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1 Introduction

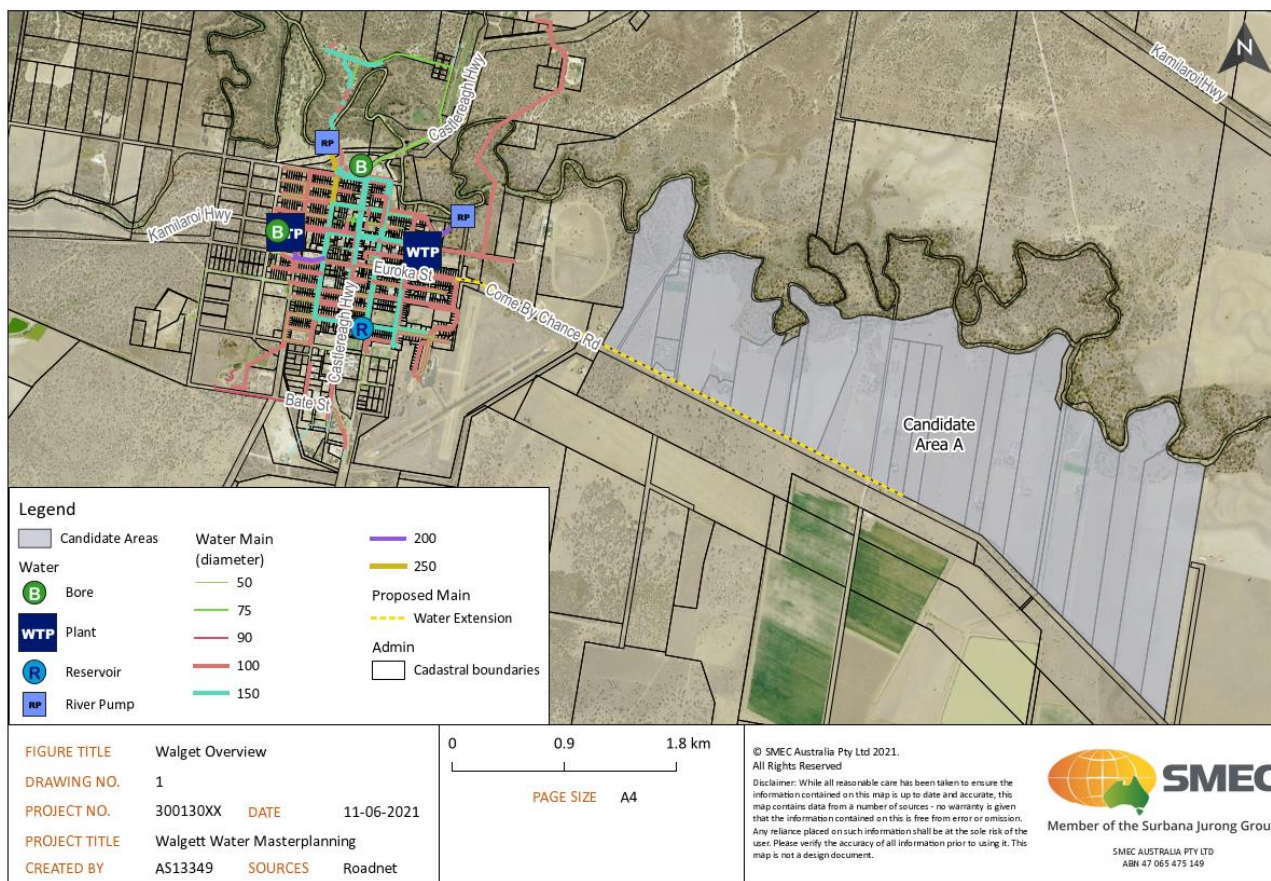
SMEC was engaged by City Plan on behalf of Walgett Shire Council to undertake an evaluation of the servicing capabilities of four identified candidate areas within the Walgett Rural Residential Strategy to support potential rezoning. This evaluation was to undertake desktop analysis to inform trunk reticulation infrastructure required to service nominated development areas.

Due to the lack of a hydraulic model of the existing network it was not possible to assess the impact of the Candidate Areas on the existing network. No detailed assessment has been made of the impact of the proposed development on existing pipelines, treatment plants, bore pumps, river pumps and reservoirs capacities. Impacts on the existing infrastructure and customers are discussed qualitatively, and opportunities for additional investigations to improve certainty as the development progresses are discussed.

1.1 Site Locations

1.1.1 Walgett

One candidate area was identified within Walgett, located on Come by Chance Rd to the east of the town centre (Figure 1-1). The Namoi River forms the northern boundary for the candidate area, with Come by Chance Rd forming the southern boundary. The candidate area encompasses 28 lots within the current cadastre.



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Figure 1-1 Overview Locality Walgett - Candidate Area A (refer Appendix A for larger version)

1.1.2 Lightning Ridge

Three candidate areas were identified within Lightning Ridge as shown in Figure 1-2. Candidate Area A is located to the North-east of the town centre, Candidate Area B to the south and Candidate Area C to the South-west.

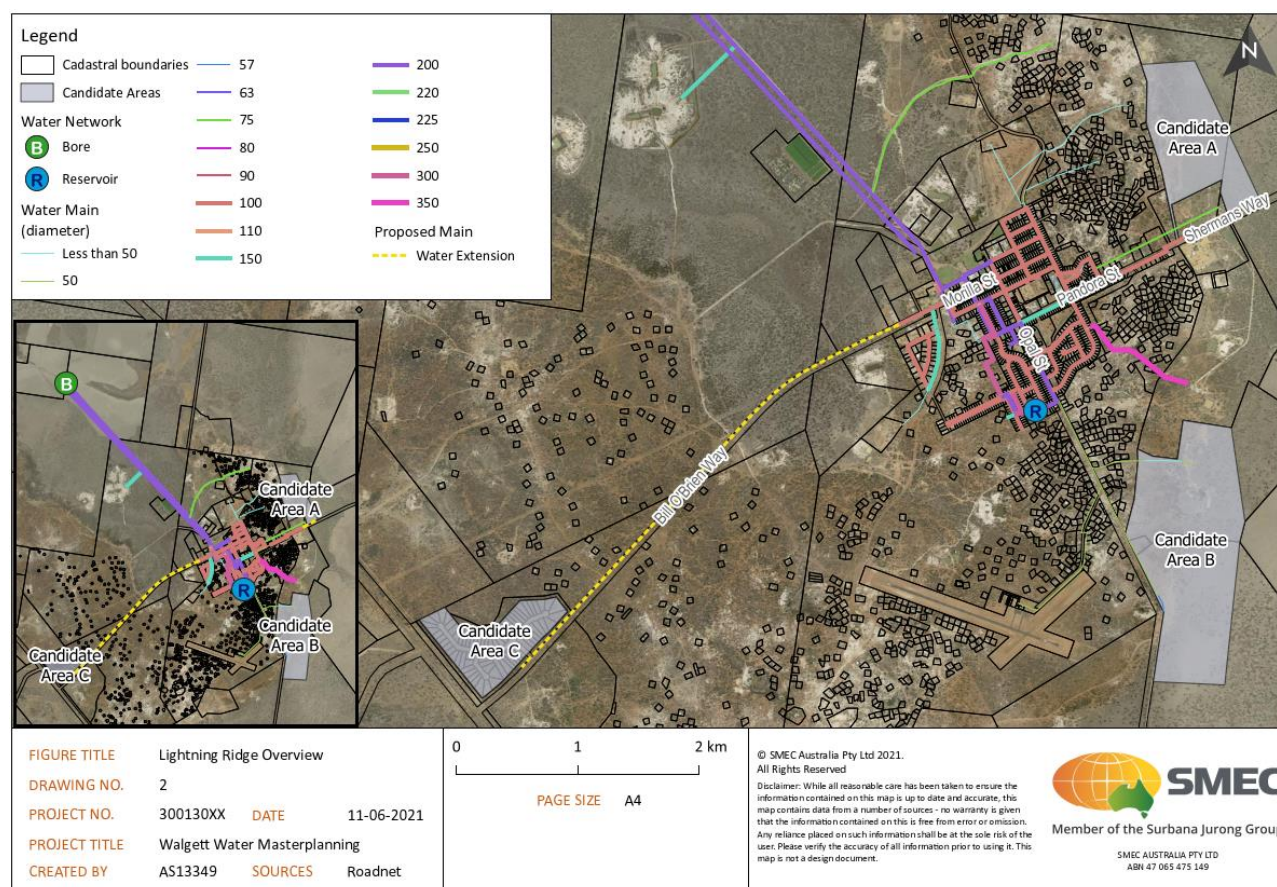


Figure 1-2 Overview Locality Lightning Ridge - Candidate Areas (refer Appendix A for larger version)

1.2 Development Density and Layout

The proposed candidate areas range from 694ha to 44ha with no defined lot breakdown currently identified. For the purpose of this analysis three (3) scenarios have been adopted whereby the candidate areas are broken into; 2ha lots, 4ha lots or 10ha lots. The breakdown of number of lots per candidate area for each scenario can be seen within Table 1-1.

Table 1-1 Development Lots by Candidate Area

Candidate Area	Area (ha)	No° 2ha lots	No° 4ha lots	No° 10ha lots
Walgett				
Candidate Area A	694.0	347.0	173.5	69.4
Lightning Ridge				
Candidate Area A	69.2	34.6	17.3	6.9
Candidate Area B	148.5	74.3	37.1	14.9
Candidate Area C	44.0	22.0	11.0	4.4

1.3 Background Information

The development of the evaluation was undertaken based on the following background documents and correspondence with Walgett Shire Council:

- City Plan Correspondence 13/05/2021 detailing; project background and scope
- Walgett Shire Council provided GIS shapefiles for Water and Sewer networks within Walgett and Lightning Ridge
- Walgett Shire Council Correspondence 25/05/2021 detailing; bulk water supply and demands, and flow and pressure tests for Walgett hydrants.
- Walgett Shire Council Virtual Meeting 11/06/2021: Council-used standard, preferred pipeline materials, ground conditions, demand and supply options.
- Walgett Shire Council Correspondence 16/06/2021 detailing; reservoir operating levels, and water demands (potable and raw)
- Walgett Shire Council Correspondence 18/06/2021 detailing; flow and pressure check readings within Walgett and Lightning Ridge. Reservoir heights included in a clarification.

Additionally, the Water Supply Code of Australia Hunter Water Edition Version 2.1 was consulted throughout the analysis.

2 Demands

The below demands were based on data supplied by Council. It was noted by Council that there is only limited monitoring data available within the system, with available data limited to bulk water inputs, with no information on pressures within the system, or more granular information on flows to determine peak hourly pipeline demands, or granular information on significant water users.

Of the available data, it can be seen that the existing system demands are highly responsive to weather events. For example, data from Lightning Ridge bore pumps in a drought year (2019) saw average demand at Lightning Ridge five times higher than in 2020.

Demands utilised in this report are summarised below in Table 2-1 and Table 2-2. Demands provided by Council are peak day demands, with no data available to indicate how peak hour demands relate to peak day.

2.1 Walgett – Existing Demands

Table 2-1 Walgett Water Demands

	Potable		Raw		Total	
	Average	Peak	Average	Peak	Average	Peak
Total Demand (kL/day)	900	1500	2500	3000	3400	4500
Customers	700	700	700	700	700	700
Total Demand (kL/day/ET)	1.3	2.1	3.6	4.3	4.9	6.4
Total Demand (L/s/ET)	0.015	0.025	0.041	0.050	0.056	0.074
Total Demand (L/s/ 100 ET)	1.5	2.5	4.1	5.0	5.6	7.4

ET = equivalent tenement = standard freestanding house

Note: the demands above are average and peak day demands, within a year, based on advice from Council.

2.2 Lightning Ridge – Existing Demands

Table 2-2 Lightning Ridge Water Demands

	Raw		Total	
	Average	Peak	Average	Peak
Total Demand (kL/day)	1500	2700	1500.0	2700.0
Customers	572	572	572	572
Total Demand (kL/day/ET)	2.6	4.7	2.6	4.7
Total Demand (L/s/ET)	0.030	0.055	0.030	0.055
Total Demand (L/s/ 100 ET)	3.0	5.5	3.0	5.5

ET = equivalent tenement = standard freestanding house

Note: the demands above are average and peak day demands, within a year, based on advice from Council.

2.3 Design Criteria

Walgett Council does not have a specific design manual for analysis and design of water networks. As such, engineering analysis has been made generally in line with WSAA – Hunter Water Edition Version 2.1, but with local adjustments made as appropriate (i.e. reflecting the much higher water usage from Council's observed data). Table HW 2.7 extracted below has been used to provide guidance pressures for lots serviced directly from the reticulation (i.e. without intermediate tanks and/or pressure boosting).

Table HW 2.7 SERVICE PRESSURE (SP) LIMITS

SP LIMIT	DEMAND	PRESSURE (m)
MAXIMUM	All applications	60
MINIMUM	Peak hour flow on a peak day of a peak week	20/25 ¹
	Peak hour flow on an extreme day of an extreme week	12
	Peak hour flow on a 95 th percentile peak day plus fire fighting flow (at location of fire flow)	15
	Peak hour flow on a 95 th percentile peak day plus fire fighting flow (other than location of a fire flow)	3

2.4 Servicing Options Considered

Providing household water service to proposed development areas was considered using a direct connection to the existing water network. This approach results in a much higher simultaneous demand (peak hour demand) to be drawn from the water network. The increase in flowrate can significantly increase pressure losses within the system.

Due to the limited pressure availability within the existing network, consideration was given to options which would reduce the peak demand and therefore pressure losses within the system.

Construction of local water tanks at the location of each rural residential lot will both reduce the simultaneous flow demands on the network allowing peak demands to be drawn from each lot's local tank, and the tank to refill overnight when demands on the system are less. It will also improve security of supply to these lots, with the on-site tanks providing short term storage to allow for repairs to the supply pipeline.

Further discussions with Walgett Shire Council Project Officers about demand and capacity concerns and constraints on the current network indicates that additional direct connections are not favoured and hence have not been recommended.

Pressure boosting from the on-lot tanks will be required to service household pressure requirements. This could be done by on-lot pumps owned and maintained by the householder. Another advantage of this approach is that fire flows would be supplied from on-lot tanks, again reducing the hydraulic load on the network. Given the limited pressure available in the network, it is noted that tanks will need to be constructed at ground level, to receive pressure from the water distribution network as analysed.

AS2419 suggests a minimum tank size of 24kL for lots with watermain pressures insufficient to meet fire flows. This tank size will supply flows of 10L/s for 40 minutes. Any additional requirements for on-lot water storage (i.e. bushfire fighting or similar) should be determined as part of the rezoning/DA process. The requirement for households to maintain firefighting volume in their on-lot storage tanks should be communicated to the householders i.e. by Lot/DP caveat or similar.

AS2419 doesn't provide specific advice regarding minimum tank sizes in the situation of dual water supply. It is suggested that a minimum tank size of 24kL is adopted for raw water, and 5kL for potable water (representing approximately 3x days average daily demand). As is the instance in all dual-water systems, plumbing provisions

of the Plumbing Code of Australia should be adopted to minimise the risk of cross contamination between the raw and potable water supply.

2.5 Limitations of Assessment

Due to the lack of a hydraulic model of the existing network it was not possible to assess the impact of the Candidate Areas on the existing network and customers.

No detailed assessment has been made of the impact of the proposed development on existing pipelines, treatment plants, bore pumps, river pumps and reservoirs capacities / fill times.

It is noted that it is anticipated that development rollout of the Candidate Areas is anticipated to be in the order of 5 ET/year, allowing time for Council to integrate any required upgrades to bulk supply / trunk pumping / treatment infrastructure as part of routine upgrades to this work.

Council assisted in the development of this work by undertaking pressure testing at key locations within the network, to advise pressures. These tests were undertaken as a single round of testing at the hydrants closest to the Candidate Areas. The testing was undertaken mid-day in winter, suggesting that the pressures observed are not indicative of the minimum peak day pressure which is typically used in design of water reticulation networks. Additionally, no testing was able to be undertaken of the potable water network, as there are no hydrants currently constructed on this system (with all firefighting being undertaken from the raw water system).

To improve the rigour of the analysis, it is suggested that additional pressure testing be undertaken prior to rollout of the lots, to confirm pressures within all systems on a peak day (potable and raw, Walgett and Lightning Ridge). The timing of this testing should target peak flows on the system, considering both weather and seasonal loading effects (i.e. peak tourist times). Alternatively, connection of the Candidate Areas directly to the reservoirs (and not the closest reticulation point) would minimise the impact of the proposed development areas on current levels of service.

It is also recommended that Council assess the reservoir fill times across peak times (summer, peak tourist season), in conjunction with proposed flow rates from the Candidate Areas, to confirm the impact on level of service is acceptable.

It is considered that the approach adopted strikes a reasonable balance between the available information, maximising use of infrastructure, and the engineering risk of the adopted service method using on-lot tanks to reduce peak demands on the system.

Development of a detailed hydraulic model, or additional pressure testing closer to the summer peak would improve certainty of the impact to existing customers of the development the Candidate Areas. Alternatively, extension of the connecting mains to the reservoirs would reduce potential impact on existing customers.

3 Walgett

3.1 Existing Infrastructure

Two systems are currently in place to supply potable and raw water to the town of Walgett and the neighbouring Namoi Aboriginal Reserve.

There are two river pump stations located along the Upper and Lower Namoi River. There are two bores; one located at the new water treatment plant on Wee Waa Rd, one located adjacent to the Walgett Bore Baths on Montkeila St.

The potable water system is fed via the Wee Waa St bore and the Upper Namoi River pumps, with supplement water available via the Walgett Bore Baths. The water is transferred to a cooling tower prior to processing at the Walgett Water Treatment Plant (WTP) is located at 117 Wee Waa St. Water is held in a clearwater reservoir within the WTP prior to being boosted to the potable water reservoir (1.4ML capacity) located on the corner of Dewhurst Street & Pitt Street.

The raw water system is fed via the Walgett Bore Baths and the Lower Namoi River pumps. The water is transferred to the raw water reservoir (5ML capacity) located on the corner of Dewhurst Street & Pitt Street. Reservoir attributes as provided by Walgett Shire Council are shown in Table 3-1.

The reticulation mains throughout the town are gravity fed, with c.80% of the town supplementing supply with rainwater tanks. A standpipe is also located within the town by which regional properties can collect water. Walgett is able to fulfill the peak summer demand of 2.5ML raw and 1.5ML potable water through running all bores for 24hrs.

The Namoi Aboriginal reserve is supplied both potable and raw water from the Walgett networks. Both are supplied to bulk water meters and dedicated pipelines.

Table 3-1 Walgett Reservoir Attributes (source: Walgett Shire Council)

	Walgett Potable	Walgett Raw
Reservoir Height (m)	24.4	24.4
Upper Operating Level (%)	99%	98%
Lower Operating Level (%)	92%	93%
Upper Operating Level (m)	24.0	23.9
Lower Operating Level (m)	22.4	22.7
Approx. Bottom Water Level (m AHD)	135m AHD	135m AHD
Approx. Bottom Operating Level	157.4m AHD	157.7m AHD
Approx. Top Operating Level	159m AHD	158.9m AHD

3.2 Existing System Pressure

As no hydraulic model was available, a Council officer undertook pressure testing to provide indication of available pressures within the raw water network. Pressure readings were undertaken at a single time, at multiple discharge flow rates, at the closest hydrant available to the proposed development area.

Pressure checks were undertaken by Walgett Shire Council at the considered connection points, where checks were physically possible. Due to lack of hydrants on the potable water network, checks were only undertaken on the raw water network. The results of checks are shown within Table 3-2.

Table 3-2 Walgett – Raw Water Pressure Results (18/06/2021 1:50pm) – Candidate Area A.

Candidate Area	Test Location	Flow Rate (l/s)	Pressure Gauge Reading 1 (m)	Pressure Gauge Reading 2 (m)
A	Albert Street, near Euroka Street	0.00	24	24
		5.09	22	21
		10.01	17	17
		14.92	8	10
		17.13	3	2

Note: Two potential pressure gauge reading locations were available on Council's standpipe, the minimum pressure reading has been adopted in this analysis.

As can be seen, the pressure ranges from 24m in a static condition, down to 2m residual at the maximum flow able to be delivered from the system. The ground level at this hydrant is approximately 135m AHD, which yields a theoretical maximum static pressure at this hydrant of 22m, indicating the pressure testing shows good alignment with theoretical boundary conditions.

The flow state of the system is unknown at the time of measurement but given the time of day (mid-afternoon) and season (winter), it is assumed that the flow state is indicative of somewhere between average day demand and peak day demand. As such, the pressures measured at this point in time are not an absolute minimum and will be expected to fall further as demand increases across the day, and in summer.

Within water networks, the minimum supply pressure is set to supply minimum pressure requirements to households on a peak day. As outlined in Section 2.3, the minimum pressure requirements of the Hunter Water code have been adopted (i.e. 20m minimum pressure at the meter on peak hour of a peak day of a peak week and 3m minimum pressure at the location of a fire flow plus 95% peak day)

3.3 Development Demand

The demands for Candidate Area A have been calculated using the design criteria as discussed in Section 2.3 (HWC WSAA code, amended with local demand data as available) and are summarised in Table 3-3 and Table 3-4.

Table 3-3 Potable Water – Walgett Candidate Area A Water Demands

	2ha lot size	4ha lot size	10ha lot size
Number of Equivalent Tenements	347	173.5	69.4
Average Day Demand (ADD) (L/s)	5.2	2.6	1.0
Peak Day Demand (PDD) (L/s)	7.8	3.9	1.6
Peak Hour Demand (PDD) (L/s)	15.8	7.9	3.2
Non-Revenue Water (NRW) (L/s)	0.5	0.3	0.1
Fire Flow at 95 th %ile Peak Day Demand (95PDD) (L/s)	7.4	3.7	1.5

ET = equivalent tenement = standard freestanding house

Table 3-4 Raw Water - Walgett Candidate Area A Water Demands

	2ha lot size	4ha lot size	10ha lot size
Number of Equivalent Tenements	347	173.5	69.4
Average Day Demand (ADD) (L/s)	14.3	7.2	2.9
Peak Day Demand (PDD) (L/s)	22.9	11.5	4.6
Peak Hour Demand (PDD) (L/s)	46.4	23.2	9.3
Non-Revenue Water (NRW) (L/s)	1.4	0.7	0.3
Fire Flow at 95 th %ile Peak Day Demand (95PDD) (L/s)	21.8	4.1	1.6

For the purpose of this analysis, one raw water supply line is considered for each candidate area. Supply infrastructure for each candidate area follows existing road easements until reaching a central point along the perimeter of each candidate area, as shown in Figure 1-2. This assessment only considers trunk reticulation requirements, noting that infrastructure (i.e. reticulation networks to each lot) within candidate areas will be determined separately as development progresses.

Due to the lack of a hydraulic model of the existing network it was not possible to assess the impact of the Candidate Areas on the existing network. No detailed assessment has been made of the impact of the proposed development on existing pipelines, treatment plants, bore pumps, river pumps and reservoirs capacities. This is discussed further in Section 2.5.

3.4 Discussion

As can be seen, the pressures at the closest hydrant to the proposed development area are in the order of the 20m minimum suggested by WSAA codes i.e. any significant additional flow would further decrease pressure to existing customers below the allowable minimum.

Given the development area is approximately 4km from the closest connection point to the existing raw and potable water networks, it will not be possible to service this development area directly from the existing water network and meet minimum pressure requirements from the existing reservoir levels.

Using an on-lot tank with and on-lot pressure boosting, Walgett Candidate Area A can be serviced at development densities for minimum lots sizes of 10 ha. At development densities greater than this, the pressure monitoring indicates that the existing system will have inadequate pressures. As such, only a minimum lot size of 10ha can be recommended.

For raw water the pipe size is DN160 and potable water is DN110. On-lot tanks and on-lot pumps will be required for both potable and raw water (refer Section 2.4 for additional discussion).

It is considered that a small diameter watermain with on-lot storage tanks with booster pumps are an appropriate solution for rural residential lots and are therefore recommended. Minimum lot sizes of 10ha/lot are considered able to be serviced, but 2-4 ha/lot is not recommended without further assessment.

4 Lightning Ridge

4.1 Existing Infrastructure

The water supply for Lightning Ridge is sourced from artesian bores. Water is extracted from bores on Borehead Rd (approximately 5km north) and pumped to two reservoirs (1.1ML and 5.2ML capacities) located at 21 Butterfly Avenue. Chlorine is injected into the system at the reservoirs to mitigate water quality issues. Reservoir attributes as provided by Walgett Shire Council are shown in Table 4-1. The reticulation mains throughout the town are gravity fed, with c.60% of the town supplementing supply with rainwater tanks. A standpipe is also located within the town by which regional properties can collect water.

Table 4-1 Lightning Ridge reservoir attributes

	Lightning Ridge Raw
Reservoir Height (m)	24.3
Upper Operating Level (%)	95%
Lower Operating Level (%)	88%
Upper Operating Level (m)	23.1
Lower Operating Level (m)	21.4
Approx. Bottom Water Level (m AHD)	167m AHD
Approx. Bottom Operating Level	188.7m AHD
Approx. Top Operating Level	190.1m AHD

4.2 Existing System Pressure

As no hydraulic model was available, a Council officer undertook pressure testing to provide indication of available pressures within the raw water network. Pressure readings were undertaken at multiple flow conditions, at the closest hydrant available to the proposed development area.

Pressure checks were undertaken by Walgett Shire Council at the considered connection points, where checks were physically possible. Due to lack of hydrants on the potable water network, checks were only undertaken on the raw water network. The results of checks are shown within Table 4-2 to Table 4-4.

The flow state of the system is unknown at the time of measurement but given the time of day (morning) and season (winter), it is assumed that the flow state is indicative of somewhere between average day demand and peak day demand. As such, the pressures measured at this point in time are not an absolute minimum and will be expected to fall further as demand increases across the day, and in summer.

Table 4-2 Lightning Ridge Candidate Areas Pressure Check Results (18/06/2021 10:45-55 am).

Candidate Area	Test Location	Flow Rate (l/s)	Gauge Reading 1 (m)	Gauge Reading 2 (m)
A (1)	Front of Church, Pandora Street, Lightning Ridge	0.00	39	38
		4.92	34	32
		9.91	20	19
		14.60	2	1
A (2)	Near Bore Bath, Pandora Street, Lightning Ridge	0.00	41	40
		4.90	36	35
		10.14	20	17
		13.60	3	1

Table 4-3 Lightning Ridge Candidate Areas Pressure Check Results (28/07/2021 9:45am).

Candidate Area	Test Location	Flow Rate (l/s)	Gauge Reading 1 (m)	Gauge Reading 2 (m)
B	Butterfly Avenue, near Lorne Road, Lightning Ridge	0.00	22	22
		3.70	20	20
		11.70	15	15
		12.30	15	15
		18.00	7	7
		20.40	1	1

Table 4-4 Lightning Ridge Candidate Areas Pressure Check Results (18/06/2021 10:10am).

Candidate Area	Test Location	Flow Rate (l/s)	Gauge Reading 1 (m)	Gauge Reading 2 (m)
C	Three Mile Road, near Bill O'Brien Way, Lightning Ridge	0.00	40	40
		4.94	39	37
		10.05	34	32
		15.08	26	27
		20.15	17	15
		22.80	7	5
		>32 (Max)	8	4

Table 4-5 summarises the zero-flow pressure test results against the theoretical minimum static pressure between reservoir bottom water level and ground level at the hydrant. As can be seen, there is good alignment between the observed pressures and theoretical.

Table 4-5: Measured Zero-Flow Pressures, compared with Theoretical Static Pressure

Candidate Test	Reservoir BWL (m AHD)	Hydrant Ground Level (m AHD)	Theoretical Static Pressure (m)	Measured (m)	Difference (m)
Walgett A	157.4	135	22.4	24	-1.6
Lightning Ridge A1	188.7	148	40.7	37	3.7
Lightning Ridge A2	188.7	146	42.7	39.5	3.2
Lightning Ridge B	188.7	166	22.7	21.5	1.2
Lightning Ridge C	188.7	148	40.7	39	1.7

4.3 Development Demand

The demand for each candidate area have been calculated using the design criteria as discussed in Section 2.3 (HWC WSAA code, amended with local demand data) and are summarised in Table 4-6, Table 4-7 and Table 4-8. Note that for the purpose of this report, candidate areas within Lightning Ridge are not considered as future sites for opal mining and no allowance has been made for significant non-household uses. No allowance has been made for demands beyond the average/peak household use as outlined in Section 2.

Table 4-6 Lightning Ridge Candidate Area A Water Demands

	2ha lot size	4ha lot size	10ha lot size
Number of Equivalent Tenements	34.6	17.3	6.92
Average Day Demand (ADD) (L/s)	1.0	0.5	0.2
Peak Day Demand (PDD) (L/s)	1.9	0.9	0.4
Peak Hour Demand (PDD) (L/s)	3.8	1.9	0.8
Non-Revenue Water (NRW) (L/s)	0.2	0.1	0.0
Fire Flow at 95 th %ile Peak Day Demand (95PDD) (L/s)	1.8	0.9	0.4

Table 4-7 Lightning Ridge Candidate Area B Water Demands

	2ha lot size	4ha lot size	10ha lot size
Number of Equivalent Tenements	74.3	37.1	14.9
Average Day Demand (ADD) (L/s)	2.2	1.1	0.4
Peak Day Demand (PDD) (L/s)	4.0	2.0	0.8
Peak Hour Demand (PDD) (L/s)	8.1	4.0	1.6
Non-Revenue Water (NRW) (L/s)	0.3	0.2	0.1
Fire Flow at 95 th %ile Peak Day Demand (95PDD) (L/s)	3.8	1.9	0.8

Table 4-8 Lightning Ridge Candidate Area C Water Demands

	2ha lot size	4ha lot size	10ha lot size
Number of Equivalent Tenements	22	11	4.4
Average Day Demand (ADD) (L/s)	0.7	0.3	0.1
Peak Day Demand (PDD) (L/s)	1.2	0.6	0.2
Peak Hour Demand (PDD) (L/s)	2.4	1.2	0.5
Non-Revenue Water (NRW) (L/s)	0.1	0.0	0.0
Fire Flow at 95 th %ile Peak Day Demand (95PDD) (L/s)	1.1	0.6	0.2

For the purpose of this analysis, one raw water supply line is considered for each candidate area. Supply infrastructure for each candidate area follows existing road easements until reaching a central point along the perimeter of each candidate area, as shown in Figure 1-2. No infrastructure is considered within candidate areas. Current pipelines, treatment plants, bore pumps, river pumps and reservoirs capacities are not analysed within this report.

4.4 Discussion

4.4.1 Candidate Area A

Minimum tested pressures at the nearest point in the existing water network are in the order of 31m. If the lots are serviced with on-lot tanks, a minimum DN90 PE lead in main is recommended from the DN100 pipe in Shermans Way.

Given the proximity of existing water infrastructure to the proposed Candidate Area, it may be possible to directly service the lots from the network (without intermediate buffer tanks). If this option is adopted a minimum lead in main of DN140 is recommended. If this option is to be pursued, it is recommended that further supporting investigations are undertaken when proposed development density is known. In the interim, more frequent pressure monitoring at the nearest hydrant in summer and at known peak times would allow for more informed decision making at that time.

4.4.2 Candidate Area B

Minimum tested pressures at the nearest point in the water network in the order of 20m, noting that the tested hydrant is remote from the Candidate Area.

There is existing water infrastructure in the vicinity of the Candidate Area, but it is very small. The existing water network is too small to directly service any proposed development density.

However, if this pipe is in good condition, it may be possible to use the existing DN50 lead in main to fill on-site tanks and pumps for the minimum 10ha lot size option.

It is suggested that Council undertake pressure testing in peak times summer, at the location of the proposed development (this would require installation of fittings to permit pressure monitoring a hydrant at the location of Candidate Area B) and also assessment of impacts at the nearby airport.

If a minimum pressure of 15-20m is not achieved at this location in summer, it is recommended that DN110 lead in main approx. 2km long is constructed from the development to the intersection of Opal St and Fred Reece Way.

4.4.3 Candidate Area C

Minimum pressures at the nearest point in the water network in the order of 35m. Approximately 4.2km length of lead in main required to service this development.

Due to the long lead in main, in conjunction with the lot size and relative level of the Candidate Area compared to the existing reservoir, it may be possible to directly service these lots from the reticulation network (i.e. no tanks required). If the lots are directly serviced, a minimum lead in main of diameter DN110 is recommended. If the lots are serviced from on-lot tanks, a lead in main of diameter DN75 is recommended.

If the direct service method is adopted, it is recommended that additional pressure testing is undertaken in summer, to ensure that the minimum pressure at the closest hydrant is at least 35m. It is noted that there is an intermediate high point along this watermain alignment,

Table 4-9 Lightning Ridge Lead in Main Sizes

	With Buffer Tanks
Candidate Area A	DN90
Candidate Area B	DN110
Candidate Area C	DN75

5 Indicative Costings – Trunk Infrastructure

Preliminary cost estimates have been prepared in line with the Hunter Water Cost Estimating Manual. These cost estimates are useful for preliminary options comparison purposes and are not to be relied upon for setting project budgets. If detailed/budgetary estimates are required, it is recommended a quantity surveyor is engaged, or tender estimates sought at a future project stage.

High level indicative costings have been prepared for trunk infrastructure the candidate areas taking into account the following assumptions:

- Pipeline has a cover of 600mm
- At least one air valve for each km of pipeline
- At least one scour valve for each km of pipeline
- Grass seeding restoration for a 2m corridor along the alignment
- Area Classification B1 : Established Residential (i.e. some allowance for traffic control, reinstatement of driveways etc)

As no specific geotechnical information is available, no allowance has been made for “non-standard” geotechnical conditions such as: treatment of acid sulphate soils, high groundwater or non-standard trench bedding (i.e. geotextile wrapped, piers etc).

A summary of cost estimates is included at Table 5-1. “Contract Award Sum” refers to the cost of construction works, whereas “Preliminary Project Estimate” refers to total project cost, including cost of project management, design works etc. Details of cost estimates can be found in Appendix C.

Cost estimates include the cost of trunk pipelines as shown indicatively on the Figures (Appendix A), but do not include an allowance for on-lot infrastructure (i.e. individual tanks and booster pumps) nor for subdivision-level infrastructure (i.e. in street reticulation etc).

Table 5-1 High level cost estimate for proposed infrastructure

Town	Candidate Area	Type	Actual Size	Length (m)	Contract Award Sum	Preliminary Project Estimate
Lightning Ridge	A	Raw	DN90	300	\$91,000	\$180,000
Lightning Ridge	B	Raw	DN110	2100	\$470,000	\$920,000
Lightning Ridge	C	Raw	DN75	4200	\$800,000	\$1,470,000
Walgett	A	Potable	DN110	4000	\$880,000	\$1,620,000
Walgett	A	Raw	DN160	4000	\$1,240,000	\$2,090,000

6 Summary

SMEC was engaged to undertake hydraulic desktop analysis of trunk water reticulation infrastructure to service nominated development areas in the Lightning Ridge and Walgett townships to support consideration of rezoning of several parcels of land.

Assessment was made of Council’s bulk water supply to determine average and peak day demands. No data was available to determine peak hour demands. However, the adopted servicing scenario of on-lot tanks will buffer flows across the day, minimising the impact of this data gap.

As no hydraulic model was available on the network, assessment has been made based on engineering approximations and a single set of pressure tests of the existing system, undertaken in winter (i.e. not representative of peak day).

Overall, it is possible to service all development areas that have been nominated for rezoning, at the densities permissible by a rural-residential designation (i.e. 2-10ha lots). The exception is the large Candidate Area A at Walgett, for which a minimum lot size of 2-4ha is not recommended, due to supply constraints in the existing water network.

It is recommended that other engineering constraints i.e. flooding, bulk water supply etc are considered when determining appropriate minimum lot sizes for development.

For all scenarios, an on-lot tank and booster pump are recommended to minimise the flows on the existing network. Refer Section 2.4 for further discussion. There are some scenarios which may be able to directly service lots from the reticulation (i.e. without tanks), but further pressure monitoring and/or development of a hydraulic model of the network is recommended if this option is adopted, assessing both peak household demand and fire flow scenarios.

For all scenarios, further pressure monitoring of the system at the nominated connection points, when the system is experiencing high/peak demands would increase certainty of minimum pressures observed and the engineering rigour of the recommended path.

As part of this assessment, no assessment has been made of availability of bulk water supply or of trunk pump or treatment capacity to service additional homes. It is understood that the proposed development areas will be rolled out slowly, allowing for upgrade of trunk assets (i.e. bore pumps, treatment plant, transfer pumps etc) to be upgraded in conjunction with maintenance upgrades to support additional development.

It is noted that in all cases, it has been assumed that connection would be made to the closest reticulation, which increases the risk of adverse impacts on existing customers. This approach increases the demand on the existing infrastructure will reduce pressures for existing customers. The adopted approach of on-lot storage tanks for the new development areas will minimise the impact, but without additional pressure testing in summer and/or development of a detailed hydraulic model it is not possible to quantify the pressure impact, nor the number of customers impacted. Alternatively, connection of the Candidate Areas directly to the reservoirs (and not the closest reticulation point) would minimise the impact of the proposed development areas on current levels of service.

Refer Section 2.5 for further discussion of limitations of assessment and options to further increase the rigour of assessment of these development areas moving forward. It is recommended that lead-in water main hydraulics are assessed as the proposed rezoning progresses (i.e. when lot density is confirmed), as part of the subdivision process. It is noted that the majority of the capital cost associated with small diameter pipelines (such as those recommended) is due to the cost of trenching, and that upsizing lead-in water mains would provide increased pressures for a marginal increase in capital cost.

6.1 Walgett

A summary of the undertaken Candidate Area analysis for Walgett is detailed below.

	Candidate Area A
Supply Strategy	Dedicated Pipeline with Trickle Tanks
Pipeline Size	Potable: Approx. 4km DN110 Raw: Approx. 4km DN160
Indicative Trunk Costings*	Potable: \$1.6M Raw: \$2.1M

* Further detail on cost estimates in Section 5

6.2 Lightning Ridge

A summary of the undertaken Candidate Area analysis for Lightning Ridge is detailed below.

	Candidate Area A	Candidate Area B	Candidate Area C
Supply Strategy	Dedicated Pipeline with Trickle Tanks	Dedicated Pipeline with Trickle Tanks	Dedicated Pipeline with Trickle Tanks
Pipeline Size	Approx. 300m DN90	Approx. 2.1km DN110	Approx. 4.2km DN75
Indicative Trunk Costings*	\$180K	\$920K	\$1.5M

* Further detail on cost estimates in Section 5

Appendix A **Figures**

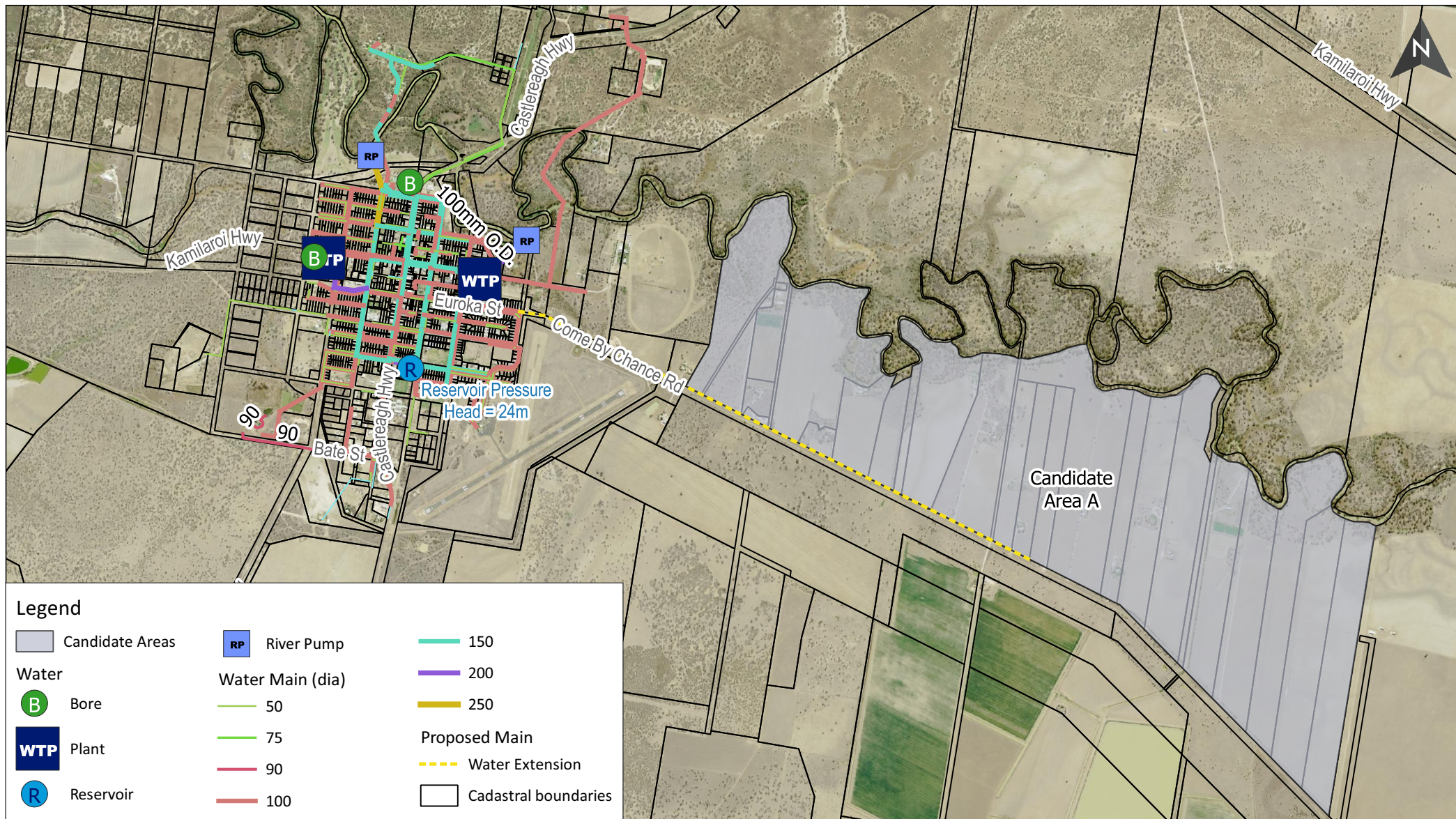


FIGURE TITLE	Walgett Overview		
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PROJECT NO.	30013119	DATE	26-07-2021
PROJECT TITLE	Walgett Water Masterplanning		
CREATED BY	AS13349	SOURCES	Roadnet

0 0.9 1.8 km

PAGE SIZE A4

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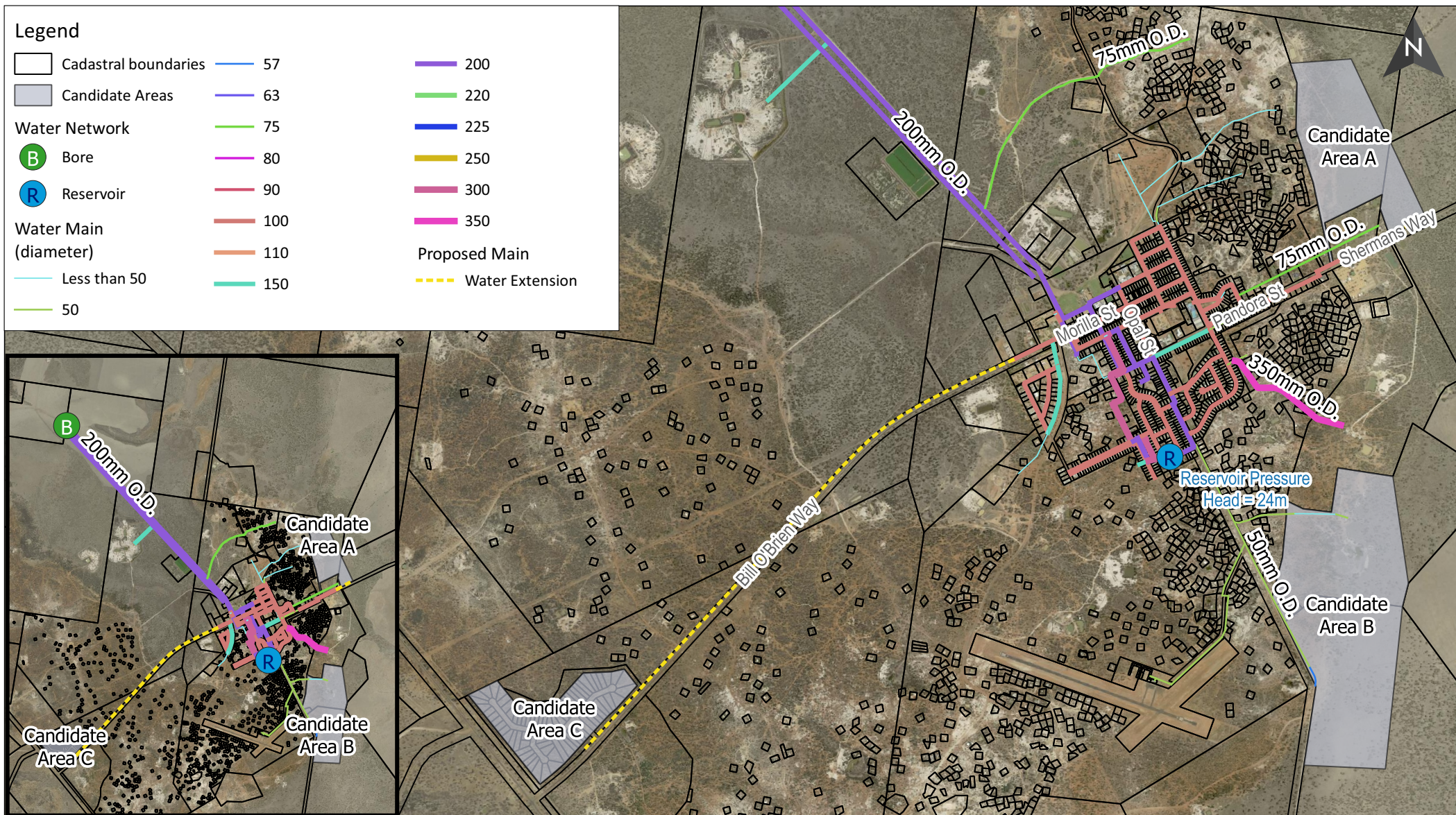


FIGURE TITLE	Lightning Ridge Overview		
DRAWING NO.	2		
PROJECT NO.	30013119	DATE	26-07-2021
PROJECT TITLE	Walgett Water Masterplanning		
CREATED BY	AS13349	SOURCES	Roadnet

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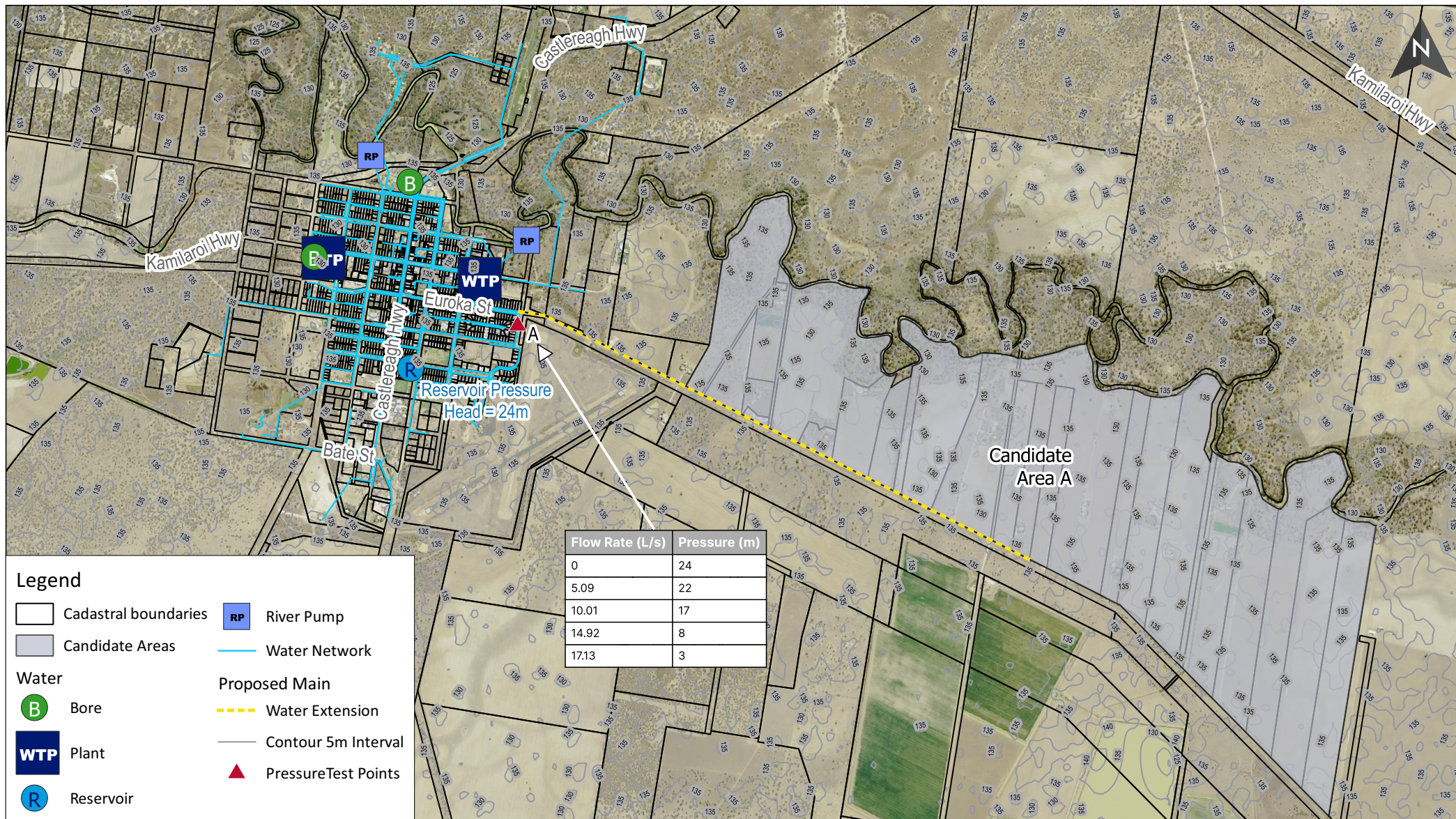


FIGURE TITLE Walgett Pressure Test Details

DRAWING NO. 3

PROJECT NO. 30013119 **DATE** 26-07-2021

PROJECT TITLE Walgett Water Masterplanning

CREATED BY AS13349 **SOURCES** Roadnet

0 0.9 1.8 km

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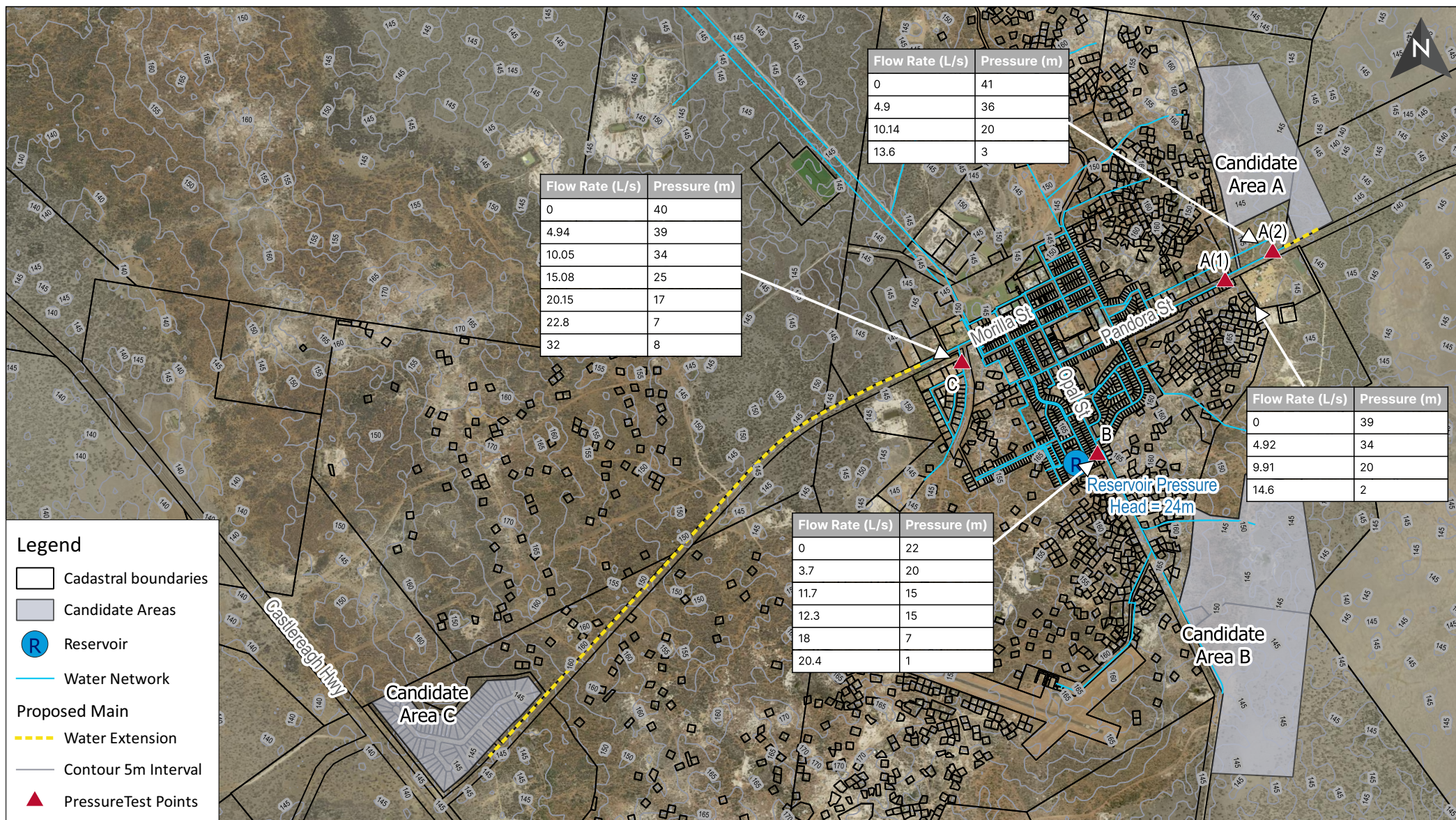


FIGURE TITLE Lightning Ridge Pressure Test Details

DRAWING NO. 4

PROJECT NO. 30013119 **DATE** 28-07-2021

PROJECT TITLE Walgett Water Masterplanning

CREATED BY AS13349 **SOURCES** Roadnet

0 1 2 km

PAGE SIZE A4

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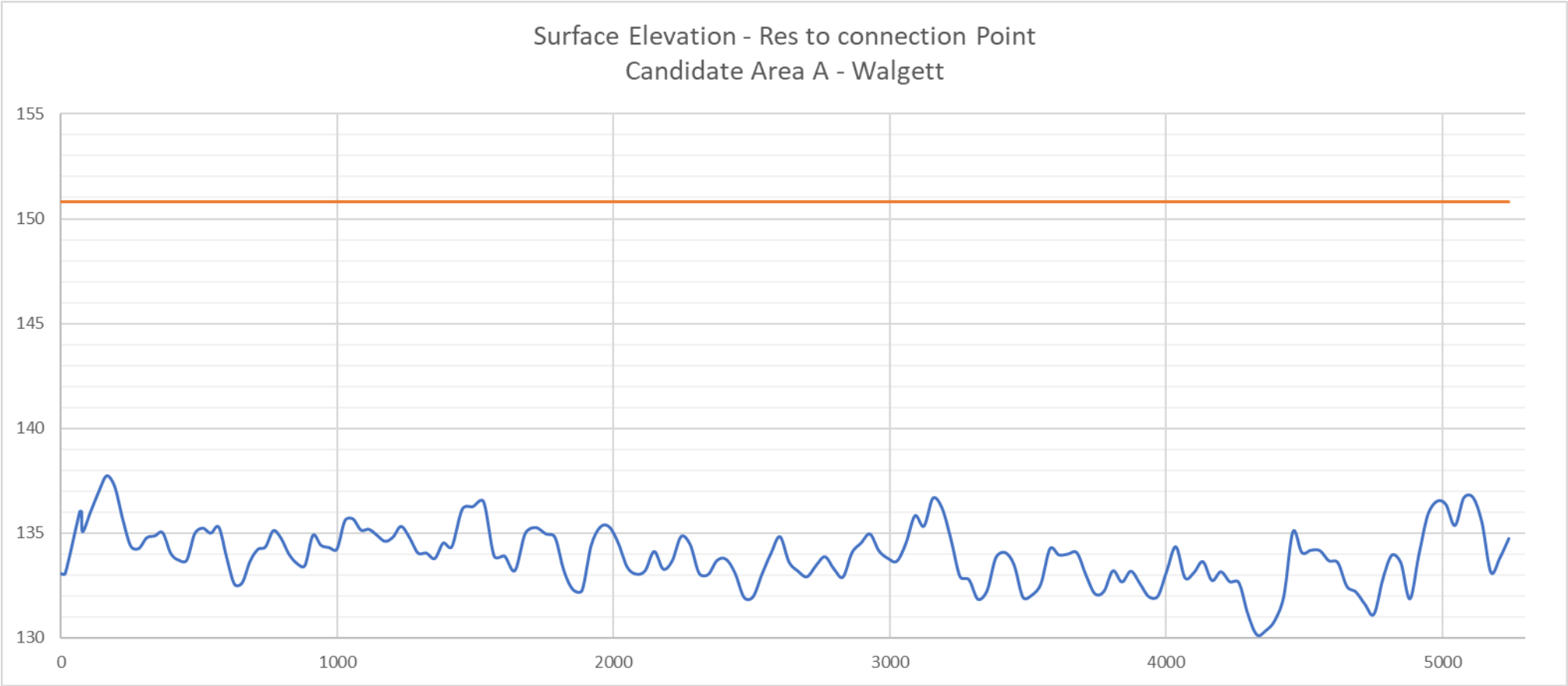
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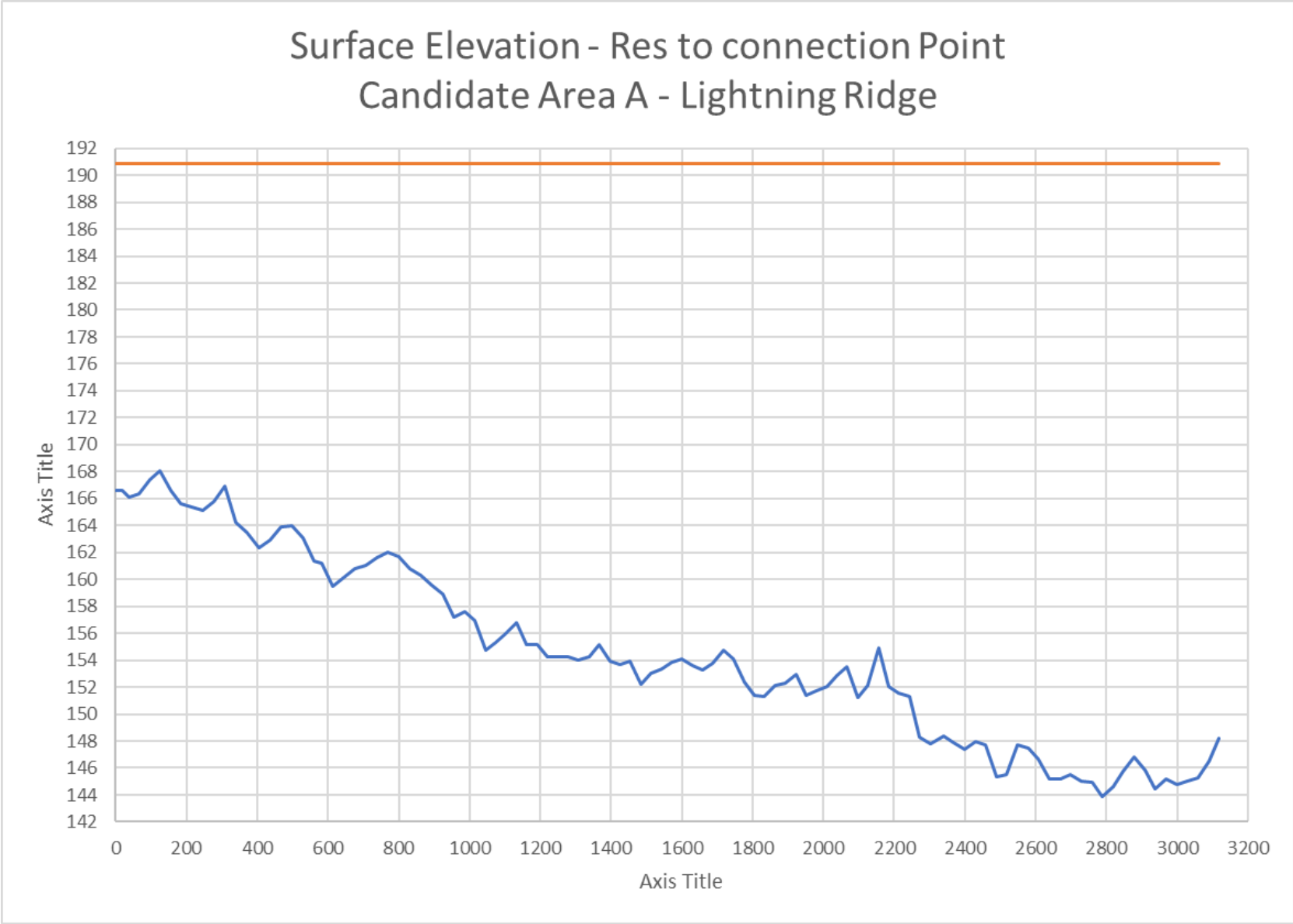
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Appendix B Candidate Area Hydraulic Grade Lines

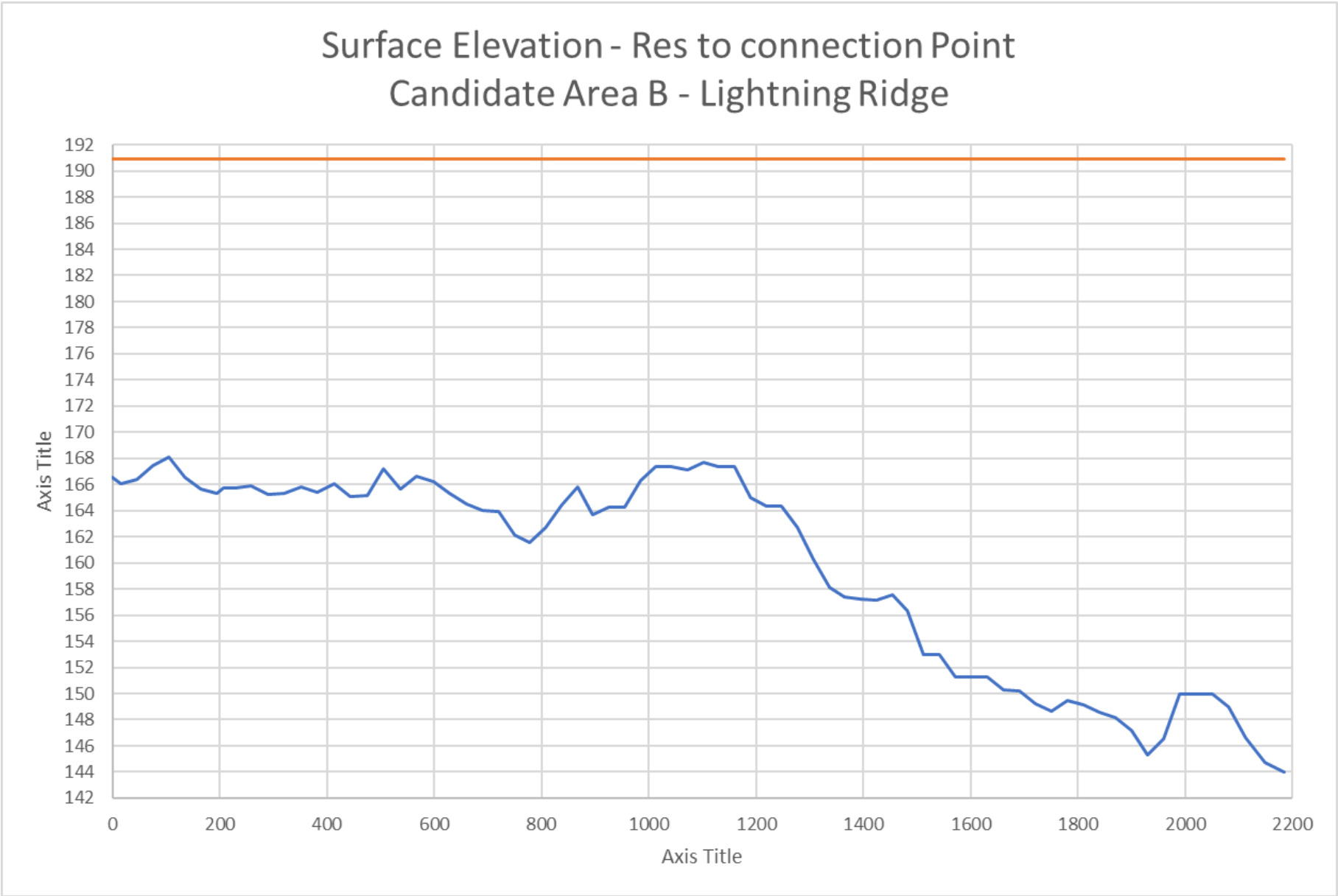
Appendix A.1 – Walgett Candidate Area A



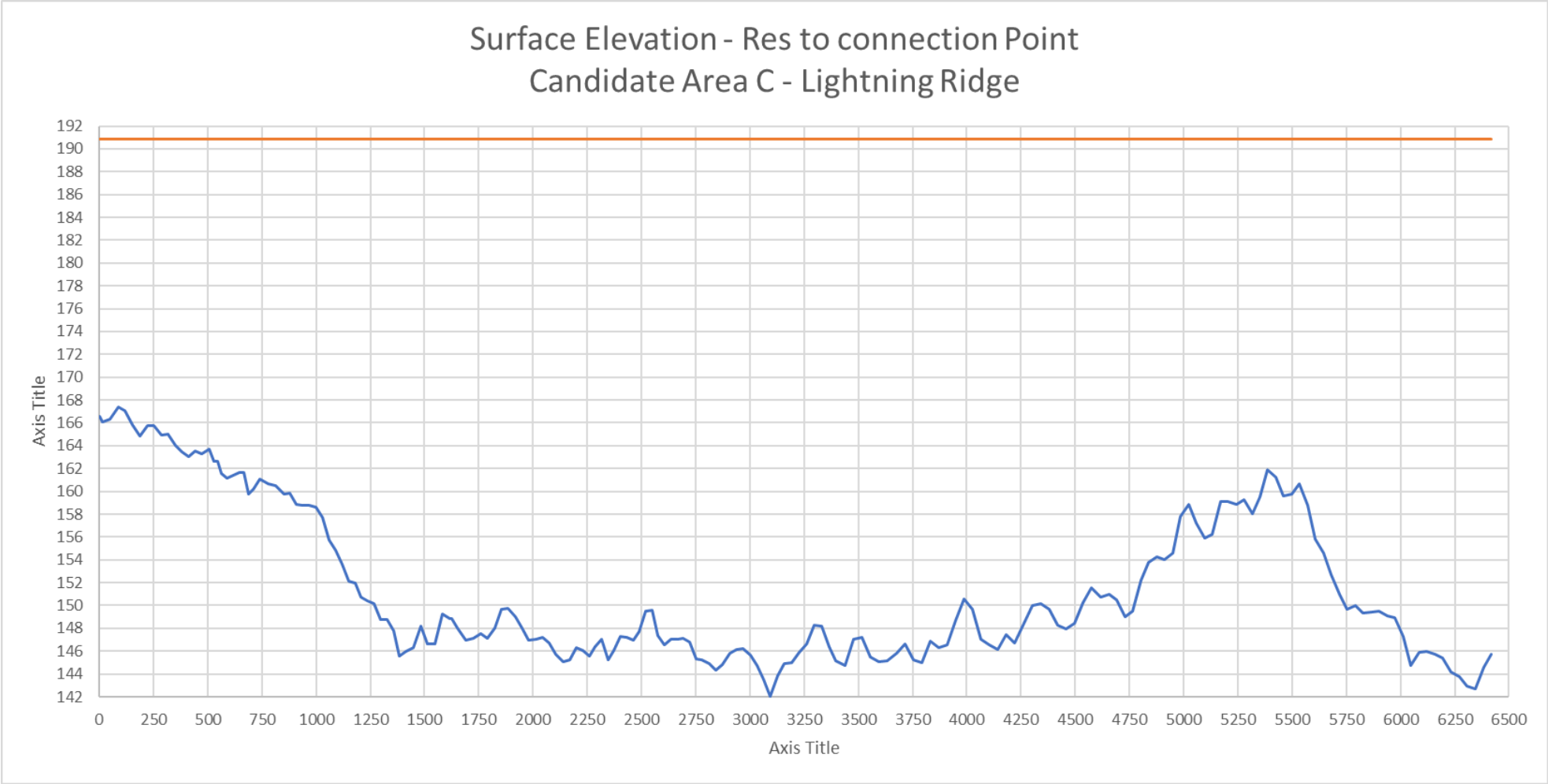
Appendix A.2 – Lightning Ridge Candidate Area A



Appendix A.3 – Lightning Ridge Candidate Area B



Appendix A.4 – Lightning Ridge Candidate Area C



Appendix C **Indicative Costing Spreadsheet**

ESTIMATING SHEET

PROJECT DESCRIPTION: Walgett Potable DN150, 4km

Date Priced: 19-Oct-2021
Date Cost Tables updated: 24-Oct-2019

Item No.	Item Description	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	\$ 15,930.00	\$ 15,930.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0002	Site Establishment <Insert Max \$>	Item	Lump Sum	\$ 28,000.00	\$ 28,000.00	Payment: 100% after completion.
HW0003	Site Dismantlement <Insert Min \$>	Item	Lump Sum	\$ 28,000.00	\$ 28,000.00	Payment: 100% after completion.
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	\$ 4,800.00	\$ 4,800.00	Payment: Maximum of 30% on submission of complying Construction EMP, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Construction EMP.
HW0005	Preparation and implementation of the Safety Management Plan	Item	Lump Sum	\$ 11,000.00	\$ 11,000.00	Payment: Maximum of 30% on submission of complying plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Safety Management Plan.
HW0006	Preparation and implementation of the Traffic Control Plan	Item	Lump Sum	\$ 53,600.00	\$ 53,600.00	Payment: Maximum of 30% on submission of complying Traffic Control Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	\$ 10,563.25	\$ 10,563.25	Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW0008	Community Consultation	Item	Lump Sum	\$ -	\$ -	Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.

Water Pipeline - Reticulation - section will be present if one or more reticulation watermain is specified

Item	Construction of Reticulation Watermain	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	Service Location	Item	Lump Sum	\$ 6,600.00	\$ 6,600.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0002	Supply all valves and flowmeters	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of valves and flowmeters supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW0003	DN100 Valves / Flowmeters	Item	Lump Sum	\$ 25,620.00	\$ 25,620.00	Payment: Percentage of fittings supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW0003	Supply all fittings	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of fittings supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW0003	DN100 Fittings	Item	Lump Sum	\$ 580.00	\$ 580.00	Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
HW0004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:					Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
20A050	Nominal DN100 PE pipe	4000	m	\$ 30.31	\$ 121,220.00	Measurement: Actual metres of pipe installed to design depth of excavation up to and including 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
20A050	Nominal DN100 PE (Trench type B)	4000	m	\$ 118.16	\$ 472,640.00	Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0006	Supply additional service connection pipe and fittings and install	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of work completed. Submit: Relevant Quality Records.
HW0007	Extra over rate for installation for Additional compaction		m3	\$ 9.41		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	\$ 39.60		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0012	Extra over rate for installation to Supply & place & compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	\$ 148.50		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0014	Extra over rate for installation for supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0015	Supply & place ballast			\$ 91.80		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW0016	External Dewatering of trench including establishment and dismantlement (Contingent Item)		m			Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0020	Supply & installation of river crossing includes supply of MSC/L pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0021	Supply and installation of pipe aerial creek crossing including supply of MSC/L pipe with protection coating, internal and external welding, testing of welds. For the following MSC/L pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0022	Bulkheads and Trenchstops in accordance with VSA & Mining WAT-109		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0023	Supply and install valve pits (excluding valves and fittings)	0	Each	\$ -	\$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0025	EMPTY					
HW0026	Supply and install structure to house flowmeter (excluding cost of flowmeter)	1	Each		\$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0027	Preparation of line sheets	4000	m	\$ 1.16	\$ 4,640.00	Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.
HW0028	Acceptance testing - reticulation main		m			Measurement: Length of pipelines constructed as per design. Submit: Satisfactory test records. Limits of Accuracy: <To be inserted>.
HW0029	Miscellaneous					
HW0030	Sub Total				\$631,300	

Item No.	Item Description	Qty	Unit		Amount \$	Application of Schedule of Rates
HW0029	Restoration - Pipelines					Payment: 100% after completion.
HW0029.01	Concrete kerb & gutter	0	m	\$ 128.00	\$ -	Measurement: Linear metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.02	Concrete driveway	0	m2	\$ 198.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.03	Exposed aggregate & stamped driveway	0	m2	\$ 256.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.04	Concrete footpath	0	m2	\$ 178.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.05	Bitumen footpath	0	m2	\$ 144.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.06	Gravel pavement	0	m2	\$ 80.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.07	Bitumen pavement	0	m2	\$ 238.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.08	AC pavement	0	m2	\$ 328.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.09	Pavers	0	m2	\$ 178.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.10	Turf	0	m2	\$ 12.60	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.11	Grass seeding	8000	m2	\$ 7.30	\$ 63,200.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0029.12	Hydromulch	0	m2	\$ 9.60	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0030	Extra over item for Excavation in rock and disposal of excess excavated material		m3			Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0031	Acid sulphate soil					
HW0031.01	Initial testing for acid sulphate soils and prepare and submit report		per test			Submit: Result for each test. Limits of Accuracy: <To be inserted>.
HW0031.02	Excavation treatment facility		Item			Payment: 100% after completion of treatment facility.
HW0031.03	Handling, treatment and testing of acid sulphate soils		m3			Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>.
HW0031.04	Disposal off site of acid sulphate soil		tonne			Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW0032	Preconstruction record					
HW0032.01	Photographic	Item	Lump Sum		\$ -	Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.
HW0032.02	Video	Item	Lump Sum		\$ -	Payment: 70% on submission of the Video record. Remainder at Practical Completion.
HW0032.03	CCTV	Item	Lump Sum		\$ -	Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.
HW0033	Work as Constructed Information <Insert Min \$>		Lump Sum	\$ 32,600.00	\$ 32,600.00	Payment: 100% at Practical Completion.

A. TOTAL ESTIMATED CONTRACT AWARD SUM \$ 878,993.25

B.	PRE-CONSTRUCTION COST (Table 10)	
HW0016	Design	\$ 131,848.89
HW0017	Project Management of Design	\$ 42,369.80
HW0018	Land Matters	\$ -
HW0024	Community Consultation	\$ 174,218.79
	Sub Total(B1)	\$ 52,265.64
	Pre construction contingency (30% of B1)	\$ -
	TOTAL PRE-CONSTRUCTION COST (B)	\$ 228,434.42

C.	CONSTRUCTION COST	
	Total Estimated Contract Award Sum (A)	\$ 878,993.25
HW0019	Principal Supplied Pipe (as applicable)	\$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	\$ -
HW0021	Principal Supplied Fittings (as applicable)	\$ -
HW0022	Pump Station HV Power Supply	\$ -
HW0023	Construction Management (Table 11)	\$ 183,378.52
	Sub Total (C1)	\$ 1,072,371.77
	Construction contingency (30% of C1)	\$ 321,711.53
	TOTAL CONSTRUCTION COST (C)	\$ 1,394,083.30

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate) \$ 1,620,567.72

ESTIMATING SHEET

PROJECT DESCRIPTION: Walgett Raw DN160, 4km

Date Prepared: 19 Oct 2021
Date Cost Tables updated: 24 Oct 2018

Item No.	Item Description	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW001	All work not included elsewhere in this schedule	Item	Lump Sum	\$ 20,734.00	\$ 20,734.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW002	Site Establishment <Insert Max \$>	Item	Lump Sum	\$ 85,000.00	\$ 85,000.00	Payment: 100% after completion.
HW003	Site Disestablishment <Insert Min \$>	Item	Lump Sum	\$ 85,000.00	\$ 85,000.00	Payment: 100% after completion.
HW004	Preparation and implementation of the Construction EMP	Item	Lump Sum	\$ 4,800.00	\$ 4,800.00	Payment: Maximum of 30% on submission of complying Construction EMP, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Construction EMP.
HW005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	\$ 11,000.00	\$ 11,000.00	Payment: Maximum of 30% on submission of complying plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Safety Management Plan.
HW006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	\$ 53,600.00	\$ 53,600.00	Payment: Maximum of 30% on submission of complying Traffic Control Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	\$ 13,085.14	\$ 13,085.14	Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW008	Community Consultation	Item	Lump Sum	\$ -	\$ -	Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.

Water Pipeline - Trunk - section will be present if one or more trunk watermain are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW101	Service Location	Item	Lump Sum	\$ 12,000.00	\$ 12,000.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW102	Supply all valves and flowmeters	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of valves and flowmeters supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW102.01	DN200 Valves / Flowmeters	Item	Lump Sum	\$ 30,100.00	\$ 30,100.00	
HW103	Supply all fittings	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of fittings supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW103.01	DN200 Fittings	Item	Lump Sum	\$ 1,760.00	\$ 1,760.00	
HW104	Supply all pipes, materials, including director tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:					Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
314ESS	Nominal DN200 PE pipe	4000	m	\$ 63.75	\$ 254,980.00	
HW105	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Up to 1.5 m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation up to and including 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
314EB	Nominal DN200 PE (French type B)	4000	m	\$ 142.00	\$ 568,000.00	
HW106	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW107	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW108	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW109	EMPTY					
HW110	Extra over rate for installation for Additional compaction.		m3	\$ 17.10		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW111	Excavate below specified design depth where directed including disposal of excess excavated material		m3	\$ 72.00		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW112	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW113	Extra over rate for installation for supply, place and compact stabilised sand cement (4:1) backfill		m3	\$ 270.00		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW114	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW115	Supply & place ballast		tonnes	\$ 91.80		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW116	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m			Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW117	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW118	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW119	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW120	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of design, excavation, disposal of excavated material, backfilling, lay, bed & test.					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW121	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW122	Subheads and Trenchstops in accordance with WSA drawing WAT-1209		Each			Payment: Number of subheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW123	Supply and install valve pits excluding cost of valves and fittings	0	Each	\$ -	\$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW124	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW125	EMPTY					
HW126	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum	\$ -	\$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW127	Preparation of line sheets	4000	m	\$ 1.16	\$ 4,640.00	Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.
HW128	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Satisfactory test records Limits of Accuracy: <To be inserted>.
HW129	Miscellaneous					
HW130	Sub Total				\$871,480	

Item No.	Item Description	Qty	Unit	Amount \$	Application of Schedule of Rates
HW009	Restoration - Pipelines:				Payment: 100% after completion.
HW009.01	Concrete kerb & gutter	0	m	\$ 126.00	Measurement: Lineal metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.02	Concrete driveway	0	m2	\$ 196.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.03	Exposed aggregate & stamped driveway	0	m2	\$ 296.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.04	Concrete footpath	0	m2	\$ 178.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.05	Bitumen footpath	0	m2	\$ 144.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.06	Gravel pavement	0	m2	\$ 80.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.07	Bitumen pavement	0	m2	\$ 238.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.08	AC pavement	0	m2	\$ 328.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.09	Pavers	0	m2	\$ 176.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.10	Turf	0	m2	\$ 12.60	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.11	Grass seeding	8000	m2	\$ 7.90	\$ 63,200.00 Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW009.12	Hydromulch	0	m2	\$ 9.60	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW011	Acid sulphate soil				
HW011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		Submit: Result for each test. Limits of Accuracy: <To be inserted>.
HW011.02	Establish treatment facility		Item		Payment: 100% after completion of treatment facility.
HW011.03	Handling, treatment and testing of acid sulphate soils		m3		Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>.
HW011.04	Disposal off site of acid sulphate soil		tonne		Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW012	Preconstruction record				
HW012.01	Photographic	Item	Lump Sum	\$ -	Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.
HW012.02	Video	Item	Lump Sum	\$ -	Payment: 70% on submission of the Video record. Remainder at Practical Completion.
HW012.03	CCTV	Item	Lump Sum	\$ -	Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.
HW013	Work as Constructed Information <insert Min \$>	Item	Lump Sum	\$ 32,600.00	\$ 32,600.00 Payment: 100% at Practical Completion.

A. TOTAL ESTIMATED CONTRACT AWARD SUM \$ 1,240,499.14

B.	PRE-CONSTRUCTION COST (Table 10)		
HW016	Design	\$	148,889.90
HW017	Project Management of Design	\$	45,771.98
HW018	Land Matters	\$	-
HW024	Community Consultation	\$	-
	Sub Total(B1)	\$	194,631.88
	Pre construction contingency (30% of B1)	\$	58,389.58
	TOTAL PRE-CONSTRUCTION COST (B)	\$	253,021.46

C.	CONSTRUCTION COST		
	Total Estimated Contract Award Sum (A)	\$	1,240,499.14
HW019	Principal Supplied Pipe (as applicable)	\$	-
HW020	Principal Supplied Valves and Flowmeters (as applicable)	\$	-
HW021	Principal Supplied Fittings (as applicable)	\$	-
HW022	Pump Station HV Power Supply	\$	179,889.88
HW023	Construction Management (Table 11)	\$	1,414,169.02
	Sub Total (C1)	\$	424,250.71
	Construction contingency (Table 12) (30% of C1)		
	TOTAL CONSTRUCTION COST (C)	\$	1,838,419.73

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate) \$ 2,091,441.18

ESTIMATING SHEET

PROJECT DESCRIPTION: Lightning Ridge A DN90, 300m

Date Priced: 19-Oct-2021
Date Cost Tables updated: 24-Oct-2019

Item No.	Item Description	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	\$ 1,387.00	\$ 1,387.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0002	Site Establishment <Insert Max \$>	Item	Lump Sum	\$ 8,500.00	\$ 8,500.00	Payment: 100% after completion.
HW0003	Site Disestablishment <Insert Min \$>	Item	Lump Sum	\$ 8,500.00	\$ 8,500.00	Payment: 100% after completion.
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	\$ 4,800.00	\$ 4,800.00	Payment: Maximum of 30% on submission of complying Construction EMP, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Construction EMP.
HW0005	Preparation and implementation of the Safety Management Plan	Item	Lump Sum	\$ 11,000.00	\$ 11,000.00	Payment: Maximum of 30% on submission of complying plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Safety Management Plan.
HW0006	Preparation and implementation of the Traffic Control Plan	Item	Lump Sum	\$ 7,350.00	\$ 7,350.00	Payment: Maximum of 30% on submission of complying Traffic Control Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	\$ 2,928.14	\$ 2,928.14	Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW0008	Community Consultation	Item	Lump Sum	\$ -	\$ -	Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.

Water Pipeline - Retiulation - section will be present if one or more reticulation watermainis are specified

Item	Construction of Reticulation Watermainis	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	Service Location	Item	Lump Sum	\$ 495.00	\$ 495.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0002	Supply all valves and flowmeters	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of valves and flowmeters supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW0003	Supply all fittings	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of fittings supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW0004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:					Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
20E53	Nominal DN80 PE pipe	300	m	\$ 19.86	\$ 5,958.50	
HW0005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation up to and including 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
20E58	Nominal DN80 PE (Trench type B)	300	m	\$ 107.20	\$ 32,160.00	
HW0006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0009	Supply additional service connection pipe and fittings and install	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of work completed. Submit: Relevant Quality Records.
HW0010	Extra over rate for installation for Additional compaction	m3	\$ 9.41	\$ 9.41	Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.	
HW0011	Excavate below specified design depth where directed including disposal of excess excavated material	m3	\$ 39.50	\$ 39.50	Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.	
HW0012	Extra over rate for installation to Supply & place & compact non cohesive material	m3	\$ -	\$ -	Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.	
HW0013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill	m3	\$ 148.50	\$ 148.50	Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.	
HW0014	Extra over rate for installation for supply, place and compact aggregate	m3	\$ -	\$ -	Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.	
HW0015	Supply & place ballast			\$ 91.90	\$ 91.90	Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW0016	External Dewatering of trench including establishment and disestablishment (Contingent Item)					Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0017	Supply and place treated timber piling for pipe support	m				Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0019	Extra over rate for installation of trenchless technique under existing rail line	m				Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0020	Supply & installation of river crossing includes supply of MSC, pipe, welding, well testing, 150mm concrete encasement, mobilisation & demobilisation of drage, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0021	Supply and installation of pipe serial creek crossing including supply of MSC, pipe with protection coating, internal and external welding, testing of welds. For the following MSC, pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0022	Bulkheads and Trenchstops in accordance with WSA drawing WAT-1209	Each				Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0023	Supply and install valve pits (excluding valves and fittings)	0	Each	\$ -	\$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0024	Flow Relief Structures	Each				Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0025	EMPTY					
HW0026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	1	Each	\$ -	\$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0027	Preparation of line sheets	300	m	\$ 1.33	\$ 400.00	Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.
HW0028	Acceptance testing - reticulation main	m				Measurement: Length of pipelines constructed as per design. Submit: Satisfactory test records. Limits of Accuracy: <To be inserted>.
HW0029	Miscellaneous					
HW0030	Sub Total				\$39,012	

Item No.	Item Description	Qty	Unit		Amount \$	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					Payment: 100% after completion.
HW0009.01	Concrete kerb & gutter	0	m	\$	128.00	\$ - Measurement: Linear metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.02	Concrete driveway	0	m2	\$	198.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.03	Exposed aggregate & stamped driveway	0	m2	\$	256.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.04	Concrete footpath	0	m2	\$	178.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.05	Bitumen footpath	0	m2	\$	144.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.06	Gravel pavement	0	m2	\$	80.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.07	Bitumen pavement	0	m2	\$	238.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.08	AC pavement	0	m2	\$	328.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.09	Pavers	0	m2	\$	178.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.10	Turf	0	m2	\$	12.60	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.11	Grass seeding	600	m2	\$	7.90	\$ 4,740.00 Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.12	Hydrumulch	0	m2	\$	9.60	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test			Submit: Result for each test. Limits of Accuracy: <To be inserted>.
HW0011.02	Establish treatment facility		Item			Payment: 100% after completion of treatment facility.
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3			Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>.
HW0011.04	Disposal off site of acid sulphate soil		tonne			Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		\$ -	Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.
HW0012.02	Video	Item	Lump Sum		\$ -	Payment: 70% on submission of the Video record. Remainder at Practical Completion.
HW0012.03	CCTV	Item	Lump Sum		\$ -	Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.
HW0013	Work as Constructed Information <Insert Min \$>	Item	Lump Sum	\$	2,445.00	\$ 2,445.00 Payment: 100% at Practical Completion.

A. TOTAL ESTIMATED CONTRACT AWARD SUM \$ 90,661.64

B.	PRE-CONSTRUCTION COST (Table 10)		
HW0016	Design	\$ 18,132.33	
HW0017	Project Management of Design	\$ 19,626.47	
HW0018	Land Matters	\$ -	
HW0024	Community Consultation	\$ -	
	Sub Total(B1)	\$ 37,758.79	
	Pre construction contingency (30% of B1)	\$ 11,327.64	
	TOTAL PRE-CONSTRUCTION COST (B)	\$ 49,086.43	

C.	CONSTRUCTION COST		
	Total Estimated Contract Award Sum (A)	\$ 90,661.64	
HW0019	Principal Supplied Pipe (as applicable)	\$ -	
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	\$ -	
HW0021	Principal Supplied Fittings (as applicable)	\$ -	
HW0022	Pump Station HV Power Supply	\$ -	
HW0023	Construction Management (Table 11)	\$ 10,000.00	
	Sub Total (C1)	\$ 100,661.64	
	Construction contingency (Table 12) (30% of C1)	\$ 30,198.49	
	TOTAL CONSTRUCTION COST (C)	\$ 130,860.13	

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C - Preliminary Estimate) \$ 179,946.56

Water Pipeline - Retiulation - section will be present if one or more reticulation watermainis are specified

ESTIMATING SHEET

PROJECT DESCRIPTION: Lightning Ridge B DN110, 2.1km

Date Printed: 19-Oct-2021
Date Cost Tables updated: 24-Oct-2018

Item No.	Item Description	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW001	All work not included elsewhere in this schedule	Item	Lump Sum	\$ 8,050.00	\$ 8,050.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW002	Site Establishment <Insert Max \$>	Item	Lump Sum	\$ 28,000.00	\$ 28,000.00	Payment: 100% after completion.
HW003	Site Disestablishment <Insert Min \$>	Item	Lump Sum	\$ 28,000.00	\$ 28,000.00	Payment: 100% after completion.
HW004	Preparation and implementation of the Construction EMP	Item	Lump Sum	\$ 4,800.00	\$ 4,800.00	Payment: Maximum of 30% on submission of complying Construction EMP, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Construction EMP.
HW005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	\$ 11,000.00	\$ 11,000.00	Payment: Maximum of 30% on submission of complying plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Safety Management Plan.
HW006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	\$ 3,600.00	\$ 3,600.00	Payment: Maximum of 30% on submission of complying Traffic Control Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	\$ 6,426.38	\$ 6,426.38	Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW008	Community Consultation	Item	Lump Sum	\$ -	\$ -	Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.

Water Pipeline - Reticulation - section will be present if one or more reticulation watermain are specified

Item	Construction of Reticulation Watermain	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW009	Service Location	Item	Lump Sum	\$ 3,465.00	\$ 3,465.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW010	Supply all valves and flowmeters	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of valves and flowmeters supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW012.04	DN100 Valves / Flowmeters	Item	Lump Sum	\$ 14,560.00	\$ 14,560.00	
HW010	Supply all fittings	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of fittings supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW013.04	DN100 Fittings	Item	Lump Sum	\$ 580.00	\$ 580.00	
HW004	Supply all pipes materials including director tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:					Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
204E03	Nominal DN100 PE pipe	2100	m	\$ 30.31	\$ 63,649.00	
HW009	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation up to and including 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
204E03	Nominal DN100 PE (French type B)	2100	m	\$ 118.16	\$ 248,136.00	
HW009	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW009	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW009	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of work completed. Submit: Relevant Quality Records.
HW010	Extra over rate for installation for Additional compaction		m3	\$ 9.41		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	\$ 39.60		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1 backfill)		m3	\$ 148.50		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW014	Extra over rate for installation for supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW015	Supply & place ballast			\$ 91.80		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m			Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW020	Supply & installation of river crossing includes supply of MSCS pipe, welding, yield testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW021	Supply and installation of pipe aerial creek crossing including supply of MSCS pipe with protection coating, internal and external welding, testing of welds. For the following MSCS pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW022	Bulkheads and Trenchstops in accordance with WSA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW023	Supply and install valve pits (excluding valves and fittings)	0	Each	\$ -	\$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW025	EMPTY					
HW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	1	Each		\$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW027	Preparation of line sheets	2100	m	\$ 1.16	\$ 2,436.00	Measurement: Length of pipelines constructed as per design. Submit: Surveying test records. Limits of Accuracy: <To be inserted>.
HW028	Acceptance testing - reticulation main		m			Measurement: Length of pipelines constructed as per design. Submit: Surveying test records. Limits of Accuracy: <To be inserted>.
HW029	Miscellaneous					
HW030	Sub Total				\$332,818	

Item No.	Item Description	Qty	Unit		Amount \$	Application of Schedule of Rates
HW030	Restoration - Pipelines:					Payment: 100% after completion.
HW030.01	Concrete kerb & gutter	0	m	\$ 128.00	\$ -	Measurement: Linear metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.02	Concrete driveway	0	m2	\$ 198.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.03	Exposed aggregate & stamped driveway	0	m2	\$ 256.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.04	Concrete footpath	0	m2	\$ 178.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.05	Bitumen footpath	0	m2	\$ 144.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.06	Gravel pavement	0	m2	\$ 80.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.07	Bitumen pavement	0	m2	\$ 238.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.08	AC pavement	0	m2	\$ 328.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.09	Pavers	0	m2	\$ 178.00	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.10	Turf	0	m2	\$ 12.60	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.11	Grass seeding	4200	m2	\$ 7.90	\$ 33,180.00	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW030.12	Hydromulch	0	m2	\$ 9.60	\$ -	Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW021	Acid sulphate soil					
HW021.01	Initial testing for acid sulphate soils and prepare and submit report		per test			Submit: Result for each test. Limits of Accuracy: <To be inserted>.
HW021.02	Establish treatment facility		Item			Payment: 100% after completion of treatment facility.
HW021.03	Handling, treatment and testing of acid sulphate soils		m3			Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>.
HW021.04	Disposal off site of acid sulphate soil		tonne			Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>.
HW012	Preconstruction record					
HW012.01	Photographic	Item	Lump Sum	\$ -	\$ -	Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.
HW012.02	Video	Item	Lump Sum	\$ -	\$ -	Payment: 70% on submission of the Video record. Remainder at Practical Completion.
HW012.03	CCTV	Item	Lump Sum	\$ -	\$ -	Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.
HW013	Work as Constructed Information <Insert Min \$>	Item	Lump Sum	\$ 17,115.00	\$ 17,115.00	Payment: 100% at Practical Completion.

A. TOTAL ESTIMATED CONTRACT AWARD SUM \$ 472,988.88

B. PRE-CONSTRUCTION COST (Table 10)	
HW016 Design	\$ 94,597.78
HW017 Project Management of Design	\$ 34,919.56
HW018 Land Matters	\$ -
HW024 Community Consultation	\$ -
Sub Total(B1)	\$ 129,517.33
Pre construction contingency (30% of B1)	\$ 38,855.20
TOTAL PRE-CONSTRUCTION COST (B)	\$ 168,372.53

C. CONSTRUCTION COST	
Total Estimated Contract Award Sum (A)	\$ 472,988.88
HW019 Principal Supplied Pipe (as applicable)	\$ -
HW020 Principal Supplied Valves and Flowmeters (as applicable)	\$ -
HW021 Principal Supplied Fittings (as applicable)	\$ -
HW022 Pump Station HV Power Supply	\$ -
HW023 Construction Management (Table 11)	\$ 104,057.55
Sub Total (C1)	\$ 577,046.43
Construction contingency (Table 12) (30% of C1)	\$ 173,113.93
TOTAL CONSTRUCTION COST (C)	\$ 750,160.36

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate) \$ 918,532.89

ESTIMATING SHEET

PROJECT DESCRIPTION: Lightning Ridge C DN75, 4.2km

Date Priced: 19-Oct-2021
Date Cost Tables updated: 24-Oct-2019

Item No.	Item Description	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	\$ 14,358.00	\$ 14,358.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0002	Site Establishment <Insert Max \$>	Item	Lump Sum	\$ 28,000.00	\$ 28,000.00	Payment: 100% after completion.
HW0003	Site Disestablishment <Insert Min \$>	Item	Lump Sum	\$ 28,000.00	\$ 28,000.00	Payment: 100% after completion.
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	\$ 4,800.00	\$ 4,800.00	Payment: Maximum of 30% on submission of complying Construction EMP, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Construction EMP.
HW0005	Preparation and implementation of the Safety Management Plan	Item	Lump Sum	\$ 11,000.00	\$ 11,000.00	Payment: Maximum of 30% on submission of complying plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Safety Management Plan.
HW0006	Preparation and implementation of the Traffic Control Plan	Item	Lump Sum	\$ 56,100.00	\$ 56,100.00	Payment: Maximum of 30% on submission of complying Traffic Control Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	\$ 9,738.19	\$ 9,738.19	Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW0008	Community Consultation	Item	Lump Sum	\$ -	\$ -	Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.

Water Pipeline - Reticulation - section will be present if one or more reticulation watermain is specified

Item	Construction of Reticulation Watermain	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	Service Location	Item	Lump Sum	\$ 6,930.00	\$ 6,930.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0002	Supply all valves and flowmeters	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of valves and flowmeters supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW0003	Supply all fittings	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of fittings supplied. Submit: Relevant Quality Records including Compliance Certificates.
HW0004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:					Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
20E035	Nominal DN80 PE pipe	4200	m	\$ 19.86	\$ 83,391.00	
HW0005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation up to and including 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
20E036	Nominal DN80 PE (Trench type B)	4200	m	\$ 107.20	\$ 450,240.00	
HW0006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>.
HW0009	Supply additional service connection pipe and fittings and install	Item	Lump Sum	\$ -	\$ -	Payment: Percentage of work completed. Submit: Relevant Quality Records.
HW0010	Extra over rate for installation for Additional compaction	m3	\$	9.41		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0011	Excavate below specified design depth where directed including disposal of excess excavated material	m3	\$	39.50		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0012	Extra over rate for installation to Supply & place & compact non cohesive material	m3	\$			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill	m3	\$	148.50		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0014	Extra over rate for installation for supply, place and compact aggregate	m3	\$			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0015	Supply & place ballast		\$	91.90		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge docket. Limits of Accuracy: <To be inserted>.
HW0016	External Dewatering of trench including establishment and disestablishment (Contingent item)	m				Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0017	Supply and place treated timber piling for pipe support	m				Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0019	Extra over rate for installation of trenchless technique under existing rail line	m				Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0020	Supply & installation of river crossing includes supply of MSC, pipe, welding, well testing, 150mm concrete encasement, mobilisation & demobilisation of design, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0021	Supply and installation of pipe serial creek crossing including supply of MSC, pipe with protection coating, internal and external welding, testing of welds. For the following MSC, pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0022	Bulkheads and Trenchstops in accordance with WSA drawing WAT-1209	Each				Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0023	Supply and install valve pits (excluding valves and fittings)	0	Each	\$ -	\$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0024	Flow Relief Structures	Each				Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0025	EMPTY					
HW0026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	1	Each	\$ -	\$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0027	Preparation of line sheets	4200	m	\$ 1.16	\$ 4,872.00	Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.
HW0028	Acceptance testing - reticulation main	m				Measurement: Length of pipelines constructed as per design. Submit: Satisfactory test records. Limits of Accuracy: <To be inserted>.
HW0029	Miscellaneous					
HW0030	Sub Total				\$545,433	

Item No.	Item Description	Qty	Unit		Amount \$	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					Payment: 100% after completion.
HW0009.01	Concrete kerb & gutter	0	m	\$	128.00	\$ - Measurement: Linear metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.02	Concrete driveway	0	m2	\$	198.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.03	Exposed aggregate & stamped driveway	0	m2	\$	256.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.04	Concrete footpath	0	m2	\$	178.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.05	Bitumen footpath	0	m2	\$	144.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.06	Gravel pavement	0	m2	\$	80.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.07	Bitumen pavement	0	m2	\$	238.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.08	AC pavement	0	m2	\$	328.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.09	Pavers	0	m2	\$	178.00	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.10	Turf	0	m2	\$	12.50	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.11	Grass seeding	8400	m2	\$	7.90	\$ 66,360.00 Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0009.12	Hydrumulch	0	m2	\$	9.50	\$ - Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test			Submit: Result for each test. Limits of Accuracy: <To be inserted>.
HW0011.02	Establish treatment facility		Item			Payment: 100% after completion of treatment facility.
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3			Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>.
HW0011.04	Disposal off site of acid sulphate soil		tonne			Measurement: Tonnes transported from the site. Submit: Weighbridge docket. Limits of Accuracy: <To be inserted>.
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum	\$	-	Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.
HW0012.02	Video	Item	Lump Sum	\$	-	Payment: 70% on submission of the Video record. Remainder at Practical Completion.
HW0012.03	CCTV	Item	Lump Sum	\$	-	Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.
HW0013	Work as Constructed Information <Insert Min \$>	Item	Lump Sum	\$	34,230.00	\$ 34,230.00 Payment: 100% at Practical Completion.

A. TOTAL ESTIMATED CONTRACT AWARD SUM \$ 798,019.19

B.	PRE-CONSTRUCTION COST (Table 10)		
HW0016	Design	\$	119,702.88
HW0017	Project Management of Design	\$	39,940.58
HW0018	Land Matters	\$	-
HW0024	Community Consultation	\$	159,643.45
	Sub Total(B1)	\$	47,893.04
	Pre construction contingency (30% of B1)	\$	207,636.45
	TOTAL PRE-CONSTRUCTION COST (B)	\$	207,636.45

C.	CONSTRUCTION COST		
	Total Estimated Contract Award Sum (A)	\$	798,019.19
HW0019	Principal Supplied Pipe (as applicable)	\$	-
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	\$	-
HW0021	Principal Supplied Fittings (as applicable)	\$	-
HW0022	Pump Station HV Power Supply	\$	-
HW0023	Construction Management (Table 11)	\$	175,564.22
	Sub Total (C1)	\$	973,583.41
	Construction contingency (Table 12) (30% of C1)	\$	292,075.02
	TOTAL CONSTRUCTION COST (C)	\$	1,265,658.44

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C - Preliminary Estimate) \$ 1,473,194.63

Water Pipeline - Reticulation - section will be present if one or more reticulation watermain is specified

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