section 5.2). • Refined stormwater drainage layouts, supported by a separate Part 1 Stormwater Management Plan (Refer Section 7.1.1). • Proposed servicing arrangements, supported by a separate Servicing Strategy Report, including: ◦ Concept Master Services Plans, with proposed easements/reserves and Authorised Connections; ◦ Scope of headworks required, as agreed with the Relevant Authorities; ◦ Identification of design basis/criteria, assumptions, modelling methodology and boundary conditions including allowances for future development and redundancies; and ◦ Identification of the need and scope for detailed site investigations to support servicing designs.

Table 3 — Design, Construction and Handover Process

	GUIDANCE NOTES	TYPICAL DETAIL
DESIGN DEVELOPMENT - CONCEPT	Advance documentation to a "concept" design. Consult with the Relevant Authorities and Regulatory Authorities to confirm the design basis and scope of work to be undertaken, including review of associated project constraints, risks and opportunities. Where possible, Development Permit conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. **Milestones:** Consultation with Relevant Authorities to discuss Development Permit conditions and agree on a design basis and scope of work to be undertaken. Clearance Letter(s) obtained for Development Permit Conditions progressively. Concept Design Documentation complete.	Concept street network and hierarchy design in response to Relevant Authority review and addressing TIA recommendations. Concept pedestrian/cycle routes, including proposed pathway widths and provisions for high activity areas (schools/commercial/activity centres etc.) Concept public open space strategies and soft landscaping treatments, including CPTED strategy measures integrated / implemented. Concept stormwater design layouts and details, supported by a separate Part 2 Stormwater Management Plan (Refer Section 7.1.2). Concept utilities and lighting servicing plans, including identification of design criteria, assumptions, and modelling methodology.
DESIGN DEVELOPMENT - PRELIMINARY	Advance design documentation to a "Preliminary" design. It is recommended that the Developer seeks informal advice and comments from Relevant Authority(s) and Regulatory Authority(s) on progression of design to resolve emerging issues. Where possible, Development Permit conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. It is recommended that the Developer commences enquiry with the Place Names Committee for the naming of places and/or streets. **Milestones:** Consultation with Relevant Authorities to progressively agree on design decisions and resolve any emerging issues (optional). Clearance Letter(s) obtained for Development Permit Conditions progressively. Preliminary Design Documentation complete. Note: A formal preliminary design milestone may not be required for all Subdivisions, depending on the context. However, it is recommended that the steps outlined be followed for all Subdivisions.	Preliminary engineering design drawings for all streets, stormwater drainage/quality, utilities and lighting servicing works including advanced plans, cross-sections, details and levels. Landscaping design drawings for all public open spaces and community Public Infrastructure including parks, playgrounds and other equipment, shade structures footpaths / cycle paths etc. Preliminary Design Report detailing all design parameters and outcomes to ensure the requirements of all Relevant Authorities and Regulatory Authorities are met. The naming of a place or street under the *Place Names Act 1967 (NT)* is administered by the Place Names Committee. A request to name places or streets should comprise: • a subdivision plan identifying streets and corresponding names • the history of each name • Commemoration Request Form for names of deceased persons (if required); and • support from the local authority. Further detail is available at www.placenames.nt.gov.au.

Table 3 — Design, Construction and Handover Process

	GUIDANCE NOTES	TYPICAL DETAIL
DESIGN DEVELOPMENT - DETAILED	Advance design documentation to a "Detailed" design and obtain Certification from the Certifying Engineer(s). Once design documentation is complete and Certified, the Developer must submit the documentation to the Relevant Authority(s) and Regulatory Authority(s) for a detailed review. Where possible, Development Permit conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. **Milestones:** Consultation with Relevant Authorities to progressively agree on design decisions and resolve any emerging issues (optional). Clearance Letter(s) obtained for Development Permit Conditions progressively. Detailed Design Documentation completed, Certified and submitted to the Relevant Authority(s) and Regulatory Authority(s) for detailed review.	Detailed Design Documentation must include drawings, technical specifications and Design Reports including calculations and modelling data to the satisfaction of the Relevant Authority(s) and Regulatory Authority(s). The scope of design documentation to be developed must meet the minimum requirements of Section 2.4 "Detailed Design Documentation Requirements".
DESIGN DEVELOPMENT - APPROVALS	Consider and address comments received from the detailed design development phase reviews. Where Detailed Design Documentation is amended, it must be Certified by the Certifying Engineer(s) and resubmitted for final 'Permission to Use' as outlined in Section 2.5 "Review and Approval Process". Where possible, Development Permit conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. **Milestones:** Design Documentation completed. When satisfied, the Relevant Authority and/or Regulatory Authority(s) will provide permission to use the documentation for construction, subject to any conditions required. Clearance Letter(s) obtained for Development Permit Conditions progressively.	Final Design Documentation must be presented to the Relevant Authority and/or Regulatory Authority(s), accompanied by a letter from the design consultant summarising the changes requested and how those changes have been incorporated. Once Stormwater and Landscaping designs have been approved by the Relevant Authority(s), and where required by the Development Permit, submit an Erosion and Sediment Control Plan detailing mitigation and management plans for the construction and post-construction phases.

Table 3 — Design, Construction and Handover Process

	GUIDANCE NOTES	TYPICAL DETAIL
CONSTRUCTION PRELIMINARIES	Prior to commencing works on site, all Conditions Precedent must be addressed with Clearance Letters issued by the Relevant Authorities and Regulatory Authorities. Following receipt of all design approvals and prior to commencement of construction works, the Developer must prepare a series of plans for approval by the Relevant Authority(s). The Developer must also hold a pre-commencement meeting with all Relevant Authority(s) to address key issues. **Milestones:** Clearance Letter(s) obtained for all Development Permit Conditions Precedent. Developer obtains all necessary approvals and permits from Relevant Authority(s). Commencement of Construction.	A Dilapidation Report must be prepared to assess the condition of existing Public Infrastructure. All necessary insurances must be obtained, as required by the Relevant Authority. The following plans must be submitted as a minimum: • Construction Environmental Management Plan, including Erosion and Sediment Control Plan (Refer Section 7.10.3). • Weed Management Plan, including pre-construction survey of declared weeds, identified management actions, and weed spread prevention measures. • Construction Traffic Management Plans addressing parking, construction access, vehicle routes and restrictions etc. • Traffic Management Plans, including Permit(s) to Work in Road Reserves. • Safety Management Plans • Inspection and Test Plans A Community Consultation Plan may also be required.
CONSTRUCTION	Construction activities commence. Developer to obtain all necessary permits, approvals and clearances for each component of the Development Works as works progress. Developer must undertake all Process and Conformance Testing, as per approved Inspection Test Plan(s). **Milestones:** Inspection Points signed off. Construction Works Complete.	Provide no less than 48 hours' notice to Relevant Authority(s) and Certifying Engineer for Inspection Points, as identified in the Standard Specification for Subdivisions (Refer Part 4). Provide 10 Business Days prior written notice of the date upon which the Developer estimates it will complete construction of each component of the Development Works intended to be handed over to that Relevant Authority.
PRACTICAL COMPLETION	The works have been completed in accordance with the requirements of all laws and approvals, these Guidelines, all relevant Base Standards, and the requirements of any Relevant Authority and/or Regulatory Authority. The Developer submits Practical Completion documentation to the Relevant Authority(s). The Relevant Authority(s) undertake an inspection of the completed works, to determine Practical Completion has been achieved. The Developer issues Security Bond(s) to the Relevant Authority(s). **Milestones:** Practical Completion Letter(s) and Clearance Letter issued by each Relevant Authority(s). Commencement of Defects Liability Period.	Practical Completion documentation to include: • Completion Certificate, including certificates of compliance; • Construction report, including CCTV Inspection of underground stormwater networks; • As-constructed drawings in PDF and AutoCAD Format, including As-Constructed Survey files identifying all works as-constructed including depth and position of underground services; • Register of non-conformances and changes from the approved design, including evidence of Certification by the Certifying Engineer and approval by the Relevant Authority. • Register of assets to be handed over, including Construction Cost and Dilapidation Reports; and • All manuals, warranties and other documents required for the use, operation and maintenance of all services and systems forming part of the Development Works. Issue Security Bond(s) to Relevant Authority(s).

Table 3 — Design, Construction and Handover Process

	GUIDANCE NOTES	TYPICAL DETAIL
LAND TITLES	Developer to apply to Development Assessment Services (DAS) for Part V approval. Developer to apply to Land Titles Office for concurrence of Survey Plans and associated Land Titles. Developer to apply to Surveyor General's Office for approval of the Survey Plans. **Milestones:** Part V Clearance issued by DAS. Land titles issued by Land Titles Office. Approved Survey Plan(s) issued by Surveyor General's Office.	Provide Clearance Letter(s) from each Relevant Authority. Provide approved Survey Plan(s) and relevant Land Titles Office forms.
DEFECTS LIABILITY PERIOD	Developer is responsible for maintenance of Soft Landscaping and rectifying any Defects associated with all of the Development Works for the nominated Defects Liability Period. **Milestones:** Completion of Defects Liability Period.	Maintain Landscaping Works in a healthy condition for the associated Defects Liability Period. Developer to repair, replace or otherwise make good any Defect(s) which occur during the Defects Liability Period in respect of each component of the Development Works.
HANDOVER	Upon completion of the Defects Liability Period, including any extensions applied due to rectification works undertaken, Developer to apply for handover to the Relevant Authority(s). Relevant Authority(s) to undertake a Final Inspection to confirm there are no outstanding Defects. **Milestones:** Relevant Authority(s) accepts Handover of the Development Works. Relevant Authority(s) release Security Bond(s) to Developer.	Nil.

2.3. SUBDIVISION MASTERPLAN

(a) The Developer must prepare a Subdivision Masterplan and submit it with each Development Application.

(b) For staged Subdivisions, the Subdivision Masterplan must:
  (i) identify proposed staging and the extent of Public Infrastructure to be provided within each stage; and
  (ii) be updated with each completed stage to reflect the Public Infrastructure constructed and required amendments to future stages.

(c) A Subdivision Masterplan provides a central document for integrated planning and design of Public Infrastructure including streets and pathways, public open space and soft landscaping, stormwater drainage, lighting and utilities. it is also used to establish the context of the Subdivision with respect to its relationship with existing Public Infrastructure and/or planned development areas surrounding the Development Site.

(d) The objectives of the Subdivision Masterplan are to ensure:
  (i) compliance with requirements of the Planning Scheme and these Guidelines;
  (ii) adequate information is provided during project initiation and project development phases to identify potential issues as early as practicable, and aid ease of assessment for proposed Subdivisions;
  (iii) Subdivisions provide effective and economical Public Infrastructure that integrates well with existing and/or planned regional Public Infrastructure;
  (iv) External Works are planned and delivered to service the full regional development potential to avoid future rework; and
  (v) Subdivisions are appropriately planned to manage interfaces between stages and/or external Development Sites in a coordinated, safe and efficient manner.

(e) The Subdivision Masterplan must include:
  (i) Existing land use zoning and locality.
  (ii) Proposed land use, including public open space areas and mixed use precincts.
  (iii) Proposed Public Infrastructure classification to be adopted (Refer Table 1).
  (iv) Site constraints imposed by Subdivision Suitability Assessments and how they have been considered and addressed.
  (v) Street network and hierarchy, including:
    (A) bus routes/stops and associated catchment areas;
    (B) emergency/service vehicle access provisions or limitations;
    (C) allotment access arrangements;
    (D) formalised parking;
    (E) footpath/shared path networks; and
    (F) connectivity of streets and pathways with existing/proposed Public Infrastructure surrounding the Development Site.
  (vi) Open Space and Soft Landscaping provisions, supported by a separate Public Open Space Masterplan if applicable (Refer Section 5.2).
  (vii) Stormwater management practices including catchments, flow directions and assigned areas for stormwater quality treatment devices.
  (viii) Proposed Servicing arrangements, including identification of existing Public Infrastructure and scope of External Works required.
  (ix) Proposed staging of the works (if applicable).
  (x) Evidence of compliance with Area Plans provided under the Planning Scheme (if applicable).

(f) The Subdivision Masterplan must demonstrate how the Developer intends to resolve issues arising from:
  (i) the Developers objectives;
  (ii) Site Suitability Assessments (Refer Section 3);
  (iii) these Guidelines; and
  (iv) Statutory/Regulatory requirements.

2.4. DETAILED DESIGN DOCUMENTATION REQUIREMENTS

(a) All engineering documents must be submitted for a detailed review to the Relevant Authority(s) and/or Regulatory Authority(s), as applicable. All Design Documentation must be presented in accordance with current standard engineering practice and provide evidence of having been Certified by a Certifying Engineer to comply with all laws and approvals, these Guidelines, all Base Standards and any other relevant documentation.

(b) The documents submitted for review must include the items identified under Section 2.4.1, unless otherwise agreed with the Relevant Authority(s) and/or Regulatory Authority(s) that certain documents are not applicable due to project-specific context.

2.4.1. DOCUMENTS TO BE SUBMITTED

(a) Site investigation reports, including the following as a minimum:
- (i) Land Suitability Assessment
- (ii) Environmental Risk Assessment
- (iii) AAPA Certificates / Clearances
- (iv) Engineering Survey / Service Locations
- (v) Geotechnical Investigation
- (vi) Traffic Impact Assessment
- (vii) Infrastructure Capacity Assessments

(b) Detailed design drawings, including the following as a minimum:
- (i) Locality plan and index of drawings
- (ii) Proposed allotment plans, illustrating zones, lot sizes and building setbacks
- (iii) Proposed access management plans, illustrating safe and clear access/crossover locations and extents
- (iv) Site grading plans, illustrating contours before and after the development
- (v) Street set out plans, longitudinal sections, cross sections, and intersection details
- (vi) Stormwater drainage set out plans and longitudinal sections, illustrating catchment boundaries, hydraulic grade lines, subsoil drainage, allotment drainage provisions, major storm (1% AEP) controls, easements/reserves, lawful point(s) of discharge, and discharge to natural environment
- (vii) Erosion and Sediment Control Plans
- (viii) Landscaping Plans, including shared paths/footpaths, pedestrian linkages, park furniture, and recreation equipment
- (ix) Irrigation Plans
- (x) Water supply plans
- (xi) Sewerage plans
- (xii) Power supply (HV/LV) plans, including single line diagrams
- (xiii) Street and public open space lighting plans
- (xiv) Master services plans, showing staging (where applicable)

(c) Specifications in the form of Project Specific Requirements, if required to supplement the Standard Specification.

(d) Design Reports, including the following as a minimum:
- (i) A summary of all design aspects describing the intent, criteria, assumptions, and considerations involved in the design.
- (ii) Confirmation of compliance with the requirements of these Guidelines, specifically identifying any aspects of the development where the criteria set out in these Guidelines have not been met, including detailed reasons for varying from these Guidelines.
- (iii) Detailed calculations for all Public Infrastructure including but not limited to traffic management, streets, pathways, pavements, stormwater drainage, stormwater quality, erosion and sediment control, utilities and lighting.

(e) Design of the following subjects must be addressed in one or more Design Report(s), submitted to the Relevant Authority(s) for approval:
- (i) Development and Suitability Assessments
- (ii) Earthworks Design

(iii) Stormwater Drainage Design, including:
- (A) Design Basis
- (B) Catchment Plans
- (C) Hydrological Modelling Inputs/Outputs and Calculations
- (D) Hydraulic Modelling Inputs/Outputs and Calculations
- (E) Impacts on External Catchments
- (F) Drainage Easements / Reserves
- (G) Drainage infrastructure for minor/major stormwater management, including allotment drainage provisions and subsoil drainage
- (H) Flow paths, extents and depths for the Major (1% AEP) Storm Event
- (I) Flow Attenuation Devices
- (J) Authorised Connections / Discharge to the Natural Environment
- (K) Stormwater Quality Management
- (L) Water Sensitive Urban Design
- (M) Erosion and Sediment Control

(iv) Streets and Pathways Design
- (A) Traffic Impact Assessment
- (B) Street Network Design
- (C) Geometrical Street Design
- (D) Turn Path Diagrams
- (E) Shared Paths and Footpaths
- (F) Driveways / Access Points
- (G) Noise Attenuation
- (H) Pavement Design
- (I) Traffic Control Devices
- (J) Street Furniture
- (K) Road Safety Audits

(v) Landscaping, Open Space and Irrigation Design

(vi) Street and Park Lighting Design

(vii) Water

(viii) Wastewater

(ix) Electrical

(x) Communications

(xi) Lighting for both Road Reserves and Public Open Space

(xii) Structural Design, including entrance statements, retaining walls, park furniture, shade structures etc.

(xiii) CPTED and Safety in Design, including hazards identified and mitigation measures adopted.

2.5. REVIEW AND APPROVAL PROCESS

(a) The Developer must consult with the Relevant Authority(s) and Regulatory Authority(s) to confirm specific requirements relating to required forms, fees, time frames and submission requirements including required documentation formats.

(b) The Relevant Authority(s) and Regulatory Authority(s) will review all the submitted Design Documentation and provide comments which must be considered and addressed in the final Design Documentation.

(c) Final Design Documentation must be presented to the Relevant Authority and/or Regulatory Authority(s), accompanied by a letter from the Certifying Engineer summarising changes undertaken since the initial review.

(d) When satisfied, the Relevant Authority and/or Regulatory Authority(s) will provide permission to use the Design Documentation for construction, subject to any conditions required. Permission to use Design Documentation for construction does not imply that the Relevant Authority and/or Regulatory Authority(s) accepts any responsibility for the technical adequacy of the Design Documentation. The Developer is accountable and responsible for the adequacy of the Design Documentation.

3. SUBDIVISION SUITABILITY ASSESSMENTS

(a) This section covers assessments to be undertaken prior to commencing the civil design of a subdivision.

(b) The complete analysis of the Development Site is critical to identify opportunities and constraints of a site and determine the development capability.

3.1. LAND SUITABILITY ASSESSMENT

(a) Land Suitability Assessment is the consideration of land constraints to determine the most suitable economic use of land while also reducing potential environmental and social risks. The Planning Scheme requires a land suitability assessment addressing the Northern Territory Land Suitability Guidelines for proposals to subdivide rural land, unzoned land and lots of 1ha or greater.

(b) A Land Suitability Assessment addresses:

- (i) drainage;
- (ii) on-site wastewater management;
- (iii) erosion risk;
- (iv) soil salinity;
- (v) soil contamination;
- (vi) acid sulfate soils;
- (vii) storm tide/surge flooding; and
- (viii) riverine flooding.

(c) More detailed requirements on storm surge and riverine flooding as it relates to Subdivisions is covered under Section 7. Stormwater Drainage.

3.2. ENVIRONMENTAL RISK ASSESSMENT

(a) The NT Environment Protection Authority (NT EPA) is responsible for regulating Environmental Impact Assessment (EIA) of proposed developments in the NT under the *Environmental Assessment Act 1982 (NT)*.

(b) EIA processes are defined by the subordinate Environmental Assessment Administrative Procedures (the Procedures), and are administered by the Environment Division (of the Department of Environment and Natural Resources) for the NT EPA. The *Guide to the Environmental Impact Assessment Process in the Northern Territory* (Refer Part 2) provides guidance on the process.

(c) The primary purpose of the EIA process is to provide for appropriate examination of proposed projects that may cause significant environmental impact. The EIA process provides Government, Developers and public stakeholders with the information needed to consider and make decisions on matters that could significantly affect the environment. It enables environmental issues to be considered in a balanced way with other aspects involved in determining the acceptability of a proposed action. It ensures that unnecessary and unacceptable harm to the environment can be avoided. The EIA process helps ensure that potential environmental impacts and potential risks are addressed at an early stage early in the planning and design of a proposed action, and proposals are designed in accordance with the principles of ecologically sustainable development.

(d) The *Environmental Assessment Act 1982 (NT)* applies to public and private projects including environmentally significant land uses and development decisions. The requirement for EIA may also apply in situations where a project, previously the subject of assessment, is subsequently altered in such a way that is likely to result in a significant effect on the environment.

(e) The Developer must undertake an Environmental Risk Assessment (ERA) in accordance with the *Environmental Risk Assessment Subdivision Guidelines* (Part 2).

- (i) The Developer must identify environmental values for the Development Site and assess what environmental risks result from the proposed Subdivision design. Where the Subdivision design is unable to mitigate risks to environmental values, the Developer must undertake a formal ERA.
- (ii) An ERA is undertaken to identify the key environmental issues with the Subdivision. The risk assessment process is the initial step in demonstrating compliance with the *Environmental Assessment Act 1982 (NT)*.

(f) Where risks in the ERA cannot be mitigated to "low", a Notice of Intent is to be prepared and submitted to the NT EPA in accordance with *Referring a Proposal to the NT EPA* (Part 2). Referral criteria for Subdivisions are defined in *Environmental Assessment Guidelines - When a Notice of Intent is not required for development proposals under the Planning Act* (Part 2). The NT EPA will decide whether a detailed Environmental Impact Assessment is required under the *Environmental Assessment Act 1982 (NT).*

3.3. ABORIGINAL AREAS PROTECTION AUTHORITY CERTIFICATE

(a) The Regulatory Authority in relation to the protection of Aboriginal Sacred Sites and the issue of Authority Certificates under the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* is the Aboriginal Areas Protection Authority (AAPA).

(b) All Sacred Sites in the NT are protected by the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* as well as the *Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)*, both of which create offences and penalties for entering on, remaining on, damaging or desecrating Sacred Sites.

(c) AAPA is an independent statutory authority established under the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* to keep records in respect of, oversee the protection of, and issue Authority Certificates in relation to works on, near, or which could otherwise affect, Aboriginal Sacred Sites across the Territory.

(d) Anyone proposing to use or work on land in the Northern Territory may apply to AAPA for an Authority Certificate to cover their proposed activities. Authority Certificates are based on consultations with custodians and provide clear instructions on what can and cannot be done in and around Sacred Sites.

(e) Authority Certificates are voluntary, but an Authority Certificate provides a statutory indemnity against prosecution in relation to the works or uses covered by the Authority Certificate, provided the applicant complies with any conditions imposed to protect Sacred Sites.

3.4. HERITAGE

(a) The Regulatory Authority in relation to heritage objects and sites, and the Heritage Register is Department of Tourism and Culture (Heritage Branch).

(b) The Heritage Branch within the Department of Tourism and Culture administers the *Heritage Act 2011 (NT)*, the NT Heritage Register and the NT Archaeological Sites Database.

(c) All Aboriginal and Macassan archaeological sites and objects are automatically protected under the *Heritage Act 2011 (NT)*. The *Heritage Act 2011 (NT)* also protects other places and objects that have been declared a heritage place or heritage object in accordance with the Act.

(d) All Developers must comply with the *Heritage Act 2011 (NT)* and in doing so, should conduct of search of the Heritage Register and contact the Heritage Branch prior to commencing any works, whether on greenfield or infill Development Sites for advice on:

  (i) whether there are any known Aboriginal or Macassan archaeological places or objects on or in the vicinity of the proposed Development Site;

  (ii) the likelihood of these places existing on or adjacent to any particular Development Site and the potential requirements for archaeological/heritage surveys prior to any construction or clearing activities; and

  (iii) any steps needed to ensure compliance with the *Heritage Act 2011 (NT)* (and protection of any heritage places or objects) on or adjacent to a Development Site.

3.5. CONTAMINATED LAND

(a) Contaminated land is soil, sediments, surface water and groundwater that contains chemicals, or other hazardous substances (e.g. asbestos) at levels that may pose a risk to human health and/or the environment. The chemicals are usually present in the land due to human activities, (e.g. heavy industry, storage of hazardous chemicals including fuels or heavy metals, or chemically intensive agriculture). Some contaminants can occur naturally (e.g. acid sulphate soils or naturally high levels of arsenic or other toxins).

(b) An assessment of site contamination is triggered when a subdivision proposal is likely to result in a more sensitive or intensive use of the land, or where the development of the land itself may disturb or otherwise expose contamination. This is not limited to a change in zoning, although a change in zoning is indicative of a change in use. The Northern Territory Contaminated Land Guideline will provide the Developer with a greater understanding of the processes that trigger an assessment, the reasons why an assessment is necessary, and where a contaminated site Accredited Auditor may be required to independently review the investigation or remediation.

(c) Where a site contamination assessment is required Developers must:

(i) Undertake an assessment of site contamination in accordance with National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM Guidelines), included in Part 2 of these Guidelines; and

(ii) contact each Relevant Authority responsible for any component of Public Infrastructure that may come into contact with, or otherwise be affected by any relevant contaminant prior to Public Infrastructure design. Certain contaminants may lead to additional requirements, or differing requirements, including in respect of material standards for Public Infrastructure.

3.6. BITING INSECT CONSTRAINTS

(a) The Regulatory Authority in respect of biting insect constraints and biting insect management plans is the Department of Health, Medical Entomology. Developers should contact Medical Entomology prior to lodging a Development Application for advice in respect of potential biting insect issues or constraints.

(b) The *Guidelines for Preventing Biting Insect Problems for Urban Residential Developments or Subdivisions in the Top End of the NT*, included in Part 2 of these Guidelines, provides direction on subdivision development requirements in relation to biting insects.

(c) A Subdivision must comply with the following biting insect requirements:

(i) there must be an urban exclusion buffer zone between urban residential development and significant and uncontrolled sources of biting insects. Areas with the potential for significant biting insect constraints are shown in the Darwin Regional Land Use Plan 2015. The urban exclusion biting insect buffer zone is typically 1.6km from significant breeding areas, but can potentially be reduced, depending on the outcome of baseline biting insect investigations, and biting insect rectification or control measures; and

(ii) rural residential, industrial and commercial land uses and Public Infrastructure such as main roads, lakes, open drains and drainage basins are permissible within an urban exclusion buffer zone.

3.7. LAND USE SEPARATION ZONES

(a) The development, growth and evolving character of a locality can bring together land uses which are incompatible due to the external effects of one land use over another. Conflict can arise because of off-site emissions such as noise, dust, vibration, smoke or fumes and odour.

(b) Land use planning within subdivisions must comply with the NT EPA Guidelines for 'Recommended Land Use Separation Distances' (Refer Part 2). This includes the exclusion of activities which principally involve human occupation of buildings or facilities within Power and Water Corporation 'Odour Management Zones' surrounding sewage treatment plants.

3.8. WELLHEAD PROTECTION ZONES

(a) Wellhead Protection Zones (WPZ) are identified by Power and Water Corporation as a planning tool used to manage development around ground water production bores or associated groundwater recharge areas. Power and Water Corporation standards define methods for determination and implementation of WPZs.

(b) Subdivisions within a WPZ will require careful planning in relation to the placement of on-site effluent treatment facilities, and may require specific consideration of effluent treatment systems.

(c) Subdivisions with the potential to negatively impact water quality or water yield will need to be actively managed, or in some instances may be excluded, to mitigate undesirable impacts on yield and contamination of groundwater supplies.

3.9. PRE-FEASIBILITY INFRASTRUCTURE CAPACITY ASSESSMENTS

(a) Prior to commencing design of Public Infrastructure as part of any Subdivision, Developers must contact all Relevant Authorities to discuss whether there is capacity in existing Public Infrastructure networks to support the proposed Subdivision, or if additional works, expansions or upgrades will be required as a condition of development. This is a key requirement as the requirement for such additional work can impact upon project feasibility.

(b) Existing Public Infrastructure networks to be considered include, but are not limited to:

(i) traffic impact assessment for existing road/street network, including public transport availability

(ii) stormwater drainage network capacity and identification of discharge constraints

(iii) reticulated water supply availability and capacity, or aquifier capacity for groundwater extraction (bores)

(iv) reticulated sewerage availability and capacity, or land capability for onsite wastewater management systems

(v) electrical supply availability and capacity

(vi) communications availability and capacity

(vii) street lighting availability and performance

(c) For Subdivisions proposing to extract groundwater for water supply, the Developer must:

(i) consult with the Relevant Authority to seek information on resource availability, and confirm the scope of capacity assessments required;

(ii) identify any constraints on groundwater availability, including those due to existing Water Allocation Plans or Water Management Zones applicable across the Development Site;

(iii) demonstrate the groundwater source quality is suitable for human consumption; and

(iv) demonstrate the potential impact of the proposed Subdivision's water usage, on existing groundwater resource users and groundwater dependent ecosystems, is within an acceptable level.

4. STREETS AND PATHWAYS

4.1. GENERAL

(a) Streets and Pathways are the backbone of any Subdivision, providing transport infrastructure to connect the community to points of interest within the Subdivision as well as the regional road network. Streets also provide public corridors for utilities and aid the delivery of essential services.

(b) By considering street network hierarchy and layouts early during the design and masterplan processes, opportunities can often be encountered to optimise lot yields and servicing arrangements while also balancing the need to provide a user friendly shared user environment of high amenity for vehicles, cyclists and pedestrians.

(c) Streets also provide opportunities to apply landscaping treatments and build a sense of character for a Subdivision. This is discussed further under Sections 5 and 6.

(d) The objectives of this section are to:
   (i) communicate a street network design philosophy to inform Subdivision masterplanning;
   (ii) define a street hierarchy for Subdivisions, and establish a guide for its application;
   (iii) set design parameters for streets, pathways and associated Public Infrastructure; and
   (iv) identify mandatory requirements for design documentation and approvals.

(e) The Relevant Authorities for streets and pathways are:
   (i) the Local Authority in relation to streets and pathways to be handed over to and accepted by the Local Authority; and
   (ii) Department of Infrastructure, Planning and Logistics in relation to streets/roads and pathways to be handed over to and accepted by the Northern Territory Government.

4.2. STREET NETWORK DESIGN PHILOSOPHY

(a) The street network must be designed, with the following key considerations incorporated into the proposed network layout.

4.2.1. ACCESSIBILITY

(a) Network connectivity should facilitate access to all areas of the Subdivision with minimal turning movements at intersections or junctions.

(b) Street network layout must ensure convenient and safe access to all allotments for vehicles, cyclists and pedestrians.

(c) Each new allotment must have individual, unconstrained access.
   (i) A right of way easement servicing a single lot may be acceptable, subject to approval by the Relevant Authority.
   (ii) A right of way easement servicing multiple lots will not be accepted. Existing right-of-way easements currently serving a single lot cannot be used for additional accesses to new lot(s).

(d) Battle axe allotments are not permitted, unless otherwise approved by the Relevant Authority. Where approved by a Relevant Authority, single battle axe designs are to have a minimum width of 10m in urban subdivisions; and 15m in rural subdivisions. Adjacent battle axe designs will not be accepted.

(e) Culs-de-sac may be required in exceptional circumstances due to Development Site based constraints and must only be used where approved by the Relevant Authority. Where approved for use, appropriate Road Reserve boundaries and truncations must be applied as agreed with the Relevant Authority.

(f) All allotments within a Subdivision must have trafficable access/egress to or from a Sub-arterial/Arterial Road during all storm events up to and including the 1% AEP Storm Event. Trafficable access/egress will be deemed sufficient where:
   (i) street/road geometry is sufficient to cater for emergency vehicle access; and
   (ii) flows within vehicle travel paths comply with the 'Major Storm Criteria' listed under Table 22.

(g) The current and future needs of emergency vehicles and public transport, including carriageway widths, bus embayments and turning paths must be provided for.

(h) The current and future needs of service vehicles, including convenient access to maintain Public Infrastructure and utilities must be provided for.

4.2.2. INTERSECTIONS

(a) Wherever possible, streets must intersect at 90 degrees. Where this is not achievable, street must not intersect at an angle of less than 70 degrees.

(b) Cross streets (4-way intersections) should be avoided where practicable. Where required, traffic lights or a roundabout must be applied to control traffic. Traffic lights are preferred as roundabouts do not favour pedestrian movements. Uncontrolled cross streets are not permitted.

(c) All intersections must be designed with sufficient lanes and control types to accommodate predicted traffic flows, have geometry that provides for relevant design vehicle turning paths and provide sight distances as required by Austroads design guidelines.

(d) All intersections must include appropriate traffic management infrastructure to prevent traffic undertaking illegal turning movements.

4.2.3. ALLEYWAYS

(a) Alleyways solely for pedestrian movement are prohibited.

4.2.4. DESIRED SPEED ENVIRONMENT

(a) Operating speeds in Subdivisions must be agreed with the Relevant Authority and typically conform to the following requirements:
   (i) Residential Zones have a maximum speed limit of 50km/hr and are typically not sign-posted, except where required to denote the commencement of a 'built-up area', or where lower speeds are warranted (e.g. school zones).
   (ii) Commercial/Mixed Use Zones are typically sign-posted at 40 to 60km/hr.
   (iii) Rural and Industrial Zones are typically sign-posted at ≥60km/hr.

(b) Desired operating speeds may be lower than the limits identified under clause 6.4.1(a) to provide a safer shared user environment for pedestrians and cyclists, particularly on lower order streets in Residential Zones.

(c) Design of the streetscape environment should consider use of geometrical design elements and landscaping features to influence driver behaviour to encourage desired operating speeds. Use of traffic control/calming devices, such as speed bumps or chicanes, to control diver speeds should be avoided where practicable. However, these types of devices may be desired and justified in special circumstances (e.g. near a pedestrian crossing for school children).

4.2.5. BUS ROUTES AND BUS STOPS

(a) It is recommended that the Developer consults with the Relevant Authority for Public Transport during the project initiation phase to identify requirements for bus routes, bus stop locations and associated street furniture (e.g. bus shelters, seats, bins, timetable totems etc.).

(b) For staged subdivisions, interim bus routes must be agreed with the Relevant Authority and temporary turnarounds may be required to facilitate public transport servicing the Subdivision prior to completion of the ultimate street network.

(c) Design of bus routes, bus stop locations and associated street furniture for interim and permanent development must be approved by the Relevant Authority.

4.2.6. STAGED WORKS

(a) Design of all streets and pathways must consider interface with future development to ensure there are no unreasonable constraints imposed on future design and construction works which could hinder the economic viability and/or safe delivery of future development.

(b) Where future streets are planned to connect with the Subdivision street network the intersection must be designed and constructed with a terminating stub to facilitate future connection. Construction must extend to the tangent points of the terminating stub.

4.3. TRAFFIC IMPACT ASSESSMENT/ STATEMENT

(a) An understanding of the traffic impact of a proposed development is essential to design both the internal layout and external integration with the surrounding street/road networks, and for assessment by the Relevant Authorities.

(b) Typically a full Traffic Impact Assessment (TIA) is required for any Subdivision that will generate in excess of 100 vehicle trips in peak hour; and a Traffic Impact Statement (TIS) is required for any Subdivision that will generate between 10 and 100 vehicle trips in peak hour.

(c) The requirement for a TIA or TIS will generally be imposed as Condition Precedent of a Development Permit if applicable. Where it is reasonably foreseeable that a Subdivision will trigger a TIA or TIS, it is recommended that the Developer undertake the assessment during the project development phase, prior to submitting a Development Application, to inform development of the Subdivision Masterplan and assist with review of the Development Application by the Development Consent Authority.

(d) A TIA/TIS must be developed in accordance with Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development, and address the following as a minimum:

- (i) Predicted traffic generation from the various land uses proposed in the Subdivision;
- (ii) Distribution of the predicted traffic generation onto the proposed internal street network and the external street/road network;
- (iii) Recommended minimum street hierarchy and street cross sections consistent with assigned traffic flows;
- (iv) Network permeability and connectivity, including for vehicles, pedestrians and cyclists;
- (v) Intersection (including property entrances) performance and configurations necessary to cater for assigned vehicle traffic flows and for the safe and efficient movement of pedestrians, cyclists and other street users;
- (vi) Provision for public transport and other transport modes, such as pedestrians and cyclists.

(e) Where the proposed subdivision incorporates a school site, consideration must also be given to specific access and controls for staff and students.

(f) A TIA/TIS may be referred to various affected Relevant Authorities for comment and the Developer must be mindful of this when preparing the TIA/TIS.

4.4. NOISE ATTENUATION

(a) Where the proposed Development Site is adjacent to Primary Collector, Sub-Arterial and/or Arterial roads, the impact of traffic noise must be assessed by a suitably qualified Consultant and noise attenuation measures implemented as required.

(b) Where traffic generated by the proposed Subdivision introduces noise for existing and/or proposed allotments, as determined by the Traffic Impact Assessment/Statement, a noise management plan including all attenuation measures must be prepared in accordance with relevant Australian Standards.

4.5. STREET HIERARCHY

(a) The Street Hierarchy of a Subdivision street network provides a range of alternative street types which can be applied in different contexts depending on the required function of a street in terms of shared user priorities. The Street Hierarchy is defined in Table 4.

Table 4 — Street Hierarchy

Classification	Description
Laneway	Laneways must only be used in conjunction with Primary Collector streets in urban environments to facilitate indirect rear access for allotments fronting onto streets with Annual Daily Traffic > 5,000 vehicles per day. Laneways must only be used for Category A Public Infrastructure (Set 1 only) and are subject to approval by the Relevant Authority. Where approved, Laneways must comply with the requirements of Section 4.6.8. Laneways are contrary to Alleyways, which are prohibited as described in Section 4.2.3.
MinorStreet/ Cul-de-sac	Minor streets are predominately used for residential access with direct lot access. In Residential / Mixed Use Zones, minor streets accommodate shared pedestrian, cyclist, and vehicular movements. In Rural Zones, minor streets are predominantly used for vehicular movements, with the provision of corridors to allow for pedestrian movements and future footpaths. Culs-de-sac may be used as an alternative in exceptional circumstances due to Development Site based constraints and must only be used where approved by the Relevant Authority.
AccessStreet	Access streets are predominately used for residential access with direct lot access, while also providing linking transport infrastructure to Secondary and Primary Collector streets. In Residential / Mixed Use Zones, Access Streets accommodate shared pedestrian, cyclist and vehicular movements with a greater focus on vehicle movement than Minor Streets with wider carriageways to provide for on-road shared parking. In Rural and Industrial Zones, Access Streets are predominantly used for vehicular movements, with limited catering to pedestrian and cyclist movements.
Secondary Collector	Secondary Collector streets service and link neighbourhoods and activity centres and typically form part of the public transport network. In Residential / Mixed Use Zones, Secondary Collector streets accommodate predominantly vehicle movements with provision of formalised on-street parking and additional footpaths to support increased pedestrian and cyclist activity off-carriageway. These streets consist of mostly residential frontage with direct access but can accommodate commercial developments also. In Rural and Industrial Zones, Secondary Collector Streets are predominantly used for vehicular movements, with limited catering to pedestrian and cyclist movements.
Primary Collector	Primary Collector streets are similar to Secondary Collector streets but typically accommodate higher traffic volumes and serve as the linking infrastructure to the sub-arterial / arterial road network. In Residential / Mixed Use Zones, direct lot access is restricted and central medians are required to provide staged pedestrian crossings due to high traffic volumes. These streets may be supported with Laneways to facilitate lot frontage to activate the streetscape while providing indirect lot access. In Rural and Industrial Zones, direct lot access is permissible and central medians are only applied where necessary to support traffic control objectives.
Sub-Arterial and Arterial Roads	Sub-Arterial and Arterial Roads service large volumes of commuter traffic at a regional level and do not typically form part of Subdivision development.

(b) The following sections nominate design criteria for Street Hierarchy relative to the Infrastructure Categories applicable to the Subdivision, as defined in Table 1.

4.5.1. DESIGN CRITERIA - CATEGORY A

(a) Infrastructure Category A utilises urban street cross-sections typically comprising:
  (i) sealed carriageways with asphalt wearing surface;
  (ii) kerb and gutter with underground stormwater systems[1]; and
  (iii) formal landscaped verges and medians, with underground services.

(b) Street Hierarchy Selection can be guided by Table 5 to determine which street type is appropriate for each area of the Subdivision. A range of selection criteria is presented including ADT, number of lots and length of street to offer flexibility for circumstances where individual criteria may not be appropriate. These criteria are presented as typical maximum values, acknowledging that higher order streets may be appropriate under low traffic volumes and or density of development to support town planning objectives.

Table 5 — Street Hierarchy Selection Criteria - Category A

Zoning	Street Type	Typical Max Annual Daily Traffic Volumes (vpd)	Typical Max No. of Dwellings	Typical Max Street Length (m)
Residential/ Mixed Use	Laneway (Set A Only)	n/a	10	140
	Minor Street/ Cul-de-sac	1,500	30	300
	Access Street	3,000	60	600
	Secondary Collector	5,000	300	As approved
	PrimaryCollector	10,000	400	As approved
Industrial	Access Street	n/a	50	1,000
	Collector	n/a	>50	As approved

(c) Two set types have been established for Infrastructure Category A; Set 1 and Set 2 as identified in Table 1.
  (i) Design Criteria for Set 1 is outlined in Table 6.
  (ii) Design Criteria for Set 2 is outlined in Table 7.

Notes

1. *Aboveground open drain networks may be required in some project specific circumstances where topography is very flat, subject to approval by the Relevant Authority.*

Table 6 — Street Hierarchy Design Criteria - Category A - Set 1

Zoning Type	Street Hierarchy	Reserve Width (Minimum)	Carriageway Width (Minimum)	Central Median	Verge Width (Minimum)	Formalised Parking Lanes [3]	Footpath [4]	Lot Access
Residential/ Mixed Use [1]	Laneway	6.25m [2]	2 x 3m	None	None	None	None	Direct access
	Minor Street/ Cul-de-sac	15m	2 x 3m	None	2 x 4.5m	None	1 x 1.5m	Direct access
	Access Street	16m	2 x 3.5m	None	2 x 4.5m	None	1 x 1.5m	Direct access
	SecondaryCollector	21.6m	2 x 3.5m	As Required	2 x 5m	2 x 2.3m	1 x 1.5m 1 x 2.5m	Direct access
	Primary Collector	24.6m	2 x 3.5m	3m	2 x 5m	2 x 2.3m	2 x 2.5m	Access via rear laneway where ADT > 5000
Industrial	Access Street	21m	2 x 5.5m	As Required	2 x 5m	None	1 x 1.5m	Direct access
	Collector	23m	2 x 6.5m	As Required	2 x 5m	None	1 x 1.5m	Direct access

Table Notes:

1. Street Hierarchy for Residential/mixed Use Zoning also applies to Rural Residential (RR) allotments residing in Residential/Mixed Use Subdivisions.
2. Laneway Reserve Widths may need to be widened to accommodate street lighting, landscaping treatments, garbage collection, and/or to improve passive surveillance.
3. Formalised Parking Lanes are in addition to the minimum Carriageway Width specified.
4. On-street Cycle Lanes should also be considered where Annual Daily Traffic (ADT) is forecast to exceed 3,000 vehicles per day. The Developer should consult with the Relevant Authority during the project development phase to confirm regional cycle path network strategies and agree on appropriate provision of cyclist facilities, considering exposure based warrants.

Table 7 — Street Hierarchy Design Criteria - Category A - Set 2

Zoning Type	Street Hierarchy	Reserve Width (Min)	Carriageway Width (Minimum)	Central Median	Verge Width (Minimum)	Formalised Parking Lanes [2]	Footpath [3]	Lot Access
Residential / Mixed Use [1]	Minor Street/ Cul-de-sac	15.5m	2 x 3.75m	None	2 x 4.0m	None	1 x 1.5m	Direct access
	Access Street	17m	2 x 4.5m	None	2 x 4.0m	None	1 x 1.5m	Direct access
	Secondary Collector	20m	2 x 5.5m	As Required	2 x 4.5m	None	1 x 1.5m 1 x 3.0m	Direct access
	Primary Collector	22m	2 x 6.5m	As Required	2 x 4.5m	None	1 x 1.5m 1 x 3.0m	Via approval
Industrial	Refer Category A - Set 1							

Table Notes:

1. Street Hierarchy for Residential/mixed Use Zoning also applies to Rural Residential (RR) allotments residing in Residential/Mixed Use Subdivisions.
2. Formalised Parking Lanes are in addition to the minimum Carriageway Width specified.
3. On-street Cycle Lanes should also be considered where Annual Daily Traffic (ADT) is forecast to exceed 3,000 vehicles per day. The Developer should consult with the Relevant Authority during the project development phase to confirm regional cycle path network strategies and agree on appropriate provision of cyclist facilities, considering exposure based warrants.

4.5.2. DESIGN CRITERIA - CATEGORY B AND C

(a) Infrastructure Category B utilises a mixed urban/rural street cross-section typically comprising:
  (i) sealed carriageways with spray seal wearing surface;
  (ii) kerb and gutter to contain pavements and convey stormwater into table drains in a controlled manner; table drains and service corridors in lieu of formal verges, including provision of a footpath and landscaping treatments; and
  (iii) a mix of underground/overhead services.

(b) Infrastructure Category C utilises a rural street cross-section typically comprising:
  (i) sealed carriageways with spray seal wearing surface;
  (ii) shoulders (no kerbing) and table drains to convey stormwater;
  (iii) table drains and service corridors in lieu of formal verges, with footpath corridors (no footpaths) and grassed landscaping treatments only; and
  (iv) a mix of underground/overhead services.

(c) Street Hierarchy Selection can be guided by Table 8 to determine which street type is appropriate for each area of the Subdivision. A range of selection criteria is presented including ADT, number of lots and length of street to offer flexibility for circumstances where individual criteria may not be appropriate. These criteria are presented as typical maximum values, acknowledging that higher order streets may be appropriate under low traffic volumes and or density of development to support town planning objectives.

Table 8 — Street Hierarchy Selection Criteria - Category B and C

Zoning	Street Type	Typical Max Annual Daily Traffic Volumes (vpd)	Typical Max No. of Dwellings	Typical Max Street Length (m)
Residential, Mixed Use and Industrial	Minor Street / Cul-de-sac; and Access Street	n/a	60	600
	Secondary and PrimaryCollector	n/a	400	As approved

(d) Design Criteria for Category B and C is outlined in Table 9 and Table 10.

Table 9 — Street Hierarchy Design Criteria - Category B

Zoning Type	Street Hierarchy	Reserve Width [1] (Minimum)	Carriageway Width (Minimum) [2]	Central Median	Verge Width [1] (Minimum)	Formalised Parking Lanes	Footpath	Lot Access
Residential, Mixed Use and Industrial	Minor Street / Cul-de-sac; and Access Street	17m	2 x 3.0m Lanes	None	2 x 5.5m	None	1 x 1.5m	Direct access
	Primary and SecondaryCollector	22m	2 x 3.0m Lanes	As Required	2 x 8m	None	1 x 1.5m	Direct access

Table Notes:

1. Road Reserve Widths must be equal to or greater than the minimum values nominated. Road Reserve Widths must be appropriately sized to accommodate table drains and separate service corridors/footpath corridors.
2. Carriageway widths may be widened to convey more stormwater in the street carriageway, where desirable for project specific circumstances (e.g. where it is practicable to reduce the extent of table drains and/or open drains).

Table 10 — Street Hierarchy Design Criteria - Category C

Zoning Type	Street Hierarchy	Reserve Width [1] (Minimum)	Carriageway Width (Minimum)	Central Median	Verge Width (Minimum)	Formalised Parking Lanes	Footpath	Lot Access
Residential, Mixed Use and Industrial	Minor Street / Cul-de-sac; and Access Street	19m	8m (2 x 3.0m Lanes, 2 x 1.0m shoulders)	None	2 x 5.5m	None	2 x 2.7m Corridors	Direct access
	Primary and SecondaryCollector	24m	8m (2 x 3.0m Lanes, 2 x 1.0m shoulders)	As Required	2 x 8m	None	2 x 2.7m Corridors	Direct access

Table Notes:

1. Road Reserve Widths must be equal to or greater than the minimum values nominated. Road Reserve Widths must be appropriately sized to accommodate table drains and separate service corridors/footpath corridors.

4.5.3. DESIGN CRITERIA - CATEGORY D AND E

(a) Infrastructure Category D and Category E utilise rural street cross-sections typically comprising:

(i) sealed carriageways with spray seal wearing surface generally. Asphalt provided at some intersections/ culs-de-sac (Category D only);

(ii) shoulders (no kerbing) and table drains to convey stormwater;

(iii) table drains and service corridors in lieu of formal verges, with footpath corridors (no footpaths) and grassed landscaping treatments only; and

(iv) a mix of underground/overhead services.

(b) Street Hierarchy Selection can be guided by Table 11 to determine which street type is appropriate for each area of the Subdivision. A range of selection criteria is presented including ADT, number of lots and length of street to offer flexibility for circumstances where individual criteria may not be appropriate. These criteria are presented as typical maximum values, acknowledging that higher order streets may be appropriate under low traffic volumes and or density of development to support town planning objectives.

Table 11 — Street Hierarchy Selection Criteria - Category D and E

Zoning	Street Type	Typical Max Annual Daily Traffic Volumes (vpd)	Typical Max No. of Dwellings	Typical Max Street Length (m)
Rural Residential (RR) **Rural Living (RL)**	Minor Street/ Cul-de-sac	n/a	5	500
	Access Street	n/a	60	6,000
	Secondary Collector	n/a	300	As approved
	PrimaryCollector	n/a	>300	As approved
Other Rural Zones (H, A, R)	Minor Street/ Cul-de-sac	n/a	10	500
	Access Street	n/a	60	30,000
	Secondary Collector	n/a	300	As approved
	PrimaryCollector	n/a	>300	As approved

(d) Design Criteria for Category D and Category E is outlined in Table 12.

Table 12 — Street Hierarchy Design Criteria - Category D and E								
Zoning Type	**Street Hierarchy [2]**	**Reserve Width [1] (Minimum)**	**Carriageway Width (Minimum)**	**Central Median**	**Verge Width [1] (Minimum)**	**Formalised Parking Lanes**	**Footpath**	**Lot Access**
All Rural Zones (RR, RL, H, A, R)	Minor Street / Cul-de-sac	20m	9m (2 x 3.5m Lanes, 2 x 1.0m shoulders)	None	2 x 5.5m	None	2 x 2.7m Corridors	Direct access
	Access Street	22m	9m (2 x 3.5m Lanes, 2 x 1.0m shoulders)	None	2 x 6.5m	None	2 x 2.7m Corridors	Direct access
	SecondaryCollector	25m	9m (2 x 3.5m Lanes, 2 x 1.0m shoulders)	As Required	2 x 8m	None	2 x 2.7m Corridors	Direct access
	Primary Collector	30m	10m (2 x 3.5m Lanes, 2 x 1.5m shoulders)	As Required	2 x10m	None	2 x 2.7m Corridors	Direct access

Table Notes:

1. Road Reserve Widths must be equal to or greater than the minimum values nominated. Road Reserve Widths must be appropriately sized to accommodate table drains and separate service corridors/footpath corridors.
2. Reserve Widths may need to be increased to facilitate a higher order of street hierarchy under future development.

4.6. STREET DESIGN

(a) Design of streets must comply with Australian Standards, Austroads Guidelines, Standard Drawings (Part 3) and the requirements of this section.

(b) Sight Distances must be checked and confirmed satisfactory in accordance with Austroads Guidelines.

4.6.1. RESERVE BOUNDARIES

(a) Road Reserve widths must generally comply with the requirements of Table 5 to Table 12.

(b) Truncations of suitable dimensions must be provided for all boundary corners at all street intersections to allow for intersection sight distances, verge width, and footpath installation. A 3m x 3m truncation must be provided as a minimum, unless otherwise approved by the Relevant Authority.

(c) Truncations at intersections with Northern Territory Government Controlled Roads must comply with NT Government requirements.

4.6.2. CUL-DE-SAC AND INTERSECTION TURNING CRITERIA

(a) Where culs-de-sac are approved for use by the Relevant Authority, Cul-de-sac radii must be minimum 10m to facilitate access for garbage trucks. Larger radii may be required where larger vehicles are expected, which is to be determined via turn-path analysis.

(b) Intersections are to be designed to accommodate appropriate vehicle use in accordance with Table 13 and Austroads Guidelines.

4.6.3. KERBING

(a) For streets where kerbing is specified, comply with Standard Drawings (Refer Part 3).

(b) Barrier kerb types must be used:

(i) on Primary Collector streets, except traffic islands and medians which must be mountable kerbing;

(ii) adjacent to all public open space areas; and

(iii) where required to restrict vehicle access or protect pedestrians/cyclists.

4.6.4. TRAFFIC ISLANDS AND MEDIANS

(a) Medians must be provided as specified in Table 5 to Table 12. Additional streets may warrant application of medians to control traffic and provide pedestrian refuge.

(b) Minimum traffic island and median widths are to be designed in accordance with Austroads Guidelines.

(c) Traffic Islands and Medians are to be surrounded with mountable kerbing. Infill must be:

(i) Traffic Islands and medians 2.5m wider or larger to be landscaped in accordance with Section 13 – Soft Landscaping.

(ii) Traffic Islands and medians less than 2.5m to be minimum 150mm concrete infill with SL82 reinforcing.

4.6.5. VERGES

(a) Verge widths must comply with the requirements of Table 5 to Table 12. Formalised Parking must not encroach into the minimum verge widths specified.

(b) Footpaths must be provided as nominated in Table 5 to Table 12 and constructed in accordance with the Standard Drawings (Refer Part 3).

(c) Verges must be appropriately landscaped in accordance with Section 6.

4.6.6. FORMALISED ON-STREET PARKING

(a) Formalised parking must be provided in the form of indented bays where specified in Table 5 to Table 12, as well as adjacent public open space and natural vegetation areas.

(b) Groups of indented bays are not to exceed a length of nominally 100m before having a landscaped separation in the form of a bulb-out to ensure the streetscape environment encourages desired operating speeds. Spacing between bulb-outs should allow for multiples of approximately 6.5m and take into account all necessary services.

(c) Off-street parking is also required for Public Open Space Areas (Refer Section 5. Public Open Space).

Table 13 — Intersection Turning Criteria			
Intersecting Streets	**Design Vehicle**	**Checking Vehicle**	**Minimum Kerb Radii [2]**
Residential and Rural Residential/Rural Living Streets			
Laneway/Minor Street	Service Vehicle (8.8m)	Service Vehicle (8.8m)	8m
Minor Street/Access Street	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	8m
Minor Street/Secondary Collector	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Access Street/Secondary Collector	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Access Street/ Primary Collector	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Secondary Collector/ Primary Collector	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi-Trailer (19m)	10m[1]
Primary Collector/ Arterial	Prime Mover and Semi-Trailer (19m)	B-double (25m)	10m[1]
Mixed Use and Industrial Streets			
Minor Street/Access Street	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Minor Street/Secondary Collector	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Access Street/Secondary Collector	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi-Trailer (19m)	10m[1]
Access Street/ Primary Collector	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi-Trailer (19m)	10m[1]
Secondary Collector/ Primary Collector	Prime Mover and Semi-Trailer (19m)	B-double (25m)	10m[1]
Primary Collector/ Arterial	Prime Mover and Semi-Trailer (19m)	B-double (25m)	10m[1]
Rural Streets			
All rural street intersections are to be designed to accommodate A - Triple (53m) Road Trains in accordance with Austroads Guide to Road Design Part 4: Intersection and Crossings unless otherwise agreed with the Relevant Authority.			

Table Notes:

1. Minimum radii for vehicles 12.5m or greater are to be confirmed by a turn path analysis and approved by Relevant Authority.
2. Where practicable to do so, and subject to approval by the Relevant Authority, smaller kerb radii should be considered to provide traffic calming to achieve the desired speed environment (Clause 4.2.4).

4.6.7. LOT ACCESS / DRIVEWAYS

(a) Direct access to allotments from the fronting Road Reserve can only be provided where permitted under Table 5 to Table 12. Where applicable, Laneways may be provided to facilitate rear of lot access on Primary Collector Streets, subject to approval by the Relevant Authority and the requirements of Clause 4.6.8. Laneways.

(b) Driveways in Subdivisions must comply with Standard Drawings (Refer Part 3) and AS/NZS 2890.1: Parking Facilities - Off-street parking. Driveway widths in excess of those shown in the Standard Drawings may be provided, subject to approval of the Relevant Authority.

(c) Driveways must be located with the following setbacks/clearances and provide adequate sight distances in accordance with Austroads Guidelines:

- (i) 500mm from street signs
- (ii) 600mm from any stormwater drainage pit
- (iii) 1000mm from overhead power/street light poles
- (iv) 1200mm clear of service pits, pillars, valve boxes etc.
- (v) 12m from any intersections

4.6.8. LANEWAYS

(a) The use of Laneways is subject to approval by the Relevant Authority and they must only be used in conjunction with Primary Collector streets in urban environments to facilitate indirect rear access for allotments fronting onto streets with Average Daily Traffic > 5,000 vehicles per day. In no circumstance should a lot solely front a laneway.

(b) Allowing for lots to front onto Primary Collector Streets will assist to activate the street, encourage the 'desired speed environment' (Section 4.2.4), improve streetscape amenity and provide passive surveillance to create a pedestrian friendly environment.

(c) The design, layout and detailing of laneways and the strategic siting of buildings to overlook these laneways is an important consideration and is critical for community safety.

(d) Design of Laneways must address the following:

- (i) Layouts must enable direct sight lines and passive surveillance down the entire length of the laneway along both directions from adjoining streets. Straight lanes and T-lanes provide a greater level of passive surveillance. H-lanes, dog-leg lanes and tightly curved lanes are not acceptable.
- (ii) Land use zoning should support siting of high density residential, mixed use and multi-storey dwellings in key locations to offer passive surveillance over the laneway. Typically these are sited at the ends of laneways and all mid-lane junctions.
- (iii) Provide adequate sight line truncations at intersections for pedestrian and vehicular safety. A minimum 2.8m sight line truncation (2m x 2m at 90 degree angle) must be provided.
- (iv) Laneway length must be max 140m where practicable. If longer laneways are required, a mid-lane link must be provided.
- (v) Laneway width should be sufficient to ensure adequate reversing space and minimise requirements for building or fence setbacks on lots, particularly where these could result in hidden recesses or provide illegal access opportunities into rear yards. Half-a-metre (0.5 metres) setback for garages and fences, and a minimum laneway width of 6 metres, allows adequate reversing space and improves safety and surveillance.
- (vi) Laneways may be locally widened in parts to create mews courts.
- (vii) Laneways must provide rubbish collection access.
- (viii) Laneways should function solely as vehicle access to lots and not act as, or create and alternate, through-route in the overall street network.
- (ix) Street lighting must be provided at the entrance to laneways and at intermediate locations along the laneways where required to support vehicle and pedestrian safety.
- (x) Utility service corridors must generally be located within the Primary Collector Street.

4.6.9. STORMWATER DESIGN

(a) Stormwater drainage design within all Road Reserves must comply with the requirements of Section 7.

4.7. STREET PAVEMENT DESIGN

(a) The objective in the design of the street pavement is to select appropriate pavement and surfacing materials, types, layer thickness's and configurations to ensure that the pavement performs adequately and requires minimal maintenance under the anticipated traffic loading for the design life.

(b) The minimum design life for pavement design must be 30 years.

(c) All street pavements must be designed in accordance with the current version of the Austroads Guide to Pavement Technology and the Standard Specification (Refer Part 4).

(d) The Developer must submit the pavement design in the Design Report to the Relevant Authority for approval.

(e) The design of the pavement must involve consideration of the following four input variables:
  (i) Design traffic;
  (ii) Subgrade evaluation;
  (iii) Pavement and surfacing materials; and
  (iv) Construction and maintenance considerations.

4.7.1. DESIGN TRAFFIC

(a) The Developer must undertake an analysis for design traffic and is responsible for determining design traffic loadings and appropriate pavement structure. Assessment of design traffic must include consideration of Subdivision staging and construction vehicles through completed stages to construct Public Infrastructure for further stages.

(b) Minimum design traffic loadings may be nominated by the Relevant Authority within Section 14 - Schedule of Variations. Where nominated, design traffic loadings used for pavement design must be the greater of:
  (i) design traffic loadings determined under clause 4.7.1(a); and
  (ii) minimum design traffic loadings nominated by the Relevant Authority in Section 14 - Schedule of Variations.

4.7.2. SUBGRADE EVALUATION

(a) Subgrade evaluation must be carried out by a NATA registered materials test authority on each different natural sub-grade material evident and must be by the conduct of soaked 4-day CBR laboratory testing.

(b) Design CBR for each subgrade area must be determined in accordance with the methods outlined in Austroads guidelines.
  (i) For in-situ subgrade test results resulting in a design CBR of less than 5%, the pavement must be designed with input from geotechnical engineer experienced in the design of street pavements.
  (ii) For in-situ subgrade tests results resulting in a design CBR of greater than 10%, pavement design must adopt a subgrade strength of CBR 10% unless higher design values are supported in writing by a geotechnical engineer.

4.7.3. PAVEMENT COMPOSITION

(a) Regardless of the outcomes of the pavement design process, the minimum overall pavement thickness to be adopted is 150mm (excluding wearing surface). The subgrade must also be compacted to a minimum depth of 150mm.

(b) All basecourse materials are to be Fine Crushed Rock (FCR) or natural gravel, as identified in Table 2.
  (i) Where FCR is used in unconfined pavements with shoulders and table drains, erosion protection measures must be provided to mitigate unravelling of exposed FCR in the shoulders and batters.

(c) Pavement materials and construction must comply with the Standard Specification (Refer Part 4).

4.7.4. WEARING SURFACE

(a) The Developer is responsible for providing a wearing surface design that accommodates the design loading, including construction traffic.

(b) The minimum wearing surfaces are outlined in Table 14 to Table 17. Asphalt thickness is reported as 'compacted thickness'. Bracketed values denote bitumen grade.

(c) Wearing surface design for intersections with Sub-Arterial / Arterial Roads) must comply with the DIPL Standard Specification for Roadworks.

Table 14 — Minimum Wearing Surface for Infrastructure Category A

APPLICATION	MINIMUM WEARING SURFACE DESIGN
Property Access / Driveways	
All Applications	Reinforced Concrete Pavement
Residential/Mixed Use Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 30mm Asphalt AC10 - Mix Type 2 (A20E)
Culs-de-sac and Intersections (no heavy vehicle movements)	Prime and 40mm Asphalt AC10 - Mix Type 2 (A20E)
Intersections (with heavy vehicle movements)	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)
Residential/Mixed Use Streets (ADT > 5,000 AADT)	
Streets	Prime and 40mm Asphalt AC14 - Mix Type 5 (A15E)
Intersections	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)
Industrial Streets	
Streets and Intersections (Zone LI)	Prime and 40mm Asphalt AC14 - Mix Type 5 (A15E)
Streets and Intersections (Zones GI, DV)	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)

Table 15 — Minimum Wearing Surface for Infrastructure Category B & C

APPLICATION	MINIMUM WEARING SURFACE DESIGN
Property Access / Driveways	
Residential Access	Prime and 14mm Single Coat Seal (S10E); or Reinforced Concrete Pavement
Mixed Use/ Industrial Access	Reinforced Concrete Pavement
Residential / Mixed Use Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Culs-de-sac and Intersections (no heavy vehicle movements)	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Intersections (with heavy vehicle movements)	Prime and 14/7mmm Two-Coat Spray Seal (S20E)
Residential/Mixed Use Streets (ADT > 5,000 AADT)	
Streets and Intersections	Prime and 14/7mm Two-Coat Spray Seal (S20E)

Table 15 — Minimum Wearing Surface for Infrastructure Category B & C	
Industrial Streets	
Streets and Intersections (Zone LI)	Prime and 14/7mm Two-Coat Spray Seal (S20E)
Streets and Intersections (Zones GI, DV)	Prime and 20/10mm Two-Coat Spray Seal (S20E)

Table 16 — Minimum Wearing Surface for Infrastructure Category D	
APPLICATION	**MINIMUM WEARING SURFACE DESIGN**
Property Access / Driveways	
All Applications	Prime and 14mm Single Coat Seal (S10E)
Rural Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Culs-de-sac and Intersections (no heavy vehicle movements)	Prime and 40mm Asphalt AC10 - Mix Type 2 (A20E)
Intersections (with heavy vehicle movements)	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)
Rural Streets (ADT > 5,000 AADT)	
Streets and Intersections	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)

Table 17 — Minimum Wearing Surface for Infrastructure Category E	
APPLICATION	**MINIMUM WEARING SURFACE DESIGN**
Property Access / Driveways	
All Applications	Prime and 14mm Single Coat Seal (S10E)
Rural Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Culs-de-sac and Intersections (no heavy vehicle movements)	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Intersections (with heavy vehicle movements)	Prime and 14/7mmm Two-Coat Spray Seal (S20E)
Rural Streets (ADT > 5,000 AADT)	
Streets and Intersections	Prime and 14/7mm Two-Coat Spray Seal (S20E)

4.7.5. ALTERNATIVE PAVEMENT TREATMENTS

(a) Where alternative street pavement treatments are proposed (e.g. entry statement or special features), plans and specifications must be submitted to the Relevant Authority for approval.

4.7.6. SUBSURFACE DRAINAGE

(a) Refer to Section 7.9.15 for subsurface drainage requirements.

4.8. STREET FURNITURE AND TRAFFIC CONTROL DEVICES

(a) Street furniture must be provided where required in accordance with Standard Drawings, Austroads and Relevant Australian Standards.

(b) All street signs, warning signs, regulatory signs, directional signs, and line marking must:
  (i) be designed and provided in accordance with AS1742: Manual of Uniform Traffic Control Devices; and
  (ii) use reflective high intensity grade reflective material for all signs (Type III as per AS 1742).

(c) As a minimum, the following signs and line marking must be provided:
  (i) street name signs at each intersection - one at each T intersection and two at each four-way intersection;
  (ii) speed limit signs, including school zones;
  (iii) radar speed signs immediately following school zone signs to altert drivers of their speed;
  (iv) warning signs at the approach to all hazards;
  (v) “keep left” signs at the approach end of the first island at all channelised intersections and at all median openings;
  (vi) separation lines on sub-arterials and collectors;
  (vii) double unbroken lines on street centreline at locations on two-way streets where the sight distance available is less than the desirable minimum specified in Austroads;
  (viii) at a temporary termination of street construction, such as a subdivision or stage boundary a diagonal striped sight board must be erected;
  (ix) holding lines at T intersections; and
  (x) other traffic control devices necessary for effective traffic control and any traffic control devices required by the Relevant Authority.

(d) Line marking must be applied with a minimum of two (2) coats. The first coat must be applied prior to the Practical Completion Date; and the second coat six (6) months later.

4.9. SHARED PATHS AND FOOTPATH DESIGN

(a) The provision of safe and convenient facilities for pedestrians and cyclists is required. Subdivision development designs must incorporate a system of footpaths and shared paths.

(b) Design of shared paths and footpaths must comply with relevant legislation, current Australian Standards, Austroads Guidelines, Standard Drawings (Part 3) and the following requirements.

4.9.1. APPLICATION

(a) Footpaths must be provided in Road Reserves as per Table 5 to Table 12 as a minimum.

(b) Footpaths and shared paths must also be included throughout Subdivisions to:
  (i) connect residential areas to public open spaces and other points of interest;
  (ii) provide access throughout the subdivision and to connect with the regional path network;
  (iii) activate public open space areas and provide access to associated facilities.

(c) On-street Cycle Lanes should be considered where Annual Daily Traffic (ADT) is forecast to exceed 3,000 vehicles per day. The Developer should consult with the Relevant Authority during the project development phase to confirm regional cycle path network strategies and agree on appropriate provision of cyclist facilities.

4.9.2. KERB RAMPS AND REFUGES

(a) Crossings and kerb ramps must be provided at all kerbs where footpaths and shared paths cross streets and roads. These must be designed and constructed in accordance with Standard Drawings and relevant Australian Standards.

(b) Pedestrian refuges must be provided within medians, as applicable.

4.9.3. ACCESS FOR PERSONS WITH A DISABILITY

(a) All public places and facilities for public access, use and enjoyment in any Subdivision must comply with the *Disability Discrimination Act 1992 (Cth)*. In particular, all public places and facilities for public access, use and enjoyment, must be reasonably open, accessible and available to people with a disability in accordance with that Act.

(b) Assessment of design requirements for streets and pathways in Subdivisions should be undertaken on a case-by-case basis to identify opportunities to remove barriers and improve accessibility where it is practicable to do so. Designs should aim to:

(i) provide fair and equitable access for persons with a disability; and

(ii) provide a more usable and accessible environment for all persons.

(c) Application of Tactile Ground Surface Indicators (TGSIs) within streets and pathways in Subdivisions will improve methods of wayfinding and increase safety within the built environment for blind or vision-impaired persons. The requirements of AS1428.4.1 should be considered on a case-by-case basis and applied where appropriate to ensure safe access for blind or vision-impaired persons.

4.10. ROAD SAFETY AUDITS

(a) The Developer must consult with Relevant Authorities to confirm the scope of road safety audits required for Public Infrastructure.

(b) All roads and/or intersections involving Arterial or Sub-Arterial Roads are subject to Road Safety Audits in accordance with the DIPL Policy “Road Safety Audits”. In general, the following must be provided:

(i) Stage 3 Audit (Detail Design)

(ii) Stage 4 Audit (Pre-opening Design)Stormwater Drainage

(c) Road Safety Audits must be prepared by a suitably qualified Road Safety Auditor and undertaken in accordance with national practice given in Austroads Guidelines.

(d) Appropriate consideration must be given to vulnerable road users and for unique traffic conditions that exist in the Northern Territory.

5. PUBLIC OPEN SPACE

5.1. INTRODUCTION

(a) This section sets out the requirements for Public Open Space, as applicable to Residential/Mixed Use Subdivisions under the Planning Scheme. For Industrial and Rural zoned Subdivisions, this section is generally not applicable unless mandated by Development Permit conditions; however, the Developer is recommended to consider the design elements outlined within this section and apply them to their Subdivision as appropriate.

(b) The provision of an integrated network of Public Open Space is a key factor in a neighbourhood's liveability, vitality, civic interaction and sense of place. A complementary range of well-located, site-responsive parks of different types, scales and activity levels should work together across project boundaries to facilitate walking and cycling as well as provide recreation, play and outdoor lifestyle opportunities for the whole community.

(c) This section sets out the range of design elements that are to be considered and addressed in the planning and design of public open space areas within a Subdivision. The design elements considered are:

- (i) Public Open Space Provision & Distribution
- (ii) Land Use & Activity
- (iii) Site Responsive Design
- (iv) Interfaces & Surveillance
- (v) Accessibility & Movement
- (vi) Stormwater Management & Drainage
- (vii) Structures & Hard Landscaping
- (viii) Streetscapes

(d) Information in each element is arranged in terms of:

- (i) Objectives - which set out the broader aims for the topic;
- (ii) Mandatory Criteria - which specify specific requirements which must be complied with; and
- (iii) Design Suggestions - which provides further options and strategies for consideration.

(e) Alternate and innovative approaches to the Mandatory Criteria may only be considered if they can clearly be demonstrated to achieve the Objectives and are subject to approval by the Relevant Authorities.

(f) Soft landscaping is covered separately within Section 6.

5.2. PUBLIC OPEN SPACE MASTERPLAN

(a) The Developer must prepare a Public Open Space Masterplan to support the Subdivision Masterplan (Section 2.3), to be submitted with the Development Application during the preliminary design development phase.

(b) The Public Open Space Masterplan must fully describe responses to the design elements outlined in this section, and clearly identify the following:

(i) location, category and size of Public Open Space, including a summary of the total area and the proportion of the area designated to different types of public open space (active, passive, linkage corridors etc.);

(ii) how linkage corridors are connected to external linkages, public open space in neighbouring suburbs or adjacent shopping/educational facilities;

(iii) the proposed network of footpaths, shared paths and cycle paths in the Subdivision that will link each Public Open Space together and to adjoining subdivisions/developments, and provide a clear hierarchy of pedestrian movement to Areas of Significance and to and between sporting, recreation and community facilities;

(iv) how access for persons with disability, and appropriate furniture is provided to all Public Open Space compliant with requirements for access for persons with disability.

(v) where Public Infrastructure is to be constructed in linkage corridors as part of the movement network, with facilities for pedestrians and cyclists designed to take priority over private vehicles for short trip options;

(vi) stormwater management elements and Water Sensitive Urban Design (WSUD) strategies to be included in the Subdivision. These must be integral with the Public Open Space and landscape design;

(vii) areas of ecological importance to be protected and include connective habitat corridors to adjoining natural habitats;

(viii) biting insect transition, easements and buffer zones;

(ix) a recreation strategy accommodating all age groups and recreational interests;

(x) a street tree framework and theme which clearly notes which tree species will be planted in each street with reference to the local authority street tree strategy as available;

(xi) the location, identification and health report for existing vegetation to be retained;

(xii) a proposed plant species list of new trees, shrubs, and grass;

(xiii) the irrigation reticulation main line systems and water sources; and

(xiv) Irrigation strategy and water use table for irrigated landscape planting and grassing in public open space.

5.3. PUBLIC OPEN SPACE PROVISION AND DISTRIBUTION

(a) This section covers the overall quantum of Public Open Space to be provided, and the range of open space types, what they should include and how they should be arranged in a broader open space network.

(b) Formal provision of Public Open Space is only required for Residential/Mixed Use Subdivisions. The following requirements are not applicable to Industrial and Rural Zoned Subdivisions, unless otherwise mandated through Development Permit conditions.

5.3.1. OBJECTIVES:

(a) To provide easy, walkable access to some form of Public Open Space for all residents within applicable Subdivisions.

(b) To appropriately locate and distribute higher use spaces throughout neighbourhoods.

(c) To ensure open space is suitably sized for its purpose.

(d) To facilitate maintenance regimes.

5.3.2. MANDATORY CRITERIA:

(a) The Planning Scheme requires Public Open Space be provided within Residential/Mixed Use Subdivisions, covering a minimum of 10% of the subdivision area. Allocation of Public Open Space must comply with the requirements of the Planning Scheme, as well as the following additional requirements:
   (i) a minimum of 50% of public open space must be landscaped / developed space; and
   (ii) a maximum of 50% of public open space can be undeveloped remnant bushland where this space includes Public Infrastructure that provides public access and benefit.

(b) Remnant bushland must be maintained in a healthy state during construction if it is to be included in the above public open space calculation. Degraded remnant bushland must be revegetated, if it is to be included in the open space calculation.

(c) Lakes and wetlands must provide a high level of amenity and recreational use if they are to be included in the above open space calculation. The inclusion of lakes and wetlands in the open space calculation is subject to approval by the Relevant Authority.

(d) Public Open Space hierarchy must conform to Table 18, including:
   (i) Pocket Parks
   (ii) Local Parks
   (iii) Neighbourhood Parks
   (iv) Regional Parks
   (v) Encumbered Linkage Corridors
   (vi) Unencumbered Linkage Corridors

5.3.3. DESIGN SUGGESTIONS:

(a) Pocket parks are encouraged to be linked to larger ones by linkage corridors or appropriate street linkages to facilitate efficient maintenance regimes.

Table 18 — Public Open Space Hierarchy	
Hierarchy Type (Typical Sizes)	**Intended Use**
Pocket Park (< 1,500m^2)	Pocket Parks are smaller public open spaces focused toward providing a nearby space for local community members. The area catchment is generally a 400 m radius or a 5-minute walk. The space is typically utilised for short periods of time and may support active and passive play but does not provide for organised sporting events.
Local Park (1,500 to 5,000 m^2)	Local Parks are medium sized public open spaces focused toward providing a nearby space for local community members. The area catchment is generally a 1000 m radius or a 10-minute walk. The space is typically utilised for active and passive play but does not provide for organised sporting events. Local Park location and design should: ◦ include accessible, safe pedestrian and cycling connections; ◦ form part of an overall pedestrian and cycling network to connect key destination points; ◦ support good passive surveillance; ◦ be responsive to natural Development Site features; ◦ build on sense of place; ◦ provide active and passive recreation, shade and seating; and ◦ assist to preserve local biodiversity and natural area values.
Neighbourhood Park (5,000 m^2 to 2 ha)	Neighbourhood Parks are large public open spaces serving as the recreational and social focus of a community. Residents are attracted by the variety of features and facilities and opportunities to socialise. Neighbourhood Parks can assist to engender sense of place and protect specific conservation values through retention of nature spaces. They may be used for junior sport or sports training if appropriate space is available. Neighbourhood Park location and design should: ◦ be central to neighbourhood population catchment; ◦ include accessible, safe pedestrian and cycling connections; ◦ form part of an overall pedestrian and cycling network to connect key destination points; ◦ support good passive surveillance; ◦ be responsive to natural Development Site features; ◦ build on sense of place; ◦ provide active and passive recreation for a range of age groups and interests; ◦ provide sporting based Public Infrastructure elements; and ◦ assist to preserve local biodiversity and natural area values. Neighbourhood Park location and design may also: ◦ be co-located with future schools to create a community hub at the planning stage; and ◦ be large enough to enable different activities and uses to occur simultaneously.

Table 18 — Public Open Space Hierarchy	
Regional Park (> 2 ha)	Regional Parks are principally designed to provide for organised formal sport. They will very likely include substantial recreation space and some nature space connected to habitat corridors at planning stage. Regional Park design and function should consider biodiversity principles and environmental management goals. Regional Parks serve several neighbourhoods with players and visitors travelling from surrounding districts. Regional Park location and design should: ◦ be located central to the population catchment to maximise accessibility; ◦ accommodate the recommended dimensions and supporting amenity for formal sport and recreation; ◦ be located on Collector Streets with good passive surveillance; ◦ be serviced by public transport networks; and ◦ include accessible, safe pedestrian and cycling connectors. Regional Park location and design may also: ◦ be collocated with a future school or other community facilities at the planning stage to create a community hub (refer Area Plan); ◦ provide a significant visual break in the urban environment, particularly along major thoroughfares; and ◦ assist to preserve local biodiversity and natural area values. Regional Park activities may: ◦ consist of sufficient space to accommodate a variety of concurrent uses, including organised sports, children's play, picnicking, exercising the dog, social gatherings and individual activities; ◦ include a combination of bushland, open parkland for casual play and space for organised sport; and ◦ accommodate multiple user groups, clubs and associations.
Encumbered Linkage Corridor (Min 15m wide)	Encumbered Linkage Corridors are designed to cater for service easements adjacent to pedestrian and cyclist movements between public open space areas or a pedestrian access point and a public open space area.
Linkage Corridor (Min 10m wide)	Linkage corridors are designed to cater for pedestrian and cyclist movements between public open space areas or a pedestrian access point and a public open space area.

5.4. LAND USE & ACTIVITY

(a) Existing and proposed surrounding land uses can have a significant and potentially negative influence on a Public Open Space in terms of their traffic generation, built form relationships and other factors. So too can particular higher use Public Open Space types be perceived as creating negative impacts for certain land uses in terms of noise and traffic generation.

5.4.1. OBJECTIVES:

(a) To pair appropriate Public Open Space provision with anticipated or existing land uses.

(b) To ensure activity levels within Public Open Space does not detract from the lifestyle of surrounding residents and businesses.

5.4.2. MANDATORY CRITERIA:

(a) Parking areas for higher use areas must be carefully located so as not to impact amenity for surrounding residents and businesses.

5.4.3. DESIGN SUGGESTIONS:

(a) Public Open Space areas within activity centres are encouraged to include a higher proportion of hardscaped treatments.

5.5. SITE RESPONSIVE DESIGN

(a) Site responsive design primarily relates to adopting a sensitive response to the existing landform and topography, providing a more authentic and anchored outcome. It may include retention of key landscape features such as trees or rocks, and can often have significant benefits in terms of limiting earthworks requirements and facilitating stormwater management strategies.

5.5.1. OBJECTIVES:

(a) To help create a sense of place by preserving landform and other natural features, where possible.

5.5.2. MANDATORY CRITERIA:

(a) Developers must identify and protect areas of ecological importance and ensure that their values are not compromised through the Subdivision process.

(b) Connective habitat corridors between adjoining natural habitats must be provided, where applicable.

5.5.3. DESIGN SUGGESTIONS:

(a) Retention of existing trees and features is encouraged.

(b) Designs that preserve and respond to existing ridge lines and valleys are encouraged.

5.6. INTERFACES & SURVEILLANCE

(a) The interface between adjacent residents and businesses and Public Open Space can be critical to their ongoing success and must be carefully considered.

(b) Passive surveillance of Public Open Space from rooms, windows and places frequented by people can go a long way to improving the space's overall sense of safety.

5.6.1. OBJECTIVES:

(a) To provide high amenity outlook to residents.

(b) To create a safe environment for users.

5.6.2. MANDATORY CRITERIA:

(a) Crime Prevention Through Environmental Design (CPTED) principles must be adhered to with all facilities.

(b) All areas of Public Open Space must include street frontage on at least one side to promote passive surveillance.

(c) Long, narrow pathways between fences must be avoided.

(d) Where lots front directly onto Public Open Space, Developers must demonstrate how surveillance of the public domain is achieved.

5.6.3. DESIGN SUGGESTIONS:

(a) Street lighting and landscape treatments should be designed to encourage active use during the day and night to minimise anti-social behaviour and vandalism.

(b) Apartments and multi-storey forms are encouraged around Public Open Space generally to assist with passive surveillance.

(c) For allotments with a direct interface to Public Open Space, apartments are encouraged over single dwellings due to their enhanced opportunities for co-ordinated interface management such as integrated fencing design, finished level management, shared controlled pedestrian access and possible controlled individual courtyard access.

5.7. ACCESSIBILITY & MOVEMENT

This section relates to accessibility both in terms of universal access for disabled persons, but also to the more general linkages and connections within and between Public Open Spaces.

5.7.1. OBJECTIVES:

(a) To ensure access to Public Open Space areas is available for all.

(b) To provide safe and clear linkages for pedestrians and cyclists around and between Public Open Space(s).

(c) To create pedestrian priority spaces, while enabling access to service and maintenance vehicles.

(d) To ensure on-street and off-street parking facilities are made available to service Public Open Space(s).

5.7.2. MANDATORY CRITERIA:

(a) All public places and facilities for public access, use and enjoyment in any Subdivision must comply with the Disability Discrimination Act 1992. In particular, all public places and facilities for public access, use and enjoyment, must be reasonably open, accessible and available to people with a disability in accordance with that Act

(b) Public Open Spaces must be designed to comply with all relevant disabled access legislation, regulations and standards, including AS1428 Design for Mobility and Access as far as reasonably practicable.

(c) The Developer must ensure that an adequate and safe hierarchy of linkage and pathways is achieved throughout the Public Open Space areas such that pedestrians and cyclists can move around and between areas of Public Open Space easily and with a high level of amenity.

(d) Public Open Space areas must be designed to:
  (i) prevent access by public vehicles;
  (ii) allow for service access for emergency, council and maintenance vehicles;
  (iii) provide access points at maximum 300 meter centres to elongated areas;
  (iv) provide access points from the lower classification of street where practicable; and
  (v) provide removable and lockable barriers at all access points.

(e) Bicycle path connections must be provided between all playground areas.

(f) Access must be provided to all pathways, street and park furniture in accordance with all disabled access requirements and standards, and CPTED principles.

(g) Refer Section 4.9 for requirements on pathways generally.

(h) On-street and off-street parking facilities must be provided for Public Open Space Areas, in accordance with the Planning Scheme and as agreed with the Relevant Authority.

5.7.3. DESIGN SUGGESTIONS:

(a) Seating for rest stops should be considered along pathways.

(b) View corridors should be maintained where possible between nodes.

(c) Bicycle infrastructure should be used adjacent Collector Streets and areas of high traffic.

5.8. STORMWATER MANAGEMENT & DRAINAGE

(a) The Public Open Space network plays an important role in the management of stormwater throughout a Subdivision and this should be integrated and balanced with its other recreational purposes.

5.8.1. OBJECTIVES:

(a) To manage the movement of stormwater safely and efficiently.

(b) To minimise the time that stormwater impacts upon the usability of Public Open Space.

5.8.2. MANDATORY CRITERIA:

(a) Stormwater management elements and Water Sensitive Urban Design (WSUD) strategies must be included in the Subdivision and be integrated with the overall Public Open Space and soft landscaping design.

(b) Refer Section 7 for general Stormwater Drainage requirements.

(c) Landscaped areas must be designed to ensure they are free draining.

(d) Subsoil drainage must be provided to all soft fall areas in accordance with Australian Standards. Provide subsoil drainage to all other landscaped areas, as necessary,

(e) Public Open Space areas may be utilised for detention purposes in major storm events, but must remain unencumbered by drains during minor storm events and have sufficient flat area for informal recreation. Detention basins must be designed in accordance with Section 7.9.14.

5.8.3. DESIGN SUGGESTIONS:

(a) Landscape schemes are encouraged to be reflective of natural stormwater systems where possible.

5.9. STRUCTURES & HARD LANDSCAPING

(a) Structures and hard landscaping form an important, typically well-used and often costly part of any landscape design and should be considered carefully to ensure that they are specified and located appropriately.

5.9.1. OBJECTIVES:

(a) Provide a variety of structures and hard landscaping to Public Open Space areas, with types and amounts of Public Infrastructure determined by predicted volumes of population in the Public Open Space at any one time. Structures and hard landscaping to include:
   (i) places of rest and gathering such as seating, picnic tables, benches, boulders and other seating types that facilitate a rest stop or place for social connection;
   (ii) appropriate shade structures for seating areas, picnic tables, recreation spaces and playground equipment that considers the duration of time park users will remain at the fixed infrastructure location.
   (iii) automated unisex public toilet facilities in locations of occasional and/or intermittent high peak usage.
   (iv) active recreation opportunities, including sporting and play equipment;
   (v) litter bins to collect waste, located adjacent maintenance access points and near picnic facilities;
   (vi) barbecues and cooking facilities for social gatherings;
   (vii) hard wearing surface treatments for key pathways and higher use areas;
   (viii) multi-modal transport storage, such as bike racks; and
   (ix) access to water for drinking and maintenance.

(b) Ensure that required services including stormwater, water, wastewater, electrical, communications and lighting are provided to service the structures and hard landscaping.

5.9.2. MANDATORY CRITERIA:

(a) A range of furniture items must be provided at appropriate locations in Public Open Spaces to improve public amenity and recreational usage, complying with the following:
   (i) All furniture must be in accordance with relevant Australian Standards including AS 1128.2 to cater for people with a disability, local and national building codes, and include Certification as necessary, to the approval of the Relevant Authority.
   (ii) Local, Neighbourhood and Regional Parks must include Public Infrastructure that can be accessed by people with a disability.
   (iii) All furniture must be robust, vandal proof, built of durable materials that will withstand general weathering and deterioration.
   (iv) All seating must be built from materials that do not overheat and discourages inappropriate use.
   (v) Shade cover must be provided to all table and seating areas. This may be achieved by a combination of tree planting and constructed shade structures, except for prominent table and seating areas which must be shaded by constructed shade structures to the approval of the Local Authority. Constructed shade structures must comply with the Building Code of Australia and be Certified.
   (vi) Constructed shade structures must be located outside of minor drainage flow paths and shaded areas must not be inundated by minor storm events.
   (vii) Places where people gather (e.g. near play equipment or at park entrances) must be provided with litter collection, seating, and solid or natural shade cover to the approval of the Relevant Authority.
   (viii) automated unisex public toilet facilities must be provided in Local, Neighbourhood and/or Regional Parks as agreed with the Relevant Authority.

(b) Drinking fountains must:
   (i) be located on a concrete slab;
   (ii) provide equal access for all users;
   (iii) incorporate appropriate drainage linked to the stormwater system; or subsoil drainage systems to plantings that will benefit from additional soil moisture, subject to approval by the Local Authority;
   (iv) incorporate automatic off taps to reduce water wastage;
   (v) provide back flow prevention; and
   (vi) incorporate a dog water bowl.

(c) Bike racks must be provided at park entrances, along the cycle network and/or at destinations within Public Open Space.

(d) Internal LED lighting must be provided to primary pathways and play areas, with the exception of pocket parks where they can be sufficiently lit from adjacent street lighting. Refer Section 12 for details.

(e) Neighbourhood and Regional Parks must include barbecues and/ or cooking facilities for social gatherings.

(f) Sporting and play equipment must be provided to meet the following requirements:
   (i) Provide a range of play opportunities and equipment or features for users of a variety of ages. The overall approach to provision of play equipment and recreational facilities must be outlined in the Public Open Space Masterplan.
   (ii) All play equipment must comply with the relevant Australian Standards, local and national building codes, and include certification as necessary, to the approval of the Relevant Authority. Relevant Australian Standards include but are not limited to AS 4486.1-1997 and AS 4685.1-6-2004.
   (iii) Play equipment must include impact absorbing surrounds, with subsoil drainage, to Australian Standards requirements.
   (iv) Total shade cover, measured between 9am and 3pm, must be provided to all play equipment by constructed shade structures. Bins and shaded seating must be provided nearby.
   (v) Play areas must have adequate separation from traffic conflict areas (vehicle, bike and pedestrian traffic) and large open stormwater drains.
   (vi) Play equipment and constructed shade structures must be located outside of minor drainage flow paths and shaded areas must not be inundated by a minor storm event.
   (vii) Design and location of play equipment is to be in accordance with CPTED principles.

5.9.3. DESIGN SUGGESTIONS:

(a) Park signage is encouraged to assist wayfinding and commemorate historical, social or natural cultural elements and place making, where appropriate.

5.10. STREETSCAPES

(a) Streetscape designs can form important secondary visual cues to help people navigate to open space assets. Streets can also become special spaces for residents, especially when more generous verges or planting regimes are proposed.

5.10.1. OBJECTIVES:

(a) Streetscape design should support the amenity, function and wayfinding of neighbourhoods.

5.10.2. MANDATORY CRITERIA:

(a) Developers must provide detailed sections and explanatory technical information for any atypical streetscapes proposed.

5.10.3. DESIGN SUGGESTIONS:

(a) Larger, possibly asymmetrical verges are encouraged where tree retention or special landscape treatments are proposed.

(b) Boulevard treatments are encouraged for streets which lead to open space areas.

(c) Water management bio-swale streets are encouraged, where appropriate.

6. SOFT LANDSCAPING

6.1. INTRODUCTION

(a) Requirements for soft landscaping across varying land use zoning and locality are broadly described in Table 2 — Typical Public Infrastructure Expectations.

6.2. OBJECTIVES

(a) To provide guidelines for the planning and design of soft landscaping elements throughout streetscapes and Public Open Spaces within a Subdivision.

(b) To ensure appropriate species of flora are selected.

(c) To ensure handover and ongoing maintenance is facilitated.

6.3. MANDATORY CRITERIA

(a) All areas within Road Reserves and Public Open Space, which are not hardscaped, must be landscaped with appropriate soft landscaping to provide a sufficient level of amenity and mitigate erosion, to the satisfaction of the Relevant Authority.

(b) Locate all soft landscaping elements with public safety as a major consideration.

(c) Comply with all requirements of the Standard Drawings and Standard Specification.

6.3.1. FLORA SELECTION

(a) All trees, plants, shrubs and ground cover species including grass seed mixes must be approved by the Relevant Authority.

(b) All flora species and planting arrangements must be low maintenance, water efficient, and suitable for the intended use, location, wind loading, site soils and drainage conditions.

(c) All trees must have the following characteristics:
  (i) sturdy and well hardened trunks and stems;
  (ii) a well developed root system;
  (iii) a minimum 3months in the container;
  (iv) obviously sound, healthy and vigorous appearance; and
  (v) be free from pests and disease.

(d) Flora with thorns are not permitted.

6.3.2. TREE PLANTING

(a) The tree planting corridor in Road Reserves is located 1100 – 1600mm off the kerb and must be installed with root barriers as per the Standard Drawings.

(b) All trees must be planted a minimum 3m from built infrastructure (streets, pathways, structures, etc.) where reasonably practicable. Where trees are located less than 3 metres from built Public Infrastructure, root barriers must be installed as per the Subdivision Standard Drawings (Part 3). Root barriers must also be provided to protect built Public Infrastructure from existing trees, as per AS 4970-2009.

(c) Trees and shrubs in Power and Water service corridors and easements must be selected from the Power and Water approved list of allowable plants, under Reference Documents (Part 2).

(d) Trees and planting must be installed to provide the following clearances at full maturity:
  (i) appropriate separation between different species of trees and plants;
  (ii) clear sight distances for pedestrians and vehicles at intersections, driveways and pedestrian crossings;
  (iii) clearance from overhead power lines, light poles and CCTV cameras to prevent Public Infrastructure damage and compromised light spills/CCTV views;
  (iv) clearance to underground services and stormwater pits to avoid root damage; and
  (v) minimum 3 meters clearance from fire hydrants.

6.3.3. GARDEN BEDS

(a) Ensure a variety of flora is installed in each garden bed to create thematic planting.

(b) Design planting arrangements to achieve 100% cover of the garden bed at maturation.

6.3.4. GRASSING

(a) Provide a variety of dryland (non-irrigated) and irrigated grassing, as appropriate.

6.3.5. REQUIREMENTS FOR STREETSCAPES

(a) Streetscapes must generally be planted as follows:
  (i) Primary Collector Street – Thematic planting is required on all verges and in any median areas. Landscape treatment to include garden beds, tree planting and grassing to both verges and medians as well as appropriate drainage, irrigation and growing medium.
  (ii) Secondary Collector, Access, and Minor / Cul-de-Sac Streets – Landscape treatment to include tree planting and grassing to both verges and medians.
  (iii) Roundabouts - typically designed with topsoil, subsoil drainage, feature planting, irrigation and mulch. Hard landscaping treatments may be adopted where subsoil drainage cannot be adequately provided, subject to approval by the Relevant Authority.

6.3.6. REQUIREMENTS FOR PUBLIC OPEN SPACE

(a) All Public Open Space areas must be landscaped to a minimum standard for the purposes of public amenity, conforming to the following requirements:
  (i) a range of plant material must be used with an appropriate balance and mix of upper canopy to provide shade, shrubs and ground covers;
  (ii) all areas that are disturbed during construction must be stabilised with grassing or other methods;
  (iii) open areas must be provided for active recreation purposes;
  (iv) shade trees (and shade structures) must be provided over play equipment, seats and along pathways for aesthetic and comfort reasons; and
  (v) areas of retained vegetation must be improved with additional planting of native species, mulch and kerbed edges.

6.3.7. IRRIGATION

(a) Permanent irrigation must be limited to active open space areas, featured landscape areas and garden beds.

(b) Within Road Reserves, except verges adjacent irrigated parks or open space areas, irrigation systems are not required and will not be owned or maintained by the Relevant Authorities.

(c) Irrigation systems must be designed and certified by a qualified irrigation designer certified by Irrigation Australia, and must comply with all relevant Australian Standards.

(d) Landscaping and irrigation works must be designed to achieve efficient use of water, providing adequate water for healthy growth of plants without wastage.

(e) All possible sources of water for irrigation purposes must be investigated by the Developer, with potable water only used where alternative water sources are not practicable. If required, potable water supply must comply with the requirements of Section 8.

(f) The Developer is responsible for the irrigation of all soft landscaping during the Defects Liability Period. Where permanent irrigation is absent, temporary irrigation may be required to assist with establishment and maintenance of soft landscaping. Any temporary irrigation installed must be removed by the Developer prior to completion of the Defects Liability Period, unless otherwise agreed with the Relevant Authority.

6.4. DESIGN SUGGESTIONS

(a) Use of trees and planting to reinforce the status and character of each type of street is encouraged.

(b) Planting regimes that are indigenous to the area are encouraged.

(c) Xeriscaping and low water use planting schemes are encouraged, particularly in locations with low rainfall.

7. STORMWATER DRAINAGE

(a) This section, together with those parts of Section 4 dealing with drainage in respect of streets and pathways, sets out the minimum requirements for design, documentation and approval of stormwater drainage systems servicing Subdivisions.

(b) Stormwater drainage is a key design consideration for the development of all land to ensure both natural systems and constructed systems continue to function in terms of stormwater volumes, discharge rates, velocities and water quality. Adverse impacts on upstream and downstream environments, including both built environments and natural ecosystems, must be mitigated as far as practicable. It is the responsibility of the Developer to ensure stormwater drainage design and construction is compatible with existing, proposed and, to the greatest extent possible, foreseeable future land use.

(c) The Developer must implement Water Sensitive Urban Design (WSUD) best management practices to mitigate adverse impacts on natural ecosystems as far as reasonably practicable. In the context of stormwater drainage, this includes but is not limited to:

- (i) preservation of natural hydrological flow regimes, including managing sub-catchment flow directions, discharge rates and volumes (Section 7.2.3);
- (ii) retention of natural Waterways, where practicable to do so (Section 7.2.4);
- (iii) selection of stormwater drainage infrastructure to slow down flows, maximise groundwater recharge, and filter out nutrients and other pollutants (Section 7.9); and
- (iv) management of stormwater quality (Section 7.10).

(d) The Relevant Authorities for stormwater drainage management are:

- (i) Local Authority in respect of stormwater Public Infrastructure design and construction on, as well as quantity and quality of discharge of stormwater to or through, Local Authority streets, land and other Public Infrastructure owned or under the care and control of the relevant Local Authority.
- (ii) Department of Infrastructure, Planning and Logistics in respect of stormwater Public Infrastructure design and construction on, as well as discharge of stormwater to or through, Territory infrastructure, land or in Northern Territory Government Controlled Road Reserves.
- (iii) Department of Environment and Natural Resources in respect of pollution incidents of surface water, groundwater and/or tidal waters under the *Water Act 1992 (NT)*; and works interfering with a Waterway.
- (iv) Northern Territory Environmental Protection authority in respect of pollution incidents under the *Waste Management and Pollution Control Act 1998 (NT)*.
- (v) Department of Health – Medical Entomology Section in respect of creation or disturbance of biting insect habitats.

(e) Stormwater design must conform to the following documents and the requirements of this Section:

- (i) Australian Rainfall and Runoff (Geoscience Australia);
- (ii) Stormwater Drainage Design in Small Urban Catchments (ARRB Special Report No. 34);
- (iii) Austroads Guidelines, including Guide to Road Design – Part 5: Drainage;
- (iv) Relevant Australian Standards;
- (v) The relevant policies or guidelines in Part 2 - Reference Documents; and
- (vi) The details provided in the accompanying Part 3 – Standard Drawings.

(f) Riverine flood/storm surge modelling and stormwater design must incorporate the longest outlook in CSIRO's Sea Level Rise Predictions.

(g) All stormwater drainage infrastructure including but not limited to pits, pipes, open drains, and basins must be free flowing and must not facilitate breeding of biting insects, as far as reasonably practicable. Guidelines for Preventing Biting Insect Problems for Urban Residential Developments or Subdivisions in the Top End of the NT and Constructed Wetlands in the Northern Territory Guidelines to Prevent Mosquito Breeding provide further guidance on best practice design and management.

7.1. STORMWATER MANAGEMENT STRATEGY

(a) Stormwater management and design approval is a two-part process. Developers must:
  (i) Submit a Part 1 Stormwater Management Plan for review to each Relevant Authority during the project development phase, prior to (or at the time of) submitting a Development Application; and
  (ii) Submit a Part 2 Stormwater Management Plan for approval to each Relevant Authority during the design development phase, after a Development is received.

(b) Flood studies may be required to confirm riverine/catchment flood levels and extents where existing studies have not been undertaken, as made available by DENR - Water Resources.

7.1.1. PART 1 STORMWATER MANAGEMENT PLAN

(a) Part 1 Stormwater Management Plans must:
  (i) include a catchment plan, clearly illustrating the existing and proposed management of stormwater flows entering and/or leaving the Development Site;
  (ii) for staged developments, provide an overall drainage plan for the whole of the proposed Subdivision, and provide for ongoing stormwater management throughout the staged development construction phase. Typically, a connection to the trunk drainage system must be constructed in the first stage, regardless of where the actual development works commence; however, the Developer may propose alternative stormwater management methods for approval by the Relevant Authority.
  (iii) expressly consider the findings and recommendations of any existing plans or reports that may affect or be affected by stormwater management on the Development Site.
  (iv) Part 1 Stormwater Management Plans must also identify the following as a minimum:
    (A) primary and secondary storm surge levels and extents;
    (B) riverine / catchment flood levels and extents;
    (C) assumed sea level rise;
    (D) locations of stormwater discharges;
    (E) any impacts of the Subdivision on the catchment-wide drainage system, including connection points and modifications required to upstream and downstream drainage infrastructure, as applicable;
    (F) stormwater management options that may mitigate any adverse impacts on existing drainage infrastructure resulting from the proposed Subdivision; and
    (G) stormwater quality requirements, including sizing and positioning of stormwater quality treatment devices.

7.1.2. PART 2 STORMWATER MANAGEMENT PLAN

(a) A Part 2 Stormwater Management Plan must be submitted to each Relevant Authority for approval after a Development Permit is received. This should be supported with approval(s) for discharging stormwater into downstream private land or Public Infrastructure.

(b) A Part 2 Stormwater Management Plan must include schematic information demonstrating that the proposed Subdivision will comply with the following conditions:
  (i) all urban properties are provided with flood immunity for the 1% Annual Exceedance Probability (AEP) Storm Event including storm surge, riverine / catchment flooding and local stormwater flows, except for Areas of Significance which require greater immunity;
  (ii) all rural properties maintain a minimum 1ha of unconstrained land during the 1% Annual Exceedance Probability (AEP) Storm Event including storm surge, riverine / catchment flooding and local stormwater flows, except for Areas of Significance which require greater immunity;
  (iii) all stormwater flow directions and management controls must be identified, including preliminary sizing of controls (e.g. detention systems, water quality treatment systems etc.);
  (iv) all stormwater must flow to a Lawful Point of Discharge without causing Nuisance to adjacent properties or Crown land, or exceeding the capacity of existing Public Infrastructure;
  (v) a risk assessment of the drainage system must be provided, identifying any safety measures to be adopted in the design; and
  (vi) all measures that will be taken to prevent pollution of stormwater from construction activities must be identified, including separate controls for each stage of the construction programme.

7.2. STORMWATER DESIGN PHILOSOPHY

7.2.1. DESIGN LIFE

(a) All materials and components of the stormwater drainage system must be durable and Fit For Purpose with a minimum design life of 40 years.

7.2.2. MAJOR/MINOR FLOOD MANAGEMENT CONCEPT

(a) Design of the stormwater drainage systems must be based on the 'Major/Minor Flood Management Concept', which provides two distinct but conjunctively-acting drainage networks to manage 'Minor' (frequent) storm events and 'Major' (rare) storm events.

(i) The minor drainage system typically comprises underground pipes or table drains, which are designed to convey to disposal a minor stormwater flow of Annual Exceedance Probability (AEP) as specified in Table 21.

(ii) The major drainage system typically comprises the arrangement of Road Reserves, drainage reserves, open space, detention basins etc. to convey to disposal a major stormwater flow of Annual Exceedance Probability (AEP) as specified in Table 22.

7.2.3. STORMWATER CATCHMENTS AND DRAINAGE NETWORKS

(a) Design of stormwater drainage networks must address the following requirements:

(i) Hydrological calculations must be undertaken considering land use across all contributing catchments is fully developed according to current permitted land use within the Planning Scheme.

(ii) Where stormwater from upstream catchments currently drains through the Development Site, stormwater infrastructure must be sized to accommodate such stormwater, without posing any adverse impacts on upstream drainage infrastructure.

(iii) Post-development flows leaving the Development Site must be equal to or less than pre-development flows. for all storm events up to and including the 1% AEP storm event. Attenuation devices, such as detention basins, may be incorporated within the Subdivision to detain peak flow rates to achieve this objective. Some Development Sites with sensitive receiving environments may need to ensure volumes do not exceed pre-development volumes also.

7.2.4. NATURAL WATERWAYS

(a) Natural Waterways, lagoons, perched swaps and similar natural features must generally be retained in their natural state in order to maintain the existing outflow characteristics and groundwater aquifer recharge.

(b) Where construction works are required to manage stormwater drainage in these areas, the methods must be approved by the Relevant Authorities and a 'Permit to Interfere with a Waterway' may be required under Section 41(1) of the *Water Act 1992 (NT)*.

7.2.5. GENERAL REQUIREMENTS FOR RESIDENTIAL, MIXED USE AND INDUSTRIAL ZONES

(a) Category A Localities must comply with the following requirements:

(i) All allotments must be graded to drain towards an adjacent servicing Road Reserve or drainage reserve. Inter-allotment drainage will only be permitted where approved by the Relevant Authority and an easement is provided in accordance with Section 7.7.

(ii) The following allotments must collect all stormwater on the Development Site during the minor storm event and discharge via a Lot Connection into a Lawful Point of Discharge:

(A) All lots smaller than 600m^2;

(B) All lots with setback lot boundaries equal to or less than 1.5m;

(C) All non-single residential allotments (such as duplex sites and units); and

(D) All commercial and industrial allotments.

(iii) Typical Lot Connection details are provided in Part 3 (Standard Drawings) and must provide a grated inlet pit installed at the property boundary to safely accommodate surcharge into the Road Reserve at the connection point without impacting upstream hydraulic performance (min 450x450 GIP for Residential Zones; and 900x600 GIP for Commercial/Industrial Zones).

(b) Category B and C Localities must comply with the following requirements:

(i) Stormwater drainage must maintain natural sheet flow across the lot into the Relevant Authority drainage system, which may include table drains, open drains, culverts, floodways and/or natural Waterways.

(ii) Inter-allotment drainage may be approved where natural sheet flow is maintained, or concentrated drainage is formalised with appropriate easements and agreement from the downstream land owners. Easements and concentrated drainage is not preferred and requires approval from the Relevant Authority.

7.2.6. GENERAL REQUIREMENTS FOR RURAL ZONES

(a) Stormwater drainage in rural zones must maintain natural sheet flow across the lot into the Relevant Authority drainage system, which may include table drains, open drains, culverts, floodways and/or natural Waterways.

(b) Inter-allotment drainage may be approved where natural sheet flow is maintained, or concentrated drainage is formalised with appropriate easements and agreement from the downstream land owners. Easements and concentrated drainage is not preferred in rural areas and requires approval from the Relevant Authority.

7.3. HYDROLOGICAL DESIGN

(a) Stormwater flow rates and volumes must be calculated using hydrological modelling in accordance with the current version of Australian Rainfall & Runoff. The Rational Method may be accepted for small rural subdivisions, subject to approval by the Relevant Authority.

(b) Rainfall data for the design storm must be obtained from Bureau of Meteorology Intensity-Frequency-Duration Charts (www.bom.gov.au). Temporal patterns must be obtained from Australian Rainfall & Runoff.

(c) Catchment characteristics including impervious areas, catchment response and loss modelling are to conform to Australian Rainfall & Runoff. Catchment characteristics must be defined based on full development of all allotments (internal or external to the Subdivision) in accordance with the Planning Scheme.

(d) Hydrological calculations for both major and minor drainage systems must be provided to the Relevant Authority as part of the Design Report (Section 2.4).

7.4. HYDRAULIC DESIGN

(a) Hydraulic design of pits, pipes, culverts, table drains and open drains must be in accordance with the current version of Australian Rainfall & Runoff.

(b) Hydraulic design of subsurface drainage must be in accordance with the current versions of Australian Rainfall & Runoff, and Austroads Guidelines.

(c) Hydraulic calculations for both major and minor drainage systems must be provided to the Relevant Authority as part of the Design Report (Section 2.4).

7.4.1. OUTLET CONDITIONS

(a) Where drainage is impacted by tidal or storm surge action, hydraulic design of stormwater Public Infrastructure must:

(i) consider tailwater conditions for Minor Storm Events as High Astronomical Tide (HAT) including the longest outlook in CSIRO's Sea Level Rise Predictions.

(ii) consider tailwater conditions for Major Storm Events as ARI 1 in 100 year Storm Surge Levels including the longest outlook in CSIRO's Sea Level Rise Predictions.

7.4.2. BLOCKAGE FACTORS

(a) All underground pit/pipe networks and culverts designed to convey part-stormwater flows during the major stormwater event must be assigned with 50% blockage to inlet capacities for determination of resulting overland flows, except for grated inlet pits in sag locations which must be assumed fully blocked.

(b) Blockage factors outlined in 7.4.2(a) may need to be adjusted for rural, regional and remote areas to take into consideration anticipated debris loadings and frequency of maintenance.

7.5. DESIGN STORM EVENTS

(a) Design storm events must be in accordance with Table 19 to Table 20.

(b) Where catchment zones discharge into downstream Public Infrastructure with lower design standards, provisions must be made to safely accommodate surcharge into the Road Reserve at the connection point without impacting upstream hydraulic performance.

Table 19 — Design Storm Events for Residential/Mixed Use and Industrial Zones

Application	**Annual Exceedance Probability (AEP)**	
	Minor Storm	**Major Storm**
Residential Zones (excl. HR)	50%	1%
Commercial and HR Zones	10%	1%
Industrial Zones	20%	1%
All Other Land Use Zones	50%	1%
Areas of Significance (See Definitions)	1%	0.2%

Table 20 — Design Storm Events for Rural Zones

Rural Public Infrastructure	**Annual Exceedance Probability (AEP)**	
	Minor Storm	**Major Storm**
Table Drains	50%	1%
Culverts under Driveway Crossovers	50%	1%
Cross Road Culverts: - On-grade - Sag Points	 5% 1%	 1% 1%
Floodways	Refer Section 7.9.13 for details.	

7.6. DESIGN FLOW CRITERIA

(a) Use of streets, open space and drainage reserves for stormwater runoff must be in accordance with Table 21 and Table 22.

Table 21 — Minor Storm Flow Criteria

Drainage Public Infrastructure		Minor Storm Criteria
Kerb and Gutter Flow	Laneway Minor Street Access Street	Flows must not overtop kerb Flow width ≤ 2.5m from Kerb
	Secondary Collector Primary Collector	Flows must not overtop kerb Flow width ≤ 2.5m from Kerb Minimum 3m street pavement free of inundation
Table Drains		Flows contained in table drains and meeting the following: Minimum 200mm freeboard to edge of street shoulder. Flow depth ≤ 750mm Flow velocity < Scour velocity Product of depth (m) and velocity (m/s) ≤ 0.40m2/s
Culverts under Driveway Crossovers		Headwaters satisfy table drain flow criteria. Headwaters provide minimum 150mm freeboard to edge of shoulder on driveway crossover. Flow velocity < Scour velocity
Cross Road Culverts		Headwaters satisfy Table Drain flow criteria. Headwaters provide minimum 200mm freeboard to edge of street shoulder. Flow velocity < Scour Velocity
Open Space and Drainage Reserves		Flow to be contained in formal drain section Flow velocity < Scour Velocity
Pedestrian Linkages		Pathways to be free of Inundation Minimum 1.0m width next to boundaries free of inundation

Table 22 — Major Storm Flow Criteria	
Application	**Major Storm Criteria**
Streets with Underground Pipe Systems	Flow contained in Road Reserve boundaries Longitudinal flows to meet the following criteria: • Depth ≤ 300mm • Product of depth (m) and velocity (m/s) ≤ 0.40m2/s Transverse flows to meet the following criteria: • Depth ≤ 200mm in roadway and max 150mm above crown • Product of depth (m) and velocity (m/s) ≤ 0.30m2/s
Streets with Table Drains	Longitudinal flows in Road Reserve to meet the following criteria: • Depth ≤ 300mm in roadway • Flow velocity < Scour velocity • Product of depth (m) and velocity (m/s) ≤ 0.40m2/s Transverse flows in Road Reserve, including flows overtopping roadways, to meet the following criteria: • Depth ≤ 200mm in roadway and max 150mm above crown • Flow velocity < Scour velocity • Product of depth (m) and velocity (m/s) ≤ 0.30m2/s Extent of flooding (or flow spread) during the Major Storm must be assessed and illustrated on Design Drawings, with flooding over proposed Lots identified as Constrained Land. Total areas of Constrained Land must be illustrated on the Design Drawings, demonstrating compliance with Planning Scheme requirements for unconstrained land.
Open Space and Drainage Reserves	Flow to be contained in formal drain section Flow velocity < Scour Velocity Min 300mm Freeboard to Allotment Boundaries Open Spaces (e.g. recreational ovals) can be used to attenuate flows and/or convey major flows.
Pedestrian Linkages	Pathways do not have to be free of Inundation; however, min freeboard of 300mm to allotment boundaries must be achieved. Minimum 1.0m width next to boundaries free of inundation

7.7. DRAINAGE EASEMENTS

(a) Rear allotment drainage will not be permitted for Category A Localities.

(b) All attempts must be made to manage stormwater drainage flows within the street/drainage reserves and associated drainage systems without the use of drainage easements. Where it is impracticable to achieve this, the Developer must obtain approval from the Relevant Authority for the use of drainage easements.

(c) Where drainage easements are approved, the following criteria must be met:

(i) The minimum easement width for underground systems must be 3.0m for pipe diameters of 450mm or less and depths of up to 1.5m. An increase in easement width must be provided for larger pipes and/or depths, as advised by the Relevant Authority. Major Storm flows (1% AEP Event) must be safely conveyed separately via the street/drainage reserve network;

(ii) Drainage easements for open drains must be designed to cater for the Major Storm Event (1% AEP), including freeboard. Easement width must accommodate full drain width plus additional land for access and maintenance as required by the Relevant Authority; and

(iii) The Developer will be responsible for the production of all easement documents and for execution and registration on each relevant title.

7.8. DRAINAGE RESERVES

(a) Drainage reserves are parcels of land owned by a Relevant Authority where the sole use is for stormwater drainage. Application of drainage reserves in Subdivisions will be subject to approval by Relevant Authorities.

(b) Where approved for use, drainage reserves must be designed to ensure public safety and amenity is maintained as a priority and the following criteria must be met:

(i) Drainage reserves must be designed to cater for the Major Storm Event (1% AEP) including freeboard;

(ii) Drainage reserves must contain vegetation, with appropriate fire breaks to adjacent properties, and cannot be lined with impervious surfaces, except where required for low flow drains; and

(iii) Drainage reserves widths are to be determined by the Public Infrastructure for which the drainage reserve caters and provide the following:

(A) A minimum buffer of 2 metres between adjacent property boundaries and the edge of an underground drain, or the edge of an open drain's top batter; and

(B) A 5 metre wide access corridor along one side of an open or underground drain to enable access for inspection and mechanical maintenance (i.e. mowing or slashing).

7.9. DRAINAGE INFRASTRUCTURE

(a) All drainage infrastructure must be constructed in accordance with the Standard Drawings (Refer Part 3), Specification (Refer Part 4) and these Guidelines.

(b) Alternatives including precast concrete structures may be accepted, subject to approval by the Relevant Authority. Where precast pits are used, 7MPa flowable fill is required for backfill.

(c) For all drainage infrastructure, appropriate safety measures must be provided to protect the public from being trapped during storm events or flooding. Accordingly, risk assessment of the drainage system must be provided in the Part 2 Stormwater Management Plan and any safety measures identified must be included in the design at no cost to the Relevant Authority. Warning signs must be installed where required.

(d) All drainage pits and headwalls must be fitted with safety grates on inlets (or other appropriate safety measures) to mitigate the risk of unintended entry into a piped systems. Design of such structures must be considered in the hydraulic design of drainage infrastructure, including impacts such as blockage and bypass overflows.

(e) Open drainage structures must be designed and fitted with features that assist persons within the flow to exit the open drain structure.

(f) In areas of high water table, the designer must consider buoyancy in relation to design of all drainage structures including pipe and culvert joints.

(g) Design of drainage Public Infrastructure must consider maintenance requirements of the Relevant Authority.

7.9.1. PIPES

(a) Scour protection must be provided at all pipes outlets.

(b) Stormwater drainage pipes must comply with Table 23.

Table 23 — Pipes Design Criteria

Materials	Reinforced concrete, including fibre reinforced concrete, manufactured and tested to Australian Standards. Polypropylene, manufactured and tested to Australian Standards, may be considered but only used where approved by the Relevant Authority. Application to use polypropylene pipes must be supported with a detailed life cycle assessment, including but not limited to consideration of performance outcomes, economics and sustainability.
Reinforced Concrete Pipes (RCP)	Minimum Size – DN 375 Minimum Class 2 Minimum clear cover must generally be 600mm in accordance with manufacturer's specifications. Reduced cover may be acceptable where higher class pipes are used. Provide sealed joints, such as Rubber Ring Joints (RRJ) or Flush Joint (FJ) with External Bands (EB)
Clearances to Services	Provide minimum 150mm vertical and horizontal clearance between stormwater pipes / culverts and any other pipes or services, or greater if specified by the Service Authority.
Minimum Grade[1]	0.50% (desirable), 0.30% (absolute)
Maximum Grade[2]	As required to control maximum velocities. Typical maxium grades for common pipe sizes are as follows: DN 375 - 15.0% DN 750 - 5.5% DN 450 - 11.0% DN 900 - 4.5% DN 525 - 9.0% DN 1050 - 3.5% DN 600 - 7.5% DN 1200 - 3.0% DN 675 - 6.5% DN 1500 - 2.2%
Velocity Limits	Minimum 1.00m/s (self-cleansing) Maximum 6.00m/s (to prevent damage to concrete)

1. 'Desirable' minimum grades must be complied with unless Development Site constraints govern adoption of 'absolute' grades and approval is obtained from the Relevant Authority.

2. Maximum grades apply to both physical pipe grades and hydraulic grade lines.

7.9.2. DRAINAGE PITS - GENERAL

(a) All pits must be spaced maximum 90 metres intervals.

(b) All pits subject to vehicle loading must be designed to withstand expected loads.

(c) All access covers and grates must be Class D (Heavy Duty) in accordance with AS3996.

(d) Pits to be free draining.

(e) Reduction in pipe sizes downstream of pits will not be permitted.

  (i) Pipework openings must be located within a single wall of a pit; that is, pipes must not be permitted to enter through the corners of a pit structure.

(f) Pit depths must be minimum 1.2 metres and maximum 3.0 metres, unless otherwise approved by the Relevant Authority.

(g) Pits must be located to minimise the likelihood of conflict with service conduits and future driveways

(h) Minimum freeboard for pits must comply with the following during the Minor Storm Event:

  (i) 150mm below the pit inlet on side entry pits and letterbox pits; and

  (ii) 150mm below the surface for grated inlet pits and junction pits.

7.9.3. SIDE ENTRY PITS

(a) The spacing and size of side entry pits (SEP) must be designed to achieve the flow criteria in Table 21.

(b) SEPs must be located at all low (sag) points. One additional SEP must be provided on-grade upstream of a low point (one side only) for overflow relief, such that the inlet level of the on-grade pit is 200mm higher than the inlet level of the sag pit.

(c) SEPs must be located immediately upstream of intersections, pedestrian crossings, and bus stops to limit the flow to 500mm maximum width for the minor design storm event in these locations.

(d) SEPs must be located to reduce potential for conflict with driveways.

(e) The location of stormwater pits on intersection tangent points or within the kerb radius at intersections must be avoided. If there is no suitable alternative, stormwater pits located in these areas may be approved by the Relevant Authority and, where approved, must be fitted with heavy duty frames and lids to provide protection from damage by wheel loads.

(f) The clearance between the kerb invert and the underside of the lid, or lid support, where applicable, must be a maximum of 100mm. Where the inlet clearance is greater than 100mm, a 12mm diameter galv bar must be placed across the opening for safety purposes.

7.9.4. JUNCTION PITS (ACCESS CHAMBERS)

(a) Junction Pits must be constructed at all pipe junctions and at changes in direction, grade, or diameter of pipe where there is not already a side entry pit or other inlet pit.

(b) On long lengths of constant size and grade, where side entry pits or other inlet pits are not required, junction pits must be constructed at maximum 90 metre intervals for cleaning and maintenance purposes.

7.9.5. LETTERBOX PITS

(a) Letterbox pits must be constructed within the invert of open drains or at low points in public open space to contain stormwater flows.

(b) Appropriate erosion control measures, such as stone pitching, must be included.

(c) The clear opening of the inlet must be a maximum of 100mm. Where the inlet clearance is greater than 100mm, a 12mm diameter galv bar must be placed across the opening for safety purposes.

7.9.6. GRATED INLET PITS

(a) Grated Inlet Pits (GIPs) are not preferred due to risk of blockage, and must only be used where approved by the Relevant Authority. A proposal to use GIPs must address:
  (i) whether the GIP is located on-grade allowing for bypass flows, or at a sag point;
  (ii) if the GIP will be highly susceptible to debris loading leading to blockages, whether via natural organic matter or man-made waste; and
  (iii) the risks associated with local stormwater flooding in the event of a blockage occurring, including whether appropriate overflow relief is available.

(b) Where GIPs are approved for use, the following criteria must be met as a minimum:
  (i) maximum depth of water must be limited to 300mm in a blockage and overflow relief must be provided.
  (ii) grates must be provided with an alan key bolt down feature (or similar approved) and safely trafficable for pedestrians, cyclists and vehicles.

7.9.7. SURCHARGE PITS

(a) The use of surcharge pits is subject to approval by the Relevant Authority.

(b) Where approved for use, the pit must be designed to address the following:
  (i) grates/outlet screens must be provided with an alan key bolt down feature (or similar approved) and be safely trafficable for pedestrians, cyclists and vehicles unless provisions are in place to prohibit access for each respective mode of transport;
  (ii) safety features must be provided to mitigate the risk of persons becoming trapped inside the pit;
  (iii) the risk of blockage in the pit/grate must be appropriately considered, including assessment of potential flooding problems;
  (iv) the pit and outlet screen must have sufficient structural integrity to withstand high outflow velocities and high pressure forces which may result due to blockage of the grate, particularly due to the presence of a bolt down feature; and
  (v) safe maintenance access must be provided for clearing of debris.

(c) Hydraulic design of surcharge pits must be undertaken in accordance with established industry guidelines and have due consideration for energy losses including 90° mitre bend loss, expansion loss, screen loss, exit loss, and friction loss in the chamber.

7.9.8. BLIND PITS AND BANDAGE JOINTS

(a) Underground (Blind) pits are not permitted.

(b) Bandage joints for pipe connections are not permitted.

7.9.9. CATCH DRAINS

(a) Where undeveloped land slopes towards the Development Site, catch drains must be provided to divert flow away from, or through, the Development Site in a controlled manner. Catch drains must be designed as open drains in accordance with Section 7.9.11, with sufficient capacity to safely convey the Major Storm Flows (1% AEP Event).

7.9.10. TABLE DRAINS

(a) Table drains must be lined with appropriate dry land grasses. Concrete lined table drains are not encouraged and must be approved by the Relevant Authority. Unlined drains will not be approved.

(b) Table drains must be trapezoidal in shape, with profiles such that mowing can be achieved with tractor mounted equipment.

(c) Where deflections in drain alignments are necessary, horizontal curves with a minimum 5 metre radius must be provided.

(d) Where drop structures are employed to control slope and velocity, the designer must address the potential for additional scour and erosion, associated maintenance issues and public safety.

(e) Scour protection must be provided at change of direction, drop structures and at the inlet / outlet to pipes and culvert structures.

(f) The design of table drains must ensure public safety and amenity is a priority. A risk assessment must be carried out and appropriate control measures put in place.

(g) Table drains must only retain water during storm conditions.

(h) Provide a minimum 1.5m offset between the top of batter and adjacent property boundary, widened as necessary to suit service corridor allocations.

(i) Table Drains must be designed in accordance with Table 24.

Table 24 — Table Drain Design Criteria

Minimum Base Width	2.0m
Maximum Batter Slope	1:6 (desirable); 1:4 (absolute)
Minimum Grade[1]	0.50% (desirable); 0.30% (absolute)
Maximum Flow Depth	750mm
Minimum Freeboard	Minimum 200mm to edge of shoulder. Freeboard must be increased on bends to account for dynamic effects.
Maximum Velocity	Not to exceed scour velocity, as determined by the designer
Maximum Depth x Velocity	0.40m2/s. Higher values may be proposed to the Relevant Authority for approval, supported by a risk assessment in accordance with ISO 31000 prepared by a Qualified Professional.

1. *'Desirable' minimum grades must be complied with unless Development Site constraints govern adoption of 'absolute' grades and approval is obtained from the Relevant Authority.*

7.9.11. OPEN DRAINS

(a) In urban environments, open drains are only permitted where they form part of the trunk drainage system.

(b) Open drains must be lined with appropriate grass as a minimum. Open unlined drains will not be approved.

(c) Profiles of grass lined drains must be such that mowing can be achieved with tractor mounted equipment.

(d) All deflections in drain alignments must be provided with horizontal curves with min 5m radius.

(e) Where drop structures are employed to control slope and velocity, the designer must consider the potential for additional scour and erosion, associated maintenance issues and public safety.

(f) Scour protection must be provided at any change of direction, drop structures and at inlets/outlets to pipes and culverts.

(g) Open drains must only retain water during storm conditions. They must be provided with suitable outlets to ensure they are free draining and mitigate erosion of downstream environments.

(h) The design of open drains must ensure public safety and amenity is a priority. A risk assessment must be carried out and appropriate control measures put in place, including fencing where appropriate. Where fencing is used, it must have suitable gate provisions to permit access for maintenance purposes.

(i) Open Drains must be designed in accordance with Table 25.

Table 25 — Open Drain Design Criteria

Minimum Base Width	2.0m
Maximum Batter Slope	1:6 (desirable); 1:4 (absolute)
Minimum Grade[1]	0.50% (desirable); 0.30% (absolute)
Maximum Flow Depth	750mm
Minimum Freeboard	Freeboard to be the greater of: • 300mm; • 20% of Channel Depth; and • Velocity Head (V2/2g).
Maximum Velocity	Not to exceed scour velocity, as determined by the designer
Maximum Depth x Velocity	0.40m2/s. Higher values may be proposed to the Relevant Authority for approval, supported by a risk assessment in accordance with ISO 31000 prepared by a Qualified Professional.
Low Flow Drains	Low Flow Drains must be provided in all open drains servicing Category A Public Infrastructure localities within the Monsoonal North Climatic Region (Figure 3), to preclude the creation of boggy saturated areas and mosquito breeding sites due to Dry Season Base Flows. Low Flow Drains must meet the following criteria: • The open drain base must be sloped to a low flow drain with a defined invert to prevent waterlogging and encourage self cleansing velocities; • The low flow drain must be impervious to prevent weed or other vegetation growth, ensuring it remains free draining, while also providing a benchmark for maintaining longitudinal design grades; • The low flow drain must be designed to wholly contain expected Dry Season Base Flows[2] and provide a profile which facilitates easy maintenance; and • Scour protection must be provided immediately adjacent the impervious low flow drain, with adequate hydraulic roughness to control low flow velocities.

1. 'Desirable' minimum grades must be complied with unless Development Site constraints govern adoption of 'absolute' grades and approval is obtained from the Relevant Authority.

2. Anticipated Dry Season Base Flows are site-specific and will be influenced by both groundwater drawdown and excess irrigation within the catchment. Estimation of Dry Season Base Flows should be undertaken during initial Development Site investigations.

7.9.12. CULVERTS

(a) Culverts must be reinforced concrete box culverts.

(b) All culverts under streets and driveway crossovers must have headwalls in accordance with Standard Drawings (Refer Part 3).

(c) Headwalls must be designed with a clear zone width in accordance with Austroads Guidelines: Guide to Road Design – Part 6: Roadside Design Safety and Barriers, unless otherwise approved by the Relevant Authority.

(d) Scour protection must be provided at the inlet and outlets of all culverts.

(e) Culverts must comply with Table 26.

Table 26 — Culverts Design Criteria

Materials	Reinforced concrete, including fibre reinforced concrete manufactured and tested to Australian Standards.
Reinforced Concrete Box Culverts (RCBC)	Minimum Height – 450mm Designed in accordance with Australian Standards Provide sealed joints with mortar and external seals
Clearances to Services	Provide minimum 150mm vertical and horizontal clearance between stormwater pipes / culverts and any other pipes or services, or greater if specified by the Service Authority.
Minimum Grade	0.50% (desirable) 0.30% (absolute)
Velocity Limits	Minimum 1.00m/s (self-cleansing) Maximum 6.00m/s (to prevent damage to concrete)

7.9.13. FLOODWAYS

(a) Where a natural low point exists within an existing or proposed new street, a floodway may be required to manage stormwater drainage flows across this point.

(b) Floodways must be designed to be trafficable during a 1% AEP storm event. Trafficable access/egress will be deemed sufficient where a floodway meets the 'Major Storm Criteria' listed under Table 22.

(c) Floodways must meet the following criteria:

(i) The floodway must have an appropriate pavement strengthening method, approved by the Relevant Authority;

(ii) Concrete margins are required at both the upstream and downstream edge of pavement, with weep holes installed in the downstream margin;

(iii) Appropriate upstream and downstream protection measures must be constructed to mitigate erosion/scour and prevent damage to both private and Public Infrastructure;

(iv) Warning sign(s) for floodways, including depth markers and "Water Over Road" signs, must be installed.

(d) Floodways resulting in street/road closures for any period must only be provided where approved by the Relevant Authority. The decision to provide such a floodway must be supported by adequate consideration of alternatives, identifying that it is not viable to construct a bridge, culvert, or trafficable floodway. The average annual time of closure (AAToC) must also be determined and considered in a detailed risk assessment of interruptions to transport access/egress in the area. The requirements of Clause 4.2.1(f) must also be demonstrated to be met.

7.9.14. DETENTION BASINS

(a) Detention basins may be required to attenuate post-development peak flow rates to match pre-development flow rates discharging from the Development Site, as discussed in Section 7.2.3(a)(iii).

(b) Detention basins must generally be designed in accordance with Australian Rainfall & Runoff, including considerations for:

  (i) hydrological design, flood capacity, and freeboard requirements;

  (ii) hydraulic design of primary and secondary outlets;

  (iii) basin floor and embankment design;

  (iv) public and operational safety; and

  (v) maintenance requirements.

(c) Detention basins can be considered as dams and design must give appropriate consideration to The *Australian National Committee on Large Dam (ANCOLD) Guidelines*.

(d) Detention basins must be modelled using runoff-routing software and designed to ensure pre-development flow rates are not exceeded for all storm events ranging from 1EY to 1% AEP, and all storm durations ranging from 10min to 72 hours.

(e) Detention basins must be designed both hydraulically and structurally to permit safe discharge of floods in excess of the 1% AEP storm event. The AEP for which the performance of the basin must be checked needs to be determined in consultation with the Relevant Authority, with appropriate consideration to the likely consequences of failure.

(f) Minimum freeboard must comply with the recommendations of Australian Rainfall & Runoff and be not less than 300mm for the 1% AEP storm event.

(g) With the exception of natural ornamental lakes and wetlands, detention basins must be free draining within a 72-hour period and are not to pond water, to prevent the creation of breeding sites for biting insects.

(h) The basin floor must be designed with a suitable grade that provides positive drainage to the basin outlet, with all basin inlet pipes / drains connected to the basin outlet via low flow drains to ensure continual flows do not create water logging and ponding on the basin surface (see Table 25 for low flow drain requirements).

(i) All batter slopes must be constructed 1 in 6 or flatter, unless otherwise approved by the Relevant Authority and supported by a site-specific geotechnical assessment.

(j) Fill materials used to construct the detention basin embankments must be non-dispersive. The Developer must prepare project-specific earthworks specifications and pipe laying details including cut-off collars for penetrations through embankment walls, as required.

(k) Public amenity, usability, risk, and safety must be paramount considerations in drainage design.

(l) The basins must be designed with adequate safety provisions relating to potential public access. This includes consideration for exclusion fencing, inlet grates on pipes / structures, and safe egress for persons that may enter the basin. Where a basin is to be fenced, a minimum 1.5m offset between the fence and top of batter must be provided.

(m) The basins must be designed to minimise the required levels and frequency of maintenance, and ensure safe and adequate maintenance access is provided.

(n) Where approved by the Relevant Authority, Detention basins may be co-located with stormwater quality treatment devices as described in Section 7.10.2. Stormwater treatment devices are typically designed to facilitate bypass of major storm event flows, so co-location will typically lead to increased sediment loads, flow velocities and extended detention depths during infrequent storm events, which may result in adverse compromises. Where co-location of systems is proposed, the Developer must demonstrate that the functional requirements of both stormwater drainage and stormwater quality management systems are met, to the satisfaction of the Relevant Authority.

7.9.15. SUBSURFACE DRAINAGE CONTROL

(a) Subsurface drainage control is required to allow the pavement subgrade to drain and mitigate the effects of groundwater seepage, and irrigation / stormwater infiltration through street surfaces and verges.

(b) Subsurface drainage control typically comprises the use of subsoil drains and/or table drains, which must comply with Austroads Guidelines and Standard Drawings (Refer Part 3). Where table drains are used, the invert must be min 150mm below the pavement subgrade level.

(c) The Developer must undertake a detailed investigation to determine the scope of subsurface drainage works required.

(d) Subsurface drainage control must be provided on both sides of street pavements, as well as in roundabouts and islands with soft landscaping. Where necessary, subsurface drainage must also be incorporated into walkways, drainage easements/reserves and public open space to ensure adequate protection of buildings, structures and public amenities from groundwater.

(e) If groundwater seepage problems occur on the Development Site, including the sites of any External Works, within the Defects Liability Period, the Developer must:

- (i) conduct works to rectify the groundwater seepage problems; and
- (ii) repair all damaged works resulting from groundwater seepage.

7.10. STORMWATER QUALITY MANAGEMENT

(a) Stormwater is rainwater, including anything the rain runoff carries along with it into the public drainage system. Stormwater from activities associated with development and post subdivision development can carry many pollutants, (e.g. sediment, oil, chemicals, nutrients, heavy metals and general wastes) that are known to cause pollution of Waterways as well as sedimentation in stormwater infrastructure.

(b) Developers must ensure stormwater systems are designed to comply with the requirements listed in the following sections.

(c) Developers may be subject to prosecution for activities associated with Subdivision development resulting in the discharge of pollutants into stormwater infrastructure or the environment (or both). In addition, Relevant Authorities may recover damages from Developers that cause damage to Public Infrastructure by failing to appropriately manage sediment and other pollutants.

7.10.1. WASTE CONTROL

(a) Any stormwater discharged from the Development Works must not contain contaminants or wastes.

(b) Development Works and associated activities must be continually managed to prevent wastes or contaminants (e.g. sediment runoff, vehicle washing wastes, concrete wastes, paint residues, oil/chemical spillages or leaks) from entering the stormwater system and, subsequently the environment.

(c) Water quality control systems are required for all stormwater discharges for both the construction and operational phase of all developments. These must be designed and located to best achieve the following criteria:

- (i) produce optimum removal of pollutants;
- (ii) minimise ongoing maintenance requirements/costs;
- (iii) provide suitable maintenance access; and
- (iv) respond to the types of pollutants being generated from the catchment(s).

(d) If the Development Site includes or may include contaminated land, refer to Section 3.5 for details.

(e) Trade Waste must not be discharged into stormwater infrastructure, which must be demonstrated in the Stormwater Management Plan. Options for handling Trade Waste typically include:

- (i) Capture and recycle all Trade Waste streams;
- (ii) Capture all Trade Waste streams and have them removed by an appropriately licensed collector/ transporter; or
- (iii) Discharge Trade Wastes to the sewerage system under a Trade Waste Agreement with the sewerage provider (PowerWater).

7.10.2. STORMWATER QUALITY

(a) The *Waste Management and Pollution Control Act 1998 (NT)* and the *Water Act 1992 (NT)* are the primary legislation that protects natural water resources in the Northern Territory. Developers must also consider any other relevant Northern Territory guidelines or strategies (e.g. Darwin Harbour Strategy).

(b) When conducting any activity or performing any action that may cause pollution or environmental harm, or that may generate waste, Developers must comply with their general environmental duty to take all measures that are reasonable and practicable to prevent or minimise pollution or environmental harm.

(c) Specific stormwater quality requirements for Subdivisions are as follows:

(i) Developers must include stormwater quality objectives and mitigation measures in Stormwater Management Plans (Refer Section 7.1) that are intended to be met as part of its conditions of development approval;

(ii) Stormwater quality controls must be designed to consider all stormwater flows, including Dry Season Base Flows, and achieve the pollutant reduction targets at Table 27.

(iii) The Developer must design all stormwater quality treatment devices using MUSIC (Model for Urban Stormwater Improvement Conceptualisation) software and provide all model data and outputs to the Relevant Authority for approval;

(iv) The Developer must develop operational management plans for all proposed stormwater quality treatment devices and provide to the Relevant Authority for approval;

(v) The Part 2 Stormwater Management Plan must be Certified to demonstrate compliance with Australian best industry practice for stormwater environmental management during the construction and post construction phases of Subdivisions; and

(vi) Compliance with the requirements of this guideline does not guarantee performance of stormwater quality treatment devices. Further works may be required should pollution result from the installation of a stormwater management system that is inappropriate to suit project specific conditions.

Table 27 — Stormwater Pollutant Reduction Targets

Stormwater Pollutants	Pollutant Reduction Targets (%)
Gross Pollutants (GP)	90%
Total Suspended Solids (TSS)	75%
Total Phosphorous (TP)	60%
Total Nitrogen (TN)	35%

(d) The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) is a software tool that simulates the behaviour of stormwater quality within catchments. MUSIC is the preferred tool for demonstrating the performance of stormwater quality treatment systems. To ensure a consistent and uniform approach to stormwater quality modelling and assessment in the Northern Territory, MUSIC Models must be designed using the following parameters to demonstrate compliance with the stormwater quality management objectives. Further support for MUSIC Modelling is provided in the *MUSIC Modelling Guidelines* and *MUSIC User Manual* provided by Water by Design.

(i) In the absence of a hydrological calibration of MUSIC in the Northern Territory, the interim rainfall parameters in Table 28 must be adopted.

(ii) All other parameters must be used as outlined in the *MUSIC Modelling Guideline*.

Table 28 — MUSIC Rainfall parameters

Location	Rainfall gauge	Mean annual rainfall (mm)	10yr rainfall period	10yr Average rainfall (mm)
Greater Darwin Region	Darwin Airport (014015)	1728	1987 - 1996	1699
Katherine Region	Katherine Aviation Museum (014903)	1091	1997 - 2006	964
Alice Springs Region	Alice Springs Airport (015590)	284	1997 - 2006	276

(e) The following stormwater quality treatment devices have been installed in the Northern Territory and thus have available field data. Suitable climates and design requirements for each treatment device are nominated at Table 29.

Table 29 — Stormwater Treatment Devices

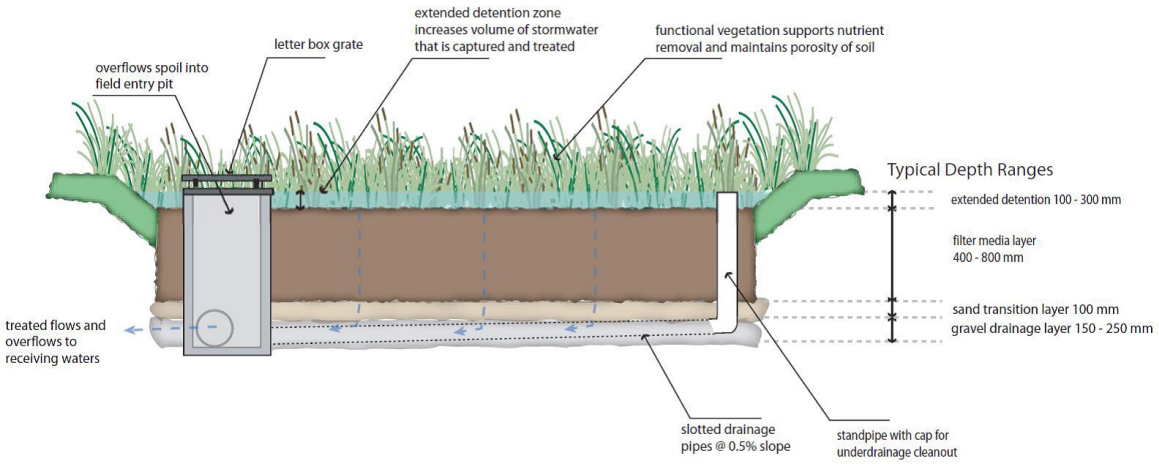
Treatment System	Suitable Climates (Refer Figure 3)		Design Requirements in the Northern Territory
	Monsoonal North	Rangelands	
Bioretention systems	Y	N	Only to be allowed as at-source treatment devices; and Requires irrigation during the dry season.
Ponds	Y	N	Designed to tolerate dry season condition (once established) without an artificial water supply. The effects of Dry Season Base Flow within the Monsoonal North climatic region must be appropriately considered in the design of these systems.
Wet/Dry Tropics Wetland	Y	N	
Ephemeral Wetland	Y	Y	

(f) Stormwater quality treatment systems are not limited to the options provided in Table 29; and any available treatment device can be presented to the Relevant Authority during the design development phase for approval at the discretion of the Relevant Authority. All stormwater quality treatment designs must be modelled in MUSIC with the correct parameters for the location and submitted for approval by the Relevant Authority.

(g) Typical design parameters for the common treatment systems outlined in Table 29 are as follows:

(i) Bioretention systems are a combination of vegetation and filter substrate that provide treatment of stormwater through filtration, extended detention and some biological uptake. They are designed to accept stormwater runoff and allow it to percolate through the densely vegetated filtration media before it is discharged (Table 30).

Table 30 — Bioretention Typical Design Parameters	
Filter Media Depth	0.5m
Extended Detention Depth	0.2m
Infiltration Rate	100mm/hr



(ii) Ponds as stormwater treatment devices are open water bodies that may contain submerged aquatic plants. They are designed to intercept stormwater pollutants, but are vulnerable to inter-event water quality issues such as algal blooms or nuisance growths of aquatic macrophytes. Typical design parameters for ponds are provided in Table 31 and the *NT Stormwater Treatment Pond Design Guidelines* (Refer Part 2).

Table 31 — Pond Typical Design Parameters	
Depth	1.5m (minimum)
Inlet Zone	Approx. 20% of pond area
Extended Detention Depth [1]	0.1m
Detention Time	48 hours
A 1 year ARI capacity connection between the inlet zone and main pond	

Table Notes:

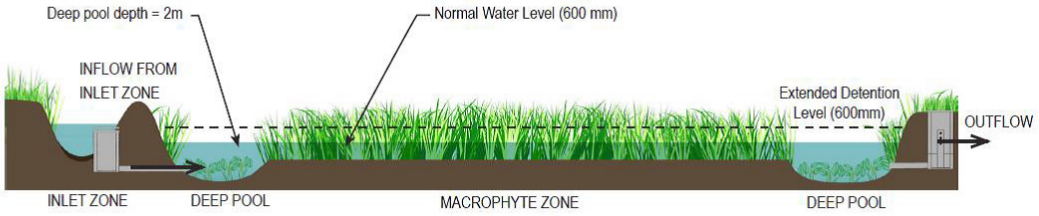
1. Extended detention depths can be greater, where pond is co-located with a detention basin (Refer Section 7.9.14)

(iii) Wet/Dry Tropics Wetlands are designed to treat stormwater runoff by capturing and retaining the stormwater for an extended period to provide treatment. The wetlands consist of deep pools (20% by area), which provide refugia for mosquito predators and a densely vegetated macrophyte zone (80% by area) (Table 32). The recommended design has been developed to ensure the wetlands will sustain permanent water in the deep pools to function as predator habitat and be able to sustain perennial vegetation in the macrophyte zone during the dry season. Where Development Sites may be expected to experience Dry Season Base Flows, the permanent pool depth should be reduced. Typical design parameters for Wet/Dry Tropic Wetlands are provided in Table 32.

Table 32 — Wet/Dry Tropic Wetland Design Parameters

Extended Detention Depth	0.6m
Deep pool Depth	2m
Macrophyte Zone Depth (no Dry Season Base Flow)	0.6m
Macrophyte Zone Depth (with Dry Season Base Flow)	0.35m
Inlet Zone	Approx. 20% of Wetland Area
Detention Time	48 hours
A 1 year ARI capacity connection between the inlet zone and macrophyte zone	

NORMAL WATER LEVEL



EXTENDED DETENTION



(iv) Ephemeral Wetlands are typically freshwater systems that experience regular inundation during rainfall, but drain and have no permanent standing water. Typical design parameters for Ephemeral Wetlands are provided in Table 33. They should be designed to resemble natural bushland settings in the NT, such as:

(A) Melaleuca / pandanus ecosystems in the Greater Darwin / Katherine Regions

(B) Woodland / grassland ecosystems in the Alice Springs RegionTypical design parameters for Ephemeral Wetlands are provided in Table 33

Table 33 — Ephemeral Wetland Design Parameters

Extended Detention Depth	0.6m
Inlet Zone	Approx. 20% of the Wetland Area
Detention Time	48 hours
No Standing water in vegetated wetland zone under normal conditions	
A 1 year ARI capacity connection between the inlet zne and macrophyte zone	

(h) The configuration of the above stormwater treatment devices must include a forebay sedimentation zone. In ponds and the wet/dry tropic wetlands this would be a wet sediment basin. Ephemeral wetlands in would include a dry inlet zone.

(i) All stormwater treatment devices must be protected through the construction/land disturbance phase to protect them from sediment laden stormwater flows.

(j) All plant species proposed for Water Quality treatment devices must be selected by a suitably qualified landscape architect/ecologist/horticulturalist, be low maintenance and suitable for the intended use, location, Development Site soil and drainage conditions. Plant species must be in accordance with requirements of the Relevant Authority, where available, and submitted to the Relevant Authority for approval.

7.10.3. EROSION AND SEDIMENT CONTROL

(a) Erosion and sediment control refers to the works undertaken to manage the disturbance of soils with the purpose of preventing and/or mitigating erosion and subsequent sediment discharge from a Development Site. The objective is to prevent detriment to the built and/or natural environments through the implementation of best practice management.

(b) The Relevant Authorities in respect of erosion and sediment control are:

- (i) Department of Environment and Natural Resources (DENR) in relation to planning and design of Erosion and Sediment Control Plans (ESCPs);
- (ii) the relevant Local Authority and the Department of Infrastructure, Planning and Logistics in respect of regulation and clearance of Development Permit conditions requiring the preparation and implementation of ESCPs; and

(c) The Relevant Authorities for administering environmental offences are:

- (i) The Northern Territory Environmental Protection Authority (NT EPA) in respect of offences under the *Waste Management and Pollution Control Act 1998 (NT)*; and
- (ii) DENR in respect of offences under the *Water Act 1992 (NT)*.

(d) Sediment discharge from Development Sites can create issues which may result in liability for damages, extra costs for the Developer, and can give rise to unnecessary delays and disputes. These include but are not limited to the following:

- (i) Damage to land and Public Infrastructure on and/or adjacent to the Development Site.
- (ii) Nuisance.
- (iii) Traffic and pedestrian hazards.
- (iv) Blockage of stormwater drainage systems.
- (v) Mosquito breeding in ponded water as a result of erosion and sediment deposition.
- (vi) Environmental harm to Waterways, wetlands and estuaries.

(e) ESCPs are often required by Local Authorities and Relevant Authorities as part of their respective consent and compliance processes for Subdivisions involving the clearing of land (whether of vegetation or of pre-existing buildings, structures, or other infrastructure) or other soil disturbing activities.

(f) The level of information and detail supplied in the ESCP must be commensurate with the potential environmental risk and the complexity of the proposed works; and of sufficient clarity to allow onsite personnel to appropriately implement the plan and achieve the required natural and built environmental protection.

(g) An ESCP should be prepared by, or under the supervision of, a suitably qualified and experienced professional and submitted to the Relevant Authority for acceptance and/or approval prior to any Development Site disturbance (including pre-works activities). It is the responsibility of the Developer and Contractor to ensure the ESCP is implemented and effective.

(h) Based on the size, complexity and location of the Subdivision, a Certified Professional in Erosion and Sediment Control (CPESC) may be required to develop the ESCP and in some cases may be required to oversee implementation to ensure effectiveness. For high to extreme risk Subdivisions, a suitably qualified and experienced CPESC third party auditor may be required to review and verify the ESCP prior to submission to the Relevant Authority for approval.

(i) Regular inspections may be undertaken by the Relevant Authority, or their delegate, to ensure compliance. When works are complete, an inspection will be undertaken by the Relevant Authority, or their delegate, to ensure works are satisfactory in relation to erosion and sediment control and Development Site stabilisation.

(j) For Subdivision Works, DENR recommends the International Erosion Control Association (IECA) Australasia Best Practice Erosion and Sediment Control (BPESC) manual as a guide for the type of information, detail and data that should be included in an ESCP. The ESCP must detail strategies, methods, controls and treatments for mitigating erosion and sediment loss from the Development Site during the clearing, establishment and construction phases.

7.11. LAWFUL POINTS OF DISCHARGE TO STORMWATER INFRASTRUCTURE

(a) The Relevant Authorities for a Lawful Point of Discharge to stormwater Public Infrastructure are:
   (i) Local Authorities in respect of Lawful Point of Discharge to stormwater Public Infrastructure in Local Authority streets, parks or other public areas under the care and control of the Local Authority;
   (ii) The Department of Infrastructure, Planning and Logistics in relation to stormwater Public Infrastructure in Northern Territory Government Controlled Road Reserves or on Crown land.

(b) All stormwater infrastructure constructed as part of Subdivision developments requires a Lawful Point of Discharge into downstream drainage Public Infrastructure. The Developer must seek and obtain written authorisation from all Relevant Authorities prior to making any connection into existing stormwater Public Infrastructure and must comply with any conditions imposed upon such authorisation.

(c) Where easements are required through downstream private property to convey stormwater flows from the Development Site to a Lawful Point of Discharge, the Developer is responsible for the production of all easement documents and for execution and registration on each relevant title.

(d) Prior to approval of the Lawful Point of Discharge by the Relevant Authority, the Developer must obtain written approval to discharge stormwater into downstream environments:
   (i) from the Relevant Authority(s) of a receiving trunk drainage system;
   (ii) from a Relevant Authority or Regulatory Authority that administers a Waterway (Section 7.12).

(e) The discharge of stormwater to a Lawful Point of Discharge must not exceed pre-development flows, as per Clause 7.2.3(a)(iii). The Relevant Authority may, subject to their approval, consider unattenuated discharge where:
   (i) The Developer's Consultant provides Certified engineering calculations supporting capacity of the downstream drainage network is sufficient to accommodate flows from all contributing catchments without any adverse impacts, considering full development across all contributing catchments in accordance with permitted land use under the Planning Scheme; or
   (ii) The Developer's Consultant provides Certified engineering calculations and designs demonstrating the scope of upgrade works required to provide the downstream drainage network with sufficient capacity to accommodate increased flows from the Subdivision, without any adverse impacts, and the Developer undertakes these works to the satisfaction of the Relevant Authority, at no cost to the Relevant Authority.

(f) The Developer must demonstrate that stormwater discharging from the Development Site will meet water quality objectives prior to the Relevant Authority providing approval for a Lawful Point of Discharge.

7.12. DISCHARGE TO WATERWAYS

(a) All stormwater infrastructure constructed as part of a Subdivision requires approval to discharge to Waterways. The Developer must seek and obtain written authorisation from all Relevant Authorities and Regulatory Authorities prior to making any connection into the natural environment and must comply with any conditions imposed upon such authorisation.

(b) The Relevant Authorities for discharge to Waterways are as follows:
   (i) The Local Authority, where a Waterway resides within Local Authority owned land or a private parcel of land which receives stormwater via easement from stormwater drainage Public Infrastructure owned by the Local Authority.
   (ii) Department of Infrastructure, Planning and Logistics (DIPL), where a Waterway resides within NT Government owned land or a private parcel of land which receives stormwater via easement from stormwater drainage Public Infrastructure owned by the NT Government.
   (iii) DIPL - Crown Land Estate office, where a Waterway is located within a parcel of Crown land.

(c) Written approval to discharge stormwater into a Waterway, from applicable Relevant Authorities as described under Clause 7.12(b), is required prior to approval of the Stormwater Management Plan(s) and Design Drawings by the Relevant Authority.

8. WATER

(a) All Subdivisions must make provisions for an adequate supply of potable water to service the Subdivision, having regard to the nature and context of the Subdivision.

(b) The Relevant Authorities for water supply are:

(i) Power and Water Corporation (PWC) for connections to and supply of water from municipal systems within Power and Water Corporation licence areas; and

(ii) Department of Environment and Natural Resources, Water Resources Division, in relation to licensing and advice on installation of bores and extraction of ground or surface water.

(c) The Indigenous Community Engineering Guidelines (ICEG) must be considered in the preliminary planning and design of water infrastructure for remote indigenous communities, as defined in Appendix A of the ICEG.

8.1. WATER MAINS

(a) All water Public Infrastructure to be gifted to PWC must be designed by a PWC accredited professional to the requirements of PWC's Connection Code for Water Supply and Sewerage Services and the Water Supply Code of Australia NT Supplement (Refer Part 2 - Reference Documents), and submitted to PWC for approval.

(b) The PWC Connection Code for Water Supply and Sewerage Services sets out the technical, procedural and charging requirements of PWC in relation to Subdivision development activity. It is intended that this Connection Code will encourage orderly, well designed and cost-effective connection, augmentation and extension of PWC Public Infrastructure.

(c) PWC encourages master planning of the entire development to assess network capacity for the full development. In smaller networks, new development activity may impact on existing source and/or treatment capacity, and augmentation could involve long lead times. PWC recommends early engagement by the Developer to facilitate preliminary assessment of network capacity for the proposed Subdivision.

(d) Where there is no reticulation near the Development Site, PWC encourages early engagement by the Developer to facilitate preliminary assessment of potential costs and technical issues in servicing the Subdivision.

(e) Minimum information required by PWC for all Development Applications:

(i) Address
(ii) Proposed town planning zones;
(iii) Number of lots;
(iv) Lot layout;
(v) Area of each lot;
(vi) Existing land use and zoning;
(vii) Subdivision staging;
(viii) Known development constraints;
(ix) Proposed servicing arrangements;
(x) Contours of land at 0.5 metre intervals;
(xi) Specific building development; and
(xii) Constrained land details.

(f) Minimum information required by PWC for assessment and approval of the proposed water supply network:

(i) Water Masterplan showing current and ultimate water network, water strategy, and Equivalent Population (EP) loads including allocation for lots other than Single Dwellings;

(ii) Provision of primary and secondary water supplies;

(iii) Internal designs with assumed connection points;

(iv) Detailed survey and geotechnical information for pipe bedding and structural designs;

(v) Design Report outlining:

(A) Assumed design parameters and boundary conditions;

(B) Hydraulics and structural calculations; and

(C) Modelling inputs/outputs, including a summary of results for various scenarios.

8.2. BORES

(a) The use of groundwater for domestic and commercial use is regulated under the *Water Act 1992 (NT)*. This includes provisions for granting bore work permits, drilling licences and licences for extracting surface water and/or groundwater.

(b) Developers must seek advice from DENR Water Resources Division prior to the construction of a bore.

(c) Within Water Control Districts, the drilling and construction of all bores must be permitted. Bores must be constructed by a driller with an NT drilling licence in accordance with the national standard.

(d) Groundwater extraction from bores for domestic purposes, drinking water for grazing stock or irrigating a garden less than 0.5ha will require a permit to construct a bore in a water control district; however, does not require a licence to extract and use groundwater for these purposes. Extraction and use of groundwater for any other purpose within water control districts must be licensed. For extraction oustide of water control districts, contact the DENR Water Resources Division.

8.2.1. SITE SELECTION CRITERIA

(a) A Groundwater Assessment that describes the suitability of the quality and quantity of local aquifers for the intended use of the groundwater for the proposed Subdivision must be provided to the Relevant Authority during the project development phase (Refer Section 3.9 for further details).

(b) The key considerations in locating a new bore is the separation distance to waste control and pollution sources. The following are the specified distance separations in Department of Health Guidelines (Refer Part 2):

- (i) 100 m separation distance for a traditional septic tank effluent trench;
- (ii) 50m separation distance for aerated waste water treatment systems (unchlorinated effluent); or
- (iii) 30m separation distance for aerated waste water treatment systems (where effluent is continuously chlorinated); and
- (iv) 100m separation distance for any pollution source, such as fertiliser and / or chemical storage area, packing sheds, plant workshops and animal enclosures;
- (v) Other location requirements are:
  - (A) No bore is permitted to be constructed within a firebreak; and
  - (B) Bores must be separated by a minimum distance of 70m to avoid interference between pumps.

8.2.2. BORE INSTALLATION

(a) Installation of bores and wastewater systems are intrinsic to each other to ensure water being extracted from bores and the underlying aquifer is not contaminated. The location of bores and on-site wastewater management systems must be shown on the Rural Master Services Plan.

(b) For any lots less than or equal to 2ha in area, the Developer must construct all bores required on these lots at the locations shown in the approved Rural Master Services Plan. This is to ensure that subsequent land purchasers are not precluded from constructing bores by the site selection criteria set out above, due to the construction of bores or septic systems on neighbouring properties.

9. WASTEWATER MANAGEMENT

(a) The management, including treatment and disposal of wastewater (e.g. domestic sewage) is an important consideration in all Subdivisions, whether urban, rural or remote and whether disposal is intended to be through an established reticulated network or by On-site Wastewater Management Systems (OWMS) using septic tanks or otherwise.

(b) Connection to reticulated sewerage is the preferred option for collection and treatment of wastewater.

(c) Developers proposing OWMS as an alternative to reticulated sewerage are required to demonstrate it is feasible.

(d) Large scale OWMS and community wastewater management systems require specific approvals to operate from environmental and health agencies; however, the complexity and scale of these systems requires them to be captured within the planning stages of a Subdivision.

(e) The Indigenous Community Engineering Guidelines (ICEG) must be considered in the preliminary planning and design of wastewater infrastructure for remote indigenous communities, as defined in Appendix A of the ICEG.

9.1. RETICULATED SEWERAGE

(a) All subdivisions should provide for connection to reticulated sewerage where practicable.

(b) Reticulated sewerage is a network of pipes including property connection sewers that receives wastewater from customer properties. In most cases, reticulated sewerage for wastewater disposal will be available within or adjacent to urban areas.

(c) The Relevant Authorities for Reticulated Sewerage are:

- (i) Development Consent Authority (DCA) is the consent authority for provision of reticulated sewerage through the Planning Scheme;
- (ii) Department of Housing & Community Development provides guidance for Public Infrastructure development for remote communities in the NT through the Indigenous Community Engineering Guidelines (ICEG 2014);
- (iii) Power and Water Corporation (PWC) manages extensions and connections to existing reticulated sewerage via an Authorised Connection; and
- (iv) The Utilities Commission establishes new and extends current Sewerage Services License Areas.

(d) All Subdivisions are to be connected to reticulated sewerage where required by the Planning Scheme.

(e) It may be necessary to extend or upgrade the existing reticulated sewerage to service a Subdivision. In these cases, advice and the approval of the Power and Water Corporation (PWC) and the Utilities Commission to extend the reticulated sewerage will be required.

(f) Any External Works undertaken should consider the full range of potential end uses to ensure Public Infrastructure is sufficient to prevent discharge to the environment (or stormwater system) of industrial wastewater or contaminated stormwater from potentially polluting end users (e.g. mechanics and car wash facilities).

(g) Reticulated sewerage within a PWC Sewerage Services Licence Area must:

- (i) be designed to the requirements of PWC's Connection Code for Water Supply and Sewerage Services and the NT Supplement to the WSAA Code; and
- (ii) be designed by a PWC accredited hydraulic designer.

(h) Minimum information required by PWC for assessment and approval of the proposed sewer network:

- (i) Sewer Masterplan showing current and ultimate sewer network, sewer strategy, and Equivalent Population (EP) loads including allocation for lots other than Single Dwellings;
- (ii) Internal designs with assumed connection points;
- (iii) Detailed survey and geotechnical information for pipe bedding and structural designs;
- (iv) Design Report outlining:
  - **(A)** Assumed design parameters and boundary conditions;
  - **(B)** Hydraulics and structural calculations; and
  - **(C)** Modelling inputs/outputs, including a summary of results for various scenarios.

(v) Other documents as listed in Table 3 — Design, Construction and Handover Process.

(i) Reticulated sewerage within a Sewerage Services Licence Area outside of PWC control must be provided in accordance with the terms of a licence issued by the Utilities Commission.

(j) Development of reticulated sewerage in remote communities must be in accordance with ICEG.

(k) Most reticulated sewerage schemes are not designed to accept Trade Waste. If Trade Waste cannot be accepted by the sewerage provider, alternative arrangements must be made in accordance with *Water Supply and Sewerage Services Act 2000 (NT)* and the requirements of the sewerage provider.

9.2. FEASIBILITY/RISK ASSESSMENT OF UNSEWERED SUBDIVISIONS

(a) The Developer must demonstrate initially through a feasibility assessment that connection of the Subdivision to reticulated sewerage is not feasible. If demonstrated, the Developer must undertake a risk assessment to determine if On-site Wastewater Management Systems (OWMS) is an acceptable solution. This is to allow decisions to be made upon:
   (i) Assessment of overall risk of utilising OWMS, including accumulative risk and pollutant modelling;
   (ii) The level of risk posed by Development Site based constraints for individual allotments or activities in the proposed subdivision; and
   (iii) Determining appropriate types of OWMS technology and any limitations, and referencing this to the Subdivision.

(b) The Relevant Authorities are as follows:
   (i) The DCA for considering feasibility studies and risk assessments of unsewered areas within their Divisions;
   (ii) The Minister for Lands and Planning for considering feasibility studies and risk assessments of unsewered areas outside of the DCA Divisions;
   (iii) PWC for input to extending reticulated sewerage within a Sewerage Services Licence Area; and
   (iv) The Utilities Commission for extending or excising areas within a Sewerage Services Licence Area.

(c) Relevant Authorities must seek comment about feasibility and risk assessments for OWMS from the following Referral Authorities:
   (i) Department of Environment and Natural Resources (DENR);
   (ii) Northern Territory Environmental Protection Authority (NT EPA);
   (iii) Department of Infrastructure, Planning and Logistics (DIPL); and
   (iv) Department of Health (DOH).

(d) A feasibility assessment for an unsewered subdivision must be provided to the DCA, which assesses the broad economic, health and environmental consequences of not connecting to reticulated sewerage. It must include the following as a minimum:
   (i) Assessing feasibility of not connecting to reticulated sewerage;
   (ii) Exploring opportunities to extend reticulated sewerage;
   (iii) Providing a long-term planning horizon for connecting to reticulated sewerage; and
   (iv) Assessing risks and outlining the costs and benefits of OWMS versus reticulated sewerage.

(e) For Subdivisions within a PWC Sewerage Services Licence Area, beyond the existing sewer reticulation, the developer must seek PWC's input for eventual sewer servicing options and requirements.

(f) Where a community wastewater management system is proposed and all or part of the Subdivision falls within an existing Sewerage Services Licence Area, the feasibility assessment must consider excision of the Subdivision from the Sewerage Services Licence Area.

(g) A Wastewater Management Risk Assessment for an unsewered Subdivision must be developed, which examines the site based constraints relevant to the proposed subdivision to determine the level of risk of using OWMS. It must include the following as a minimum:
   (i) A Land Capability Assessment undertaken in accordance with these Guidelines for Land Capability Assessment for On-site Wastewater Management (Refer Part 2).
   (ii) Detailed site-specific information identifying the site and soil constraints to be considered when selecting and designing OWMS, including any constraints which might compromise the long-term effectiveness of using OWMS;

(iii) Evaluation of any risk of contamination of groundwate/surface water and associated health risks; and

(iv) Evaluation of the sustainability and environmental implications of OWMS for the Subdivision, including impacts on public health, land use and the continuing uses of energy, materials and finances. Refer NT EPA Guideline: 'Recommended Land Use Separation Distances' (Refer Part 2) for requirements on buffer distances to minimise interaction between potentially conflicting land uses.

(h) A draft Wastewater Management Risk Assessment must be provided to the Referral Authorities for consideration at the project development phase. A final Wastewater Management Risk Assessment must be submitted with a Development Application for approval by the DCA.

9.3. ON-SITE WASTEWATER MANAGEMENT SYSTEMS

(a) There are two broad categories of On-site Wastewater Management Systems (OWMS) recognised in the NT:

(i) Small OWMS servicing individual lots with a daily hydraulic capacity <2000 L/day (e.g. residential and commercial systems); and

(ii) Large-scale OWMS servicing individual lots, or a group of properties that are part of a single activity, with a daily hydraulic capacity >2000 L/day (e.g. shopping centres, correctional facilities, workers camps, etc.). Large-scale OWMS may also include community wastewater management systems that incorporate a centralised package treatment that collects wastewater from individual properties connected to a sewer main.

(b) The Relevant Authorities for OWMS generally are:

(i) DIPL – Building Advisory Services (BAS) for wastewater generators of less than 2000 L/day on an individual lot within a building control area;

(ii) Department of Health (DOH) for wastewater generators of less than 2000 L/day on an individual lot outside of a building control area;

(iii) DOH, BAS and NT Environmental Protection Authority (NT EPA) for wastewater generators greater than 2000 L/day on a single lot within any area;

(iv) DOH/NT EPA for the treatment and disposal aspects of community wastewater management systems; and

(v) PowerWater Corporation in relation to any on-site sewage treatment system proposed within a Wellhead Protection Zone.

(c) The Developer must ensure that requirements from Relevant Authorities are met and considered within planning submissions.

(d) The Developer must consider the following Reference Documents (Refer Part 2) for design of OWMS:

(i) AS/NZS 1547: On-site Domestic Wastewater Management.

(ii) Code of Practice for On-site Wastewater Management: for design of small OWMS.

(iii) Guidelines for Wastewater Works Design Approval of Recycled Water Systems: for design of large-scale OWMS.

(iv) Guidelines for Land Capability Assessment for On-site Wastewater Management.

(v) NT EPA Recommended Land Use Separation Distances: for requirements on buffer distances to minimise interaction between potentially conflicting land uses.

(e) Designing large-scale OWMS is complex, relying upon different levels of documentation dependent upon project-specific considerations for effluent reuse, level of treatment required, system loading and receiving environment for effluent disposal. The proposed designs must respond to site constraints identified in the Land Capability Assessment.

(f) The treatment and disposal of wastewater must not result in the creation or exacerbation of mosquito breeding. Information on design and management principles can be found in the Department of Health guideline 'Mosquito Breeding and Wastewater Treatment and Disposal in the Northern Territory' (Refer Part 2).

(g) Disposal of wastewater has the potential to impact on adjacent lands, stormwater drains, waterways or underlying aquifers, hence Developers may be required to obtain environmental approval including a Waste Discharge Licence from the Department of Environment and Natural Resources (DENR) or the Northern Territory Environmental Protection Authority (NT EPA).

(h) All lots forming the proposed Subdivision must be individually certified by the Developer's engineer and referenced to the Developer's Subdivision Masterplan specifically for the Subdivision.

(i) Subdivision Certification must include identification of site constraints to be considered by the Certifying Engineer (Hydraulic) for design and construction purposes, including:

(i) Minimum lot sizes and restrictions due to site constraints identified in the Land Capability Assessment;

(ii) Special requirements such as restrictions for water/wellhead protection zones;

(iii) Particular setbacks, referenced in the Code of Practice for On-site Wastewater Management, and noted within the subdivision (such as creeks, waterways, bores); and

(iv) Recognising the application and preference of small and large-scale OWMS.

10. ELECTRICAL

10.1. GENERAL

(a) Electrical Public Infrastructure in subdivision developments must be designed by an appropriately qualified electrical consultant.

(b) Electrical Public Infrastructure to be handed over to Power and Water must be designed by a Power and Water Corporation accredited electrical consultant (designer/engineer).

(c) Electrical Public Infrastructure for all lighting must be designed in accordance with Section 12 - Lighting.

(d) Electrical Public Infrastructure design for all other facilities to be handed over to the Relevant Authority (e.g. BBQs, GPOs, Irrigation Controllers etc.) must be designed in accordance with *AS/NZS 3000: Electrical Installations*.

(e) The Indigenous Community Engineering Guidelines (ICEG) must be considered in the preliminary planning and design of electrical infrastructure for remote indigenous communities, as defined in Appendix A of the ICEG.

10.2. POWER AND WATER INFRASTRUCTURE

(a) The Developer must provide the final subdivision layout and intended zoning of each newly created lot to the Power and Water Corporation accredited electrical consultant to facilitate design of the required minimum basic supply.

(b) The Developer's Power and Water accredited electrical consultant must design the electrical reticulation in accordance with;

  (i) Network Policy NP001 Design and Construction for Network Assets;

  (ii) Network Policy NP020 Guidelines for Developers of Subdivisions and Electricity Infrastructure;

  (iii) Network Policy NP041 Guidelines for Electrical Design Consultants; and

  (iv) Power and Water Overhead Line, Underground and Aerial Bundled Cable Manuals.

(c) The Developer must comply with the handover and documentation requirements set out in Network Policy NP001 – Design and Construction of Network Assets.

(d) For remote communities the Developer and the Developer's Power and Water accredited consultant must also comply with, and ensure the proposed subdivision development will comply with, Indigenous Community Engineering Guidelines (ICEG 2017) for Remote Communities in the NT

(e) Development in urban areas must have underground electrical reticulation.

(f) Development in remote, rural and industrial areas must have overhead electrical reticulation unless the Relevant Authority requests underground electrical reticulation or the Developer has preference to use underground electrical reticulation.

(g) The Developer's Power and Water accredited electrical consultant must provide Certification that all electrical designs comply with standards listed above via a Certificate of Electrical Design Compliance (NP041 Appendix B).

11. COMMUNICATIONS

(a) The Developer is responsible for registering the design and installation of fibre-ready communications facilities to service all lots within Subdivisions of more than two allotments. The Developer must initially register the Subdivision with Telstra via the 'Telstra Smart Community' Portal, by making an 'Application for Reticulation'. On receipt of the application, Telstra will state if the Subdivision is in a Telstra or NBN Co. serviced area. If the Subdivision is found to be in an NBN Co. serviced area, a 'New Development Application Form' must be submitted to NBN Co.

(b) Communications designs must be in accordance with:

  (i) All relevant Legislation, including Communications Alliance G645: Fibre-Ready Pit and Pipe Specification for Real Estate Development Projects; and

  (ii) Relevant Authority requirements, policies and technical specifications (Refer Part 2 - Reference Documents).

(c) The Developer must liaise directly with the Relevant Authority to confirm the scope of work for provision of communications services to the Subdivision, including any External Works and the land provisions necessary for siting the utility Public Infrastructure within the Subdivision.

(d) The Developer must submit applications and designs to the Relevant Authority for approval prior to construction, to the minimum time frames stipulated by the Relevant Authority.

(e) Developers must install and obtain acceptance of the constructed communications fibre-ready pit and pipe Public Infrastructure from the Relevant Authority.

(f) The Developer is responsible for contacting the Relevant Authority to coordinate installation of communications cabling in advance of services being required, to the minimum time frames stipulated by the Relevant Authority.

12. LIGHTING

(a) The Relevant Authorities for lighting are:
  (i) Local Authority in relation to street lighting and lighting to other public parks and places to be vested in the Local Authority; and
  (ii) Department of Infrastructure, Planning and Logistics in relation to street lighting to roads and lighting to other public places to be vested in the Northern Territory Government.

(b) The Relevant Standards for street lighting and lighting within public areas are:
  (i) AS/NZS 1158: Lighting for Roads and Public Spaces
  (ii) AS/NZS 3000: Electrical Installations;
  (iii) AS/NZS 4282: Control of the Obtrusive Effects of Outdoor Lighting;
  (iv) Power and Water Corporation for electrical supply metering to public areas not within designated Road Reserves and for mounting street lights to overhead power poles; and
  (v) Power and Water Corporation for connection to Relevant Authority main switchboards.

12.1. GENERAL

(a) Developers must provide lighting to streets, carparks, bus stops, parks, walkways including pedestrian crossings, footpaths/shared paths and other public areas of the proposed subdivision development, unless otherwise specified by the Relevant Authority. This lighting must be in accordance with the relevant Australian Standards and the requirements and specifications of the Relevant Authority.

(b) Smart lighting technology must be incorporated to the requirements of the Relevant Authority.

(c) LED luminaire types must comply with Relevant Authority requirements. Where not specified, the following minimum standards/requirements must apply:
  (i) Compliance with SA/SNZ TS 1158.6:2015 - Lighting for roads and public places Luminaires - Performance
  (ii) Rated life of power supply: 100,000 hours minimum
  (iii) Predicate power supply failure rate: 0.2% per 1000 operating hours
  (iv) Ingress Protection (IP) ratings:
    (A) Optical Module: minimum IP65
    (B) Gear Chamber: minimum IP24
    (C) Power Supply: minimum IP65
  (v) Correlated Colour Temperature (CCT):
    (A) Category V Streets: 4000K
    (B) Category P Streets: 3000K and 4000k as directed by the Relevant Authority
  (vi) Minimum Colour Rendering Index (CRI): - 70+Ra
  (vii) Power supply dimming: Digital Addressable Lighting Interface (DALI) 2.0
  (viii) Integral power supply to be Zhaga Book 18 compatible with DALI 2.0
  (ix) Luminaire housing: aluminium alloy LM6
  (x) Luminaire IK Rating:
    (A) Category V Streets: minimum IK06
    (B) Category P Streets: minimum IK08
  (xi) Smart controls readiness: NEMA/ANSI C136.41 7 contact receptacle
  (xii) Electrical Compliance: Class 1 and optional Class 2
  (xiii) Surge protection: 20kV/10kA within the luminaire housing

(d) Pole/outreach types, footing details, active/neutral streetlighting conductor types, and conduit size for all lighting to comply with the Subdivision Standard Drawings (Part 3) and AS/NZS 3000. Alternative pole/outreach types may be desirable to build a sense of character for the community; and may be submitted to the Relevant Authority for approval.

(e) The Developer must provide structural certification for the proposed luminaire/pole/outreach/footing arrangements, noting that the Subdivision Standard Drawings (Part 3) are based on assumed wind loading which will vary significantly between different localities.

(f) All lighting must be designed by an appropriately qualified Consultant, meeting the requirements of the Relevant Authority.

(g) All lighting designs must be Certified by an appropriately qualified Consultant, having a minimum of four years experience in the design of lighting for subdivisions and:

  (i) for Infrastructure Categories A and D, being a full Member of the Illuminating Engineering Society of Australia and New Zealand (MIES ANZ), or holding equivalent qualifications acceptable to the Relevant Authority.

  (ii) for Infrastructure Categories B, C and E, meeting any additional requirements of the Relevant Authority.

(h) Certification required under section 12.1(g) must include a statement confirming that the design meets the requirements of the Subdivision Development Guidelines, any additional requirements of the Relevant Auhority, and all requirements of the applicable parts of the AS/NZS 1158 standard series. Where any aspects do not comply, these must be clearly identified and justified.

(i) The Developer must obtain asset numbers from the Relevant Authority and install identification markers on all lighting poles, in accordance with the requirements of the Relevant Authority.

12.2. PUBLIC OPEN SPACE LIGHTING

(a) Public open space lighting design to comply with AS/NZS 1158.3.1, with associated electrical reticulation designed to comply with AS/NZS 3000. Lighting must be designed to ensure no nuisance/ obtrusive lighting in accordance with AS/NZS 4282.

(b) Developers must provide lighting to Public Open Space areas to Category P with Sub Categories (e.g. P1 to P4, P6 to P12), as advised by the Relevant Authority.

(c) Lighting must support public safety and comply with Crime Prevention Through Environmental Design (CPTED) principles.

(d) Feature lighting, such as bollard lights and ground lights, can be provided but must not form part of the compliance calculations for illumination.

(e) Public open space lighting must be energy efficient LED type. Some Relevant Authorities may have LED manufacturer type preferences to use. With freestanding pole mounted LED luminaires, additional surge diverter/s must be incorporated within the base of the pole as part of the pole switch pack.

(f) Public open space light poles must be rigid Type 9 or 5 in accordance with the Standard Drawings. Poles must be galvanised, or colour powder coated if advised by the Relevant Authority.

12.3. STREET LIGHTING

12.3.1. GENERAL

(a) Streetlighting design within subdivisions to comply with AS/NZS 1158.3.1 Category P1/P2/P3/P4, as advised by the Relevant Authority. Developers may be required to provide new or upgrade existing street lighting at intersection/s with the existing streets/roads, to either Category V or P with Sub Categories AS/NZS 1158.1.1 Category V3/V5/Flag Lighting or AS/NZS 1158.3.1 Category P1/P2/P3/ P4, as advised by the Relevant Authority.

(b) Street lighting is generally not provided in rural subdivisions, however, Relevant Authorities may request;

  (i) Category V3 Lighting in accordance with AS/NZS 1158.1.1 to intersections with arterial/sub arterial roads;

  (ii) Flag Lighting in accordance with AS/NZS 1158.1.1 to intersection with all other streets/roads; and

  (iii) Lighting in accordance with AS/NZS 1158.1.1 and AS/NZS 1158.3.1 for special traffic managements treatments (e.g. pedestrian refuges).

(c) Street lighting for dedicated pedestrian crossings away from signalised intersections must be in accordance with the lighting technical parameters of AS/NZS 1158.4.

12.3.2. MATERIALS

(a) Street lighting must be energy efficient LED type with integral surge diverter/s. Some Relevant Authorities may have LED manufacturer type preferences to use. With freestanding streetlight pole mounted LED luminaires, additional surge diverter/s must be incorporated within the base of the street light pole as part of the pole switch pack.

(b) Street light poles must be galvanised, or colour powdercoated if advised by the Relevant Authority. Generally Rigid type poles must be used; however, frangible type (i.e. vehicle impact absorbing columns) may be required by the Relevant Authority.

12.3.3. LOCATION

(a) Street light poles are to be generally aligned with dividing boundary of allotments as far as practicable.

(b) Street light poles must be located within the vicinity of pedestrian refuge locations but not too close as to cause possible viewing obstruction.

12.3.4. CONTROL

(a) Street lighting control is to be designed as outlined in Table 34 below;

Table 34 — Street Lighting Control

Electrical Reticulation	Street Lighting Control Type
Underground	Underground street lighting reticulation is connected to the Relevant Authority main switch board. Control is by the Relevant Authority main switch board containing a contactor (with Photoelectric (PE) cell control), or an individual PE cell/switch/smart control on each streetlight luminaire.
Overhead	Where overhead Power and Water LV reticulation is Open Wire or Aerial Bundled Conductor (ABC) type, street lighting control must be via an individual Photoelectric (PE) Cell or smart control on each streetlight luminaire.

12.3.5. REQUIREMENTS FOR UNDERGROUND ELECTRICAL RETICULATION

(a) Where underground street lighting reticulation is used, compliance with AS/NZS 3000 is required.

(b) The point of supply for the underground street lighting reticulation must be from a Relevant Authority main switch board.

(i) Where more than one Relevant Authority is involved (e.g. at intersections), then multiple Relevant Authority main switch boards will need to be provided for connection of each Relevant Authority street lighting reticulation.

(ii) The Relevant Authority main switch board(s) must comply with Power and Water Installation and Service Rules.

(iii) The Relevant Authority main switch board(s) must incorporate a Multiple Earth Neutral (MEN) connection, connected to earth via an earth stake located adjacent to the Relevant Authority main switch board(s).

(iv) The Relevant Authority main switch board(s) must incorporate a 3 phase circuit breaker main switch and a single phase RCD for traffic signal controller circuits (which are deemed as final sub-circuits with dedicated active/neutral/earth conductors).

(c) Underground street lighting reticulation is to be within the same trench alignment as HV/LV electrical reticulation and communications Public Infrastructure to AS/NZS 3000 Category installation requirements, wth minimum 0.10m separation and typically at 0.75m depth of cover to top of street lighting reticulation conduit. Underground street lighting reticulation cabling type is to be 25sqmm Cu XLPE/NJ/PVC active and neutral conductors, with a 35sqmm Cu PVC-insulated green-yellow earth cable sized to AS/NZS 3000 requireents. All actives, netural and erth cables are to be enclosed within the same 80mm HD uPVC conduit.

(d) The Relevant Authority street lighting columns must have switch packs located within each column containing an individual RCD per luminaire, as per the Subdivision Standard Drawings (Part 3).

12.3.6. REQUIREMENTS FOR OVERHEAD ELECTRICAL RETICULATION

(a) Where overhead electrical reticulation is used within a Subdivision, street lights are typically mounted on the power poles in accordance with Power and Water standards, subject to approval by Power and Water.

(b) Where overhead street lighting reticulation is used on Power and Water overhead power poles, compliance with AS/NZS 3000 is not required as each streetlight luminaire will be connected to the Power and Water service fuse located on the overhead power pole to Power and Water standard drawings.

13. PRACTICAL COMPLETION, DEFECTS, SECURITIES, HANDOVER AND ACCEPTANCE

13.1. PRACTICAL COMPLETION

(a) The Developer must give each Relevant Authority 10 Business Days prior written notice of the date upon which the Developer estimates it will complete construction of each component of the Development Works intended to be handed over to that Relevant Authority.

(b) When the Developer considers it has completed construction of a component of the Development Works intended to be handed over to a Relevant Authority, the Developer must give notice in writing to the Relevant Authority. Each Relevant Authority may outline its own requirements for information to be submitted upon completion. The following information must be submitted as a minimum in a digital format with appropriate indexing:

- (i) Completion Certificate, including certificates of compliance;
- (ii) Construction report, including CCTV Inspection of underground stormwater networks;
- (iii) As-constructed drawings, including As-Constructed Survey files;
- (iv) Register of non-conformances and changes from the approved design, including evidence of Certification by the Certifying Engineer and approval by the Relevant Authority;
- (v) Register of assets to be handed over, including Construction Cost and Dilapidation Reports; and
- (vi) All manuals, warranties and other documents required for the use, operation and maintenance of all services and systems forming part of the Development Works.

(c) Within 10 Business Days of receiving written notice in accordance with section 13.1(b), the Relevant Authority will inspect the relevant component of the Development Works and:

- (i) if satisfied Practical Completion has been achieved, provide to the Developer a Practical Completion Letter and Clearance Letter (as applicable); or
- (ii) if not satisfied Practical Completion has been achieved, give notice to the Developer setting out the works required to be undertaken, or the documentation required to be provided, to achieve Practical Completion.

(d) The Developer must perform the works or provide the documentation set out in a notice under section 13.1(c)(ii)as soon as possible after receipt of the notice and, upon completion may give to the Relevant Authority a further notice in accordance with section 13.1(b).

(e) This section 13.1 will continue to apply in respect of each component of the Development Works intended to be handed over to a Relevant Authority until such time as the Relevant Authority issues a Practical Completion Letter to the Developer pursuant to section 13.1(c)(i).

(f) The Developer must refer to the Relevant Authority for details on applicable charges and payment terms for inspections required under section 13.1(c).

13.2. DEFECTS

(a) During the Defects Liability Period in respect of any component of the Development Works handed over to or intended to be handed over to a Relevant Authority, if any Defect is found or occurs in respect of those works, the Developer must:

- (i) repair, replace or otherwise make good the Defect and any damage to the Development Works caused by the defect; and
- (ii) carry out such rectification works:
  - (A) causing as little disruption to the operation of the relevant Development Works (and any surrounding Public Infrastructure) as possible;
  - (B) in accordance with these Guidelines as if the rectification works were Development Works; and
  - (C) in accordance with the reasonable requirements of any Relevant Authority.

(b) The Developer must undertake rectification works for all Defects within the following timeframes after becoming aware of the relevant Defect (whether by notice from a Relevant Authority or otherwise):
  (i) Major Defects - within 48 hours.
  (ii) Minor Defects - within 20 Business Days.

(c) If the Developer fails to undertake rectification works in accordance with this Section within the periods set out above, or if and to the extent a Major Defect requires immediate rectification works (and it is not reasonable to require 48 hours notice to the Developer), then:
  (i) the Relevant Authority may carry out the works, or engage third parties to carry out the works; and
  (ii) the costs, including incidental costs incurred by the Relevant Authority in connection with doing or procuring the works will be a debt due and payable by the Developer to the Relevant Authority on demand and (without limiting any other rights of the Relevant Authority at law) may be deducted from any Security Bond.

(d) The Developer must maintain all soft landscaping in a healthy condition for the duration of the applicable Defects Liability Period. Any soft landscping elements which become unhealthy prior to handover and acceptance will be considered a Defect.

13.3. SECURITIES

(a) A Relevant Authority may, in respect of any component of Development Works handed over to and accepted by or to be handed over to and accepted by that Relevant Authority, require the Developer to provide a Security Bond in respect of the Developer's obligations to rectify Defects in and maintain the relevant component of the Development Works, such Security Bond to be in the form of:
  (i) cash to be held by the Relevant Authority; or
  (ii) one or more unconditional and irrevocable guarantees;
    (A) issued by an authorised deposit-taking institution as defined in the *Banking Act 1959 (Cth)*, or an insurer, acceptable to the Relevant Authority;
    (B) in favour of the Relevant Authority;
    (C) given expressly in respect of the Developer's obligations to rectify Defects in and maintain the relevant component of the Development Works; and
    (D) with no expiry date.

(b) If the Developer defaults in the performance of its obligations to rectify Defects or maintain the relevant component of the Development Works, the Relevant Authority will be entitled (without prejudice to any other rights or remedies available to it) to:
  (i) forfeit or call upon the Security Bond in accordance with its terms; and
  (ii) apply part or all of the Security Bond as it sees fit.

(c) Provided there are no outstanding or unrectified Defects in respect of the relevant component of the Development Works at the expiry of the Defects Liability Period, the baance of the Security Bond will be returned to the Developer. Where there are outstanding or unrectified Defects at the expiry of the Defects Liability Period, the balance of the Security Bond may be called upon by the Relevant Authority or held by the Relevant Authority until such time that the Relevant Authority is satisfied all Defects have been rectified to its satisfaction.

13.4. HANDOVER AND ACCEPTANCE

(a) The processes for handover and acceptance of Development Works by each Relevant Authority are set out in the Schedule of Variations.

(b) Where, for any Relevant Authority, there is no handover and acceptance process set out in the Schedule of Variations the following process will apply:
  (i) Not less than 20 Business Days prior to the expiry of the Defects Liability Period in respect of any component of the Development Works, the Developer must give notice in writing to the Relevant Authority setting out the date upon which the Defects Liability Period expires.

(ii) Within 10 Business Days of receiving a notice pursuant to section 13.4(b)(i), the Relevant Authority must inspect the relevant component of the Development Works and must:

(A) give notice to the Developer that there are no outstanding Defects required to be rectified by the Developer, confirming the date on which the Defects Liability Period will expire and the Security Bond (if any) will be released; or

(B) give notice to the Developer that there are outstanding Defects which must be rectified by the Developer prior to the end of the Defects Liability Period (and in any event before the Relevamt Authority will accept handover of the relevant component of the Development Works).

(iii) If a Relevant Authority gives the Developer a notice under section 13.4(b)(ii)(B), the Developer must rectify the identified Defects and, when complete, must issue a further notice in accordance with 13.4(b)(i).

(iv) Sections 13.4(b)(i) to 13.4(b)(iii) will continue to apply until the Relevant Authority issues a notice pursuant to section 13.4(b)(ii)(A).

14. SCHEDULE OF VARIATIONS

14.1. EXAMPLE

Document Reference	Detail of Variation	Variation Date
7.9.1 - Table 23	Minimum pipe size may be DN300 sewer grade PVC.	01 Apr 2019
7.9.6	Council will not accept Grated Inlet Pits.	01 Apr 2019
4.7.1(b)	Liaise with Council to confirm Minimum Design Traffic.	01 Apr 2019
Part 3 – SS3002	Council will not accept Type 2 Lot Connections.	01 Apr 2019
Part 4 – 8.9.3	Developer to analyse all three bitumen samples and provide NATA endorsed test reports to Council.	01 Apr 2019

14.2. CITY OF DARWIN

Document Reference	Detail of Variation	Variation Date

14.3. CITY OF PALMERSTON

Document Reference	Detail of Variation	Variation Date

14.4. ALICE SPRINGS TOWN COUNCIL

Document Reference	Detail of Variation	Variation Date

14.5. KATHERINE TOWN COUNCIL

Document Reference	Detail of Variation	Variation Date

14.6. LITCHFIELD COUNCIL

Document Reference	Detail of Variation	Variation Date

14.7. BELYUEN SHIRE COUNCIL

Document Reference	Detail of Variation	Variation Date

14.8. WAGAIT SHIRE COUNCIL

Document Reference	Detail of Variation	Variation Date

14.9. COOMALIE COMMUNITY GOVERNMENT COUNCIL

Document Reference	Detail of Variation	Variation Date

14.10. BARKLY REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.11. CENTRAL DESERT REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.12. EAST ARNHEM REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.13. MACDONNELL REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.14. ROPER GULF REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.15. TIWI ISLANDS REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.16. VICTORIA DALY REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.17. WEST ARNHEM REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.18. WEST DALY REGIONAL COUNCIL

Document Reference	Detail of Variation	Variation Date

14.19. NHULUNBUY CORPORATION LIMITED

Document Reference	Detail of Variation	Variation Date

14.20. DEPARTMENT OF INFRASTRUCTURE PLANNING AND LOGISTICS

Document Reference	Detail of Variation	Variation Date



PART 2
REFERENCE DOCUMENTS

a) Reference Documents are policies that are relevant to subdivision infrastructure design, construction and maintenance from Relevant Authorities. These Guidelines do not include all standards and requirements that may be required or imposed by any Relevant Authority or Regulatory Authority in all circumstances. Relevant Authorities and Regulatory Authorities may impose other standards and take account of other policies if appropriate in the circumstances.

b) The following sections have been specifically numbered to align with their relevant sections in the Guidelines documents.

1. PART 1 – SUBDIVISION DEVELOPMENT GUIDELINES

DEVELOPMENT SUITABILITY ASSESSMENTS

No.	Reference Document	Section Reference
1.	Environmental Management https://transport.nt.gov.au/infrastructure/technical-standards-guidelines-and-specifications/technical-specifications/environmental-management	3
2.	Northern Territory Land Suitability Guidelines https://nt.gov.au/__data/assets/pdf_file/0005/228992/nt-land-suitability-guidelines.pdf	3.1
3.	Environmental Assessment Guidelines https://ntepa.nt.gov.au/environmental-assessments/env-assessment-guidelines	3.2
4.	Guide to the Environmental Impact Assessment Process in the Northern Territory https://ntepa.nt.gov.au/environmental-assessments/guide-to-the-eia-process-in-the-northern-territory	3.2
5.	National Environment Protection (Assessment of Site Contamination) Measure 1999 https://www.legislation.gov.au/Details/F2013C00288	3.2
6.	Guidelines: Recommended Land Use Separation Distances https://ntepa.nt.gov.au/about-ntepa/for-your-comment/comments-closed/draft-guideline-recommended-land-use-separation-distances	3.7

STREETS AND PATHWAYS

No.	Reference Document	Section Reference
1.	Austroads Design Guides https://austroads.com.au/about-austroads/austroads-guides	4
2.	DIPL Policy “Road Safety Audit” https://nt.gov.au/driving/management/road-safety-audits	4.10

STORMWATER DRAINAGE

No.	Reference Document	Section Reference
1.	Australian Rainfall and Runoff 2016 http://arr.ga.gov.au/arr-guideline	7
2.	Guidelines for Preventing Biting Insect Problems for Urban Residential Developments or Subdivisions https://digitallibrary.health.nt.gov.au/prodjspui/bitstream/10137/2682/1/Guidelines%20for%20preventing%20biting%20insect%20problems%20for%20urban%20residential%20d.. .pdf	7
3.	Constructed Wetlands in the Northern Territory Guidelines to Prevent Mosquito Breeding https://ntepa.nt.gov.au/__data/assets/pdf_file/0003/286815/appendix_v.pdf	7.10.2
4.	Best Practice Erosion and Sediment Control (BPESC) https://www.austieca.com.au/publications/best-practice-erosion-and-sediment-control-bpesc-document	7.10.3
5.	Land Management Technical Notes and Fact Sheets https://denr.nt.gov.au/land-resource-management/rangelands/technical-notes-fact-sheets/land-management-technical-notes-and-fact-sheets	7.10.3

WATER

No.	Reference Document	Section Reference
1.	Refer to Power and Water website https://www.powerwater.com.au/developers/water-and-wastewater/standards-and-guidelines	8
2.	Indigenous Community Engineering Guidelines (ICEG 2014) for Remote Communities in the NT https://nt.gov.au/__data/assets/pdf_file/0007/373156/ICEG-for-remote-communities.pdf	8

WASTEWATER MANAGEMENT

No.	Reference Document	Section Reference
1.	Indigenous Community Engineering Guidelines (ICEG 2014) for Remote Communities in the NT https://nt.gov.au/__data/assets/pdf_file/0007/373156/ICEG-for-remote-communities.pdf	9
2.	Guidelines for Preventing Mosquito Breeding Associated with Wastewater Treatment and Disposal in the Northern Territory https://digitallibrary.health.nt.gov.au/prodjspui/bitstream/10137/2685/1/Mosquito%20breeding%20and%20wastewater%20treatment%20and%20disposal%20in%20the%20NT%20-%202016.pdf	9
3.	Refer to Power and Water website https://www.powerwater.com.au/developers/water-and-wastewater/standards-and-guidelines	9.1

4.	Guidelines for Land Capability Assessment for On-site Waste Water Treatment https://nt.gov.au/__data/assets/pdf_file/0006/228804/guidelines-land-capability-assessment-onsite-wastewater-management.pdf	9.2, 9.3

ELECTRICAL

No.	Reference Document	Section Reference
1.	Indigenous Community Engineering Guidelines (ICEG 2014) for Remote Communities in the NT https://nt.gov.au/__data/assets/pdf_file/0007/373156/ICEG-for-remote-communities.pdf	10
2.	NP001.1 Design and Construction of Network Assets – General Requirements https://www.powerwater.com.au/__data/assets/pdf_file/0009/14202/NP001.1-Design-and-Construction-of-Network-Assets-General-Requirements-qdoc2008_738.pdf	10
3.	NP001.2 General Specification for Underground Electrical Reticulation https://www.powerwater.com.au/__data/assets/pdf_file/0010/14203/NP001.2-General-Specification-for-Underground-Electrical-Reticulation-qdoc_174.pdf	10
4.	NP001.3 General Specification for Overhead Electrical Reticulation https://www.powerwater.com.au/__data/assets/pdf_file/0011/14204/NP001.3-General-Specification-for-Overhead-Electrical-Reticulation-qdoc2008_173.pdf	10
5.	NP001.4 General Specification for Overhead-Rural Residential Subdivisions https://www.powerwater.com.au/__data/assets/pdf_file/0012/14205/NP001.4-General-Specification-for-Overhead-Rural-Residential-Subdivisions-qdoc2008_739.pdf	10
6.	NP001.5 General Specification for Overhead Industrial and Commercial Subdivisions https://www.powerwater.com.au/__data/assets/pdf_file/0013/14206/NP001.5-General-Specification-for-Overhead-Industrial-and-Commercial-Subdivisions-QDOC2008_176.pdf	10
7.	NP001.6 General Specification for URD Subdivisions https://www.powerwater.com.au/__data/assets/pdf_file/0014/14207/NP001.6-General-Specification-for-URD-Subdivisions-qdoc2008_177.pdf	10
8.	NP001.7 Reliability Criteria for Distribution Networks https://www.powerwater.com.au/__data/assets/pdf_file/0015/14208/NP001.7-Reliability-Criteria-for-Distribution-Networks-qdoc2008_178.pdf	10
9.	NP001.8 Handover Documentation https://www.powerwater.com.au/__data/assets/pdf_file/0016/14209/NP001.8-Handover-Documentation-qdoc2008_179.pdf	10
10.	NP001.9 Conditions of Supply to Large Customers https://www.powerwater.com.au/__data/assets/pdf_file/0008/14210/NP001.9-Electricity-Supply-to-Large-Customers-qdoc2008_180.pdf	10

11.	NP001.10 Documentation Requirements https://www.powerwater.com.au/__data/assets/pdf_file/0009/14211/NP001.10-Documentation-Requirements-qdoc2008_181.pdf	10
12.	NP020 Guidelines for Developers of Subdivision and Electricity Infrastructure https://www.powerwater.com.au/__data/assets/pdf_file/0013/14215/NP020-Guidelines-for-Developers-of-Subdivision-and-Electricity-Infrastructure.pdf	10
13.	NP021 Easement Guidelines https://www.powerwater.com.au/__data/assets/pdf_file/0014/14216/NP021-Easement-Guidelines.pdf	10
14.	NP041 Guidelines for Electrical Design Consultants https://www.powerwater.com.au/__data/assets/pdf_file/0016/14218/NP041-Guidelines-for-Electrical-Design-Consultants-2017.pdf	10
15.	NP003 Installation Rules https://www.powerwater.com.au/__data/assets/pdf_file/0010/14212/NP003-Installation-Rules.pdf	10

BACKGROUND SUPPORT DOCUMENTATION

No.	**Reference Document** (web link will be available upon implementation of the Subdivision Development Guidelines)	Section Reference
1.	Road Hierarchy for Uniform Subdivision Guidelines within the Northern Territory	4
2.	Technical Report – Road Hierarchy Design For Northern Territory Subdivision Development Guidelines	4
3.	Review of Water Sensitive Drainage in the Northern Territory	7
4.	NT Government – Case Study of Construction Phase vs Operation Phase Stormwater Quality Treatment	7
5.	NT Stormwater Treatment Pond Design Guidelines	7

2. PART 4 – STANDARD SPECIFICATION

CONFORMANCE TESTING

No.	Reference Document	Section Reference
1.	Northern Territory Materials Testing Manual https://transport.nt.gov.au/__data/assets/pdf_file/0019/233740/Materials-Testing-Manual.pdf	

NOTES:
1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.

DRAWING No.	SUBDIVISION STANDARD DRAWINGS
SS0000	SCHEDULE OF DRAWINGS
SS1000	STREET HIERARCHY - CATEGORY A - RESIDENTIAL AND MIXED USE - SET TYPE 1 - SHEET 1 OF 4
SS1001	STREET HIERARCHY - CATEGORY A - RESIDENTIAL AND MIXED USE - SET TYPE 1 - SHEET 2 OF 4
SS1002	STREET HIERARCHY - CATEGORY A - RESIDENTIAL AND MIXED USE - SET TYPE 2 - SHEET 3 OF 4
SS1003	STREET HIERARCHY - CATEGORY A - INDUSTRIAL - SET TYPE 1 - SHEET 4 OF 4
SS1004	STREET HIERARCHY - CATEGORY B AND C - RESIDENTIAL, MIXED USE AND INDUSTRIAL
SS1005	STREET HIERARCHY - CATEGORY D AND E - RURAL
SS1006	VEHICLE ACCESS - CATEGORY A - TYPICAL DETAILS
SS1007	VEHICLE ACCESS - CATEGORY B - TYPICAL DETAILS
SS1008	VEHICLE ACCESS - CATEGORY C TO E - TYPICAL DETAILS
SS1009	FOOTPATHS, SHARED PATHS AND KERB RAMPS - TYPICAL DETAILS
SS1010	STREET NAME SIGNS - TYPICAL DETAILS
SS2000	PLANTING - TYPICAL DETAILS
SS3000	SUBSOIL DRAINAGE - TYPICAL DETAILS
SS3001	STORMWATER PIPES - TYPICAL TRENCH DETAILS
SS3002	STORMWATER PIPES - TYPICAL LOT CONNECTION DETAILS
SS3003	STANDARD SIDE ENTRY PIT - TYPE A DETAILS - SHEET 1 OF 2
SS3004	STANDARD SIDE ENTRY PIT - TYPE B TO E DETAILS - SHEET 2 OF 2
SS3005	GRATED SIDE ENTRY PIT - GENERAL ARRANGEMENT - SHEET 1 OF 3
SS3006	GRATED SIDE ENTRY PIT - LINTEL & PIT ARRANGEMENT DETAILS - SHEET 2 OF 3
SS3007	GRATED SIDE ENTRY PIT - GRATE AND FRAME - SHEET 3 OF 3
SS3008	ACCESS CULVERT - TYPICAL ENDWALL DETAILS
SS4000	URBAN MASTER SERVICES PLAN - SAMPLE LAYOUT
SS4001	RURAL MASTER SERVICES PLAN - SAMPLE LAYOUT

DRAWING No.	DEPARTMENT OF INFRASTRUCTURE, PLANNING & LOGISTICS STANDARD DRAWINGS
CS-3100	GENERAL DRAINAGE NOTES AND APRON DETAILS
CS-3102	RCP 375mm DIA. TO 675mm DIA. HEADWALL & WINGWALL DETAIL - NARROW CHANNELS
CS-3103	RCP 450mm DIA. TO 900mm DIA. HEADWALL & WINGWALL DETAILS 0 TO 20 SKEW ANGLE
CS-3105	RCP 1050mm DIA. TO 1800mm DIA. HEADWALL & WINGWALL DETAILS 0 TO 20 SKEW ANGLE
CS-3106	RCP 1050mm DIA. TO 1800mm DIA. HEADWALL & WINGWALL DETAIL 21 TO 45 SKEW ANGLE
CS-3107	RCBC 450mm HIGH TO 1200mm HIGH HEADWALL & WINGWALL DETAILS 0 TO 20 SKEW ANGLE
CS-3108	RCBC 450mm HIGH TO 1200mm HIGH HEADWALL & WINGWALL DETAIL 21 TO 45 SKEW ANGLE
CS-3119	MANHOLES AND INLET PITS
CS-3120	CATCH DRAIN AND LETTER BOX PIT
CS-3123	GABION DROP STRUCTURE
CS-3200	STEEL BEAM GUARDRAIL (WITH FLARED TERMINALS)
CS-3300	STANDARD KERB PROFILES
CS-3302	PRAM RAMPS, WITH AND WITHOUT TACTILE GROUND SURFACE INDICATOR (TGSI)
CS-3303	TACTILE GROUND SURFACE INDICATOR (TGSI) INSTALLATION DETAILS FOR BUS STOPS, ISLAND CROSSINGS, STAIRS, RAMPS AND DIRECTION CHANGE
CS-3305	VEHICLE BARRIER FENCING, WHEELCHAIR CROSSING FOR MEDIANS & INTERSECTION HOLD RAIL DETAILS
CS-3306	CYCLE/SHARED PATH CULVERT CROSSING FENCE DETAILS
CS-3307	PEDESTRIAN FENCE
CS-3308	1800mm SECURITY FENCE
CS-3311	ACCESS GATE DETAILS
CS-3400	LINE MARKING
CS-3500	FLEXIBLE GUIDE POSTS
CS-3501	FLOOD GAUGE POSTS
CS-3503	SCHOOL ZONE SIGN DETAILS

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS DATE JUNE 2019 | CHECKED PB DATE JUNE 2019
DESIGNED PB DATE JUNE 2019 | CHECKED SPB DATE JUNE 2019
DESIGN PROJECT LEADER SPB DATE JUNE 2019 | NTG PROJECT MANAGER N/A DATE JUNE 2019

Northern Territory Government

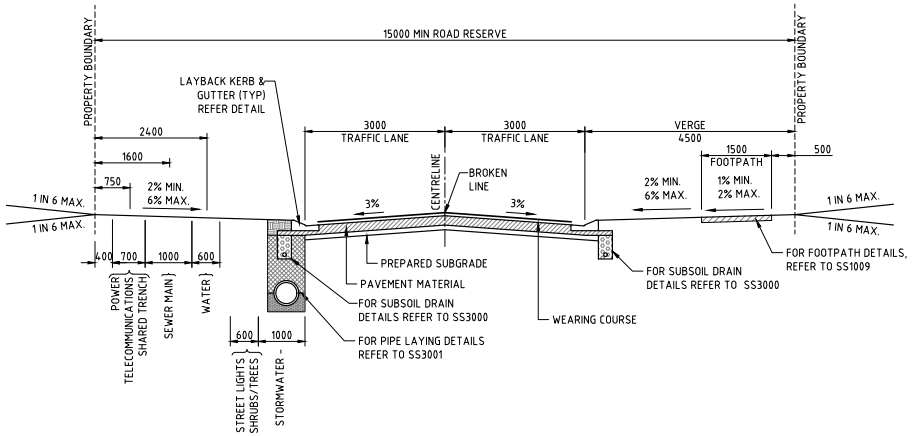
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
GENERAL

SCHEDULE OF DRAWINGS

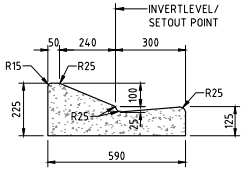
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NOTES:

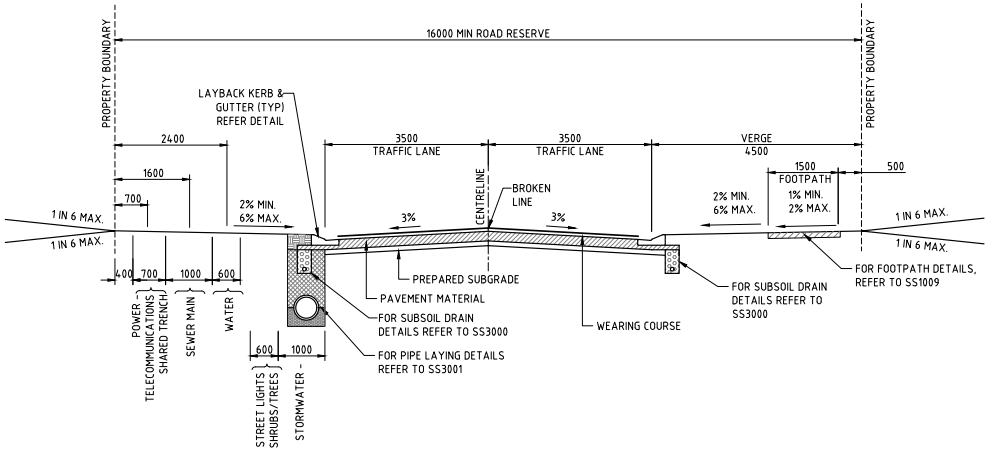
1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. ALL LINEMARKINGS AND SIGNAGE MUST COMPLY WITH AS1742 AND DIPL STANDARD DRAWINGS. RRPMs AND GUIDEPOSTS MAY ALSO BE REQUIRED IN PROJECT SPECIFIC CIRCUMSTANCES.
4. EXTEND PAVEMENT MATERIAL UNDER KERB 75mm MINIMUM THICKNESS AND MIN 300mm BEHIND BACK OF KERB.
5. SERVICE CORRIDORS ARE SHOWN ON ONE SIDE OF STREET RESERVE FOR ILLUSTRATION PURPOSES; HOWEVER, THE NOMINATED SERVICE CORRIDORS EXIST ON BOTH SIDES OF THE STREET RESERVE AND ACTUAL SERVICES MAY BE LOCATED ON ONE OR BOTH SIDES OF THE ROAD, AS APPLICABLE.
6. PROVIDE 100mm TOPSOIL AND GRASS TO ALL VERGES AND MEDIANS, OR ALTERNATIVE LANDSCAPING TREATMENT.
7. STORMWATER PIPES MAY NOT BE REQUIRED IN LANEWAYS, DEPENDING ON LENGTH OF LANEWAY AND SIZE OF CONTRIBUTING STORMWATER CATCHMENTS.
8. REFER PROJECT DRAWINGS FOR EARTHWORKS, SUBGRADE PREPARATION, PAVEMENT MATERIALS AND WEARING SURFACE SPECIFICATIONS.



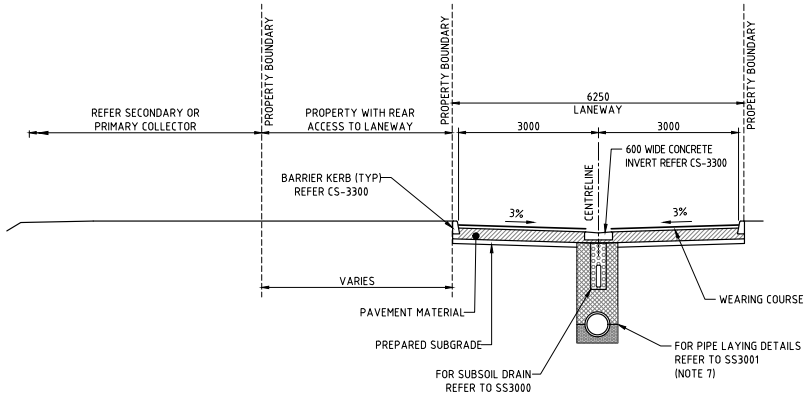
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NOT TO SCALE



ACCESS STREET
NOT TO SCALE



LANEWAY - BACK OF BLOCK
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No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

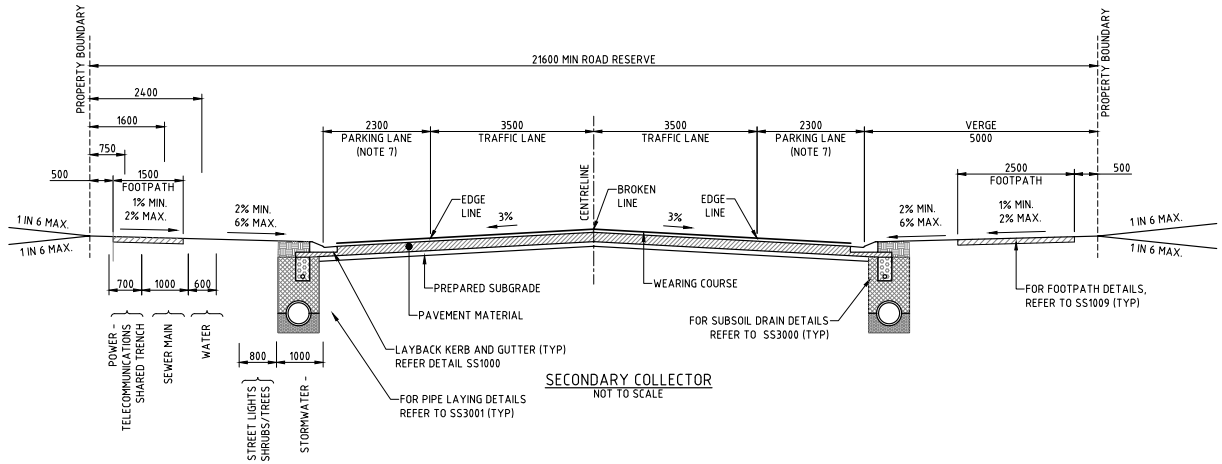
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

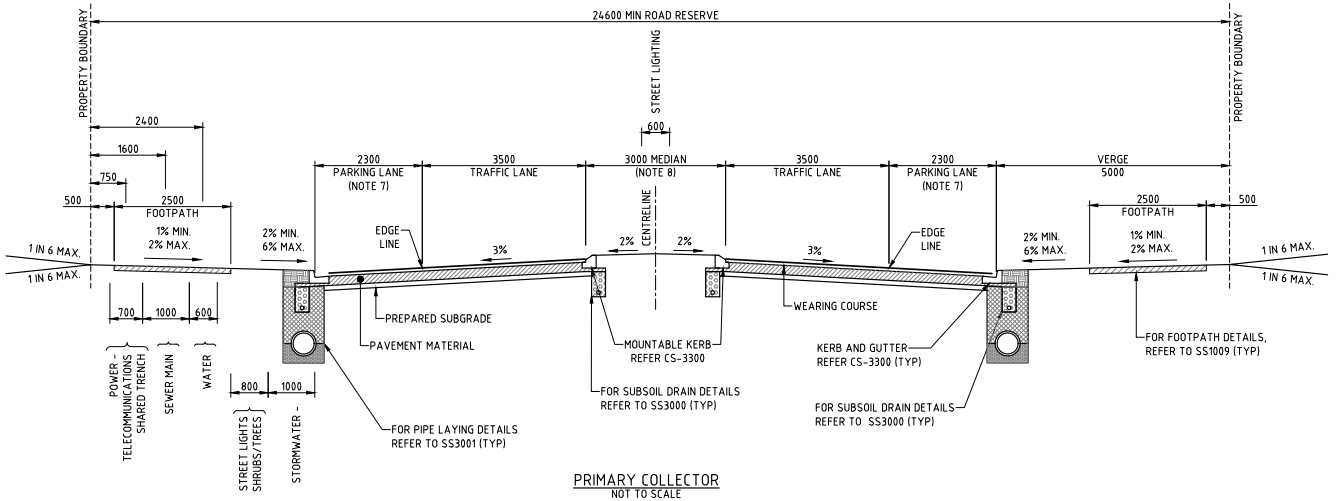
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

STREET HIERARCHY - CATEGORY A
RESIDENTIAL AND MIXED USE - SET TYPE 1

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 4	SS1000	0	A1



SECONDARY COLLECTOR
NOT TO SCALE



PRIMARY COLLECTOR
NOT TO SCALE

NOTES:

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6. PROVIDE 100mm TOPSOIL AND GRASS TO ALL VERGES AND MEDIANS, OR ALTERNATIVE LANDSCAPING TREATMENT.
7. PROVIDE BULB OUTS IN PARKING LANES AT MAX 100m CENTRES.
8. MEDIANS MAY ALTERNATIVELY BE INVERTED WITH STORMWATER DRAINAGE INFRASTRUCTURE.
9. REFER PROJECT DRAWINGS FOR EARTHWORKS, SUBGRADE PREPARATION, PAVEMENT MATERIALS AND WEARING SURFACE SPECIFICATIONS.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

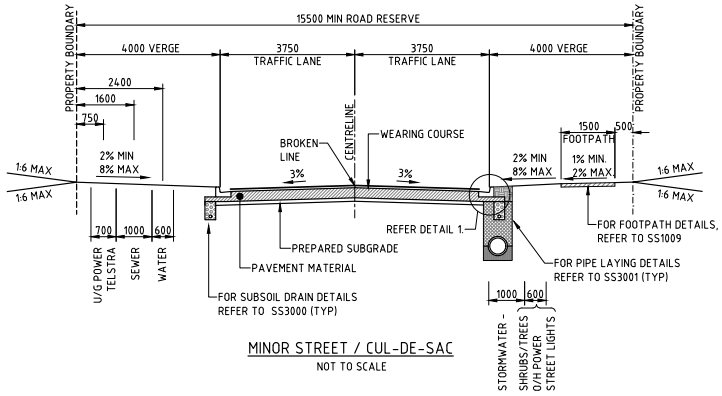
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DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

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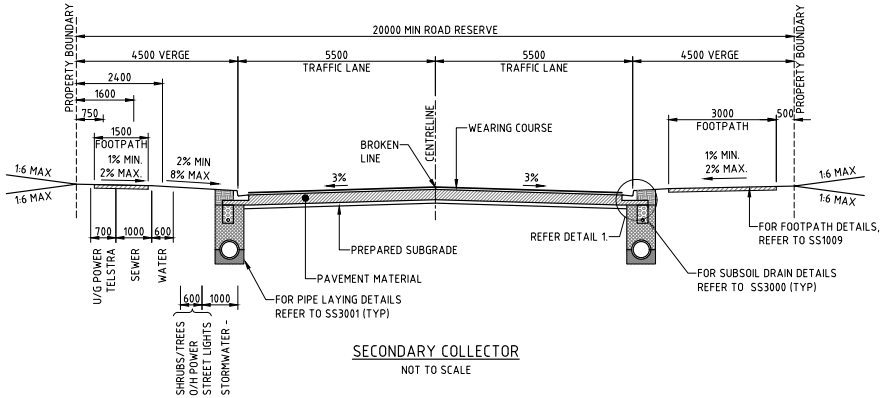
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

STREET HIERARCHY - CATEGORY A
RESIDENTIAL AND MIXED USE - SET TYPE 1

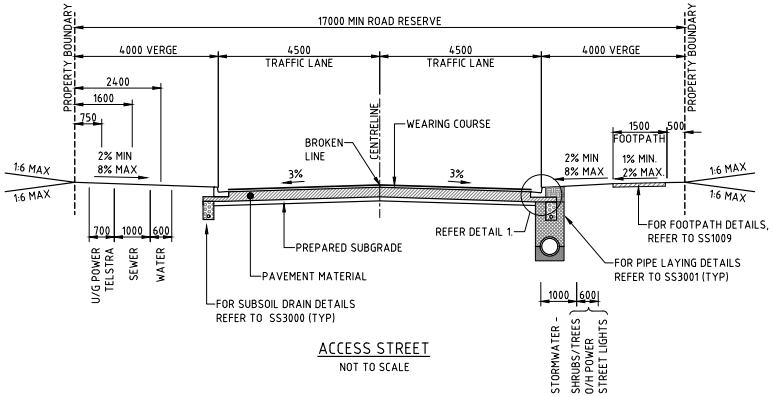
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-	-	2 OF 4	SS1001	0	A1



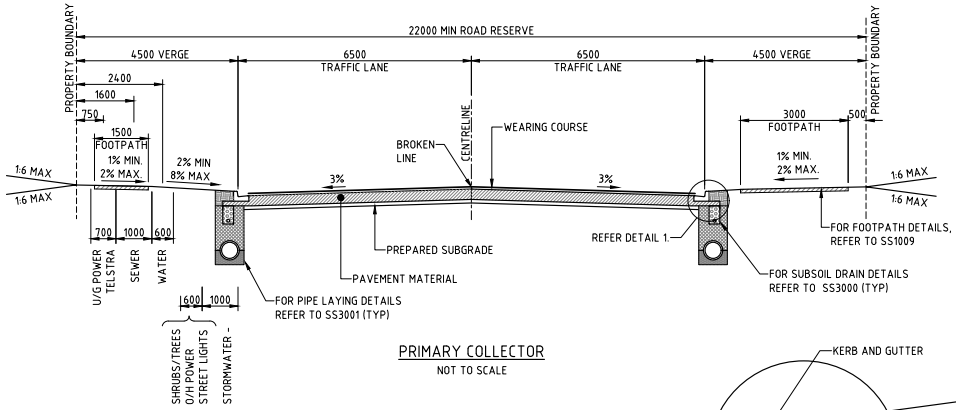
MINOR STREET / CUL-DE-SAC
NOT TO SCALE



SECONDARY COLLECTOR
NOT TO SCALE



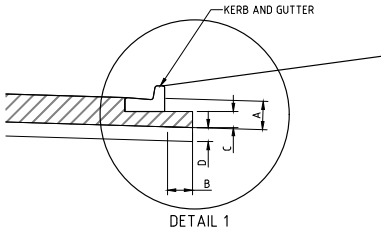
ACCESS STREET
NOT TO SCALE



PRIMARY COLLECTOR
NOT TO SCALE

NOTES:

1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. ALL LINEMARKINGS AND SIGNAGE MUST COMPLY WITH AS1742 AND DIPL STANDARD DRAWINGS. RRPMs AND GUIDEPOSTS MAY ALSO BE REQUIRED IN PROJECT SPECIFIC CIRCUMSTANCES.
4. EXTEND PAVEMENT UNDER KERB AS PER DETAIL 1.
5. SERVICE CORRIDORS ARE SHOWN ON ONE SIDE OF STREET RESERVE FOR ILLUSTRATION PURPOSES; HOWEVER, THE NOMINATED SERVICE CORRIDORS EXIST ON BOTH SIDES OF THE STREET RESERVE AND ACTUAL SERVICES MAY BE LOCATED ON ONE OR BOTH SIDES OF THE ROAD, AS APPLICABLE.
6. PROVIDE 100mm TOPSOIL AND GRASS TO ALL VERGES AND MEDIANS, OR ALTERNATIVE LANDSCAPING TREATMENT.
7. REFER PROJECT DRAWINGS FOR EARTHWORKS, SUBGRADE PREPARATION, PAVEMENT MATERIALS AND WEARING SURFACE SPECIFICATIONS.



DETAIL 1

NOTES:

A MIN. PAVEMENT THICKNESS 300mm.
B MIN. PAVEMENT EXTEND BEYOND BACK OF KERB 300mm.
C MIN. PAVEMENT DEPTH BELOW KERB 150mm.
D MIN . SUBGRADE THICKNESS 150mm.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

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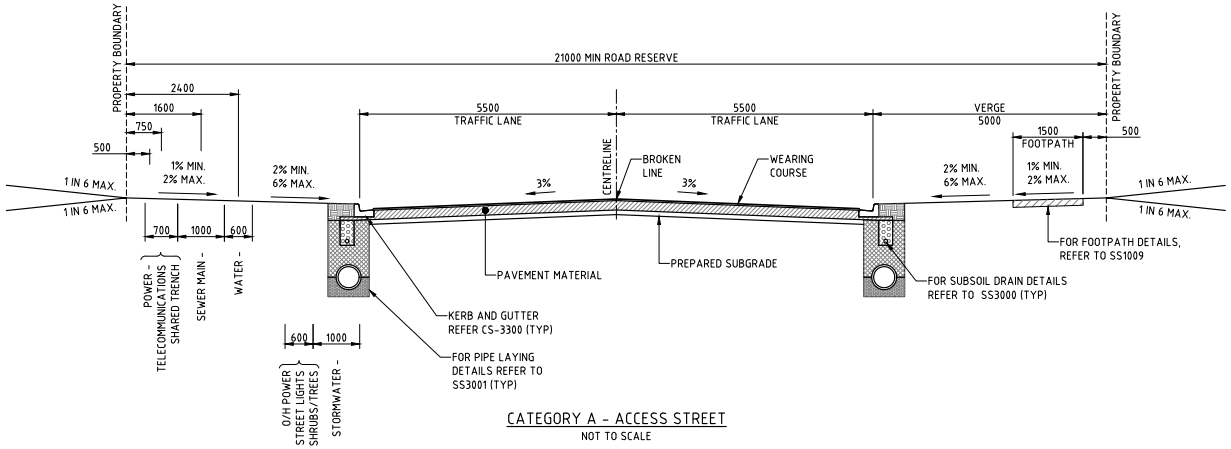
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREET AND PATHWAYS

STREET HIERARCHY - CATEGORY A
RESIDENTIAL AND MIXED USE - SET TYPE 2

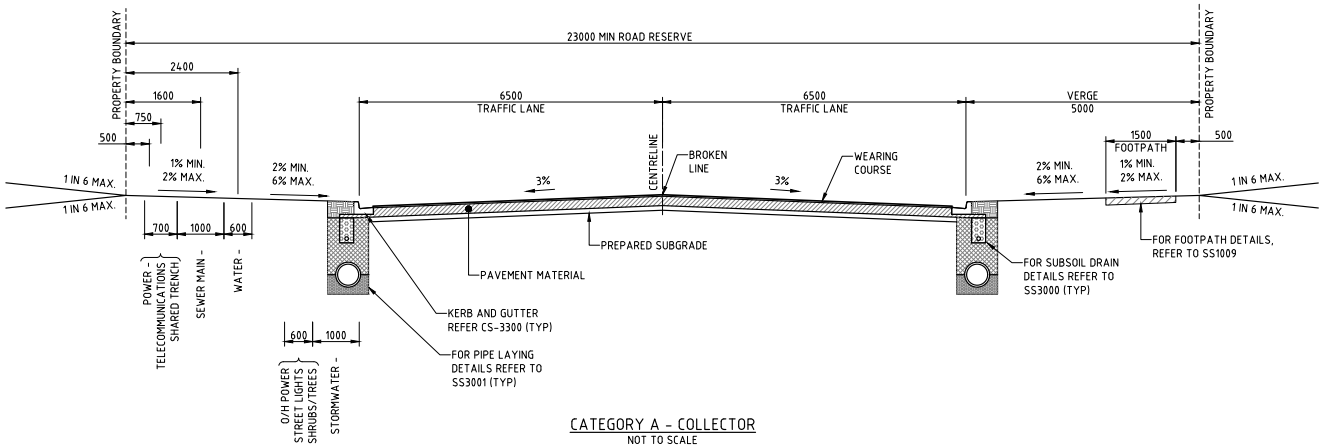
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-	-	3 OF 4	SS1002	0	A1

NOTES:

1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. ALL LINEMARKINGS AND SIGNAGE MUST COMPLY WITH AS1742 AND DIPL STANDARD DRAWINGS. RRPMs AND GUIDEPOSTS MAY ALSO BE REQUIRED IN PROJECT SPECIFIC CIRCUMSTANCES.
4. EXTEND PAVEMENT UNDER KERB 75mm MINIMUM THICKNESS AND MIN 300MM BEHIND BACK OF KERB.
5. SERVICE CORRIDORS ARE SHOWN ON ONE SIDE OF STREET RESERVE FOR ILLUSTRATION PURPOSES; HOWEVER, THE NOMINATED SERVICE CORRIDORS EXIST ON BOTH SIDES OF THE STREET RESERVE AND ACTUAL SERVICES MAY BE LOCATED ON ONE OR BOTH SIDES OF THE ROAD, AS APPLICABLE.
6. PROVIDE 100mm TOPSOIL AND GRASS TO ALL VERGES AND MEDIANS, OR ALTERNATIVE LANDSCAPING TREATMENT.
7. REFER PROJECT DRAWINGS FOR EARTHWORKS, SUBGRADE PREPARATION, PAVEMENT MATERIALS AND WEARING SURFACE SPECIFICATIONS.



CATEGORY A - ACCESS STREET
NOT TO SCALE



CATEGORY A - COLLECTOR
NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

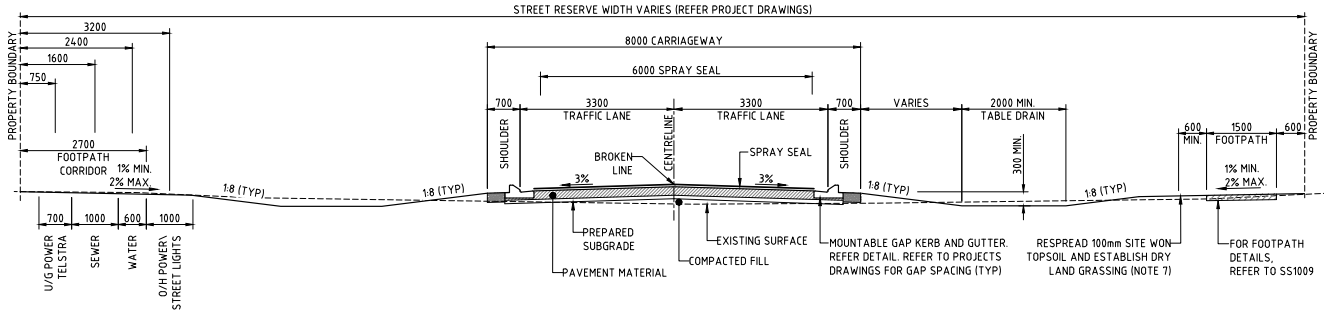
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DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

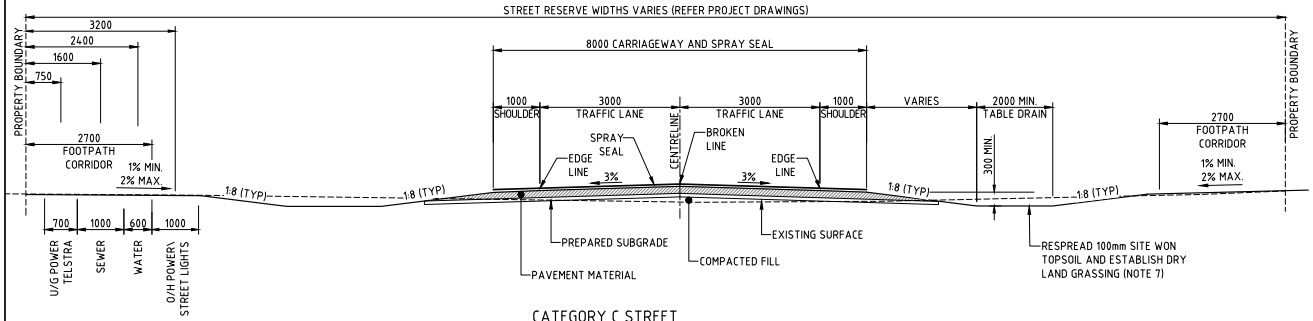
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

STREET HIERARCHY - CATEGORY A
INDUSTRIAL - SET TYPE 1

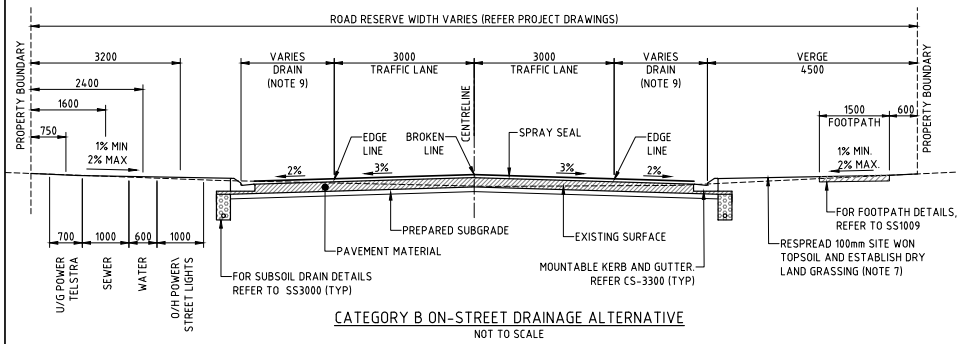
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-	-	4 OF 4	SS1003	0	A1



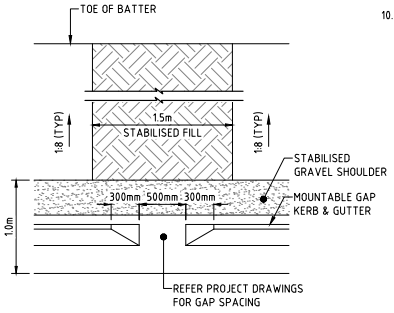
CATEGORY B STREET
NOT TO SCALE



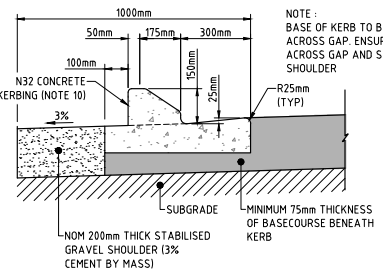
CATEGORY C STREET
NOT TO SCALE



CATEGORY B ON-STREET DRAINAGE ALTERNATIVE
NOT TO SCALE



KERB GAP PLAN VIEW
NOT TO SCALE



MOUNTABLE GAP KERB & GUTTER (MGK&G)
NOT TO SCALE

NOTES:

1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. THE TYPICAL STREET CROSS-SECTIONS ILLUSTRATED WILL VARY BETWEEN PROJECTS DUE TO SITE SPECIFIC CIRCUMSTANCES. THE DEVELOPER'S CONSULTANT MUST DEVELOP A DESIGN WHICH APPROPRIATELY RESPONDS TO SITE CONSTRAINTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   - 3.1 TOPOGRAPHY MAY GOVERN ALTERNATIVE STORMWATER DRAINAGE ARRANGEMENTS, INCLUDING A COMBINATION OF TABLE DRAINS, VERGES SLOPING TOWARDS THE CARRIAGEWAY TO CONVEY WATER IN THE KERB AND GUTTER FOR CONTROLLED DISTANCES, AND/OR VERGES SLOPING AWAY FROM THE CARRIAGEWAY TO SHEETFLOW INTO ADJACENT LANDS WHERE APPROVED BY THE RELEVANT AUTHORITY. IT MAY ALSO BE DESIRABLE TO WIDEN TRAFFIC LANE WIDTHS IN CATEGORY B STREETS TO CONVEY MORE STORMWATER IN THE CARRIAGEWAY, AS ILLUSTRATED BY THE ON-STREET DRAINAGE ALTERNATIVE.
   - 3.2 TABLE DRAIN BATTER SLOPES ARE NOMINATED AS 1:8 TO FACILITATE CONSTRUCTION OF CONCRETE INVERT DRIVEWAY ACCESSES (REFER SS1007 and SS1008) WITHOUT NEEDING TO ADJUST TABLE DRAIN BATTER SLOPES AT FREQUENT INTERVALS. WHERE SPACE PERMITS, BATTER SLOPES SHOULD BE FLATTENED TO 1:10 TO IMPROVE CLEARANCE TO UNDERSIDE OF VEHICLES WHEN USING DRIVEWAY ACCESSES. WHERE DRIVEWAYS ARE CONSTRUCTED AS CULVERT CROSSINGS, OR NO DRIVEWAY ACCESS IS REQUIRED, BATTER SLOPES CAN BE STEEPENED TO 1:6 (OR 1:4 WHERE APPROVED BY THE RELEVANT AUTHORITY).
   - 3.3 TABLE DRAINS ARE NOMINATED AS 300mm MIN DEPTH FROM EDGE OF SHOULDER AND MUST BE MIN 150mm BELOW SUBGRADE LEVEL TO FACILITATE SUBSOIL DRAINAGE. IF NO TABLE DRAINS ARE PROPOSED FOR ONE OR MORE SIDES OF THE ROAD PAVEMENT, ALTERNATIVE SUBSOIL DRAINAGE INFRASTRUCTURE MUST BE PROVIDED UNLESS OTHERWISE APPROVED BY THE RELEVANT AUTHORITY.
   - 3.4 SERVICE CORRIDORS ARE SHOWN ON ONE SIDE OF STREET RESERVE FOR ILLUSTRATION PURPOSES; HOWEVER, THE NOMINATED SERVICE CORRIDORS EXIST ON BOTH SIDES OF THE STREET RESERVE AND ACTUAL SERVICES MAY BE LOCATED ON ONE OR BOTH SIDES OF THE ROAD, AS APPLICABLE.
   - 3.5 STREETLIGHTS ARE NOMINATED WITHIN THE OVERHEAD POWER SERVICE CORRIDOR, AS THEY ARE TYPICALLY ATTACHED TO OVERHEAD POWER POLES. WHERE TABLE DRAINS EXIST ON BOTH SIDES OF THE STREET, THIS MAY RESULT IN LARGE OFFSETS BETWEEN THE NOMINATED OVERHEAD POWER SERVICE CORRIDOR AND THE STREET CARRIAGEWAY LEADING TO DIFFICULTIES ACHIEVING REQUIRED STREET LIGHTING PERFORMANCE LEVELS. IF THIS OCCURS, STANDALONE STREET LIGHTING POLES MAY NEED TO BE ADOPTED.
   - 3.6 MINIMUM STREET RESERVE WIDTHS ARE NOT SPECIFIED DUE TO THE SIGNIFICANT NUMBER OF PROJECT SPECIFIC FACTORS WHICH INFLUENCE REQUIRED RESERVE WIDTHS. TYPICAL STREET RESERVE WIDTHS ARE IN THE ORDER OF 20m TO 30m FOR CATEGORY B AND C INFRASTRUCTURE LOCALITIES AND MUST ALLOW FOR MINIMUM 3700 WIDE SERVICE CORRIDORS ON BOTH SIDES OF THE RESERVE. SERVICE CORRIDORS MUST BE LOCATED ENTIRELY OUTSIDE OF TABLE DRAINS, UNLESS OTHERWISE APPROVED BY THE SERVICE AUTHORITIES.
4. REFER PROJECT DRAWINGS FOR EARTHWORKS, SUBGRADE PREPARATION, PAVEMENT MATERIALS AND SPRAY SEAL SPECIFICATIONS.
5. EXPOSED PAVEMENT MATERIALS IN SHOULDERS AND DRAIN BATTERS MUST BE APPROPRIATELY STABILISED TO MITIGATE EROSION.
6. FOOTPATH CORRIDORS ARE NOMINATED AS 2700 WIDE TO ALLOW FOR 1500 WIDE FOOTPATHS WITH 600 WIDE SHOULDERS AT MAX 1:40 CROSSFALL, AS REQUIRED BY AS1428.1.
7. RESPREAD 100mm SITE WON TOPSOIL AND ESTABLISH DRYLAND GRASSING ON ALL TABLE DRAINS, BATTERS AND UNPAVED AREAS WITHIN THE STREET RESERVE.
8. ALL LINEMARKINGS AND SIGNAGE MUST COMPLY WITH AS1742 AND DIPL STANDARD DRAWINGS. RRPMs AND GUIDEPOSTS MAY ALSO BE REQUIRED IN PROJECT SPECIFIC CIRCUSMTANCES.
9. WIDTH OF ON-STREET DRAIN IS TO BE DESIGNED TO ENSURE MINOR STORM FLOW CRITERIA IS MET, AS OUTLINED IN THE SUBDIVISION DEVELOPMENT GUIDELINES. DRAIN WIDTHS IN EXCESS OF 2.0m MUST BE APPROVED BY THE RELEVANT AUTHORITY. KERBED DISCHARGE INTO TABLE DRAINS MAY BE REQUIRED AT INTERIM LOCATIONS TO MANAGE ON-STREET FLOW WIDTH AND DEPTHS PRIOR TO ULTIMATE DISCHARGE INTO OUTLET DRAINS.
10. KERBING TO COMPLY WITH AS2876: CONCRETE KERBS AND CHANNELS (GUTTERS) – MANUALLY OR MACHINE PLACED. EXTEND BASECOURSE UNDER ALL KERBS MIN 75mm THICKNESS.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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AMENDMENTS

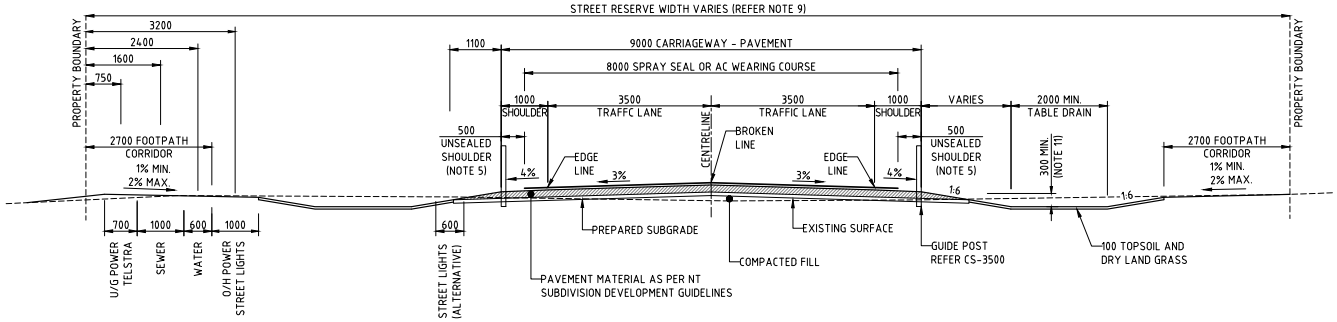
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DESIGNED: PB — DATE JUNE 2019	CHECKED: SPB — DATE JUNE 2019
DESIGN PROJECT LEADER: SPB — DATE JUNE 2019	NTG PROJECT MANAGER: N/A — DATE JUNE 2019

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

STREET HIERARCHY - CATEGORY B AND C RESIDENTIAL, MIXED USE AND INDUSTRIAL

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS1004	0	A1

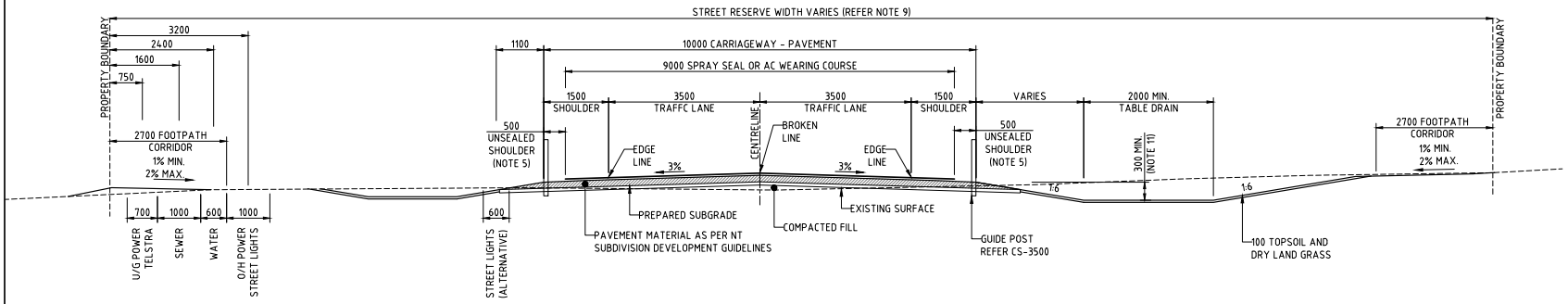


CATEGORY D AND E - MINOR STREET / CUL-DE-SAC, ACCESS STREET AND SECONDARY COLLECTOR
NOT TO SCALE

NOTES:
1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL LINEMARKINGS AND SIGNAGES SHALL COMPLY WITH AS1742.
3. RRPM'S TO BE USED TO SUPPLEMENT LINE MARKING. COMPLY WITH AS1742.2.
4. BATTER SLOPES MAY BE STEEPENED TO 1 IN 4 WHERE 1 IN 6 IS IMPRACTICAL, SUBJECT TO APPROVAL BY THE RELEVANT AUTHORITY.
5. APPLY 1.2L/m^2 PRIME ON UNSEALED SHOULDERS. WHERE FINE CRUSHED ROCK (FCR) IS USED, ADDITIONAL EROSION PROTECTION MEASURES MUST BE PROVIDED TO MITIGATE UNRAVELING OF EXPOSED FCR IN SHOULDERS AND BATTERS.
6. TOPSOIL AND DRYLAND GRASSING MUST BE ESTABLISHED ON ALL TABLE DRAINS, BATTERS AND UNPAVED AREAS WITHIN THE ROAD RESERVE.
7. SERVICE CORRIDORS ARE SHOWN ON ONE SIDE OF ROAD RESERVE FOR ILLUSTRATION PURPOSES. THE NOMINATED SERVICE CORRIDORS EXIST ON BOTH SIDES OF THE ROAD RESERVE AND ACTUAL SERVICES MAY BE LOCATED ON ONE OR BOTH SIDES OF THE ROAD, AS APPLICABLE.
8. CROSS FALL VARIES WHERE SUPERELEVATION REQUIRED.
9. STREET RESERVE WIDTHS MUST BE EQUAL TO OR GREATER THEN THE MINIMUM VALUES NOMINATED IN TABLE 1. STREET RESERVE WIDTHS MUST BE APPROPRIATELY SIZED TO ACCOMMODATE TABLE DRAINS AND SEPARATE SERVICE CORRIDORS/FOOTPATH CORRIDORS.
10. RESERVE WIDTHS ARE MINIMUM VALUES AND MAY NEED TO BE INCREASED TO FIT TABLE DRAINS WITHIN STREET RESERVES.
11. TABLE DRAIN INVERTS MUST BE MIN 150MM BELOW SUBGRADE LEVEL TO FACILITATE SUBSOIL DRAINAGE. IF NO TABLE DRAINS ARE PROPOSED FOR ONE OR MORE SIDES OF THE ROAD PAVEMENT, SUBJECT TO APPROVAL BY THE RELEVANT AUTHORITY, ALTERNATIVE SUBSOIL DRAINAGE INFRASTRUCTURE MUST BE PROVIDED.

TABLE 1 (REFER NOTE 9)

STREET HIERARCHY	MINIMUM STREET RESERVE WIDTH (m)
MINOR STREET / CUL-DE-SAC	20
ACCESS STREET	22
SECONDARY COLLECTOR	25
PRIMARY COLLECTOR	30



CATEGORY D AND E - PRIMARY COLLECTOR
NOT TO SCALE

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DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

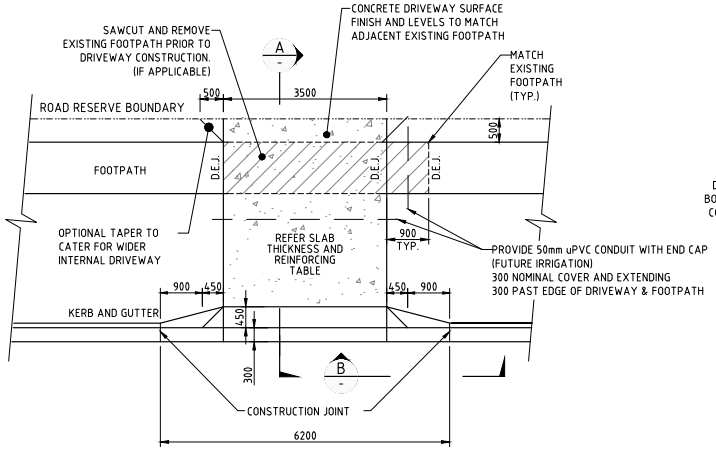
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

STREET HIERARCHY - CATEGORY D AND E
RURAL

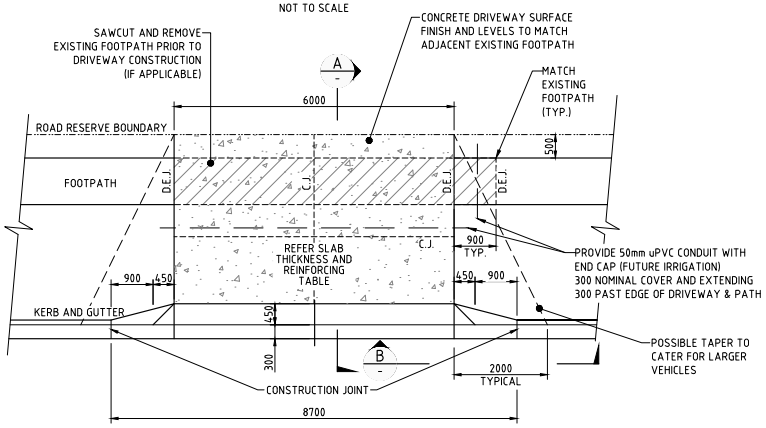
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-	-	1 OF 1	SS1005	0	A1

SLAB THICKNESS AND REINFORCING

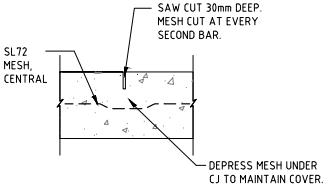
LAND USE ZONE	THICKNESS	REINFORCING
RESIDENTIAL	100mm	SL72
NON-RESIDENTIAL	150mm	SL92



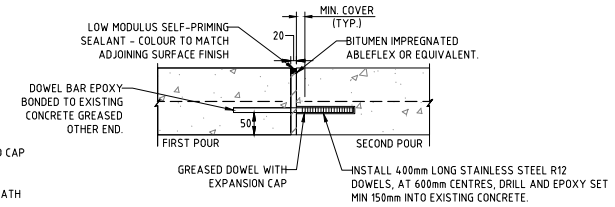
1. RESIDENTIAL
NOT TO SCALE



2. NON - RESIDENTIAL
NOT TO SCALE



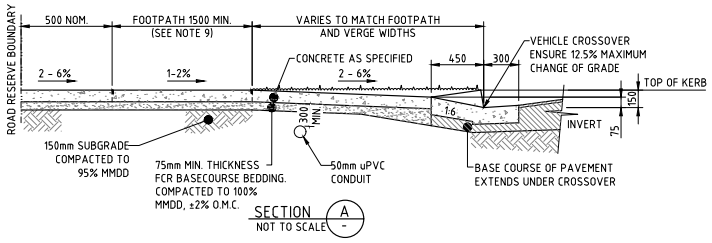
CONTRACTION JOINT (CJ)
NOT TO SCALE



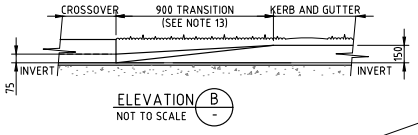
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NOT TO SCALE

GENERAL NOTES

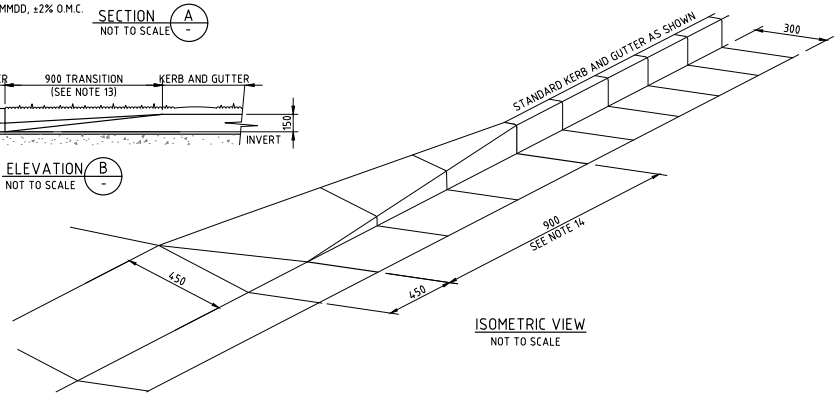
1. ALL WORK MUST COMPLY WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. CONCRETE TO BE N25/20/80. CONCRETE TO BE MOIST CURED FOR AT LEAST 48 HOURS AFTER CONCRETE POUR.
3. EXPOSURE CLASSIFICATION AND MINIMUM COVER TO REINFORCEMENT MUST COMPLY WITH AS3600.
4. MOISTEN BASECOURSE PRIOR TO CASTING CONCRETE.
5. CONSTRUCTION JOINTS ARE REQUIRED FOR PLANNED INTERRUPTIONS. ROUGHEN AND CLEAN FACE OF HARD CONCRETE, REMOVE FOREIGN MATERIAL.
6. THE CONCRETE PATH MUST BE STEEL TROWELLED FOLLOWED BY A MOIST HAIR BROOM. THE FINAL SURFACE MUST BE NON-SLIP WITH A MINIMUM TEXTURED SURFACE OF 2mm.
7. CONCRETE WORKS MUST COMPLY WITH AS3600 AND AS1379.
8. MATCH NEW DRIVEWAYS TO EXISTING FOOTPATH AND VICE-VERSA. REFER SS1009 FOR FOOTPATH DETAILS.
9. THE TOTAL WIDTH OF THE FOOTPATH THAT TRAVERSES A VEHICULAR CROSSING SHALL HAVE A CROSSFALL OF 1% - 2% TOWARDS THE ROADWAY.
10. LIAISE WITH APPROPRIATE AUTHORITY FOR ADJUSTMENT OF EXISTING STRUCTURES WHERE NECESSARY. PITS MUST NOT BE LOCATED WITHIN DRIVEWAYS.
11. THE DRIVEWAY MUST MEET SIGHT DISTANCE CRITERIA FOR BOTH ENTRY AND EXIT IN ACCORDANCE WITH AS2890.1.
12. DRIVEWAYS MUST BE A MINIMUM OF 6m FROM THE TANGENT POINTS OF ANY INTERSECTING ROADWAY.
13. TRANSITION NOT REQUIRED WHERE DRIVEWAY INSTALLED AGAINST LAYBACK KERB.



SECTION A
NOT TO SCALE



ELEVATION B
NOT TO SCALE



ISOMETRIC VIEW
NOT TO SCALE

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0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

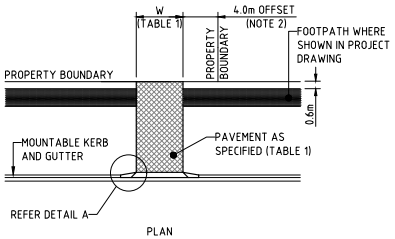
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

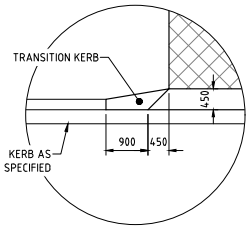
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

VEHICLE ACCESS - CATEGORY A
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS1006	0	A1



TYPE 1- STANDARD VEHICLE ACCESS
NOT TO SCALE



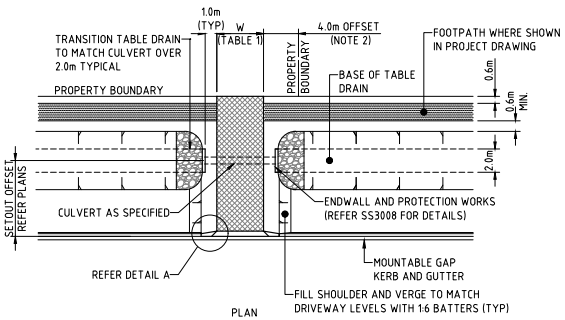
DETAIL A
NOT TO SCALE

LEGEND:

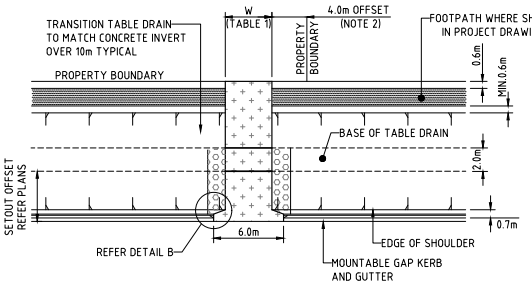
- 10mm SINGLE COAT SPRAY SEAL (S10E) SHOULDER.
- 3% CEMENT (BY MASS) STABILIZED FILL, 150mm THICKNESS.
- CONCRETE FOOTPATH (REFER SS1009)
- VEHICLE ACCESS TO BE EITHER CONCRETE OR SEALED AS PER TABLE 1.
- CONCRETE INVERT. REFER DETAIL.

NOTES:

1. ALL WORK MUST COMPLY WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. DETAIL SHOWN FOR SINGLE VEHICLE ACCESS. DUAL ACCESS SHALL BE CONSTRUCTED EQUAL ABOUT PROPERTY BOUNDARY.
3. ESTABLISH INVERT ON A COMPACTED SUBGRADE AND MATCH TO TABLE DRAIN INVERT LEVELS AND GRADES (MIN. 0.5%)
4. UPSTREAM AND DOWNSTREAM PROTECTION WORKS MAY BE REQUIRED - EACH SITE SHALL BE INDIVIDUALLY ASSESSED.
5. WHERE SPRAY SEAL SURFACE ABUTS CONCRETE DRIVEWAY, PROVIDE 100mm SPRAY SEAL OVERLAP OF CONCRETE DRIVEWAY.
6. WHERE CONCRETE FOOTPATH ABUTS CONCRETE DRIVEWAY, PROVIDE DOWELLED EXPANSION JOINT AS PER SS1006.
7. IN THE EVENT THE ACCESS IS LOCATED OFF AN EXISTING SEALED ROAD THEN:
   - 7.1. PROVIDE A SAWCUT INTO SOUND UNCONTAMINATED PAVEMENT MATERIAL.
   - 7.2. LAP TOPMOST COAT OF SEAL 200mm OVER SAWCUT.
   - 7.3. ENSURE THE JOINT IS A SMOOTH TRANSITION OVER THE EXISTING SEAL WITHOUT FORMING INVERTS OR CRESTS
8. DRIVEWAYS MUST MEET SIGHT DISTANCE CRITERIA FOR BOTH ENTRY AND EXIT IN ACCORDANCE WITH AS2890.1 AND BE LOCATED A MINIMUM OF 6m FROM THE TANGENT POINTS OF ANY INTERSECTING ROADWAY.
9. CONCRETE WORKS MUST GENERALLY COMPLY WITH AS3600 AND AS1379.
10. CONCRETE TO BE N32/20/80. EXPOSURE CLASSIFICATION AND MINIMUM COVER TO REINFORCEMENT MUST COMPLY WITH AS3600.
11. PROVIDE CONTRACTION JOINTS AT MAX 5m CENTRES AND ANY CHANGES IN SHAPE AND DIRECTION. PROVIDE DOWELED EXPANSION JOINTS AT MAX 15m CENTRES. EACH CONCRETE PANEL MUST HAVE A MAXIMUM WIDTH TO LENGTH RATIO OF 1:1.5. REFER SS1006 FOR JOINT DETAILS.
12. CONSTRUCTION JOINTS ARE REQUIRED FOR PLANNED INTERUPTIONS. ROUGHEN AND CLEAN FACE OF HARD CONCRETE, REMOVE FOREIGN MATERIAL.
13. MOISTEN BASECOURSE/SUBGRADE PRIOR TO CASTING CONCRETE.
14. THE CONCRETE MUST BE STEEL TROWELLED FOLLOWED BY A MOIST HAIR BROOM. THE FINAL SURFACE MUST BE NON-SLIP WITH A MINIMUM TEXTURED SURFACE OF 2mm.
15. CONCRETE TO BE MOIST CURED FOR A LEAST 48 HOURS AFTER CONCRETE POUR.

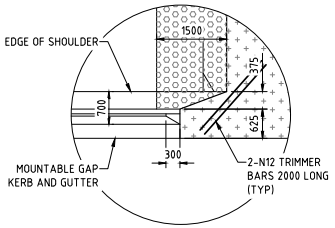


TYPE 2 -VEHICLE ACCESS WITH CULVERT
NOT TO SCALE

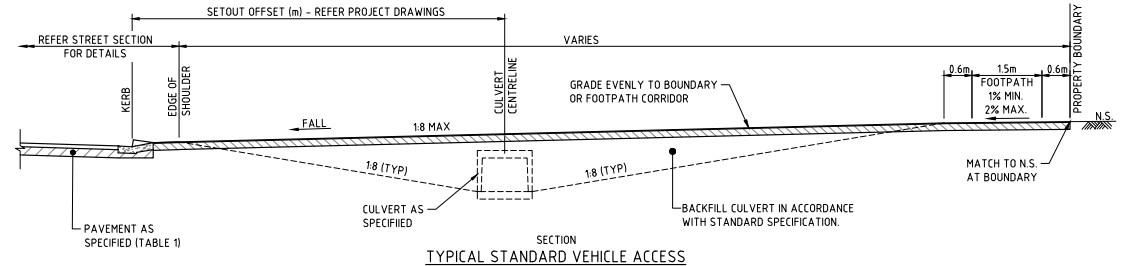


TYPE 3 - VEHICLE ACCESS WITH CONCRETE INVERT
NOT TO SCALE

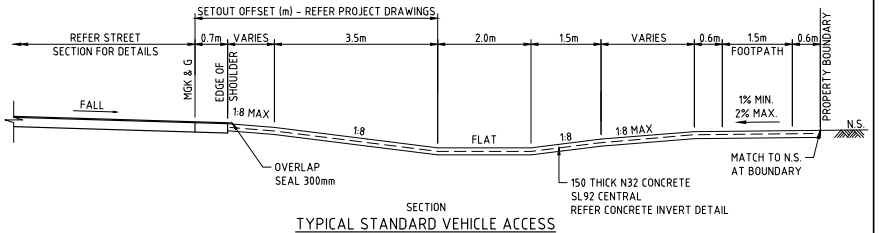
TABLE 1 - ACCESS PAVEMENT DETAIL		
ACCESS TYPE	W (m)	PAVEMENT
RESIDENTIAL (SINGLE)	4.0m	PRIME AND 14mm SINGLE COAT SEAL (S10E) 150mm THICK COMPACTED GRAVEL ON 150mm THICK COMPACTED SUBGRADE MIN CBR 15
RESIDENTIAL (DUAL)	8.0m	
NON-RESIDENTIAL (SINGLE)	6.0m	PROVIDE 150mm N32 CONCRETE SL92 MESH CENTRAL, WITH EDGE THICKENING ALL-ROUND ON 75 MIN BASECOURSE BEDDING COMPACTED TO 100% MMDD, ON 150mm SUBGRADE COMPACTED TO 95% MMDD
NON-RESIDENTIAL (DUAL)	12.0m	



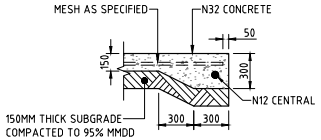
DETAIL B
NOT TO SCALE



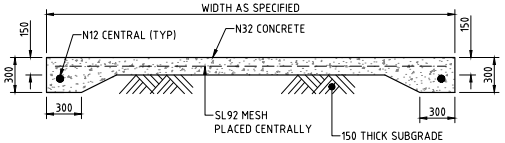
TYPICAL STANDARD VEHICLE ACCESS
WITH CULVERT
NOT TO SCALE



TYPICAL STANDARD VEHICLE ACCESS
WITH CONCRETE INVERT
NOT TO SCALE



EDGE THICKENING (ET) DETAIL
NOT TO SCALE



CONCRETE INVERT DETAIL
NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

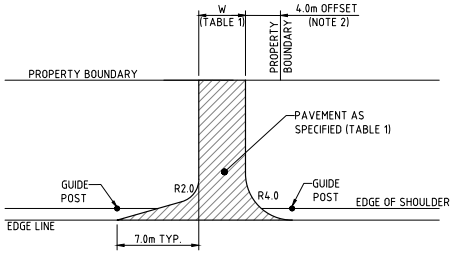
VEHICLE ACCESS - CATEGORY B
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS1007	0	A1

TABLE 1 - ACCESS PAVEMENT DETAIL		
ACCESS TYPE	W (m)	PAVEMENT
RESIDENTIAL (SINGLE)	4.0m	PRIME AND 14mm SINGLE COAT SEAL (S10E) 150mm THICK COMPACTED GRAVEL ON 150mm THICK COMPACTED SUBGRADE MIN CBR 15
RESIDENTIAL (DUAL)	8.0m	
NON-RESIDENTIAL (SINGLE)	6.0m	PROVIDE 150mm N32 CONCRETE SL92 MESH CENTRAL, WITH EDGE THICKENING ALL ROUND ON 75 MIN BASECOURSE BEDDING COMPACTED TO 100% MMDD, ON 150mm SUBGRADE COMPACTED TO 95% MMDD
NON-RESIDENTIAL (DUAL)	12.0m	

NOTES:

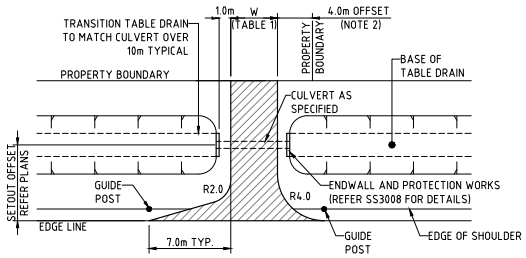
1. ALL WORK MUST COMPLY WITH THE STANDARD SPECIFICATION FOR SUBDIVISION ALONG WITH PROJECT SPECIFIED AMENDMENTS.
2. DETAIL SHOWN FOR SINGLE VEHICLE ACCESS DUAL, ACCESS SHALL BE CONSTRUCTED EQUAL ABOUT PROPERTY BOUNDARY.
3. ESTABLISH INVERT ON A COMPACTED SUBGRADE AND MATCH TO TABLE DRAIN INVERT LEVELS, AND GRADES. (MIN 0.5%)
4. UPSTREAM AND DOWNSTREAM PROTECTION WORKS MAY BE REQUIRED - EACH SITE SHALL BE INDIVIDUALLY ASSESSED.
5. PROPERTY ACCESSES ADJACENT AN UNSEALED ROAD MAY BE UNSEALED.
6. IN THE EVENT THE ACCESS IS LOCATED OFF AN EXISTING SEALED ROAD THEN:
   - 6.1. PROVIDE A SAWCUT INTO SOUND UNCONTAMINATED PAVEMENT MATERIAL.
   - 6.2. LAP TOPMOST COAT OF SEAL 200mm OVER SAWCUT.
   - 6.3. ENSURE THE JOINT IS A SMOOTH TRANSITION OVER THE EXISTING SEAL WITHOUT FORMING INVERTS OR CRESTS.
7. DRIVEWAYS MUST MEET SIGHT DISTANCE CRITERIA FOR BOTH ENTRY AND EXIT IN ACCORDANCE WITH AS2890.1 AND BE LOCATED A MINIMUM OF 6m FROM THE TANGENT POINTS OF ANY INTERSECTION ROADWAY.
8. CONCRETE WORKS MUST GENERALLY COMPLY WITH AS3600 AND AS1379.
9. CONCRETE TO BE N32/20/80. EXPOSURE CLASSIFICATION AND MINIMUM COVER TO REINFORCE MUST COMPLY WITH AS3600.
10. PROVIDE CONTRACTION JOINTS AT MAX 5m CENTERS AND ANY CHANGES IN SHAPE AND DIRECTION. PROVIDE DOWELED EXPANSION JOINTS AT MAX 15m CENTERS. EACH CONCRETE PANEL MUST HAVE A MAXIMUM WIDTH TO LENGTH RATIO OF 1:1.5. REFER SS1006 FOR JOINT DETAILS.
11. CONSTRUCTION JOINTS ARE REQUIRED FOR PLANNED INTERRUPTIONS. ROUGHEN AND CLEAN FACE OF HARD CONCRETE, REMOVE FOREIGN MATERIAL.
12. MOISTEN BASECOURSE/SUBGRADE PRIOR TO CASTING CONCRETE.
13. THE CONCRETE MUST BE STEEL TROWELLED FOLLOWED BY A MOIST HAIR BROOM. THE FINAL SURFACE MUST BE NON-SLIP WITH A MINIMUM TEXTURED SURFACE OF 2mm.
14. CONCRETE TO BE MOIST CURED FOR AT LEAST 48 HOURS AFTER CONCRETE POUR.



PLAN

TYPE 1- STANDARD VEHICLE ACCESS

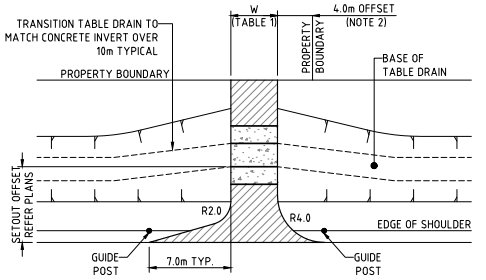
NOT TO SCALE



PLAN

TYPE 2 -VEHICLE ACCESS WITH CULVERT

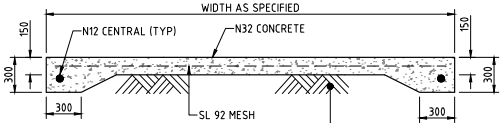
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PLAN

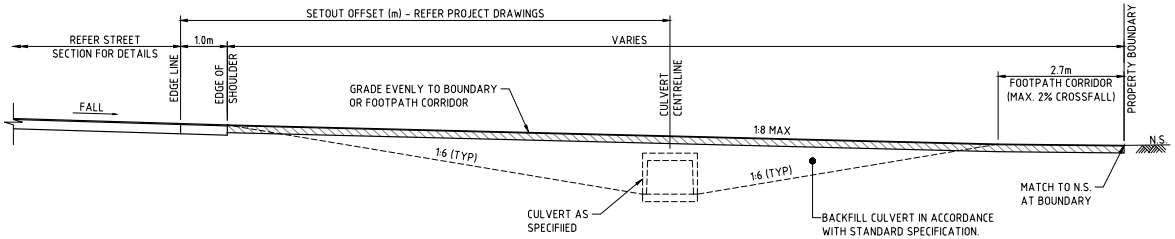
TYPE 3 - VEHICLE ACCESS WITH CONCRETE INVERT

NOT TO SCALE



CONCRETE INVERT DETAIL

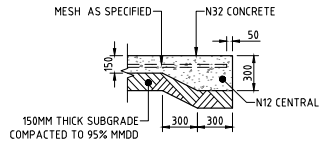
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SECTION

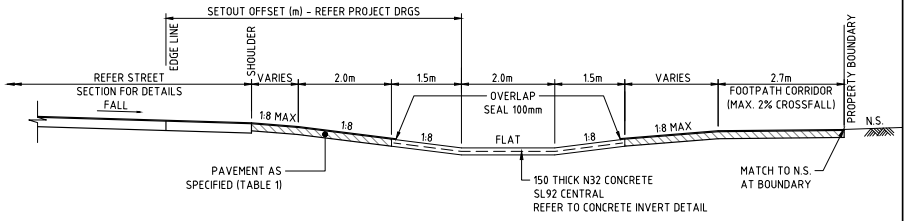
TYPICAL STANDARD VEHICLE ACCESS WITH CULVERT

NOT TO SCALE



EDGE THICKENING (ET) DETAIL

NOT TO SCALE



SECTION

TYPICAL STANDARD VEHICLE ACCESS WITH CONCRETE INVERT

NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

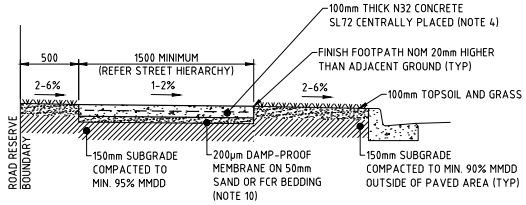
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

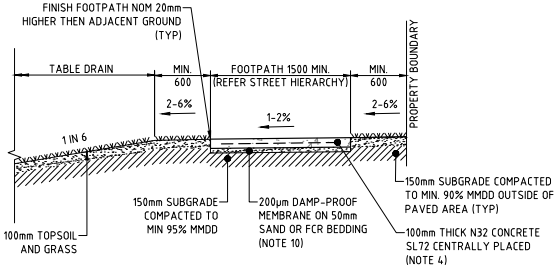
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

VEHICLE ACCESS - CATEGORY C TO E
TYPICAL DETAILS

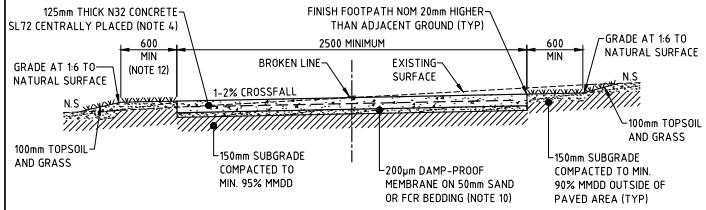
NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS1008	0	A1



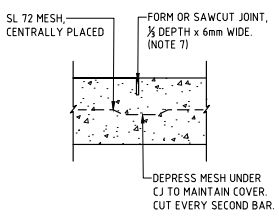
TYPICAL FOOTPATH SECTION - BEHIND KERB (NOTE 11)
NOT TO SCALE



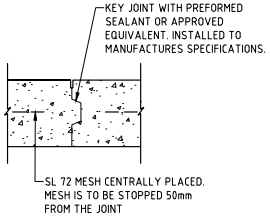
TYPICAL FOOTPATH SECTION - BEHIND TABLE DRAIN (NOTE 11)
NOT TO SCALE



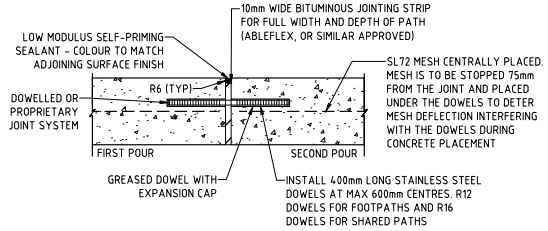
TYPICAL SHARED PATH SECTION
NOT TO SCALE



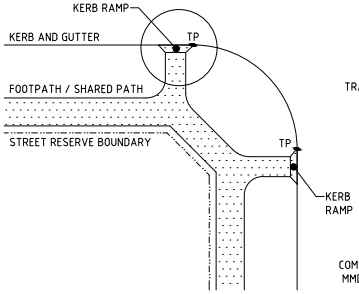
CONTRACTION JOINT (CJ)
NOT TO SCALE



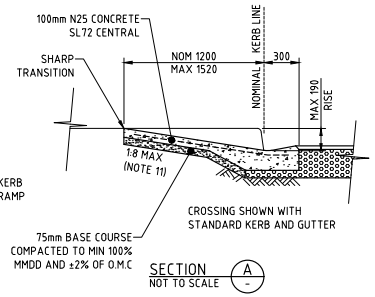
KEYED EXPANSION JOINT (KEJ)
NOT TO SCALE



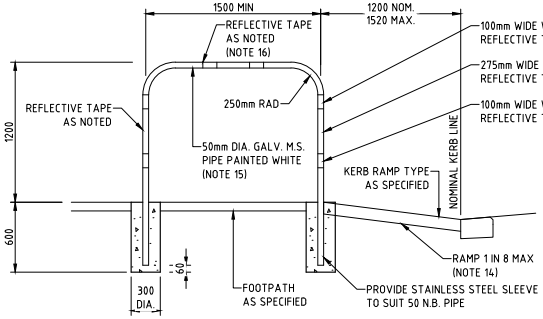
DOWELLED EXPANSION JOINT DETAIL (DEJ)
NOT TO SCALE



KERB RAMP PREFERABLE LOCATIONS
NOT TO SCALE



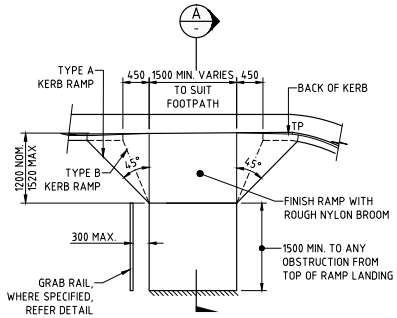
SECTION A
NOT TO SCALE



GRAB RAIL DETAIL
NOT TO SCALE

GENERAL NOTES:

1. ALL WORK MUST COMPLY WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILIMETRES UNLESS NOTED OTHERWISE.
3. CONCRETE WORKS MUST COMPLY WITH AS3600 AND AS1379.
4. EXPOSURE CLASSIFICATION AND MINIMUM COVER TO REINFORCEMENT MUST COMPLY WITH AS3600. CONCRETE THICKNESS MAY NEED TO BE INCREASED TO MEET DURABILITY REQUIREMENTS.
5. CONCRETE TO BE N32/20/80. CONCRETE TO BE MOIST CURED FOR AT LEAST 48 HOURS AFTER CONCRETE POUR.
6. NO LONGITUDINAL JOINTS IN PATHS. TRANSVERSE JOINTS MUST BE PROVIDED AS FOLLOWS:
   6.1. CONTRACTION JOINTS (CJ) AT MAX 2m CENTERS, AND ALL CHANGES IN SHAPE AND DIRECTION.
   6.2. EXPANSION JOINTS (KEJ, OR DEJ) AT MAX 6m CENTERS. CONCRETE THICKNESS MAY NEED TO BE INCREASED WHEN USING DEJs DUE TO RISK OF SPALLING IN THIN SLABS.
7. SAWCUT JOINTS MUST BE UNERTAKEN BETWEEN 4HOURS TO 12 HOURS AFTER LAYING CONCRETE, DEPENDING ON CONDITIONS. JOINT SEALANT IS REQUIRED IN SANDY AEAS.
8. CONSTRUCTION JOINTS ARE REQUIRED FOR PLANNED INTERRUPTIONS. ROUGHEN AND CLEAN FACE OF HARDENED CONCRETE, REMOVE LOOSE AND FOREIGN MATERIAL.
9. THE CONCRETE PATH MUST BE STEEL TROWELLED FOLLOWED BY A MOIST HAIR BROOM. THE FINAL SURFACE MUST BE NON-SLIP WITH A MINIMUM TEXTURED SURFACE OF 2mm.
10. SAND OR FCR BEDDING MAY BE OMITTED FOR CATEGORY B AND C INFRASTRUCTURE LOCALITIES.
11. CROSSFALL IN VERGE ADJACENT TO FOOTPATH TO COMPLY WITH AS1428.1, WHERE APPLICABLE.
12. INCREASED CLEARANCE TO BATTERS MAY BE REQUIRED FOR SHARED PATHS PER AUSTROADS GUIDELINES.
13. TYPE A KERB RAMP TO BE USED WHEREVER PAVED SURFACES (PEDESTRIAN CORRIDORS) EXTEND TO BACK OF KERB. TYPE B MAY BE USED WHEREVER PAVED SURFACES (PEDESTRIAN CORRIDORS) EXTEND NO FURTHER THAN TOP OF KERB RAMP LOCATION.
14. IF HEIGHT DIFFERENCE BETWEEN KERB INVERT AND LEVEL OF PATH EXCEEDS 150mm, OR LENGTH OF CROSSOVER EXCEEDS 1200mm, THEN GRADE OF CROSSOVER TO BE 1 IN 14. (REFER TO AS1428.1)
15. GRAB RAILS TO BE FROM 50mm N.B GALVANISED STEEL PIPE WITH WALL THICKNESS NOT LESS THAN 3mm. ALL JOINTS SHALL BE WELDED &SHARP EDGES GROUND SMOOTH. ALL WELDING SLAG TO BE SHIPPED AWAY AND AREAS OF DAMAGED GALVANISING SHALL BE MADE GOOD WITH AN APPROVED WHITE ZINC RICH PAINT.
16. REFLECTIVE TAPE TO BE CLASS 1 TO AS1906.1



PLAN OF KERB RAMP (NOTE 13)
NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

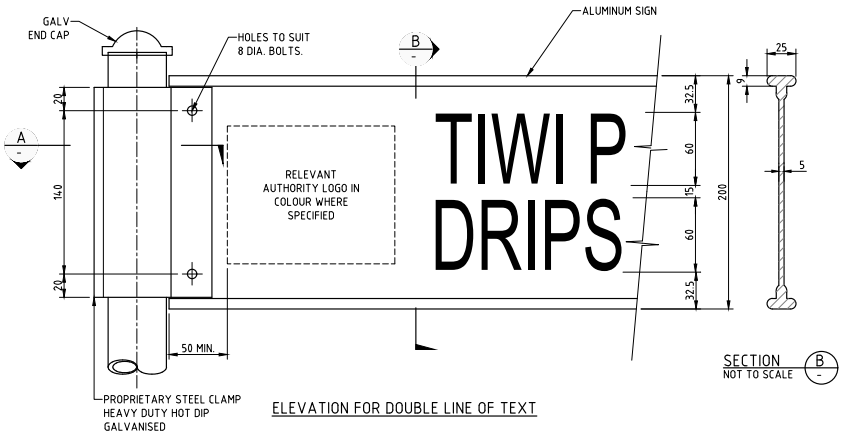
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

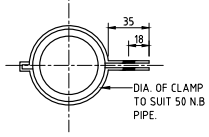
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

FOOTPATHS, SHARED PATHS AND KERB RAMPS
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS1009	0	A1



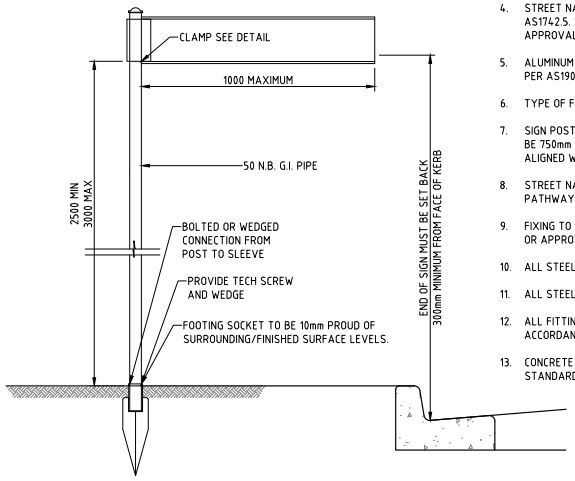
ELEVATION FOR DOUBLE LINE OF TEXT



COLOUR OF SIGNS

STREET SIGNS:
BLACK LETTERS ON REFLECTORISED WHITE BACKGROUND.

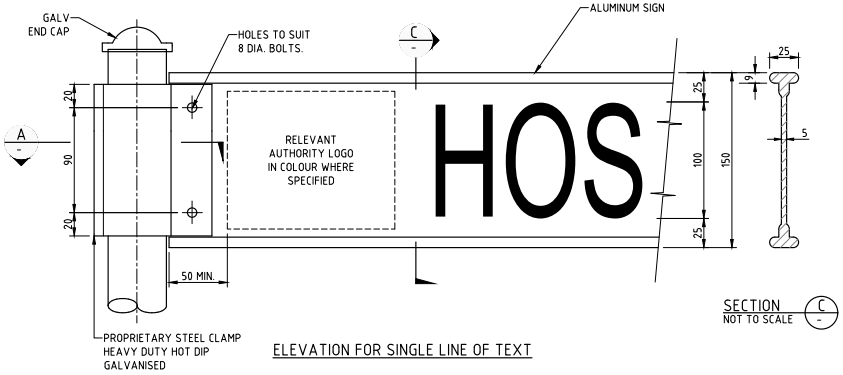
INFORMATION SIGNS:
REFLECTORISED WHITE LETTERS ON BLUE BACKGROUND.



TYPICAL INSTALLATION DETAIL
"OZSOCKETS" FOOTING (OR APPROVED SIMILAR)
NOT TO SCALE

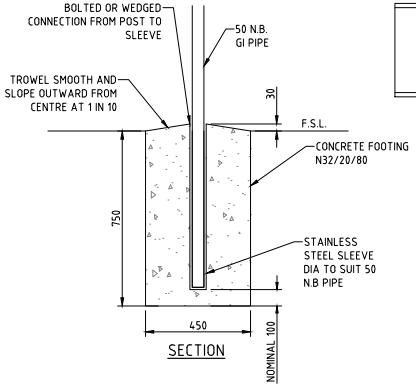
GENERAL NOTES

1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. STREET Nos. ARE ONLY REQUIRED WHERE NOMINATED ON PROJECT DRAWINGS OR REQUIRED BY RELEVANT AUTHORITY.
3. ALL STREET NAME SIGN POSTS MUST BE REMOVABLE.
4. STREET NAME SIGN COLORS, LETTER SIZE, LETTER TYPES TO CONFORM TO AS1742.5, SPECIAL DECORATIVE, HERITAGE, OTHER SIGN STYLES SUBJECT TO APPROVAL OF RELEVANT AUTHORITY.
5. ALUMINUM STREET NAME SIGN TO CONSIST OF RETRO-REFLECTIVE MATERIALS AS PER AS1906.1.
6. TYPE OF FOOTING TO BE AGREED WITH RELEVANT AUTHORITY.
7. SIGN POST HEIGHT MUST BE TO AS1742. SETOUT OF STREET NAME SIGN POST TO BE 750mm BEHIND KERB SET OUT LINE OR 2000-4000mm FROM EDGE OF SEAL, ALIGNED WITH PROPERTY BOUNDARY PROJECTION OF MINOR ROAD.
8. STREET NAME SIGN POSTS MUST HAVE MIN 0.5m CLEARANCE FROM ALL PATHWAYS.
9. FIXING TO UTILITY POLES: USE 13mm WIDE 'BAND-IT' STAINLESS STEEL STRAPPING OR APPROVED EQUIVALENT. SUBJECT TO APPROVAL BY SERVICE AUTHORITY.
10. ALL STEEL PIPES MUST BE CLASS 1 TO AS1074.
11. ALL STEEL PLATES MUST BE AS3678.
12. ALL FITTINGS AND POSTS MUST BE HEAVY HOT DIPPED GALVANISED IN ACCORDANCE WITH AS4680.
13. CONCRETE SUPPLY AND PLACEMENT MUST COMPLY WITH AS1379, AS3600 AND STANDARD SPECIFICATION FOR SUBDIVISIONS.



ELEVATION FOR SINGLE LINE OF TEXT

STANDARD STREET OR INFORMATION SIGN
NOT TO SCALE



TYPICAL INSTALLATION DETAIL
FOR CONCRETE FOOTING
NOT TO SCALE



STREET SIGNS WITH LOGO

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

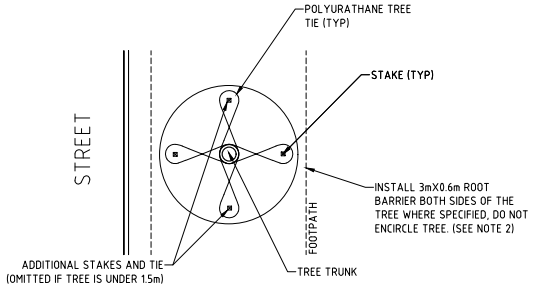
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

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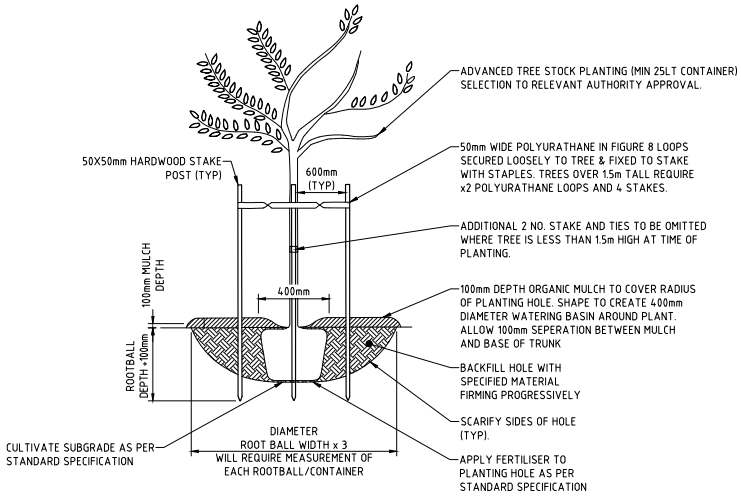
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STREETS AND PATHWAYS

STREET NAMES SIGNS
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS1010	0	A1



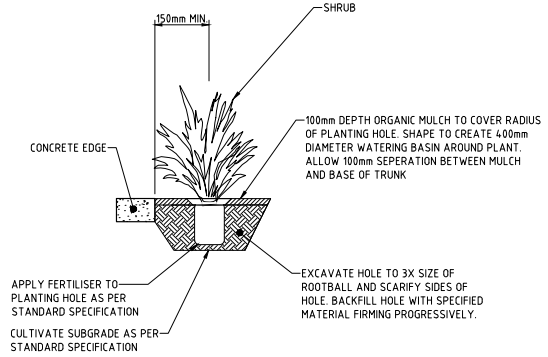
TREE PLANTING PLAN
NOT TO SCALE



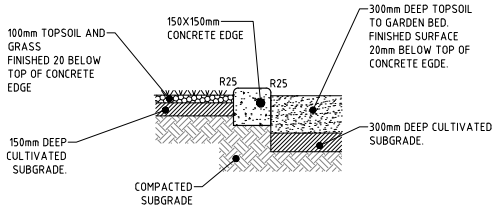
TREE PLANTING ELEVATION
NOT TO SCALE

NOTES:

1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH SPECIFIC AMENDMENTS.
2. WHERE TREES ARE LOCATED LESS THAN 3m FROM BUILT INFRASTRUCTURE (ROADS, PATHWAYS, SHELTERS, BUILDING ETC.), OR 1m FROM SERVICES, ROOT BARRIERS MUST BE INSTALLED. EXISTING NATIVE TREES MAY REQUIRE GREATER DISTANCES IN ACCORDANCE WITH AS4970.
3. REFER PROJECT LANDSCAPING AND IRRIGATION DESIGN DRAWINGS FOR FURTHER DETAILS.



SHRUB PLANTING DETAIL
NOT TO SCALE



GARDEN BED TO GRASS TYPICAL DETAIL
NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

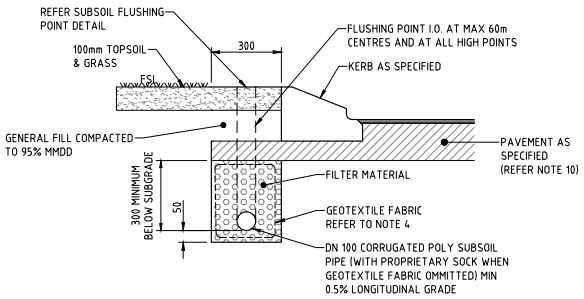
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SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
PUBLIC OPEN SPACE AND LANDSCAPING

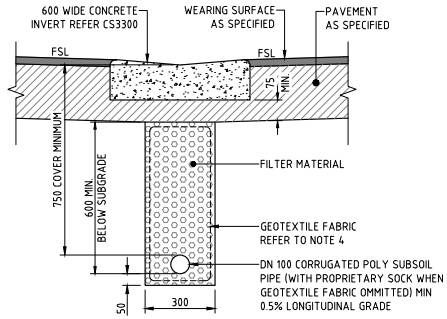
PLANTING
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS2000	0	A1

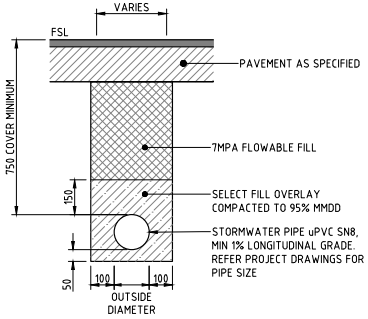
9.4



SUBSOIL DRAIN TYPE 1 – BEHIND KERB
NOT TO SCALE



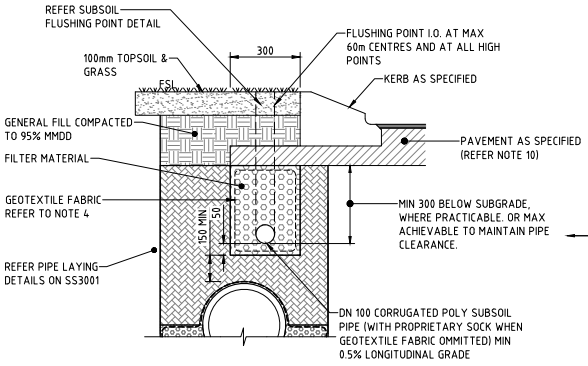
SUBSOIL DRAIN TYPE 3 – BENEATH CONCRETE INVERT
NOT TO SCALE



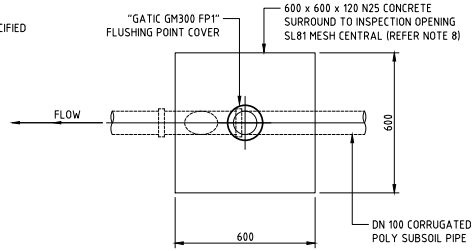
SUBSOIL DRAIN – TYPICAL ROAD CROSSING
NOT TO SCALE

NOTES:

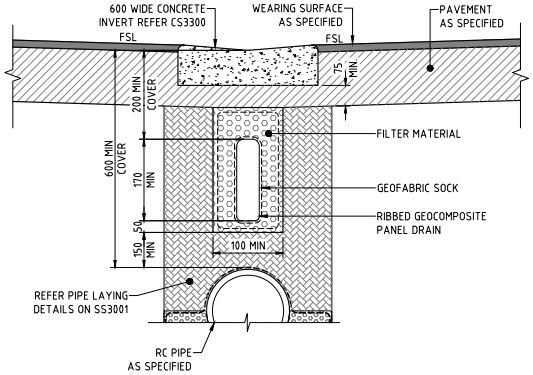
1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
3. PROVIDE MINIMUM COVER TO ALL PIPES IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
4. GEOTEXTILE FABRIC TO COMPLY WITH STANDARD SPECIFICATION FOR SUBDIVISIONS. LAY GEOTEXTILE FABRIC CONTINUOUSLY. PROVIDE MINIMUM LAP LENGTHS IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS. GEOTEXTILE FABRIC MAY BE OMITTED IN ROCK, WHERE APPROVED BY CERTIFYING ENGINEER.
5. PROVIDE WEEPHOLE CONNECTIONS TO DEWATER DRAINAGE TRENCH. INSTALL TO UPSTREAM SIDES OF ALL PITS AND HEADWALLS.
6. ALL PVC PIPE JOINTS TO BE SPIGOT AND SOCKET TYPE WITH RUBBER RING JOINT UNLESS OTHERWISE APPROVED BY THE RELEVANT AUTHORITY.
7. LOCATE FLUSHING POINTS AT TOP OF LINE AND MAX. 60m SPACINGS. LOCATE TO AVOID CONFLICT WITH OTHER SERVICES AND LOT ACCESSES.
8. CONCRETE SURROUND MAY BE OMITTED WHERE FLUSHING POINT LOCATED IN CONCRETE PAVEMENT.
9. OUTLET ALL SUBSOILS TO DRAINAGE STRUCTURES.
10. EXTEND PAVEMENT BENEATH KERB , 75 MIN. THICKNESS AND 300 BEYOND THE BACK OF KERB.



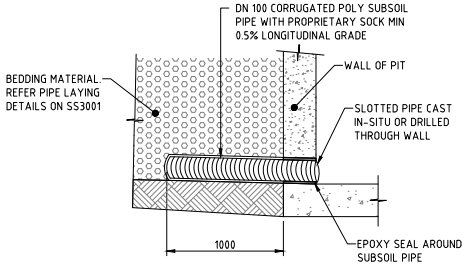
SUBSOIL DRAIN TYPE 2 – BEHIND KERB IN COMMON TRENCH
NOT TO SCALE



PLAN

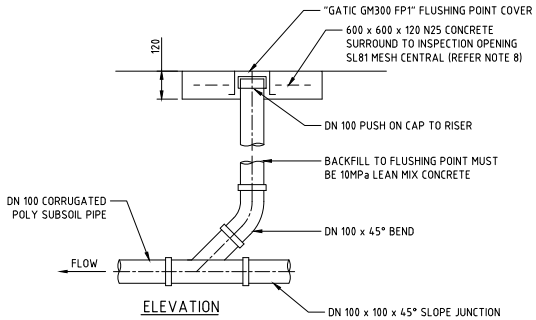


SUBSOIL DRAIN TYPE 4 – BENEATH CONCRETE INVERT IN COMMON TRENCH
NOT TO SCALE



WEEPHOLE CONNECTION TO MANHOLES, SIDE ENTRY PITS AND HEADWALLS
NOT TO SCALE

(REFER NOTE 5)



ELEVATION

SUBSOIL FLUSHING POINT DETAIL
NOT TO SCALE

(REFER NOTES 6 & 7)

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

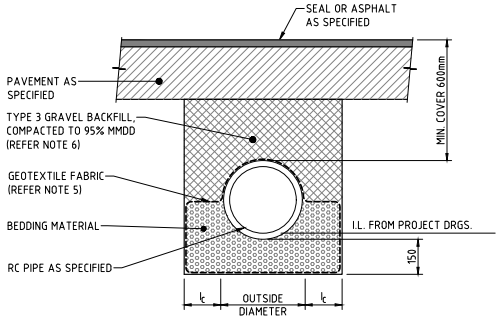
Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

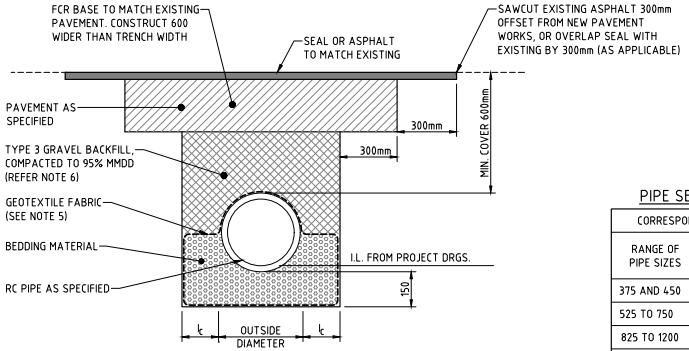
SUBSOIL DRAINAGE
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS3000	0	A1

9.4



NEW ROAD CROSSING
NOT TO SCALE



EXISTING ROAD CROSSING
NOT TO SCALE
(REFER NOTE 8)

PIPE SETOUT TABLE

CORRESPONDING PIPE SIZES	
RANGE OF PIPE SIZES	BACK OF KERB OFFSET TO PIPE C.L.
375 AND 450	240 BEHIND
525 TO 750	110 BEHIND
825 TO 1200	150 IN FRONT
1350 TO 1650	375 IN FRONT
1800 TO 2100	675 IN FRONT

NOTES:

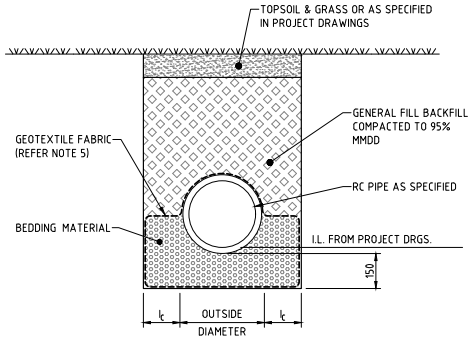
1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
3. DETAILS REFLECT STORMWATER PIPES ONLY. FOR ALL OTHER SERVICES, REFER TO RELEVANT AUTHORITY TECHNICAL REQUIREMENTS.
4. PROVIDE MINIMUM COVER TO PIPES IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS.
5. GEOTEXTILE FABRIC TO COMPLY WITH STANDARD SPECIFICATION FOR SUBDIVISIONS. LAY GEOTEXTILE FABRIC CONTINUOUSLY. PROVIDE MINIMUM LAP LENGTHS IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS. GEOTEXTILE FABRIC MAY BE OMMITTED IN ROCK, WHERE APPROVED BY CERTIFYING ENGINEER.
6. STABILISE ALL BACKFILL WITH 2% CEMENT BY MASS AND COMPACT TO 95% RELATIVE COMPACTION WHERE THE TRENCH OR EMBANKMENT IS LOCATED, OR WILL BE LOCATED, BENEATH A PAVEMENT.
7. FLOWABLE FILL MAY BE USED AS AN ALTERNATIVE BACKFILL, WHERE APPROVED BY THE RELEVANT AUTHORITY.
8. TRENCHING MUST ONLY BE USED FOR EXISTING ROAD CROSSINGS WHERE APPROVAL IS OBTAINED FROM THE RELEVANT AUTHORITY.

TRENCH WIDTH PARAMETERS TABLE

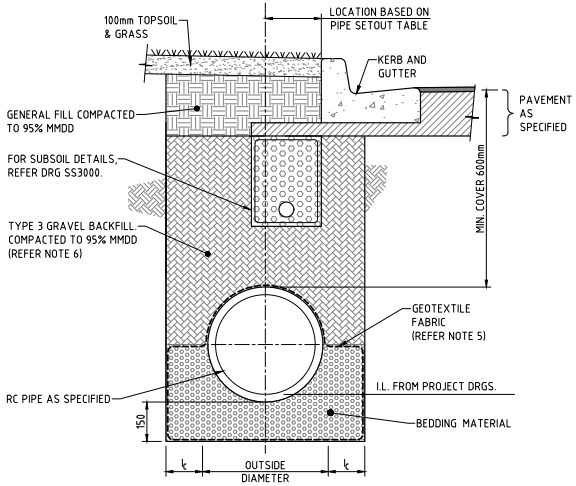
NOMINAL PIPE DIAMETER DN	MINIMUM t_t (mm)
≤600	150
>600, ≤1200	200
>1200	D/6

TABLE NOTES:

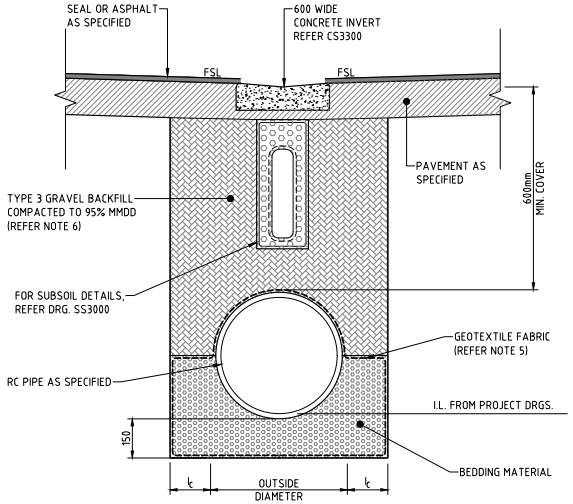
1. THE MINIMUM VALUES SHOULD ONLY BE USED WHEN NECESSARY COMPACTION BETWEEN THE PIPES CAN BE ASSURED.
2. MINIMUM VALUES MAY NEED TO BE INCREASED FOR RUBBER RING JOINT PIPES TO ENSURE MIN. 50mm SEPARATION BETWEEN SOCKETS.



NON TRAFFICABLE AREAS
NOT TO SCALE



ROADSIDE
NOT TO SCALE



PIPE BENEATH INVERT
NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

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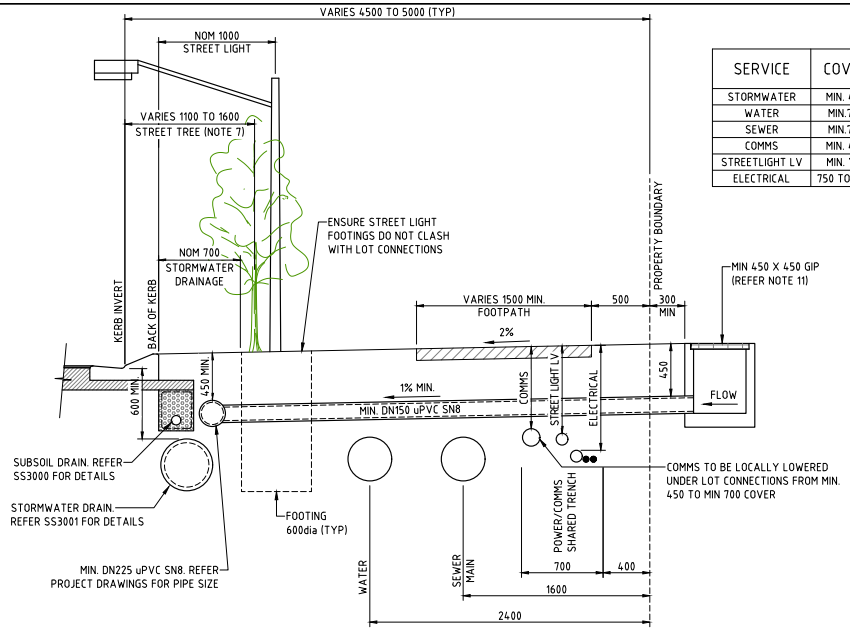
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

STORMWATER PIPES
TYPICAL TRENCH DETAILS

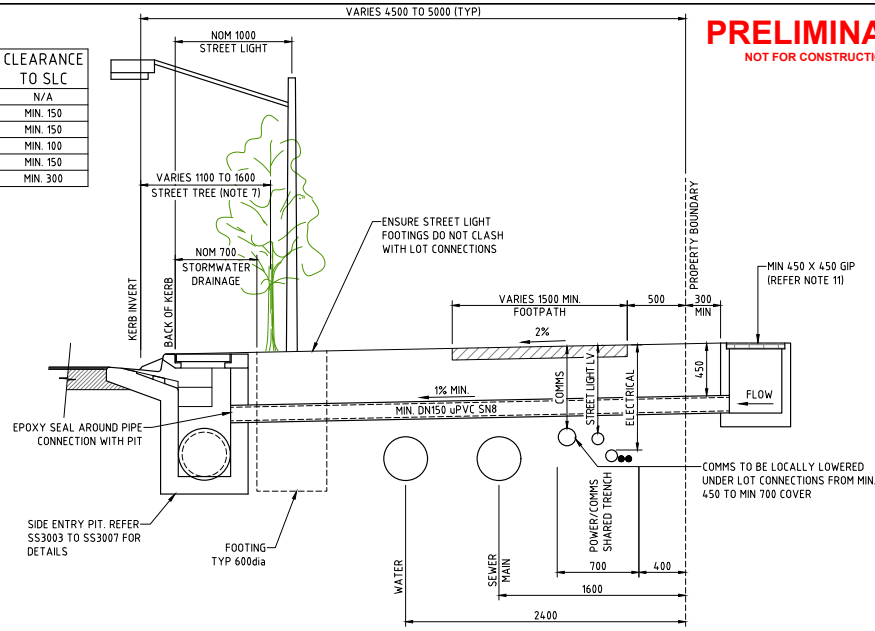
NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS3001	0	A1

PRELIMINARY
NOT FOR CONSTRUCTION

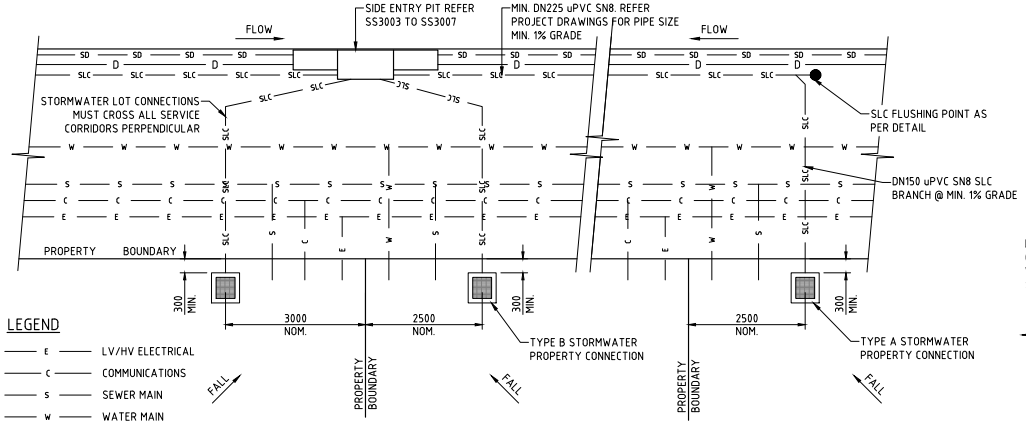
SERVICE	COVER	CLEARANCE TO SLC
STORMWATER	MIN. 450	N/A
WATER	MIN.750	MIN. 150
SEWER	MIN.750	MIN. 150
COMMS	MIN. 450	MIN. 100
STREETLIGHT LV	MIN. 750	MIN. 150
ELECTRICAL	750 TO 1000	MIN. 300



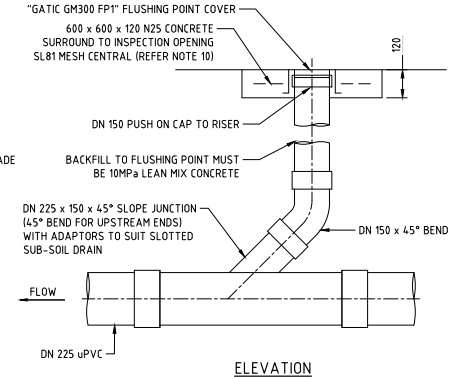
TYPE A STORMWATER LOT CONNECTION
NOT TO SCALE



TYPE B STORMWATER LOT CONNECTION
NOT TO SCALE



TYPICAL STORMWATER PROPERTY CONNECTIONS
NOT TO SCALE



ELEVATION
SLC FLUSHING POINT DETAIL
NOT TO SCALE
(REFER NOTES 8 & 9)

NOTES:
1. ALL WORK MUST BE UNDERTAKEN IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. SERVICE DEPTHS AND CLEARANCES SHOWN ARE NOMINAL ONLY. THE DEVELOPER MUST CONSULT WITH THE SERVICE AUTHORITIES TO CONFIRM CURRENT REQUIREMENTS AND OBTAIN NECESSARY APPROVALS FOR STORWATER LOT CONNECTIONS.
4. LOT CONNECTIONS ARE GENERALLY TO BE 900mm FROM THE LOWEST SIDE BOUNDARY AND MIN 300 FROM STREET RESERVE BOUNDARY. EXACT SETOUT OF PIT AND PIPE TO SUIT SERVICE CONNECTION ARRANGEMENTS IN ACCORDANCE WITH SERVICE AUTHORITY REQUIREMENTS.
5. REFER TO STANDARD DRAWING SS3001 FOR TYPICAL TRENCH DETAILS TO BE APPLIED TO STORMWATER LOT CONNECTIONS.
6. CONNECTING STORMWATER LOT CONNECTIONS DIRECTLY INTO STREET STORMWATER DRAINAGE PIPES USING PROPRIETARY SADDLE CONNECTORS (OR SIMILAR) MUST ONLY BE USED WHERE APPROVED BY THE RELVANT AUTHORITY, AND INSTALLED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
7. STREET TREES TO TYPICALLY BE AT 1100 OFFSET FOR UP TO 4500 VERGE WIDTH AND 1600 OFFSET FOR 5000 VERGE WIDTH.
8. ALL PVC PIPE JOINTS TO BE SPIGOT AND SOCKET TYPE WITH RUBBER RING JOINT UNLESS OTHERWISE APPROVED BY THE RELEVANT AUTHORITY.
9. LOCATE FLUSHING POINTS AT TOP OF LINE AND MAX. 60m SPACINGS. LOCATE TO AVOID CONFLICT WITH OTHER SERVICES AND LOT ACCESSES.
10. CONCRETE SURROUND MAY BE OMITTED WHERE FLUSHING POINT LOCATED IN CONCRETE PAVEMENT.
11. GRATE AND COVER TO BE MINIMUM CLASS B.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
A	ISSUED FOR COMMENT	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

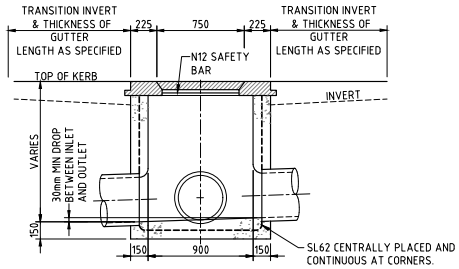
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

STORMWATER PIPES
TYPICAL LOT CONNECTION DETAILS

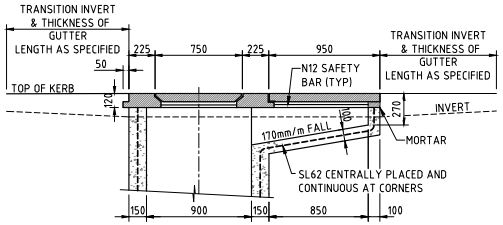
NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No. AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS3002 A	A1



SECTION THROUGH 1 BAY SEP

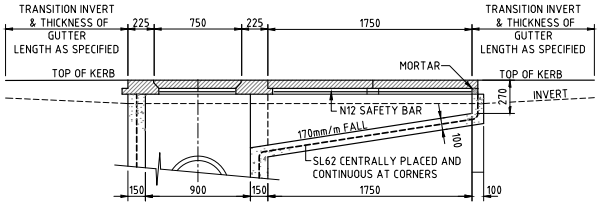
NOT TO SCALE

PRECAST COMPONENTS : 1 FRAME AND COVER, 3 LINTELS, 2 LIDS



SECTION THROUGH 2 BAY SEP

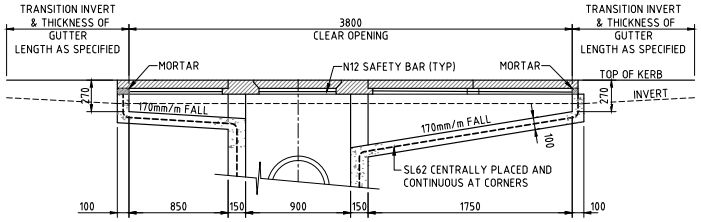
NOT TO SCALE



SECTION THROUGH 3 BAY SEP

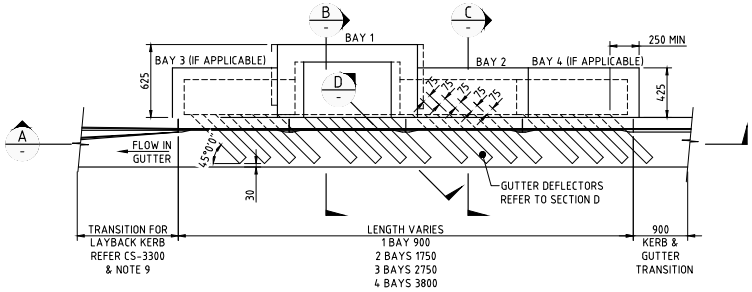
NOT TO SCALE

PRECAST COMPONENTS : 1 FRAME AND COVER, 4 LINTELS, 3 LIDS



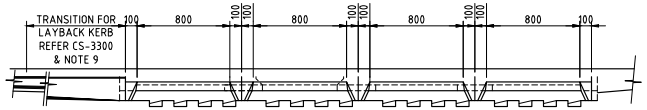
SECTION THROUGH 4 BAY SEP

NOT TO SCALE



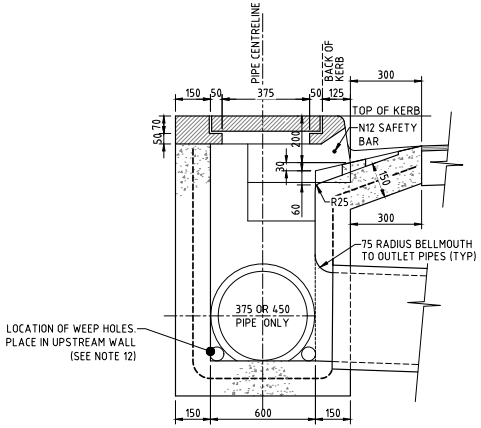
PLAN

NOT TO SCALE



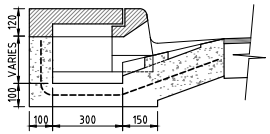
SECTION A

NOT TO SCALE



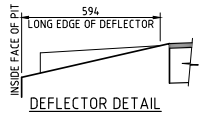
SECTION B

NOT TO SCALE



SECTION C

NOT TO SCALE



DEFLECTOR DETAIL

SECTION D

NOT TO SCALE

NOTES:

1. ALL WORK MUST COMPLY WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
3. CONCRETE MUST BE N32/20/80. PROVIDE MINIMUM COVER TO REINFORCEMENT IN ACCORDANCE WITH AS3600.
4. ALL CONCRETE WORKS MUST COMPLY WITH AS1379 AND AS3600.
5. ALL REINFORCING MUST COMPLY WITH AS1304 AND AS4671.
6. ALL WORK IN CONFINED SPACES MUST COMPLY WITH AS2865.
7. ALL WORK AT HEIGHTS MUST COMPLY WITH WORKSAFE AUSTRALIA GENERAL CODE OF PRACTICE FOR THE PREVENTION OF FALLS IN GENERAL CONSTRUCTION.
8. SAG PITS DO NOT REQUIRE DEFLECTORS.
9. TRANSITIONS TO LAYBACK KERB :
   SAG PITS – 1m (UPSTREAM AND DOWNSTREAM)
   PITS ON GRADE – 3m (BOTH SIDES) ON STRAIGHTS
   – 1.5m ON CURVES LESS THAN R20m
10. PRECAST COMPONENTS DETAILED ARE MANUFACTURED BY HUMES – SIMILAR APPROVED PRECAST COMPONENTS MAY BE USED.
11. FOR FIXING OF PRECAST COMPONENTS USE MORTAR MIXED WITH 'BONDCRETE' OR SIMILAR APPROVED AGENT.
12. WEEPHOLES MUST BE PROVIDED REFER SS3000 FOR DETAILS.
13. LOCATE KERB RAMPS CLEAR OF TRANSITION SECTIONS TO PITS.
14. ALL FRAMES, COVERS, LINTELS AND LIDS TO BE CLASS C LOAD RATING GENERALLY AND CLASS D WHERE LOCATED AT TANGENT POINTS OR WITHIN THE KERB RADIUS AT INTERSECTIONS.
15. REFER PROJECT DRAWINGS FOR ACTUAL LOCATION OF PIPE(S).
16. N12 SAFETY BAR TO BE HOT DIPPED GALVANISED.
17. PROVIDE 7 MPa FLOWABLE FILL BACKFILL TO ALL DRAINAGE STRUCTURES.
18. DESIGN AND INSTALLATION OF PRECAST PITS WHERE APPROVED, SHALL ENSURE THAT PENETRATIONS DO NOT COMPROMISE THE OVERALL STRENGTH CAPACITY OF THE PIT.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

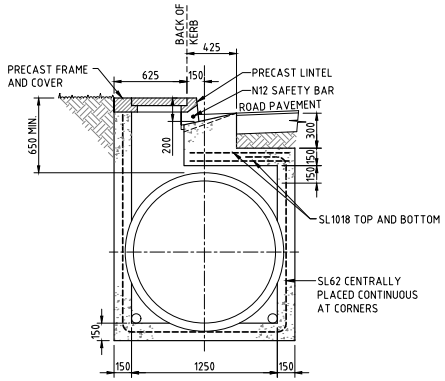
Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

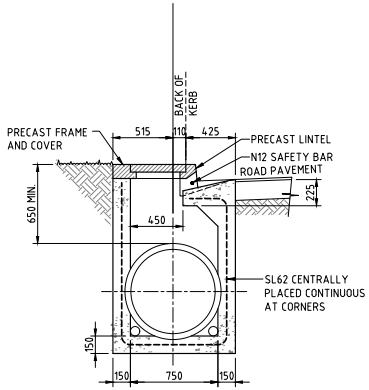
STANDARD SIDE ENTRY PIT
TYPE A DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 2	SS3003	0	A1

NOTES:
1. REFER SS3003 FOR NOTES.



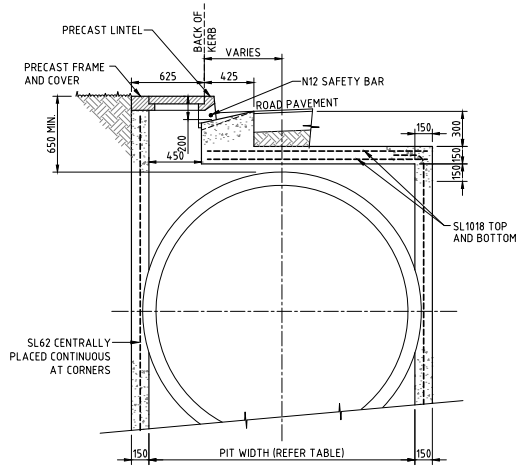
TYPICAL SECTION TYPE C
NOT TO SCALE



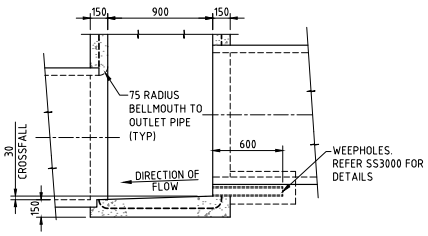
TYPICAL SECTION TYPE B
NOT TO SCALE

TABLE

PIT TYPES AND CORRESPONDING PIPE SIZES			
PIT TYPE	RANGE OF PIPE SIZES	BACK OF KERB OFFSET TO PIPE C.L.	PIT WIDTH
A	375 AND 450	REFER TO SS3003	
B	525 TO 750	110 BEHIND	770
C	825 TO 1200	150 IN FRONT	1250
D	1350 TO 1650	375 IN FRONT	1700
E	1800 TO 2100	675 IN FRONT	2150
LENGTH OF ALL PITS AS DETAILED = 900			



TYPICAL SECTION TYPE D-E
NOT TO SCALE



TYPICAL SECTION ALONG GRADE
NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDRAD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

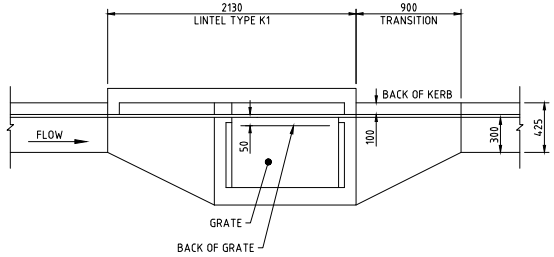
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

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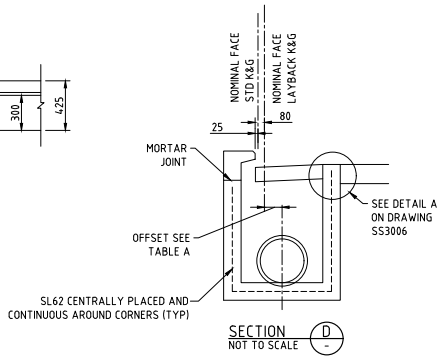
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

STANDARD SIDE ENTRY PIT
TYPE B TO E DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	2 OF 2	SS3004	0	A1



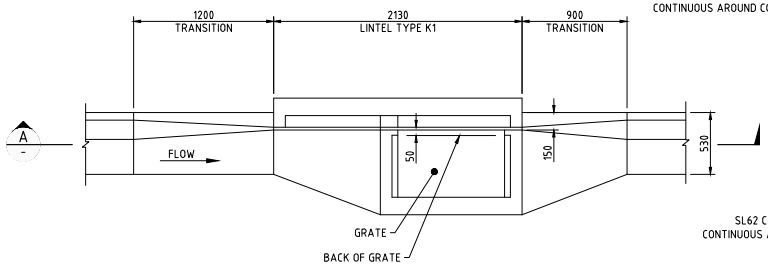
SINGLE BAY SIDE ENTRY PIT PLAN
(STANDARD KERB & GUTTER)
NOT TO SCALE



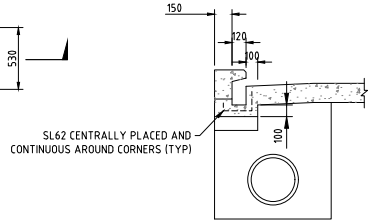
SECTION D
NOT TO SCALE

NOTES:

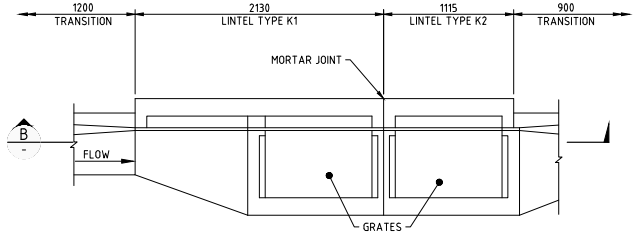
1. ALL WORK MUST COMPLY WITH THE STANDARDS SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS IN MILLIMETERS (mm) UNLESS NOTES OTHERWISE.
3. CONCRETE MUST BE N32/20/80, PROVIDE MINIMUM COVER TO REINFORCEMENT IN ACCORDANCE WITH AS3600.
4. ALL CONCRETE WORKS MUST COMPLY WITH AS1379 AND AS3600.
5. ALL REINFORCING MUST COMPLY WITH AS1304 AND AS4671.
6. ALL WORK IN CONFINED SPACES MUST COMPLY WITH AS2865.
7. ALL WORK AT HEIGHTS MUST COMPLY WITH WORKSAFE AUSTRALIA GENERAL CODE OF PRACTICE FOR THE PREVENTION OF FALLS IN GENERAL CONSTRUCTION.
8. FOR FIXING OF PRECAST COMPONENTS USE MORTAR MIXED WITH 'BONDCRETE' OR SIMILAR APPROVE AGENT.
9. WEEPHOLES MUST BR PROVIDED REFER SS3000 FOR DETAILS.
10. LOCATE KERB RAMPS CLEAR OF TRANSITION SECTIONS TO PITS.
11. ALL FRAMES, COVERS, LINTELS AND LIDS TO BE CLASS C LOAD RATING GENERALLY AND CLASS D WHERE LOCATED AT TANGENT POINTS OR WITHIN THE KERB RADIUS AT INTERSECTIONS.
12. REFER PROJECT DRAWINGS FOR ACTUAL LOCATION OF PIPE(S).
13. PROVIDE 7 MPa FLOWABLE FILL BACKFILL TO ALL DRAINAGE STRUCTURES.
14. DESIGN AND INSTALLATION OF PRECAST PITS WHERE APPROVED, SHALL ENSURE THAT PENETRATIONS DO NOT COMPROMISE THE OVERALL STRENGTH CAPACITY OF THE PIT.
15. PIPES ENTERING ON FRONT OR BACK WALLS OF MULTIPLE BAY PITS SHALL BE CENTERED ON BAY CENTRELINES NOT ON SUPPORT BEAM CENTRELINES.
16. FOR LINTEL AND PIT ARRANGEMENTS ON-GRADE / IN-SAG AND WITH MULTIPLE BAYS, REFER DRAWINGS SS3006.
17. FOR GRATE AND FRAME DETAILS REFER DRAWING SS3007.



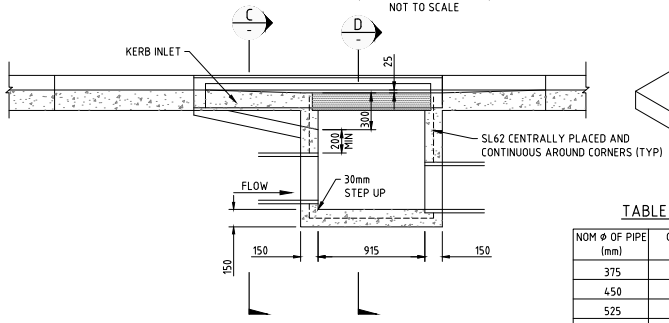
SINGLE BAY SIDE ENTRY PIT PLAN
(LAYBACK KERB & GUTTER)
NOT TO SCALE



SECTION C
NOT TO SCALE



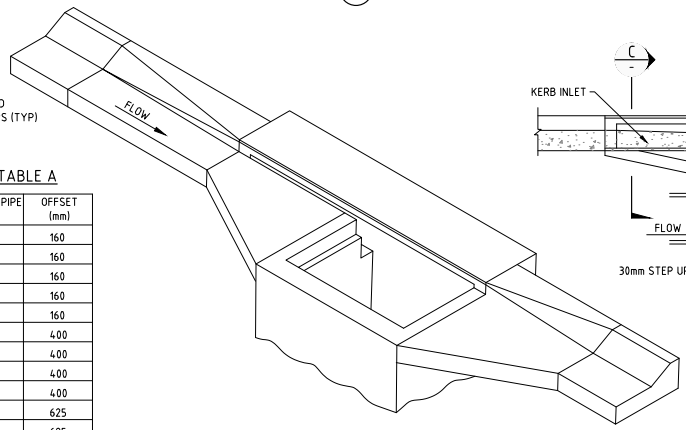
MULTI-BAY SIDE ENTRY PIT PLAN
(LAYBACK KERB & GUTTER)
NOT TO SCALE



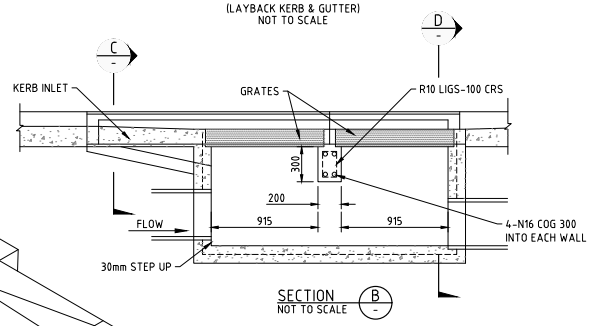
SECTION A
NOT TO SCALE

TABLE A

NOM ø OF PIPE (mm)	OFFSET (mm)
375	160
450	160
525	160
600	160
675	160
750	400
900	400
1050	400
1200	400
1350	625
1500	625
1650	625



ISOMETRIC VIEW TYPE 'A"
1 BAY PIT ON GRADE



SECTION B
NOT TO SCALE

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN: KS	CHECKED: PB
DATE: JUNE 2019	DATE: JUNE 2019
DESIGNED: PB	CHECKED: SPB
DATE: JUNE 2019	DATE: JUNE 2019
DESIGN PROJECT LEADER: SPB	NTG PROJECT MANAGER: N/A
DATE: JUNE 2019	DATE: JUNE 2019

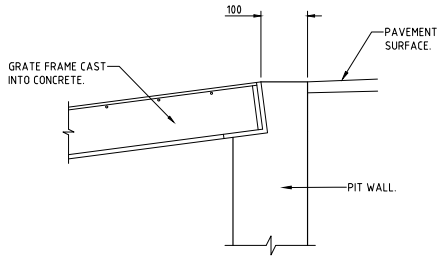
Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

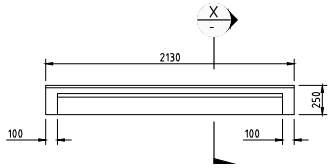
GRATED SIDE ENTRY PIT
GENERAL ARRANGEMENT

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No. AMENDMENT	SHEET SIZE
-	-	1 OF 3	SS3005 0	A1

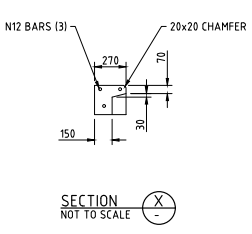
NOTES:
1. REFER S3005 FOR NOTES



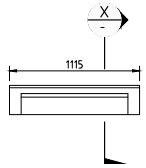
DETAIL A
REFER SS3005



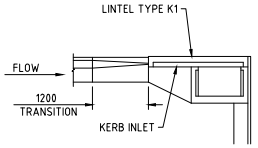
LINTEL K1
ELEVATION
NOT TO SCALE



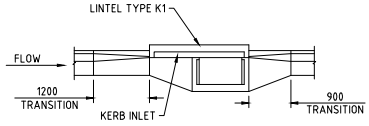
SECTION X
NOT TO SCALE



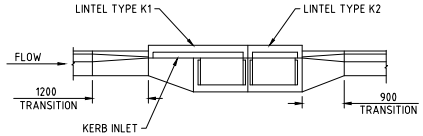
LINTEL K2
ELEVATION
NOT TO SCALE



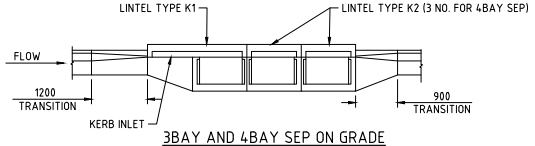
1BAY CORNER SEP



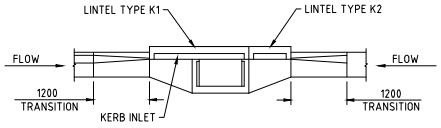
1BAY SEP ON GRADE



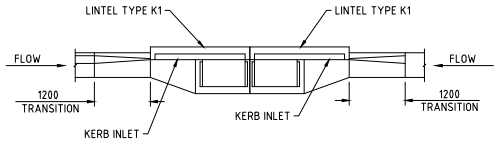
2BAY SEP ON GRADE



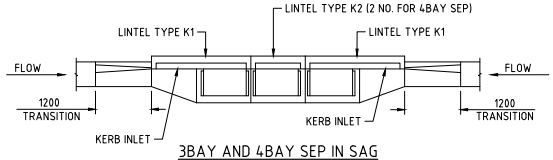
3BAY AND 4BAY SEP ON GRADE



1BAY SEP IN SAG



2BAY SEP IN SAG



3BAY AND 4BAY SEP IN SAG

PIT ARRANGEMENT DETAILS

NOT TO SCALE
NOTE: TRANSITIONS ARE SHOWN FOR LAYBACK KERB
REFER SS3005 FOR TYPICAL KERB AND GUTTER TRANSITIONS

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

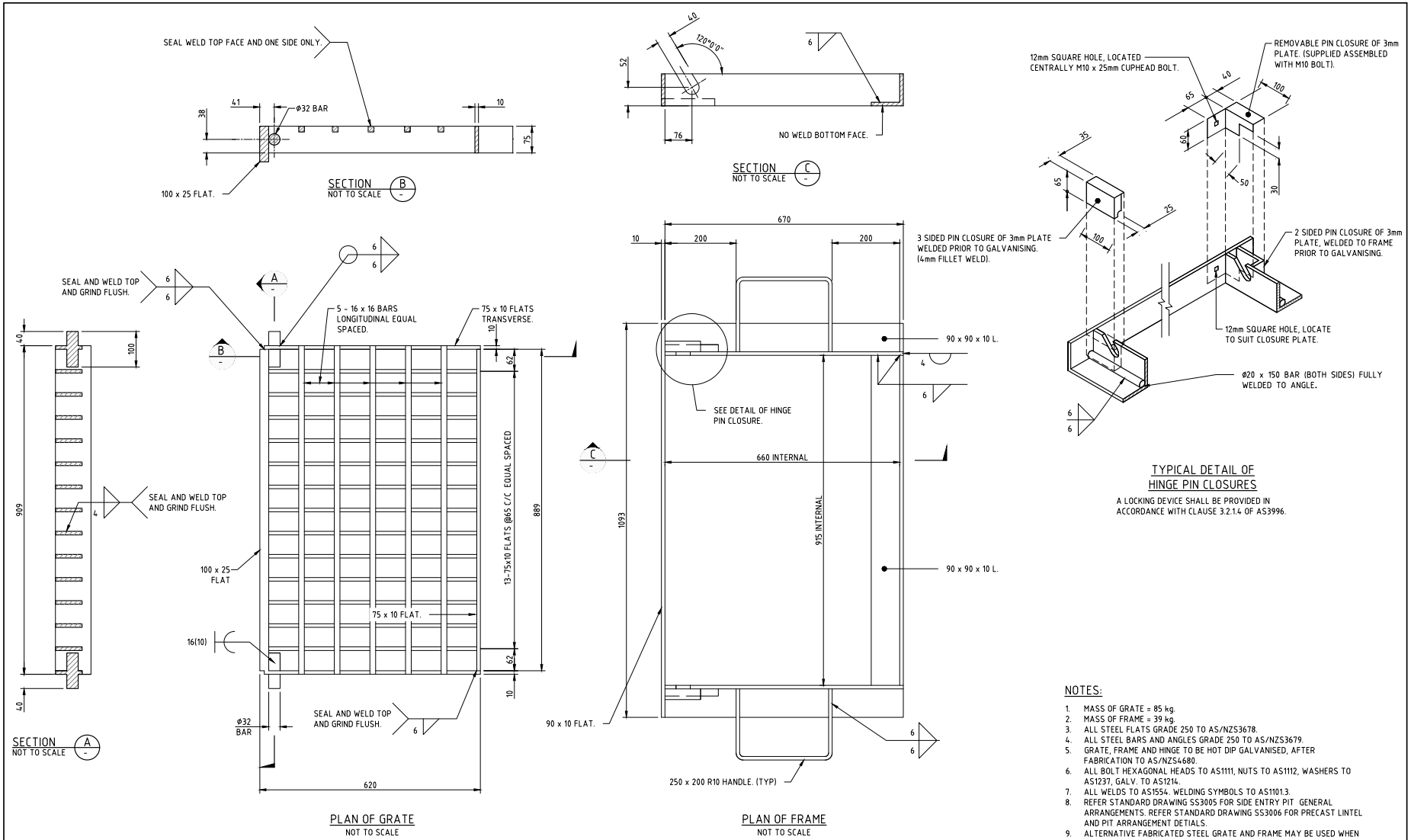
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DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

GRATED SIDE ENTRY PIT
LINTEL & PIT ARRANGMENT DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	2 OF 3	SS3006	0	A1



TYPICAL DETAIL OF HINGE PIN CLOSURES

A LOCKING DEVICE SHALL BE PROVIDED IN ACCORDANCE WITH CLAUSE 3.2.1.4 OF AS3996.

NOTES:

1. MASS OF GRATE = 85 kg.
2. MASS OF FRAME = 39 kg.
3. ALL STEEL FLATS GRADE 250 TO AS/NZS3678.
4. ALL STEEL BARS AND ANGLES GRADE 250 TO AS/NZS3679.
5. GRATE, FRAME AND HINGE TO BE HOT DIP GALVANISED, AFTER FABRICATION TO AS/NZS4680.
6. ALL BOLT HEXAGONAL HEADS TO AS1111, NUTS TO AS1112, WASHERS TO AS1237, GALV. TO AS1214.
7. ALL WELDS TO AS1554. WELDING SYMBOLS TO AS1101.3.
8. REFER STANDARD DRAWING SS3005 FOR SIDE ENTRY PIT GENERAL ARRANGEMENTS. REFER STANDARD DRAWING SS3006 FOR PRECAST LINTEL AND PIT ARRANGEMENT DETIALS.
9. ALTERNATIVE FABRICATED STEEL GRATE AND FRAME MAY BE USED WHEN APPROVED, GRATE AND FRAME TO BE CLASS D BICYCLE SAFE TO AS3996.
10. ALL DIMENSIONS IN MILLIMETRES (mm).
11. REFER SS3005 FOR NOTES.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

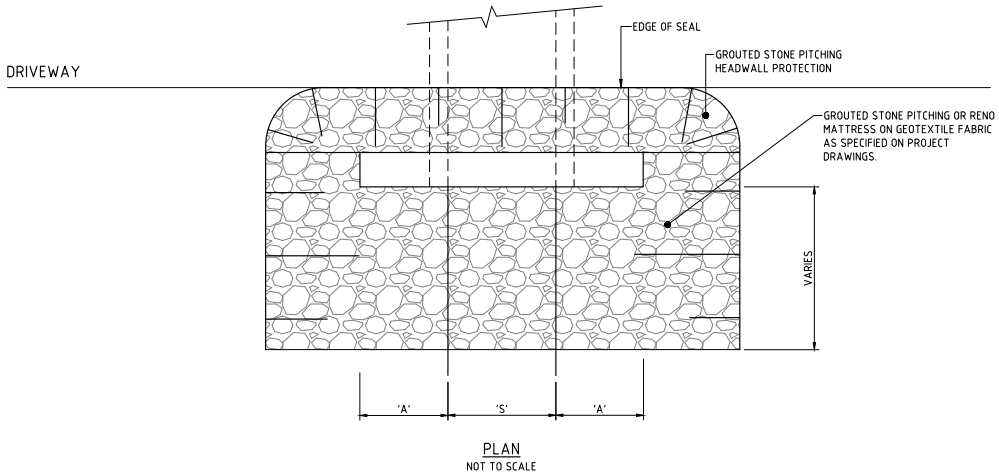
DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

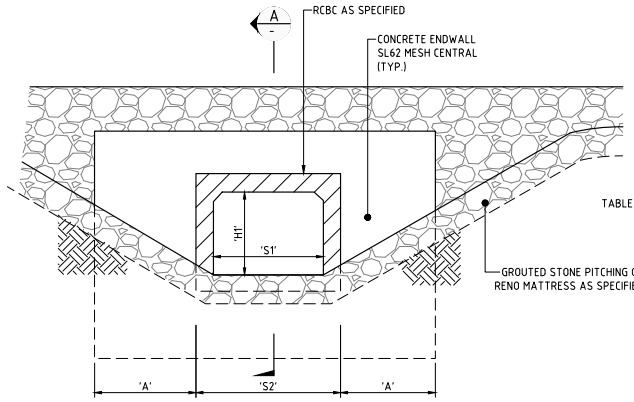
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

GRATED SIDE ENTRY PIT GRATE AND FRAME

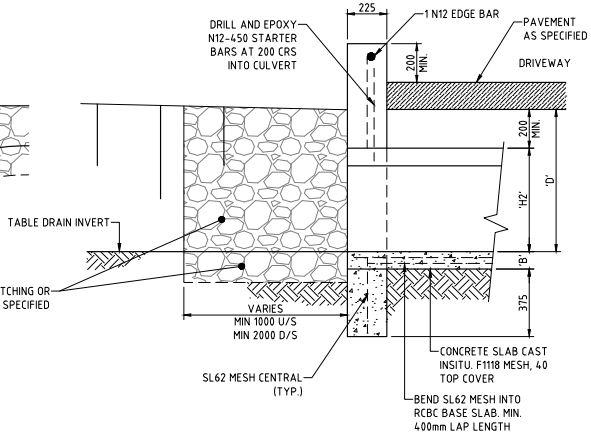
NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	3 OF 3	SS3007	0	A1



PLAN
NOT TO SCALE



ELEVATION
NOT TO SCALE



SECTION A
NOT TO SCALE

GENERAL NOTES:

1. ALL WORK MUST COMPLY WITH THE STANDARD SPECIFICATION FOR SUBDIVISIONS ALONG WITH PROJECT SPECIFIC AMENDMENTS.
2. ALL DIMENSIONS IN MILLIMETERS (mm) UNLESS NOTED OTHERWISE.
3. R.C.B.C SIZE AND EXTENT OF PROTECTION WORKS MUST BE APPROVED BY THE RELEVANT AUTHORITY PRIOR TO COMMENCEMENT OF WORKS. PROTECTION SHOULD BE EXTENDED OVER AREAS WHERE THE BATTER SLOPE EXCEEDS 1:4.
4. FOR MULTIPLE BOXES THE SPACING BETWEEN BOXES MUST BE 25mm MINIMUM AND MORTAR FILLED.
5. CONCRETE MUST BE CLASS N32/20/80. PROVIDE MINIMUM COVER TO REINFORCEMENT IN ACCORDANCE WITH AS3600.
6. ALL CONCRETE WORKS MUST COMPLY WITH AS1379 AND AS3600.
7. ALL REINFORCING MUST COMPLY WITH AS1304 AND AS4671.
8. F1118 MESH LONGITUDINAL BARS IN CULVERT SLABS MUST BE LAID IN DIRECTION OF TRAFFIC.
9. CONCRETE FLOOR SLAB TO EXTEND MIN 25mm PAST R.C.B.C OUTER WALLS.
10. ON DRIVEWAYS, STONE PITCHING MUST MATCH WITH THE BITUMINOUS SURFACE. NO GAP BETWEEN THE SURFACE OF THE DRIVEWAY AND HEADWALL PROTECTION WILL BE ACCEPTED.
11. MIN CULVERT HEIGHT 450mm, WHERE LARGE CULVERTS ARE REQUIRED (HEIGHT > 600), APPROPRIATE BARRIERS/EDGE TREATMENT MUST BE INSTALLED.

TABLE OF DIMENSIONS

BOX CULVERT SIZE	'S1'	'H1'	'S2'	'H2'	'A'	'B'	'D'
450x450	451	457	611	552	450	115	752
600x450	606	457	766	572	690	115	772
750x450	756	457	948	582	710	115	782
750x600	756	610	948	735	940	115	935
900x450	908	457	1100	582	710	115	782
900x600	908	610	1100	735	940	115	935
1200x450	1212	457	1404	582	730	130	782
1200x600	1212	610	1404	735	960	130	935

TABLE NOTE:
DIMENSIONS SHOWN ARE NOMINAL ONLY AND BASED ON A B2 EXPOSURE CLASSIFICATION. EXACT CULVERT DIMENSIONS, INCLUDING WALL THICKNESS AND CROWN THICKNESS, WILL VARY DEPENDING ON EXPOSURE CLASSIFICATION, LOADING, AND MANUFACTURES SPECIFICATIONS.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

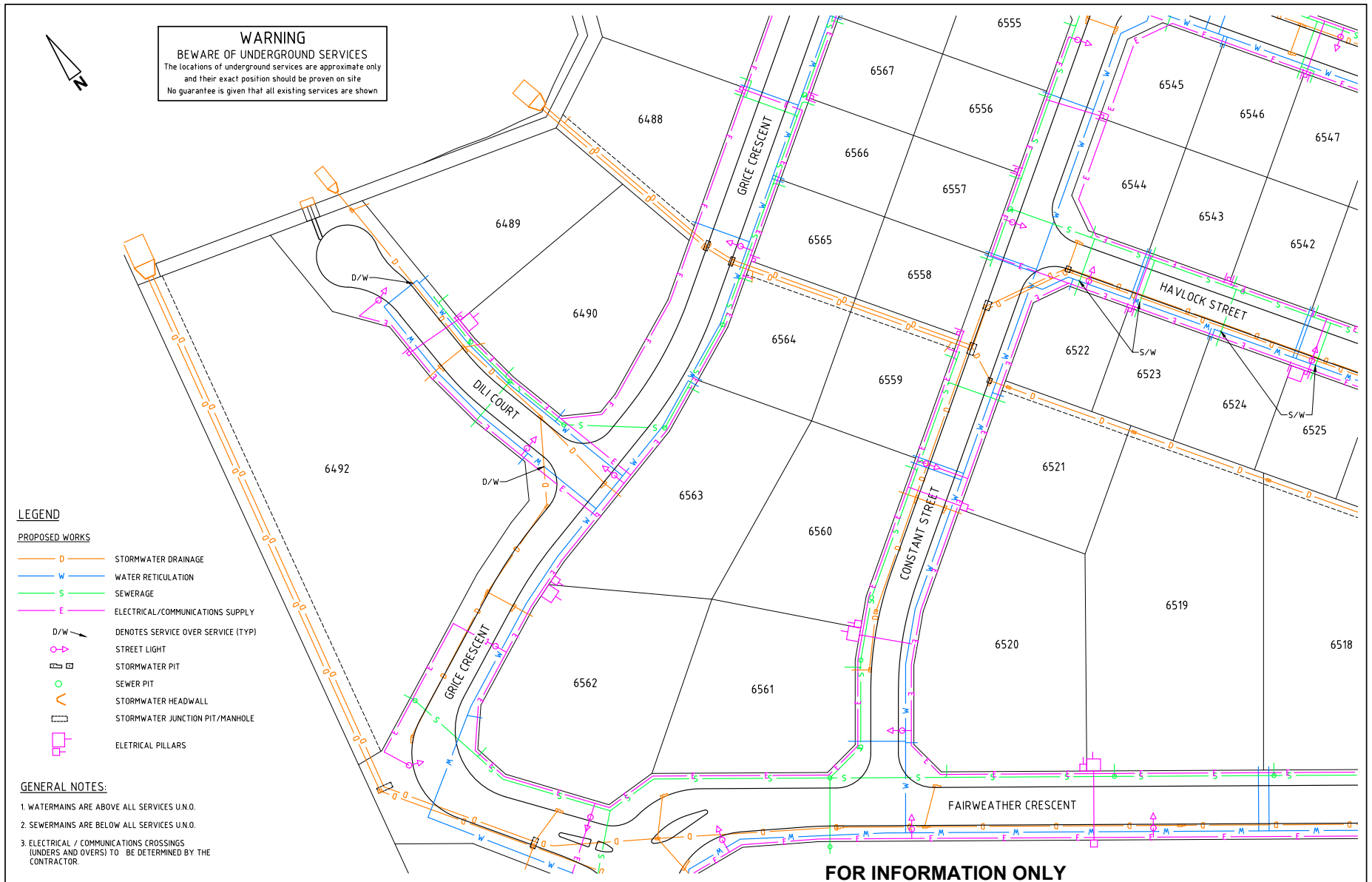
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DESIGNED: PB — DATE JUNE 2019	CHECKED: SPB — DATE JUNE 2019
DESIGN PROJECT LEADER: SPB — DATE JUNE 2019	NTG PROJECT MANAGER: N/A — DATE JUNE 2019

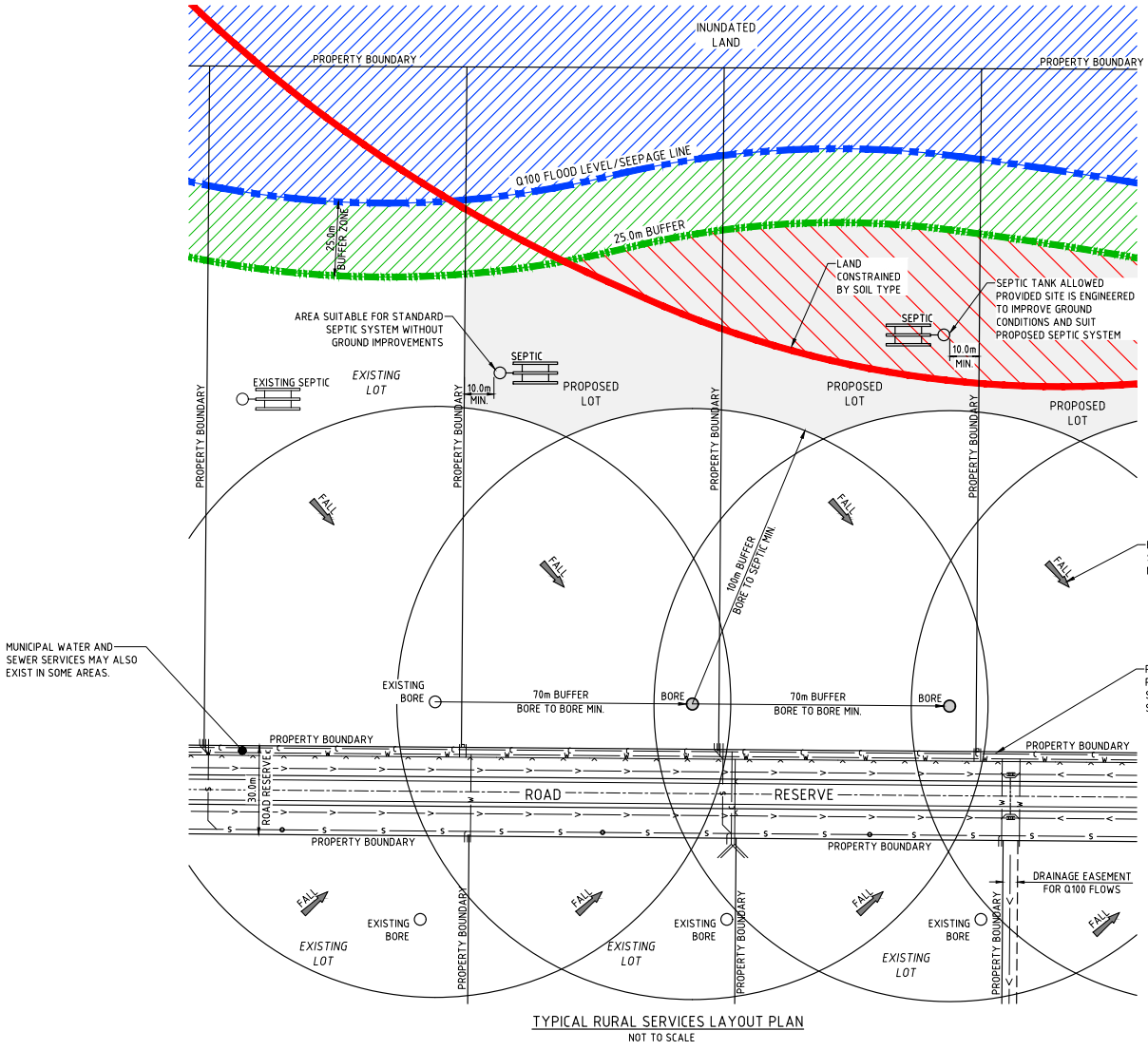
Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
STORMWATER DRAINAGE

ACCESS CULVERT
TYPICAL ENDWALL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS3008	0	A1


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
N
6488
6489
6490
6492
6555
6567
6556
6545
6546
6547
6566
6557
6544
6543
6542
6565
6558
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6525
6563
6560
6521
6519
6520
6518
6562
6561
GRICE CRESCENT
DILI COURT
CONSTANT STREET
HAVLOCK STREET
FAIRWEATHER CRESCENT
D/W
S/W
LEGEND
PROPOSED WORKS
D STORMWATER DRAINAGE
W WATER RETICULATION
S SEWERAGE
E ELECTRICAL/COMMUNICATIONS SUPPLY
D/W DENOTES SERVICE OVER SERVICE (TYP)
STREET LIGHT
STORMWATER PIT
SEWER PIT
STORMWATER HEADWALL
STORMWATER JUNCTION PIT/MANHOLE
ELETRICAL PILLARS
GENERAL NOTES:
1. WATERMAINS ARE ABOVE ALL SERVICES U.N.O.
2. SEWERMAINS ARE BELOW ALL SERVICES U.N.O.
3. ELECTRICAL / COMMUNICATIONS CROSSINGS (UNDERS AND OVERS) TO BE DETERMINED BY THE CONTRACTOR.
FOR INFORMATION ONLY
0 ISSUED AS A STANDARD DRAWING JUNE 2019 KS BYRNE CONSULT.
No. DESCRIPTION DATE INIT. DEPT/COMPANY.
AMENDMENTS
5 0 5 10 15 20 25m
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DRAWN KS DATE JUNE 2019
CHECKED PB DATE JUNE 2019
DESIGNED PB DATE JUNE 2019
CHECKED SPB DATE JUNE 2019
DESIGN PROJECT LEADER SPB DATE JUNE 2019
NTG PROJECT MANAGER N/A DATE JUNE 2019
Northern Territory Government
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
UTILITIES
URBAN MASTER SERVICES PLAN
SMAPLE LAYOUT
NTG PROJECT No. -
NTG ASSET No. -
SHEET No. 1 OF 1
NTG DRAWING No. SS4000
AMENDMENT 0
SHEET SIZE A1



TYPICAL RURAL SERVICES LAYOUT PLAN
NOT TO SCALE

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

FOR INFORMATION ONLY

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	JUNE 2019	KS	BYRNE CONSULT.

AMENDMENTS

DRAWN KS	DATE JUNE 2019	CHECKED PB	DATE JUNE 2019
DESIGNED PB	DATE JUNE 2019	CHECKED SPB	DATE JUNE 2019
DESIGN PROJECT LEADER SPB	DATE JUNE 2019	NTG PROJECT MANAGER N/A	DATE JUNE 2019

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
UTILITIES

RURAL MASTER SERVICES PLAN
SAMPLE LAYOUT

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
-	-	1 OF 1	SS4001	0	A1

DRAWING LIST	
NUMBER	SHEET TITLE
SS5000	DRAWING LIST
SS5001	STEEL COLUMNS - 9.0m AND 12.0m TAPERED OUTREACH TYPE
SS5002	STEEL COLUMNS - 12.0m TAPERED OUTREACH TYPE VIAC
SS5003	STEEL COLUMNS - 5.5m TAPERED OUTREACH TYPE
SS5004	STEEL COLUMNS - 6.5m TAPERED CURVED OUTREACH TYPE
SS5005	STEEL COLUMNS - 5.5m TAPERED POST TOP TYPE
SS5006	TYPE 5 AND TYPE 9 RAG BOLT REINFORCEMENT DETAILS
SS5007	TYPE 12 RAG BOLT REINFORCEMENT DETAIL
SS5008	TYPE 5, 9 AND 12 RAG BOLT ASSEMBLY FOOTING DETAIL
SS5009	RAG BOLT REINFORCEMENT BAR - DEFORMED DETAILS
SS5010	OUTREACH ARMS
SS5011	CABLE PIT
SS5012	LED LUMINAIRE SWITCH PACK WIRING DIAGRAM
SS5013	LED LUMINARE SWITCH PACK DETAILS
SS5014	MSB WITH TIME CONTROL WIRING DIAGRAM AND DETAILS
SS5015	MSB WITH NO TIME CONTROL WIRING DIAGRAM AND DETAILS

SCALE: N/A

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	26/04/19	CJ	AF
A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

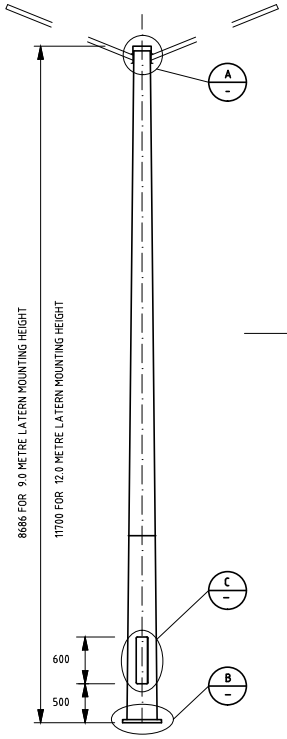
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DESIGNED: C J — DATE	CHECKED: TO — DATE
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Northern Territory Government

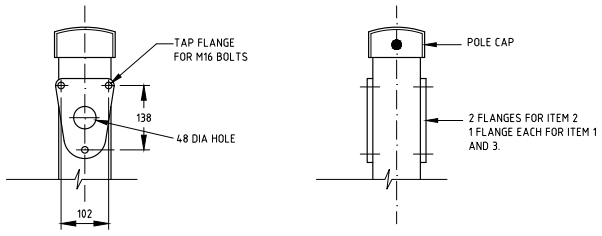
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING
-

DRAWING LIST

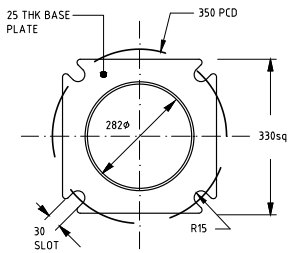
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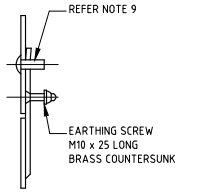
9m AND 12m COLUMN ELEVATION



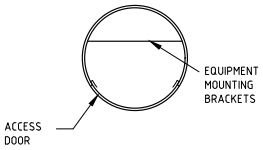
OUTREACH MOUNTING PLATE - DETAIL A

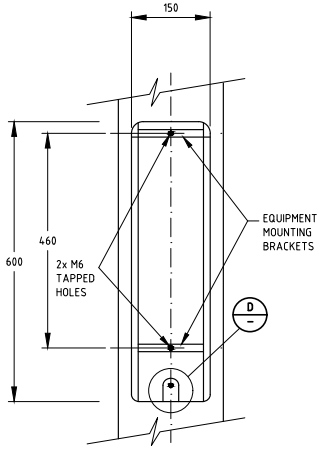


BASE PLATE - DETAIL B



DETAIL D





EQUIPMENT ACCESS - DETAIL C

(DOOR NOT SHOWN FOR CLARITY)

NOTES:

1. ALL WELDING AND WELD PREPARATION SHALL BE IN ACCORDANCE WITH AS1554.
2. CIRCUMFERENTIAL WELDS TO BE JOGGLED BUTT TYPE. LONGITUDINAL WELDS TO BE SINGLE BUTT TYPE. ALL WELDS TO BE MADE BY CONTINUOUS AUTOMATIC PROCESS AND ARE NOT TO BE DRESSED SMOOTH.
3. AFTER FABRICATION ALL COMPONENTS TO BE ACID DE-SCALED AND HOT DIPPED GALVANIZED MINIMUM 450g/sq.m TO AS4680.
4. WIND LOADING TO COMPLY WITH THE REQUIREMENTS OF AS/NZS 1170.2: 2011 SECTION 4 AND APPENDIX E. DESIGN TO BE BASED ON THE FOLLOWING:
   - IMPORTANCE LEVEL 2
   - REGION C, TERRAIN CATEGORY 2
   - VR strength = 64m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:200 - Fc = 1.05 (INCLUSIVE)
   - VR service = 47m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:25 - Fc=1.0 (INCLUSIVE)
   - FOR MAX HEIGHT NOT EXCEEDING 13M
   - Mz cat = 1.02
   - MAXIMUM WIND SPEED OF V/des = 66m/s,
   - MAXIMUM SERVICABILITY WIND SPEED OF V/deservice=48.5m/s,
   - DEFLECTION LIMIT = 2% OF NOMINAL LENGTH
   - 4.5m OUTREACH ARMS AS SHOWN ON DRAWING E11.
   - LUMINAIRE'S WITH A WIND AREA OF 0.13sq.m, A MASS OF 12kg EACH AND DRAG CO- EFFICIENT OF 0.5
5. COLUMNS ARE TO CONFORM TO THE REQUIREMENTS OF AS4100 AND AS1798.
6. COLUMNS ARE TO HAVE CONTINUOUS TAPER OVER THEIR ENTIRE LENGTH AND A STEEL THICKNESS OF NOT LESS THAN 3mm.
7. TWO PIECE COLUMNS MUST BE ASSEMBLED PRIOR TO DELIVERY.
8. ACCESS DOORS ARE NOT INTERCHANGEABLE. ENSURE THAT INDIVIDUAL COLUMNS AND DOORS ARE SUITABLY MATCHED AND MARKED.
9. EQUIPMENT ACCESS DOOR TO BE PROVIDED (DETAIL C) HAVING 'TAMPER PROOF' LOCKING DEVICE. DOOR ACCESS SCREW TO BE M10 STAINLESS STEEL I.S.O. METRIC BUTTON HEAD SOCKET TYPE.
10. ALL COLUMNS ARE TO BE MANUFACTURED TO ACCEPT THE MOUNTING OF OUTREACHES AS SHOWN ON SHEET E11.
11. ALL POLE MANUFACTURERS SHALL COMPLY WITH ISO 3834.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

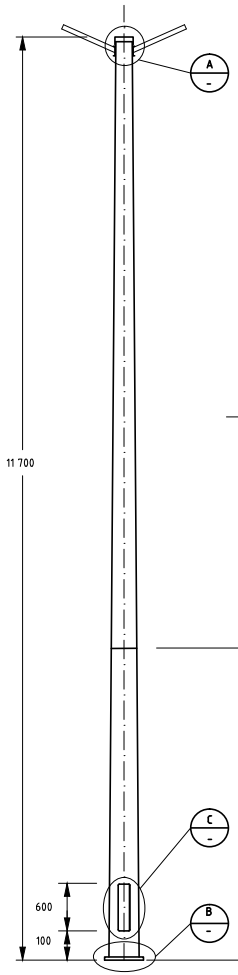
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DATE		DATE	
DESIGNED	C J	CHECKED	TO
DATE		DATE	
DESIGN PROJECT LEADER	PB	NTG PROJECT MANAGER	TO
DATE		DATE	

Northern Territory Government

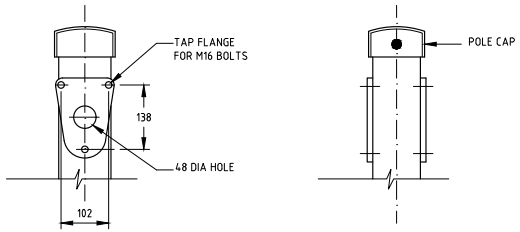
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

STEEL COLUMNS - 9.0M AND 12.0M TAPERED OUTREACH TYPE
TYPICAL DETAILS

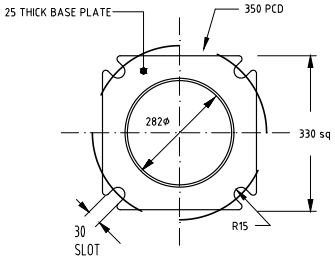
NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E02 OF 16	SS5001	0	A1



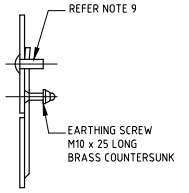
12m VIAC ELEVATION



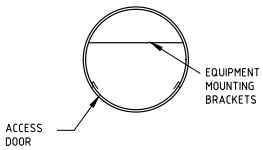
OUTREACH MOUNTING PLATE - DETAIL A

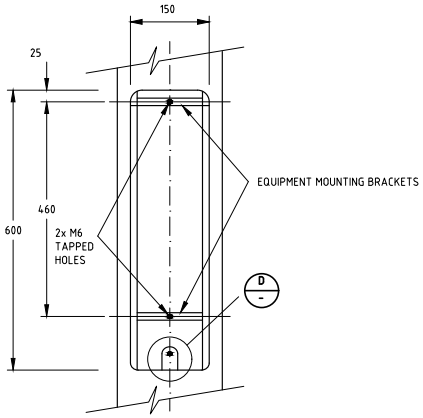


BASE PLATE - DETAIL B



DETAIL D





EQUIPMENT ACCESS - DETAIL C

(DOOR NOT SHOWN FOR CLARITY)

V.I.A.C. (VEHICLE IMPACT ABSORPTION COLUMN) DESIGN PERFORMANCE:

THE MANUFACTURER SHALL SUPPLY EVIDENCE OF TESTING WHICH DEMONSTRATES THE ADEQUACY AND SUITABILITY OF THE COLUMN AS BEING IMPACT ABSORBENT.

TYPICAL OF THE PERFORMANCE REQUIRED IS THAT FOR FRONTAL IMPACT OF A VEHICLE OF 1200kg MASS IMPACTING AT 60km/h, THE COLUMN WILL PRODUCE DECELERATIONS, MEASURED AT THE VEHICLE FLOOR PAN, NO GREATER THAN 10G AVERAGED OVER ANY 50 MILLISECOND PERIOD, NOR GREATER THAN 10G FOR ANY PERIOD LONGER THAN 10 MILLISECONDS. THE TENDERER SHALL SUBMIT CALCULATIONS OR TEST RESULTS TO PROVE COMPLIANCE WITH WIND LOAD CRITERIA.

NOTES:

1. ALL WELDING AND WELD PREPARATION SHALL BE IN ACCORDANCE WITH AS1554.
2. CIRCUMFERENTIAL WELDS TO BE JOGGLED BUTT TYPE, LONGITUDINAL WELDS TO BE SINGLE BUTT TYPE. ALL WELDS TO BE MADE BY CONTINUOUS AUTOMATIC PROCESS AND ARE NOT TO BE DRESSED SMOOTH.
3. AFTER FABRICATION ALL COMPONENTS TO BE ACID DE-SCALED AND HOT DIPPED GALVANIZED MINIMUM 450g/sq.m TO AS4680.
4. WIND LOADING TO COMPLY WITH THE REQUIREMENTS OF AS/NZS 1170.2: 2011 SECTION 4 AND APPENDIX E. DESIGN TO BE BASED ON THE FOLLOWING:
   - IMPORTANCE LEVEL 2
   - REGION C, TERRAIN CATEGORY 2
   - VR strength = 64m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:200 - Fc = 1.05 (INCLUSIVE)
   - VR service = 47m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:25 - Fc=1.0 (INCLUSIVE)
   - FOR MAX HEIGHT NOT EXCEEDING 13M
   - Mz cat = 1.02
   - MAXIMUM WIND SPEED OF V/des = 66m/s,
   - MAXIMUM SERVICABILITY WIND SPEED OF V/deservice=48.5m/s,
   - DEFLECTION LIMIT = 2% OF NOMINAL LENGTH
   - 4.5m OUTREACH ARMS AS SHOWN ON DRAWING E11.
   - LUMINAIRE'S WITH A WIND AREA OF 0.13sq.m, A MASS OF 12kg EACH AND DRAG CO- EFFICIENT OF 0.5
5. COLUMNS ARE TO CONFORM TO THE REQUIREMENTS OF AS4100 AND AS1798.
6. COLUMNS ARE TO HAVE CONTINUOUS TAPER OVER THEIR ENTIRE LENGTH AND A STEEL THICKNESS OF NOT LESS THAN 3mm.
7. TWO PIECE COLUMNS MUST BE ASSEMBLED PRIOR TO DELIVERY.
8. ACCESS DOORS ARE NOT INTERCHANGEABLE. ENSURE THAT INDIVIDUAL COLUMNS AND DOORS ARE SUITABLY MATCHED AND MARKED.
9. EQUIPMENT ACCESS DOOR TO BE PROVIDED (DETAIL C) HAVING 'TAMPER PROOF' LOCKING DEVICE. DOOR ACCESS SCREW TO BE M10 STAINLESS STEEL I.S.O. METRIC BUTTON HEAD SOCKET TYPE.
10. ALL COLUMNS ARE TO BE MANUFACTURED TO ACCEPT THE MOUNTING OF OUTREACHES AS SHOWN ON SHEET E11.
11. ALL POLE MANUFACTURERS SHALL COMPLY WITH ISO 3834.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	26/04/19	CJ	AF
A	PRELIMINARY ISSUE	17/04/19	CJ	AF

AMENDMENTS

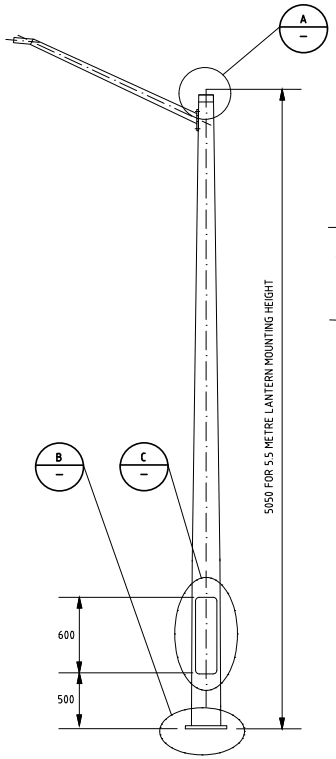
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DESIGNED C J DATE	CHECKED TO DATE
DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE

Northern Territory Government

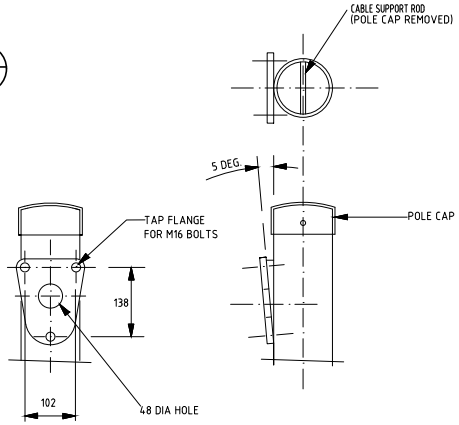
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

STEEL COLUMNS - 12.0M TAPERED OUTREACH TYPE VIAC
TYPICAL DETAILS

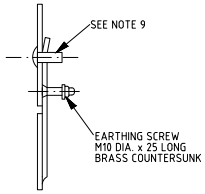
NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E03 OF 16	SS5001	0	A1



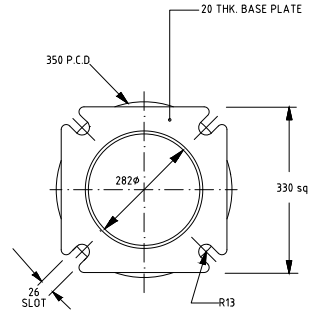
ITEM 1 - 5.5 METRE COLUMN - SINGLE OUTREACH TYPE



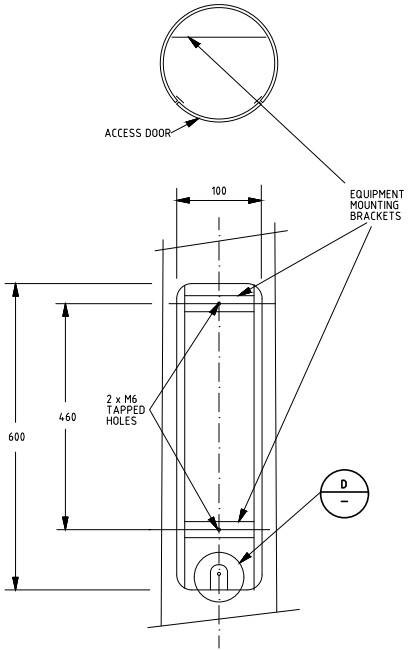
OUTREACH MOUNTING PLATE - DETAIL A



DETAIL D



BASE PLATE - DETAIL B



EQUIPMENT ACCESS - DETAIL C

(DOOR REMOVED FOR CLARITY)

NOTES:

1. ALL WELDING AND WELD PREPARATION SHALL BE IN ACCORDANCE WITH AS1554.
2. CIRCUMFERENTIAL WELDS TO BE JOGGLED BUTT TYPE. LONGITUDINAL WELDS TO BE SINGLE BUTT TYPE. ALL WELDS TO BE MADE BY CONTINUOUS AUTOMATIC PROCESS AND ARE NOT TO BE DRESSED SMOOTH.
3. AFTER FABRICATION ALL COMPONENTS TO BE ACID DE-SCALED AND HOT DIPPED GALVANIZED MINIMUM 450g/sq.m TO AS4680.
4. WIND LOADING TO COMPLY WITH THE REQUIREMENTS OF AS/NZS 1170.2: 2011 SECTION 4 AND APPENDIX E. DESIGN TO BE BASED ON THE FOLLOWING:
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   - VR service = 47m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:25 - Fc=1.0 (INCLUSIVE)
   - FOR MAX HEIGHT NOT EXCEEDING 13M
   - Mz cat = 1.02
   - MAXIMUM WIND SPEED OF V/des = 66m/s,
   - MAXIMUM SERVICABILITY WIND SPEED OF V/deservice=48.5m/s,
   - DEFLECTION LIMIT = 2% OF NOMINAL LENGTH
   - 4.5m OUTREACH ARMS AS SHOWN ON DRAWING E11.
   - LUMINAIRE'S WITH A WIND AREA OF 0.13sq.m, A MASS OF 12kg EACH AND DRAG CO- EFFICIENT OF 0.5
5. COLUMNS ARE TO CONFORM TO THE REQUIREMENTS OF AS4100 AND AS1798.
6. COLUMNS ARE TO HAVE CONTINUOUS TAPER OVER THEIR ENTIRE LENGTH AND A STEEL THICKNESS OF NOT LESS THAN 3mm.
7. TWO PIECE COLUMNS MUST BE ASSEMBLED PRIOR TO DELIVERY.
8. ACCESS DOORS ARE NOT INTERCHANGEABLE. ENSURE THAT INDIVIDUAL COLUMNS AND DOORS ARE SUITABLY MATCHED AND MARKED.
9. EQUIPMENT ACCESS DOOR TO BE PROVIDED (DETAIL C) HAVING 'TAMPER PROOF' LOCKING DEVICE. DOOR ACCESS SCREW TO BE M10 STAINLESS STEEL I.S.O. METRIC BUTTON HEAD SOCKET TYPE.
10. ALL COLUMNS ARE TO BE MANUFACTURED TO ACCEPT THE MOUNTING OF OUTREACHES AS SHOWN ON SHEET E11.
11. ALL POLE MANUFACTURERS SHALL COMPLY WITH ISO 3834.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	26/04/19	CJ	AF
A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

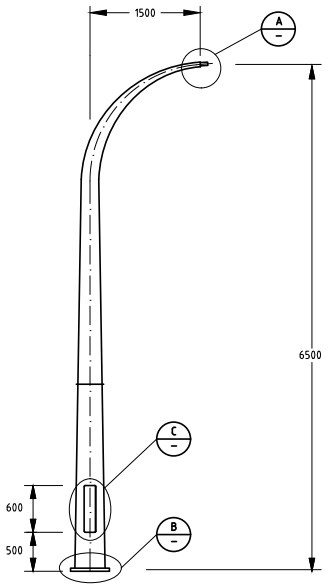
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DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE

Northern Territory Government

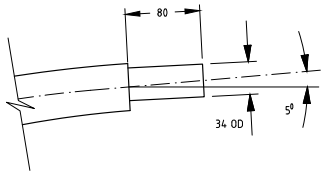
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

STEEL COLUMNS - 5.5M TAPERED OUTREACH TYPE
TYPICAL DETAILS

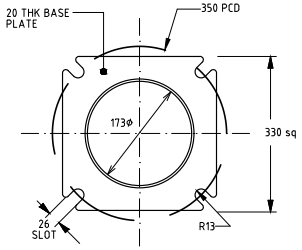
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TBA	TBA	E04 OF 16	SS5003	0	A1



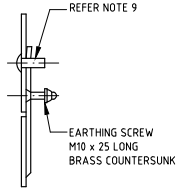
6.5m CURVED OUTREACH TYPE



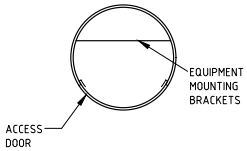
SPIGOT - DETAIL A

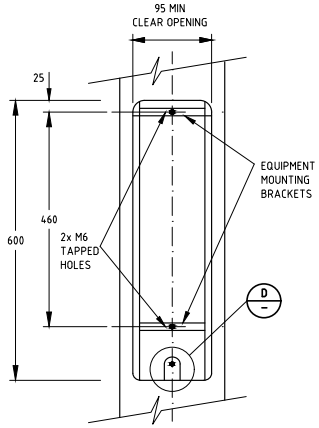


BASE PLATE - DETAIL B



DETAIL D





EQUIPMENT ACCESS - DETAIL C

(DOOR REMOVED FOR CLARITY)

NOTES:

1. ALL WELDING AND WELD PREPARATION SHALL BE IN ACCORDANCE WITH AS1554.
2. CIRCUMFERENTIAL WELDS TO BE JOGGLED BUTT TYPE. LONGITUDINAL WELDS TO BE SINGLE BUTT TYPE. ALL WELDS TO BE MADE BY CONTINUOUS AUTOMATIC PROCESS AND ARE NOT TO BE DRESSED SMOOTH.
3. AFTER FABRICATION ALL COMPONENTS TO BE ACID DE-SCALED AND HOT DIPPED GALVANIZED MINIMUM 450g/sq.m TO AS4680.
4. WIND LOADING TO COMPLY WITH THE REQUIREMENTS OF AS/NZS 1170.2: 2011 SECTION 4 AND APPENDIX E. DESIGN TO BE BASED ON THE FOLLOWING:
   - IMPORTANCE LEVEL 2
   - REGION C, TERRAIN CATEGORY 2
   - VR strength = 64m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:200 - Fc = 1.05 (INCLUSIVE)
   - VR service = 47m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:25 - Fc=1.0 (INCLUSIVE)
   - FOR MAX HEIGHT NOT EXCEEDING 13M
   - Mz cat = 1.02
   - MAXIMUM WIND SPEED OF V/des = 66m/s,
   - MAXIMUM SERVICEABILITY WIND SPEED OF V/de service=48.5m/s,
   - DEFLECTION LIMIT = 2% OF NOMINAL LENGTH
   - 1.5m OUTREACH ARM AS SHOWN.
   - LUMINAIRE'S WITH A WIND AREA OF 0.13sq.m, A MASS OF 12kg EACH AND DRAG CO- EFFICIENT OF 0.5
5. COLUMNS ARE TO CONFORM TO THE REQUIREMENTS OF AS4100 AND AS1798.
6. COLUMNS ARE TO HAVE CONTINUOUS TAPER OVER THEIR ENTIRE LENGTH AND A STEEL THICKNESS OF NOT LESS THAN 3mm.
7. TWO PIECE COLUMNS MUST BE ASSEMBLED PRIOR TO DELIVERY.
8. ACCESS DOORS ARE NOT INTERCHANGEABLE. ENSURE THAT INDIVIDUAL COLUMNS AND DOORS ARE SUITABLY MATCHED AND MARKED.
9. EQUIPMENT ACCESS DOOR TO BE PROVIDED (DETAIL C) HAVING 'TAMPER PROOF' LOCKING DEVICE. DOOR ACCESS SCREW TO BE M10 STAINLESS STEEL I.S.O. METRIC BUTTON HEAD SOCKET TYPE.
10. ALL COLUMNS ARE TO BE MANUFACTURED TO ACCEPT THE MOUNTING OF OUTREACHES AS SHOWN ON SHEET E11.
11. ALL POLE MANUFACTURERS SHALL COMPLY WITH ISO 3834.
12. CURVED OUTREACH IS TO SINGLE SECTION TAPERED TUBULAR STEEL CONSTRUCTION.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

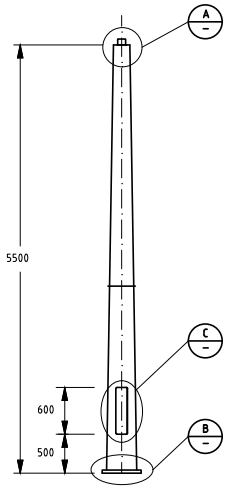
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DESIGNED C J DATE	CHECKED TO DATE		
DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE		

Northern Territory Government

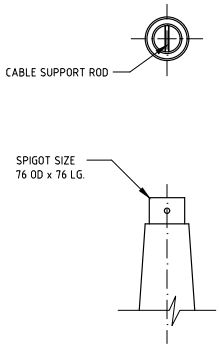
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

STEEL COLUMNS - 6.5M TAPERED CURVED OUTREACH TYPE
TYPICAL DETAILS

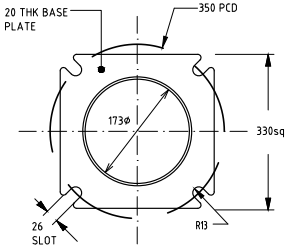
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TBA	TBA	E05 OF 16	SS5004	0	A1



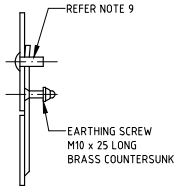
5.5m POST TOP TYPE COLUMN



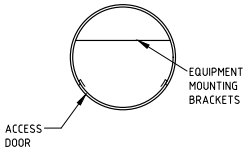
SPIGOT - DETAIL A

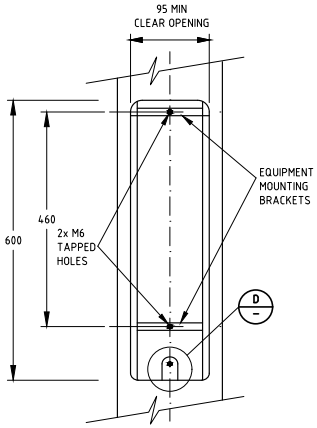


BASE PLATE - DETAIL A



DETAIL D





EQUIPMENT ACCESS - DETAIL C

(DOOR REMOVED FOR CLARITY)

NOTES:

1. ALL WELDING AND WELD PREPARATION SHALL BE IN ACCORDANCE WITH AS1554.
2. CIRCUMFERENTIAL WELDS TO BE JOGGLED BUTT TYPE. LONGITUDINAL WELDS TO BE SINGLE BUTT TYPE. ALL WELDS TO BE MADE BY CONTINUOUS AUTOMATIC PROCESS AND ARE NOT TO BE DRESSED SMOOTH.
3. AFTER FABRICATION ALL COMPONENTS TO BE ACID DE-SCALED AND HOT DIPPED GALVANIZED MINIMUM 450g/sq.m TO AS4680.
4. WIND LOADING TO COMPLY WITH THE REQUIREMENTS OF AS/NZS 1170.2: 2011 SECTION 4 AND APPENDIX E. DESIGN TO BE BASED ON THE FOLLOWING:
   - IMPORTANCE LEVEL 2
   - REGION C, TERRAIN CATEGORY 2
   - VR strength = 64m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:200 - Fc = 1.05 (INCLUSIVE)
   - VR service = 47m/s - ANNUAL PROBABILITY OF EXCEEDEANCE = 1:25 - Fc=1.0 (INCLUSIVE)
   - FOR MAX HEIGHT NOT EXCEEDING 13M
   - Mz cat = 1.02
   - MAXIMUM WIND SPEED OF V/des = 66m/s,
   - MAXIMUM SERVICABILITY WIND SPEED OF V/deservice=48.5m/s,
   - DEFLECTION LIMIT = 2% OF NOMINAL LENGTH
   - 4.5m OUTREACH ARMS AS SHOWN ON DRAWING E11.
   - LUMINAIRE'S WITH A WIND AREA OF 0.13sq.m, A MASS OF 12kg EACH AND DRAG CO- EFFICIENT OF 0.5
5. COLUMNS ARE TO CONFORM TO THE REQUIREMENTS OF AS4100 AND AS1798.
6. COLUMNS ARE TO HAVE CONTINUOUS TAPER OVER THEIR ENTIRE LENGTH AND A STEEL THICKNESS OF NOT LESS THAN 3mm.
7. TWO PIECE COLUMNS MUST BE ASSEMBLED PRIOR TO DELIVERY.
8. ACCESS DOORS ARE NOT INTERCHANGEABLE. ENSURE THAT INDIVIDUAL COLUMNS AND DOORS ARE SUITABLY MATCHED AND MARKED.
9. EQUIPMENT ACCESS DOOR TO BE PROVIDED (DETAIL C) HAVING 'TAMPER PROOF' LOCKING DEVICE. DOOR ACCESS SCREW TO BE M10 STAINLESS STEEL I.S.O. METRIC BUTTON HEAD SOCKET TYPE.
10. ALL COLUMNS ARE TO BE MANUFACTURED TO ACCEPT THE MOUNTING OF OUTREACHES AS SHOWN ON SHEET E11.
11. ALL POLE MANUFACTURERS SHALL COMPLY WITH ISO 3834.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

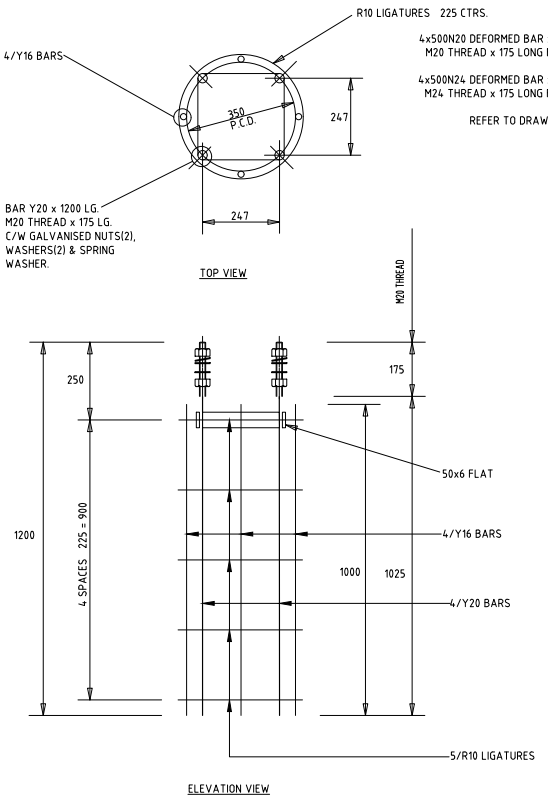
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DESIGNED C J DATE	CHECKED TO DATE
DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE

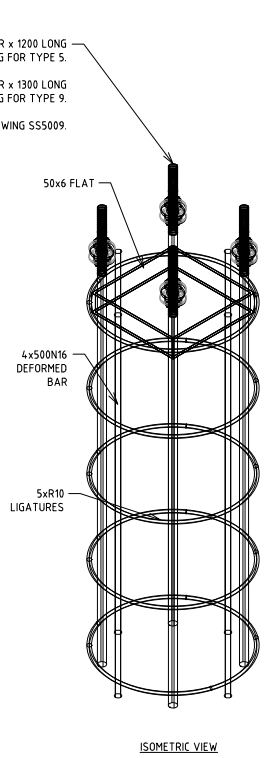
Northern Territory Government

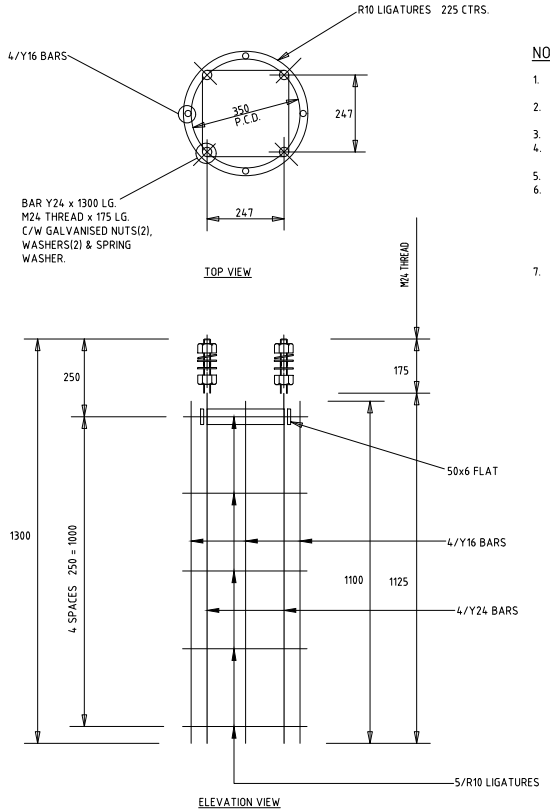
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

STEEL COLUMNS - 5.5M TAPERED POST TOP TYPE
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E06 OF 16	SS5005	0	A1







NOTES:

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3679 P1 AND AS 1302.
2. ALL WELDING AND WELD PREPARATION TO BE TO AS1554. FILLET WELDS TO BE 6mm UNLESS NOTED OTHERWISE.
3. 50x6 FLAT BAR TO BE WELDED TO RAG BOLTS ONLY.
4. RAG BOLTS SHALL BE GRADE 500N DEFORMED BARS. MINIMUM 175mm THREAD (TO AS1275) SHALL BE CUT IN TO DEFORMED BARS.
5. PITCH CIRCLE DIAMETER (P.C.D.) OF RAG BOLTS IS CRITICAL.
6. THE 175mm THREADED SECTION OF THE RAG BOLTS TOGETHER WITH THE ASSOCIATED NUTS AND WASHERS SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH AS 2312. NUTS AND WASHERS SHALL BE GRADE 8.8 AND AFTER GALVANISING BE FIRM FITTING ON THE THREADED SECTION OF THE RAG BOLTS -IN ACCORDANCE WITH AS 1112,AS 1237 AND AS 1252, AS APPROPRIATE
7. THIS DESIGN OF RAG BOLT REINFORCEMENT FOUNDATION IS BASED ON SOIL WHICH HAS A SHEAR STRENGTH OF NOT LESS THAN 200kPa i.e.,COMPACT MEDIUM CLAY,WELL BONDED SANDY LOAM, BONDED SAND AND GRAVEL WITH REASONABLE SURFACE WATER DRAINAGE (OR BETTER CONDITIONS THAN DESCRIBED). ANY SOIL CONDITIONS HAVING A SHEAR STRENGTH OF LESS THAN 200kPa i.e.,SOFT CLAY,POOR COMPACTED SAND AND SOILS THAT TEND TO ABSORB LARGE AMOUNTS OF WATER, WILL REQUIRE SPECIAL FOUNDATION DESIGN OF LARGER DIMENSION.

TYPE APPLICATION:

ITEM 1: TYPE 5 - FOR USE WITH 5.5 METRE POST TOP TAPERED STEEL COLUMNS.
ITEM 2: TYPE 9 - FOR USE WITH 6.5 METRE AND 9.0 METRE TAPERED STEEL COLUMNS WITH OUTREACH ARMS.

REFERENCE DRAWINGS:

SS5008 - RAG BOLT REINFORCEMENT FOOTING ARRANGEMENTS
SS5009 - RAG BOLT REINFORCEMENT BAR - DEFORMED

ITEM 1 - RAG BOLT REINFORCEMENT ASSEMBLY - TYPE 5

ITEM 2 - RAG BOLT REINFORCEMENT ASSEMBLY - TYPE 9

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	26/04/19	CJ	AF
A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

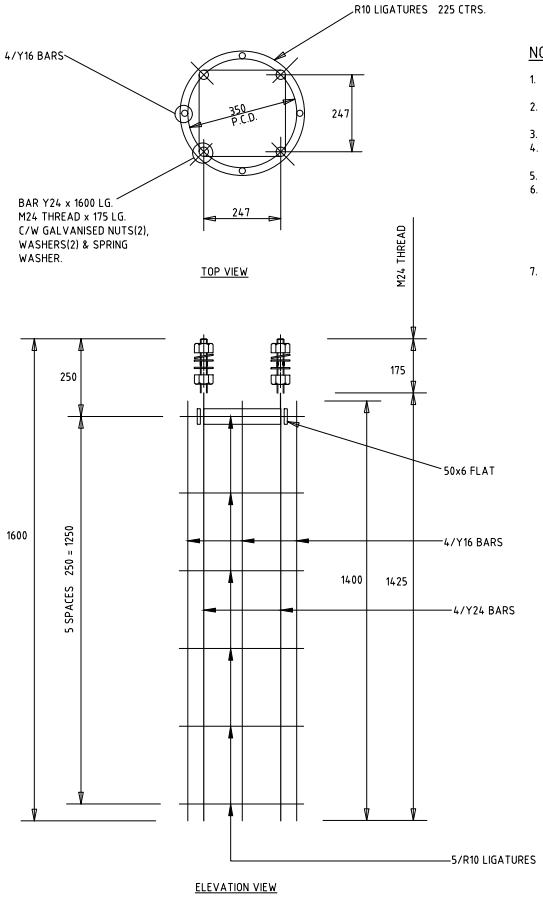
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DESIGN PROJECT LEADER PB	DATE	NTG PROJECT MANAGER TO	DATE

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

TYPE 5 AND TYPE 9 RAG BOLT REINFORCEMENT
REINFORCEMENT TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E07 OF 16	SS5006	0	A1



ITEM 3 - RAG BOLT REINFORCEMENT ASSEMBLY - TYPE 12

NOTES:

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3679 Pt1 AND AS 1302.
2. ALL WELDING AND WELD PREPARATION TO BE TO AS1554. FILLET WELDS TO BE 6mm UNLESS NOTED OTHERWISE.
3. 50x6 FLAT BAR TO BE WELDED TO RAG BOLTS ONLY.
4. RAG BOLTS SHALL BE GRADE 500N DEFORMED BARS. MINIMUM 175mm THREAD (TO AS1275) SHALL BE CUT IN TO DEFORMED BARS.
5. PITCH CIRCLE DIAMETER (P.C.D.) OF RAG BOLTS IS CRITICAL.
6. THE 175mm THREADED SECTION OF THE RAG BOLTS TOGETHER WITH THE ASSOCIATED NUTS AND WASHERS SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH AS 2312. NUTS AND WASHERS SHALL BE GRADE 8.8 AND AFTER GALVANISING BE FIRM FITTING ON THE THREADED SECTION OF THE RAG BOLTS -IN ACCORDANCE WITH AS 1112,AS 1237 AND AS 1252, AS APPROPRIATE
7. THIS DESIGN OF RAG BOLT REINFORCEMENT FOUNDATION IS BASED ON SOIL WHICH HAS A SHEAR STRENGTH OF NOT LESS THAN 200kPa i.e.,COMPACT MEDIUM CLAY,WELL BONDED SANDY LOAM, BONDED SAND AND GRAVEL WITH REASONABLE SURFACE WATER DRAINAGE (OR BETTER CONDITIONS THAN DESCRIBED). ANY SOIL CONDITIONS HAVING A SHEAR STRENGTH OF LESS THAN 200kPa i.e.,SOFT CLAY,POOR COMPACTED SAND AND SOILS THAT TEND TO ABSORB LARGE AMOUNTS OF WATER, WILL REQUIRE SPECIAL FOUNDATION DESIGN OF LARGER DIMENSION.

TYPE APPLICATION:

ITEM 3: TYPE 12 - FOR USE WITH 12.0 METRE SINGLE AND DOUBLE OUTREACH TAPERED STEEL COLUMN.

REFERENCE DRAWINGS:

SS5008- RAG BOLT REINFORCEMENT FOOTING ARRANGEMENTS
SS5009 - RAG BOLT REINFORCEMENT BAR - DEFORMED

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	17/04/19	CJ	AF

AMENDMENTS

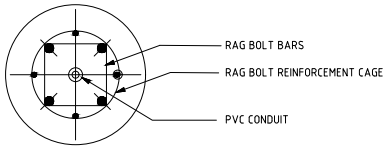
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Northern Territory Government

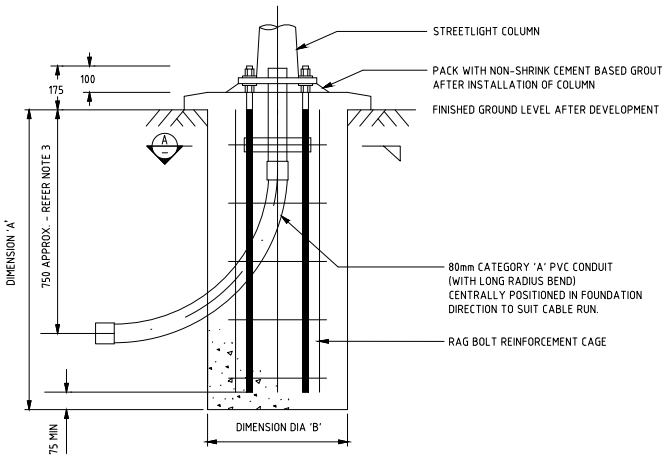
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

TYPE 12 RAG BOLT REINFORCEMENT
REINFORCEMENT TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E08 OF 16	SS5007	0	A1



SECTION A



SECTIONAL ELEVATION

FOOTING SELECTION TABLE			
COLUMN DESCRIPTION	FOUNDATION DIMENSIONS 'A'	'B'	RAG BOLT TYPE
5.5 METRE POST TOP & 5.5 METRE SINGLE OUTREACH	1100	600	5
6.5 METRE CURVED & 9 METRE SINGLE OUTREACH	1200	600	9
12 METRE SINGLE & DOUBLE OUTREACH	1500	600	12

NOTES:

1. ALL REINFORCEMENT, CONCRETE AND CONCRETE MATERIALS SHALL BE IN ACCORDANCE WITH AS3600.
2. MINIMUM COMPRESSIVE DESIGN STRENGTH (F'c) SHALL BE 20MPa AT 28 DAYS.
3. WHERE CONNECTION TO STREETLIGHT COLUMN IS FROM A CABLE PIT, DEPTH OF CONDUIT FOR CABLE ENTRY TO BE DEPENDENT ON LOCATION AND DEPTH OF CABLE PIT TO MINIMUM COVER OF 500mm.
4. COVER TO REINFORCEMENT SHALL BE 75mm MINIMUM.

REFERENCE DRAWINGS:

SS5006 RAG BOLT REINFORCEMENT TYPE 5 AND 9
SS5007 RAG BOLT REINFORCEMENT TYPE 12
SS5009 RAG BOLT REINFORCEMENT, BAR - DEFORMED

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

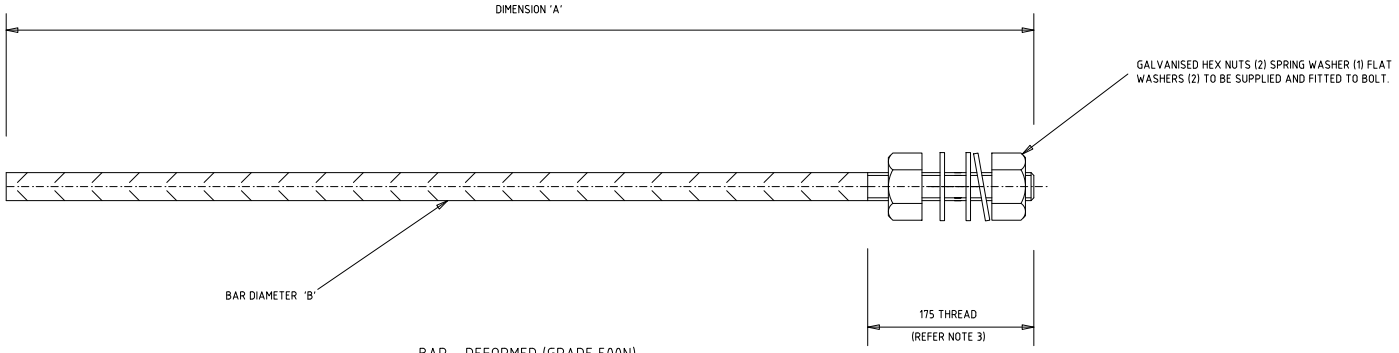
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DATE		DATE	
DESIGNED	C J	CHECKED	TO
DATE		DATE	
DESIGN PROJECT LEADER	PB	NTG PROJECT MANAGER	TO
DATE		DATE	

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

TYPE 5, 9 AND 12 RAG BOLT ASSEMBLY FOOTING
FOOTING TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E09 OF 16	SS5008	0	A1



BAR - DEFORMED (GRADE 500N)

ITEM	DIM. 'A'	DIA. 'B'	THREAD
1	1200	20	M20
2	1300	24	M24
3	1600	24	M24

NOTES:

1. DEFORMED BAR TO BE IN ACCORDANCE WITH AS/NZS 4671.
2. DEFORMED BAR SHALL BE GRADE 500N. MINIMUM 175 mm THREAD (TO AS 1275) SHALL BE CUT STRICTLY IN ACCORDANCE WITH TEMPCORE INSTRUCTIONS.
3. THE 175 mm THREADED SECTION OF THE DEFORMED BAR SHALL BE HOT DIPPED GALVANISED IN ACCORDANCE WITH AS 1650.
4. NUTS AND WASHERS (TO AS 1252) AND FIRM FITTING ON TO BE GRADE 8.8, GALVANISED CORROSION PROTECTED THREAD.

REFERENCE DRAWINGS:

SS5006 RAG BOLT REINFORCEMENT TYPE 5 AND TYPE 9.
SS5007 RAG BOLT REINFORCEMENT TYPE 12.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	26/04/19	CJ	AF
A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

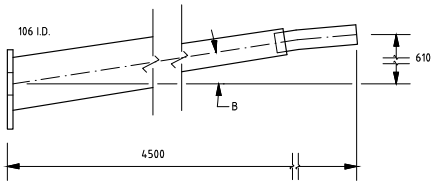
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DESIGNED C J DATE	CHECKED TO DATE
DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE

Northern Territory Government

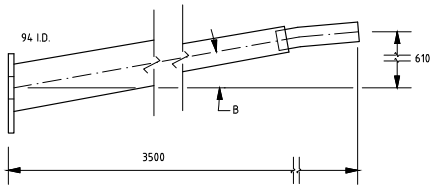
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

RAG BOLT REINFORCEMENT DEFORMED BAR
DEFORMED REINFORCEMENT BAR TYPICAL DETAILS

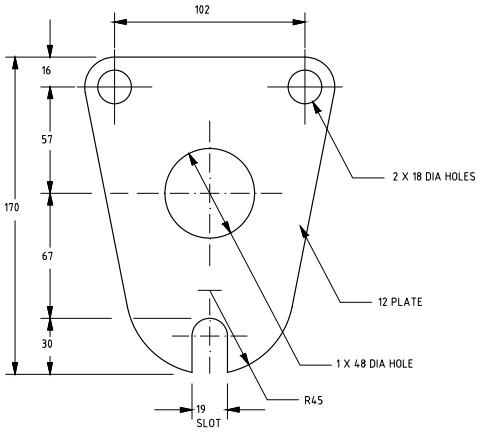
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TBA	TBA	E10 OF 16	SS5009	0	A1



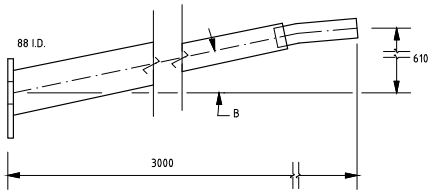
ITEM 1



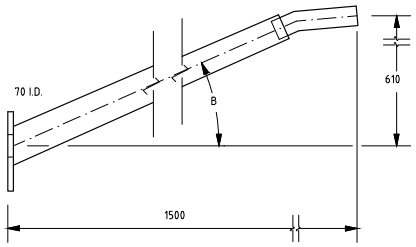
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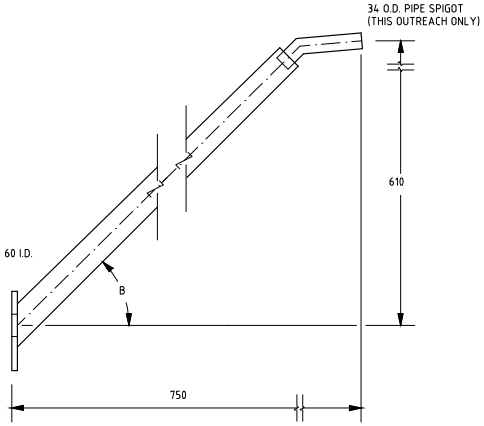
MOUNTING FLANGE DETAIL



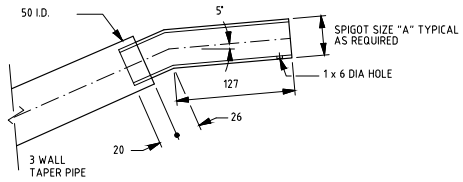
ITEM 3



ITEM 4



ITEM 5



TYPICAL SPIGOT DETAIL

NOTES:

1. ALL WELDING AND WELD PREPARATION SHALL BE IN ACCORDANCE WITH AS1554.
2. CIRCUMFERENTIAL WELDS TO BE JOGGLED BUTT TYPE. LONGITUDINAL WELDS TO BE SINGLE BUTT TYPE. ALL WELDS TO BE MADE BY CONTINUOUS AUTOMATIC PROCESS AND ARE NOT TO BE DRESSED SMOOTH.
3. AFTER FABRICATION ALL COMPONENTS TO BE ACID DE-SCALED AND HOT DIPPED GALVANIZED MINIMUM 450g/sq.m TO AS4680.
4. WIND LOADINGS TO COMPLY WITH THE REQUIREMENTS OF AS1170 PART 2, i.e. REGION C AND TERRAIN CATEGORY 2. DESIGN TO BE BASED ON LUMINARIES WITH A WIND AREA OF 0.13sq.m, A MASS OF 12kg AND A DRAG COEFFICIENT OF 0.8 APPLIED TO IT.
5. OUTREACHES ARE TO CONFORM TO THE REQUIREMENTS OF AS4100 AND AS1798.
6. OUTREACHES ARE TO HAVE CONTINUOUS TAPER OVER THEIR ENTIRE LENGTH.
7. OUTREACHES OF A SHARP PRISMATIC SHAPE, i.e. POLYGONAL WILL NOT BE CONSIDERED DUE TO THEIR INCREASED DRAG COEFFICIENT.
8. ALL OUTREACH MANUFACTURERS SHALL COMPLY WITH ISO 3834.

OUTREACH DESCRIPTION			
ITEM No.	SPIGOT SIZE "A"	NOMINAL LENGTH "B"	UPLIFT ANGLE
1	42mm	4.5m	9°
2	42mm	3.5m	10°
3	42mm	3.0m	12°
4	42mm	1.5m	24°
5	34mm	0.75m	45°

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
0	ISSUED AS A STANDARD DRAWING	26/04/19	CJ	AF
A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

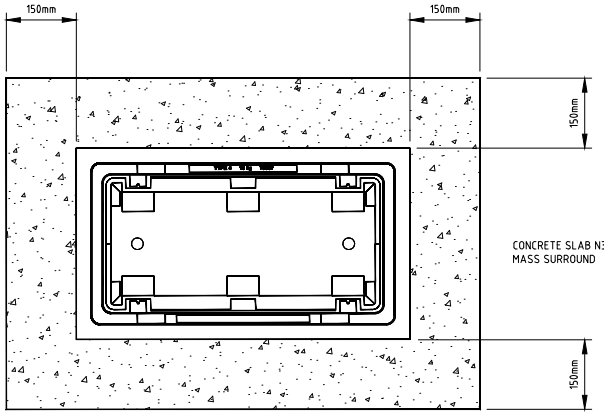
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DESIGNED C J DATE	CHECKED TO DATE		
DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE		

Northern Territory Government

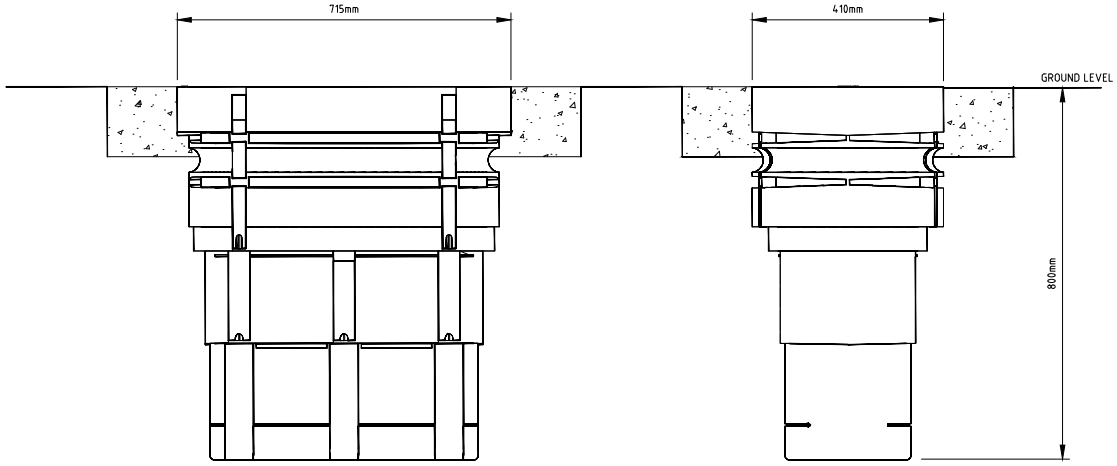
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

OUTREACH ARMS
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E11 OF 16	SS5010	0	A1



PLAN



ELEVATION/SECTION

END ELEVATION/SECTION

NOTES:

1. ACO PIT TYPE 4 OR EQUAL.
2. CABLE JOINTING PIT MATERIAL TO BE HIGH DENSITY POLY-ETHYLENE.
3. CONCRETE COVER TO HAVE A MINIMUM COMPRESSIVE DESIGN STRENGTH OF N32/20/80.
4. ALL REINFORCEMENT, CONCRETE AND CONCRETE MATERIALS SHALL BE IN ACCORDANCE WITH AS1379 AND AS3600.
5. ENGRAVED LETTERING IN CONCRETE COVER TO BE "ELECTRICAL".
4. CONCRETE COVER TO HAVE A NON-SLIP FINISH ON THE UPPER SURFACE.
5. AREA AROUND LID MUST BE RIGIDLY SUPPORTED BY MIN 150mm WIDE x 150mm DEEP CONCRETE SURROUND AS SHOWN.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

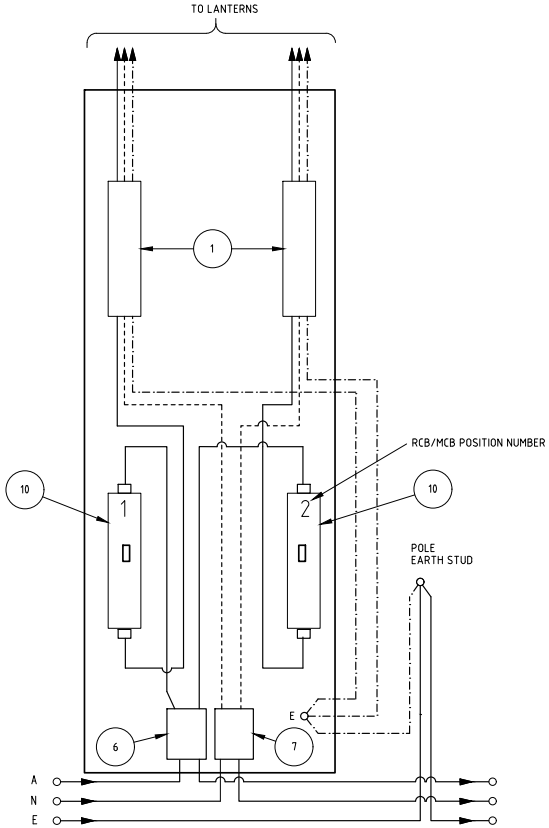
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Northern Territory Government

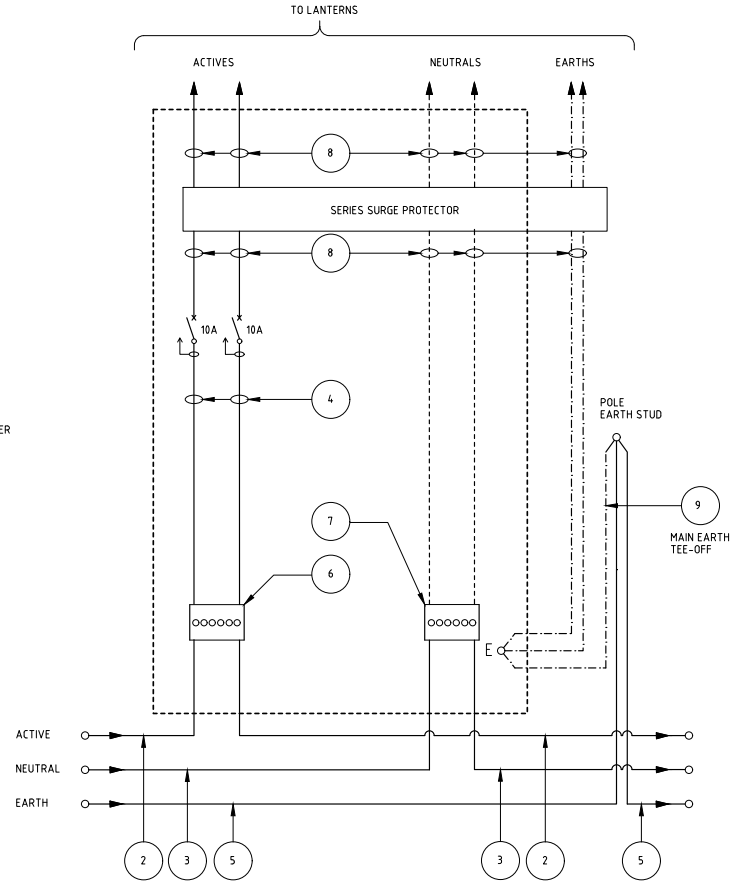
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

CABLE PIT
TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E12 OF 16	SS5011	0	A1



WIRING DIAGRAM



SCHEMATIC WIRING DIAGRAM

NOTES:

1. FOR RIGIDLY MOUNTED COLUMNS ONLY.
2. FOR SINGLE LUMINAIRE APPLICATIONS FIT ONE RCD/CB AT POSITION 1.
3. FOR DOUBLE LUMINAIRE APPLICATIONS FIT ONE RCD/CB AT BOTH POSITIONS 1 & 2.
4. ALL CABLES SHALL HAVE DESTINATION TAG WITH CRITCHLEY K-TYPE TAG SECURED TO THE CABLE WITH NYLON CABLE TIES.

ITEM No.	Q.TY.	DESCRIPTION
1	AR	SERIES SURGE PROTECTION
2	AR	25sqmm CU CABLE - BLACK
3	AR	25sqmm CU CABLE BLACK
4	AR	16sqmm CU CABLE - RED
5	AR	35sqmm CU G/Y PVC
6	1	INSULATED MIN. 6 HOLE RED ACTIVE LINK TO SUIT UP TO 35sqmm Cu CABLE
7	1	INSULATED MIN. 6 HOLE BLACK NEUTRAL LINK TO SUIT UP TO 35sqmm Cu CABLE
8	AR	4sqmm TWIN/ECC CABLE
9	AR	6sqmm CU GR/Y INSULATED CABLE
10	AR	10A RCD/CB 10kA TYPE B 30mA

TO BE READ IN CONJUNCTION WITH DRAWING SS5013

ABBREVIATION: AR = AS REQUIRED

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
1	DELETED PREVIOUS ITEM 5	08/07/19	CJ	AF
0	ISSUED AS A STANDARD DRAWING	26/04/19	CJ	AF
A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

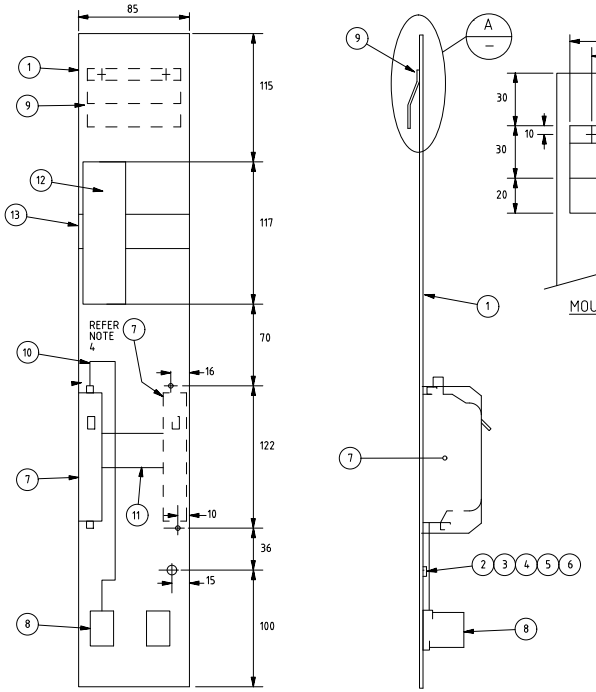
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Northern Territory Government

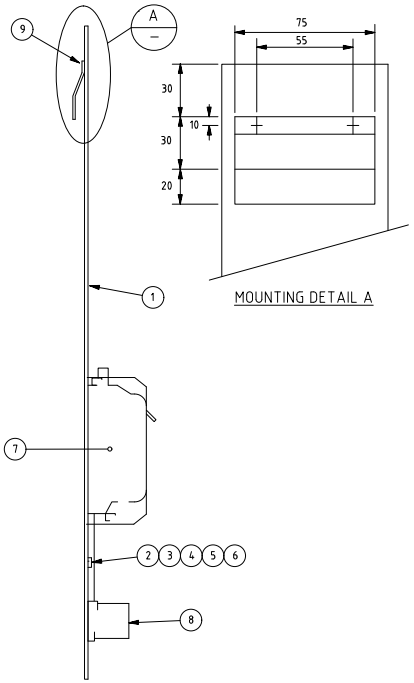
SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

LED LUMINAIRE SWITCH PACK
WIRING DIAGRAM

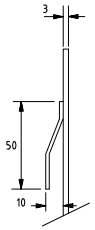
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TBA	TBA	E13 OF 16	SS5012	1	A1



SWITCH PACK LIGHTING COLUMN WITH SURGE PROTECTOR



MOUNTING DETAIL A



NOTES :

1. ALL MOUNTING HOLES TO BE 4 mm DIA.
2. SECURE RAIL AND RESIDUAL CURRENT CIRCUIT BREAKER/S WITH SELF-TAPPING SCREWS (COUNTERSUNK FOR RAILS).
3. MOUNTING BRACKET TO BE RIVETED TO BASE PLATE.
4. WHEN USED WITH DOUBLE OUTREACH COLUMNS, USE AN ADDITIONAL BREAKER IN POSITION SHOWN.

ITEM No.	Q.TY.	DESCRIPTION
1	1	ALUMINIUM BASE PLATE 560mm X 85mm X 3mm
2	1	STAINLESS STEEL 5 mm 'STANKO" LUG
3	1	STAINLESS STEEL 5 mm WASHER
4	1	STAINLESS STEEL 5 mm SPLIT WASHER
5	1	STAINLESS STEEL 5 mm BOLT
6	2	STAINLESS STEEL 5 mm NUTS
7	AR	RCD/MCB - 10kA - 10 A DIN
8	2	ACTIVE AND NEUTRAL LINKS (1 EACH)
9	1	MOUNTING BRACKET
10	AR	CABLE Cu 4 sqmm PVC RED SDI
11	1	DIN RAIL FOR RCD/MCBs
12	1	SERIES SURGE PROTECTOR 15kA
13	1	DIN RAIL FOR SURGE PROTECTION DEVICE

TO BE READ IN CONJUNCTION WITH DRAWING SS5012

ABBREVIATION: AR = AS REQUIRED

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	15/04/19	CJ	AF

AMENDMENTS

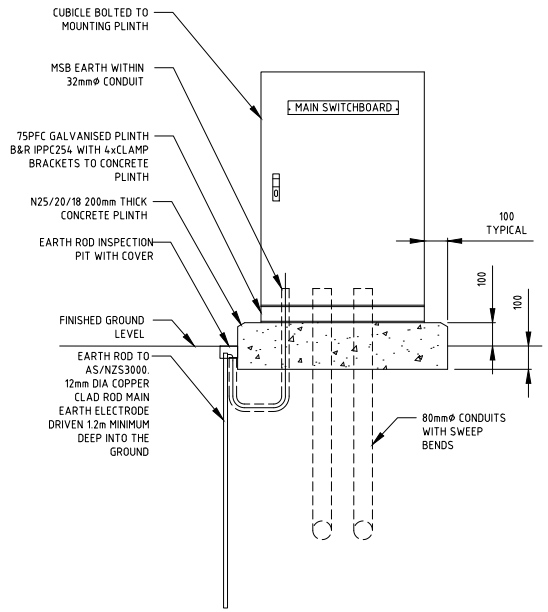
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SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

LED LUMINARE SWITCH PACK DETAILS
TYPICAL DETAILS

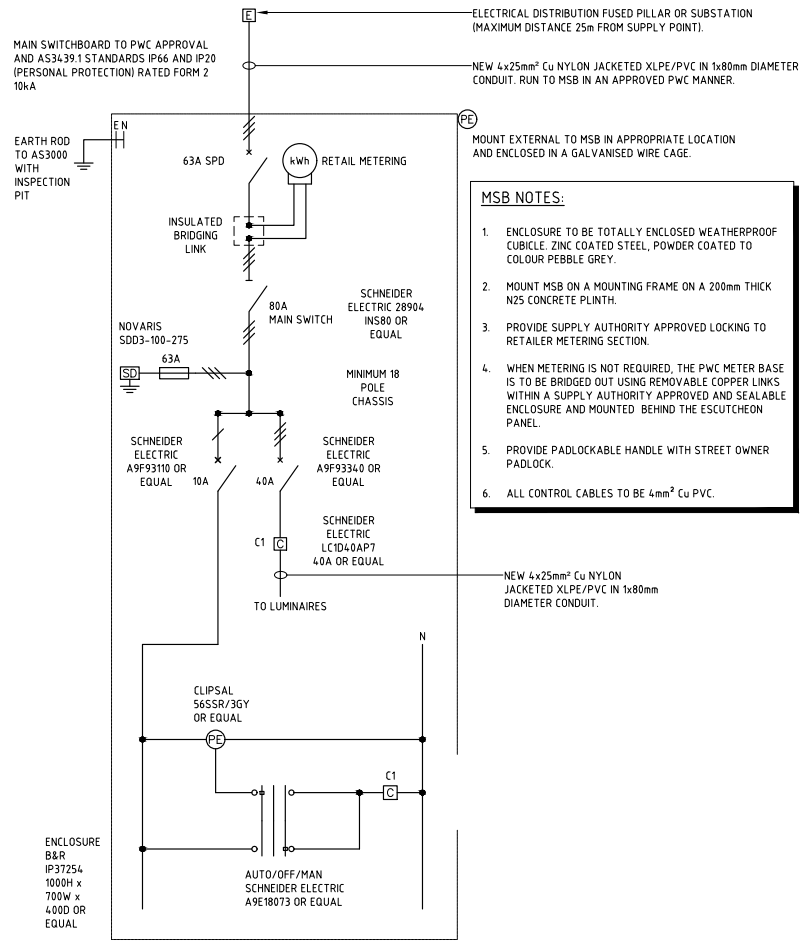
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TBA	TBA	E14 OF 16	SS5013	0	A1



MSB ELEVATION ASSEMBLY FOR UNDERGROUND STREET LIGHTING SCHEMES

SWITCHBOARD SCHEMATICS

- ONE PHASE
- THREE PHASE
- ON LOAD ISOLATOR
- CIRCUIT BREAKER
- COMBINED RESIDUAL CURRENT DEVICE/CIRCUIT BREAKER (30mA SENSITIVITY UNO)
- ENERGY METER
- EARTH/NEUTRAL CONNECTION
- CONTACTOR
- SURGE DIVERTER
- FUSE
- ELECTRICAL SUPPLY PILLAR OR SUBSTATION
- PHOTO ELECTRIC CELL



MSB NOTES:

1. ENCLOSURE TO BE TOTALLY ENCLOSED WEATHERPROOF CUBICLE. ZINC COATED STEEL, POWDER COATED TO COLOUR PEBBLE GREY.
2. MOUNT MSB ON A MOUNTING FRAME ON A 200mm THICK N25 CONCRETE PLINTH.
3. PROVIDE SUPPLY AUTHORITY APPROVED LOCKING TO RETAILER METERING SECTION.
4. WHEN METERING IS NOT REQUIRED, THE PWC METER BASE IS TO BE BRIDGED OUT USING REMOVABLE COPPER LINKS WITHIN A SUPPLY AUTHORITY APPROVED AND SEALABLE ENCLOSURE AND MOUNTED BEHIND THE ESCUTCHEON PANEL.
5. PROVIDE PADLOCKABLE HANDLE WITH STREET OWNER PADLOCK.
6. ALL CONTROL CABLES TO BE 4mm² Cu PVC.

MSB SCHEMATIC DIAGRAM WITH TIME CONTROL FOR UNDERGROUND STREET LIGHTING SCHEMES

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	10/04/19	CJ	AF

AMENDMENTS

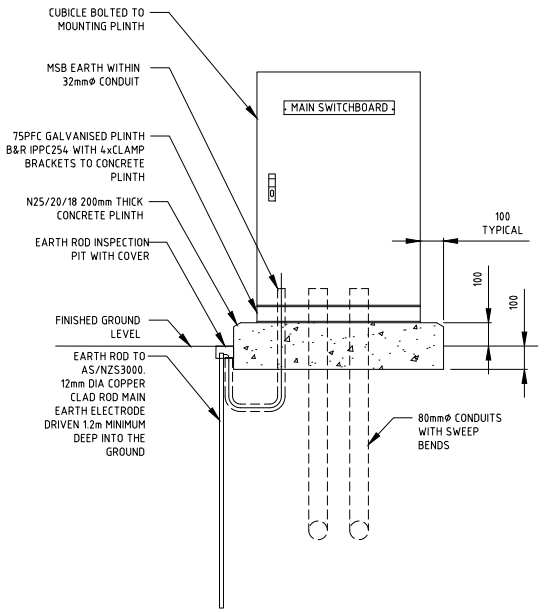
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DESIGNED C J DATE	CHECKED TO DATE
DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE

Northern Territory Government

SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

MSB WITH TIME CONTROL WIRING DIAGRAM AND DETAILS
WIRING DIAGRAM AND TYPICAL DETAILS

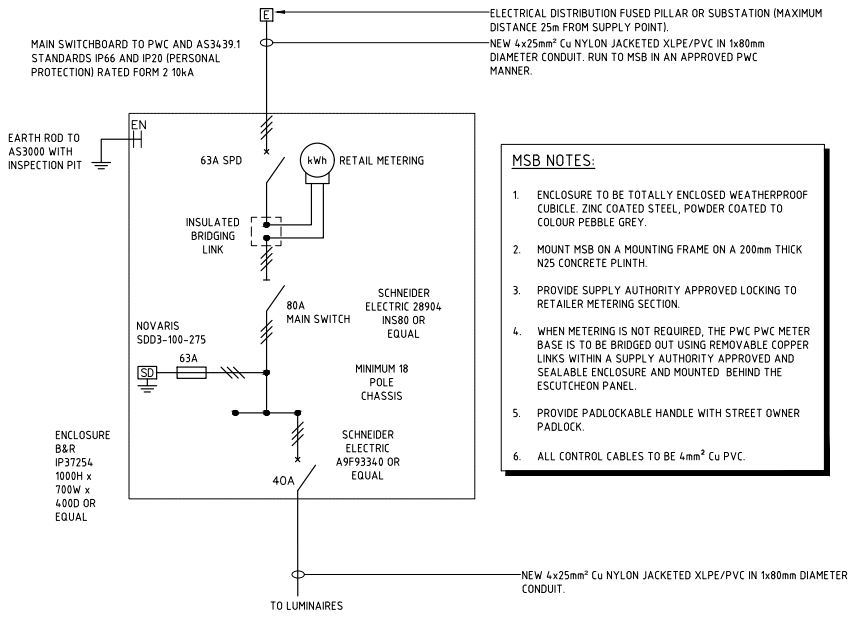
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TBA	TBA	E15 OF 16	SS5014	0	A1



MSB ELEVATION ASSEMBLY FOR UNDERGROUND STREET LIGHTING SCHEMES

SWITCHBOARD SCHEMATICS

- ONE PHASE
- THREE PHASE
- ON LOAD ISOLATOR
- CIRCUIT BREAKER
- COMBINED RESIDUAL CURRENT DEVICE/CIRCUIT BREAKER (30mA SENSITIVITY UNO)
- kWh ENERGY METER
- EARTH/NEUTRAL CONNECTION
- C CONTACTOR
- SD SURGE DIVERTER
- FUSE
- E ELECTRICAL SUPPLY PILLAR OR SUBSTATION
- PE PHOTO ELECTRIC CELL



MSB SCHEMATIC DIAGRAM WITHOUT TIME CONTROL FOR UNDERGROUND STREET LIGHTING SCHEMES

MSB NOTES:

1. ENCLOSURE TO BE TOTALLY ENCLOSED WEATHERPROOF CUBICLE. ZINC COATED STEEL, POWDER COATED TO COLOUR PEBBLE GREY.
2. MOUNT MSB ON A MOUNTING FRAME ON A 200mm THICK N25 CONCRETE PLINTH.
3. PROVIDE SUPPLY AUTHORITY APPROVED LOCKING TO RETAILER METERING SECTION.
4. WHEN METERING IS NOT REQUIRED, THE PWC PWC METER BASE IS TO BE BRIDGED OUT USING REMOVABLE COPPER LINKS WITHIN A SUPPLY AUTHORITY APPROVED AND SEALABLE ENCLOSURE AND MOUNTED BEHIND THE ESCUTCHEON PANEL.
5. PROVIDE PADLOCKABLE HANDLE WITH STREET OWNER PADLOCK.
6. ALL CONTROL CABLES TO BE 4mm² Cu PVC.

SCALE: N.T.S.

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY.
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A	PRELIMINARY ISSUE	12/04/19	CJ	AF

AMENDMENTS

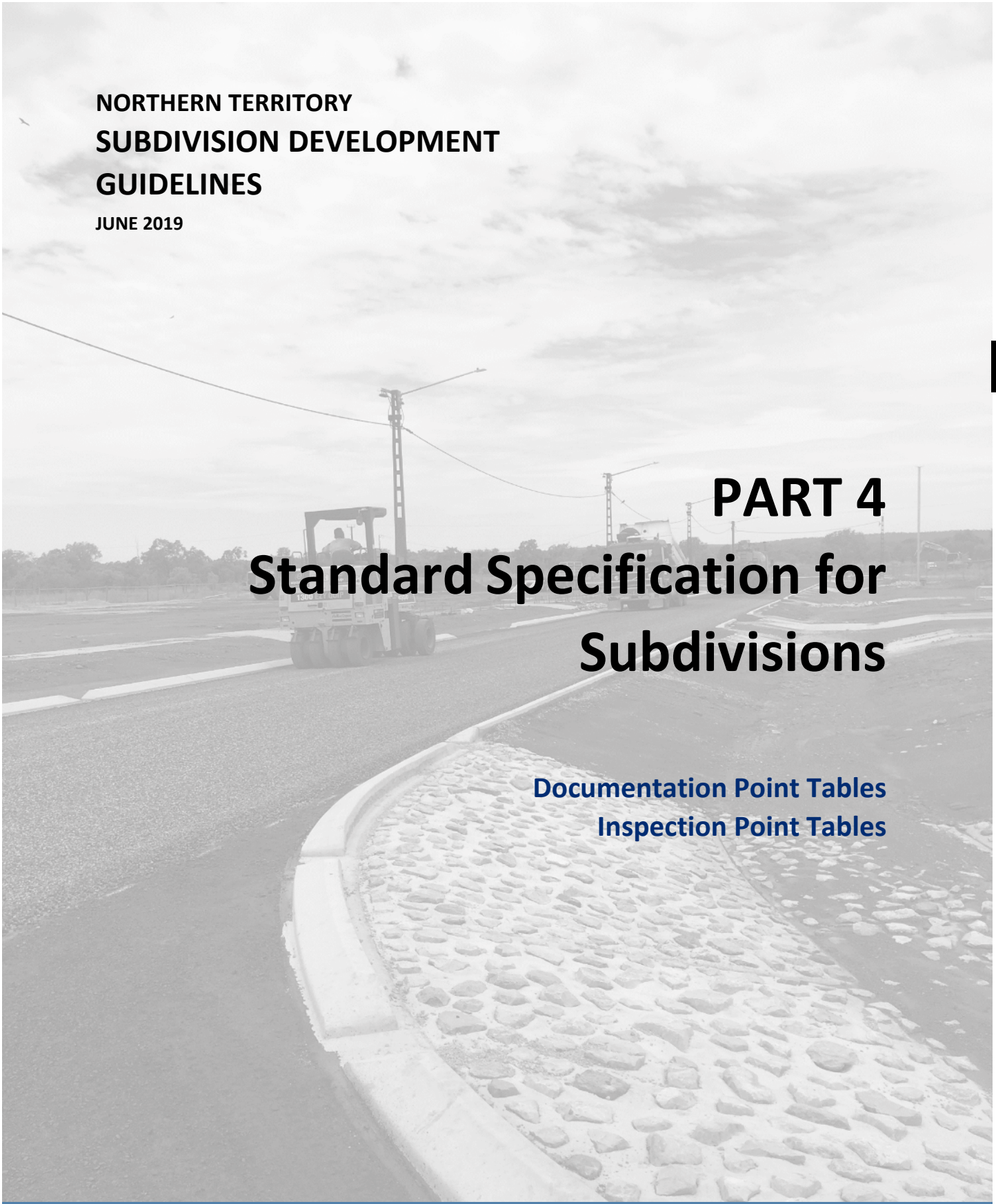
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DESIGN PROJECT LEADER PB DATE	NTG PROJECT MANAGER TO DATE		

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SUBDIVISION DEVELOPMENT GUIDELINES STANDARD DRAWINGS
LIGHTING

MSB WITH NO TIME CONTROL WIRING DIAGRAM AND DETAILS
WIRING DIAGRAM AND TYPICAL DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
TBA	TBA	E16 OF 16	SS5015	0	A1



NORTHERN TERRITORY

SUBDIVISION DEVELOPMENT GUIDELINES

JUNE 2019

PART 4
Standard Specification for Subdivisions

Documentation Point Tables
Inspection Point Tables

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Introduction

The Standard Specification for Subdivisions provides best practice construction standards for important Public Infrastructure and sets out the minimum standards required by Relevant Authorities to facilitate clearance of Development Permit conditions. This includes stipulating requirements for documentation to be submitted (Documentation Points) as well as inspections to be undertaken (Inspection Points), which are summarised in the attached tables.

Use of this Document

Prior to commencing the Development Works on the Development Site, the Developer and Relevant Authority must use the attached tables to agree on whether each Documentation Point and Inspection Point is to be considered a Hold Point or Witness Point for both the Relevant Authority and the Certifying Engineer. Once confirmed, this will inform the development of Inspection Test Plans (ITPs) for the Development Works.

The nomination of formal Documentation Points and Inspection Points does not absolve the Developer of their responsibility to implement their own Project Controls and Quality Assurance plans to ensure the Development Works is conforming to all necessary requirements. It is expected that the Developer will employ Quality Management personnel and undertake their own internal Witness Points and Hold Points, beyond that required by these tables. It is also expected that the Developer will undertake their own internal inspections to confirm conformance prior to requesting attendance at Inspection Points from the Relevant Authority and/or Certifying Engineer.

The nominated Documentation Points and Inspection Points do not address all requirements for Conformance Testing, where specified in the Standard Specification. The Developer must ensure that all necessary Conformance Testing is identified in the ITPs and delivered to the Certifying Engineer for Certification of the Development Works.

Definitions

Documentation Point	means any stage of the Development Works identified in Table A as a point at which certain documentation is required to be submitted. Each Documentation Point will also be either a Hold Point or a Witness Point as indicated in Table A.
Hold Point (HP)	means any Documentation Point where documentation must be submitted and the relevant Development Works must not proceed until written approval is provided. means any Inspection Point where a physical inspection must be undertaken and the relevant Development Works must not proceed until written approval is provided.
Inspection Point	means any stage of the Development Works identified in Table B as a point at which a physical inspection of the relevant Development Works may be required. Each Inspection Point will also be either a Hold Point or a Witness Point, as indicated in Table B.
Witness Point (WP)	means any Documentation Point where documentation must be submitted and the relevant Development Works may proceed subject to any notice to the contrary. means any Inspection Point where an opportunity to inspect the Development Works must be given.

Hold Points

(a) For each Documentation Point that is also a Hold Point:
  (i) the Developer must:
    a. provide the relevant documentation to the Relevant Authority and/or Certifying Engineer (as applicable) for approval;
    b. not proceed with any Development Works relevant to the documentation until the Relevant Authority and/or Certifying Engineer (as applicable) provides written approval to proceed.
  (ii) the Relevant Authority and/or Certifying Engineer (as applicable) must review the relevant documentation and, at the earliest practicable opportunity, provide a written approval to proceed with the Development Works or a written response setting out any variations or modifications to the documentation required before approval to proceed will be given (in which case clauses (a)(i) and (a)(ii) will apply again).

(b) For each Inspection Point that is also a Hold Point:
  (i) the Developer must;
    a. provide not less than 2 Business Days prior written notice to the Relevant Authority and/or Certifying Engineer (as applicable); and
    b. not proceed with any subsequent works that would conceal or otherwise render those works incapable of inspection, amendment or correction until the Relevant Authority and/or Certifying Engineer (as applicable) provides written approval to proceed.
  (ii) After receiving notice from the Developer, the Relevant Authority and/or Certifying Engineer (as applicable) must:
    a. undertake an inspection of the relevant Development Works at the earliest practicable opportunity;
    b. provide a written approval to proceed with the Development Works or a written response setting out any variations, modifications or further works required before approval to proceed will be given (in which case clauses (b)(i) and (b)(ii) will apply again).
  (iii) The Developer and the Relevant Authority and/or Certifying Engineer must all make best endeavours to facilitate, and must not unreasonably delay, the inspection.

Witness Points

(a) For each Documentation Point that is also a Witness Point, the Developer:
  (i) must provide the relevant documentation to the Relevant Authority and/or Certifying Engineer (as applicable);
  (ii) may proceed with the Development Works relevant to the documentation subject to any notice issued by the Relevant Authority and/or Certifying Engineer to the contrary.

(b) For each Inspection Point that is also a Witness Point:
  (i) the Developer:
    a. must provide not less than 2 Business Days prior written notice to the Relevant Authority and/or Certifying Engineer (as applicable); and
    b. if the Relevant Authority and/or Certifying Engineer (as applicable) provides notice that it intends to undertake an inspection, must not proceed with any subsequent works that would conceal or otherwise render those works incapable of inspection, amendment or correction until the Relevant Authority and/or Certifying Engineer (as applicable) provides written approval to proceed; or
    c. if the Relevant Authority and/or Certifying Engineer (as applicable) provides notice that it does not intend to undertake an inspection, must provide the Relevant Authority and/or Certifying Engineer (as applicable) with detailed photographic evidence of the relevant Development Works and may thereafter proceed with subsequent works.

(iii) After receiving notice from the Developer, the Relevant Authority and/or Certifying Engineer (as applicable) must give notice to the Developer that it;

a. intends to undertake a physical inspection of the relevant Development Works; or
b. does not intend to undertake a physical inspection of the relevant Development Works.

(iv) Where the Relevant Authority and/or the Certifying Engineer elects to undertake an inspection of the relevant Development Works, the Developer and the Relevant Authority and/or Certifying Engineer (as applicable) must all make best endeavours to facilitate, and must not unreasonably delay, the inspection.

TABLE A - DOCUMENTATION POINTS

DOCUMENTATION POINTS				HOLD POINT / WITNESS POINT REQUIREMENTS		
ID	**Clause No.**	**Clause Heading**	**Description**	**Relevant Authority**	**Certifying Engineer**	**Comments**
Documentation Point 1	1.3	Miscellaneous Provisions - Inspection Test Plans	Submit Inspection Test Plans (ITPs), detailing all procedures and test plans to be undertaken to complete the Development Works, before commencing the Development Works.			
Documentation Point 2	1.4	Miscellaneous Provisions - Dilapidation Survey	Submit a copy of the Dilapidation Report prior to commencing the Development Works.			
Documentation Point 3	1.5.1	Miscellaneous Provisions – Permits - Permit to Work in a Road Reserve	Obtain all necessary permits to work in Road Reserves prior to commencement of relevant Development Works.			
Documentation Point 4	1.5.2	Miscellaneous Provisions – Permits - Permit to Interfere with a Waterway	Obtain all necessary Permits to Interfere with a Waterway prior to commencement of relevant Development Works.			
Documentation Point 5	1.9	Miscellaneous Provisions - Borrow Pits	Obtain approval for use of Borrow Pits on land not owned by the Developer.			
Documentation Point 6	1.10	Miscellaneous Provisions - Explosives	Where explosives are proposed to be used on the Development Site, including for External Works, notify all owners of Adjacent Land a minimum of 10 Business Days prior to commencing blasting operations. Inspect and record the condition of all structures and services subject to possible effect by use of explosives before and after blasting operations.			
Documentation Point 7	1.10	Miscellaneous Provisions - Explosives	Obtain approval for the use of explosives for External Works prior to commencing blasting operations.			
Documentation Point 8	1.15	Miscellaneous Provisions - Work on Railway Sites	Obtain approval of the proposed work plan from the owner and operator of the rail system prior to commencing the relevant Development Works.			
Documentation Point 9	1.16	Miscellaneous Provisions - Work Near Traffic Counting Stations	Obtain the location of traffic counting station cables prior to commencing any excavation, boring of holes, rock breaking, soil compaction or similar activity in the vicinity of traffic counter station detector loops.			
Documentation Point 10	1.20	Miscellaneous Provisions - As-Constructed Documentation	Submit a procedure for approval for recording and submitting As-Constructed Documentation, prior to commencing the Development Works.			
Documentation Point 11	1.20	Miscellaneous Provisions - As-Constructed Documentation	Submit As Constructed information in accordance with the approved procedure.			
Documentation Point 12	2.6.1	Provision for Traffic - Traffic Management Plan Design	Submit Traffic Management Plans (TMPs), including associated Traffic Guidance Schemes (TGS), prior to commencing the relevant Development Works.			
Documentation Point 13	2.6.4	Provision for Traffic - Traffic Control Amendments	Submit all amendments to the TMPs and TGS prior to implementation of any changes, unless there is an urgent need for amendments to mitigate hazards.			
Documentation Point 14	4.11.2	Earthworks - Proof Rolling	Submit a proof rolling procedure prior to commencing relevant Development Works, including the proposed method of preparing the areas, the extent of proof rolling, and details of the plant and/or equipment proposed to be used.			

TABLE A - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 15	4.11.3	Earthworks - Conformance Testing	Submit evidence of Subgrade conformance prior to placing further materials.			
Documentation Point 16	5.6	Conformance Testing - Notice of Testing	Provide notification of failed Test Lots prior to any rework being undertaken.			
Documentation Point 17	6.3.3	Pavements and Shoulders - On-Formation Mixing and Placing	Where non-potable water supplies are used for pavements, submit evidence of required water quality of the proposed source.			
Documentation Point 18	6.5.1	Pavements and Shoulders - Pavement Acceptance Requirements	Obtain approval for Pavement and Shoulders acceptance prior to any surfacing work, including satisfying all requirements for:			
Documentation Point 19	7.2.3	Stabilisation and Modification - Additives	Obtain approval for stabilisation and modification additive use.			
Documentation Point 20	7.2.4	Stabilisation and Modification - Water	Where non-potable water supplies are used for stabilised and/or modified pavements, submit evidence of required water quality of the proposed source.			
Documentation Point 21	7.3.5	Stabilisation and Modification - Binder Spreading	Obtain approval for binder field application rates in stabilised and/or modified pavements for each source material, prior to commencing stabilisation and/or modification works.			
Documentation Point 22	7.3.5	Stabilisation and Modification - Binder Spreading	Obtain approval for bag spotting and spreading, prior to use in the relevant Development Works.			
Documentation Point 23	7.3.6	Stabilisation and Modification - Binder Mixing	Obtain approval for the use of rotary hoes or graders to mix binders in small scopes of stabilisation and/or modification works.			
Documentation Point 24	7.3.7	Stabilisation and Modification - Granular Modification	Obtain approval for the blending ratios of granular modified materials, based on laboratory testing.			
Documentation Point 25	8.3.1	Spray Sealing – Aggregates	Submit current NATA endorsed test certificates providing evidence that the nominated Spray Seal aggregate supply conforms to specified properties.			
Documentation Point 26	8.8.2	Spray Sealing - Binder Testing	Undertake Conformance Testing of all binders in accordance with Table 5 4 – Test Frequencies for Bitumen Spray Sealing. Provide notification of non-conforming samples.			
Documentation Point 27	8.12.3	Spray Sealing - Application Spray Rates	Submit spray rates, prior to commencing Spray Seal application.			
Documentation Point 28	8.12.4	Spray Sealing - Preparation for Sprayer Run	Submit copies of records of sprayer tank dips and temperatures of tank contents.			
Documentation Point 29	8.13	Spray Sealing - Application of Aggregate	Submit details of the proposed aggregate loader for Spray Seal works prior to commencing loading operations.			
Documentation Point 30	8.13.3	Self-Propelled Multi Rubber Tyred Vibrating Rollers	Obtain approval for the use of self-propelled multi rubber tyred vibrating rollers in Spray Seal works prior to using them.			

TABLE A - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 31	8.14	Spray Sealing - Waste Material	Obtain approval for use of rotary type brooms to windrow loose aggregate. Suction type brooms are still to be used to remove the waste aggregate.			
Documentation Point 32	8.15.1	Spray Sealing - Reporting - Spray Sheets	Submit signed spray sheets that record the following information for all Spray Seal runs conducted.			
Documentation Point 33	9.4.2	Dense Graded Asphalt - Design Mix Requirements	Obtain approval for asphalt materials and mix designs prior to use in the Development Works.			
Documentation Point 34	9.4.2	Dense Graded Asphalt - Design Mix Requirements	Obtain approval for amendments to the approved asphalt materials and mix designs prior to use in the Development Works.			
Documentation Point 35	9.8.4	Dense Graded Asphalt – Spreading - Laying Pattern	Submit a construction program and paving plan prior to commencement of asphalt works. Paving plans must be confirmed prior to the commencement of each work shift.			
Documentation Point 36	9..8.7	Dense Graded Asphalt - Spreading - Longitudinal Joints	Provide a plan showing all proposed longitudinal joints in asphalt works. The plan must be approved prior to the relevant works commencing.			
Documentation Point 37	10.7.2	Concrete Works - Contraction Joints	Obtain approval for use of saw cut joints, prior to use in the Development Works.			
Documentation Point 38	11.3.2	Concrete Works - Concrete Quality Plans	Submit a Concrete Quality Plan for approval prior to commencing any concreting operations.			
Documentation Point 39	11.3.4	Concrete Works - Sampling and Testing	Obtain approval for the method of concrete strength assessment, prior to ordering concrete.			
Documentation Point 40	11.6.4	Concrete Works – Reinforcement - Cutting and Bending	Reinforcing bars must be bent cold in a manner that will not damage them, unless a written Approval for hot bending is obtained.			
Documentation Point 41	11.6.4	Concrete Works - Reinforcement - Cutting and Bending	Any reinforcing bar that has already been bent must not be re-bent at the site of the original bend without Approval.			
Documentation Point 42	11.6.4	Concrete Works - Reinforcement - Cutting and Bending	Flame cutting of reinforcing steel is not allowed without prior Approval.			
Documentation Point 43	11.8.3	Concrete Works - Joint Materials	Submit copies of supplier/manufacturer product data sheets and specifications for all jointing materials.			
Documentation Point 44	11.9.2	Concrete Works - Supply and Placement - Chemical Admixtures	Obtain approval for the use of concrete admixtures, prior to incorporating them into a concrete mix.			
Documentation Point 45	11.9.5	Concrete Works - Supply and Placement - Hot Weather Placing	Submit proposed method(s) of maintaining the specified temperatures of placed concrete.			
Documentation Point 46	11.9.8	Concrete Works - Supply and Placement - Prevention of Moisture Loss from Hardened Concrete	Obtain approval for the use of curing compounds on concrete, in lieu of moist curing, prior to placing the relevant concrete works.			

TABLE A - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 47	11.10	Concrete Works - Precast Concrete	Obtain approval for all precast concrete works prior to manufacturing.			
Documentation Point 48	11.10.1	Concrete Works - Precast Concrete - Manufacture	Submit the following items 5 Business Days prior to fabrication of the precast concrete item commencing:			
Documentation Point 49	11.10.2	Concrete Works - Precast Concrete - Handling, Storage and Delivery	Submit evidence that all precast concrete units have been inspected and signed-off by the manufacturer's inspector, in a format to be approved, prior to delivery of the unit to the Development Site.			
Documentation Point 50	11.11.3	Concrete Works - Surface Finishes - Finishing Methods	Prior to undertaking concreting works involving exposed aggregate finish, conduct a trial and obtain approval for product selection, application rates, construction methodologies, timeframes for removal of paste, and agreed surface finish quality.			
Documentation Point 51	12.3.1	Steel Works - Shop Drawings	Submit shop drawings for minor streel works prior to fabrication.			
Documentation Point 52	12.3.2	Steel Works - Compliance	Submit evidence that steel used complies with the required material standards, prior to use in the Development Works.			
Documentation Point 53	12.6.2	Steel Works - Bolted Connections - Enlargement of Bolt Holes	Obtain approval for enlargement of bolt holes, via flame cutting or otherwise, prior to undertaking.			
Documentation Point 54	12.7.1	Steel Works - Welding - General	Submit a Weld Procedure Specification, prior to commencement of any welding.			
Documentation Point 55	12.7.6	Steel Works - Welding - Preparation	Submit Certification of all weld preparation.			
Documentation Point 56	12.7.7	Steel Works - Non-Destructive Weld Examination (NDE)	Submit Certification of all radiographic and ultrasonic weld inspections, where required.			
Documentation Point 57	13.4.2	Drainage Works - Precast Reinforced Concrete Box Culverts (RCBC)	Submit shop drawings for precast reinforced box culverts, prior to fabricating any units.			
Documentation Point 58	13.5.11	Drainage Works Construction of Pipes and Box Culverts - Backfill	Obtain approval for use of Flowable Fill as an alternative backfill material in Culvert works.			
Documentation Point 59	13.13	Drainage Works - CCTV Inspections	Submit a copy of the CCTV Inspection Report, including video footage and still images, supported by a statement that all the works are conforming (or otherwise).			
Documentation Point 60	14.9.2	Protection Works - Gabions - Steel Wire Mesh	Where proposed, obtain approval for omission of the PVC coating on gabion steel wire mesh, prior to fabrication of gabion baskets.			
Documentation Point 61	14.10.2	Protection Works - Reno Mattresses - Steel Wire Mesh	Where proposed, obtain approval for omission of the PVC coating on reno mattress steel wire mesh, prior to fabrication of reno mattress baskets.			

TABLE A - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 62	15.2	Furniture and Traffic Control Devices - Tactile Ground Surface Indicators	Submit proposed Tactile Ground Surface Indicator details prior to installation.			
Documentation Point 63	15.5.2	Furniture and Traffic Control Devices – Guide Posts - Certification of Guide Posts	Provide certification that guide posts conform to specified requirements.			
Documentation Point 64	15.6.2	Furniture and Traffic Control Devices - Signs - Materials	Submit details of proposed Anti-Graffiti film or coating products, prior to use in the relevant Development Works.			
Documentation Point 65	16.5	Pavement Marking - Pavement Marking Paint	Submit Certificates of Compliance, issued by an accredited testing authority, stating that the pavement marking paints proposed to be used conform to, or comply with the relevant Australian Standards and/or APAS specifications.			
Documentation Point 66	16.6	Pavement Marking - Glass Beads	Submit a Certificate of Compliance in respect to the glass beads complying with the relevant Australian Standard and APAS specification.			
Documentation Point 67	16.7	Pavement Marking - Thermoplastic Materials	Obtain approval for use of thermoplastic materials.			
Documentation Point 68	16.8	Pavement Marking - Cold Applied Plastic Materials	Obtain approval for use of cold applied plastic materials.			
Documentation Point 69	16.8	Pavement Marking - Cold Applied Plastic Materials	Provide evidence that all proprietary cold applied plastic material products, such as epoxy or plastic products, have demonstrated satisfactory field performance for a period of at least three years.			
Documentation Point 70	16.10	Pavement Marking - Pavement Marking Application	Submit details of type of equipment to be used for applying Pavement marking materials.			
Documentation Point 71	16.10	Pavement Marking - Pavement Marking Application	Submit documented evidence to show that the pavement marking spraying equipment has been calibrated in accordance with NTTM 405.1 and with PCCP requirements and is certified by PCCP as being suitable for the Development Works to be carried out.			
Documentation Point 72	16.11	Pavement Marking – Conformance and Tolerances	Provide evidence that the complete Pavement marking complies with the requirements of this specification.			
Documentation Point 73	16.13	Pavement Marking - Raised Retroreflective Pavement Markers (RRPMs)	Submit details in relation to the manufacturer's warranties, performance, durability and maintenance of the raised retroreflective pavement markers.			
Documentation Point 74	16.14	Pavement Marking - Removal of Pavement Markings	Obtain approval of the method used for line marking removal before commencing removal operations.			
Documentation Point 75	16.15	Pavement Marking - Reporting	Submit pavement marking reports.			
Documentation Point 76	17.2.3	Landscape - Materials - Grass	Submit grass seed certificates prior to application of grassing.			

TABLE A - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 77	17.2.6	Landscape - Materials – Imported Topsoil	Submit Certified test reports and associated delivery dockets confirming imported topsoil complies with AS 4419.			
Documentation Point 78	17.2.8	Landscape - Materials – Imported Mulch	Submit Certified test reports ad associated delivery dockets confirming imported mulch complies with AS 4454.			
Documentation Point 79	17.8.4	Landscape - Planting – Supply of Plants	Obtain approval for use of alternative plant species, prior to ordering plants.			
Documentation Point 80	17.9.2	Landscape - Hydroseeding – Developer Submissions	Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials and application rates.			
Documentation Point 81	17.9.5	Landscape - Hydroseeding - Composition	Obtain approval for use of chemical additives to hydroseeding mixes other than fertilizer, soil neutralizers and biostimulant materials.			
Documentation Point 82	17.10.2	Landscape - Irrigation – Irrigation Systems	Submit irrigation designs prior to installation of irrigation systems.			
Documentation Point 83	17.10.3	Landscape - Irrigation – Water Source	Liaise with the Service Authority and obtain approval for connections in relation to water supply requirements.			
Documentation Point 84	17.11.2	Landscape - Shade Structures - Permits and Certification	Submit a copy of all Building Permit(s) and Certificate(s) of Occupancy.			
Documentation Point 85	19.10.2	Street Lighting – Existing Street Lighting - Temporary Lighting	Submit plans of the proposed temporary street lighting for approval prior to removal of existing street lights.			
Documentation Point 86	20.3	Directional Boring - Proposed Method	Submit details of the proposed method of thrust boring not less than 10 Business Days prior to commencement of construction using that method.			
Documentation Point 87	20.3.1	Direction Boring - Proposed Method - Directional Boring with Pipe Casing	Submit Certification that the pipe jacking equipment is fit for use, 10 Business Day prior to commencement of construction using that method.			
Documentation Point 88	20.3.1	Direction Boring - Proposed Method - Directional Boring without Pipe Casing	Obtain approval to use directional boring without pipe casing.			

TABLE B - DOCUMENTATION POINTS

DOCUMENTATION POINTS				HOLD POINT / WITNESS POINT REQUIREMENTS		
ID	**Clause No.**	**Clause Heading**	**Description**	**Relevant Authority**	**Certifying Engineer**	**Comments**
Documentation Point 1	1.3	Miscellaneous Provisions - Inspection Test Plans	Submit Inspection Test Plans (ITPs), detailing all procedures and test plans to be undertaken to complete the Development Works, before commencing the Development Works.			
Documentation Point 2	1.4	Miscellaneous Provisions - Dilapidation Survey	Submit a copy of the Dilapidation Report prior to commencing the Development Works.			
Documentation Point 3	1.5.1	Miscellaneous Provisions – Permits - Permit to Work in a Road Reserve	Obtain all necessary permits to work in Road Reserves prior to commencement of relevant Development Works.			
Documentation Point 4	1.5.2	Miscellaneous Provisions – Permits - Permit to Interfere with a Waterway	Obtain all necessary Permits to Interfere with a Waterway prior to commencement of relevant Development Works.			
Documentation Point 5	1.9	Miscellaneous Provisions - Borrow Pits	Obtain approval for use of Borrow Pits on land not owned by the Developer.			
Documentation Point 6	1.10	Miscellaneous Provisions - Explosives	Where explosives are proposed to be used on the Development Site, including for External Works, notify all owners of Adjacent Land a minimum of 10 Business Days prior to commencing blasting operations. Inspect and record the condition of all structures and services subject to possible effect by use of explosives before and after blasting operations.			
Documentation Point 7	1.10	Miscellaneous Provisions - Explosives	Obtain approval for the use of explosives for External Works prior to commencing blasting operations.			
Documentation Point 8	1.15	Miscellaneous Provisions - Work on Railway Sites	Obtain approval of the proposed work plan from the owner and operator of the rail system prior to commencing the relevant Development Works.			
Documentation Point 9	1.16	Miscellaneous Provisions - Work Near Traffic Counting Stations	Obtain the location of traffic counting station cables prior to commencing any excavation, boring of holes, rock breaking, soil compaction or similar activity in the vicinity of traffic counter station detector loops.			
Documentation Point 10	1.20	Miscellaneous Provisions - As-Constructed Documentation	Submit a procedure for approval for recording and submitting As-Constructed Documentation, prior to commencing the Development Works.			
Documentation Point 11	1.20	Miscellaneous Provisions - As-Constructed Documentation	Submit As Constructed information in accordance with the approved procedure.			
Documentation Point 12	2.6.1	Provision for Traffic - Traffic Management Plan Design	Submit Traffic Management Plans (TMPs), including associated Traffic Guidance Schemes (TGS), prior to commencing the relevant Development Works.			
Documentation Point 13	2.6.4	Provision for Traffic - Traffic Control Amendments	Submit all amendments to the TMPs and TGS prior to implementation of any changes, unless there is an urgent need for amendments to mitigate hazards.			
Documentation Point 14	4.11.2	Earthworks - Proof Rolling	Submit a proof rolling procedure prior to commencing relevant Development Works, including the proposed method of preparing the areas, the extent of proof rolling, and details of the plant and/or equipment proposed to be used.			

TABLE B - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 15	4.11.3	Earthworks - Conformance Testing	Submit evidence of Subgrade conformance prior to placing further materials.			
Documentation Point 16	5.6	Conformance Testing - Notice of Testing	Provide notification of failed Test Lots prior to any rework being undertaken.			
Documentation Point 17	6.3.3	Pavements and Shoulders - On-Formation Mixing and Placing	Where non-potable water supplies are used for pavements, submit evidence of required water quality of the proposed source.			
Documentation Point 18	6.5.1	Pavements and Shoulders - Pavement Acceptance Requirements	Obtain approval for Pavement and Shoulders acceptance prior to any surfacing work, including satisfying all requirements for:			
Documentation Point 19	7.2.3	Stabilisation and Modification - Additives	Obtain approval for stabilisation and modification additive use.			
Documentation Point 20	7.2.4	Stabilisation and Modification - Water	Where non-potable water supplies are used for stabilised and/or modified pavements, submit evidence of required water quality of the proposed source.			
Documentation Point 21	7.3.5	Stabilisation and Modification - Binder Spreading	Obtain approval for binder field application rates in stabilised and/or modified pavements for each source material, prior to commencing stabilisation and/or modification works.			
Documentation Point 22	7.3.5	Stabilisation and Modification - Binder Spreading	Obtain approval for bag spotting and spreading, prior to use in the relevant Development Works.			
Documentation Point 23	7.3.6	Stabilisation and Modification - Binder Mixing	Obtain approval for the use of rotary hoes or graders to mix binders in small scopes of stabilisation and/or modification works.			
Documentation Point 24	7.3.7	Stabilisation and Modification - Granular Modification	Obtain approval for the blending ratios of granular modified materials, based on laboratory testing.			
Documentation Point 25	8.3.1	Spray Sealing – Aggregates	Submit current NATA endorsed test certificates providing evidence that the nominated Spray Seal aggregate supply conforms to specified properties.			
Documentation Point 26	8.8.2	Spray Sealing - Binder Testing	Undertake Conformance Testing of all binders in accordance with Table 5 4 – Test Frequencies for Bitumen Spray Sealing. Provide notification of non-conforming samples.			
Documentation Point 27	8.12.3	Spray Sealing - Application Spray Rates	Submit spray rates, prior to commencing Spray Seal application.			
Documentation Point 28	8.12.4	Spray Sealing - Preparation for Sprayer Run	Submit copies of records of sprayer tank dips and temperatures of tank contents.			
Documentation Point 29	8.13	Spray Sealing - Application of Aggregate	Submit details of the proposed aggregate loader for Spray Seal works prior to commencing loading operations.			
Documentation Point 30	8.13.3	Self-Propelled Multi Rubber Tyred Vibrating Rollers	Obtain approval for the use of self-propelled multi rubber tyred vibrating rollers in Spray Seal works prior to using them.			

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DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 31	8.14	Spray Sealing - Waste Material	Obtain approval for use of rotary type brooms to windrow loose aggregate. Suction type brooms are still to be used to remove the waste aggregate.			
Documentation Point 32	8.15.1	Spray Sealing - Reporting - Spray Sheets	Submit signed spray sheets that record the following information for all Spray Seal runs conducted.			
Documentation Point 33	9.4.2	Dense Graded Asphalt - Design Mix Requirements	Obtain approval for asphalt materials and mix designs prior to use in the Development Works.			
Documentation Point 34	9.4.2	Dense Graded Asphalt - Design Mix Requirements	Obtain approval for amendments to the approved asphalt materials and mix designs prior to use in the Development Works.			
Documentation Point 35	9.8.4	Dense Graded Asphalt – Spreading - Laying Pattern	Submit a construction program and paving plan prior to commencement of asphalt works. Paving plans must be confirmed prior to the commencement of each work shift.			
Documentation Point 36	9..8.7	Dense Graded Asphalt - Spreading - Longitudinal Joints	Provide a plan showing all proposed longitudinal joints in asphalt works. The plan must be approved prior to the relevant works commencing.			
Documentation Point 37	10.7.2	Concrete Works - Contraction Joints	Obtain approval for use of saw cut joints, prior to use in the Development Works.			
Documentation Point 38	11.3.2	Concrete Works - Concrete Quality Plans	Submit a Concrete Quality Plan for approval prior to commencing any concreting operations.			
Documentation Point 39	11.3.4	Concrete Works - Sampling and Testing	Obtain approval for the method of concrete strength assessment, prior to ordering concrete.			
Documentation Point 40	11.6.4	Concrete Works – Reinforcement - Cutting and Bending	Reinforcing bars must be bent cold in a manner that will not damage them, unless a written Approval for hot bending is obtained.			
Documentation Point 41	11.6.4	Concrete Works - Reinforcement - Cutting and Bending	Any reinforcing bar that has already been bent must not be re-bent at the site of the original bend without Approval.			
Documentation Point 42	11.6.4	Concrete Works - Reinforcement - Cutting and Bending	Flame cutting of reinforcing steel is not allowed without prior Approval.			
Documentation Point 43	11.8.3	Concrete Works - Joint Materials	Submit copies of supplier/manufacturer product data sheets and specifications for all jointing materials.			
Documentation Point 44	11.9.2	Concrete Works - Supply and Placement - Chemical Admixtures	Obtain approval for the use of concrete admixtures, prior to incorporating them into a concrete mix.			
Documentation Point 45	11.9.5	Concrete Works - Supply and Placement - Hot Weather Placing	Submit proposed method(s) of maintaining the specified temperatures of placed concrete.			
Documentation Point 46	11.9.8	Concrete Works - Supply and Placement - Prevention of Moisture Loss from Hardened Concrete	Obtain approval for the use of curing compounds on concrete, in lieu of moist curing, prior to placing the relevant concrete works.			

TABLE B - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 47	11.10	Concrete Works - Precast Concrete	Obtain approval for all precast concrete works prior to manufacturing.			
Documentation Point 48	11.10.1	Concrete Works - Precast Concrete - Manufacture	Submit the following items 5 Business Days prior to fabrication of the precast concrete item commencing:			
Documentation Point 49	11.10.2	Concrete Works - Precast Concrete - Handling, Storage and Delivery	Submit evidence that all precast concrete units have been inspected and signed-off by the manufacturer's inspector, in a format to be approved, prior to delivery of the unit to the Development Site.			
Documentation Point 50	11.11.3	Concrete Works - Surface Finishes - Finishing Methods	Prior to undertaking concreting works involving exposed aggregate finish, conduct a trial and obtain approval for product selection, application rates, construction methodologies, timeframes for removal of paste, and agreed surface finish quality.			
Documentation Point 51	12.3.1	Steel Works - Shop Drawings	Submit shop drawings for minor streel works prior to fabrication.			
Documentation Point 52	12.3.2	Steel Works - Compliance	Submit evidence that steel used complies with the required material standards, prior to use in the Development Works.			
Documentation Point 53	12.6.2	Steel Works - Bolted Connections - Enlargement of Bolt Holes	Obtain approval for enlargement of bolt holes, via flame cutting or otherwise, prior to undertaking.			
Documentation Point 54	12.7.1	Steel Works - Welding - General	Submit a Weld Procedure Specification, prior to commencement of any welding.			
Documentation Point 55	12.7.6	Steel Works - Welding - Preparation	Submit Certification of all weld preparation.			
Documentation Point 56	12.7.7	Steel Works - Non-Destructive Weld Examination (NDE)	Submit Certification of all radiographic and ultrasonic weld inspections, where required.			
Documentation Point 57	13.4.2	Drainage Works - Precast Reinforced Concrete Box Culverts (RCBC)	Submit shop drawings for precast reinforced box culverts, prior to fabricating any units.			
Documentation Point 58	13.5.11	Drainage Works Construction of Pipes and Box Culverts - Backfill	Obtain approval for use of Flowable Fill as an alternative backfill material in Culvert works.			
Documentation Point 59	13.13	Drainage Works - CCTV Inspections	Submit a copy of the CCTV Inspection Report, including video footage and still images, supported by a statement that all the works are conforming (or otherwise).			
Documentation Point 60	14.9.2	Protection Works - Gabions - Steel Wire Mesh	Where proposed, obtain approval for omission of the PVC coating on gabion steel wire mesh, prior to fabrication of gabion baskets.			
Documentation Point 61	14.10.2	Protection Works - Reno Mattresses - Steel Wire Mesh	Where proposed, obtain approval for omission of the PVC coating on reno mattress steel wire mesh, prior to fabrication of reno mattress baskets.			

TABLE B - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 62	15.2	Furniture and Traffic Control Devices - Tactile Ground Surface Indicators	Submit proposed Tactile Ground Surface Indicator details prior to installation.			
Documentation Point 63	15.5.2	Furniture and Traffic Control Devices – Guide Posts - Certification of Guide Posts	Provide certification that guide posts conform to specified requirements.			
Documentation Point 64	15.6.2	Furniture and Traffic Control Devices - Signs - Materials	Submit details of proposed Anti-Graffiti film or coating products, prior to use in the relevant Development Works.			
Documentation Point 65	16.5	Pavement Marking - Pavement Marking Paint	Submit Certificates of Compliance, issued by an accredited testing authority, stating that the pavement marking paints proposed to be used conform to, or comply with the relevant Australian Standards and/or APAS specifications.			
Documentation Point 66	16.6	Pavement Marking - Glass Beads	Submit a Certificate of Compliance in respect to the glass beads complying with the relevant Australian Standard and APAS specification.			
Documentation Point 67	16.7	Pavement Marking - Thermoplastic Materials	Obtain approval for use of thermoplastic materials.			
Documentation Point 68	16.8	Pavement Marking - Cold Applied Plastic Materials	Obtain approval for use of cold applied plastic materials.			
Documentation Point 69	16.8	Pavement Marking - Cold Applied Plastic Materials	Provide evidence that all proprietary cold applied plastic material products, such as epoxy or plastic products, have demonstrated satisfactory field performance for a period of at least three years.			
Documentation Point 70	16.10	Pavement Marking - Pavement Marking Application	Submit details of type of equipment to be used for applying Pavement marking materials.			
Documentation Point 71	16.10	Pavement Marking - Pavement Marking Application	Submit documented evidence to show that the pavement marking spraying equipment has been calibrated in accordance with NTTM 405.1 and with PCCP requirements and is certified by PCCP as being suitable for the Development Works to be carried out.			
Documentation Point 72	16.11	Pavement Marking – Conformance and Tolerances	Provide evidence that the complete Pavement marking complies with the requirements of this specification.			
Documentation Point 73	16.13	Pavement Marking - Raised Retroreflective Pavement Markers (RRPMs)	Submit details in relation to the manufacturer's warranties, performance, durability and maintenance of the raised retroreflective pavement markers.			
Documentation Point 74	16.14	Pavement Marking - Removal of Pavement Markings	Obtain approval of the method used for line marking removal before commencing removal operations.			
Documentation Point 75	16.15	Pavement Marking - Reporting	Submit pavement marking reports.			
Documentation Point 76	17.2.3	Landscape - Materials - Grass	Submit grass seed certificates prior to application of grassing.			

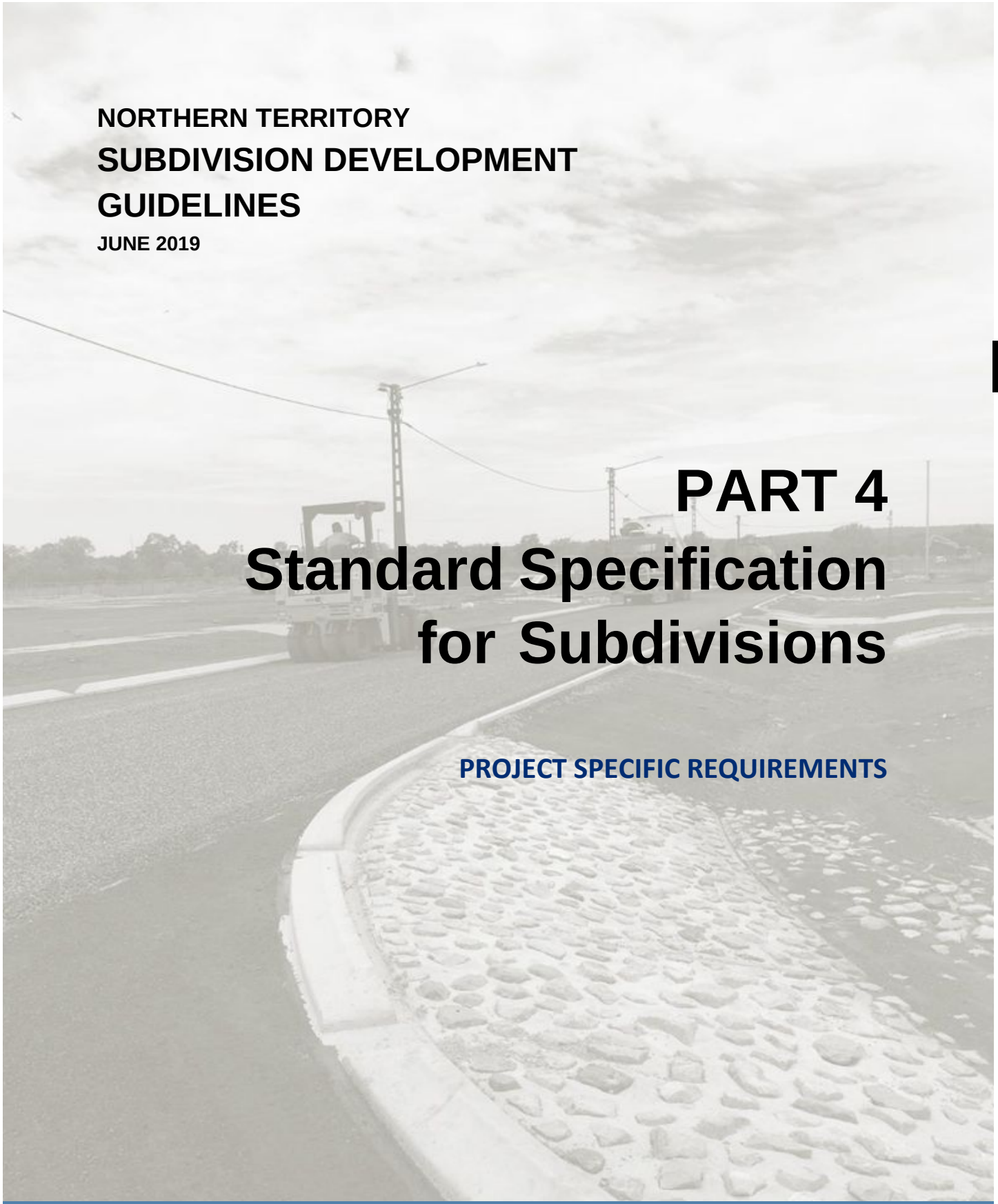
TABLE B - DOCUMENTATION POINTS						
DOCUMENTATION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Documentation Point 77	17.2.6	Landscape - Materials – Imported Topsoil	Submit Certified test reports and associated delivery dockets confirming imported topsoil complies with AS 4419.			
Documentation Point 78	17.2.8	Landscape - Materials – Imported Mulch	Submit Certified test reports ad associated delivery dockets confirming imported mulch complies with AS 4454.			
Documentation Point 79	17.8.4	Landscape - Planting – Supply of Plants	Obtain approval for use of alternative plant species, prior to ordering plants.			
Documentation Point 80	17.9.2	Landscape - Hydroseeding – Developer Submissions	Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials and application rates.			
Documentation Point 81	17.9.5	Landscape - Hydroseeding - Composition	Obtain approval for use of chemical additives to hydroseeding mixes other than fertilizer, soil neutralizers and biostimulant materials.			
Documentation Point 82	17.10.2	Landscape - Irrigation – Irrigation Systems	Submit irrigation designs prior to installation of irrigation systems.			
Documentation Point 83	17.10.3	Landscape - Irrigation – Water Source	Liaise with the Service Authority and obtain approval for connections in relation to water supply requirements.			
Documentation Point 84	17.11.2	Landscape - Shade Structures - Permits and Certification	Submit a copy of all Building Permit(s) and Certificate(s) of Occupancy.			
Documentation Point 85	19.10.2	Street Lighting – Existing Street Lighting - Temporary Lighting	Submit plans of the proposed temporary street lighting for approval prior to removal of existing street lights.			
Documentation Point 86	20.3	Directional Boring - Proposed Method	Submit details of the proposed method of thrust boring not less than 10 Business Days prior to commencement of construction using that method.			
Documentation Point 87	20.3.1	Direction Boring - Proposed Method - Directional Boring with Pipe Casing	Submit Certification that the pipe jacking equipment is fit for use, 10 Business Day prior to commencement of construction using that method.			
Documentation Point 88	20.3.1	Direction Boring - Proposed Method - Directional Boring without Pipe Casing	Obtain approval to use directional boring without pipe casing.			

INSPECTION POINTS TABLE

INSPECTION POINTS				HOLD POINT / WITNESS POINT REQUIREMENTS		
ID	**Clause No.**	**Clause Heading**	**Description**	**Relevant Authority**	**Certifying Engineer**	**Comments**
Inspection Point 1	3.7	Clearing, Grubbing and Rehabilitation - Grubbing	Obtain approval for cleared and grubbed surface prior to commencing earthworks operations.			
Inspection Point 2	4.2.2	Earthworks in Cut other than Rock - Excavation and Subgrade Preparation	For earthworks in cut, proof roll the compacted Subgrade in accordance with Clause 4.11.2 – Proof Rolling to identify any areas of Unsuitable Material.			
Inspection Point 3	4.2.3	Earthworks in Cut - Other than Rock - Unsuitable Material below Subgrade Surface other than Rock	If Unsuitable Materials are encountered below Subgrade Surface other than rock, obtain direction before remedial works commence.			
Inspection Point 4	4.3.2	Earthworks in Cut - Rock - Excavation and Subgrade Preparation	If rock is encountered below the Subgrade Surface, obtain direction before remedial works commence.			
Inspection Point 5	4.3.3	Earthworks in Cut - Rock - Dissolution Cavities in Rock	If Dissolution Cavities are encountered below the Subgrade Surface, provide notification for direction before remedial works commence.			
Inspection Point 6	4.4.2	Earthworks in Fill - Preparation of Foundation Prior to Filling	Proof roll the foundation prior to filling in accordance with Clause 4.11.2 – Proof Rolling to identify any areas of Unsuitable Material.			
Inspection Point 7	4.4.3	Earthworks in Fill - Unsuitable Material Beneath Fill	If Unsuitable Materials are encountered in foundations beneath fill, obtain direction before remedial works commence.			
Inspection Point 8	4.4.4	Earthworks in Fill – Dissolution Cavities Beneath Fill	If Dissolution Cavities are encountered in foundations beneath fill, obtain direction before remedial works commence.			
Inspection Point 9	4.4.6	Earthworks in Fill – Placement of Fill	For earthworks in fill, proof roll the Subgrade Surface in accordance with Clause 4.11.2 – Proof Rolling.			
Inspection Point 10	6.5.2	Pavements and Shoulders - Pavement Acceptance - Proof Rolling	Proof roll and obtain approval for all areas of final Pavement surface prior to commencing surfacing works.			
Inspection Point 11	7.5.2	Stabilisation and Modification - Conformance - Conformance Testing	Obtain approval for conformance of stabilized or modified layer prior to commencing surfacing works.			
Inspection Point 12	8.12	Spray Sealing - Spraying	Provide notice prior to spraying bitumen.			
Inspection Point 13	9.5.1	Dense Graded Asphalt - Surface Preparation - New Construction	Provide notice of the scheduled commencement time of surface preparation works for each asphalt work program.			
Inspection Point 14	9.8.1	Dense Graded Asphalt - Spreading - General	Provide notice before commencement of asphalt material spreading.			

INSPECTION POINTS TABLE						
INSPECTION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Inspection Point 15	11.6.12	Concrete Works - Reinforcement - Reinforcement Inspection	Do not place concrete until the reinforcement has been inspected and approved.			
Inspection Point 16	11.7.4	Concrete Works - Formwork - Formwork Inspection	Do not place concrete until the formwork has been inspected and approved.			
Inspection Point 17	11.9.4	Concrete Works - Concrete Supply and Placement – Concrete Placing	Provide notice so that inspection may be made before and during pouring concrete.			
Inspection Point 18	12.2	Minor Steel Works - General	Provide notice for commencement of shop fabrication.			
Inspection Point 19	12.8.1	Minor Steel Works - Protective Coatings - Surface Preparation	Do not apply protective coatings to steel works until the surface preparation has been inspected and approved.			
Inspection Point 20	13.4.2	Drainage Works - Materials – Precast Reinforced Concrete Box Culverts (RCBC)	Provide notice prior to casting precast reinforced concrete box culverts.			
Inspection Point 21	13.5.3	Drainage Works - Construction of Pipes and Box Culverts – Excavation	If Unsuitable Materials or Dissolution Cavities are encountered in the foundations or trench walls for pipe and box culverts, obtain direction before remedial works commence.			
Inspection Point 22	13.5.10	Drainage Works - Construction of Pipes and Box Culverts – Connection to Existing Systems	Obtain approval for cleaning out of existing drainage systems once completed.			
Inspection Point 23	13.5.10	Drainage Works - Construction of Pipes and Box Culverts – Connection to Existing Systems	Obtain approval for pipe and/or box culvert installations prior to backfilling.			
Inspection Point 24	13.6.4	Drainage Works - Construction of Concrete Drainage Structures – Excavation	If Unsuitable Materials or Dissolution Cavities are encountered in the foundations or trench walls for pipe and box culverts, obtain direction before remedial works commence.			
Inspection Point 25	13.10.2	Drainage Works - Subsoil Drains - Excavation	Where subsoil drain trenches are excavated in rock and subsoil drain pipes are fitted with filter socks, geotextile fabric may be omitted where approved.			
Inspection Point 26	13.10.3	Drainage Works - Subsoil Drains – Bedding and Pipe Laying	Obtain approval of the subsoil pipe installation before backfilling.			
Inspection Point 27	13.12	Drainage Works - Cleanout of Drainage Works	Obtain approval for cleanliness of all new and existing affected drainage works.			

INSPECTION POINTS TABLE						
INSPECTION POINTS				**HOLD POINT / WITNESS POINT REQUIREMENTS**		
Inspection Point 28	14.5.2	Protection Works - Stone Pitching - Grouted Stone Pitching	Obtain approval of stone pitching before grouting.			
Inspection Point 29	17.2.5	Landscape - Materials – Site Topsoil	Obtain approval for re-use of site topsoil on the Development Site prior to application.			
Inspection Point 30	17.8.2	Landscape - Planting – Setting out of Holes	Obtain approval of the planting set out before commencing any planting.			
Inspection Point 31	17.8.3	Landscape - Planting – Preparation and Treatment of Holes	Provide notification of completing preparation and treatment requirements for plant holes.			
Inspection Point 32	19.6.2	Street Lighting - Excavation – Column Footings	If rock is encountered which prevents excavation to the required dimensions, obtain direction prior to proceeding.			
Inspection Point 33	19.8	Street Lighting - Cable Installation	Obtain approval for street lighting trench excavation and cable installation prior to commencing backfilling.			
Inspection Point 34	19.11.2	Street Lighting - Testing and Commissioning - Commissioning	Arrange for commissioning work to live up the newly installed street lighting distribution system.			



NORTHERN TERRITORY

SUBDIVISION DEVELOPMENT GUIDELINES

JUNE 2019

PART 4
Standard Specification for Subdivisions

PROJECT SPECIFIC REQUIREMENTS

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ABOUT THIS DOCUMENT

REFERENCE TEXT

Read these Project Specific Requirements (PSRs) in conjunction with the Standard Specification for Subdivisions - June 2009 (SSS) and the approved Construction Drawings.

USE OF THIS DOCUMENT

These Project Specific Requirements provide additional detail or variations from the Standard Specification for Subdivisions, as required to suit project specific circumstances.

Project Specific Requirements must be documented using this template and must be approved by all Relevant Authority(s) and/or Regulatory Authority(s) prior to construction.

The clause numbering in these Project Specific Requirements must remain consistent and refer back to the relevant clause and section in the Standard Specification for Subdivisions.

PRECEDENCE

Any provision in the approved Project Specific Requirements, or on the approved Construction Drawings, overrides any conflicting provision in the Standard Specification for Subdivisions.

INFORMATION

This document is available electronically in native format from the Northern Territory Subdivision Development Guidelines Online Platform.

For further information regarding this Standard Specification contact:-

Manager Specification Services
Department of Infrastructure, Planning and Logistics
PO Box 61
Palmerston NT 0831

Telephone: (08) 8946 5021
Email: DocumentationServices.Dipl@nt.gov.au

First edition - June 2019

PROJECT INFORMATION

DEVELOPMENT PERMIT	
Development Permit No.	

SITE INFORMATION			
Property Address:			
Section Number:		Hundred of:	

DEVELOPER			
Full Name:			
Company/Organisation:			
Postal Address			
Email:			
Phone:		Mobile:	

APPROVAL	
Relevant Authority	
Representative	
Signed	
Date	

PROJECT SPECIFIC REQUIREMENTS 2019

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SUBDIVISION DEVELOPMENT GUIDELINES

JUNE 2019

PART 4
Standard Specification for Subdivisions

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ABOUT THIS SPECIFICATION

USE OF THIS DOCUMENT

This Standard Specification provides best practice construction standards for important Public Infrastructure such as streets and pathways, public open space and landscaping, stormwater drainage, and street lighting. It sets out the minimum standards required by Relevant Authorities to facilitate clearance of Development Permit conditions imposed on a Subdivision by the Northern Territory Development Consent Authority; the approval authority under the *Planning Act 1999* (NT).

This Standard Specification is to be used by Developers for construction of Subdivisions. It can be supplemented by Project Specific Requirements where required to provide additional detail or to vary from this Standard Specification. Project Specific Requirements must be documented using the template provided and approved by all Relevant Authority(s) and/or Regulatory Authority(s) prior to construction.

SCOPE EXCLUSIONS

Works within Northern Territory Government Controlled Roads must be undertaken in accordance with the Department of Infrastructure, Planning and Logistics Standard Specification for Roadworks.

Traffic control signals and intelligent transport systems; traffic counting stations; and protective coatings must be undertaken in accordance with the Department of Infrastructure, Planning and Logistics Standard Specification for Roadworks.

Utilities including water, sewer, electrical and communications Public Infrastructure must be constructed in accordance with the applicable Service Authority's requirements.

This document does not address commercial matters including, but not limited to, fees which may be imposed by Relevant Authorities for review/approval of documentation, issuing of permits, site inspections, acceptance of assets, security bonds etc. The Developer must liaise with the Relevant Authorities to inform themselves of applicable expenses.

STRUCTURE OF THE GUIDELINES

This document forms Part 4 of the Northern Territory Subdivision Development Guidelines and must be read in conjunction with the following parts:

Part 1 – Guidelines;

Part 2 - Reference Documents; and

Part 3 - Standard Drawings.

PRECEDENCE

In the event of an inconsistency, conflict, discrepancy, error, or omission between or among the provisions of these specifications and any part of the Guidelines outlined above, the Developer must immediately notify the Relevant Authority for direction on how to remedy such inconsistency, conflict, discrepancy, error, or omission.

DISCLAIMER

Reasonable efforts have been made to ensure that material in this Standard Specification is accurate and up to date at the date of publication, however, this Standard Specification in no way constitutes the provision of professional advice, and should not be relied upon as or in substitution for independent professional advice.

The Territory and each Relevant Authority does not guarantee, and accepts no legal liability whatsoever arising from or connected to, the accuracy, reliability, currency or completeness of any material contained in this Standard Specification, the Guidelines, Standard Drawings, any Reference Document, Base Standard or any linked website. Developers must seek and rely upon appropriate independent professional advice for all aspects of any Subdivision or Development Works.

DOCUMENTATION AND INSPECTION POINTS

Tables of Documentation and Inspection Points, including allocation of responsibilities are available via the Subdivision Development Guidelines online platform.

SCHEDULE OF VARIATIONS

Refer to the Schedule of Variations within the Subdivision Development Guidelines (Part 1) for variations to this Specification imposed by each Relevant Authority.

PROJECT SPECIFIC REQUIREMENTS

This Standard Specification is to be used by Developers for construction of Subdivisions. It can be supplemented by Project Specific Requirements where required to provide additional detail or to vary from this Standard Specification. Project Specific Requirements must be documented using the template provided and approved by all Relevant Authority(s) and/or Regulatory Authority(s) prior to construction.

DEFINITIONS

Adhesion Agent	A substance used for the purpose of promoting the adhesion between binder and aggregate in spray sealing and dense graded asphalt applications.
Adjacent Land	Land adjacent to but not forming part of the Development Site upon which any works in relation to a subdivision development are, or are to be, undertaken.
Allotment Fill	Fill required to achieve a design level on an allotment within a Subdivision.
As-Constructed Drawings	Detailed drawings showing the completed works and any variation to the approved Construction Drawings carried out during the construction phase, signed and certified as complete and accurate by: • a Certifying Engineer having undertaken appropriate regular inspections and having made appropriate enquiries in respect of the state of completion of the relevant component of Public Infrastructure; and • the Developer. Detailed requirements for the format of As-Constructed Drawings is provided in Section *1.20 - As-Constructed Documentation.*
As-Constructed Survey	Detailed survey plans recording any variations between the approved Construction Drawings and as-constructed works, signed and Certified as complete and accurate by: • a Licensed Surveyor who is currently registered under the provisions of Part IV of the *Licensed Surveyors Act 1983 (NT)*; and • the Developer. Detailed requirements for the format of As-Constructed Survey is provided in *Section 1.20 - As-Constructed Documentation.*
Basecourse	That upper-most layer of constructed material immediately above the Subgrade or Sub-base and below the pavement surface (sealed or unsealed) extending for the full width of the Pavement and Shoulder.
Base Standards	The minimum design and construction standards, and the requirements under them. Set out in Part 2 - Reference documents.
Bound Materials	Materials including natural gravels, crushed materials or in-situ materials stabilised with an introduced binder, such that substantive tensile strength is imparted to the treated material.
Borrow Pit	An excavation or extraction area for obtaining fill, gravel, rock and rubble.
Business Day	A day other than a Saturday, Sunday or public holiday in the place in which the Development Site is situated, also excluding: 27th, 28th, 29th, 30th and 31st December; and any day officially registered by Bureau of Meteorology on 'Cyclone Warning' in the place in which the Development is situated.
Calendar Day	Means any day of the week.
Carriageway	That portion of a street for the use of vehicles including shoulders and auxiliary lanes.
CCTV Inspection	Closed Circuit Television camera inspection carried out by a suitably qualified professional on underground pipes, culverts and/or conduits to report on obstructions and/or Defects.

Certification	A written acknowledgment by a Certifying Engineer that the design and/or construction of each component of Development Works has been completed in accordance with the requirements of all Laws and approvals, the Guidelines, including the Standard Drawings and this Standard Specification, all Base Standards and any other relevant documentation. Approved deviations from these requirements should be clearly stated. The Term "Certified" has a corresponding meaning.
Certified Seed	Seed by record of origin, purity, and strain and conforming in character to the parent stock.
Certifying Engineer	A consultant and/or their duly authorised representative(s) appointed by the Developer to undertake design and/or construction Certification associated with each component of the Development Works. The Certifying Engineer must be an independent, professional engineer who is competent in the relevant component of the Development Works. The Certifying Engineer must be a Chartered Professional Engineer, unless noted otherwise. The Certifying Engineer, or their employing organisation, must hold an appropriate level of Professional Indemnity Insurance for the component of the Development Works being Certified.
Chainage	The distance measured along the street centre line from its nominated start point.
Coarse Grained Aggregate	Where the average grain size of the constituent minerals is greater than 1mm. The average grain size is determined optically under a petrographic microscope or by calibrated hand lens.
Conformance Testing	The testing to be carried out by the Developer to ensure that the Development Works complies with the Construction Drawings and Specifications.
Construction Drawings	'Issued For Construction' Drawings, approved for use by a Relevant Authority pursuant to Section 2.5 of the Guidelines.
Controlled Fill	Fill for which engineering properties are to be controlled, as defined in AS 3978: *'Guidelines on Earthworks for Commercial and Residential Developments'.*
Cutter	A light petroleum distillate added to bitumen to temporarily reduce its viscosity.
Defect	Any item of work or materials which is incomplete, defective, deficient, unsafe, failing, non-complying or not Fit For Purpose in respect of any component of Public Infrastructure constructed as part of or in connection with any Development Works. This includes errors and omissions from design and/or construction works. Includes Major Defects and Minor Defects, as defined separately.
Defects Liability Period	Means the period of time the Developer is liable for any Defect occurring in relation to Public Infrastructure to be handed over to the Relevant Authority, commencing on the Practical Completion Date for that component of Public Infrastructure and expiring at the end of the relevant period defined in Part 1 of the Guidelines.
Design Documentation	Technical specifications, plans, drawings, calculations, reports and other documents required to satisfactorily detail all aspects of the Development Works.
Developer	The owner of the land the subject of a subdivision development, including the Developer's Representative(s).
Developer's Representative	A person or entity (and each of their employees, agents, Contractors, subcontractors and consultants) appointed, authorised or otherwise engaged by the Developer to act on their behalf in communications with any Relevant Authority or Regulatory Authority for the purpose of or in connection with undertaking a component of the Development Works.

Development Consent Authority	Has the meaning given to it in the *Planning Act 1999 (NT)*
Development Permit	Any permit issued by a Development Consent Authority, pursuant to the *Planning Act 1999 (NT)*.
Development Site	The parcel or parcels of land (including any part of any parcel) on which Development Works are being, have been or are to be undertaken and includes: Adjacent Land for the time and to the extent of any works on Adjacent Land; and any other land affected by External Works for the time and to the extent of any works on that land.
Development Works	All and any works that are to be undertaken on the Development Site, or Adjacent Land, and any External Works, as part of or in furtherance of the Subdivision (including works to complete the conditions of any Development Permit, or any conditions necessary to satisfy the requirements of any Relevant Authority or Regulatory Authority).
Dilapidation Report	A report on the condition of Public Infrastructure at a given point in time. Typically completed on existing Public Infrastructure prior to Development Works commencing, recording any existing damage and the state of any particular assets that may be affected by the Development Works.
Dissolution Cavities	Cavities formed in certain rocks, where portions have been dissolved by groundwaters.
Documentation Point	Any stage of the Development Works identified as a point at which certain documentation is required to be submitted. Each Documentation Point will also be either a Hold Point or a Witness Point.
Dry Density Ratio	The percentage ratio of the field dry density of a material to the Modified Maximum Dry Density (MMDD) of that material. This property is also termed Relative Compaction or Modified Compaction.
Exotic Plants	Any plants not native to Australia.
External Works	All Development Works external to the Development Site (including, but not limited to, any works on Adjacent Land) and necessary for proper subdivision or development including, but not limited to, the construction, reconstruction or upgrade of Public Infrastructure, private infrastructure, or public or privately owned lands affected by, or having effect on, the proposed Subdivision.
Fine Grained Aggregate	Where the average grain size of the constituent minerals is less than 1mm. The average grain size is determined optically under a petrographic microscope or by calibrated hand lens.
Fine Tilth	The friable soil resulting from cultivation.
Fit For Purpose	Appropriate, and of the necessary standard and quality, for its intended use or purpose.
Flux Oil	A petroleum distillate added to bitumen to produce a long-term reduction in its viscosity.
Formation	The surface of finished earthworks on which a Pavement is constructed. It includes the earthworks (cut and fill), subgrade and the general shaping of the drainage. The formation width is therefore the distance of cut or fill, including table drain(s), out to the limits of any batters as applicable.
Germination Percentage	The proportion of pure seed germinating in a fixed time under standard laboratory conditions.
Ground Cover	A measure of the quantity of nominated vegetation (e.g. grassing) covering the ground surface, as determined using the Step Point Method or Quadrat Method, to the satisfaction of the Relevant Authority. Typically expressed as a percentage (e.g. 80% Ground Cover).

Guidelines	Means all four parts of the Subdivision Development Guidelines, being: Part 1 – Design Guidelines Part 2 – Reference Documents Part 3 – Standard Drawings Part 4 – Standard Specification
Inspection and Test Plan	Any plan, approved by each Relevant Authority, setting out the minimum inspection and testing requirements for Public Infrastructure to demonstrate conformance with the Standard Specification and the requirements of each Relevant Authority.
Inspection Point	Any stage of the Development Works identified as a point at which a physical inspection of the relevant Development Works may be required. Each Inspection Point will also be either a Hold Point or a Witness Point.
Large Box Culverts	Precast box culverts and link slabs having spans greater than 1200 mm, heights greater than 1200 mm or fill heights exceeding 1600 mm.
Laws	Includes all statutes, regulations, by-laws and all instruments under them and consolidations, amendments, re-enactments or replacements of any of them.
Licensed Surveyor	A Licensed Surveyor who is currently registered under the provisions of Part IV of the *Licensed Surveyors Act 1983 (NT)*.
Longitudinal Markings	Any line which runs parallel to the street centre line, e.g. broken line, edge line, separation line, barrier line.
Major Defects	Defects which prohibit safe operation of Public Infrastructure and/or safe use of public areas, or cause significant loss of amenity.
Minor Defects	Defects which do not prohibit safe operation of Public Infrastructure and/or safe use of public areas, and do not cause significant loss of amenity.
Modification	As it relates to *Section 7 – Stabilisation and Modification*, means a lighter form of stabilisation that treats an unbound material with small quantities of binder or granular material, to improve its unbound properties.
Mulch	Stable material spread as a surface treatment to reduce soil erosion, water loss, and weed invasion.
Native Plants	Plants that are natural to Australia.
Northern Territory Government Controlled Road Reserves	The roads, including Road Reserves, under the care, control and management of the Northern Territory Government and its relevant Department(s).
NPK Ratio	The ratio of Nitrogen (N), Phosphorus (P), and Potassium (K) in a fertiliser compound.
Nuisance	Any interference with a public or private right including, without limitation, any hazard, annoyance, interference, harm, loss (including expense) or damage caused by dust, fumes, heat, sound, vibration, escape of gases or liquids causing damage to land or other property or interfering with the use and enjoyment of them.
Optimum Moisture Content	The amount of water by mass, expressed as a percentage of the dry mass of the material, at which Maximum Modified Dry Density is obtained.
Other Markings	All diagonal lines, chevron markings and messages on the pavement, including symbols, words, numerals, arrows and kerb markings.
Pavement	That portion of a street constructed for the structural support of, and to form the running surface for, traffic. The Pavement structure refers to the pavement layers, in combination, above the Subgrade Surface, to support the traffic loadings. May be sealed or unsealed. Excludes the Shoulders.

Practical Completion	In relation to each component of the Development Works intended to be handed over to a Relevant Authority, when: The Developer has provided the Relevant Authority with all items required under Part 1 of the Guidelines; and The Relevant Authority is satisfied that the works are complete in accordance with the Guidelines and the Design Documentation except for Minor Defects which: do not individually or in the aggregate prevent the Development Works from being used for their intended purpose; are of the type that the Relevant Authority is satisfied there are reasonable grounds for not promptly rectifying them; and can be rectified without affecting the convenient use of the works or any other affected Public Infrastructure.
Practical Completion Date	The date that Practical Completion has been achieved, as Certified by a Relevant Authority in a Practical Completion Letter.
Precoating Material	A material used for pre-coating aggregate to promote adhesion of bitumen. Do not use diesel.
Prime	An application of a primer to a prepared Base without cover aggregate to provide penetration of the surface temporary waterproofing and to obtain a bond between the Pavement and the subsequent Seal or Asphalt. It is a preliminary treatment to a more permanent bituminous surface.
Primerseal	An application of primer binder with a fine cover aggregate to a prepared Base to provide penetration of the surface and retain a light cover aggregate.
Process Testing	The testing carried out by the Developer, as outlined in the Inspection Test Plan(s), additional to Conformance Testing, to ensure that the Development Works is in accordance with the Construction Drawings and Specifications.
Project Specific Requirements	Means any variation of the requirements of this Standard Specification documented using the template provided and submitted to, and approved in writing by, each Relevant Authority in respect of a particular Subdivision.
Provide	Provide and similar expressions include supply, install, connect, test, commission, and leave ready for use.
Public Infrastructure	Any infrastructure currently, or proposed to be, owned and maintained by a Relevant Authority. Includes any component of the Development Works that is intended to be handed over to and accepted, and thereafter owned and maintained, by a Relevant Authority.
Recycled Crushed Glass	RCG conforming to Specifications for Recycled Crushed Glass as an Engineering Material, Section 9.
Registered Mix Design	An asphalt mix which has been placed on the Department of Infrastructure, Planning and Logistics' Asphalt Mix Design Register.
Regulatory Authority	Any governmental, semi-governmental, public, statutory or judicial body, entity, department or authority responsible for exercising statutory powers, rights or other authority under any legislation, subordinate legislation, or other legislative instrument in force from time to time in the Northern Territory and, for each component of Public Infrastructure, means any such body that regulates the design, construction, use, discharge to or from the infrastructure (whether or not that body will or is intended to own that Public Infrastructure upon completion of a subdivision development). Regulatory Authorities include, but are not limited to, the Development Consent Authority and the Power and Water Corporation in its capacity as regulator for electricity, water, and sewerage Public Infrastructure.
Relative Compaction	Has the same meaning as Dry Density Ratio.

Relevant Authority	Means, for a component of Public Infrastructure constructed as part of the Development Works, any governmental, semi-governmental, public, statutory body, statutory corporation or government owned corporation, entity, department or authority that is intended to accept handover of, own and maintain that Public Infrastructure after Practical Completion. Includes Service Authority and Local Authority as applicable.
Retroreflective	Meets specified reflectivity, expressed as minicandela per lux per square metre (mcd/lux/m2) and measured by a reflectometer approved by the Relevant Authority.
Road Reserve(s)	Means any area of land reserved or dedicated, or to be reserved or dedicated, to the Northern Territory of Australia or a Local Authority as a road or street under the *Control of Roads Act 1953 (NT)*, *Local Government Act 2008 (NT)*, or the *Planning Act 1999 (NT)* and includes a road reserve in respect of a street as referred to in the Guidelines.
Root Ball	The finely bound fibrous root and soil removed intact from the container with the plant.
Safety Data Sheet	Provides information about hazardous materials such as identity, ingredients, health and physical hazards, safe handling and storage, emergency procedures, and disposal considerations.
Seal (Spray Seal)	A sprayed application of bituminous binder into which aggregate is incorporated. May include more than one application of binder and aggregate, and may include geotextile fabric.
Service Authority	Has the meaning given to it in the *Planning Act 1999 (NT)*.
Shoulder	The portion of a Carriageway adjacent the Pavement, and flush with the surface of the Pavement. Provides run-off for vehicles from traffic lanes. May be sealed or unsealed.
Soil Binding Agent	Material which stabilises and conditions soil and aids moisture retention.
Stabilisation	Process used to enhance material properties for Pavement design purposes to overcome deficiencies in available materials, by incorporation of a binder or granular material (or both).
Standard Drawings	The Standard Drawings, as referenced in Part 3 of the Guidelines.
Standard Specification	This Specification.
Sub-base	One or more layers of material placed over the Subgrade and below the Basecourse extending for the full width of the Pavement and Shoulder.
Subdivision	Has the meaning given to it in the *Planning Act 1999 (NT)*.
Subgrade	Top 150 mm of material below Subgrade Surface. Also known as Subgrade Layer.
Subgrade Surface	The prepared surface immediately beneath the Pavement and Shoulder layers. Also extends under footpaths, kerb and gutter, and surface structures.
Test Lot	An area designated for Conformance Testing, to be agreed between the Developer and Certifying Engineer, based upon: • A Test Lot will represent no more than one work shift's production. • A Test Lot will be continuous and will have been brought to completion at the same time. • A Test Lot will be composed of essentially homogeneous material with no distinct changes in attribute values.

Testing Contractor	A NATA accredited Testing Contractor(s) appointed by the Developer to undertake Process Testing and Conformance Testing for the Development Works.
Tom(s)	Devices used to hold pipe culverts in place during backfilling of trenches. Also; Horizontal device(s), such as timbers, metal struts, hydraulic spreaders, etc, spanning across an excavation for holding soldiers (vertical timbers) or walings (horizontal timbers) in place against the sides of trenches before and during trench backfilling.
Traffic Control Device	Any sign, signal, pavement marking or other installation placed or erected for the purpose of regulating, warning, guiding or providing for the safety of street users. It does not include temporary warning devices and control measures erected only for the construction period.
Traffic Controller	A person responsible for the control of traffic on public streets.
Traffic Guidance Scheme	Includes, but is not limited to, plans, drawings, sketches, diagrams, instructions, and after hours arrangements, for the guidance of traffic under approved Traffic Management Plans. Formerly referred to as Traffic Control Diagram(s).
Transverse Markings	Any line which is at right angles to the centre line of the street, e.g. stop line, hold line, pedestrian cross walk.
Unpaved Areas	Those areas within the Road Reserve which are not part of the Pavement, including any verges and medians not paved, batters and table drains, but excluding footpaths and vehicle access strips.
Unsuitable Material	Any material that fails proof rolling and/or Conformance Testing, where specified, or is otherwise not Fit For Purpose.
Warm Mix Asphalt	Warm Mix Asphalt (WMA) is asphalt that contains a warm mix additive, or utilises a warm mix process, that has the ability to reduce the mixing and compaction temperature requirements below the typical temperatures used for that application.
Waterway	Has the meaning given to it in the *Water Act 1992 (NT)*.

GLOSSARY

AADT	Annual Average Daily Traffic
AAPA	Australian Asphalt Pavement Association
APAS	Australian Paint Approvals Scheme
ARRB	Australian Road Research Board
ASTM	American Society for Testing And Materials
AS/NZS	Australian Standard / New Zealand Standard
ATLM	Audio Tactile Line Marking
CBR	California Bearing Ratio
CCTV	Closed Circuit Television
DIPL	Department of Infrastructure, Planning and Logistics
DOH	Department of Health
ESCP	Erosion and Sediment Control Plan
IRI	International Roughness Index
ISO	International Organisation for Standardisation
ITP	Inspection Test Plan
MMDD	Modified Maximum Dry Density
MPa.s	Milli Pascal Seconds – a unit measure of viscosity
NATA	National Association of Testing Authorities, Australia
NTCP	Northern Territory Codes of Practice
NTTM	Northern Territory Test Method
NTMTM	Northern Territory Materials Testing Manual
PCCP	Painting Contractors Certification Program
PMB	Polymer Modified Binder
RCG	Recycled Crushed Glass
SAMI	Strain Alleviating Membrane Interlayer
TGS	Traffic Guidance Scheme
TMP	Traffic Management Plan
VPD	Vehicles per lane per day

INFORMATION

This Specification is available electronically in PDF from the Northern Territory Subdivision Development Guidelines Online Platform.

For further information regarding this Standard Specification contact:-

Manager Specification Services
Department of Infrastructure, Planning and Logistics
PO Box 61
Palmerston NT 0831

Telephone: (08) 8946 5021
Email: DocumentationServices.Dipl@nt.gov.au

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1. MISCELLANEOUS PROVISIONS

1.1 STANDARDS

Conform to the following Standards, Acts and Publications unless specified otherwise:

AS/NZS 1336	Eye and face protection - Guidelines
AS/NZS 1337 (set)	Personal eye protection and Eye and face protection
AS/NZS 1338 (set)	Filters for eye protectors
AS 1348	Road and traffic engineering - Glossary of terms
AS 1379	Specification and supply of concrete
AS 1742(set)	Manual of uniform traffic control devices
AS/NZS 1800	Occupational protective helmets - Selection, care and use
AS/NZS 1801	Occupational protective helmets
AS/NZS 1906(set)	Retroreflective materials and devices for road traffic control purposes
AS/NZS 1906.4	Retroreflective materials and devices for road traffic control purposes - High-visibility materials for safety garments
AS/NZS 2161 (set)	Occupational protective gloves
AS 2187.1	Explosives - Storage, transport and use - Storage
AS 2187.2	Explosives - Storage, transport and use - Use of explosives
AS/NZS 2210 (set)	Safety, protective and occupational footwear
AS/NZS 4399	Sun protective clothing - Evaluation and classification
AS/NZS 4501.1	Occupational protective clothing - Guidelines on the selection, use, care and maintenance of protective clothing
AS/NZS 4501.2	Occupational protective clothing - General requirements
AS/NZS 4602.1	High visibility safety garments - Garments for high risk applications
AS 4742	Machine-mounted forward and reverse audible warning alarm
ISO 9533	Earth-moving machinery - Machine-mounted audible travel alarms and forward horns - Test methods and performance criteria
NTMTM	NT Materials Testing Manual
NTCP	NT Codes of Practice
NTTM	NT Test Methods

Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)

Mineral Titles Act 2010 (NT)

Mining Management Act 2001 (NT)

Work Health and Safety (National Uniform Legislation) Act 2011 (NT) and *Work Health and Safety (National Uniform Legislation) Regulations 2011 (NT)*.

Dangerous Goods Act 1998 (NT) and *Dangerous Goods Regulations 1985 (NT).*

Railways of Australia (ROA) Code - Installation of Other Parties Services and Pipelines Within Railway Boundaries

Water Act 1992 (NT)

Energy Pipelines Act 1981 (NT)

Australian Communications Media Authority (ACMA) - any Standards, Acts, controls specifically required. Refer to ACMA directly.

Standard Specification for Environmental Management, DIPL publication

1.1.1 Overseas Standards

Where no Australian Standard exists, the Developer must comply with the referenced standards published by the British Standards Institute (BSI) or the American Society for Testing Materials (ASTM).

1.1.2 Currency of Standards

The Developer must comply with Standards current at the time of being granted any approval by a Relevant Authority and/or Regulatory Authority for a particular component of the Development Works, except where different editions and/or amendments are required by statutory authorities, including, but not limited to, NATA and the National Construction Code including the Building Code of Australia.

1.2 ENVIRONMENTAL MANAGEMENT

The NTG *Standard Specification for Environmental Management* applies to all Subdivisions.

1.3 INSPECTION TEST PLANS

Documentation Point 1 – Submit Inspection Test Plans (ITPs), detailing all procedures and test plans to be undertaken to complete the Development Works, before commencing the Development Works.

1.4 DILAPIDATION SURVEY

Prior to commencing Development Works within existing Road Reserves and/or easements,

undertake a dilapidation survey to ascertain the existing condition of assets.

Documentation Point 2 – Submit a copy of the Dilapidation Report prior to commencing the Development Works.

1.5 PERMITS

1.5.1 Permit to Work in a Road Reserve

Documentation Point 3 - Obtain all necessary permits to work in Road Reserves prior to commencement of relevant Development Works.

Applications must be supported with Traffic Management Plans. Refer *Section 2 - Provision for Traffic.*

1.5.2 Permit to Interfere with a Waterway

Documentation Point 4 - Obtain all necessary Permits to Interfere with a Waterway prior to commencement of relevant Development Works.

1.6 ESTABLISHMENT

Liaise with the Relevant Authority regarding establishment on the Development Site, including, but not necessarily limited to, the following:

Advertise

Advertise works via Project Notice Boards as required by the Relevant Authority.

Permits

Obtain all permits required where any Development Works affect existing Public Infrastructure or Waterways.

Access to site

Access to the Development Site and construction traffic routes must be agreed with the Relevant Authority. A construction traffic management plan may be required.

Demobilisation

Prior to demobilising, restore and rehabilitate all elements of Public Infrastructure to the satisfaction of the Relevant Authority.

1.7 WASTE, CONTAMINANTS AND EXCESS MATERIALS

Remove all waste, contaminants and excess materials from the Development Site and dispose of lawfully.

1.8 VOLATILE SUBSTANCES MANAGEMENT

The Developer must become familiar with any Volatile Substance Abuse Management Plan(s) which is/are applicable in the areas where the Developer needs access so that the Development Works can be carried out. This includes, but is not limited to, the Development Site(s) of the works, the site(s) of any accommodation used by the Developer, and any access routes used by the Developer.

The Developer must comply with the requirements of any applicable Volatile Substance Abuse Management Plan(s).

Copies of Volatile Substance Abuse Management Plans are available via Part 2 – Reference Documents.

1.9 BORROW PITS

Documentation Point 5 – Obtain approval for use of Borrow Pits on land not owned by the Developer.

Where used, the establishment, operation and rehabilitation of the Borrow Pits must comply with the DIPL *Standard Specification for Roadworks and the NTG Standard Specification for Environmental Management.*

1.10 EXPLOSIVES

Comply with all Laws and the following requirements of NT WorkSafe:

- Licence to carry and store explosives.
- Vehicle licensed to carry explosives.
- Shot Firer's Certificate.

Documentation Point 6 – Where explosives are proposed to be used on the Development Site, including for External Works, notify all owners of Adjacent Land a minimum of 10 Business Days prior to commencing blasting operations. Inspect and record the condition of all structures and services subject to possible effect by use of explosives before and after blasting operations.

Documentation Point 7 - Obtain approval for the use of explosives for External Works prior to commencing blasting operations.

1.11 PLANT AND EQUIPMENT

Clean plant and equipment in a location and in a manner which prevents pollution of the surrounding environment.

Clean plant and equipment before it is brought on to the Development Site and immediately before it leaves the Development Site to make it pest and weed free.

1.11.1 Mobile Plant Machinery - Broadband Alarm

Broadband Alarms (White Sound) must be fitted to all construction vehicles and mobile plant before commencement of works and be Fit For Purpose.

1.11.2 Warning Beacons on Vehicles and Mobile Plant, Machinery, and Equipment

Provide beacons, or other mounted visual illuminated warning devices on the highest point of the cabin roof or superstructure of all vehicles, mobile plant, mobile machinery, and mobile equipment in accordance with the Vehicle-Mounted Signs And Devices Clause in the Description And Use of Signs And Devices Section of AS 1742.3 where these are being used for External Works.

Fit beacons with globes rated at a minimum of 55 watts, or the LED equivalent.

Do not use strobe lights.

Ensure that the light is operational whenever the plant or equipment is working.

Ensure that the light is visible from all approaches and not obscured by exhaust stacks, back hoe arms etc, and that the beacons or warning devices are not covered in dust.

Non-compliance with this clause may result in the Developer being directed to cease work.

1.12 SAFETY

Comply with the *Work Health and Safety (National Uniform Legislation) Act 2011 (NT) and Work Health and Safety (National Uniform Legislation) Regulations 2011 (NT)* and any applicable Codes of Practice, and any applicable Australian Standards.

Site specific and Task specific induction training is still required for all work sites and is to be provided by the Developer.

1.12.1 Work Health and Safety Management Plan

The Developer must prepare and comply with a Work Health Safety Management Plan(s) as required by applicable legislation.

Provide a copy upon request by any Relevant Authority and/or Regulatory Authority.

1.12.2 Work Involving Chemicals

Comply with *Work Health and Safety (National Uniform Legislation) Act 2011 (NT) and Work Health and Safety (National Uniform Legislation) Regulations 2011 (NT).*

Safety Data Sheets documentation for chemicals used during the works must be held on site at all times during the works.

Spill clean-up equipment and materials, appropriate for the type and quantities of chemicals used on the Development Site, must be kept on site at all times during the works. Equipment and materials must be kept in a readily accessible location and must be maintained and replenished as needed.

Staff trained in the use of the spill clean-up equipment and materials must be on the Development Site at all times during the works.

Report all chemical spills to the NT Pollution Hotline, phone 1800 064 567.

Chemicals include, but are not limited to, paints, fuels, oils, herbicides, pesticides, tars, lubricants, cleaning products (domestic and industrial types), inks, dyes, toners, fertilizers etc.

1.13 SITE PERIMETER FENCING

Provide and erect site perimeter fencing, including hoardings to the satisfaction of the Relevant Authority, for the duration of Development Works to prevent accidental and/or unauthorised access to the Site.

1.14 REQUIREMENTS FOR EXCAVATIONS

Undertake dial before you dig (DBYD) prior to any work. Observe all DBYD recommendations related to safe excavation, duty of care and excavating safely.

Comply with NT Work Safe and Safe Work Australia Codes of Practice applicable to the works, including the *Safe Work Australia Code of Practice for Excavation Works.*

Provide shoring (or similar) to all trenching and/or excavations that are saturated or in unstable ground.

Provide shoring (or similar) to all trenching and/or excavations that are deeper than 1.5 metres, and where a person is required to enter, unless a suitably qualified geotechnical engineer Certifies that the trenching and/or excavation is stable. Maintain a record of such Certification on the Development Site for the duration of associated works.

1.15 WORK ON RAILWAY SITES

Comply with *Work Health and Safety (National Uniform Legislation) Act 2011 (NT) and Work Health and Safety (National Uniform Legislation) Regulations 2011 (NT).*

Carry out work within railway sites to the approval of the owner and accredited operator of the railway.

The Developer must comply with all requirements, conditions and directions of the owners and accredited operators of the Railway pursuant to the *Northern Territory Rail Safety Act*, when carrying out work within 100 metres of the Railway. Obtain any approvals or licences required for such work.

Comply with the terms of any current existing interface agreement for work within the railway sites.

Give at least 10 Business Days written notice to the owner and operator of intent to commence work and provide a work plan showing safe working conditions for the site.

Documentation Point 8 – Obtain approval of the proposed work plan from the owner and operator of the rail system prior to commencing the relevant Development Works.

If work is required to be carried out within 3 metres of the actual rail line, this work must be co-ordinated through the owners and accredited operators of the Railway.

1.16 WORK NEAR TRAFFIC COUNTING STATIONS

Documentation Point 9 - Obtain the location of traffic counting station cables prior to commencing any excavation, boring of holes, rock breaking, soil compaction or similar activity in the vicinity of traffic counter station detector loops.

Follow all directions and instructions issued by the Relevant Authority in relation to work in the vicinity of such cables.

1.17 SETTING OUT WORKS

Setting out of works must be undertaken using a Licensed Surveyor.

Allotment boundaries must be pegged out at the commencement of works and maintained throughout the construction phase to enable accurate visual assessment of works. Flagged fence post droppers are preferred.

1.18 LEVEL CHECKING

Check levels using a Licensed Surveyor.

All levels shown on the Construction Drawings must be checked and compared to demonstrate conformance with the specified tolerances. Any levels outside of tolerance must be clearly identified within the survey report(s) and rectified.

1.19 LEVEL AUDITING

The Relevant Authority may request to audit any level survey submitted to show conformance with the specified tolerances.

1.20 AS-CONSTRUCTED DOCUMENTATION

Documentation Point 10 – Submit a procedure for approval for recording and submitting As-Constructed Documentation, prior to commencing the Development Works.

Document all changes to and variations to the approved Construction Drawings as the Development Works proceeds, particularly items that are covered or become inaccessible.

Use a Licensed Surveyor to record the changes and variations.

All coordinates must be in Geocentric Datum of Australia (GDA 94) and all levels to Australian Height Datum (AHD).

Provide the following As-Constructed Documentation to the Relevant Authorities progressively as the Development Works proceed and upon Practical Completion:

- PDF copies of drawings in A3 size format;
- Soft copies of drawings in AutoCad and/or Microstation format;
- Copies of text information in A4 portrait format in Microsoft Word and/or PDF format;
- Tables and schedules in Microsoft Excel and/or PDF format.; and
- Survey files in .pdf and Autocad/ Microstation format.

The Developer must provide the Relevant Authorities with As-Constructed Drawings to the same level of detail set on the approved Construction Drawings, including scales, styles, notes and modified title blocks. The set of As-Constructed Drawings must include each and all drawings included in the Design Documentation. Should more drawings be required to cover the extent of constructed features, these also must be included on the As-Constructed Documentation.

As Constructed Drawings must clearly identify information what set out and levels are design and what set out and levels are As Constructed.

As Constructed Drawings without changes must be described as “As Constructed – No Changes” in the amendment description column.

Show set-out on the As Constructed Drawings. Clearly identify on the As Constructed Drawings which levels are design levels and which levels are As Constructed levels.

Where the As-Constructed Drawings are to be reduced, the annotation character heights must be selected so that the annotation character heights as reproduced are not less than 1.8 mm. Resolution to be a minimum of 600 dpi.

As-Constructed Drawings must be signed and Certified as complete and accurate by:

- a Certifying Engineer having undertaken appropriate regular inspections and having made appropriate enquiries in respect of the state of completion of the relevant component of Public Infrastructure; and
- the Developer.

Documentation Point 11 – Submit As Constructed information in accordance with the approved procedure.

2. PROVISION FOR TRAFFIC

2.1 GENERAL

Ensure the Development Site is operated and maintained in a safe and satisfactory condition.

Comply with the following general requirements.

- Ensure public safety.
- Minimise obstruction and inconvenience to the public.
- Assume responsibility for the safe conduct of traffic through, past or around the Development Site, 24 hours a day, for the duration of the Development Works.

Comply with all Laws, including but not limited to the following Acts and associated Regulations:

- *Control of Roads Act 1953 (NT)*
- *Traffic Act 1987 (NT)*
- *Work Health and Safety (National Uniform Legislation) Act 2011 (NT)*

2.2 STANDARDS

Conform to the current editions of the following Standards and publications unless specified otherwise:

AS 1742.2	Manual of uniform traffic control devices – Traffic control devices for general use.
AS 1742.3	Manual of uniform traffic control devices - Traffic control devices for works on roads.
AS 1742.9	Manual of uniform traffic control devices – Bicycle facilities
AS 1742.10	Manual of uniform traffic control devices – Pedestrian control and protection
AS/NZS 1906.1	Retroreflective materials
AS/NZS 3845.1	Road safety barrier systems
AS 4191	Portable traffic signals
AS 4852.2	Variable Message Signs – Portable Signs
ISO 31000	Risk management
NTTM	NT Test Methods.
NTMTM	NT Materials Testing Manual.
AUSTROADS	Guide to Road Design
AUSTROADS	Guide to Bridge Technology
AUSTROADS	Guide to Road Safety Part 6: Road Safety Audit
NT WorkSafe	All relevant bulletins, guidelines and codes of practice.
Safe Work	All relevant bulletins, Australia guidelines and codes of practice.

2.3 INTERNAL WORKS

For all works within the parcel of land subject to Subdivision, make all necessary provisions for traffic to comply with all Laws and Standards applicable to the Development Works.

2.4 EXTERNAL WORKS

Obtain all necessary Permit(s) to work within a Road Reserve from prior to commencing any External Works within Road Reserves. Refer *Section 1.5 - Permits*.

Comply with all requirements of the Relevant Authorities, including preparation and submission of Traffic Management Plans and restricted working arrangements.

Comply with all Laws and Standards applicable to the Development Works.

For all External Works in Northern Territory Government Controlled Road Reserves, refer to the DIPL Specification for Roadworks – Provision for Traffic Section.

2.5 TRAFFIC MANAGEMENT PERSONNEL

All personnel engaged in the Development Works must have a current valid NT Construction Induction White Card, or equivalent qualification recognised by NT WorkSafe.

Only persons qualified in nationally accredited units of competency in WorkZone Traffic Management can be utilised for traffic management. The four levels of accreditation are:

- WorkZone Traffic Management Plan Designer (WZ1)
- WorkZone Traffic Controller (WZ2)
- WorkZone Traffic Supervisor (WZ3)
- Escort mobile road marking operations (WZ 4)

NT accreditation is provided by completion of applicable training course(s); and obtaining a WorkZone Traffic Management ID Card from NT Motor Vehicle Registry.

2.6 TRAFFIC MANAGEMENT PLANS

2.6.1 Traffic Management Plan Design

Traffic Management Plans (TMPs) are required to be designed by a Northern Territory accredited Traffic Management Plan Designer (WZ1).

Design the TMP in conformance with the requirements of AS 1742 – *'Manual of uniform Traffic Control Devices, Part 3: Traffic Control Devices for Works on Roads'.*

Include sufficient details on the TMP to explain the potential hazards, the assessed risks and the proposed treatments for the proposed Development Works activities and Development Site.

Documentation Point 12 – Submit Traffic Management Plans (TMPs), including associated Traffic Guidance Schemes (TGS), prior to commencing the relevant Development Works.

2.6.2 Access to Adjacent Properties and Side Streets

Maintain access to adjacent properties and side streets at all times to a level appropriate for the type and frequency of traffic.

Provide and erect proposed and approved signs detailing alternative access, only after approval from the Relevant Authority is obtained for the Traffic Management Plan.

Ensure adequate access is maintained for pedestrians and cyclists as required, including delineated access if existing paths are being closed as part of the works.

2.6.3 Temporary Pedestrian Access

Conform to: AS 1742.9 and AS 1742.10.

Maintain access for pedestrians, cyclists and persons with disabilities passing through and around the Development Site. Where existing paths are to be demolished or will become inaccessible or modified due to Development Works, provide temporary access to a standard not less than the pre-existing or pre-construction standard.

Temporary access must;

- Be clearly delineated and have adequate width and height clearance.
- Be smooth, free draining and free of obstructions and loose material.
- Provide clear guidance where paths change direction.
- Be illuminated by temporary lighting to assist path users where existing street lighting has been removed or affected by the works.
- Be arranged so that path users are clearly visible to vehicle drivers and plant operators at street pedestrian crossing points.

2.6.4 Traffic Control Amendments

Modify the Traffic Management Plan (TMP) during the Development Works to suit site conditions if required or requested by the Relevant Authority.

Changes made to the TMP must be clearly marked in the amended TMP.

Documentation Point 13 – Submit all amendments to the TMPs and TGS prior to implementation of any changes, unless there is an urgent need for amendments to mitigate hazards.

In situations where immediate hazard mitigation is necessary, the changes may be implemented and notice of the changes provided as soon as practicable thereafter.

2.7 INCIDENT RESPONSE

If an incident occurs within, adjacent to, on approach to or departure from the Development Site, make a photographic record of the Traffic Control Devices, site conditions, placement of plant and equipment etc., as soon as practicable after the event. Advise the Relevant Authority of the incident as soon as possible.

Notify the following services if disruption to traffic is expected: Public Transport Operators, Emergency Services and Garbage Collection.

Organise Police control as required, or as requested by the Northern Territory Police.

2.8 RESTORATION

Upon completion of Development Works associated with the provision for traffic:

- Remove all temporary warning signage and other traffic control devices.
- Remove all temporary works and reinstate the areas to their original state.
- Stabilise all areas impacted by the Development Works to prevent erosion.
- Where applicable reseed with local native grasses and trees and shrubs.
- Comply with the requirements of the Environmental Approvals and Clearances issued by the Relevant and/or Regulatory Authorities.
- Reinstate permanent Traffic Control Devices temporarily removed during the Development Works.

3. CLEARING, GRUBBING AND REHABILITATION

3.1 CLEARING

DEMOLITION; Remove fencing, buildings, kerbing, debris, drainage structures, old street surfaces and other structures as required.

EXTENT; Clear the Development Site only to the extent shown on the Construction Drawings and specified in this section.

EXCESS CLEARING; Where excess clearing has taken place beyond that specified or shown on the Construction Drawings for External Works, rehabilitate the areas in accordance with the Relevant Authority requirements.

3.2 TREES TO BE RETAINED

Retain selected trees shown on the Construction Drawings.

PROTECTION; Protect from damage, trees which are required to be retained. Do not remove topsoil from the areas within the dripline of the trees and keep the area free of construction equipment and materials.

DAMAGE; If a tree, which is marked to be retained, is damaged and repair work is considered impractical, or is attempted and fails, remove the tree and the root system, if so directed. Replace the tree with a tree of the same species and similar condition and size.

3.3 MULCHING

Mulch all cleared vegetative matter in mechanical brush chippers to a maximum size of 100 mm as the clearing work proceeds. Do not stockpile cleared material for later Mulching.

STUMPS; Remove stumps and other material unsuitable for Mulching from the Development Site and dispose of lawfully.

GRASSES; Do not Mulch grass clods, roots or other components containing viable propagules.

STOCKPILES; Stockpile Mulched material on the Development Site for use during reinstatement work in accordance with the Environmental Management Plan.

SURPLUS MATERIAL; Remove excess Mulch from the Development Site and dispose of lawfully.

3.4 STRIPPING OF TOP LAYER

EXTENT; Strip the top layer of natural material to a nominal depth of 100 mm unless shown otherwise on the Construction Drawings.

Stockpile stripped material on the Development Site within 1 km of the point of origin. Comply with approved Erosion and Sediment Control Plans and relevant OH&S Legislation.

Remove excess stripped material from the Development Site and dispose of lawfully.

Spread stripped material on areas to be landscaped, following completion of earthworks.

3.5 TREATMENT OF EXISTING SEALED SURFACE

Rip the existing Sealed surface.

Conform to the following:

Table 3-1 - Treatment of Existing Sealed Surfaces

Specified Cover over Existing Seal	**Maximum Seal Fragment Size**
Fill depth 500 mm or greater	1 m2
Fill depth less than 500 mm	Remove seal from the Development Site.
Pavement re-sheeting only	Remove seal from the Development Site and replace with similar volume of Pavement.

3.6 SCARIFYING OF EXISTING STREETS

Scarify, both longitudinally and laterally, for the full width of the formation by ripping, with 500mm maximum tyne spacing, to a depth of 250 mm resulting in a maximum size of demolished Seal of 100 mm.

Remove demolished Seal from the Development Site and dispose of lawfully, unless otherwise approved by the Relevant Authority.

3.7 GRUBBING

Grub out and remove from the site all cleared vegetation to a depth of 200 mm below Subgrade Surface in cut and 200 mm below natural surface under fill.

Fill grub holes and other excavations as required with Standard Fill, unless otherwise directed by the Certifying Engineer, compacted to 95% Relative Compaction.

Inspection Point 1 – Obtain approval for cleared and grubbed surface prior to commencing earthworks operations.

3.8 REHABILITATION

Reinstate any clearing undertaken during the Development Works which is not subject to landscaping, including temporary detours, to rehabilitate the area consistent with its untouched surrounds. This includes topsoiling, grassing,

seeding, planting, mulching, watering and other measures necessary to rehabilitate the area.

Reinstate all existing infrastructure which has been damaged or impacted by the Development Works.

3.9 CLEANING UP

Remove all excess fill, rubble and other debris from the Development Site and dispose of lawfully.

4. EARTHWORKS

4.1 STANDARDS

Conform to the following Standard and Publication unless specified otherwise:

AS 1289 (set)	Methods of testing soils for engineering purposes.
AS 3798	Guidelines on Earthworks for Commercial and Residential Developments
NTMTM	NT Materials Testing Manual.
NTTM	NT Test Methods

4.2 EARTHWORKS IN CUT – OTHER THAN ROCK

4.2.1 Description

Operations necessary for excavation in soils, including:

- shaping and trimming the cut formation;
- compaction of the Subgrade;
- removal / replacement of Unsuitable Materials; and
- removal of excess materials.

4.2.2 Excavation and Subgrade Preparation

Excavate, shape and trim works to the nominated design Subgrade Surface level.

Rip the cut Subgrade to a depth of 150mm and compact in accordance with *Clause 4.10 – Compaction*.

Inspection Point 2 – For earthworks in cut, proof roll the compacted Subgrade in accordance with *Clause 4.11.2 – Proof Rolling* to identify any areas of Unsuitable Material.

Conformance Testing must be undertaken to confirm the Subgrade material conforms to the required properties.

4.2.3 Unsuitable Material Below Subgrade Surface other than Rock

Inspection Point 3 – If Unsuitable Materials are encountered below Subgrade Surface other than rock, obtain direction before remedial works commence.

Replace Unsuitable Material with Standard Fill, unless otherwise directed by the Certifying Engineer, compacted to 95% Relative Compaction in Road Reserves and under buildings, and 90% Relative Compaction for Allotment Fill.

Floodways: Replace Unsuitable Material with Floodway Fill, compacted to 95% Relative Compaction.

4.3 EARTHWORKS IN CUT - ROCK

4.3.1 Description

Operations necessary for excavation in rock, including:

- shaping and trimming the cut formation;
- removal / replacement of Unsuitable Materials;
- removal of excess materials; and
- filling of Dissolution Cavities in cut rock.

4.3.2 Excavation and Subgrade Preparation

Inspection Point 4 - If rock is encountered below the Subgrade Surface, obtain direction before remedial works commence.

Excavate to Subgrade Surface level, taking care not to over-excavate or disturb underlying in-situ materials.

Trim the excavation to shed water.

Remove all loose and disturbed materials from the cut rock face, and rock which has been rendered unstable.

Replace excavated material with Select Fill compacted to 95% Relative Compaction.

Do not rip and compact the rock Subgrade.

4.3.3 Dissolution Cavities in Rock

Inspection Point 5 - If Dissolution Cavities are encountered below the Subgrade Surface, provide notification for direction before remedial works commence.

Following excavation of the final profile, if Dissolution Cavities are present in rock materials, fill the cavities with lean mix concrete or cement slurry/grout.

4.4 EARTHWORKS IN FILL

4.4.1 Description

Earthworks in fill includes preparation prior to filling, winning, hauling, placing and compacting material on all prepared areas including holes, pits and other depressions.

4.4.2 Preparation of Foundation Prior to Filling

Subsequent to stripping of topsoil, moisture condition the foundation and apply a minimum of three passes with maximum mass compaction equipment.

Inspection Point 6 – Proof roll the foundation prior to filling in accordance with *Clause 4.11.2 – Proof Rolling* to identify any areas of Unsuitable Material.

4.4.3 Unsuitable Material Beneath Fill

Inspection Point 7 - If Unsuitable Materials are encountered in foundations beneath fill, obtain direction before remedial works commence.

Replace Unsuitable Material with Standard Fill, unless otherwise directed by the Certifying

Engineer, compacted to 95% Relative Compaction in Road Reserves and under buildings, and 90% Relative Compaction for Allotment Fill.

4.4.4 Dissolution Cavities Beneath Fill

Inspection Point 8 - If Dissolution Cavities are encountered in foundations beneath fill, obtain direction before remedial works commence.

Subsequent to stripping of topsoil, if Dissolution Cavities are present in rock materials, fill the cavities with lean mix concrete or cement slurry/grout.

4.4.5 Benching

Provide benching in accordance with the Construction Drawings where the existing surface inclines at steeper than eight horizontal to one vertical.

Provide terracing in accordance with the Construction Drawings where the existing surface inclines at steeper than three horizontal to one vertical.

4.4.6 Placement of Fill

Fill must be placed as 'Controlled Fill' as follows:

- Deposit and spread the material in uniform level layers to a maximum thickness of 250 mm loose measurement, unless otherwise Specified on Construction Drawings.
- Moisture condition to fill material between +-/2% of OMC; and
- Compact each layer to the specified compaction (refer ***Table 5-11 – Dry Density Ratios for Conformance***) before placing the next layer.
- Use Standard Fill for the Subgrade layer, unless otherwise specified on the Construction Drawings.

All Allotment Fill is to be carried out under Level 1 Inspection and Testing in accordance with AS 3798 and comply with *Section 5 - Conformance Testing.*

Inspection Point 9 – For earthworks in fill, proof roll the Subgrade Surface in accordance with *Clause 4.11.2 – Proof Rolling*.

4.5 FILL MATERIAL

4.5.1 General Fill

Use the best locally available material.

Use fill material, whether cut or borrow, that is free of organic matter and has a minimum 4 day soaked CBR at 95% MMDD of 20%, to AS 1289, and a plasticity index between 2% and 15%.

4.5.2 Standard Fill

Conform to the following properties:

Table 4-1 – Standard Fill Properties		
CBR 4 day soaked at 95% MMDD to AS 1289:		20 Min.
Maximum Particle Size:	For Subgrade Layers	50mm
	For other than Subgrade Layers	100mm
Plasticity Index:		2%-15%

4.5.3 Select Fill

Select Fill must be comprised of gravel, decomposed rock or broken rock, free from organic matter and lumps of clay.

Conform to the following Grading and Properties:

Table 4-2 – Grading – Select Fill	
AS Sieve (mm)	% Passing (Dry Weight)
75.00	100
9.50	30 - 100
2.36	15 - 65
0.075	5 - 25

Table 4-3 – Select Fill Properties	
CBR, 4 day soaked at 95% MMDD to AS 1289:	30 minimum.
Plasticity Index:	2 - 15% maximum.
Linear Shrinkage:	2 - 6%.

4.5.4 Sand Clay Fill

Sand Clay Fill may be used as an alternative to Select Fill.

Conform to the following Grading and Properties:

Table 4-4 – Grading – Sand Clay Fill	
As Sieve (mm)	% Passing (Dry Weight)
4.75	80 - 100
2.36	60 - 100
0.425	30 - 60
0.075	14 - 28

Table 4-5 – Sand Clay Fill Properties	
CBR: 4 day soaked and 95% MMDD to AS 1289:	30 minimum
Plasticity Index	15% maximum
Linear Shrinkage	1 - 8%

4.5.5 Floodway Fill

Floodway fill must be used for replacement of Unsuitable Materials beneath floodways.

Floodway fill must be comprised of angular or broken rock, free from organic matter and lumps of clay.

Conform to the following Grading and Properties:

Table 4-6 – Grading – Floodway Fill	
Maximum size:	100 mm.
Plasticity Index:	10 maximum.
Linear Shrinkage	5.0 maximum.

Table 4-7 – Floodway Fill Properties	
AS Sieve (Mm)	**Percentage Passing**
75.0	40 - 100
19.0	15 - 50
2.36	0 - 25

4.6 PREPARATION AND MAINTENANCE OF SUBGRADE SURFACE

Trim, prepare, and maintain, Subgrade Surface to the required tolerances specified in this Section, free of depressions, cracking, laminations, organic inclusions, and other Defects. Surface to be formed and maintained to be free draining, and suitable for proof rolling.

Maintain and repair any damage to the prepared surface prior to placing further material.

4.7 EARTHWORKS FOR DRAINAGE

Comply with the requirements of the *Standard Specification for Environmental Management* and obtain all necessary permits, including *Permit to Interfere with a Waterway.*

Refer to *Section 13 – Drainage Works*

4.7.1 Site Drainage

Construct site drainage to the details, levels and dimensions as shown on the Construction Drawings.

Provide temporary site drainage as required to manage stormwater runoff during construction.

Comply with approved Erosion and Sediment Control Plans, plus any additional requirements requested by the Relevant Authority.

4.7.2 Stream Diversions

Obtain a *Permit to Interfere with a Waterway* and provide a copy to the Relevant Authority as per *Clause 1.5.2*.

Comply with approved Erosion and Sediment Control Plans, plus any additional requirements requested by the Relevant Authority.

4.7.3 Levees

Construct using Standard Fill with a Plasticity Index of 6% minimum.

Compact in layers not exceeding 150 mm compacted thickness.

Construct in locations, and to dimensions shown on the Construction Drawings.

4.7.4 Drains

Construct all drains including table drains, open drains and catch drains, to the dimensions shown on the Construction Drawings.

Grade to prevent ponding of water.

Compact all drain bases and batters to provide a dense uniform surface.

4.8 WIDENING OF EXISTING FORMATION

Cut back the existing Formation and Pavement as shown on the Construction Drawings by not less than 150 mm on each edge to sound densely compacted material to form a uniform edge (curved or straight where applicable).

Construct the widening by cutting and filling as specified.

4.9 TRIM AND COMPACT UNPAVED AREAS

Shape, grade and compact as specified.

4.10 COMPACTION

Mix to a homogeneous material and compact with no compaction planes and free of cracking to conform to the Dry Density Ratios specified in *Table 5-11 – Dry Density Ratios for Conformance* and to *Clause 4.11 - Conformance*.

4.11 CONFORMANCE

4.11.1 Tolerances

Finish earthworks to a smooth compacted and uniform surface within the following limits:

Formation Width:	Not less than specified.
Subgrade Surface:	Maximum 25 mm below and not above specified level.
Subgrade Width:	Not less than specified. Extend minimum 150 mm minimum beyond the back of kerb.
Unpaved Areas:	Maximum 75 mm above or below specified level, free of depressions capable of ponding water. Maximum 40mm adjacent to kerbs.

Allotment Fill Surface:	Maximum 50 mm above or below specified level, free of depressions capable of ponding water.
Batter:	Not steeper than the specified slope. Maximum variation at any point from specified plane of batter must be 150 mm in earth and 300 mm in rock.
Drainage Works:	Refer to *Section 13 – Drainage Works*

4.11.2 Proof Rolling

Documentation Point 14 - Submit a proof rolling procedure prior to commencing relevant Development Works, including the proposed method of preparing the areas, the extent of proof rolling, and details of the plant and/or equipment proposed to be used.

Proof roll all areas and obtain satisfactory results before ordering Conformance Testing of those areas.

Plant Requirements

Use plant in proof rolling procedures that comply with the following requirements:

- For Infrastructure Category A localities, fully loaded water cart, minimum size 12 tonne, on standard pneumatic road tyres, fully inflated.
- Fully loaded, minimum single trailer articulated heavy vehicle, on standard pneumatic road tyres, fully inflated.
- Pneumatic tyred compaction plant with a mass of not less than 20 tonnes and with a ground contact pressure under either the front or rear wheels of not less than 450 kPa per tyre and a ground contact area of not less than .035 m2 per tyre.
- Do not use flat drum rollers.

Check areas for level tolerance and layer thickness before proof rolling.

Proof roll each layer immediately following completion of compaction. If proof rolling is carried out at a later time, water the surface and roll with the test roller prior to commencement of proof rolling.

Compliance; the proof rolling requirements are deemed to comply when an area withstands proof rolling without visible deformation, cracking, heaving, or springing.

Provide uniform and stable support for rear wheel loads when at walking pace.

Remedial work; remove and reconstruct areas that deform, break up or show signs of distress as directed by the Certifying Engineer.

4.11.3 Conformance Testing

Fill

Conformance testing must be carried out on each layer of fill.

Subgrade

Subgrade surface must be tested only when it is within level tolerance and conforms to proof rolling.

Check Subgrade Surface levels prior to testing.

Documentation Point 15 – Submit evidence of Subgrade conformance prior to placing further materials.

5. CONFORMANCE TESTING

5.1 GENERAL

The Developer is responsible for all process control and Conformance Testing.

The Developer must carry out all Conformance Testing specified, and any additional testing requested by the Relevant Authority and Certifying Engineer.

All testing must be conducted by a NATA accredited testing laboratory.

5.2 STANDARDS

Northern Territory Test Methods (NTTM) and NT Codes of Practice (NTCP) for materials testing are given in the Northern Territory Materials Testing Manual (NTMTM). The methods contained in the Materials Testing Manual take precedence over all other test methods and procedures, and are used in conjunction with relevant Australian Standards.

The following standards are referred to in this section;

AUSTRALIAN STANDARDS

AS 1141	Methods for testing and sampling aggregates.
AS 1141.11.1	- Particle size distribution by sieving.
AS 1141.14	- Particle shape, by proportional calliper.
AS 1141.15	- Flakiness index.
AS1141.18	- Crushed particles.
AS 1141.20.1	- Average least dimension of aggregate by direct measurement (size≥10 mm).
AS 1141.20.2	- Average least dimension of aggregate by direct measurement (size 5 mm & 7 mm).
AS 1141.23	- Los Angeles value.
AS 1141.24	- Sodium sulphate soundness.
AS 1141.40	- Polished aggregate friction value - Vertical road-wheel machine.
AS 1141.41	- Polished aggregate friction value – Horizontal bed machine.
AS 1289	Methods of testing soils for engineering purposes.
AS 1289.3.1.1	- Liquid limit – Four point Casagrande method.
AS 1289.3.2.1	- Plastic limit – Standard method.
AS 1289.3.3.1	- Plasticity index.
AS 1289.3.4.1	- Linear shrinkage.
AS 1289.3.6.1	- Particle size distribution.
AS 1289.5.1.1	- Determination of the dry density/moisture content relationship – Standard compaction.
AS 1289.5.2.1	- Determination of the dry density/moisture content relationship - Modified compaction.
AS 1289.5.8.1	- Field density using a nuclear surface moisture-density gauge.
AS1289.5.4.1	- Soil compaction and density tests – Compaction control test – Dry density ratio, moisture variation and moisture ratio
AS 1289.6.1.1	- Determination of a California Bearing Ratio of a soil
AS 2341(set)	Methods of testing bitumen and related road making products.
AS/NZS 2341.2	- Dynamic viscosity (coefficient of shear) by flow through a capillary tube.
AS 2341.3	- Determination of kinematic viscosity by flow through a capillary tube.
AS/NZS 2341.4	- Determination of dynamic viscosity by rotational viscometer.
AS 2341.12	- Determination of penetration.
AS/NZS 2341.13	- Long-term exposure to heat and air.
AS 2891	Methods of sampling and testing asphalt.
AS/NZS 2891.3.1	Bitumen content and aggregate grading – Reflux method.
AS/NZS 2891.3.2	Bitumen content and aggregate grading – Centrifugal extraction method.
AS/NZS 2891.3.3	Bitumen content and aggregate grading – Pressure filter method.

AS/NZS 2891.5	Determination of stability and flow – Marshall procedure.
AS/NZS 2891.7.1	- Determination of maximum density of asphalt – Water displacement method
AS/NZS 2891.7.3	- Determination of maximum density of asphalt – Methylated spirit displacement
AS/NZS 2891.8	Voids and density relationships for compacted asphalt mixes.
AS/NZS 2891.9.1	Determination of bulk density of compacted asphalt - Waxing procedure.
AS/NZS 2891.9.2	Determination of bulk density of compacted asphalt - Presaturation method.
AS/NZS 2891.9.3	Determination of bulk density of compacted asphalt - Mensuration method.
AS 4049.3	Paints and related materials – Pavement marking materials Part 3: Waterborne paint – for use with surface applied glass beads.

NT CODES OF PRACTICE

NTCP 102.1	Testing field compaction for conformance
NTCP 103.1	Site selection by the stratified random technique.
NTCP 107.1A	Surface Roughness

NT TEST METHODS

NTTM 204.1	Cement content of stabilised materials – Heat of neutralisation
NTTM 204.7	Rate of spread of lime or cement
NTTM 204.8	Stabiliser distribution
NTTM 215.1	Standard ball penetration test
NTTM 216.1	Measurement of layer thickness
NTTM 304.1	Determination of skid resistance with the portable skid tester
NTTM 305.1	Determination of pavement surface texture depth - sand patch method
NTTM 404.1	Retroreflectivity testing of pavement marking
NTTM 404.3	Retroreflectivity testing of pavement marking – wet condition

AUSTROADS TEST METHODS

AGPT04H	Austroads Guide to Pavement Technology Part 4H: Test Methods
AGPT/T103	Pre-treatment and Loss on Heating of Bitumen Multigrade and polymer Binders (rolling thin film oven [RTFO] test)
AGPT/T111	Handling Viscosity of Polymer Modified Binders (Brookfield Thermosel)
AGPT/T112	Flash Point of Polymer Modified Binders
AGPT/T121	Shear Properties of Polymer Modified Binders (ARRB ELASTOMETER)
AGPT/T122	Torsional Recovery of Polymer Modified Binders
AGPT/T124	Toughness of Polymer Modified Binders (ARRB Extensiometer)
AGPT/T131	Softening Point of Polymer Modified Binders
AGPT/T231	Deformation Resistance of Asphalt Mixtures by the Wheel Tracking Test.

MAIN ROADS WESTERN AUSTRALIA, TEST METHODS

WA 730.1	Bitumen Content and Aggregate Grading.

5.3 SPECIFIC TESTS

Conduct field density testing using Nuclear Density Gauges in accordance with NTCP 102.1 and AS 1289.5.8.1.

Conduct CBR moulding using a compaction hammer conforming with the requirements of AS 1289.5.1.1 or AS 1289.5.2.1.

Where tests are required that are not included in the NTMTM, use the appropriate Australian Standard.

5.4 TESTING CONTRACTORS

The Developer must engage NATA accredited Testing Contractor(s) for all Conformance Testing.

5.5 ORDERING TESTING

When required, order the Conformance testing in writing from a NATA accredited Testing Contractor. Include on the order the following information:

- Test Lot boundaries including start and finish chainages, length and width
- Type of layer
- Type of tests required
- Date and time when Test Lot will be ready for testing

When Conformance Testing has been ordered and the relevant Development Works is not ready for testing or fails testing at the time specified by the Developer, the Developer will bear the cost of time and travel incurred by the Testing Contractor, Certifying Engineer and Relevant Authority, where applicable.

5.6 NOTICE OF TESTING

Provide the Relevant Authority and Certifying Engineer with the results of Process Testing as identified in the relevant ITP with all requests for Conformance Testing.

Documentation Point 16 – Provide notification of failed Test Lots prior to any rework being undertaken.

5.7 TABLES - TEST FREQUENCIES, CONFORMANCE TESTING

Test frequencies as per the following tables**.**

Table 5-1 - Test Frequencies For Soils – Part 1 of 2

Type Of Test	**General Fill**	**Standard Fill**	**Select Fill / Sand Clay Fill**	**Subgrade**	**Sub-Base**	**Basecourse**
Field Density (FDD) by NTCP 102.1 and AS 1289.5.8.1.	1 in 2,500 m2 (min 3 tests)	1 in 2,500 m2 (min 3 tests)	1 in 2,500 m2 (min 3 tests)	1 in 1,000 m2 (min 3 tests)	1 in 1,000 m2 (min 3 tests)	1 in 1,000 m2 (min 3 tests)
Modified Compaction (MMDD) by AS 1289.5.2.1	1 per FDD	1 per FDD	1 per FDD	1 per FDD	1 per FDD	1 per FDD
Particle Size Distribution by AS 1289.3.6.1.	-	-	1 per each 2,000 m3	-	1 in 5000 m2 (min. 1 test)	1 in 5000 m2 (min. 1 test)
Plasticity Index by AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	1 per each 2,000 m3	1 per each 2,000 m3	1 per each 2,000 m3	1 in 5,000 m2 (min 1 test)	1 in 5000 m2 (min 1 test)	1 in 5000 m2 (min 1 test)
Linear Shrinkage by AS 1289.3.4.1	1 per each 2,000 m3	1 per each 2,000 m3	1 per each 2,000 m3	1 in 5,000 m2 (min 1 test)	1 in 5000 m2 (min 1 test)	1 in 5000 m2 (min 1 test)
California Bearing Ratio by AS 1289.6.1.1	1 per each 2,000 m3	1 per each 2,000 m3	1 per each 2,000 m3	1 in 5 FDD (min 1 test)	1 in 5 FDD (min 1 test)	1 in 5 FDD (min 1 test)
Pavement Layer Thickness by NTTM 216.1				-	1 per FDD	1 per FDD
Ball Penetration by NTTM 215.1				-	-	1 in 5,000 m2
Pavement Degree of Saturation prior to Sealing by AS 1289				-	-	1 in 5,000 m2
Stabiliser Spread Rate by NTTM 204.7				1 per run *	1 per run	1 per run
Stabiliser Content by NTTM 204.1				1 per 1000m2 (min 3 tests)	1 per 1000m2 (min 3 tests)	1 per 1000m2 (min 3 tests)
Stabiliser Distribution by NTTM 204.8				1 per 1000m2 (min 3 tests)	1 per 1000m2 (min 3 tests)	1 per 1000m2 (min 3 tests)
Soluble Salt Content of Construction Water				-	-	1 per source
Los Angeles Abrasion Value by AS 1141.23						1 per source

Notes:

Minimum number of tests, where specified, is applied per Test Lot.

For variable soil conditions, additional testing may be required.

FDD – Field Dry Density; MMDD – Maximum Modified Dry Density; Run = 1 pass of cement spreader

Table 5-2 - Test Frequencies For Soils – Part 2 of 2

Type Of Test	**Unpaved Areas**	**Trench Foundation**	**Trench Backfill**	**Sand Bedding for Concrete Works**	**Culvert Bedding Material**	**Subsoil Filter Material**
Field Density (FDD) by NTCP 102.1 and AS 1289.5.8.1	1 in 2,500 m2 (Min. 3 tests)	3 tests per 10 m3 (Min. 3 tests)	3 tests per 10 m3 (Min. 3 tests)	-	-	-
Modified Compaction (MMDD) by AS 1289.5.2.1	1 per FDD	1 per FDD	1 per FDD	-	-	-
Particle Size Distribution by AS 1289.3.6.1	-	1 per each 300 m3	1 per each 300 m3	1 in 250 t (Min. 3 tests)	1 in 250 t (Min. 3 tests)	1 in 250 t (Min. 3 tests)
Plasticity Index by AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	1 per each 2,000 m3	1 per each 300 m3	1 per each 300 m3	1 in 250 t (Min. 3 tests)	-	-
Linear Shrinkage by AS 1289.3.4.1	1 per each 2,000 m3	1 per each 300 m3	1 per each 300 m3	1 in 250 t (Min. 3 tests)	-	-
California Bearing Ratio by AS 1289.6.1.1	1 per each 2,000 m3	1 per each 300 m3	1 per each 300 m3	-	-	-
Los Angeles Abrasion Value by AS 1141.23	-	-	-	1 per source	1 per source	1 per source

Notes:
Minimum number of tests, where specified, is applied per Test Lot.
For variable soil conditions, additional testing may be required.
FDD – Field Dry Density; MMDD – Maximum Modified Dry Density; Run = 1 pass of cement spreader

Table 5-3 – Maximum Dry Density (MDD) Minimum Curing Times (AS 1289.5.2.1:2017)		
Plasticity	**Condition of Prepared Sample**	
	Within 2% of OMC	**Greater than 2% from OMC**
Sands and Granular Material (NP)	2 hours	2 hours
Low Plasticity (LL ≤ 35%)	24 hours	48 hours
Medium Plasticity (LL > 35% to ≤ 50%)	48 hours	96 hours (4 days)
High Plasticity (LL > 50%)	96 hours (4 days)	168 hours (7 days)
NP – Non plastic LL – Liquid limit OMC – Optimum moisture content		

Table 5-4 – Test Frequencies for Bitumen Spray Sealing				
Test Method	**Property Tested**	**Cutback Bitumen/ Emulsions**	**Straight Run Binder**	**Polymer Modified Bitumen**
AS/NZS 2341.2 or AS 2341.3 or AS 2341.4	Dynamic Viscosity (60ºC)	1 per 15,000L	1 per 15,000L	-
	Dynamic Viscosity (135ºC)	-	1 per 15,000L	-
AS 2341.12	Penetration (25ºC)	-	1 per 15,000L	-
AG:PT/T121	Consistency (60ºC)	-	-	1 per 15,000L
AG:PT/T121	Stiffness at 15^{0}C (kPa)		-	1 per 15,000L
AG:PT/T111	Dynamic Viscosity (165ºC)	-	-	1 per 15,000L
AG:PT/T122	Torsional Recovery at 25ºC, 30s (%)	-	-	1 per 15,000L
AG:PT/T131	Softening Point (^{o}C)	-	1 per 15,000L	1 per 15,000L
AS/NZS 2341.13	Durability of base binder	1 per project	1 per project	
AG:PT/T112	Flash Point (^{o}C) min.	1 per project	1 per project	1 per project
AG:PT/T103	Loss on Heating (%mass) max.	1 per project	1 per project	1 per project
AG:PT/T124	Toughness at 4^{o}C, 100mm(Nm) min.	1 per project	1 per project	1 per project

Table 5-5 – Asphalt Testing Frequencies - During Works			
Test Method	**Test Method**	**Minimum Test Frequency**	
		Daily Production <100 tonnes	**Daily Production >100 tonnes**
-	Mixing temperature	Every mix	Every mix
-	Laying temperature	Every 30 minutes	Every 30 minutes
-	Asphalt surface temperature at commencement of compaction	Every Mix	Every mix
AS/NZS 2891.3 or WA730.1	Bitumen content	1 No.	1 per 100 t *
AS/NZS 2891.3 or WA730.1	Particle size distribution	1 No.	1 per 100 t *
AS/NZS 2891.5	Stability	1 No.	1 per 100 t *
AS/NZS 2891.5	Flow	1 No.	1 per 100 t *
AS/NZSSS2891.7.1 AS/NZSSS2891.7.3	Maximum Density	1 No.	1 per 100 t *
AS 2341.3	Viscosity of Binder	1 per work shift	1 per work shift
* One test per nominated tonnage or part thereof.			

All sampling is to be performed at the plant from safe sampling platforms.

Binder sampling is to be conducted on the binder in actual use, either at transfer to the bitumen tank on the asphalt plant or from the tank itself.

Table 5-6 – Asphalt Testing Frequencies – After Works Completed		
Test Method	**Test Method**	**Frequency**
AS 2891	Thickness of layer	1 per core
AS/NZS 2891.8	Air Voids of compacted asphalt layer	1 per core
AS/NZS 2891.9	In-situ Density	1 per core
AGPT04H – AGPT/T231	Wheel track testing (composite sample)	1 per Type or 1 per 1000 t

Carry out density testing as soon as practicable after completion of works.

Do not test within 200 mm of an edge and longitudinal joint and within 1 metre of a transverse joint. Do not test odd shaped areas completed by hand placing of asphalt.

Conform to the following number of cores per Test Lot.

Table 5-7 – Number of Cores per Test Lot			
Area (m2)	<100	100 – 1500	>1500
No. of Cores	1	Minimum 3	1 per 500m2 (minimum 3)

Reinstate core holes by:

- Removing waste/debris and moisture from the core hole;
- Tack coating the hole with bitumen emulsion, applied by spray or brush; and
- Filling the hole with hot mix asphalt, compacted in lifts to conform with surrounding materials.

Table 5-8 - Test Frequencies for Aggregates and Pavement Surfaces			
Type of Test	**Aggregate**	**Pavement Marking**	**Pavement Surface**
Particle Size Distribution by AS 1141.11	1 in 250 t (Minimum of 3)	-	-
Los Angeles Abrasion Value by AS 1141.23	1 in 250 t	-	-
Particle Shape by AS 1141.14 at 2:1 ratio	1 in 250 t	-	-
Flakiness Index by AS 1141.15	1 in 250 t (Minimum of 3)	-	-
Average Least Dimension by AS 1141.20.1, AS 1141.2 *	1 in 250 t (Minimum of 3)	-	-
Sulphate Soundness by AS 1141.24	1 in 1,000 t	-	-
Percentage of Crushed Faces by AS 1141.18	1 in 250 t	-	-
Polished Aggregate Friction Value by AS 1141.40 or AS 1141.41	-	-	1 in 20,000 m2
Surface Texture Depth by NTTM 305.1	-	-	1 in 5,000 m2
Skid Resistance by NTTM 304.1	-	-	As nominated by Relevant Authority
Roughness	-	-	As nominated by Relevant Authority
Retroreflectivity of Pavement Marking by NTTM 404.1 & NTTM 404.3	-	1 per 1,000 lin. m	-
Wear Assessment of Road Marking Paints – Image Analysis to AS 4049.3:2005 Appendix K, Method A Photographic Method	-	As nominated by Relevant Authority	-
* Take Average Least Dimension samples only from the stockpile on the project site.			

Table 5-9 - Test Frequencies for Surface Roughness Testing		
Type of test	**Frequency**	**Required value (IRI)**
Lane Roughness Value – Pavement and Shoulders – NTCP 107.1A	3 runs per constructed traffic lane	Maximum value
Test Lot Average Surface Roughness Value – Dense Graded Asphalt – NTCP 107.1A	3 runs per constructed traffic lane	Mean value

Table 5-10 - Sampling Frequencies For Fresh Concrete		
Type of Test	**Frequency**	**Number of samples**
Slump - AS 1012.3	Per truck	Per truck as required
Making, curing and compressive strength of concrete - AS 1012.8 and AS 1012.9	1 truck pour	1 set of cylinders *
	2 truck pour	2 sets of cylinders *
	3 - 5 truck pour	3 sets of cylinders *
	6 - 10 truck pour	4 sets of cylinders *
	11+ truck pour	4 sets of cylinders plus 1 additional set of cylinders per every additional 1 to 5 trucks after the first 10 trucks *
Kerbs and Gutters, Inverts, Drainage Structures, Floodway Margins		
Type of Test	**Frequency**	**Number of samples**
Slump - AS 1012.3	Per each set of cylinders **	Per each set of cylinders
Making, curing and compressive strength of concrete - AS 1012.8 and AS 1012.9	1 set of cylinders per 25m3 , or each Test Lot. **	1 set of cylinders *
* A set of cylinders consists of 3 cylinders unless directed otherwise. ** Or as directed by the Relevant Authority.		

5.8 CONFORMANCE TESTING RESULTS

5.8.1 Test Lot Testing

Conformance of compaction will be based on Test Lots.

Give each Test Lot a number. Number the Test Lots using a logical system to be agreed with the Certifying Engineer. Maintain a register of all Test Lots and Test Lot numbers. Include the location of each Test Lot on the Test Lot register. Provide a copy of the Test Lot register to the Relevant Authority and Certifying Engineer upon request.

Test Lots defined by the Developer must be clearly marked out on the Development Site.

Test Lots of work must be agreed between the Developer and Certifying Engineer, based upon:

- A Test Lot will represent no more than one work shift's production.
- A Test Lot will be continuous and will have been brought to completion at the same time.
- A Test Lot will be composed of essentially homogeneous material with no distinct changes in attribute values.

Each Test Lot will be subject to Conformance Testing in accordance with NTCP 102.1.

Defective sections will be excluded from the Test Lot to be tested and identified as a separate Test Lot, and will also be subjected to Test Lot testing.

Quality of the Test Lot will be judged as conformance or non-conformance of each Test Lot. This will be based on all tests conducted on the Test Lot in accordance with NTCP 102.1.

Conformance of materials is based on samples from the finished works.

When Test Lots fail to satisfy the conformance criteria, reprocess the entire Test Lot and resubmit for retesting.

Should the Test Lot under consideration be subdivided, then each subdivision will be classed as a Test Lot and each subdivided Test Lot will be subject to Test Lot testing.

Non-conforming Test Lots which are subdivided after testing will be treated as separate Test Lots and each and every subdivided Test Lot will be retested.

5.8.2 Conformance of Compaction of Soils

In situ density is expressed as a percentage of the Maximum Modified Dry Density. One Modified Dry Density test for each in situ density test will apply.

In situ density will be determined and reported in accordance with NTCP 102.1 and relevant Australian Standards.

A minimum of three tests will apply to each and every Test Lot.

The Mean Dry Density Ratio (R) is calculated as follows:

$$R = \frac{\sum x_i}{n}$$

xi = an individual test result

n = the number of results in the Test Lot.

The Characteristic Mean Dry Density Ratio (*Rc*) is calculated as follows:

$$R_c = R - k * s$$

where:

R = the mean dry density ratio for the Test Lot

k = the multiplier in *Table 5-12 – Multiplier Values for Soils*.

s = the standard deviation.

The Standard Deviation (*s*) is calculated as follows:

$$s = \sqrt{\frac{\sum (x_i - R)^2}{(n-1)}}$$

where:

xi = an individual test result

R = the mean of n results

N = the number of test results in the Test Lot.

When less than six tests are used to determine conformance of a Test Lot, the Mean Dry Density Ratios in *Table 5-11 – Dry Density Ratios for Conformance*, Column A apply.

When six or more tests are used to determine conformance of a Test Lot, the Characteristic Mean Dry Density Ratios in *Table 5-11 – Dry Density Ratios for Conformance*, Column B, apply.

5.8.3 Conformance of Compaction of Asphalt

Air Voids Ratio is the difference between the maximum density of a mix and the bulk density of that compacted mix expressed as a percentage of the maximum density.

A minimum of three tests will apply for each Test Lot greater than 100m².

The Characteristic Air Voids Ratio is calculated as follows:

$$R = \frac{\sum x_i}{n}$$

xi = an individual test result

n = the number of results in the Test Lot.

Table 5-11 – Dry Density Ratios for Conformance			
Works Components	**A** **Mean Dry Density Ratio (R) %** **("n" is 3 to 5)**	**B** **Characteristic Mean Dry Density Ratio (Rc) %** **("n" is 6 or greater)**	
Allotment Fill	90.0 or greater	89.0 or greater	Conformance
	89.9 or less	88.9 or less	Non-conformance
Fill in Road Reserves Fill under Buildings Pavement Subgrade Pavement Shoulders Unpaved Areas Unsealed Sub-Base Unsealed Basecourse	95.0 or greater	94.0 or greater	Conformance
	94.9 or less	93.9 or less	Non-conformance
Sealed Pavement Sub-Base1 Stabilised and Modified Basecourse	98.0 or greater	97.0 or greater	Conformance
	97.9 or less	96.9 or less	Non-conformance
Sealed Pavement Basecourse1	100.0 or greater	99.0 or greater	Conformance
	99.9 or less	98.9 or less	Non-conformance

1. Pavement layers are considered 'Sealed' if they include a Spray Seal and/or asphalt wearing surface.
2. Backfill all test excavations with the material and density ratio specified for that layer, treated as follows:

- Base and Sub-Base Layers: stabilised with at least 3% cement (by mass).
- Other Layers: unstabilised.

Table 5-12 – Multiplier Values for Soils	
Values of the Multiplier k for Characteristic Mean Dry Density Ratio (Rc)	
Number of tests per Test Lot (n)	**k**
6	0.50
7	0.54
8	0.56
9	0.59
10	0.61
15	0.68
20	0.72

6. PAVEMENTS AND SHOULDERS

6.1 STANDARDS

Conform to the following standards and publications unless specified otherwise:

AS 1141	Methods for sampling and testing aggregates.
AS 1289	Methods of testing soils for engineering purposes.
NTCP 107.1A	Surface Roughness
NTMTM	NT Materials Testing Manual.
NTTM	NT Test Methods

6.2 MATERIAL PROPERTIES

6.2.1 Natural Gravel

Only use where permitted.

Obtain natural gravel from sources of naturally occurring deposits.

Produce required properties by crushing, screening, mixing or other processes necessary.

Ensure particles are tough, durable and of a tightly binding nature free of organic or other deleterious materials.

Conform to *Table 6-1 - Natural Gravel Particle Sizes* and *Table 6-2 - Natural Gravel Properties* in the finished condition.

6.2.2 Fine Crushed Rock (FCR)

Manufacture from hard rock quarry operations by crushing clean, hard, durable rock free from natural gravel, clay, loam or other deleterious substances.

Conform to *Table 6-3 – Fine Crushed Rock Particle Sizes* and *Table 6-4 – Fine Crushed Rock Properties* in the finished condition.

6.2.3 Blends of Natural Gravel and Fine Crushed Rock

Not permitted for Sealed Pavements without written approval from the Relevant Authority.

6.2.4 Sand Clay

Obtain Sand Clay from sources of naturally occurring deposits.

Produce required properties by screening, mixing or other processes necessary, to produce a material of a tightly bound nature, free of organic or other deleterious materials.

Conform to the requirements of *Table 6-5 – Sand Clay - Grading* and *Table 6-6 – Sand Clay - Properties* in the finished condition.

Table 6-1 - Natural Gravel Particle Sizes

AS Sieve (mm)	Percentage Passing			
	Type 1	**Type 2**	**Type 3**	**Type 4**
75.0	100	-	-	100
37.5	80-100	100	-	80-100
19.0	50-80	70-100	100	60-100
9.5	35-65	50-80	70-100	50-95
4.75	25-50	35-65	50-80	40-80
2.36	15-40	25-50	35-65	30-65
0.425	7-20	10-30	15-35	20-50
0.075	3-13	4-16	6-20	5-25

Refer to Construction Drawings for types to be used. Generally as follows:

- Type 2 or Type 3 for Basecourse (Sealed/Unsealed)
- Type 1, Type 2, Type 3 or Type 4 for Sub-Base
- Type 3 for Shoulder Material.

Table 6-2 - Natural Gravel Properties				
Attribute	**Application**			
	Sealed Basecourse		**Unsealed Basecourse and Shoulder Material**	**Sub-Base**
	Monsoonal North	**Tablelands**		
Liquid Limit (LL)	25% max	30%	35% max	30% max
Plasticity Index (PI)	1-6%	1 - 10%	4 – 12 %	1-10%
Linear Shrinkage (LS)	0-3%	0 - 6%	2 – 8 %	0-6%
PI x % passing 0.425 mm Sieve	180 max	300 max	400 max	400 max
California Bearing Ratio (CBR) 4 day soaked (AS 1289)	80 min	80 min	50 min	30 min
at a relative density of:	100% MMDD	100% MMDD	95% MMDD	95% MMDD
Los Angeles Abrasion (LAA) Loss	50 max	60 max	60 max	60 max
Refer Part 1 – *Subdivision Development Guidelines* for Localities across the Northern Territory including illustration of 'Monsoonal North' and 'Tablelands' climatic regions.				

Table 6-3 – Fine Crushed Rock Particle Sizes	
AS Sieve (mm)	**Percentage Passing**
37.5	100
19.0	90 - 100
13.2	75 - 90
9.5	60 - 80
4.75	38 - 60
2.36	25 - 45
0.425	12 - 26
0.075	6 - 14

Table 6-4 – Fine Crushed Rock Properties	
Property	**Value Limit(s)**
Liquid Limit (LL)	25% max.
Plasticity Index (PI)	1 - 6%
Linear Shrinkage (LS)	3% max.
Dust Ratio (DR) (% passing 0.075 mm)/(% passing 0.425 mm) x 100	25 - 50
CBR, 4 day soaked at 100% MMDD at 2.5 mm penetration (AS 1289)	100 min.
Los Angeles Abrasion (LAA) Loss: – Coarse Grained Aggregate – Fine Grained Aggregate	 35% max. 25% max.
PI x % passing 0.425 mm sieve	180 max.

Table 6-5 – Sand Clay - Grading	
AS Sieve (mm)	Percentage Passing
4.75	80 - 100
2.36	60 - 100
0.425	30 - 60
0.075	14 - 28

Table 6-6 – Sand Clay - Properties	
Plasticity Index (PI):	20% maximum for Sealed streets; 15% maximum for unsealed streets.
Linear Shrinkage (LS):	1% - 8%.
CBR: 4 day soaked at 95% MMDD to AS 1289.	50 minimum

6.3 CONSTRUCTION OF PAVEMENT LAYERS

6.3.1 Process Testing

Undertake Process Testing in Test Lots and comply with *Clause 5.8.2 - Conformance of Compaction of Soils.*

Include the following activities, as applicable:

- Borrow Pit investigative sampling, on a grid basis
- Borrow Pit confirmatory sampling, on a windrow/ stockpile basis
- On-formation testing, on a Test Lot basis.

Include the following elements of the Development Work in the Process Testing program as applicable;

- Fill
- Sub-grade
- Sub-Base
- Basecourse
- Shoulders
- Stabilisation

Rework and retest failed Test Lots a maximum of two times subsequent to an initial test failure.

Following a third test failure rip up, remove and replace the entire failed layer before carrying out any further testing.

Where relevant, provide additional Process Testing procedures for concrete, bitumen and other elements subject to Conformance Testing.

Refer to *Section 5 - Conformance Testing.*

6.3.2 Production of Natural Gravel and Sand Clay Materials

Work Borrow Pits to achieve conforming material. Control depth of winning to avoid contamination of gravel.

Screen, blend and condition materials to achieve specified material property requirements.

6.3.3 On-formation Mixing and Placing

Place material in uniform layers over Subgrade Surface or lower layers of the Pavement.

Remove segregated and contaminated material from the Development Site.

Remove deleterious materials, rocks, refuse and organic materials such as timber, branches, roots and the like by manual stick picking methods.

Do not place material on a previous layer that has:

- become waterlogged or cracked; and/or
- otherwise deteriorated.

Mix the material uniformly throughout with water to achieve a moisture content within 2% of the optimum moisture content (OMC) and the specified conforming Dry Density Ratio.

Ensure water is clean and free from oil, alkali, organic matter and other deleterious substances, and that it conforms to:

- a total soluble salts content of less than 3,000 mg/litre (total dissolved salts), and
- 1% maximum by mass of undissolved solids, in accordance with AS 3550.4

Documentation Point 17 – Where non-potable water supplies are used for pavements, submit evidence of required water quality of the proposed source.

6.3.4 Compaction

Compact in uniform layers not less than 100 mm nor greater than 200 mm compacted thickness.

Achieve a homogeneous mass with no compaction planes.

Conform to the Dry Density Ratios specified in *Table 5-11 – Dry Density Ratios for Conformance.*

Maintain the prepared pavement layer.

6.4 SUPPLY TO STOCKPILE

Comply with approved Construction Environmental Management Plan (CEMP), including Erosion and Sediment Control Plan (ESCP). The stockpile area must comply with the following requirements;

- Clear and grade the area to ensure free draining.
- Spread and compact a 75 mm thick layer of Sub-Base to 95% Relative Compaction.

6.5 PAVEMENT ACCEPTANCE

6.5.1 Pavement Acceptance Requirements

Documentation Point 18 – Obtain approval for Pavement and Shoulders acceptance prior to any surfacing work, including satisfying all requirements for:

- Proof rolling
- Conformance testing
- Dry back
- Final Pavement layer integrity
- Surface roughness
- Other tolerances

For unsealed Pavements, obtain approval for Pavement conformance at conclusion of Pavement works.

6.5.2 Proof Rolling

Inspection Point 10 - Proof roll and obtain approval for all areas of final Pavement surface prior to commencing surfacing works.

Conform to the approved procedure, as outlined in *Clause 4.11.2 – Proof* Rolling.

6.5.3 Conformance Testing

Refer to the Conformance Testing section for testing requirements.

Only the finished compacted Basecourse, Sub-Base and Shoulder conforming to proof rolling, level tolerance and layer thickness should be tested.

Pavements and Shoulders must be considered as separate Test Lots.

Backfill and compact all test holes in accordance with *Section 5 – Conformance Testing*.

Remedial work; rework or reconstruct areas that do not conform.

6.5.4 Surface Roughness Requirement

Surface roughness testing is to be carried out in accordance with NTCP107.1A, as directed by the Relevant Authority.

Where required, comply with the following.

Table 6-7 - Surface Roughness Tolerances	
Surface Roughness (IRI) to be less than the following limits when surveyed at 50km/hr.	
Street Classification	**Max. Surface Roughness IRI (m/km)**
Minor, Access	4.2
Secondary Collector, Primary Collector	3.4

Surface roughness tolerances represent an absolute upper limit and all lane roughness values must be less than the values specified.

Test Lotting and averaging out of field values is not permitted.

Rectify all areas where Surface Roughness exceeds specified values.

Where required, roughness testing must be collected within 7 days of completion of testing of the Basecourse.

Ensure that the Pavement and/or wearing surface is free of loose material, debris and standing water when testing is undertaken.

The following areas are excluded from the requirement to achieve specified IRI limits:

- Roundabouts;
- Railway lines (35 m after the event);
- Bridge joints (35 m after the event);
- Intersections (stop bar to stop bar);
- Inspection pit covers and related surface Defects within the wheel paths (15 m including the event);
- Surface Defects related to existing Culverts which are not part of the works (width of Culvert plus 30 m after the event); and
- Cattle grids.

In these locations, the additional requirements of *Clause 6.5.8 - Other Tolerance Requirements* still apply. Undertake best efforts to achieve a smooth ride to minimise driver discomfort in the finished condition.

6.5.5 Final Pavement Layer Integrity Requirement

Final Pavement layers must be homogeneous in appearance, uniformly bonded, free from layering, cracking, disintegration or surface tearing, uniformly hard and dense, free of laminations and roller indentations, with the coarse fraction slightly exposed.

The Pavement layer must retain these characteristics after sweeping/brooming and be suitable to receive bituminous surfacing.

Slurried up surfaces are not permitted.

Remove sticks and any loose material.

Do not introduce new material to the Pavement surface after final compaction.

Remedial work; remove and reconstruct areas that do not conform.

Ball Penetration testing to conform to *Clause 6.5.8 - Other Tolerance Requirements.*

6.5.6 Dry Back Requirement

Allow the top 75 mm of the Pavement layer to dry back to a Moisture Ratio (Rm) equal or less than 65% for FCR and 70% for natural gravel.

Moisture Ratio (Rm) is defined as follows:

$$Rm = \frac{(100 \times wf)}{wr}$$

where:

Rm = Moisture Ratio, in percent

wf = field moisture content, in percent

wr = adjusted optimum moisture content, in percent.

The Developer must carry out all testing to determine the Moisture Ratio.

6.5.7 Remedial Work

Where Pavement thickness is 200 mm or greater, scarify to not less than 100 mm depth and recompact where finish not achieved. Where Pavement thickness is less than 200 mm scarify and recompact to full depth where finish not achieved.

6.5.8 Other Tolerance Requirements

Compliance with dimensional tolerances must be confirmed using engineering survey and captured in As-Constructed Drawings.

Refer to *Clause 1.18 - Level Checking, Clause 1.19 - Level Auditing,* and *Clause 1.20 As-Constructed Documentation.*

Comply with the following Final Surfaces Tolerances.

Table 6-8 - Final Surfaces Tolerances	
ALL PAVEMENT TYPES	
Test Parameter	Tolerance
Straight Edge Deviation	5 mm in 3 m
Compacted Thickness	Not less than specified
Width	Not less than specified
Surface Roughness	Not more than specified in *Table 6-7 - Surface Roughness Tolerances.*
Ball Penetration Test (before Priming)	Less than or equal to 3mm, for any individual test result (averaging not permitted) Not required for asphalt surfacing, when thickness 50mm or greater.
KERBED PAVEMENTS	
Test Parameter	Tolerance
Kerb Level	-0 mm to +10 mm
Asphalt Level	-0 mm to +10 mm
Basecourse Surface Level	-5 mm to +10 mm
Sub-base Surface Level	-10 mm to +10 mm
Sub-grade Surface Level	Refer to *Section 4 – Earthworks.*
UNKERBED PAVEMENTS	
Test Parameter	Tolerance
Basecourse Surface Level	-20mm to +20mm

7. STABILISATION AND MODIFICATION

7.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1141	Methods for sampling and testing aggregates.
AS 1160	Bitumen emulsions for construction and maintenance of pavements.
AS 1289 (set)	Method of testing soils for engineering purposes.
AS 1478.1	Chemical admixtures for use in concrete.
AS 1672.1	Limes and limestones - Limes for building.
AS 2157	Cutback bitumen.
AS 3972	Portland and blended cements.
NTMTM	NT Materials Testing Manual.
NTTM	NT Test Methods

7.2 MATERIALS

7.2.1 Binders

Lime

Use Calcium Hydroxide (hydrated lime/lime slurry), as Ca(OH)2 .

Obtain Relevant Authority's approval for use of Calcium Oxide (quicklime), as CaO.

Do not use dolomite limes (CaMg(CO3)2). Do not use agricultural lime (Calcium Carbonate (CaCO3)).

Conform to AS 1672.1

Cement

Use type GP (general purpose portland cement) or GB (general purpose blended cement).

Supply and store in a manner that protects against the weather and moisture.

Conform to AS 3972.

Bitumen

Conform to bitumen classes in *Section 8 – Spray Sealing* clauses for straight run and emulsion grades.

7.2.2 Granular Modification

For Pavement layers, final blended material to conform to requirements of *Section 6 - Pavements and Shoulders* clauses in the finished condition.

For Subgrade and fill layers, final blended material to conform to requirements of *Section 4 - Earthworks* clauses in the finished condition.

7.2.3 Additives

Documentation Point 19 – Obtain approval for stabilisation and modification additive use.

Follow manufacturer's recommendations when using retarders and water reducing additives.

7.2.4 Water

Ensure water is clean and free from oil, alkali, organic matter and other deleterious substances, and that it conforms to:

- a total soluble salts content of less than 3,000 mg/litre (total dissolved salts), and
- 1% maximum by mass of undissolved solids, in accordance with AS 3550.4

Documentation Point 20 – Where non-potable water supplies are used for stabilised and/or modified pavements, submit evidence of required water quality of the proposed source.

7.2.5 Materials to be Stabilised

Refer to Construction Drawings for details of materials to be stabilised.

7.3 IN SITU STABILISATION

7.3.1 Binder Application Rate

Refer to the Construction Drawings for binder application rate to be used.

7.3.2 Preliminary Trial

This clause applies only for Subdivisions involving greater than 1000 m2 in treated area.

Locate trial section within the Development Site.

Carry out a preliminary trial of the proposed operation to determine:

- effectiveness of mechanical plant;
- passes necessary to achieve the specified mixing;
- optimum curing time between preliminary and final mixing (lime stabiliser only); and
- field moisture content and plant pattern to achieve final compaction.

Carry out all necessary process control testing for this purpose.

Conform to Dry Density Ratios specified in *Table 5-11 – Dry Density Ratios for Conformance*.

7.3.3 Preparation of Layer

Scarify existing Pavement sections and new material, where necessary, full depth before spreading binder or granular modifier.

Tyne the surface lightly when quicklime is used.

Compact lightly to reveal irregularities in the spread material and to permit the stabilising equipment to traverse the area without excessive displacement of the surface.

Shape and trim the surface to the alignment, levels and cross-sections necessary to produce the final levels and compacted thickness.

7.3.4 Commencement and Continuity of Work

Complete full width Stabilisation in one Business Day.

Cease stabilising during the following conditions:

- Wet weather, or if rain is likely to fall.
- Windy periods which could cause loss of stabiliser, or dust Nuisance.

7.3.5 Binder Spreading

Field Application Rates

The Developer is responsible for determining the binder field application rate.

Use Process Control Testing, in accordance with NTTM 204.7 (with project field samples, source binder and field water) to determine field application rate, for layer specified, to achieve the following:

Table 7-1 – Binder Tolerances

Element Assessed	Parameters
Cement Stabilised Layer (Bound)	UCS between 1.5 and 2.0 MPa
Cement Modified Layer	UCS between 0.7 and 1.5 MPa
Lime Modified Layer	Lime demand test to determine quantity to reduce Plasticity Index and increase CBR to limits in Pavements and Shoulders for natural gravel.

Documentation Point 21 – Obtain approval for binder field application rates in stabilised and/or modified pavements for each source material, prior to commencing stabilisation and/or modification works.

Spreading Requirements

Calibrate mechanical spreader and check spread rate prior to commencement.

Spreading must be visually uniform throughout each spreader run.

Documentation Point 22 – Obtain approval for bag spotting and spreading, prior to use in the relevant Development Works.

Quicklime

Water the spread material sufficiently to allow full slaking.

Avoid overwatering and avoid underwatering.

Lime Slurry

Initial mixing in separate paddle mixer or similar.

Use mechanical sprayer with agitation to maintain a lime/water ratio within ±10% of initial ratio.

Lime/water ratio to be between 1:2 and 1:0.8 (by mass) equivalent to 1 tonne of hydrated lime mixed with 2,000 and 800 litres of water respectively.

7.3.6 Binder Mixing

Use plant capable of:

- mixing the binder with the nominated layer of material uniformly over the full depth to be treated; and
- adding water uniformly to the materials while mixing with application rate between 0 to 10% (by mass) of the material being mixed.

Resultant mix to be uniform in colour and free of lenses, pockets or clumps of binder.

Prevent segregation.

Pulverise clayey material until at least 90% passes 19 mm sieve.

Add water to the materials during mixing to achieve Optimum Moisture Content.

Documentation Point 23 – Obtain approval for the use of rotary hoes or graders to mix binders in small scopes of stabilisation and/or modification works.

Cement Treated Layers

Commence compaction and finishing immediately following satisfactory mixing.

Lime Treated Layers

Shape the treated layer to the approximate cross-section after satisfactory mixing and lightly compact.

Cure for a period of 24 to 72 hours.

Commence final mixing.

Add water during mixing to achieve Optimum Moisture Content.

Resultant mix to be uniform in colour and free of lenses, pockets or clumps of lime.

7.3.7 Granular Modification

The Developer is responsible for determining the blending ratios of materials to achieve the requirements of the *Section 6 – Pavements and Shoulders* clauses, in the finished condition.

Use Process Testing.

Documentation Point 24 – Obtain approval for the blending ratios of granular modified materials, based on laboratory testing.

7.3.8 Compaction

Compact parallel to the centre line of the Pavement and for the full depth of the treated layer.

Commence compaction at the lower edge of the Pavement and work progressively towards the crown or the higher edge.

Allow for progressive and uniform overlap between passes.

Wet the surface lightly after compaction to reduce moisture loss and lay the dust when necessary.

Cement Stabilisation

Complete the mixing, compacting and finishing within two hours of adding binder and water, or within working time limits, whichever is the lesser.

7.3.9 Finishing

Final surface shall be smooth, dense, closely knit, free from compaction planes and cracks and finished to the tolerances specified.

Filling or addition of material to the surface of the Pavement to meet tolerance requirements will not be permitted.

Maintain the surface material at not less than its specified Optimum Moisture Content during all finishing operations.

Reconstruct non-complying areas.

7.3.10 Construction Joints

Longitudinal Joints

Minimise longitudinal joints by stabilising the full width of traffic lanes or wider as one continuous operation.

Joints to be straight or follow street curvature as appropriate.

Transverse Joints

Form joints following any break in excess of two hours in the continuity of the Stabilisation operations.

Cut the end of the material to a plane face at an angle not exceeding 45 degrees from the vertical.

Check the surface adjacent to the joint with a straight edge prior to recommencement and further cut back the joint as necessary to achieve surface tolerance.

7.3.11 Curing of Cement Treated Layers

For cement treated layers (stabilised or modified), cure using either of the following methods:

- Keep the finished surface damp (without leaching) until further construction or other curing operations are carried out.
- Alternatively cure by applying a bitumen emulsion or a bitumen primer as specified.

For bituminous curing, apply the bituminous curing membrane as soon as possible after mixing and compaction but no later than 24 hours after Relative Compaction results are available.

Use:

- Bitumen emulsion ARS Grade 320, or
- Cut-back bitumen Class AMC 2 or Class AMC 3.

Application rate for bitumen emulsions to be 0.3 to 0.45 litres per square metre.

Maintain clear of vehicular traffic for four Calendar Days following application of bitumen emulsions.

7.4 PLANT MIX STABILISATION

7.4.1 Binder Application Rate

Refer to the Construction Drawings for binder application rate to be used.

7.4.2 Preliminary Trial

This clause applies only for Subdivisions involving greater than 1000 m2 in treated area.

Locate trial section within the Development Site.

Carry out a preliminary trial of the proposed operation to determine:

- effectiveness of mechanical plant; and
- field moisture content and plant pattern to achieve final compaction.

Test stabilised material for conformance with *Table 5-11 – Dry Density Ratios for Conformance* in Conformance Testing.

7.4.3 Commencement and Continuity of Work

Complete full width Stabilisation of Pavement in one Business Day.

Do not stabilise during wet weather, or if rain is likely to fall.

7.4.4 Care of Existing Surface

Avoid damage to existing surface on which the mix is placed.

Repair any damage.

7.4.5 Mixing

Mixing plant to be capable of maintaining the mix proportions.

Add cement and water to material to be stabilised and mix for a minimum period of 30 seconds.

Material to be uniform and without segregation.

Batch Mixer

Scales used for weighing cement for batching plants must be used solely for that purpose.

Proportion the dry materials by mass.

Continuous Mixer

Proportion the dry materials by volume.

Use a continuous feeder which allows feed rate of different aggregate sizes to be adjusted separately.

7.4.6 Delivery

Minimise segregation during loading and unloading and discharge directly into the hoppers of paving machines without spillage.

Provide open trucks with tarpaulins.

7.4.7 Laying

Paving Machine

Deposit and spread the Pavement material in one operation using self-propelled mechanical tamper-spreader.

Lay material uniformly without segregation to produce a uniform surface texture and required thickness.

Grader Laying

To be used on minor work only, where approved by the Relevant Authority.

Spread the material in one layer not less than 75 mm nor more than 200 mm compacted thickness.

7.4.8 Compaction, Finishing, Construction Joints and Curing

Conform to the requirements specified for in-situ Stabilisation.

7.5 CONFORMANCE

7.5.1 Tolerances

For stabilised layers conform to the tolerances specified in *Section 6 – Pavements and Shoulders*, and with *Table 7-3 – Stabilised and Modified Layers Conformance*.

7.5.2 Conformance Testing

Binder Application Rate

The Developer is responsible for checking the application rate.

Determine the stabiliser application rate in accordance with NTTM 204.7.

Refer to Conformance Testing for Test Frequencies.

Correct application deficiencies by the application of additional stabiliser and remixing if mixing has already commenced.

Stabiliser Content

The Developer must carry out Conformance Testing of the layers in the finished condition.

Compaction

The Developer must carry out Conformance Testing.

Check areas for level tolerance and layer thickness before testing.

Only the finished compacted Pavement complying with level tolerance and layer thickness is to be tested.

Dry Density Ratios must be determined 24 hours after final compaction.

Backfill test holes within 24 hours of testing with new stabilised material.

Inspection Point 11 – Obtain approval for conformance of stabilized or modified layer prior to commencing surfacing works.

7.5.3 Surface Roughness Requirement

Surface roughness testing is to be carried out as directed by the Relevant Authority. Where required, comply with the following.

Table 7-2 - Surface Roughness Tolerances

Surface Roughness (IRI) to be less than the following limits when surveyed at 50km/hr.

Street Classification	**Max. Surface Roughness IRI (m/km)**
Minor, Access	4.2
Secondary Collector, Primary Collector	3.4

Surface roughness tolerances represent an absolute upper limit and all field values must be less than the values specified.

Test Lotting and averaging out of field values is not permitted.

As a minimum, data must be collected before application and after completion of the final wearing surface.

Ensure that the Pavement and/or wearing surface is free of loose material, debris and standing water when testing is undertaken.

Rectify all areas where Surface Roughness exceeds specified level.

The following areas are excluded from the requirement to achieve specified IRI limits:

- Roundabouts;
- Railway lines (35 m after the event);
- Bridge joints (35 m after the event);
- Intersections (stop bar to stop bar);
- Inspection pit covers and related surface Defects within the wheel paths(15 m including the event);
- Surface Defects related to existing Culverts which are not part of the works (width of Culvert plus 30 m after the event); and
- Cattle grids.

Table 7-3 – Stabilised and Modified Layers Conformance		
Dry Density Ratio:		Refer ***Table 5-11 – Dry Density Ratios for Conformance***.
Binder Application Rate/Content		±10% of the field application rate averaged for each Test Lot
Stabiliser Distribution:	[i]	Binder content must not vary by more than ±0.5% absolute between top and bottom half of a layer at any location as determined in accordance with NTTM 204.8.
	[ii]	Binder content must not vary by more than ±0.5% from the designated value in any point.
Moisture Content during Compaction:	[i] [ii]	±1.5% of moisture content determined at preliminary trial. ±1.5% of Optimum Moisture Content.
[i] apply if a preliminary trial is carried out (i.e. total area over 1,000m2) [ii] apply if a preliminary trial is not carried out (i.e. areas under 1,000m2) Take samples for Liquid Limit, Plastic Limit, Linear Shrinkage, California Bearing Ratio from the unstabilised Pavements.		

8. SPRAY SEALING

8.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1141	Methods for sampling and testing aggregates
AS 1141.14	- Particle shape, by proportional caliper
AS 1141.15	- Flakiness index
AS 1141.18	- Crushed particles in coarse aggregate derived from gravel
AS 1141.20.1	- Average least dimension – Direct measurement (nominal size 10 mm and greater)
AS 1141.20.2	- Average least dimension – Direct measurement (nominal sizes 5 mm and 7mm)
AS 1141.23	- Los Angeles value
AS 1141.24	- Aggregate soundness – Evaluation by exposure to sodium sulphate solution
AS 1141.25.1	- Degradation factor – Source rock
AS 1141.26	- Secondary minerals content in igneous rocks
AS 1141.29	- Accelerated soundness index by reflux
AS 1141.40	- Polished aggregate friction value – Vertical road wheel machine
AS 1141.41	- Polished aggregate friction value – Horizontal bed machine
AS 1141.50	- Resistance to stripping of cover aggregates from binders
AS 1160	Bituminous emulsions for the construction and maintenance of pavements
AS 1742.3	Manual of uniform traffic control devices – Traffic control for works on roads
AS 1906.3	Retroreflective materials and devices for road traffic control purposes – Raised pavement markers
AS 2008	Residual bitumen for pavements
AS 2106.2	Methods for the determination of the flash point of flammable liquids (closed cup) - Penksy Martens closed cup method
AS 2157	Cutback bitumen
AS 2341 (set)	Methods of testing bitumen and related roadmaking products
AS 2341.6	- Determination of density using a hydrometer
AS 2341.9	- Determination of water content (Dean and Stark)
AS/NZS 2341.13	- Long-term exposure to heat and air
AS 2758.2	Aggregates and rock for engineering purposes - Aggregate for sprayed bituminous surfacing
AS 2809.5	Road tank vehicles for dangerous goods - Tankers for bitumen based products
AS 3568	Oils for reducing the viscosity of residual bitumen for pavements
AS 3706	Geotextiles – Methods of Test
AS 3706.1	- General requirements, sampling, conditioning, basic physical properties and statistical analysis
AS 3706.2	- Determination of tensile properties – Wide strip and grab method
AS 3706.3	- Determination of tearing strength – Trapezoidal method

NORTHERN TERRITORY TEST METHODS

NTTM 215.1	Standard bell penetration test
NTTM 304.1	Determination of skid resistance with the portable skid tester

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ASTM D86	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)

ASTM D1298	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
AUSTROADS	
AGPT04H-08	Austroads Guide to Pavement Technology – Part 4H: Test Methods
AGPT04K-09	Guide to Pavement Technology – Part 4K: Seals
AGPT/T103	Pre-treatment and Loss on Heating of Bitumen Multigrade and polymer Binders (rolling thin film oven [RTFO] test)
AGPT/T108	Segregation of Polymer Modified Binders
AGPT/T109	Ease of Remixing of Polymer Modified Binders
AGPT/T111	Handling Viscosity of Polymer Modified Binders (Brookfield Thermosel)
AGPT/T112	Flash Point of Polymer Modified Binders
AGPT/T121	Shear Properties of Polymer Modified Binders (ARRB ELASTOMETER)
AGPT/T122	Torsional Recovery of Polymer Modified Binders
AGPT/T131	Softening Point of Polymer Modified Binders
AGPT/T132	Compressive Limit of Polymer Modified Binders
AGPT/T142	Rubber content of digested crumb rubber binders - Trichlor bath method
AGPT/T190	Specification Framework for Polymer Modified Binders and Multigrade Bitumens
AP-C87-15	Austroads Glossary of Terms
AP-G41-08	Bituminous Materials Sealing Safety Guide
AP-T68/06	Update of the Austroads Sprayed Seal Design Method
AP-T235-13	Guide to the Selection and Use of Polymer Modified Binders and Multigrade Bitumens
AP-T236-13	Update of Double/Double Design for Austroads Sprayed Seal Design Methods

Weeds Management Act 2001 (NT)

8.2 SCOPE

Spray sealing treatments include:

- Prime
- Primerseal
- Enrichment
- Initial Seal or Reseal:
  - With conventional bitumen, cutback bitumen or bitumen emulsion binder
  - With modified binder

Spray sealing work consists of:

- Supply and delivery of materials.
- Storage and handling of raw materials.
- Precoating of aggregate.
- Preparation of Pavement surfaces.
- Preparation of bituminous materials.
- Recording of Spray Sealing works.
- Sampling of Bituminous Products.
- Application of primer and/or primerbinder and/or binder.
- Spreading and rolling of aggregate.
- Removal of loose aggregate.
- Traffic Control.
- Installation of temporary Pavement markers.
- Installation and retrieval of after-care signage.
- Traceability of works and materials.

8.3 MATERIAL REQUIREMENTS

8.3.1 Aggregates

Aggregates must be clean, hard, durable, skid resistant, dry crushed stone, or gravel of uniform quality free from noxious weeds and other deleterious material, and conform with the properties specified. Minimum 3 crushed faces.

Nominate source of aggregate supply.

Conform to *Table 8-6 – Aggregate Grading and Average Least Dimension (ALD)*, and to *Table 8-7 – Aggregate Properties*.

Documentation Point 25 - Submit current NATA endorsed test certificates providing evidence that the nominated Spray Seal aggregate supply conforms to specified properties.

Aggregate used for testing must be sampled from the Development Site.

8.3.2 Cutter

Cutter is to be Kerosene or Jet A1 Aviation Turbine Fuel – conform to *Table 8-2 - Cutter Oil Properties*.

8.3.3 Precoat and Adhesion Agents

Adhesion Agents are to be in the concentrated form and not contain diesel as part of the mixture.

Precoat all aggregates to conform to the following:

Precoat mixture is to be 100/0/100/1 and not contain Diesel as part of the mixture.

Bitumen residue (by mass): 50%.

Kerosene (by Mass) 50%

Adhesion agent (by mass): minimum 1%

8.3.4 Bitumen

Standard Classes of bitumen to conform to the requirements of AS 2008.

Manufacture all AS 2008 bitumen in a refinery and have NATA endorsed certificates of manufacture.

Durability Value in accordance with AS/NZS 2341.13 is to be a minimum of 7 days with no maximum value.

Multigrade bitumen to comply with AGPT/T190.

8.3.5 Cut Back Bitumen

Conform to the requirements of AS 2157 and *Table 8-3 - Cut Back Bitumen Properties***.**

Designation is by AMC class.

8.3.6 Bitumen Emulsion

Refer to Construction Drawings for details of type of emulsion to be used.

Conform to the requirements of AS 1160.

Utilise within 90 Calendar Days of manufacture.

Spraying temperature: 60% bitumen content, 30 to 60 °C.

8.3.7 Polymer Modified Binder

A mixture of Standard Class bitumen and elastomeric polymer or crumb rubber additive.

All Conformance Testing to be carried out in accordance with Austroads and Australian Standard Test Methods.

Base binders for the production of PMB must meet the specification limits outlined in *Table 8-8 – Base Binder for Polymer Modified Bitumen***,** from the refinery. All base binders must be process tested for conformance to ensure compliance before manufacture into PMB's.

Polymer Modified Binders must conform to the requirements outlined in *Table 8-10 – Polymer Modified Binders for Sprayed Sealing Applications*.

Manufacture of Polymer Modified Binders must meet the requirements of the Guide to the Manufacture, Storage and Handling of Polymer Modified Binders, Australian Asphalt Pavement Association, 2013.

8.4 SPRAYERS AND PERSONNEL

Sprayers must have current calibration accredited by a tester nominated on the Australian Asphalt Pavement Association (AAPA) website. All calibrated sprayers must be listed on the AAPA website. A copy of the calibration certificate must be with the vehicle at all times.

Calibrate sprayers yearly.

Ensure sprayer driver and operator are skilled and trained with an understanding of sprayer calibration and an appreciation of the requirements of the work.

Ensure relevant personnel understand the types and quantities of the various materials and mixtures to be used.

Bitumen spraying plant and equipment must be in good working condition at all times.

8.5 FINAL PREPARATION OF PAVEMENT SURFACE

Remove raised reflective Pavement markers. Repair any damage to the Pavement surface caused by the removal of raised reflective markers with an emulsion/sand mixture before Sealing.

Remove deleterious materials, rocks, refuse and organic materials such as timber, branches, leaves, and exposed roots and the like.

Immediately before spraying, sweep the entire Pavement surface to remove all loose stones, dust, dirt and foreign matter.

Do not sweep Fine Crushed Rock, or low plasticity type materials, with steel brooms.

Maintain the prepared final surface to be free of loose foreign objects.

Remove adherent patches of foreign material with a steel scraper.

Dampen the prepared surface lightly immediately before spraying (for Primes and Primerseals only).

Remove water from the surface of Primed or Sealed Pavements before applying binder.

Do not allow traffic on the prepared surface.

8.6 SETTING OUT

Setting out to be by a Licensed Surveyor in accordance with *Clause 1.17 - Setting out Works*.

8.7 BINDER COAT REQUIREMENTS

8.7.1 General

Conform to *Table 8-1 – Binder Type Requirements***.**

Table 8-1 – Binder Type Requirements	
Application	**Binder Type**
Prime and Primerseal	Class C240 / C320 applied in cutback form.
Tack Coat and Enrichment	CRS170/60 applied in emulsion form.
Seal Coat	S10E or S20E polymer modified bitumen, with an elastomeric modifier. Refer Construction Drawings for details.

References

- *Austroads Guide to Pavement Technology Part 4K Selection and Design of Sprayed Seals.*
- *Austroads - Guide to the Selection and Use of Polymer Modified Binders and Multigrades – AP-T235-13 (2013)*
- *AS2008 - Bitumen for Pavements*

Requirements

Selection of binder type other than those specified above can be considered in special circumstances, subject to approval of the Relevant Authority.

Material properties for polymer modified binders are contained in *Table 8-10 – Polymer Modified Binders for Sprayed Sealing Applications***.**

For further guidance, refer to *Austroads - Guide to the Selection and Use of Polymer Modified Binders and Multigrades (TT1357 2012)*

Heat to spraying temperature, generally between 180°C and 200°C, but do not exceed the maximum allowable. Refer *Table 8-4 – Temperature Control Requirements for Polymer Modified Binders* for Polymer Modified Bitumen. Avoid heating bitumen in quantities excess to requirements.

Remove from the Development Site binder which has been overheated or has deteriorated or become contaminated prior to its application to the street.

Prevent foaming.

Ensure product meets the requirements of the specification at point of delivery.

8.7.2 Prime, Primerseals and Enrichment Coats

Provide bitumen complying with *Table 8-8 – Base Binder for Polymer Modified Bitumen***.**

Prime to be AMC 0 to AMC 00. Refer to Construction Drawings for cut back requirements for Primerseals ad Enrichment Coats.

Cut-Back Bitumen Mixed On Site:

Heat bitumen to a temperature appropriate for achieving final spraying temperature making allowance for incorporation of the unheated Cutter.

Add unheated Cutter to heated bitumen and circulate until a homogeneous mixture is achieved.

Spray immediately once circulation is complete.

Allow at least three Calendar Days to elapse after Priming before applying the binder coat.

Keep traffic off the primed surface for this period.

Use a Primerseal if traffic cannot be kept off surface for 3 Calendar Days.

8.7.3 Straight Run Binder Coats

Do not use Straight Run Binder Coats unless you have prior approval from the Relevant Authority.

Provide bitumen Class 320 complying to AS 2008.

Ensure product meets the requirements of the specification at point of delivery.

8.7.4 Polymer Modified Binder Coats

Provide bitumen in conformance with *Table 8-8 – Base Binder for Polymer Modified Bitumen* blended with the required polymer as follows:

Prepare the product in a manufacturing or blending plant that complies with the Guide to the Manufacture, Storage and Handling of Polymer Modified Binders, Australian Asphalt Pavement Association, 2013.

Ensure product meets the requirements of the specification at point of delivery.

Store, mix, heat and spray the polymer modified binder as recommended by the polymer manufacturer.

Both coats of two coat Seals must contain polymer.

8.8 SAMPLING OF BINDER

8.8.1 Collection of Samples

Each sample must comprise three containers of product collected at the same time from the same supply source.

Sample containers must:

- be clean, rust free and leak proof;
- have a capacity of not less than one litre; and
- be capable of receiving a product at high temperatures.

Samples must be collected at point of delivery, prior to addition of Adhesion Agents, on transfer from the bulker to the sprayer. Do not take

bituminous samples from the spray wagon, except for Prime samples.

All sampling must be in accordance with Australian and Austroads standards. The supplier is to perform the sampling. Ensure staff carrying out sampling are competent in sampling methods.

Ensure sampling techniques do not allow contamination of the samples.

Samples must be clearly identified with permanent marker on adhesive labels on each container.

Store all samples taken to prevent accidental damage or contamination.

8.8.2 Testing

Documentation Point 26 - Undertake Conformance Testing of all binders in accordance with *Table 5-4 – Test Frequencies for Bitumen Spray Sealing*. Provide notification of non-conforming samples.

8.9 STOCKPILE SITES

8.9.1 Stockpiles of materials

Provide a separate site for each aggregate size. Allow 15 metres between adjacent sites.

Ensure sites are well drained and on hard ground. Avoid contamination by dust.

Maintain access streets and stockpile sites.

Do not allow stockpiled aggregates to become wet due to rain. Cover all stockpiles with sheet plastic or similar material.

Avoid sites under trees, telephone lines, overhead transmission lines or where overhead clearance is less than 6 metres.

Remove from the Development Site any non-conforming aggregate.

Remove all unused aggregate from stockpile sites at conclusion of the Spray Sealing works.

8.10 PRECOATING AGGREGATE

All aggregates used must be dry before applying Precoating Material.

No Precoating Material is required for SAMI and Emulsion Seals, unless stated in the Construction Drawings.

Apply a uniform film of Precoating Material to all aggregate used for Sealing purposes.

Do not load directly into trucks from a precoater machine.

Aggregate which has been excessively precoated will be rejected.

All precoating must be performed with a powered shaking screen deck precoater, which removes dust, dirt and oversize materials and evenly applies Precoating Material to the aggregate.

8.11 ADHESION AGENT

Adhesion agent must be used. Do not use diesel based Adhesion Agents.

Use 1% Adhesion Agent in the Binder. Written approval must be obtained from the Relevant Authority for variation of this rate.

Circulate in binder for 20 minutes before spraying.

8.12 SPRAYING

Inspection Point 12 - Provide notice prior to spraying bitumen.

Store bitumen at lowest practical temperature and for the shortest possible duration.

Comply with *Table 8-4 – Temperature Control Requirements for Polymer Modified Binders*.

Seek approval from the Certifying Engineer to vary these requirements.

Remove bitumen from the Development Site when temperature limits are exceeded.

8.12.1 Atmospheric Conditions

Commence spraying only when Pavement temperature

- is in excess of 20 °C, or
- has been in excess of 15 °C for at least one hour.

For cutback work, commence spraying when Pavement temperature is in excess of 10 °C.

For emulsion work, commence spraying when Pavement temperature is in excess of 5 °C.

Cease spraying if rain threatens, or in windy or dusty conditions.

Protect the work in the event of a sudden change in weather by closing the affected section of street or by rigidly controlling traffic speed.

8.12.2 Preparing the Sprayer

Circulate the mixture.

Check the horizontal and vertical alignment and the cleanliness of the spraybar and its extensions.

Determine the appropriate number of nozzles for the width to be sprayed. Ensure the end nozzles fitted are EAN18W.

Check that the nozzles in use are symmetrical about the sprayer.

Check the alignment and setting of the nozzle to ensure that the fans of material from intermediate nozzles are parallel and at an angle of 30 degrees to the centre line of the spraybar. Ensure that the fans from the end

nozzles are parallel to each other and at an angle of 45 degrees to the centre line of the spraybar.

Set the height of the spraybar so that the lower faces of the nozzles are 250 mm (or that specified on the calibration certificate) above the Pavement when the sprayer is full.

Fit an end shield to the spraybar when necessary to prevent spraying material on the kerb, or to counter any wind effects which would compromise uniform spraying.

Position the guide rod to conform to the setting out and edges of spray. Check by making a dummy run.

8.12.3 Application Spray Rates

Application spray rates must be determined by the Developer, using *Austroads Guide to Pavement Technology Part 4K Selection and Design of Sprayed Seals***.**

Refer to *Table 5-8 - Test Frequencies for Aggregates and Pavement Surfaces* for sampling requirements of aggregates.

Documentation Point 27 – Submit spray rates, prior to commencing Spray Seal application.

Spray rates to be at 15°C and adjusted for temperature as per *Table 8-9 – Bitumen Equivalent Volumes*.

For Prime, Primerseals and polymer modified binders, the rate of application refers to the whole of the mixture, including all modifiers, cutback materials, combining oils and Adhesion Agents. For enrichments and emulsion seals, the rate of application refers to the whole of the mixture.

8.12.4 Preparation for Sprayer Run

Record the volume and temperature of the sprayer contents before each run, while sprayer is on level ground. Dip sprayer tank before and after each sprayer run. Record the dip readings, and the temperature of the sprayer contents at the time the dip was done.

Documentation Point 28 – Submit copies of records of sprayer tank dips and temperatures of tank contents.

Check that the spray bar is at the correct height before the spraying begins.

Determine the length of sprayer run from the available quantity in the sprayer and the application rate. Ensure the area to be sprayed is not greater than the area that can be covered by aggregate in the loaded trucks.

Start and finish each spray run on a protective strip of paper placed on the Pavement. The paper to be wide enough to ensure the sprayed material is being discharged correctly over the full width of spray. Place sufficient protective paper to protect street fixtures.

Place paper on the Pavement and masking around areas to be sprayed or wherever the sprayer is stationary on the street Pavement.

Seal joins are only allowed where line marking is to be placed. No joins are allowed in wheel paths.

Excess overspray and spills must be removed before Sealing works proceed.

8.12.5 Installation of Temporary Pavement Markers

Temporary Pavement Markers to conform to AS 1906.3.

Spacings of temporary Pavement markers to be in accordance with AS 1742.3 or as directed by the Relevant Authority.

8.12.6 Sprayer Run

Attain uniform spraying speed before spraying commences.

Avoid an excess or deficiency of material due to faulty overlap at longitudinal joints when spraying a street in half-widths.

Overlap to be 300 mm with an intermediate nozzle.

Do not use end nozzles on an overlap.

Make allowances for “Fog Spraying” when joining to existing Seals.

Cease spraying before the level of material in the tank falls to a level which reduces the full discharge of the pump.

Remove and dispose of all paper as per the approved Construction Environmental Management Plan.

Clean off any sprayed material from street fixtures.

8.12.7 Hand Spraying

Plan work to minimise the requirement for the use of a hand sprayer.

Any strips of Pavement not adequately covered with sprayed material to be sprayed later with the hand attachment.

8.13 APPLICATION OF AGGREGATE

Load aggregate into appropriate aggregate spreading trucks using an approved loader which does not contaminate the aggregate with dust, dirt and oversize stone.

Documentation Point 29 – Submit details of the proposed aggregate loader for Spray Seal works prior to commencing loading operations.

Apply aggregate to sprayed binder within:

- 10 minutes where the Pavement temperature is 20°C or greater.
- 5 minutes where the Pavement temperature is between 15 and 20 °C.

Polymer Modified Binders: Apply aggregate within 5 minutes irrespective of Pavement temperature.

Emulsion Binders: Apply aggregate to emulsion coat before the emulsion breaks.

Use “cut off plates” on spreader boxes to ensure that the correct widths are covered in aggregate, without overlap.

In trafficked areas, apply both coats of a two coat Seal on the same Business Day. Where not trafficked apply the second coat on the following Business Day.

8.13.1 Aggregate Spread Rates

Spread the aggregate evenly and uniformly over the sprayed surface at a rate complying with *Table 8-5 – Aggregate Spread Rates***.**

Use a mechanical spreader; manual spreader boxes are not to be used.

Rerun or hand cover bare or insufficiently covered areas after the first spreading.

Remove all excess aggregate.

8.13.2 Rolling Rate

Roll the treated surface with self-propelled rubber tyred rollers with a minimum tyre pressure of 600 kPa and a minimum wheel load of 1 tonne.

Roller speed on the first pass to be between 5 and 10km/h, with subsequent passes between 15 and 25 km/h.

Conform to the following:

- Entire area to receive one roller pass immediately after covering.
- 75% of rolling within 1 hour of covering.
- 100% of rolling within 2 hours of covering.

Minimum Rolling Rate: 1 roller hour per 2,000 litres of binder.

Ensure a uniform distribution of aggregate. Drag broom to distribute surplus aggregate but do not dislodge embedded aggregate. Drag broom before 50% of rolling is complete. Drag brooms are not to be rotary brooms.

For two-coat treatments, double the specified rolling rate.

Roll in daylight hours only.

Sweep all loose aggregate from the Carriageway at completion of rolling.

Ensure aggregate on the final surface is uniformly distributed and firmly held by the binder.

Adjust drag broom to distribute surplus aggregate, but not to dislodge embedded aggregate.

Re-roll the surface after sweeping to ensure uniform bedding of aggregate in binder.

8.13.3 Self-Propelled Multi Rubber Tyred Vibrating Rollers

Documentation Point 30 – Obtain approval for the use of self-propelled multi rubber tyred vibrating rollers in Spray Seal works prior to using them.

Do not use steel drum rollers fitted with rubber covers.

Self-propelled multi rubber tyred vibrating rollers must not be used on works other than resealing works.

All self-propelled multi rubber tyred vibrating rollers must meet the same requirements as are required for self-propelled multi rubber tyred non-vibrating rollers in respect to rolling speeds, tyre pressures, and wheel loadings.

If the self-propelled multi rubber tyred vibrating rollers meet all the above requirements, one self-propelled multi rubber tyred vibrating roller will be considered to be equivalent to 2 self-propelled multi rubber tyred non-vibrating rollers for calculations of rolling times.

A minimum of 2 self-propelled multi rubber tyred non-vibrating rollers must be on the Development Site at all times during execution of the works.

8.14 WASTE MATERIAL

Remove all excess aggregate by suction broom. Ensure no aggregates are distributed onto the verge, Shoulders and/or table drains.

Documentation Point 31 – Obtain approval for use of rotary type brooms to windrow loose aggregate. Suction type brooms are still to be used to remove the waste aggregate.

Category A areas aggregate removal / sweeping regime:

Initial sweep after rolling has concluded

Second sweep after 24 hours

Third sweep after 48 hours.

Sweep all aggregate from Shoulders in rural areas.

Remove all waste material from the Development Site and dispose of lawfully.

8.15 REPORTING

8.15.1 Spray sheets

Documentation Point 32 – Submit signed spray sheets that record the following information for all Spray Seal runs conducted.

- Contractors Name
- Project Details
- Contract Number
- Specification schedule number
- Street Name

- Product Type Sprayed
- Precoat type used, Precoat litres / m3
- Aggregate supplier, Aggregate Type, Aggregate size
- Run number, Start Time of spray run
- Pavement Temperature, Ambient Temperature
- Start Chainage of spray run – actual km of Street
- End chainage of spray run – actual km of Street
- Total Length, Width of spray run
- Total area of spray run
- Temperature of product at spraying
- Start Dip, End Dip
- Total sprayed hot, Correction factor, Total sprayed cold
- Application rate cold
- Ordered application rate
- Percent of application rate ordered
- Number of rollers used
- Bitumen sample number
- Signature of Contractor representative
- Signature section for Developer representative

8.16 CONFORMANCE

Final surfaces must conform to the following requirements. Rectify non-conforming work by methods approved by the Relevant Authority.

8.16.1 Aggregates Properties

Aggregates must conform to *Table 8-7 – Aggregate Properties*.

8.16.2 Skid Resistance

Standard; NTTM 304.1

Conformance; Not less than that specified in NTTM 304.1, Table 2.

Skid resistance testing may be carried out by the Relevant Authority.

Final surfaces with non-conforming skid resistance will be rejected.

8.16.3 Spray Rates

Spray rates applied at less than 95% or more than 105% of the rate indicated in the procedure must be rectified by resurfacing.

Bleeding and Flushed Seals

Rectify bleeding and/or flushing Seals during the Defects Liability Period.

8.17 TABLES

Table 8-2 - Cutter Oil Properties			
Refer to AS 3568:1999, Table 1 for complete specification requirements.			
Property	**Min**	**Max**	**Test Method**
Density at 15 °C, kg/m3	775	830	ASTM D1298, AS 2341.6
Distillation – Initial Boiling Point, °C – Final Boiling Point, °C	 140 -	 - 280	ASTM D86
Flash Point °C (Penksy Martens closed cup)	38	-	AS 2106.2
Water content, % by volume	-	0.1	AS 2341.9
Viscosity, mPa.s at 40 °C	-	2.0	ASTM D445

Table 8-3 - Cut Back Bitumen Properties			
Class (AS 2157)	**Dynamic Viscosity at 60°C (Pa.s)**	**Approx Parts Bitumen to Cutter**	**Spraying Temperature. (°C)**
Prime Coats			
AMC 00	0.008 - 0.016	100 - 100	Ambient
AMC 0	0.025 - 0.05	100 - 80	35 - 55
Primerseal Coats			
AMC 5	5.5 - 11.0	100 - 12	120 - 150
AMC 6	13.0 - 26.0	100 - 7	135 - 160
AMC 7	43.0 - 86.0	100 - 3	150 - 175

Table 8-4 – Temperature Control Requirements for Polymer Modified Binders		
Property	**Straight Run Binder**	**Polymer Modified Binder**
Temperature at point of spraying	175 to 185 °C	180 to 200 °C
Holding time at spraying temperature	7 days max.	2 days max.
Temperature for medium term storage	130 to 150 °C	140 to 160 °C
Holding time for medium term storage	30 days	7 to 10 days

Table 8-5 – Aggregate Spread Rates	
SINGLE / SINGLE SEALS	**Application Rate m2/m3**
Straight Run Binder Coats, Multi Grade, and Polymer Modified Binders	900/ALD m2/m3
Emulsions and Cut-back Binders	800/ALD m2/m3
SAMI	1000/ALD to 1100/ALD m2/m3
DOUBLE / DOUBLE SEALS – FIRST COAT APPLICATIONS	
Straight Run Binder Coats, Multi Grade, and Polymer Modified Binders	950/ALD m2/m3
Emulsions and Cut-back Binders	850/ALD m2/m3
DOUBLE / DOUBLE SEALS – SECOND COAT APPLICATIONS	
All Binders	900/ALD m2/m3

Table 8-6 – Aggregate Grading and Average Least Dimension (ALD)						
Sieve Size (mm)	**% Passing (Dry Mass)**					
	Nominal Size of Aggregate					
	20 mm	**16 mm**	**14 mm**	**10 mm**	**7 mm**	**5 mm**
26.5	100					
19.0	85 - 100	100				
16.0	-	80 - 100	100			
13.2	0 - 15	0 – 20	85 - 100	100		
9.5	0 - 5	0 – 2	0 - 15	85 - 100	100	
6.7	0 - 2		0 - 5	0 - 15	85 - 100	100
4.75			0 - 2	0 - 5	0 - 15	85 - 100
2.36				0 - 2	0 - 5	0 - 15
1.18					0 - 2	0 - 5
Min. ALD (1)	12.0mm	9.5mm	8.0mm	5.5mm	3.5mm	2.5mm
Note: (1). Test Methods AS 1141.20.1, AS 1141.20.2 - Direct Measurement.						

Table 8-7 – Aggregate Properties			
Aggregate Property	**Traffic Count (AADT: Two Lanes)**		
	Less Than 300 VPD	**300 to 6,000 VPD**	**More Than 6,000 VPD**
AS 1141.14 Misshapen Particles: Calliper Ratio 2:1	25% maximum	15% maximum	12% maximum
AS 1141.15 Flakiness Index	25 maximum	25 maximum	25 maximum
AS 1141.23 Los Angeles Abrasion (LAA):			
- Fine Grained Aggregate	30% maximum	25% maximum	20% maximum
- Coarse Grained Aggregate	40% maximum	35% maximum	30% maximum
AS 1141.24 Sulphate Soundness	15% maximum	12% maximum	10% maximum
AS 1141.40/41 Polished Aggregate Friction Value	40 minimum	40 minimum	45 minimum
AADT - Annual Average Daily Traffic; VPD - Vehicles Per Day			
AS 1141.18 - Crushed particles in coarse aggregate derived from gravel. Ensure 80% minimum by mass are classified as crushed particles. AS 1141.25.1 - Degradation factor – Source rock (Washington Degradation Test). Igneous rocks must have a minimum value of 50. AS 1141.26 - Secondary minerals content in igneous rocks must not exceed 25%. AS 1141.29 - Accelerated soundness index by reflux. Igneous rocks must have a minimum value of 94. AS 1141.50 - Resistance to stripping of cover aggregates from binders. Binder to be S10E with 1% adhesion agent. Precoat to be 100/0/100 with 1% adhesion agent. The maximum wet stripping (saturated, surface dry) value of the precoated aggregate must not exceed 10%.			

Table 8-8 – Base Binder for Polymer Modified Bitumen		
Property	**Specification limit minimum**	**Specification limit maximum**
Viscosity at 60°C, Pa.s	140	380
Viscosity at 135°C, Pa.s	0.25	0.65
Penetration at 25°C (100g, 5s), pu (pu unit is 0.1mm)	40	N/A
Flashpoint °C	250	N/A
Matter Insoluble in toluene, percent mass	N/A	1.0
Short Term effect of heat and air (Rolling Thin film Oven Test) Viscosity of residue at 60°C as a percentage of original	N/A	300
Long term effect of Heat and air, days	7	N/A
Density at 15°C, t/m3	TBR	TBR

Equivalent volumes of bituminous material measured at higher temperature converted to 15oC (15oC converted higher temperature) are shown in the table below. Interpolate to determine equivalent volumes at temperatures other than those specified.

Table 8-9 – Bitumen Equivalent Volumes

Temp (°C)	Factor	Temp (°C)	Factor
15	1.0000 (1.0000)	120	0.9356 (1.0688)
40	0.9844 (1.0158)	130	0.9296 (1.0757)
50	0.9782 (1.0223)	140	0.9237 (1.0826)
60	0.9720 (1.0288)	150	0.9178 (1.0896)
70	0.9659 (1.0353)	160	0.9119 (1.0966)
80	0.9597 (1.0420)	170	0.9060 (1.1038)
90	0.9537 (1.0486)	180	0.9002 (1.1109)
100	0.9476 (1.0553)	190	0.8944 (1.1181)
110	0.9416 (1.0620)	200	0.8886 (1.1253)
		210	0.8829 (1.1326)

Table 8-10 – Polymer Modified Binders for Sprayed Sealing Applications

Test Method	Binder Property	PMB Class					
		S10E	**S15E**	**S20E**	**S25E**	**S35E**	**S45R**
AGPT/T121	Consistency at 60 °C (Pa.s) min.	250	700	700	5000	300	1000
AGPT/T121	Underlying Viscosity at 60 °C (Pa.s)	TBR	TBR	TBR	TBR	TBR	TBR
AGPT/T121	Stiffness at 15 °C (kPa) max.	140	140	140	95	180	180
AGPT/T142	Rubber Content by analysis (%) min	NA	NA	NA	NA	NA	10
AGPT/T132	Compression Limit at 70 °C , 2kg (mm) min.	NA	NA	NA	NA	NA	0.2
AGPT/T121	Elastic Recovery at 60 °C , 100s (%) min.	NA	NA	NA	85	NA	25
AGPT/T111	Viscosity at 165 °C (Pa.s) max.	0.55	0.55	0.55	0.8	0.55	4.5
AGPT/T112	Flash Point (°C) min.	250	250	250	250	250	250
AGPT/T103	Loss on Heating (% mass) max.	0.6	0.6	0.6	0.6	0.6	0.6
AGPT/T122	Torsional Recovery at 25 °C , 30s (%).	22 - 50	32 - 62	45 - 74	54 - 85	16 - 32	25 - 55
AGPT/T131	Softening Point (°C).	48 - 64	55 - 75	62 - 88	82 - 100	48 - 56	55 - 65
AGPT/T108	Segregation value (%) max.	8	8	8	8	8	8

Notes:

1. Class of PMB: S=Sealing, E=Elastomeric Polymer, R=Granulated Crumbed Rubber
2. NA means not applicable for that PMB class, TBR = To be reported
3. AGPT Test Methods are available from Austroads Guide to Pavement Technology Part 4H: Test Methods
4. S35E must be manufactured with Polybutadiene (PBD) polymers (To be used only if approved by the Relevant Authority, as an alternative to S10E).

9. DENSE GRADED ASPHALT

9.1 DEVELOPERS RESPONSIBILITIES

The Developer is responsible for the production and placing of the registered and approved design mix in accordance with the technical requirements of this specification.

The Developer must undertake Conformance Testing in accordance with Conformance Testing and maintain a record of test results in accordance with the Developer's Quality System.

9.2 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1141 (set)	Methods for sampling and testing aggregate.
AS 1160	Bituminous emulsion for the construction and maintenance of pavements.
AS 2008	Bitumen for pavements.
AS 2150	Hot mix asphalt – a guide to good practice.
AS 2157	Cut back bitumen.
AS 2758 (set)	Aggregates and rock for engineering purposes.
AS 2891 (set)	Methods of sampling and testing asphalt.

AUSTRALIAN ASPHALT PAVEMENT ASSOCIATION (AAPA)

Guide to the manufacture, storage and handling of polymer modified binders

Advisory Note 7 Guide to the manufacture, storage and handling of binders for Spray Sealing (and hot mix asphalt)

AUSTROADS

AGPT04B	Austroads Guide to Pavement Technology Part 4B Asphalt
AGPT04H	Austroads Guide to Pavement Technology Part 4H: Test Methods
AGPT/T103	Pre-treatment and Loss on Heating of Bitumen Multigrade and polymer Binders (rolling thin film oven [RTFO] test)
AGPT/T111	Handling Viscosity of Polymer Modified Binders (Brookfield Thermosel)
AGPT/T112	Flash Point of Polymer Modified Binders
AGPT/T121	Shear Properties of Polymer Modified Binders (ARRB ELASTOMETER)
AGPT/T122	Torsional Recovery of Polymer Modified Binders
AGPT/T131	Softening Point of Polymer Modified Binders
AGPT/T190	Austroads Framework Specification for Polymer Modified Binders and Multigrade Bitumen

NT PUBLICATIONS

NTCP 103.1	Site selection by the stratified random technique
NTCP 107.1	Ride Quality
NTMTM	Northern Territory Materials Testing Manual
NTTM	Northern Territory Test Method

OTHER PUBLICATIONS

MRWA	Main Roads Western Australia, Test Methods

9.3 MATERIALS

9.3.1 Coarse Aggregates

Coarse aggregates must consist of crushed stone, with a minimum of 3 crushed faces, which is clean, hard, of high strength, angular, which has adequate skid resistance, which is durable and free from laminated particles, clay and other aggregations of fine material, soil, organic matter and any other deleterious material. Coarse aggregate must not fracture under compaction equipment or deteriorate rapidly. Coarse aggregate materials must conform to the requirements of *Table 9-2 - Properties - Coarse Aggregates***.**

9.3.2 Fine Aggregates

Fine aggregates must consist of clean, hard, sharp, washed, durable natural sand and/or material manufactured from crushed stone of uniform quality free from clay and other aggregations of fine material, soil, organic matter and any other deleterious material.

Where crushed fine materials are from sources other than the source of the coarse material used in the asphalt mix, the parent rock must meet all requirements listed in *Table 9-2 - Properties - Coarse Aggregates*.

Fine aggregates must meet the requirements of *Table 9-3 - Properties - Fine Aggregate*.

9.3.3 Mineral Filler

Filler must consist of mineral material, natural or crushed mineral materials, hydrated lime or cement with a particle size less than 0.075 mm.

Filler must be dry, free from lumps, clay, organic material or any other deleterious material, and complies in all respects with the requirements of AS 2150.

9.3.4 Bituminous Binder

Refined bitumen must be Class 320, conforming to the requirements of AS 2008.

Polymer Modified Binders (PMB) must comply to the requirements of *Austroads Framework Specification for Polymer Modified Binders and Multigrade Bitumen, AGPT/T190*. Properties of PMB grades referred to in this specification are outlined in *Table 9-4 – Polymer Modified Binders For Asphalt Applications***.**

Bitumen handling and storage must be in accordance with AAPA Guide to the Manufacture, Storage and Handling of Polymer Modified Binders and with AAPA Advisory Note 7 Guide to the manufacture, storage and handling of binders for spray sealing (and hot mix asphalt).

Where requested, provide evidence that the binder used for asphalt manufacture has been handled and stored according to these requirements.

9.3.5 Bitumen Emulsion

A rapid setting bitumen emulsion, conforming to requirements of AS 1160 when applied as a tack coat.

9.3.6 Additives

Additives such as bitumen Adhesion Agents, hydrated lime and the like may be proposed to be used in the mix, provided that full details of the type of additive are provided. The material must be nominated and shown as part of the mix design in accordance with the Asphalt Mix Design clause.

9.3.7 Reclaimed Asphalt Pavement

Crush and screen reclaimed asphalt pavement (RAP) from milling or excavation of existing asphalt as necessary to achieve a well graded, free flowing and consistent product. Ensure a maximum size no greater than the maximum size of the asphalt being produced.

RAP material must not contain tar binder and must be free of contaminants such as unbound granular base material, concrete, clay, soil, organic matter or any other deleterious material.

Processed RAP material must be placed in separate stockpiles prior to use. Where RAP material has been stockpiled for some time and is no longer in a free-flowing condition, reprocessing must be undertaken to ensure that it is free flowing at the time of incorporation into the manufacturing of new asphalt materials.

RAP addition in manufactured asphalt must not exceed:

- 15% by mass in base layers, and
- 10% by mass in the wearing course.

9.4 ASPHALT MIX DESIGN

9.4.1 Mix Type and Design Traffic Category

Refer to Construction Drawings for mix type.

Refer to *Table 9-1 - Mix Type Designation* for traffic category, binder type and aggregate size for different mix types.

9.4.2 Design Mix Requirements

All asphalt mixes proposed for use must be a Registered Mix Design with Department of Infrastructure, Planning and Logistics.

Where a new design mix is proposed, the Developer must register the mix in accordance with the Department of Infrastructure, Planning and Logistics' Code of Practice for Registration of Asphalt Mix Designs.

Documentation Point 33 – Obtain approval for asphalt materials and mix designs prior to use in the Development Works.

Approval of the Registered Mix Design for use does not relieve the Developer from employing suitable manufacturing and handling techniques to ensure performance of the mix. The Developer is also accountable for rectification of Defects should the mix not perform.

The manufacturer must notify the Relevant Authority of any proposed changes to the components or proportions of components used in the Registered Mix Design.

Where it is proposed to change the source grading or nature of the components or binders, new mix designs must be carried out and approved.

Documentation Point 34 – Obtain approval for amendments to the approved asphalt materials and mix designs prior to use in the Development Works.

Registration of mix designs must be renewed every 2 years from the date of acceptance.

If a Registered Mix Design has unsatisfactory handling or field performance, the Developer, Certifying Engineer or Relevant Authority may request the mix be de-registered.

9.5 SURFACE PREPARATION

9.5.1 New Construction

Inspection Point 13 - Provide notice of the scheduled commencement time of surface preparation works for each asphalt work program.

The Developer must prepare existing surfaces to ensure that asphalt construction can be

completed in accordance with the requirements of This Specification. The Developer must:

- ensure that the surface has been adequately prepared so that the specified asphalt material density can be achieved;
- ensure that the surface has been adequately prepared to achieve shape and level requirements where required;
- ensure that the exposed granular base layer is tightly bound and free from vegetation and other foreign matter;
- ensure there are no laminations or false Pavements within the exposed surface;
- remove all foreign matter by sweeping or other means; and
- ensure that exposed granular layers have sufficiently dried back to the requirements of *Clause 6.5.5 – Final Pavement Layer Integrity Requirement* prior to the application of the bituminous spray Primerseal.

The Developer must apply a bituminous Spray Seal Prime coat to the exposed granular surface as specified in SPRAY SEALING. Allow for curing time, as specified, prior to application of asphalt.

Refer to Construction Drawings for details of the bituminous Seal.

Prior to laying base or wearing surface asphalt all depressions greater than 15 mm must be filled with an asphalt correction course layer. Minimum asphalt layer thicknesses must be observed during this procedure.

9.5.2 Resurfacing of Existing Surfaces

All vegetation and loose and extraneous matter must be removed prior to the application of bituminous resurfacing materials.

Depressions greater than 25 mm must be filled with an asphalt correction course layer. Minimum asphalt layer thicknesses must be observed during this procedure.

9.5.3 Tack Coat

Apply a fine spray of bitumen emulsion lightly and evenly over the whole of the area to be covered with asphalt at a rate of 0.1 – 0.2 litres/m2 unless otherwise directed by the Certifying Engineer.

The Pavement must be dry and dust free before any application of tack coat.

Apply tack coat by spray bar fitted to mechanical sprayer. Hand spray only in areas where it is impractical to use a spray bar.

Protective splash boards or spray skirts must be used to eliminate over spray beyond the surface where tack coat is being applied.

Allow the tack coat to 'break' before laying the asphalt.

Clean and tack coat existing surfaces against which new work is to be laid.

Re-apply tack coat where damaged by construction traffic or weather.

9.6 MIXING

Asphalt materials must be manufactured in a plant capable of consistently producing asphalt that complies with the approved Registered Mix Design. The asphalt material must meet manufacturing temperature requirements outlined in *Table 9-5 – Acceptable Temperature Ranges by Materials*.

9.6.1 Asphalt Material Storage

Asphalt may be stored in hot storage facilities for a period not exceeding 24 hours from the time of manufacture.

9.7 TRANSPORT AND SUPPLY

9.7.1 Transport

Asphalt materials must be transported by trucks with clean trays which permit seamless discharge of the asphalt material to the receiving hopper. All transport vehicles must be free from oil leaks.

The asphalt material must be covered with suitable tarps to reduce the rate of cooling during transport.

Delivery trucks must be fitted with adjustable tailgate(s) to allow control of the mix during discharge into the receiving hopper.

All delivery dockets must provide information that can trace each load to the manufacturing cycle and also point of placement.

Delivery dockets must record:

- Unique Docket Number
- Time of Departure
- Temperature at point of discharge from the manufacturing plant
- Product Type and Bitumen Type
- Mass of Materials – Individual load tonnage and cumulative tonnage

9.7.2 Rate of Supply

The frequency of asphalt material deliveries must be planned to achieve a uniform rate in line with the capacity of spreading and compaction processes.

Rate of delivery must allow continuous placing of the asphalt material having regard to;

- the number of haulage vehicles available; and
- the haulage distance to the work site.

Cooling must be minimised by prompt delivery and placement of the asphalt material at the Development Site.

9.8 SPREADING

9.8.1 General

Inspection Point 14 - Provide notice before commencement of asphalt material spreading.

The asphalt material must be laid at a uniform thickness to the tolerances listed in *Table 9-6 – Finished Pavement Properties*. The paving operation must be one continuous operation where practicable. Where a break in paving occurs due to a planned stop or prolonged delay period, a transverse joint must be constructed.

Asphalt that has cooled below acceptable initial rolling temperature(s) must be removed from the Development Site and replaced prior to initial rolling.

Asphalt must not be laid when rain is imminent. Paving must cease during heavy or continuous rain, or in wet conditions where the material will not adhere or key to existing surfaces.

Remove from the Development Site all rain affected and/or temperature depleted materials.

9.8.2 Mechanical Spreading

Paving machines must be self-propelled and equipped and operated with an electronic levelling apparatus.

Where limited quantities of asphalt are required, or the area to be paved is restricted or of limited width, such as footpaths or parking areas, other spreaders approved by the Relevant Authority may be used.

9.8.3 Hand Spreading

Hand spreading will be permitted only in locations where spreading with a paving machine is impractical. Hand spreading may be used to correct localised depressions and/or irregularities.

Spreading of excess material over newly placed asphalt during joint matching is not permitted. All excess material must be removed and discarded from the Development Site.

Broadcasting of asphalt over the mat is not permitted at any time.

9.8.4 Laying Pattern

Work must be completed as one continuous operation where practicable.

Documentation Point 35 - Submit a construction program and paving plan prior to commencement of asphalt works. Paving plans must be confirmed prior to the commencement of each work shift.

Laying patterns are not to have longitudinal joints programmed to be left as cold joints. Full width paving shall be programmed.

9.8.5 Construction Joints

Paving plans must detail the construction processes and procedures. Use processes and procedures which minimise longitudinal and transverse construction joints.

Longitudinal joints must be located within the lane line of the Pavement or the traffic sump line. Longitudinal joints must not be located under wheel paths.

Longitudinal joints must be laterally offset by 100 mm and transverse joints by 500 mm when paving multiple layers.

Construction joints must be minimised within intersections, and within braking zones in approaches to intersections, and within acceleration zones of intersections.

During paving, overlap each adjoining lane by at least 25 mm to form an even transverse surface. Proud asphalt material must be raked back immediately to form a ridge along the top of the joint. Where excess material remains in place, this material must be removed from the joint area prior to compaction rolling. Following rolling the resultant joint must be smooth and of similar texture to the Pavement in general.

9.8.6 Transverse Joints

Form transverse joints by cutting with a purpose-built asphalt cut off wheel, or diamond saw, or profiler, to form a vertical face. All waste asphalt is to be removed from the Development Site.

When constructing transverse joints, ensure that the joint and the approaches to the joint do not deviate more than 5 mm under a 3 metre straight edge. Cut back existing Pavement to a true level surface with no deviation. Cut back must be a minimum of 200 mm or be sufficient in length to match existing Pavement levels and to also maintain cross-falls.

Transverse joints include joints created where a paving machine has stopped in any surfacing works.

Exposed joint faces must be treated with bitumen emulsion tack coat prior to placing asphalt against them.

Transverse Match of Overlay to Existing Pavement:

- Saw cut existing asphalt Pavement 20 mm depth along the match line of joint.
- Remove taper wedge of existing asphalt Pavement along the overlay side of match joint.

- Feather the asphalt overlay down to the existing Pavement to achieve a maximum slope of 1 in 10 and for the full width of the Pavement.
- Ensure depth of overlay above existing Pavement in taper wedge area is not less than 20 mm.

9.8.7 Longitudinal Joints

Documentation Point 36 – Provide a plan showing all proposed longitudinal joints in asphalt works. The plan must be approved prior to the relevant works commencing.

Do not leave unfinished longitudinal joints. Where in unforeseen circumstances longitudinal joints must be left unfinished, the Development Site must have traffic management in place, with traffic management personnel onsite, until the joint is finished.

All longitudinal joints must be parallel to and follow the shape of the street alignment, unless directed otherwise by the Relevant Authority.

Edges must not remain unsupported unless directed otherwise by the Relevant Authority. Unsupported edges must be cut back at least 75 mm if adjacent runs are not paved within the time taken to cool below acceptable paving temperatures.

All unsupported edges left over-night must have tapered edges and must be cut back prior to paving adjacent runs.

All open faces must be treated with bitumen emulsion tack coat prior to paving.

9.8.8 Temporary Ramps

Provide compacted asphalt ramps measuring a maximum 1% grade relative to existing surrounding Pavement grades, where transverse joints are left overnight under traffic.

Longitudinal ramps must be a minimum of 300 mm wide under traffic, and must be visually monitored at all times for the period the ramps are in use.

9.9 COMPACTION

9.9.1 Compaction Generally

All plant and equipment used for the execution of the Development Works must be free of oil and fuel leaks.

Compaction methodology must be used so that rollers do not stop on the hot new asphalt surface.

Defer rolling if excessive displacement of the asphalt occurs but only until the asphalt has cooled sufficiently to permit rolling to continue.

The depth of each layer compacted must not exceed 5 times the nominated aggregate maximum size.

9.9.2 Compaction Temperatures

Compaction must be completed prior to cooling of the asphalt material below temperatures at which point the material may be damaged by rolling or at the point at which densification ceases.

9.9.3 Initial Rolling

Initial breakdown rolling must commence immediately following asphalt placement behind the spreader using a steel wheeled roller. Initial rolling must not result in adverse displacement or cracking.

Steel wheeled rollers must be fitted with adjustable scrapers and the drums must be kept moist with water to prevent the mix from sticking to the drums.

9.9.4 Intermediate Rolling

Self-propelled pneumatic tyred rollers with the same tyre pressure in all compacting tyres must be used for intermediate rolling. Rollers must be fitted with water lubricant systems that stop the asphalt sticking to the rubber tyres. Do not use detergents or other chemicals for lubrication. Sand may be spread on the new asphalt to prevent the asphalt sticking to the tyres. Rolling must be completed during applicable material temperatures.

9.9.5 Final Rolling

A static steel wheeled roller must be used during final rolling. This procedure must remove all roller marks from the surface to ensure a smooth even surface.

9.9.6 Joint Compaction

All joints and free edges must be constructed and compacted to obtain acceptable surface texture.

Offset transverse joints in adjoining runs by 1 m minimum.

Rolling of unsupported edges must not result in shape loss and/or excessive lateral displacement.

Finished joints must obtain a smooth even surface which does not exceed 5 mm deviation under a 3 m straight edge.

9.9.7 Hand Tampers

Compact asphalt materials by vibratory plates or hand tampers in locations inaccessible to rollers. Finish hand tamped surfaces to a smooth even surface conforming with machine finished areas.

All free edges not laterally supported are to be pushed up with a heavy hand rake and tamped, to form a firm and cohesive edge of not less than 60^{o} slope prior to rolling the free edge or applying the adjacent paving run.

9.10 CONFORMANCE

9.10.1 Conformance Testing

The Developer must undertake internal Process Testing.

The Developer is responsible for carrying out all Conformance Testing of materials and completed Pavement properties.

Bitumen used in the asphalt production must be tested in accordance with *Section 5 – Conformance Testing* and *Section 8 – Spray Sealing*.

Surface roughness testing will be carried out at the discretion of the Relevant Authority.

9.10.2 Process Testing

Provide test reports for all Process Testing performed on the works when requested by the Relevant Authority to provide the reports.

9.10.3 Finished Pavement Properties

The works must conform to the requirements listed in *Table 9-6 – Finished Pavement Properties***.**

9.10.4 Flood Testing

The Relevant Authority may request the Developer undertake flood testing to show conformance with the specified tolerances as required.

9.10.5 Conformance on Asphalt Production

Conform to the variation limits to the Registered Mix Design shown in *Table 9-9 - Variation Limits To The Registered Mix Design*.

9.10.6 Conformance Sampling and Testing Frequencies

The Developer is responsible for undertaking conformance sampling of asphalt materials taken from trucks at the mixing plant and finished asphalt Pavement in accordance with the requirements of Conformance Testing.

9.10.7 Asphalt Compaction

The Developer must provide details of Test Lots to the Relevant Authority, including:

- map of Lot location(s) relative to land marks including direction;
- Test Lot numbers; and
- Test Lot register.

Test Lots must:

- consist of no more than one work shift's production;
- be continuous; and
- consist of homogeneous material without distinct changes in characteristic properties.

Each Test Lot will be subject to Conformance Testing including:

- asphalt material testing;
- in-situ compaction;
- level compliance where appropriate:
- roughness; and
- visual assessment.

Should the Test Lot under consideration be subdivided then each subdivided Test Lot will be subjected to separate testing.

Non-conforming Test Lots, which are subdivided must be retested individually following subdivision.

Core sample locations must be selected by the laboratory on a stratified random basis in accordance with NTCP 103.1. Supply copies of the completed stratified random selection with each compaction report.

Carry out density testing as soon as practicable after completion of works. The work represented by a Test Lot will be assessed as the characteristic value of in-situ air voids where the Characteristic Value of Air Voids is calculated in accordance with Conformance Testing.

Conform to *Table 9.10 - Characteristic Value of Air Voids*.

Clause 5.8.3 – Conformance of Compaction of Asphalt only applies for specified asphalt thickness greater than or equal to 30 mm.

9.10.8 Ride Quality

Surface roughness testing is to be carried out as directed by the Relevant Authority. Where required, comply with the following.

Conform to *Table 9-7 - Surface Roughness Tolerances*.

Surface roughness tolerances represent an absolute upper limit and all field values must be less than the values specified. Test Lotting and averaging out of field values is not permitted.

As a minimum, data must be collected before application and after completion of the final wearing surface.

Ensure that the Pavement and/or wearing surface is free of loose material, debris and standing water when testing is undertaken.

Rectify all areas where Surface Roughness exceeds specified level.

The following areas are excluded from the requirement to achieve specified IRI limits:

- Roundabouts;
- Railway lines (35 m after the event);
- Bridge joints (35 m after the event);
- Intersections (stop bar to stop bar);
- Inspection pit covers and related surface Defects within the wheel paths (15 m including the event);

- Surface Defects related to existing Culverts which are not part of the works (width of Culvert plus 30 m after the event); and
- Cattle grids.

9.11 TABLES

Table 9-1 - Mix Type Designation						
Mix Type	1	2	3	4	5	6
Traffic Category	Light	Light to Medium	Medium	All	Heavy	Medium (Car Park)
Binder Type	A20E	A20E	A20E	A15E	A15E	A20E
Aggregate size (mm)	7	10	14	20	14	10

Table 9-2 - Properties - Coarse Aggregates		
Item	Acceptance Criteria	Test Method
Proportion of misshapen particles	15% max. at 2:1 calliper ratio	AS 1141.14
Los Angeles Abrasion	35% maximum loss	AS 1141.23
PAFV	45 minimum	AS 1141.41 & AS 1141.42
Wet Strength	150 kN minimum	AS 1141.22
Wet/Dry Strength Variation	35% maximum	AS 1141.22
Dry Density	Report	AS 1141.6.1
SSD Density	Report	AS 1141.6.1
Water Absorption	Maximum 2.5%	AS 1141.6.1

Table 9-3 - Properties - Fine Aggregates		
Item	Acceptance Criteria	Test Method
Soundness	≤12% weighted loss	AS 1141.24
Dry Density	Report	AS 1141.5
SSD Density	Report	AS 1141.5
Water Absorption (crushed materials)	3.0% maximum	AS 1141.5
Water Absorption (Quartz Sands)	1.5% maximum	AS 1141.5

Table 9-4 – Polymer Modified Binders For Asphalt Applications			
Test Method	**Binder Property**	**Class**	
		A20E	**A15E**
AGPT/T111	Viscosity at 165°C (Pa.s) max.	0.60	0.9
AGPT/T122	Torsional recovery at 25°C, 30 s (%) min.	38	58
AGPT/T131	Softening point (°C) min.	65	82
AGPT/T121	Consistency at 60°C (Pa.s) min.	2200	8000
AGPT/T121	Stiffness at 25°C (kPa) max.	35	30
AGPT/T112	Flash point (°C) min.	250	250
AGPT/T103	Loss on heating (% mass) max.	0.6	0.6
AGPT/T108	Segregation value (%) max.	8	8

Table 9-5 – Acceptable Temperature Ranges by Materials		
Material	**Minimum Manufacturing Temperature (°C)**	**Maximum Manufacturing Temperature (°C)**
Class 320 Bitumen	150	170
A20E PMB	160	175
A15E PMB	160	175
Asphalt at discharge from asphalt mixing plant	135 *	170
* Minimum of 130 °C when produced as Warm Mix Asphalt. The Developer must retain records of temperatures with Test Lot Testing records.		

Table 9-6 – Finished Pavement Properties	
Finish Pavement surfaces smooth, dense, true to shape and to the following tolerances;	
Thickness:	Not less than specified.
Surface levels:	Maximum deviation from design level 0 to +10 mm under a 3m straight edge
Surface roughness:	Comply with ***Table 9-7 - Surface Roughness Tolerances***.
Contamination from chemicals, petroleums (including oils, petrol and diesel) or solvents	Non-conformance – Remove and replace affected areas.
The Developer must retain records of Straight Edge Testing with Test Lot Testing records.	

Table 9-7 - Surface Roughness Tolerances	
Surface Roughness (IRI) to be less than the following limits when surveyed at 50km/hr.	
Street Classification	**Max. Surface Roughness IRI (m/km)**
Minor Street / Access Street	4.2
Secondary Collector / Primary Collector	3.4

Table 9-8 – Surface Shape Requirements						
Layer	Deviation Below 3m Straight Edge (mm)					
	Freeways and Highways with High Speed Traffic		Heavy and Very Heavy Traffic Streets		Medium and Light Traffic Streets	
	Parallel to Centreline	Transverse to Centreline	Parallel to Centreline	Transverse to Centreline	Parallel to Centreline	Transverse to Centreline
Wearing Course	3	5	5	7	7	10
Intermediate and Base	6	10	8	12	12	16

Table 9-9 - Variation Limits To The Registered Mix Design	
Grading:	
AS SIEVE (mm)	% PASSING (by mass)
4.75 or larger	+ or - 7
2.36	+ or - 5
1.18 to 0.30	+ or - 4
0.15	+ or - 3
0.075	+ or - 2
Bitumen Content:	Maximum variation 0.3% by mass to the Registered Mix Design.
Maximum Density:	Maximum variation 5% by mass to the Registered Mix Design

Table 9-10 - Characteristic Value of Air Voids			
Traffic Category:	Light	Medium	Heavy
Conformance:	3.0 – 8.0	3.0 – 8.0	3.0 – 7.0

10. NON-STRUCTURAL CONCRETE WORKS

10.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1012:	Methods of testing concrete
AS 1141:	Methods for sampling and testing aggregates
AS 1289:	Methods of testing soils for engineering purposes
AS 1379:	Specification and supply of concrete
AS 1478.1:	Chemical admixtures for concrete, mortar and grout – Admixtures for concrete
AS 2350.0:	Method of sampling portland and blended cements – General introduction and list of methods
AS 2350.1:	Method of sampling portland, blendedand masonary cements - Sampling
AS 2785.1:	Aggregates for rock for engineering purposes – concrete aggregates
AS 2876:	Concrete kerbs and channels (gutters) – Manually or machine placed
AS 3600:	Concrete structures
AS 3610:	Formwork for concrete
AS 3610.1:	Documentation and surface finish.
AS 3799:	Liquid membrane-forming curing compounds for concrete
AS 3972:	Portland and Blended Cements
AS/NZS 4200:	Pliable building membranes and underlays
AS 4654:	Waterproofing membrane systems for exterior use – Above ground level
AS 4654.2:	Design and installation
AS/NZS 4671:	Steel reinforcing materials
AS/NZS 4680:	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
NTMTM	NT Material Testing Manual
NTTM	NT Test Methods

10.2 GENERAL

This section specifies requirements for minor concrete works including kerbs, drainage inverts, footpaths, and vehicle crossovers. This section does not apply to rigid Pavements, buildings, bridges or other structural works.

Refer to *Clause 5.7 – Conformance Testing* for sampling frequencies for fresh concrete.

Refer to *Section 11 - Structural Concrete Works* for specifications on structural concrete.

10.3 CONCRETE SUPPLY AND PLACEMENT

Generally, conform to AS1379 and AS3600.

Conform to *Section 11 – Structural Concrete Works*.

10.3.1 Recycled Crushed Glass

Recycled Crushed Glass (RCG) may be used as a replacement of fine aggregate in concrete, where approved by the Relevant Authority.

Where approved, use RCG conforming to *Specifications for Recycled Crushed Glass as an Engineering Material - Section 9*.

10.4 FOUNDATION PREPARATION

Rip and compact Subgrade to a depth of 150mm to achieve min 95% Relative Compaction.

Provide min 50mm thick sand for all concrete Pavements. Sand bedding must be either:

- clean washed compacted river sand, free from debris and organic materials; or
- manufactured sands from fine crushed rock ('cracker dust') conforming to the material properties specified in *Table 6-4 – Fine Crushed Rock Properties* and the grading in *Table 10-1 – Manufactured Sand Grading*:

Table 10-1 – Manufactured Sand Grading

AS Sieve (mm)	Percentage Passing
6.7	100
4.75	90 - 100
2.36	70 - 100
1.18	40 - 90
0.600	15 - 80
0.300	5 - 40
0.150	0 - 25
0.075	0 - 15

Where damp proof membranes are not specified, moisten the sand bedding sufficiently in advance of placing to ensure a firm, uniform moist surface at the time of placing.

Remove loose material and debris from the surface. Do not operate construction equipment on the prepared surface.

10.5 DAMP PROOF MEMBRANES

10.5.1 Schedule

Location:	As shown on Construction Drawings
Membrane type:	Polythene Builders Film
Proprietary item:	Fortecon (or similar)
Total thickness:	200µm

10.5.2 Placement

The laying of damp proof membranes must be strictly in accordance with the manufacturer's requirements.

All joints must be lapped for a minimum 300mm and securely sealed with pressure tape. Care must be taken in placing the membrane to avoid creases and wrinkles.

Prior to the concrete pour, the membrane must be inspected, and any punctures or tears repaired.

10.6 REINFORCEMENT AND FORMWORK

Conform to *Section 11 – Structural Concrete Works* generally.

Construct kerbs and inverts as integral units by extrusion using a kerb machine. Comply with *AS 2876: Concrete kerbs and channels (gutters) – Manually or machine placed*.

10.7 JOINTS

10.7.1 Expansion joints

Locations

Provide expansion joints as follows:

- Footpaths/Shared Paths: 6 m max spacing
- Kerbs / Inverts: 15 m max spacing
- At all junctions with other concrete structures or services
- As shown on the Construction Drawings

Details

Conform to Standard Drawings for footpaths and shared paths.

Conform to the following for kerbs / inverts:

- Joint Filler: use 20mm thick Bitumen Impregnated Ableflex closed cell compressible filler strip (or similar approved).

Form the edge of the concrete placed first to provide a smooth vertical face. Fix the joint filler with waterproof adhesive.

- Once concrete has been poured and hardened, detach the removable top strip of the Joint Filler and fill with Fosroc Thioflex 600 (or similar approved) joint sealant.

Conform to Construction Drawings otherwise.

10.7.2 Contraction joints

Locations

Provide contraction joints as follows:

- Footpaths: 2m spacing maximum
- Kerbs / Inverts: 3m spacing maximum
- As shown on the Construction Drawings

Details

Conform to Standard Drawings for footpaths and shared paths.

Conform to the following for kerbs / inverts:

- Form weakened plane joints to a width of 3 mm and a depth at least one quarter of the depth of concrete.

Withdraw the former during finishing and tool the joint to a 6mm radius.

Conform to Construction Drawings otherwise.

Where approved, contraction joints may be constructed by sawing the hardened concrete.

Documentation Point 37 – Obtain approval for use of saw cut joints, prior to use in the Development Works.

10.7.3 Construction joints

Terminate each day's placing with a construction joint coinciding with a contraction joint or expansion joint.

Where fresh concrete is to be placed against hardened concrete, scabble and clean the existing concrete surface prior to casting. Ensure that the joints are saturated and the joint surface is dry ('Saturated Surface Dry') prior to casting the second pour.

10.8 FINISHES

Immediately after compaction of the concrete, carry out transverse finishing using a vibrating screed followed by hand finishing and broom finishing. Produce surfaces to tolerance Class U3, as defined in *Clause 11.11.2 – Unformed Surfaces*.

Hand finish: Eliminate minor irregularities and score marks with hand operated long handled floats.

Broom finish: When most of the water glaze or sheen has disappeared and before the concrete becomes non-plastic, texture the whole surface of the Pavement at right angles to the direction of the placing of the concrete using coarse brooms at least 500 mm wide with bristles made of nylon or flexible wire. Wash brooms regularly to remove slurry.

Joints and edges: Finish with a jointing tool.

Finished Pavement surface: Provide a surface uniform in appearance and free from

depressions in which water can pond, with an average texture depth of 2 mm to 2.5 mm.

Remove and replace rain damaged concrete.

10.9 CURING

Concrete works to be moist cured for at least 72 hours immediately after the concrete has taken its initial set.

Do not use curing compounds in lieu of moist curing unless approved by the Relevant Authority.

10.10 CONFORMANCE

Refer to *Clause 11.13 – Conformance*.

11. STRUCTURAL CONCRETE WORKS

11.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1012:	Methods of testing concrete
AS 1141:	Methods for sampling and testing aggregates
AS 1289:	Methods of testing soils for engineering purposes
AS 1379:	Specification and supply of concrete
AS 1478.1:	Chemical admixtures for concrete, mortar and grout – Admixtures for concrete
AS 2349:	Method of sampling Portland and blended cements
AS 2350.0:	Method of sampling portland and blended cements – General introduction and list of methods
AS 2350.1:	Method of sampling portland, blendedand masonary cements - Sampling
AS 2785.1:	Aggregates for rock for engineering purposes – concrete aggregates
AS 2876:	Concrete kerbs and channels (gutters) – Manually or machine placed
AS 3600:	Concrete structures
AS 3610:	Formwork for concrete
AS 3610.1:	Documentation and surface finish.
AS 3799:	Liquid membrane-forming curing compounds for concrete
AS 3972:	Portland and Blended Cements
AS/NZS 4200:	Pliable building membranes and underlays
AS 4654:	Waterproofing membrane systems for exterior use – Above ground level
AS 4654.2:	Design and installation
AS/NZS 4671:	Steel reinforcing materials
AS/NZS 4680:	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
NTMTM	NT Material Testing Manual
NTTM	NT Test Methods

11.2 GENERAL

This section specifies requirements for typical structural concrete works associated with Subdivisions. It does not apply to buildings or bridges.

11.3 CONCRETE QUALITY CONTROL

11.3.1 Responsibility

The Developer is wholly responsible for the supply of concrete and construction of concrete works in accordance with This Specification and the Construction Drawings.

11.3.2 Concrete Quality Plans

The Developer must submit a Concrete Quality Plan to the Relevant Authority and Certifying Engineer including, but not limited to the following:

- Concrete Placing Method Statement; and
- Pre-pour Check List.

Documentation Point 38 – Submit a Concrete Quality Plan for approval prior to commencing any concreting operations.

Acceptance of these plans does not relieve the Developer of responsibility to ensure the concrete works comply with the requirements of this Specification.

11.3.3 Certifications

All concrete supplied must, at arrival on site, be supplied with batch plant certificates for the respective batches. Batch certificates must contain all information about the concrete supplied as required by AS1379 and This Specification.

The plant from which the concrete is supplied must be certified to ISO 9001.

11.3.4 Sampling and Testing

Compressive strength

Sample, test, and assess: To AS 3600 and

AS 1379.

Project assessment: Required.

Documentation Point 39 – Obtain approval for the method of concrete strength assessment, prior to ordering concrete.

Production assessment may be used if applicable and if the project is registered with the concrete producer for dissemination of production assessment statistics to the Relevant Authority and Certifying Engineer.

Other Quality Parameters

Sample, test and assess: To: AS 1379.

Slump: Test not less than one sample from each batch before placing concrete from that batch in the Development Works. Take the samples at the point of discharge on the Development Site.

Additional tests: None

Rejection

Remove rejected concrete from the Development Site.

Testing Authority

NATA registered.

11.3.5 Inspection and Test Plans

Refer to *Clause 11.13 – Conformance*.

The Developer must prepare Inspection and Test Plans (ITP) for the concrete supply and placement works. No concreting operation must commence before the Concrete Quality Plans have been reviewed and approved by the Relevant Authority and Certifying Engineer.

Inspections must be undertaken at the following stages:

- Completed formwork, and reinforcement, cores and embedments fixed in place.
- Commencement of concrete placing.

11.3.6 Records

The Developer must keep records of:

- Concrete delivery dockets related to pours and approximate locations in pours;
- Supplier quality statements and records;
- Reinforcement inspections;
- Formwork inspections; and
- Concrete placements.

The Developer must retain on-site records of slump tests, concrete test results, weather conditions under which concrete is placed, and the location of the concrete poured.

11.3.7 Rejection of Concrete

Refer to *Clause 11.13 – Conformance*.

11.4 FOUNDATION PREPARATION

Rip and compact Subgrade to a depth of 150mm to achieve min 95% MMDD compaction.

Provide min 50mm thick sand for all concrete Pavements. Sand bedding must be either:

- clean washed compacted river sand, free from debris and organic materials; or
- manufactured sands from fine crushed rock ('cracker dust') conforming to the material properties specified in *Table 6-4 – Fine Crushed Rock Properties* and the grading in *Table 11-1 – Manufactured Sand Grading*.

Where damp proof membranes are not specified, moisten the sand bedding sufficiently in advance of placing to ensure a firm, uniform moist surface at the time of placing.

Remove loose material and debris from the surface. Do not operate construction equipment on the prepared surface.

Table 11-1 – Manufactured Sand Grading

AS Sieve (mm)	Percentage Passing
6.7	100
4.75	90 - 100
2.36	70 - 100
1.18	40 - 90
0.600	15 - 80
0.300	5 - 40
0.150	0 - 25
0.075	0 - 15

11.5 DAMP PROOF MEMBRANES

11.5.1 Schedule

Location:	As shown on Drawings
Membrane type:	Polythene Builders Film
Proprietary item:	Fortecon (or similar)
Total thickness:	200µm

11.5.2 Placement

The laying of vapour barriers and waterproofing membranes must be strictly in accordance with the manufacturer's requirements.

All joints must be lapped for a minimum 300mm and securely sealed with pressure tape. Care must be taken in placing the membrane to avoid creases and wrinkles.

Prior to the concrete pour, the membrane must be inspected, and any punctures or tears repaired.

11.6 REINFORCEMENT

11.6.1 General

Supply and fix reinforcement, including tie wires, support chairs, spacers and accessories.

11.6.2 Storage

Reinforcement must, upon delivery to the Development Site, be stored on blocks or racks clear of the ground and must be protected to prevent accumulation of dust and other harmful substances.

Reinforcement must be readily identifiable as to grade and origin, with different types and sizes of reinforcement stored separately and clearly marked.

11.6.3 Cleaning

Reinforcement must be supplied and maintained free from loose mill scale, loose rust, mud, oil, grease and other coatings which would reduce the bond with the concrete.

11.6.4 Cutting and Bending

Unless shown otherwise, the reinforcement must be accurately cut, bent, and fabricated to the shapes and sizes shown on the Construction Drawings and to the dimensional tolerances allowed by AS 3600.

Documentation Point 40 - Reinforcing bars must be bent cold in a manner that will not damage them, unless a written Approval for hot bending is obtained.

Documentation Point 41 - Any reinforcing bar that has already been bent must not be re-bent at the site of the original bend without Approval.

Documentation Point 42 - Flame cutting of reinforcing steel is not allowed without prior Approval.

11.6.5 Cover Requirements

Minimum cover to reinforcement must be as specified on Construction Drawings, and taken to include negative tolerances as detailed in AS 3600.

Cover to reinforcement must be inspected as part of the pre-pour inspection. Any non-conformance must be fixed prior to concrete pour.

11.6.6 Supports

Any metal device used for connecting bars or for maintaining reinforcement in the correct position must not remain within the specified minimum concrete cover to reinforcement except where expressly instructed by the Certifying Engineer or provided for herein.

For concrete works cast on ground, bar chairs and other support legs must be placed on plastic discs to prevent damage to the membrane and/or sinking into the ground.

11.6.7 Splicing

Splicing of reinforcement must be by lapping and must be in accordance with Section 13 of AS3600, unless otherwise shown on the Construction Drawings or approved by the Relevant Authority.

Mechanical splices must be used only where shown on the Construction Drawings.

Welded steel wire fabric (or mesh) must be lapped as detailed on the Construction Drawings and where not detailed must overlap by at least one complete mesh on all sides such that the end cross wire of one sheet overlaps with the second end wire of the adjacent sheet.

11.6.8 Fixing

Reinforcement must be accurately placed as shown on the Construction Drawings or as directed by the Certifying Engineer, and must be securely tired and held in position so that it will not be displaced during construction and concrete placement.

Bar crossings must be secured with at least one turn of soft galvanised annealed tying wire of 16 s.w.g. (1.5mm diameter); the ends of the tie being twisted and turned down into the work. Patent ties may be used for securing bars, but the Developer must obtain Approval from the Certifying Engineer for the type and number to be used.

11.6.9 Welding

No welding of reinforcement is allowed, unless Approved by the Relevant Authority and Certifying Engineer in writing.

11.6.10 Tolerances

Unless shown otherwise, the reinforcement must be cut, bent, and fabricated to the dimensional tolerances allowed by AS 3600.

11.6.11 Galvanic Corrosion

Where metals of different types are used together for reinforcement, supports and/or fixings, the Developer must ensure there is no risk of Galvanic Corrosion.

11.6.12 Reinforcement Inspection

Inspection Point 15 - Do not place concrete until the reinforcement has been inspected and approved.

Reinforcement must be inspected in place and, depending on the type of concrete element, approved by the Relevant Authority and Certifying Engineer prior to completion of the formwork. The Developer must inspect the reinforcement and correct any Defects prior to requesting an inspection by the Relevant Authority.

11.7 FORMWORK

11.7.1 General

All concrete must be placed in formwork except on the underside of slabs, foundations and the like which are placed directly on the ground, and where suitable precautions have been taken to ensure no loss of moisture to the ground.

All forms and the use of formwork must conform to the current requirements of AS 3610.

All formwork must be designed and constructed to produce concrete members which will conform within the specified tolerances to the shapes, lines, levels, dimensions and surface finish required by the Construction Drawings and This Specification.

11.7.2 Design of Formwork

The Developer is responsible for the design and structural adequacy of all formwork.

11.7.3 Formwork Construction

General

Formwork must be rigidly constructed and ensure that the finished concrete is true to the required shape, position and level, and to the standard of finish specified.

All forms must have joints sufficiently tight to prevent the escape of any mortar, slurry or free water.

Construct forms so that they can be removed without damaging the concrete.

Chamfers

Except where specifically detailed on the Construction Drawings, or where further elements are to be placed against them, all exposed horizontal and vertical arises must have a symmetrical chamfer. This chamfer must be 25mm x 25mm unless detailed otherwise on the Construction Drawings.

Form Ties

Form bolts and ties must be designed and installed so that they may be extracted without damaging the surrounding concrete. All cavities caused by their removal must be degreased, cleaned, wetted and carefully packed with shrinkage compensated mortar that provides equivalent durability to the parent concrete.

Block-outs, Inserts and Embedded Items

Block-outs, inserts and embedded items must be firmly located in a manner such that construction tolerances are complied with.

Embedded metallic items must be isolated from the reinforcing steel and must not encroach on the designated cover unless suitable corrosion protection is applied.

Galvanize ferrous fixings (other than stainless steel) to AS/NZS 4680 or AS 1214. Passivate galvanized surfaces to be embedded in concrete by dipping in 0.2% sodium dichromate solution.

Treatment of Forms

The Developer must select the form lining or facing to produce the required finished concrete surface.

Form linings must be thoroughly cleaned and coated with a suitable release agent prior to placing concrete in compliance with AS 3610 and which will not affect the colour of the finished concrete. No part of the reinforcement or adjacent concrete faces must be coated with release agent. Mould oils must be selected to minimise the formation of bug-holes on the concrete surface.

Prior to concrete pour, forms must be blown out to remove dust, minor debris, and free water.

11.7.4 Formwork Inspection

Inspection Point 16 - Do not place concrete until the formwork has been inspected and approved.

Should any forms show signs of bulging or sagging after the concrete has been placed, the concrete must be removed as directed by the Relevant Authority and the forms reconstructed to the Relevant Authority's satisfaction.

11.7.5 Removal of Formworks

Stripping and removal of formwork, including timeframes for removal, must comply with AS 3610.

11.8 JOINTS

11.8.1 Joint Locations

Provide joints at locations as nominated on the Construction Drawings.

11.8.2 Joint Details

Refer to Construction Drawings for joint details.

Finish visible jointing material neatly flush with adjoining surfaces.

Before filling joints, dry and clean the joint surfaces, and prime to the manufacturer's recommendation.

11.8.3 Joint Materials

Documentation Point 43 - Submit copies of supplier/manufacturer product data sheets and specifications for all jointing materials.

Comply with those specifications.

Foamed materials: (in compressible fillers); Use closed-cell or impregnated types, which do not absorb water.

Bond breakers: Back-up materials for sealants, including backing rods and the like, must not adhere to the sealant, or be faced with a non-adhering material.

Sealants: Use low modulus self-priming sealant, unless otherwise nominated on Construction Drawings. Colour to match adjoining surface finish.

11.8.4 Construction Joints

Terminate each day's placing with a construction joint coinciding with a contraction joint or expansion joint.

Where fresh concrete is to be placed against hardened concrete, scabble and clean the existing concrete surface prior to casting. Ensure that the joints are saturated and the joint surface is dry ('Saturated Surface Dry') prior to casting the second pour.

11.9 CONCRETE SUPPLY AND PLACEMENT

11.9.1 Ready Mixed Supply

Refer to *Clause 11.3.4 - Sampling and Testing* and *Table 5-10 - Sampling Frequencies For Fresh Concrete* in the Conformance Testing section.

Supply concrete with the following properties unless specified otherwise:

Table 11-2 – Concrete Properties	
Property	**Required Measure**
Compressive Strength	N25
Aggregate Size – Generally – Machine Extruded Kerbs and Gutters	 20 mm 10 mm
Slump – Generally – Machine Extruded Kerbs and Gutters	 80 mm ± 15 mm 40 mm

Conduct slump testing on site for each and every truck.

To: AS 1379: Section 5. Nominate the slump and mix proportions prior to supplying any concrete. These values must be used for acceptance or rejection of concrete onsite.

11.9.2 Chemical admixtures

Documentation Point 44 – Obtain approval for the use of concrete admixtures, prior to incorporating them into a concrete mix.

Chemical admixtures for concrete and their use must conform to AS 1478.1.

Where two or more chemical admixtures are proposed for incorporation into a concrete mix, their compatibility must be certified by the manufacturers.

Storage: Store admixtures in accordance with the manufacturers recommendations.

11.9.3 Addition of Admixtures

Chemical admixtures must only be added after slump test compliance confirmation. A further slump test post admixtures addition may also be required.

Where the Certifying Engineer has approved the addition of superplasticisers at the plant prior to dispatch of any concrete, a slump test of each batch must be performed and recorded by a NATA accredited testing laboratory prior to the addition of the superplasticisers. The slump test report must record the time of the addition of the superplasticisers, amount of the superplasticiser added and product identification.

Chemical admixtures: Admixtures are to be added in accurate amounts. Amounts being added are to be exact and measured using accurate and regularly maintained and calibrated devices.

Delay the addition of superplasticisers as long as practicable before the concrete is discharged from the concrete mixer. Make allowance for the reversion time of superplasticisers.

Agitate concrete for at least 5 minutes following the addition of superplasticiser before dispensing.

11.9.4 Concrete Placing

Inspection Point 17 - Provide notice so that inspection may be made before and during pouring concrete.

Ensure all constituent materials, formwork, falsework, reinforcement, and environmental conditions comply with all requirements prior to casting concrete.

Place and compact concrete within the following time after the addition of the mixing water to the mix:

Table 11-3 – Maximum Time to Place Concrete after Mixing	
Concrete Temp at Time of Placing	**Maximum Time (minutes)**
25°C to 28°C	75
28°C to 32°C	60
32°C to 35°C	45

Fully compact the concrete to remove entrapped air. Avoid over-vibration that may cause segregation.

Place concrete in layers such that each succeeding layer is blended into the preceding one by the compaction process.

Placing slabs and Pavements: Place concrete uniformly over the width of the slab so that the face is generally vertical and normal to the direction of placing.

Place concrete in a continuous operation between construction joints so that the face of the concrete is in a plastic state when succeeding concrete is placed against it.

Do not allow concrete to free-fall from a height greater than 1.5 metres.

Place all concrete in dry weather unless otherwise approved by the Certifying Engineer.

For each truck of premixed concrete provide an identification certificate on delivery listing the information required by AS 1379.

11.9.5 Hot Weather Placing

The provisions of this clause apply to concreting when the surrounding shaded outdoor temperature is greater than 32°C.

Mixing: Do not mix concrete when the outdoor shaded temperature on the site exceeds 38oC, unless otherwise approved and then only subject to such conditions as may be imposed.

Handling: Take precautions to prevent premature stiffening of the fresh mix and to reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete as rapidly as possible.

Placing: Before and during concrete placing maintain the formwork and reinforcement at a temperature not greater than 32oC by protection, cold water spraying, or other effective means. When placed in the formwork, the temperature of the concrete must not exceed 35oC.

Temperature control methods:

Documentation Point 45 - Submit proposed method(s) of maintaining the specified temperatures of placed concrete.

Methods may include:

- using chilled mixing water; or
- spraying the coarse aggregate with cold water; or
- covering the container in which the concrete is transported to the forms; or
- a combination of these methods.

Evaporation Control: Erect barriers to protect freshly laid concrete from drying winds.

Immediately after placement, cover the concrete with an impervious membrane, or hessian kept wet, until curing begins.

As an alternative to immediate covering where temperature exceeds 25°C or where not protected against drying winds, protect the concrete with a fog spray application of aliphatic alcohol evaporation retardant.

11.9.6 Curing – General

The Developer is responsible for the provision of curing and protection of the concrete meeting the requirements of This Specification and, where more stringent, the requirements of AS 3600.

Curing of the concrete must comprise measures to:

- Prevent plastic cracking in plastic concrete; and
- Ensure specified hardened concrete properties are achieved.

All curing methods are subject to Approval of the Relevant Authority and Certifying Engineer.

11.9.7 Prevention of Moisture Loss from Plastic Concrete

Protection of unformed surfaces from premature drying due to exposure to sun and/or drying winds must be prevented with the use of shades, screens and/or by spraying the exposed surface with an approved evaporation retarder (e.g. Aliphatic Alcohol).

Any concrete which exhibits plastic drying shrinkage cracking is liable to rejection by the Relevant Authority.

11.9.8 Prevention of Moisture Loss from Hardened Concrete

Protect and cure all exposed surfaces immediately after the concrete has taken its initial set.

During the curing period continuously maintain the concrete, with minimum moisture loss, at a reasonably constant temperature, not excessively hot or cold, by a suitable method which may include the following:

- Ponding or continuous sprinkling with water (wet curing).
- An impermeable membrane.
- An absorptive cover kept continuously wet.
- An approved curing compound.

Documentation Point 46 – Obtain approval for the use of curing compounds on concrete, in lieu of moist curing, prior to placing the relevant concrete works.

Prevent staining during the curing process of all concrete surfaces that will be visible in the completed works.

Continuously maintain the protection and curing of each element for the minimum time specified by AS 3600 to provide the concrete with durability corresponding to the specified exposure classification, or minimum 3 Calendar Days (whichever is greater).

Curing compounds, where approved for use, must comply with AS 3799. Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to toppings such as concrete toppings and cement-based render. Apply as a continuous coating without visible breaks or pinholes, at the rate recommended by the manufacturer.

11.9.9 Protection of Concrete Surfaces

The Developer must protect all finished concrete surfaces from damage and staining from any source. Any damages or staining must be removed or made good to the satisfaction of the Relevant Authority.

11.10 PRECAST CONCRETE

Documentation Point 47 – Obtain approval for all precast concrete works prior to manufacturing.

Where approved, precast concrete must generally comply with all other requirements specified in this Section, AS 3850 and the following clauses.

11.10.1 Manufacture

Precast concrete units must be designed and fabricated by an experienced and acceptable precast concrete manufacturer.

Lifting devices must be designed in accordance with precast industry design standards. The precast manufacturer must supply structural engineering Certification confirming adequacy of proposed lifting devices.

Design must consider stresses induced during handling, shipping and installation to avoid product cracking or other handling damage.

Casting methods must be designed to ensure that no damage occurs to the units.

Documentation Point 48 - Submit the following items 5 Business Days prior to fabrication of the precast concrete item commencing:

- Shop drawings, including installation and construction requirements;
- Product data sheets and installation instructions for anchors, lifting inserts and other devices;
- Concrete production and placing method statements;
- Copies of material certifications and/or laboratory test reports for all materials used in construction, finishing and curing of the precast concrete; and
- Recent in-plant QA/QC inspection reports.

The units must be free from any grout loss, honeycombing, cracking or spalling. Units with Defects of this nature must be rejected.

All units must be marked such that it can be related to shop drawings and other quality control reports, including an identification mark and the production date.

Manufacture the units accurately. Fix the units securely and accurately in their final positions. Supply components and materials, including fasteners, braces, shims, jointing strips, sealant, flashings, grout and mortar.

Consider the strength of the units and all forces and loads that will possibly be imposed on the units prior to being finally fixed in final position, and make appropriate allowances when handling, transporting and placing.

11.10.2 Handling, Storage and Delivery

Precast concrete units must be handled, stored and transported in a manner to minimise damage.

Units must only be lifted from the specified lifting points.

Units must not be handled or transported until they have reached sufficient strength, as determined by the manufacturer, to ensure no damage to the units will occur.

Documentation Point 49 – Submit evidence that all precast concrete units have been inspected and signed-off by the manufacturer's inspector, in a format to be approved, prior to delivery of the unit to the Development Site.

Any units damaged during handling, storage or delivery must be replaced.

11.10.3 Installation

Precast concrete units must be installed to the lines and grades shown in the Construction Drawings.

Precast concrete units must be lifted by suitable lifting devices at Certified points provided by the precast concrete manufacturer.

The precast concrete manufacturer must provide installation instructions, in accordance with industry standards. The Developer must ensure all installation instructions are followed.

No precast concrete units are to be lifted until a structural engineering Certificate is provided by the manufacturer, confirming the lifting devices are adequate and the proposed method of erection will not cause damage or overstress of the units.

11.11 SURFACE FINISHES

11.11.1 Formed Surfaces

All formed concrete surfaces are to be Class 3 in accordance with AS3610, unless noted otherwise in the Construction Drawings.

Any remedial treatment to formed surfaces must be agreed with the Relevant Authority and Certifying Engineer following inspection immediately after removing the formwork and must be carried out without delay unless otherwise specified or directed.

Apart from the filling of minor surface blemishes, as provided for above, plastering of Defective concrete as a means of making good is not permitted.

11.11.2 Unformed Surfaces

Unformed surfaces are limited to the top faces of slabs and those permanently concealed surfaces which could be constructed to within the required tolerances without formwork but

subject to Approval by the Relevant Authority and Certifying Engineer to do so.

Refer to *Table 11-4 – Unformed Concrete Finishes Schedule* for description and tolerances.

All unformed surfaces which are permanently concealed must be of U1 finish. All unformed surfaces which are exposed or above ground must be of U2 (floated) finish, except concrete pavements which must be of U3 (broomed) or U4 (exposed aggregate) finish.

Note tolerances for project specific elements are specified in *Clause 11.12 – Dimensional Tolerances*.

11.11.3 Finishing methods

Finish surfaces to a smooth and even colour.

Remove free surface water during final screeding of unformed surfaces.

Round off exposed edges and corners.

Protect exposed surfaces from rain until final set has occurred.

Wood float finish: Produce the final finish with a wood float.

Steel trowelled finish: Use steel hand trowels to produce the final finish free of trowel marks and uniform in texture and appearance.

Broom finish: After wood floating, use a broom to produce an even textured slip-resistant surface.

Exposed aggregate finish: After wood floating, apply a uniform coat of surface retarder onto the surface as soon as the initial bleeding of the concrete has finished but before initial set. Protect the sprayed surface from direct sunlight, wind, rain, and dirt by covering with damp proof membranes (or similar). Once adequate time has elapsed, typically 2 to 12 hours depending on concrete type and ambient conditions, remove the soft paste which has formed on the concrete surface using a broom and wash down with clean water to produce an even textured slip-resistant surface. Comply with supplier/manufacturer specifications for use of surface retarders. Ensure that concrete mix supply and placement methods are consistent to produce an exposed aggregate finish with uniform appearance.

Documentation Point 50 – Prior to undertaking concreting works involving exposed aggregate finish, conduct a trial and obtain approval for product selection, application rates, construction methodologies, timeframes for removal of paste, and agreed surface finish quality.

11.12 DIMENSIONAL TOLERANCES

11.12.1 Standard

To: AS 3600 - Tolerances for Structures and Members sub-clause, except where the requirements of this clause or AS 3610.1 - Physical Quality sub-clause are more stringent.

11.12.2 Project Specific Tolerances

Tolerances must be as nominated in *Table 11-5 – Tolerances for Concrete Surfaces, Inserts and Reinforcement***.**

Refer to *Section 13 – Drainage Works* for additional tolerances on kerbs, inverts, Culverts, pipes and drainage structures.

11.13 CONFORMANCE

Concrete which is not placed, cured or finished as specified, does not have the specified strength or other specified properties, is not sound, dense, durable or crack-free will be considered Defective. Defective concrete must be addressed as outlined below.

The Developer must bear all cost and delays resulting from the rejection of concrete and subsequent rectification.

11.13.1 Minor Defects

Where approved by the Relevant Authority, Minor Defects can be repaired.

The Developer must submit details of all proposed repair procedures for all repair types to the Relevant Authority and Certifying Engineer for Approval. Repaired concrete will be rejected unless the repair method has been Approved.

Approval for repairs will not be given if the Defective area is too extensive or the techniques proposed are not adequate to ensure a visually acceptable and durable repair.

11.13.2 Major Defects

Concrete with Major Defects, where approval for repairs is not granted, must be removed to a point agreed with the Relevant Authority and Certifying Engineer at which a visually and structurally acceptable construction joint can be made, and the Defective element rebuilt.

Table 11-4 – Unformed Concrete Finishes Schedule		
Type	Description	Surface Tolerance
U1	A wood floated finish to produce a uniform surface without surface pitting or cavities.	Max 5mm abrupt; and Max 15mm over a 3m Straight Edge
U2	A high-quality steel floated finish having a dense smooth impervious finish without surface pitting or cavities.	Nil abrupt; and Max 5mm over a 3m Straight Edge
U3	A wood floated surface with a broomed finish.	Max 3mm abrupt; and Max 5mm over a 3m Straight Edge
U4	A wood floated surface with an exposed aggregate finish.	Max 3mm abrupt; and Max 5mm over a 3m Straight Edge

Table 11-5 – Tolerances for Concrete Surfaces, Inserts and Reinforcement			
Type	Irregularity	Formed Finish	Unformed Finish
General Exposed Concrete	Departure from alignment ad grade	+10mm -10mm	Refer Table – Unformed Concrete Finishes Schedule
	Variations in cross-sectional dimensions	+10 -5mm	
	Straight Edge Deviation	3mm max in 3m 6mm max in 15m	
Inserts	Variations in locations of inserts, block-outs and openings	5mm	
	Variations in sizes of inserts, block-outs and openings	+5mm -0mm	
Reinforcement	Variation in reinforcement cover from that designated	As per AS3600. Note minimum cover nominated is absolute minimum, including negative tolerance.	
	Variation in reinforcement spacing from that designated	20mm	
	Variation in number of bars based on specified spacing	None	

12. MINOR STEEL WORKS

12.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS/NZS 1111:	ISO metric hexagon bolts and screws
AS/NZS 1163:	Cold formed structural steel hollow sections
AS 1214:	Hot-dipped galvanized coatings on threaded fasteners (ISO metric course thread series)
AS 1252:	High strength steel bolts with associated nuts and washers for structural engineering
AS 1397:	Continuous hot-dipped metallic coated steel sheet and strip – Coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS 1554:	Structural steel welding
AS/NZS 1554.1:	Welding of steel structures
AS 1627:	Metal finishing – Preparation and pre-treatment of surfaces
AS/NZS 3678:	Structural steel – Hot-rolled plates, floorplates and slabs
AS/NZS 3679.1:	Structural steel – Hot-rolled bars and sections
AS 4100:	Steel structures
AS/NZS 4600:	Cold-formed steel structures
AS/NZS 4680:	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

12.2 GENERAL

This section details requirements for minor steel works, including but not limited to handrails, guard rails, fencing and ancillaries to civil infrastructure.

This section does not apply to concrete reinforcement or structural steel works.

Inspection Point 18 – Provide notice for commencement of shop fabrication.

12.2.1 Cross References

For reinforcement steel generally, refer to *Section 11 - Structural Concrete Works*.

9.4

12.3 DEVELOPER'S SUBMISSIONS

12.3.1 Shop drawings

Shop drawings must contain the following information:

- Relevant details of each assembly, component and connection.
- Amended specification for the fabrication, surface treatment, transport and erection.

Documentation Point 51 - Submit shop drawings for minor streel works prior to fabrication.

12.3.2 Compliance

Documentation Point 52 – Submit evidence that steel used complies with the required material standards, prior to use in the Development Works.

12.4 MATERIALS AND COMPONENTS

12.4.1 Standards

Materials generally: To: AS 4100 - Section 2.

Cold-formed sections: To: AS/NZS 4600.

12.4.2 Steel Grades

Refer ***Table 12-1 - Steel Grades*** for details.

Table 12-1 - Steel Grades

Type of steel	Standard	Grade
Hot rolled structural bars and sections To: AS/NZS 3679.1 Table 1 – Chemical composition of bars and sections	AS/NZS 3679.1	250
Hot rolled plates, floor plates and slabs To: AZ/NZS 3678 Table 2 – Chemical composition – Mechanical property grades	AS/NZS 3678	250
Cold-formed structural Hollow sections To: AS/NZS 1163	AS/NZS 1163	250 or 350 as available.
Cold formed purlins and girts To: AS 1397	AS 1397	G450 or Z350

12.5 CONSTRUCTION GENERALLY

12.5.1 Availability

If steel members are not available in the required section, grade or length, submit full details of proposal including location of proposed splices or joints and their fabrication details. Approval must be obtained, before substituting other sections or grades or splicing shorter lengths.

12.5.2 Site work

Do not fabricate or weld steel onsite without the approvals of the Relevant Authority.

12.5.3 Identification marks

Provide marks or other means for identifying each member, and for the setting out, location, erection and connection of the steelwork. If the work includes more than one bolting category, mark bolted connections to show the bolting category.

12.6 BOLTED CONNECTIONS

12.6.1 Bolting Category

Refer Construction Drawings for bolting category.

12.6.2 Enlargement of Bolt Holes

Documentation Point 53 – Obtain approval for enlargement of bolt holes, via flame cutting or otherwise, prior to undertaking.

12.7 WELDING

12.7.1 General

All welds must be in accordance with AS/NZS 1554.1.

Documentation Point 54 - Submit a Weld Procedure Specification, prior to commencement of any welding.

12.7.2 Weld category

Refer Construction Drawings for weld categories.

12.7.3 Weld type

Weld type not shown on the drawings: 6 mm continuous fillet weld made using E48XX electrodes or equivalent.

12.7.4 Welding of Reinforcement

No welding of reinforcement is allowed, unless Approved by the Relevant Authority and Certifying Engineer in writing.

12.7.5 Certification of Welders and Welding Supervisors

Welders and welding supervisors must be certified to AS 1554.1.

The Relevant Authority may at any time request to see the "Welder Qualification Records (WQR)" of any welder involved in the steelwork fabrication and/or hold the welding of a test piece.

Do not use welders that are not prequalified for the welding operation they are to perform.

All welding must be carried out under supervision of personnel who have had suitable training and experience in the fabrication of welded structures and who are certified in accordance with AS/NZS 1554.1.

12.7.6 Preparation

Inspect all SP weld preparations to ensure correct setup of root gap and weld preparation size.

A suitably qualified Certifying Engineer must be engaged in accordance with AS/NZS 1554.1 to inspect all weld preparations and Certify their compliance.

Documentation Point 55 – Submit Certification of all weld preparation.

12.7.7 Non-destructive Weld Examination

Standard: To AS/NZS 1554.1, Section 7.

Conform to *Table 12-2 - Non-destructive Weld Examination (NDE)*.

Where possible, place steelwork in a suitable position and orientation to enable testing to be carried out safely.

Methods: Inspect welds in conformance with the Non-destructive weld examination (NDE) table.

Table 12-2 - Non-destructive Weld Examination (NDE)

Type of Weld and Category	Examination Method	Extent of Total Weld Length (%)
GP Shop Fillet Welds	Visual means	100%
SP Welds	Visual; and MPI or Ultrasonic Inspection	Visual – 100% MPI or UI – 10%
SP Welds on Splicing	MPI or Ultrasonic Inspection	100%

Radiographic and ultrasonic inspection: Have the examination performed by an independent NATA registered testing authority.

Documentation Point 56 – Submit Certification of all radiographic and ultrasonic weld inspections, where required.

Repairs: Repair welds revealed as faulty by non-destructive examination and repeat the examination.

12.7.8 Cleaning Welds

Degrease and clean all welds and black metal surfaces. Coat welds done after galvanising with two-pack organic zinc rich primer to APAS Specification 2916, DFT greater or equal to 70µm.

12.8 PROTECTIVE COATINGS

12.8.1 Surface preparation

All steel surfaces must be prepared for protective coatings in accordance with AS 1627. Remove loose millscale, loose rust, oil, grease, dirt, globules of weld metal, weld slag and other foreign matter.

Time Delay: Apply protective coatings as soon as possible after surface preparation and prior to any deterioration of the surface. If the surface is contaminated or rust bloomed, repeat the surface preparation.

Inspection Point 19 – Do not apply protective coatings to steel works until the surface preparation has been inspected and approved.

12.8.2 Galvanising

Generally: All exposed steel must be heavy duty hot dip galvanised in accordance with AS/NZS 4680.

Passivation: Galvanised steel to be in contact with concrete to be passivated by dipping in 0.2% sodium dichromate solution.

Shop work: Steel work fabricated offsite must be galvanised and passivated prior to delivery to the Development Site.

12.8.3 Protection and Repairs

Protect the coatings from damage during transport and handling.

After erection/installation, repair any damage to the coatings.

All damaged coatings to be thoroughly wire brushed and treated with two coats (each min 50µm DFT) of two-pack organic zinc rich primer overlapping original coating.

13. DRAINAGE WORKS

13.1 STANDARDS

Conform to the following Standards and Publications unless specified otherwise:

AS 1012(set)	Methods of testing concrete.
AS 1141(set)	Methods for sampling and testing aggregates.
AS 1289(set)	Methods of testing soil for engineering purposes.
AS 1379	Specification and supply of concrete.
AS 1478.1	Chemical admixtures for concrete.
AS 1597(set)	Precast reinforced concrete box culverts.
AS/NZS 2041 (set)	Buried corrugated metal structures.
AS 2349	Method of sampling portland and blended cements.
AS 2350	Methods of testing portland and blended cements.
AS 2439	Perforated plastics drainage and effluent pipe and fittings.
AS 2758.1	Aggregates and rock for engineering purposes - Concrete aggregates.
AS 3600	Concrete structures.
AS 3610	Formwork for concrete.
AS 3706(set)	Geotextiles - Methods of test.
AS/NZS 3725	Design for installation of buried concrete pipes.
AS 3972	Portland and blended cements.
AS/NZS 4058	Precast concrete pipes (pressure and non-pressure).
AS/NZS 4671	Steel reinforcing materials
AS 5100.5	Bridge Design - Concrete
NTMTM	NT Materials Testing Manual.
NTTM	NT Test Methods
AUSTROADS	
AGBT Set	Guide to Bridge Technology.
ARRB	

Specifications for Recycled Crushed Glass as an Engineering Material

WorkSafe Australia Excavation Work Code of Practice

13.2 GENERAL

This section applies to the construction of various drainage works, including the following items:

- Pipes and box Culverts;
- Drainage structures;
- Kerbing / concrete inverts, catch drains, table drains and open drains;
- Inlet/outlet channels;
- Subsoil drains;
- Removal of existing drainage structures; and
- Cleanout and CCTV Inspections.

This section does not cover construction specifications for the following items. Refer to Construction Drawings and Project Specific Requirements for details:

- Floodways;
- Detention basins; and
- Stormwater quality treatment devices.

13.3 CLEARING

Clear the Development Site as specified in *Section 3 – Clearing, Grubbing and Rehabilitation*.

Interfering with a waterway without authorisation is an offence under the Water Act 1992 (NT). All Subdivision works interfering with waterways require a 'Permit to Interfere with a Waterway' pursuant to Section 41(1) of the *Water Act 1992 (NT)*.

13.4 MATERIALS

Undertake all necessary Conformance Testing.

Ensure that all precast items, including pipes and box Culverts, are indelibly marked with a Standards Australia conformance stamp. Precast items not stamped must be removed from the Development Site.

13.4.1 Precast Reinforced Concrete Pipes (RCP or RC Pipe)

Reinforced concrete, including fibre reinforced concrete, manufactured and tested to Australian Standards.

Pipes must be minimum Class 2, unless noted otherwise on Construction Drawings. Pipes to be clearly marked as to their class.

Provide sealed joints, such as Rubber Ring Joints (RRJ) or Flush Joint (FJ) with External Bands (EB).

13.4.2 Precast Reinforced Concrete Box Culverts (RCBC)

Use box Culverts of the inverted U-type suitable for installation on a cast-in-situ concrete slab.

Design and supply box Culverts which have a span not greater than 1200 mm, height not more than 1200 mm and a fill height not more than 1600 mm in accordance with AS 1597.1.

Design all other box Culverts in accordance with AS 1597.2.

Use Standard Vehicle Loadings including NT Standard Road Train, with addition of the HLP 400 Abnormal Vehicle Loading on all National Highways, and HLP 320 on all other routes.

Provide Culverts designed for the exposure classification of the site of the works, determined from AS 5100.5 Exposure Classifications Table. Refer to *Section 21 - NT Climate Zones Table*.

Documentation Point 57 - Submit shop drawings for precast reinforced box culverts, prior to fabricating any units.

Shop drawings must:

- show complete reinforcement and dimensions with tolerances;
- Certify that the culverts comply with the applicable sections of AS 5100.5 and with AS 1597; and
- Certify that the culverts are adequate to resist all specified loads and the soil loads pertaining to the Development Site.

Provide a table of construction axle loads versus minimum required cover for each box Culvert size.

Inspection Point 20 - Provide notice prior to casting precast reinforced concrete box culverts.

13.4.3 Subsoil Drain Pipe

Use 100 mm diameter (DN100) Class 400 (SN8) corrugated poly subsoil pipe. Include filter sock where subsoils are installed in rock and geotextile fabric is omitted.

Use compatible couplings and fittings.

13.4.4 Filter Material

Must be a hard, durable stone having a Los Angeles Abrasion Loss not greater than 35%.

Conform to the grading specified by the manufacturer of the subsoil pipe.

If manufacturer's grading not supplied, filter material is to consist of a single sized aggregate of 14mm particle size, with a maximum of 5% passing the AS 0.15mm sieve.

13.4.5 Bedding Material

Bedding material to be clean granular screened aggregate free from sticks, stones and other deleterious material.

Must be a hard, durable stone having a Los Angeles Abrasion Loss not greater than 35%.

For Reinforced Concrete Pipe (RCP) culverts; use single sized aggregate of 14mm particle size, with a maximum of 5% passing the AS 0.15mm sieve.

For Reinforced Concrete Box Culverts (RCBC); use material with a Plasticity Index less than 6, conforming to *Table 13-1 – RCBC Bedding Material Size***.**

Recycled Crushed Glass, conforming to the Specifications for Recycled Crushed Glass as an Engineering Material Section 9, may be used where approved by the Relevant Authority.

Table 13-1 – RCBC Bedding Material Size

AS Sieve (mm)	Percentage Passing
19.0	100
2.36	50 - 100
0.600	20 - 90
0.300	10 - 60
0.150	0 - 25
0.075	0 - 10

13.4.6 Geotextile Fabric

Conform to the requirements of the Protection Works Section.

13.4.7 General Fill

Conform to the requirements of the Earthworks Section.

13.4.8 Standard Fill

Conform to the requirements of the Earthworks Section.

13.4.9 Type 3 Gravel Backfill

Conform to the requirements of the Pavements and Shoulders Section.

13.4.10 Flowable Fill (Cement Stabilised)

Conform to Appendix A of AS/NZS 3725 for 'Controlled Low Strength Materials'.

28day characteristic compressive strength to be max 7 MPa.

13.4.11 Concrete

Conform to the requirements of *Section 11 – Structural Concrete Works*.

13.4.12 Sand Bedding

Conform to the requirements of *Section 11 – Structural Concrete Works*.

13.4.13 Damp Proof Membrane

Conform to the requirements of *Section 11 – Structural Concrete Works*.

13.4.14 Mortar

Use one-part fresh cement and three parts clean sharp sand mixed with potable water to yield a stiff but workable mixture.

13.4.15 Grouted Stone Pitching

Conform to the requirements of *Section 14 – Protection Works*.

13.5 CONSTRUCTION OF PIPES AND BOX CULVERTS

13.5.1 Standard Drawings

Refer to Standard Drawings.

13.5.2 Setting Out

Measure Culvert length along the invert to the outside face of headwalls or inside face of pit walls.

Set out the Culverts with pegs before construction.

13.5.3 Excavation

Excavate in whatever material is encountered.

Pump, bail, sheet, shore and brace as necessary.

Divert water when necessary.

Rectify foundations which are affected by rain or surface water entering the excavation.

Construct trench to dimensions shown on Standard Drawings.

Backfill with Type 3 Gravel Backfill up to the specified level if the trench is excavated too deep.

Inspection Point 21 - If Unsuitable Materials or Dissolution Cavities are encountered in the foundations or trench walls for pipe and box culverts, obtain direction before remedial works commence.

Replace Unsuitable Material with Standard Fill, unless otherwise directed by the Certifying Engineer, compacted to 95% Relative Compaction.

13.5.4 Culverts in Fill under Construction

Place and compact fill, type as specified, to 300mm above the design level of the top of Culvert, or to Subgrade Surface if less, prior to construction of the Culvert.

Excavate the fill in accordance with *Clause 13.5.3 – Excavation* to permit the construction of the Culvert.

13.5.5 Foundation Preparation

Compact the trench foundation, with a vibrating plate or similar, and undertake treatment of Unsuitable Materials and Dissolution Cavities in rock in accordance with the *Section 4 – Earthworks*.

13.5.6 Bedding

Place a layer of Bedding Material in the trench, thickness as specified on Standard Drawings, and compact with a vibrating plate or similar.

Pipe Culverts; shape the Bedding material to hold the pipe Culverts in position during placement and compaction of additional backfill materials. Place and compact a further (haunching) layer of bedding in accordance with Standard Drawings and AS/NZS 3725.

13.5.7 Laying Generally

Lay Culverts commencing from the downstream end.

Lifting equipment must be certified for the Culvert load and should be sized so as not to damage the Culvert. Ensure correct lifting techniques are employed as per the Culvert manufacturer's recommendations.

Do not lift the Culverts unless the lifting points are Certified by the manufacturer. Refer to *Clause 11.10 - Precast Concrete*.

Install and secure plugs or apply mortar in lifting holes, as per the Culvert manufacturer's recommendations.

Plugs, when used, must provide a tight waterproof seal.

Where required to use part-lengths of Culverts, protect all cut faces with epoxy coating of sufficient thickness to provide equivalent durability to the remainder of the Culvert.

End caps, when used, must provide a tight waterproof seal.

13.5.8 Laying Pipe Culverts

Refer Standard Drawings for Pipe Laying Details.

Face rebates or sockets upstream.

Rest the full length of the pipe barrel on the bedding.

Position pipes so that the 'TOP' markings on the pipes are visible on the tops of the pipes and the pipes are orientated so that the markings are within 5 degrees of the vertical axis.

Maximum joint deflections must comply with manufacturer's guidelines and provide a water tight joint.

Fill all joints with stiff mortar firmly rammed into openings. Remove excess mortar from barrel of Culvert. Apply external rubber bands to Flush Joint (FJ) Pipes.

Brace pipes of 1200 mm diameter and greater with Toms until the completion of the embankment and Pavement. The Toms must bear against a sill along the invert and a cap

against the crown of the pipe. Provide Toms opposite every pipe joint.

Cast collars and blocks in one operation. Restrain the Culvert prior to constructing the collars or blocks by partially backfilling around the barrel of the pipe to one-half of the pipe diameter.

13.5.9 Laying Box Culverts

Refer Standard for Box Culvert Laying Details.

Lay precast box Culverts on a cast-in-situ reinforced concrete base slab.

Ensure concrete base slab exceeds external width of box Culverts as shown on the typical details.

Butt box Culverts firmly together. Cut away lifting hooks and seal over the affected area with an approved epoxy resin.

Mortar external joints and apply external joint seals, Densopol HT60 or equivalent, 150 mm wide.

13.5.10 Connection to Existing Systems

Repair all cut openings and make watertight. Protect all cut faces with epoxy coating of sufficient thickness to provide equivalent durability to the remainder of the drainage structure.

Demolish existing endwalls/ headwalls/ wingwalls to make way for the extension of the Culvert, where applicable.

Clean out new work and existing work affected by the new work.

Inspection Point 22 – Obtain approval for cleaning out of existing drainage systems once completed.

13.5.11 Backfill

Inspection Point 23 – Obtain approval for pipe and/or box culvert installations prior to backfilling.

Do not place backfill against any in-situ concrete structure until the concrete has attained 80% characteristic strength and approval has been given.

Backfill the around the Culvert and for the remainder of the trench with material as specified in the Standard Drawings, placed and compacted in accordance with the *Section 4 - Earthworks* and as follows.

- Place backfill in layers not exceeding 150 mm compacted thickness.
- Ensure the maximum difference in height of backfill on each side of a Culvert is 300 mm.
- Stabilise all backfill with 2% cement by mass and compact to 95% Relative Compaction where the trench or embankment is located, or will be located, beneath a Pavement. Produce a uniform mix. Complete compaction within one hour of adding mixing water.
- Use compaction equipment which will not damage the Culvert and drainage structures.
- Carry out Conformance Testing.

Stabilise top 150 mm of backfill, for a distance of 1 m adjacent to culvert endwalls/ headwalls/ wingwalls, so as to be erosion resistant.

Remove surplus material from the Development Site.

Documentation Point 58 – Obtain approval for use of Flowable Fill as an alternative backfill material in Culvert works.

For External Works, reinstate any damaged surfaces to the satisfaction of the Relevant Authority.

13.5.12 Construction Loading on Culverts

Provide the minimum compacted thickness of cover specified in *Table 13-2 – Minimum Required Cover Thickness (Metres)* before allowing traffic to cross a Culvert.

Do not permit construction vehicles having axle loads greater than 10 tonnes to cross Large Box Culverts under any depth of fill unless specific certification is provided by the Culvert crown unit manufacturer that the Culverts have been designed to cope with those loads.

Table 13-2 – Minimum Required Cover Thickness (Metres)							
Maximum Construction Vehicle Axle Load (tonne)	**Type, Size and Class Of Culvert**						
	Concrete Pipes, By Pipe Class						**Boxes**
	Less than 1200 mm Nominal Diameter			**1200 mm Nominal Diameter or more**			**Less than 1200 mm Span, 1200 Height and 1600 Final Fill Height**
	Concrete Pipe Class						
	X(2)	**Y(3)**	**Z(4)**	**X(2)**	**Y(3)**	**Z(4)**	
9	0.4	0.4	0.4	0.4	0.4	0.4	0.1
20	0.8	0.6	0.4	0.5	0.4	0.4	0.6
35	1.3	0.8	0.6	1.3	0.4	0.4	0.9
50	1.0	0.8	-	1.0	0.4	-	1.2

13.6 CONSTRUCTION OF CONCRETE DRAINAGE STRUCTURES

13.6.1 General

This section relates to construction of the following structures:

- Culvert Endwalls/Headwalls/Wingwalls; and
- Drainage Pits.

13.6.2 Standard Drawings

Refer Standard Drawings for:

endwall, headwall and wingwall details;

standard and grated side entry pits;

manholes and grated inlet pits; and

letter box pits.

13.6.3 Setting Out

Measure pits to the inside face of the wall.

Finished surface levels for kerbside structures are measured at the top of kerb.

Set out the structure with pegs before construction.

13.6.4 Excavation

Excavate in whatever material is encountered.

Pump, bail, sheet, shore and brace as necessary.

Divert water when necessary.

Rectify foundations which are affected by rain or surface water entering the excavation.

Backfill with Type 3 Gravel Backfill up to the specified level if excavated too deep.

Inspection Point 24 - If Unsuitable Materials or Dissolution Cavities are encountered in the foundations or trench walls for pipe and box culverts, obtain direction before remedial works commence.

Replace Unsuitable Material with Standard Fill, unless otherwise directed by the Certifying Engineer, compacted to 95% Relative Compaction.

13.6.5 Concrete Works

Conform to *Section 11 – Structural Concrete Works* for all concrete works, including but not limited to:

- Foundation Preparation;
- Damp Proof Membranes;
- Reinforcement;
- Formwork;
- Concrete Supply and Placement;
- Surface Finishes;
- Dimensional Tolerances; and
- Conformance.

13.6.6 Precast Drainage Structures

Precast drainage structures may be used, subject to Approval by the Relevant Authority.

Comply with *Clause 11.10 – Precast Concrete*.

13.6.7 Steel Works

Conform to *Section 12 – Minor Steel Works* for all steel works, including but not limited to:

- Materials and Components;
- Bolted Connections;
- Welding; and
- Protective Coatings.

13.7 KERBING AND CONCRETE INVERTS

13.7.1 Standard Drawings

Refer to Standard Drawings for kerbing and concrete invert details.

13.7.2 General

Finish Pavement wearing surface 5mm proud of kerbing and concrete inverts to ensure positive drainage.

13.7.3 Concrete Works

Construct kerbing and concrete inverts in accordance with *Section 10 – Non-Structural Concrete Works*.

Provide joints as specified.

13.8 CONSTRUCTION OF CATCH DRAINS, TABLE DRAINS AND OPEN DRAINS

13.8.1 General

Construct all drains in accordance with Construction Drawings and *Section 4 – Earthworks*.

13.8.2 Drop Structures

Construct drop structures, where specified on Construction Drawings.

Refer DIPL Standard Drawing CS-3123 for Gabion Drop Structure details. Refer Construction Drawings for other drop structure types.

13.8.3 Stabilisation

Stabilise all drain bases and batters as specified on Construction Drawings.

Where not specified, provide minimum 100mm topsoil and dryland grassing in accordance with *Section 17 – Landscape*.

13.9 INLET AND OUTLET CHANNELS

Excavate the inlet and outlets of all Culverts to facilitate the flow of water.

Conform to the following:

Bed width:	Minimum 150 mm greater than overall width of Culvert.
Side batters:	6 horizontal to 1 vertical, or flatter.
Bed grade:	Minimum 0.5% in the direction of flow.

13.10 SUBSOIL DRAINS

13.10.1 General

Refer Standard Drawing SS-3000 for Subsoil Drainage Details.

Provide minimum 0.50% longitudinal grade to all subsoil drains.

13.10.2 Excavation

Excavate trenches to dimensions shown in the Standard Drawings.

Ensure the base of the excavation is dense and provides positive fall towards the outlet.

Line the trench with geotextile fabric. Refer to *Clause 14.3 –Geotextile Fabrics*.

Inspection Point 25 – Where subsoil drain trenches are excavated in rock and subsoil drain pipes are fitted with filter socks, geotextile fabric may be omitted where approved.

13.10.3 Bedding and Pipe Laying

Place a bedding layer of 50 mm of Filter Material in the trench and compact with a vibrating plate or similar.

Lay subsoil drain pipe central to trench.

Inspection Point 26 – Obtain approval of the subsoil pipe installation before backfilling.

13.10.4 Backfilling

Place and compact Filter Material to extents shown in the Standard Drawings in layers not exceeding 300 mm.

Compact backfill with a vibrating plate compactor or similar.

Prevent contamination of the Filter Material.

13.10.5 Flushing Points

Construct flushing points in accordance with Standard Drawing SS-3000.

Flushing points consist of inspection openings and caps supported in a concrete surround, suitable for Class D loading.

Provide flushing points at top of the line and at maximum 60 metre spacings, in accordance with the Standard Drawings.

Locate flushing points to avoid other infrastructure, including allotment accesses and services.

13.10.6 Connections to Drainage Structures

Connect subsoil drain pipes into drainage pits and headwalls to provide an outlet for water.

13.11 REMOVAL OF EXISTING CULVERTS AND DRAINAGE STRUCTURES

Demolish and remove from the Development Site, as specified, existing Culverts and drainage structures.

13.12 CLEANOUT OF DRAINAGE WORKS

Clean out all new work and existing work affected by the new work.

Inspection Point 27 – Obtain approval for cleanliness of all new and existing affected drainage works.

13.13 CCTV INSPECTIONS

CCTV Inspections that can confirm the absence of Defects are required for all new underground stormwater drainage systems.

The Relevant Authority may request additional CCTV Inspections be undertaken for existing underground stormwater drainage systems,

where the Development may impact the existing stormwater infrastructure.

Documentation Point 59 – Submit a copy of the CCTV Inspection Report, including video footage and still images, supported by a statement that all the works are conforming (or otherwise).

In the event there are Defects within the new systems, all necessary rectification works are required to be undertaken.

13.14 CONFORMANCE

Conform to the following:

Table 13-3 – Drainage Works Tolerances

Property/dimension	**Tolerance**
Invert Level and Grade Line of All Drainage Works	No ponding of water (free draining)
Kerbing / Concrete Inverts	Vertical: +/- 5mm Horizontal: +/- 10mm Dimensions: +/-5mm
Open Drains with grassing	Vertical: +/- 50 mm Horizontal: +/- 200mm
Open Drains with hard lining	Vertical: +/- 20 mm Horizontal: +/- 200mm
Cross Road Culverts	Vertical: +/- 20 mm Horizontal: +/- 200mm
Underground Pipe Culverts	Vertical: +/- 20 mm Horizontal: +/- 20mm
Drainage Structures	Vertical: +/- 20 mm Horizontal: +/- 20mm Dimensions: +/- 5 mm
Concrete Works	Concrete Thickness: Not less than specified.
Subsoil Drains	Vertical: +/- 50 mm Horizontal: +/- 200mm Slope: max 25mm sag in 8 m

14. PROTECTION WORKS

14.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1012	Methods of testing concrete.
AS 1141(set)	Methods of sampling and testing aggregates.
AS 1141.25.1	Degradation factor – Source rock (Washington Degradation Test).
AS 1141.26	Secondary minerals content in basic igneous rocks
AS 1141.29	Accelerated soundness index by reflux. Basic igneous rocks
AS 1289(set)	Methods of testing soils for engineering purposes.
AS 1725(set)	Chain link fabric fencing.
AS 2001.2.3.2	Methods of test for textiles – Method 2.3.2: Physical tests – Determination of maximum force using the grab method.
AS 2423	Coated steel wire fencing products for terrestrial, aquatic and general use.
AS 2758.1	Aggregates and rock for engineering purposes – Concrete aggregates.
AS 3706(set)	Geotextiles – Methods of test.
AS 3972	General purpose and blended cements.
AS 4133(set)	Methods of testing rocks for engineering purposes.
AS/NZS 4671	Steel reinforcing materials
AS/NZS 4680	Hot dip galvanized (zinc) coatings on fabricated ferrous articles.
NTMTM	NT Materials Testing Manual.
NTTM	NT Test Methods

14.2 FOUNDATIONS

Excavate, fill and trim the foundations to the required shape prior to commencing the protection works.

Compact the Subgrade, on which protection works are to be laid to 95% Relative Compaction.

14.3 GEOTEXTILE FABRICS

14.3.1 General

Install geotextile fabrics where shown on the Standard Drawings and Construction Drawings.

Supply and lay non-woven polypropylene or polyester geotextile fabric, consisting of long chain synthetic polymers composed of at least 95% by mass of polyolefins or polyesters. The geotextile filaments must be rot-proof, chemically stable and must have low water absorbency. Filaments must resist delamination and maintain their dimensional stability in the geotextile.

Non-woven geotextiles must have filaments bonded by needle punching, heat or chemical bonding processes.

Woven geotextiles must have filaments interlaced in two sets, mutually at right angles. One set must be parallel to the longitudinal direction of the geotextile.

Geotextiles must be free of any flaws which may have an adverse effect on the physical and mechanical properties of the geotextile.

Geotextiles must be stabilised against ultra-violet radiation such that, when tested in accordance with AS 3706.11, must have a retained strength of at least 50% after 500 hours of exposure.

14.3.2 Storage, Packaging and Handling

Geotextiles must be stored under protective cover or wrapped with a waterproof, opaque UV protective sheeting to avoid damage prior to installation.

Geotextiles must not be stored directly on the ground or in any manner in which they may be affected adversely by heat, water or soil. The method of storage must be in accordance with recommendations by the manufacturer.

The protected geotextile rolls must be clearly labelled showing manufacturer, type of geotextile, and batch identification number.

Handle rolls with forklifts or similar, using dedicated slings, free of sharp hooks or tongs. Rolls that are dropped, dragged or pushed around on the ground will be rejected.

14.3.3 Delivery and Product Certification

Geotextile must be delivered to the Development Site at least 5 Business Days prior to commencement of installation.

Provide a Certificate of Compliance that the geotextile complies with all the requirements as specified, together with test results reported on NATA endorsed test documents. The certificate must not be more than 12 months old.

The Certificate of Compliance to include: quality control documentation for the relevant batch/Test Lots, physical properties sheet, and

manufacturer's letter of certification stating compliance.

14.3.4 Construction

Prepare smooth surfaces for placement of the geotextile, free of sharp objects, large rocks and protruding vegetation.

Place geotextiles just ahead of the advancing face of construction work, with a maximum of 48 hours of placement prior to covering.

Repair punctures and tears in accordance with manufactuer's specifications.

Where used in trenches or other drainage configurations, place the geotextile to the shape of the prepared surface, folding and overlapping where required. Fully envelope drainage materials in trenches.

Unless specified elsewhere, the overlap must be minimum 300 mm. Overlap to be minimum 500 mm where large ground deformations are expected. Sewing may be permitted provided the seam strength exceeds the parent material grab strength.

Direct travel of machinery over geotextile not permitted. Conform to the following initial layer of material thicknesses prior to trafficking with machinery:

Table 14-1 - Minimum Initial Layer Thickness Prior to Trafficking with Machinery (mm)

Nominal Maximum Particle Size D85 of Initial Fill Layer (mm)	Minimum Initial Layer Thickness (mm)
< 150	300
150 - 300	400
300 - 500	500

Rock armour placed directly on geotextiles must be placed with a drop height of less than 1.5m, and placed in a such a manner so as not to damage, puncture or tear the geotextile.

Obtain Relevant Authority approval for use of vibratory compaction methods on the initial layer.

14.3.5 Geotextile Grades

Unless specified elsewhere, use: non-woven, Strength Grade B.

All strength grades, where specified, based on a Characteristic Values (Q), to conform to the following table:

Table 14-2 – Geotextile Strength Grade Properties

Geo textile Strength Grade	Elong-ation (1)	Grade Strength (2) (N)	Tear (2) (N)	G Rating (2)
A	>30%	500	180	900
	<30%	800	300	1350
B	>30%	700	250	1350
	<30%	1100	400	2000
C	>30%	900	350	2000
	<30%	1400	500	3000
D	>30%	1200	450	3000
	<30%	1900	700	4500
E	>30%	1600	650	4500

Table Notes:

1. % Elongation corresponding to max CBR burst strength as per AS 3706.4. Generally <30% for wovens, >30% for non-wovens.
2. Property value is 80th percentile characteristic value (mean strength – 0.83 x standard deviation), as per relevant AS test.
3. N = Newtons

Filtration properties relevant to each grade to be certified as part of *Clause 14.3.3 - Delivery and Product Certification* requirements.

14.3.6 Conformance Testing

Where project requirement is less than 15,000 m^2, sampling and testing is not required.

Provide samples to independent, NATA accredited testing laboratory when project exceeds 15,000 m^2, to the following test frequencies:

Table 14-3 – Test Frequencies

Description	**Units**	**Test Method**	**Test Frequency**
Tensile Strength	kN/m	AS 3706.2	1 per 15,000 m^2
Tear Strength	N	AS 3706.3	1 per 15,000 m^2
CBR Burst Strength	N	AS 3706.4	1 per 15,000 m^2
Grade Tensile Strength	N	AS 2001.2. 3.2	1 per 15,000 m^2
Flow Rate	l/m2/s	AS 3706.9	1 per 90,000 m^2

Samples to be 15 m^2 in size, cut across full width of the roll, not within 2 m of the end of a roll.

14.4 ROCK PROPERTIES

The rock properties specified in this clause apply to the rock, stone, aggregate and boulders specified in the following clauses in this section;

- Stone Pitching
- Dumped Rock
- Quarter Tonne Dumped Rock
- Rubble
- Gabions
- Reno Mattresses

Requirements: Clean, dry, durable crushed stone of uniform quality, free from declared weeds and their seeds, vegetable matter and other deleterious materials.

Particles must have at least 2 crushed faces and comply with the following standards;

AS 1141.25.1	Degradation factor – Source rock (Washington Degradation Test). Basic igneous rocks, e.g. Basalt aggregates, must have a minimum value of 50.
AS 1141.26	Secondary minerals content in basic igneous rocks, e.g. Basalt aggregates, must not exceed 25□.
AS 1141.29	Accelerated soundness index by reflux. Basic igneous rocks, e.g. Basalt aggregates, must have a minimum value of 94.

14.5 STONE PITCHING

14.5.1 Stone Pitching

The stone to be spalls of hard durable rock complying with *Clause 14.4 - Rock Properties* and with no dimension less than 150mm and not larger than 200 mm.

Hand place the stones so that they are firmly bedded in layers.

The average plane of the exposed face to be within 100 mm of the specified plane and all exposed faces of stones to be within 50 mm of the average plane.

14.5.2 Grouted Stone Pitching

Place stones as specified in *Clause 14.5.1 - Stone Pitching.*

Inspection Point 28 - Obtain approval of stone pitching before grouting.

Grout stone pitching with cement mortar.

Cement mortar to consist of one part cement to three parts of clean sand mixed with potable water to form a workable mixture.

Work the mortar into gaps between the stones of the stone pitching to bind the stones. Work from the lower end of the slope of the pitching up the slope.

Allow the mortar to cure for at least 48 hours.

Remove Defective mortar and re-grout any loose stones.

Provide 75 mm diameter uPVC pipe sections to form weep holes penetrating the full thickness of the stone pitching and grout at the rate of one every 5 square metres of stone pitching.

14.6 DUMPED ROCK PROTECTION

Large spalls or boulders complying with *Clause 14.4 - Rock Properties* and having a least dimension of 200mm.

Dump into the specified area.

Protect adjacent areas from damage due to dumping.

The average plane of the exposed rock face to be within 100 mm of the specified position.

14.7 QUARTER TONNE CLASS DUMPED ROCK PROTECTION

Use large spalls or boulders complying with *Clause 14.4 - Rock Properties* and having the following grading.

Table 14-4 – Rock – Size and Grading

Rock Size	Minimum % Larger Than
35kg	90
250kg	50
500kg	0

Dump into the specified area.

Protect adjacent areas from damage due to dumping.

The average plane of the exposed rock face to be within 100 mm of the specified position.

14.8 RUBBLE

Broken rock complying with *Clause 14.4 - Rock Properties*.

Maximum size of rubble to be 200 mm.

At least 30% by mass to have a nominal size of 100 mm or greater.

No more than 20% by mass to pass the 2.36 mm sieve.

Dump rubble without segregation onto the prepared area.

Compact rubble to a tight finish.

The average plane of the exposed face to be within 100 mm of that specified.

The exposed face to be within 100 mm of the average plane.

14.9 GABIONS

14.9.1 General

A flexible, hexagonal woven steel wire mesh box, filled with packed stone, complying with *Clause 14.4 - Rock Properties* and securely laced with steel wire.

14.9.2 Steel Wire Mesh

Use galvanized steel wire, Grade W15Z380 to AS 2423.

Zinc coating; 250 g/sq.m Galvanization to be carried out prior to weaving of the mesh.

Minimum tensile strength of wire: 380 MPa

Mesh openings to be 80 mm x 100 mm maximum, hexagonal in shape with flexible joints consisting of not less than two full turns.

All wire to be coated with average thickness of 0.55 mm extruded grey PVC firmly attached to the wire. The minimum thickness of coating to be 0.40 mm in accordance with AS 2423.

The PVC coating may not be required where abrasion of wire is not likely to be of concern, or where deleterious effects on the wire of ground water, soil salinity, natural weather exposure and water emersion is not significant.

Documentation Point 60 – Where proposed, obtain approval for omission of the PVC coating on gabion steel wire mesh, prior to fabrication of gabion baskets.

Conform to the following wire sizes and galvanizing weights:

Table 14-5 – Wire Properties - Gabions	
Wire Type	**Minimum Diameter (mm)**
Body wire	2.7
Binding and lacing wire	2.2
Selvedge wire	3.4

Selvedge wire must be woven integrally along all edges of the mesh, in accordance with the manufacturer's instructions, and such that the mesh must not unravel.

The steel wire mesh must be sized so that it can be folded into regular boxes, complete with diaphragms, having dimensions specified. Diaphragms to be at 1,000 mm spacings.

14.9.3 Construction

Assemble and erect in accordance with the manufacturer's instructions.

Pretension the wire framework against a firm anchor or adjacent units.

Retain the shape of the wire framework with spreaders.

Fill with hard durable stone, complying with *Clause 14.4 - Rock Properties* and placed in stages to achieve the tightest packing of stone.

Maximum stone dimension: 250 mm.

Minimum stone dimension: 100 mm.

Overfill the framework by 20 mm to 50 mm to allow for subsequent movement of the stone.

Perform lacing operations using lacing wire conforming to the properties specified for Steel Wire Mesh. Wire to pass around the edges being joined using alternative single and double loops through each mesh in turn. Tightness of the mesh and wiring is essential.

Ensure a tightly packed, neat and uniform construction.

14.10 RENO MATTRESSES

14.10.1 General

A flexible, hexagonal woven steel wire mesh box, filled with packed stone, complying with *Clause 14.4 - Rock Properties* and securely laced with steel wire.

14.10.2 Steel Wire Mesh

Use galvanized steel wire, Grade W15Z380 to AS 2423.

Zinc coating; 250 g/sq.m. Galvanization to be carried out prior to the weaving of the mesh.

Minimum tensile strength of wire: 380 MPa.

Mesh openings to be 60 mm x 80 mm maximum, hexagonal in shape with flexible joints consisting of not less than two full turns.

All wire to be coated with average thickness of 0.55 mm extruded grey PVC firmly attached to the wire. The minimum thickness of coating to be 0.40 mm in accordance with AS 2423.

The PVC coating may not be required where abrasion of wire is not likely to be of concern, or where deleterious effects on the wire of ground water, soil salinity, natural weather exposure and water emersion is not significant.

Documentation Point 61 – Where proposed, obtain approval for omission of the PVC coating on reno mattress steel wire mesh, prior to fabrication of reno mattress baskets.

Conform with the following wire sizes and galvanizing weights:

Table 14-6 – Wire Properties – Reno Mattresses	
Wire Type	**Minimum Diameter (mm)**
Body wire	2.0
Binding and lacing wire	2.2
Selvedge wire	2.4

Selvedge wire to be woven integrally along all edges of the mesh, in accordance with the manufacturer's instructions.

Cut to shape where necessary.

Mattress Panels

Bottom panel: Includes both sides and both end panels.

Top panel: Must have the same dimension as the bottom, without the sides and ends, and be supplied separately.

Diaphragms: Extend over the full width of the mattress from top to bottom at maximum intervals of 1 m.

14.10.3 Construction

Assemble and erect in accordance with the manufacturer's instructions.

Align diaphragms perpendicular to the direction of flow unless otherwise specified.

Pretension the wire framework against a firm anchor or adjacent units.

Retain the shape of the wire framework with spreaders.

Fill with hard durable stone complying with *Clause 14.4 - Rock Properties* and placed in stages to achieve the tightest packing of stone.

Maximum stone dimension:

120 mm when mattress depth 170 mm.

150 mm when mattress depth 230 mm.

200 mm when mattress depth 300 mm or greater.

Minimum least stone dimension: 80 mm.

Overfill the framework by 20 mm to 50 mm to allow for subsequent movement of the stone.

Perform lacing operations using lacing wire conforming to the properties specified for Steel Wire Mesh. Wire to pass round the edges being joined using alternative single and double loops through each mesh in turn. Tightness of the mesh and wiring is essential.

Last panel on downstream side, or at base of slope, must be a whole unit (i.e. not cut).

Ensure a tightly packed, neat and uniform construction.

14.11 REVETMENT MATTRESSES

14.11.1 General

A nylon fabric material filled with mortar with filter points for the relief of hydrostatic uplift pressure.

Conform to the manufacturer's instructions.

14.11.2 Materials

Mortar mix proportions:

Table 14-7 – Mortar Mix Proportions – Revetment Mattresses

Cement Type GP or GB	Fine Sand	Coarse Sand	Water
1 (500kg)	1.2 (600kg)	2.2 (1,100kg)	450 l/m^3

Adjust fine sand/coarse sand proportions if required to provide workable mix.

14.11.3 Construction

Toe-in to provide cut-off walls minimum 300 mm deep and width not less than maximum thickness of mattress.

Lay, cut and stitch mattress on prepared surface. Make allowance for take up of fabric resulting from filling mattress with mortar.

All stitching and seams to be neat in appearance and strength to withstand filling pressure.

Ensure mattress is anchored prior to mortar pumping to prevent creep during placement of mortar.

Provide openings in fabric at a maximum of one every 50 sq.m for placement of mortar. Opening to match size of pumping hose.

Make good openings on completion of mortar pumping.

All areas of mattress to be hard filled with mortar with smooth surface.

Do not permit any loading on the mattress until one hour after mortar pumping has been completed.

Remove spilt mortar from surface of mattress by hand only. Do not use water to wash spilt mortar.

Make good any Defective areas.

14.12 EMBANKMENT PROTECTION - CONCRETE

Construct embankment protection from concrete reinforced with a single layer of centrally located SL72 mesh. Conform to *Section 11 – Non-Structural Concrete Works.*

Overlap the mesh by 200 mm at joints.

Make contraction joints in the vertical plane, at 2 m maximum spacing.

Continue reinforcement mesh across construction joints

Where margins are required, construct the embankment protection and the margins as an integral unit.

Where there are adjacent protection works, construct the toe of the embankment protection and the adjacent protection work as an integral unit.

Drainage weepholes to be 75 mm diameter penetrating the full thickness of the protection works. Install the drainage holes at 3 m intervals just above the toe.

Install additional rows of drainage holes parallel to the first, and at 3 m intervals and spacings, where shown on Construction Drawings.

The exposed surface to be within 50 mm of the specified position.

14.13 MARGINS

Construct margins with reinforced concrete, conforming to the requirements of *Section 10 – Non-Structural Concrete Works.*

Make contraction joints at 3 m maximum spacing.

Form the top 75 mm of the vertical face nearer the Pavement, and any exposed outer face, true to line and level.

Wood float and broom finish the upper surface of the margin. Finish flush with the top of the Pavement.

Where adjacent Pavement is Sealed, overlap the bituminous Seal on the margins by not less than 100 mm.

TOLERANCES

Width: Not less than specified.

Level: + or – 10 mm of top of adjacent Pavement.

15. FURNITURE AND TRAFFIC CONTROL DEVICES

15.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1012(set)	Methods of testing concrete
AS 1074	Steel tubes and tubulars for ordinary services
AS/NZS 1111(set)	ISO metric hexagon commercial bolts and screws Set
AS/NZS 1112(set)	ISO metric hexagon nuts, including thin nuts, slotted nuts and castle nuts Set
AS 1273	Unplasticised PVC (UPVC) downpipe and fittings for rainwater
AS 1397	Steel sheet and strip hot dipped zinc coated or aluminium/zinc coated
AS/NZS 1554(set)	Structural steel welding (Set)
AS/NZS 1594	Hot rolled steel flat products
AS 1604.1	Specification for preservative treatment – Sawn and round timber
AS 1722	Pipe threads of whitworth form
AS 1725(set)	Chain link fabric fencing
AS/NZS 1734	Aluminium and aluminium alloys - Flat sheet, coiled sheet and plate
AS 1742(set)	Manual of uniform traffic control devices
AS 1743	Road signs – Specifications
AS 1744	Standard alphabet for road signs
AS/NZS 1906.1	Retroreflective materials and devices for road traffic control purposes – Retroreflective sheeting
AS 2423	Coated steel wire fencing products for terrestrial, aquatic and general use
AS/NZS 3750.9	Paints for steel structures - Organic zinc-rich primer
AS/NZS 3845.1	Road safety barrier systems and devices - Road safety barrier systems
AS/NZS 4680	Hot dip galvanized (zinc) coatings on fabricated ferrous articles
APAS 1441/1	Permanent graffiti barrier, clear, exterior
APAS 1442/1	Temporary graffiti barrier, clear, exterior
APAS 1443	Graffiti Remover

15.2 TACTILE GROUND SURFACE INDICATORS

Tactile Ground Surface Indicators (TGSI) to be installed where nominated on Construction Drawings.

Devices used must conform to AS1428.4.1.

Comply with Standard Drawings, where applicable.

Documentation Point 62 – Submit proposed Tactile Ground Surface Indicator details prior to installation.

15.3 FENCING

15.3.1 General

Construct all fencing in accordance with the applicable Standard Drawings, including:

- Security fence
- Pedestrian safety fence
- Vehicle movement barriers/fences
- Cyclist holding rails
- Culvert crossing guard rails

Refer Construction Drawings for nominated locations and set out.

15.3.2 Clearing

Clear fencing lines including the removal of trees, shrubs, vegetable matter and debris. Grub out all roots that interfere with the placement of posts.

15.3.3 Erection

Erect fences so that the line of the tops of the posts is uniform. Adjust the position of posts to compensate for the irregularities of the ground.

15.3.4 Gates

Provide gates where nominated on Construction Drawings and across existing access tracks, driveways and streets.

15.3.5 Interface with Existing Fences

Install a post at the intersection of new fence with existing fence and fix the wiring of both fences to that post.

Complete the necessary sections of new fencing before removing or opening a boundary or internal fence.

Obtain the owners agreement to the proposed fence removal and advise the owner or occupier in writing of the date the fence will be removed.

Erect gates or grids at fence openings as specified on Construction Drawings.

15.3.6 Temporary Site Safety Fence

Materials, construction, and installation to AS 4687.

Erect the fence in accordance with manufacturer's and/or supplier's specifications.

Ensure installation methods are consistent with possible local weather events.

15.4 BOLLARDS

15.4.1 General

Refer Construction Drawings for nominated bollard types, locations and set out.

Where bollard details are not specified on Construction Drawings, comply with the following:

15.4.2 Recycled Plastic Bollards

Supply round pre-moulded recycled plastic bollards, 1.5 m length x 150 mm dia with built-in colours and UV stabilised, resistant to termites, microorganisms and moisture.

Install recycled plastic bollards as per manufacturer's recommendations.

15.4.3 Timber Bollards

Use Stringybark, Woollybutt or Pine timber, pressure impregnated with ACQ preservative formulation, copper oxide (CuO) and quaternary ammonium compound (DDAC) to Category H4 of AS 1604.

Do not use preservative treatments that contain arsenic or chromium.

15.4.4 Metal Bollards

Supply and install metal bollards as per manufacturer's recommendations.

15.5 GUIDE POSTS

15.5.1 Posts

Supply and install thermoplastic guide posts manufactured from plastic alloy ASA/PC (or similar) in accordance with Standard Drawings and conforming to the following:

Colour: Opaque white.

Finish: Smooth, glossy.

Length: 1380 mm. Installation tolerance - height to be 1100mm to 900mm above finished surface.

Width: 95 mm minimum, 105 mm maximum, width to be constant to within 1 mm.

Web thickness: 3 mm minimum, 5 mm maximum.

15.5.2 Certification of Guide Posts

Guide posts must comply with the following:

- Where installed in normal working conditions, guide posts are capable of self-erecting after 10 impacts head on, from an average sedan travelling at 60 km/h.
- After 2,000 hours of exposure in an Atlas Weatherometer, the guide posts do not change colour by more than 10 points on a Delta E colour chart.
- The guide post material has a minimum Vicat softening point of 120ºC.
- Physical testing as specified.
- Resistant to termites.

Documentation Point 63 - Provide certification that guide posts conform to specified requirements.

15.5.3 Guide Post Characteristics

Provide guide posts which have the following:

- An anti-withdrawal device which will prevent the guide post from being withdrawn without dislodgement of the compacted backfill. Anti-withdrawal devices must be engaged on each and every guide post prior to installation of guide posts.
- Legible and indelible markings similar to those used to mark uPVC sewer and water pipes, in letters no less than 5 mm high, showing month and year of manufacture and located approximately 400 mm from the top of the post. Stick-on labels are not permitted.
- Legible and indelible marking 380 mm from the bottom of the guide post, to indicate depth for installation. Stick-on labels are not permitted.

15.5.4 Delineators

Rectangular Retroreflectors

To be of Class 1A Retroreflective material.

Size to be 200 mm x 50 mm for red delineators; and for white delineators. Area minimum 100 cm2 (10,000 mm2).

Discrete Device Type Retroreflectors

Maximum projected face area for red delineator devices and white delineator devices to be 100 cm2 (10,000 mm^2). Minimum length of shortest projected dimension to be 60 mm.

Installation

Attach one red and one white delineator to each guide post, 50 mm from the top of the post.

The red delineator to be attached to the convex side of curved guide posts where applicable.

Attach any discrete device type retroreflectors required as specified.

Red delineators to be on the left and white delineators to be on the right when viewed in the direction of travel.

15.6 SIGNS

15.6.1 General

Refer Standard Drawings for street name signs.

Refer Construction Drawings for nominated sign types, locations and set out

15.6.2 Materials

Non-Reflective Materials

In accordance with AS 1743.

Reflective Material

Use high intensity Class 1 standard in accordance with AS/NZS 1906.1 for all signs, including temporary signs, and hazard markers with the exception that all black legends are to be non-reflective.

Blanks

Use aluminium marine grade alloy designation 5052 - H38. Thickness 1.6 mm.

Steel sheets may only be used for temporary signs.

Manufacture

Chemically clean aluminium blanks before painting or bonding of reflective material.

Stamp the month and year of manufacture and the Relevant Authority's symbol on the backs of all signs.

Posts

Post sizes to conform to *Table 15-3 – Signs – Mounting Selection* unless specified otherwise.

Posts to be medium grade galvanized pipe with plain ends and constructed from a single length of pipe. Cap each post with a galvanized cap. Do not use "Ingal" posts.

Standard; to AS 1074.

Anti-Graffiti Coating

Apply Anti-Graffiti products to all new signs in Residential, Mixed Use and Industrial Subdivisions, and as specified.

Documentation Point 64 – Submit details of proposed Anti-Graffiti film or coating products, prior to use in the relevant Development Works.

15.6.3 Anti-spear fixings for hazard markers (sight boards)

Hazard markers (D4-1-1A), and other signs at similar heights, which are installed parallel to the path of travel of traffic, require anti-spear fixings.

Hazard marker signs are to comprise two D4-1-1A signs, mounted end to end.

The bracing rails are to be aluminium extrusions, each made up of two equal length sections, spliced at the centre line. The aluminium extrusions are to be Capral EK8891S WA Type A, or Ullrich UA6490, or equal equivalent.

The construction details are shown on the Queensland Department of Transport and Main Roads Standard Drawing No. 1452, Sheets 1, 2, and 3.

The Notes and any annotation on the Queensland Standard Drawing Sheets which refer to any ancillary documents are to be disregarded, and the Northern Territory requirements are to be met – refer to Northern Territory specifications in this document and, if applicable, in other Northern Territory specifications documents.

15.6.4 Supply and Delivery

Supply all brackets, bolts, nuts and bracings.

Fix bracings to the signs prior to delivery.

15.6.5 Location of Signs

Street signs to be located clear of vegetation and be clearly visible under headlight illumination.

Lateral Placement

Lateral placement to be measured to the edge of the sign nearest the street.

Lateral placement to be as follows:

Unkerbed streets: 2 to 4 m clear from the edge of the traffic lane, and 600 mm minimum clear from the outer edge of the Shoulder.

Kerbed streets: 500 mm to 1000 mm from the front face of the kerb.

Height

Height to be measured as the clearance to the lowest edge of the lowest sign in an assembly.

Heights for street signs to be as follows:

Table 15-1 – Heights for signs	
Unkerbed Streets	
Fingerboard (G3) and street name signs (G5):	2 m above the near edge of the Pavement.
Other signs:	1 m to 1.5 m above the near edge of the Pavement.
Kerbed Streets:	
Signs overhanging a footpath/shared path:	2.5 m minimum above footway.
Signs not overhanging a footpath/shared path:	1 m to 1.5 m clearance except for those specific signs on medians and islands given below.

Table 15-2 – Height of specific signs on medians and traffic islands
The following signs, when used on medians and traffic islands, to have a clearance 150 mm above the kerb:
D4-1-2 Hazard Marker
D4-2-2 Hazard Marker
D4-3 Hazard Marker
R2-3 (Keep Left) (Keep Right)
R2-5 (No U Turn)
R2-6 (No Right Turn) (No Left Turn)
R2-15 (U Turn Permitted).

15.6.6 Installation

Conform to *Table 15-3 – Signs – Mounting Selection***.**

Install posts vertically.

Provide and install galvanised steel sleeves when installing sign posts in concreted or paved locations.

Sleeves, when specified, to be the length of the specified ground footing depth and extend 50 mm above the finished surface level.

Attach the post to the sleeve with a galvanized M10 bolt, 25 mm from the top of the sleeve. Encase the post, or sleeve when used, in a footing of 20 MPa concrete.

Orientation of street sign face:

Vertical, and turned 3 degrees to 5 degrees horizontally from oncoming traffic on straight sections. On curves, at right angles to centre line of street.

Exception: Parking signs to be oriented 5 degrees from parallel to the kerb to face oncoming traffic.

15.6.7 Reinstatement and Relocation of Existing Signs

Dismantle existing post and signs carefully.

Store in a manner to prevent damage.

Backfill the hole left by the post and its footing with Standard Fill, unless otherwise directed by the Certifying Engineer, and compact the fill to the same density as the surrounding area.

Erect signs in new locations as shown on the Construction Drawings.

The Developer must replace all signs damaged during dismantling, transport, storage and/or erection with new signs.

15.6.8 General Requirements

- Spacing between posts:
  - 2 post signs - 0.6 times sign width.
  - 3 post signs - 0.4 times sign width.
  - 4 post signs - 0.3 times sign width.
- Brace spacing to be 380 mm maximum.
- Adopt the nearest size in the list for intermediate sizes.
- Post sizes for galvanized pipe posts are for sign clearance of less than 2 m above the Pavement. For sign clearances greater than 2 m, increase the nominal diameter of the pipe size by a percentage equal to the percentage increase in height above 2 m.
- Where signs are erected in groups treat the overall dimensions of the group as one sign size to determine the post requirement from *Table 15-3 – Signs – Mounting Selection Sign Mounting Selection Tables***.**

15.7 FLOOD GAUGE POSTS

15.7.1 Posts and Gauges

Supply and install posts and gauges in accordance with Standard Drawings.

Use galvanized posts, single length 150 mm x 50 mm x 3 mm RHS with a 3 mm end cap welded to the top.

Paint welds with zinc rich organic paint to APAS specification 2916.

15.7.2 Installation

Erect the post vertically at the outer edge of the Shoulder or concrete margin, on the left hand side when viewed in the direction of travel.

Install a concrete footing, of 20 MPa concrete, with a depth of 650 mm and a diameter of 300 mm.

Cast a suitable galvanized sleeve, 650 mm in length, in the footing so that the sleeve extends 50 mm above the finished surface level.

Attach post to sleeve with a galvanized M10 bolt 25 mm from the top of the sleeve.

Secure gauge to post with No 10 galvanized Tek screws or 4 mm blind pop rivets at 300 mm centres staggered alternately each side.

Position gauge zero to comply with lowest spot on floodway along the street centre line.

15.8 STEEL BEAM GUARDRAIL

15.8.1 Materials

Refer to Standard Drawings for details.

Rails

Use W-beam guardrail to AS/NZS 3845.1 of nominal 300 mm width formed from HA 350 steel to AS/NZS 1594.

Rails to be capable of withstanding a cold bend of 180 degrees around a diameter 2.5 times its own thickness without cracking.

Base metal thickness to be 2.7 mm minimum.

Terminal Sections

Form from HA 350 steel having the same properties and thickness as the rails.

Posts

Fabricate posts and block outs from steel channel section in accordance with the Standard Drawing.

Bolts And Nuts

Shape bolt shoulders and holes in rail elements to prevent the bolts from turning.

Length of bolts to be sufficient to extend 6 mm to 12 mm beyond the nuts.

Galvanizing

Galvanize all components by hot dip galvanizing, after fabrication, to AS/NZS 4680.

Where the galvanising on guard rail or associated fittings has been damaged, the coating must be repaired by regalvanising or by painting with a minimum of two coats of a zinc-rich inorganic paint in accordance with AS/NZS 3750.9 and one coat of aluminium paint.

Compliance

Marking of materials - To: AS/NZS 1594

Each coil or shipping unit must be clearly and durably marked or tagged to indicate the following:

(a) Steel grade designation.
(b) Dimensions.
(c) Name or registered trade name or mark of the manufacturer.
(d) Batch identification.

If the marked portion of the material is subsequently removed, then these markings are to be transferred to each remaining portion of the material.

Traceability of components - To: AS/NZS 3845 Part 1

All steel rails, posts and other critical components must be permanently marked in lettering at least 10 mm high with the name of System Manufacturer, the date and month of manufacture the grade of steel and base metal thickness (BMT) to allow the product to be traced.

Where plastic components make up a key element of the system, they must be permanently marked clearly indicating the month and year of manufacture in a location that can be easily inspected.

Bolts must be marked in accordance with AS 1111.1 or AS/NZS 1252.

Certificate(s) of compliance - To: AS/NZS 1594

Provide Certificate(s) of compliance from the manufacturer that the steel used in the manufacture of the steel beam guardrails is of structural grade HA 350.

Certificate(s) of compliance - To: AS/NZS 4680

Provide Certificate(s) of compliance from the galvanizer that the galvanizing complies with AS/NZS 4680.

15.8.2 Installation

Erect the rail in a manner that produces a smooth, continuous, taut rail closely conforming to the line and grade of the Carriageway.

Lap rails so that the ends of rails do not face oncoming traffic in the adjacent lane.

Attach reflective delineators to the guardrail in accordance with the manufacturer's specifications.

Delineator heights to match heights of delineators on guide posts.

Delineator dimensions detailed in *Clause 15.5.4 – Delineators*.

15.9 SIGN MOUNTING SELECTION TABLES

Table 15-3 – Signs – Mounting Selection

Sign Size W x D	No. and NB Gal. Pipe Posts	Sign Attachment Brackets (Or M8 Bolts) Per Post	Bracing	Footing	
				Depth (mm)	Dia. (mm)
300 x 300	1 x 50	2	No	600	300
300 x 450	1 x 50	2	No	600	300
450 x 450	1 x 50	2	No	600	300
450 x 300	1 x 50	2	No	600	300
450 x 600	1 x 50	2	No	600	300
450 x 750	1 x 50	2	No	600	300
450 x 900	1 x 50	2	No	600	300
600 x 450	1 x 50	2	No	600	300
600 x 600	1 x 50	2	No	600	300
600 x 750	1 x 50	2	No	600	300
600 x 900	1 x 50	3	No	600	300
600 x 1050	1 x 50	3	No	600	300
750 x 450	1 x 50	2	No	600	300
750 x 600	1 x 50	2	No	600	300
750 x 750	1 x 50	2	No	600	300
750 x 900	1 x 50	2	No	1500	300
750 x 1200	1 x 50	3	No	1000	300
900 x 300	1 x 50	2	Yes	600	300
900 x 600	1 x 50	2	Yes	600	300
900 x 900	1 x 50	3	Yes	600	300
900 x 1350	1 x 50	4	Yes	1000	300
1050 x 600	1 x 50	2	Yes	1000	300
1050 x 900	1 x 50	3	Yes	1000	300
1200 x 600	2 x 50	2	Yes	600	300
1500 x 800	2 x 50	2	Yes	1000	300
1800 x 600	2 x 50	2	Yes	1000	300
1800 x 1200	2 x 80	4	Yes	1000	300
2400 x 1200	2 x 80	4	Yes	1200	450
2400 x 1800	2 x 100	5	Yes	1200	450
3000 x 600	2 x 50	2	Yes	1000	300
3000 x 1200	2 x 80	4	Yes	1200	450
3000 x 1800	2 x 100	5	Yes	1500	450
3700 x 600	2 x 80	2	Yes	1000	300

Table 15-3 – Signs – Mounting Selection					
Sign Size W x D	**No. and NB Gal. Pipe Posts**	**Sign Attachment Brackets (Or M8 Bolts) Per Post**	**Bracing**	**Footing**	
				Depth (mm)	**Dia. (mm)**
3700 x 1200	3 x 80	4	Yes	1200	450
3700 x 1800	3 x 100	5	Yes	1500	450
3700 x 2400	4 x 100	7	Yes	1500	450
4300 x 600	2 x 80	2	Yes	1000	300
4300 x 1200	3 x 80	4	Yes	1200	450
4300 x 1800	3 x 100	5	Yes	1500	450
4900 x 600	3 x 80	2	Yes	1000	300
4900 x 1200	3 x 100	4	Yes	1200	450
4900 x 1800	3 x 100	5	Yes	1500	450
5500 x 600	3 x 80	2	Yes	1000	300
5500 x 1200	3 x 100	4	Yes	1200	450
5500 x 1800	4 x 100	5	Yes	1500	450
6100 x 600	3 x 80	2	Yes	1000	300
6100 x 1200	3 x 100	4	Yes	1200	450
6100 x 1800	4 x 100	5	Yes	1500	450

16. PAVEMENT MARKING

16.1 GENERAL

This section specifies the materials, testing and standards of workmanship for marking of Pavements with road marking paint and/or thermoplastic material, including glass beads.

16.2 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS/NZS 1580(set)	Paints and related materials - Methods of test
AS/NZS 1580.205.4	Application properties - Airless spraying
AS 1742(set)	Manual of uniform traffic control devices
AS 1744	Standard alphabets for road signs
AS 1906(set)	Retroreflective materials and devices for road traffic control purposes
AS/NZS 2009	Glass beads for road marking materials
AS/NZS 2310	Glossary of paint and painting terms
AS/NZS 2311(set)	Guide to the painting of buildings
AS/NZS 2433	Plastics - Method for exposure to ultraviolet lamps
AS 2700	Colour standards for general purposes
AS 2890 (set)	Parking facilities
AS 3730 (set)	Guide to properties of paints for buildings
AS/NZS 3750.22	Paints for steel structures – Full gloss enamel – Solvent-borne
AS 4049.(set)	Paints and related materials -pavement marking materials
APAS AP-S0041/2	Pavement marking paint, solvent-borne
APAS AP-S0041/3	Pavement marking paint, cold applied plastic
APAS AP-S0041/4	Road marking paint, thermoplastic
APAS AP-S0041/5	Road marking paint, water borne
APAS AP-S0042	Glass beads for pavement marking paint
NTTM 401.1	Operation of wet film thickness comb
NTTM 402.1	Field procedure for measurement of the rate of application of spherical glass beads
NTTM 405.1	Certification of pavement line marking apparatus

Standard Drawings

16.3 SCOPE

This section specifies the materials, testing and standards of workmanship for marking of Pavements.

Pavement marking treatments include, but are not limited to:

- Traffic control
- Set out of Pavement markings to Australian and Northern Territory Standards
- Painting of markings with waterborne, thermoplastic and cold applied paints
- Installation and removal of Raised Retroreflective Pavement markers
- Removal and disposal of temporary Pavement markers
- Reporting of works performed

16.4 CONTRACTOR ACCREDITATION

All Pavement marking work must be carried out by a contractor accredited to the Painting Contractor Certification Program (PCCP) in a class or category applicable to the Development Works. The PCCP is administered by the CSIRO. Information regarding the PCCP can be obtained at http://www.apas.gov.au/pccp/.

The Relevant Authority may give an exemption for this clause at their discretion.

16.5 PAVEMENT MARKING PAINT

Documentation Point 65 - Submit Certificates of Compliance, issued by an accredited testing authority, stating that the pavement marking paints proposed to be used conform to, or comply with the relevant Australian Standards and/or APAS specifications.

16.5.1 Pavement Marking Paint Types

Use approved water based white pavement marking paint conforming to APAS AP-S0041/5 and suitable for application by spray equipment in accordance with Test Method AS/NZS 1580.205.4 to asphalt and bituminous sealed street surfaces and for use with Type B-HR and/or Type D-HR drop-on spherical glass beads.

16.5.2 Pavement Marking Paint Colours

The standards for pavement marking paint colours are:

- White pavement marking paint must have a white colour to AS 2700S(N14);

- Yellow pavement marking paint must have a golden yellow colour to AS 2700S(Y14); and
- Black pavement marking paint must have a black colour to AS 2700S(N61).

16.6 GLASS BEADS

Use glass beads conforming to AS/NZS 2009 and APAS specification AP-S0042.

Documentation Point 66 - Submit a Certificate of Compliance in respect to the glass beads complying with the relevant Australian Standard and APAS specification.

Infrastructure Category A: use Type B-HR glass beads for initial application, and Type D-HR glass beads for second application.

Infrastructure Category B to E: use Type B-HR glass beads for initial and remark applications.

Refer to *Table 16-2 - Application Times – All Longitudinal and Transverse Pavement Markings***.**

16.7 THERMOPLASTIC MATERIALS

Documentation Point 67 – Obtain approval for use of thermoplastic materials.

Thermoplastic pavement marking materials must comply with AS 4049.2 and with APAS Specification AP-S0041/4.

Thermoplastic pavement marking material must consist of aggregate, pigment, binder, glass beads and extenders, capable of being softened by heating and hardened by cooling.

For continuous thermoplastic pavement marking, 100 mm drainage gaps shall be provided, at a maximum spacing of 3m, to allow adequate drainage of the pavement surface. Nominate the method of identifying the location and spacing for these gaps.

16.8 COLD APPLIED PLASTIC MATERIALS

Use approved plastic pavement marking materials to *APAS AP-S0041/36 Cold Applied Plastic*.

Documentation Point 68 – Obtain approval for use of cold applied plastic materials.

Documentation Point 69 - Provide evidence that all proprietary cold applied plastic material products, such as epoxy or plastic products, have demonstrated satisfactory field performance for a period of at least three years.

Material – Generally: A two part Poly Methyl Methacrylate resin based pavement marking material that complies with the requirements for colour, luminance and bead content of AS 4049.2, and which complies with AS 4049.4, sprayed or screeded onto the Pavement, containing pre-mixed glass beads, with additional drop-on beads being added during application, conforming with the following requirements of AS 4049.2: Clause 5.1 – Colour, Clause 5.2 – Luminance, and Clause 7 - Field Testing. The material must have a maximum no-pick-up time of 60 minutes.

Do not use cold applied plastic materials on new works for Infrastructure Category A.

16.9 PAVEMENT MARKING SETTING OUT

The location of all pavement markings on new surfaces, including RRPMs, must be set out by spotting with paint or other approved method prior to application of the markings.

Ensure the distance between the centre line of the marking and the centre line of the set out mark is less than 30 mm. The apparent line of the markings must be a smooth continuous alignment when viewed in the direction of the line.

New work: Set out line marking to the line pattern specified in accordance with AS 1742 and Standard Drawings for Line Marking, including the setting out of arrows, letters, numerals, chevrons and RRPMs.

Remarking: Remark along the line of the existing line marking and to the tolerances specified for new work.

16.10 PAVEMENT MARKING APPLICATION

Apply the marking materials using a self-propelled mobile sprayer, hand sprayer, hand painting or hand screeding as directed by the Relevant Authority.

Documentation Point 70 – Submit details of type of equipment to be used for applying Pavement marking materials.

Documentation Point 71 - Submit documented evidence to show that the pavement marking spraying equipment has been calibrated in accordance with NTTM 405.1 and with PCCP requirements and is certified by PCCP as being suitable for the Development Works to be carried out.

Substrate: Ensure that the Pavement surface is free from dirt, loose detritus, mud and other extraneous matter, and is dry before and after painting operations.

Protect all applications from traffic until the binder has hardened sufficiently to retain the glass beads.

Produce markings so that they are straight, with smooth even curves where necessary. Remove any marking material beyond the defined marking leaving a neat and smooth marking on the pavement.

Produce markings free from ghosting and raggedness on the sides and ends and parallel with the general alignment of the Carriageway with the lines level, uniform and free from streaks.

Reinstate pavement markings that are damaged by traffic during paint drying time and remove all tyre pickup marks.

16.10.1 Longitudinal Application

Apply the marking materials using a self-propelled mobile sprayer having a minimum capacity of 200 litres of paint.

Apply paint evenly to the Pavement surface at the specified film thicknesses and immediately after apply an even application of glass beads at the specified rates.

On all new work, apply one coat of paint and glass beads to the Pavement in the direction of traffic flow.

For remarking, apply one coat of paint and glass beads to the surface in the direction of traffic flow.

16.10.2 Transverse and Other Marking Applications

Apply the marking materials using a self-propelled or hand sprayer with a capacity of 20 litres of paint.

Apply paint evenly to the Pavement surface to the specified film thickness and immediately after apply an even application of glass beads at the specified rates.

16.10.3 Markings on Concrete Pavement

Prime the concrete Pavement surface with an approved primer before applying markings. Allow sufficient time for primer to cure to manufacturer's recommendations before applying markings.

16.10.4 Glass Beads

Apply glass beads by low pressure or delivered by gravity dispenser, D-HR beads may require application by static drop method in conjunction with air pressures to retain beads.

Maximum application speed for glass beads shall be as per manufacturer's recommendations.

The application rates specified for glass beads are the amounts that are retained in the painted surface after three weeks of trafficking.

Ensure that the loss in glass beads after three weeks traffic does not exceed ten per cent of total applied.

16.11 CONFORMANCE AND TOLERANCES

Documentation Point 72 – Provide evidence that the complete Pavement marking complies with the requirements of this specification.

Pavement marking must conform to the following tables:

- *Table 16-1 - Application Rates – All Longitudinal and Transverse Pavement Markings*
- *Table 16-2 - Application Times – All Longitudinal and Transverse Pavement Markings*
- *Table 16-3 – Dimensional Tolerances for Pavement Markings*

Remove defective marking by sand blasting, or other approved methods, make good the surface in an approved manner.

Remark all Pavement marking at the end of the Defects Liability Period.

Table 16-1 - Application Rates – All Longitudinal and Transverse Pavement Markings					
Infrastructure Category	**Works**	**Wet film paint thickness**	**Dry film paint thickness**	**Glass beads type**	**Rate of glass beads to be retained**
Infrastructure Category A	Initial marking	> 0.360 mm	> 0.230 mm	B-HR	> 300g/m^2
	Remarking	> 0.515 mm	> 0.330 mm	D-HR	> 400g/m^2
Infrastructure Category B to E	Initial marking	> 0.360 mm	> 0.230 mm	B-HR	> 300g/m^2
	Remarking	> 0.360 mm	> 0.230 mm	B-HR	> 300g/m^2
Notes: 1. Paint film thickness tolerances exclude surface applied glass beads.					

Table 16-2 - Application Times – All Longitudinal and Transverse Pavement Markings			
Infrastructure Category	**Works**	**Longitudinal Markings**	**Transverse Markings**
Infrastructure Category A	Initial marking	Before opening of works to traffic	Before opening of works to traffic
	Resurfacing/ Resealing	Within 2 Calendar Days	Hold lines – 1 Calendar Day Other lines - within 2 Calendar Days
	Remarking	9 months maximum	9 months maximum
Infrastructure Category B to E	Initial marking	Before opening of works to traffic	Before opening of works to traffic
	Resurfacing/ Resealing	Within 21 Calendar Days	Within 21 Calendar Days
	Resurfacing/ Resealing – Overtaking Lanes	Within 5 Calendar Days	Within 5 Calendar Days
	Remarking	3 to 6 months	3 to 6 months

Table 16-3 – Dimensional Tolerances for Pavement Markings		
Properties	**Tolerances**	
	New work	**Remarking work**
Locations of centrelines of markings	< 20 mm from locations as shown on drawings	+/- 5 mm
Widths of lines	+/- 5 mm	+/- 10 mm
Lengths of lines	+/- 50 mm	+/- 100 mm
Locations of arrows, chevrons, letters, numerals	+/- 50 mm	+/- 50 mm
Deviation and/or trueness of lines	< 15mm in 2 metres	< 15mm in 2 metres

16.12 FIELD TESTING

Undertake the following Conformance Testing:

Wet film thickness: Check the thickness of the wet film applied to the Pavement by the method NTTM 401.1 - Operation of Wet Film Thickness Comb.

Glass bead application: Check the application rate of glass beads to the surface of the marked line by the method NTTM 402.1 - Field Procedure for Measurement of the Rate of Application of Spherical Glass Beads.

Wear assessment limits: The degree of wear is defined as the area of Pavement marking remaining after a period of time, relative to the initial area of the Pavement marking.

Degree of wear: At the Relevant Authority's discretion, determine the degree of wear using Image Analysis in accordance with AS 4049.3:2005 Appendix K, Method A, Photographic Method.

Wear limits for Pavement marking: 95% intact area after six months.

Remark Pavement marking that does not conform to the specified limits.

16.13 RAISED RETROREFLECTIVE PAVEMENT MARKERS (RRPMS)

Use Raised Retroreflective Pavement Markers (RRPMs) conforming to AS/NZS 1906 Retroreflective materials and devices for road traffic control purposes.

Documentation Point 73 – Submit details in relation to the manufacturer's warranties, performance, durability and maintenance of the raised retroreflective pavement markers.

Provide raised retroreflective pavement markers with the following attributes:

Table 16-4 – Raised Retroreflective Pavement Markers Dimensions

Aspect	Dimension
Height (above pavement level when installed)	18 – 25 mm
Width at right angles to the direction of the traffic	110 – 130 mm
Length parallel to the direction of the traffic	80 – 110 mm

16.13.1 Materials

Use markers fixed to the Pavement surface as recommended by the manufacturer of the marker.

Use adhesives as recommended by the manufacturer.

Use adhesives within the time recommended by the adhesive manufacturer.

16.13.2 Pavement Preparation

Clean the Pavement.

Ensure each RRPM site is free of dirt, oil, grease, paint and any other material which would affect the bond of adhesive to the Pavement.

Abrasive blast, chip, or burn Pavements that cannot be cleaned by sweeping.

Do not place markers if moisture is present. Ensure pavement is dry before applying markers.

16.13.3 Placing Markers

Place markers in accordance with AS 1742.3 and Standard Drawings.

Place the reflectors to face the oncoming traffic.

Do not obscure the reflective faces by adhesive.

Ensure that the surface finish is smooth.

Discard markers which are not positioned correctly within the time recommended by the manufacturer for use of the adhesive. Remove stale adhesive from the Pavement surface.

Do not place markers over joints in concrete pavement.

Wear limits for pavement markers: 95% intact area after six months.

Replace markers that have dislodged within 12 months of installation.

16.14 REMOVAL OF PAVEMENT MARKINGS

Documentation Point 74 – Obtain approval of the method used for line marking removal before commencing removal operations.

Removal of Pavement marking must not adversely affect the integrity of the Pavement surface.

When Longitudinal and Transverse Markings are removed, the marks left on the Pavement surface must not confuse the motorist with ghosting or incorrect directions. Where removal is outside of 100 mm of the existing lines then the entire width of the lane is to be consistent with the line removal texture.

When arrows, letters or figures are to be removed or temporarily blacked out, the removal pattern must be in the shape of a rectangle or square to minimise confusion to the motorists.

Remove all materials and debris generated by removal operations from the Development Site and dispose of lawfully. Repair any surface Defects caused by the removal process.

The following methods may be considered and will be dependent on the type of surface, extent and application.

16.14.1 Resealing and Asphalting

Spray sealing and/or Asphalt replacement is the preferred method for replacement. Determination of materials must be in accordance with existing materials. Conform to specification requirements.

Where this method is used, the reworking needs to be for the full width of the Pavement.

16.14.2 Sandblasting or Water Blasting

This methodology is the preferred method for marking removal on asphalt and concrete surfaces.

Use a skirt or guard around the blaster to minimise the spraying of material away from the immediate work area.

Remove waste material before it can be transported by rain, wind or traffic. This will generally require the use of a vacuum attachment operating concurrently with the blasting operation or alternative method approved by the Relevant Authority.

16.14.3 Machine Grinding

This method may be considered for use on smaller removal jobs where surface finish is not a concern. It can be used on most asphalt and concrete surfaces.

16.14.4 Paint Blackout

Paint blackout may be considered as a temporary measure only and must be removed upon completion of the Development Works.

16.14.5 Other Methods

Other methods such heat lance or paint stripping may also be considered, where approved by the Relevant Authority.

16.14.6 Raised Reflective Pavement Marker Removal

Where required, remove raised Pavement markers by breaking the bond between the adhesive, the street surface and the base of the raised Pavement marker.

Repair all divots caused by the removal of raised Pavement markers with hot melt adhesive or epoxy adhesive to the level of the surrounding Pavement.

16.15 REPORTING

Documentation Point 75 – Submit pavement marking reports.

Reports to contain the following information, in Microsoft Excel spreadsheet format:

- Date
- Street ID
- Chainages – start point and finish point of each section of works
- GPS coordinates in Decimal Degrees - start point and finish point of each section of works
- Type of carriageway – inbound / outbound (for duel carriageways) and full width (for two way carriageway)
- Bead size used and Paint application rate

17. LANDSCAPE

17.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 2303	Tree stock for landscaping use
AS 2698(set)	Plastic pipes and fittings for irrigation and rural applications
AS 2698.2	Polyethylene rural pipe
AS 2698.3	Mechanical joint fittings for use with polyethylene micro-irrigation pipes
AS/NZS 3500(set)	Plumbing and drainage
AS 4373	Pruning of amenity trees
AS 4419	Soils for landscaping and garden use.
AS 4454	Composts, soil conditioners and mulches
AS/NZS 4685(set)	General Safety Requirements and Test Methods
AS 4486	Playgrounds and Playground Equipment Development, Installation, Inspection, Maintenance and Operation.

17.2 MATERIALS

Refer to AS 2303 for tree stock requirements.

17.2.1 Trees, Shrubs and Ground Covers

Provide trees, shrubs and ground covers which have the following characteristics:

- Trunks/stems to be sturdy and well hardened.
- A well-developed vigorous root system.
- A minimum of three months in their container.
- Be sound, healthy, vigorous, and free from insect pests, plant diseases, sun scalds, fresh abrasions of the bark, or other disfigurements.

17.2.2 Rock

Site rock: Rock which has been salvaged and stockpiled onsite for placement in landscaping works. Remove all other rock from the Development Site and dispose of lawfully.

Imported rock: Rock which has been selected prior to delivery. Types may include Granite spalls, Porcelinite, Acacia Blue, Coffee Rock and Weathered Limestone.

17.2.3 Grass

Provide Certified Seed with an appropriately numbered seed analysis report or certificate cross referenced to the number on the seed packaging.

Documentation Point 76 – Submit grass seed certificates prior to application of grassing.

Seed must be used only if its report or certificate has been issued within the previous six months.

Seed used must be true to label.

Seed must have minimum Germination Percentage of 80%.

Certified Seed must comply with the following purity characteristics:

- Clean seed, minimum 94% by weight.
- Weed seed, maximum 0.2% by weight.
- Other crop seed, maximum 0.8% by weight.
- Inert matter, maximum 5.0% by weight.
- Must not contain any species of plants declared as a weed under the *Weeds Management Act 2001 (NT)*.

Certified Seed mixes must conform to the requirements of the Relevant Authority.

Grass to exhibit 90% Ground Cover prior to the Practical Completion Date.

Grass to achieve 100% Ground Cover prior to end of Defects Liability Period.

17.2.4 Fertiliser

Fertilisers must be stored in waterproof sealed bags under shelter away from water and direct sunlight.

Fertilisers must conform to *Table 17-3 - Fertilisers*.

17.2.5 Site Topsoil

Topsoil excavated from the Development Site which has the following characteristics:

- Contains organic matter; and
- Supports plant life.

Inspection Point 29 – Obtain approval for re-use of site topsoil on the Development Site prior to application.

17.2.6 Imported Topsoil

Imported topsoil must be Certified to comply with AS 4419 and the following requirements:

- Be free draining;
- Be red-brown or black sandy loam;
- Contain no grass or weed growth;
- Maximum stone size of 50 mm; and
- Must not contain any material from plant species declared as weeds under the *Weeds Management Act 2001 (NT)*.

Documentation Point 77 - Submit Certified test reports and associated delivery dockets confirming imported topsoil complies with AS 4419.

17.2.7 Insecticide

Use Fipronil (or similar Approved) for termite control.

Insecticide must be used strictly in accordance with the manufacturer's specifications.

17.2.8 Mulch

Organic

- Must be stable, free from impurity, and be sufficiently heavy to prevent dispersal by wind.
- Must be shredded bark, wood chips or similar.
- Wood chips must be a maximum size of 50 mm, inert, and must be free of resinous toxins and termites.
- Must conform generally to AS 4454.

Inorganic

- Must be washed and screened lateritic gravel or brick chips with particle sizes in the range 6 mm minimum to 25 mm maximum.

Imported Mulch

Documentation Point 78 – Submit Certified test reports ad associated delivery dockets confirming imported mulch complies with AS 4454.

17.3 SITE PREPARATION

17.3.1 Setting Out

The Developer is responsible for accurately setting out the works in accordance with the Construction Drawings.

Trees must be installed with consideration of the following:

- provision of clear sightlines at vehicular intersections;
- clearance from light poles and CCTV to prevent compromising light spills and CCTV Views.
- provision of clear sightlines of pedestrians and cars at driveways and pedestrian crossing locations; and
- 3 metres vegetation clearance to fire hydrants.
- do not obscure traffic signs, signals, or other essential roadside features.

17.3.2 Protection of Existing Vegetation

Ensure all trees, shrubs, and other vegetation to be retained within the limits of work are protected in accordance with AS 4970 protection of trees on development sites.

Protect vegetation prior to commencing construction work in the vicinity of that vegetation.

Do not place or dump any chemical type materials including oil, paint, bituminous products, fuels, and cement/concrete near the vegetation. Prevent windblown chemical type materials, such as cement, from affecting vegetation.

Do not stockpile bulk materials - such as spoil from excavation, boulders, cleared vegetation - under or near vegetation. Ensure spoil is not placed against trunks.

Do not remove topsoil from within the dripline (i.e. canopy area) of trees to be retained unless essential to the works. For excavation within the dripline, keep open as short a period as possible and use excavation methods that preserve the root system intact and undamaged.

Where excavation around the root system is unavoidable, non-mechanical excavation methods such as hydro excavation must be used.

Cut roots only where it is absolutely necessary. When cutting roots ensure cuts are made with a clean bladed saw to the minimum number of roots possible. Under no circumstances are roots to be pruned using excavation machinery.

Backfill excavation around tree roots with material of at least comparable quality to that excavated. Consolidate backfill and do not backfill around trunks above the original level. Thoroughly water backfilling.

Avoid damage to overhead limbs by machinery. Only remove the minimum amount required if limbs must be removed to allow machinery to work.

Where branches are to be removed, cut them back to the branch collar. Pruning should be undertaken by a qualified arborist and conform to AS 4373.

17.3.3 Clearing and Grubbing

Conform to *Section 3 – Clearing, Grubbing and Rehabilitation*.

17.3.4 Earthworks

Conform to *Section 4 - Earthworks*.

17.3.5 Subgrade Cultivation

Prepare Subgrade prior to spreading of topsoil.

Rip Subgrade to a depth of min 200mm across the direction of slope and cultivate so that the sub-surface soil can be worked freely to a minimum depth of 150mm.

Areas to be ripped must not be worked when subsoil is wet or plastic.

Do not disturb services or tree roots; if necessary cultivate these areas by hand. Cultivate manually within 300 mm of paths and structures, and other infrastructure which may be damaged.

Allow for clearing and removing stones exceeding 25mm, perennial weeds and any rubbish or other deleterious material brought to the surface during cultivation.

During cultivation, thoroughly mix in any materials required to be incorporated into the subsoil.

Trim surfaces to specified levels after cultivation.

17.4 TOPSOIL

17.4.1 Source

Use compliant site topsoil or imported topsoil from an approved off-site source. Refer to *Clauses 17.2.5 –Site Topsoil* and *17.2.6 – Imported Topsoil*.

17.4.2 Placing topsoil

Spread the topsoil on the prepared subsoil and grade evenly, making the necessary allowances to permit the following:

- Required finished levels and contours may be achieved after light compaction.
- Grassed areas may be finished 20mm lower than adjacent hard surfaces such as kerbs, paths and mowing strips.

17.4.3 Consolidation

Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil in excess of 50 mm diameter.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting.

17.4.4 Topsoil depths

Spread topsoil to the following typical depths:

- Grassed areas: 100mm
- Garden beds: 300mm
- Refer Construction Drawings for nominated topsoil depths, where slopes exceed 1:6.

17.5 ROCKWORK

Use approved Site Rock, otherwise provide Imported Rock. Refer to *Clause 17.5 - Rockwork*.

Place rocks while earthworks is being carried out.

Bury rock two thirds by volume, with weathered faces exposed. Protect the weathered faces from damage. Ensure all rock faces have no sharp edges or laminating faces.

17.6 EDGING

Supply and install 150mm wide x 150mm deep concrete edging to all garden beds, tree pits, planter boxes, between garden beds and loose surface finishes, and grassed areas and edge of retained trees and vegetation.

17.7 GRASSING

17.7.1 Topsoil Preparation

Bring the area to a Fine Tilth and conform to the prescribed finished levels prior to the placement of grass seed.

17.7.2 Supply of Grass Seeds

Supply fresh Certified Seeds conforming to *Clause 17.2.3 – Grass*. Certified Seed mixes must conform to the requirements of the Relevant Authority.

17.7.3 Fertiliser Application

Apply fertiliser complying with *Table 17-3 - Fertilisers* with minimum application rates in accordance with *Table 17-5 - Fertiliser Application Rates*, to the finished topsoiled surface and lightly work into the soil.

The fertiliser may be applied simultaneously with the grass seed.

17.7.4 Application

Apply Certified Seed in accordance with the mixture application rate nominated by the Relevant Authority, as a minimum, to the prepared topsoiled surface and lightly work into the soil.

The grass seed may be applied simultaneously with the fertiliser.

Apply seed uniformly by mechanical means or hydro-mulching. Hand distribution must only be used in areas inaccessible to machinery.

The seed must be sown on a calm day and applied in two equal sowings in transverse directions.

17.7.5 Reseeding

Reseed any areas that fail to gain 90% Ground Cover prior to the Practical Completion Date.

Bring area requiring reseeding to a fine tilth by hand raking only.

17.7.6 Establishment

Irrigate and fertilise grassing to maintain it in a healthy condition.

Maintain grassed area free of all weeds and insects.

Ensure grass has and maintains uniform Ground Cover with active growth.

17.7.7 Mowing

Mow the grass to maintain a maximum height as follows:

- Residential/mixed use zones: 70mm
- Industrial zones: 70mm
- Rural zones: 150mm

17.8 PLANTING

17.8.1 General

Refer to Standard Drawings for typical planting details generally.

17.8.2 Setting Out of Holes

Accurately set out the locations for trees/shrubs to be planted in accordance with the Construction Drawings.

Inspection Point 30 - Obtain approval of the planting set out before commencing any planting.

17.8.3 Preparation and Treatment of Holes

Identify all cable and services locations prior to excavating any holes.

Prepare holes initially in accordance with *Table 17-4 – Initial Planting Hole Preparation Chart***.**

Remove excess excavated material, rubbish and cut vegetation from the Development Site.

Excavate planting holes by mechanical or manual means, as appropriate.

Size of planting holes must be as shown on the Standard Drawings.

Cultivate the subgrade and scarify the sides of holes.

Treat planting holes in hard, dense material prior to planting by:

- placing 1 kg Gypsum or Claybreaker around the sides and bottom of the hole; and
- filling hole with water and allowing to drain.

Treat holes with Fipronil in accordance with manufacturer's instructions prior to planting.

Inspection Point 31 - Provide notification of completing preparation and treatment requirements for plant holes.

17.8.4 Supply of Plants

Place an order with an approved nursery for the supply of all plants required to complete the works.

Supply plants conforming to AS 2303 – 'Tree Stock for Landscape Use' and pruned in accordance with AS 4373 Pruning of 'Amenity Trees'. Trees grown in air root pruning pots are preferred. Trees that do not conform with the nominated Standards must be rejected.

Ensure that a minimum of five number or 5%, whichever is the greater, additional plants of each species nominated is available if necessary for replacement purposes.

Remove immediately from the Development Site all dead, dying or diseased plants and replace with new plants of the same species.

Alternative plant species, other than those nominated in the approved Construction Drawings, must not be used in the Development Works without approval.

Documentation Point 79 – Obtain approval for use of alternative plant species, prior to ordering plants.

Plant species for use in stormwater quality treatment systems (e.g. lakes, wetlands) must not be substituted.

17.8.5 Treatment of Plants

Containerised plantings must be well watered prior to despatch from the nursery and must remain in the containers until required for planting.

Protect all plants during transportation, against excessive sunlight, wind and drought.

Trees and shrubs which are not immediately planted must be stood upright on level ground, protected and maintained in good condition by the Developer.

Replace immediately all plantings which have become damaged, gone missing or fallen below the specified standards for supply.

Drive any tree stakes required into the ground before planting so as not to damage the Root Ball.

For the duration of the Defects Liability Period, check regularly for any termite/insect attack or fungal infestation and carry out eradication by use of sprayed insecticide or fungicide in accordance with the manufacturer's specifications.

17.8.6 Planting of Trees, Shrubs and Ground Cover

Planting must take place only in conditions where shaded temperature is below 32 °C.

Root barriers must be installed to street trees adjacent to services and footpaths. Refer Standard Drawings for root barrier placement. Ensure root barriers do not encircle trees.

Maintain the integrity of the plant root zone and the surrounding earth mound.

Place fertiliser in the hole adjacent to, but not in contact with, the root zone of the plant. Fertiliser must be in accordance with *Table 17-3 - Fertilisers*. Application rates in accordance with *Table 17-5 - Fertiliser Application Rates***.**

17.8.7 Backfilling

Backfill material must be in accordance with *Table 17-4 – Initial Planting Hole Preparation Chart***.**

Backfill the hole to finished surface level, firming progressively, so that the plant is contained firmly in the ground in a vertical position.

Work surface fertiliser into top 50 mm of backfill. Fertiliser must be in accordance with *Table 17-3 - Fertilisers*. Application rates in accordance with *Table 17-5 - Fertiliser Application Rates*.

Water backfill material immediately after surface fertilisation to ensure no air voids or loose material surround the plant root zone.

17.8.8 Mulching

Supply Mulch as specified that is free from weeds, seeds, sticks, stones, insects, diseases and other deleterious matter.

Provide organic Mulch in a 100 mm thick compacted layer to cover the radius of the planting hole. Shape to create a 400mm diameter watering basin around the main stem.

Ensure a gap of 100 mm is retained between the main stem and the Mulch.

17.8.9 Maintenance

Establish and maintain all garden beds and planting areas during the Defects Liability Period, including:

- irrigating and fertilising to maintain all vegetation in a healthy condition;
- maintaining 100mm organic Mulch;
- eradicating all weeds to a schedule agreed with the Relevant Authority; and
- Pruning to conform to *AS4373 – 'Pruning of Amenity Trees'*.

17.9 HYDROSEEDING

17.9.1 General

Use an approved hydraulically-applied proprietary erosion control Engineered Fibre Matrix (EFM) product.

The EFM is to be 100% biodegradable, and is to be composed of 100% recycled, thermally refined (within a pressurized vessel) virgin wood fibres, crimped interlocking biodegradable fibres, mineral activators and Soil Binding Agents (including high-viscosity colloidal polysaccharides, cross-linked biopolymers, and water absorbents).

The EFM is to be phytosanitized, free from plastic netting, and when cured is to form an intimate bond with the soil surface to create a continuous, porous, absorbent and flexible erosion resistant blanket that allows for rapid germination and accelerated plant growth.

The EFM is to perform as a Bonded Fibre Matrix (BFM) product and may require a 4-24 hour curing period to achieve maximum performance.

17.9.2 Developer Submissions

Product Data:

Documentation Point 80 - Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials and application rates.

17.9.3 Delivery, Storage, and Handling

Deliver materials and products in UV and weather-resistant factory labelled packages.

Store and handle in strict compliance with manufacturer's instructions and recommendations.

Protect from damage, weather, excessive temperatures and construction operations.

17.9.4 Materials

The EFM must conform to the following typical property values when uniformly applied at a rate of 3,900 kilograms per hectare under laboratory conditions.

Table 17-1 - Engineered Fibre Matrix Properties

Property	**Test Method**	**Required Tested Value**
Physical		
Mass Per Unit Area	ASTM D6566[1]	≥ 390 g/m^2
Thickness	ASTM D6525[1]	≥ 4 mm
Ground Cover	ASTM D6567[1]	≥ 98%
Water Holding Capacity	ASTM D7367	≥ 1,400%
Material Colour	Observed	Green

Table 17-1 - Engineered Fibre Matrix Properties		
Performance		
Cover Factor[2]	Large Scale Testing	≤ 0.05
% Effectiveness[3]	Large Scale Testing	≥ 95 %
Cure time	Observed	4 – 24 hours
Vegetation Establishment	ASTM D73221	≥ 600 %
Functional Longevity[4]	ASTM D5338	≤ 12 months
Environmental		
Ecotoxicity	EPA 2021.0 (USA)	48-hr LC50 > 100%
Biodegradability	ASTM D5338	Yes

NOTES

1. ASTM test methods developed for Rolled Erosion Control Products and have been modified to accommodate Hydraulically-Applied Erosion Control Products.
2. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.
3. % Effectiveness = One minus Cover Factor multiplied by 100%.
4. Functional Longevity is the estimated time period, based upon ASTM D5338 testing and field observations, that a material can be anticipated to provide erosion control and agronomic benefits as influenced by composition, as well as site-specific conditions, including; but not limited to – temperature, moisture, light conditions, soils, biological activity, vegetative establishment and other environmental factors.

17.9.5 Composition

All components of the EFM shall be pre-packaged by the Manufacturer to assure both material performance and compliance with the following values.

- Thermally Processed* (within a pressurized vessel) Virgin Wood Fibres – 77%
  - *Heated to a temperature greater than 193 degrees Celsius for 5 minutes at a pressure greater than 345 kPa.
- Soil Binding Agents (including high-viscosity colloidal polysaccharides, cross-linked biopolymers, and water absorbents) – 18%
- Crimped Biodegradable Interlocking Fibres – 2.5%
- Micro-Pore Granules – 2.5%

Under no circumstances shall field mixing of components be permitted.

No chemical additives with the exception of fertilizer, soil neutralizers and biostimulant materials should be added to this product.

Documentation Point 81 – Obtain approval for use of chemical additives to hydroseeding mixes other than fertilizer, soil neutralizers and biostimulant materials.

17.9.6 Substrate and Seedbed Preparation

Examine substrates and conditions where materials will be applied.

Apply products to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope.

Do not proceed with installation until satisfactory conditions are established.

Depending upon project sequencing and intended application, prepare seedbed in compliance with other specifications.

17.9.7 Installation

Strictly comply with equipment manufacturer's installation instructions and recommendations.

Use approved hydroseeding machines with fan-type nozzle (50-degree tip).

To achieve optimum soil surface coverage, apply EFM from opposing directions to soil surface.

Rough surfaces (rocky terrain, cat tracked and ripped soils) may require higher application rates to achieve 100% cover.

Slope interruption devices or water diversion techniques are recommended when slope lengths (3H:1V) exceed 15m. Slope interruption intervals may need to be decreased based on steeper slopes or other site conditions.

EFM is not recommended for channels or areas with concentrated water flow unless used in conjunction with a rolled erosion control product designed to accommodate the anticipated hydraulic conditions.

For erosion control and revegetation: to ensure proper application rates, measure and stake area.

For maximum performance, apply EFM in a two-step process:

Step One: Apply fertilizer with specified prescriptive agronomic formulations and typically 50% of specified seed mix with a small

amount EFM for visual metering. Do not leave seeded surfaces unprotected, especially if precipitation is imminent.

Step Two: Mix balance of seed and apply EFM at a rate of 22.7 kg per 316 litres of water over freshly seeded surfaces. Confirm loading rates with equipment manufacturer.

Depending upon site conditions EFM may be applied in a one-step process where all components may be mixed together in single tank loads. Consult with Manufacturer for further details.

Best results and more rapid curing are achieved at temperatures exceeding 15°C. Curing times may be accelerated in high temperature, low humidity conditions with product applied on dry soils.

Mixing: Use a mechanically agitated hydroseeding machine:

- Fill 1/3 of mechanically agitated hydroseeder with water. Turn pump on for 15 seconds and purge and pre-wet lines. Turn pump off.
- Turn agitator on and load low density materials first (i.e. seed).
- Continue slowly filling tank with water while loading fibre matrix into tank.
- Consult application and loading charts to determine number of bags to be added for desired area and application rate. Mix at a rate of 22.7 kg per 316 litres of water.
- All EFM should be completely loaded before water level reaches 75% of the top of tank.
- Top off with water and mix until all fibre is fully broken apart and hydrated (minimum of 10 minutes — increase mixing time when applying in cold conditions). This is very important to fully activate the bonding additives and to obtain proper viscosity.
- Add fertilizer and any other approved additives.
- Shut off recirculation valve to minimize potential for air entrainment within the slurry.
- Slow down agitator and start applying with a 50-degree fan tip nozzle.
- Spray in opposing directions for maximum soil coverage.

Application Rates: The following application rates are for standard conditions. Increase application rates on rough surfaces.

Refer to Manufacturer's information for additional details including mixing ratios/loading rates for specific machine sizes and visual keys for proper application.

Table 17-2 - Application Rates	
Slope Gradient / Condition	Application rate
≤ 4H to 1V	2,800 kg/ha
> 4H to 1V and ≤ 3H to 1V	3,360 to 3,400 kg/ha
> 3H to 1V and ≤ 2H to 1V	3,900 to 3,920 kg/h
> 2H to 1V and ≤ 1H to 1V	4,480 to 4,500 kg/ha
For slopes steeper than 1H to 1V use alternative stabilization methods.	
H = horizontal V = vertical	

17.9.8 Cleaning and Protection

Clean spills promptly.

Do not allow treated areas to be trafficked or subjected to grazing.

17.9.9 Inspection and Maintenance

Initial inspections must ensure installations are in accordance with the project plans and specifications with material quantities and activities fully documented.

Subsequent inspections must be conducted at pre-determined time intervals and corrective maintenance activities directed after each significant rainfall event or other potentially damaging weather or site event.

17.10 IRRIGATION

17.10.1 General

Irrigate all soft landscaping during the Defects Liability Period. Where permanent irrigation is absent, temporary irrigation may be required to assist with establishment and maintenance of soft landscaping.

Remove all temporary irrigation installed must prior to completion of the Defects Liability Period, unless otherwise agreed with the Relevant Authority.

17.10.2 Irrigation Systems

General

Standard: To AS/NZS 3500.1

Place a high priority on avoiding surface runoff when selecting system components. Use low trajectory sprinklers where possible. Select components to keep the sprinkler precipitation rate below the infiltration rate of the soil and/or use repeat cycles to allow water to soak into the root zones.

Where possible, separate station/zones for irrigation at the top and bottom of sloped areas.

Irrigation system to be designed to the Relevant Authority irrigation system requirements.

Documentation Point 82 – Submit irrigation designs prior to installation of irrigation systems.

Materials

Pipework upstream of control valves: Use uPVC class 12.

Pipework downstream of control valves: Use uPVC class 9 or high-density polyethylene.

Performance

Coverage (mm of water over area to be watered):

- 50 mm per week, applied as two applications of 4mm per day, during the first 13 weeks.
- Progressively hardening off to suit the local conditions during the remainder of the Defects Liability Period.

Ensure that final water usage is such that plant health and vigour is maintained without wastage of water.

17.10.3 Water Source

Documentation Point 83 - Liaise with the Service Authority and obtain approval for connections in relation to water supply requirements.

Carry out the excavation necessary to locate and expose the connection point. On completion, reinstate any surfaces and elements which have been disturbed.

Fit a backflow prevention device as required to meet the approval of the Service Authority.

17.10.4 Telemetric Control Station Details

Telemetric operated Irrigation control stations must be constructed to comply with the Relevant Authority requirements.

17.11 SHADE STRUCTURES

17.11.1 Construction

Construct all shade structures in accordance with the Construction Drawings.

17.11.2 Permits and Certification

Obtain all necessary Building Permits and Certification.

Documentation Point 84 – Submit a copy of all Building Permit(s) and Certificate(s) of Occupancy.

17.12 SPORTING AND PARK FURNITURE AND EQUIPMENT

Supply all park furniture and play equipment as specified in Construction Drawings and in accordance with all relevant Australian Standards including, but not limited to, AS 4422, AS 4486 and AS 4685.

Install all park furniture and play equipment in accordance with manufacturer's specifications, unless advised otherwise by the Relevant Authority.

All soft fall areas must be constructed with subsoil drainage in accordance with *Clause 13.10 – Subsoil Drains*.

Any concrete works, such as footings, are to be carried out in accordance with Structural Concrete Works Section and Construction Drawings.

17.13 LANDSCAPE MAINTENANCE

The Defects Liability Period is 12 months for landscaping works, including grassing and planting.

Where existing grassing or planting is within the Development Site, maintain it as for the corresponding classifications of new grassing or planting.

Throughout the Defects Liability Period, carry out maintenance work including, watering, mowing, weeding, fertilising, pest and disease control, reseeding, returfing, staking and tying, replanting, cultivating, pruning, hedge clipping, aerating, reinstatement of Mulch, renovating, top dressing, and keeping the Development Site neat and tidy.

Replace diseased or poorly formed plants.

Commence grass maintenance works at the completion of sowing, hydroseeding and turfing. Maintain healthy weed-free growth.

17.14 LANDSCAPE TABLES

Table 17-3 - Fertilisers			
Use	**General Plant Category**	**Where Used**	**Component Requirements**
Planting	Native	Surface	Native Plant Feed Mix
	Exotic	Surface	Exotic Planting and Feeding Mix
	Native and/or Exotic	Hole	Granular or Tablet Slow Release (6 month minimum) 20:10:10 NPK Ratio
Feeding	All existing plants	Surface	As for Planting - Surface
Grassing	All seeding, both new and existing	Surface	Fast Release 15:7:7 NPK Ratio Trace Elements
Do not use fertiliser with Grevillia and Banksia plant varieties.			

Table 17-4 – Initial Planting Hole Preparation Chart				
Land Categories and Soil Characteristics				
Land Categories	**Category 1 - Marine Sediments**	**Category 2 - Soil and Gravel** (depth greater than 600 mm)	**Category 3 - Shallow Soils**	**Category 4 - Surface Rock** (soil depth overlaying rock less than 600 mm)
Visual appearance	Grey and brown muds, silts and clays: occasionally pale beach sands	Usually red, yellow and brown sandy loams to sandy clay loams with varying amounts of ironstone gravel; occasionally siltstone and quartz gravel	Soil material similar to Category 2, overlaying laterite on siltstone*	Very little or no soil; extensive areas out of cropping laterite on siltstone*
Operational Steps				
Initial Rock Break	-	-	-	Rip and rock break.
Initial Excavation	Hole size dependent upon species and area	Excavate to 600 mm.	Excavate hole until machine rejection (commonly bed rock layer).	Excavate hole to 600 mm minimum.
Secondary Rock Break	-	-	Rock break bottom to a depth of 1200 mm.	Rock break bottom further 600 mm down.
Secondary	-	Excavate rocks.	Excavate rocks greater than 150 mm.	Excavate rocks greater than 150 mm.
Excavation Hole Backfilling	In situ excavated material	If excavated soil has less than 30% gravel, then no additive is required.	Backfill with imported topsoil.	Backfill with imported topsoil.
		If excavated soil has 30 to 70% gravel, then a 50% mixture with imported topsoil is required. If excavated soil has greater than 70% gravel, then backfill of imported topsoil is required.	NOTE If existing soil is free draining or humic, then it may be substituted for imported topsoil.	
* Laterite - rough textured rock, reddish brown in colour, with orange and yellow mottles (splotches of colour), contains ironstone gravels and pores. * Siltstone - relatively smooth textured, white, reddish and yellowish layered rock, often with mottles. No ironstone gravel and pores.				

Table 17-5 - Fertiliser Application Rates		
Plant Type, Use, Planting Method	**Size of container or plant**	**Application Rate per container or per plant**
Native, Planting Surface	Tube stock 150 mm container 200 mm container 250 mm container 300 mm container 20 litre bag	10 g 30 g 80 g 100 g 150 g 300 g
Exotic, Planting, Surface	Plant height: 0.5 m 1.0 m 2.0 m	 100 g 200 g 300 g
Native and/or Exotic, Planting, Hole	Ground covers and shrubs 10 cm tall Ground covers and shrubs 20 cm tall	10 g 20 g
	Plants to 1 m Plants to 2 m Plants to 3 - 4 m	40 g 80 g 120 g
	Advanced trees and palms 2 m - Advanced trees and palms 3 m - Advanced trees and palms 4 m -	200 g 300 g 400 g
	These rates apply to both granular compound and equivalent products.	
Native, Feeding, Hole and/or surface	Ground covers: up to 300 mm wide 300 - 600 mm wide 600 - 900 mm wide 900 - 1000 mm wide Thereafter	 30 g 50 g 75 g 100 g 100 g per metre
	Shrubs: up to 300 mm high/wide 300 - 600 mm high/wide 600 - 900 mm high/wide 900 - 1000 mm high/wide Thereafter	 50 g 75 g 100 g 150 g 200 g/metre of height or width
	Trees	200 g/metre of height
Exotic, Feeding, Hole and/or surface	Plants	250 g/metre of plant height

18. DUCTING AND CONDUITS

18.1 STANDARDS

Conform to the following Standards and publications unless specified otherwise, and with the requirements of applicable Service Authorities:

AS 1345	Identification of the contents of pipes, conduits and ducts.
AS/NZS 2053	Conduits and fittings for electrical installations.
AS/NZS 3000	Electrical installations (Australian/New Zealand Wiring Rules)
AS/NZS 3500	Plumbing and drainage
NTMTM	NT Materials Testing Manual.
NTTM	NT Test Methods

18.2 SUPPLY AND INSTALLATION

In kerbed areas, terminate duct crossings 500 mm behind kerbs unless specified otherwise.

In areas of no kerbing, terminate duct crossings clear of the Pavement as specified.

Excavate trench to a width appropriate for the ducting and which allows compaction of the backfill to be readily undertaken.

Provide the specified minimum cover required by the relevant authority, but not less than 750 mm.

Locate ducts to avoid other services.

Lay at right angles to the street centre line and with straight lines and grades unless specified otherwise.

Minimum fall to be 1% to the lower side of the street.

Lay ducting on 50 mm thick sand bedding.

Install 4 mm galvanised draw wires in all conduits. One draw wire to remain in place in conduit.

Cap all conduits with standard uPVC caps.

Place marker tape from each end of the conduit to the surface.

Backfill the trench with Select Fill to Subgrade Surface level and compact to 95% Relative Compaction.

Where trench excavated through existing Pavement, backfill above Subgrade Surface with Basecourse, as specified in *Section 6 – Pavements and Shoulders*, compacted to 100% Relative Compaction. Reinstate the wearing surface.

18.3 MARKINGS

In kerbed areas, mark kerbs with a letter to identify the type of ducts which pass under them as follows:

Electrical: 'E'.

Communications: 'T'.

Water: 'W'.

Height of letter: 50 mm.

Width of letter: 30 mm.

Stamp the letter into new kerb after the concrete has taken its initial set and before final set.

In existing kerbed areas, mark existing kerb with an aluminium plate containing the identification letters as specified.

Outside of kerbed areas, provide markers in accordance with Relevant Authority requirements..

18.4 CONDUIT MARKERS

Erect 600 mm x 600 mm signs at locations specified to highlight the existence of conduits. Refer to ***Table 15-3 – Signs – Mounting Selection***

Sign legend to be:

"Service Conduits Laid. Opening of Road Surface Prohibited."

18.5 ELECTRICAL DUCTING ('E')

Ducting conduit must be heavy duty uPVC coloured light orange and solvent cement jointed.

Lay a copper earth cable (35 mm2) in a continuous strip along the bottom of each trench where high voltage and low voltage cables are to be installed.

Install a 35mm2 Cu insulated cable within all street lighting conduits to AS/NZS3000 Category A installation requirements.

Supply and install orange PVC cable marker tape over the ducts as specified. Refer to *Clause 19.8 – Cable Installation* for Street Lighting.

Liaise with the Service Authority regarding the installation of the ducts.

18.6 WATER DUCTING ('W')

Ducting conduit to be heavy duty PVC, 100 mm diameter, coloured white and solvent cement jointed.

Use uPVC class 9.

Lay conduits two to a trench opposite each alternate allotment boundary.

Service each allotment by a separate conduit.

Liaise with the Service Authority regarding the installation of the ducts.

18.7 COMMUNICATIONS DUCTING ('T')

Liaise with the Service Authority(s) and give minimum 10 Business Days' notice prior to the need for ducting to be installed for inspection purposes.

19. STREET LIGHTING

19.1 OUTLINE DESCRIPTION

Supply, install, test and commission new underground power supplied street lighting as specified herein and as shown on the Construction Drawings.

Modify and replace existing street lighting as specified herein and as shown on the Construction Drawings.

19.2 CROSS REFERENCES

Refer to the following sections:

- *Section 4 - Earthworks* for excavation and trenching.
- *Section 11 - Structural Concrete Works* for pole footings.

Refer to Standard Drawings.

19.3 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS/NZS 1158(set)	Lighting for roads and public places.
AS/NZS 3000	Electrical Installations - Australian/New Zealand Wiring Rules.

19.4 MATERIALS

19.4.1 Columns

Requirement: Provide columns in accordance with Standard Drawings, to suit the individual street lighting design requirements.

Erection: Upon erection ensure columns stand vertically, in all directions, under final loading conditions.

19.4.2 Footings and Ragbolt Assemblies

Construct footings and ragbolt assemblies in accordance with Standard Drawings.

19.4.3 Terrain Category

Columns, footings and ragbolt assemblies must be suitable for the wind loading conditions of the area in which they are to be installed.

19.4.4 Luminaires

Provide street light luminaires of the types specified on the Construction Drawings.

Time control main switchboard: Control luminaires via a time switch controlled contactor with a PE-cell override feature located in a new plinth mounted main switchboards for underground areas. When luminaires are to be controlled by individual PE-cells, time control will not be required. Refer to Standard Drawings showing the details of non-time controlled main switchboard option.

Switch Packs: Provide switch pack in the base of each pole. In each switch pack provide a terminal strip for terminating the active and neutral conductors. Provide an automatic residual current circuit breaker rated at 10A with a fault level of 10kVA with B-curve characteristics for each luminaire. Refer to Standard Drawings.

19.5 EARTHING

The Multiple Earthed Neutral (MEN) system must be employed. Earth all light fittings, columns, trays and parts of the installation as required by AS/NZS 3000 and as detailed in Standard Drawings.

Provide an M10x25mm earth stud located inside the column, near the bottom equipment mounting bracket. Weld the stud to the column prior to hot dip galvanising. Stud is to be accessible through the access door.

Connect all columns to the main 1x 35mm2 copper earth cable at the earth stud.

19.6 EXCAVATION

19.6.1 General

Excavate for footings and trenches as shown on the Construction Drawings and Standard Drawings.

19.6.2 Column footings

Vertically excavate all column footing holes and avoid larger than necessary excavations.

Where necessary, carry out pumping to remove ground, storm and /or surface water.

If the final hole is larger than specified, backfill with concrete to the undisturbed soil.

Inspection Point 32 - If rock is encountered which prevents excavation to the required dimensions, obtain direction prior to proceeding.

19.6.3 Trenches

Nominal trench width: 300 mm.

Nominal trench depth: 880 mm.

19.6.4 Existing Services

Excavate with care when crossing existing underground services. Increase the trench depth to provide a minimum of 150 mm clearance between the lowest part of the service and the first layer of marking tape.

Ramp the trench back from the obstruction.

19.7 FOOTINGS

Supply and place concrete footings in accordance with *Section 11 – Structural Concrete Works*.

19.8 CABLE INSTALLATION

All underground street lighting power cables to be fully enclosed in 80mm heavy-duty orange uPVC underground conduit laid to AS/NZS 3000 Category A installation requirements.

Carry out cable installation in accordance with the following:

- Cover the bottom of the trench with 50 mm bedding sand.
- Lay conduits on the bedding sand.
- Top up with bedding sand to form a layer 150 mm minimum over cables.
- Lay the first cable marker tape.
- Backfill the trench with a second marker tape at a depth of 300 mm below finished ground level.

Inspection Point 33 – Obtain approval for street lighting trench excavation and cable installation prior to commencing backfilling.

19.8.1 Bedding

Bedding sand: Use clean washed river sand.

The Developer must compact the bedding to ensure there are no air spaces left, particularly in close vicinity of the cables and ducts, which would give an increase in external thermal resistance. Mechanically operated rammers must not be used for this purpose.

Bedding must not be placed in any excavation containing free water or slurry.

19.8.2 Backfilling

Backfill: Use Select Fill, as specified *Section 4 – Earthworks*.

Place backfill in 150 mm maximum layers and compacted to 95% Relative Compaction.

19.8.3 Cable Marker Tapes

Lay two cable marker tape strips as follows:

Strip 1: Directly on top of the 150 mm bedding sand layer covering the conduit.

Strip 2: 300 mm below the finished ground level.

Lay cable marker tapes with a 600 mm minimum overlap at joins.

19.8.4 Polymeric Cable Protection Covers at Street Crossings

For all street crossings, lay two polymeric cable protection covers as follows:

Strip 1: Directly on top of the 150 mm bedding sand layer covering the conduit.

Strip 2: 300 mm below the finished ground level.

Lay cable protection covers with a 600 mm minimum overlap at joins.

19.9 INSTALLATION OF LIGHT COLUMNS

Install light columns, outreaches, luminaires and fittings in accordance with the Standard Drawings, and as specified in the Construction Drawings.

19.9.1 Nameplate Details

The Developer must provide a permanent nameplate label, to be fixed with screws to the outside of lighting column beneath the access cover, with the following information:

Manufacturer's name, address and phone number.

Customer:

Contract No:

Date of Manufacture.

Labels must be engraved laminated plastic or photo anodised rigid aluminium and must comply with the following requirements:

Engraved lettering must be black on a white background with minimum 3 mm high lettering.

19.10 EXISTING STREET LIGHTING

19.10.1 Disconnection and Removal

Make safe, disconnect and remove existing wiring.

Dismantle existing street lighting installations, taking care to avoid damage to items during dismantling operations and transport.

Deliver the salvaged materials to a storage shed to be nominated by the Relevant Authority.

Excavate and remove from the site all traces of abandoned concrete footings, hold down bolts and cabling.

19.10.2 Temporary Lighting

Provide temporary lighting at intersections during periods of construction if existing street lighting is removed before new street lighting is installed.

Provide temporary lighting to a Category agreed with the Relevant Authority.

Documentation Point 85 – Submit plans of the proposed temporary street lighting for approval prior to removal of existing street lights.

19.11 TESTING AND COMMISSIONING

19.11.1 Testing

Measure and record in Megohms the insulation resistance between each conductor and earth.

Check continuity of each cable installed.

Check correct phasings of all active cables of the low voltage distribution system.

Check polarity at each street lighting column to ensure that neutral and active cables are not inadvertently interchanged. Incorrect polarity at a street lighting column would result in a live column.

19.11.2 Commissioning

Inspection Point 34 - Arrange for commissioning work to live up the newly installed street lighting distribution system.

Commissioning must not be scheduled until all the above test results are found satisfactory.

19.12 REINSTATEMENT

Reinstate any damage to streets, footpaths, verges, drainage structures and vehicle driveways to their original condition.

20. DIRECTIONAL BORING

20.1 GENERAL

This section specifies the underground boring of passages for the installation of piping, piped services, or cabled services, beneath trafficked surfaces, buildings or other nominated areas without trenching, disruption to traffic or subsidence.

Directional bore all installations beneath existing streets, unless otherwise approved by the Relevant Authority.

20.2 STANDARDS

Conform to the following Standards and publications unless specified otherwise:

AS 1579	Arc welded steel pipes and fittings for water and waste water.
AS/NZS 3000	Electrical installations (Australian/New Zealand Wiring Rules)
AS/NZS 3500 (set)	Plumbing and drainage
AS/NZS 4645	Gas distribution networks

Conform to the requirements of the Relevant Authorities if their services are to be installed in the bored passages.

20.3 PROPOSED METHOD

Documentation Point 86 – Submit details of the proposed method of thrust boring not less than 10 Business Days prior to commencement of construction using that method.

Include details of proposed filling of cavities. No disruption or excavation of the surface is to take place over the length nominated.

Co-ordinate boring works those with jurisdiction over the services installed in the bored passages.

20.3.1 Directional Boring with Pipe Casing

Keep dimensions of jacking pits to the minimum necessary.

Use pipe jacking equipment inspected and approved and certified as fit for use by a competent person. The certification of fitness for use must have been issued not more than one year prior to the date of the scheduled completion of the works plus one calendar month. A competent person is defined in the NT Work Safe Bulletin 09.01.16 *Competent Persons for Inspection and Maintenance of Plant*.

Comply with the guidance provided in the Safe Work Australia Code of Practice: *Managing Risks of Plant in the Workplace*.

Documentation Point 87 – Submit Certification that the pipe jacking equipment is fit for use, 10 Business Day prior to commencement of construction using that method.

Certification must be issued by a competent person, as defined in the NT Work Safe Bulletin cited above. Submit evidence of qualifications and competence upon request.

Provide documented evidence 10 Business Days prior to commencement of construction using that method.

Use a welded mild steel pipe casing manufactured in accordance with AS 1579 and of sufficient strength to withstand the forces generated irrespective of the nature of sub-surface material encountered.

Ensure the inside diameter of the casing is 50 mm greater than the maximum outside diameter of the pipe joints, skids, cradle runners or other protrusions related to pipe insertion.

20.3.2 Directional Boring Without Pipe Casing

Documentation Point 88 – Obtain approval to use directional boring without pipe casing.

Bore the hole cleanly without projections to a diameter at least 50 mm greater than the maximum outside diameter of the pipe joints, skids or other protrusions related to pipe insertion.

Use plastic skids extending the whole length of the pipe apart from joints to ensure the pipe is at least 10 mm clear of the hole perimeter. Insert the pipe so that the joints are neither stressed nor pulled apart.

20.4 TESTING OF SERVICES

Co-ordinate testing of services with the applicable Relevant Authority with jurisdiction over the installed service to be tested. Comply with all applicable Standards and the requirements of the Relevant Authority.

If any installation is tested, and fails that test, the Developer is to rectify the installation and test the installation again.

20.5 FILLING OF CAVITIES

This sub-clause is in respect to piping installed in passages bored without pipe casings.

Pressure Pipes

Carry out grouting of the pipe/casing cavity with pumped cementitious grout (Class 10 MPa) containing an appropriate plasticising agent. Pipe to be under a pressure equal to normal

expected operating pressure when grouting takes place.

Non-pressure Pipes

Fill cavities with granular material free of clay, dust, fines, salt or organic matter complying with either of the following gradings and properties:

Table 20-1 - Granular Bedding Material Gradings

Sieve Size	Percentage Passing By Weight	
	Type 1a	**Type 1b**
9.5 mm	100	-
6.75 mm	100	90 – 100
2.36 mm	100	75 – 100
1.18 mm	95 – 100	45 – 95
600 µm	80 – 100	20 – 80
300 µm	40 – 80	5 – 40
150 µm	0 – 6	0 – 6
75 µm	0 – 6	0 - 6

Linear shrinkage of materials passing a 425 µm sieve to be less than 2.5%.

20.6 END CAPS

Fit end caps to a bored passage if services will not be installed in the passage on the day it is bored.

Fit end caps to pipe casing if services will not be installed in the pipe casing on the day it is bored/installed.

Plug ends of bored passages around the installed services after installation, testing, and commissioning of the services is complete. Use an appropriate plugging material which is compatible with the materials of the installed services with which the plugging material will come into contact.

21. NORTHERN TERRITORY CLIMATE ZONE TABLE

NORTHERN TERRITORY CLIMATE ZONE TABLE						
		NTCZ 01 Areas south of, and including, Tennant Creek	NTCZ 02 Areas north of Tennant Creek and south of and including Katherine, and areas more than 50 km from the coast or tidal estuaries	NTCZ 03 Areas north of Katherine and areas between 10 km and 50 km from the coast or tidal estuaries	NTCZ 04 Areas less than 10 km from the coast or tidal estuaries	NTCZ 05 Areas inside buildings
ISO 9223	Atmospheric Corrosivity Classification	3	4	5	5	2
AS1170/BCA	Wind Region	A4	B	B & C	C	n/a
AS 1192	Service Condition Category	2	3	4	5	n/a
	Corrosion Category	B	C & F	D	E	C
AS 1231	Thickness Grade	AA15	AA25	AA25	AA25	AA10 Low airborne moisture levels AA15 High airborne moisture levels
AS/NZS 2312.1	Climate Category	C2	C3 & T	T	C5-I & C5-M	C1
AS 2423 AS/NZS 4534	Climate Category	B	C & F	F	E & F	n/a
AS 2699	Durability Classification	R1 (Green mark)	R2 (Yellow mark)	R3 (Red mark)	R4 (White / blue)	R1 (Green mark)
AS 3566.2	Corrosion Resistance Class	3	4	4	4	n/a
AS 3715	Service Condition Category	3	4	5	5	n/a
	Atmospheric Corrosivity Classification	3	4	5	5	n/a
AS 4145	Corrosion resistance category	C6	C6	C7	C7	C6
BCA Table 3.5.1.1a	Environment category	Low	Low	Medium	High - V High	n/a
AS 5100	Exposure Classification	A	A	B1	B2 or C	A

Agenda Item 9.5

Report No. 42 / 20ts

TO: **TECHNICAL SERVICES COMMITTEE - MONDAY 16 MARCH 2020**

SUBJECT: **HANDOVER OF INFRASTRUCTURE ASSETS PACKAGE DEAL**

AUTHOR: **DIRECTOR TECHNICAL SERVICES - SCOTT ALLEN**

EXECUTIVE SUMMARY

This report is to provide Council with an update on the negotiations with NTG Officers regarding the handover of assets at Kilgariff Estate, Ilpeye Ilpeye Town Camp and the Boardwalk. Other assets that are still in discussion and are outlined in the list below.

RECOMMENDATIONS

That it be a recommendation to Council

1. **That Council endorse the *Handover of Infrastructure Assets Package Deal* Letter**
2. **That Council only accept the inheritance of the subdivision assets conditional on the acceptance of the proposed package deal agreement**

REPORT

1. BACKGROUND

Since the construction of Kilgariff Estate in 2012, Council has had ongoing requests from the NT Government to assume ownership of the infrastructure. Council has been negotiating with NTG Officers from the Department of Infrastructure Planning and Logistics (DIPL), in regard to a package deal to assume ownership of the following infrastructure:

- Kilgariff Estate
- Ilpeye Ilpeye Town Camp
- The Boardwalk

Other assets that are being negotiated but continue to be under discussion are listed below:

- Netball Court
- White Gate
- Larapinta 7 lot subdivision
- Albrecht Drive loop road
- Mount Johns Valley
- Industrial Land at Arumbera
- RWMF expansion

As Council is the local authority inheriting the proposed assets at Kilgariff Subdivision, but the assets do not conform to current standards, concessions have been sought by DIPL to the subdivision requirements. Due to the concessions sought, Council is currently involved in negotiations with DIPL to offset the impacts from the predicted reduction in asset life of the infrastructure.

Council has been involved in negotiations with DIPL in regard to the Kilgariff Subdivision since 2012. Greenhill Engineers were engaged by Council in 2012 to provide expert advice on the matter. As the

discussion has not progressed in the last five years, the authorisation by Council on the inheritance of the subdivision assets is conditional to the agreement of the proposed package deal agreement.

2. DISCUSSION

Council and NTG have been meeting regularly to finalise a deal for the handover of infrastructure assets to Council. Council is proposing three infrastructure items be handed over that includes a remuneration component to offset the infrastructure standards shortfall identified.

The intent is for any identified financial component to be exchanged in a land deal through packaging of land in Kilgariff and Arumbera for uses such as:

- Depot Land around 15,000m2 (net worth $750k) in Arumbera.
- Community purpose land 11,000m2 (net worth $1.5M) in Kilgariff neighbourhood centre
- Commercial land in Kilgariff (to be determined)
- Sports and recreational use 50,000m2 (net worth $750k) location to be determined

It should be noted that in usual development practice some land would be provided gratis to Council for community purposes and this will be factored into the negotiations.

KILGARIFF ESTATE:

ISSUE	DESCRIPTION	REMEDY
Asphalt	An assessment identified that the asphalt surface is unlikely to meet the 25-year pavement design life standard and will require a financial investment from Council earlier than would otherwise have been necessary to re-construct the asphalt seal.	A monetary contribution in lieu of the defects identified resulting from this compromised infrastructure of $429,592.80 (excluding GST).
Open Unlined Drain	The drain is non-compliant and has a gradient of 0%. A grade of 0.1% has been identified as Council's minimum requirement.	Officers recommend to not accept ownership of the open unlined drainage network
Storm Water Infrastructure	Due to the flat nature of the site, there is no pit and pipe infrastructure within the sub-division	Officers recommend monitoring the efficiency of the road and internal stormwater network. The monitoring is to be undertaken until a 1:5 years storm event has occurred at which time a review of the impact will be completed to Council's satisfaction with ongoing discussions related to the rectification of the drainage throughout that period.

Report No. 42 / 20ts

Norris Bell Avenue	Concerns with the pooling of water on the corner of Stuart Highway and Norris Bell Avenue	Whilst Council is not currently seeking the immediate remedial action on this issue, Council would accept, under a signed deed, that NT Government will rectify the issue to Council's satisfaction should the Industrial land project not progress or 3 years have elapsed since handover of Kilgariff Estate.
Colonel Rose Road Causeway Crossover	Concerns with the flooding of Colonel Rose Road.	Whilst Council is not currently seeking immediate remedial action on this issue, Council would accept, under a signed deed, that NT Government will rectify the issue to Council's satisfaction upon the commencement of the access road into Kilgariff Estate from Colonel Rose Drive.



Kilgariff Estate – Open Unlined Drain

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Kilgariff Estate – Storm Water Network



Kilgariff Estate – Norris Bell Avenue Flooding

Report No. 42 / 20ts



Kilgariff Estate – Colonel Rose Road Flooding

ILPEYE ILPEYE:

ISSUE	DESCRIPTION	REMEDY
Asphalt	An assessment identified that the asphalt surface is unlikely to meet the 25-year pavement design life standard and will require a financial investment from Council earlier than would otherwise have been necessary to re-construct the asphalt seal.	A monetary contribution in lieu of the defects identified resulting from this compromised infrastructure of $283,920.00 (excluding GST).
Stone Pitched Drain and Open Unlined Drains	The stone pitched drain is non-compliant and a major hazard	Officers recommend to not accept ownership of the stone pitched drain and open unlined drainage network
Storm Water Underground Infrastructure	A number of deficiencies have been identified within the underground storm water infrastructure and not all of the pipework has been surveyed	A monetary contribution in lieu of the defects identified resulting from this compromised infrastructure of $150,000.00 (excluding GST).

Playground Infrastructure	Concerns with the compliance with the Australian Standards for Playgrounds	Council will accept ownership of the playground with a contribution of $50,000.00 excluding GST to allow the defects identified above, to be fixed or to install compliant equipment where required.

THE BOARDWALK:

Council requests a structural review of the boardwalk following a significant flow event. Council is willing to accept ownership and ongoing responsibility for the maintenance of the boardwalk after it's satisfactory assessment during the significant flow event.

If the Handover of Infrastructure Assets Package Deal Letter is approved by Council, the letter will be forwarded to the NTG for endorsement by the Minister

3. POLICY IMPACTS

Alice Springs Town Council Strategic Plan: 2018 to 2021

OBJECTIVE 1: A DYNAMIC COMMUNITY

1.3: Safe and reliable public infrastructure

1.3.1: Maintain and improve local road network

1.3.2: Maintain and improve local footpaths and cycle networks

OBJECTIVE 2: A GREAT PLACE TO LIVE

2.1: Community life, promoting a healthy, vibrant culture

2.1.1: Provide sport, recreation and leisure opportunities, which maximise social capital

2.1.2: Promote active lifestyles for people of all ages

4. FINANCIAL IMPACTS

Below is the combined cost for Council to accept ownership of the projects.

PROJECT	COSTINGS
1. Kilgariff Estate	$429,592.80 excluding GST
2. Ilpeye Ilpeye Town Camp	$571,025.60 excluding GST
3. Todd River Boardwalk	NIL
TOTAL	**$1,000,618.40**

Report No. 42 / 20ts

5. SOCIAL IMPACTS

Council has an obligation to take over ownership of Ilpeye Ilpeye Town Camp and Kilgariff Estate but it also has the same obligation to take over ownership of infrastructure that is acceptable to Council standards

6. ENVIRONMENTAL IMPACTS

The environmental impacts from the storm water drainage network need to be clarified and form part of ongoing discussions with DIPL.

7. PUBLIC RELATIONS

Council has an obligation to take over ownership of Ilpeye Ilpeye Town Camp and Kilgariff Estate but it also has the same obligation to take over ownership of infrastructure that is acceptable to Council standards

8. ATTACHMENTS

Attachment A: Handover of Infrastructure Assets Package Deal Letter



Scott Allen
DIRECTOR TECHNICAL SERVICES

11 March 2020

Ms. Sarah Fairhead
Senior Director - Southern Region
Department of Infrastructure, Planning and Logistics
Northern Territory Government
GPO Box 2130
Alice Springs NT 0871

Dear Sarah,

9.5

HANDOVER OF INFRASTRUCTURE ASSETS PACKAGE DEAL

Further to our ongoing meetings dealing with various projects located in Alice Springs that are relevant to both the Department of Infrastructure, Planning & Logistics (DIPL) and Alice Springs Town Council (Council), I refer to the ongoing and latest discussions between both parties on Thursday 27 February 2020, around the requirement for a clear process on the handover of Kilgariff Estate, Ilpeye Ilpeye Town Camp and the Boardwalk to Council.

This letter identifies the proposed items for handover, the defects identified, and a breakdown of the proposed costs to rectify each defect. These defects are proposed to be addressed through a monetary contribution and the handover of new assets from NT Government to Council.

Below are the proposed assets for handover to Council from DIPL:

1. Kilgariff Estate
2. Ilpeye Ilpeye Town Camp
3. Todd River Boardwalk
4. Community purpose land at Kilgariff Estate
5. Sporting / recreation land at Kilgariff Estate
6. Depot use land in the new Arumbera Industrial Estate
7. A multi-use parcel of land for future land development

The above items will have specific matters that will need to be addressed to Council's satisfaction, as part of a holistic handover and acceptance by Council of the listed items.

1. Kilgariff Estate:

a. Asphalt
b. Open Unlined Drain
c. Storm Water Infrastructure
d. Norris Bell Avenue
e. Colonel Rose Road Causeway Crossover

a. Asphalt - An assessment into the service life expectancy of the asphalt was undertaken by Greenhill Engineers and has been an agenda item with Council previously raising a number of concerns pertaining to the quality of construction for the Kilgariff Estate, with particular concern in relation to the asphalt surface.

DIPL have also previously stated that the works undertaken by the contractor did not comply with NT Government standards.

In accordance with the Alice Springs Town Council Subdivision Guidelines (2012) at the time of construction of the Kilgariff Estate asphalt, a design service life of 25 years was required. This requirement was advised to be met by the design engineers (CARDNO) as shown in the pavement design calculations provided at the time of the engineering approval.

The report by Pavement Asset Services notes that the asphalt surface is unlikely to meet the 25-year pavement design life standard and will require a financial investment from Council earlier than would otherwise have been necessary to re-construct the asphalt seal.

A high air voids ratio in asphalt will accelerate the deterioration of the surface resulting in a reduced asset life and increased maintenance costs. The results of the investigation by Pavement Asset Services suggest that the asphalt installed at the Kilgariff Estate will have a service life of 15 years.

b. It has been established that the Kilgariff Estate consists of approximately 1967 lineal metres of sealed carriageway, with approximately 17,570 sq. m of asphalt. The monetary contribution in lieu of the defects identified resulting from this compromised infrastructure of $429,592.80 (excluding GST).

c. Open Unlined Drain – further to the continuous concerns expressed by Council with regard to the non-compliant open drains, it must be noted that Council will not accept ownership of the open unlined drainage network.

d. Storm Water Infrastructure – Council has stated previously that it understands the complexities surrounding the site and its non-compliance with Council guidelines. Due to the inability of both parties to reach a resolution on this matter, Council is proposing that the internal storm water network remains under the care and control of the NTG.

   Council recommends that a monitoring clause be written into the agreement with a view to determining a long-term outcome for both parties. This will enable the handover of the sub-division to be completed whilst ensuring this matter remains on the table for finalisation. The monitoring is to be undertaken until a 1:5 years storm event has occurred at which time a review of the impact will be completed to Council's satisfaction, with ongoing discussions related to the rectification of the drainage throughout that period.

e. Norris Bell Avenue – Council has stated previously that it has concerns with the pooling of water on the corner of Stuart Highway and Norris Bell Avenue. Council agrees that with the potential industrial land proposal for Arumbera, the works would form part of the intersection upgrade.

   Whilst Council is not currently seeking the immediate remedial action on this issue, Council would accept, under a signed deed that NT Government will rectify the issue should the Industrial land project not progress or 3 years have elapsed since handover of Kilgariff Estate. The remedial works would need to be to the satisfaction of Council.

f. Colonel Rose Road Causeway Crossover – Council has stated previously that it has concerns with the flooding of Colonel Rose Road. Council agrees that with future development within the Kilgariff Estate, Council reserves the right to accept the road way in its current form.

   Whilst Council is not currently seeking immediate remedial action on this issue, Council would accept, under a signed deed that NT Government will rectify the issue upon the commencement of the access road into Kilgariff Estate from Colonel Rose Drive. The remedial works would need to be to the satisfaction of Council.

2. Ilpeye Ilpeye Town Camp:

I refer to the recent discussion between DIPL and Council on 5 November 2019, around the government's requirement for a clear explanation on the defects identified, and a breakdown of the proposed costs to rectify each defect. These defects are proposed to be addressed through a monetary contribution.

The previous letters from Council sent to your office dated 30 May 2019 and 7 May 2019, identify the following assets for handover to Council through DIPL:

a. Asphalt/Pavement
b. Stone Pitched Drain (Open drains)
c. Storm Water underground Infrastructure
d. Playground Infrastructure

Please find below a justification of costs under each listed item.

a. Asphalt / Pavement - an assessment into the service life expectancy of the asphalt was undertaken by Greenhill Engineers in January 2019.

Council have previously raised a number of concerns with the quality of construction of the infrastructure for the Kilgariff Estate, with particular concern in relation to the asphalt surface. Concerns have been raised due to inadequate testing results being provided by the contractor. Visual inspections of the asphalt since the construction indicated that the surface was showing signs of premature wear and damage.

Methodology of Investigation: Twenty cores of the asphalt surface were taken to a NATA accredited asphalt testing laboratory for analysis, where results for the following asphalt properties were undertaken:

- Asphalt particle grading
- Binder Content
- Air Voids percentage
- Asphalt layer thickness

A visual inspection of the surface was also carried out in November 2018 with notes made on the surface texture, extent of cracking and condition of the seal. The results of the visual inspection and asphalt properties were assessed, to determine the expected life of the asphalt as installed.

It was established that, the Kilgariff Estate consists of approximately 1,300 lineal metres of sealed carriageway, with approximately 10,920 sq. m of asphalt. The asphalt had been in place for approximately 2 years at the time of the inspection. The asphalt as installed at Kilgariff Estate appears to have a higher air voids ratio than would typically be expected, in order to achieve a design life of 25 years. The air voids ratio for the samples was higher than that reported by BTO/ DIPL at the time of construction.

In accordance with the Alice Springs Town Council Subdivision Guidelines at the time of construction of the Kilgariff Estate asphalt, a design service life of 25 years was required. This requirement was advised to be met by the design engineers (CARDNO) as shown in the pavement design calculations provided at the time of the engineering approval.

The report by Pavement Asset Services notes that the asphalt surface is unlikely to meet the 25-year pavement design life standard and will require a financial investment from ASTC earlier than would otherwise have been necessary to re-construct the asphalt seal.

A high air voids ratio in asphalt will accelerate the deterioration of the surface resulting in a reduced asset life and increased maintenance costs. The results of the investigation by Pavement Asset Services suggest that the asphalt installed at the Kilgariff Estate will have a service life of 15 years.

The monetary contribution in lieu of the defects identified resulting from this compromised infrastructure is $283,920.00 (excluding GST).

b. Stone Pitched Drain and Open Unlined Drains - further to the continuous concerns expressed by Council with regard to the non-compliant open drains, it must be noted that Council is unable to accept ownership of the open unlined drainage network and stone pitched drain in its current state. As identified in the meeting held on 5 November 2019 this matter can be discussed separately along with the other open drains.

c. Storm Water Underground Infrastructure - the latest review of the Stormwater CCTV by Greenhill Engineers provided to NTG on 11 April 2018 had identified a number of deficiencies. The defects include cracks, holes in the top of pipes, inappropriate pipe connections, exposed rubber ring joints, missing lifting lugs, pipe sections that had not been pushed home adequately etc.

   There were missing sections of the CCTV as the entire pipe length had not been surveyed. It is expected that internal pipe re-lining might resolve most of the known defects. Based on the known defects it is estimated that the repairs could amount to $150,000.00 (excluding GST). Please note that this amount does not take into consideration any of the missing sections.

d. Playground Infrastructure - previously Council had required certification of the playground infrastructure to Australian Standards. During recent inspections, the state of equipment within the playground has been found to be in an unacceptable condition.

   Council will accept ownership of the playground with a contribution of $50,000.00 to allow the defects identified above, to be fixed or to install compliant equipment where required.

   In addition to the above water ponding has been observed at a number of locations in this subdivision. Such defects will also necessitate substantial reconstruction costs when damage occurs earlier than predicted in future. Please note that the above costs have not been included in the assessment of the asset life reduction.

   It must be noted that, a thorough assessment has not been undertaken to determine the extent of overall defects. This is due to the lack of information provided to Council in relation to the subdivision. As-Constructed information has not been provided for infrastructure such as footpaths, pram ramps, road and kerb surface levels, etc. Engaging in the exercise of cost substantiation also has the potential for added expense to Council and can cause further loss of time in investigations on both sides.

The overall monetary contribution resulting from the known defects listed above has been estimated at $571,025.60 (excluding GST). This includes an administration fee of 18% to cover costs of investigation through consultants.

Further to this contribution and conditions outlined in relation to the identified assets, Council is willing to accept ownership of these assets from the date of handover.

3. Todd River Boardwalk:

Council is willing to accept ownership and ongoing responsibility for the maintenance of the boardwalk. Please supply all as constructed drawing and certification documentation as part of the

package deal. Council requests a structural review of the boardwalk following a significant flow event.

FINANCIAL BREAKDOWN:

Below is the combined cost for Council to accept ownership of the projects.

PROJECT	COSTINGS
1. Kilgariff Estate	$429,592.80 excluding GST
2. Ilpeye Ilpeye Town Camp	$571,025.60 excluding GST
3. Todd River Boardwalk	NIL
TOTAL	**$1,000,618.40**

4. Community Purpose Land at Kilgariff Estate:

The usage community purpose land for this space is still to be determined by Council. Potential sites could include a satellite library or town hall. The land is part of a previous agreement to provide community purpose land, free of charge to Council. The land size required would be approximately 11,000m².

5. Sporting / Recreation Land at Kilgariff Estate:

Council is requesting land for sporting facilities to be constructed at Kilgariff Estate. The exact location would need to be determined as there is some sentiment on the appropriate locations. The land could be dual purpose with the proposed school. Council is requesting the following:

- 2 x playing fields (2 x ovals @ 2Ha each – fields lit to 750LUX)
- Sporting Facility including:
  - change rooms
  - medical room
  - officials room
  - club house
  - public toilets
  - shade structures
  - car park

6. Depot Land in the new Arumbera Industrial Estate:

Council is requesting land to accommodate a Council satellite depot. The depot will be used for truck access and regress, stockpiling and storage of materials, storage of machinery, mechanical workshop and tree nursery. The land size required would be approximately 15,000m².

7. Multi-Use Block of Land for Future Land Development:

Council is considering this space for a family housing / affordable / lifestyle village. The creation of Council owned land to be rented out for community benefit. The affordable housing would be at the lesser end of the size range and the lifestyle village needs a minimum of 120 homes to allow efficiencies. The land size required would be approximately 75,000 - 120,000m².

Further to this contribution, whether it be monetary (from DIPL or Council depending on the final package) or in the land packages numbered 1 to 7 identified earlier in the letter, and the accompanying conditions outlined in relation to the identified assets, Council is willing to consider acceptance of these assets from the date of handover.

It must be noted that this proposal and any eventual agreement identified will require Council endorsement and that statutory approval is conditional on this letter of offer being accepted.

Council is committed to working with the NT Government and appreciates your ongoing effort in working through these outstanding matters.

Yours sincerely,

Robert Jennings
CHIEF EXECUTIVE OFFICER

MEETING MINUTES OF THE PARKS ADVISORY COMMITTEE MEETING HELD ON TUESDAY 25 FEBUARY 2020, IN THE ALICE SPRINGS TOWN COUNCIL, ANDY MCCNEILL ROOM

PRESENT

Mayor Damien Ryan
Councillor Jimmy Cocking (Chair)
Councillor Jamie de Brenni
Councillor Jacinta Price
Mr Matthew Digby
Mr Domenico Pecorari
Mr Jonathan Pilbrow

OFFICERS IN ATTENDANCE

Mr Scott Allen - Director Technical Services
Mr Takudzwa Charlie - Manager Technical Services
Mr Stephen Baloban - Manager Infrastructure
Mr Ben Fitzgerald - Manager Depot
Ms Kaitlyn Weekes - Project Administration Officer (Minutes)

OBSERVER Mr Dalton Dupuy

14th Alice Springs Town Council Parks Advisory Committee Attendance List 2019/2020					
	27 Aug 19	29 Oct 19	25 Feb 20	28 Apr 20	30 Jun 20
Mayor Damien Ryan	✓	✓	✓		
Councillor Jimmy Cocking	✓	✓	✓		
Councillor de Brenni	✓	✓	✓		
Councillor Jacinta Price	**A**	✓	✓		
Matthew Digby	**A**	✓	✓		
Jonathan Pilbrow	✓	✓	✓		
Domenico Pecorari	**A**	**A**	✓		

✓	Attended
✓ phone	Attended via phone
A	Apology received
--	No attendance and no apology recorded

The meeting opened at 4:30 pm.

1. APOLOGIES

Mr Robert Jennings
Ms Sabine Taylor

2. CONFLICT OF INTEREST

Nil

UNCONFIRMED

3. CORRESPONDENCE

3.1. Email to Council from Bernard Hickey – re: Tucker Park – 20 November 2020

The Committee received and noted the correspondence from Bernard Hickey.

3.2. Letter to Council from Isabel and Dalton Dupuy – re: Oleander Park – 4 February 2020

The Committee received and noted the correspondence from Dalton Dupuy.

4. MINUTES OF PREVIOUS MEETING

4.1 Minutes of the Parks Advisory Committee meeting held 29 October 2019.

RESOLVED:
That the minutes of the Parks Advisory Committee meeting held 29 October 2019 be confirmed as a true and accurate record of that meeting.

Moved: Mayor Ryan **Seconded:** Mathew Digby **CARRIED**

5. FINANCE REPORT

The Committee received and noted the *Income and Expenditure Report – for the Period Ending 13 February 2020*. Parks funds available assuming all commitments are realised are $498,330.79.

6. BUSINESS ARISING FROM THE PREVIOUS MINUTES

6.1 Ashwin Park

Ashwin Park revised plan was tabled for the Committee.

The Committee discussed:

- Removing the concept of a concrete path and replacing with bitumen
- A concept of a Community garden and the need for discussion with residents highlighting this would be included in stage 2.
- A reduction in the amount of path and shade (over exercise equipment) to reduce the costs.

The Committee noted additional shade trees were a priority however the plan already includes 30 trees.

RESOLVED:
That it be recommended to Council:

That Council officers adapt the plan for Ashwin Park and present to the Community through public consultation.

Moved: Mayor Ryan **Seconded:** Mathew Digby **CARRIED**

Action:
Council officers to adjust the plan and call another public meeting at Ashwin Park.

6.2 Madigan Park

Two design proposals were tabled for the potential subdivision of Madigan Park. Proposals included:

1. That half the of the park land is sold to an external developer, and
2. That Council develop 4 x Units and gain income over the years from land value.

UNCONFIRMED

Both designs for Madigan Park were discussed by the Committee and a request was made to ensure a laneway continue through to the other side in the final plan to ensure community access.

Concern was raised that Council may be seen as developers and not representing the face of the community. The Committee requested that the final decision be open to public consultation.

RESOLVED:
That it be recommended to Council:

That Council select option two, to develop the park into 4 units.

Moved: Councillor de Brenni **Seconded:** Mathew Digby **CARRIED**

Action:
Officers go out to public consultation after Council has made its decision.

6.3 Oleander Park

The Oleander Park revised plan was tabled for the Committee.

A member of the general public, Mr Dalton Dupuy attended the meeting to raise concerns about the path location. The Committee discussed investigating other options for path location, material and width of the path to reduce costs.

Discussion ensued in regard to adopting a '*friends of parks'* mode of design.

Action:
Officers to await the receipt of a precedent drawing from Mr Dalton Dupuy and table for discussion at the next meeting.

6.4 Rotorac Park

The Committee discussed the proposed location for a Pet Park at Rotorac Park. Members of the committee expressed their support and discussed the timeline for completion, access, carparking, and how the park would be managed.

RESOLVED:
That it be recommended to Council:

That Council move the proposed Pet Park at Rotorac Park to Public Consultation.

Moved: Councillor de Brenni **Seconded:** Mayor Ryan **CARRIED**

Action:
Once approved by Council, Officers go out to public consultation and also consider parking and how the park will be managed.

6.5 Spencer Park

The Committee discussed installing one shade structure at Spencer Park, in place of an existing structure that has been destroyed, at a cost of $50,000.

RESOLVED:
That it be recommended to Council:

That Council install one 12 x 8m shade structure at a cost of $50,000 excluding GST

Moved: Councillor De Brenni **Seconded:** Mayor Ryan **CARRIED**

UNCONFIRMED

6.6 Tucker Park

The Tucker Park revised plan was tabled. The Committee discussed reducing the path width to 1.5m to reduce costs.

Action:
Council Officers to adjust the plan and call another public meeting at Tucker Park

6.7 Lyndavale Park

The Manager of Infrastructure advised members of the Committee that the residents of Lyndavale Park had planned to provide a presentation on proposed updates for the Park however nothing had been received to date.

Action:
Council will re-engage the community about a presentation for the next Park Advisory Committee meeting in April.

6.8 Todd River Fitness Stations

The Manager Infrastructure advised work on the shade structures for the Todd River Fitness stations was progressing and the pre-fabrication process has begun.

6.9 4 Smart Bins

The Committee discussed proposed locations and existing trials being undertaken with Smart Bins in the community.

7 OTHER BUISNESS

7.1 Gillen Park Community Garden

Mayor Ryan raised the Gillen Park Community Garden, expressing concern for the state of the garden and requested Council consider installing trees for shade in this area.

8 NEXT MEETING:

4:30pm on 28 April 2020 in the Andy McNeil Room.

The meeting closed at 5:30pm

UNCONFIRMED

MINUTES OF THE MEETING OF THE REGIONAL WASTE MANAGEMENT FACILITY (RWMF) COMMITTEE HELD WEDNESDAY 26 FEBRUARY 2020, HELD AT THE ALICE SPRINGS TOWN COUNCIL – ARUNTA MEETING ROOM, CIVIC CENTRE 93 TODD STREET ALICE SPRINGS

PRESENT

Mayor Damien Ryan (Acting Chair)
Deputy Mayor Matt Paterson
Councillor Glen Auricht
Councillor Jimmy Cocking

OFFICERS IN ATTENDANCE

Mr Scott Allen - Director Technical Services
Mr Takudzwa Charlie - Manager Technical Services
Mr James Sanders - Acting Manager RWMF
Ms Charlotte Klempin - Environment Officer
Ms Stephanie Dominguez - Executive Assistant (Minutes)

The meeting opened at 12:00pm with a quorum.

13th Alice Springs Town Council Regional Waste Management Facility Meeting - Attendance List 2019/2020					
	15 Aug 19	17 Oct 19	30 Jan 20	26 Feb 20	28 May 20
Mayor Damien Ryan	✓	✓	✓	✓	
Councillor Glen Auricht	✓	✓	✓	✓	
Councillor Jimmy Cocking	✓	✓	✓	✓	
Councillor Matt Paterson	✓	✓	✓	✓	
Councillor Eli Melky		✓	✓	A	

✓		Attended
✓	Proxy	Proxy attended in place of committee member
A		Apology received
--		No attendance and no apology recorded
		Not a member of the Committee at this time

1. APOLOGIES

Councillor Eli Melky
Mr Robert Jennings - Chief Executive Officer
Ms Sabine Taylor - Director Corporate Services
Mr Oliver Eclipse - Manager RWMF

2. CONFLICT OF INTEREST

Nil

3. MINUTES OF THE PREVIOUS MEETING

3.1 Minutes - Regional Waste Management Facility Committee - 17 October 2019

RESOLVED:
That the minutes of the Regional Waste Management Facility Committee meeting held 17 October 2019 be confirmed as a true and correct record of the proceedings

Moved: Deputy Mayor Paterson **Seconded**: Councillor Auricht **CARRIED**

UNCONFIRMED

3.2 Minutes - Special Meeting - Regional Waste Management Facility Committee - 30 January 2020

RESOLVED:
That the minutes of the Regional Waste Management Facility Committee special meeting held 30 January 2020 be confirmed as a true and correct record of the proceedings

Moved: Councillor Auricht **Seconded**: Deputy Mayor Paterson **CARRIED**

Councillor Cocking entered the room at 12:02pm

4. BUSINESS ARISING FROM THE PREVIOUS MINUTES

4.1 Action from the previous meeting - Cardboard Recycling

The Committee received and noted the cardboard recycling income vs expenditure information. No further discussion occurred.

4.2 Action from the previous meeting - Illegal Dumping

The Committee received and noted the following documents that were provided in response to an action from the previous meeting:

- *Alice Springs (Management Public Places) By-Law 2009*
- *NT Waste Management and Pollution Control Act 1998*, and
- *NT EPA Factsheet*

Discussion ensued in regard to illegal dumping on crown land, process of collection and disposal by the Department of Infrastructure Planning and Logistics (DIPL), and costs associated with disposal of this waste. Councillor Auricht suggested the costs associated with disposal should be an incentive for DIPL to forward information in regard to illegal dumping to the relevant authorities for investigation and prosecution.

The Committee discussed the infringements associated with offences under the *Alice Springs (Management of Public Places) By-Law 2009* and *NT Waste Management and Pollution Control Act 1998*.

Sections of the *Alice Springs (Management Public Places) By-Law 2009* relevant to discussion:

Alice Springs (Management Public Places) By-Law 2009

Part 3	*Prohibited Activities and Conduct*
Part 3.1	*Offences relating to the environment*
(43)	*Dumping of goods and materials*
Part 5.4	*Contravention and penalties*
(81)	*Penalties*

Penalties relevant to this section are:

43 (2)	*5 penalty units (individual)*
43 (3)	*500 penalty units (commercial)*

Additional penalty units apply, per day that the dumped goods are not collected:

43 (4)	*5 penalty units **per day** (individual)*
43 (5)	*500 penalty units **per day** (commercial)*

1 penalty unit equals $157 (current at time of meeting).

UNCONFIRMED

Councillor Cocking suggested the current fines are inadequate as a disincentive for illegal dumping and suggested the Director Technical Services meet with a representative of DIPL and the NT Environment Protection Authority (NT EPA) to discuss ways of addressing the issue of illegal dumping in the Community.

Councillor Cocking suggested it would be worth initiating a review of the *Management of Public Places By-Law* now to allow Council's access to a more strengthened By-Law in the future, and suggested that Council instigate a program for the community to report illegal dumping with potential rewards for convictions. Mayor Ryan requested a report from the Director Technical Services on a potential program for reporting illegal dumping.

Discussion ensued in regard to a similar program Council currently supports in regard to reporting graffiti or vandalism:

> *Graffiti or vandalism*
>
> *Alice Springs Town Council, NT Government and Power and Water offer $500 each towards a total $1500 reward to those who can assist police in the conviction of a person who has committed an offense of vandalism or graffiti.*

Action:
1. Director Technical Services to meet with an appropriate representative of DIPL and the NT EPA to discuss ways of how the issue of illegal dumping can be addressed and report back to this Committee.
2. Director Technical Services to prepare a report investigating a potential Council program for reporting illegal dumping and present to a future Technical Services Committee.

5. CORRESPONDENCE

Nil

6. FINANCIAL STATEMENTS

6.1 Financial Statement for the period ending October 2019
6.2 Financial Statement for the period ending November 2019
6.3 Financial Statement for the period ending December 2019
6.4 Financial Statement for the period ending January 2020

The Committee received and noted the Financial Statements October 2019 - January 2020.

Moved: Councillor Cocking **Seconded**: Councillor Auricht **CARRIED**

6.4.1 Town Council Expenditure - Councillor Cocking

Councillor Cocking enquired about the *Town Camp Revenue and Town Camp Expenditure* in the Regional Waste Management Facility Financial Performance Report for the period ending 31 January 2020, noting 18.97% expenditure against budget with concerns it is very underspent for this time of year. The Director Technical Services advised the timing of invoice receipt in regard to this work could have an impact on the expenditure to date, and would follow up with the Director Corporate Services.

Action:
Director Corporate Services to investigate *Town Camp Expenditure* and provide an update.

7. GENERAL BUSINESS

7.1 Regional Waste Management Facility Report - Manager Technical Services

The Committee received and noted the RWMF Reports October 2019 - January 2020.

Moved: Councillor Cocking **Seconded**: Councillor Auricht **CARRIED**

UNCONFIRMED

7.2 Food Organics Garden Organics (FOGO) Trial - Environment Officer

The Environment Officer gave an update on the FOGO Trial to date:

- One tonne of waste had been received from internal trial participants
- One windrow had been created with work expected to begin on a second windrow in the next few weeks
- Regular temperature monitoring was occurring throughout the week, and over the weekend with a temperature probe
- Preparations for stage two of the trial are underway

The Environment Officer reported that MRA Consultants were making a presentation to the *Waste 2020 Conference* in May on Council's FOGO Trial.

Mayor Ryan enquired in regard to participation for the internal trial and the amount of contamination that was being found in the FOGO waste. The Environment Officer advised 68 households were actively participating out of the targeted 200 and at this stage contamination removal was occurring manually during this small-scale controlled trial. The Director Technical Services advised that stage two of the trial would give a better insight into contamination issues that may be faced on a larger scale.

Mayor Ryan enquired how stage two would work. The Director advised:

- Expressions of interest would be sought and participants selected,
- A contractor will be engaged to specifically collect the FOGO waste,
- Collection frequency may be adjusted throughout the trial based on conditions, and
- Visual inspections will occur for contamination throughout the trial.

Mayor Ryan enquired if all costs associated with the trial were financed through the Climate Action Plan (CAP) budget. The Director Technical Services advised that currently staff resources at the RWMF for this internal part of the trial were borne by the RWMF and noted when a casual employee is engaged for the second stage of the trial it would be funded through the CAP budget in addition to costs associated with the contractor for FOGO waste collection.

Mayor Ryan requested estimates on Council's spend to date and forecast spend for the FOGO trial and if a quote from the contractor had been obtained for stage two of the trial. The Director Technical Services advised a quote had been requested.

Action:
Environment Officer to prepare a report on FOGO project financials including spend to date and forecasted spend.

7.3 RWMF Master Plan - Manager Technical Services

The Manager Technical Services advised that Council has engaged *EcOz Environmental Consultants* to complete a comprehensive 10-year Master Plan for the RWMF which was expected to be completed by July/August 2020.

In preparation for the Master Plan, a range of inspections and investigations would include:

- Review of historical financial and waste data,
- Review of environmental monitoring reports,
- Infrastructure audits with lifecycle and replacement costs determined, and
- Survey of volumes and airspace measurements

The Manager Technical Services advised that the chosen consultant has extensive experience in cell design.

UNCONFIRMED

7.4 RWMF Staff - Mayor Ryan

Mayor Ryan enquired how many staff were currently employed at the RWMF. The Acting Manager RWMF advised staff numbers were in the mid 20's with a few positions in the process of recruitment.

7.5 Rediscovery Centre - Mayor Ryan

Mayor Ryan requested a report on the financials of the Rediscovery Centre to compare the last 12 months with the preceding 12 months, to determine if any impact has occurred as a result of the change of hours.

7.6 Clean Up Australia Day - Mayor Ryan

Mayor Ryan reminded the Committee that the Clean Up Australia Day event would be held on Sunday 1 March 2020, 7:30am in the Todd River.

8. NEXT MEETING

Thursday 28 May 2020.

Mayor Ryan requested that the next meeting be held onsite at the RWMF.

The meeting closed at 12:34pm.

UNCONFIRMED

MINUTES OF THE MEETING OF THE SPORTS FACILITIES ADVISORY COMMITTEE (SFAC) HELD ON THURSDAY 27 FEBRUARY 2020 - ALICE SPRINGS TOWN COUNCIL, ANDY MCNEILL MEETING ROOM

PRESENT

Mayor Damien Ryan
Deputy Mayor Matt Paterson
Councillor Marli Banks
Councillor Eli Melky
Bruce Walker (Chair)
Mr Aaron Blacker
Ms Ann Jacobs
Mr Anthony Murphy
Mr Tim Pearson
Mr Phillip Preece
Mr Jim Rebbechi

OFFICERS IN ATTENDANCE

Mr Scott Allen - Director Technical Services
Mr Takudzwa Charlie - Manager Technical Services
Mr Tama Wakelin - Healthy Communities Coordinator (Observing)
Ms Stephanie Dominguez - Executive Assistant (Minutes)

13th Alice Springs Town Council Sport Facility Advisory Committee - Attendance List 2019/2020							
	29 Aug 19	12 Sept 19 **Special Meeting**	31 Oct 19	28 Nov 19 **Special Meeting**	27 Feb 20	30 Apr 20	25 Jun 20
Mayor Damien Ryan	✓	A	✓	✓	✓		
Deputy Mayor Matt Paterson	✓	✓	✓	✓	✓		
Councillor Marli Banks	✓	✓	✓	✓	✓		
Councillor Eli Melky	✓	✓	✓	✓	✓		
Dr Bruce Walker	A	✓ **Phone**	A	✓	✓		
Mr Aaron Blacker	✓	✓	✓	✓	✓		
Ms Sarah France	A	A	A	A	A		
Ms Ann Jacobs	✓	✓	✓	✓	✓		
Mr Lachlan Modrzynski	✓	A	--	A	A		
Mr Anthony Murphy	✓	✓	✓	✓	✓		
Mr Jamie Orr	✓	✓	A	A	A		
Mr Tim Pearson	✓	✓	✓	A	✓		
Mr Phillip Preece	✓	--	✓	A	✓		
Mr Jim Rebbechi	A	--	✓	✓	✓		

✓	Attended
✓ **Proxy**	Proxy attended in place of committee member
A	Apology received
--	No attendance and no apology recorded

The meeting opened at 12:09pm.

1. APOLOGIES

Mr Robert Jennings - Chief Executive Officer
Ms Sabine Taylor - Director Corporate Services
Ms Jodie Summers - Manager Governance
Ms Sarah France
Mr Lachlan Modrzynski
Mr Jamie Orr

2. CONFLICT OF INTEREST

Nil

3. SPORTS FACILITIES ADVISORY COMMITTEE (SFAC) - TERMS OF REFERENCE

The Chair reported the Manager Governance has completed the review of the new *Sports Facilities Advisory Committee - Terms of Reference* considering the feedback of this Committee from the special meeting held in November 2019, and the requirements of Council. He advised that the final documents were presented to Council and adopted at the Ordinary Council Meeting held Monday 24 February 2020.

The Chair noted, after decision of Council and subsequent discussion with the Chief Executive Officer, his term as Chairperson of SFAC had come to an end, and it had been decided that an Elected Member would assume the role of Chairperson for the Sports Facilities Advisory Committee after elections and endorsement at the August Ordinary Council meeting.

Mayor Ryan noted his personal thanks to Dr Walker for his contribution to the Committee and the guidance he had provided in his time as Chairperson. The Director Technical Services echoed Mayor Ryan's sentiments on behalf of the Chief Executive Officer and Council.

The Director Technical Services advised that Council had adopted a new suite of documents relating to the Sport Facilities Fund:

- *Sport Facilities Fund – Membership Agreement*
- *Deed of Licence*
- *SFAC Terms of Reference,* and
- *SFAC Representation Nomination Form*

The Director noted these documents will be distributed to Sport Facilities Fund members and the nomination process would allow members the opportunity to nominate a representative to join SFAC. The Director advised nominations would be sought in the coming month.

Councillor Banks enquired if all positions would be considered vacant and if nominations would be sought from all fund members concurrently or if a staggered approach would be adopted. The Director Technical Services advised that all positions on SFAC had reached the end of their term therefore Council would seek nominations for all positions.

Discussion ensued in regard to the extension of membership terms that had occurred in 2019 while the review of the SFAC Terms of Reference was undertaken by the Manager Governance.

Councillor Banks suggested there was value to continuing current memberships through to August to align with the changeover of Chairperson.

Discussion ensued around procedure and function of the Committee in the interim while changes are implemented and nominations are sought for SFAC members from Sport Facilities Fund members.

UNCONFIRMED

The Chair sought feedback from Committee members in regard to the timeline and process of nominating new representatives for their sport, or the option of continuing on in their current position as members of SFAC through until August:

- Phillip Preece advised he had consulted the sport that originally nominated him and would leave the decision with them to determine if they renominated him or put forward a different representative
- Tim Pearson advised Touch Football has its AGM this week, therefore it was an appropriate time for the Committee to consider a nomination
- Ann Jacobs advised Netball was at the beginning of the season and would be in the position to nominate an appropriate representative
- Aaron Blacker advised League and Union were in opposite seasons and the timeline wouldn't make a significant impact, but expressed concern that if memberships weren't accepted by Council in time for the next meeting there may not be members for the next Committee Meeting
- Jim Rebbechi expressed his interest in continuing on the Committee as long as he was endorsed to do so

The Director Technical Services advised that all current positions would continue until new nominations had been endorsed by Council.

Councillor Melky expressed concern that no formal provision has been made for current Committee members or timeline for changeover however supported that the Committee proceed as normal until new memberships had been endorsed.

Councillor Banks requested that the endorsed Terms of Reference be included in the papers for future meetings and enquired in regard to the term of membership. The Director Technical Services clarified that new memberships would apply for two-year terms.

Discussion ensued in regard to the process of electing of chairperson to the Sport Facilities Advisory Committee, and the need for an interim recommendation to support Dr Walker continuing on as Chairperson through to August 2020 as the Election of Chairperson process had been deferred last year due to Dr Walkers absence from the October 2019 meeting.

Dr Bruce Walker relinquished the role of Chairperson at 12:41pm
Mayor Ryan assumed the role of Acting Chairperson at 12:41pm

As Acting Chairperson, Mayor Ryan called for nominations for the role of Chairperson for the term through until August 2020. Councillor Melky nominated Dr Bruce Walker. No further nominations were received.

RESOLVED:
That it be a recommendation to Council

That the Sport Facilities Advisory Committee nominate Dr Bruce Walker to continue as Chairperson through until the August 2020 meeting.

Moved: Councillor Melky **Seconded:** Philip Preece **CARRIED**

Mayor Ryan relinquished the role of Acting Chairperson at 12:44pm
Dr Bruce Walker assumed the role of Chairperson at 12:44pm

The Chair acknowledged that this meeting was arranged under the previous Terms of Reference, a quorum had been reached, the meeting could continue, and members would be provided an update as the process of endorsing new members is undertaken.

Action:
Executive Assistant Technical Services to circulate the new *Sports Facilities Advisory Committee - Terms of Reference* which were endorsed at the 24 February 2020 Ordinary

UNCONFIRMED

Council Meeting once the final document is prepared with the corresponding resolution number.

4. MINUTES OF PREVIOUS MEETING

4.1 Minutes from the Sport Facility Advisory Committee held 31 October 2019

RESOLVED:
That the minutes of the Sport Facility Advisory Committee meeting held 31 October 2019 be confirmed as a true and correct record of the proceedings

Moved: Mayor Ryan **Seconded:** Ann Jacobs **CARRIED**

3.2 Minutes from the Special Meeting of the Sport Facility Advisory Committee held 28 November 2019

RESOLVED:
That the minutes of the Special Meeting of the Sport Facility Advisory Committee meeting held 28 November 2019 be confirmed as a true and correct record of the proceedings

Moved: Mayor Ryan **Seconded:** Aaron Blacker **CARRIED**

5. BUSINESS ARISING FROM PREVIOUS MINUTES

5.1 Alice Springs Sports Facilities Master Plan 2019-2029 - Manager Technical Services

The Manager Technical Services advised that at the Ordinary Council Meeting held on 28 January 2020, Council resolved to endorse the Sports Facilities Master Plan 2019-2029 and display the document for public comment.

Ordinary Council Meeting – 28 January 2020 (excerpt)

14.4.3 Alice Springs Sport Facilities Master Plan (2019-2029)
Report No. 3 / 20cncl

That Council endorse the final recommended Alice Springs Sports Facilities Master Plan 2019-2029, and the plan to be displayed on Council's website from Wednesday 29 January - Friday 28 February 2020 for public comment.

CARRIED (20785)

The Manager Technical Services advised responses would be provided to this Committee for their information at the next meeting.

5.2 Albrecht Oval - Sport Field Lighting - Update - Manager Technical Services

The Manager Technical Services advised that Council went out to tender for the construction of the Albrecht Oval Sport Field lighting on 13 February 2020, the tender is due to close on the 26 March 2020, a tender assessment will then be completed and a report put up for Council endorsement. Construction is expected to start after this process has concluded.

The Chair enquired as to when the Director expected to have lights on at the Oval. The Director responded, advising he hoped to have lights on before November 2020.

The Chair described his experience with delay of construction materials for field lighting poles. The Director Technical Services advised this would be one of the first items discussed with the winning tenderer.

UNCONFIRMED

5.3 Update on Action - ASTC & Alice Springs Hockey Association Meeting - Director Technical Services

The Director Technical Services advised that a meeting was held on the 12 December 2019 with Hockey to discuss concerns and clarify processes for reporting issues, and Council was awaiting further information from Hockey to progress some of their requests.

Ann Jacobs sought clarification on who was responsible for what at the field. The Director Technical Services responded, advising that Hockey was responsible for their playing surface, all other maintenance at the facility would be completed by Council, and if Hockey had a request for repair of the water cannons they could submit a request to SFAC.

6. CORRESPONDENCE

6.1 Email of thanks from Deb Bray - Alice Springs Basketball - 9 December 2019

The Committee received and noted the correspondence from Deb Bray.

6.2 Email from Bernadette Sheilds - Resignation from SFAC - 20 January 2020

The Committee received and noted the correspondence from Bernadette Sheilds.

Action:
Director Technical Services to send a letter of thanks to Bernadette Sheilds on behalf of the Committee, recognising her time and contribution to the Committee.

7. FINANCE REPORT

7.1 Finance Report for the Period Ending 14 February 2020

The Finance Report was received and noted by the committee.

Total Reserve Balance (As at 14 February 2020)	**$**	**840,359.35**
Total commitments (purchase orders)	$	15,877.26
Capital - $ Nil		
Operational - $6,123.51		
Potential Future Commitments - $9,753.75		
Funds available assuming all commitments are realised	$	824,482.09

Moved: Tim Pearson **Seconded**: Philip Preece **CARRIED**

Ann Jacobs enquired if the $11,000 increase paid by AFL was a result of increased female player participation. The Director Technical Services took the question on notice.

The Chair noted the total funds available in the budget, and highlighted the Committee should consider what these funds should be spent on, highlighting the funds were intended for the development of sports facilities.

Discussion ensued in regard to a report that was requested from Officers in regard to the value of sporting assets and how this should relate to the fund's investment in each facility. The Director Technical Services advised that the report on the value of sporting assets would be included as part of a larger project and when complete would be available to the committee.

Action:
Sports Officer to obtain information about the increase in AFL payments and provide an update to the next Committee meeting.

UNCONFIRMED

8. GENERAL BUSINESS

8.1 NTG $6.2M Sporting Facility Upgrades - Update

The Director Technical Services acknowledged the contribution from the Northern Territory Government for the $6.2M for the sporting facility upgrades and thanked those who were available to attend the Official Opening of the Albrecht Oval Grandstand which was held on 25 February 2020 marking the completion of 6 out of 7 projects.

The Director advised that works were underway at Rhonda Diano Oval and were expected to conclude at the end of March 2020.

Aaron Blacker enquired if there were any remaining funds, noting this Committees original priority of power upgrades at Anzac Oval. The Director Technical Services advised that all funds from the $6.2M were expended.

Discussion ensued in regard to the power issues that users of Anzac Oval face including the need to bring in generators for events, and the importance and potential for the venue for sporting and community events.

Mayor Ryan suggested that power upgrades at Anzac Oval be put forward by the Director Technical Services to Council's budget discussions. The Director Technical Services noted the Mayor's request for this to be included in budget discussions.

Discussion ensued in regard to the cost for power upgrades. Aaron Blacker noted previous requests, which had been supported by Council, to mitigate the power issues such as applications for funding to install solar due to various reasons hadn't come to fruition.

RESOLVED
That it be a recommendation to Council

That Council examine the need for power upgrades at Anzac Oval during the next round of budget discussions

Moved: Aaron Blacker **Seconded**: Deputy Mayor Paterson **CARRIED**

8.2 Dilapidation Reports and Repairs - Progress

The Committee received and noted the *Dilapidation Report*.

Traeger Park Main

The Chair noted issues with the speakers in the lounge at Traeger Park. The Director Technical Services advised that the speakers often get turned down and the volume could be adjusted.

Paul Fitzsimmons Oval (CDU)

The Chair enquired about the expiry on the licence agreement with CDU and reported on a partnership model in Darwin that could be mirrored. The Director Technical Services advised Council would accept feedback from sports, but any negotiation with CDU in regard to a licence agreement would be handled as an operational matter.

Ordinary Council Minutes – 27 May 2019 (extract)

13.3.11 Sport Facility Advisory Committee Minutes
Dilapidation Reports and Repairs – Progress (Agenda Item 7.4)

That Sport Facility Advisory Committee recommends Council engages in conversation with Charles Darwin University in regard to a longer lease on Paul Fitzsimmons Oval.

CARRIED (20369)

UNCONFIRMED

Action:
Director Technical Services to initiate further discussion with CDU about a licence renewal for Paul Fitzsimmons Oval.

9. OTHER BUSINESS

9.1 Albrecht Oval Cricket Nets - Mayor Ryan

Mayor Ryan enquired about ownership and maintenance of the cricket nets at Albrecht Oval. The Director Technical Services advised that the nets will become a Council asset and Council will be responsible for maintenance.

9.2 Facility Scoreboards - Mayor Ryan

Mayor Ryan enquired about the condition of scoreboards at Council facilities, if they should be identified for investment of SFAC funds. Mayor Ryan requested a report on the condition of scoreboards at Council facilities so that they can be considered for upgrades where necessary.

Discussion ensued in regard to the Sports Facilities Master Plan and Dilapidation Reports and responsibility for this committee on projects to consider.

Tim Pearson noted it was important to consider communal access, security and connectivity for all sports that access each facility. Deputy Mayor Paterson suggested scoreboard trailer options could be considered.

Direction was given for the report to include:

- A range of scoreboard options for each facility, and
- Estimate of costs for the scoreboard options
- Importance of introduction of scoreboard to the sport (compared to other priorities)

The Committee requested that the sports be consulted during the investigation for suitable options for each location to ensure the suggestions meet the needs of the sports.

The Chair highlighted the historical process of the SFAC which included review FAT meeting requests, review of the *Dilapidation Reports* and consideration of direct requests from sports. The Committee would prioritise all these items and make recommendations to Council. He noted a shift in the process with significant number of items on the *Dilapidation Reports* now being treated as maintenance and no longer being funded through SFAC, in addition to this Council was referring things to this Committee for advice.

Councillor Banks enquired if an investment into scoreboards was the best use of funds and expressed support for the consideration of other priorities and opportunities. The Chair highlighted that references to scoreboards had been reported by sports on the *Dilapidation Report* and as such it was an appropriate item for the Committee to consider.

Discussion ensued in regard to the *Dilapidation Report*. The Chair requested the report be reviewed in the following way prior to the next meeting:

- Removal of completed items, and
- Retain items listed by Council as ‘no issue’ for review by sports

The Chair summarized the way forward for the Committee to consider as a collective and determine the work program and priorities for the next 12 months:

- Sports Officer to initiate the Annual Facility Review meetings in August
- Dilapidation Reports to be updated for the next meeting
- Report on sporting assets / priorities to be provided to the Committee, and
- Anzac Oval priorities to be reinitiated

The Director Technical Services noted the request.

UNCONFIRMED

Councillor Banks left the room at 1:44pm

Action:
The Director Technical Services to provide a report on the condition of scoreboards and opportunities for scoreboards at Council sporting facilities.

Action:
Sports Officer to review the Dilapidation Reports with the Depot prior to the next meeting and submit a reviewed version to the next Committee Meeting.

10. NEXT MEETING

Thursday, 30 April 2020 – 12noon.
Andy McNeill Meeting Room, Alice Springs Town Council

The meeting closed at 1:47 pm

UNCONFIRMED

Agenda Item 10.4

MINUTES OF THE DEVELOPMENT COMMITTEE OPEN MEETING HELD ON MONDAY 2 MARCH 2020 IN THE ALICE SPRINGS TOWN COUNCIL - ARUNTA ROOM

The meeting opened at 7:01 am

1. ATTENDANCE

Mayor Damien Ryan
Councillor Glen Auricht *(via phone)*
Councillor Marli Banks
Councillor Jamie de Brenni *(Chair)*
Councillor Eli Melky
Councillor Matt Paterson – *arrived at 7:03am*
Councillor Jacinta Price – *arrived at 7:05am*

OFFICERS IN ATTENDANCE

Chief Executive Officer - Robert Jennings
Scott Allen – Director Technical Services
Dilip Nellikat – Manager Developments
Kristine Capangpangan – Administration Officer *(Minutes)*

13th Alice Springs Town Council
Development Committee Attendance List 2019/20

	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Feb-20	Mar-20	Apr-20	May-20	Jun-20
Mayor Damien Ryan	✓	✓	✓	✓	✓	✓	✓	✓			
Councillor Glen Auricht	✓	✓	A	✓	✓	✓	✓	✓			
Councillor Marli Banks	✓	✓	✓	A	✓	✓	✓	✓			
Councillor Jamie de Brenni	✓	✓	✓	✓	A	✓	✓	✓			
Councillor Jimmy Cocking	✓	✓	✓	✓	✓	✓	✓	A			
Councillor Eli Melky	✓	✓	✓	✓	✓	✓	✓	✓			
Councillor Matt Paterson	✓	✓	✓	✓	✓	✓	✓	✓			
Councillor Jacinta Price	✓	✓	✓	✓	✓	✓	✓	✓			
Councillor Catherine Satour	✓	✓	✓	✓	A	✓	✓	A			

(✓) *Present* **(A)** *Apology* **(--)** *No attendance and no apology tendered*

APOLOGIES

Councillor Jimmy Cocking
Councillor Catherine Satour

2. DISCLOSURE OF INTEREST

2.1 Agenda Item 5.3 - Councillor Paterson

3. MINUTES OF PREVIOUS MEETING

3.1 Minutes of the Previous Meeting held 3 February 2020

RESOLVED:
That the minutes of the Development Committee Open meeting held on 3 February 2020 be confirmed as a true and correct record of the meeting proceedings.

UNCONFIRMED

Moved: Mayor Ryan **Seconded:** Councillor Melky **CARRIED**

4. BUSINESS ARISING

4.1 Update on Action Item 5.1 from Minutes dated 2 December 2019

ACTION:
Director Technical Services to write a letter of invitation to the hospital board to meet with Council early next year to present its car parking master plan and to provide Council with clarification on how it will address its shortage of car parking long term.

The Director Technical Services advised that a draft letter is currently being formalised. The letter will be sent when approved by the CEO.

5. DCA APPLICATIONS – FEBRUARY 2020

5.1 Lot 544, 12 Hele Crescent – PA2018/0055

Alterations and Additions to Light Industry warehouse with reduced parking and rear building setback.
Conditions: Basic Stormwater, Permit to Work within ASTC Road Reserve, Carparking outside of CBD: A shortfall of 16 spaces identified.

Councillor Paterson joins the meeting at 7:03am

5.2 Lot 4440, 10 Flynn Drive – PA2020/0047

14.4m x 3.3m demountable building to be utilized as an administration office space for existing medical clinic.
Conditions: Basic Stormwater, Permit to Work within ASTC Road Reserve

Manager Developments explained that the demountable will be a permanent structure on the premise and that the provision for extra car parking was not addressed as a condition on Council's DCA response letter as there would be no addition to the staff onsite as presumed on the application. Discussion ensued.

The CEO sought clarity over the requirement for the additional car parking. Manager Developments clarified that the impact would be minimal and that the additional floor area is approximately $40m^2 – 45m^2$.

Councillor Price joins the meeting at 7:05am

ACTION:
Manager Developments to send a further response letter to the DCA expressing Council's concerns over the additional office space added onsite and its potential impacts to car parking by the end of the week.

Councillor Paterson leaves the room due to a conflict of interest at 7:10am

5.3 Lot 1826, 3 Ashwin Street – PA2019/0397

Multiple Dwellings (2 x 2 bedroom dwellings in a single storey building)
Conditions: Basic Stormwater, Kerb Crossovers and Driveways, Permit to Work within ASTC Road Reserve, Sight lines

Mayor Ryan enquired about the identity of the Consent Authorities, Southern Minister.

The Committee welcomed this development as it would tidy the visual appearance to the site.

ACTION:
Manager Developments to obtain the name of the Southern Minister to report back by the next meeting.

UNCONFIRMED

Councillor Paterson returns to the room at 7:13am

5.4 Lot 3461, 73 Flynn Drive – PA2019/0489
Multiple Dwellings – construct an additional 3 bedroom single story dwelling
Conditions: Basic Stormwater, Kerb Crossovers and Driveways, Permit to Work within ASTC Road Reserve, Sight lines

5.5 Lots 9288 & 9289, 325 & 365 Ross Highway – PA2020/0049
Subdivision of 2 lots to create 3 lots
Conditions: Basic Stormwater, Kerb Crossovers and Driveways, Permit to Work within ASTC Road Reserve, Sight lines

Manager Developments clarified that for a Rural Living zone, a minimum requirement of 2 hectares is required for an allotment. The total site area of this development is 8 hectares.

5.6 Lots 9487, 16 Jennerae Drive – PA2020/0040
Unit Titles Schemes subdivision to create two units and common property
Conditions: Basic Stormwater, Permit to Work within ASTC Road Reserve

5.7 Lot 7032, 7 Willoby Court – PA2020/0028
Shed addition to an existing single dwelling with a reduced front setback
Conditions: Basic Stormwater, Permit to Work within ASTC Road Reserve, Sight lines

6. DCA PERMITS – FEBRUARY 2020 *(For Information Only)*

6.1 Lot 516 – Unit 1 20 Chewings Street – DP20/0032
Verandah addition with a reduced primary street setback (retrospective approval)

6.2 Lot 9094 – 62 Elder Street - DP20/0029
Extension to single storey warehouse with reduced building setback to rear boundary

6.3 Lot 2830 – 4 Finlayson Street - DP20/0044
Verandah addition to an existing single dwelling with reduced front and side setbacks

6.4 Lot 5949 – 17 Eagle Court – DP20/0048
Carport in front of Garage - Setback variation to side boundary.

6.5 Lot 10225 – 5 Brandt Court – DP20/0054
Alterations and additions to an existing two storey single dwelling with reduced setbacks to front and side boundaries.

6.6 Lot 4818 – 134 Kurrajong Drive – DP20/0062
Carport addition to an existing single dwelling with a reduced side setback

6.7 Lot 2965 – 27 Barclay Crescent – DP20/0067
Carport addition to existing single dwelling with reduced building setbacks to front and side boundaries.

7. PART 5's ISSUED – FEBRUARY 2020 *(For Information Only)*

7.1 Lot 9043 – 90 Todd Street – DP13/0705A
Additions and alterations to an existing restaurant in a single storey building

7.2 Lot 5757 – 17 Battarbee Street – DP20/0038
Post constructed pergola addition to single dwelling with reduced building setback to side boundary

UNCONFIRMED

7.3 Lot 190 – 69 Bath Street – DP19/0255
Alterations and additions to Medical Clinic in a single storey building

7.4 Lot 716 – 25 Warburton Street – DP19/0248
Carport additions (x3) to existing multiple dwellings with reduced building setbacks to primary street and side boundaries

7.5 Lot 6774 – 8 Albrecht Drive – DP19/0073
2 storey grandstand in a single building

7.6 Lots 10654 & 3463 – 69 Flynn Drive – DP19/0103
Consolidation to create one lot

7.7 Lots 10653 & 3426 – 16 Bruce Street – DP19/0104
Consolidation to create one lot

7.8 Lot 7735 – 14 Railway Terrace – DP19/0077
Multiple dwelling development in a Defined Flood Area

8. GENERAL BUSINESS

8.1 Designing Better

Councillor Banks expressed concerns on the lack of consultation that was provided to Council on this project and the promotion of design heights. It was suggested that a presentation relevant to Council and Alice Springs be conducted by the Commission.

The CEO advised that consultation process is now in Stage 1c and suggested that Council make comment.

Concerns were raised over the relevance to high-rise buildings and its impact to Alice Springs and the community and how Council will protect the Alice Springs vision moving forward with the document.

The CEO noted that the Area Plan has gone through the consultation process and that it would override the Design Guidelines. Area Plans, whilst not legislative are strongly referenced and there are zoning controls that is legislative which could protect the Alice Springs community. It was recommended by the CEO that the Committee review the document to start with for further discussion at a future meeting

9. NEXT MEETING / ADJOURNMENT

Monday 6 April 2020, 7am in the Arunta Room

The meeting adjourned at 7:23am to resume in Confidential

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