murchisonshire

Ancient land under brilliant skies

Ordinary Council Meeting

27 October 2022

Agenda Attachments

CLIENT MEMO

TO: Shire of Murchison

ATTN: Bill Boehm

FROM: Joshua Kirk

DATE: 12 October 2022, revised 20 October 2022

REF: Sealed Pavement Cost Contribution Preliminary Assessment

Bill,

As requested, Greenfield has undertaken a preliminary assessment of the potential impact of heavy vehicle traffic on typical sealed pavements within the Shire of Murchison (Shire). This memo summarises the results of our preliminary assessment.

1.0 BACKGROUND

Greenfield understands that the Shire is concerned about the impact that RAV vehicles can have on the Shire's sealed and unsealed road network. Specifically, RAV vehicles have the potential to accelerate the wear on sealed pavement and surfacing assets. The Shire is interested in exploring opportunities to recover some or all of the incremental additional cost imposed by RAV vehicles on the Shire's road assets.

Specifically, the Shire is seeking to understand the incremental cost incurred from proposed RAV vehicle trucking programs by way of a $/tonne/kilometre rate or similar basis and has requested that Greenfield complete an assessment of this cost.

1.1 Relevant Literature

In the preparation of this report, Greenfield has consulted various relevant sources that discuss the issues of incremental cost impacts from heavy vehicles on local roads including:

- WALGA – Heavy Vehicle Cost Recovery Policy Guideline for Sealed Roads (July 2017)
- WALGA – User Guide: Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks (May 2015)
- ARRB – Technical Basis for Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks (October 2015)

2.0 TYPICAL TRAFFIC AND ROAD STANDARD

2.1 Typical traffic volumes

The Shire has a relatively large road network however most roads generally experience low to very low traffic volumes. Typical recent average daily traffic data from one of the Shire's primary roads, Carnarvon Mullewa Rd are as follows.

- Total No of Vehicles per day: 51
- Equivalent Standard Axles per day: 22
- % of Heavy Vehicles (Classes 3-12): 17%

AUSTROADS Standard Vehicle Classes												
Veh. Class	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ESA Multiplier	0	0	0.6	1.5	3.6	1.3	1.7	2.6	3.1	5.3	5.7	10.8
No. of Veh.	28.8	13.3	3.1	1.1	0.8	0.8	0.7	0.3	0.6	0.3	0.8	0.4

Table 1: Recent average daily traffic data from Carnarvon Mullewa Rd based on a period of 83 days (daily data shown)

These typical values will be adopted as being representative of the typical traffic volumes across the Shire's road network.

Note that the figures in Table 1 are for AustRoads Vehicle classifications. The Vehicle Class row represents the 12 vehicle classes defined by this system whilst the ESAA Multipler row represents the contribution from each vehicle class to the total equivalent standard axle (ESA) value. In other words, differing vehicle classes have different ESA values.

For road access in Western Australia, it is often typical to consider Restricted Access Vehicle (RAV) classifications. Unfortunately the RAV vehicle classifications do not correlate neatly with the AustRoads vehicle classifications. A report published by WALGA (prepared by ARRB) entitled *User Guide: Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks* provides a useful figure for determining the number of ESA each RAV vehicle combination represents. Please note that ESA per RAV vehicle combination varies with loading of the vehicle and this variation is reflected in the figure below.

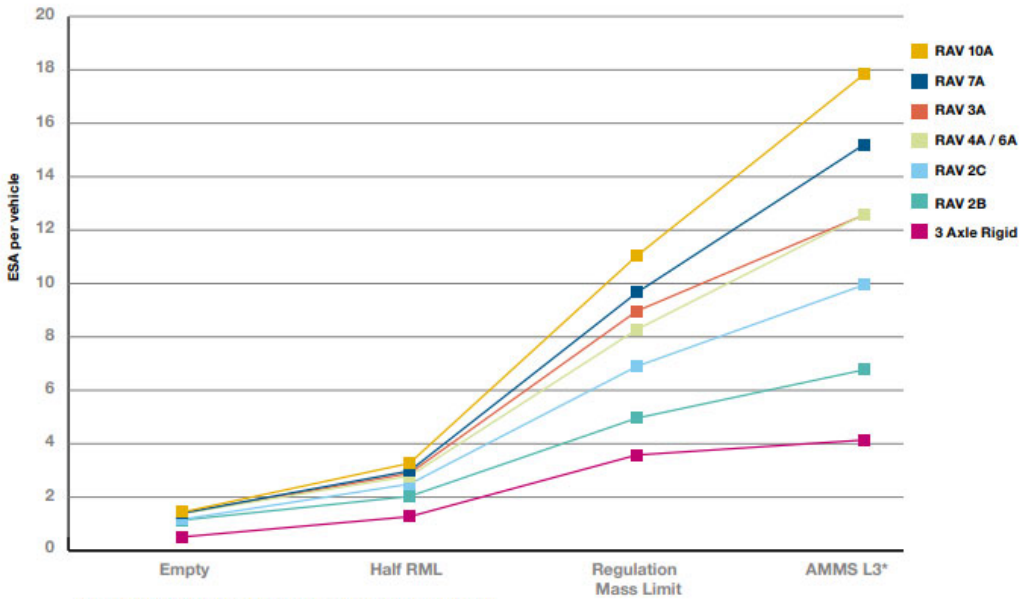


Figure 4: ESA per vehicle for increasing payload

Figure 1: ESA per vehicle for increasing payload

2.2 Typical road standard

Due to the relatively low traffic volumes and low tonnages, the Shire, similar to many regional local governments, typically adopts a fit-for-purpose standard of sealed road construction. The typical cross-section comprises:

- 11m wide formation constructed of insitu materials (the top 150mm of the formation is referred to as the subgrade)
- 9m wide gravel pavement typically approx. 150 – 200mm compacted thickness constructed from local, naturally occurring gravel materials
- 3% crowned cross-section on straights and 3 – 4% superelevation on curves
- 7m wide two-coat bitumen seal surfacing
- Sealed floodways: 10m wide gravel pavement typically approx. 200mm compacted thickness constructed from local, naturally occurring gravel materials.

3.0 FACTORS AFFECTING PAVEMENT LIFE

3.1 Pavement design process

Based on *Main Roads WA (MRWA) Engineering Road Note 9 (May 2013): Procedure for the Design of Road Pavements* and *Austroads Guide to Pavement Technology Part 2: Pavement Structural Design*, pavement life is a function of numerous variables including:

- Material properties and bearing strength of the Subgrade
- Annual Average Daily Traffic (AADT) and % of Heavy Vehicles
- Future traffic growth
- Material properties and bearing strength of the pavement gravel
- The thickness of the pavement gravel layer
- Roadside drainage and exposure to moisture

For a known desired pavement life, known insitu subgrade CBR and calculated design traffic, the minimum thickness of granular pavement material can be calculated for lightly trafficked granular pavements (Figure 12.2 *Austroads Guide to Pavement Technology)* (refer to Figure 2 below).

Figure 12.2: Example design chart for lightly-trafficked granular pavements with thin bituminous surfacings

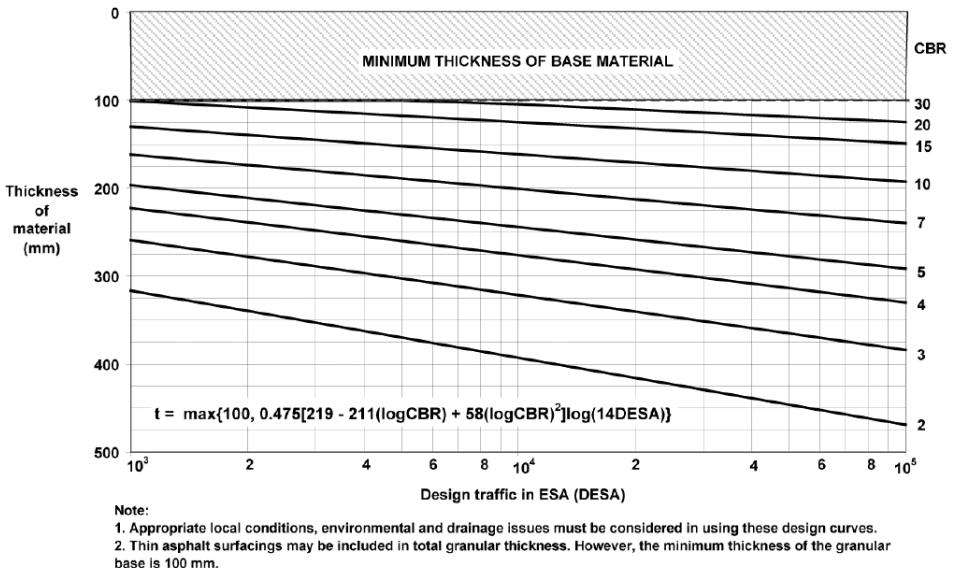


Figure 2: Estimated thickness of granular pavement material for lightly trafficked applications

Alternatively, for higher traffic applications, for a known desired pavement life, known insitu subgrade CBR and calculated design traffic, the minimum thickness granular pavement material can be calculated from Figure 8.4 in *Austroads Guide to Pavement Technology* (refer to Figure 3 below).

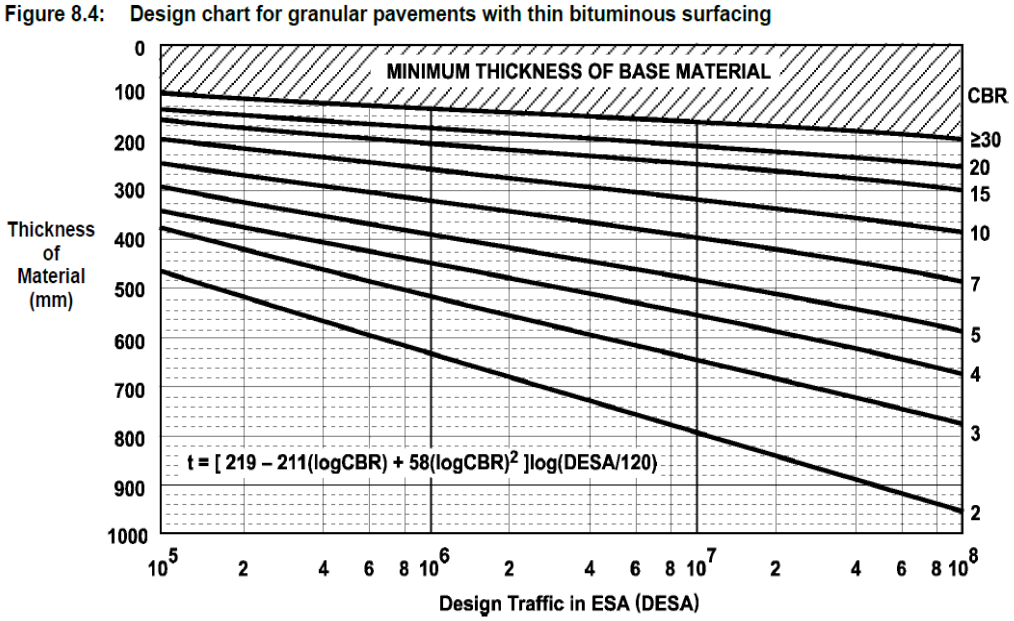


Figure 3: Estimated thickness of granular pavement material for normal traffic applications

3.2 Subgrade bearing strength

Pavement design and useful life is particularly sensitive to the strength of the underlying subgrade material. For the same traffic loading, a lower subgrade strength requires a thicker gravel pavement layer. MRWA Note 9 stipulates that a significant amount of local knowledge about the performance of similar material is required to use a design subgrade with a California Bearing Ratio (CBR) value > 10%. A significant amount of local knowledge is likely to constitute site sampling and geotechnical testing of numerous samples along each road section across the road network.

The purpose of this preliminary assessment is to determine a typical average cost impact of heavy vehicles on sealed pavements across the Shire. Note that the strength of the subgrade is likely to vary along the length of a road and vary with location; refer to section 4.2 for how this has been considered in this preliminary model.

3.3 AADT and % of heavy vehicles

Pavement life is a function of single-point loads and the cumulative effects of loading over time. The *Austroads Guide to Pavement Technology* notes that because it has been well established that light vehicles (Austroads Classes 1 & 2) contribute very little to the structural deterioration of pavements, only heavy vehicles are considered in pavement design. Pavement life, or rather the damage to pavements from heavy vehicle loading, depends on:

- The number of axles in the vehicle
- The grouping of these axles, and
- The axle group load

The following table shows the relationship between the Austroads Vehicle Class and the equivalent standard axle (ESA) multiplier which accounts for the various vehicle classes and their axle grouping and axle loading. Note that an ESA is defined as a dual-wheeled single axle applying a load of 80kN or approx. 8.1T.

AUSTROADS Standard Vehicle Classes												
Veh. Class	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ESA Multiplier	0	0	0.6	1.5	3.6	1.3	1.7	2.6	3.1	5.3	5.7	10.8

Table 2: ESA multiplier showing the effect of varying Austroads vehicle classes on ESA

From the table above, it is evident the significant additional contribution to total ESA that classes 10 – 12 have in comparison to classes 3 – 9. As a result, the mix of heavy vehicles within this assumed percentage is important in obtaining an accurate estimate of pavement life and required granular material thickness for the mix of heavy vehicles typically found across the Shire road network.

3.4 Pavement bearing strength

For the same traffic loading, a gravel material of lower bearing strength requires a thicker gravel pavement layer to compensate. Additionally, pavement design methods are typically based on a minimum bearing strength of 80 for the gravel pavement material. The bearing strength is largely a function of the particle size distribution which can not only vary from gravel pit to gravel pit, but also within a single pit. As suitable naturally occurring gravel pits are becoming scarcer over time, the material properties of naturally occurring gravel materials are also a key factor in pavement performance and design life.

As noted above, the purpose of this preliminary assessment is to determine a typical average cost impact of heavy vehicles on sealed pavements across the Shire. However, the strength of the naturally occurring pavement gravels is likely to vary along the length of a road and vary with location. This being the case, and the fact that Greenfield does not have access to actual test data, we have used a design pavement CBR of 80 as an upper bound for the estimated strength in this analysis.

3.5 Rainfall runoff and roadside drainage

It is important to understand that the CBR of both the subgrade and pavement gravel are influenced by moisture. When the finer clay fraction of the material properties are exposed to moisture, the CBR value typically reduces compared to a drier sample of the same material. This means that the road formation height, contributing catchment runoff, and roadside drainage are also factors in the performance of the road.

4.0 SENSITIVITY ANALYSIS

Based on the adopted parameters in section 3.0, the typical standard of sealed road constructed by the Shire for the current traffic volumes experienced (refer to Table 1) provides for a pavement life of between approx. 3 – 35 years depending on location (using a subgrade CBR varying between 8 – 12).

Given the number of variables in this analysis, the general lack of site-specific data, and that this preliminary assessment is intended to apply across the entire Shire, Greenfield has characterised three base case scenarios as described below. These base case scenarios will form the basis for the sensitivity analysis of pavement life and its variability with traffic volumes. The intent is that the Shire might use these three base cases to manage and give consideration for differing environmental and site conditions along a road.

4.1 Limitations of the Road-Traffic Model

The model developed for this preliminary assessment is relatively simplistic in that it is based on:

- an average increase in heavy vehicle traffic over the entire life of the pavement
- subgrade and pavement CBRs that are constant

In reality, the proportion of heavy vehicle traffic over the life of a pavement is likely to change. Specifically, there may be periods of high heavy vehicle traffic volumes when resource developments are in progress. These may be for a short duration relative to the total pavement life. As such, the scenarios presented below are based on an average increase in traffic over the life of the pavement. In a worst-case event, should the percentage of heavy vehicle traffic double, then the pavement life is approx. 1.1 years, 12.6 years and 18.9 years for the low, average and high performance sites respectively.

Additionally, as noted in section 3.0, the subgrade and pavement CBRs can vary significantly based on a range of factors. Over the life of a pavement, the subgrade and pavement are likely to be exposed to moisture but this moisture content will vary with environmental conditions. As a result, the CBR of both the subgrade and pavement will also vary. The road-traffic model below equates these changes in subgrade and pavement CBR performance to a constant average subgrade CBR over the life of the pavement. In reality, this will vary and, as shown above, even small changes in the average CBR of the subgrade material will result in significant changes to the pavement life.

4.2 Base Case Scenarios

4.2.1 Low Performance Site

The low performance site scenario represents a specific location that may have one or more of the following attributes:

- Poor quality insitu materials
- Known pavement and/or subgrade failures
- Low-lying with poor drainage or areas of water ponding against or on the road formation

For the LOW scenario, CBRs of the insitu subgrade between 8 – 9 have been adopted.

4.2.2 Average Performance Site

The average performance site scenario represents a specific location that may have one or more of the following attributes:

- Average quality insitu materials, generally with some larger, boney material
- Existing road pavement and/or subgrade is known to provide reasonable performance under typical traffic volumes
- No significant drainage issues or water can drain away from the road formation in a short period following rain events

For the AVERAGE scenario, CBRs of the insitu subgrade between 9 – 12 have been adopted.

4.2.3 High Performance Site

The high performance site scenario represents a specific location that may have one or more of the following attributes:

- Good quality insitu materials, generally with some rock or harder material
- Existing road pavement and/or subgrade is known to provide good performance under higher traffic volumes
- Formalised drainage elements minimise water ponding against road formation

For the HIGH scenario, CBRs of the insitu subgrade >12 have been adopted.

4.3 Impact of Changes in Heavy Vehicle Traffic Volumes

The current typical traffic volumes comprise approx. 17% heavy vehicles (classes 3 – 12). As part of a sensitivity analysis, Greenfield has considered the following five traffic scenarios (Table 3) to determine the

impact of varying heavy vehicle traffic volumes on pavement life for the three different base case scenarios. Refer to Appendix A for the full details of the traffic scenarios.

Please note that for the various traffic scenarios, the mix of heavy vehicles has been assumed to remain constant and equal to the mix of the actual current traffic volumes.

Scenario	AADT (veh/day)	Change in HV traffic	ESA per day	No. of HV per day	% of HV
Current Actual Traffic	51	-	22	8.9	17%
10% decrease in HV traffic	50	-10%	20	8.0	16%
10% increase in HV traffic	52	+10%	24	9.8	19%
30% increase in HV traffic	54	+30%	28	11.6	22%
50% increase in HV traffic	55	+50%	33	13.4	24%

Table 3: Traffic volume scenarios

The analysis has been completed assuming a total granular material compacted thickness of 200mm and determined the estimated pavement life for the % HV figures above with varying site performance characteristics strengths; refer to Figure 4 for details.

Scenario	Estimated Pavement Life (years)		
	Low CBR	Average CBR	High CBR
Total Cumulative Design Traffic (ESA)	**$1.8x10^4$**	**$2.0x10^5$**	**$3.0x10^5$**
Current Actual Traffic	2.3	25.2	37.8
10% decrease in HV traffic	2.5	28.0	42.0
10% increase in HV traffic	2.1	22.9	34.4
30% increase in HV traffic	1.7	19.4	29.1
50% increase in HV traffic	1.5	16.8	25.2

Table 4: Estimated pavement life (years) with changes in heavy vehicle traffic

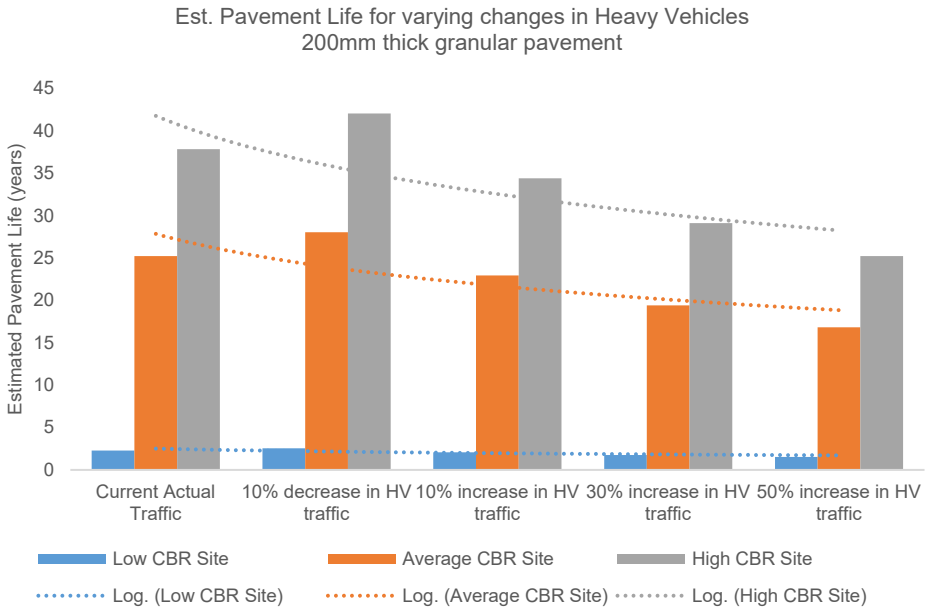


Figure 4: Sensitivity of pavement life to subgrade CBR and changes in heavy vehicles.

As shown in Figure 4, pavement life is highly sensitive to the subgrade CBR strength adopted as a result of the contributing factors detailed in section 3.0.

5.0 COST RECOVERY CONSIDERATIONS

5.1 Cost Recovery Approaches

As shown in the sections above, the estimated pavement life decreases with increasing heavy vehicle traffic. The life that is lost is a function of the total heavy vehicle traffic; the table below takes a conservative (high side) approach assuming a 50% increase in heavy vehicle traffic from current levels and summarises the approx. reduction in pavement life.

CBR Scenario	Estimated Pavement Life (Years)		
	Current Traffic Volumes	50% Increase in HV Traffic applied over the full life of the pavement	Reduction in Life
Low	2.3	1.5	0.8
Average	25.2	16.8	8.4
High	37.8	25.2	12.6

Table 5: Typical reduction in sealed pavement life for a 50% increase in heavy vehicle traffic

From a cost recovery perspective, the Shire has two options:

1. Continue to construct sealed pavements to the current standard and reconstruct the pavements more often.

2. Construct sealed pavements to a higher standard (thicker granular material) which allows for future traffic increases to achieve a similar estimated life as what is provided by the current standard and current traffic volumes.

5.2 Option 1 – Retain Existing Standard and Increase Reconstruction Frequency

For Option 1, the percentage reduction in pavement life due to varying increases in heavy vehicle traffic volumes is relatively consistent across the three base case scenarios (low, average and high performance sites). For the varying different heavy vehicle traffic scenarios, should the Shire retain the existing standard of construction then it is reasonable to expect that the sealed pavements will need to be reconstructed on a more frequent basis. The extent of this impact is summarised in the table below.

Traffic Scenario	Increase in Reconstruction Frequency due to Increase in HV traffic
10% increase in HV	1.1
30% increase in HV	1.3
50% increase in HV	1.5

Table 6: Required increase in the frequency of sealed pavement reconstruction due to reduction in pavement life from HV traffic

5.3 Option 2 – Upgrade Standard of Construction to Achieve Similar Life

The additional depth of granular pavement material required to accommodate the increased heavy vehicle traffic volumes and achieve a similar pavement life to what is provided by the current pavement standard and traffic volumes is summarised in the table below.

		Pavement Thickness (mm) to achieve the same design life as provided by current pavement with current traffic volume		
		Low Scenario	Average Scenario	High Scenario
	Current Traffic Volume	200	200	200
	10% increase HV	225	210	205
	30% increase HV	230	215	207
	50% increase HV	240	220	210

Table 7: Required increase in thickness of granular material to achieve similar pavement life

Please note that given that the Low Performance site already has a relatively short pavement life for the current traffic volume, the increase in pavement thickness presented in Table 7 for the Low Performance Case represents the pavement thickness required to achieve a 10-year pavement life.

Based on the above, for a relatively small incremental increase in the total compacted thickness of the granular pavement material, the pavement life can be extended to be of a similar life as the current standard of pavement with the current traffic volumes.

From a cost perspective, the current standard of sealed pavement requires approx. 2,300m3 of gravel per kilometre loose (approx. 2,200m3 compacted). Adopting a conservative approach, if it is assumed an upgraded standard requires an increase in granular material thickness of approx. 30mm (to provide for a total compacted thickness of 230mm) this would require an additional approx. 350m3 (loose; 270m3 compacted) of granular pavement material.

6.0 POSSIBLE COST RECOVERY RATES

The Shire has provided recent data on the cost of sealed pavement construction. Overall, the Shire can construct the typical standard of sealed pavement (section 2.2) for approx. $65,000 per kilometre. Based on typical industry standards, it is assumed that approx. 80% of this total cost is related to the supply, import, placement, conditioning, compaction and trimming of the granular pavement material.

6.1 Option 1 – Retain Existing Standard and Increase Reconstruction Frequency

Using Option 1 for the methodology to calculate cost recovery rates, the analysis is focused on the increased frequency of sealed pavement reconstruction due to the wear and deterioration from heavy vehicle loading. Given that reconstructing sealed pavements is generally less work than constructing new sealed pavement, it has been assumed that the cost of reconstructing sealed pavement is approx. 80% of the cost of constructing new sealed pavements.

With this change, the cost comparison across the various base case scenarios is shown below.

		Traffic Scenarios			
		Current traffic $7.93x10^3$ ESAs/yr	**10% increase** $8.72x10^3$ ESAs/yr	**30% increase** $1.03x10^4$ ESAs/yr	**50% increase** $1.19x10^4$ ESAs/yr
Low CBR	**Annual Depreciation Cost ($/km)**	$17,184.81	$18,903.29	$22,340.25	$25,777.21
	Additional Annual Depreciation Cost: ESA Rate ($/ESA/km)	-	$2.17		
	Additional Annual Depreciation Cost: Tonne Rate ($/T/km)	-	$0.267		
Average CBR	**Annual Depreciation Cost ($/km)**	$1,546.63	$1,701.30	$2,010.62	$2,319.95
	Additional Annual Depreciation Cost: ESA Rate ($/ESA/km)	-	$0.20		
	Additional Annual Depreciation Cost: Tonne Rate ($/T/km)	-	$0.024		
High CBR	**Annual Depreciation Cost ($/km)**	$1,031.09	$1,134.20	$1,340.42	$1,546.63

	Additional Annual Depreciation Cost: ESA Rate ($/ESA/km)	-	$0.13
	Additional Annual Depreciation Cost: Tonne Rate ($/T/km)	-	$0.016

Table 8: Cost recovery model Option 1 – retain the current standard and accept accelerated depreciation and reconstruction frequency

As is summarised in the table above, the cost per tonne kilometre ranges between approx. $0.016 – 0.267 depending on the site location.

To determine the cost per RAV vehicle combination per kilometre, the $/ESA/km value in Table 8 can be multiplied by the ESA per RAV combination provided in Figure 1. For example, the approx. cost for a regulation loaded RAV 10 vehicle ranges from approx. $1.43 - 23.83 per kilometre in a high and low CBR location respectively.

6.2 Option 2 – Upgrade Standard of Construction to Achieve Similar Life

Using Option 2 for the methodology to calculate cost recovery rates, the cost of the upgraded road standard assuming a 230mm thick pavement rather than a 200mm thick pavement is approx. 12% more; that is approx. $72,800/km.

With this change, the cost comparison across the various base case scenarios is shown below.

	Low CBR	**Average CBR**	**High CBR**
CURRENT PAVEMENT (200mm)			
Total Design Traffic (ESA)	$1.80x10^4$	$2.0x10^5$	$3.0x10^5$
Average $/ESA/km	$3.61	$0.33	$0.22
PROPOSED PAVEMENT (230mm)			
Total Design Traffic (ESA)	$7.00 x10^4$	$7.00 x10^5$	$1.50 x10^6$
Average $/ESA/km	$1.04	$0.10	$0.05
Average $/T/km	$0.128	$0.013	$0.006

Table 9: Cost recovery model Option 2 – construct sealed pavement to a higher standard to realise similar pavement life as current pavement standard under increased HV traffic

As is summarised in the table above, the cost per tonne kilometre ranges between approx. $0.006 – 0.128 depending on the site location.

To determine the cost per RAV vehicle combination per kilometre, the $/ESA/km value in Table 9 can be multiplied by the ESA per RAV combination provided in Figure 1. For example, the approx. cost for a regulation loaded RAV 10 vehicle ranges from approx. $0.53 – 11.44 per kilometre in a high and low CBR location respectively.

7.0 SUMMARY AND POTENTIAL NEXT STEPS

Heavy vehicle traffic on local Shire roads can have a significant impact on the life of the sealed pavement and without proper management, can impose significant costs on local governments. Determining a reasonable contribution from heavy vehicle operators as compensation for the additional pavement wear is a challenging proposition given the significant complexity involved with structural pavement design. Pavement life is highly sensitive to the bearing strength of both the underlying subgrade material and the pavement gravel. As both of these are likely to vary along a road and will vary across the entire Shire, any cost recovery model needs to consider the site location.

This preliminary analysis has looked at three site locations; a low, average and higher performance site location scenario against a range of design traffic volumes to provide some indicative range of costs that might be applicable and representative of the cost of heavy vehicles on sealed pavements. It should be noted that there are numerous assumptions within this preliminary model and that a small change in these assumptions may have a significant change in the outcome. In particular, the model estimates of:

- a constant average subgrade CBR over the life of the pavement
- a constant percentage increase of heavy vehicles over the life of the pavement.

In reality, both of these inputs are likely to vary over the life of a sealed pavement and without any additional detailed information related to each parameter, it is difficult to say how well these estimates model the actual parameters.

The model shows that due to the significant additional design cumulative traffic that can be accommodated by an incremental increase to a thicker granular pavement, constructing pavements to a higher design standard initially is likely to produce the most cost-effective outcome. Where there is an existing sealed pavement and there is proposed to be a significant change in heavy vehicle volumes, the initial incremental cost is likely to be higher on a per tonne kilometre basis as the standard, or thinner granular pavement is likely to require reconstruction on a more frequent basis. At the time of reconstruction, consideration should be given to upgrading the standard of these sealed pavement segments, such that the benefit of the capacity of a thicker pavement to accommodate much greater design traffic volumes is realised.

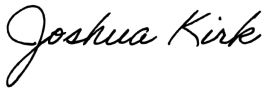
Furthermore, for the sealed pavement within the Shire that is greater than five years old, from Greenfield's knowledge of the road network, these sections are generally still providing a reasonable level of service and do not appear to be at or near the end of life. Whilst the model suggests that for a LOW CBR location, a sealed pavement would be nearing the end of its useful life after five years, these site observations provide a contrary perspective and indicate that the LOW CBR site location and conditions may not be a realistic or a frequent scenario that requires consideration within this Shire.

To further develop this analysis and possibly reduce the range of uncertainty within the model, the Shire may wish to consider conducting testing of the CBR of the existing insitu pavement and/or subgrade material as well as undertaking pavement dippings to establish the typical pavement thickness for various roads in the Shire. Given that the current major focus for the Shire is the Carnarvon Mullewa Rd, undertaking a program of insitu CBR testing and pavement dippings would allow better site characterisation and the actual CBRs and pavement depths could be used to refine the estimated remaining life of the existing granular material. Additionally, continuing to collect and improve the quality and completeness of the Shire's traffic data along the length of this road would also reduce uncertainty in the model.

Finally, the Shire should give consideration as to how an adopted cost recovery unit rate will vary over time. There is likely two scenarios; either a fixed rate is adopted and is appropriately time indexed, or a rate is determined on a regular basis (e.g. yearly) which is pegged to the current cost of the Shire's sealed pavement construction.

If you have any queries, please feel free to contact me.

Kind regards



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GREENFIELD TECHNICAL SERVICES

APPENDIX A – TRAFFIC SCENARIOS

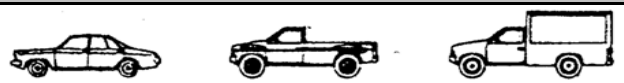
The following traffic figures have been used in the analysis above.

													ESA per day	No. HV	Change in HV Traffic	% of HV	AADT
Veh. Class	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**					
ESA Multiplier	0	0	0.6	1.5	3.6	1.3	1.7	2.6	3.1	5.3	5.7	10.8					
Actual Traffic	28.8	13.3	3.1	1.1	0.8	0.8	0.7	0.3	0.6	0.3	0.8	0.4	21.73	8.9	17%	17%	51
Proportion HV			0.35	0.12	0.09	0.09	0.08	0.03	0.07	0.03	0.09	0.04					
10% HV decrease	28.8	13.3	2.79	0.99	0.72	0.72	0.63	0.27	0.54	0.27	0.72	0.36	19.56	8.01	-10%	16%	50.11
10% HV increase	28.8	13.3	3.41	1.21	0.88	0.88	0.77	0.33	0.66	0.33	0.88	0.44	23.90	9.79	10%	19%	51.89
30% HV increase	28.8	13.3	4.03	1.43	1.04	1.04	0.91	0.39	0.78	0.39	1.04	0.52	28.25	11.57	30%	22%	53.67
50% HV increase	28.8	13.3	4.65	1.65	1.2	1.2	1.05	0.45	0.9	0.45	1.2	0.6	32.60	13.35	50%	24%	55.45
100% HV increase	28.8	13.3	6.2	2.2	1.6	1.6	1.4	0.6	1.2	0.6	1.6	0.8	43.46	17.8	100%	30%	59.9

GREENFIELD TECHNICAL SERVICES

APPENDIX B – AUSTROADS VEHICLE CLASSES

AUSTROADS Vehicle Classification System

Level 1	Level 2		Level 3	AUSTROADS Classification		
Length (indicative)	**Axles and Axle Groups**		**Vehicle Type**			
Type	**Axles**	**Groups**	**Typical Description**	**Class**	**Parameters**	**Typical Configuration**
	LIGHT VEHICLES					
Short up to 5.5m		1 or 2	**Short** Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	**1**	d(1) ≤ 3.2m and axles = 2	
Medium 5.5m to 14.5m	3, 4 or 5	3	**Short - Towing** Trailer, Caravan, Boat, etc	**2**	groups = 3 d(1) ≥ 2.1m, d(1) ≤ 3.2m, d(2) ≥ 2.1m and axles = 3, 4 or 5	
	HEAVY VEHICLES					
	2	2	**Two Axle Truck or Bus**	**3**	d(1) > 3.2m and axles = 2	
	3	2	**Three Axle Truck or Bus**	**4**	axles = 3 and groups = 2	
	> 3	2	**Four Axle Truck**	**5**	axles > 3 and groups = 2	
Long 11.5m to 19.0m	3	3	**Three Axle Articulated** Three axle articulated vehicle, or Rigid vehicle and trailer	**6**	d(1) > 3.2m, axles = 3 and groups = 3	
	4	> 2	**Four Axle Articulated** Four axle articulated vehicle, or Rigid vehicle and trailer	**7**	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 4 and groups > 2	
	5	> 2	**Five Axle Articulated** Five axle articulated vehicle, or Rigid vehicle and trailer	**8**	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 5 and groups > 2	
	≥ 6	> 2	**Six Axle Articulated** Six axle articulated vehicle, or Rigid vehicle and trailer	**9**	axles = 6 and groups > 2 or axles > 6 and groups = 3	
Medium Combination 17.5m to 36.5m	> 6	4	**B Double** B Double, or Heavy truck and trailer	**10**	groups = 4 and axles > 6	
	> 6	5 or 6	**Double Road Train** Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	**11**	groups = 5 or 6 and axles > 6	
Large Combination Over 33.0m	> 6	> 6	**Triple Road Train** Triple road train, or Heavy truck and three trailers	**12**	groups > 6 and axles > 6	

Definitions:

Group: Axle group, where adjacent axles are less than 2.1m apart

Groups: Number of axle groups

Axles: Number of axles (maximum axle spacing of 10.0m)

d(1): Distance between first and second axle

d(2): Distance between second and third axle

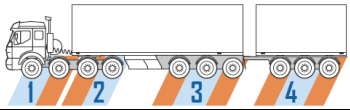
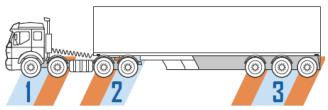
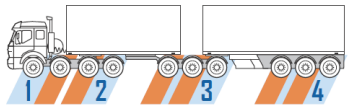
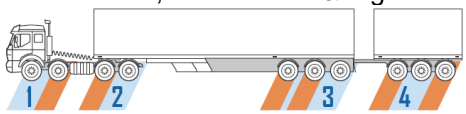
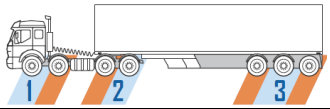
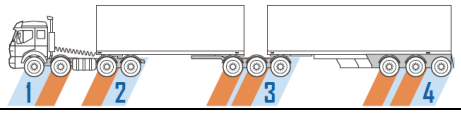
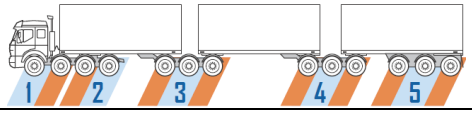
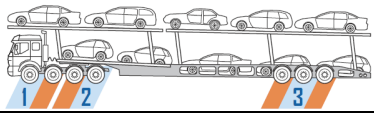
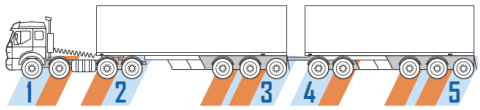
16.1.1 - October 2022

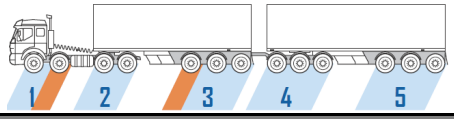
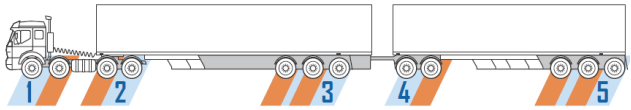
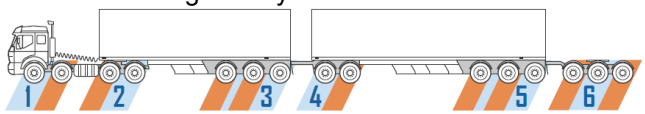
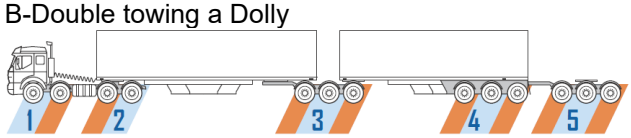
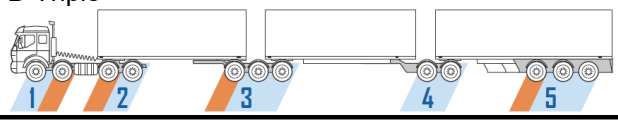
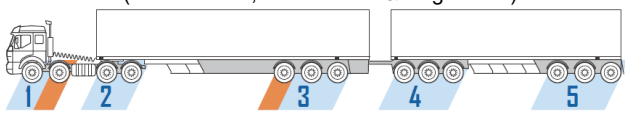
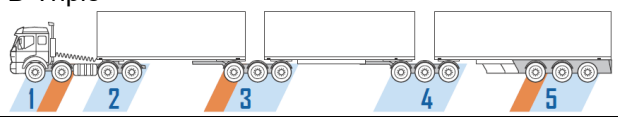
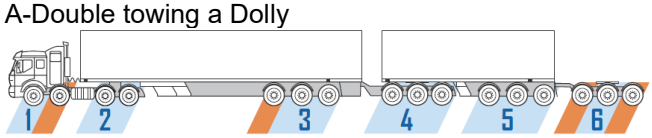
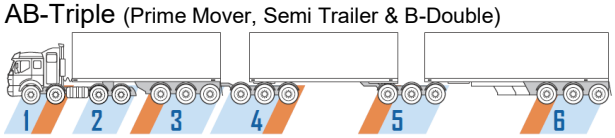
APPENDIX C – MRWA RAV VEHICLE CLASSIFCATIONS

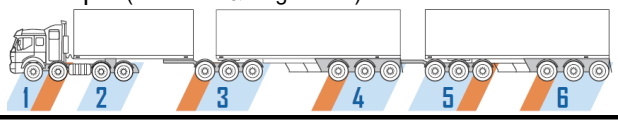
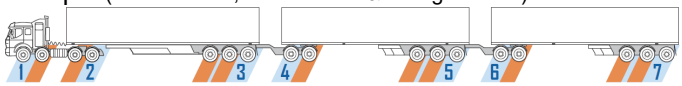
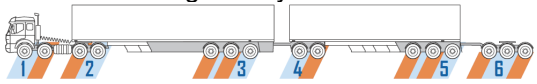
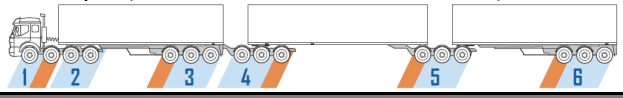
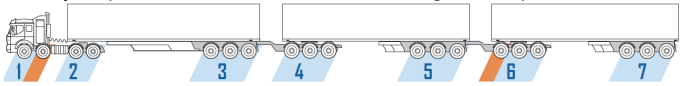
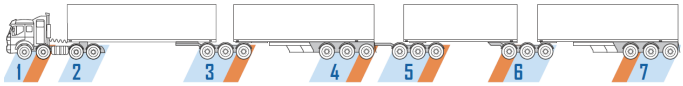
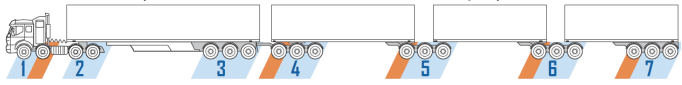
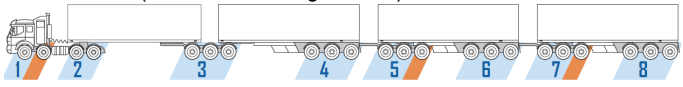
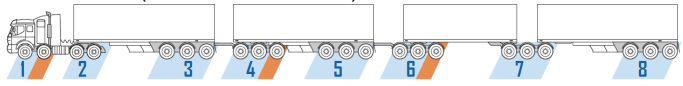
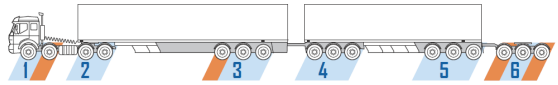
1 APPLICATION

1.1 Approved Vehicles

1.1.1 The *Class 2 and 3 Prime Mover, Trailer Combinations Order 2017* applies to a RAV in the following table:

Category 1 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
1A	Prime Mover, Semi Trailer & Pig Trailer 	≤20 m	50 t	Tandem Drive Network 1
1B	Prime Mover & Semi Trailer 	≤19.0 m	48.5 t	Tandem Drive Network 1
1C	Short B-Double 	≤20 m	50 t	Tandem Drive Network 1
Category 2 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
2A	Prime Mover, Semi Trailer & Pig Trailer or Dolly 	≤27.5 m	66.5 t	Tandem Drive Network 2
2B	Prime Mover & Semi Trailer 	≤20 m	48.5 t	Tandem Drive Network 2
2C	B-Double 	≤27.5 m	68.5 t	Tandem Drive Network 2
2D	Short B-Triple 	≤27.5 m	88.5 t	Tandem Drive Network 2
2E	Car Carrier Semi Trailer 	≤25 m	48.5 t	Tandem Drive Network 2
Category 3 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
3A	A-Double (Prime Mover, Semi Trailer & Dog Trailer) 	≤27.5 m	85 t	Tandem Drive Network 3

Category 4 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
4A	A-Double (Prime Mover, Semi Trailer & Dog Trailer) 	≤27.5 m	88.5 t	Tandem Drive Network 4
Category 5 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
5A	A-Double (Prime Mover, Semi Trailer & Dog Trailer) 	>27.5 m ≤36.5 m	85 t	Tandem Drive Network 5
5B	A-Double towing a Dolly 	27.5 m + dolly	85 t + dolly	Tandem Drive Network 5
5C	B-Double towing a Dolly 	27.5 m + dolly	68.5 t + dolly	Tandem Drive Network 5
5D	B-Triple 	>27.5 m ≤36.5 m	85 t	Tandem Drive Network 5
Category 6 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mas**	**Approved Network**
6A	A-Double (Prime Mover, Semi Trailer & Dog Trailer) 	>27.5 m ≤36.5 m	88.5 t	Tandem Drive Network 6
6B	B-Triple 	>27.5 m ≤36.5 m	88.5 t	Tandem Drive Network 6
6D	A-Double towing a Dolly 	27.5 m + dolly	88.5 t + dolly	Tandem Drive Network 6
Category 7 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
7A	AB-Triple (Prime Mover, Semi Trailer & B-Double) 	>27.5 m ≤36.5 m	108.5 t	Tandem Drive Network 7

7B	BA-Triple (B-Double & Dog Trailer) 	>27.5 m ≤36.5 m	108.5 t	Tandem Drive Network 7
Category 8 RAVs				
Category 8 RAVs consist of Truck, Trailer Combinations only. Refer to the Truck, Trailer Combinations Operating Conditions.				
Category 9 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
9A	A-Triple (Prime Mover, Semi Trailer & 2 Dog Trailers) 	>36.5 m ≤53.5 m	121.5 t	Tandem Drive Network 9
9B	A-Double towing a Dolly 	36.5 m + dolly	85 t + dolly	Tandem Drive Network 9
9C	BA-Triple (B-Double & Dog Trailer) 	>36.5 m ≤45 m	108.5 t	Tandem Drive Network 9
9D	AB-Triple (Prime Mover, Semi Trailer & B-Double) 	>36.5 m ≤45 m	108.5 t	Tandem Drive Network 9
Category 10 RAVs				
Category	**Vehicle Description**	**Length**	**Max. Mass**	**Approved Network**
10A	A-Triple (Prime Mover, Semi Trailer & 2 Dog Trailers) 	>36.5 m ≤53.5 m	128.5 t	Tandem Drive Network 10
10B	Double B-Double 	>36.5 m ≤53.5 m	128.5 t	Tandem Drive Network 10
10C	ABB-Quad (Prime Mover, Semi Trailer & B-Triple) 	>36.5 m ≤53.5 m	128.5 t	Tandem Drive Network 10
10D	BAA-Quad (B-Double & 2 Dog Trailers) 	>36.5 m ≤53.5 m	148.5 t	Tandem Drive Network 10
10E	AAB-Quad (A-Double & B-Double) 	>36.5 m ≤53.5 m	148.5 t	Tandem Drive Network 10
10F	A-Double towing a Dolly 	36.5 m + dolly	88.5 t + dolly	Tandem Drive Network 10

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RadComms
Making waves 15 & 16 November 2022

The ACMA acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, culture and community. We pay our respects to Elders past, present and future.

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Have your say

14 October 2022

ACMA consults on remaking the WA radio quiet zone band plan

We have opened a consultation on remaking the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011, which is due to sunset on 1 April 2023.

We want to remake the band plan with minor changes, and rename it the Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023.

You can access the consultation paper and a draft of the new plan on the ACMA website.

Your views are welcome by **5 pm (AEDT) on 14 November 2022**. For more information, please contact freqplan@acma.gov.au.

Proposal to remake the Australian Radio Quiet Zone Western Australia Band Plan - consultation 34/2022

The Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 is due to sunset on 1 April 2023.

We want to remake the band plan with minor changes and retitle it the Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023.

Status: **Open**
Consultation number: **IFC 34/2022**

IN PROGRESS

Closing in **27 days** (14 November 2022)

1 Consultation opens

14 Oct 2022

Upload submission

2 Consultation closes

14 Nov 2022

On this page

Key documents

Consultation paper: Proposal to remake the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 (308.12 KB)

Draft Radiocommunications (ARQZWA) Frequency Band Plan 2023 (88.17 KB) 18.2.1 - October 2022

The issue

Under Part 4, Chapter 3 of the *Legislation Act 2003*, most legislative instruments 'sunset'. They are automatically repealed on 1 April or 1 October that first occurs 10 years after they are registered.

The Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 supports the Australian Radio Quiet Zone Western Australia (ARQZWA) and its viability for radio astronomy services.

The band plan is due to sunset on 1 April 2023. Our view is the band plan is operating effectively and efficiently. It continues to form a necessary and useful part of the legislative framework.

We want to remake the band plan with minor changes. We would like to retitle it the Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023. You can access a draft of the new plan in the key documents section.

Have your say

We welcome your comments on the proposed band plan.

Please send submissions to freqplan@acma.gov.au by **5 pm (AEDT) on 14 November 2022.** Or you can simply click on the 'Upload submission' button above.

Publication of submissions

Read about the ACMA's policy regarding the publication of submissions.

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Australian Communications and Media Authority

Automatic sunsetting of legislative instruments **Proposal to remake the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011** Consultation paper

OCTOBER 2022

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Contents

Executive summary

The Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 (the band plan) is part of a multi-tiered spectrum planning regulatory arrangement in place to support the Australian Radio Quiet Zone Western Australia (ARQZWA) and its ongoing viability for radio astronomy services.

Under Part 4 of Chapter 3 of the *Legislation Act 2003*, most legislative instruments 'sunset'. That is, they are automatically repealed on 1 April or 1 October that first occurs 10 years after they are registered. This is an automatic process applying to most legislative instruments, regardless of their content.

The band plan is due to sunset on 1 April 2023. We have formed the preliminary view that the band plan is operating effectively and efficiently, and continues to form a necessary and useful part of the legislative framework.

The ACMA proposes to remake the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 with only such minor changes as are referred to below, and to retitle it the Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023. A draft of the proposed new band plan is available in the key documents section of this consultation.

We invite comments from interested parties on the proposed new band plan by **COB, Monday 14 November 2022**. Information about making a submission is in the Invitation to comment section of this consultation paper.

About the band plan

The ACMA established the Australian Radio Quiet Zone Western Australia (ARQZWA) on 11 April 2005 with the introduction of Spectrum Embargo 41. The ARQZWA aims to maintain the 'radio-quietness' of a site in remote Western Australia, near Boolardy Station, around 300 km north-west of Geraldton. The area has very low levels of radiofrequency energy because of its low population and remote location.

The ARQZWA facilitates the development and use of new radioastronomy technologies at that location, and supports Australia's hosting of the Square Kilometre Array (SKA). Since 2005, the Murchison Radioastronomy Observatory (MRO) has been developed at the centre of the ARQZWA. It is home to several significant radioastronomy projects, with the construction of the SKA set to commence in 2023.

There is a multi-tiered spectrum planning regulatory arrangement in place to support the ARQZWA and its ongoing viability for radio astronomy services. This includes the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 (the band plan).

Other parts of the ARQZWA spectrum planning arrangements are described in Appendix A.

Band plan

A frequency band plan made under section 32 of the *Radiocommunications Act 1992* (Radiocommunications Act) must set out the purpose, or purposes, for which the frequency band or bands designated in it can be used. The use of a frequency band may include the reservation of spectrum in that band for the prevention or control of interference to radiocommunications.

The band plan commenced on 11 July 2011. It establishes a radio quiet zone (RQZ) in the mid-west region of Western Australia.

The band plan establishes 2 zones:

- **RQZ (inner):** within the frequency range 70 MHz to 25.25 GHz, and within a distance of 70 km from the ARQZWA centre point (latitude 26.704167° South, longitude 116.658889° East)
- **RQZ (outer):** within the frequency range 70 MHz to 25.25 GHz, and between a distance of 70 to 150 km from the ARQZWA centre point (latitude 26.704167° South, longitude 116.658889° East).

Services authorised to operate in the RQZ (inner) zone that are not radio astronomy services – in relation to radio astronomy services – are defined as secondary services. Applicants for new licences within both the RQZ (inner) and RQZ (outer) zones are required to consult with the MRO entity before applying for a licence. The MRO entity is responsible for operating the Murchison Radioastronomy Observatory. The entity is currently the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Issues for comment

The ACMA is seeking comment on the continuing need for the band plan, and its effectiveness and efficiency.

Need for the band plan

The band plan is an important part of the regulatory framework in place to support the ARQZWA. Maintaining the band plan, which has legislative force, would provide greater predictability for all parties by maintaining the radio quietness of the ARQZWA while facilitating access to other users in the area (where appropriate). We consider the provision of additional certainty is desirable.

In particular, the ACMA considers the certainty that the band plan provides will continue to assist the Commonwealth to maintain the suitability of the site for radio astronomy, while managing the impacts on other uses, including mining, in the surrounding areas.

Question 1

Is the band plan still needed? If so, why? If not, why not?

Effectiveness and efficiency of the instrument

Our assessment is that current regulatory arrangements in support of the ARQZWA are largely operating effectively. We have not been required to adjudicate in negotiations between the MRO entity and prospective licensees around the ARQZWA area. Further, there have been no reports to the ACMA of interference to radioastronomy services within the ARQZWA.

Table 1 shows the number of assignments within each of the zones of the band plan. Of the 268 assignments currently registered within the area covered by the plan, 123 assignments were issued after its commencement.

Table 1: Assignments within the area covered by the band plan

Band plan zone	Current assignments	Assignments since commencement of the band plan
RQZ (inner)	6	0
RQZ (outer)	268	123

Based on the ACMA Register of Radiocommunications Licences as at 1 August 2022.

Table 2 outlines the top 5 licence holders within the area covered by the band plan. Telstra holds over one-third of assignments, with Big Bell Gold Operations and Crosslands Resources holding 19 per cent each of assignments in the area.

Table 2: Top 5 licensees within the area covered by the band plan

Licensee	Current assignments	Percentage of current assignments
Telstra Corporation Limited	92	34%
Big Bell Gold Operations Pty Ltd	50	19%
Crosslands Resources Ltd	50	19%
DBNGP (WA) Nominees Pty Ltd	20	7%
Shire of Murchison	8	3%

Based on the ACMA Register of Radiocommunications Licences as at 1 August 2022.

The ACMA has conducted preliminary consultation with representatives of the CSIRO. Under current arrangements in the band plan and RALI MS 32, prospective licensees around the ARQZWA are required to consult CSIRO as the 'MRO entity' on their proposals. The CSIRO has advised that it works with prospective licensees in the ARQZWA to facilitate operations as much as possible.

CSIRO have also advised that in the interest of stability for all stakeholders, it will not seek any technical changes to the parameters of the band plan (for example, geographic scope, frequency bands).

We are not aware of any major concerns about the operation of the band plan. Therefore, our view is that the band plan is largely operating effectively and efficiently.

Question 2

Is the band plan effective and efficient? If not, why not?

Potential enhancements

The ACMA is seeking stakeholder comments on potential amendments to the band plan as discussed below.

Operation of services authorised under class licence

Section 137 of the Radiocommunications Act states that the ACMA must not issue a class licence that is inconsistent with the spectrum plan or any relevant frequency band plan. Under the current version of the band plan, section 7 describes the permitted purposes of an applicable frequency band. This includes any additional services mentioned in section 8 of the band plan. Subsection 8(1) states (emphasis added):

> An applicable frequency band may also be used for services provided under an apparatus licence whether issued before or after the commencement of this Frequency Band Plan.

Strict interpretation of section 137 of the Radiocommunications Act and the band plan together could conclude that services provided using radiocommunications devices authorised via class licence are not able to be provided in the areas and frequency bands covered by the band plan.

However, there may be some instances where it is necessary for radiocommunications devices authorised via class licence to be used within the areas and frequency bands covered by the band plan.

The interaction between class licences and the band plan was considered when the band plan was made. We proposed to include conditions in several class licences, such that operation of radiocommunications transmitters must not cause harmful interference to radio astronomy receivers operating at the centre of the ARQZWA and must be consistent with the band plan. However, it was decided to include conditions only in class licences where sufficient protections did not already exist, with those conditions being no more extensive than necessary to provide adequate protection to radio astronomy services within the ARQZWA.

Appendix B lists the 15 current class licences and any current provisions related to the ARQZWA included within them. An example is the Radiocommunications (Low Interference Potential Devices) Class Licence 2015. This states that operations within 70 km of the MRO are not authorised if they will cause interference with the operation of radio astronomy observations by the observatory.

Nonetheless, there may be inconsistencies in current class licensing arrangements that need to be addressed. We would like to explore whether the provisions of the band plan need to be reviewed regarding operations authorised by a class licence and any potential inconsistencies between the band plan and class licences.

Option 1: Maintain current band plan provisions
If it is considered desirable for services provided via class licence to not be permitted in all cases within the geographic area and frequency band covered by the band plan, no changes will be required to the current provisions of the band plan.

However, modifications would be required to various class licences to explicitly exclude the geographic area and frequency band covered by the band plan from their scope. Appendix B lists the 15 current class licences and identifies current provisions related to the ARQZWA included within them, if any.

Option 2: Include class licences as an 'additional service' in the band plan
If it is desirable for services provided via class licence to be permitted within the ARQZWA in any case, those services would need to be included in section 8 of the band plan as an additional service. A potential amendment to section 8 of the band plan to facilitate this would be required by adding a new subsection (5), as follows:

> (5) An applicable frequency band may also be used for services provided under a class licence whether issued before or after the commencement of this frequency band plan.

In cases where the operation authorised by a class licence is not desirable within the ARQZWA, the relevant area and frequency range can then be considered for explicit exclusion from the class licence. This is the case, for example, in the Radiocommunications (Intelligent Transport Systems) Class Licence 2017 where operations within 70 km of the Murchison Radioastronomy Observatory are not authorised.

The preferred option for the ACMA is Option 2, as it provides the flexibility to authorise class-licensed services within the ARQZWA where necessary.

We are seeking stakeholder views on the treatment of services provided via class licence within the ARQZWA.

Question 3

Should Option 1 or Option 2 be pursued regarding the operation of services provided via class licence within the ARQZWA? Why?

If Option 2, which class licences should be modified, if any, and what changes, if any, should be made regarding operations within the ARQZWA? Why?

Supplementary radio quiet zones

The current band plan refers to the possible establishment of supplementary radio quiet zones. These provisions have not been used since the commencement of the band plan. Use of these provisions would require a variation to the band plan.

We are proposing to remove supplementary radio quiet zone provisions to further streamline the instrument. Should the establishment of supplementary radio quiet zones become necessary, the development of a new band plan – or a variation to the existing band plan – would be considered in consultation with stakeholders.

Other amendments

The current band plan uses the term 'MRO entity' to refer to the entity responsible for operating the Murchison Radioastronomy Observatory. The entity is currently the Commonwealth Scientific and Industrial Research Organisation (CSIRO). To simplify the instrument, we are proposing to refer directly to the CSIRO instead of the MRO entity in the Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023.

Question 4

Do you support the making of the Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023? If not, why not?

Proposed suppression of Spectrum Embargo 41

As discussed in Appendix A, Spectrum Embargo 41 currently forms part of the regulatory arrangement in place to support the ARQZWA. Spectrum embargos are policy statements by the ACMA outlining the circumstances where it is likely to refuse to issue an apparatus licence in parts of the spectrum.

Spectrum Embargo 41 prevents new assignments in the frequency range 70 MHz to 25.25 GHz within 70 km of the ARQZWA. This replicates the RQZ (inner) zone of the band plan. The band plan outlines the following requirements for the RQZ (inner) zone:

> Services authorised to operate that are not radio astronomy services are taken to be 'secondary services' in relation to radio astronomy services.

> Applicants for new apparatus licences are required to consult with the MRO entity before applying for a licence.

Given the identical requirements of the band plan, Spectrum Embargo 41 appears to be unnecessary. Therefore, we are seeking stakeholder comments on the suppression of Spectrum Embargo 41.

Question 6

Is the proposed suppression of Spectrum Embargo 41 supported? If not, why not?

Invitation to comment

Comments are sought from the public regarding our proposal to remake the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011, with minor changes, on the basis that it is operating effectively and efficiently.

Making a submission

We invite comments on the issues set out in this consultation paper.

> Online submissions can be made by uploading a document. Submissions in PDF, Microsoft Word or Rich Text Format are preferred.

> Submissions by post can be sent to:

The Manager
Spectrum Planning Section
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616

The closing date for submissions is **COB, Monday 14 November 2022**.

Consultation enquiries can be emailed to freqplan@acma.gov.au.

Publication of submissions

We publish submissions on our website, including personal information (such as names and contact details), except for information that you have claimed (and we have accepted) is confidential.

Confidential information will not be published or otherwise released unless required or authorised by law.

Privacy

View information about our policy on the publication of submissions, including collection of personal information during consultation and how we handle that information.

Information on the *Privacy Act 1988,* how to access or correct personal information, how to make a privacy complaint and how we will deal with any complaints, is available in our privacy policy.

Appendix A: Spectrum planning arrangements for the ARQZWA

There is a multi-tiered spectrum planning regulatory arrangement in place to support the ARQZWA and its ongoing viability for radio astronomy services. This includes:

> The Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 (the band plan)
> Spectrum Embargo 41
> Radiocommunications Assignment and Licensing Instruction (RALI) MS32
> Provisions in the Australian Radiofrequency Spectrum Plan 2021 (ARSP)
> Specific arrangements in relevant spectrum, class and apparatus licences.

This appendix describes the spectrum planning regulatory arrangements in place as at September 2022, with the exception of the band plan. This is discussed in the body of this document.

Under section 299 of the Radiocommunications Act, we must have regard to any agreement, treaty or convention between Australia and another country or countries that makes provision in relation to radio emission. Australia is party to the Convention Establishing the Square Kilometre Array Observatory. We must have regard to this convention.

Spectrum Embargo 41

Spectrum embargoes are ACMA policy statements outlining the circumstances where we are likely to refuse to issue an apparatus licence in parts of the spectrum.

Spectrum Embargo 41 was created on 11 April 2005. The embargo was the first step in establishing the ARQZWA. It prevented the assignment of apparatus licences within the frequency range 108 MHz to 25.25 GHz (but excluding bands managed under the *Broadcasting Services Act 1992*) within 100 km of Mileura Station (Latitude 26° 22' 58.7" South, Longitude 117° 19' 6" East).

The embargo has evolved since its initial establishment, including a shift in the centre location, frequency range and radius of the area included in the embargo. The current embargo, which was last reviewed on 19 December 2014, prevents new assignments in the frequency range 70 MHz to 25.25 GHz within 70 km of the ARQZWA centre at latitude 26.704167° South, longitude 116.658889° East.[1]

Radiocommunications Assignment and Licensing Instruction MS32

Radiocommunications Assignment and Licensing Instructions (RALIs) provide advice on frequency assignment policy and coordination procedures. They reflect our current policies and set the technical framework for the operation of radiocommunications equipment and services.

RALI MS32 sets out processes to coordinate apparatus licensed services within the ARQZWA. It provides criteria for assessment of proposed assignments within a

[1] GDA94 datum.

coordination zone. This zone lies between the embargo area and a radius of up to 260 km from the centre of the RQZ, depending on frequency.

In cases where interference from the proposed radiocommunications transmitter would exceed the threshold levels specified in this RALI, the prospective licensee must implement interference-mitigation measures and consult with the MRO entity to reach agreement on adequate interference protection.

Where applicable, the coordination processes in RALI MS32 are also applied to radiocommunications transmitters operating under spectrum licences.

Australian Radiofrequency Spectrum Plan

Section 32 of the Act requires that a frequency band plan must be consistent with the Australian Radiofrequency Spectrum Plan 2021 (the spectrum plan).

While the spectrum plan makes provision for radio astronomy in a number of bands, it does not make specific provision for radio astronomy in the full range of bands that are identified for operation in the ARQZWA and set out in the band plan.

In order to achieve consistency, subsection 10(8) of the spectrum plan specifies that a frequency band may be used for a radio astronomy service if provision is made for such use in a frequency band plan.

Australian footnote AUS103 to the spectrum plan also sets out that: 'the Murchison Radioastronomy Observatory (MRO) (latitude 26° 42' 10.4" S, longitude 116° 39' 37.0" E) hosts the Australian Square Kilometre Array Pathfinder (ASKAP) operating in the band 700–1 800 MHz and the Murchison Widefield Array (MWA) operating in the band 80–300 MHz'.

Licensing arrangements

Spectrum licences

Since the establishment of the ARQZWA, all relevant spectrum licences have either been issued or re-issued to include measures to protect radio astronomy receivers operating within the ARQZWA from harmful interference.

Class licences

Under section 137 of the Radiocommunications Act, we must not issue a class licence that is inconsistent with the spectrum plan or a frequency band plan.

Clauses are included in the following class licences. They require that a radiocommunications transmitter operating under the class licence must not cause harmful interference to radio astronomy receivers operating at the centre of the ARQZWA:

- the Radiocommunications (Low Interference Potential Devices) Class Licence 2015
- the Radiocommunications (Communication with Space Object) Class Licence 2015
- the Radiocommunications (Citizen Band Radio Stations) Class Licence 2015.

Apparatus licences

Special condition 52A is typically included on apparatus licences where the area of operation could potentially include or be close to the ARQZWA.

Special condition 52A states:

> This service must not cause interference to radioastronomy services operating within the Australian Radio Quiet Zone Western Australia (ARQZWA) as defined in the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan.
>
> This service is coordinated as per the consultative process and coordination zone parameters of the Radiocommunications Assignment and Licensing Instruction 'Coordination of Apparatus licensed Services within the Australian Radio Quiet Zone Western Australia' (RALI MS32).

Summary

Figure 1 illustrates the combined effect of the band plan, Spectrum Embargo 41 and RALI MS32. Figure 2 illustrates the geographic coverage of the various regulatory arrangements.

Figure 1: Spectrum planning regulatory arrangements for ARQZWA

Frequency band (MHz)	Distance from centre (km)									
	0–70	70–100	100–120	120–140	140–145	145–150	150–165	165–180	180–190	190–260
70–100										
100–30										
230–400										
400–520										
520–694										
694–1000										
1000–2300										
2300–6000										
6000–10000										
10000–25250										

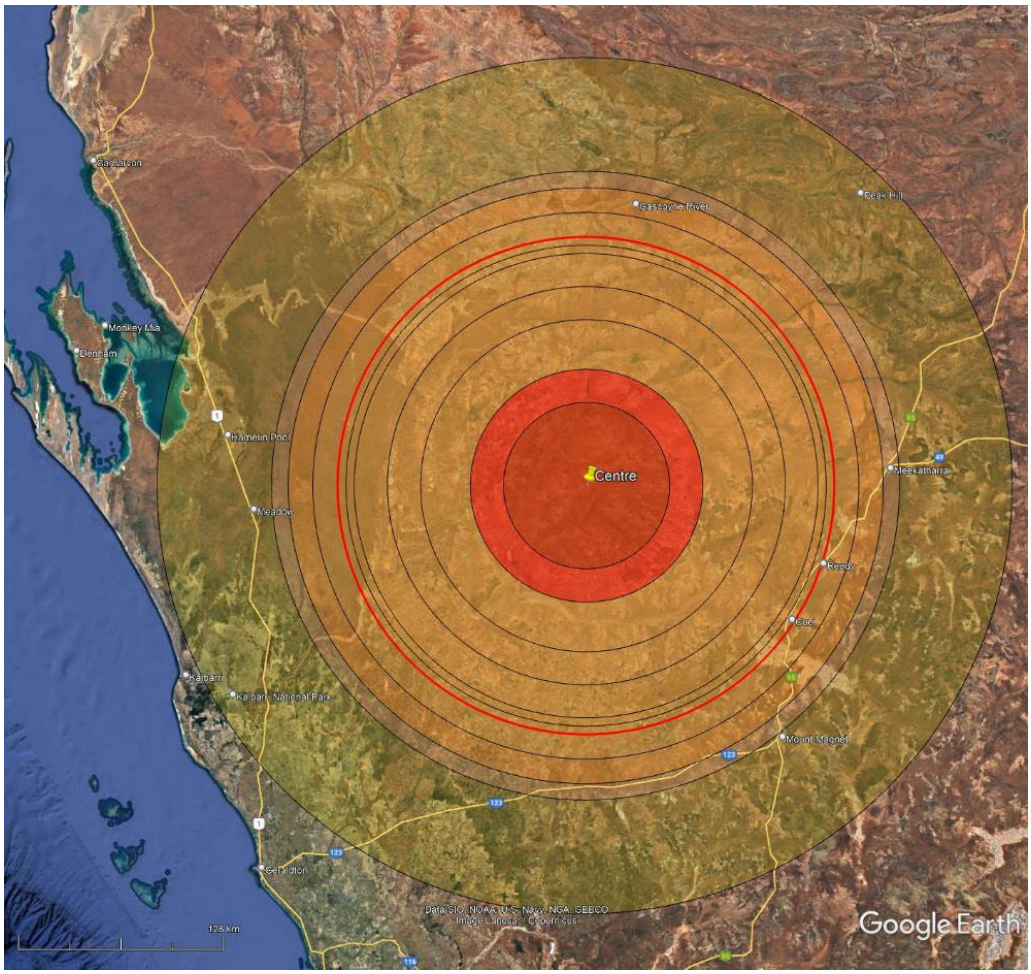
Band plan: Radiocommunications transmitters are taken to be a secondary service in relation to radio astronomy; MRO entity consultation required.

Spectrum Embargo 41: Restriction on the issue of new apparatus licences.

Band plan: MRO entity consultation required.

RALI MS32: Defines coordination criteria for radiocommunications transmitters operating within a specified distance from the centre of the ARQZWA; MRO entity consultation required where coordination criteria are not met.

Figure 2: Geographic coverage of regulatory arrangements for ARQZWA



> Inner dark red shaded circle: 50 km radius (coordination point for RALI MS32).

> Outer red shaded circle: 70 km radius (inner zone of the ARQZWA band plan).

> Red line: 150 km radius (outer zone of the ARQZWA band plan).

> Other circles of various radii indicate the coordination thresholds for different frequency ranges specified in the Annex to RALI MS32.

Appendix B: Provisions in class licences relevant to the band plan

Class licence	Provisions regarding the ARQZWA
Radiocommunications (27 MHz Handphone Stations) Class Licence 2015	None. Frequencies included in the class licence are outside of the scope of the band plan.
Radiocommunications (Aircraft and Aeronautical Mobile Stations) Class Licence 2016	None. However, this class licence includes frequencies and the geographic area covered by the band plan.[2]
Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018	None. However, this class licence is limited to security-controlled airports, of which there are none within the area covered by the band plan.
Radiocommunications (Cellular Mobile Telecommunications Devices) Class Licence 2014	None. This class licence is limited to communications with licensed public telecommunications service (PTS) base stations. However, this could include frequencies and the geographic area covered by the band plan.
Radiocommunications (Citizen Band Radio Stations) Class Licence 2015	Operations within 70 km of the Murchison Radioastronomy Observatory are not authorised if they will cause interference with the operation of radio astronomy observations by the observatory.
Radiocommunications (Communication with Space Object) Class Licence 2015	Includes a note regarding operations within the RQZ (inner) zone.

[2] This class licence did not require conditions for protection of radio astronomy services in the ARQZWA as the risk of interference to the observatory was considered to be low.

Class licence	Provisions regarding the ARQZWA
Radiocommunications (Cordless Communications Devices) Class Licence 2014	None. However, this class licence includes frequencies and the geographic area covered by the band plan.[2]
Radiocommunications (Emergency Locating Devices) Class Licence 2016	None. However, this class licence includes frequencies and the geographic area covered by the band plan.[2]
Radiocommunications (Intelligent Transport Systems) Class Licence 2017	Operations within 70 km of the Murchison Radioastronomy Observatory are not authorised.
Radiocommunications (Low Interference Potential Devices) Class Licence 2015	Operations within 70 km of the Murchison Radioastronomy Observatory are not authorised if they will cause interference with the operation of radio astronomy observations by the observatory.
Radiocommunications (Maritime Ship Station — 27 MHz and VHF) Class Licence 2015	Class licence limited to maritime ship stations (not on land and therefore not within the ARQZWA).
Radiocommunications (Overseas Amateurs Visiting Australia) Class Licence 2015	None. However, this class licence includes frequencies and the geographic area covered by the band plan.[2]
Radiocommunications (Public Safety and Emergency Response) Class Licence 2013	None. However, this class licence includes frequencies and the geographic area covered by the band plan.[2]

Class licence	Provisions regarding the ARQZWA
Radiocommunications (Radio-controlled Models) Class Licence 2015	None. Frequencies included in the class licence are outside of the scope of the band plan.
Radiocommunications (Radionavigation—Satellite Service) Class Licence 2015	None. Authorises RNSS receivers only – therefore no interference potential to radio astronomy.

Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023

The Australian Communications and Media Authority makes the following frequency band plan under subsection 32(1) of the *Radiocommunications Act 1992*.

Dated:

Member

Member/General Manager

Australian Communications and Media Authority

1 Name

This is the *Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023*.

2 Commencement

This instrument commences on 1 April 2023.

Note: This instrument was registered before it commenced. The Federal Register of Legislation may be accessed, free of charge, at www.legislation.gov.au.

3 Authority

This instrument is made under subsection 32(1) of the Act.

4 Purpose of the frequency band plan

(1) The purpose of this frequency band plan is to establish a radio quiet zone to prevent harmful interference to radio astronomy services.

(2) In particular, this frequency band plan makes provision for the purposes for which applicable frequency bands may be used in the RQZ.

5 Interpretation

(1) In this instrument, unless the contrary intention appears:

applicable frequency band has the meaning given by section 6.

CSIRO means the Commonwealth Scientific and Industrial Research Organisation.

GDA94 means the geodetic datum designated as the "Geocentric Datum of Australia (GDA)", gazetted in the Commonwealth of Australia *Gazette* No. GN 35, on 6 September 1995, as existing on that date.

Note 1: The Commonwealth of Australia *Gazette* No. GN 35 is available, free of charge, from the Federal Register of Legislation at www.legislation.gov.au.

Note 2: More information on GDA94 can be obtained, free of charge, from Geoscience Australia at www.ga.gov.au and from the Intergovernmental Committee on Surveying and Mapping at www.icsm.gov.au.

radio astronomy service has the same meaning as in the spectrum plan.

RQZ means that part of the radio quiet zone:

(a) described in columns 2 to 4 of item 1 in the Schedule; and

(b) described in columns 2 to 4 of item 2 in the Schedule.

Note 1: A number of other expressions used in this instrument are defined in the Act, including the following:

- ACMA;
- apparatus licence;
- class licence;
- frequency band;
- frequency band plan;
- interference;
- operate;
- spectrum plan.

Note 2: A number of other expressions used in this instrument may be defined in a determination made under section 64 of the *Australian Communications and Media Authority Act 2005*. At the time this instrument was made, the following expressions were defined in such a determination:

- Act;
- harmful interference.

(2) In this instrument, unless otherwise specified, a reference to a frequency band includes all frequencies that are greater than but not including the lower frequency, up to and including the higher frequency.

Note: This subsection means the lower number in the reference to a frequency band is not included in the frequency band.

(3) In this instrument, geographic coordinates describing a point do so with reference to GDA94.

6 Meaning of *applicable frequency band*

A frequency band is an ***applicable frequency band*** for an area if it is applicable to the area under section 7.

7 Applicable frequency band

(1) The frequency band applicable to the part of the RQZ described in columns 2 to 4 of item 1 in the Schedule is the range set out in column 5 of the item.

(2) The frequency band applicable to the part of the RQZ described in columns 2 to 4 of item 2 in the Schedule is the range set out in column 5 of the item.

8 Permitted purposes

(1) An applicable frequency band:

(a) may be used for 1 or more of the following:

(i) radio astronomy services; or

(ii) any additional services mentioned in section 9; and

(b) may be reserved for prevention or control of interference with radio astronomy services.

(2) For an instrument made under the Act, a service mentioned in subparagraph (1)(a)(ii) that is authorised to operate in the part of the RQZ described in columns 2 to 4 of item 1 in the Schedule in an applicable frequency band is taken to be a secondary service in relation to a service mentioned in subparagraph (1)(a)(i).

9 Additional services

(1) An applicable frequency band may also be used for services provided under an apparatus licence whether issued before or after the commencement of this frequency band plan.

(2) The use under subsection (1) must not be inconsistent with the spectrum plan or another frequency band plan.

(3) If an apparatus licence is issued after the commencement of this frequency band plan, subsection (1) only applies for services under the licence if the applicant for the licence consults with CSIRO about those services before applying for the licence.

(4) However, the ACMA may, in writing, decide that an applicant need not consult with CSIRO.

Note: See subsection 32(5A) of the Act.

(5) An applicable frequency band may also be used for services provided under, and in accordance with the conditions of, a class licence whether issued before or after the commencement of this frequency band plan.

Schedule 1 Description of radio quiet zone

(sections 5, 7 and 8)

Column 1	Column 2	Column 3	Column 4	Column 5
Item	**Name or description**	**Central location or coordinates**	**Radius**	**Frequency range**
1	RQZ (inner)	latitude 26.704167 South, longitude 116.658889 East (GDA94)	70 km	70 MHz — 25.25 GHz
2	RQZ (outer)	latitude 26.704167 South, longitude 116.658889 East (GDA94)	70 - 150 km	70 MHz — 25.25 GHz

20.1 - October 2022

Embracing Change

Information Brochure

2022 WA Local Government
Convention and Trade Exhibition

Sunday, 2 to Tuesday, 4 October 2022

Crown Perth
Great Eastern Hwy, Burswood

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The Program

Sunday, 2 October

2.30pm – 6.00pm	Convention Service Desk Open
5.00pm – 6.30pm	**Welcome Drinks** An evening of food, beverages and networking

Monday, 3 October

7.00am	Convention Service Desk open for Convention Registration
9.00am – 1.00pm	**WALGA Annual General Meeting** Includes recognition of Honours Award recipients
1.00pm – 2.00pm	Lunch
2.00pm – 3.00pm	**Opening Keynote Speaker** Simon Trott, Chief Executive Officer, Rio Tinto Iron Ore
3.00pm – 3.40pm	Afternoon Tea
3.40pm – 5.00pm	**Local Government into the Future** Bernard Salt AM, futurist, columnist, speaker, business adviser and media commentator
6.30pm – 10.00pm	**Cocktail Gala, Optus Stadium ($125)** Enjoy food, drinks, dancing and the stunning view

Tuesday, 4 October

6.30am	Convention Service Desk open
7.30am – 8.50am	**Convention Breakfast ($95)** Justin Langer AM
9.00am	**The State of Play** Panel Discussion with Federal Members of Parliament
10.30am – 11.15am	Morning Tea

Tuesday, 4 October (continued)

11.15am	**Leading the Way for Climate Resilient Regions**
12.45pm – 1.30pm	Lunch
1.30pm	**CONCURRENT SESSIONS**
	Future of Local Government Workforce Delve into current and emerging trends in the future of work and what this means for WA Local Governments. This session will explore issues such as our future skills needs, the impact of technology and labour force inclusion. It will also provide early insights into new research about the current workforce capability of WA Local Governments in Western Australia.
	Tourism into the Future Tourism industry experts will examine some of the trends that will define the future of tourism in WA and explore how Local Governments can position themselves to partner in supporting economic development for their local communities through tourism.
	Building Control: Red Tape or Community Service? The future of Local Government Building Services The community's confidence in the quality of new buildings is at an all-time low. This session will hear from leading industry speakers on solutions to this issue, and what Local Government's role is in addressing it.
	Holistic Wellbeing Measures: A Tool For Better Planning and More Engaged Citizens WALGA has signed an MOU to support the Western Australian Development Index (WADI) project, which aims to establish a state-wide wellbeing metrics framework into WA. This session will explore the purpose of wellbeing measures with reference to specific examples of wellbeing measurement by Local Governments.
3.00pm - 3.45pm	Afternoon Tea
3.45pm	**Closing Speaker** Dr Craig Challen SC, OAM
4.45pm	Official Close of the 2022 Local Government Convention

Additional Events

Sunday, 2 October	
3.00pm – 5.00pm	**Mayors' and Presidents' Forum** Separate registration – by invitation only
Monday, 3 October	
7.00am – 8.30am	**ALGWA (WA) Breakfast** Register online via Delegate Registration. Other enquiries to Cr Chontelle Stone, President, ALGWA(WA) - 0411 612 382 or algwawa@outlook.com
7.30am – 8.45am	**Heads of Agency Breakfast** This breakfast is for Mayors, Presidents and CEOs only and invitations will be sent directly. CLICK HERE for more information.
Wednesday, 5 October	
9.30am – 4.00pm	**2022 WALGA Aboriginal Engagement and Reconciliation Forum** Separate registration – CLICK HERE for more information

Optional Activities for Partners

The Partner Program offers an interesting range of options for accompanying guests. Social networking functions include the Welcome Drinks on Sunday evening and the Cocktail Gala on Monday evening. See page 11 for more information.

Elected Member Training

WALGA Training has scheduled a selection of its Elected Member training opportunities prior and post-Convention.

- **Thursday, 29 September** Emergency Management for Local Government
- **Friday, 30 September** Community Disaster Recovery for Local Government
- **Thursday, 6 October** Emergency Management for Local Government Leaders
- **Monday, 10 October** Strategic Policy Development

More information on WALGA Training opportunities can be found in the WALGA Training Directory on WALGA's Training Website.

WALGA Aboriginal Forum

Seminar Program

ABORIGINAL FORUM '22

Wednesday, 5 October 2022
9:00 AM to 5:00 PM
Optus Stadium, Victoria Drive, Burswood

9:00am **Welcome**
MC: Roanna Edwards

9:05am **Welcome to Country Address**
Kerry-Ann Winmar

9:15am **Welcome to Country Video**

9:20am **WALGA President Address**
Cr Karen Chappel

9:30am **Minister Opening Address**
Hon Dr Tony Buti MLA, Minister for Aboriginal Affairs

9:50am **Keynote address**
Daniel Morrison, Wungening Aboriginal Corporation

10:10am **Presentation: Uluru Statement from the Heart**
Nolan Hunter, Local Dialogue participant and Former CEO Kimberley Land Council

10:20am **Panel Discussion: Aboriginal leadership and change makers in Local Government and the community**
Nolan Hunter, Local Dialogue participant and Former CEO Kimberley Land Council
Daniel Morrison, Wungening Aboriginal Corporation
Cr Brooke O'Donnell, Deputy Mayor City of Kalamunda
Cr Cecilia Kelly, Shire of Mount Magnet
Cr Barry Winmar, City of Kwinana
Cr Elsta Foy, Shire of Broome

11:00am **Morning tea**

Truth Telling Session – Recognising our histories and addressing racism

11:30am **Minister Video Address**
Hon Linda Burney MP, Minister for Indigenous Australians

11:35am **Presentation "Gnulla Karnany Waangkiny" (Our Truth Telling)**
Robert Miles, Chairman, Noongar Kaartdijin Aboriginal Corporation
Helen Shanks, Director - Noongar Kaartdijin Aboriginal Corporation, Project Coordinator - Shire of Toodyay

11:55am **Panel Discussion: Let's Talk About Racism - Impact and Change**
Christine Young; Executive Project Officer, City of Melville
Leanne Woods; First Nations Engagement Coordinator, City of Melville,
Barbara Freeman; Family and Community Development Manager, City of Cockburn

12:40pm **Lunch**

Justice Session – Closing the gap
MC: Shahna Rind, Senior Consultant Aboriginal Learning and Development, Department of Communities and Local Government Aboriginal Network Member (TBC)

1:20pm **Music Performance: Proud Noongar Boys, Balga Senior High School**

1:35pm **Presentation: City of Swan Aboriginal Trainee program and RAP actions**
John Mogridge, Aboriginal Partnership and Development Officer
Steven Freestone, Acting Supervisor Parks East
Amy Freestone, Aboriginal Trainee, City of Swan

1:55pm **Presentation: The Willagee Youth Drop-In Program**
Jen Bawden, Team Leader Willagee Library
Aimee Ryan, First Nations Community Development Officer
Emma Hewitt, Creative Learning Producer – City of Melville

2:15pm **Presentation: How Local Government can Champion Justice Reinvestment**
Sophie Stewart, Coalition and Campaign Manager, Social Reinvestment WA
Lulkbudia Mclean, SRWA Campaigner, Social Reinvestment WA
Hannah Woodward, Justice Reinvestment Development Officer, Social Reinvestment WA

2:35pm **Afternoon tea**

Healing Session – Moving to a better place

3:00pm **Presentation: Yacker Danjoo Ngala Bidi**
Konrad Seidl, Alliance Manager Community Safety and Amenity
Danny Ford OAM

3:20pm **Presentation: Menang First - The Albany Approach to Restoring Menang Noongar Place Names, Reconciliation and WA's First Bicentenary**
Lester Coyne, Menang Elder, Chair, Albany Aboriginal Heritage Reference Group
Louise Paterson, Manager Community Relations, City of Albany
Bethany Findlay, Bicentenary Coordinator, City of Albany

3:40pm **Interactive workshop: Caring for Country, for us, by us, with us.**
Carol Innes, Co-Director of the Danjoo Kooliny Initiative in the Centre of Social Impact at the University of Western Australia

4:40pm **Department of Local Government, Sport and Industries Update**

4:45pm **Reflection time**

5:00pm **Networking and Canapes on the Terrace**