

Litchfield Council

Shared Path Plan

DC1917

Prepared for
Litchfield Council

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1 Introduction

Cardno has been commissioned by Litchfield Council to prepare a Shared Path Plan for the footpath and Shared Path network within the Litchfield Council Municipality. The Municipality has identified the need to develop a Shared Path Plan to provide an overview of the existing gaps in the network and identify opportunities to expand and improve it. This requires the development of a framework to identify opportunities and constraints associated with the existing infrastructure network and propose potential expansions of this network in the future.

This framework is complemented by a detailed implementation program and associated estimate of costs.

To assist in identifying feasible, cost effective solutions for the Municipality, Cardno completed a saddle survey of each of the existing Shared Paths within the network, as well as nearby attractors and generators. This site-based review of the existing infrastructure is designed to identify potential routes for improvement, assess the feasibility of potential route alignments and upgrade recommendations and assess the likely increase in cycling and walking demand expected to eventuate following improvements.

As detailed within the Austroads guidelines, pedestrian paths (known as 'Footpaths') are generally reserved for use by pedestrians, people in wheelchairs, mobility scooters and personal mobility devices, such as walking frames; and Shared Paths provide for movement of pedestrians and cyclists within the same path space. Shared Paths are the most common form of off-road path in Australia. For the purpose of this assessment, Cardno will consider all paths as Shared Paths unless the contrary is stated.

1.1 Background

The Municipality is located on the outskirts of Darwin and has approximately 7km of footpath network and 7km of Shared Path network across its over 600km road network. This Shared Path Plan has been prepared in accordance with the *Austroads Guidelines*, *Litchfield Council Development and Subdivision Standards*, *the Litchfield Subregional Land Use Plan 2016*, *the Strategic Plan 2018-2022*, and *the Darwin Shared Path and Bicycle Lane Technical Notes*.

This Shared Path Plan seeks to develop a clear and concise network of routes to encourage cyclists and pedestrians by providing for safer and more convenient routes.

1.2 Need for the Study

Cardno was engaged to undertake this consultancy as the Litchfield Council has highlighted a desire to identify the gaps in the current network to plan to provide a more efficient and connected network.

As stated in the Litchfield Strategic Plan 2018-2022, Council is committed to 'encourage alternate modes of transport, improve safety and connectedness with pedestrian and bike infrastructure where possible and affordable'.

This Shared Path Plan will provide information on the planning, capital works programs and connection to the existing paths to provide a greater level of connectivity throughout the Litchfield Municipality. There are existing path networks located at:

- | | | |
|------------------------|--------------------|------------------------|
| > Anglesey Road | > Biddlecombe Road | > Carruth Road |
| > Challoner Circuit | > Constant Street | > Dili Court |
| > Fairweather Crescent | > Freds Pass Road | > Girraween Road |
| > Grice Crescent | > Havelock Street | > Herkes Road |
| > Nightjar Road | > Patsalou Road | > Smyth Road |
| > Thorngate Road | > Whitewood Road | > The Grange on Stuart |

This Shared Path Plan has been developed in accordance with the following publications and standards:

- > Austroads Guidelines;
- > Super Tuesday Bike Count- Bicycle Network Palmerston;
- > Darwin Shared Path and Bicycle Lane Technical Notes;
- > Litchfield Council Development and Subdivision Standards;
- > Litchfield Strategic Plan 2018-2022;
- > Northern Territory Planning Schemel;

- > Coolalinga Rural Activity Centre - Litchfield Subregional Land Use Plan 2016;
- > Howard Springs Rural Activity Centre – Litchfield Subregional Land Use Plan 2016;
- > Humpty Doo Rural Activity Centre - Litchfield Subregional Land Use Plan 2016;
- > Berry Springs Rural Activity Centre – Litchfield Subregional Land Use Plan 2016;
- > Girraween Service Node - Litchfield Subregional Land Use Plan 2016;
- > Humpty Doo Rural Activity Centre - Northern Territory Planning Commission;
- > Draft Holtze Area Plan; and
- > Towards an Area Plan for Humpty Doo Rural Activity Centre.

The Shared Path Plan will guide development of a safe, comfortable, attractive, direct and integrated network connecting schools and community facilities, Council reserves and attractions within and surrounding the Municipality.

The Shared Path Plan will provide direction for future network expansions and potential connections to Community sports facilities and educational facilities in addition to the promotion and development of cycling tourism opportunities/activities/destinations.

The Shared Path Plan addresses the following areas and objectives for the Municipality:

- > Identification of routes that efficiently and effectively service and connect the current paths;
- > Identification of safe routes to surrounding schools;
- > Provision of connections to key attractions including sporting, recreational and shopping facilities, and tourist attractions;
- > Defining gaps in service and plans for future growth corridors;
- > Enhancing connections to the available recreational and tourism tracks and trails; and
- > Encouraging a more active population through recreational walking and cycling options.

1.3 Council Vision and Objectives

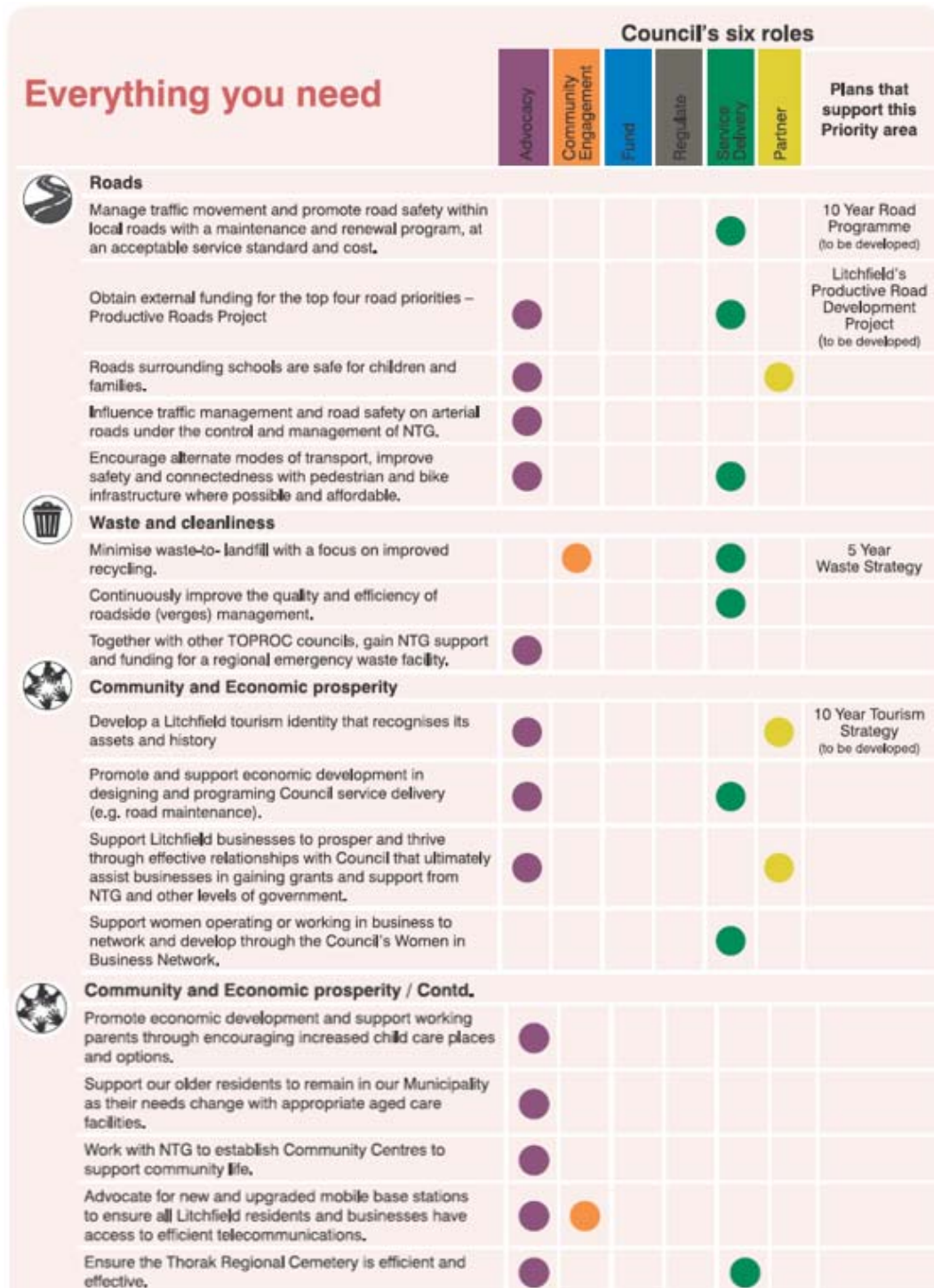
Litchfield Council has detailed through its Strategic Plan 2018-2022 three priority areas and nine outcomes that will have a direct impact on the community. Each outcome will be achieved by Council investing time, money or effort.

Figure 1-1 Litchfield Council Strategy 2018-2022



Source: Litchfield Council Strategic Plan 2018-2022

Figure 1-2 Detailed Strategy 2018-2022



Source: Litchfield Council Strategic Plan 2018-2022

The promotion of walking and cycling can greatly assist and contribute to Litchfield's outcome of being a safe and liveable community by having well connected networks. This Shared Path Plan provides the "Vision" and sets the framework for the policy direction for cycle/pedestrian infrastructure provision to encourage cycling and walking as a commuting alternative both in, and around the Municipality.

The primary purpose of the Shared Path Plan is to identify the deficiencies in the current network to develop a coordinated and strategic approach to delivering future Shared Path's infrastructure in order to encourage users to utilise alternate modes of transport.

2 Study Area

Litchfield Municipality is situated 25km from Darwin and 100km from Litchfield National park. Litchfield is recognised as ‘rural area’, with properties typically being on larger block sizes. The Municipality is bounded by the Adelaide River to the East, Van Diemen Gulf to the North, Coomalie Shire to the South and the City of Darwin and Palmerston to the Northwest. Both the Stuart and Arnhem Highways run through the region offering easy access to Darwin, Litchfield National Park, Katherine, Kakadu and Jabiru.

Spread over 3,100km², Litchfield is rapidly growing and is currently home to over 25,500 people. Litchfield residents enjoy a rural lifestyle which combines a mix of rural residential, horticultural, agricultural and industrial interests within its boundaries.

Figure 2-1 Location Map - Litchfield Municipality

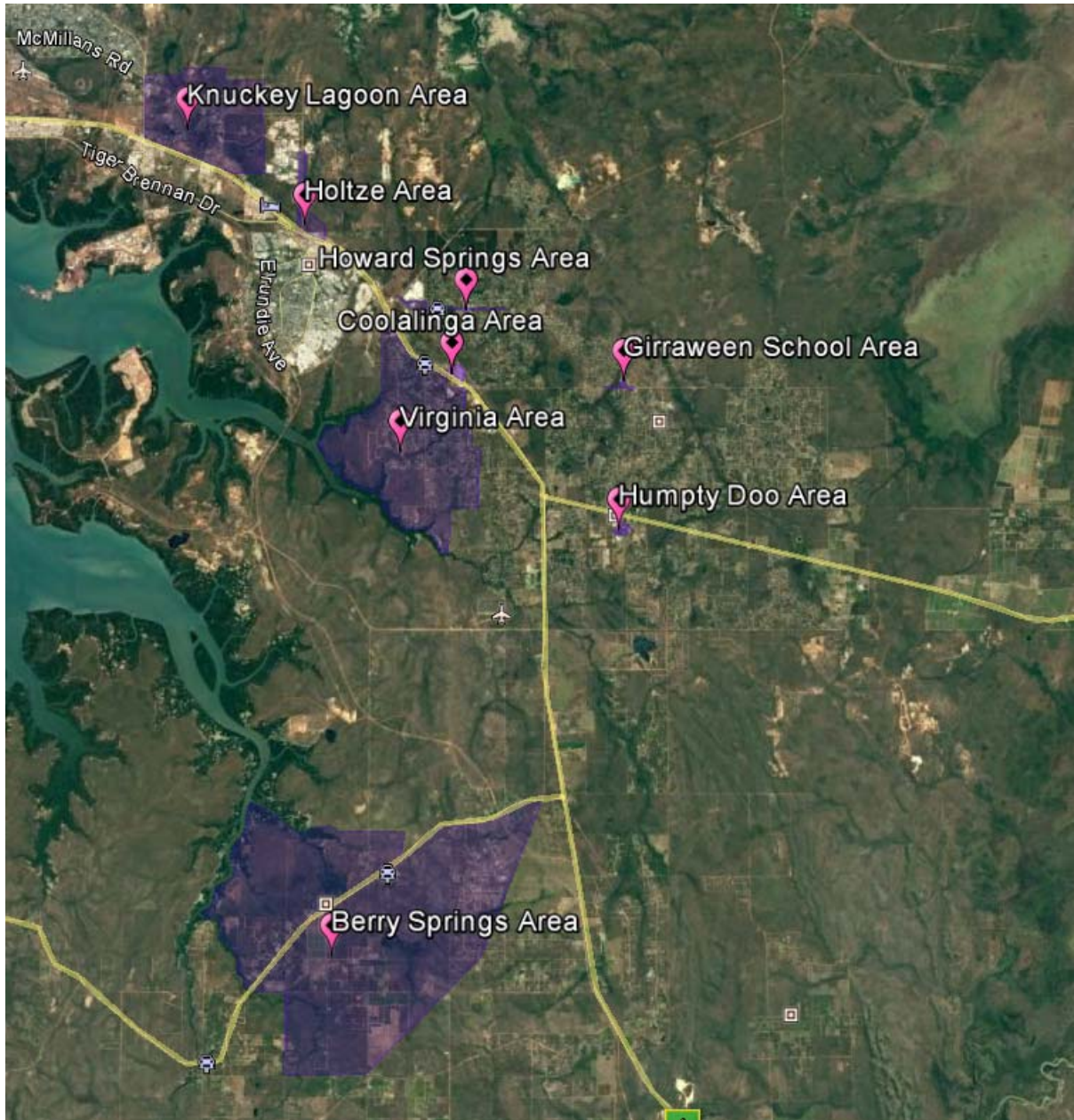


Source: Google maps 2019

The municipality has several main geographical locations where its path network is currently developed or this report is proposing future path networks. These geographical locations are listed below and depicted in Figure 2-2 however it is noted that these represent the individual study areas assessed as part of this project and not the registered boundaries of the various regions.

- > Holtze Area (including Knuckey Lagoon);
- > Howard Springs Area;
- > Coolalinga Area;
- > Virginia Area;
- > Girraween School Area;
- > Humpty Doo Area; and
- > Berry Springs Area.

Figure 2-2 Location of the areas



Source: Google Earth

2.2 Population data

The Census results for 2016 for the municipality were analysed to gain a greater understanding of the community and its behaviours. According to the 2016 Census, the majority of the population aged 15 or over travelled to work via car as a driver (62.8%) or as a passenger (4.5%). 8.2% travelled by bus and only 3.9% said they walked to work.

Table 2-1 Travel to work, Top responses 2016 Census

Travel to work, top responses <i>Employed people aged 15 years and over</i>	Litchfield (M)	%	Northern Territory	%	Australia	%
Car, as driver	7,362	62.8	61,874	60.3	6,574,571	61.5
Bus	961	8.2	4,872	4.7	323,201	3.0
Car, as passenger	525	4.5	6,947	6.8	489,922	4.6
Worked at home	491	4.2	2,653	2.6	503,582	4.7
Walked only	459	3.9	8,683	8.5	370,427	3.5
People who travelled to work by public transport	1,245	10.6	6,555	6.4	1,225,668	11.5
People who travelled to work by car as driver or passenger	8,210	69.9	70,991	69.1	7,305,271	68.4

In Litchfield (M) (Local Government Areas), on the day of the Census, the most common methods of travel to work for employed people were: Car, as driver 62.8%, Bus 8.2% and Car, as passenger 4.5%. Other common responses were Worked at home 4.2% and Walked only 3.9%. On the day, 10.6% of employed people used public transport (train, bus, ferry, tram/light rail) as at least one of their methods of travel to work and 69.9% used car (either as driver or as passenger).

Source: Australian Bureau of Statistics 2016 Census

Almost 40% of the dwellings have 3 or more vehicles registered, 36.9% have 2 and 18% have 1. Only 1.9% of the dwellings informed not having vehicle.

Table 2-2 Number of registered motor vehicles per dwelling 2016 Census

Number of registered motor vehicles	Litchfield (M)	%	Northern Territory	%	Australia	%
None	117	1.9	6,948	10.7	623,829	7.5
1 motor vehicle	1,114	18.0	20,562	31.6	2,881,485	34.8
2 motor vehicles	2,282	36.9	22,357	34.4	2,999,184	36.2
3 or more vehicles	2,344	37.9	11,813	18.2	1,496,382	18.1
Number of motor vehicles not stated	332	5.4	3,389	5.2	285,197	3.4

In Litchfield (M) (Local Government Areas), 18.0% of occupied private dwellings had one registered motor vehicle garaged or parked at their address, 36.9% had two registered motor vehicles and 37.9% had three or more registered motor vehicles.

Source: Australian Bureau of Statistics 2016 Census

Regarding education, in Litchfield Municipality 47.3% of people were attending an educational institution at the time of the Census. Of these, 19.1% were in primary school, 14.6% in Secondary school and, 9.3% in a technical or tertiary institution.

Table 2-3 Education 2016 Census

Education	Litchfield (M)	%	Northern Territory	%	Australia	%
Preschool	253	2.8	3,707	4.6	347,621	4.8
Primary - Government	1,236	13.4	15,160	18.6	1,314,787	18.2
Primary - Catholic	207	2.3	2,632	3.2	380,604	5.3
Primary - other non Government	316	3.4	2,570	3.2	231,490	3.2
Secondary - Government	752	8.2	8,233	10.1	827,505	11.5
Secondary - Catholic	152	1.7	2,070	2.5	338,384	4.7
Secondary - other non Government	428	4.7	2,911	3.6	280,618	3.9
Technical or further education institution	340	3.7	3,045	3.7	424,869	5.9
University or tertiary institution	518	5.6	8,054	9.9	1,160,626	16.1
Other	141	1.5	1,655	2.0	198,383	2.8
Not stated	4,847	52.7	31,342	38.5	1,707,023	23.7

In Litchfield (M) (Local Government Areas), 38.5% of people were attending an educational institution. Of these, 19.2% were in primary school, 14.5% in secondary school and 9.3% in a tertiary or technical institution.

Source: Australian Bureau of Statistics 2016 Census

2.3 Super Tuesday Bike Count- Palmerston 2019

Bicycle Network is Australia's biggest bike riding organization. Since 2007 the organization has been conducting bicycle counts at key intersections selected by local governments. The count has been named *Super Tuesday and Super Sunday*.

The count records volumes, gender, and movement flow of people on bikes. This information reflects up-to-date cycling activity and trends. The 2019 count was conducted on 03 September between 6:30am and 8:30am.

Within Litchfield Municipality there was one counting point at the crossing point at Howard Springs Rd / Howard Springs Shared Path and the results are presented below.

Figure 2-3 Super Tuesday 2019 counts Howard Springs



Source: Bicycle network. Super Tuesday Bike Count – Palmerston 2019

In total, 18 cyclists were recorded using the Shared Path during the two hours survey. Although there was an incremental increase in the number of cyclists compared to previous years, the volume of users is considered low for the area.

3 Planning for Pedestrians and Cyclists

Austrroads recognises that walking and cycling have significant roles in transport systems through Australia and are expected to make an important contribution to the well-being and transportation of people in the future.

3.1 NT Legislature

As stated on the Darwin Regional Transport Plan 2018, in the Northern Territory, *all paths are Shared Paths which means that cyclists and pedestrians can use all paths. 'Footpaths' can be used by cyclists and 'cycle paths' can be used by pedestrians, effectively extending the active transport network of paths. Except for a restricted number of high use, recreational paths, the Shared Path network currently meets existing levels of demand. However, as Darwin's population grows and the number of people cycling and walking increases, the Shared Path network may need to evolve to provide separately for cyclists and pedestrians.*

Regarding road users, Austrroads- Guide to Road Design Part 6A presents the category of users of Shared Paths.

Table 3-1 Category of users of Shared Paths

Category of user	Specific users within category
Pedestrians	Children Elderly People pushing prams & strollers Family groups Dog walkers Joggers
Cyclists	Children Families Adults Individuals & groups Power assisted bicycles
Users with disabilities (vision, hearing mobility, & cognitively impaired users)	Pedestrians Sporting users Manual wheelchair users Electric wheelchair/scooter users
Small-wheeled vehicle users	Children's pedal/motorized/electric cars In-line skaters Skate boarders Foot scooters
Others	Organized events Maintenance workers Horse riders Anglers

Source: Austrroads

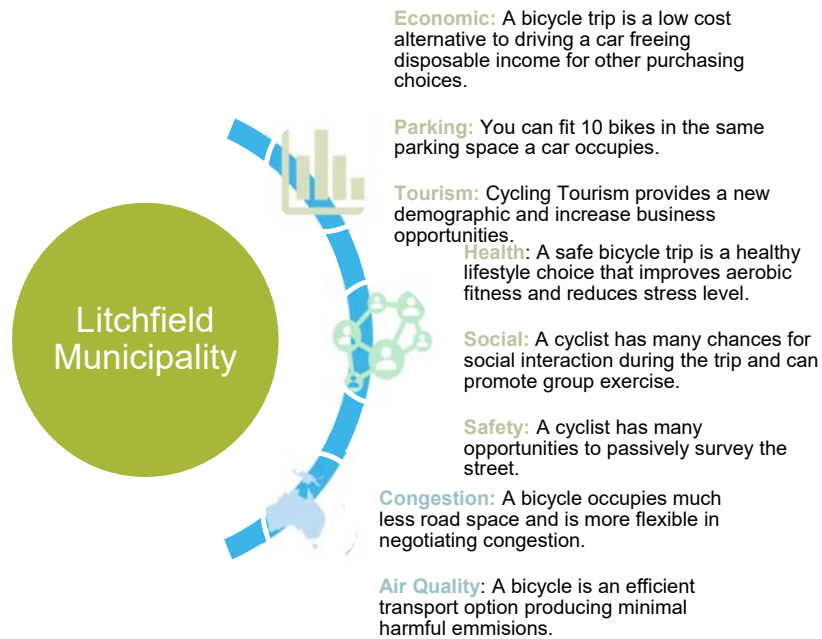
3.2 Benefits of Walking and Cycling

The Department of Health recognised that the benefits of regular physical activity or exercise include reducing the risk of health conditions, Type 2 diabetes, certain forms of cancer, depression and some injuries.

In Australia, walking is one of the most popular forms of activity. The Bureau of Statistics reports that overall Australians aged 15 years and over exercise 42 minutes per day on average, the largest part of which consisted of walking for transport and for exercise.

Cycling is undertaken for both commuting and recreational purposes in the Municipality. Given the many benefits of cycling, there is considerable potential to increase the uptake of active transport modes particularly as a viable commuter transport choice. Recreational cycling also has potential to increase tourism with the global increasing popularity of cycling tourism. Some of the benefits of increasing Cycling as a commuter mode of transport are presented in the figure below.

Figure 3-1 Benefits of Cycling



By providing appropriate Shared Paths within the Litchfield Municipality, residents and visitors can benefit from all the health benefits that walking or cycling provide.

3.3 Type of Cyclists and their Requirements

Bicycle mode choice is dependent upon a number of factors including population demographics, topography of the region, weather effects and available cycling infrastructure. Cycling is increasingly becoming a viable alternative to other transport modes for all purposes, with increases in commuting, recreational and other general-purpose trips for all ages. However, cycling infrastructure must be provided to facilitate cycling activities by all. For this reason, infrastructure should be designed to cater for the requirements of a number of types of cyclist. For the purposes of this Shared Path Plan, cyclists have been broadly categorised into three main groups as shown in **Table 3-2**.

Table 3-2 Types of Cyclists and their Requirements

Cyclist Type	Cycling Profile
Casual Cyclists	Casual cyclists predominantly consist of family groups and young / inexperienced cyclists who tend to use the off-street path network to minimize conflict with motor vehicles. It is likely that casual cyclists will not travel a great distance, but rather tend to cycle for errands and other specific tasks, as well as for fitness and recreation.
Commuter Cyclist	Commuters have a different and well-defined set of needs, tending to travel within the roadway, sharing the road with vehicular modes in preference on off-street cycling infrastructure. Commuters tend to be habitual riders with experience and confidence in road riding. Travel speed is generally higher than what casual cyclists achieve which makes them more suited to riding along the roadway, rather than along the pedestrian network.
Recreational Cyclists	Recreational cyclists comprise of those who ride for fitness and as part of social riding groups. These cyclists tend to be relatively confident riders capable of reaching higher speeds. Recreational riders can also constitute casual riders accessing recreational paths

with friends and family, for recreation or fitness purposes. Cycling speeds tend to be very slow with cyclists preferring high quality off-street paths.

3.4 Shared Path facilities

A Shared Path is provided where pedestrians and cyclists share the same path space. A Shared Path may be appropriate where demand exists for both a pedestrian path and a bicycle path but where there is a low number of pedestrians or cyclists and the use is not expected to be sufficiently great enough to provide separate facilities.

Shared Paths are the most common form of off-road path in Australia where cyclists and pedestrians share the same path. Shared Paths need to be built wide enough to cater for the existing and future cycling volumes. The following criteria for Shared Paths are provided within the Austroads Guide to Road Design Part 6a: Paths for Walking and Cycling:

- > Regional paths should be 4.0 m wide to permit the cyclist groups/couples to pass pedestrian couples or other cyclist groups, or to permit cyclists travelling in opposite directions to pass pedestrians with convenience and safety. However, it should be noted that in some jurisdictions, cyclists may be prohibited from riding side-by-side on Shared Paths.
- > 2.5 m and 3.0 m are the absolute minimum widths for paths having a predominant purpose of commuting and recreation respectively, during periods of peak use.
- > 2.0 m is an acceptable path width where the path has a very low use at all times and on all days, where significant constraints exist limiting the construction of a wider path.
- > 3.0 m is the minimum path width for a path where high speeds occur.

While these widths are provided, it is acknowledged that there may be locations where this is not achievable, and that this should not exclude a vital, narrower path from the Shared Path network. However, every effort should be made so that new paths are constructed to the recommended standard.

Table 3-3 Shared Path widths

	Path width (m)		
	Local access Path	Regional Path ⁽³⁾	Recreational Path
Desirable minimum width	2.5	3	3.5
Minimum width – typical maximum	2.5 ⁽¹⁾ -3 ⁽²⁾	2.5 ⁽¹⁾ -4 ⁽²⁾	3 ⁽¹⁾ -4 ⁽²⁾

(1) A lesser width should only be adopted where cyclist volumes and operational speeds will remain low.

(2) A greater width may be required where the numbers of cyclists and pedestrians are very high or there is a high probability of conflict between users (e.g. people walking dogs, roller blades and skaters etc.).

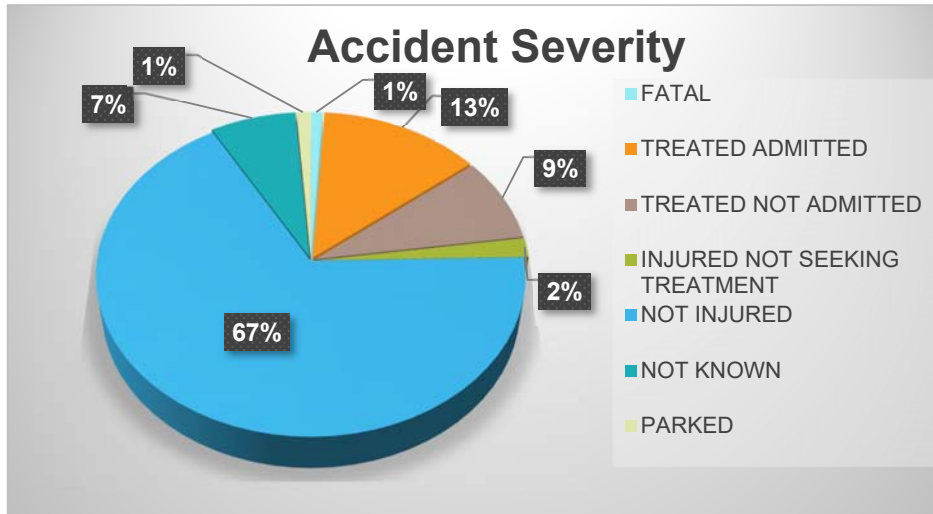
(3) May be part of a principal bicycle network in some jurisdictions.

Source: Guide to Road Design part 6A- Paths for Walking and Cycling table 5.3

3.5 Crash Data

Safety is a very important factor in developing a successful Shared Path Plan. The availability and quality of existing path facilities is a good way of determining the level of safety and performance within an area. Road Safety NT crash data was used to identify the level of safety. This data showed that approximately 1030 people were involved in approximately 586 accidents that have occurred within the study areas from 1 January 2009 to 31 July 2019. A breakdown of this Crash data is presented in Figure 3-2, Figure 3-3, and Figure 3-4 below.

Figure 3-2 Data Crash for Shared Path area



Source: Road Safety NT

Over the last 10 years, 9 cyclists were involved in crashes within the study area, specifically within the Thorngate Road and Whitewood Road areas. For the same period, there were 7 accidents involving pedestrians, 2 of them being fatal.

The data showed that 89% of the accidents involving a cyclist occurred in the carriageway and although the precise location of the accidents was not recorded for all accidents, some of the intersections noted were:

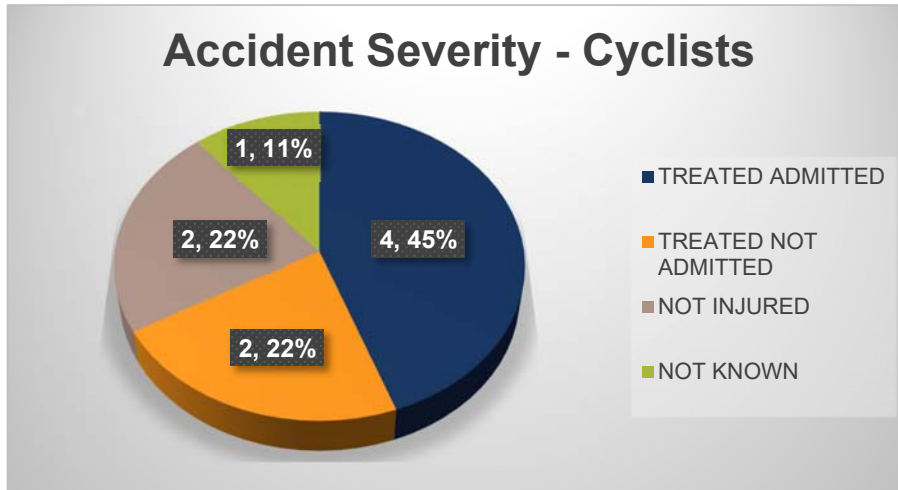
- > Yarrowonga Rd / McKenzie Pl;
- > Yarrowonga Rd / Stuart Hwy; and
- > Whitewood Rd / Kundook Plc.

Other accidents were recorded at Stuart Hwy, Thorngate Rd, Howard Springs Rd, Inverway Cir, and on the bike path.

Further to the cyclist accidents, it was found that 85% of accidents involving pedestrians occurred on the carriageway. One accident was recorded on Nutwood Crescent and one outside the Humpty Doo Primary School. The remaining accidents, which account for 71% of the total, occurred along the Stuart Hwy at following intersections:

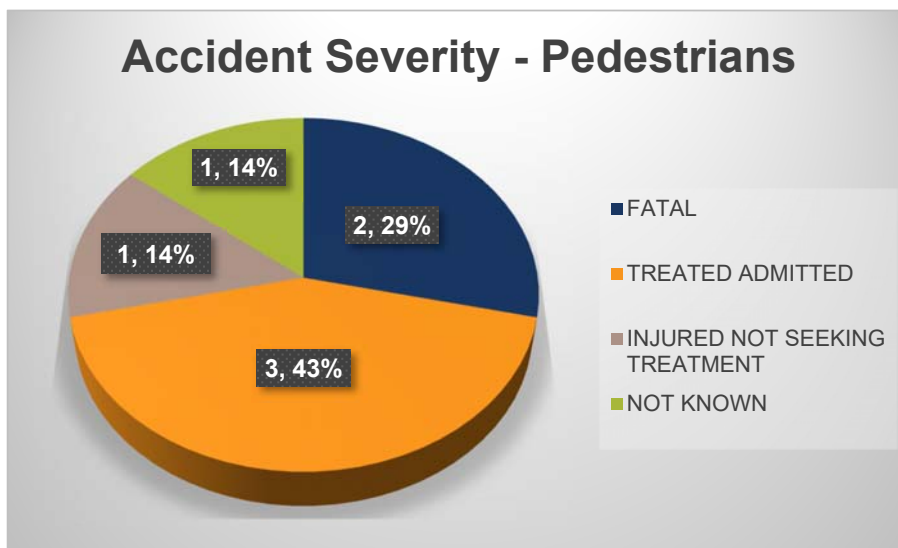
- > Stuart Hwy / Temple Terrace (fatal);
- > Stuart Hwy / Howard Springs Rd;
- > Stuart Hwy / Yarrowonga Rd; and
- > Stuart Hwy / United petrol station Coolalinga (fatal).

Figure 3-3 Accident Severity of Crashes Involving Cyclists



Source: Road Safety NT

Figure 3-4 Accident Severity of Crashes Involving Pedestrians



Source: Road Safety NT

3.6 Network analysis

To allow for an assessment of the functional benefit of any proposed path networks, it is required that the various trip attractors and generators that exist within the study area be identified and mapped. The following sections provide details of the various attractors and generators that are present within each of the individual study areas.

3.6.1 Trip Attractors

Potential trip attractors within each of the nominated study areas have been reviewed and tabulated below to provide a greater understanding of the potential locations which residents are likely to travel to. Understanding these attraction points and their locations will also provide a greater level of input into determining the relative priority of each of the proposed Shared Paths with paths providing linkages to the attraction points having a higher priority.

3.6.1.1 Holtze and Knuckey Lagoon Areas

Table 3-4 Attractor points - Holtze and Knuckey Lagoon Areas

Category	Thorngate Road
Health and Medical	<ul style="list-style-type: none"> ▪ Palmerston Regional Hospital ▪ Top End Medical Centre ▪ Palmerston GP Super Clinic
Education	<ul style="list-style-type: none"> ▪ Charles Darwin University, Palmerston ▪ Durack Primary School, Palmerston ▪ Driver Primary School, Palmerston ▪ Gray Primary School, Palmerston
Recreation/Tourism	<ul style="list-style-type: none"> ▪ Knuckey Lagoon Recreation Reserve ▪ Gateway Shopping Centre ▪ Oasis Shopping Village ▪ Progressive Combat Centre ▪ Palmerston Water Park ▪ Palmerston Golf Course ▪ Crocodylus Park
Civic Amenities	<ul style="list-style-type: none"> ▪ Australia Post
Other	<ul style="list-style-type: none"> ▪ Darwin Free Spirit Resort ▪ Thorak Regional Cemetery

3.6.1.2 Howard Springs Area

Table 3-5 Attractor points - Howard Springs Area

Category	Whitewood Road (Howard Springs)
Health and Medical	<ul style="list-style-type: none"> ▪ Arafura Medical Centre ▪ Arafura Medical Clinic
Education	<ul style="list-style-type: none"> ▪ Howard Springs Primary School ▪ Good Shepherd Lutheran College ▪ MacKillop Catholic College, Palmerston ▪ Mother Teresa Catholic Primary School, Palmerston
Recreation/Tourism	<ul style="list-style-type: none"> ▪ BIG4 Howard Springs Holiday Park ▪ Howard Park Reserve ▪ Lukphinong Muaythai Gym
Civic Amenities	<ul style="list-style-type: none"> ▪ Australia Post

3.6.1.3 Coolalinga and Virginia Areas

Table 3-6 Attractor points – Coolalinga and Virginia Areas

Category	Coolalinga
Health and Medical	<ul style="list-style-type: none"> ▪ Ark Medical & Skin Cancer Centre ▪ Coolalinga Doctors and health Centre ▪ Coolalinga Medical Centre
Education	<ul style="list-style-type: none"> ▪ Bees Creek Primary School ▪ Sattler Christian College
Recreation/Tourism	<ul style="list-style-type: none"> ▪ Coolalinga central ▪ Freds Pass Sport and Recreation Reserve (multi sports facility) ▪ McMinns Lagoon Recreation Reserve ▪ Darwin Boomerang Motel and Caravan Park
Civic Amenities	<ul style="list-style-type: none"> ▪ Australia Post
Other	<ul style="list-style-type: none"> ▪ Coolalinga Tourists Park ▪ Litchfield Council Offices

3.6.1.4 Girraween School Area

Table 3-7 Attractor points – Girraween School Area

Category	Girraween Road
Health and Medical	▪ -
Education	▪ Girraween Primary School
Recreation/Tourism	▪ McMinns Lagoon Recreation Reserve ▪ Freds Pass Sports and Recreation Reserve (multi sports facility) ▪ Humpty Doo and Rural Area Golf Club ▪ Girraween Lagoon
Civic Amenities	▪ -
Other	▪ Litchfield Council offices

3.6.1.5 Humpty Doo Area

Table 3-8 Attractor points – Humpty Doo Area

Category	Freds Pass Road (Humpty Doo)
Health and Medical	▪ Arafura Medical Clinics
Education	▪ St Francis of Assisi Catholic Primary School ▪ Taminmin College ▪ Humpty Doo Primary School
Recreation/Tourism	▪ McMinns Lagoon Recreation Reserve ▪ Humpty Doo Village Green
Civic Amenities	▪ Australia Post
Other	▪ Humpty Doo Hostel ▪ Humpty Doo Haven Resort ▪ Humpty Doo Hotel ▪ Humpty Doo Homestay Cottage ▪ PWC McMinns Pumping Station ▪ Humpty Doo Plaza

3.6.1.6 Berry Springs Area

Table 3-9 Attractor points – Berry Springs Area

Category	Freds Pass Road (Humpty Doo)
Health and Medical	▪ Arafura Medical Clinics Berry Springs
Education	▪ Berry Springs Primary School
Recreation/Tourism	▪ Berry Springs Recreational Reserve (including the Territory Wildlife Park) ▪ AAOK Lakes Resort & Caravan Park
Civic Amenities	▪ Australia Post
Other	▪ -

3.7 Reserves

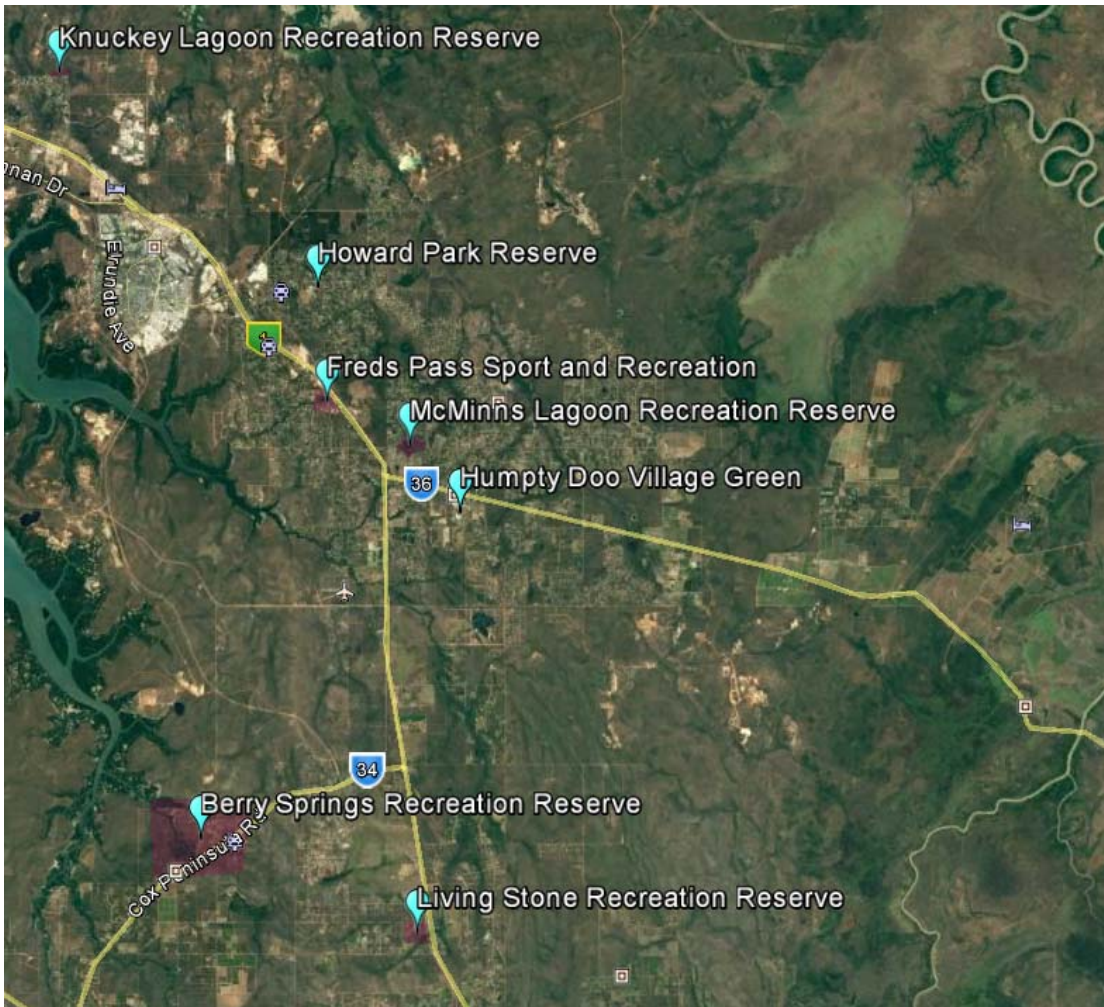
There are seven recreational reserves within the municipality that are being considered as points of interest. Locals and tourists can use different modes of transport to get to these destinations and visitors can find a wide range of activities. A graphic illustrating these reserves is provide below as Figure 3-5.

Although the reserves were included in the previous section, this chapter will give a deeper view of the reserves and access points. Those assessed as part of this report include:

- > Knuckey Lagoon Recreation Reserve: located within the Holtze and Knuckey Lagoon Areas, this reserve contains six walking trails, basketball courts and other open spaces. The reserve has an access point from Brandt Rd.
- > Howard Park Reserve: Located within the Howard Springs area, it has a direct access from the Shared Path from Whitewood Rd offering open spaces to practice sports.
- > Freds Pass Sport and Recreation: near Coolalinga and Virginia Areas not only offers open space areas but the Saturdays Rural Market. It can be accessed from the Stuart Highway.
- > Humpty Doo Village Green: with direct access from Challoner Circuit is located within the Humpty Doo Area. This reserve has infrastructure to practice some sports such as skate boarding.

- > McMinns Lagoon Recreation Reserve: located near Humpty Doo Area, has a number of walking tracks with access from Power Rd, Sayer Rd, and Dreamtime Dr.
- > Living Stone Recreational Reserve: situated within Livingstone, it has access from Livingstone Rd and some of the amenities include a large open hall, oval, beach volleyball court, playground and a picnic area. It is noted that this reserve is not connected to the remainder of the network due to its isolated location.
- > Berry Springs Recreational Reserve: is situated on Cox Peninsula Road, between the Territory Wildlife Park and the Berry Springs Primary School. It has a wide range of activities for the public.

Figure 3-5 Recreational Reserves location Litchfield Municipality



Source: Google Earth

3.8 Schools and School Bus services

There are 9 schools within Litchfield Municipality that have been considered to plan the Shared Path network in order to provide safer routes and connections for students, staff and visitors. The school bus routes that serve these schools have been considered to determine if trips to and from the facilities could be a split of pedestrian/cyclist modes and public transport. The routes cover the school areas and share some of the road where the proposed paths are, but all the paths are off-road. It is noted that bicycles are not permitted on busses and so the use of split mode transport would require the construction of facilities to safely store bicycles at the travel mode change (essentially a bicycle 'park and ride' facility).

The list of the schools within the overall study area is presented below.

Table 3-10 List of Schools

Area	School
Howard Springs Area and Good Shepherd School Area	<ul style="list-style-type: none"> ▪ Good Shepherd Lutheran College ▪ Howard Springs Primary School
Coolalinga and Virginia Areas	<ul style="list-style-type: none"> ▪ Bees Creek Primary School ▪ Sattler Christian College
Girraween School Area	<ul style="list-style-type: none"> ▪ Girraween Primary School
Humpty Doo Area	<ul style="list-style-type: none"> ▪ Humpty Doo Primary School ▪ Taminmin College ▪ St Francis of Assisi Catholic Primary School
Berry Springs Area	<ul style="list-style-type: none"> ▪ Berry Springs Primary School

3.9 Bus Stops facilities

An assessment of the bus stop locations within the municipality was undertaken to identify the areas that have been used by pedestrians and cyclists without provisions. The outcome of this assessment is to propose Shared Paths that provide connections for users between the bus stops and their surroundings. Similar to the identification of trip attractors, the review and assessment of the location of bus stops and bus routes will be used to assist with determining the relative priority of any nominated Shared Paths.

3.10 Future Land Use Developments

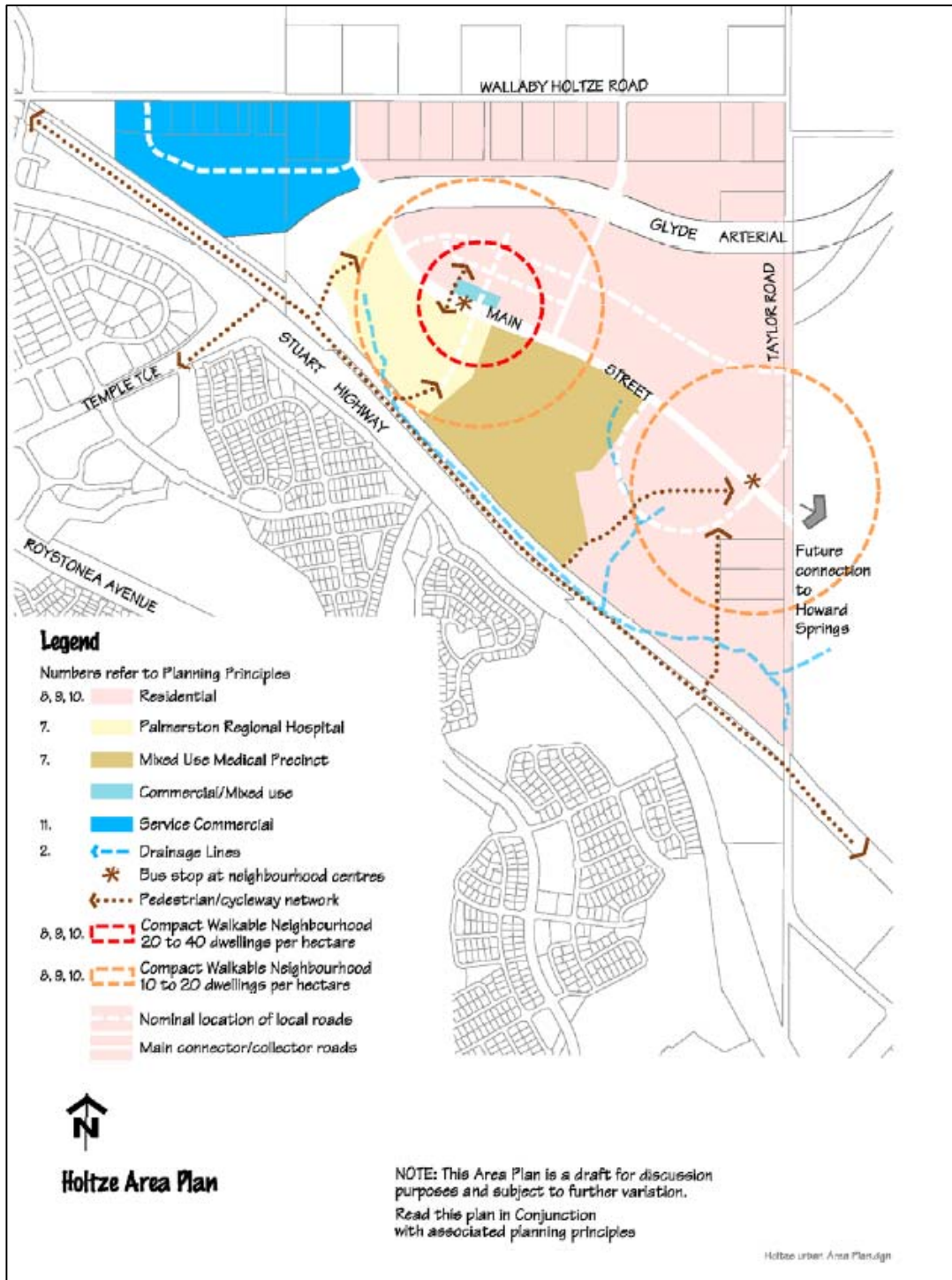
As stated in the Litchfield Strategic Plan 2018-2022, *'Litchfield is earmarked to play an important role in accommodating urban growth within the Darwin Region over the next 40 to 50 years. Its major urban development zones are in the areas of Holtze, Weddell and Murrumujuk, while its rural activity centres are Berry Springs, Howard Springs, Humpty Doo and Coolalinga.'*

The following section outlines the currently available details for regional development within each of the subsections of this study.

> Holtze and Knuckey Lagoon Areas

The Holtze Area Plan recognises the Palmerston Regional Hospital as a focus for urban growth. As a result, the development of the hospital's surrounding area will be considered for medical related businesses development, residential and commercial / mixed uses. The priority road connection will be Temple Terrace, especially for public transport. The area will also have connection to Taylor Rd and an internal road and path network that will connect the area with Litchfield Shared Path network.

Figure 3-6 Holtze Area Plan

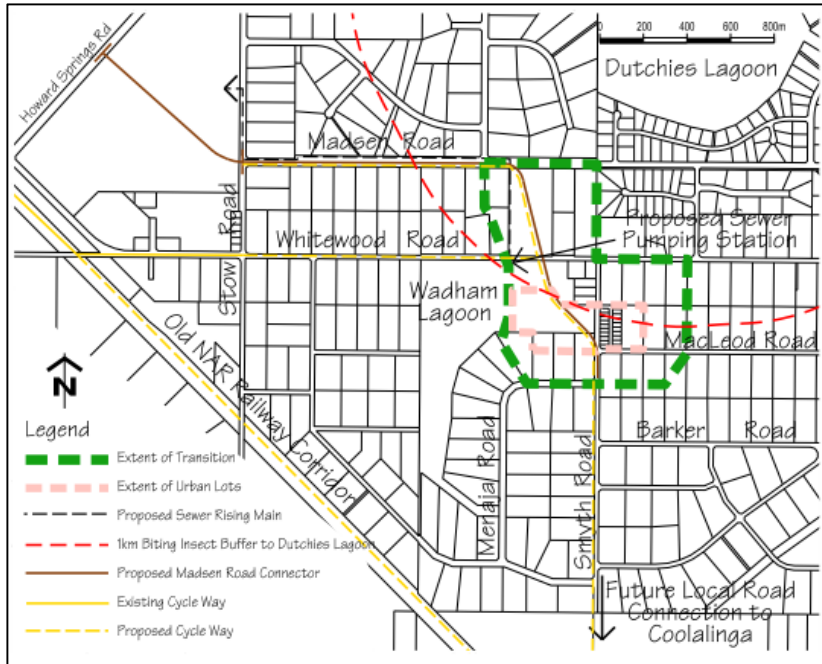


Source: Holtze Area Plan – Draft Plan

> Howard Springs Area

As Howard Springs Rural Activity Centre is close to Palmerston and Coolalinga, future connections include the extension of Stow Road and Smyth Road to Coolalinga, and the extension of Madsen Road through Kowandi North to Holtze. Madsen Road will be also be connected across Whitewood Road to Smyth Road. The extension of Madsen Road will be consistent to the rural characteristics of the area. It considers separate Shared Path, pedestrian crossings, measures to slow traffic speeds and shade trees/structures.

Figure 3-7 Area Plan for Howard Springs Rural Activity Centre

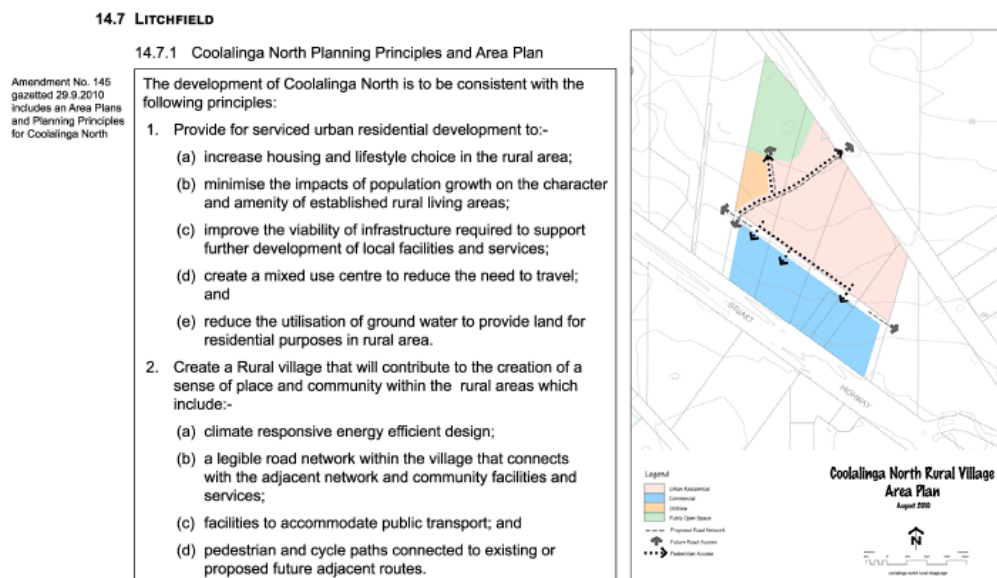


Source: Northern Territory Planning Scheme

> Coolalinga and Virginia Areas

Details for the development of the Coolalinga / Virginia Areas in the NT Planning Scheme are:

Figure 3-8 Area Plan for Coolalinga

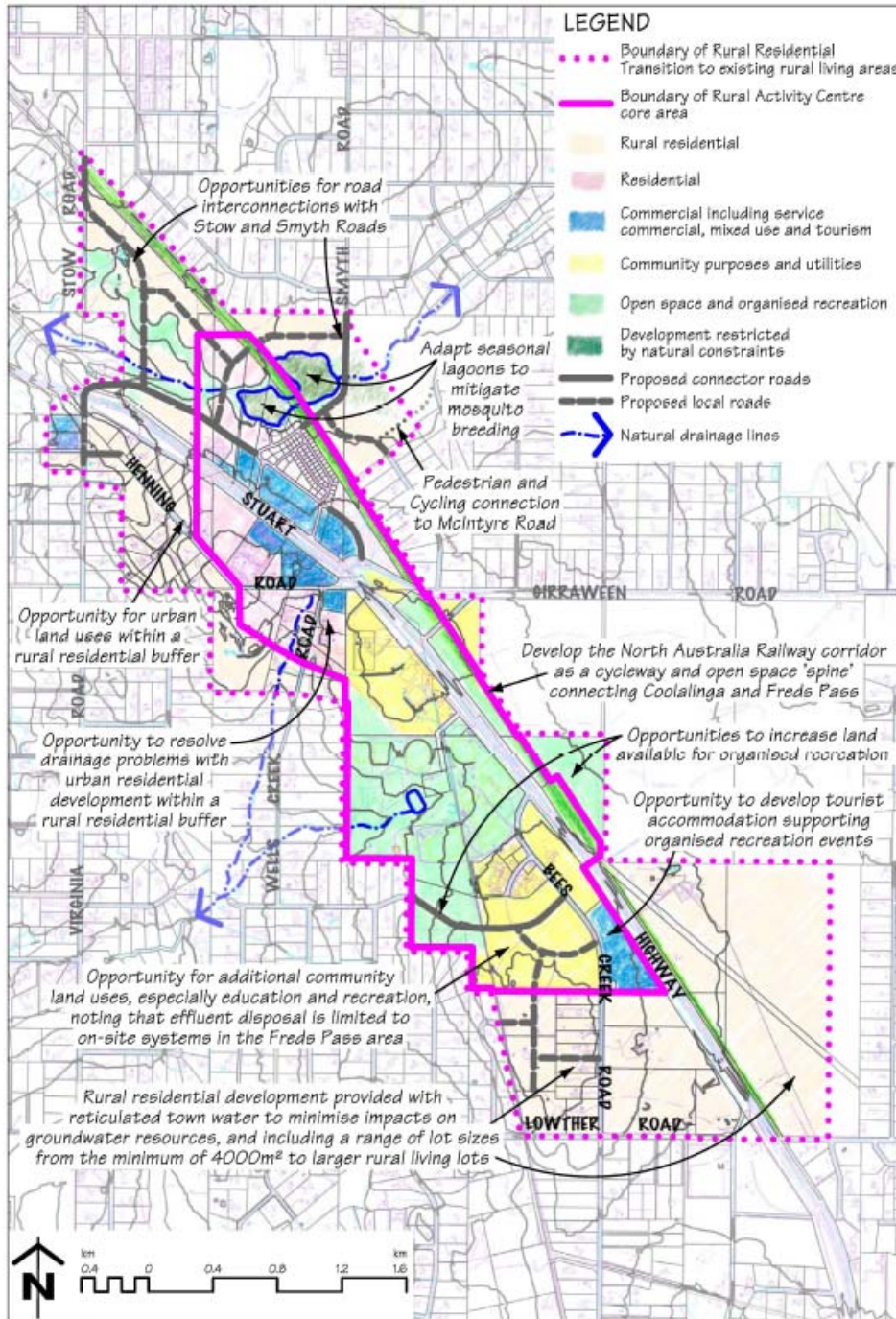


Source: NT Planning Scheme

Coolalinga has been defined as an area in transition. The concept plan mentions that Undeveloped Crown land north of the Highway has the capacity to extend the range of housing options. The concept plan has a residential lot yield in the order of 50 multiple or small-lot dwellings, over 500 urban lots and 150 residential lots. Should these yields be realised, there will be a greater requirement for Shared Path infrastructure to provide connectivity for the increase in residents with the area.

As mentioned in the plan, there is an opportunity for a caravan park or similar tourist facility within the TC Zone of Fred Pass and a future potential for rural residential lots in the South of Freds Pass. Over time approximately 80 rural residential lots could be developed west of the Highway and 200 lots east of the Highway. Similar to the increase in land yields above, this will result in a greater need for Shared Path infrastructure.

Figure 3-9 Land Use Concept for Coolalinga and Freds Pass Rural Activity Centre

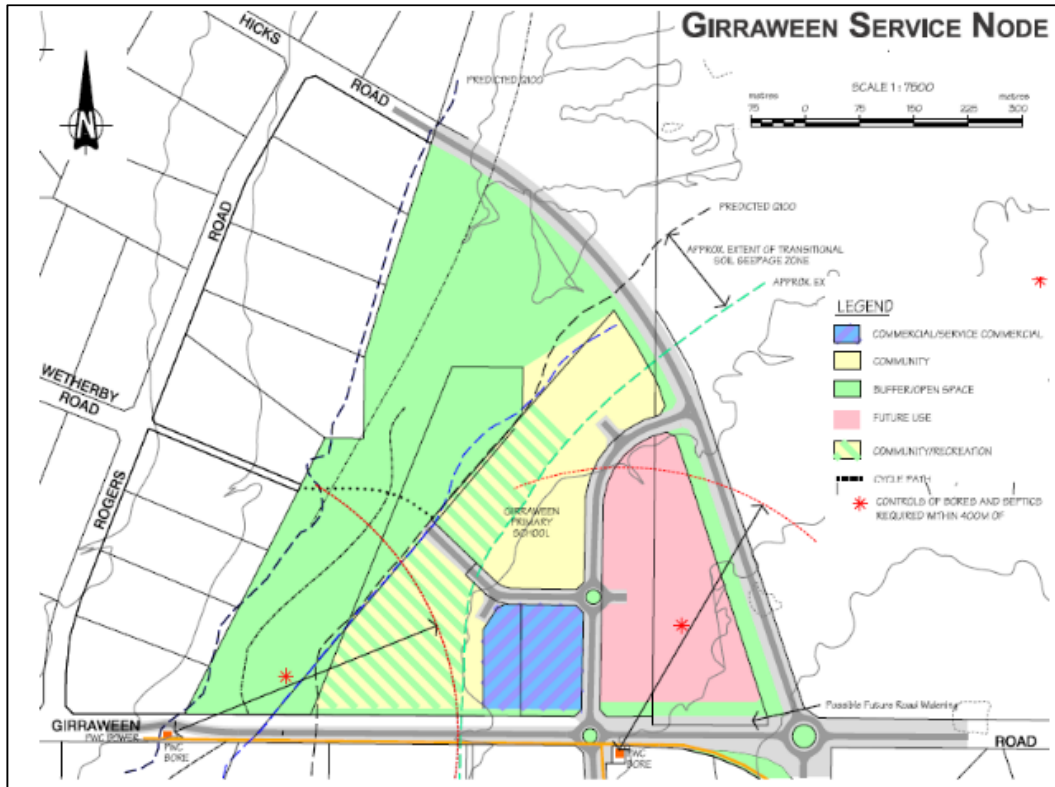


Source: Litchfield subregional land use plan

> Girraween

For the area of Girraween Road, the plan provides for a future Service node along Girraween Road and a future collector road intended to link Gunn point Road and the Arnhem Highway. The construction of the service node will provide a future attractor for the area which will in turn increase the need for a connective shared network to provide access from the residential areas to the service node.

Figure 3-10 Girraween Service Node



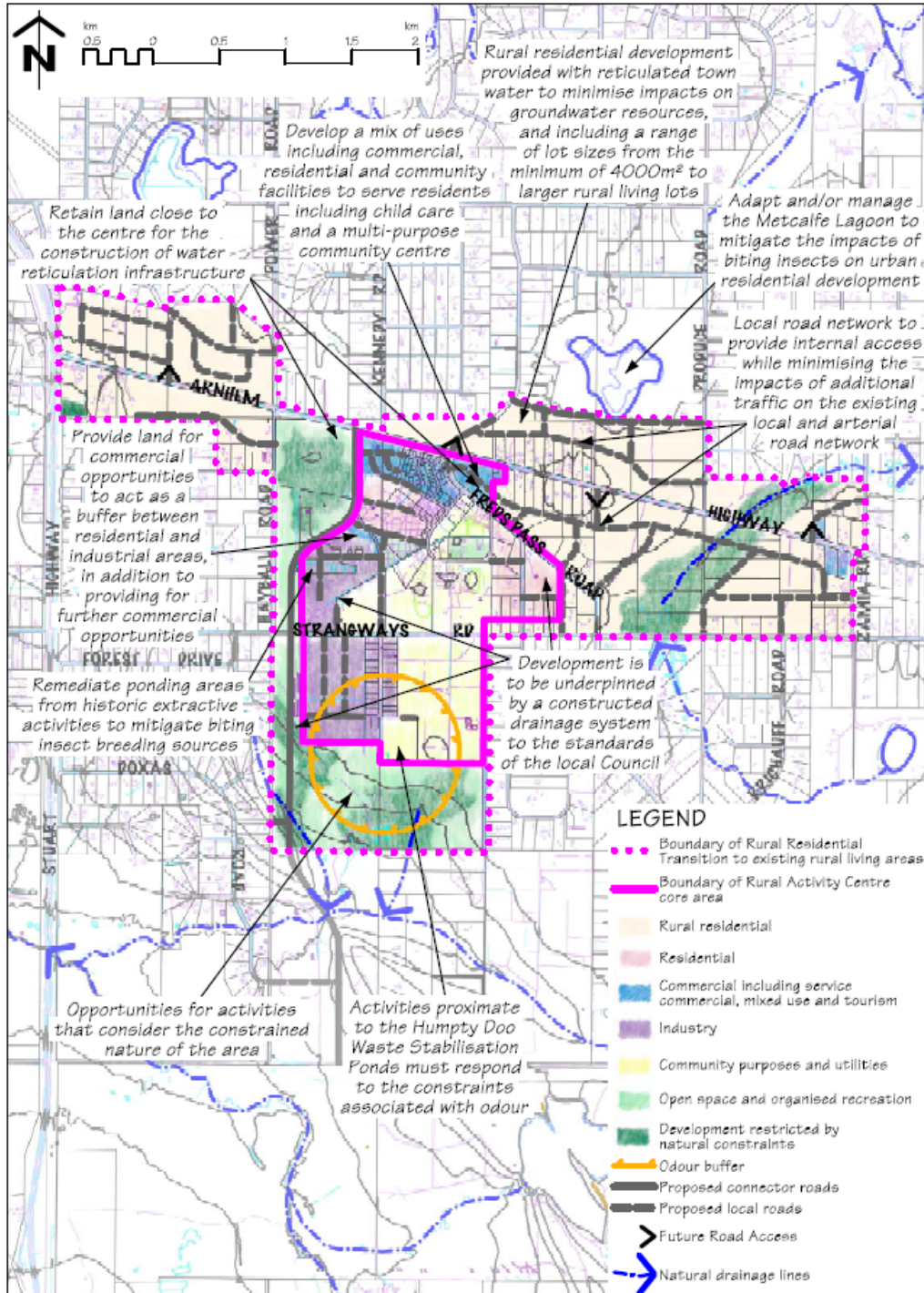
Source: Litchfield subregional land use plan

> Humpty Doo Area

Details for the development of the Humpty Doo (Fred's Pass Road) Area in the NT Planning Scheme are:

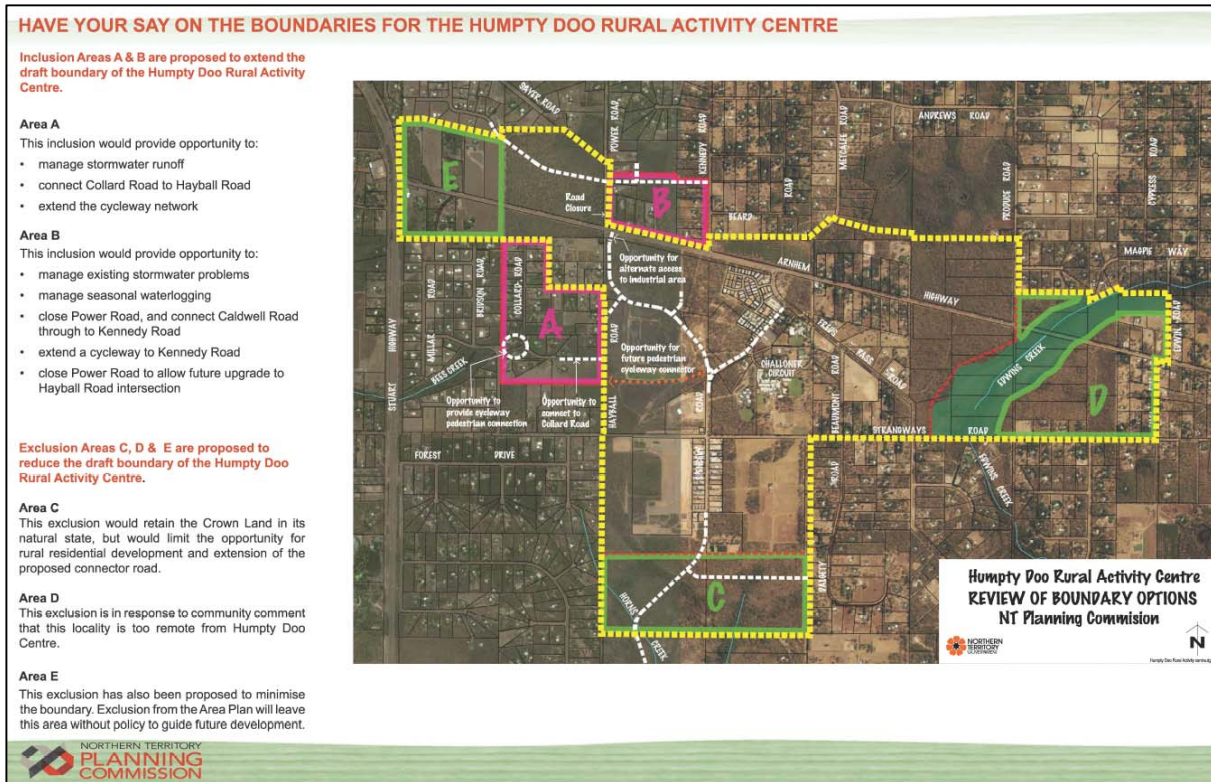
The Land Use Plan indicates that *development in Humpty Doo Rural Activity Centre has taken up current facilities, and current growth will require expansion of additional services. The concept plan has a residential lot yield in the order of 80 multiple or small-lot dwellings, 300 urban lots and 875 rural residential lots.* This densification of the area will introduce additional residents resulting in a greater requirement for Shared Path infrastructure.

Figure 3-11 Land Use Concept for Humpty Doo Rural Activity Centre



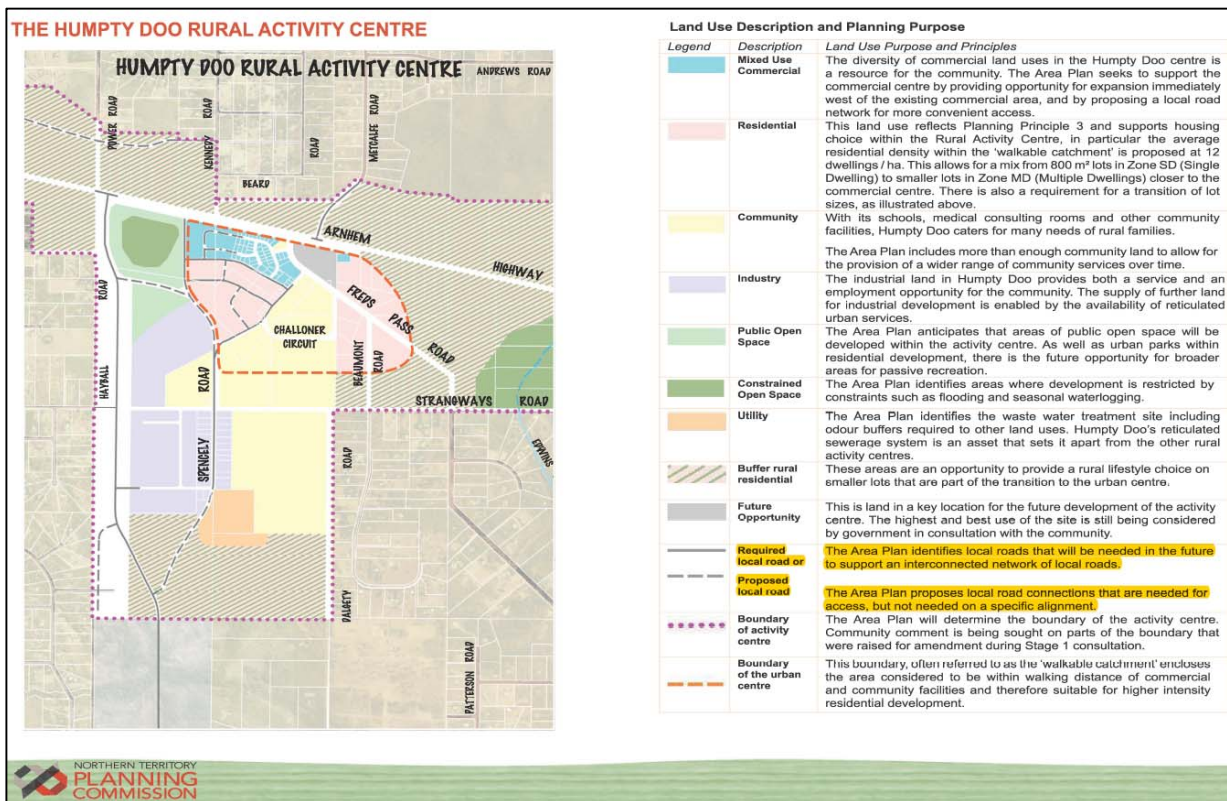
Source: Litchfield subregional land use plan

Figure 3-12 Draft Area Plan Humpty Doo



Source: NT Planning Commission

Figure 3-13 Rural Activity Centre Humpty Doo



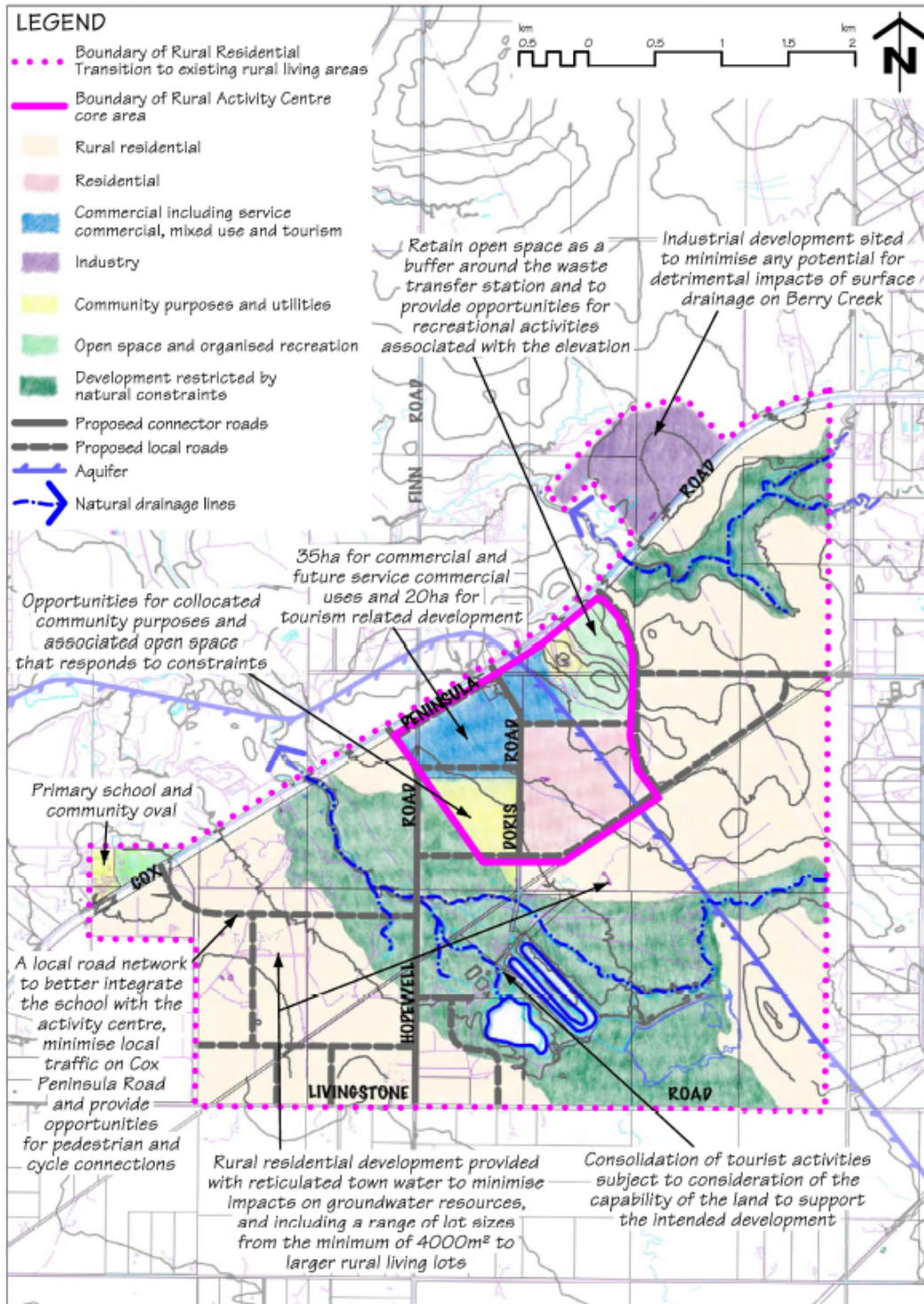
Refer to highlighted roads section
Source: NT Planning Commission

> Berry Springs

Litchfield Subregional Land Use Plan 2016 considers that despite the lack of reticulated services, the area has a considerable potential to develop a comprehensive centre providing a range of facilities and services as well as housing options. This new centre will become the main attractor for the Berry Springs area with Shared Path links to it from other attractors being required.

The concept plan presents a residential lot yield in the order of 700 urban lots and 1800 rural residential lots.

Figure 3-14 Land Use Concept for Berry Springs Area



Source: Litchfield subregional land use plan

4 Shared Path development

The following section provides a summary of the Saddle survey that was completed and outlines the extents of the existing Litchfield Municipality Shared Path Network.

4.1 Saddle Survey

4.1.1 Methodology

The saddle survey involved a general evaluation of the existing Shared Path network and looked at:

- > Confirming the characteristics and features of the existing route network (off-road) based on information provided by the Client and supplemented by desktop and field checking;
- > Identifying gaps and deficiencies, such as the need for line marking, signage, grab rails, kerb ramps, crossing facilities or improvements etc;
- > Identifying key cycling and walking trip generators and local activity nodes, including existing schools, recreation centres, parks, shopping facilities etc., to determine the most suitable locations for potential cycle and walking routes;
- > Identifying and considering the location of schools within the Municipality to ensure that 'Safe Routes to School' facilities are considered;
- > Identifying actual and perceived barriers to cycling or walking; and
- > Producing appropriate maps, illustrating trip generators and attractors, as well as the existing infrastructure including off-road paths.

4.1.1.1 Results of the Survey

The saddle survey was conducted by Cardno staff on 9 December 2019 on the current Shared Paths of the Municipality with Council staff being invited to participate. An additional saddle survey was conducted on 01 May 2020 on the shared path within The Grange on Stuart Land Estate. This provided Cardno with valuable input and feedback for potential pedestrian and cycling infrastructure improvements, based on detailed local knowledge. Key observations that were highlighted include:

- > Clean the paths from debris and trim plants;
- > Missing signage and wayfinding information;
- > Missing connections between the network paths and activity centres; and
- > A greater need for provision of end of trip facilities (outside the scope of this investigation).

4.2 Litchfield Municipality Shared Path Network Review

The path network was reviewed in alignment with Austroads Guidelines and Development and Subdivision Standards from Litchfield Council as an integrated network to include connections to current paths, schools, and activity and tourist centres.

The existing infrastructure has been assessed with respect to its extent, sufficiency and quality. Issues, deficiencies and opportunities have also been described, as determined through saddle survey and path infrastructure inspections completed by Cardno, through discussions with the Council, and through a review of other policies and plans. The results of the saddle survey are presented in Appendix A sorted into separate tables for each of the study areas.

The location of the existing paths is presented in Appendix D.

4.2.1 Holtze and Knuckey Lagoon Areas

The Thorngate Road Shared Path currently connects from the NT Government owned Shared Path that runs parallel to Stuart Highway (linking between the city of Darwin to the west and Palmerston Regional Hospital and Whitewood Road to the south-east) to the main entrance of Robertson Barracks.

Table 4-1 Holtze and Knuckey Lagoon Areas current network

Council ID	Name	Road Name	Length (m)	Width (m)	Surface type	Year built
47404	Thorngate Road Foot Path 001	Thorngate Road	2293	2	Bitumen	-

4.2.2 Howard Springs Area

Howard Springs' Shared Path is comprised of 4225m of Concrete and Bitumen surface, with widths between 1m and 2.55m. The description of the paths and the network review are presented below.

Table 4-2 Howard Springs Area current network

Council ID	Name	Road Name	Length (m)	Width (m)	Surface type	Year built
45949	Nightjar Road Foot Path 001	Nightjar Road	250	1	Concrete	2016
47020	Smyth Road Foot Path 001	Smyth Road	51	1.2	Concrete	-
Varies	Whitewood Road Foot Path	Whitewood Road	3924	varies	varies	-

The existing path on Whitewood Rd connects the Howard Spring area to the existing Stuart Highway Arterial Shared Path which provides connection to Darwin and Palmerston. The schools in the area and Howard Park Reserve are also connected along this path. The figures in Appendix D show the existing path and the gaps in the network on Smyth Rd.

4.2.3 Coolalinga Area and Virginia Area

The Coolalinga Shared Path encompass Coolalinga Central and its surrounding subdivision. The total length of the current path is 3273m and path widths are between 1m and 2.2m. The following table presents the Shared Paths within the Coolalinga network.

Table 4-3 Coolalinga Area and Virginia Area current network

Council ID	Name	Road Name	Length (m)	Width (m)	Surface type	Year built
Varies	Biddlecombe Road Foot Path	Biddlecombe Road	140	1	Concrete	2016
Varies	Constant Street Foot Path	Constant Street	225	1.2	Concrete	2016
46556	Dili Court Foot Path	Dili Court	109	2	Concrete	2016
Varies	Fairweather Crescent Foot Path	Fairweather Crescent	1418	1.2 / 2.2	Concrete	-
Varies	Grice Crescent Foot Path	Grice Crescent	886	1.2 / 2.2	Concrete	2015
47030	Havelock Street Foot Path	Havelock Street	315	1.2	Concrete	2016
45951	Patsalou Road Foot Path	Patsalou Road	200	1	Concrete	2016

4.2.4 Girraween School Area

The Girraween Shared Path is largely provided to allow for connection to the Girraween Primary School. The following table presents the Shared Paths within the Girraween area network.

Table 4-4 Girraween school Area current network

Council ID	Name	Road Name	Length (m)	Width (m)	Surface type	Year built
47034	Anglesey Road Foot Path	Anglesey Road	145	2.2	Bitumen	2015
Varies	Carruth Road Foot Path	Carruth Road	279	1.5 / 2	Bitumen / Concrete	-
Varies	Girraween Road Foot Path	Girraween Road	1196	1.5 / 2.2	Bitumen	-
47012	Herkes Road Foot Path 001	Herkes Road	34	2	Bitumen	-

4.2.5 Humpty Doo Area

Humpty Doo Area currently has 2337m of Shared Paths on Challoner Circuit and Freds Pass Road. The location and extension of each section of the path is presented below.

Table 4-5 Humpty Doo Area current network

Council ID	Name	Road Name	Length (m)	Width (m)	Surface type	Year built
Varies	Challoner Circuit Foot Path	Challoner Circuit	509	1.5 / 2	Concrete	-
Varies	Freds Pass Road Foot Path	Freds Pass Road	1043	1	Bitumen / Concrete	-
Unknown	The Grange on Stuart	N/A	1420	1.2 / 2.5	Bitumen / Concrete	-

4.2.6 Berry Springs Areas Shared Path Network Review

At the time of this assessment, the Berry Springs Area does not currently have a Shared Path network.

5 Proposed Network Upgrades

The following network plans provide a series of recommendations for consideration by the Litchfield Council and is provided as additional information collected during the saddle surveys to better inform the current condition of the existing network and highlight any minor alterations that can be made to improve functionality and safety.

The proposed path network focuses on providing an integrated network to connect key trip attractors and land uses in the Municipality; under the basis that connectivity is related to the quality of a Shared Path network, describing the continuous nature of facilities or of the continuous nature of desired conditions. Cyclists and pedestrians need to be able to undertake and complete meaningful trips. This will be achieved by connecting the current paths and improving the network to provide linkage from residents' properties to the trip attractors both within each of the areas and in the surrounding areas.

The maps for the proposed connections for each area are presented in Appendix D.

5.1 Shared Path Hierarchy

The hierarchy for the proposed Shared Path network for Litchfield Municipality consist of Primary and Secondary paths as follows:

- > The Primary Network: consisting of key routes between key trip attractors. These routes would represent the 'spine' of the network and could be expected to be built to a higher standard. The operation of the primary network is much the same as the operation of a Sub-Arterial or Distributor Road classification (urban road) does for vehicles.
- > The Secondary Network: consisting of coverage routes, connecting users to the Primary network and providing a lower-order connectivity within the areas. These routes would tend to represent a general one-way bicycle path standard. The function of the secondary network is much the same as the operation of a Collector classification (urban road) does for vehicles.

In line with the above guidelines and standards, the following table presents the proposed widths and their uses for this planning study.

Table 5-1 Nominated Shared Path widths

	Shared Path width	Shared Path material
Primary Network	2.5	Asphalt
Secondary Network	1.5	Concrete

Austrroads specifies minimum width for Shared Paths as 2.5m, with the annotation that lesser widths should only be adopted where cyclists' volumes and operational speeds remain low. Cardno recognises that the secondary network will fulfil these requirements due to the location of the paths and the areas it will serve. Therefore, a Shared Path width of 1.5m will be sufficient to provide safe connectivity for users.

While not part of this study, it is noted that path networks within newer developments (for example the current development on Beaumont Road) appear to generally only have a 1.2m width. Although all paths are able to be used by both pedestrian and cyclists, these smaller width paths generally provide more of a pedestrian transport function and are not recognised as "Shared Paths" under the Austrroads definition. These paths operate similar to that of a Local road or Cul-de-sac classification (urban road) does for vehicles.

5.2 Holtze and Knuckey Lagoon Areas proposed connections

The majority of attraction points for Holtze and Knuckey Lagoon area are located in Palmerston. As the Shared Path on Thorngate Rd connects to Palmerston, cyclists and pedestrians can join Palmerston Shared Path network to access the desired locations.

The attraction points that are currently without path connections are Knuckey Lagoon Recreation Reserve and Thorak Regional Cemetery. In order to connect these points to the network, the existing Shared Path needs to be extended:

- > North on Thorngate Rd – Campbell Rd to the west to join the path starting on Campbell Rd / Lighthorse Dr and then north on Deloraine Rd to connect to the Thorak Regional Cemetery.
- > From Campbell Rd / Stevens Rd intersection extend the network north-west through Brandt Rd to connect to the main entrance of Knuckey Lagoon Recreation Reserve.

5.3 Howard Springs Area proposed connections

The existing Whitewood Road path has the potential to connect or expand the network through the additional Shared Path sections listed below. These additional linkages, will provide a greater level of access for surrounding residents to the Howards Springs shopping hub, including the surrounding facilities (Vet and restaurants) and public infrastructure (school).

- > North: Providing a Shared Path on Hamilton Rd will allow the connection of the wider residential area (along Madsen Road) to the main attraction points located around the Howard Springs shops. Further to this, it will connect Madsen Road to the existing Whitewood Road path network and this providing a greater level of connectivity to other areas / regions.
- > South: Connections to Coolalinga and Girraween areas (including the attractors within these areas) can be completed by expanding the network though Hicks Rd, Hillier Rd, Smyth Rd and Westall Rd. This would not only connect the areas but the residents between these two areas.

It has been identified that the table drains along Hillier Rd are generally located on one side of the road, with some sections having drains on both sides of the road. Additionally, there is an overhead power line on the opposite side of the road that would be required to be relocated to enable the construction of a Shared Path. Given this, there is a significantly greater construction costs associated with Shared Paths on Hillier road and other with a similar cross section. Due to the significant increase in costs due to the additional network changes that would be required (moving power lines to allow space for a Shared Path) the proposed priority of the Shared Paths on these roads should be further assessed.

- > East: The subdivisions located on the eastern part of Hicks Rd could be connected by providing secondary path networks along the main roads of each subdivision. Again, this would provide for a greater level of connectivity for residents within these areas.

5.4 Coolalinga and Virginia Area proposed connections

The Shared Path network described in the previous areas connects the Coolalinga area with the northern part of the network, thus providing access for the Howard Springs area to the Coolalinga area, including the main local attractor – the Coolalinga Central Shopping district.

Coolalinga and Virginia Areas could be connected to the south, east and west through the Shared Path connections listed below. Through these connections the Coolalinga path could connect to Howard Springs, Palmerston, Darwin city, and Humpty Doo area covering the attraction points along these routes.

- > Continuing the existing path that runs parallel to Stuart Hwy through to Freds Pass;
- > Stuart Hwy – Girraween Rd, connecting the area with Girraween Area;
- > From Stuart Hwy provide a Shared Path on Bees Creek Rd to connect Bees Creek Primary School, Sattler Christian College and Freds Pass Sport and Recreation Reserve. The path on Bees Creek Rd can continue to join the proposed path on Lowther Rd;
- > From Stuart Hwy provide a path along Lowther Rd and Virginia Rd and to provide Shared Path to the properties around the area provide a path along Fisher Rd - Dowling Rd - Booking Cct; and
- > To connect Coolalinga from the north-west to Virginia Area, the existing path on Stuart Hwy can be continued to join the proposed path on Virginia Rd.

It has been raised by the Council that the children's crossing on Sattler Crescent does not have a path connection on the opposite side of the road. A path is proposed to provide a greater connection to the surrounding area.

5.5 Girraween School Area proposed connections

The connection of Girraween School Area to the north, thus providing access to the regional trip attractors, could be possible through the proposed path along Carruth Rd and Hicks Rd and the connection with the surrounding residential properties can be completed by providing paths on Rogers Road and Wetherby Road.

Another potential connection to the northern part is through Girraween Lagoon. It has been identified that this track is within private property so Litchfield Council will need to investigate the feasibility of this connection.

The west would be directly connected by extending the existing path on Girraween Rd towards Coolalinga.

The southern part of Girraween School Area can be connected through Primary network paths along Anglesey Rd; and further connections through Pioneer Dr, Produce Rd and Wanderrie Rd. Although it is noted that there are table drains along some of these roads, the provision of paths to provide connectivity to the relative attraction points does require these paths to be constructed. As noted in previous sections, this could be accommodated by the reconstruction of sections of the table drains to provide an area for the Shared Path. It is noted that providing a path on Pioneer Dr would allow for the connection of the Humpty Doo Golf Club to the network through Norm Lane.

5.6 Humpty Doo Area proposed connections

Humpty Doo Area can be connected to the network through Shared Paths on the Arnhem Hwy. There is an existing path that runs from Power Rd to Edwin Rd. From each end, the existing path can be extended to connect to Stuart Hwy on the west and Kotska Rd on the east. From these paths, the network will be connected through to Power Rd and Produce Rd.

The path along Sayer Rd will provide connectivity to the McMinns Lagoon Reserve and Virginia Area.

The existing network is not connected on Humpty Doo Plaza between Challoner Circuit and Freds Pass Rd, so a Shared Path connecting the network is required.

Humpty Doo's southern residents could be connected through paths along: Freds Pass Rd, Goode Rd and Kotska Rd.

The path within the Grange on Stuart is not connected with the wider path network but it provides a path through a conservation area that is used by residents of the estate primarily for recreation. The path connects to the ends of Millar and Kelman Roads, which are both culs-de-sac, and to Risk Road.

5.7 Berry Springs Area proposed connections

As the land use for the area is mainly rural, the proposed path in the area is intended to connect Berry Springs Centre with Berry Springs Primary School. To connect the Berry Springs area with Litchfield's Shared Path network it would be required to provide a path parallel to Stuart Hwy – Cox Peninsula Rd. The total length of this path is about 22Km. This path could be considered for the long-term planning by Litchfield municipality, in conjunction with the NT Government (Stuart Highway connection).

5.8 Primary and Secondary Network Expansion

The follow tables present the proposed primary and secondary network upgrades detailed in the sections above. As noted above, the key purpose of these paths is to provide connection to the trip attractors within each of the study areas and to provide linkages between the study areas.

The corresponding maps for the proposed network are presented in Appendix D.

Table 5-2 provides a full list of the proposed Primary Network, including the proposed length. The proposed surface type for the primary network is asphalt and the proposed width is 2.5m.

Table 5-2 Proposed Primary Network

Area	Location	Approx. length (m)
Humpty Doo Area	Freds Pass Rd - Close gap	372
Humpty Doo Area	Arnhem Hwy between Edwin Rd and Kotska Rd (NTG owned land)	3129
Howard Springs Area	Smyth Rd - Whitewood Rd - Existing path	104
Howard Springs Area	Smyth Rd - Closing gap	47.5
Howard Springs Area	Smyth Road between Nightjar Rd and Barker Rd	618
Howard Springs Area	Smyth Road between Barker Rd and Westall Rd	630
Howard Springs Area	Whitewood Road between Hillier Rd and Schirmer Ct	196
Howard Springs Area	Whitewood Road between Madsen Rd and Hicks Rd	177
Howard Springs Area	Hicks Road between Compigne Rd and Good Shepherd School	1052
Howard Springs Area	Smyth Road between Westall Rd and the existing Coolalinga-Whitewood Rd track (Private land)	867
Howard Springs Area	Whitewood Road between Schirmer Ct and Madsen Rd	750
Howard Springs Area	Hicks Road between Whitewood Rd and Goy Rd	445
Howard Springs Area	Hicks Road between Watling Rd and Compigne Rd	1336
Howard Springs Area	Hillier Road between Barker Rd and Stanley Rd	264
Howard Springs Area	Hicks Road between Goy Rd and McGill Rd	763
Howard Springs Area	Hicks Road between McGill Rd and Watling Rd	1719
Howard Springs Area	Hillier Road between Whitewood Rd and Barker Rd	1142
Howard Springs Area	Hillier Road between Stanley Rd and Girraween Rd	1807
Howard Springs Area	Path connecting Westall Rd to existing Coolalinga-Whitewood Rd track (NTG owned land)	202
Howard Springs Area	Westall Rd between Whitewood Rd and Aken Rd	618
Howard Springs Area	Westall Rd between Aken Rd and Smyth Rd	1728
Girraween School Area	Anglesey Road between Girraween Rd and Florigon Rd	655
Girraween School Area	Produce Road between Pioneer Dr and Arnhem Hwy	2295
Girraween School Area	Carruth Rd	229
Girraween School Area	Power Road	1564
Girraween School Area	Pioneer Dr between Anglesey Road and Produce Road	755
Girraween School Area	Anglesey Road between Florigon Rd and Pioneer Dr	2552
Girraween School Area	Pioneer Dr between Anglesey Rd and Power Rd	2404
Girraween School Area	Pioneer Dr between Produce Rd and Norm Ln	2368
Girraween School Area	Pioneer Dr between Norm Ln and Wanderrie Rd	4051
Girraween School Area	Wanderrie Rd between Pioneer Dr and Nolan Rd	1651
Coolalinga and Virginia Areas	Girraween Rd - Freds Pass (NTG owned Land)	1554
Coolalinga and Virginia Areas	Girraween Road between Hillier Rd and Girraween Lagoon	2012
Coolalinga and Virginia Areas	Girraween Road between Girraween Lagoon and the existing path on Girraween Rd	1978
Coolalinga and Virginia Areas	Lowther Rd between Goodenia Dr and Stuart Hwy	2173
Coolalinga and Virginia Areas	Girraween Road between Coolalinga Area and Hillier Rd	1306
Coolalinga and Virginia Areas	Virginia Rd Between Fisher Rd and Bilby Rd	1369
Coolalinga and Virginia Areas	Virginia Rd Between Bilby Rd and Stuart Hwy	1917
Coolalinga and Virginia Areas	Stuart Hwy Coolalinga-Virginia (NTG owned Land)	1210
Coolalinga and Virginia Areas	Virginia Rd Between Lowther Rd and Fisher Rd	1002
Coolalinga and Virginia Areas	Coolalinga- Whitewood Rd to Girraween Rd (NTG owned Land)	1248
Coolalinga and Virginia Areas	Lowther Rd between Virginia Rd and Goodenia Dr	2069
Berry Springs Area	Cox Peninsula Rd (NTG owned Land)	3991

Table 5-3 provides a full list of the proposed Secondary Network, including the proposed length. The proposed surface type for the secondary network is concrete and the proposed width is 1.5m.

Table 5-3 Proposed Secondary Network

Area	Location	Approx. length (m)
Humpty Doo Area	Freds Pass Rd	4478
Humpty Doo Area	Sayer Rd	2439
Humpty Doo Area	Goode Rd	3496
Humpty Doo Area	Kotska Rd	8244
Howard Springs Area	Hamilton Rd	496
Howard Springs Area	Madsen Rd	4295
Howard Springs Area	Aken Rod - Stow Rd	461
Howard Springs Area	Cornelius Rd	2334
Howard Springs Area	Goy Rd	1223
Howard Springs Area	Thornbill Crescent	934
Howard Springs Area	Sittella Rd	1066
Howard Springs Area	Watling Rd	2919
Howard Springs Area	Currawong Dr	1481
Howard Springs Area	Corella Av	1476
Holtze and Knuckey Lagoon Area	Brandt Rd	1020
Holtze and Knuckey Lagoon Area	Deloraine Rd	1034
Holtze and Knuckey Lagoon Area	Thorngate Rd-Campbell Rd	2097
Girraween School Area	Rogers Circuit	918
Girraween School Area	Wetherby Rd	942
Girraween School Area	Girraween Lagoon	2312
Girraween School Area	Norm Ln	834
Girraween School Area	Bridgemaury Cr	2406
Girraween School Area	Woodcote Cr	2690
Coolalinga and Virginia Areas	Sattler Christian College	141
Coolalinga and Virginia Areas	Stuart Highway - Girraween Rd	637
Coolalinga and Virginia Areas	Bees Creek Rd - Stuart Hwy - Sattler Cr	718
Coolalinga and Virginia Areas	Bees Creek- Sattler Cr - Lowther Rd	1795
Coolalinga and Virginia Areas	Jacomb Pl	620
Coolalinga and Virginia Areas	London Rd	933
Coolalinga and Virginia Areas	Fancesca Circuit	1013
Coolalinga and Virginia Areas	Fisher Rd - Dowling Rd - Booking Cct	3189

5.9 Consultation

During the development stage of this Shared Path plan, Cardno were advised of communications to Council about sections of path to be considered as part of the study. A summary of these paths and commentary around their suitability is provided below:

- > Shared Path extensions – Girraween Road. As a separate off-road addition or as a road shoulder extension or combination of both.

An additional 2.5m wide Shared Path connecting from the existing path on Girraween Road to the Stuart Highway has been detailed within the proposed path developments.

- > A footpath past houses on Whitewood Road (Hillier to Hicks)

An additional 2.5m wide Shared Path connecting from the existing path on Whitewood Road to Hicks Road has been detailed within the proposed path developments.

- > Footpaths along south side of Whitewood Road from Hamilton Road to the HS Vet

This path section has not been included as a proposed development as there is an existing path which provides linkage to this area. Should the development of the area in the future provide a need for a path network on both sides of Whitewood Road, this could be further investigated.

- > Footpaths along western side of Smythe Road from Thai Restaurant to HS Shops

The linkage that would be achieved by the requested section of path is achieved by the proposed connection of the existing path in front of the Vet to Whitewood Road and to the existing Nightjar Road Path. For the same reasons noted above, the provision of a path on both sides of Smyth Road is not currently nominated however may be investigated further in the future.

6 Implementation Programme

To allow for the assessment and grading of both the existing paths with defects and the proposed new path sections, a scoring matrix was developed. This matrix assessed each of the nominated path sections against criteria which is considered to provide value to the community and provided a ranking of High, Medium or Low for each path section. These rankings were then scored with High being worth 3, Medium being worth 2 and Low being worth 1, with the corresponding score providing a level of importance for the development of the path sections. The full list of assessment criteria is:

Table 6-1 Assessment Matrix Criteria

Criteria	Scoring	Comments
Safety	Existing path in good condition – Low Existing path requiring maintenance – Med Existing Path with defects / no path - High	
Improved Connectivity	Less than 10 lots connected - Low 10 to 50 lots connected – Med Greater than 50 lots - High	*note this refers to the wider network and not just the immediate vicinity of the path
Bus Stop connection	No bus / Route used by buses – Low Single bus stop on /near route – Med More than 1 bus stop - High	For Primary paths where a length of road (eg Whitewood) has been split up into sections to reduce the cost, the assessment of this criteria has viewed the whole length and not just the section assessed
Identified in the Area plan	Not within area plan – Low Within Area plan but not referenced – Med Referenced in Area plan - High	Items which are 'referenced in the area plan' refer to where roads have been nominated for development. This is given a higher priority as these roads are identified as key infrastructure with the path network being considered equally important
Attractor – Health and Medical	No linkage provided – Low Provide indirect linkage – Med Provide direct linkage - High	
Attractor – Education	No linkage provided – Low Provide indirect linkage – Med Provide direct linkage - High	
Attractor – Rec/Tourism	No linkage provided – Low Provide indirect linkage – Med Provide direct linkage - High	
Attractor – Civic/commercial	No linkage provided – Low Provide indirect linkage – Med Provide direct linkage - High	
Network importance	Secondary – Low Primary - High	
Cost	> 300k – Low > 100k, <300k – Med < 100k - High	Refer to Cost section for further details on how these items have been generated.

It is noted that only the safety criteria has been used to determine the importance of existing paths with defects and so these should be viewed separately to the proposed path network assessments.

6.2 Summary of assessment

The full detailed assessment has been included as Appendix B however the following section provides a summary of the highest rated items.

6.2.1 Existing network

A review of the Priorities Assessment Matrix has identified that the following items should be completed initially to rectify the highest priority defects. Following this, the remainder of the list can be reviewed with upgrades being completed as funding allows.

> Nightjar / Macleod Rd intersection

There is currently no continuation of the Shared Path and it ends abruptly at a drainage channel. To rectify, construct continuation of Shared Path or if this is not completed in the short term, install safety barrier and signage.

> 430 Whitewood Rd

Existing overgrowth of plants is obstructing the path with sharp branches at eye level. To rectify, trim the plants back to the property boundary.

> Whitewood Rd / Hillier Rd intersection

The existing drainage adjacent the path presents a hazard. Construct safety barrier to protect cyclists and pedestrians.

> 376 Whitewood Rd.

> The existing drainage adjacent the path presents a hazard. Construct safety barrier to protect cyclists and pedestrians.

> Girraween Rd / Rogers Rd intersection.

> The existing drainage adjacent the path presents a hazard. Construct safety barrier to protect cyclists and pedestrians.

6.2.2 Proposed network

Similar to the existing network, the following items represent the sections of the proposed new networks which the Priorities Assessment Matrix has identified should be prioritised.

> Smyth Rd - Whitewood Rd - Existing path

Continuation of Shared Path on Smyth Rd between Whitewood Rd and existing Smyth Rd path (in front of Vets).

> Smyth Rd - Closing gap

Install new path to close the gap between the existing network and Nightjar Rd.

> Freds Pass Rd - Close gap

Missing connection. Continuation of the current path up to Freds Pass Rd.

7 Cost Planning

In line with the nominated primary and secondary Shared Path network upgrades, Cardno have prepared an estimate of costs based on a square meter rate for construction of concrete / asphalt paths. A summary of the assumptions used when preparing this estimate are:

- Only preparation of subgrade, base and path construction have been allowed for;
- No allowance for site survey, contingency or escalation has been made;
- Costs for the remediation of the defects highlighted from the saddle survey have not been provided;
- No allowance has been made for additional infrastructure that may be required to allow for the construction of the Shared Path (e.g. floodway crossings); and
- The estimate has been completed assuming a 100mm concrete path with SL72 mesh or a 30mm thick asphalt, both with a 150mm thick base.

Due to the nominated lengths, the cost for construction of proposed paths is significantly higher than the likely available budgets nominated by the Litchfield Council staff. For this reason, it has not been possible to provide groupings of nominated path lengths that would be able to be tendered and constructed as part of a yearly program of works. Given the large costs, it is likely that Territory or Federal government grants funding for capital infrastructure developments will be required to enable the completion of the nominated high priority works, should the Council wish to complete these works in the short term.

As an alternative to the construction of paths by Council, additional subdivision guidelines could be implemented to require the construction of path sections during the development of parcels of land adjacent to those sections of road which have been nominated as either high priority or being required to form part of the primary network.

A cost table for each of the sections of nominated Shared Path is provided in Appendix C.

8 Conclusion

The provision of an accessible and functional Shared Path network provides many key benefits to communities including:

- Increasing the use of bicycles / pedestrian movement as a commuter form of transport leading to a reduction in vehicles on the road, hence reducing congestion (although not a significant issue in the Litchfield municipality) and road maintenance requirements;
- Aligns with the outcomes of the Detailed Strategy for the Litchfield Municipality;
- General health benefits due to an increase in active lifestyles; and
- Potential for reduction in serious crashes due to recreational and commuter cyclists and pedestrians travelling away from roads thus reducing their interactions with vehicles.



While Shared Path infrastructure can provide these benefits (and others), it is noted that, due to remoteness of the municipality, greater lengths of path are required to provide connectivity to a similar number of people when compared to areas that have a higher population density. For this reason, the costs may make short term development of large sections of path unfeasible. It is proposed Council focuses on initially remediating those areas highlighted in the saddle survey and then progressively installing the priority network to provide greater linkages in and around the municipality.




APPENDIX

A

SADDLE SURVEY OUTCOMES

Figure A-1 Howard Springs Area. Existing Path Issues, Opportunities and Recommendations – assessment date 9/12/2019

No.	Location	Issue	Image	Recommended Outcome
1	225 and 205 Whitewood Rd	Width change		Install a barrier to protect users from leaving the path
2	Whitewood Rd between Stow Rd and Kundook PI	Cracks in the path		Monitor cracking and replace when required



No.	Location	Issue	Image	Recommended Outcome
3	Smyth Rd - whitewood Rd -existing path	No continuation of Shared Path		Continuation of Shared Path on Smyth Rd between Whitewood Rd and existing Smyth Rd path (in front of Vets)
4	Smyth Rd - closing gap	No continuation of Shared Path		Install new path to close the gap between the existing network and Whitewood Rd
5	Nightjar / Macleod Rd intersection	No continuation of shared path and concrete drainage		Construct continuation of Shared Path or if this is not completed in the short term, install safety barrier and signage.




No.	Location	Issue	Image	Recommended Outcome
6	Whitewood Rd between Smyth Rd and Hamilton Rd	Cracks in the path		Monitor cracking and replace when required
7	Whitewood Rd / Hamilton Rd intersection	No alignment on paths		<p>Align path such that pedestrians and cyclists are provided with a direct route across the side road.</p> <p>Sweep off loose material and monitor following storm events</p>
8	376 Whitewood Rd	Concrete Drainage		Construct safety barrier to protect cyclists and pedestrians




No.	Location	Issue	Image	Recommended Outcome
9	430 Whitewood Rd	Plants obstructing path. Sharp branches at eye level		Trim plants




No.	Location	Issue	Image	Recommended Outcome
10	Whitewood Rd / Hillier Rd intersection	Concrete Drainage		Construct safety barrier to protect cyclists and pedestrians



Figure A-2 Coolalinga and Virginia Areas Existing Path Issues, Opportunities and Recommendations – assessment date 9/12/2019

No.	Location	Issue	Image	Recommended Outcome
1	Fairweather Cr between Stuart Hwy and Grice Cres	No continuation of Shared Path		Install wayfinding signage at Fairweather Cr and Stuart Hwy intersection indicating crossing point or continuation of the path to connect to Fairweather Cres between Constants St and Grice Cres
2	Fairweather Cr between Stuart Hwy and Grice Cres	Concrete path requires servicing and cracks in the path		Monitor cracking and replace when required Repair damages section of path.

No.	Location	Issue	Image	Recommended Outcome
3	Biddlecombe Rd	Loose material on path		Sweep off loose material and monitor following storm events
4	Patsalou Rd	Loose material on path		Sweep off loose material and monitor following storm events
5	Grice Cres between Biddlecombe Rd and Dili Ct	Sewer manhole above the path level		Reconstruct path to tie in with sewer pit lid

No.	Location	Issue	Image	Recommended Outcome
6	Grice Cres between Biddlecombe Rd and Dili Ct	Plants obstructing path on approach to Dili Ct		Trim plants
7	Dili Ct	Plants obstructing path		Trim plants
8	Grice Cres between Dili Ct and Grice Cres	Cracked path		Monitor path and if cracking deteriorates, replace path section.

No.	Location	Issue	Image	Recommended Outcome
9	Fairweather Cres between Grice Cres and Stuart Hwy	Sewer manhole above the path level		Reconstruct path to tie in with sewer pit lid
10	Fairweather Cres between Grice Cres and Stuart Hwy	Step in path		Re-work concrete section to remove step
11	Fairweather Cres between Grice Cres and Constant St	Valve Box uneven surface		Recast in lids to be flush with path

No.	Location	Issue	Image	Recommended Outcome
12	Fairweather Cres between Grice Cres and Constant St	Poor visibility to carpark access		Signage for path users and 'Watch for bicycles' sign for drivers and trim plants to improve sight distance.
13	Fairweather Cres between Grice Cres and Constant St	No continuation of Shared Path nor crossing point		Provide a crossing point to connect to the existing path on the opposite side of the road or continuation of the path to connect to Fairweather Cres between Stuart Hwy and Grice Cres








No.	Location	Issue	Image	Recommended Outcome
14	Fairweather Cres between Grice Cres and Constant St	Concrete path requires servicing		Repair damaged concrete section to return path to full width.

Figure A-3 Girraween School Area Existing Path Issues, Opportunities and Recommendations – assessment date 9/12/2019

No.	Location	Issue	Image	Recommended Outcome
1	Carruth Rd between Herkes Rd and School drop off zone entrance	No continuation of Shared Path		Implement continuation of Shared Path
2	Herkes Rd	Loose material on path		Sweep off loose material and monitor following storm events
3	Girraween Rd between Carruth and Hicks Rd	Loose material on path		Sweep off loose material and monitor following storm events

No.	Location	Issue	Image	Recommended Outcome
4	Hicks Rd	No continuation of path		Opportunity for Future connection
5	Girraween Rd East bound	No continuation of path		Opportunity for Future connection
6	Anglesey Rd	No continuation of path		Opportunity for Future connection









No.	Location	Issue	Image	Recommended Outcome
7	Girraween Rd	Cracked path		Monitor cracking and replace when required
8	Girraween Rd / Rogers Rd intersection	Concrete Drainage		Construct safety barrier to protect cyclists and pedestrians from drain hazard

Figure A-4 Humpty Doo Area Existing Path Issues, Opportunities and Recommendations – assessment date 9/12/2019

No.	Location	Issue	Image	Recommended Outcome
1	Beaumont Rd	No continuation of path (subdivision)		Opportunity for Future connection
2	Freds Pass Rd	Poor condition of path between Challoner Cct (West) and Arnhem Hwy		Replace path. *It is noted that the adjacent parcel of land is currently being assessed from a master planning perspective to provide a future community facility. The outcomes of this assessment shall inform the requirement to replace the path.
3	Challoner Cct (East) / Freds Pass Rd	Missing connection		Construct continuation of the current path up to Freds Pass Rd




No.	Location	Issue	Image	Recommended Outcome
4	Freds Pass Rd between Challoner Cct (West) and Beaumont Rd	Concrete Drainage		Construct safety barrier to protect cyclists and pedestrians
5	The Grange on Stuart. Between Millar Rd and Risk Rd- Northern path	U-barrier fences 1m separation, not enough clearance for maneuvers for bikes or users with disability. Plants obstructing path. Loose material on path. Cracks along the path.		Increase the distance between U-barrier fences to 3m. Trim plants. Sweep off loose material and monitor following storm events

No.	Location	Issue	Image	Recommended Outcome
				

No.	Location	Issue	Image	Recommended Outcome
6	The Grange on Stuart between Northern and Southern path	Culvert headwalls adjacent the path	 <p>The image block contains three photographs. The top photo shows a close-up of a concrete culvert headwall with two circular openings, situated in a wooded area with a dirt path leading to it. The middle photo shows a long, straight dirt path flanked by dense trees and vegetation, with a small stream or ditch on either side. The bottom photo shows a close-up of the culvert structure, highlighting the concrete headwall and the surrounding earth and roots.</p>	Construct safety barrier to protect cyclists and pedestrians

No.	Location	Issue	Image	Recommended Outcome
7	The Grange on Stuart Rd between Kelman Rd and Risk Rd- Southern path	<p>U-barrier fences only provide 1m separation which is inadequate clearance for maneuvers for bicycles and some other users.</p> <p>Loose material on path</p>		<p>Increase the distance between U-barrier fences to 3m.</p> <p>Sweep off loose material and monitor following storm events. Material appears to be settling in a low spot in the path following rain event. Potential for installation of cross flow drainage and raising the path.</p>

Figure A-5 Holtze Area Existing Path Issues, Opportunities and Recommendations – assessment date 9/12/2019

No.	Location	Issue	Image	Recommended Outcome
1	Thorngate Rd existing path	Culvert headwalls adjacent the path (approx. 6 along the current alignment)		Construct safety barrier to protect cyclists and pedestrians
2	Thorngate Rd / Glendower Rd intersection	Telecommunications pit protruding from path surface		Reconstruct pit to tie in with path level
3	Thorngate Rd / Robertson Barracks fence (south bound)	Concrete Drainage		Construct safety barrier to protect cyclists and pedestrians

No.	Location	Issue	Image	Recommended Outcome
4	Thorngate Rd	Insufficient signage at the road crossing points.		Install 'road ahead' warning signage on both approaches to the road
5	Thorngate Rd existing path	Cracks along the path.		Monitor cracking and replace when required
6	Thorngate Rd - various points	Loose soil across path		Sweep off loose material and monitor following storm events

Shared Path Plan

APPENDIX

B

ASSESSMENT MATRIX

Table B1 - Existing Path Priority list (sorted by Priority)

Area	Location	Work Details	Work Type	Path Type / Hierarchy	Constraints / Comments	Image Ref No (where relevant)	Priority Considerations										TOTAL
							Safety	Improve connectivity (encourage use)	Bus Stop connection	Area plan identified	Community Attractor - Health and Medical	Community Attractor - Education	Community Attractor - Rec/Tourism	Community Attractor - Civic/commercial	Network Importance	Cost	
Howard Springs Area	Smyth Rd - Whitewood Rd - Existing path	Continuation of Shared Path on Smyth Rd between Whitewood Rd and existing Smyth Rd path (in front of Vets)	New	Proposed primary network		IMG 8362	High	High	Medium	High	High	High	High	High	High	High	29
Howard Springs Area	Smyth Rd - Closing gap	Install new path to close the gap between the existing network and Nightjar Rd	New	Proposed primary network		IMG 8364	High	High	Medium	High	High	High	High	High	High	High	29
Humpty Doo Area	Freds Pass Rd - Close gap	Missing connection. Continuation of the current path up to Freds Pass Rd	New	Proposed primary network		IMG 8392	High	Medium	Medium	High	High	High	High	High	High	Medium	27
Coolalinga and Virginia Areas	Sattler Christian College	Install new path to provide connection to students and users	New	Proposed secondary network			High	Medium	Medium	High	Low	High	High	High	High	Low	24
Howard Springs Area	Smyth Road between Nightjar Rd and Barker Rd	Install new path to connect to Whitewood Rd and the services around the area. It will also connect to the existing Coolalinga-Whitewood Rd track	New	Proposed primary network			High	High	Low	High	Medium	Medium	Medium	High	High	Medium	24
Howard Springs Area	Smyth Road between Barker Rd and Westall Rd	Install new path to connect to Whitewood Rd and the services around the area. It will also connect to the existing Coolalinga-Whitewood Rd track	New	Proposed primary network			High	High	Low	High	Medium	Medium	Medium	High	High	Medium	24
Howard Springs Area	Whitewood Road between Hillier Rd and Schirmer Ct	Install new path connecting the existing path on Whitewood Rd to Schirmer Ct	New	Proposed primary network			High	Medium	Low	High	Medium	Medium	Medium	High	High	High	23
Howard Springs Area	Whitewood Road between Madsen Rd and Hicks Rd	Install new path to connect to Hicks Rd	New	Proposed primary network			High	Medium	Low	High	Medium	Medium	Medium	High	High	High	23
Berry Springs Area	Cox Peninsula Rd	Install new path to connect Berry Springs Primary School and the recreation reserve to the commercial area	New	Proposed primary network	NTG owned land		High	Low	Low	High	High	High	Medium	Medium	High	Low	22
Coolalinga and Virginia Areas	Stuart Highway - Girraween Rd	Install new path to connect Coolalinga area to Girraween Rd	New	Proposed secondary network	NTG owned land		High	Medium	High	Low	High	Low	High	High	High	Low	22
Coolalinga and Virginia Areas	Bees Creek Rd - Stuart Hwy - Sattler Cr	Install new path to connect Stuart Hwy to Bees Creek Primary School, Sattler Christian College, Freds Pass Sport and Recreation, and Litchfield Council offices	New	Proposed secondary network			High	Medium	Low	High	Low	High	High	High	High	Low	22
Coolalinga and Virginia Areas	Girraween Rd - Freds Pass	Install new path to connect Coolalinga area and Girraween Rd to Freds Pass and its services	New	Proposed primary network	NTG owned land		High	High	Low	High	Low	High	High	High	Low	High	22
Coolalinga and Virginia Areas	Girraween Road between Hillier Rd and Girraween Lagoon	Install new path to connect Coolalinga area through Girraween Rd	New	Proposed primary network			High	Medium	Low	High	Medium	Medium	High	Medium	High	Low	22
Coolalinga and Virginia Areas	Girraween Road between Girraween Lagoon and the existing path on Girraween Rd	Install new path to connect the existing path on Girraween Rd to Girraween Lagoon and Coolalinga Area	New	Proposed primary network			High	Medium	Medium	High	Medium	Medium	Medium	Medium	High	Low	22
Howard Springs Area	Hicks Road between Compigne Rd and Good Shepherd School	Install new path to connect to Whitewood Rd and to provide connectivity to Good Shepherd School	New	Proposed primary network			High	High	Low	High	Medium	Medium	Medium	Medium	High	Low	22
Howard Springs Area	Smyth Road between Westall Rd and the existing Coolalinga-Whitewood Rd track	Install new path to connect to Whitewood Rd and the services around the area. It will also connect to the existing Coolalinga-Whitewood Rd track	New	Proposed primary network	Private land		High	High	Low	High	Medium	Medium	Medium	Medium	High	Low	22
Howard Springs Area	Hamilton Rd	Install new path to connect Whitewood Rd to the north	New	Proposed secondary network			High	High	Medium	High	Medium	Medium	Medium	Medium	Low	Medium	22
Coolalinga and Virginia Areas	Bees Creek- Sattler Cr - Lowther Rd	Install new path to connect to Lowther Rd	New	Proposed secondary network			High	Medium	Low	High	Low	High	High	High	Low	Low	21
Coolalinga and Virginia Areas	Lowther Rd between Goodenia Dr and Stuart Hwy	Install new path to connect Goodenia Dr to Stuart Hwy	New	Proposed primary network			High	Medium	High	Medium	Low	Medium	High	High	High	Low	21
Girraween School Area	Anglesey Road between Girraween Rd and Florigon Rd	Install new path to connect the existing path on Girraween Rd to Florigon Rd	New	Proposed primary network			High	High	Medium	High	Low	High	Low	Low	High	Low	21
Howard Springs Area	Whitewood Road between Schirmer Ct and Madsen Rd	Install new path to connect to Madsen Rd	New	Proposed primary network			High	Medium	Low	High	Medium	Medium	Medium	Medium	High	Low	21
Howard Springs Area	Madsen Rd	Install new path to connect Stow Rd to Whitewood Rd	New	Proposed secondary network			High	High	Medium	High	Medium	Medium	Medium	Medium	Low	Low	21
Howard Springs Area	Hicks Road between Whitewood Rd and Goy Rd	Install new path to connect to Whitewood Rd and to provide connectivity to Good Shepherd School	New	Proposed primary network			High	High	Low	Low	Medium	Medium	Medium	Medium	High	Medium	21
Howard Springs Area	Hicks Road between Watling Rd and Compigne Rd	Install new path to connect to Whitewood Rd and to provide connectivity to Good Shepherd School	New	Proposed primary network			High	High	Low	Medium	Medium	Medium	Medium	Medium	High	Low	21
Howard Springs Area	Hillier Road between Barker Rd and Stanley Rd	Install new path to provide connectivity between Whitewood Rd and Girraween Rd and to provide connectivity to the bus stop located on Hillier Rd	New	Proposed primary network	Road Cross section will prevent path development		High	Medium	Medium	Low	Medium	Medium	Medium	Medium	High	Medium	21
Coolalinga and Virginia Areas	Girraween Road between Coolalinga Area and Hillier Rd	Install new path to connect Coolalinga area through Girraween Rd	New	Proposed primary network			High	Medium	Low	Medium	Medium	Medium	Medium	Medium	High	Low	20
Coolalinga and Virginia Areas	Virginia Rd Between Fisher Rd and Bilby Rd	Install new path to connect Fisher Rd to Bilby Rd	New	Proposed primary network			High	Medium	High	Low	Medium	Low	Medium	Medium	High	Low	20
Coolalinga and Virginia Areas	Virginia Rd Between Bilby Rd and Stuart Hwy	Install new path to connect Bilby Rd to Stuart Hwy	New	Proposed primary network			High	Medium	High	Low	Medium	Low	Medium	Medium	High	Low	20
Coolalinga and Virginia Areas	Stuart Hwy Coolalinga-Virginia Area	Install new path to connect Virginia area to Coolalinga Area	New	Proposed primary network	NTG owned land		High	Medium	High	Low	Medium	Low	Medium	Medium	High	Low	20
Girraween School Area	Produce Road between Pioneer Dr and Arnhem Hwy	Install new path to connect to the existing path on Humpty Doo Area	New	Proposed primary network			High	High	Medium	Low	Low	Medium	Medium	Medium	High	Low	20
Howard Springs Area	Hicks Road between Goy Rd and McGill Rd	Install new path to connect to Whitewood Rd and to provide connectivity to Good Shepherd School	New	Proposed primary network			High	High	Low	Low	Medium	Medium	Medium	Medium	High	Low	20
Howard Springs Area	Hicks Road between McGill Rd and Watling Rd	Install new path to connect to Whitewood Rd and to provide connectivity to Good Shepherd School	New	Proposed primary network			High	High	Low	Low	Medium	Medium	Medium	Medium	High	Low	20
Howard Springs Area	Hillier Road between Whitewood Rd and Barker Rd	Install new path to provide connectivity between Whitewood Rd and Girraween Rd and to provide connectivity to the bus stop located on Hillier Rd	New	Proposed primary network	Road Cross section will prevent path development		High	Medium	Medium	Low	Medium	Medium	Medium	Medium	High	Low	20
Howard Springs Area	Hillier Road between Stanley Rd and Girraween Rd	Install new path to provide connectivity between Whitewood Rd and Girraween Rd and to provide connectivity to the bus stop located on Hillier Rd	New	Proposed primary network	Road Cross section will prevent path development		High	Medium	Medium	Low	Medium	Medium	Medium	Medium	High	Low	20
Howard Springs Area	Path connecting Westall Rd to existing Coolalinga-Whitewood Rd track	Install new path to connect Westall Rd to existing Coolalinga-Whitewood Rd track	New	Proposed primary network	NTG owned land		High	High	Low	Low	Medium	Low	Medium	Low	High	High	20
Coolalinga and Virginia Areas	Virginia Rd Between Lowther Rd and Fisher Rd	Install new path to connect Lowther Rd to Fisher Rd	New	Proposed primary network			High	Medium	Medium	Low	Low	Medium	Medium	Medium	High	Low	19
Coolalinga and Virginia Areas	Coolalinga- Whitewood Rd to Girraween Rd	Install new path to connect the existing Coolalinga-Whitewood Rd track to Girraween Rd	New	Proposed primary network	NTG owned land		High	High	Low	Low	Medium	Low	Medium	Medium	High	Low	19
Girraween School Area	Carruth Rd	Install new path to connect Girraween school to the proposed path on Hicks Rd	New	Proposed primary network			High	Medium	Low	Medium	Low	High	Low	Low	High	Medium	19
Girraween School Area	Power Road	Install new path to connect to the existing path on Humpty Doo Area	New	Proposed primary network	Subject to outcomes of the area plans and other ongoing studies.		High	Medium	Medium	Low	Low	Medium	Medium	Medium	High	Low	19
Humpty Doo Area	Freds Pass Rd	Install new path to connect the suburb to the existing network	New	Proposed secondary network			High	High	Low	Medium	Low	High	High	Low	Low	Low	19
Coolalinga and Virginia Areas	Lowther Rd between Virginia Rd and Goodenia Dr	Install new path to provide connectivity to the existing bus stops	New	Proposed primary network			High	Medium	High	Medium	Low	Low	Low	Low	High	Low	18
Girraween School Area	Pioneer Dr between Anglesey Road and Produce Road	Install new path to connect the proposed paths on Pioneer Dr, Anglesey Rd and Produce Rd	New	Proposed primary network			High	High	Medium	Low	Low	Low	Medium	Low	High	Low	18
Girraween School Area	Rogers Circuit	Install new path to connect to the existing network on Girraween Rd	New	Proposed secondary network			High	Medium	Medium	Medium	Low	High	Low	Low	Low	Medium	18
Girraween School Area	Anglesey Road between Florigon Rd and Pioneer Dr	Install new path to connect to Girraween Rd and Pioneer Dr	New	Proposed primary network			High	High	Low	Medium	Low	Medium	Low	Low	High	Low	18
Howard Springs Area	Westall Rd between Whitewood Rd and Aken Rd	Install new path to connect to Whitewood Rd	New	Proposed primary network			High	Medium	Low	Low	Low	Medium	Medium	Low	High	Medium	18
Girraween School Area	Pioneer Dr between Anglesey Rd and Power Rd	Install new path to connect Pioneer Dr between Anglesey Rd and Power Rd	New	Proposed primary network			High	Medium	Medium	Low	Low	Low	Medium	Low	High	Low	17
Humpty Doo Area	Arnhem Hwy between Edwin Rd and Kotska Rd	Install new path to connect Arnhem Hwy between Edwin Rd and Kotska Rd	New	Proposed primary network	NTG owned land		High	Medium	Medium	Low	Low	Low	Medium	Low	High	Low	17
Girraween School Area	Wetherby Rd	Install new path to connect to Rogers Circuit	New	Proposed secondary network			High	Medium	Low	Low	Low	High	Low	Low	Low	Medium	16
Girraween School Area	Girraween Lagoon	Install new path to connect Hicks Rd to Girraween Rd	New	Proposed secondary network	Private land		High	Medium	Low	Low	Low	Medium	High	Low	Low	Low	16
Girraween School Area	Norm Ln	Install new path to connect to Humpty Doo Rural Area Golf Club	New	Proposed secondary network			High	Medium	Low	Low	Low	Low	High	Low	Low	Medium	16
Girraween School Area	Pioneer Dr between Produce Rd and Norm Ln	Install new path to connect Pioneer Dr between Produce Rd and Norm Ln	New	Proposed primary network			High	Medium	Medium	Low	Low	Low	Low	Low	High	Low	16
Holtze and Knuckey Lagoon Area	Brandt Rd	Install new path to connect to Knuckey Lagoon Recreational Reserve	New	Proposed secondary network			High	Medium	Low	Low	Low	Low	High	Low	Low	Medium	16

Shared Path Plan

APPENDIX

C

COST TABLES

Area	Location	Path Material	Path Width (m)	Approx. length (m)	Estimated Cost
Humpty Doo Area	Freds Pass Rd - Close gap	Asphalt	2.5	372	\$ 172,422.00
Humpty Doo Area	Freds Pass Rd	Concrete	1.5	4478	\$ 1,106,961.60
Humpty Doo Area	Arnhem Hwy between Edwin Rd and Kotska Rd	Asphalt	2.5	3129	\$ 1,450,291.50
Humpty Doo Area	Sayer Rd	Concrete	1.5	2439	\$ 602,920.80
Humpty Doo Area	Goode Rd	Concrete	1.5	3496	\$ 864,211.20
Humpty Doo Area	Kotska Rd	Concrete	1.5	8244	\$ 2,037,916.80
Howard Springs Area	Smyth Rd - Whitewood Rd - Existing path	Asphalt	2.5	104	\$ 48,204.00
Howard Springs Area	Smyth Rd - Closing gap	Asphalt	2.5	47.5	\$ 22,016.25
Howard Springs Area	Smyth Road between Nightjar Rd and Barker Rd	Asphalt	2.5	618	\$ 286,443.00
Howard Springs Area	Smyth Road between Barker Rd and Westall Rd	Asphalt	2.5	630	\$ 292,005.00
Howard Springs Area	Whitewood Road between Hillier Rd and Schirmer Ct	Asphalt	2.5	196	\$ 90,846.00
Howard Springs Area	Whitewood Road between Madsen Rd and Hicks Rd	Asphalt	2.5	177	\$ 82,039.50
Howard Springs Area	Hicks Road between Compigne Rd and Good Shepherd School	Asphalt	2.5	1052	\$ 487,602.00
Howard Springs Area	Smyth Road between Westall Rd and the existing Coolalinga-Whitewood Rd track	Asphalt	2.5	867	\$ 401,854.50
Howard Springs Area	Hamilton Rd	Concrete	1.5	496	\$ 122,611.20
Howard Springs Area	Whitewood Road between Schirmer Ct and Madsen Rd	Asphalt	2.5	750	\$ 347,625.00
Howard Springs Area	Madsen Rd	Concrete	1.5	4295	\$ 1,061,724.00
Howard Springs Area	Hicks Road between Whitewood Rd and Goy Rd	Asphalt	2.5	445	\$ 206,257.50
Howard Springs Area	Hicks Road between Watling Rd and Compigne Rd	Asphalt	2.5	1336	\$ 619,236.00
Howard Springs Area	Hillier Road between Barker Rd and Stanley Rd	Asphalt	2.5	264	\$ 122,364.00
Howard Springs Area	Hicks Road between Goy Rd and McGill Rd	Asphalt	2.5	763	\$ 353,650.50
Howard Springs Area	Hicks Road between McGill Rd and Watling Rd	Asphalt	2.5	1719	\$ 796,756.50
Howard Springs Area	Hillier Road between Whitewood Rd and Barker Rd	Asphalt	2.5	1142	\$ 529,317.00
Howard Springs Area	Hillier Road between Stanley Rd and Girraween Rd	Asphalt	2.5	1807	\$ 837,544.50
Howard Springs Area	Path connecting Westall Rd to existing Coolalinga-Whitewood Rd track	Asphalt	2.5	202	\$ 93,627.00
Howard Springs Area	Westall Rd between Whitewood Rd and Aken Rd	Asphalt	2.5	618	\$ 286,443.00
Howard Springs Area	Aken Rod - Stow Rd	Concrete	1.5	461	\$ 113,959.20
Howard Springs Area	Cornelius Rd	Concrete	1.5	2334	\$ 576,964.80
Howard Springs Area	Westall Rd between Aken Rd and Smyth Rd	Asphalt	2.5	1728	\$ 800,928.00
Howard Springs Area	Goy Rd	Concrete	1.5	1223	\$ 302,325.60
Howard Springs Area	Thornbill Crescent	Concrete	1.5	934	\$ 230,884.80
Howard Springs Area	Sittella Rd	Concrete	1.5	1066	\$ 263,515.20
Howard Springs Area	Watling Rd	Concrete	1.5	2919	\$ 721,576.80
Howard Springs Area	Currawong Dr	Concrete	1.5	1481	\$ 366,103.20

Howard Springs Area	Corella Av	Concrete	1.5	1476	\$	364,867.20
Holtze and Knuckey Lagoon Area	Brandt Rd	Concrete	1.5	1020	\$	252,144.00
Holtze and Knuckey Lagoon Area	Deloraine Rd	Concrete	1.5	1034	\$	255,604.80
Holtze and Knuckey Lagoon Area	Thorngate Rd-Campbell Rd	Concrete	1.5	2097	\$	518,378.40
Girraween School Area	Anglesey Road between Girraween Rd and Florigon Rd	Asphalt	2.5	655	\$	303,592.50
Girraween School Area	Produce Road between Pioneer Dr and Arnhem Hwy	Asphalt	2.5	2295	\$	1,063,732.50
Girraween School Area	Carruth Rd	Asphalt	2.5	229	\$	106,141.50
Girraween School Area	Power Road	Asphalt	2.5	1564	\$	724,914.00
Girraween School Area	Pioneer Dr between Anglesey Road and Produce Road	Asphalt	2.5	755	\$	349,942.50
Girraween School Area	Rogers Circuit	Concrete	1.5	918	\$	226,929.60
Girraween School Area	Anglesey Road between Florigon Rd and Pioneer Dr	Asphalt	2.5	2552	\$	1,182,852.00
Girraween School Area	Pioneer Dr between Anglesey Rd and Power Rd	Asphalt	2.5	2404	\$	1,114,254.00
Girraween School Area	Wetherby Rd	Concrete	1.5	942	\$	232,862.40
Girraween School Area	Girraween Lagoon	Concrete	1.5	2312	\$	571,526.40
Girraween School Area	Norm Ln	Concrete	1.5	834	\$	206,164.80
Girraween School Area	Pioneer Dr between Produce Rd and Norm Ln	Asphalt	2.5	2368	\$	1,097,568.00
Girraween School Area	Pioneer Dr between Norm Ln and Wanderrrie Rd	Asphalt	2.5	4051	\$	1,877,638.50
Girraween School Area	Wanderrrie Rd between Pioneer Dr and Nolan Rd	Asphalt	2.5	1651	\$	765,238.50
Girraween School Area	Bridgemary Cr	Concrete	1.5	2406	\$	594,763.20
Girraween School Area	Woodcote Cr	Concrete	1.5	2690	\$	664,968.00
Coolalinga and Virginia Areas	Sattler Christian College	Concrete	1.5	141	\$	34,855.20
Coolalinga and Virginia Areas	Stuart Highway - Girraween Rd	Concrete	1.5	637	\$	157,466.40
Coolalinga and Virginia Areas	Bees Creek Rd - Stuart Hwy - Sattler Cr	Concrete	1.5	718	\$	177,489.60
Coolalinga and Virginia Areas	Girraween Rd - Freds Pass	Asphalt	2.5	1554	\$	720,279.00
Coolalinga and Virginia Areas	Girraween Road between Hillier Rd and Girraween Lagoon	Asphalt	2.5	2012	\$	932,562.00
Coolalinga and Virginia Areas	Girraween Road between Girraween Lagoon and the existing path on Girraween Rd	Asphalt	2.5	1978	\$	916,803.00
Coolalinga and Virginia Areas	Bees Creek- Sattler Cr - Lowther Rd	Concrete	1.5	1795	\$	443,724.00
Coolalinga and Virginia Areas	Lowther Rd between Goodenia Dr and Stuart Hwy	Asphalt	2.5	2173	\$	1,007,185.50
Coolalinga and Virginia Areas	Girraween Road between Coolalinga Area and Hillier Rd	Asphalt	2.5	1306	\$	605,331.00
Coolalinga and Virginia Areas	Virginia Rd Between Fisher Rd and Bilby Rd	Asphalt	2.5	1369	\$	634,531.50
Coolalinga and Virginia Areas	Virginia Rd Between Bilby Rd and Stuart Hwy	Asphalt	2.5	1917	\$	888,529.50
Coolalinga and Virginia Areas	Stuart Hwy Coolalinga-Virginia	Asphalt	2.5	1210	\$	560,835.00

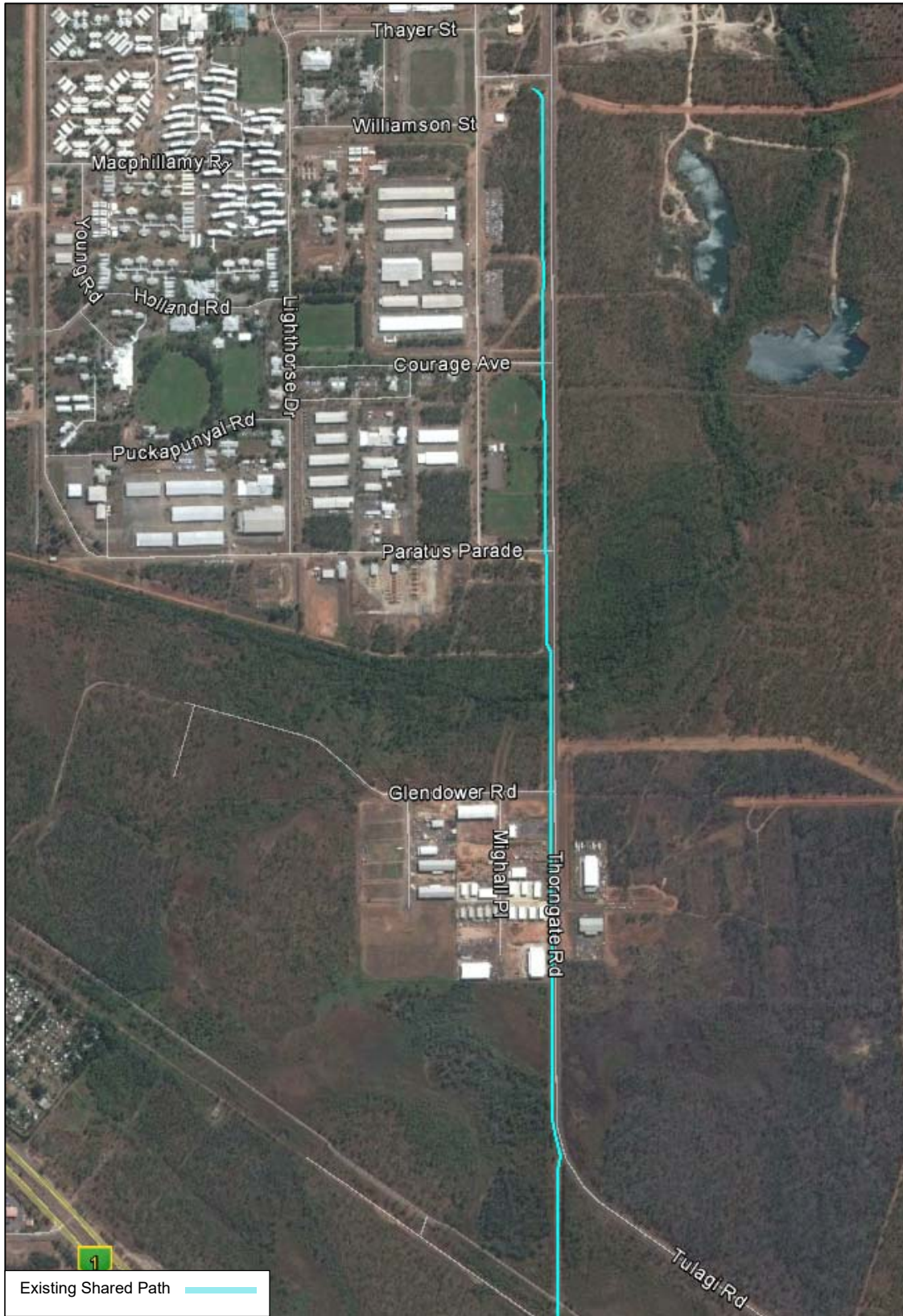
Coolalinga and Virginia Areas	Virginia Rd Between Lowther Rd and Fisher Rd	Asphalt	2.5	1002	\$	464,427.00
Coolalinga and Virginia Areas	Coolalinga- Whitewood Rd to Girraween Rd	Asphalt	2.5	1248	\$	578,448.00
Coolalinga and Virginia Areas	Lowther Rd between Virginia Rd and Goodenia Dr	Asphalt	2.5	2069	\$	958,981.50
Coolalinga and Virginia Areas	Jacomb Pl	Concrete	1.5	620	\$	153,264.00
Coolalinga and Virginia Areas	London Rd	Concrete	1.5	933	\$	230,637.60
Coolalinga and Virginia Areas	Fancesca Circuit	Concrete	1.5	1013	\$	250,413.60
Coolalinga and Virginia Areas	Fisher Rd - Dowling Rd - Booking Cct	Concrete	1.5	3189	\$	788,320.80
Berry Springs Area	Cox Peninsula Rd	Asphalt	2.5	3991	\$	1,849,828.50
Total overall cost						\$ 41, 527,143.45

APPENDIX

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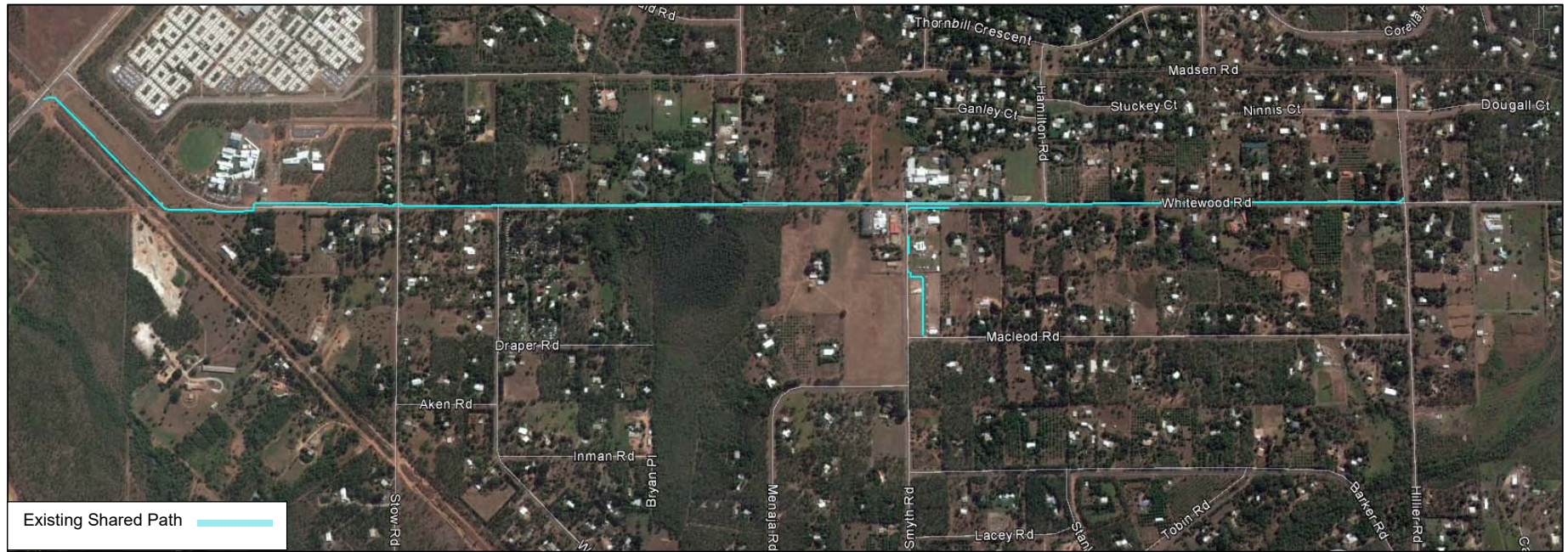
MAPS AND IMAGES

Figure 1-1 Existing Network Holtze and Knuckey Lagoon Area



Source: Google Earth

Figure 1-2 Existing Network Howard Springs Area



Source: Google Earth

Figure 1-3 Existing Network Coolalinga Area



Source: Google Earth

Figure 1-4 Existing Network Girraween School Area



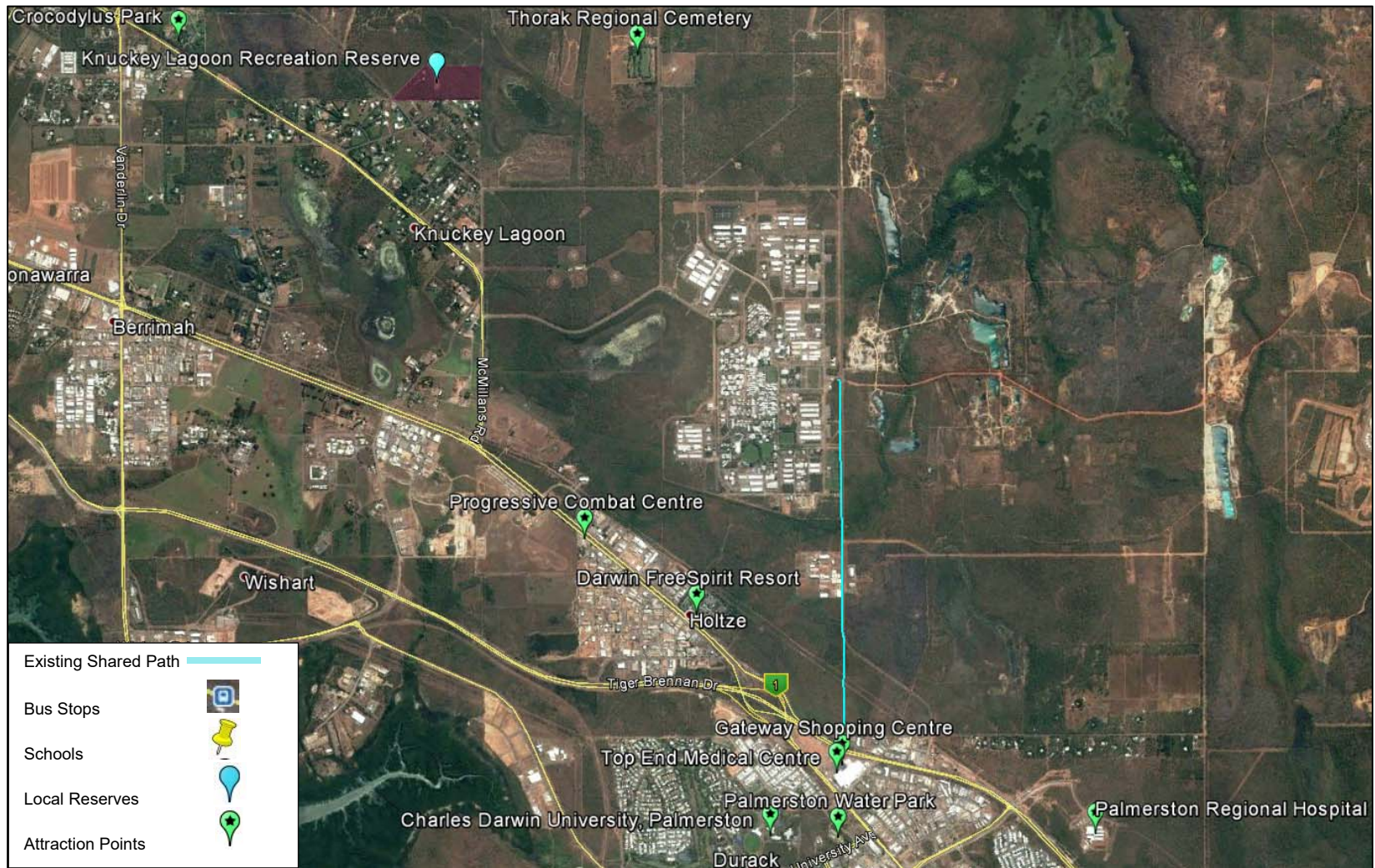
Source: Google Earth

Figure 1-5 Existing Network Humpty Doo Area



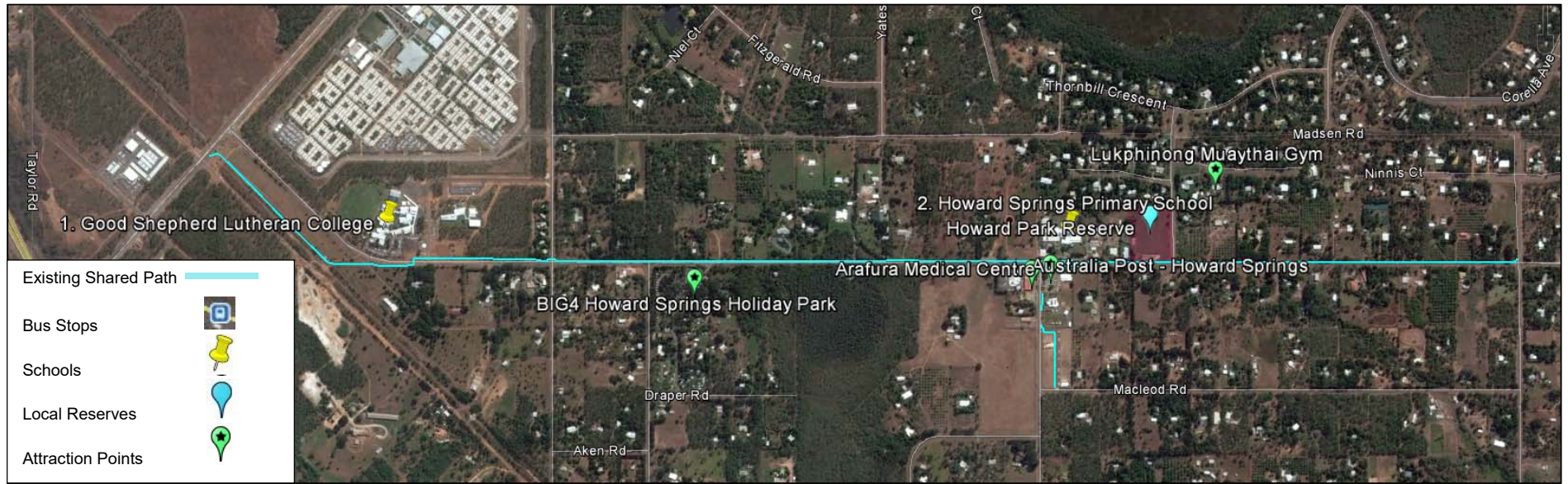
Source: Google Earth

Figure 1-6 Location of attraction points, schools and reserves Holtze and Knuckey lagoon Area



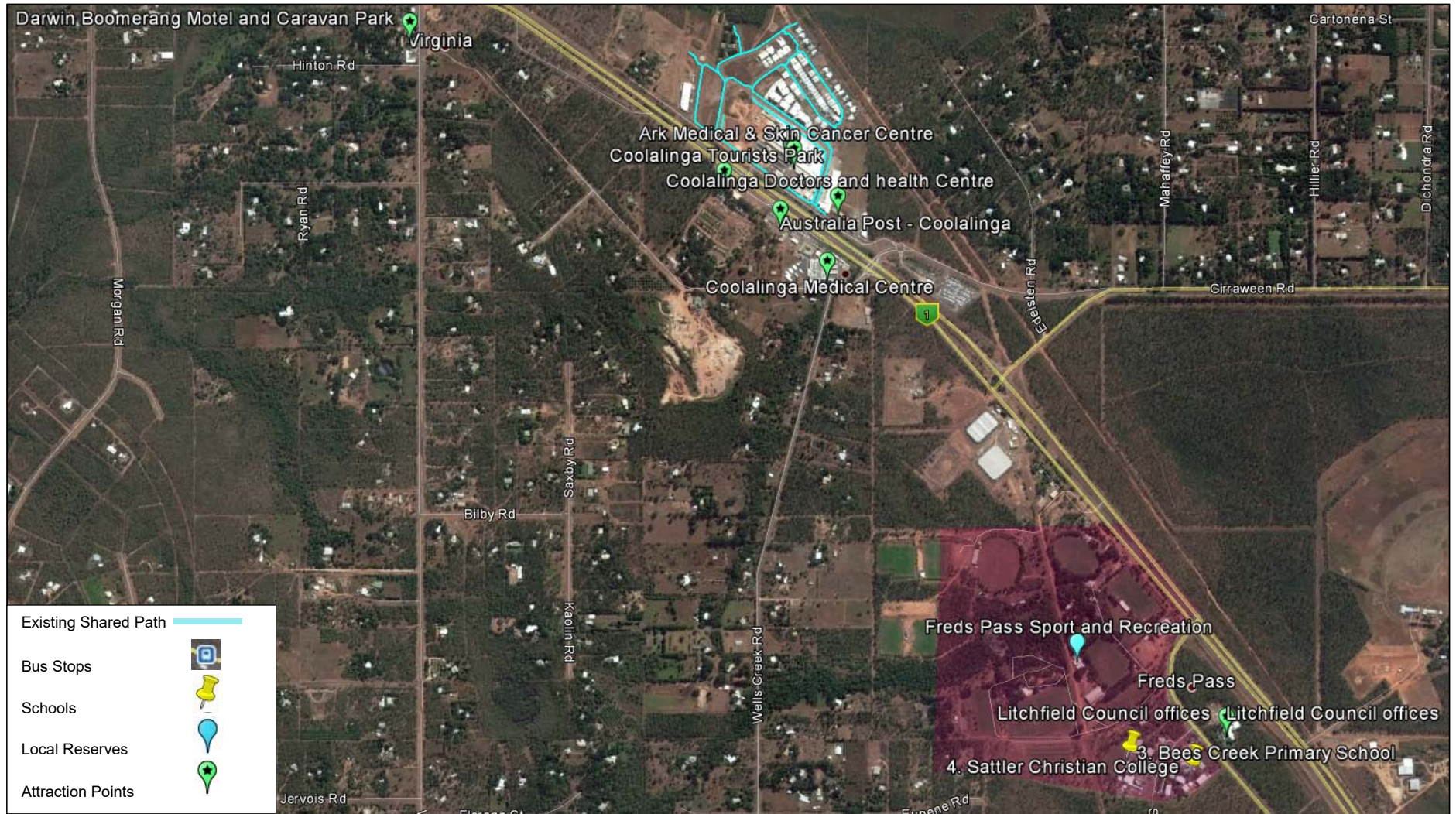
Source: Google Earth

Figure 1-7 Location of attraction points, schools and reserves Howard Springs Area



Source: Google Earth

Figure 1-8 Location of attraction points, schools and reserves Coolalinga and Virginia Areas



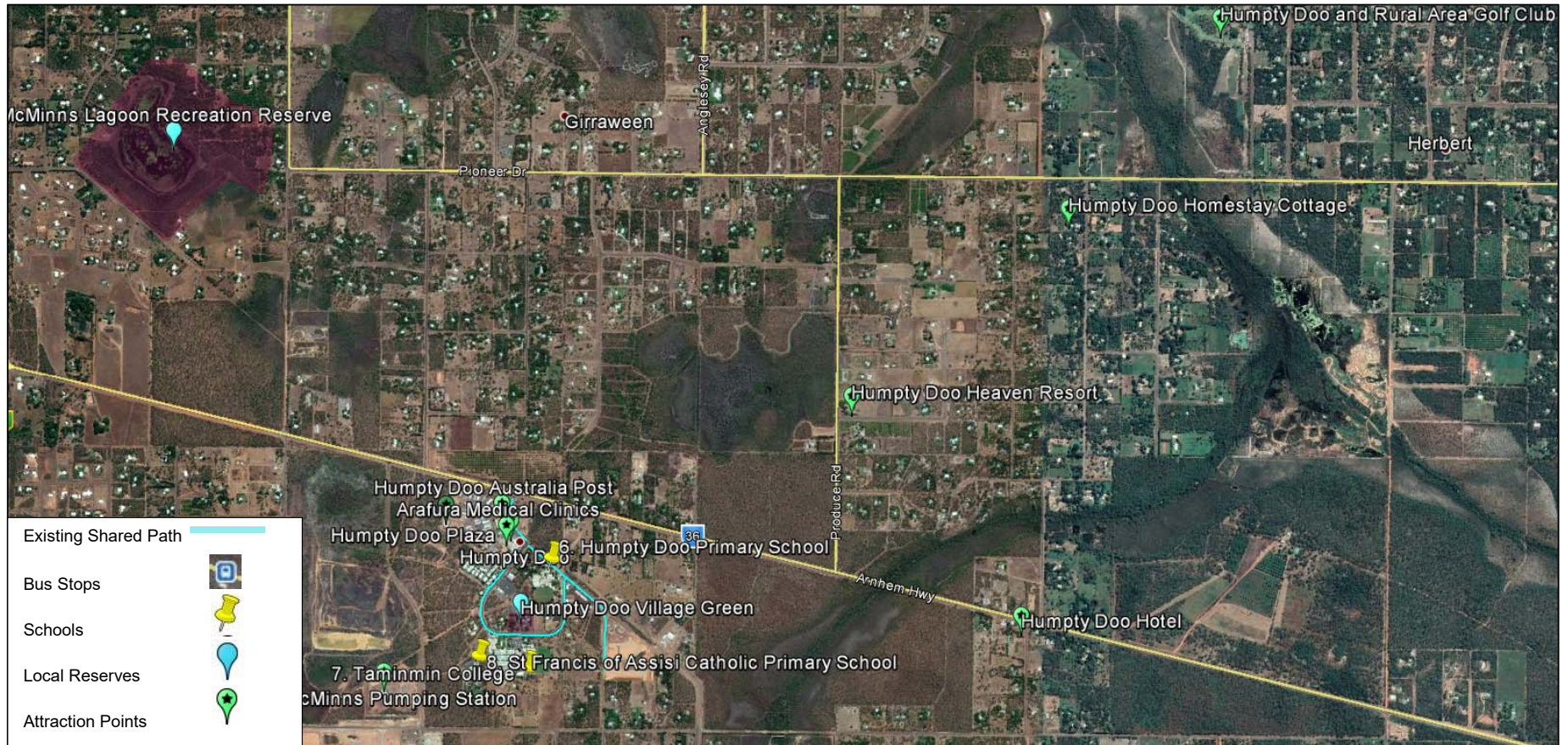
Source: Google Earth

Figure 1-9 Location of attraction points, schools and reserves Girraween School Area



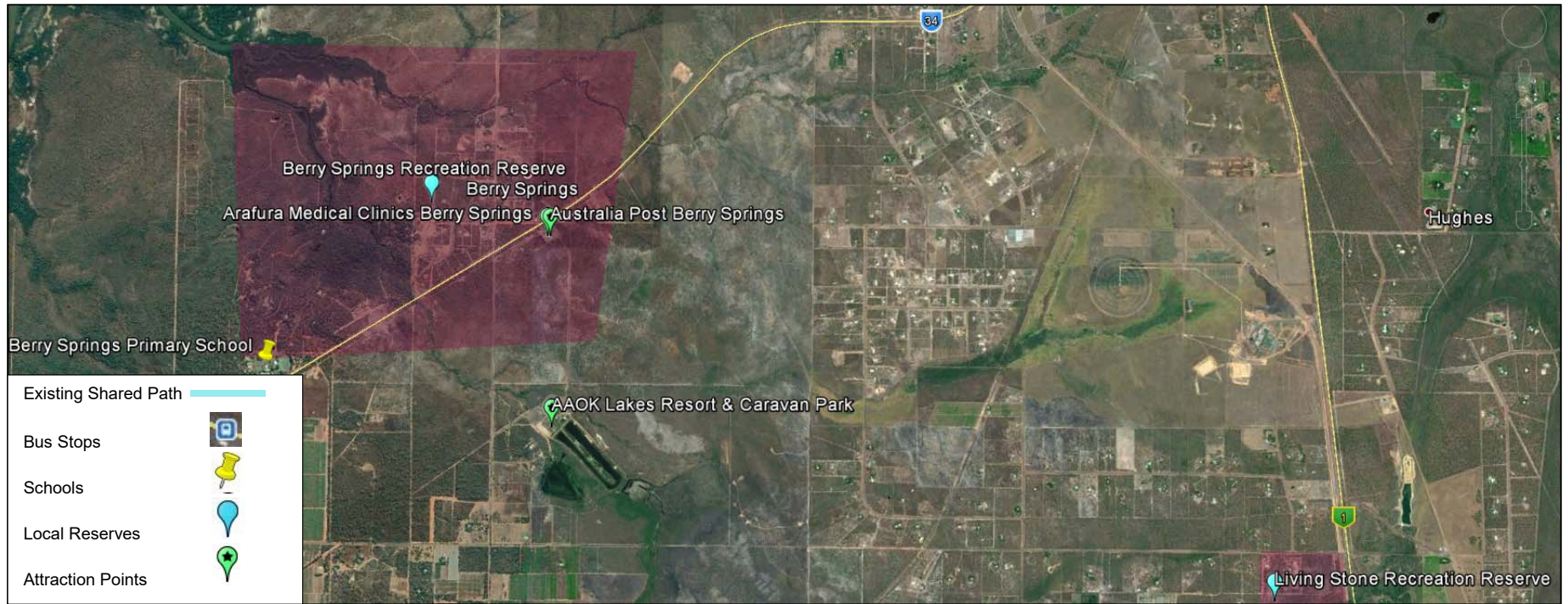
Source: Google Earth

Figure 1-10 Location of attraction points, schools and reserves Humpty Doo Area



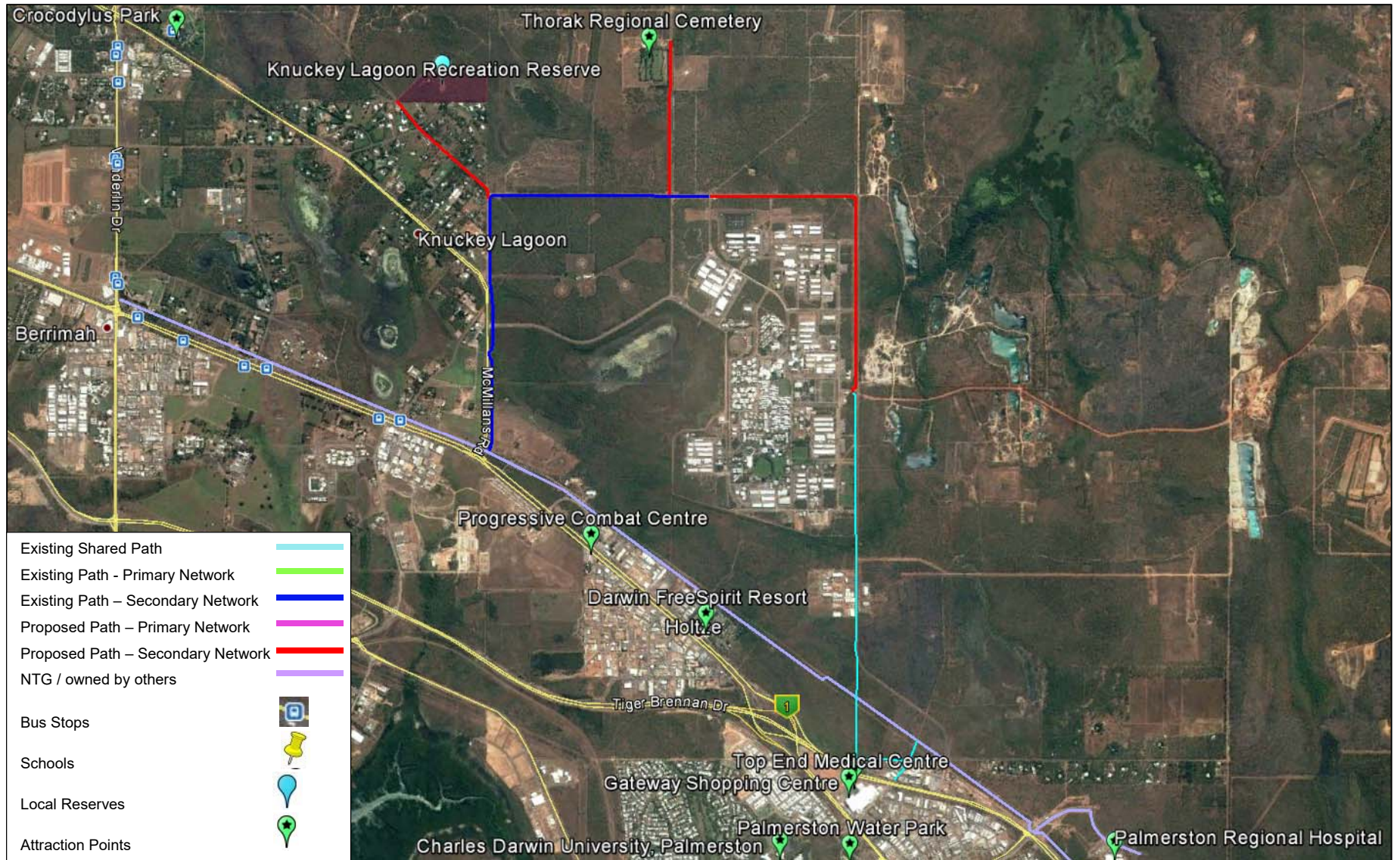
Source: Google Earth

Figure 1-11 Location of attraction points, schools and reserves Berry Springs Area



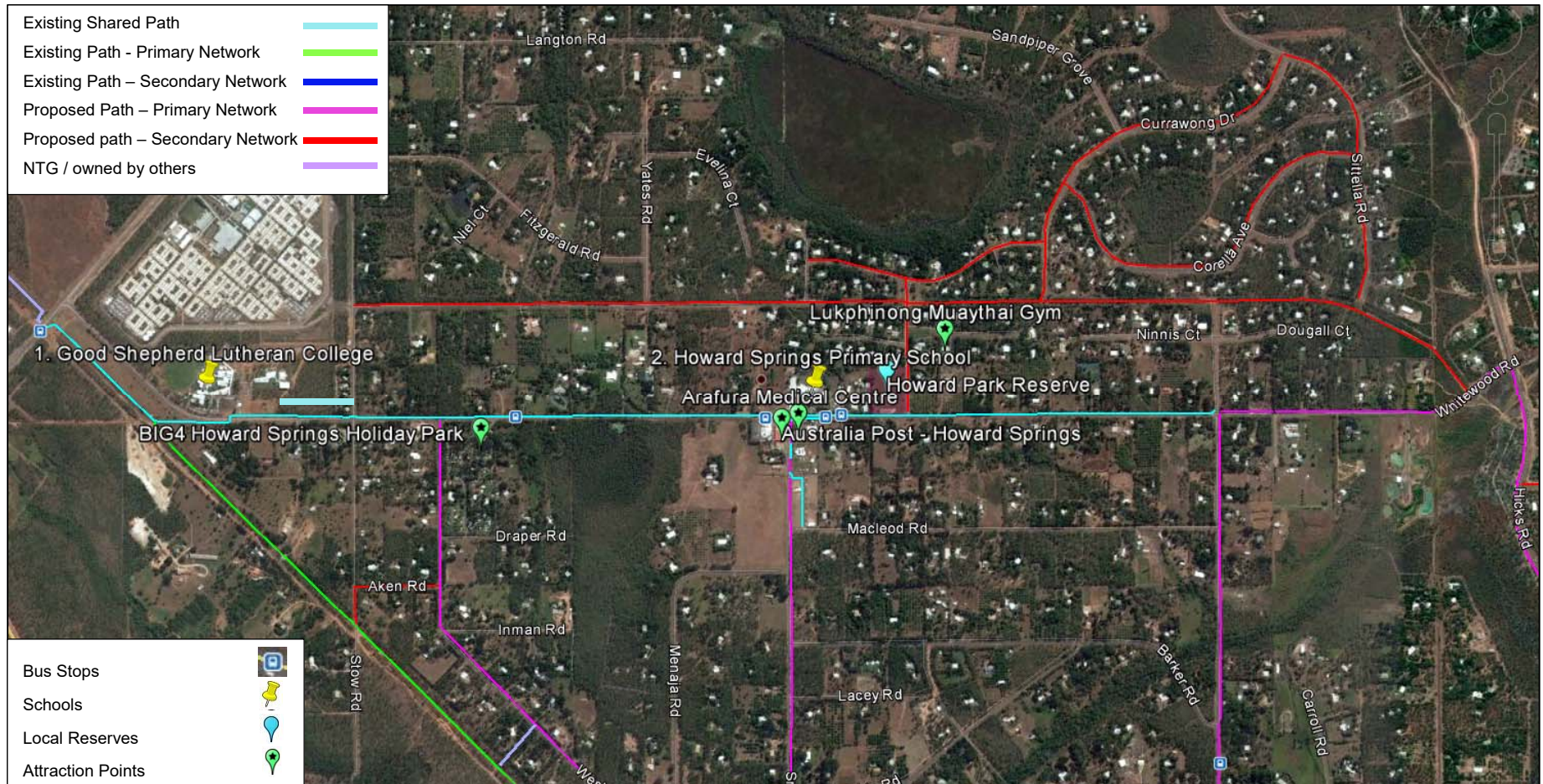
Source: Google Earth

Figure 1-12 Proposed Network Holtze and Knuckey Lagoon Area



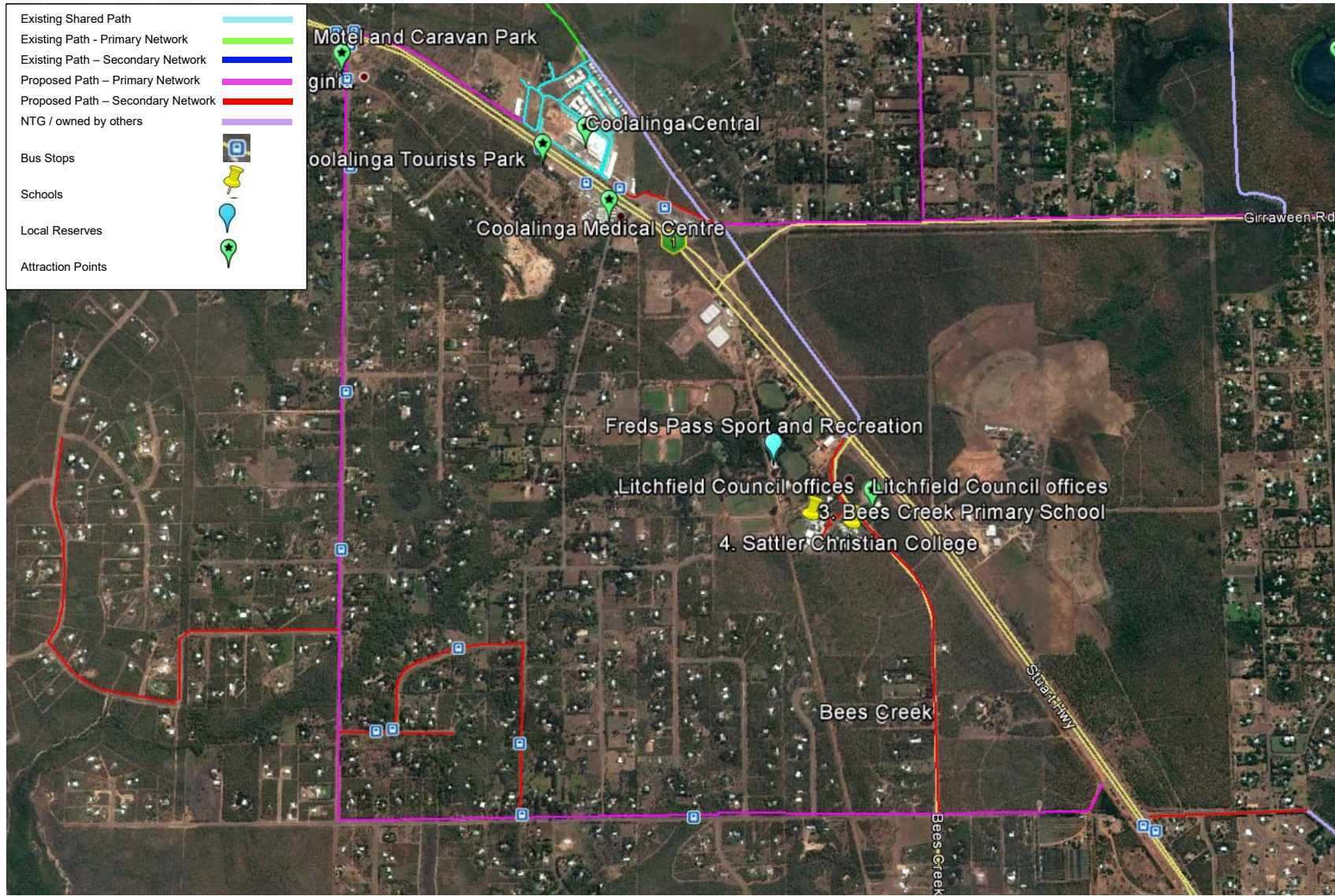
Source: Google Earth

Figure 1-13 Proposed Network Howard Springs Area



Source: Google Earth

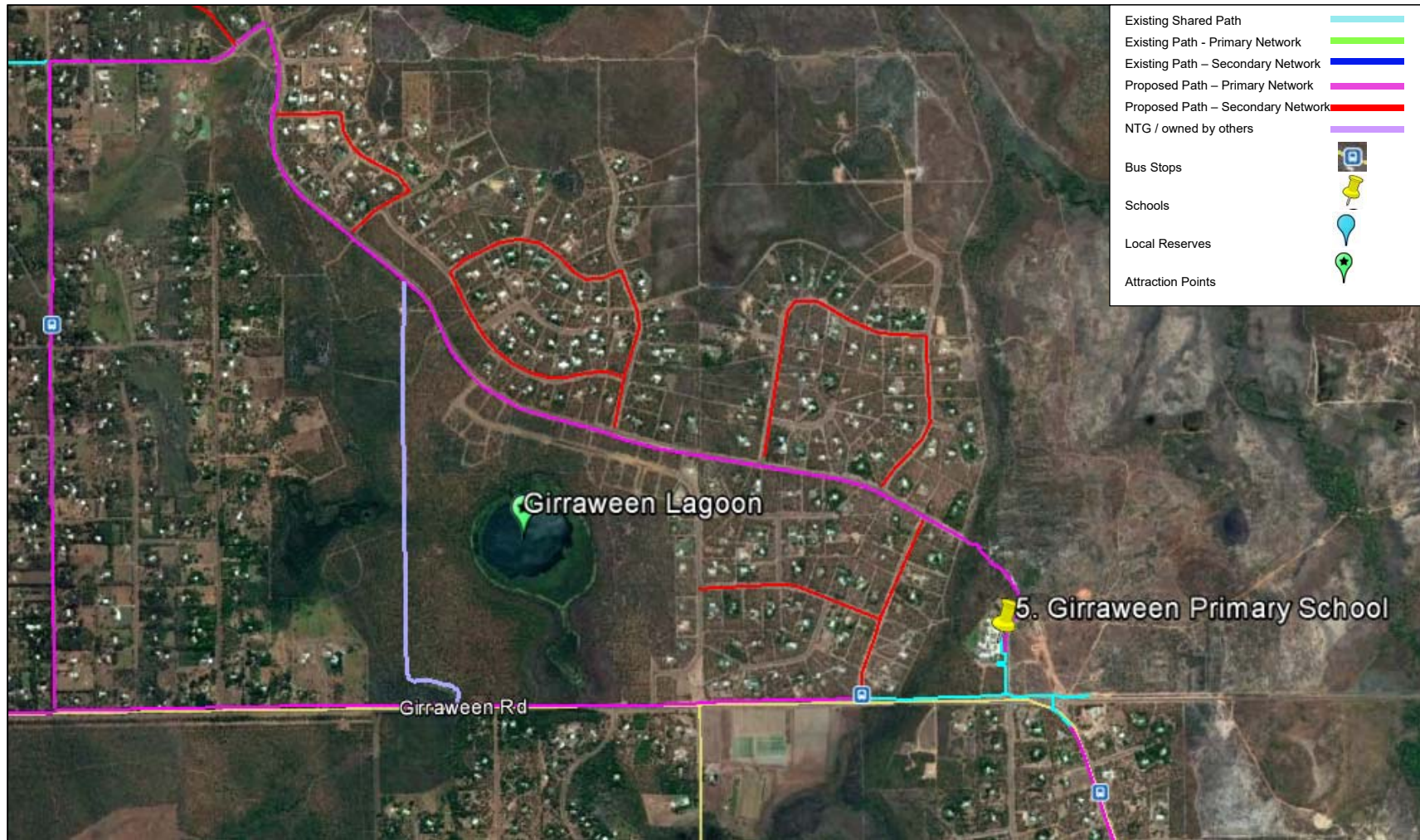
Figure 1-14 Proposed Network Coolalinga and Virginia Areas



Source: Google Earth

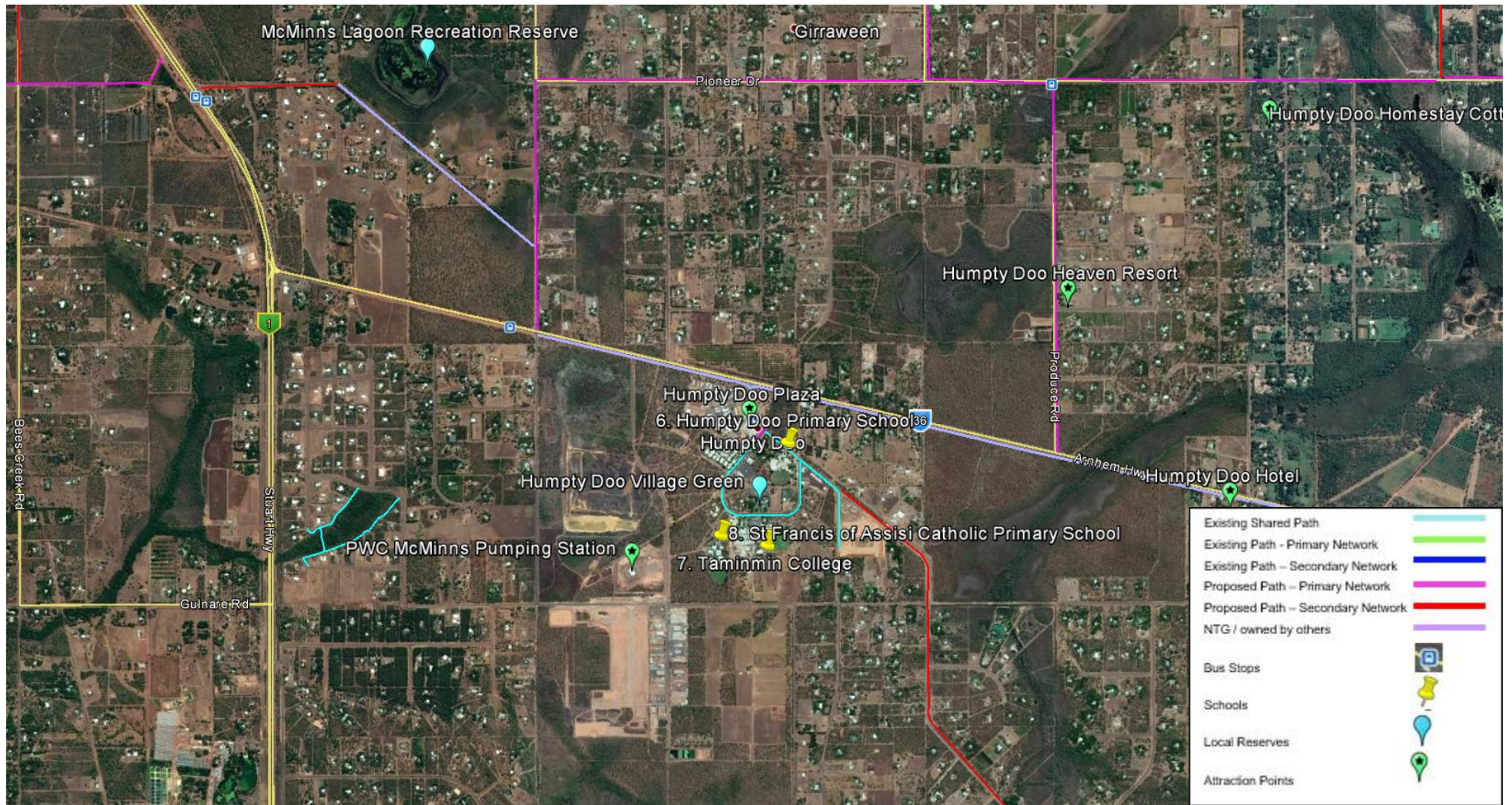
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Figure 1-15 Proposed Network Girraween School Area



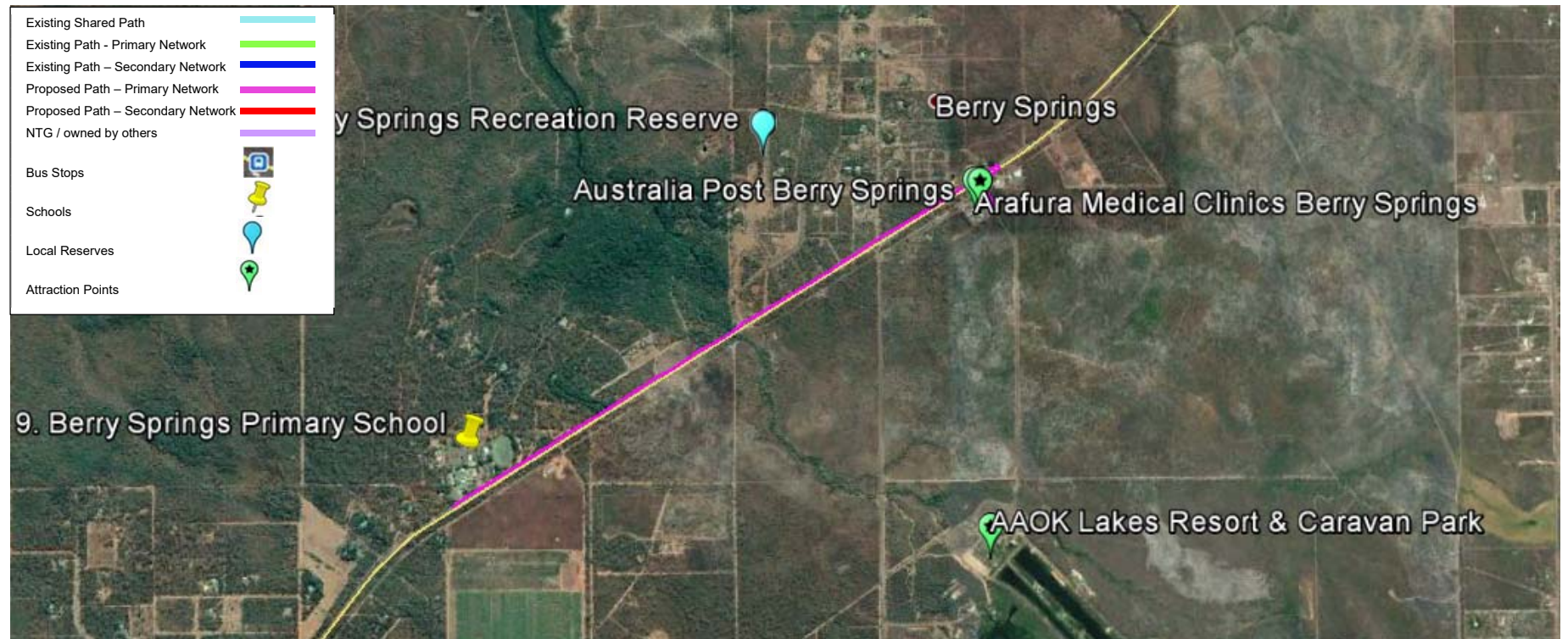
Source: Google Earth

Figure 1-16 Proposed Network Humpty Doo Area



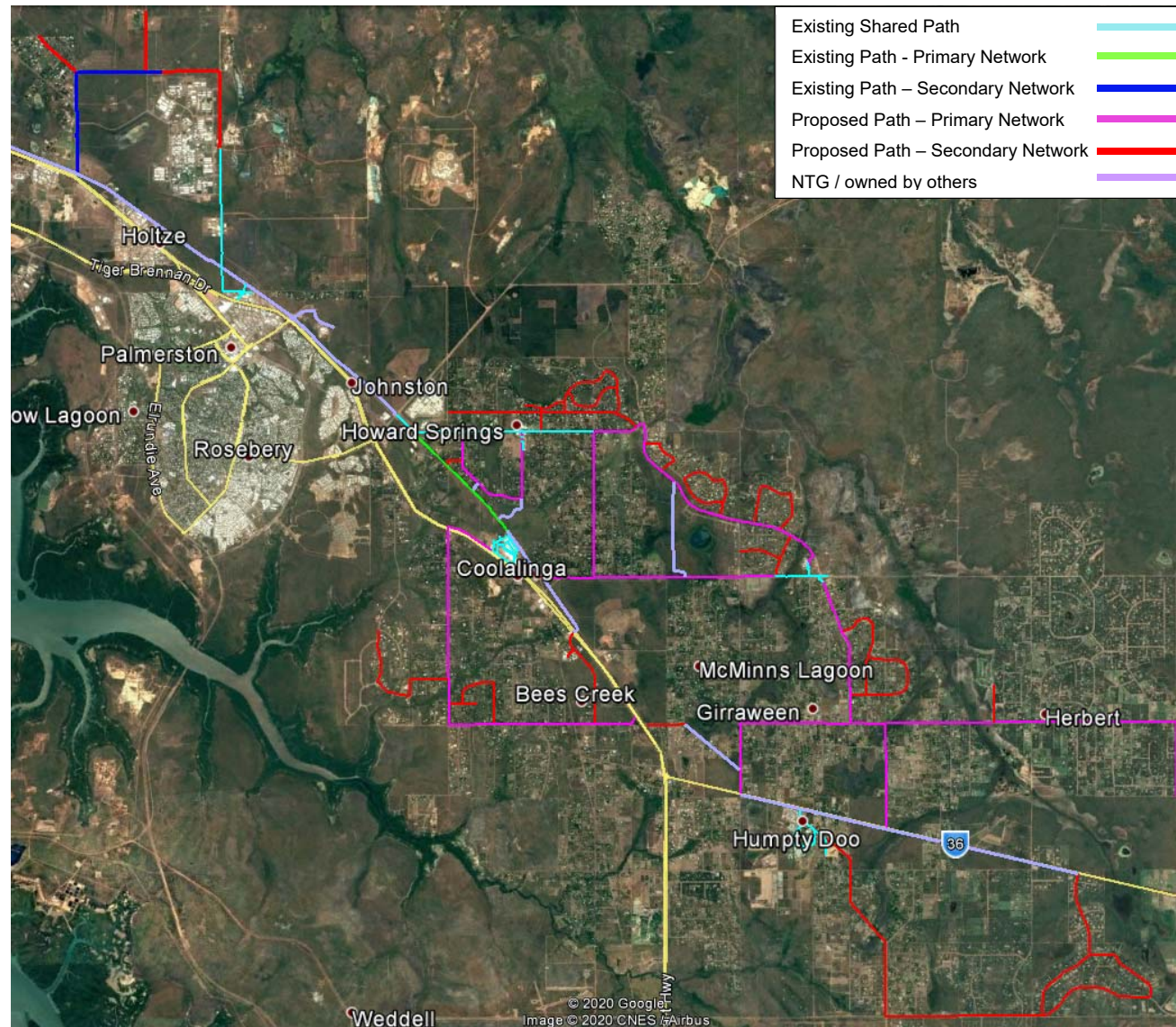
Source: Google Earth

Figure 1-17 Proposed Network Berry Springs Area



Source: Google Earth

Figure 1-18 Network. Total except Berry Springs



Source: Google Earth