Lot 12 Bayshore Drive Byron Bay

SITE STRATEGY & URBAN DESIGN PROTOCOL

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OVERVIEW AND SCOPE

1. Purpose

The Lot 12 Site Strategy and Urban Design Protocol describes Council's vision for the site, and provides a set of objectives and built form, site infrastructure and public realm principles to guide its redevelopment.

The document is designed to assist those looking to respond to Council's Expression of Interest for the development of the site. The document is in two parts:

Part A sets out Council's strategy for Lot 12, articulating a vision and objectives the future of the land of the site, a broad description of land uses consistent with this vision and the key design outcomes Council consider to be important for the land.

Part B sets out a range of urban design protocols to guide future development at the site so that Council's vision can be met.

A separate document "Expression of Interest – Lot 12 Development" will set out the procedures and terms of the Expression of Interest process, and clarify the types of responses sought by Council.

All responses to the Expression of Interest will be assessed against the vision and objectives and development proposals will be assessed against the urban design protocols.

It is intended that the document will continue to guide future site development following the EOI process. It will be reviewed periodically to ensure it remains current and adaptable over time as the community/population changes.

2. The Site

Lot 12 Bayshore Drive, Byron Bay (described as Lot 12 DP 1189646), is located within the Byron Bay Arts and Industry Estate and presents a unique development opportunity.

The Bundjalung of Byron Arakwal people are the Traditional Custodians of the land on which the Arts and Industry Estate now sits.

The physical characteristics of the site include:

- Developable area of approximately 2.6ha within a total site area of 5.81ha
- Developable area is flat and without vegetation
- Located in one of Australia's iconic destinations Byron Bay
- Located within the Byron Bay Arts and Industry Estate home to an eclectic mix of innovative businesses and commercial premises
- Located opposite a local shopping centre
- 3.5kms by road from the Byron Bay Town Centre
- 3.5kms by road from the Pacific Motorway
- 440m from the rail line and Solar Train North Beach Station

A 7m wide easement exists on the title of the Lot 12, located along the Bayshore Drive frontage and accommodating services and drainage infrastructure.

A pipeline will soon be constructed along the southern boundary of the lot, which will require a new 6m wide easement. Otherwise, the developable part of the property is unencumbered.



Figure 1: Outline of developable area of Lot 12

3. Site background and context

From the early 1980s to the early 2000s, Lot 12 was used by Council for storage of construction materials, including old bridge timbers, concrete pipes, soil, road base and rock stockpiles and other Council stores.

In about 2015, stockpiled materials were removed from the site and works were undertaken to sort, spread and compact the remaining clean fill material across the cleared part of the property.

The clean up works were carried out under an EPA License, which was surrendered in early 2017, following successful completion of the works.

Lot 12 sits within the Byron Arts and Industry Precinct. A Precinct Plan was developed and endorsed by Council in June 2020. This Plan details high level aspirations for the site. This document <u>can be found here</u>.

This guideline supersedes in the case of any conflicting information.

Other relevant background documents include:

- Business and Industrial Lands Strategy
- Economic Development Strategy Enterprising Byron
- <u>Northern Rivers Economic Development Strategy</u>

PART A SITE STRATEGY

1. Site Vision

Lot 12 a place to learn, collaborate, create, change and connect

Lot 12 is a place of innovation that:

- leads the way locally to inspire global solutions.
- is a catalyst precinct to support local ideas, creativity and initiatives.
- is supported by low carbon and climate resilient infrastructure, technology and systems.
- demonstrates excellence in urban design, governance and delivery models.

2. Site Objectives

The following objectives are key to realising Council's vision for Lot 12:

Productive

- Growth of technology-based and creative industries.
- Diverse and resilient employment community.
- Layered economy that includes large and small businesses, start-ups and supportive businesses such as cafés and service providers that create community and destinations.
- Focal point for development of industry clusters, including opportunity for collaboration between educational institutions and industry.
- Strong site brand focused on innovation and clean technology.

Active

- Vibrant, safe and integrated mixed use community with a diverse range of business and employment opportunities, focusing on creative industries, digital economy, education, research and training.
- Well connected community both internally (pedestrians, cycles and public transport) and to the surroundings (Byron Town Centre, Cavanbah Centre, rail, beach, etc.).
- Seamless management of the interfaces between adjacent land uses: a workable and consistent mix.

Sustainable

- Best practice sustainability at precinct and building site levels.
- High level of resource efficiency with great environmental outcomes and new business models utilising smart technology.
- Flexibility for adaption to changes in market conditions and technological advances.
- Minimisation of waste and maximisation of water and energy efficiency.

Place

- Distinctive, recognisable and marketable 'sense of place'.
- A well-designed public realm that favours pedestrian use over vehicles and active transport links over private car use.
- An active public realm both during the day and at night.
- Built form and public realm that work together.
- Integrated and site-specific public art.

3. Land Use

Whether through incubation or innovation, learning or economic development, projects to be included will focus on the creative and digital economy sectors, across the following quadrants:

- Education, Research and Training;
- Arts and culture; and
- Environment.

A TAFE NSW Connected Learning Centre (CLC) will be an anchor tenant of the site, with a requirement for a parcel of 3,500m², to incorporate the CLC building, associated outdoor learning spaces and access/ manoeuvring space for the associated CLC vehicles.

The site is not intended to provide residential, tourism or stand-alone retail outcomes.

A 6m wide easement is required along the southern boundary of the site, providing for an underground pipelines associated with delivery of recycled water from Council's West Byron Sewerage Treatment Plant.

4. Tenure, Infrastructure and Financial Outcomes

The site is currently wholly owned by Council as Operational Land. Council will retain ownership of the vegetated part of the property, which will be managed for its biodiversity values.

Council would like to retain ownership of the majority of the developed land, which would be provided to the developer through long term lease arrangements.

The infrastructure required to service development of the site is to be provided in a way that is cost-neutral to Council. To achieve this, Council will consider proposals that combine the long term lease arrangements with sale of some parts of the site.

5. Design Outcomes

The public realm and built form should work together to achieve an integrated, mixed use development that displays excellence in design, achieving, as a minimum, the following key outcomes:

- Building height, alignment, form, grain and massing are appropriate to the site topography, open space design, and adjacent built form.
- A safe public realm is achieved through passive surveillance, active interfaces and attractive and safe landscaping.

- The site has a unique identity recognisable in the built form and public realm design and public art.
- Buildings reinforce the scale and volumetric proportions of the overall site and adjacent public realm, achieving a high standard of design quality.
- Buildings and spaces are designed to evolve and accommodate change over time.
- Lot 12 connects to surrounding land uses and movement networks.

PART B URBAN DESIGN PROTOCOLS

1. Introduction

It is anticipated that responses to the Expression of Interest would include a Structure Plan showing the desired future development of the site, together with information outlining how that Structure Plan would be delivered.

This should include staging and management plans for development and a governance and delivery model.

In compiling that information, regard should be had to the information in this Part, which communicates the important design outcomes Council is looking for.

2. Protocols

ENVIRONMENTAL PERFORMANCE

Outcome

Lot 12 provides an inclusive, healthy and environmentally conscious community. The community is carbon neutral once fully occupied, setting a new benchmark in urban design and community place planning.

Guidelines

Sustainability •	Embrace social, economic, cultural and environmental sustainability. Provide best practice in sustainable development through the Green Star Communities framework (or similar), demonstrating 'World Leadership' in sustainable design at both precinct level and at individual building sites.
•	Create buildings that are carbon neutral in operation, using renewable energy where feasible.
•	Utilise building materials selected for their life cycle performance and local content.
•	Ensure that building facades respond to the local climate, and are modelled for energy, thermal comfort, daylight and glare.
•	Provide for connection to recycled water from the Byron Sewerage Treatment Plant.
•	Integrate smart technology throughout the site and building infrastructure and systems, including digital infrastructure, smart lighting and safety controls.
•	Manage the environmental impacts of construction in accordance with ISO 14001 Environmental Management Systems specific to this site.
Wellbeing •	Provide all buildings with high quality daylight and fresh air, to provide optimal indoor environments for staff.
•	Consider connection to the surrounding landscaped areas and

	public realm, with use of biophilic design approaches encouraged.
	 Ensure that facades are transparent to allow visual connection with the precinct.
WSUD & Stormwater	 Collect, treat and retain stormwater on site as far as possible. Improve the quality of any stormwater that leaves the site before it exits the site.
	Utilise stormwater to make a feature and cool the public realm.
	Maximise the use of rain gardens and localised retention techniques.
Biodiversity	 Respond to the existing significant biodiversity on the residue of Lot 12 and integrate those biodiversity values where possible.
Resource Efficiency	 Achieve energy efficiency through site selection, passive design and active measures.
	 Achieve minimal environmental impact of all tenants through the sharing of infrastructure, resources, and other environmental opportunities.
	 Achieve minimal water consumption by utilising non-potable sources such as stormwater, rainwater and recycled water in preference to potable water.
Responsible	 Commit to the smallest practical impact on the environment during construction.
Educational	 Provide an example of a sustainable mixed use precinct to educate visitors, workers, students and visitors.
	Encourage a culture of sustainability.
Material choice	 Utilise materials that are durable, fit for purpose, contain eco- preferred content and are low maintenance.
	 Consider longevity, robustness and whole of life in the selection of materials and building techniques.
Waste	 Achieve minimal waste generation through consideration of reuse and recycling options on site.
	Provide for a minimum of 90% of all construction waste generated to be segregated for recycling and diverted from landfill.

ACCESS AND MOVEMENT

Outcomes

Lot 12 presents as an identifiable unified precinct, with strong active connections to surrounding land uses and pedestrian and cycle networks.

The design balances high quality permanent landscape with flexible, well-designed urban spaces that can change as Lot 12 is developed, and can support a variety of activities and events that enliven and enrich the diverse community of workers, students and visitors.

Lot 12 contains a well-designed public realm that favours pedestrian use over vehicles and active transport links over private car use.

The priority for pedestrian and active movement solutions is implemented for access both into and within the site.

Guidelines

Staging	 Provide a framework for systematic development in the future. Provide flexibility for future project scope changes. Provide for intermediate uses on site until land is ready for development. Remain true to the vision of Lot 12. Allow for evolution of the precinct.
Management	 Provide leadership and strength of vision across the whole site. Allow for entrepreneurial and innovative input for the greater good of the project. Provide an economic development focus. Ensure a community / social / cultural development focus. Evolve as an adaptable precinct over time as the community / population changes and builds.
Movement	 Connect with existing and proposed pedestrian and cycle networks and strategies, as per the Byron Shire PAMP and Bike Plan. Provide easy pedestrian connection to the neighbourhood retail centre oppose the site. Promote and prioritise active transport over private car use both inter and intra the site. Emphasise shared, low speed, pedestrian friendly movement corridors throughout the precinct. Establish strong north-south and east-west links across the site, connecting the adjoining Habitat development, the Cavanbah Centre and the wider Arts & Industry Estate. Cater for heavy vehicle access into and through the site to service internal uses. Provide direct access to the precinct for bus users and those accessing the site by taxi or ride-share. Integrate public pick up and drop down with public realm elements, including paving, seating, drinking fountains, wayfinding and signage. Take into account new technologies as they are realised, including driverless cars and shuttles.
Routes	 Generally discourage private vehicle use of the site internally. Define vehicle movement routes by capacity and character. Ensure the hierarchy is clear. Support the key pedestrian and cycle connections into Lot 12

	 connecting destinations and favouring routes with no vehicle traffic. Keep junctions and intersection radii tight. Provide a main entry to the precinct that responds to the recommendations of the draft <i>Traffic Study and Analysis of Options for Site Access</i> (dated 22 May 2020) as per Attachment A.
Streets as Social Place	 Provide places, not roads! Put the public realm first, providing safe and attractive venues for meeting and active use. Clearly define private, communal and public realms. Allow for appropriate volumes of vehicle traffic, including heavy vehicle use.
Block Size	Keep blocks small where possible.Provide block sizes that allow for future change.
Block Interiors	Provide for internal flexibility of uses and layout.Respect visual and acoustic privacy by the arrangement of buildings.

PUBLIC REALM

Outcomes

Public realm design focuses on the needs of the people who use Lot 12 - students, workers and visitors, connecting people and places, and facilitating commerce, education and recreation.

The design is flexible to bring diverse characters and participants together on the site, and to allow the public realm to become richer and more multi-layered over time.

Pedestrian passages focus on making routes safe and creating comfortable places that encourage social interaction and community spirit.

Public spaces support permanent landscape infrastructure, such as mature trees, and spaces that can accommodate activities that are key to achieving a lively and safe public realm.

The public realm, and the landscaping within, creates a distinctive place that supports the sense of cultural identity and community ownership that results in safe and well used places.

Guidelines

Social spaces	 Provide areas within the public realm that concentrate various activities.
	 Ensure an active interface to adjacent land uses.
	 Allow for flexibility and adaptability.
	• Be comfortable to be in, safe and aesthetically stimulating.

Distinctive places	Create a distinctive Lot 12 identity as Byron Bay's creative and innovation neighbourhood.						
	Embrace the Byron Bay climate and soils.						
	 Integrate public art within the public realm design as a key contributor to making distinctive, memorable places. 						
Safety and	Focus on natural passive surveillance.						
security	 Create active interfaces between the public realm and adjacent buildings. 						
	Follow Crime Prevention through Environmental Design (CPTED) principles.						
	Avoid long lengths of blank walls adjacent to movement routes and open spaces.						
	Integrate secure service yards and loading docks within the building footprint that is also integrated with the building's architecture.						
Cohesive whole	Consider the site infrastructure design integrated within the public realm design.						
Street design	 Incorporate stormwater management (WSUD) and utility servicing within the street cross-sections. 						
Open space	 Provide a variety of quality open space types - active and passive - catering for many interests and abilities. 						
	 Ensure the location, distribution and organisation of open space complements the built form arrangement. 						
	 Ensure that the public realm is considered with the built form so that each complements the other. 						
	 Connect open spaces as a continuous network. 						
	 Provide connection to existing open space and recreational social infrastructure, particularly the Cavanbah Centre. 						
Trees/ Planting	• Locate major tree groups comprising tree avenues, copses and individual trees, throughout the site as a key component of the public realm design and to work with built form location, height and massing.						
	 Use local indigenous native species within a wider mix of plants to achieve locally suitable outcomes. 						
Public art	Incorporate public art within the design as an integrated component.						
	 Make public art a memorable part of experiencing the site, both for first time and repeat visitors. 						
	 Ensure public art is relevant for the site, reflecting its origins and history, and contemporary use. 						
Street furniture	 Provide a consistent palette of furniture for the public realm that also makes context. 						
	 Allow for bespoke design items (designer, artist) supporting place identity. 						
	 Ensure materials and design details are of a high quality to minimise whole of life costs. 						

	Ensure maintenance is minimised. Incorporate smart technology where possible.					
Lighting	• Be co-ordinated with the placement of other public realm elements such as trees.					
	 Consider the appearance of light poles and luminaires during the day as well as night. 					
	Be strategic and dramatic, highlighting focal points.					
	 Only use energy efficient lamps and luminaires. 					
Wayfinding	 Propose wayfinding signage that is integrated with other architectural elements and the public art strategy. 					
	 Include destination signage and information on multi-nodal routes and timetables. 					

BUILT FORM

Outcomes

Lot 12 development offers adaptable and flexible building stock, providing a diverse range of uses and efficiency in the use of public infrastructure.

Users include students, workers and visitors attracted to the site by a range of employment, creative/ digital industries, commercial, educational and community opportunities.

Building mass encloses but does not overwhelm the public realm.

Interesting facade treatments and an active interface at ground level attract attention and use, adding to the character of Lot 12 overall, its legibility to visitors and the marketing of individual businesses.

The detail, craftsmanship, texture, durability, colour, sustainability, treatment and life cycle cost of materials contributes to the comfort, safety and visual appeal of the environment and its overall feel and character.

Guidelines

Buildings	•	Ensure that building mass encloses but does not overwhelm the public realm.			
	٠	Provide buildings of up to 3 storeys.			
	٠	Provide built form of a pedestrian scale at ground level.			
	•	Provide varied building forms to create individuality within the overall continuity of built form expression.			
	•	Optimise spacing between buildings to provide outlook, daylight and sunlight access, and privacy.			
• Integrate a variety of land uses, in commercial, community and arts,		Integrate a variety of land uses, including education and research, commercial, community and arts/ culture.			
	•	Create a purpose designed 'central hub' that will become the heart			

	of the precinct with an active ground plane and diversity of spaces to support the innovation ecosystem.				
	 Incorporate 'vertical' (multi-storey mixed use development) and 'horizontal' mix of uses. 				
Human scale	 Comprise medium rise buildings that have a direct relationship with the public realm. 				
	• Create a pleasant pedestrian environment with access to sun, shade and shelter.				
	 Clearly define private, communal and public realms. 				
	 Keep commercial units narrow on the ground floor. 				
	Keep the grain fine.				
Contextually	Positively contribute to the public realm character.				
sensitive	Provide a significant and positive presence to Bayshore Drive.				
	 Provide appropriate response to the size, shape and orientation of the overall site. 				
	Achieve height and massing determined in relationship with the adjacent land uses.				
Legibility	 Provide obvious, well defined points of access to buildings. 				
	Make entrances a feature in the facade.				
	 Utilise detailed massing and facade treatments to welcome, guide and orientate users. 				
	Separate pedestrian access from vehicle access.				
	 Integrate signage within the facade design. 				
High standards	Demonstrate high standards of design and construction.				
of design	Commit to innovation and enterprise.				
Accessibility	Provide universal access.				
Active and vibrant	 Create synergies between activities during day and night. Provide sefety for visitors, workers and students. 				
Access to sunlight	 Provide access to sunlight for building occupants, neighbouring sites and the public realm. 				
Privacy	Ensure privacy where needed.				
Spaces between	 Include spaces between buildings for tree planting, landscaping, pedestrian movement and amenity. 				
Compact	 Include compact low-medium rise built forms that make efficient use of space and provide for generous landscaping and pedestrian pathways 				
Sensitive to type of use	Ensure appropriate noise and odour reduction techniques between uses to limit conflict.				
Trees	 Plant trees with a mature height of 12 metres or over in natural ground. 				
	Plant trees with a mature height of less than 12 metres over roof				

decks or platforms with a minimum soil depth of one metre.

- Plant deciduous trees on the northern face of buildings to allow sun access to these buildings in winter.
- Utilise a variety of tree species to achieve maximum functionality and visual interest.
- Where possible, incorporate planted roof decks and balconies into building design.

INFRASTRUCTURE

Outcomes

The digital future of Lot 12 is supported with robust and resilient infrastructure.

Common service corridors locate infrastructure services as part of the overall site organisation and general arrangement of built form, internal site movement and the public realm.

Service and emergency vehicle routes are clearly designated through the arrangement of buildings and the public realm, and are supported by corresponding robust pavement design.

Guidelines

Technology / Data	•	Maximise the extent to which data collection storage and re-use fo asset management and design is incorporated within the public realm.			
Services	•	Locate key services within a central common corridor, located to feed service connection to buildings and the public realm and designed for future expansion and provision of new services currently not known or anticipated.			
	•	Locate end points and supporting service infrastructure into building design rather than being free-standing.			

Attachment A DRAFT TRAFFIC ANALYSIS



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22 May 2020 Ref No: 3544-1008

The General Manager Byron Shire Council PO Box 219 MULLUMBIMBY NSW 2482

Attention: Rob van lersel

Dear Rob,

Traffic Study and Analysis of Options for Site Access Lot 12 DP 1189646, Bayshore Drive, Ewingsdale

We understand that Lot 12 DP 1189646, located on Bayshore Drive to the south of the Habitat development and opposite the IGA commercial site, is owned by Council and earmarked for future development comprising a TAFE NSW 'Connected Learning Centre' (CLC), public car parking, and possible mixed-use development.

As per our engagement, we have undertaken a traffic study and analysis of potential intersection options to inform Council's decision regarding access to Lot 12. With regard to intersection options, our aim was to best serve the future uses of Lot 12 while maintaining or improving the efficiency and safety of the adjacent road network for all road users.

Please find herein a summary of the traffic study and analysis of the intersection options, including results of traffic modelling undertaken using SIDRA Intersection.

Existing site

The site within this study was limited to the 150m section of Bayshore Drive between Centennial Circuit and Sunrise Boulevard. This stretch of road has upright kerb and gutter on both sides and a nominal width of 11m invert to invert.

It currently provides access to the IGA site (known as Byron Bay Fair) with channelised left and right turn lanes on Bayshore Drive and a wide (11m) driveway. The driveway allows for two vehicles side by side waiting to exit onto Bayshore Drive, one turning left and one turning right. There is a short acceleration lane for vehicles turning right onto Bayshore Drive.

The study area also provides access to Lot 12 via an informal gravel track roughly opposite the IGA entrance. There are currently no turn lanes for vehicles accessing Lot 12.

The study area and site context are shown in Figure 1 overleaf.

Existing traffic volumes

Existing peak hour traffic volumes at the site have been estimated using manual traffic count data undertaken at the Bayshore Drive / Wallum Place intersection for Stage 5 of the Habitat development as presented in the *Traffic Impact Assessment* prepared by Rytenskild (V1, Feb 2020) and provided by Council.

quality solutions sustainable future



Figure 1 – Study Area

This data, collected in early December 2019 indicates that the afternoon peak hour traffic travelling south on Bayshore Drive immediately south of the Wallum Place intersection is 255 vehicles per hour, and 185 vehicles per hour travelling north at the same location. It is noted that the Sunrise Boulevard and Bayshore Lane intersections are located between our study area and the Wallum Place intersection. A portion of the southbound traffic captured by Rytenskild would turn off Bayshore Drive onto Sunrise Boulevard, thus not entering the study area. Similarly, a portion of traffic would turn left onto Bayshore Drive from Sunrise Boulevard or Bayshore Lane heading into the study area. However, the latter is estimated to be less than the former and as such, it is assumed that the volume of traffic travelling south at our study site would be lower than 255 v/h.



For the northbound traffic, the Rytenskild data would not have captured traffic volumes travelling through our study area turning off into Sunrise Boulevard or Bayshore Lane. Conversely, it would include traffic that bypassed the study area by entering Bayshore Drive from Sunrise Boulevard. It is assumed that these two volumes would be similar and as such the 185 v/h is taken to be representative of the traffic travelling north within the study area.

We have undertaken our own manual traffic counts to estimate the peak hour traffic volumes at the IGA site entrance. This data was collected during the afternoon peak hour on Tuesday 28th April 2020. It should be noted that this was during the restrictions associated with COVID19 and as such have been assumed to be 20% lower than traffic volumes expected under 'normal' circumstances. Adjusted figures for south and northbound traffic on Bayshore Drive are 174 v/h and 184 v/h. These figures correlate with the Rytenskild data, taking into account the expected loss of traffic from the stream between Wallum Place and the study area via Sunrise Boulevard.

Proposal

Council propose to develop Lot 12 to include:

- TAFE NSW 'Connected Learning Centre'
- Public car parking
- Other mixed-use development which may include commercial, retail and residential

A draft design for the development of Lot 12 included a two-way intersection at the southern boundary of the site and an entry-only intersection approximately halfway along the Lot 12 eastern boundary. However, this configuration – particularly the right turns into and out of Lot 12 at the southern boundary – would clash with the existing intersection at the IGA access. Further, questions were raised as to the suitability of adding two new intersections within the study area given that existing traffic volumes are already relatively high and future development at the Habitat site to the north is expected to increase the volumes considerably.

Traffic generation

Considering a ten-year design horizon, we know that traffic volumes on Bayshore Drive within the study site will increase as a result of the Habitat development, the proposed bioenergy plant on Wallum Place and the proposed future development on Lot 12. Additionally, it can be expected that general growth of background traffic volumes will be no more than 2.5% per year (as adopted by TfNSW, formerly RTA, in 2006 for Byron Shire local roads). Note that reports by Veitch Lister Consulting (*West Byron Development Transport Study Report*, March 2011) and Bitzios Consulting (*West Byron Development Area – Western Precinct Traffic Assessment*, November 2016) indicate a forecast growth rate on Bayshore Drive of only 0.49% compounded annually.

Intersection options

A number of options to provide access to Lot 12 have been identified, including:

- T-intersection(s)
 - One t-intersection north of the IGA site entry
 - Two t-intersections, one north of the IGA site entry and one to the south, the latter providing left in access only
- Roundabout
 - Dual lane
 - Single lane

Modelling

Five scenarios have been modelled using SIDRA Intersection v8 traffic modelling software:

- 1. Bayshore Drive / IGA entrance intersection:
 - a. Existing layout with 2020 traffic volumes
 - b. Existing layout with 2030 traffic volumes
- 2. Two t-intersections (IGA entrance and Lot 12 entrance) with 2030 traffic volumes
- 3. Dual lane roundabout servicing the IGA site and Lot 12 with 2030 traffic volumes
- 4. Single lane roundabout servicing the IGA site and Lot 12 with 2030 traffic volumes

Sketches of scenarios 2 and 3 are provided in Attachment A.

Geo

Traffic volumes input to the model are provided in the tables and notes below.

It should be noted that there was no data available to estimate traffic generated by Lot 12 beyond the TAFE CLC. If it is anticipated that peak hour traffic volumes will be significantly higher than the volumes estimated, then additional assessment should be undertaken.

Northbound on Bayshore	Southbound on Bayshore	Left into Lot 12	Right into Lot 12	Left out of Lot 12	Right out of Lot 12	Refer to
1	↓ ↓			_ _	-	note
153	145	0	0	0	0	1
184	174	0	0	0	0	2
115	143	0	0	0	0	3
1	1	0	0	0	0	4
0	0	0	0	0	7	5
0	0	15	5	5	80	6
300	318	15	5	5	87	7
384	407	19	6	6	111	8

Table 1 Traffic volumes at the Bayshore Drive / Lot 12 intersection

Table 2 Traffic volumes at the Bayshore Drive / IGA intersection

Northbound on Bayshore	Southbound on Bayshore	Left into IGA	Right into IGA	Left out of IGA	Right out of IGA	Refer to
1	L L				Ĺ	note
123	104	41	118	141	30	1
148	125	49	142	169	36	2
115	143	16	0	14	2	3
1	1	0	0	0	0	4
0	6	1	0	1	0	5
15	80	5	0	4	1	6
279	355	71	142	188	39	7
357	454	91	181	241	50	8

Notes:

- 1. Afternoon peak traffic counts manually collected on Tuesday 28th April 2020, 16:00 to 17:00.
- 2. Adding 20% to allow for increase after COVID19 restrictions are relaxed.
- 3. Projected traffic generated by Habitat Stage 4 and 5 (from Rytenskild report).
- 4. Projected traffic associated with bioenergy plant on Wallum Plan (from application, via Council).
- 5. Projected traffic associated with the TAFE development (provide by Brewster Hjorth Architects in
- conjunction with TAFE, via Council).
- 6. Projected traffic associated with remaining development on Lot 12 (including public car park).
- 7. Sum of rows 2 to 6.
- 8. Projected traffic for the year 2030 assuming 2.5% growth compounded annually.

Assumptions:

- 1. The afternoon peak is taken as the worst case, as most vehicles would be leaving Lot 12 making a right turn onto Bayshore Drive.
- 2. 5% heavy vehicles on Bayshore Drive, 1% accessing Lot 12/IGA.
- 3. 10% of traffic associated with Habitat Stages 4 and 5 go into/out of IGA after leaving Habitat.
- 4. 10% of traffic associated with TAFE go into/out of IGA after leaving the TAFE site.
- 20% was selected as an appropriate increase to account for the April 2020 traffic counts being lower due to the COVID19 restrictions, based on the traffic counts taken by Rytenskild in November 2019, prior to the restrictions.



Results

Results of the modelling are provided in **Attachment B** and summarised below, focussing on the resultant level of service (LOS) per lane and delay (in seconds) for critical movements. LOS is calculated by SIDRA using a number of 'measures of effectiveness', including the average delay, delay to critical movements, queue lengths, and, for roundabouts, the degree of saturation.

Scenario	Intersection	Layout	Year	LOS and delays
1(a)	Bayshore Dr. / IGA	Existing	2020	B for right turn from IGA (12.7s delay) A for all other movements
1(b)	Bayshore Dr. / IGA	Existing	2030	C for right turn from IGA (22.0s delay) A for all other movements
2	Bayshore Dr. / IGA & Bayshore Dr. / Lot 12	2 x T- intersections	2030	D for right turn from IGA (24.9s delay) C for right turn from Lot 12 (20.3s delay) A for all other movements
3	Bayshore Dr. / IGA / Lot 12	Dual lane roundabout	2030	B for right turn into Lot 12 (10.2s delay) A for all other movements
4	Bayshore Dr. / IGA / Lot 12	Single lane roundabout	2030	B for right turn into Lot 12 (15.4s delay) B for straight southbound (12.7s delay) B for left turn into IGA (12.8s delay) B for right turn from Lot 12 (12.3s delay) A for all other movements

Table 3 SIDRA Intersection modelling results

The *Guide to Traffic Studies and Analysis Methods* (AGTM03, Austroads, 2020) Table 6.1 suggests that the typical mid-block capacity of an urban road is between 900 and 1,000 passenger vehicles per hour. The traffic on Bayshore Drive is expected to around 800 vehicles per hour during the peak hour in the year 2030 based on the assumptions described herein.

The *Guide to Traffic Generating Developments* (GTGD, RTA, 2002) offers the following information regarding LOS at intersections, to be used as a guide:

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs	
A	< 14	Good operation	Good operation	
в	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity	
С	29 to 42	Satisfactory	Satisfactory, but accident study required	
D	43 to 56	Operating near capacity	Near capacity & accident study required	
E	57 to 70	At capacity; at signals, incidents will cause excessive delays	At capacity, requires other control mode	
		Roundabouts require other control mode		

Figure 2 – Level of service criteria for intersections, Table 4.2 from GTGD



Conclusions and recommendations

Scenario 1a has been modelled to understand the current traffic situation within the study area. Scenario 1b has been modelled to estimate the likely situation in ten years' time, assuming a 2.5% growth rate compounded annually and taking into account the known traffic generators (Habitat and the bioenergy plant).

Scenarios 2, 3 and 4 are all models for the year 2030 with estimates of traffic generated by potential development of Lot 12. They represent the feasible options for providing access to Lot 12 while maintaining access to the IGA site. Aspects of each scenario are noted in **Table 4**.

Table 4Comments on Scenarios 2, 3 and 4

Scenario	Comments
Scenario	 Comments Efficiency Comparing Scenario 2 to Scenario 1b (i.e. the existing site without the Lot 12 development): No change to efficiency for through traffic movements, slight decrease in delay for turn movements from the major road, slight increase in delay for the left turn out of IGA, and moderate increase in delay for the right turn out of IGA resulting in a drop in LOS from C to D for this movement. Of the four new movements associated with the Lot 12 intersection, all are expected to yield LOS A during the 2030 peak hour with the exception of the right turn. Predictably, the two movements within Scenario 2 with LOS less than A are the two right turns onto the major road. Safety Many opposing movements and conflict points within a short section of road, resulting in a high risk of collision between vehicles. Intersections would require regular maintenance to ensure all signage and linemarking is clear, as delineation of movements is paramount to safety rating and would be difficult to upgrade in the future.
2 2 x Tees	Peds / cyclists The minimal separation between the Lot 12 and IGA intersections and the necessity for turning lanes leaves very little (if any) opportunity to accommodate pedestrian crossing or refuge within the study area, with the exception of converting the existing median at the south end of the site. This median is already sufficiently wide, and the location is generally considered to be convenient to allow pedestrians associated with Lot 12 to cross Bayshore Drive and access the IGA site and/or the existing shared paths to the north. Paths on both sides of Bayshore Drive would need to extend to meet the refuge and encourage pedestrians and cyclists to use this crossing point, and fencing (or similar) may be required to discourage crossing between the two t-intersections. Further, a shared path on the western side of Bayshore Drive is strongly recommended to provide a safe and convenient pedestrian connection between Lot 12 and Habitat.
	Construction costs Costs mainly associated with traffic control, road widening (3.5m x 55-75m), signage and linemarking. Potential loss of portion of Lot 12 required to accommodate road widening within the road reserve (3.5m x 55m). As noted, it would be difficult to upgrade this option in the future if acceptable levels of safety and/or efficiency could not be maintained.



Scenario Comments

Efficiency

Roundabouts promote continuous traffic flow whereas cross or t-intersections generally require vehicles to slow to a standstill to navigate gaps in oncoming traffic and a 90-degree turn. Compared to Scenario 1b (i.e. the existing site without the Lot 12 development):

- Minimal increase in delay (decrease in efficiency) for through traffic on Bayshore Drive (unimpeded versus 5s delay northbound and 7.2s southbound)
- Slight increase in delay for the left turn into IGA (+3.4s)
- Slight decrease in delay for the right turn into the IGA (-1.0s)
- Negligible change to the left turn out of the IGA
- Significant decrease in delay for the right turn out of the IGA (22.0s down to 8.4s).

Of the six new movements associated with the Lot 12 leg of the roundabout, all are expected to operate at the top LOS with the exception of the right turn out Lot 12, with an expected LOS B (10.2s – only just outside LOS A).

The roundabout option appears to offer a superior level of service compared to Scenario 2. However, it should be noted that the roundabout introduces a delay for the through traffic, albeit minimal, which would otherwise have proceeded unimpeded. This has notable benefits for safety but minor negative impacts on the efficiency of the majority of the traffic within the study area.

Safety

3

Dual lane

RAB

Roundabouts offer a higher level of safety and a significantly lower crash rate compared to cross and t-intersections by removing the conflict points and acting as a traffic calming device (i.e. all vehicles need to slow to navigate a roundabout).

Ideally, the roundabout would be located central to the Bayshore Drive alignment rather than offset to the west, as shown in the attached sketch. However, this would require acquisition of a portion of the IGA site, loss of several parking bays (~8) and likely some redesign of a portion of the existing car park to accommodate a shared path and suitable crossing. The implications to safety are that the deflection/deviation for southbound traffic through the offset roundabout is less than the recommended minimum to sufficiently slow traffic and discourage lane-changing within the intersection. It's possible that detailed design could improve this issue.

Peds / cyclists

Statistically, roundabouts are at least as safe for pedestrians as other forms of intersection control, particularly if coupled with appropriately located refuge islands. The roundabout option allows for the existing median island to be converted to a refuge island. As per Scenario 2, paths on both sides of Bayshore Drive would need to extend to meet the refuge and encourage pedestrians and cyclists to use this crossing point. Further, a shared path on the western side of Bayshore Drive is strongly recommended to provide a safe and convenient pedestrian connection between Lot 12 and Habitat.

Construction costs

Costs to design and construct a roundabout are relatively high compared to the design and construction of Scenario 2. Further, Scenario 3 will require widening of the existing median island at the IGA site entrance by 1-1.5m to allow for construction of a pedestrian refuge island and extension of the path to meet refuge crossing point (as shown on the sketch attached). This will require concurrence with the IGA site owners and will result in the loss of 1-2 existing parking bays or narrowing of existing driveway.

Costs will include traffic control, roundabout construction, reconstruction of Bayshore Drive approaches, signage, linemarking and loss of portion of Lot 12 required to accommodate the roundabout.



Scenario Comments

Efficiency

Roundabouts promote continuous traffic flow whereas cross or t-intersections generally require vehicles to slow to a standstill to navigate gaps in oncoming traffic and a 90-degree turn. Compared to Scenario 1b (i.e. the existing site without the Lot 12 development):

- Minimal and moderate increase in delays (decrease in efficiency) for through traffic on Bayshore Drive (unimpeded versus 5.4s delay northbound and 12.7s southbound)
- Moderate increase in delay for the left turn into IGA (+7.3s)
- Slight decrease in delay for the right turn into IGA (-1.0s)
- Slight increase in delay for the left turn out of IGA (+1.2s)
- Significant decrease in delay for the right turn out of the IGA (22.0s down to 9.6s).

Of the six new movements associated with the Lot 12 leg of the roundabout, all are expected to operate at the top LOS with the exception of the left turn into Lot 12 and the right turn out of Lot 12, both with expected LOS B and 15.4s and 12.3s delays respectively.

The roundabout option appears to offer a superior level of service compared to Scenario 2. However, it should be noted that the roundabout introduces a delay for the through traffic, which would otherwise have proceeded unimpeded. This has notable benefits for safety but minor negative impacts on the efficiency of the majority of the traffic within the study area. As expected, the efficiency of the dual lane roundabout in Scenario 3 offers improved efficiency compared to the single lane roundabout in this scenario.

Safety

4

Single

lane RAB

Roundabouts offer a higher level of safety and a significantly lower crash rate compared to cross and t-intersections by removing the conflict points and acting as a traffic calming device. Although evidence was not readily available, it is expected that a single lane roundabout would provide a safer environment compared to a dual lane roundabout, due to the reduced number of vehicles occupying the intersection at any one time and the reduced opportunity for driver error associated with changing lanes within the intersection.

As detailed in Scenario 3, it would be ideal for the roundabout to be located central to the Bayshore Drive alignment. It would be easier to design a single lane roundabout providing the required deflection for through traffic, compared to the dual lane option, as less space would be required and therefore less impact on the neighbouring land.

Peds / cyclists

Statistically, roundabouts are at least as safe for pedestrians as other forms of intersection control, particularly if coupled with appropriately located refuge islands. The roundabout option allows for the existing median island to be converted to a refuge island. As per Scenario 2, paths on both sides of Bayshore Drive would need to extend to meet the refuge and encourage pedestrians and cyclists to use this crossing point. Further, a shared path on the western side of Bayshore Drive is strongly recommended to provide a safe and convenient pedestrian connection between Lot 12 and Habitat.

Construction costs

Costs to design and construct a roundabout are relatively high compared to the design and construction of Scenario 2, however a single lane roundabout would have lower construction costs than the dual lane option. As per Scenario 3, Scenario 4 would likely require widening of the existing median island at the IGA site entrance by 1-1.5m to allow for construction of a pedestrian refuge island and extension of the path to meet refuge crossing point (as shown on the sketch attached). This will require concurrence with the IGA site owners and will result in the loss of 1-2 existing parking bays or narrowing of existing driveway.

Costs will include traffic control, roundabout construction, reconstruction of Bayshore Drive approaches, signage, linemarking and loss of portion of Lot 12 required to accommodate the roundabout – all very similar to Scenario 3, but less due to the smaller size.



In summary, each option has different advantages and disadvantages.

Based purely on costs, Scenario 2 is the best option. It will be the easiest to design and construct with very little impact outside the road reserve.

This option also provides the best efficiency for through traffic, which makes up the largest proportion of all traffic moving through/within the study area. Although the level of service offered by the two right turn movements onto the main road are expected to be C (from Lot 12) and D (from the IGA), this is considered acceptable for the peak hour at an urban roundabout intersection. Further, the volume of traffic turning right out of the IGA site is expected to be relatively low and motorists experiencing delays during peak periods may choose to turn left and take an alternative route. Similarly, the modelling has assumed the worst case that the majority of traffic exiting Lot 12 will turn right. It may be the case that many vehicles turn left, taking Sunrise Boulevard to leave the industrial estate rather than Bayshore Drive. Thus, Scenario 2 is the most desirable option based on costs, traffic efficiency is expected to be acceptable, and pedestrians can be accommodated with minor alterations to the existing refuge.

However, based on safety – and noting that traffic crashes have significant cost implications – Scenario 2 is considered to fall well behind the two roundabout options. The roundabout options also 'win' on *overall* efficiency, assuming introducing a minimal delay to the through traffic flow is considered acceptable. Pedestrians can be accommodated in a similar way in all three scenarios.

It could be argued that the roundabout options will provide the best outcomes from an amenity perspective as they reduce the overall length of the intersection and allow for landscaping of the centre island. Comparing the single and dual lane options, the latter will offer better futureproofing and efficiency, but be more costly and require more land.

I trust this information is helpful to you in planning the future of Lot 12.

If you require any clarification or additional information please get in touch by calling 02 6687 7666 or emailing me at <u>michelle@geolink.net.au</u>.

Yours sincerely, **GeoLINK**

Michelle Erwin Senior Civil Engineer

Attachment A: Attachment B: Sketches of Scenario 2 and Scenario 3 SIDRA Intersection modelling results



Notes:

- 1. No change to kerb or path on eastern side of Bayshore Drive.
- 2. No change to IGA site entry - retain existing channelised left and right turn lanes. Minor change to IGA site exit - removal of short acceleration lane for vehicles turning right onto Bayshore Drive.
- Entry/exit to Lot 12 including channelised left and right turn 3. lanes on Bayshore Drive and short acceleration lanes. Will require road widening (3.5m x 75m), some vegetation removal, and may require a strip of Lot 12 DP 1189646 to be dedicated as road reserve.
- Possible left turn entry only to Lot 12. Will require road 4. widening (3.5m x 30m) and may require property acquisition
- 5.
- 6. Limited opportunity to provide safe crossing point (i.e. refuge) for pedestrians. Existing median may be converted to pedestrian refuge if southern access (4) was not constructed.



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Notes:

- New dual lane roundabout servicing IGA site and Lot 12. 1. Note offset position to avoid property acquisition on eastern side of road reserve and deviation in approaches to provide adequate deflection. Subject to detailed design.
- 2. No widening on the eastern side of Bayshore Drive.
- Widening of road and road reserve required on western side 3. of Bayshore Drive to accommodate roundabout (~1,000m²).
- 4. Possible left turn entry only to Lot 12. Will require road widening (3.5m x 30m) and may require property acquisition (Lot 22 DP 812667).
- Existing kerb inlet pit may be accommodated in design. 5.
- Widen existing median island within IGA site by 1-1.5m to 6. path to meet refuge crossing point. Will require loss of 1-2
- 7. Convert existing median to pedestrian refuge, extend existing path on eastern side of Bayshore Drive to meet the refuge and provide connection to new development within Lot 12.



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ATTACHMENT B - SIDRA INTERSECTION MODELLING RESULTS

Scenario 1a - Bayshore Drive / IGA entrance intersection, existing layout with 2020 traffic volumes

abla Site: 1 [IGA - Existing] IGA Entrance Site Category: (None) Giveway / Yield (Two-Way)

	Approaches			Intersection
	South	East	North	Intersection
Delay (Control)	2.7	5.8	0.9	2.6
LOS	NA	А	NA	NA





Scenario 1b - Bayshore Drive / IGA entrance intersection, existing layout with 2030 traffic volumes



IGA Entrance Site Category: (None) Giveway / Yield (Two-Way) Design Life Analysis (Final Year): Results for 10 years

	Approaches			Intersection
	South	East	North	Intersection
Delay (Control)	3.1	8.6	0.9	3.4
LOS	NA	А	NA	NA





Scenario 2 - Two t-intersections (IGA entrance and Lot 12 entrance) with 2030 traffic volumes

++ Network: 2 [Bayshore Drive]

New Network Network Category: (None) Design Life Analysis (Final Year): Results for 10 years





Scenario 3 - Dual lane roundabout servicing the IGA site and Lot 12 with 2030 traffic volumes





Scenario 4 - Single lane roundabout servicing the IGA site and Lot 12 with 2030 traffic volumes



