

APPENDIX 1

BACKGROUND REVIEW
URBAN DESIGN & TRAFFIC ENGINEERING



Memo

To:	Peter Douglas	Date:	March 2019
Company:	Mildura Rural City Council	From:	Hansen Partnership
Cc:			
Re:	Mildura South NAC Stage 1: Background Review		

The following memo provides a concise outline of relevant background information relating specifically to the proposed Mildura South Neighbourhood Activity Centre (NAC). This review seeks to highlight the key parameters found in relevant background documents and identify potential gaps for the Urban Design Framework to investigate. It is understood that considerable technical work has been prepared relating to the designated NAC site, over the last five years.

The NAC The following documents were reviewed as part of this background review:

- Mildura South Neighbourhood Activity Centre Economic Assessment (August 2018)
- Sixteenth Street Greenway Interface: Amendment C100 Part 2 (June 2018)
- Mildura South (Sixteenth & Deakin West) Development Plan (October 2014)
- Mildura South Urban Design Plan: Precinct Structure Plan (October 2014)
- Mildura Housing and Settlement Strategy (December 2013)

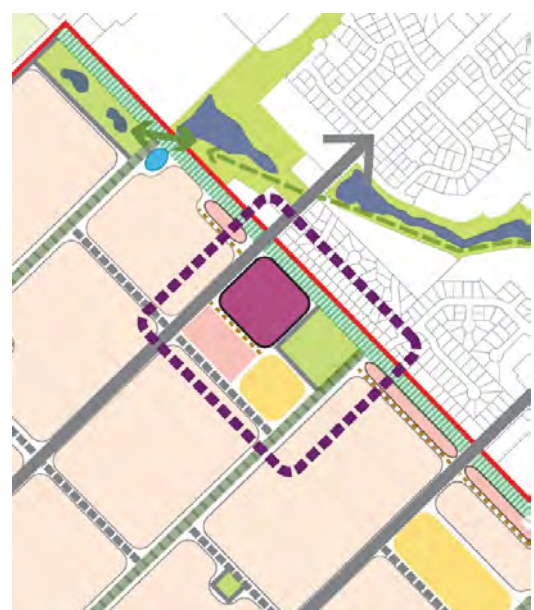
To aid in the communication of Urban Design Recommendations, an Issues and Opportunities diagram is attached to this memo which will assist with ongoing discussions with relevant stakeholders and Council during the subsequent phases of this project.

Project Background

The NAC forms part of the Mildura South Precinct Structure Plan adopted through Amendment C75 in 2015.

The Amendment sought to implement the strategic intent of the *Mildura South Urban Design Plan Precinct Structure Plan* (MSPSP) and the *Mildura South (Sixteenth and Deakin West) Development Plan* (MSDP) which were adopted by Council in 2014. These documents set out Council’s plan for managing residential development and in particular supports the development of a Neighbourhood Activity Centre at Sixteenth Street and Ontario Avenue.

The Amendment applied the **Urban Growth Zone** (Schedule 1) to the land identified for the NAC. As outlined in the Precinct Structure Plan map, the NAC illustrates indicative areas for commercial, public open space, community and medium density residential uses in association with a proposed street network. The precise boundary of the Commercial 1 Zone, Public Use Zone and Residential Growth Zone will be determined by an Urban Design Framework.



Extract from the MSPSP of the proposed NAC

The Precinct Structure Plan (2014) outlines the following indicative land use mix for the 8ha NAC study area:

- **2ha** to be allocated for retail uses which should include a 3,500-4,000 sqm full line supermarket and associated retail suitable for a neighbourhood centre;
- **2ha** to be allocated for community use;
- **2ha** to be allocated for public open space, and
- the remaining land – approximately 2ha - to be used for residential with higher density around the retail area.

Assessment & Recommendations Table

The following table of recommendations outlines key considerations found within the earlier Development Plan (2014), Economic Assessment Report (2018) and the Sixteenth Street Masterplan (2016) and how they may influence the curation of the masterplan in following Stages. The table is broken into 3 themes including access and movement, public open space and land use mix.

Reference Document	Key Consideration	Relevance	Hansen Recommendation
Access & Movement			
Mildura South Development Plan (2014)	<p><i>Identify existing roads (Ontario Avenue) as key vehicular movement corridor and prioritise vehicular movement, use these roads for bus routes where possible.</i></p> <ul style="list-style-type: none"> ▪ 30m road reserve ▪ 60km/h speed limit ▪ 12m carriageway including 2 lanes of traffic in both directions ▪ 1.5m footpath ▪ 6.9m landscaped verge to both sides of road. 	High	<p>Explore opportunities for the proposed NAC bus interchange to be positioned along Ontario, adjacent to the proposed supermarket, away from the internal edge road. Further testing is required to determine suitable pedestrian links from Ontario Avenue, through the commercial precinct to the village green.</p> <p>The management of safe pedestrian crossings will need to be considered along this road.</p>
	<p><i>The Sixteenth Street and Ontario Avenue intersection (north) should be considered for signalisation.</i></p>	High	<p>This is considered appropriate, given the preference for bus routes, delivery vehicles and trucks to access the NAC.</p>
	<p><i>Car parking, freight and loading for retail premises should be primarily accessed from Ontario Avenue.</i></p>	High	<p>Management of cross-overs and the direction of entering/exiting vehicles is an important consideration. This will influence the positioning of retail frontages to Ontario Avenue subject to loading and servicing requirements.</p> <p>The positioning of the proposed loading crossover requires further testing from</p>

		<p>Traffic Engineers, given proximity to proposed signalised intersection.</p> <p>It is acknowledged that the current Development Plan includes car parking access from the internal edge road. Further testing is required to potentially avoid crossovers from this lower order street (opposite public open space).</p>
<p>Elsey Parkway (south-east) will form a key part of the pedestrian and cycle network and play a key role in the amenity of the neighbourhood. Recognise that there will be two stages in their development on the basis of subdivision patterns.</p> <p>Parkways will be the key pedestrian and cycle connections to Sixteenth Street.</p> <ul style="list-style-type: none"> ▪ Road reserve 30.6m ▪ Single carriageway in both directions. ▪ 1.8m bike path including 2.5m verge in both directions. 	Medium	<p>It is acknowledged a Parkway is positioned along the south-east boundary of the NAC. The interim Parkway road reserve will be 17.5m wide and the long-term road reserve will be 35m. Further testing is required for the functional attributes of the intersection with the Edge Road adjacent to the Village Green/Community Uses. A left-in/ left-out function may be suited to the interim road configuration.</p>
<p>Sixteenth Street (north-east) was identified within the Mildura South Framework Plan as forming a key 'green spine'. Create a significant landscaped verge with generous canopy plantings and incorporate separated pedestrian and cycle routes, as well as generous understorey planting and other landscape features. (30m wide road reserve).</p>	High	<p>A masterplan has been prepared since the Development Plan (refer to Sixteenth Street Masterplan Report). The role of Sixteenth Street as a green spine has been maintained. The UDF should clearly delineate pedestrian, cycle and vehicle access from this main road into the NAC.</p> <p>The intersection with the central Edge Road is an important consideration for the positioning of active commercial uses and maintaining pedestrian priority to the south.</p>
<p>Helen Road (south-west) is classified as a Secondary Road, aligned to the south west boundary of the NAC. The role of Secondary Roads is to provide connections between Access Avenues.</p> <ul style="list-style-type: none"> ▪ 28m road reserve 	Medium	<p>This road facilitates direct frontages with medium density housing (apartments) and community uses. Further testing is required to determine extent of required crossovers from NAC uses (in association with medium density housing designation)</p>

	<ul style="list-style-type: none"> ▪ 12m carriageway + parallel parking ▪ 2m cycle paths ▪ 1.5m pedestrian paths 		<p>while maintaining safe pedestrian and cycle infrastructure.</p> <p>Where dwellings front Helen Road, a rear laneway may be preferred providing for front to back arrangements and minimise crossover frequency.</p>
	<p>Provide an 'edge' road around the village green with a very low speed limit and some on-street car parking, including a generous bus stop.</p> <ul style="list-style-type: none"> ▪ 18m road reserve ▪ 9.5m carriageway including parallel parking on 1 side. ▪ 1.5m pedestrian path +5m verge. 	High	<p>Explore opportunities for the public open space to directly abut community and/or medium density residential uses to provide direct (and safe) pedestrian connections to the park. The current configuration of the development plan positions the POS in an 'island' formation, surrounded by roads on all sides. The public open space may benefit from passive surveillance and activation through direct abutments to complementary 'community' uses.</p> <p>Alternatively, the east-west oriented 'Edge Road' could benefit from a 1-way condition (southbound). Buses should also avoid using this lower order road.</p> <p>The edge road could be prioritised for pedestrian and cycle movement in combination with slow vehicle speeds to access the NAC services. Ensuring the edge road does not operate as a 'rat-run' through the centre is highly critical.</p>
	<ul style="list-style-type: none"> ▪ Local roads will accommodate footpaths on both sides of the reserve of a minimum width of 1.2m. ▪ Non-local roads will accommodate a minimum path width of 1.5m. ▪ Sixteenth Street will accommodate a minimum path width of 2m. 	Medium	<p>It is understood, local roads are not fixed and are able to be reconfigured.</p> <p>Further testing is required surrounding the minimum path width for streets in the NAC context. Given the higher volumes of pedestrian movement, all streets should accommodate a minimum 2m path width, subject to traffic engineering analysis.</p>
	<p>The NAC is proposed to accommodate a small bus 'interchange' where there may be opportunities to catch buses to a greater variety of locations.</p>	High	<p>Further testing is required to determine the appropriate location and configuration of bus stops and/or interchange within the NAC. Subject to Traffic Engineering advice, any bus interchange will need to consider pedestrian safety and</p>

			minimisation of vehicle conflict. The current location of the interchange between the park and supermarket may need to be reconsidered.
Mildura South Development Plan (2014) <i>Relevant Guidelines</i>	<ul style="list-style-type: none"> ▪ <i>Car parking should have a skin of residential or commercial uses and landscape buffers to screen views of car parking from the public realm.</i> ▪ <i>Discourage establishment of any drive-thru takeaway outlets within the centre.</i> ▪ <i>Ensure clear and amenable pedestrian access is provided to and between different land uses within the centres.</i> 	Medium	<p>These guidelines are considered relevant for the development of the UDF.</p> <p>Further consideration is required regarding the preference for consolidated car parking as opposed to scattered parking throughout the precinct.</p>
Sixteenth Street Greenway Interface: Amendment C100 Part 2 (June 2018)	<p><i>The masterplan proposes the following road configuration to the NAC interface:</i></p> <ul style="list-style-type: none"> ▪ <i>3m wide traffic lane in both directions.</i> ▪ <i>60 degree angled parking bays to the south (NAC).</i> ▪ <i>2m wide footpaths to both side of the road.</i> ▪ <i>3m wide dedicated bike path to the south (NAC)</i> ▪ <i>2.1m wide parallel parking to the north.</i> ▪ <i>A pedestrian crossing to the south of the internal edge road.</i> 	High	<p>The masterplan builds on the objectives outlined in the earlier development plan supporting the implementation of a high amenity movement corridor supporting protected (and generous) pedestrian and cycle infrastructure. The UDF should maintain the proposed alignment of paths and landscape, acknowledging the removal or avoidance of crossovers from Sixteenth Street and instead advocating for vehicle access via the Avenues or Parkways.</p>
	<p><i>At the Edge road and Sixteenth Street junction a 6.3m wide landscape verge (or outstand) is proposed to frame the entry into the NAC.</i></p>	Medium	<p>The UDF should integrate the proposed masterplan concept which applies to the north-east boundary of the study area.</p>

Reference Document	Key Consideration	Relevance	Hansen Recommendation
Public Open Space			
Mildura South Development Plan (2014)	<p><i>The Sixteenth Street North Village Green will be the central gathering space for the Mildura South community.</i></p> <p><i>The location of the village green adjoining the main (retail) activity centre and community hub of the Mildura South growth area is important. Medium density housing and community infrastructure should also be provided in this area.</i></p>	High	<p>The siting of the public open space at the junction with Sixteenth Street and the Parkway is a positive outcome to ensure high amenity pedestrian and cycle links from surrounding residential areas are achievable.</p> <p>The UDF can provide further guidance for the configuration of open space functions and activities as well as the alignment of pedestrian links/crossings into the reserve from surrounding commercial, community and residential uses.</p>
	<p><i>Include an Edge Road separating the park from adjoining retail, cafes, higher density housing or community uses. This road should not be dominated by car parking and should include a dedicated bus stop area.</i></p>	High	<p>As previously discussed, the Edge Road is an acceptable lower-order access link between commercial activities and open space. It is recommended however, that any bus interchange is relocated away from this road given buses tend to sit idle at these interchanges and disrupt pedestrian connections between destinations.</p>
	<p><i>The indicative concept for the parkland includes the following activities:</i></p> <ul style="list-style-type: none"> ▪ <i>Grassed areas</i> ▪ <i>BBQ and seating area</i> ▪ <i>Tennis and basketball courts</i> ▪ <i>Outdoor gym equipment</i> ▪ <i>Skate park and playground</i> ▪ <i>Community meeting rooms</i> 	Medium	<p>The UDF can provide further clarity for the siting, size and alignment of activities within the reserve and whether all activities are feasible in this 2ha location.</p> <p>Further, Council may seek to provide indicative budget allocation for the public open space, where an interim design concept may be required during the initial phases of residential and commercial development.</p>
Mildura South Neighbourhood Activity Centre Economic Assessment (August 2018)	<p><i>A larger portion of public open space may be implemented during the early stages of the NAC development. This area would allow for the future expansion of commercial and retail uses when the Mildura South population increases.</i></p>	Medium	<p>Further testing and investigation areas are required to determine the suitable location and configuration of any additional 'interim' public open space within the NAC. This use should offer different functions from the Village Green and be programmed to easily transition into commercial development (i.e. paved</p>

			'urban' plaza accommodating temporary pop-ups or events).
<p>Mildura South Development Plan (2014)</p> <p><i>Relevant Guidelines</i></p>	<ul style="list-style-type: none"> ▪ Provide useable open spaces that are generous in dimension to allow for recreational and sport activities. ▪ Include planting of grasses, shrubs and trees that are of indigenous origin, drought tolerant, low maintenance and suitable to the climatic conditions of the area. ▪ Offer direct interfaces with dwellings. ▪ Provide a suitable range of park infrastructure. ▪ Design open spaces having regard to the Safer Design Guidelines of Victoria. ▪ Ensure open space has a road frontage to all edges. 	Medium	As outlined above, the Village Green provides substantial opportunities for direct abutments with community uses and lower order roads which promote pedestrian and cycle movement. The public open space should offer activities which cater to the local residential catchment as well as offer flexible spaces for community events and functions associated with the NAC designation.
Land Use & Built Form			
<u>Medium Density Housing</u>			
<p><i>Mildura South Neighbourhood Activity Centre Economic Assessment (August 2018)</i></p>	<p><i>The allocation of 2 hectares of land for medium density housing in the NAC remains a sound long term provision to provide for a range of housing options and a 'complete community in itself'.</i></p> <p><i>The area would accommodate approximately 56 medium density dwellings with an average lot size of 250m². This would comprise 22% of the total medium density dwelling stock expected in the DP area.</i></p>	High	<p>Further testing is required to determine the appropriate 'typology' and location of medium density housing in the NAC, having regard to the preferred street network and public open space.</p> <p>The 'type' of medium-density housing will be substantially guided by appropriate vehicle access in accordance with the proposed street network.</p> <p>Rear loaded products may be suited toward the public open space or Parkways, where semi-detached dwellings could be positioned to secondary roads.</p>
	<p><i>Key informants have identified that the cost of construction for medium density housing is not necessarily cheaper than standard dwelling</i></p>	High	<p>It is worthwhile exploring medium-density dwelling typologies that are desirable from a 'life-style' point of view given proximity to future public open space and commercial offerings.</p>

	<i>densities, there for making the product less desirable.</i>		Medium density housing may support aged care or retirement living products.
	<p><i>The medium density housing should also be suitably diverse. The built form could include:</i></p> <ul style="list-style-type: none"> ▪ <i>Single storey units on small lots</i> ▪ <i>Double storey terraced town houses (not yet a favoured form of development in Mildura but which has been popular elsewhere)</i> ▪ <i>Shop-top apartments</i> ▪ <i>Retirement villages</i> 	Medium	<p>High density typologies may be suited toward to retail/supermarket node with consolidated or 'skinned' car parking.</p> <p>Attached and semi-attached townhouses or units should be located in close proximity to public open space and higher order streets, such as Helen Road to the south east/west of the study area.</p> <p>Retirement living may be suited to abuttals with community functions and access to public transport.</p>
	<i>The Masterplan for the NAC will need to identify how the housing relates to the other uses in the NAC.</i>	High	Consideration toward the 'hierarchy' of medium density housing in relation to standard residential subdivision as well as proposed commercial/retail/community uses will be required.
Mildura South Development Plan (2014)	<i>Areas identified for the provision of 'medium density' housing can be utilised to provide other 'accommodation' related uses which provide for permanent accommodation such as aged care facilities or retirement village, co-housing or villa unit developments.</i>	Medium	<p>Further investigation with Council and landowners are required to determine the capacity to deliver alternative medium density housing products.</p> <p>Social and/or affordable housing models within the NAC study area may be appropriate given proximity to services and facilities.</p> <p>Aged Care and Retirement Living facilities could also be appropriate in a portion of the designated community use parcel.</p>
	<p><i>Parcels of land over 3ha within the Mildura South growth area must include:</i></p> <p><i>A minimum area of 5% of net residential development area demonstrating a density of 40 dwellings per hectare. These medium density areas must be provided in suitable locations such as along main roads and adjoining areas of non residential land uses, such as parks or retail / community</i></p>		

	<i>uses. Additional parameters around the provision of medium density lots are outlined below.</i>		
Mildura South Development Plan (2014) <i>Built form guidelines</i>	<ul style="list-style-type: none"> ▪ <i>Medium density housing should not exceed 3 storeys.</i> ▪ <i>Side setbacks between properties should be minimal to allow for maximum use of the land.</i> ▪ <i>Dwellings on corner sites require special treatment to address both street frontages.</i> ▪ <i>Dwellings with frontages to public opens space should maximise passive surveillance and outlook.</i> 	High	<p>High level feasibility testing for housing types (townhouse, apartment, unit etc.) is required to determine an indicative appropriate building envelope that facilitates adequate daylight and amenity for new dwellings, while maximising the capacity of the land to deliver alternative housing types.</p> <p>The type of medium density housing will be determined by location and interface conditions as well as vehicle and parking requirements subject to Traffic engineering advice.</p>
<u>Commercial</u>			
<i>Mildura South Neighbourhood Activity Centre Economic Assessment (August 2018)</i>	<p><i>At full development, the NAC can support a medium-sized supermarket (1500m²) and speciality shops with a total retail floorspace of 3000m² plus 750m² of non-retail space.</i></p> <p><i>The total land requirement including open space, circulation and parking would be approximately 1.2ha.</i></p>	High	<p>Further testing is required to determine the suitable size and configuration of commercial and retail forms within the NAC having regard to the anticipated future population. An interim development option may be necessary to ensure a full-line supermarket can be delivered in the long term while preserving land for future expansion.</p> <p>It is also necessary to explore the suitability of the location of the proposed supermarket to the north-west corner of the NAC. Consideration is required toward pedestrian footfall and ease of access to car parking.</p>
	<p><i>A full-line supermarket may be difficult to sustain given the expected population growth. Should the population at full development be more than expected (above 9000 people) the NAC should accommodate for a full-line supermarket and larger range of speciality shops, therefore requiring 2ha.</i></p>	Medium	As above.

	<p><i>Additional public open space could be positioned adjacent to the commercial offering to allow for future expansion of the supermarket and retail provisions.</i></p>	Medium	<p>The location and function of any interim public open space should be carefully considered to ensure it is distinct from the Village Green, potentially offering temporary retail or community uses.</p>
	<p><i>Non-retail elements of a NAC has different demand indicators and so the usual approach in planning new centres is to allow a proportion of the total floorspace to be non-retail. In this case, 20% of total space has been allocated to non-retail purposes.</i></p>	Medium	<p>Given the breadth of the Sixteenth Street verge, it is recommended that non-retail uses are positioned this frontage where they can benefit from green outlook rather than an active pedestrian thoroughfare.</p>
<p><i>Mildura South Development Plan (2014)</i></p>	<p><i>2ha of the identified area will be allocated to retail /commercial space by private developers. The masterplan will need to provide key parameters for the development of this centre in both an interim and a final preferred format.</i></p> <p><i>This includes a full line supermarket (3000m2), specialty retail, personal services and hospitality uses.</i></p>	High	<p>The NAC economic assessment is the guiding document to facilitate commercial development in the study area. The siting and interface arrangement of proposed commercial and retail uses should have regard to the preferred street hierarchy and pedestrian amenity. There is an emerging preference to position retail to the north-south edge road, capturing the activity and vibrance of the adjacent open space and pedestrian oriented street.</p> <p>The back-of-house for the supermarket and higher order retail uses should be positioned to Ontario Avenue with more active uses positioned to Sixteenth Street and the Edge Road.</p>
<p><u><i>Community Uses</i></u></p>			
<p><i>Mildura South Development Plan (2014)</i></p>	<p><i>Land identified for community facilities is likely to be partially acquired by Council for community uses but other facilities such as the medical centre are likely to be acquired by private developers.</i></p> <p><i>The masterplan will need to include input from community planners to identify specific facilities and floor areas necessary to support the anticipated population.</i></p> <p><i>Some of the land currently identified for 'community' uses may</i></p>	Medium	<p>Since the adopting of the Development Plan, there is limited guidance from Council regarding the demand or allocation of land for community uses.</p> <p>Further testing and investigations are required by Council, to determine suitable community uses for the NAC, including but not limited to:</p> <ul style="list-style-type: none"> - Childcare centres. - Aged Care. - Meeting or function facilities. - Health services.

	<i>be available for additional private residential development.</i>		
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Yours faithfully
Hansen Partnership Pty Ltd
Urban Design Team

DRAFT

Project No. 180378

20 March 2019

Gerhana Waty
 Hanson Partnership Pty Ltd
 Level 4 126 Exhibition Street
 Melbourne VIC 3000

Via email: gwaty@hansenpartnership.com.au

Dear Gerhana,

**RE: Mildura South Neighbourhood Activity Centre
 Traffic Engineering Advice and Design Parameters**

Trafficworks has been engaged to provide traffic engineering advice and design parameters to be considered in the development of the Mildura South Neighbourhood Activity Centre (NAC). Key considerations and design parameters to be incorporated in the design are detailed as follows.

Road Hierarchy

The proposed road hierarchy should be implemented in line with the Mildura Shire Council Planning Scheme *Clause 56.06 – Access and Mobility Management*. The road hierarchy is summarised in Table 1 below.

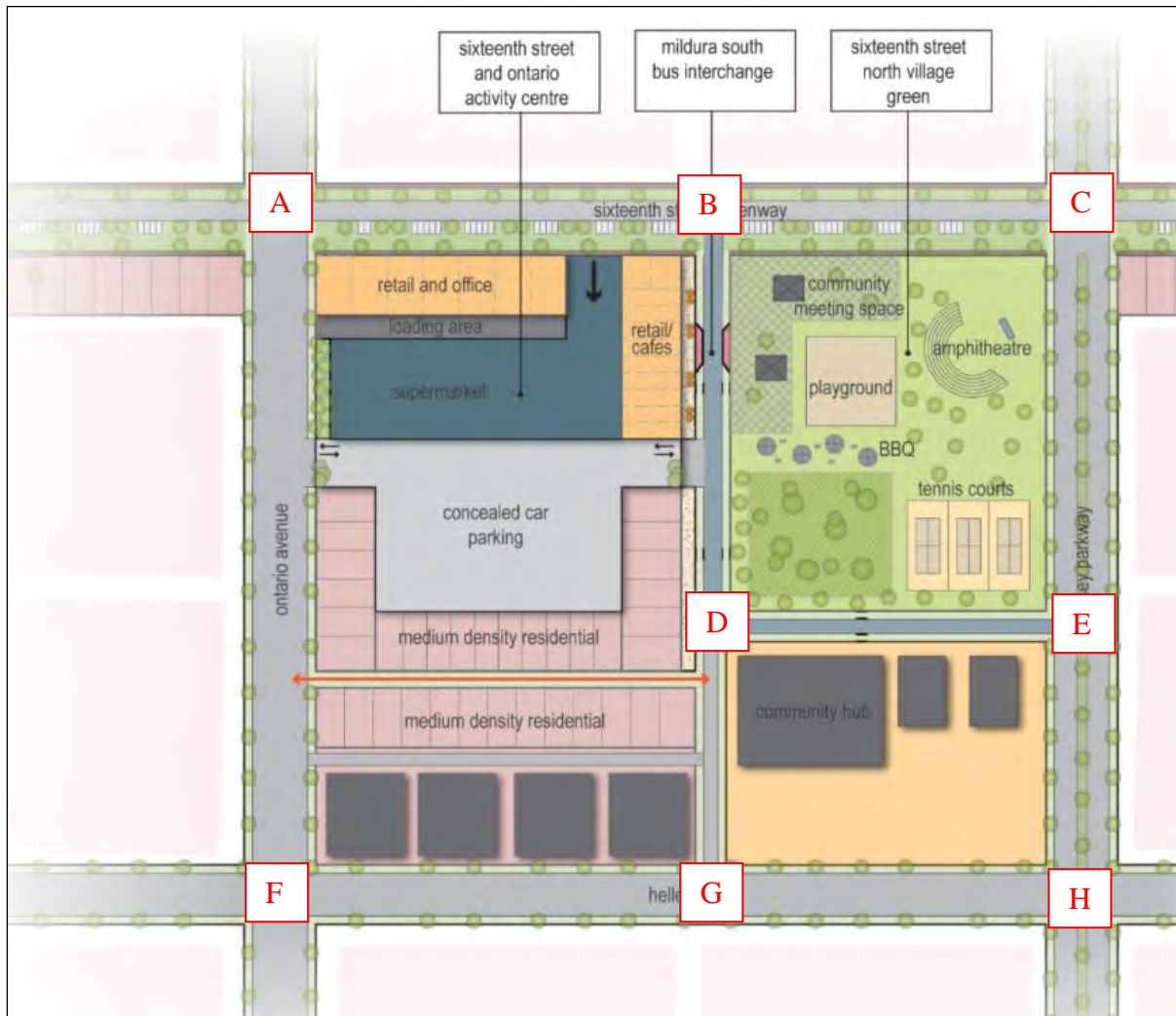
Table 1: Road Hierarchy

Road Type	Traffic Volume	Target Speed	Cross Section
Access Lane	300 vpd	10 km/h (shared zone)	5.5 m width No verge, car parking or footpaths
Access Place	300 - 1,000 vpd	15 km/h	5.5 m carriageway 7.5 m combined verge (with 2.5 m and 3.5 m min each side) Kerbside car parking on one side OR Hardstand car parking within verge 1.5 m wide footpaths (unless signed as a shared zone)

Road Type	Traffic Volume	Target Speed	Cross Section
Access Street Level 1	1,000 - 2,000 vpd	30 km/h	5.5 m carriageway 4.0 m verge on both sides Hardstand car parking within verge 1.5 m wide footpath both sides (widened to 2.0 m in activity centres)
Access Street Level 2	2,000 - 3,000 vpd	40 km/h	7.0 - 7.5 m carriageway 4.5 m verge on both sides Kerbside car parking on both sides 1.5 m wide footpath both sides (widened to 2.0 m in activity centres)
Connector Street Level 1	3,000 vpd	50 km/h	3.5 m wide lanes / 7.0 m carriageway 4.5 m verge on both side 2.3 m wide intended car parking bays 1.5 m wide footpath both sides (widened to 2.0 m in activity centres) On-street cycle facilities (optional)
Connector Street Level 2	3,000 - 7,000 vpd	50 - 60 km/h	3.5 m wide lanes / 7.0 m carriageway 6.0 m verge on both sides, plus central median 2.3 m wide intended parking bays 1.5 m wide footpath on both sides OR 2.5 m shared path on both sides On-street cycle facilities (optional)

Proposed Internal Road Network

Figure 1: Mildura NAC



The following provides comments related to the configuration and operation of the proposed internal road network within the Mildura South NAC:

- Ontario Avenue (A to F)
 - Designated as an “Access Avenue” in the Mildura South PSP, which aligns with a Connector Street cross section (undivided road), including parallel car parking and bus stops.
 - As per the Mildura Planning Scheme, bus stops should be provided kerbside (rather than indented).
 - Primary access to the off-street car parking area should be via Ontario Avenue, rather than the NAC Access Road.
 - On-street loading opportunities for the retail stores and offices fronting Sixteenth Street Greenway could be provided via Ontario Avenue.
 - Access to the supermarket loading bay will be via Ontario Avenue. This access should be designed to ensure vehicles can both enter and exit the loading bay in a forward direction (i.e. not required to reverse from Ontario Avenue).

- Direct access onto Ontario Avenue from medium density residential development (townhouses or apartment complexes) would be appropriate, however, the number of crossovers should be minimised.
- Hellen Road (F to H)
 - Designated as a “Secondary Road” in the Mildura South PSP, which aligns with a Connector Street cross section (undivided road), including on-road bicycle lanes and parallel car parking on both sides.
 - Direct access onto Hellen Road from medium density residential development (townhouses or apartment complexes) would be appropriate, however, the number of crossovers should be minimised.
- Elsey Parkway (C to H)
 - Designated as a “Parkway” in the Mildura South PSP, which aligns with a Connector Street cross section (divided road), including separated on-road bicycle lanes and parallel car parking on both sides.
- Sixteenth Street Greenway (A to C)
 - Designated with a unique “Sixteenth Street Greenway” cross section in the Mildura South PSP, which aligns with a Connector Street cross section (undivided road), including a two-way off-road bicycle path, indented parallel car parking on one side and angled car parking on the other side.
 - All bicycle and pedestrian crossing points need to be designed to ensure the priority is clear (pedestrian and cyclists or vehicles to give way) e.g. at the intersections with Ontario Avenue, the NAC Access Road and Elsey Parkway.
 - Intersections between the footpath and bicycle path should ensure clear priority is provided to path users on both facilities. This could include:
 - continuous centre line along the bicycle path through the intersection
 - bicycle symbols on bicycle path either side of the intersection
 - give way line marking, LOOK BIKE line marking and TGSIs installed on the footpath
 - The number of property crossovers onto Sixteenth Street Greenway should be minimised.
- NAC Access Road (B to E)
 - Designated as an “Edge Road” in the Mildura South PSP, which generally aligns with an “Access Street Level 2” cross section, but modified to include indented parallel car parking on one side (adjacent to the open space).
 - This is the main roadway through the centre of the NAC. The development plans indicate a major bus terminus at its northern end.
 - On-street loading opportunities will need to be provided for the abutting retail stores.
 - Consideration to be given on providing a 40 km/h speed limit. Bus friendly traffic calming devices can be considered to assist in managing speeds.
 - The PSP indicates that on-street car parking will be provided along one side only, adjacent to the park. Convenient on-street car parking should be maximised adjacent to the retail stores and community facilities. This is particularly important

for the community uses, which does not propose any nearby off-street car parking. This could be achieved by:

- reducing the verge width / providing indented car parking within the verge
- increasing the road reserve width
- converting the roadway to one-way operation
- Secondary access to the off-street car parking area should be via the NAC Access Road.
- It is unclear if an off-road bicycle path will be included within the open space, however if not, cyclists will be required to share the carriageway with vehicular traffic.
 - Consideration should be given to accommodating cyclist movements within the NAC, with bicycle facilities providing connections to key destinations and end-of-trip facilities (i.e. bicycle racks).
 - An off-road bicycle facility should be considered within the open space on the east side of the NAC Access Road.
 - This is particularly important should a shared area connection (or pedestrian / cycle only area) be implemented to connect with Hellen Road.
- NAC internal north - south road (D to G)
 - This roadway is not specifically mentioned in the Mildura South PSP, but it is expected to be similar to the “local road” layout, which generally aligns with an “Access Street Level 2” type cross section and modified to include a wider carriageway width.
 - This roadway is not considered integral in providing vehicle access through the NAC, and therefore consideration could be given to designating this section of road as a shared area, with priority given to pedestrians and cyclists rather than vehicular traffic and a speed limit of 10 – 15 km/h applied. Implementation of a shared zone will need to be complimented with landscaping and contrasting pavement material in order to create a slow speed environment.
 - To further increase pedestrian and cyclist separation, this road segment could be fully closed to vehicular traffic during peak hours of operation for the community hub and associated community facilities.
 - If the facilities are implemented, a bicycle connection should be provided between the shared area and the off-road bicycle path along the NAC Access Road within the open space.
- East-West Laneway
 - This roadway is designated as a “Rear Access Lane” in the Mildura South PSP, which align with an “Access Lane” type cross section, with no parking or footpath provision.
 - This laneway will provide access to the medium density residential development, for residential access only, and through traffic should be discouraged.
 - Some medium density lots will have no access to the laneway and access will be via “concealed car parking” area. Access to residential lots from a public car parking area is not acceptable and the proposed medium density development should be redesigned to avoid this.

Bus Routes and Bus Stops

Bus routes should provide access to key destinations but should be planned to ensure that the interaction between pedestrians, cyclists and buses is limited. The *Public Transport Guidelines* indicates a target of locating bus routes so that 95 % of residences are within 400 m safe walking distance of the bus route, and for aged care, facilities, educational, medical and community facilities to be located within 200 m of a planned bus stop.

The development plan indicates that bus routes are planned along the NAC Access Road, Eley Parkway and Sixteenth Street Greenway. The following should be considered:

- Bus stops to be located every 300 m and reflect the location of key attractors
- For two-lane two-way roads, a clear trafficable road width of 7 m is required, with separate designated space for cyclists and / or parking (in addition to the 7 m trafficable road width required for bus operations). With the NAC access road, this can be achieved by providing indented parallel parking
- On connector streets with a median, buses should have a clear trafficable width of 3.5 m, clear of bicycle lanes or parking. Along Eley Parkway, a carriageway width of 5.5 m is provided in each direction. With a parking lane width of 2.3 m, this leaves 3.2 m for buses, which is less than desirable
- The location of bus stops should be defined with a bus stop flag, which restricts parking 20 m on the approach and 10 m on the departure of the bus flag
 - If the bus stop requires a longer length of restricted parking, bus stop signage should be installed.
- Indented bus bays may be implemented to improve traffic flow on low speed roads, particularly at locations where buses may need to wait for several minutes at a time (i.e. at timing points, driver changeover points and heavily patronised stops). However, where possible, there is a preference to provide kerbside bus stops within the traffic lane to avoid the delay associated with buses waiting to re-enter the traffic stream. *VicRoads Supplement to AS 1742.12* provides the following guidance:
 - “Bus bays should not be constructed in 60 km/h zones unless there is physically no way another vehicle could overtake the stopped bus, or the stop is very close to the departure side of a signalised intersection in a way that would severely impact intersection operation”
- Indented bus stops should be designed:
 - with a 3.0 m width, to ensure that a bus will not overhang the traffic lane
 - to allow the bus to enter and exit the stop without requiring the vehicle to reverse (i.e. requiring adequate length)
- Raised pedestrian crossings along Sixteenth Street Greenway should be designed with bus friendly gradients and longer flat top humps to cater for bus traffic (75 mm height and 9.0 m length)

Intersection Treatments

The Precinct Structure Plan does not provide detail on the types of intersections to adopt surrounding the NAC. However, the preliminary masterplan appears to show give-way controlled cross intersections. This type of treatment creates multiple conflict points at the intersection and

is likely to cause confusion for drivers and result in cross traffic type collisions, particularly with right turning vehicles. This type of treatment also introduces risk for pedestrians crossing at the intersection.

Give-way controlled T-intersections are considered to be an acceptable treatment, however at cross intersections, consideration should be given on providing other higher forms of intersection control such as roundabouts, signals or a staggered T-intersection.

Table 2 below provides suggestions on appropriate intersection options for each of the intersections within and surrounding the NAC.

Table 2: Intersection controls within the Mildura NAC

Intersection	Appropriate treatments to consider	Benefits and considerations
Ontario Avenue / Sixteenth Street	Signals	<ul style="list-style-type: none"> • This form of intersection will provide a controlled crossing for pedestrians from the existing Mildura South community who may utilise these facilities to access the NAC • Motorists approaching from Ontario Avenue who are unfamiliar with the area and have been driving long distances may not be expecting to stop at a signalised intersection. Therefore, this should be complimented with other 'gateway' treatments to slow drivers down prior to the signals
	Roundabout	<ul style="list-style-type: none"> • Should only be considered if traffic flows on all four legs are balanced • Pedestrian crossings will be required. If provided as raised zebra crossings, these should be set back from the roundabout a minimum 6 m to allow for storage of one vehicle between the crossing and the roundabout • Threshold treatments on the Sixteenth Street legs can be considered
Ontario Avenue / Hellen Road	Roundabout	<ul style="list-style-type: none"> • This intersection should be provided as a roundabout to safely manage vehicular conflicts • Pedestrian crossings can be managed by refuge crossings on each approach of the roundabout
Eley Parkway / Sixteenth Street	Staggered T-intersection	<ul style="list-style-type: none"> • As per the preliminary masterplan • A raised pedestrian / cyclist crossing across the side road can be included. If priority was given to pedestrians / cyclists, then the crossing should be set back a minimum 6 m from the give way line

Intersection	Appropriate treatments to consider	Benefits and considerations
	Roundabout	<ul style="list-style-type: none"> If the intersection cannot be staggered, then this intersection should be provided as a roundabout to safely manage conflicts
Hellen Road / Elsey Parkway	Roundabout	<ul style="list-style-type: none"> This intersection should be provided as a roundabout to safely manage vehicular conflicts Consideration can be given for a zebra crossing with kerb extensions north of the roundabout
Sixteenth Street / NAC Access Road	Give-way controlled	<ul style="list-style-type: none"> Intersection design will need to allow for the turning movements of a bus, which is likely to result in large corner splays. This can be minimised if the NAC access road is a one-way road A raised pedestrian and cyclist crossing has been shown on the preliminary masterplans. If priority was given to pedestrians / cyclists, then the crossing should be set back a minimum 6 m from the give way line
Elsey Parkway / NAC Access Road	Give-way controlled (left-in left-out)	<ul style="list-style-type: none"> Intersection design will need to allow for the turning movements of a bus, which is likely to result in large corner splays. This can be minimised if the NAC access road is a one-way road

Pedestrian / Cyclist Crossing Facilities

Table 3 below outlines pedestrian crossing facilities that can be considered within the Mildura NAC:

Table 3: potential pedestrian crossing facilities to adopt

Pedestrian Facility Type	Considerations	Appropriate locations
Pedestrian refuge / median	<ul style="list-style-type: none"> • Only appropriate where there is sufficient road width to accommodate a refuge island and maintain adequate through lanes • The minimum width of the refuge is 2 m. Where there is a high pedestrian volume, the desirable width is 3 m • A cut-through section is preferred through the refuge • Suitable for shopping streets, where pedestrian movements across a road is spread over a length of heavily trafficked road • Many people feel unsafe standing in a refuge in the middle of the road, particularly where the road carries high speed traffic or high volumes of heavy traffic • Can be used in conjunction with kerb extensions 	<ul style="list-style-type: none"> • Ontario Avenue • Elsey Parkway
Kerb extension	<ul style="list-style-type: none"> • Consist of local widening of the footpath into the carriageway, to reduce the crossing width • The extension will often improve sight distance to pedestrians, where there is parallel parking on the side of the road • Considered appropriate on low speed / low volume roads where it is safe for pedestrians to cross without staging • Can be used on the approach to the NAC on Ontario Avenue as a form of 'gateway' treatment to encourage drivers to reduce speed. Appropriate set back from the traffic lane will need to be provided • Not appropriate on roads with kerbside bicycle lanes 	<ul style="list-style-type: none"> • Sixteenth Street • NAC Access Street • Ontario Avenue (as a gateway treatment)
Pedestrian traffic signals	<ul style="list-style-type: none"> • Not appropriate on local roads • Appropriate on collector roads and at locations where there is a high pedestrian demand • Can be a shared pedestrian / cyclist crossing. In this scenario, consideration for cyclist lanterns, holding rails and bicycle detection can be given 	<ul style="list-style-type: none"> • Ontario Avenue • Elsey Parkway • Sixteenth Street • Hellen Road

Pedestrian Facility Type	Considerations	Appropriate locations
Pedestrian (zebra) crossing	<ul style="list-style-type: none"> • Not appropriate on multilane or high speed / high volume collector and arterial roads • Appropriate on roads with a speed limit of 50 km/h or less • Can be used in conjunction with kerb extensions • Less suitable when crossing numbers are low • Good sight distance and conspicuity are required • Suits all users 	<ul style="list-style-type: none"> • Sixteenth Street • NAC Access Street • North-South Road
Raised zebra crossing (Wombat Crossing)	<ul style="list-style-type: none"> • Similar considerations to a zebra crossing • Can form part of a traffic calming scheme, as it provides positive speed control • Careful consideration to be made in its design on bus routes 	<ul style="list-style-type: none"> • Sixteenth Street • NAC Access Street • North-South Road
Shared zone	<ul style="list-style-type: none"> • Environment is adapted for low-speed • Streetscape / landscaping will need to be implemented to increase awareness of the different conditions • Only appropriate on local roads, where vehicular movements can be restricted, and there is high pedestrian movement 	<ul style="list-style-type: none"> • North South Road (subject to location of car park access points)

Car Parking

Car parking should be provided in line with the Mildura Shire Council Planning Scheme *Clause 52.06 – Car Parking*. This includes:

- the provision of an adequate number of car parking spaces to accommodate the car parking demand generated by each proposed use
- compliant car parking access aisle and car parking space dimensions

Car Parking Provision

Statutory car parking requirements for a variety of commercial, community and residential uses which may be applicable for the Mildura South NAC are summarised in Table 4 below.

Table 4: Statutory Car Parking Requirements for various uses

Land Use	Statutory Requirement	Car Parking Measure
Commercial Uses		
Convenience Restaurant	0.3	to each patron permitted
Food and Drink premises	4	to each 100m ² leasable floor area
Medical Centre	5	to the first person providing health services
	3	to each additional person providing health services
Office	3.5	to each 100m ² net floor area
Postal Agency	4	to each 100m ² leasable floor area
Restaurant	0.4	to each patron permitted
Shop	4	to each 100m ² leasable floor area
Supermarket	5	to each 100m ² leasable floor area
Community Uses		
Bowling Green	6	to each rink, plus 50% of the relevant requirement of any ancillary use
Child care centre	0.22	spaces per child
Place of Assembly (e.g. community centre / place of worship / function centre)	0.3	to each patron permitted
Squash Court	3	to each court, plus 50% of the relevant requirement of any ancillary use
Swimming Pool	5.6	to each 100m ² of the site
Tennis Court	4	to each court, plus 50% of the requirement of any ancillary use
Residential Uses		
Residential Dwelling	1	to each one or two bedroom dwelling
	2	to each three or more bedroom dwelling
	1	For visitors to every 5 dwellings, for developments of 5 or more dwellings

Should an intended land use within the Mildura South NAC not have a specific rate included within the Mildura Shire Council Planning Scheme, a separate car parking demand assessment will be required to ensure there will be an adequate provision of car parking.

The provision of car parking should meet or exceed the calculated car parking demand for the NAC, with all parking for residents to be provided off street, with parking for visitors (to residential properties), staff and patrons / shoppers able to be provided both on and off-street.

Car parking dimensions and requirements

The Mildura Shire Council Planning Scheme *Clause 52.06 – Car Parking* indicates the following requirements for car parking spaces (refer to Table 5).

Table 5: Car Parking Space Dimensions

Type	Accessway width	Car space width	Car space length
Parallel	3.6 m	2.3 m	6.7 m
45°	3.5 m	2.6 m	4.9 m
60°	4.9 m	2.6 m	4.9 m
90°	6.4 m	2.6 m	4.9 m
	5.8 m	2.8 m	
	5.2 m	3.0 m	
	4.8 m	3.2 m	

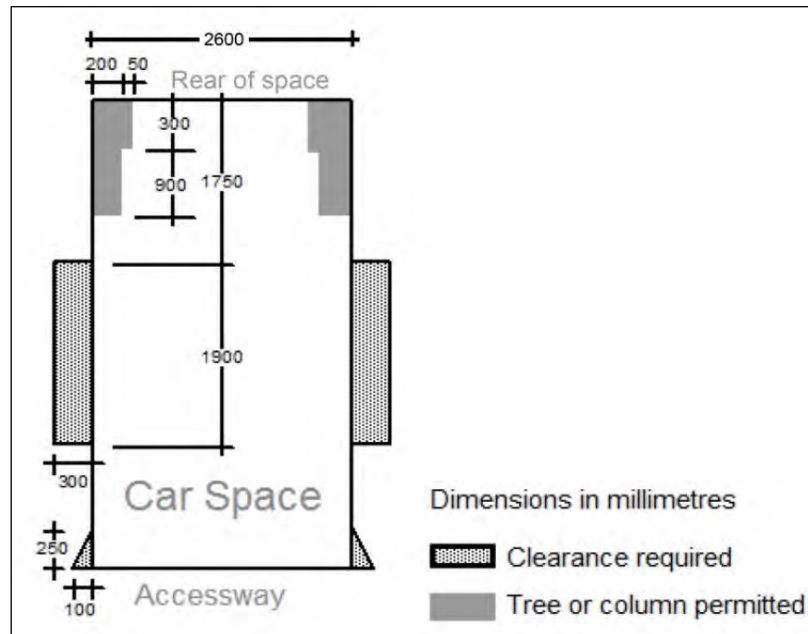
Additional requirements for car parking spaces (as per the Mildura Planning Scheme and the Australian Standards for car parking):

- Disabled car parking spaces:
 - To be provided in accordance with *AS 2890.6 – Parking Facilities – Off-Street peaking for people with disabilities (2009)*, car parking spaces need to be:
 - 2.4 m wide x 5.4 m long
 - an adjacent 2.4 m wide shared area with central bollard
 - Disabled car parking spaces may encroach into an accessway width by 500 mm (i.e. the space can be 4.9 m in length)
 - Disabled car parking spaces should be provided as 90° spaces, rather than parallel spaces, due to the requirement for a shared area.
 - Disabled car parking spaces shown along Sixteenth Street Greenway should be modified to reflect this requirement¹. Note that two disabled spaces may share a shared area.
- An additional 300 mm width is required for car parking spaces located adjacent to a high wall or fence.
- Car parking areas open to the public should be designed to allow vehicles to enter and exit in a forward direction, including blind aisle extensions where the parking aisle is closed at one end:
 - a 1.0 m aisle extension, if the aisle is up to 6 spaces in length

¹ It is acknowledged that the disabled car parking spaces are provided as per *AS 2890.5 Parking Facilities – On-Street Parking (1993)*, however, due to the age of the standard and more recent update for off-street parking, it is considered more appropriate to apply dimensions as per the off-street standard.

- a 1.0 m extension plus provision for vehicles to turn around, if the aisle is greater than 6 spaces in length
- A wall, fence, column, tree or any other fixed structure may not encroach into the required clearance surrounding each car parking space (refer to Figure 2).

Figure 2: Required Clearance to Car Parking Spaces



- Accessways should:
 - be a minimum of 3.0 m width (ideally 5.5 m – 6.5 m wide for two-way access)
 - provide a passing area of 6.1 m wide x 7.0 m long at the entrance (if greater than 50 m long and providing access to 10 or more car parking spaces)
- ramp gradients for multi-level car parks:
 - $\leq 10\%$ grade within 5.0 m of the frontage road
 - For public car parks, maximum 20% grade (≤ 20 m distance) or 16.7% grade (for > 20 m distance)
 - For private / residential car parks, maximum 25% grade (≤ 20 m distance) or 20% (for > 20 m distance)
 - Changes in grade require ramp transition to avoid vehicle scraping or bottoming out
 - summit grade change $>12.5\%$
 - sag grade change $>17.5\%$
- a minimum 2.1 m clear headroom is required beneath obstructions.

Design Vehicles

The following design vehicles should be adopted for each of the different scenarios within the NAC:

Table 6: Design vehicles to adopt within the NAC

Scenario	Design vehicle
Supermarket (full line)	19 m semi-trailer
Small supermarket (e.g. IGA)	12.5 m long rigid vehicle
Retail stores / cafe	8.8 m long rigid vehicle
NAC access road (i.e. bus routes)	12.5 m rigid bus
Residential streets / intersections	10.5 m waste collection vehicle 8.8 m service vehicle (fire trucks and ambulance vehicles)
Car parking access aisles and ramps	B99 vehicle (5.2 m) and B85 vehicle (4.9 m)
Car parking spaces	B85 vehicle (4.9 m)

Please contact me on (03) 9490 5903 if you would like to discuss this further.

Yours sincerely,



Bernard Chan
Associate

