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Cairns Regional Council

Extrinsic Material to the Local Government Infrastructure Plan

Revision 2.2

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1.0	*27/09/16*	*Draft Report*	SJB	SAB
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2.2	*29/01/19*	*2018 Interim LGIP – Amendments from public consultation*	SJB	SAB

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1.0 Planning Assumptions

Underpinning the Planning Assumptions of the Local Government Infrastructure Plan (LGIP) is the Cairns Regional Council (CRC) Population and Demand Model. These Geographic Information System (GIS) models have been developed using a "bottom up" approach, allowing for the spatial allocation of population and demands (residential & non-residential) across all land parcels within the Local Government Area (LGA), from the base date of 2018 through to a realistic capacity determined for the current Planning Scheme. The base assumptions and methodologies employed to develop these models and other key inputs into the Planning assumptions are detailed below.

1.1 *Population*

The 2015 edition Low Series Population Projections published by the Queensland Government Statistician's Office (QGSO) were used as a basis for determining population projections across the LGA for the periods 2016 – 2036. The low series projection was considered most appropriate projection, being more closely aligned to current growth being experienced within the region. The population totals for beyond 2036 have been extrapolated based on totals in previous periods.

An assessment of the 2018 edition population forecasts prepared by the QGSO (released in November 2018) supports Council's approach chosen for the LGIP, with the growth forecasts now being further reduced. The LGIP assumptions now lie at the mid-point between the most current low and medium series forecasts (refer to **Figure 1.1** below).

Tourism forecasts have been included in the projections based on data provided by the ABS relating to tourist accommodation (small area data). This is to ensure that infrastructure networks accommodate the demand generated by both resident and visitor populations. The various accommodation types identified have been assessed and a 2010 "maximum overnight tourist capacity" determined. The use of 2010 figures as a basis to determine tourist capacity was considered most appropriate, as ABS data releases after this date do not contain the same level of detail. The results of this assessment have been trended over projection cohorts using expected population growth rate as a surrogate for determining projected tourists over time. Total population projections are identified in **Table 1.1**.

Table 1.1 QGSO and Tourist Projections (2016 to Ultimate)

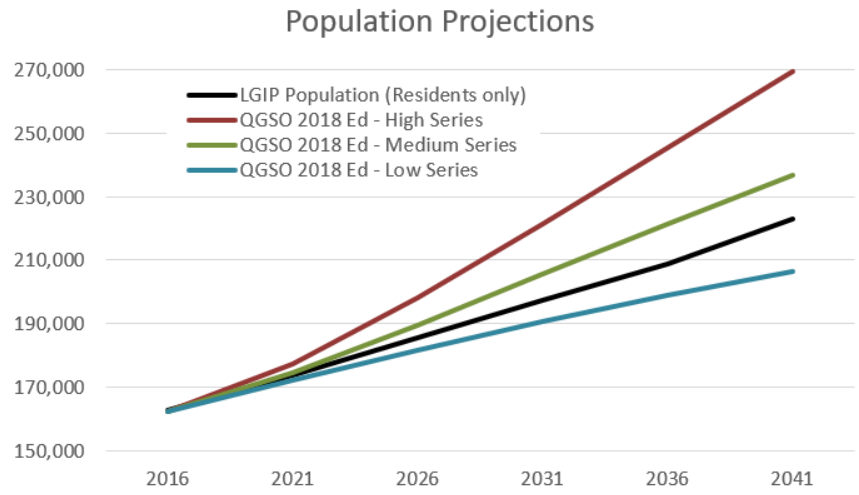
Projection Source	2016	2021	2026	2031	2036	2041	2046	Ultimate
QGSO Projections	162,829	173,543	185,455	197,439	208,860	222,866	237,811	279,465
Tourism Projections	20,907	22,456	23,945	25,471	26,924	28,710	30,620	35,882
Total Population Projections	*183,736*	*195,999*	*209,400*	*222,910*	*235,784*	*251,576*	*268,431*	*315,347*

Sources:

1. Queensland Government Statisticians Office (QGSO) - 2015 Edition Population (low series)
2. Tourism Projections: 8635.3.55.001 - Tourist Accommodation, Small Area Data, Queensland - Electronic Delivery, June 2010 (ABS)

Notes:

1. % tourist growth based on QGSO population growth rates
2. Projections beyond 2036 have been extrapolated from previous periods



Population Projection Series	2016	2021	2026	2031	2036	2041
LGIP Population (Residents only)	162,829	173,543	185,455	197,439	208,860	222,866
QGSO 2018 Ed - High Series	162,451	177,254	197,958	221,474	245,380	269,481
QGSO 2018 Ed - Medium Series	162,451	174,549	189,436	205,468	221,242	236,593
QGSO 2018 Ed - Low Series	162,451	172,216	181,577	190,710	199,057	206,548

Figure 1.1 – Comparison of Population Projections – 2018 Edition QGSO and Cairns LGIP

1.1.1 Current Population

An analysis of current land uses using Council's existing rating database was performed and verified using quantitative analysis of satellite imagery. Land use classifications have been used to allocate the current population across the LGA, based on assumptions around household size, dwelling type and in some circumstances dwelling densities (**Table 1.1.1**).

Table 1.1.1 Current Population Allocations

Identified Residential Use	Population Allocation Assumption	Source(s)
Residential Dwelling	Household size – *varies depending on dwelling type*	ABS – 2011 PEP Profiles
Other Residential Uses	Density per hectare – *varies depending on use*	ABS – 2011 PEP Profiles Quantitative analysis of sample sites

Density per hectare figures for Other Residential Uses were determined using a combination of Australian Bureau of Statistics (ABS) household size data from PEP profiles and a quantitative analysis of sample sites.

> *e.g. Caravan parks were assumed to have a household size equivalent to an ABS "Other Dwelling". Quantitative analysis was used to identify a typical number of caravan sites per hectare in order to determine an assumed population density per hectare.*

Current household sizes for attached, detached, and other dwelling types are shown in **Table 1.1.2.** These were determined following an analysis of ABS Census data for the region and have been trended forward to 2036 based on QGSO projected changes to household size. Projections beyond 2036 have been extrapolated based on average change in previous periods. Results of existing population allocations were assessed against a number of randomly selected ABS census boundaries to confirm their suitability and alignment with real data.

Table 1.1.2 Household Density Assumptions

Dwelling Type	2016	2021	2026	2031	2036	CRC Model 2036 to Ultimate

Separate House	2.83	2.77	2.75	2.73	2.72	2.72
Semi, Detached, Flats	1.92	1.87	1.86	1.85	1.84	1.84
Other	2.04	2.00	1.99	1.97	1.97	1.97
All	*2.55*	*2.49*	*2.47*	*2.45*	*2.44*	*2.44*

The accuracy of the allocation of population using this approach has been verified through a comparative assessment against ABS population data within census boundaries (e.g. at a SA2 level).

1.1.2 Ultimate Population

The ultimate development potential of CairnsPlan 2016 was determined through the following process:

Developable area was determined through an analysis of the Digital Cadastre Database (DCDB), with consideration given to the following factors:

- Currently approved development applications;
- Application of constraints which may limit affected development. The degree to which constraints affected development has been determined using council officer's experience in dealing with proposed developments affected by the relevant constraints, in addition to any requirements or considerations identified within the planning scheme overlay codes. The constraints considered as part of this assessment were:
    - Water resources;
    - Flood hazards;
    - Biodiversity, waterways & conservation areas
    - Constrained land identified from Broad Hectare Study performed by DSDIP and CRC

Ultimate development density assumptions were developed for each zone, with consideration given to the following factors:

- Residential Density provisions within the planning scheme for each zone type, including assumptions around dwelling composition (**Table 1.1.3 & Table 1.1.4**)
- Household size calculations and projections (**Table 1.1.2**)
    - Household size projections have been determined using ABS 2011 census data, trended forward to 2036 based on QGSO projected changes to household size. Projections beyond 2036 have been extrapolated based on average change across previous periods.
- For larger lots, assumptions about land requirements for roads, parks and other infrastructure services
    - This figure varied depending on individual zone provisions within the Planning Scheme (i.e. considerations/requirements in urban vs rural zones)
- Discussions with Council Officers and understanding the realistic development trends throughout the LGA
    - This included assumptions around realistic triggers affecting propensity to develop (e.g. site area).

Table 1.1.3 Dwelling Composition Assumptions for Residential Uses

Planning Scheme Zone	Precinct*	% Attached	% Detached
Rural		0%	100%
Rural Residential		0%	100%
Emerging Communities		46%	54%
Emerging Communities	Mount Peter Local Plan - Cooper Road Residential	0% - 30%**	70 - 100%**
Emerging Communities	Mount Peter Local Plan - Maitland Road	25%	75%
Emerging Communities	Mount Peter Local Plan - Future Communities	25%	75%
Emerging Communities	Gordonvale Local Plan - Draper Road Residential	25%	75%
Low Density Residential		28%	72%
Low Density Residential	Babinda	0%	100%
Low-Medium Density Residential		46%	54%
Medium Density Residential		98%	2%
Medium Density Residential	Building Height Overlay – Area 3	99%	1%
Township		0%	100%
Tourist Accommodation		99%	1%
Tourist Accommodation	City Centre Local Plan - Area 2a	99.9%	0.1%
Tourist Accommodation	Building Height Overlay – Area 1	100%	0%
Tourist Accommodation	Building Height Overlay – Area 2	99%	1%
Tourist Accommodation	Building Height Overlay – Area 3	98%	2%
Tourist Accommodation	The Islands	100%	0%
Principal Centre		100%	0%
Major Centre		100%	0%
Major Centre	Edmonton Local Plan – Area 1 and 2	95%	5%
District Centre		100%	0%
Local Centre		100%	0%
Neighbourhood Centre		100%	0%
Specialised Centre		100%	0%
Mixed Use		100%	0%
Strategic Port Land		100%	0%

**Where precincts not identified, zone assumptions were used.*
***Dwelling composition assumptions varied locally within precinct.*

Table 1.1.4 Ultimate Residential Density Assumptions

Planning Scheme Zone	Excluded Land - Services, Roads, etc.	Lot Size (m^2) – Attached*	Lot Size (m^2) – Detached*	Planned Density - Gross (Dwellings/Ha)*
Emerging Community	*Varies depending on assumed underlying intent*			11-18[t]
Low Density Residential	30%		700	9-11[t]
Low-Medium Density Residential	30%	200-400**	600	15
Medium Density Residential	20-30%**	130-300**	650	48-66[t]
Tourist Accommodation, Specialised and Principal Centres Zones (excluding the Islands)	20-30%**	130-300**	650	74-406[t]
Major, District, Local and Neighbourhood Centre Zones	20-30%**	130-300**	650	4-23[t]
Strategic Port Land	20-30%**	130-300**	650	15-309[t]
Mixed Use	20-30%**	130-300**	650	2-219[t]
Rural Residential	15%		4000	2
Township	30%		700	9
Rural	10%		400,000	0.02

** Lot Size represents a realistic ultimate average size, based on an assessment of planning scheme provisions, market trends and preferences, and matters affecting propensity to develop.*
*** Varies depending on dwelling type*
[t] *Varies depending on location within LGA and height/storey restrictions*

1.1.3 Interim Population Allocation

Growth between current and ultimate population has been allocated using a 'gravity model' approach, with weighted consideration given to factors affecting propensity to develop. These include:

- Location with respect to the Priority Infrastructure Area (PIA) (i.e. accommodates 10-15 years growth);
    - Within the 10-15 year PIA period, 2.5% of population growth was assumed to be satisfied outside the PIA boundary. This was considered a reasonable assumption, given the extent of Residential, Rural Residential and isolated areas of Tourist Accommodation zoned land outside the PIA.
- Availability and proximity to infrastructure services;
- The likely staging of development for particular areas based on direction from Council's planning department;
- Realistic assumptions around propensity of infill development within the PIA period:
    - Between 50% and 75% of land capable of infill development was made available over the PIA period for the purpose of limiting the proportional allocation of growth to these areas under the gravity model approach. These assumptions varied depending on zone type and characteristics of individual areas within the LGA;
- Existence of Planning Approvals.

Residential populations were allocated across all residential Planning Areas, while tourist growth was only allocated to only those Planning Areas likely to accommodate tourist population (i.e. all Tourist Accommodation areas and the Strategic Port Land, Principal Centre, Mixed Use and Specialised Centre Areas located in close proximity to the City Centre). **Table 1.1.5** summarises the population found in each Planning District for the periods 2016 to Ultimate.

Table 1.1.5 Population Projections 2016 to Ultimate

Planning District	2016	2021	2026	2031	2036	2041	2046	Ultimate
Babinda	1,675	1,686	1,704	1,712	1,732	1,757	1,791	1,894
Barron - Smithfield	18,967	20,825	22,670	24,266	25,278	26,294	27,343	30,585
Cairns Beaches	22,912	24,720	26,430	28,065	29,272	30,516	31,968	35,126
CBD - North Cairns	17,056	18,988	20,690	23,169	26,097	29,076	32,276	38,935
Freshwater - Stratford - Aeroglen	4,245	4,433	4,610	4,754	4,855	4,993	5,117	5,496
Gordonvale - Goldsborough	7,574	7,899	8,294	8,587	9,483	10,336	11,630	15,510
Inner Suburbs	63,577	66,262	70,358	73,945	76,538	78,822	81,047	87,974
Mt Peter	244	818	1,409	2,074	4,605	10,027	15,814	33,122
Portsmith - Woree Industrial	907	1,032	1,102	1,175	1,242	1,301	1,355	1,568
Redlynch Valley	10,095	10,817	11,438	11,932	12,281	12,718	13,097	14,252
Rural Lands	3,966	4,054	4,165	4,262	4,478	4,615	4,808	5,390
The Islands	245	243	248	252	258	263	270	293
White Rock - Edmonton	32,273	34,222	36,283	38,716	39,663	40,859	41,916	45,202
TOTAL	183,736	195,999	209,400	222,910	235,784	251,576	268,431	315,347

Source: CRC (Cairns City) Model 2017

1.2 *Infrastructure Demand*

Council's spatial demand models express residential and non-residential demand in the following units:

- Equivalent Persons (EP's) – Water and wastewater networks
- Impervious area – Stormwater network
- Trips – Transport network
- Persons – Parks and land for community facilities network

1.2.1 Residential Demand

The Residential Demands have been calculated for each network based on the following:

- Water supply and wastewater
  - EPs determined based on the population determined for each time cohort on a 1:1 basis
- Stormwater
  - Impervious areas applied to existing and typical future uses based on development category impervious fractions within the Queensland Urban Drainage Manual (QUDM)
- Transport
  - Trips determined based on the population determined for each time cohort, divided by the detached dwelling household size for that cohort, with 10 trips per dwelling then applied
- Parks and land for community facilities
  - Persons determined based on the population for each time cohort

1.2.2 Non-Residential Demand

Non-Residential Demands for the Water Supply, Sewer and Transport networks have been calculated by applying ET rates per hectare to the developable areas derived from the population modelling process for the relevant parcels. The process for determining the existing demand utilised the land use information developed through the population modelling process, and categorises uses into the most appropriate Planning Scheme Zone to determine generation rates (presented in **Table 1.2.3**). ET's are then converted into the following:

- EP's, using the detached dwelling household size for that cohort
- Trips, applying 10 trips per ET

The resultant demands have then been factored down in order to represent a reasonable level of development that currently exists on each site. The assumptions used to determine these factors consider each sites characteristics with respect to current zoning, location and size, as well as recent trends within the LGA and targeted quantitative analysis, where possible.

Ultimate future demands are also based on assumed ET rates per hectare for each non-residential zone presented in **Table 1.2.3**. In order to represent a realistic level of ultimate development, a 10 percent reduction to the total demand for each parcel was applied, accounting for limitations or restrictions to extent of development that may occur during the life of this Planning Scheme. If existing demand calculated exceeded the future demand, the existing figures were kept constant for all demand cohorts.

Allocation of non-residential demand through the interim periods has been trended over the 5-year cohorts through until Ultimate, based on the population growth found over the same period, within an applicable 'trending district'. This approach applies a local, regional, or council wide growth trend to individual zones within different regions, depending on the typical non-residential uses accommodated there. This assumes that the growth in non-residential demand is directly proportional to the rate of growth of residential demand within each of these regions. The application of trending districts is summarised in **Table 1.2.4**.

Table 1.2.3 Demands (ETs/ha) applied to Non Residential Planning Scheme Zones

Planning Scheme Zone	Transport - ETs / ha	Water/Sewer – TUs / ha	Planning Scheme Zone	Transport - ETs / ha	Water/Sewer – ETs / ha
Community Facilities	8-60*	8-60*	Neighbourhood Centre	28	14
District Centre	62.5-70*	25-28*	Principal Centre	45-120*	30-60*
General Industry	11.25	15	Special Purpose	8	8
High Impact Industry	7.5	15	Specialised Centre	12-195*	12-130*
Light Industry	16	8	Sport and Recreation	4.5-29*	9-29*
Local Centre	34	17	Strategic Port Land	15-90*	15-60*
Low Impact Industry	15-16*	8-15*	Tourism	10	10
Major Centre	35-75*	14-30*	Tourist Accommodation	14-30*	14-30*
Medium Impact Industry	11.25	15	Waterfront and Marine Industry	7.5	15
Mixed Use	14-30*	8-30*			

**Varies depending on location, precinct and/or underlying intent*

Table 1.2.4 Trending Districts applied to Non Residential Planning Scheme Zones (by Locality)

Planning Scheme Zone	Locality	Trending District
Cairns airport extent	Barron - Smithfield	Council-Wide
Cairns airport extent	Freshwater - Stratford - Aeroglen	Council-Wide
Community Facilities	Babinda	Babinda
Community Facilities	Barron - Smithfield	Northern District
Community Facilities	Cairns Beaches	Northern District
Community Facilities	CBD - North Cairns	Central District
Community Facilities	Freshwater - Stratford - Aeroglen	Central District
Community Facilities	Gordonvale - Goldsborough	Southern District
Community Facilities	Inner Suburbs	Central District
Community Facilities	Islands - Fitzroy Island	Council-Wide
Community Facilities	Mt Peter	Southern District
Community Facilities	Portsmith - Woree Industrial	Central District
Community Facilities	Redlynch Valley	Central District
Community Facilities	Rural Lands	Council-Wide
Community Facilities	White Rock - Edmonton	Southern District
District Centre	Babinda	Babinda
District Centre	Gordonvale - Goldsborough	Gordonvale - Goldsborough
District Centre	Inner Suburbs	Inner Suburbs
District Centre	Redlynch Valley	Redlynch Valley
District Centre	White Rock - Edmonton	White Rock - Edmonton
Emerging Communities	Gordonvale - Goldsborough	Southern District
Emerging Communities	Mt Peter	Southern District
Emerging Communities	White Rock - Edmonton	Southern District
High Impact Industry	Gordonvale - Goldsborough	Council-Wide
High Impact Industry	Portsmith - Woree Industrial	Council-Wide
Local Centre	Babinda	Babinda
Local Centre	Barron - Smithfield	Barron - Smithfield
Local Centre	Cairns Beaches	Cairns Beaches
Local Centre	Freshwater - Stratford - Aeroglen	Freshwater - Stratford - Aeroglen
Local Centre	Inner Suburbs	Inner Suburbs
Local Centre	Mt Peter	Mt Peter
Local Centre	White Rock - Edmonton	White Rock - Edmonton
Low Density Residential	White Rock - Edmonton	White Rock - Edmonton
Low Impact Industry	Babinda	In accordance with Direction from Planning Section
Low Impact Industry	Barron - Smithfield	Northern District
Low Impact Industry	CBD - North Cairns	Central District
Low Impact Industry	Freshwater - Stratford - Aeroglen	Central District

Planning Scheme Zone	Locality	Trending District
Low Impact Industry	Gordonvale - Goldsborough	Southern District
Low Impact Industry	Inner Suburbs	Central District
Low Impact Industry	Portsmith - Woree Industrial	Central District
Low Impact Industry	White Rock - Edmonton	Southern District
Low-medium Density Residential	Mt Peter	Southern District
Major Centre	Barron - Smithfield	Northern District
Major Centre	Inner Suburbs	Central District
Major Centre	White Rock - Edmonton	Southern District
Medium Impact Industry	Freshwater - Stratford - Aeroglen	Council-Wide
Medium Impact Industry	Gordonvale - Goldsborough	Southern District
Medium Impact Industry	Inner Suburbs	Council-Wide
Medium Impact Industry	Portsmith - Woree Industrial	Council-Wide
Medium Impact Industry	White Rock - Edmonton	Southern District
Mixed Use	Barron - Smithfield	Northern District
Mixed Use	Cairns Beaches	Northern District
Mixed Use	CBD - North Cairns	Council-Wide
Mixed Use	Freshwater - Stratford - Aeroglen	Central District
Mixed Use	Gordonvale - Goldsborough	Southern District
Mixed Use	Inner Suburbs	Council-Wide
Mixed Use	Portsmith - Woree Industrial	Council-Wide
Mixed Use	Redlynch Valley	Central District
Mixed Use	White Rock - Edmonton	Southern District
Neighbourhood Centre	Barron - Smithfield	Barron - Smithfield
Neighbourhood Centre	Cairns Beaches	Cairns Beaches
Neighbourhood Centre	CBD - North Cairns	CBD - North Cairns
Neighbourhood Centre	Freshwater - Stratford - Aeroglen	Freshwater - Stratford - Aeroglen
Neighbourhood Centre	Gordonvale - Goldsborough	Gordonvale - Goldsborough
Neighbourhood Centre	Inner Suburbs	Inner Suburbs
Neighbourhood Centre	Redlynch Valley	Redlynch Valley
Neighbourhood Centre	White Rock - Edmonton	White Rock - Edmonton
Open Space	CBD - North Cairns	Council-Wide
Principal Centre	CBD - North Cairns	Council-Wide
Rural	White Rock - Edmonton	Southern District
Special Purpose	Babinda	Babinda
Special Purpose	Barron - Smithfield	Northern District
Special Purpose	Cairns Beaches	Northern District
Special Purpose	CBD - North Cairns	Council-Wide
Special Purpose	Freshwater - Stratford - Aeroglen	Central District
Special Purpose	Gordonvale - Goldsborough	Southern District

Planning Scheme Zone	Locality	Trending District
Special Purpose	Inner Suburbs	Central District
Special Purpose	Islands - Double Island	Council-Wide
Special Purpose	Islands - Fitzroy Island	Council-Wide
Special Purpose	Islands - Green Island	Council-Wide
Special Purpose	Mt Peter	Southern District
Special Purpose	Portsmith - Woree Industrial	Council-Wide
Special Purpose	Redlynch Valley	Central District
Special Purpose	Rural Lands	Council-Wide
Special Purpose	White Rock - Edmonton	Southern District
Specialised Centre	Cairns Beaches	Council-Wide
Specialised Centre	CBD - North Cairns	Council-Wide
Specialised Centre	Inner Suburbs	Council-Wide
Sport and Recreation	Babinda	Babinda
Sport and Recreation	Barron - Smithfield	Northern District
Sport and Recreation	Cairns Beaches	Northern District
Sport and Recreation	CBD - North Cairns	Central District
Sport and Recreation	Freshwater - Stratford - Aeroglen	Central District
Sport and Recreation	Gordonvale - Goldsborough	Southern District
Sport and Recreation	Inner Suburbs	Central District
Sport and Recreation	Portsmith - Woree Industrial	Central District
Sport and Recreation	Redlynch Valley	Central District
Sport and Recreation	Rural Lands	Council-Wide
Sport and Recreation	White Rock - Edmonton	Southern District
Strategic Port Land	CBD - North Cairns	Council-Wide
Strategic Port Land	Portsmith - Woree Industrial	Council-Wide
Strategic Port Land	Rural Lands	Council-Wide
Tourism	Barron - Smithfield	Council-Wide
Tourism	Cairns Beaches	Council-Wide
Waterfront and Marine Industry	Portsmith - Woree Industrial	Council-Wide

1.3 *Employment*

The Cairns Regional Council Employment Model has been developed to provide important inputs into the Local Government Infrastructure Plan (LGIP). The methodology for the employment modelling process is detailed below.

1.3.1 Current Employment

Australian Bureau of Statistics (ABS) Census data was used to determine an existing employment profile within the Cairns Local Government Area (LGA) by employment sector for the entire local government area.
The employment profile is based on:

- Total population
- Total current workforce
- Total potential workforce (residents aged 15 and older)
- Residents who both live and work locally
- Industry of employment by occupation
    - For the purposes of the LGIP employment modelling, ABS industry of occupation has been re-categorised into 'employment sectors' in order to align with categories in the LGIP tables. Assumptions made to assign ABS employment industry into LGIP Employment Sector are detailed in **Table 1.3.1** below.

Table 1.3.1. Employment Category and Sector Assumptions

ABS Employment Industry Category	LGIP Employment Sector	ABS Employment Industry Category	LGIP Employment Sector
Agriculture, forestry & fishing	Other	Financial & insurance services	Commercial
Mining	Other	Rental, hiring & real estate services	Commercial
Manufacturing	Industry	Professional, scientific & technical services	Commercial
Electricity, gas, water & waste services	Industry	Administrative & support services	Commercial
Construction	Other	Public administration & safety	Commercial
Wholesale trade	Industry	Education & training	Community Purposes
Retail trade	Retail	Health care & social assistance	Commercial
Accommodation & food services	Commercial	Arts & recreation services	Commercial
Transport, postal & warehousing	Industry	Other services	Other
Information media & telecommunications	Commercial	Inadequately described/Not stated	Other

In addition to the profile identified above, ABS census data has been used to determine, for each region, a:

- Labour retention rate (Residents working locally ÷ total work force)
- Job containment rate (Residents working locally ÷ local jobs available)

These attributes are identified in order to assess the employment increase as a result of growth occurring within the LGA.

1.3.2 Future Employment

The Council-wide employment projections assume that the employment rate is maintained, considering labour retention and job containment, throughout all projection periods. The ratio of work force to population is used to determine Council-wide employment projections for each cohort within the employment sectors identified above. Population projection figures are used from the completed Cairns Population Model 2017, which is based on Queensland Government Statisticians Office (QGSO) population data, and is supplemented with tourist figures identified from available ABS data.

Total employment projections for each employment category are distributed across the LGIP projection areas proportionally, weighted based on non-residential demand growth across consistent zones and/or precincts, using the CRC population and demand model.

Table 1.3.2 Cairns Plan Zones by relevant Employment Sector

Employment Sector	Consistent Zones within Cairns Plan*	
Retail	Community Facilities District Centre Emerging Communities Local Centre Major Centre Mixed Use	Neighbourhood Centre Open Space Principal Centre Special Purpose Specialised Centre Sport and Recreation
Commercial		
Community Services		
Industry	Cairns Airport Extent High Impact Industry Low Impact Industry	Medium Impact Industry Strategic Port Land
Other (incl. Home based business)	Conservation Environmental Management Residential Zones	Rural Rural Residential

**Applicable employment sector for each zone has been varied where specific planning scheme precincts alter the development outcomes being sought by Council.*

The outputs of the employment model, as used in the LGIP employment assumption tables, include:

- *Total* current jobs identified within each LGIP projection area for each employment sector;
- Additional job requirements for *local growth* (i.e. growth within LGA) for each projection period, mathematically distributed amongst employment sectors within LGIP projection areas

1.3.3 Floor Space Requirements

Floor space requirements are calculated based assumptions about floor space per employee requirements for each employment sector. The assumed floor space requirements are detailed in **Table 1.3.3**, and have been identified based on industry knowledge, which has been discussed and confirmed with Council officers. As with the employment figures, floor space outputs used in the LGIP assumption tables include:

- *Total* existing floor space requirements within each LGIP projection area for each employment sector
- Additional floor space requirements for *local growth* (i.e. growth within LGA) for each cohort, mathematically distributed amongst employment sectors within LGIP projection areas

Table 1.3.3 Floor space assumptions by Employment Sector

Employment Sector	Floor Space (m²/employee)
Retail	30
Commercial	30
Industry	150
Community Services	25
Other (incl. Home based business)	20

1.4 *Priority Infrastructure Area – Characteristics, Capacity and Compliance*

The availability of a spatial parcel-based population model facilitated a rigorous analysis of the appropriateness of the PIA. After consideration was given to factors affecting propensity to develop, the realistic spare population capacity inside the PIA boundary was determined to be approximately **89,000** persons. Factors considered included typical development characteristics (determined density rates) and realistic assumptions around rates of infill development to occur within a 10 to 15 year period.

The population growth shown in **Table 1.4.1** indicates that the PIA boundary has capacity available beyond 2033, which is greater than 15 years from the base year of the LGIP. Although this is outside the 10-15 year requirement identified in the MGR, this is considered acceptable given the following considerations.

- The planning assumptions are conservative, using the low series 2015 edition QGSO projections which have reduced significantly from the 2013 projections, and future revisions to these have potential to significantly impact the date at which the PIA capacity will be exceeded.
- All infrastructure networks have been planned to 'ultimate' development, and the identified PIA area represents logical and efficient extensions to the existing networks.
- Significant available capacity inside the PIA is comprised of infill development, which may or may not develop to its full potential over a 15 year horizon.

Table 1.4.1 Population growth by locality (Inside and outside PIA)

Locality	Total Population				Growth @ 2028		Growth @ 2033		Growth @ Ultimate	
	2018	2028	2033	Ultimate	Inside PIA	Outside PIA	Inside PIA	Outside PIA	Inside PIA	Outside PIA
Babinda	1,679	1,707	1,720	1,894	21	7	27	13	147	68
Barron - Smithfield	19,710	23,309	24,671	30,585	3,583	15	4,936	24	10,790	86
Cairns Beaches	23,635	27,084	28,548	35,126	3,421	27	4,863	50	11,275	216
CBD - North Cairns	17,829	21,681	24,340	38,935	3,852	0	6,511	0	21,106	0
Freshwater - Stratford - Aeroglen	4,320	4,668	4,794	5,496	350	-2	477	-3	1,178	-2
Gordonvale - Goldsborough	7,704	8,411	8,945	15,510	493	215	635	606	3,277	4,529
Inner Suburbs	64,651	71,793	74,982	87,974	7,156	-14	10,348	-16	23,330	-7
Mt Peter	474	1,675	3,087	33,122	1,071	131	1,276	1,338	1,422	31,226
Portsmith - Woree Industrial	957	1,131	1,202	1,568	174	0	245	0	610	0
Redlynch Valley	10,384	11,636	12,071	14,252	1,246	6	1,673	15	3,771	98
Rural Lands	4,001	4,204	4,349	5,390	0	202	0	347	0	1,389
The Islands	244	249	254	293	0	5	0	10	0	49
White Rock - Edmonton	33,052	37,256	39,095	45,202	4,192	11	6,023	19	12,076	74
Total	188,641	214,804	228,059	315,347	25,560	603	37,014	2,404	88,981	37,725

Source: CRC (Cairns City) Model 2017

To assist in demonstrating that the PIA meets the Minister Guidelines and Rules' requirements for determining the PIA (Section 20), **Tables 1.4.2** and **1.4.3** are provided below to identify the allocation of growth to broad land categories over the first 10-15 years of the LGIP, the PIA horizon. The reported categories are:

- Greenfield – PIA peripheries
  - Large residential sites which expand the developed residential area
- Englobo land development & vacant developed land
  - Large englobo residential sites which are located within the current residential areas, but are capable of significant density increases
  - Uptake of vacant, developed land
- Infill – All areas
  - Smaller scale redevelopment of existing residential sites
  - CBD and coastal areas unit development
- Other growth
  - Non-residential areas
  - Growth outside the PIA
  - Growth in private institutions (e.g. hospital, boarding schools, etc.)

This demonstrates that the LGIP Planning Assumptions and PIA as currently drafted, provides for a mixture residential land development types and locations across the Cairns Local Government Area. By 2033 (the PIA Period) it is anticipated that approximately half of the population growth will be satisfied through typical small-scale infill and unit development, while the remaining 50% of growth will be accounted for within more typical greenfield land developments. This is considered reasonable given the requirement to accommodate not only resident populations but tourist populations.

Table 1.4.2 Population Growth Allocation to Land Categories 2018 to 2028, 2033 and Ultimate

Planning District	2028 (Growth)	2028 (%)	2033 (Growth)	2033 (%)	Ultimate (Growth)	Ultimate (%)
Greenfield – Inside PIA	7,817	30%	10,350	26%	20,195	16%
Englobo Land – Inside PIA	6,353	24%	8,662	22%	18,713	15%
Infill – Inside PIA	11,241	43%	17,652	45%	49,189	39%
Other Growth	752	3%	2,754	7%	39,096	31%
Total	26,163	100%	39,418	100%	127,193	100%

Source: CRC (Cairns City) Model 2017

Table 1.4.3 Population Growth Allocation to Land Categories 2018 to 2028 & 2033 (by Planning District)

Planning District	2028				2033				Ultimate			
	Greenfield	Infill - Englobo Land & Vacant lots	Infill - Small Developments & Units	Other Growth	Greenfield	Infill - Englobo Land & Vacant lots	Infill - Small Developments & Units	Other Growth	Greenfield	Infill - Englobo Land & Vacant lots	Infill - Small Developments & Units	Other Growth
Babinda	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.1%
Barron - Smithfield	6.6%	4.9%	2.3%	0.1%	6.0%	4.2%	2.3%	0.1%	3.8%	2.7%	2.0%	0.1%
Cairns Beaches	6.8%	2.4%	2.9%	1.1%	6.0%	2.2%	2.9%	1.4%	3.6%	1.5%	2.6%	1.4%
CBD - North Cairns	0.0%	2.8%	12.1%	-0.1%	0.0%	3.0%	13.6%	-0.1%	0.0%	3.0%	13.6%	0.0%
Freshwater - Stratford - Aeroglen	0.0%	0.4%	1.0%	-0.1%	0.0%	0.3%	0.9%	-0.1%	0.0%	0.2%	0.7%	0.0%
Gordonvale - Goldsborough	1.5%	0.1%	0.3%	0.8%	1.3%	0.1%	0.2%	1.5%	1.7%	0.1%	0.8%	3.6%
Inner Suburbs	1.2%	6.2%	20.4%	-0.4%	0.9%	5.3%	20.3%	-0.3%	0.5%	3.0%	15.1%	-0.2%

Mt Peter	3.8%	0.0%	0.0%	0.8%	3.0%	0.0%	0.0%	3.6%	1.1%	0.0%	0.0%	24.7%
Portsmith - Woree Industrial	0.0%	0.6%	0.2%	-0.1%	0.0%	0.5%	0.2%	-0.1%	0.0%	0.3%	0.2%	-0.1%
Redlynch Valley	1.3%	2.0%	1.5%	0.0%	1.2%	1.7%	1.4%	0.0%	0.7%	1.1%	1.1%	0.1%
Rural Lands	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%	1.1%
The Islands	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
White Rock - Edmonton	8.6%	5.1%	2.3%	0.0%	7.9%	4.6%	2.8%	0.0%	4.5%	2.7%	2.4%	0.1%
Total	30%	24%	43%	3%	26%	22%	45%	7%	16%	15%	39%	31%
Total Growth	7,817	6,353	11,241	752	10,350	8,662	17,652	2,754	20,195	18,713	49,189	39,096

Source: CRC (Cairns City) Model 2017

The other key requirements outlined within Section 20 of the Ministers Guidelines and Rules in deter mining the PIA, is that it must consider:

- The spare capacity of existing trunk infrastructure networks;
- The cost effectiveness of the future trunk infrastructure required to service the projected infrastructure demand at the states desired standard of service; and
- That the Local Government must be able to fund and supply adequate trunk infrastructure to serv ice the assumed urban development.

The PIA reflects the extent of urban zoned land containing the full suite of urban services and approved development, which will assist in achieving an efficient, sequential pattern of development through logical extensions to the current development footprint. Council's PIA has been drafted with a focus for short-term growth to utilise the existing capacities available in areas where the full suite of urban services is readily available. This approach represents the most cost effective infrastructure delivery program to meet the anticipated type, scale and location of growth across the City.

2.0 Cost Assumptions

Unit rates used within the schedule of works (SoW) model are included using the information deemed most accurate and appropriate, which was available at the time the document was drafted. For asset costing purposes within the SoW model, all unit rates have been indexed to the base year of the model, 2018, using a rate of 2.5% unless otherwise noted.

2.1 *Baseline Valuation*

The existing asset valuations within Council's SoW model provide an additional level of detail when compared to the standard SoW models 'baseline valuation'. The 'Base Estimate' within the Cairns Regional Council (CRC) SoW model provides an equivalent valuation figure, however this is built from a raw unit rate cost in addition to project owners costs (on-costs).

On costs are considered to be an essential element of the 'current replacement cost' identified within the MGR, relating to design/redesign, environmental considerations, traffic management and project management amongst other things, all necessary components of the cost to replace an asset. The Evans and Peck report referenced within the State SoW model user manual identifies that many Council's already include on costs within their unit rates. CRC has chosen to separate these costs in order to provide additional transparency and ease of understanding throughout their LGIP documents.

2.2 *Water Supply & Sewerage Network*

2.2.1 Water Supply / Sewer Unit Rates

Current replacement cost for active assets (pump stations, treatment plants etc.) have been provided as project costs, and were sourced from Council's asset register.

Unit rates for passive assets (mains, manholes, fittings, etc) have been derived from the June 2012 Cardno report – "*Provision of Unit Rates for Water and Wastewater Assets for 2011/12*" prepared on behalf of Council. This report builds a cost for water supply and sewer assets which is based on:

- Raw unit rate cost; plus
- Application of various cost modifiers which affect construction cost, including:
    - Existing Development Type (Rural, Urban, High Density Urban, CBD)
    - Soil Type (Good soil, poor soil, sand, acid sulfate soil, soft rock, hard rock)
    - Pipe depth
    - Pipe diameter

Spatially dependant cost modifiers (development/soil type) have been identified within a GIS system using boundaries provided with the abovementioned Cardno report.

2.2.2 Cost Modifiers

In addition to the unit rates identified above, the cost modifiers listed in **Table 2.2.1** have also been applied as necessary to assets across the water supply and sewerage networks.

Table 2.2.1. Asset Cost Adjustments

Cost Modifier	Valuation Component	Applies To	Adjustment Factor
On-Cost Allowance	Works	All existing & future assets	20%
Time-Based Contingency	Works	All future assets	0-30%

2.3 *Stormwater Network*

2.3.1 Stormwater Unit Rates

Unit rates for the majority of assets (culverts, manholes, channels, wingwalls, etc) have been derived from the cost reviews prepared on behalf of Council by external consultants. These costs are determined for most Stormwater Assets and are built upon the following:

- Raw unit rate cost; plus
- Application of various cost modifiers which affect construction cost, including:
    - Existing Development Type (Rural, Urban, High Density Urban, CBD)
    - Soil Type (Good soil, poor soil, sand, acid sulfate soil, soft rock, hard rock)
    - Pipe depth
    - Pipe diameter

Spatially dependant cost modifiers (development/soil type) have been identified within a GIS system using boundaries provided with the abovementioned report.

2.3.2 Stormwater Project Costs

Stormwater costs for all future assets and a number of existing assets (constructed after 2011) have been applied as project costs identified from Council's Capital Expenditure program and the variety of Drainage Management Plans and other Network Planning studies performed to date.

2.3.3 Cost Modifiers

In addition to the unit rates identified above, the cost modifiers listed in **Table 2.3.1** have also been applied as necessary to assets across the water supply and sewerage networks.

Table 2.3.1. Asset Cost Adjustments

Cost Modifier	Valuation Component	Applies To	Adjustment Factor
On-Cost Allowance	Works	All existing & future assets	20%
Time-Based Contingency	Works	All future assets	10-20%

2.4 *Transport Network*

2.4.1 Transport Unit Rates

Transport costs have been applied as project costs identified from Council's Capital Expenditure program and detailed planning documents wherever possible. Where such costs do not exist, unit rates have been applied as detailed below.

Road unit rates have been determined using the mean unit rates from the following sources (minus on cost allowance and indexed to the base year of the LGIP):

- Council draft Priority Infrastructure Plan (PIP) unit rates (2006)
- Council Asset Book unit rates (2008)
- Available developer unit rates (2010)

The mean unit rates are outlined in **Table 2.4.1** below. A more detailed breakdown of how these unit rates have been determined has been provided in the Cost Input spreadsheet provided as part of the LGIP extrinsic material.

Table 2.4.1 Road Unit Rates

Road Hierarchy	SoW Unit Rate ($2018)
Minor Collector	$2,874
Major Collector	$3,057
Collector - CBD	$3,280
Industrial Collector	$3,433
Rural Major	$1,068
Sub-arterial - 2 Lane Undivided	$3,754
Sub-arterial - 2 Lane median divided	$4,545
Sub-arterial - 4 lane median divided	$5,033
Sub-arterial - 4 lane median divided with parking	$5,424

Sub-Arterial - CBD	$4,796
Non Standard Cross Section	$2,879
Roundabout - 1 Lane Minor	$287,626
Roundabout - 2 Lane Major	$370,991
Signalised Intersection	$613,043
Bridge	$7,479

Unit rates for Road Structures have been determined using the former draft PIP values and are outlined in **Table 2.4.2** below, with detailed calculations provided in the Cost Input spreadsheet provided as part of the LGIP extrinsic material.

Table 2.4.2 Structure Unit Rates

Structure Type	Draft PIP Unit Rate ($2006)	SoW Unit Rate ($2018)*
Bridge	$5,561 /m²	$7,479 /m²
RCBC/600x150	$519 /lm	$698 /lm
RCBC/600x225	$458 /lm	$616 /lm
RCBC/600x300	$519 /lm	$698 /lm
RCBC/750x300	$581 /lm	$781 /lm
RCBC/750x375	$659 /lm	$886 /lm
RCBC/900x225	$639 /lm	$859 /lm
RCBC/900x300	$639 /lm	$859 /lm
RCBC/900x450	$818 /lm	$1,100 /lm
RCBC/900x600	$1,015 /lm	$1,366 /lm
RCBC/900x750	$1,182 /lm	$1,590 /lm
RCBC/1200x450	$1,002 /lm	$1,347 /lm
RCBC/1200x600	$1,242 /lm	$1,670 /lm
RCBC/1200x900	$1,720 /lm	$2,313 /lm
RCBC/1200x1200	$2,163 /lm	$2,909 /lm
RCBC/1500x1200	$2,399 /lm	$3,227 /lm
RCBC/1500x1500	$3,119 /lm	$4,195 /lm
RCBC/1500x600	$1,490 /lm	$2,004 /lm
RCBC/1500x750	$1,779 /lm	$2,393 /lm
RCBC/1500x900	$2,093 /lm	$2,815 /lm
RCBC/1800x1200	$3,050 /lm	$4,102 /lm
RCBC/1800x600	$1,729 /lm	$2,326 /lm
RCBC/1800x900	$2,449 /lm	$3,293 /lm
RCBC/2100x1200	$3,286 /lm	$4,419 /lm
RCBC/2100x1500	$3,439 /lm	$4,625 /lm
RCBC/2100x1800	$3,921 /lm	$5,273 /lm
RCBC/2100x2100	$4,234 /lm	$5,695 /lm
RCBC/2100x2500	$4,552 /lm	$6,122 /lm

Structure Type	Draft PIP Unit Rate ($2006)	SoW Unit Rate ($2018)*
RCBC/2100x900	$2,829 /lm	$3,804 /lm
RCBC/2300x2100	$4,234 /lm	$5,695 /lm
RCBC/2400x1200	$3,230 /lm	$4,344 /lm
RCBC/2400x1500	$3,508 /lm	$4,718 /lm
RCBC/2400x1800	$4,176 /lm	$5,617 /lm
RCBC/2400x2100	$4,531 /lm	$6,094 /lm
RCBC/2400x2400	$4,878 /lm	$6,561 /lm
RCBC/2400x900	$3,062 /lm	$4,118 /lm
RCBC/2700x1800	$4,238 /lm	$5,699 /lm
RCBC/2700x2400	$5,375 /lm	$7,229 /lm
RCBC/2700x750	$2,590 /lm	$3,484 /lm
RCBC/2800x2300	$5,375 /lm	$7,229 /lm
RCBC/3000x1200	$3,728 /lm	$5,013 /lm
RCBC/3000x1500	$4,264 /lm	$5,735 /lm
RCBC/3000x1800	$4,793 /lm	$6,446 /lm
RCBC/3000x2100	$5,240 /lm	$7,047 /lm
RCBC/3000x2400	$5,111 /lm	$6,874 /lm
RCBC/3000x3000	$6,260 /lm	$8,419 /lm
RCBC/3000x3300	$6,634 /lm	$8,922 /lm
RCBC/3000x750	$5,248 /lm	$7,058 /lm
RCBC/3300x2100	$5,607 /lm	$7,541 /lm
RCBC/3300x3000	$6,634 /lm	$8,922 /lm
RCBC/3600x1500	$4,755 /lm	$6,395 /lm
RCBC/3600x2100	$9,728 /lm	$13,083 /lm
RCBC/4000x3000	$7,847 /lm	$10,553 /lm
RCBC/4100x1200	$4,199 /lm	$5,647 /lm
SLBC/1200x1200	$2,163 /lm	$2,909 /lm
RCP/450	$249 /lm	$335 /lm
RCP/750	$492 /lm	$662 /lm
RCP/1200	$960 /lm	$1,292 /lm
RCP/1500	$1,334 /lm	$1,794 /lm
RCP/1800	$1,751 /lm	$2,355 /lm

**2006 costs have been escalated to 2018 dollars at 2.5% p.a.*

Pathway costs are based on the same source as the Road Unit Rate costs and are applied using pathway area (i.e. $/m²).

With the exception of land in the Mt Peter area, rates for road corridor land within each transport catchment are informed by the 2006 Rushton Valuations used in Council's former draft PIP, and are identified in **Table 2.4.3** below. The Mt Peter rates have been selected based on valuations of specific land parcels and recent land sales in the area.

Table 2.4.3 Land Valuations for Road Corridors

Catchment	Draft PIP Unit Rate ($2006)	SoW Unit Rate ($2018)*
Cairns Urban	$150 /m²	$202 /m²
Mount Peter	N/A	$67 /m²
Babinda	$35 /m²	$47 /m²
Gordonvale	$80 /m²	$108 /m²
Rural Lands	$5 /m²	$7 /m²

**2006 costs have been escalated to 2018 dollars at 2.5% p.a.*

2.4.2 Cost Modifiers

In addition to the unit rates identified above, adjustments to transport unit rates have been applied as per **Table 2.4.4** which reflect the unit rate cost variances that are impacted on by asset delivery or construction type. In addition to these, the other cost modifiers in **Table 2.4.5** have also been applied as necessary to assets across the transport network. These adjustments have been determined based on a review of typical Council costs under each construction scenario.

Table 2.4.4 Transport Unit Rate Adjustments

Asset Delivery / Construction Type	Adjustment Factor *(applied to base unit rate)*
Existing	1.0
Future (New assets only)	1.0
Staged Construction	0.6*
Minor Upgrade	0.6
Major Upgrade	1.2

**Based on a 2 stage construction for a total construction cost of 1.2 x the expected cost for construction in a single stage*

Table 2.3.5 Asset Cost Adjustments

Modifier	Valuation Component	Applies To	Adjustment Factor
On-Cost Allowance	Works	All existing & future assets	7.5%
Time Based Contingency	Works	All future assets	10-20%
External Demand Allowance	Works	Road Assets within Cairns Urban (TR1) Catchment	-1.5%

2.5 *Parks and Land for Community Facilities Network*

2.5.1 Parks Unit Rates

Both existing and future trunk park embellishment costs have been provided as project costs, either from Council's asset register (existing assets) or from detailed planning reports.

In some circumstances, site-specific purchase costs have been identified by Council, based on recent acquisitions of sites in similar locations. The land value for these sites has been applied as a project cost, and these valuations have been specifically identified as 'Project costs' within the Schedule of Works model. For all other sites, unit rates have been used to determine land value.

Unit rates to determine land value have been informed by the October 2017 APV Valuers and Asset Management report "The valuation of Cairns Regional Council Land, Buildings and Other Structure Assets". A comparative assessment was performed between the former LGIP land values and latest revaluations to determine suitable changes in value to reflect latest trends across the local government area.

Table 2.5.1 Unit Rates for Parks and Community Facility Land Values

Park Location and Hierarchy	Unit Rate $2018
Cairns Beaches - City Wide Park	$12
Cairns Beaches - Community Meeting Space	$20
Cairns Beaches - District Sports Park	$34
Cairns Beaches - District Park	$35
Cairns Beaches - District Park/Conservation	$35
Cairns Beaches - Other Open Space	$12
Cairns Beaches - Local Park	$81
Barron - Smithfield - City Wide Park	$12
Barron - Smithfield - City Wide Sports Park	$12
Barron - Smithfield - Community Meeting Space	$11
Barron - Smithfield - District Sports Park	$34
Barron - Smithfield - District Park	$19
Barron - Smithfield - District Park/Conservation	$49
Barron - Smithfield - Other Open Space	$12
Barron - Smithfield - Local Park	$49
Freshwater - Stratford - Aeroglen - District Sports Park	$34
Freshwater - Stratford - Aeroglen - District Park	$19
Freshwater - Stratford - Aeroglen - Conservation	$20
Freshwater - Stratford - Aeroglen - Local Park	$65
CBD - North Cairns - City Wide Park	$12
CBD - North Cairns - City Wide Sports Park	$12
CBD - North Cairns - Local Park	$53
CBD - North Cairns - Other Open Space	$12
CBD - North Cairns - Community Meeting Space	$20
CBD - North Cairns - District Park	$26
Inner Suburbs - City Wide Park	$12
Inner Suburbs - City Wide Sports Park	$12
Inner Suburbs - Community Meeting Space	$20
Inner Suburbs - District Sports Park	$50
Inner Suburbs - District Park	$69
Inner Suburbs - Local Park	$53
Inner Suburbs - Other Open Space	$12
Inner Suburbs - Conservation	$53

Inner Suburbs - Local Recreation Node	$53
Redlynch Valley - Community Meeting Space	$11
Redlynch Valley - Conservation	$12
Redlynch Valley - District Sports Park	$42
Redlynch Valley - District Park	$12
Redlynch Valley - Local Park	$42
Portsmith - Woree Industrial - District Sports Park	$71
Portsmith - Woree Industrial - Local Park	$42
White Rock - Edmonton - City Wide Park	$12
White Rock - Edmonton - Community Meeting Space	$11
White Rock - Edmonton - District Sports Park	$69
White Rock - Edmonton - Conservation	$69
White Rock - Edmonton - District Park	$79
White Rock - Edmonton - Local Park	$17
Gordonvale - Goldsborough - District Sports Park	$30
Gordonvale - Goldsborough - District Park	$30
Gordonvale - Goldsborough - Local Park	$10
Gordonvale - Goldsborough - Other Open Space	$30
Gordonvale - Goldsborough - Community Meeting Space	$9
Mt Peter - Local Park	$10
Mt Peter - District Park	$30
Mt Peter - District Sports Park	$30
Babinda - Community Meeting Space	$30
Babinda - City Wide Park	$11
Babinda - District Park	$12
Babinda - District Sports Park	$79
Babinda - Local Park	$69
Rural Towns and Villages - City Wide Park	$17
Rural Towns and Villages - District Sports Park	$5
Rural Towns and Villages - District Park	$49
Rural Towns and Villages - Local Park	$79
Rural Towns and Villaves - Other Open Space	$10
Rural Towns and Villages - Community Meeting Space	$49

2.5.2 Cost Modifiers

In addition to the unit rates identified above, the cost modifiers in **Table 2.5.2** have also been applied as necessary to assets across the Parks and Land for Community Facilities Network.

Table 2.5.2. Asset Cost Adjustments

Modifier	Valuation Component	Applies To	Adjustment Factor
On-Cost Allowance	Works	All existing & future assets	7.5%
Time Based Contingency	Works	All future assets	10-20%

3.0 Network Planning

Network planning for the Cairns Regional Council LGIP has been consistently undertaken beyond the 10-15 year timeframe of the PIA. In order to provide a basis to produce a Discounted Cashflow Model of the future expenditures required under the LGIP for the life of the Planning Scheme, a realistic ultimate development of the Planning Scheme has been nominated at or around 2059. The considerations given to the planning of each network within the LGIP are as follows.

3.1 *Network Planning in General*

The following reports have been used across all networks to assess future growth characteristics, and to review existing servicing adequacy using the Desired Standards of Service (DSS) identified within each network for the LGIP document:

- CairnsPlan 2016;
- CRC Asset Registers and Data;
- CRC Development Approval Register and Data;
- QGSO Estimated Residential Population and Population Forecasts by LGA, 2011 – 2036, 2015 Edition;
- QGSO Draft Broadhectare Study, 2014;
- Cardno Mount Peter Structure Plan Area Sequencing of Development and Infrastructure, 2010;
- Cairns Port Authority City Port Local Area Plan and Seaport Local Area Plan, March 2013;
- Cairns Airport Land Use Plan, Dec 2012;
- FNQROC Development Manual – Issue 6, FNQROC, 2014;
- Cairns Regional Council Assets, Cairns Regional Council, 2015; and
- Review of Owners Project Cost and Contingency Allowances, Evans and Peck, 2009.

Additionally, the population and demand models completed as a part of the LGIP project, have been considered against Council's previously completed network planning in order to reassess its appropriateness and assist in determining where planning 'gaps' may exist that need to be addressed.

3.2 *Water Supply Network*

Network planning for the water supply network has been based on the identification of future growth characteristics above, guided by discussions between Council planners and engineers, and supplemented with the recommendations identified within the following studies and reports, which have also been included as extrinsic material within the LGIP:

- Report for Overall Water Supply Strategy for Cairns – Cairns Regional Council, 2009;
- Cairns City Water Storage Strategy – SKM, 2001;

- Water Security Strategy Final Report, Cairns Regional Council, 2015;
- Bulk Water Transfer Scenario Development, Cairns Regional Council, 2015;
- Demand Management Strategy (2016 – 2025), Cairns Regional Council, 2015;
- Updated Flow Derivation and Reliability Analysis Report, Division 1, Gilbert and Sutherland, 2014;
- Mount Peter Water Supply Catchment Planning Study, Cairns Regional Council, 2015;
- Goldsborough Water Supply Planning Report Update, SKM, 2005;
- Babinda Water Network and Christian St Booster Pump Station Sizing, Cairns Regional Council, 2014;
- Review of Water Reticulation Trunk Upgrade Requirements for LGIP - All Catchments, Cairns Regional Council, 2015;
- Design Criteria Review Trunk Water and Sewage Planning, Cairns Regional Council, 2015;
- Rural Water Supply Schemes - Preliminary Water Security and Levels of Service performance Assessment, 2018, Stantec;
- Freshwater Water Treatment Plant Planning Report, 2018, Hunter H20;
- Moore Road and University Reservoir Catchment Planning Study, 2018, Stantec
- Planning Guidelines for Water and Sewage, QLD Department of Energy and Water Supply, 2014; and
- WSAA Codes, Water Services Association of Australia.

Water supply network planning has been undertaken to a 41 year planning horizon, which exceeds the 10-15 year minimum specified within the MGR, at a level of service that aligns with the DSS in the LGIP.

3.3 *Sewerage Network*

Network planning for the sewerage network has been based on the identification of future growth characteristics above, guided by discussions between Council planners and engineers, and supplemented with the recommendations identified within the following studies and reports, which have also been included as extrinsic material within the LGIP:

- Report of Cairns CBD Sewerage: Review of System Capacity – GHD, 2007;
- Southern WWTP Sewerage Catchment: Planning Report – Cardno, 2009;
- Marlin Coast WWTP Recycled Water Supply Scoping Study – SKM, 2009;
- Gordonvale Wastewater Treatment Plant Planning Study, CH2MHILL, 2012;
- Edmonton Wastewater Treatment Plant Planning Study, CH2MHILL, 2012;
- Southern Wastewater Treatment Plant Planning Report, GHD, 2013;
- Northern WWTP Operational Description, Cleaner Seas Alliance, 2010;
- Marlin Coast WWTP Operational Description, Cleaner Seas Alliance, 2010;
- Marlin Coast Sewerage Catchment Planning Study, GHD, 2013;
- Northern WWTP Sewerage Catchment Planning Report, Cardno, 2012;
- Southern WWTP Sewerage Catchment: Planning Report, Cardno, 2009;
- Edmonton, Mount Peter and Gordonvale Sewerage Planning Report, Cardno, 2017
- Review of Sewerage Upgrade requirements for LGIP - All Catchments, Cairns Regional Council, 2015;
- Design Criteria Review Trunk Water and Sewage Planning, Cairns Regional Council, 2015; and

- Planning Guidelines for Water and Sewage, QLD Department of Energy and Water Supply, 2014.

Sewerage network planning has been undertaken to a 41 year planning horizon (the ultimate development of the Planning Scheme), exceeding the 10-15 year minimum specified within the MGR, at a level of service that aligns with the DSS in the LGIP.

3.4 *Stormwater Network*

Network planning for the stormwater network was based on identification of future growth characteristics above, and supplemented through recommendations identified within the following documents, included within the extrinsic material of the LGIP:

- Palm Cove Drainage Management Planning Report, Connell Wagner, 1998;
- CBD and Environs Drainage Management Plan, SKM, 2011;
- Cayley Street Drain Drainage Management Plan, Pat Flanagan & Associates, 1996;
- Skeleton Creek Drainage Management Plan for Cairns City Council Phase 1 Report, Colefax Clayton Smith, 1997;
- Skeleton Creek Drainage Management Plan for Cairns City Council Phase 2 Report, Colefax Clayton Smith, 1998;
- Smithfield Drainage Management Plan Stage 1 Report, Ove ARUP, 1996;
- Smithfield Drainage Management Plan Stage 2 Report, Ove ARUP, 1997;
- Dillon Close Drain – White Rock Drainage Management Plan, SKM, 2001;
- Review of Drainage Management Plan - Blackfellows Creek, Collinson/McKinnons Creek, O'Learys Creek, WorleyParsons, 2008;
- Stoney Creek Drainage Management Plan Volume 2 – Phase 2 Report, Flanagan Consulting Group, 2001;
- Hydraulic Investigation of Moores Gully, Brown Consulting, 2006;
- Trinity Beach Drainage Study, Pat Flanagan & Associates, 1996;
- Cairns Regional Council Asset Management Plan – Drainage & Marine Infrastructure; and
- Cairns Regional Council Design of an Urban Stormwater Monitoring Program.

Stormwater planning has been undertaken to a 41 year planning horizon (the ultimate development of the Planning Scheme), exceeding the 10-15 year minimum specified within the MGR, at a level of service that aligns with the DSS in the LGIP.

3.5 *Transport Network*

Network planning for the transport network was based on identification of future growth characteristics above, with specific consideration given to the ultimate development of the draft planning scheme and the following documents:

- Cairns Regional Council Transport Network Plan – Flanagan Consulting Group, 2006;
- Cairns Regional Council Transport Network Plan, Flanagan Consulting Group, 2006;
- Draft Cairns Region Priority Infrastructure Plan, Cairns Regional Council, 2010;
- Cairns Transit Network, Department of Transport and Main Roads, 2010;
  Far North Queensland Principal Cycle Network Plan, Department of Transport and Main Roads, 2009; and
- Cairns Regional Council, Cycling and Walking Study 2010-2030, Strategic Leisure, 2010.

Transport network planning has been undertaken to a 41 year planning horizon (the ultimate development of the Planning Scheme), exceeding the 10-15 year minimum specified within the MGR, at a level of service that aligns with the DSS in the LGIP.

The trunk road network for the Region, comprises roads that:

- Carry more than 3000 vpd (ultimately);
- Service multiple development sites;
- Provide a high order road function servicing the wider traffic catchment whereby the majority of vehicle trips start or end external to the local area; and
- Form part or have been designed to form part of the public transport (bus) road network.

3.6 *Parks and Land for Community Facilities*

Network planning for parks and land for community facilities was based on identification of future growth characteristics above, and supplemented through the recommendations identified within the following documents, included within the extrinsic material of the LGIP:

- Cairns Regional Council Public Open Space Policy – Cairns Regional Council, 2013;
- Public Parks and Land for Community Purposes – Trunk Infrastructure Planning Study – Strategic Leisure, 2010;
- Cairns Regional Council, The Community Development Strategic Plan 2011-2016, Cairns Regional Council, 2011; and
- Cairns Regional Council Future Needs Report Cairns Social and Community Infrastructure Needs Study, 99 Consulting (in association with Fieldworx), 2011.

Parks and land for community facilities network planning has been undertaken to a 41 year planning horizon (the ultimate development of the Planning Scheme), exceeding the 10-15 year minimum specified within the MGR, at a level of service that aligns with the DSS in the LGIP.

4.0 Financial Modelling Assumptions

Financial modelling inputs for the Cairns Regional Council Local Government Infrastructure Plan (LGIP) Schedule of Works (SoW) model are as per **Table 4.1**. Including a brief comment/justification around the appropriateness of the chosen input

Table 4.1 Financial Modelling Assumptions within the Cairns LGIP SoW model.

Financial Modelling Assumptions		Inputs	Comments/Justification
Model Setup	Base Year of Model	2018	Chosen to align with available data at the beginning of the LGIP project
	Infrastructure Planning Horizon	41	41 years for all networks (2018 to 2059)
	Demand Unit (Unit of Measure)	EP	Equivalent Persons (Water Supply, Wastewater networks)
		Imp Ha	Impervious Area (Hectares) (Stormwater network)
		Trips	Trips per day (Transport networks)
		Persons	Resident population (Parks and land for community facilities network)
Financial Inputs	Discount Rates		
	Post-tax Nominal WACC to be applied to Expenses	6.00%	The Weighted Average Cost of Capital used in the LGIP modelling has been based on the 'average basic 10 year bond rate' + the 'rate of return (premium/margin) over the average 10 year bond rate'. This approach is based on the guidance provided in Local Government Bulletin 06/01, using the bond rate applicable at the time of preparation of the LGIP. A breakdown of the figures applied are: • average basic 10 year bond rate of 2.5%; • margin of 3.5% This therefore equates to a WACC of 6%.
	Real Post-tax Nominal WACC to be applied to Revenues	3.41%	Based on the WACC, adjusted for inflation using the Fisher Equation.
	Escalations		
	Works Escalation Rate	2. 5%	Selected based on historical and forecast CPI and historical PPI movements, and to align with Council's long term financial forecast
	Land Escalation Rate	2. 5%	
	Modelled Charge Inflation Rate	2. 5%	

The LGIP SoW model has adopted a "User Pays" approach for the apportionment of infrastructure costs between the users. In addition, this calculation method also employs a Discounted Cashflow methodology to appropriately model the time value of money over the modelling horizon and to understand the true cost of infrastructure delivery and funding. The SoW model therefore applies the following formula in order to determine a cost per demand unit.

$$\frac{\textit{Existing Infrastructure Value (\$) + NPV (Nominal) of Future Infrastructure Expenditure (\$)}}{\textit{Current Demand (D) + NPV (Real) of Future Demand (D)}}$$

The Net Present Value (NPV) of future infrastructure expenditure is determined using the *Nominal WACC* (6.00%) and *Escalation Rates* (2.5%), to take into account the escalation of the capital spend in the years forward of the base year.

The NPV of future demand is a proxy, used to represent future revenue from infrastructure charges. This is determined using a *Real WACC* (3.41%), which is adjusted to account for inflationary effects.

The use of these equations determines an escalating price path which is driven by the inflation rate. In this way, the contribution rate grows over time in line with other cost growth in works, land, sales and wages.

The final Cost Schedules are presented in the LGIP SoW Model.