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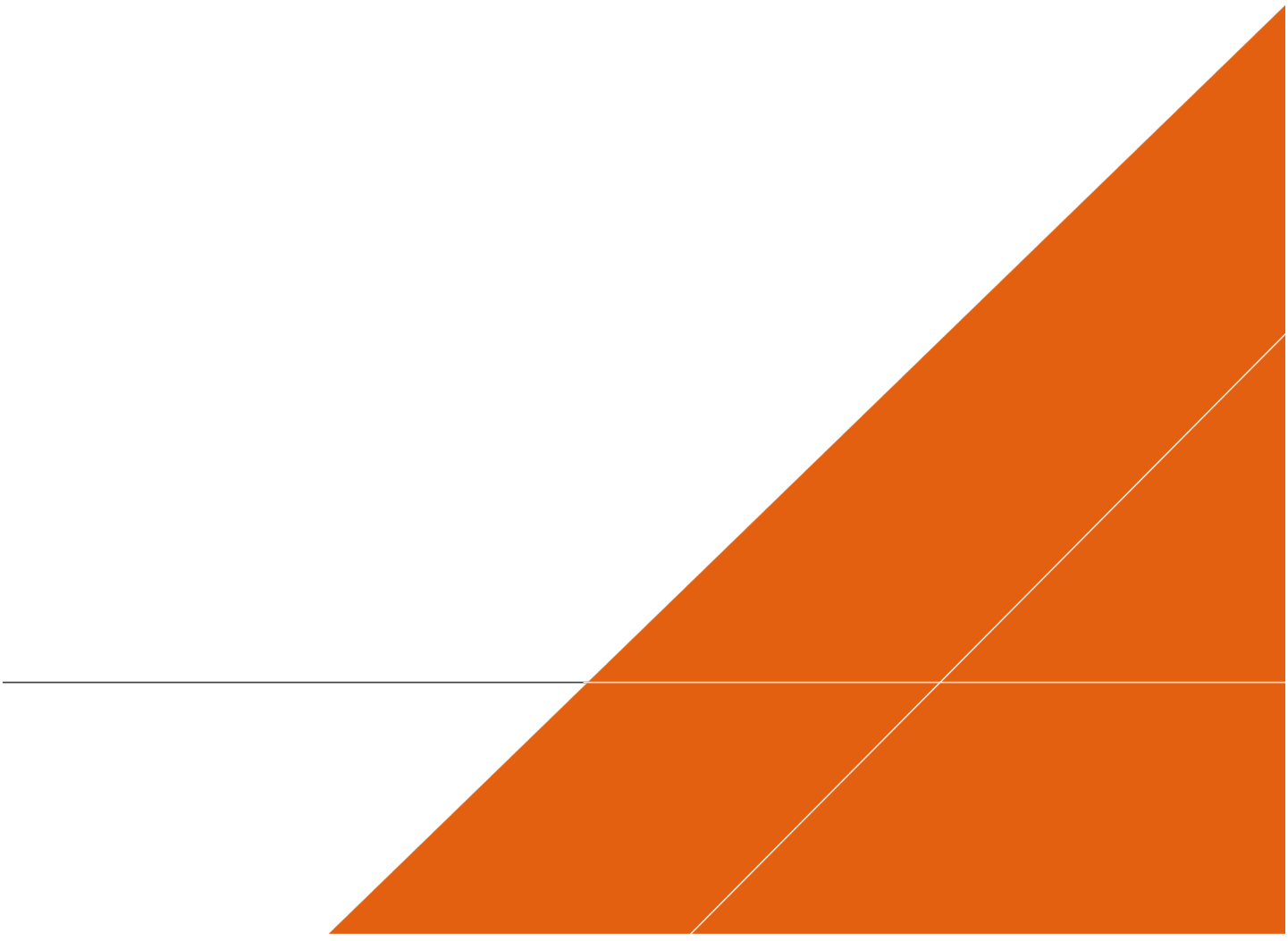
MOREE SPECIAL ACTIVATION PRECINCT

Utilities Infrastructure Report

17 MARCH 2021



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DEPARTMENT OF PLANNING, INDUSTRY AND ENVIRONMENT (DPIE)

Moree Special Activation Precinct

Utilities Infrastructure Report

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APPENDICES

1 INTRODUCTION

On 3 December 2019, the NSW Government declared Moree a Special Activation Precinct (SAP) investigation area, delivered by the $4.2 billion Snowy Hydro Legacy Fund.

With a renowned, Australia-wide reputation and heritage of agriculture and farming, this SAP places the Moree region as the country's highest productive grain region, capitalising on existing road and air freight, and the future Inland Rail.

The NSW Department of Planning, Industry and Environment (DPIE) is leading the master planning process of the Moree SAP. Accordingly, DPIE has engaged Arcadis Australia Pacific (Arcadis) to prepare a series of utilities studies, including a Utilities and Infrastructure report (this report) for the Moree SAP, which focuses on the servicing component of the master plan.

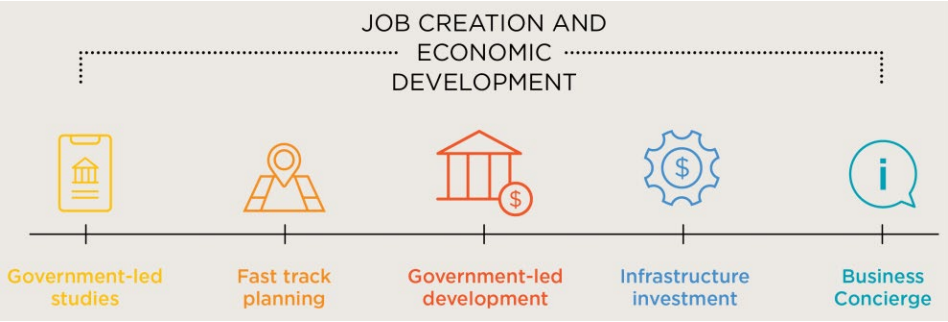
Two Enquiry by Design (EbD) workshops were organised as part of the SAP master planning process. A preliminary EbD was held on the 14 and 15 September 2020 to develop three initial land use scenarios. Following an interdisciplinary assessment of the three scenarios, a final EbD workshop was held between 17 and 20 November 2020 to study the interdisciplinary constraints of the three scenarios and identify and develop a preferred land use Structure Plan.

This report assesses the land use Structure Plan from the final EbD workshop from a utilities perspective.

1.1 Moree Special Activation Precinct

The establishment of SAPs is a joint Government Agency initiative by the Department of Regional NSW, DPIE and the Regional Growth NSW Development Corporation (RGDC) as part of the *20-Year Economic Vision* for Regional NSW. SAPs are a new way of planning and delivering infrastructure projects in strategic regional locations in NSW to 'activate' State or regionally significant economic development and jobs creation. They will be delivered as part of the $4.2 billion Snowy Hydro Legacy Fund.

Job creation and economic development through SAPs are underpinned by five core components (Figure 1-1).



Source: NSW Government 2019
Figure 1-1 SAP key elements

Table 1-1 SAP process (Source: NSW Government 2019)

COMPONENT	DESCRIPTION
Government led studies	The Department of Planning, Industry and Environment conducts technical studies to inform the development of the Master Plan and to ensure land uses and development occurs in the right locations for each precinct. This up-front planning takes the burden away from investors wanting to grow or start up a business in the precincts.
Fast track planning	Once the Master Plan and other supporting planning instruments are endorsed, this will provide investors with streamlined planning and environmental approvals. This may include providing for land uses that suit complying development or approval exemptions.
Government led development	The Regional Growth NSW Development Corporation will lead and coordinate the delivery, through Delivery Plans according to the Master Plan for each precinct, that supports orderly development, sensitive to market drivers, landowners and infrastructure delivery.
Infrastructure Investment	Government will invest in new or upgrade roads, water, power, digital connectivity and social infrastructure for each precinct, removing barriers for investors to establish and grow.
Business Concierge	The Regional Growth NSW Development Corporation offers targeted business with concierge services to attract investment and support businesses to establish and grow in each precinct.

Moree was chosen as it has a rich agricultural tradition dating back to the establishment of the initial pastoral land more than 150 years ago. There have been several step changes since, with the introduction of wheat, pecan nuts in the 1960s and cotton in the 1970s.

Moree is well placed in the freight network to be an intermodal freight hub as it is intersected by the Newell, Carnarvon and Gwydir Highways in addition to being located on the Inland Rail line.

The Moree SAP objectives include:

- Increase the volume of freight mode shift to rail
- Enable a broader cluster of freight and logistics-related activity
- Make Moree an attractive precinct for value-adding agribusiness
- Enable businesses to establish on appropriate sites that would benefit from efficient access to freight and logistics networks
- Enable businesses to establish that require access to a high quality and secure water supply
- Provide increased economic and enhanced social outcomes for the broader community with a focus on the local Indigenous population

The completion of Inland Rail expected by 2025 has the potential to dramatically improve the efficiency of freight transport between Moree and key seaports, as well as large population centres (Source: NSW Government 2019, Figure 1-2). Moree is located on the Narrabri and North Star (N2NS) section and would provide more immediate freight savings.

Source: NSW Government 2019
Figure 1-2 Moree transport connectivity

The presence of Inland Rail combined with the existing assets that Moree offers would enable for a more diverse range of industries to be established and for the national economy and Moree economy to be more productive and more resilient. Freight movements are primarily focused on the Port of Newcastle with other movements to Ports of Botany and Kembla.

Inland Rail would also enable access to the Port of Brisbane and other northern markets for bulk and containerised freight. The Moree SAP provides an innovative and effective program to capitalise on this potential.

The region is also blessed with one of the highest levels of solar irradiation in NSW, providing opportunities to maximise Renewable Energy generation in support of the SAP and future businesses, as part of the Vision Statement.

1.2 Vision statement and utilities and infrastructure aspirations

The Vision for the Moree SAP is an evolving statement covering both Vision and Aspirations for the Precinct.

The overall Moree SAP Vision is as follow:

> With national and global connections, the Moree Special Activation Precinct enables diversification of Moree's proud agricultural economy by building on its strong connection to Country and sustainable water endowments and energy infrastructure. The Special Activation Precinct fosters world-class opportunities to value-add, embrace new technologies and develop innovative and sustainable energy solutions.

The following aspirations have been recognised from utilities and infrastructure perspective to ensure the success of the Moree SAP:

- Identify water and telecommunication infrastructure opportunities for the SAP.
- Identify the required extensions, upgrades or new infrastructure or services to cater for the SAP.

- Provide location details of infrastructure, utilities and services and indicative amount of land required for the infrastructure.
- Provide expected capacity from utility providers
- Review the broader regional networks that would service the precinct.
- Identify any service augmentation, if required.

1.3 Report structure

The remainder of this report is structured as follows:

- **Strategic Context**
  Outlines local, regional, and state-wide context of regulations and policies related to utilities and infrastructure for the Moree SAP.
- **Methodology**
  Description of the process used for undertaking the study, and list of stakeholders involved and information relied upon as part of the study.
- **Key findings and assessment**
  This includes the findings from the utilities baseline analysis which was undertaken and current demands and capacities of different networks.
- **Structure plan Assessment**
  Review of the Structure Plan against the vision and aspirations of the Moree SAP from the context of electrical, water, sewer, and telecommunications assessment and comparison of the electrical, water, sewer, and telecommunications demand estimates from new businesses in the SAP and land-areas necessary to support the development of the opportunities.
- **Opportunities and Constraints**

  List of the Opportunities and Constraints found during the utilities study for consideration in the electrical, water, sewer, and telecommunications demand estimates from new businesses in the Moree SAP.
- **Delivery Plan**

  Recommendations for the staged implementation of the electrical, water, sewer, and telecommunications opportunities and upgrades of the utilities infrastructure.
- **Conclusions**

  Summary of recommendations.

2 CONTEXT AND PROJECT OVERVIEW

The Utilities and infrastructure analysis for Moree SAP study area and the wider region, through desktop analysis, utility authority consultation and site visits have summarised the existing condition and capacity of existing services infrastructure located within the Moree SAP. The report provides the opportunities and constraints within the investigation area for the following services infrastructure:

- Electricity
- Potable water
- Wastewater
- Data and communications
- Gas.

The details of existing infrastructure found in this report are based on drawings and data provided by Dial Before You Dig (DBYD) and the utility authority consultation. This information would need additional confirmation through site investigations before the commencement of any other utility design, including utility authorities' approvals. There are several existing utility services in and around the site which are discussed in detail in this report.

Following the scenario assessment phase and reporting, a final Ebd workshop was held in Moree at the Council's premises between 17 and 20 November 2020 to develop the Master Plan for the investigation area. Refer to *Figure 2-1* and *Figure 2-2* below. The workshop enabled interdisciplinary collaboration to understand the environmental, infrastructure, and social constraints and develop the master plan.

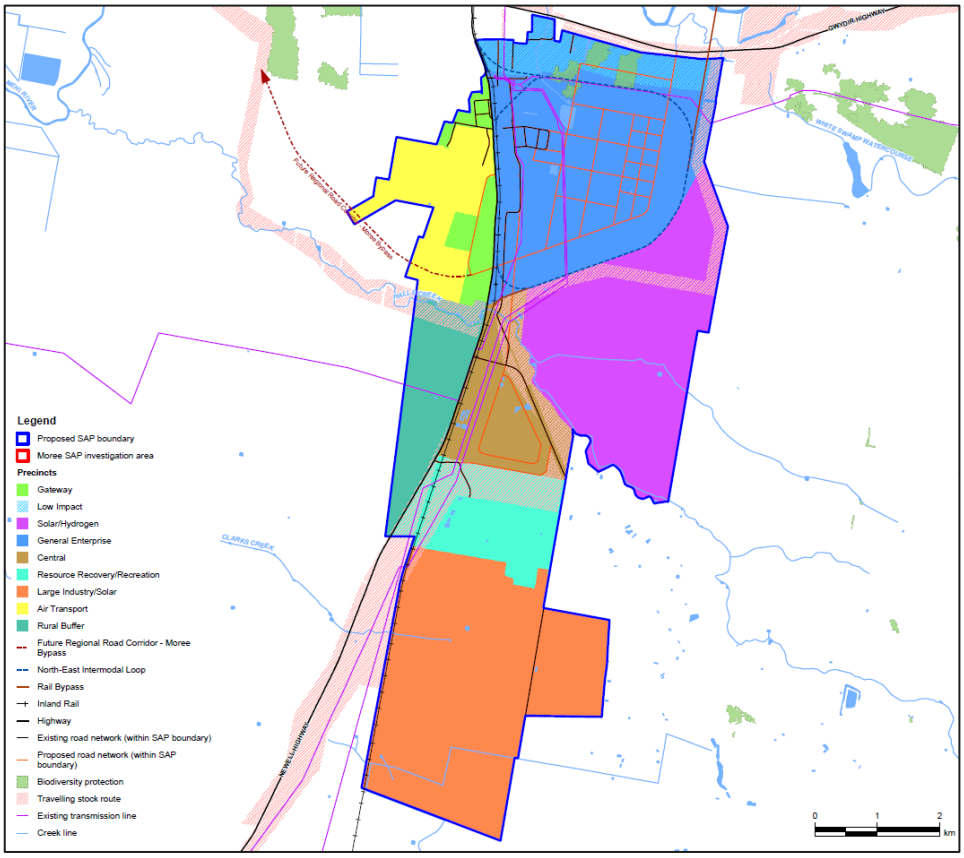


Figure 2-1 Final Master Plan updated responding to the Final Enquiry by Design (WSP Layout)

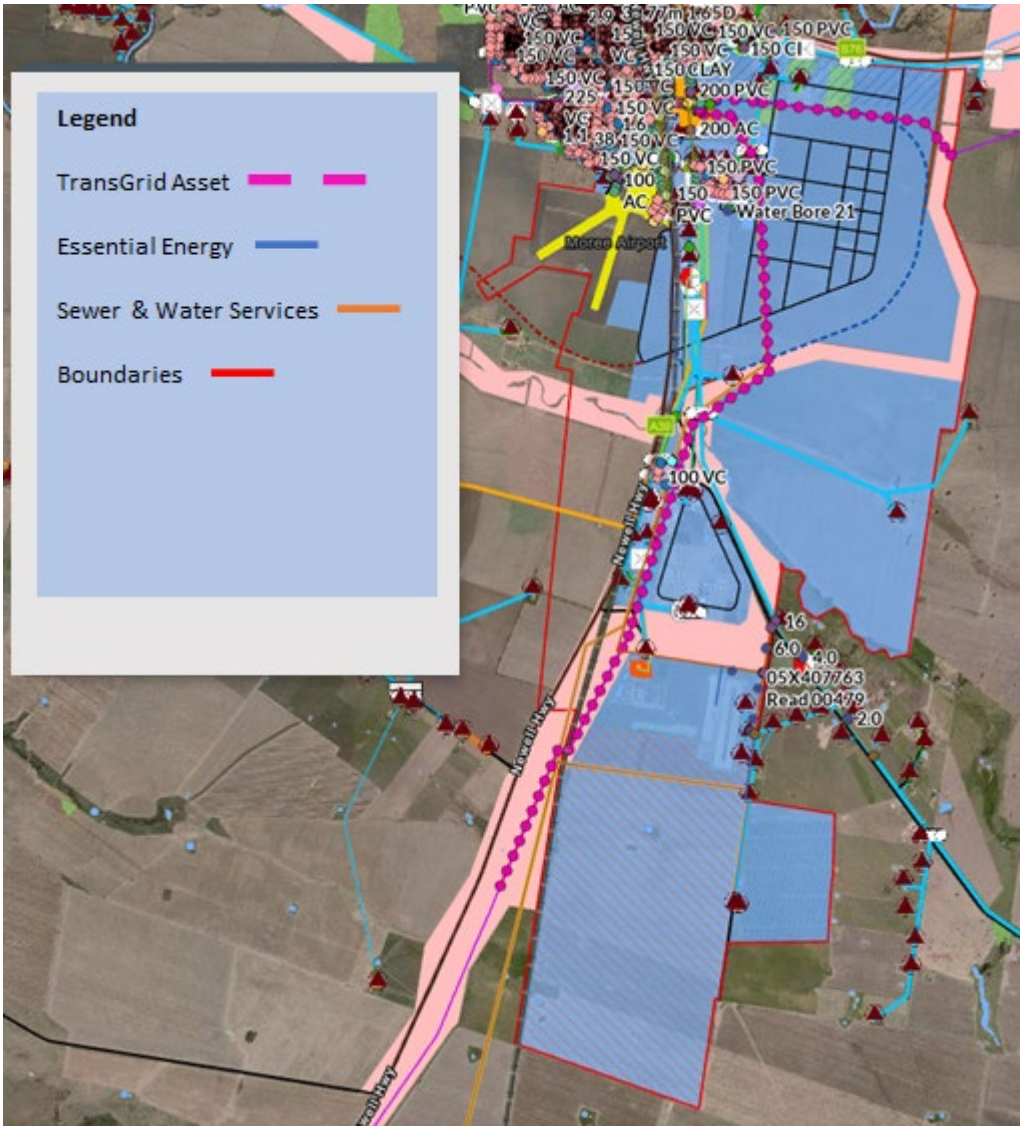


Figure 2-2 Master Plan GIS Layout (GIS Layout with utilities)

The objectives of the Utilities Infrastructure Report are listed below:

- Prepare a report for the Moree SAP informed by the previous Technical Studies and workshops.
- Identify the required extensions, upgrades or new infrastructure or services to cater for the proposed development.
- Provide location details of infrastructure, utilities and services and indicative amount of land required for the infrastructure.
- Provide expected capacity from utility providers
- Review the broader regional networks that would service the precinct.
- Identify any required augmentation.

Figure 2-3 shows the relationship between the SAP study process and this stage of works.

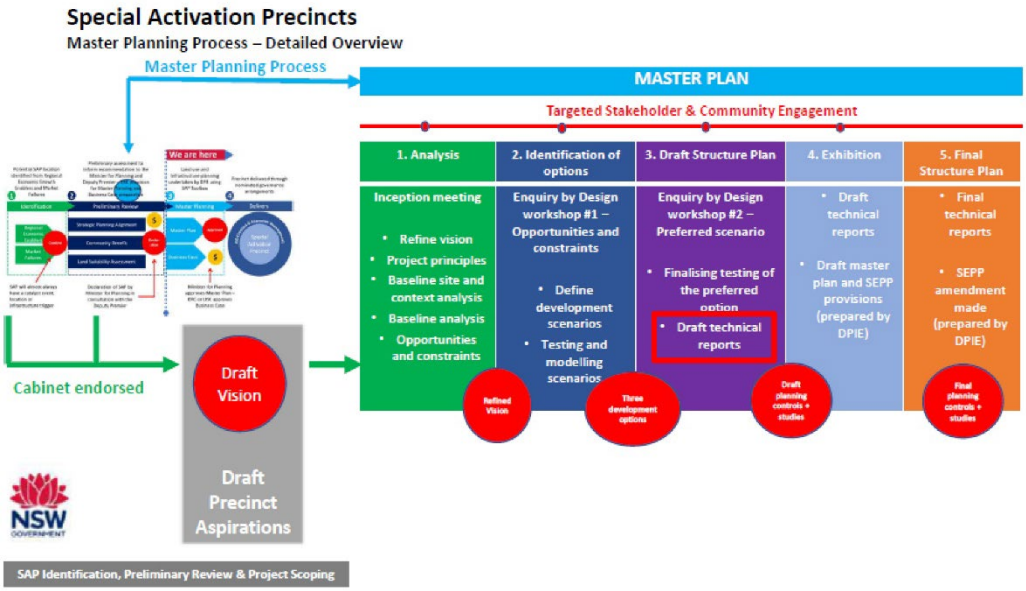


Figure 2-3 SAP process, with this Report outlined in red

This report has been prepared based on the following utility reports and other studies:

- Moree SAP - B.2.2B Utilities Scenario Report (October 2020), Arcadis
- Moree Water Supply Reticulation Network Analysis – Stage 1 Report Number: WSR-14046 (August 2014) Moree Plains Shire Council.
- Strategic Business Plan for Water Supply and Sewerage Services (September 2018) Moree Plains Shire Council
- Proposal preparation of an Integrated Water Cycle Management Strategy Proposal Number: PWA IS 19019 (May 2020) Moree Plains Shire Council.
- Load Forecasts from Essential Energy's Distribution Annual Planning Report (DAPR)
- Google Maps
- Dial Before You Dig (DBYD) enquiry
- GIS developed with a combined service plan of existing utilities.

3 METHODOLOGY

The methodology adopted for the Structure Plan was informed significantly by the Enquiry by Design (EbD) process, a planning tool used to allow key stakeholders to collaborate on developing a vision for the Moree SAP.

3.1 Project timeline

Figure 3-1 shows the Moree SAP project's timeline from commencement to forecast completion of the Final Master Plan.

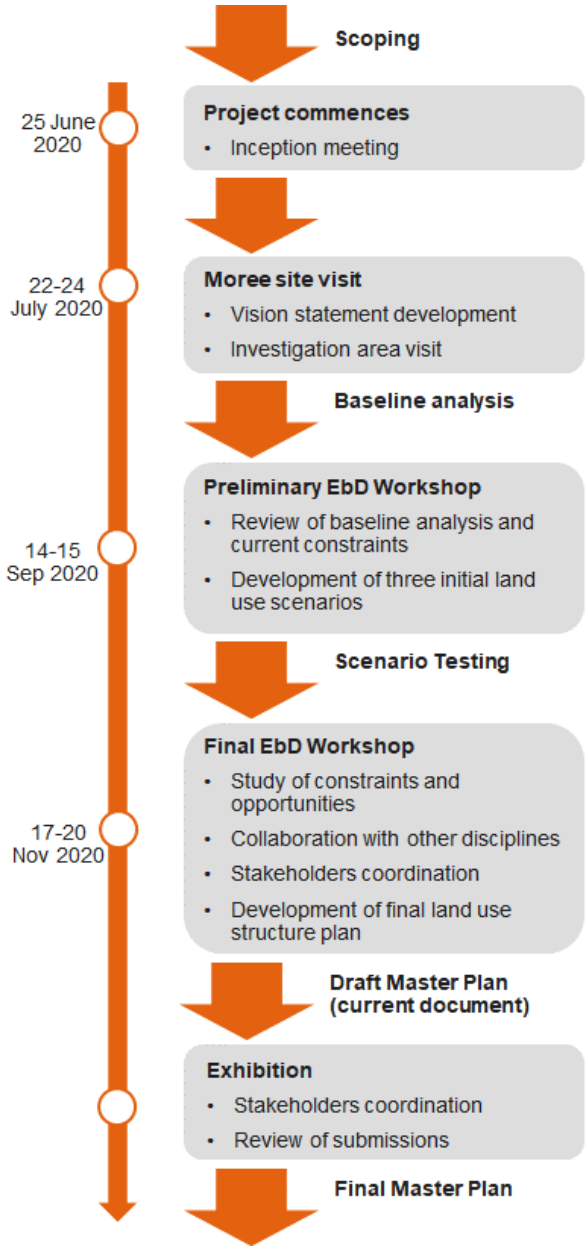


Figure 3-1 Methodology and timeline

3.2 Enquiry by Design workshops

The following two EbD workshops were held:

- Preliminary EbD workshop – 14 and 15 September 2020 - to develop three initial land use scenarios, which would then be further developed in an interdisciplinary assessment.
- Final EbD workshop – 17 to 20 November 2020 - to study the interdisciplinary constraints and opportunities of each scenario and develop a final land use structure plan based on the assessment.

The participants and stakeholders in the Final EbD workshop included:

- Department of Planning Industry and Environment
- Regional Growth NSW Development Corporation
- Moree Plains Shire Council
- Department of Regional NSW
- Moree Local Aboriginal Land Council
- NSW Environment Protection Authority
- State agencies (including Transport for NSW)
- Australian Rail Track Operation (ARTC); and
- Various consultants and subject matter experts – covering engineering, environmental, economics, Indigenous and other matters.

During the EbD workshops, inter-disciplinary participants and subject-matter-experts worked collaboratively with all stakeholders to present results of respective analyses, provide input, constructively debate ideas and options, critique and challenge thinking, and to discuss the advantages and disadvantages of the various scenarios considered.

Interdisciplinary elements were recognised and incorporated to create robust, evidence-based reporting and challenge the status quo and promote innovative and flexible ideas to challenging issues facing the SAP.

Overall, the streamlined approach to Master Planning enabled all participants' contributions to be duly considered and resulted in the recommendation of a robust Structure Plan that embodies all of the inputs, considerations, constraints, suggestions and requirements from all respective parties.

The outcome of the FEbD is a Structure Plan aligned with the Moree SAP vision and aspirations.

Of particular note, the outcomes from the discussions during the FEbD, which are reflected in the Structure Plan include:

- Identification of a suitable location and orientation for the proposed Inter-Modal Terminal
- Long-term rail line relocation and routing, within the broader transport network
- Measures to protect biodiversity and heritage artifacts including preservation of the Travelling Stock Route (TSR)
- Determination of water volumes and sourcing to satisfy the increased demands from the SAP, including certainty regarding water availability to meet first movers into the SAP
- Measures to create early employment opportunities and priorities to create jobs for locals including Indigenous workers

- Staged land use development strategy to take advantage of existing infrastructure
- Allocation of sufficiently large land areas for new solar farms in the SAP to achieve a net-zero outcome
- Proposed servicing and new supporting infrastructure development strategy for the SAP.

During the EbD workshops, the utilities studies were discussed with consideration of the strengths, weaknesses, opportunities, and constraints of the respective utilities. Further detailed analysis and active discussions were held around the following:

3.2.1 Essential Energy and TransGrid assets

- Electrical supply to new developments within the Moree SAP will be assessed by Essential Energy via a connection application process based on the customer electricity demand.
- From the required load at each land use, developments or commercial premises would typically connect to the network as low voltage customers.
- Existing 22kV network capacity may not be sufficient, which would require a contestable project to upgrade the existing distribution network and associated Moree 66/22kV zone substation.
- Essential Energy 66 kV feeder 721 and 722 are located within the Moree SAP, connecting the TransGrid bulk supply point to the Zone Substation-Moree.
- 66kV feeders 723:WTR to Wathagar and 876 to the Moree Solar Farm run south from Moree 132/66 kV substation and have significant portions of their line routes within the Moree SAP.
- Existing TransGrid 132 kV feeder 96M from Narrabri to Moree is currently located on Intermodal and Value Add Agriculture Precinct. Further planning must be advised that TransGrid confirmed a 45.72-metre wide easement applied to current transmission lines.

3.2.2 Water and sewer assets

- Consultation with Moree Plains Shire Council (MPSC) on the volume of water to be supplied by MPSC (kL/day) to the SAP.
- Location of the two water bores for the interim water supply followed by an additional two bore locations as the SAP develops (total four bores).
- Sewer demand and location of the wastewater generated areas. On-site sewer management facilities can be utilised in a low demand distant parts of the development to reduce the pipe run and make the servicing strategy more economically feasible. Each type of industrial development should be investigated further on a case-by-case basis to confirm the sewer demand.
- It has been noted by MPSC during Enquiry by Design workshops that the existing sewer treatment plant (STP) Moree Sewer System has approximately 50 per cent capacity. Further investigation or documentation should be provided to support this statement and confirm if the sewerage flow from the proposed development can be partially directed to this plant.
- To ensure and improve existing Moree STP serviceability, ensure the existing infrastructures are adequately maintained and monitored. Without the monitoring process, there would be insufficient data to analyse the supply versus demand
- A new STP or upgrade of the existing plant should be considered to treat and potentially reuse the flow within the proposed development.

4 KEY FINDINGS AND ASSESSMENT

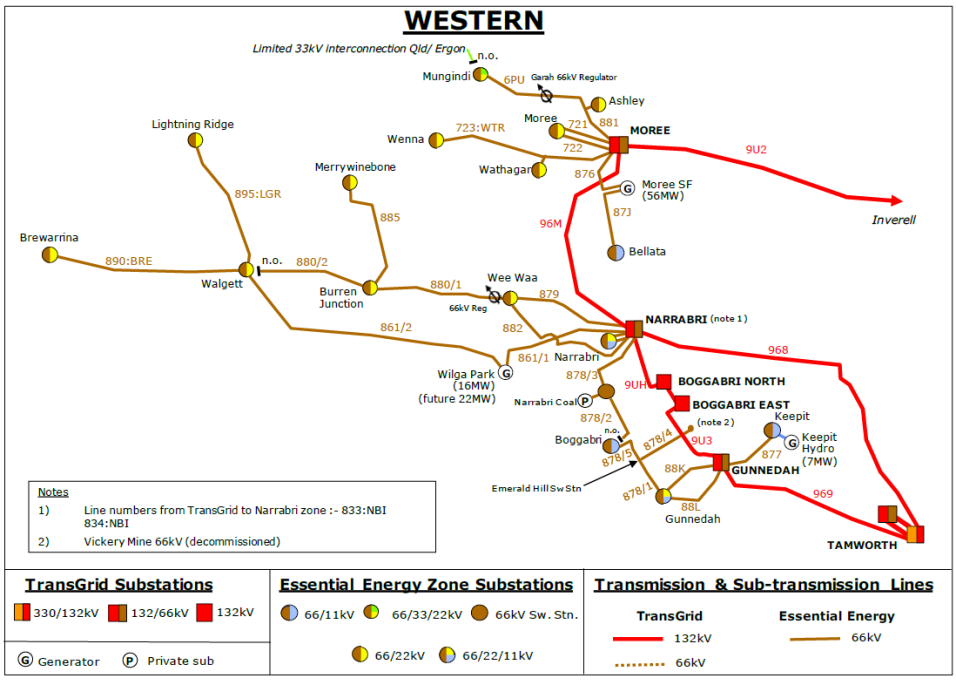
The following reflects the findings from the Utilities Infrastructure Baseline study, which assessed the current Utilities Infrastructure facilities in Moree and the surrounding area, and the potential opportunities for new utilities infrastructure generation for the SAP.

4.1 Existing electricity network

TransGrid and Essential Energy operate the transmission network which passes through the Moree SAP investigation area. Essential Energy also operates the distribution network. The majority of TransGrid's transmission occurs above ground through powerlines and a series of conductors supported by structures to maintain a safe electrical clearance to the ground. At transmission and distribution substations, high voltages are reduced for further transmission or local distribution. Transmission feeder lines are more significant than 132 kV while distribution feeder lines are less than 132 kV.

4.1.1 Existing transmission network near Moree

The transmission network surrounding the Moree region is as shown in Figure 4-1. The Moree region is serviced from the 132 kV transmission and 66 kV sub-transmission networks via several substations owned by TransGrid and Essential Energy.



Source: Essential Energy
Figure 4-1 Electricity Network in the Western Area

4.1.2 Existing Essential Energy lines and network

The loads and low voltage/ high voltage (LV/ HV) consumers are supplied via the 22 kV and 11 kV distribution networks owned by Essential Energy from various 66/22 kV and 66/11 kV Zone Substations as listed below:

- Moree 66/22 kV
- Wenna 66/22 kV

- Wathagar 66/22 kV
- Ashley 66/2 kV
- Mungindi 66/22/11 kV
- Bellatta 66/11 kV.

The Essential Energy Moree 66/22 kV Zone Substation is the only substation that directly supplies the Moree SAP area, with all other substations being outside of the investigation area.

4.1.3 Existing TransGrid 132 kV transmission lines and easement

Bulk power for the Moree region is supplied from the TransGrid bulk supply point (Moree 132/66 kV substation), which is fed by two TransGrid 132 kV feeders 9U2 from Inverell and 96M from Narrabri.

The two TransGrid 132 kV feeders to Moree are located close to the Moree SAP northern boundary, and within the future Regional Enterprise land area. Current TransGrid's owned service has a 45.72-metre wide high voltage transmission easement over this line, and impacts will require significant investigation and planning if modifications are required for future works.

4.1.4 Existing load demand (winter and summer)

This section of the report has been referenced the Renewable Energy Baseline Analysis Report regarding the load demand assessment in Moree SAP.

The demand for electricity for the Moree region is generally higher in winter than in summer. This is evident from the Load Forecasts from Essential Energy's Distribution Annual Planning Report (DAPR) for the substations and distribution feeders servicing the Moree region.

4.1.5 Moree 66/22 kV substation

The present load forecast, as used by Essential Energy for its network planning purposes, is essentially flat, year-on-year, as shown in Table 4-1.

Table 4-1 Summer and Winter Substation Loads (source: Essential Energy)

SUMMER Moree supply Area POE50 indicative demand forecast													
Sub-station	kV	Transformer rating (MVA)			Firm normal cyclic rating (MVA)	Forecast PF	Forecast (MVA)					Embedded generation	95% peak load exceeded (hours)
		Tx.1	Tx.2	Tx.3			18/19	19/20	20/21	21/22	22/23		
Ashley	66/22	8			0	0.99	1.4	1.4	1.4	1.4	1.4	0.34	1
Bellata	66/11	2.8	2.5		2.75	0.94	1.1	1.1	1.1	1.1	1.1	0.38	12
Moree	**66/22**	**15/30**	**24/30**		**33**	**0.98**	**22.5**	**22.7**	**22.8**	**22.9**	**23.0**	**6.59**	**11.5**
Mungindi	66/22/33	8			0	0.95	2.4	2.4	2.4	2.4	2.4	0.65	6
Wathagar	66/22	5			0	0.95	0.9	0.9	0.9	0.9	0.9	0.21	5
Wenna	66/22	7.5			0	0.98	0.4	0.4	0.4	0.4	0.4	0.04	16
Winter Moree Supply Area POE50 Indicative Demand Forecast													
Sub-station	kV	Transformer rating (MVA)			Firm normal cyclic rating (MVA)	Forecast PF	Forecast (MVA)					Embedded Generation	95% peak load exceeded (hours)
		Tx.1	Tx.2	Tx.3			2019	2020	2021	2022	2023		
Ashley	66/22	8			F	0.98	5.6	5.6	5.6	5.6	5.6	0.34	24
Bellata	66/11	2.8	2.5		3	0.99	0.8	0.8	0.8	0.8	0.8	0.38	6
Moree	**66/22**	**15/30**	**24/30**		**36**	**1.00**	**19.8**	**19.9**	**20.0**	**20.1**	**20.2**	**6.59**	**8.5**
Mungindi	66/22/33	8			0	0.95	5.6	5.7	5.8	5.9	6.0	0.65	8
Wathagar	66/22	5			0	0.95	5.2	5.1	5.1	5.0	5.0	0.21	48.5
Wenna	66/22	7.5			0	0.98	0.7	0.7	0.7	0.7	0.7	0.04	4.5

The 2019 load demand of the Moree 66/22 kV substation (which directly supplies the Moree SAP) is 19 MVA. The substation has two transformers (one 15/30 MVA and one 24/30 MVA), but a stated 'firm normal cyclic' summer rating of 33 MVA and 36 MVA for winter.

Essential Energy load data suggests a current utilisation of only 58 per cent of its summer rating with a potential ability to service an additional 14 MVA of new load (or an increase of 73 per cent above its current peak summer demand level of 19 MVA).

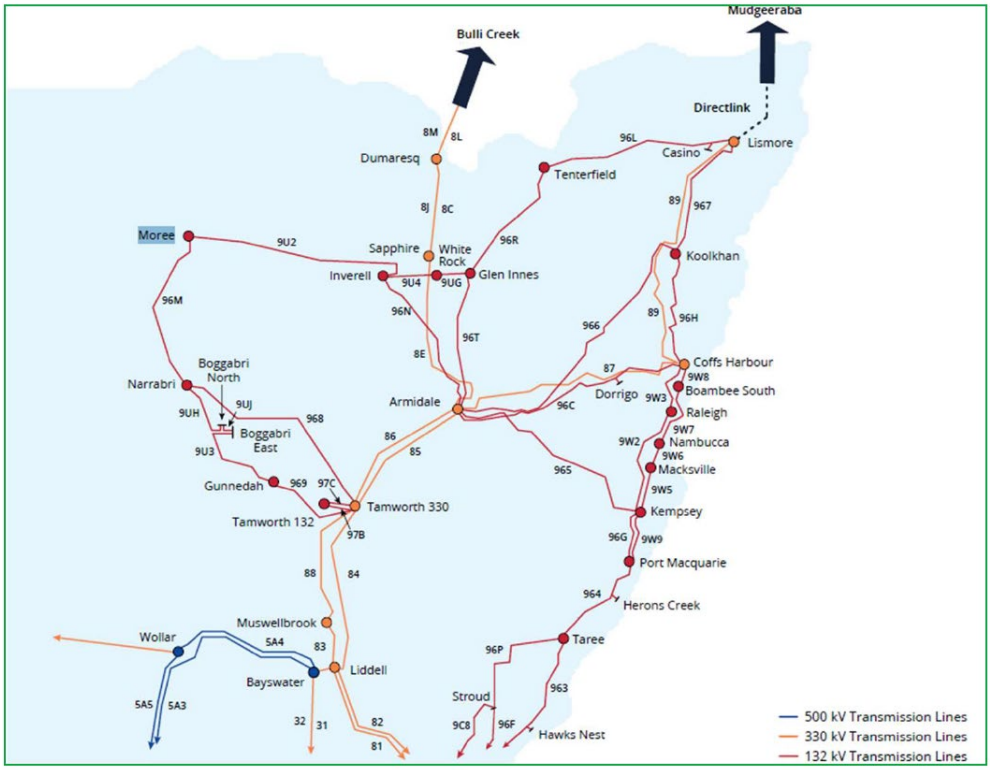
There are two 66 kV sub-transmission lines from the TransGrid bulk supply point to the Moree 66/22 kV Zone Substation (feeder numbers 721 and 722), with each line rated for 64 MVA in summer, and 71 MVA in winter with demand levels of only 8 to10 MVA each. This suggests there is ample spare capacity to support the ultimate substation summer rating of 33 MVA and winter rating of 36 MVA at the Moree 66/22 kV Zone Substation.

Table 4-2 Sub-transmission Feeder Load Forecast (source: Essential Energy)

Feeder number	Feeder voltage kV	Feeder Origin	Feeder Destination	Summer Line rating MVA	Summer Line Forecast MVA					Winter Line rating MVA	Winter Line Forecast MVA				
					19/20	20/21	21/22	22/23	23/24		2019	2020	2021	2022	2023
876	66	TransGrid Moree 132/66kV STS	Moree Solar Farm	70	55.6	56.2	56.8	57.3	57.9	78	54.8	54.9	55.1	55.2	55.4
87J	66	Moree Solar Farm	Bellata ZS	25	1.0	0.9	0.9	0.9	0.9	27	0.9	0.9	0.9	0.9	0.9
721	**66**	**TransGrid Moree 132/66kV STS**	**Moree ZS**	**64**	**10.2**	**10.2**	**10.2**	**10.1**	**10.1**	**71**	**9.3**	**9.3**	**9.4**	**9.4**	**9.4**
722	**66**	**TransGrid Moree 132/66kV STS**	**Moree ZS**	**64**	**10.7**	**10.7**	**10.7**	**10.7**	**10.7**	**71**	**9.8**	**9.9**	**9.9**	**9.9**	**10.0**
881/1	66	TransGrid Moree 132/66kV STS	Ashley Tee	15	3.9	4.0	4.0	4.0	4.0	25	11.4	11.5	11.6	11.7	11.8
881/2	66	Ashley Tee	Ashley ZS	10	1.4	1.4	1.4	1.4	1.4	16	5.6	5.6	5.6	5.6	5.6
6PU	66	Ashley Tee	Mungindi ZS	10	2.4	2.4	2.4	2.4	2.4	16	5.6	5.7	5.8	5.9	6.0
723:WTR/1	66	TransGrid Moree 132/66kV STS	Wathagar ZS	12	2.4	2.4	2.4	2.4	2.4	19	5.2	5.2	5.2	5.2	5.3
723:WTR/2	66	Wathagar ZS	Wenna ZS	15	0.7	0.7	0.7	0.7	0.7	25	0.8	0.8	0.8	0.8	0.8

4.1.6 TransGrid Moree 132/66 kV substation

The greater transmission network further upstream of the Moree region is as shown in Figure 4-2:



Source: TransGrid
Figure 4-2 Transmission Network in Northern Area NSW

The peak load demand at the TransGrid Moree 132/66 kV Bulk Supply Point substation is shown to be 28 MVA in summer and 36MVA in winter. It is forecast to be relatively flat from 28 to 31 MVA (in summer) and from 36 to 37 MVA (in winter) over the next 10 years by TransGrid as shown in

Table 4-4 and Table 4-5 below. Note, however, that this is before considering any load increase in the region due to additional industries and loads at the Moree SAP.

Table 4-3 TransGrid Bulk Supply Substations Summer Loads (source: TransGrid)

Region	2019/20			2020/21			2021/22			2022/23			2023/24			2024/25			2025/26			2026/27			2027/28			2028/29		
	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA	MW	MVAr	MVA
Armidale 66 kV	28	5	28	28	5	28	28	5	28	28	5	28	28	5	28	28	5	28	28	5	29	28	5	29	28	5	29	28	5	29
Boambee South 132 kV	18	2	18	18	2	18	18	2	18	18	2	18	18	2	18	18	2	18	18	2	18	18	2	18	18	2	18	18	2	18
Casino 132 kV	27	7	28	27	7	28	27	7	28	27	7	27	26	7	27	26	7	27	26	7	27	26	7	27	25	7	26	25	7	26
Coffs Harbour 66 kV	61	11	62	62	11	62	62	11	63	62	11	63	63	11	63	63	11	64	63	11	64	64	11	65	64	11	65	64	11	65
Dorrigo 132 kV	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2
Dunoon 132 kV	6	-1	6	7	-1	7	7	-1	7	7	-1	7	7	-1	7	7	-1	7	7	-1	7	7	-1	7	7	-1	7	7	-1	7
Glen Innes 66 kV	10	-2	10	10	-2	10	11	-2	11	11	-2	11	11	-2	11	11	-2	11	11	-2	11	11	-2	12	12	-2	12	12	-2	12
Gunnedah 66 kV	29	-6	29	29	-6	29	29	-6	29	28	-6	29	28	-6	29	28	-6	29	28	-6	29	28	-5	29	28	-5	29	28	-5	28
Hawks Nest 132 kV	11	1	11	11	1	11	11	1	11	12	1	12	12	2	12	12	2	12	13	2	13	13	2	13	13	2	13	13	2	14
Herons Creek 132 kV	11	3	11	11	3	11	11	3	11	11	3	11	11	3	11	11	3	11	11	3	11	11	3	11	11	3	11	11	3	11
Inverell 66 kV	35	-3	35	35	-3	35	35	-3	35	35	-3	35	35	-3	35	35	-3	35	35	-3	36	35	-3	36	36	-3	36	36	-3	36
Kempsey 33 kV	31	5	32	32	5	32	33	5	33	33	5	34	34	5	34	35	5	35	35	6	36	36	6	36	37	6	37	37	6	38
Koolkhan 66 kV	53	8	53	53	9	54	54	9	54	54	9	55	55	9	55	55	9	56	56	9	56	56	9	57	57	9	57	57	9	58
Lismore 132 kV	82	22	85	82	22	85	83	22	85	83	22	86	83	22	86	83	22	86	84	22	86	84	22	87	84	22	87	84	22	87
Macksville 132 kV	10	2	10	10	2	10	10	2	10	10	2	10	10	2	10	10	2	10	11	2	11	11	2	11	11	2	11	11	2	11
Moree 66 kV	**28**	**3**	**28**	**28**	**3**	**28**	**28**	**3**	**29**	**29**	**3**	**29**	**29**	**3**	**29**	**29**	**3**	**29**	**30**	**3**	**30**	**30**	**3**	**30**	**30**	**3**	**30**	**31**	**3**	**31**
Mullumbimby 132 kV	47	-3	47	47	-3	47	48	-3	48	48	-3	48	49	-3	49	50	-3	50	50	-3	50	51	-3	51	51	-3	51	52	-3	52
Nambucca 66 kV	7	1	7	8	1	8	8	1	8	8	1	8	8	1	8	8	1	8	8	1	9	9	1	9	9	1	9	9	1	9
Narrabri 66 kV	58	8	58	59	8	59	60	8	60	61	8	62	62	9	63	63	9	64	64	9	65	65	9	66	66	9	67	68	9	68
Port Macquarie 33 kV	73	12	74	75	12	76	77	12	78	78	12	79	80	13	81	82	13	83	84	13	85	85	13	86	87	14	88	89	14	90
Raleigh 132 kV	11	2	11	11	2	11	11	2	11	11	2	11	11	2	12	12	2	12	12	3	12	12	3	12	12	3	12	12	3	13
Stroud 132 kV	36	-3	36	37	-3	37	38	-3	38	39	-3	39	40	-3	40	41	-3	41	41	-3	42	42	-3	42	43	-3	43	44	-3	44
Tamworth 66 kV	113	24	115	113	24	115	113	24	115	113	24	115	113	24	115	113	24	115	113	24	115	113	24	115	113	24	115	113	24	115
Taree 33 kV	29	6	30	30	6	31	31	6	31	31	6	32	32	6	32	33	6	33	33	6	34	34	6	34	34	7	35	35	7	36
Taree 66 kV	55	9	56	56	10	57	57	10	58	58	10	59	59	10	60	60	10	61	61	11	62	63	11	63	64	11	65	65	11	66
Tenterfield 22 kV	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4
Terranora 110 kV	97	7	98	98	7	98	99	7	99	103	7	103	104	7	104	104	7	104	104	7	104	103	7	104	103	7	104	103	7	103

Table 4-4 TransGrid Bulk Supply Substations Winter Loads (source: TransGrid)

	2019			2020			2021			2022			2023			2024			2025			2026			2027			2028		
Region	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**	**MW**	**MVAr**	**MVA**
Armidale 66 kV	41	3	41	41	3	41	41	3	41	41	3	41	41	3	41	41	3	41	41	3	41	41	3	41	41	3	41	41	3	41
Boambee South 132 kV	19	0	19	19	0	19	19	0	19	19	0	19	19	0	19	19	0	19	19	0	19	19	0	19	19	0	19	19	0	19
Casino 132 kV	20	2	20	20	2	20	20	2	20	20	2	20	20	2	20	19	2	19	19	2	19	19	2	19	19	2	19	18	2	18
Coffs Harbour 66 kV	62	-8	62	62	-8	63	63	-8	63	63	-8	64	63	-8	64	64	-8	64	64	-8	65	64	-8	65	65	-8	65	65	-8	66
Dorrigo 132 kV	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	0	2	2	0	2	2	0	2
Dunoon 132 kV	6	0	6	7	0	7	7	0	7	7	0	7	7	0	7	7	0	7	7	0	7	7	0	7	7	0	7	7	0	7
Glen Innes 66 kV	13	-2	14	13	-2	14	13	-2	14	13	-2	14	13	-2	14	13	-2	14	13	-2	14	13	-2	14	13	-2	14	13	-2	14
Gunnedah 66 kV	24	-6	25	24	-6	25	24	-6	25	24	-6	25	24	-6	24	24	-6	24	24	-6	24	23	-6	24	23	-6	24	23	-6	24
Hawks Nest 132 kV	8	-1	8	9	-1	9	9	-1	9	9	-1	9	10	-1	10	10	-1	10	10	-1	10	11	-1	11	11	-1	11	11	-1	11
Herons Creek 132 kV	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11
Inverell 66 kV	32	-8	33	32	-8	33	32	-8	33	32	-8	33	32	-8	33	32	-8	33	32	-8	33	32	-8	33	33	-8	33	33	-8	33
Kempsey 33 kV	31	4	31	32	4	32	33	4	33	33	4	33	34	4	34	35	4	35	35	4	35	36	4	36	37	5	37	37	5	38
Koolkhan 66 kV	44	-5	44	44	-5	44	43	-5	43	43	-5	43	43	-4	43	42	-4	43	42	-4	42	42	-4	42	42	-4	42	41	-4	42
Lismore 132 kV	78	13	79	78	13	79	78	13	79	78	13	79	79	13	80	79	13	80	79	13	80	79	13	80	80	13	81	80	13	81
Macksville 132 kV	10	1	10	10	1	10	10	1	10	10	1	10	10	1	10	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11
Moree 66 kV	**36**	**4**	**36**	**36**	**4**	**36**	**36**	**4**	**36**	**36**	**4**	**36**	**36**	**5**	**36**	**36**	**5**	**37**	**36**	**5**	**37**	**37**	**5**	**37**	**37**	**5**	**37**	**37**	**5**	**37**
Mullumbimby 132 kV	55	-3	55	55	-4	55	56	-4	56	56	-4	57	57	-4	57	57	-4	58	58	-4	58	59	-4	59	59	-4	59	60	-4	60
Nambucca 66 kV	9	1	9	9	1	9	9	1	9	9	1	9	9	1	9	9	1	9	10	1	10	10	1	10	10	1	10	10	1	10
Narrabri 66 kV	57	5	57	58	5	58	59	5	60	61	5	61	62	5	62	63	5	63	64	5	64	65	5	65	66	5	66	67	5	67
Port Macquarie 33 kV	76	10	77	78	11	79	80	11	81	82	11	82	83	11	84	85	11	86	87	12	87	88	12	89	90	12	91	92	12	93
Raleigh 132 kV	10	1	10	11	1	11	11	1	11	11	1	11	11	1	11	11	1	11	12	1	12	12	1	12	12	1	12	12	1	12
Stroud 132 kV	33	-5	33	34	-5	34	35	-5	35	36	-5	36	36	-5	37	37	-5	38	38	-5	38	39	-5	39	40	-6	40	41	-6	41
Tamworth 66 kV	96	8	97	96	8	97	96	8	97	96	8	97	96	8	97	96	8	97	96	8	97	96	8	97	96	8	97	96	8	97
Taree 33 kV	27	4	27	27	4	27	28	4	28	28	4	29	29	4	29	30	4	30	30	4	30	31	4	31	32	4	32	32	4	32
Taree 66 kV	55	5	55	56	5	56	57	5	58	58	5	59	60	6	60	61	6	61	62	6	62	63	6	63	64	6	64	65	6	65
Tenterfield 22 kV	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4
Terranora 110 kV	84	-5	84	87	-6	87	87	-6	87	87	-6	87	92	-6	92	92	-6	92	92	-6	92	92	-6	92	92	-6	92	92	-6	92

The current utilisation of the 132 kV transmission lines to the Moree region / bulk supply point, is only at 50 to 53 per cent, as shown in Figure 4-3 below and suggests that there is sufficient capacity in the transmission network to support load growth in the Moree SAP up to the capacity of the existing assets.

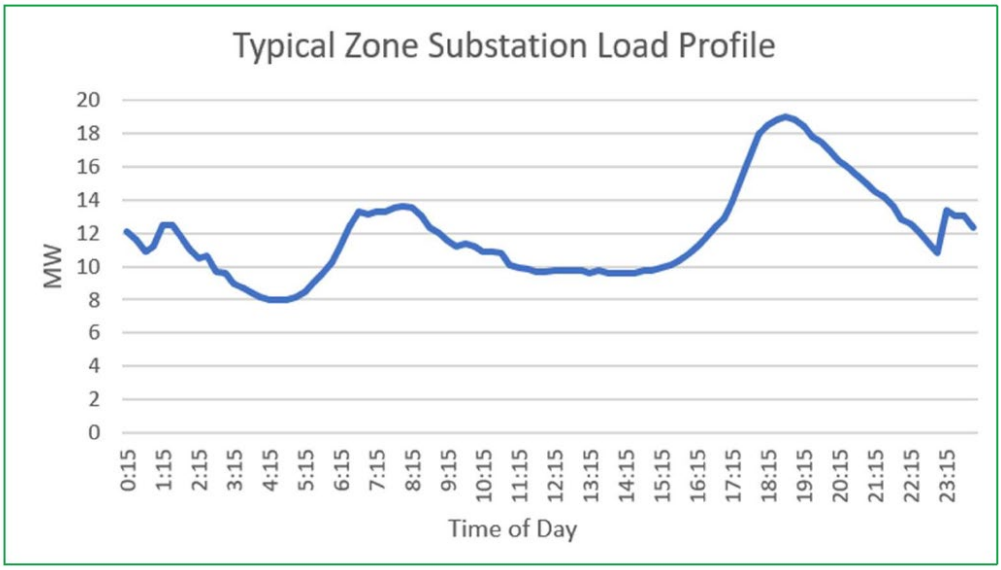
Source: TransGrid
Figure 4-3 Transmission Line Utilisation Factors

4.1.7 Current energy consumption in Moree SAP

Total energy delivered to the whole of the Northern Tablelands part of NSW in 2019 was 1,239 GWh. There is no split shown of this total energy figure for the Northern Tablelands that was delivered through the various Essential Energy substations serving the Moree region. (This information has been requested from Essential Energy but is not currently available at the time of this report).

In any case, a rough estimate of the energy delivered through the Moree 66/22 kV substation which directly supplies the Moree SAP, based on the 19 MVA recorded maximum demand of the substation and assuming a typical zone substation load profile as shown in Figure 4-4 below, with a load factor of 0.63, suggests an annual energy delivered figure of approximately 104,850 MWh (or 105 GWh).

The current population in Moree Plains Shire is 13,949 and it was assumed that the population would be largely (about 80 per cent) centred in Moree town, which is serviced by the Moree 66/22 kV substation. If the split between residential and commercial/industrial for the energy delivered through Moree 66/22 kV substation is 40:60, then it could be assumed that the energy from the residential demand would equate to about 0.8 x 0.4 x 105 = 33.6 GWh p.a., or about 6.1 MVA.



Source: AusGrid
Figure 4-4 Typical Zone Substation Daily Load Profile

4.1.8 Moree SAP – Existing Essential Energy 22kV and LV distribution networks

The Existing Essential Energy 22 kV and LV Distribution Networks have been provided within the Moree SAP study area from the GIS data obtained from TransGrid and Essential Energy, respectively.

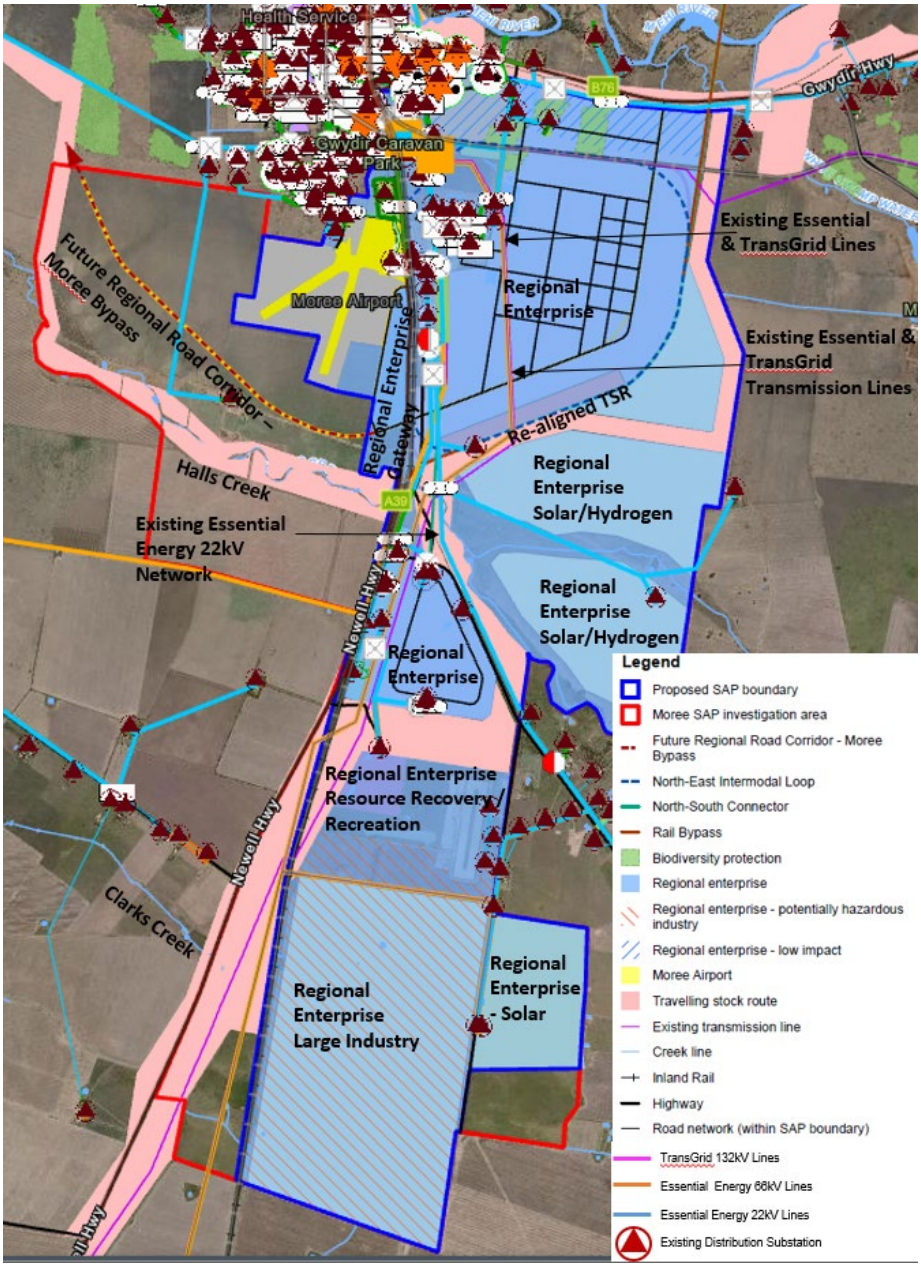


Figure 4-5 Existing TransGrid and Essential Energy Network in Proposed Moree SAP

4.2 Existing potable water services

Moree Plains Shire Council manages four potable water supply schemes (Boggabilla, Moree, Mungindi and Pallamallawa) and five non-potable water supply systems (Boomi, Garah, Gurley, Boggabilla and Weemelah). Ashley/Biniguy is non-potable at this time with further works to progress to potable is underway. Figure 4-6 highlights the water supply area in the Council region.

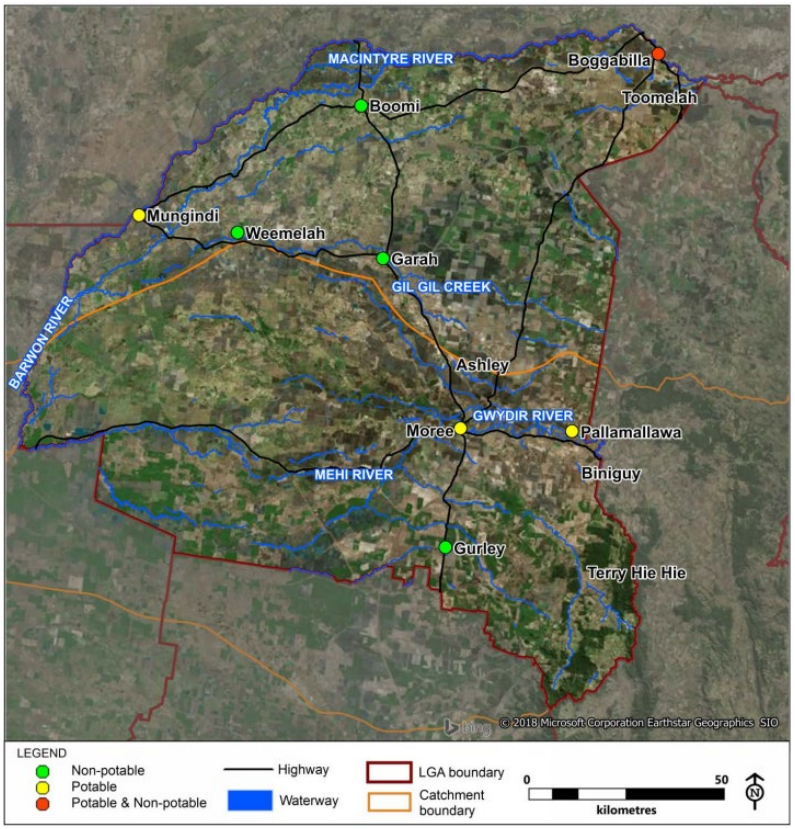


Figure 4-6 Council water supply areas

The existing potable water network servicing in the study area of Moree SAP has been identified based on DBYD records and "Moree Plains Water Supply Reticulation Network Report". The main sources of water for Moree (refer to Figure 4-7) and the study area of Moree SAP is the borefield located north of Moree, which currently includes 8 operational bores extracting water from the Lower Gwydir Groundwater Source which pumps directly into Broadwater Reservoir. Two additional bores, a bore to the south of Moree with water stored at the Tycannah Street Reservoir, and a bore with water stored at Greenbah Tower, pump directly into the reticulation system. There is a booster station at Broadwater Reservoir to assist in transferring water to the Boston Street Reservoir during high demand periods. A small area south of Moree is fed by a pressure boosted pump system. The potable water supply is chlorinated and fluoridated. Three untreated bores are used to draw non-potable water for parks, gardens and ovals.

Key existing potable water system details of the Moree Water Supply System (MWSS) within the Moree SAP study area are provided in the following Table 4-5.

Table 4-5 Moree Water Supply System details

Item	Existing Load	Units
Total reservoir water storage	25.1	ML
Potable water allocation	3,550	ML/annum
Average potable water supply	2,600	ML/annum
Unused allocation	750	ML/annum
System supply capacity	15.47	ML/day

Item	Existing Load	Units
Modelled peak daily demand	18.07	ML/day
Average daily system demand	4.966	ML/day
Average daily system supply including water losses	5.846	ML/day
System pipe reticulation sizes	100-200	mm

Potable water system inefficiency and high losses in the existing system has been identified. Moree Plains Water Supply Reticulation Network Report 2014 has noted that the existing water system (reservoirs volume and capacity) based on the provided modelling is inadequate to cater for existing users. However, Council advised that it can provide 500 ML/annum with likelihood for an additional 250-500 ML/annum in midterm over the next 2 to 3 years. Longer term could yield an additional 250 to 500 ML/annum of allocation of water.

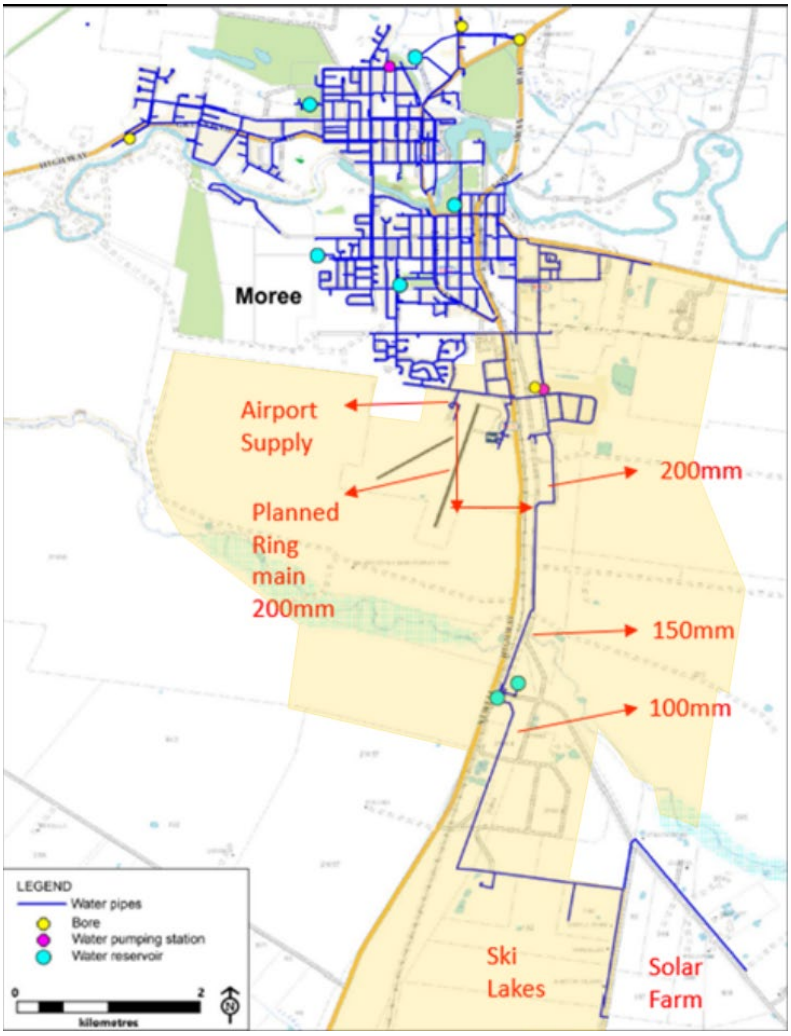


Figure 4-7 MWSS existing pipe sizes supply to Moree SAP

4.3 Existing sewer system

The MPSC manages five sewerage schemes (Ashley, Boggabilla, Gurley, Moree and Mungindi) as shown on Figure 4-8.

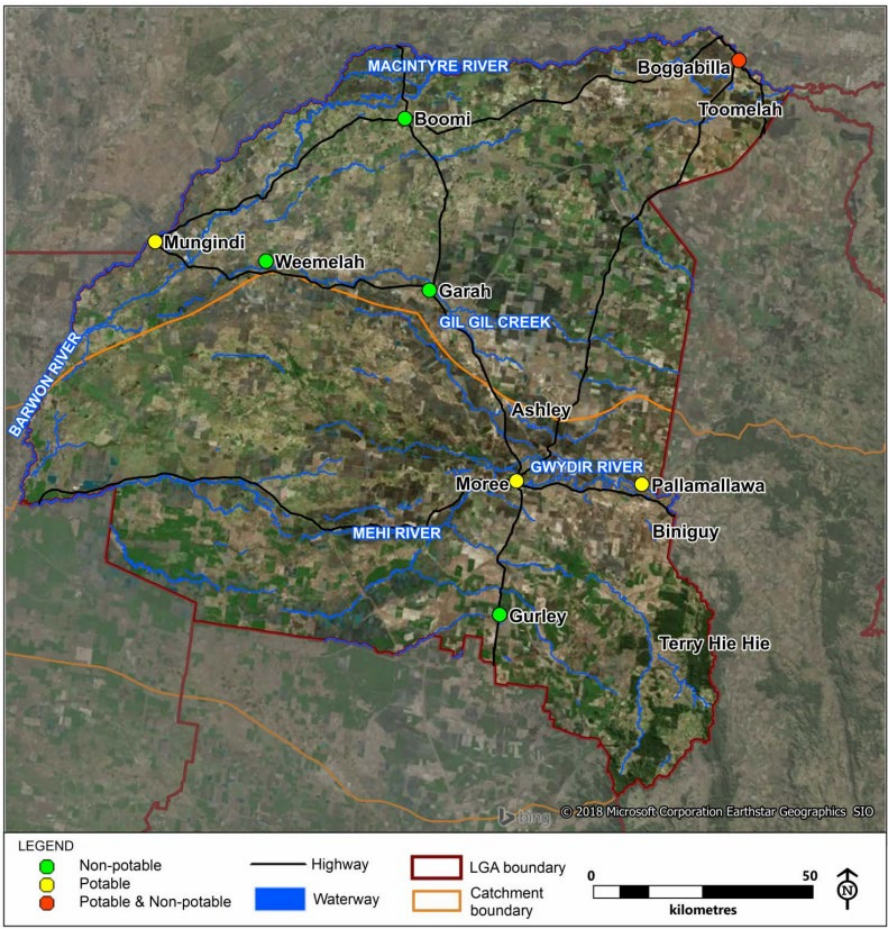


Figure 4-8 Council sewerage scheme locations

Moree is serviced by a conventional gravity sewerage system. The existing sewerage network servicing in the study area of the Moree SAP has been identified based on DBYD records and "MPSC Strategic Business Plan for Water and Sewerage Supply 2018". Of the 22 pumping stations, three deliver directly to the STP. Moree STP is located at the north western edge of the town off Boundary Street adjacent to Ron Harborne Oval. In 1985, the plant was augmented by the construction of an intermittent extended aeration tank (IEAT) to relieve overloading and allow for growth. A maturation (tertiary) pond is used for disinfection of the effluent. Treated effluent is piped from Moree STP to irrigate Ron Harborne Oval, Moree Cemetery, Moree Golf Course, Mike Shaw Park and property to the north of the Gwydir River. Effluent that is not reused is piped by gravity flow from the maturation pond outlet to the pipe discharge point at Greenbah Creek. Treated effluent from the Moree STP is used for irrigation at the Ron Harborne Oval, Moree Cemetery, Moree Golf Course, and an irrigation property to the north of the Gwydir River. The Sewer Rising Mains route (Figure 4-9) provides a connection to the sewerage from Moree SAP study area to the Moree STP.

Table 4-6 Moree Sewer Supply System details

Item	Existing Load	Units
Average daily sanitary flow (ADSF)	660	kL/day
Peak wet weather flow (PWWF)	6,209	kL/day
STP average daily inflow	**3,690**	kL/day
Current capacity *	50%	%
System pipe reticulation sizes	100-200	mm

* Current capacity was provided verbally by the Council during Enquiry by Design and Final Enquiry by Design workshops.

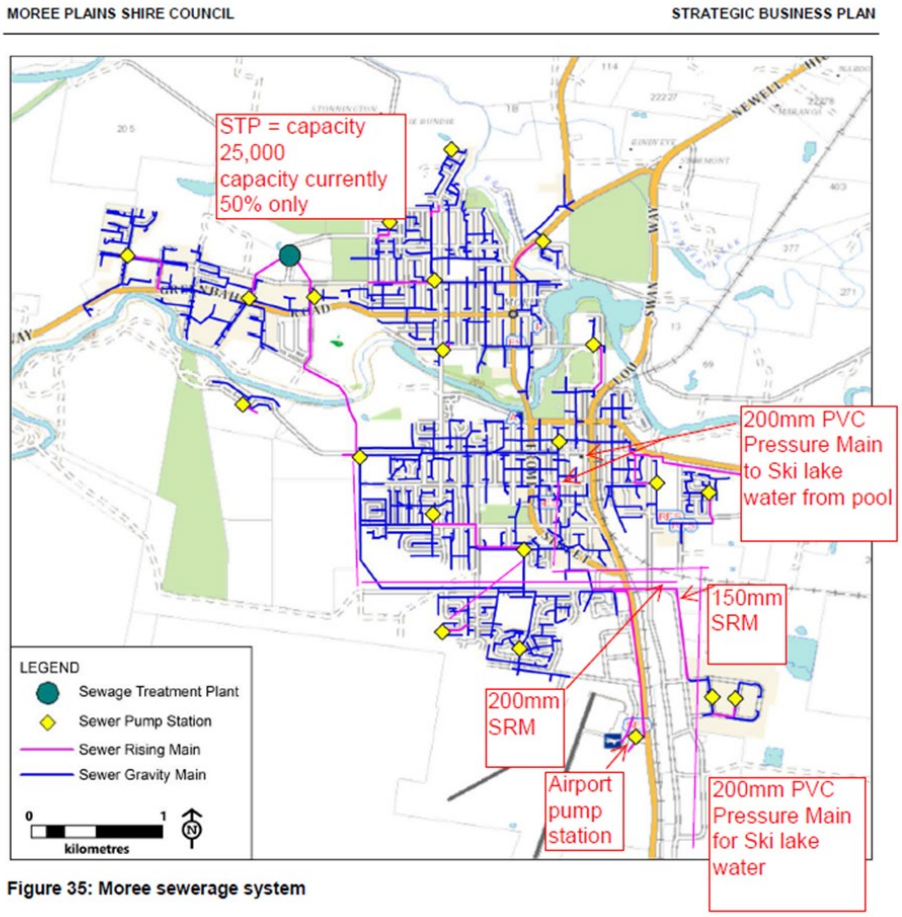


Figure 4-9 Council Sewerage networks in Moree Plains Shire and SAP study area

4.4 Existing telecommunication service

The communication providers include their conduits, cables and optic fibre around or within the Moree SAP study area. The site investigation in the next design phase would confirm if any assets are within Telstra conduits: The telecommunication providers available around or within the Moree SAP study area are:

- Telstra
- NBN

- AARNet
- NextGen
- Pipe Networks.

4.4.1 Telstra

Telstra assets are present within the Moree SAP study area. Figure 4-10 provides an overview of the Telstra network running through the Moree SAP.

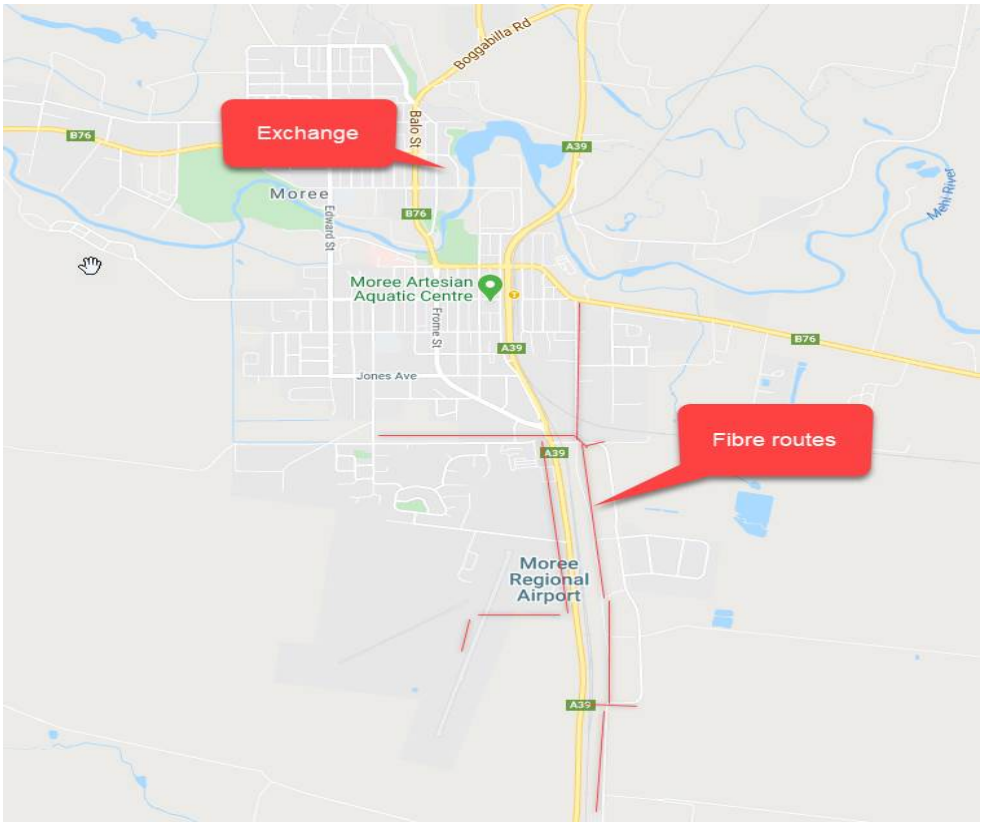


Figure 4-10 Telstra networks in Moree Plains Shire

The Telstra representative for Moree, NSW have been consulted, and the following high-level information has been obtained:

- The main Telstra fibre runs along the railway line between the track and Newell Highway
- The Telstra asset is interstate significant Telstra asset QLD-NSW-VIC.
- Telstra exchange is located at Moree, NSW
- Telstra upgrades are planned for the Inland Rail works
- Telstra can extend fibre infrastructure to service the Moree SAP
- The location of fibre access joint to service future requirements for Special Activation Precinct will be required to be provided for Telstra to provide network connections to the Moree SAP customers.

4.4.2 NBN

Figure 4-11 maps the available NBN Network located within the Moree SAP study area. The NBN network is the Australian government's high-capacity broadband network.

The NBN network uses a range of technologies to bring fast internet and high-quality streaming to the customers. The NBN network has replaced ADSL and cable broadband in some areas of Moree. Further consultation will be required with NBN to supply the Moree SAP study area.

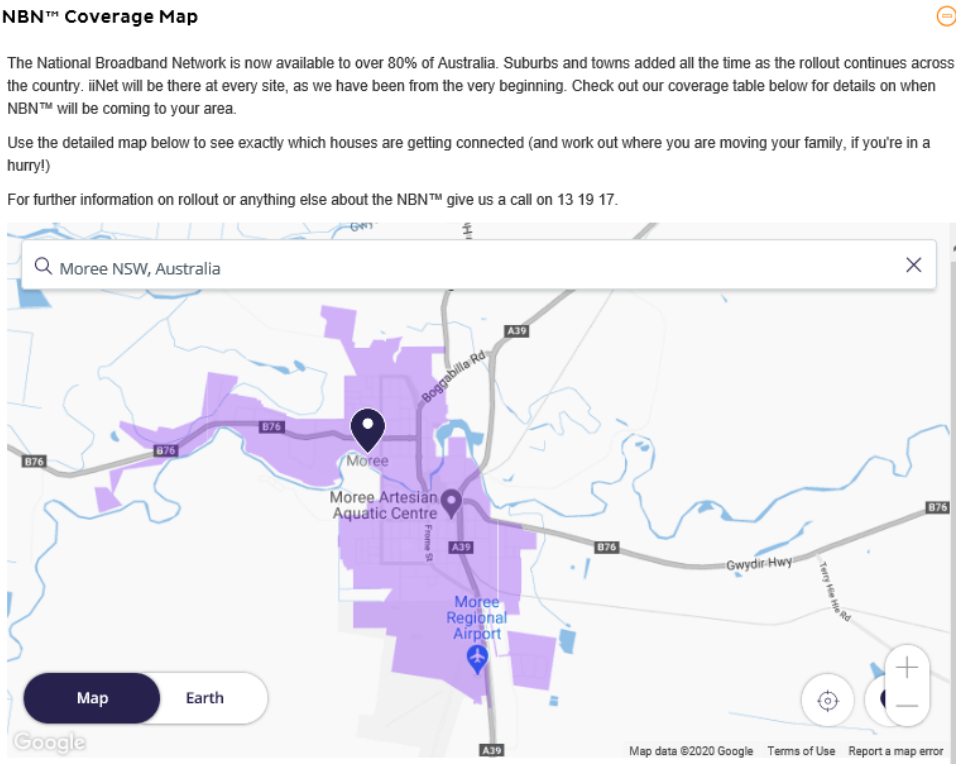


Figure 4-11 NBN Coverage Map in Moree Plains Shire

4.4.3 AARNet

The AARNet communication assets are located within the Moree SAP study area that includes AARNet fibre optic cable assets. The map below (Figure 4-12) indicates the approximate location of the AARNet assets within the Moree SAP study area. There may be additional AARNet assets in this area contained within Telstra ducts. Any further consultation can be made by contacting AARNet NOC on 1300 APL NOC (1300 275 662).

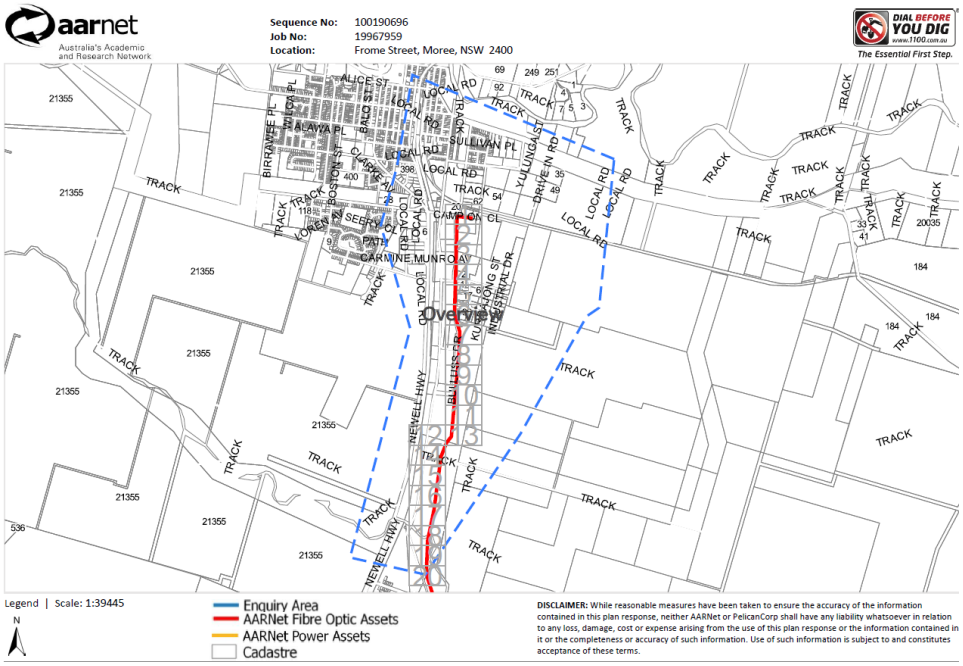


Figure 4-12 AARNet networks in Moree Plains Shire

4.4.4 Nextgen

The Nextgen communication assets are located within the Moree SAP study area. The Nextgen sketches and plans (Figure 4-13) provided by Nextgen Networks are circuit diagrams only and indicate the presence of telecommunications plant in the general vicinity of the geographical area shown. The exact ground cover and alignments cannot be given with any certainty and cover may alter over time. The telecommunications plant does not follow straight lines and careful on-site investigation is essential to uncover and reveal its exact position. The accuracy and/or completeness of the information in the plans cannot be guaranteed often due to changes in the surrounding land after Nextgen's deployment and are indicative only.

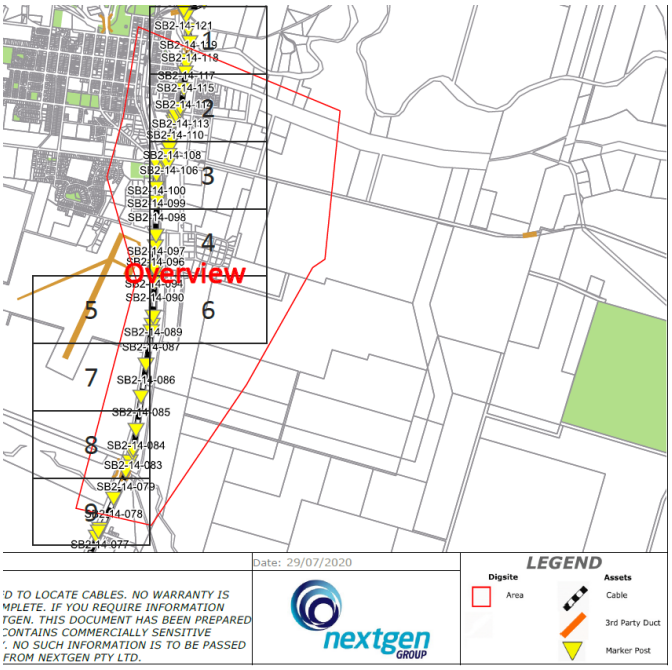


Figure 4-13 Nextgen networks in Moree Plains Shire

4.4.5 Pipe networks

The Pipe Networks communication assets are located within the Moree SAP study area.

4.5 Existing gas service

There are no existing gas services within the MPSC region.

4.6 Stakeholder liaison

Utilities providers contacts are highlighted in Appendix A. Utility providers were contacted to obtain relevant utility data required to assess the existing infrastructure and compare to the future demand requirements.

4.7 Summary of key findings

Table 4-7 below provides a summary of the findings of utility infrastructure investigation.

Table 4-7 Summary of existing issues

Utility	Existing network	Current issues
Electrical	The 2019 load demand at Moree 66/22kV Zone Substation is 19MVA, load data suggests a potential ability to service an additional 14MVA new load. Current 66kV sub-transmission lines (feeder 721 and 722) line rated for 64MVA-71MVA with demand levels of 8-10MVA each.	• Existing 22kV network capacity may not be sufficient, which will require to upgrade of overhead lines and the zone substation. • Essential Energy 66kV feeder 721 and 722 are located within the Moree SAP, connecting the TransGrid bulk supply point to the Zone Substation-Moree. • 66kV feeders 723:WTR to Wathagar and 876 to the Moree SF run south from to Moree 132/66kV substation and have significant portions of their line routes within the Moree SAP. • Existing TransGrid 132kV feeder 96M from Narrabri to Moree is currently located on Intermodal and Value Add Agriculture Precinct. Further planning needs to be advised that TransGrid confirmed a 45.72m wide easement is applied to current transmission lines.
Water	Currently Immediate Moree water availability is 500 ML/annum Midterm (over next 2 to 3 years) - additional 250 to 500 ML/annum Longer term could yield an **additional** 250 to 500 ML/annum	• Data collection and monitoring improvements are required to provide detailed assessments of the water cycle (water supply demand and sewerage system flows). • High water losses (NRW and leakage).

Utility	Existing network	Current issues
		• Monitoring of water sources as part of the drought management strategy is not currently undertaken. • Best-practice water supply pricing has not been implemented (3 tier usage charge is in place with reduced charge for high consumption). • The asbestos cement (AC) and concrete lined (CI) water supply mains are in a poor condition resulting in a number of failures. • Previous maintenance activities have been reactive due to limited resources. • Ongoing difficulties with labour shortages, skill gaps and staff retention.
Sewer	Existing capacity of Moree sewerage treatment plant (STP) is 3,690 kL/day. 50% spare capacity has been assumed through the verbal discussion with the Council during Enquiry by Design. Further investigation required to support the data.	• Data collection and monitoring improvements are required to provide detailed assessments of the water cycle (water supply-demand and sewerage system flows). • Inflow and Infiltration are high with limited data available to confirm this. • The asbestos cement (AC) and concrete-lined (CI) water supply mains are in poor condition resulting in a number of failures.
Communications	Various Telecommunication providers carrying major Optical Fibre Assets are located within the Moree SAP study area	Telstra has primary fibre running in the area and has the capacity for future fibre upgrades. No other issues were identified in consultation with Telstra.

5 STRUCTURE PLAN

5.1 Final Master Plan

Following the scenario assessment phase and reporting, a final EbD Workshop was held in Moree at the MPSC premises between 17 and 20 November 2020 to develop the Master Plan for the investigation area. The workshop enabled an atmosphere of interdisciplinary collaboration to understand the environmental, infrastructure, and social constraints and develop the proposed final Master Plan.

During that workshop, it was determined that the initial scenarios assessed did not fully meet the Moree SAP vision and aspirations and a reconfiguration of the proposed land-usages and land-areas, taking into account inputs from various stakeholders was undertaken. Vital information from the market-sounding exercise which gauged the level of interest and expected take-up of land-parcels from new businesses and also an analysis of the types of new businesses to be serviced, was a key consideration from a Renewable Energy perspective as this directly affected the estimated energy demands of the new businesses and the size/scale of the new renewable energy opportunities which would be needed to achieve the net-zero target.

The location of the new businesses also informed the suggested siting of new renewable energy generation (namely the new large scale solar farms) in the Structure Plan. The proposed final structure plan that is assessed in this report, is as shown in Figure 5-1.

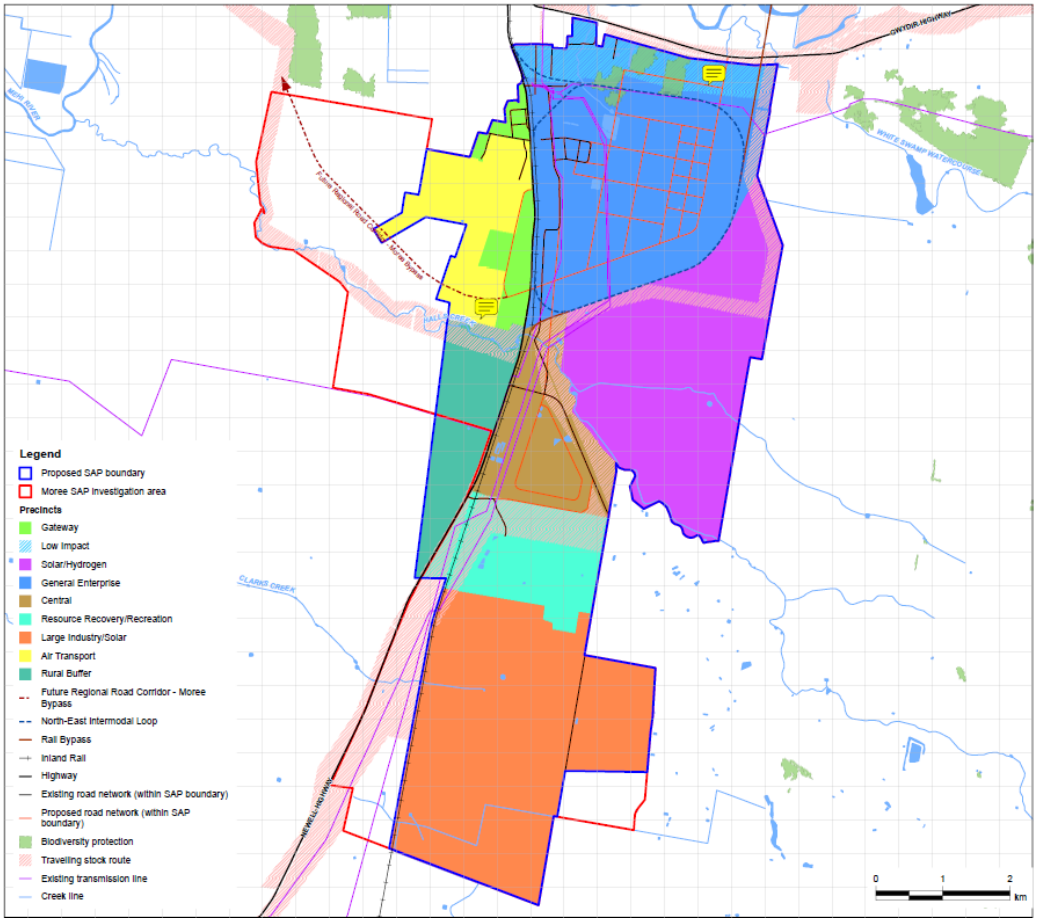


Figure 5-1 Final Proposed Structure Plan assessed

5.2 Anticipated land uses, type and size

As per the CIE Economic Study, the proposed SAP land uses, net developed area for 40 years, and the proposed employment figures are summarised in Table 5-1. The net developable regional enterprise has been revised to 835 hectares.

Table 5-1 Proposed land use and employment

Land use type	Net developable area (hectares) ultimate	Employment ultimate
Intermodal	30	15
Freight and logistics	20	10
Horticulture/ native horticulture	520	3441
Resource recovery	60	20
Value add agriculture	80	170
Bio-energy	30	10
Potentially hazardous	25	25
Enterprise/ hub	10	25
Energy/ solar	700-2110	16
Total	**2,885**	**3,732**

This report provides an overview of the following local and broader regional infrastructure to service the SAP.

- Electricity
- Water
- Sewer
- Telecommunications.

The Moree SAP investigation area is predominantly a greenfield site with minimum utility infrastructure. This report assesses the availably of the existing systems to cater to the development needs.

5.3 Land-use area, estimated electricity demand and supply analysis

Based on the Moree SAP Structure Plan - Preferred Scenario Land Yields – Preliminary, Table 5-2 outlines the land areas of different sub-precinct types and future maximum demands in 40-year time.

The respective electricity maximum demand estimates for each land use area is also shown below. These energy demands would inform the assessments of a network upgrade plan from utilities' perspectives.

Transmission assets (above 33 KV) are covered in the Moree SAP - B.3.2D Renewable Energy Report.

Table 5-2 Land-use areas and estimated electricity demands

Land use type	CIE identified precinct	Load factor	Power factor	Area (Ha)	Maximum demand (MVA)
Intermodal	Central	0.86	0.80	30	9.19 **(0.00)**
Freight and logistics	Central	0.90	0.90	20	3.11 (-3.66)
Horticulture and intensive agriculture	North-eastern	0.90	0.90	468	16.60 (0.00)
Traditional native horticulture	North-eastern	0.40	0.90	52	0.69 (0.00)
Resource recovery	North-eastern	0.40	0.90	60	1.42 (.00)
Value add agriculture	North-eastern	0.64	0.80	80	20.13 (0.00)
Bio-energy / high impact	North-eastern	0.64	0.80	60	21.71 (-8.51)
Energy/ solar hub (incl WtE, H2)	Solar	1.00	1.00	714	9.08 (-212.00)
Hazardous industry	Potentially Hazard	1.00	1.00	25	3.51 (0.00)
Enterprise/ hub	Gateway	0.60	0.90	10	3.19 (-0.45)
New Moree SAP load	-	-	-	1519	88.6
After diversified demand (MVA)			-		70.9
Current Moree region			-		19.0
Estimated future Moree region			-		**89.9 MVA**

Note: Figures shown within bracket in Orange are the estimates of Renewable Energy Generation, refer to A.3.2D Renewable Energy Report for estimated electricity load details.

The information about the business type and allocation details are in line with the recommended land use from CIE and Final Structure Plan, Arcadis' Renewable Energy Report has used a set of assumptions for the developments within each land use precinct, along with businesses types considered to be likely, etc.

Arcadis Renewable Energy Report states the methodology and assumptions that were used to determine the energy demand estimates.

5.3.1 New zone substation and 22 kV network reticulation in Moree SAP

5.3.1.1 Electricity power supply distributed by existing/ proposed zone substation

Table 5-3 Load distributed from Moree Zone Substation and New Zone Substation Supply Arrangement

Zone substation	CIE identified precinct	Estimate maximum demand (MVA)	40-year network capacity (MVA)
Existing Moree Zone Substation	North-eastern Precinct Gateway Solar (North/ Central and South) Existing Moree Load	63.59	66.0
Second Zone Substation	Central and Southern Precinct Potentially hazardous	26.31	33.0
Total		89.9	

As per the *Moree SAP Structure Plan - Preferred Scenario Land Yields – Preliminary,* the upgraded Moree zone substation would potentially be utilised for the existing local power supply and new loads created from future Regional Enterprise (Gateway, horticulture and intensive agriculture, resource recovery and value-added agriculture and bio-energy industries).

The large developments in the Central and Southern part of SAP (potentially hazardous and intermodal, freight and logistics precinct) would unlikely be serviced from the existing zone substation long lengths of feeders needed and large voltage drops. With the growth power supply requirement from SAP, when more capacity is needed, it is recommended to install the third transformer in the new proposed substation as required.

This new zone substation is assumed to be near the existing 66 kV transmission network in an Essential Energy easement area. It is suggested to coordinate early with the electricity provider to further study substation footprint, location, and any easement requirements.

5.3.1.2 Proposed 22 kV distribution network reticulation

Further to the power supply from zone substations, a new 11 kV or 22 kV distribution network will be required to roll out either from overhead or underground within the Moree SAP to suit the specific planning scheme.

The Proposed road network as shown in the Structure Plan (within the SAP boundary) is assumed to accommodate Essential Energy distribution assets.

Depending on development locations, new connections may require installation of a new pole-mounted transformer or an underground cable from the future overhead mains to supply the new pad-mounted transformer.

Essential Energy may require large industrial customers to connect to the network as high voltage customers. This process usually requires more detailed technical studies into network strength and stability.

5.4 Land-use area, estimated water demand and supply analysis

5.4.1 Water service assumptions of the proposed development

In the absence of being provided with more specific information on the likely new businesses that would be attracted to Moree SAP and their likely water demands, Arcadis established assumptions for viable businesses, and to estimate the respective water demands, using the methodology outlined below:

- Economics Report (by CIE) summarised market sounding work that listed the most likely investments to be attracted to the Moree SAP and suitable industries to be considered, based on the level of interest shown from the wide mix of businesses consulted.
- Arcadis had not determined the load compositions of individual facilities that could be developed within each land use area nor undertaken any detailed assessments of the service load of typical plant and equipment potentially installed by land users. This would invariably change depending on the exact nature, size and scale of the facility that is ultimately developed/constructed.
- Arcadis determined the estimates of water demand, based on:
  - the allotted land use areas
  - assumptions of development footprint (as a percentage of the allotted land) within which facilities or premises would be established
  - assumptions of industrial use of potable water demand in accordance with Sydney Water's "average daily water use" guide.
  - Project knowledge of similar land use – e.g. for intermodal facilities, warehousing and logistics hubs, etc.
- The estimates of water generation have been determined based on:
  - Assumptions of wastewater treatment and reuse for non-potable demand.
  - Assumptions of rainwater collection and reuse for non-potable demand
- It has been assumed that non-potable water demand can be covered through wastewater treatment and rainwater reuse
- Water use for industrial needs (hydroponics, etc.) has been excluded.

Further assumptions per development type are shown in Table 5-4.

Table 5-4 List of assumptions for water usage

Precinct type	Assumptions
Intermodal **Freight and logistics** **Horticulture and intensive agriculture** **Resource recovery** **Value add agriculture** **Energy/ solar** **Bio-energy generation** **Potentially hazardous**	Average potable water demand has been estimated based on • Development area - Light Industrial Use 40kL/NHa/day for potable water supply. Source: Water Planning Guideline Section 3: Water Demand and Growth (Sydney Water, 2014) Table 3-2 and 3-8and • Employment - 80L/person/day. Maximum potable water demand is 1.6 of the average demand as per Water Supply Code of Australis WSA03 Further assumption has been made as follows: • Net hectare (floor area of future building development) has been calculated based on % of total land area. Percentage of the area has been assumed based on Arcadis experience with similar industrial land development.
Enterprise/ hub	Average potable water demand has been estimated based on • Development area - Commercial Use 41kL/NHa/day Source: Water Planning Guideline Section 3: Water Demand and Growth (Sydney Water, 2014) Table 3-2 and 3-8 • Employment - 80L/person/day. Maximum potable water demand is 1.6 of the average demand as per Water Supply Code of Australis WSA03 Further assumption has been made as follows: • Net hectare (floor area of future building development) has been calculated based on % of total land area. Percentage of the area has been assumed based on Arcadis experience with similar industrial land development.

5.4.2 Development water demand

Potable water demand has been calculated for taking into consideration above-mentioned assumptions based on two methods:

- Area-based, refer to
- Table 5-5
- Employment-based, refer to Table 5-6.

Table 5-5 Potable water demand based on area

Precinct Name	Net area (Ha)	Build up % %	Building area (NHa)	Average demand kL/day	Max demand kL/day
Intermodal	30.00	10%	3.00	85	135
Freight and logistics	20.00	30%	6.00	169	271
Horticulture and intensive agriculture	520	30%	156	4399	7039
Resource recovery	60	30%	18	508	812
Value add agriculture	80	30%	24	677	1083
Bio-energy	30	30%	9	254	406
Potentially hazardous	25	30%	8	212	338
Energy/ solar	2110	5%	106	2975	4760
Hub	10	30%	3	74	119
Total daily water demand, ML/day				**9.35**	**14.96**
Total annual water demand, ML/annum				**2,338**	

Table 5-6 Potable water demand based on employment

Precinct Name	Employment	Average demand kL/day	Max demand kL/day
Intermodal	15	1.20	1.92
Freight and logistics	10	0.80	1.28
Horticulture and intensive agriculture	3441	275.28	440.45
Resource recovery	20	1.60	2.56
Value add agriculture	170	13.60	21.76
Bio-energy	10	0.80	1.28
Potentially hazardous	25	2.00	3.20
Energy/ solar	16	1.28	2.05
Hub	25	2.00	3.20
Total daily water demand, ML/day		**0.3**	**0.48**
Total annual water demand, ML/annum		**74.64**	

Calculated water demand based on area-based assumptions was done on high-level estimation and considered conservative. It includes industrial demand however excludes irrigation water requirements. Water demand based on the employment is considerably lower and input from the potential future businesses in the area are recommended to confirm employment and potable water use requirements.

Table 5-7 Potable Water Demand Comparison with the supply

Total annual water demand (area based)	Council water provision	% of SAP water demand covered by Council water
2,338 ML/annum	Short term 500 ML/annum	21%
	Medium term (2-3 years) additional 250-500 ML/annum	32-43%
	Long term – additional 250-500 ML/annum	53-64%

The rest of the water demand can potentially be covered through the non-potable water source such as rainwater use, treated wastewater, non-potable bore water etc.

Potable water demand calculated based on the employment component can be fully covered by the Council's potable water provision. Employment-based demand appears to be three per cent of the area-based demand. Confirmation of reliability of the data for services' demands calculations is advisable to ensure sufficient water resource allocation to the development.

A new opportunity for water supply has been considered to supply water predominantly for industrial needs for the Moree SAP through water mining such as two bores for interim (20 years) and two additional bores for the ultimate 40-year period, 3,900 ML/year, averaging about 10.7 ML/d, subject to water extraction approvals and potential annual limits. Further investigations required to confirm the viability of potable water supply by mining.

It is proposed to reticulate the new potable water pipework within the future road reserves to each industrial precinct as required. The pipe sizes would depend on the simultaneous demand of each precinct.

Refer to Appendix B for the proposed potable water reticulation strategy supply to the Moree SAP.

5.5 Land-use area, estimated wastewater demand and supply analysis

5.5.1 Wastewater service assumptions of the proposed development

In the absence of being provided with specific information on the likely new businesses that would be attracted to Moree SAP, or their likely sewer demands, Arcadis set about to establish an assumptions list of businesses considered to be likely, and to estimate the respective demands, using the methodology outlined below:

- Arcadis reviewed the notes from the Market Sounding exercise (by CIE) which listed the most likely investments to be attracted to the Moree SAP and suitable industries to be considered, based on the level of interest shown from the wide mix of businesses who were consulted.
- Arcadis had not determined the load compositions of individual facilities which could be developed within each land use area nor undertaken any detailed assessments of services load of typical plant and equipment which could be installed by land users. This would invariably change depending on the exact nature, size and scale of the facility that is ultimately developed/constructed.

- Arcadis determined the estimates of sewer demand, based on:
  - the allotted land use areas
  - assumptions of development footprint (as a percentage of the allotted land) within which facilities or premises would be established
  - assumptions sewerage flow estimation for undeveloped areas are based on planning in accordance with Sewerage Code of Australia WSA02-2002-2.2.
  - project knowledge of similar land use – e.g. for intermodal facilities, warehousing and logistics hubs.

Further assumptions per development type are shown in Table 5-8.

Table 5-8 List of assumptions for sewer service

Precinct Type	Assumptions
Intermodal **Freight and logistics** **Horticulture and intensive agriculture** **Resource recovery** **Value add agriculture** **Energy/ solar** **Bio-energy generation** **Potentially hazardous**	Estimations has been completed based on Sewerage Code of Australia WSA02-2002-2.2 for future industrial areas: • Equivalent Population - 150 EP/ha. • Daily average sanitary flow – 150 l/d/EP (0.0017 l/s/EP) Further assumptions have been made as follows: • Net hectare (floor area of future building development) has been calculated based on % of total land area. Percentage of the area has been assumed based on Arcadis experience with similar large industrial land development.
Enterprise/ hub	Estimations has been completed based on Sewerage Code of Australia WSA02-2002-2.2 for local commercial areas: • Equivalent Population - 75 EP/ha. • Daily average sanitary flow – 150 l/d/EP (0.0017 l/s/EP) Further assumptions have been made as follows: • Net hectare (floor area of future building development) has been calculated based on % of total land area. 30% has been assumed based on Arcadis experience with similar commercial and industrial land development.

5.5.2 Development sewer demand

Potable water demand has been calculated for taking into consideration the assumptions mentioned above based on two methods:

- Area-based
- Employment-based.

Table 5-9 highlights the details of sewer demands of each precinct.

Table 5-9 Sewer demand

Precinct name	ADWF l/s	Daily Average area based kL/day	Daily Average employment based kL/day
Intermodal	0.77	67.50	2.25
Freight and logistics	1.53	135.00	1.50
Horticulture and intensive agriculture	39.78	3510.00	516.15
Resource recovery	4.59	405.00	3.00
Value add agriculture	6.12	540.00	25.50
Bio-energy	2.30	202.50	1.50
Potentially hazardous	1.91	168.75	3.75
Energy/ solar	26.90	2373.75	2.40
Hub	0.38	67.50	3.75
Total sewer flow	**84.28**	**7470**	**560**

Calculated sewerage demand was done on high-level estimation and considered to be conservative Sewer demand based on the employment is considerably lower, and input from the potential future businesses in the area are recommended to confirm employment and usage requirements.

Existing STP average inflow is 3,690 kL/day. The existing sewer treatment plant Moree Sewer System has approximately 50 per cent capacity. Further investigation or documentation should be provided to support this statement and confirm if the sewerage flow from the proposed development can be partially directed to this plant.

Area-based calculations suggest that SAP sewer demand can likely be covered by the existing Moree STP for up to approximately 25 per cent of the development. The rest of the development can be provided with on-site wastewater treatment.

Each type of industrial development should be investigated further on a case-by-case basis to confirm sewer demand and location of the wastewater generated areas. On-site sewer management facilities can be utilised in distant parts of the development with low sewer generation to reduce the pipe run and make the servicing strategy more economically feasible.

Alternatively, a new STP should be considered on the lowest section of the SAP study area to cater for the entire SAP area.

The existing Moree STP can fully cover Employment-based demand.

5.6 Land-use area, estimated communication service demand and supply analysis

5.6.1 Proposed communication service

Telstra major optical fibre assets and Telstra exchange are located adjacent to the Moree SAP study area.

Telstra and NBN have been consulted regarding the proposed development. Telstra has made the following recommendations:

- The developer to complete Telstra developer application forms located at the website: https://www.telstra.com.au/smart-community
- The proposed final Master Plan would be required to be registered with NBN Co and Telstra for NBN Co and Telstra. NBN Co and Telstra would accordingly plan for future communication service requirements.
- NBN Co would assess the application and contact the developer to discuss the options.
- The Telstra Developer Application Forms and Application for Reticulation (AFR) would be required to be completed to agree with Telstra's Terms and Conditions. Telstra would undertake the design work based on the information provided by the developer. Refer to the website https://www.telstra.com.au/content/dam/tcom/external/telstra-smart-community/Terms-and-Conditions-All-Development-Types.pdf

5.7 Proposed gas service

A proposed high-pressure gas pipeline Hunter Gas Pipeline from Newcastle to Wallumbilla is in the preliminary planning stage by a private company Westonal through Moree. Westonal has been consulted to provide the details of the proposed High-Pressure gas. The proposed 610 mm diameter High-Pressure gas is planned to be installed adjacent to the Newell Highway in 2023 through the Moree Plains Shire.

- The gas supplier information is limited at this stage.
- The gas pipeline alignment is not finalised and may travel through the stock routes or private properties.
- The gas has 10-metre easement requirements.

The regional gas pipeline proposal and further investigations into the supply of gas are required as this work progresses.

Further consultation would be required between MPSC and Westonal if the Council wishes Westonal to supply customers at Moree, including the Moree SAP.

The proposed gas corridor is not finalised, and further coordination would be required with Westonal to ensure that gas pipelines are outside of the SAP boundary.

It has been assumed that the gas requirement would be minimal and extension of the service to the developments are not feasible based on the development typology.

Any future gas consumption requirements for industrial development would need to be further consulted with Hunter Gas Pipeline during the next phase of the design.

6 OPPORTUNITIES AND CONSTRAINTS

6.1 Electrical

6.1.1 Opportunities

- Coordination with Essential Energy and TransGrid is recommended to seek further clarification and confirmation of network planning and electricity capability information, transmission lines route and any other requirements.
- Upgrade of existing distribution network likely will be required at 22 kV overhead conductors and installation of new UG network as required.
- Establishing a new zone substation can be further utilised in future Moree SAP areas development and planning.
- Electrical supply to new LV voltage customers within the Moree SAP will be assessed by Essential Energy via a connection application process that considers consumer demand and network capacity.
- Commercial premises will typically be able to connect to the network as low voltage customers.

6.1.2 Constraints

- Essential Energy 66 kV feeders 721 and 722 are located within the Moree SAP, connecting the TransGrid bulk supply point to the Zone Substation-Moree.
- 66 kV feeders 723:WTR to Wathagar and 876 to the Moree Solar Farm run south from to Moree 132/66kV substation and have significant portions of their line routes within the Moree SAP.
- Existing TransGrid 132 kV feeder 96M from Narrabri to Moree is currently located on Intermodal and Value Add Agriculture Precinct. Transgrid has confirmed that a 45.72-metre wide easement is applied to current transmission lines. It is noted that any future infrastructure will not be allowed in the 45.72-metre wide easement.

6.2 Water and sewer

6.2.1 Opportunities

The opportunities for the Moree SAP study area have been listed below:

- Potable water and sewer utilities are available within the SAP study areas.
- Improvement of the existing water and sewer infrastructure efficiency through adequate maintenance and monitoring.
- Water demand can be fully covered by the Moree water allocation and non-potable water supply such as rainwater, treated wastewater or bore water reticulation.
- Up to 25 per cent of the future sewer development demand can be covered by the existing STP. Opportunity for a decentralised option such as on-site wastewater treatment facilities can be investigated further to cover the rest of the demand. A decentralised system would reduce pipework reticulation and grid maintenance.
- Alternatively, a new sewerage treatment plant with wastewater treatment and reuse can be considered to cater the whole SAP development.

- New services proposed to reticulate are to be located within the new road reserves.

6.2.2 Constraints

- There are substantial supply constraints regarding the potable water network, particularly with water pressure and size of pipes to the current Moree SAP study area. As well as condition of the existing pipes in SAP area. Rectification work will be required to improve the water network.
- Water service is present within a small future SAP area. New pipework reticulation will be required.
- No sewer is within the future SAP area. New pipework reticulation will be required.
- Large area and relatively small demand may affect the viability and efficiency of the utilities in a centralised system.

6.3 Gas and telecommunications

6.3.1 Opportunities

- The proposed High-Pressure gas supply is planned for 2023 through Moree, NSW.
- Various telecommunication assets are present within the Moree SAP study area available for connection.

6.3.2 Constraints

- No gas service presently available. New pipework reticulation will be required, subject to future demand.
- New communications (Telstra/NBN) pit and pipe system will be required to provide service to the future SAP development.

7 DELIVERY PLAN

7.1 Design and costs

The infrastructure upgrade works identified in the previous section would be required to be designed and cost as part of the development of the Final Business Case and Delivery Phase. The concept design stage of the Moree SAP focuses on the design and cost of identified utilities.

7.2 Proposed staging of works

7.2.1 Electrical distribution network capacity with 20-year and 40-year required power supply load

The proposed Moree SAP has planned a large development area that would have various types of industry in each precinct which potentially requires a power supply for different types of manufacturing activities.

Current spare capacity of the Essential Energy Moree (66/22 kV) substation is only able to service an additional 14 MVA of new load. Upgrade of the existing network is considered to satisfy the future anticipated total load: 82.5 MVA from the Essential Energy 22 kV distribution network.

7.2.1.1 20-year of time load on distribution network

It is assumed that the 20-year time maximum demand would be 50% of the total calculated load of about 50.7MVA.

There are two distribution network upgrade plans in Table 7-1 for the interim period, which would depend on the SAP development staging that would need further investigations.

Table 7-1 Essential Energy Moree Zone Substation capacity vs 20-year electricity load

Zone substation	Number of TX and rating	Current Load Capacity (MVA)	Total load: existing/proposed (MVA)	Spare Capacity (MVA)
Existing Zone Substation	2 x 30	33	19	14
Option A	3 x 30 (existing)	66	54.4	12
Option B	2 x 30 (existing)	33	27.2	5.8

Upon the SAP development consequence, the existing Moree Zone substation's capacity is likely to be depleted first if the 20-year development starts from the North-eastern and Central Precincts. It is suggested to consider establishing a third transformer to provide additional capacity up to 66 MVA in the 22 kV network first.

Any electricity consumption development is expected to occur more towards the south of the SAP before the existing substation runs out of capacity. In that case, it would require the new second substation to be established at the 20-year period of time.

7.2.1.2 40-year of time load on distribution network

The Moree SAP's ultimate development would require an additional 50 per cent of the new load for each precinct's growing businesses. This additional load is likely to be supplied by the new zone substation and associated 11 kV or 22 kV across the distribution network.

Table 7-2 Essential Energy Moree Zone Substation capacity vs ultimate electricity load

Zone substation	Number of TX and rating	Current Load Capacity (MVA)	Total load: existing/proposed (MVA)	Spare Capacity (MVA)
Existing Zone Substation	2 x 30	33	19	14.0
Ultimate Works	3 x 30 (existing)	66	59.9	6.1
	2 x 30 (new)	33	30	3.0

7.2.2 Potable water demand comparison with the supply required water supply

Table 7-3 Potable water demand comparison with the supply

Total annual water demand (area based)	Council water provision	% of SAP water demand covered by Council water
2,338 ML/annum	Short term 500 ML/annum	21%
	Medium term (2-3 years) additional 250-500 ML/annum	32-43%
	Long term – additional 250-500 ML/annum	53-64%

Potable water demand calculated based on the employment component that can be fully covered by the Council's potable water provision. Employment based demand appears to be three per cent of the area-based demand. Confirmation of reliability of the data for services demand calculations is advisable to ensure sufficient allocation of the water resource to the development. The rest of the water demand can potentially be covered through the non-potable water source such as rainwater use, treated wastewater, non-potable bore water etc.

A new opportunity for water supply has been considered to supply water predominantly for industrial needs for the Moree SAP through water mining such as two bores for interim (20 year) and two additional bores for the ultimate 40-year period, 3,900 ML/year, averaging about 10.7 ML/d, subject to water extraction approvals and potential annual limits.. Further investigations required to confirm viability of potable water supply by mining.

It is proposed to reticulate the new potable water pipework within the future road reserves to each industrial precinct as required. The pipe sizes will depend on the simultaneous demand of each precinct.

Refer to Appendix B for the proposed potable water reticulation strategy supply to the Moree SAP.

7.2.3 Sewerage demand comparison with the supply required sewerage supply

The existing STP average inflow is 3,690 kL/day. The existing sewer treatment plant Moree Sewer System has approximately 50 per cent capacity. Further investigation or documentation should be provided to support this statement and confirm if the sewerage flow from the proposed development can be partially directed to this plant.

Area based calculations suggest that SAP sewer demand can likely be covered by the existing Moree STP for up to approximately 25 per cent of the development. The rest of the development can be provided with on-site wastewater treatment.

Each type of industrial development should be investigated further on a case-by-case basis to confirm sewer demand and location of the wastewater generated areas. On-site sewer management facilities can be utilised in distant parts of the development with low sewer generation to reduce the pipe run and make the servicing strategy more economically feasible.

Alternatively, a new STP should be considered on the lowest section of the SAP study area to cater for the entire SAP area.

Employment based demand can be fully covered by the existing Moree STP. Indicative location of the proposed STP and interim pump station are provided in Figure 7-1 below. The pump station area allocation is approximately 100 square metres.

Sewer service reticulation is proposed to follow future roads, depending on pipe/ground falls and location for connection requirements.

Pipe reticulation, minimum 150 mm to be provided by gravity, or smaller pipework can run where a low-pressure system is required. Refer to Appendix B for the concept infrastructure.

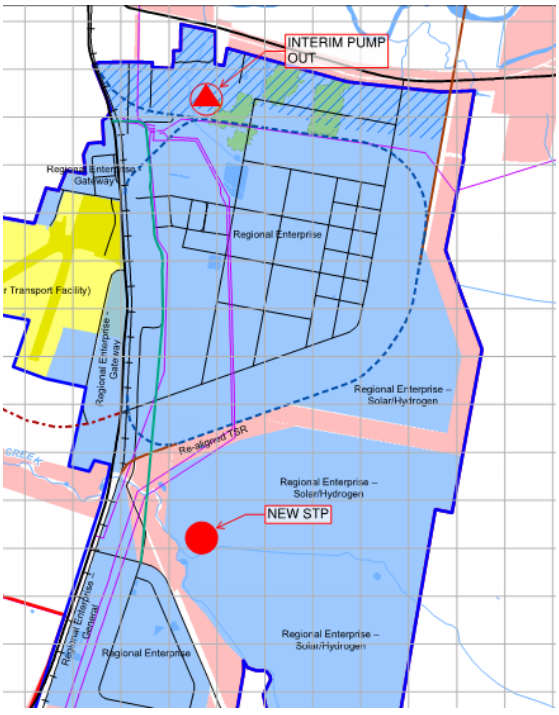


Figure 7-1 Sewer service

7.2.4 Summary of the utilities infrastructure upgrades necessary for the Moree SAP

The Summary of utilities upgrades required for the Moree SAP are listed in *Table 7-4*.

Table 7-4 Summary of infrastructure upgrades

Utility	Existing network	Proposed network upgrade plan
Electrical	The 2019 load demand at Moree 66/22kV Zone Substation is 19MVA. Load data suggests a potential ability to service an additional 14MVA new load. Current 66kV sub-transmission lines (feeder 721 and 722) line rated for 64MVA-71MVA with demand levels of 8-10MVA each.	Estimated maximum demand: 82.5MVA Future electricity demand in Moree will require to upgrade existing 66/22kV zone substation with a 3rd Transformer and establish a 2nd zone substation in the south portion of development. Following the upgrade of zone substation, new 22kV and low voltage overhead / underground network will likely to be established along the proposed main road to provide the utilities power supply.
Water	Currently Immediate Moree water availability is 500 ML/annum. Midterm (over next 2 to 3 years) - additional 250 to 500 ML/annum Longer term could yield an **additional** 250 to 500 ML/annum.	SAP potable water demand estimated based on the development area is 2,338ML/annum. The unused allocation of Moree water can potentially be provided to cater Moree SAP, subject to Council's approval. This can cover up to approximately 64% of the development potable water demand in long term. Alternative source proposed to cover the rest of the water demand (non-potable component such as toilet flushing, etc), eg. rainwater, treated wastewater, bore water etc.
Sewer	Existing capacity of Moree sewerage treatment plant (STP) is 3,690 kL/day. 50% spare capacity has been assumed through the verbal discussion with the Council during Enquiry by Design. Further investigation required to support the data.	SAP sewer flow calculated based on the development area is 7,470kL/day. Existing STP spare capacity can cover up to ~25% of the development. Further details of the development and investigation is required to confirm if on-site sewer management facilities can be utilised in some areas of the development to treat the rest of the sewer flow. Alternatively, a new STP is proposed to cover the entire SAP development. Wastewater proposed to be treated and reused within the SAP development.
Communications	Various Major Optical Fibre Assets are located within the Moree SAP study area	Telstra Developer Application Form and Application of Reticulation to be completed in the next stage of design.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Electrical

There are two 132 kV feeders owned by TransGrid supplying the Moree 132/66 kV Bulk Supply substation and multiple 66/22 kV and Low Voltage overhead / underground Essential Energy lines within the Moree SAP boundary.

To provide power supply to the future precinct, the existing electricity distribution network will require to establish a future Zone Substation to suit the future maximum demand loads.

The exact pinch points of zone substation and distribution electrical assets should be coordinated and identified with Energy Authorities. It is suggested that a concept design plan with proposed alterations to the existing electrical network be prepared and presented to each of the utilities for comment and requirements to allow progression to detailed design.

The planning of the precinct to consider the 45-metre easement requirements of the existing 132 KV and 66 KV electrical assets.

8.2 Potable water and wastewater

It has been identified that the urban localities within the study area are currently well serviced by multiple utilities, providing opportunities for extension of services to the future SAP development area.

Moree water allocation and an alternative water source (rainwater, treated wastewater, bore water) can cover future SAP demand. Council is to confirm water allocation and availability dates to the development.

Sewer flow from the SAP's development likely can be accommodated by a mix of existing STP spare capacity and on-site wastewater treatment facilities where possible. Use of on-site treatment facilities can reduce the load on the infrastructure. Council is to confirm existing STP spare capacity, its allocation to the development site and connection availability dates.

If an option with a new centralised STP is selected to treat the ultimate wastewater demand of the future development, staging and location of the services for switch over between the interim (utilising Council's STP) and ultimate solutions (dedicated SAP STP) should be considered. In this case the centralised STP is proposed to be commissioned when the spare capacity of existing STP is insufficient (at approximately 25 per cent of the Moree SAP development) or infrastructure reticulation is more efficient from the new STP location.

Further details on development such as services requirements, equivalent population, location and size of the facilities within each lot, and roads can refine services plans and form a basis for infrastructure and lead-in reticulation.

Further engagement and consultation with Council to resolve some of the issues by implementing procedures for ongoing maintenance and replacement program is recommended. review of Council's construction methods to ensure it meets best practice and provides balanced system with minimum wastage. Council also intends to promote better water use practice between the water users.

Further coordination with the utility authorities will confirm the lead-in infrastructure requirements and routes during the next stages aligns with preferred Structure Plan.

8.3 Gas and telecommunication

The proposed High-Pressure gas supply is planned for 2023 through Moree, NSW.

Various communication assets are available adjacent to the Moree SAP study area. Telstra and NBN Co will be required to be contacted to confirm the requirements.

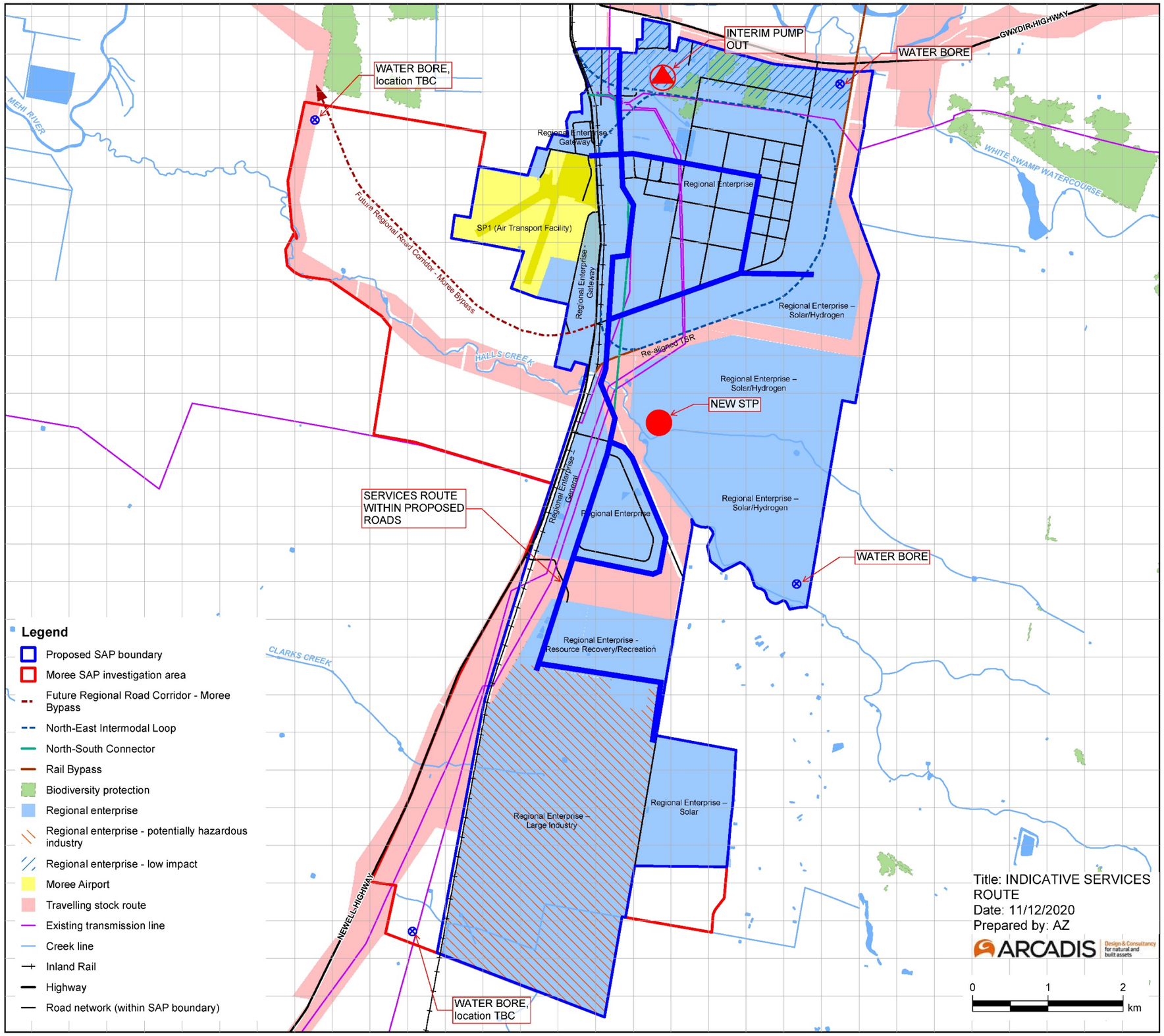
Appendix A

Contact details of existing utilities providers

Authority Name	Utility Type	Contact Details
Transgrid	Electricity Transmission	michael.lowe@transgrid.com.au mark.dorahy@transgrid.com.au
Essential Energy	Electricity	132 391
Moree Plains Shire Council Potable Water	Potable Water	Anub Nair anub.nair@mpsc.nsw.gov.au Services Engineer (02) 6757 3421 Mob: 0438 388 697
Moree Plains Shire Council Wastewater	Wastewater	Anub Nair Services Engineer (02) 6757 3421 Mob: 0438 388 697 anub.nair@mpsc.nsw.gov.au
Telstra	Communications	Glen Foelz Project Manager - Network Integrity M 0419 727 599 E glen.j.foelz@team.telstra.com
NBN	Communications	Kenny D'Cruz M 0408 179 066 kennydcruz@nbnco.com.au Network Planning and Deployment and Demand Programs
AARNet	Communications	1300 275 662
Nextgen	Communications	1800 0325 32 olga.votrubec@vocus.com.au
Pipe Networks	Communications	1800 2011 00
BP	Monitor ground water contamination	David Pepplinkhouse M 0434 613 635
Hunter Gas Pipeline	Proposed Gas	Garbis Simonian Suite 18, Level 11, 809-811 Pacific Hwy, Chatswood NSW 2067 M 0414 273 334 E: gsimonian@westonal.com.au

Appendix B

Services route within proposed roads


INTERIM PUMP OUT
WATER BORE
GWYDIR HIGHWAY
WATER BORE, location TBC
MEHI RIVER
Regional Enterprise Gateway
WHITE SWAMP WATERCOURSE
Regional Enterprise
SP1 (Air Transport Facility)
Future Regional Road Corridor - Moree Bypass
Regional Enterprise - Gateway
Regional Enterprise – Solar/Hydrogen
HALLS CREEK
Re-aligned TSR
Regional Enterprise – Solar/Hydrogen
NEW STP
SERVICES ROUTE WITHIN PROPOSED ROADS
Regional Enterprise - General
Regional Enterprise
Regional Enterprise – Solar/Hydrogen
WATER BORE
Regional Enterprise - Resource Recovery/Recreation
CLARKS CREEK
Regional Enterprise – Large Industry
Regional Enterprise – Solar
NEWELL HIGHWAY
WATER BORE, location TBC
Legend
Proposed SAP boundary
Moree SAP investigation area
Future Regional Road Corridor - Moree Bypass
North-East Intermodal Loop
North-South Connector
Rail Bypass
Biodiversity protection
Regional enterprise
Regional enterprise - potentially hazardous industry
Regional enterprise - low impact
Moree Airport
Travelling stock route
Existing transmission line
Creek line
Inland Rail
Highway
Road network (within SAP boundary)
Title: INDICATIVE SERVICES ROUTE
Date: 11/12/2020
Prepared by: AZ
ARCADIS
Design & Consultancy for natural and built assets
0
1
2
km