ADDENDUM TO WYNDELLA ROAD LOCHINVAR WASTEWATER SERVICING STRATEGY

1.0 BACKGROUND

CPG Estates engaged ADW Johnson (ADWJ) to prepare the *Wyndella Road Wastewater Servicing Strategy,* which was approved by Hunter Water on 18 August 2023. The strategy identified Option 2 as the preferred sewer servicing option for the R1 (General Residential) zoned land to the north of the New England Highway between Wyndella Rd and Lochinvar Creek. Option 2 required the construction of a new wastewater pump station (Lochinvar 2 WWPS) to service the R1 zone land. Lochinvar 2 WWPS was located in RU1 (Primary Production) zoned flood-affected land immediately north of the R1 zoned area.

A design inception meeting for Lochinvar 2 WWPS was conducted on 12 October 2023 between ADWJ and Hunter Water (HW) staff. At the meeting, HW confirmed their preference for Lochinvar 2 WWPS to be located outside of the flood zone, on Lot 38 DP975690 60 New England Hwy, Lochinvar. Another outcome from the meeting was for Hunter Water to engage with Newquest (developer of RU1 zoned land to the northwest of the R1 zoned area) to confirm timeframes for a possible rezoning of the RU1 land and to confirm the feasibility of draining their site to the proposed Lochinvar 2 WWPS.

Subsequent discussions around accessing Lot 38 DP975690 60 New England Hwy, Lochinvar for a pump station site were unsuccessful and the owners indicated that they would not consent to the use of their land for a WWPS.

A meeting was subsequently undertaken between CPG Estates, Newquest, HW, and ADWJ staff on 2 November 2023. At this meeting Newquest confirmed that they could accept a pump station on land at Windermere Rd, Windermere (Lot 1902 DP1112961) – the site is accessible off Cantwell Rd. Hunter Water indicated that they may accept a WWPS on this site, provided it could be demonstrated that flood risks could be mitigated. At the meeting, HW requested that an addendum report be prepared assessing the NPV of options servicing RU1 zoned land that could drain under gravity to Lochinvar 2 WWPS to confirm whether the size and location of Lochinvar 2 WWPS, as determined in the wastewater servicing strategy needed to be modified.

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2.0 SUMMARY OF OPTIONS

This addendum report reviews and compares the following options:

1. The currently preferred option from the *Wyndella Road Wastewater Servicing Strategy;*
2. An option where Lochinvar 2 WWPS services R1 zoned and RU2 zoned land north of NEH, except for a portion of Newquest site (and adjoining sites) draining under gravity to Lochinvar 1 WWPS; and
3. An option where Lochinvar 2 WWPS services R1 zoned and RU1 zoned land north of NEH, except for the Newquest site, which would be serviced by a new WWPS rather than draining to Lochinvar 2 WWPS. An assumption of this option is the land bounding the Newquest site that could drain under gravity to Lochinvar 1 WWPS be assessed.

3.0 COMPARISON OF OPTIONS

The table below outlines the development areas considered within the addendum.

Table 1 – Development areas

Development areas	Lots (ET)
R1 zoned land in approved strategy.	650
CPG Estates – RU1 Land (Lot 1 DP65706).	550
Newquest (Lots 1901 and 1902 DP1112961).	500^
Feher (Lot 2 DP 379508).	200
Gravity catchment to the west and north of Newquest site draining to Lochinvar 1 (not shown on plans).	400
Total catchment north of the New England Highway	**2,300**

^For option 2 – 350 lots drain to Lochinvar 2 WWPS

The table below summarises the key WWPS information.

Table 2 – Key WWPS data

Option	WWPS	ET	Well diameter (mm)	Approx. well depth (m)	Rising main diameter (mm)	Ultimate Pump power (kW)	Ult. Pump duty (L/s)
1	Lochinvar 2 WWPS – Current strategy option.	650	3000	5	200	20	55
2	Lochinvar 2 WWPS - R1 and RU1 zoned land to Lochinvar 2 WWPS.	1750	3800	10.5	225	90	143
3	Lochinvar 2 WWPS - R1 and RU1 zoned land to Lochinvar 2 WWPS, excluding Newquest load.	1400	3800	8	225	60	115

	Newquest WWPS	350	2400	5	150	10	30

NB- Table excludes 550 additional ET draining under gravity to Lochinvar 1 WWPS from NQ and areas adjoining NQ site.

Table 3 - Capital and 7% NPV comparison

Option	WWPS	ET	Construction estimate	NPV 7%	Cost per lot
1	Lochinvar 2 WWPS - Strategy option.	650	$1,829,182	$1,995,738	$2,814
2	R1 and RU1 zoned land to Lochinvar 2 WWPS.	1750	$3,138,140	$3,532,355	$1,793
3	R1 and RU1 zoned land to Lochinvar 2 WWPS (ex Newquest) + Newquest WWPS.	1750	$4,120,030	$3,865,761	$2,354

NB- Table excludes 550 additional ET draining under gravity to Lochinvar 1 WWPS from NQ and areas adjoining NQ site.

4.0 IMPACTS ON LOCHINVAR 1 WWPS

Lochinvar 1 WWPS has an ultimate capacity of 360L/s or for around 4,560 theoretical residential ET. The current theoretical Lochinvar 1 WWPS catchment from existing strategies is estimated at around 5,600 ET. This includes an allowance for the St Helena development and assumes 923 ET from the area to the north of the New England Highway (NEH).

This addendum to the Wyndella Rd Strategy calculates a maximum developable area from the catchment to the north of the NEH of 2,300 ET. This would increase loads draining from the area to the north of the NEH to Lochinvar 1 WWPS from 923 ET up to 2,300 ET. As a result of the increased catchment to the north of the NEH, the maximum theoretical load to Lochinvar 1 WWPS would increase to around 6,980 ET, which is 2,420 ET above the current Lochinvar 1 WWPS theoretical capacity (4,560 ET).

The zoned areas to the north of the NEH currently support around 650 ET of potential development, beyond this, the other areas require rezoning. This rezoning would occur over an extended period, meaning the ultimate growth would be a minimum of 20 years away and likely far longer. Hunter Water has advised that the performance of Lochinvar 1 WWPS will be monitored over this period and capacity reviewed on an ongoing basis.

5.0 OPTION DISCUSSION

From the above assessment, it appears that a larger and deeper Lochinvar 2 WWPS is preferred based on the assessment of both construction cost and 7% NPV. Hunter Water noted their requirement to locate the WWPS outside of flood-affected land. However, the developer of the R1-zoned land (Lot 38 DP 975690) has not been willing to accept a WWPS on that parcel of land.

The Newquest developer has indicated that they could accept a WWPS on a portion of their property on the opposite side of Cantwell Rd at Lot 1902 DP 1112961). This portion of land sits within a portion of potentially flood-affected land.

To determine the flood risk of the site ADWJ requested flood information from Maitland City Council (MCC). MCC has advised that the Reduced Level (RL) Australian Height Datum (AHD) of the 1 in 100-year (1% AEP) Flood event for Lot 1902 DP 1112961 is 25.85m AHD.

The following is an extract from Hunter Water design manual - SECTION 4 SEWAGE PUMPING STATIONS AND RISING MAINS –

Where a pumping station is situated in a flood-prone area the switchgear must in all cases be located above flood level. For small to medium pumping stations the finished surface of the top of the wet well roof slab should be placed 0.3 metres above 100-year flood level. The base of the electrical switchboard cabinet shall be mounted a minimum of 0.6 meters above the 100-year flood level.

The ground level at the proposed Lochinvar 2 WWPS site is 25.3m, which indicates that the 1 in 100yr water level would be approx. 0.55m above the surface at this location. To meet the requirements of the design code, the wet well roof slab would need to sit at RL 26.05m and the base of the switchboard located at 26.35m.

To accommodate a pump station in this location, the pump station site would need to be raised by approx. 0.7m. Local fill could be excavated from the area surrounding the WWPS to ensure the filling did not impact the flood storage area or increase downstream flood risks. Consideration could also be given to increasing the last section of Cantwell Road so that it remains above RL 25.85m, if necessary. This could be confirmed during the design phase.

The key difference between the options is the wet well depth and rising main diameter. The wet well for Option 1 is not as deep as either Option 2 or 3, but this creates a constraint if the RU1 land is ever redeveloped, as the depth won't allow these sites to be serviced and a new WWPS will be required.

Option 2 requires Lochinvar 2 WWPS to have a wet well 10.5m deep, whereas Option 3 requires the wet well at approx. 8m deep. The deeper well for Option 2 results from the need for the gravity line from the Newquest site to drain under the creek. Aerial sewer and inverted siphon options were assessed but were not considered feasible for this crossing, due to the impacts of the aerial crossing on the stream, and the siphon depth required to service the Newquest site.

A deep sewer has been allowed for in Option 2, between the creek and the collecting manhole, but this was not required for Option 3. The deep sewer has been assumed to be delivered upfront with Lochinvar 2 WWPS works, but this is likely to be delivered later by Newquest, making the NPV of the option more favourable.

In Option 3, the last section of DN300 to Lochinvar 1 WWPS needs to be duplicated to allow the additional gravity catchment, including the upper part of the Newquest site, to be serviced. This has been included in the cost and NPV, but deferred, as it won't be required until around half the lots in the gravity catchment have been delivered.

For context regarding the constructability of deep wet wells, several deeper wells have been recently constructed within Hunter Water's area of operation, as listed below, indicating that a well of 10.5m depth is feasible.

- Heddon Greta 2 WWPS (DN3000) - 9.5m to invert (2016).
- Dora Creek 4 WWPS (DN3000) - 9.5m to invert (2023).

6.0 CONCLUSION

Option 1, the currently preferred wastewater servicing strategy option, is cheaper and has a lower NPV than the other options, but is only able to service 650 lots of R1 zoned land. On a cost-per-lot basis, Option 1 is the most expensive option presented.

While the RU1 land cannot currently service residential development, rezoning applications for the identified sites are being prepared and have a high likelihood of being supported by MCC due to the demand for vacant land in this area. The developer is confident that lots will be delivered within 5 years on the Newquest RU1 land. In light of this, Options 2 and 3 are the only options being assessed in this Addendum.

Option 2 is preferred over Option 3 on a capital cost, NPV, and cost-per-lot basis. Whilst the deeper well for Option 2 will be more expensive to install initially it will be more cost-effective over the long term for Hunter Water as it will be able to service more lots and will mean that Hunter Water has fewer WWPS to manage in the future.

Based on the above assessment, Option 2 is recommended. This option comprises a single deep pump station (Lochinvar 2 WWPS) located at the northern end of Cantwell Rd. The pump station design would need to ensure Hunter Water design code requirements relating to flooding can be complied with.

Regards,

CHRIS BARKER
SENIOR ENGINEER
ADW JOHNSON PTY LTD
HUNTER OFFICE

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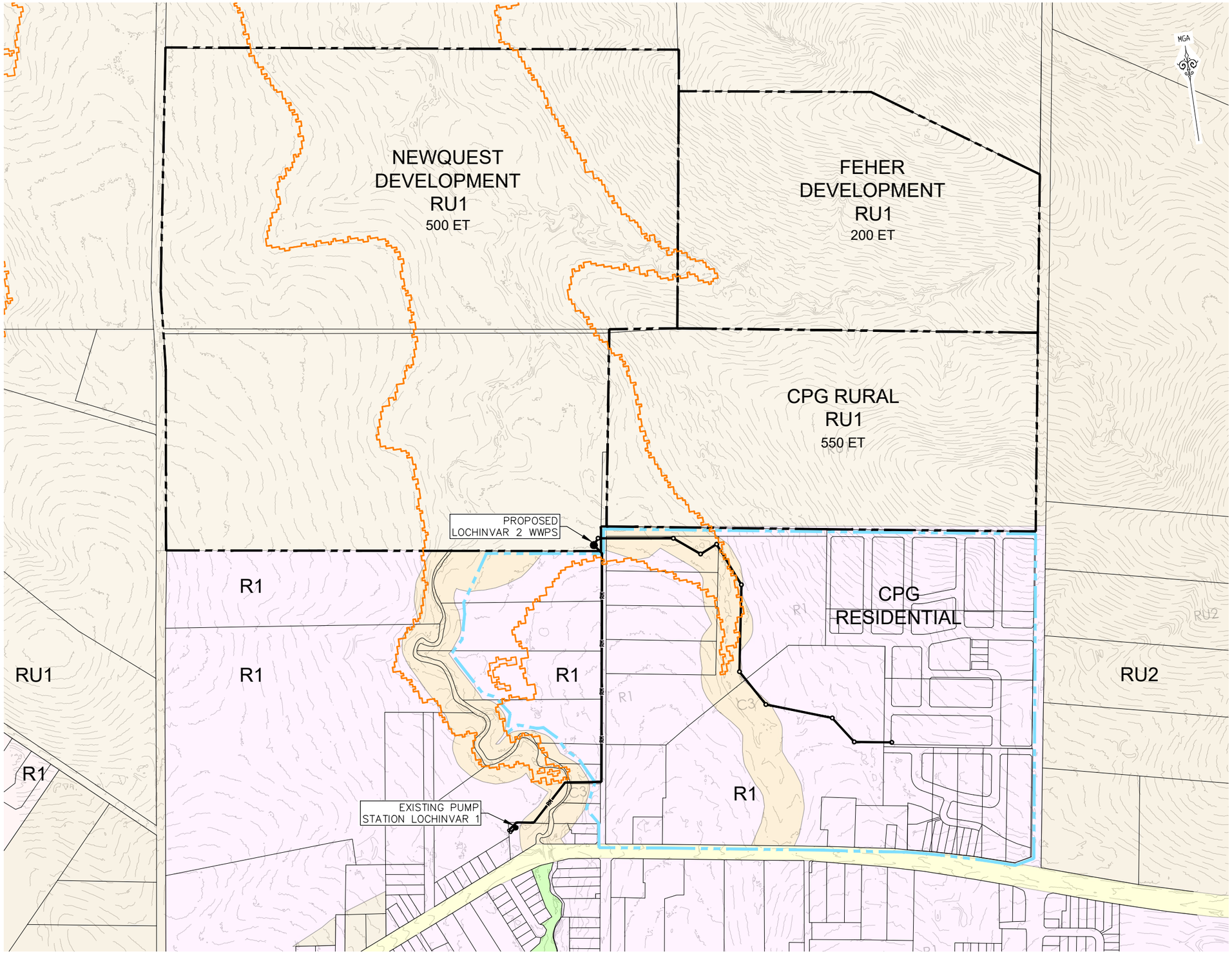
APPENDIX A

CONCEPT PLANS
FUTURE GRAVITY SEWER L.S. FROM FEHER



LEGEND

- EXISTING BOUNDARIES (DCDB)
- PROPOSED BOUNDARIES
- EXISTING 1m CONTOURS
- STRATEGY CATCHMENT
- PROPOSED DEVELOPMENT BOUNDARIES
- PROPOSED GRAVITY SEWER
- PROPOSED RISING MAIN
- R1: RESIDENTIAL ZONE
- RU1: RURAL 1 ZONE
- RU2: RURAL 2 ZONE
- RE1: RECREATION 1 ZONE
- C3: RIPARIAN ZONE
- HUNTER RIVER 1% AEP

GRAVITY SEWER THROUGH ADJOINING LAND TO WWPS - EXISTING STRATEGY OPTION

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
B	29.02.24	RIPARIAN PLANNING ZONE ADDED	SHO	CB	CO-ORDINATE SYSTEM: MGA 56	DATUM: N/A CONTOUR INTERVAL: 1m	0 100 200m SCALE: 1:4000 (FULL)	

drawing title:
OPTION 1
- EXISTING STRATEGY OPTION

location:
NEW ENGLAND HIGHWAY AND
WYNDELLA ROAD, LOCHINVAR

council: MAITLAND CITY COUNCIL

dwg ref: 240332-STRAT-032

client:
CPG ESTATES

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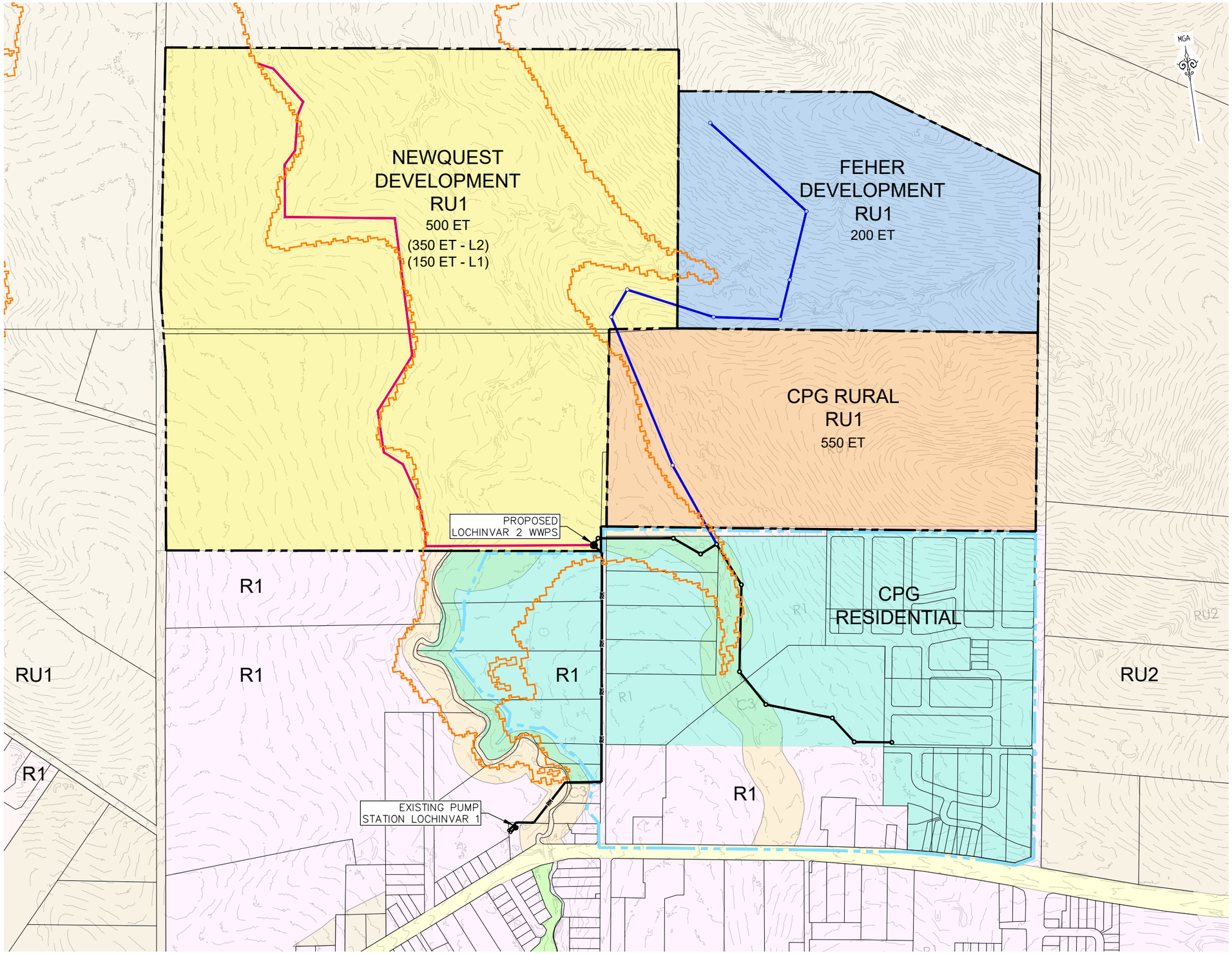
working beyond expectations



LEGEND

- EXISTING BOUNDARIES (DCDB)
- PROPOSED BOUNDARIES
- EXISTING 1m CONTOURS
- STRATEGY CATCHMENT
- PROPOSED DEVELOPMENT BOUNDARIES
- PROPOSED GRAVITY SEWER
- PROPOSED RISING MAIN
- PROPOSED FUTURE GRAVITY SEWER
- NEWQUEST PROPOSED FUTURE GRAVITY SEWER
- R1: RESIDENTIAL ZONE
- RU1: RURAL 1 ZONE
- RU2: RURAL 2 ZONE
- RE1: RECREATION 1 ZONE
- C3: RIPARIAN ZONE
- HUNTER RIVER 1% AEP

GRAVITY SEWER THROUGH ADJOINING LAND TO WWPS - SINGLE PUMP STATION OPTION

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
B	29.02.24	RIPARIAN PLANNING ZONE ADDED	SHO	CB	CO-ORDINATE SYSTEM: MGA 56	DATUM: N/A CONTOUR INTERVAL: 1m	0 100 200m SCALE: 1:4000 (FULL)	

drawing title:

OPTION 2
- SINGLE PUMP STATION OPTION

location:
NEW ENGLAND HIGHWAY AND
WYNDELLA ROAD, LOCHINVAR

council: MAITLAND CITY COUNCIL

dwg ref: 240332-STRAT-034

client:
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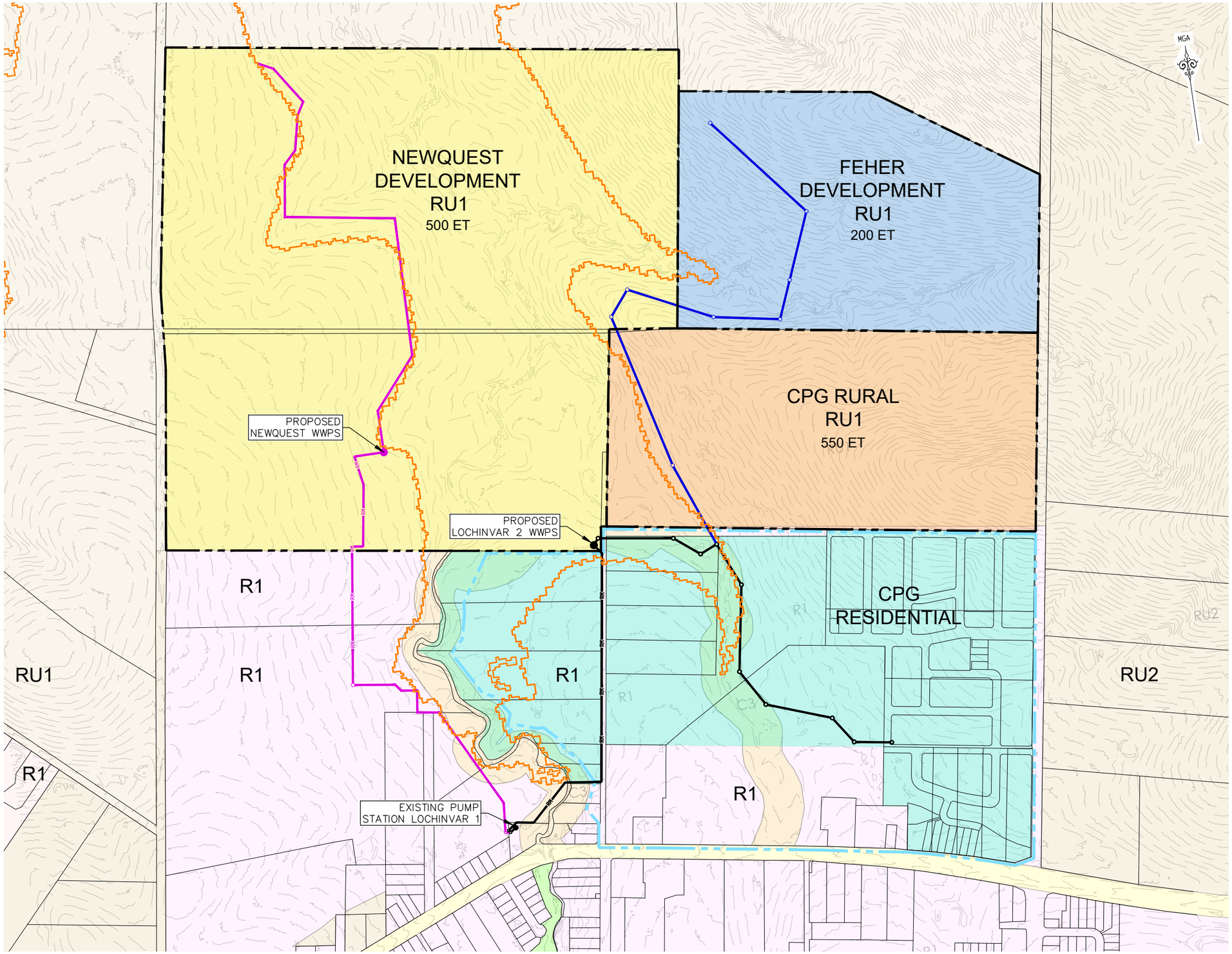

LEGEND

- EXISTING BOUNDARIES (DCDB)
- PROPOSED BOUNDARIES
- EXISTING 1m CONTOURS
- STRATEGY CATCHMENT
- PROPOSED DEVELOPMENT BOUNDARIES
- PROPOSED GRAVITY SEWER
- PROPOSED RISING MAIN
- PROPOSED FUTURE GRAVITY SEWER
- NEWQUEST PROPOSED FUTURE GRAVITY SEWER
- NEWQUEST PROPOSED FUTURE RISING MAIN
- R1: RESIDENTIAL ZONE
- RU1: RURAL 1 ZONE
- RU2: RURAL 2 ZONE
- RE1: RECREATION 1 ZONE
- C3: RIPARIAN ZONE
- HUNTER RIVER 1% AEP

GRAVITY SEWER THROUGH ADJOINING LAND TO WWPS - TWO PUMP STATION OPTION

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
B	29.02.23	RIPARIAN PLANNING ZONE ADDED	SHO	CB	CO-ORDINATE SYSTEM: MGA 56	DATUM: N/A CONTOUR INTERVAL: 1m	0 100 200m SCALE: 1:4000 (FULL)	

drawing title:
OPTION 3 - TWO PUMP STATION OPTION

location:
NEW ENGLAND HIGHWAY AND WYNDELLA ROAD, LOCHINVAR

council: MAITLAND CITY COUNCIL

dwg ref: 240332-STRAT-033

client:
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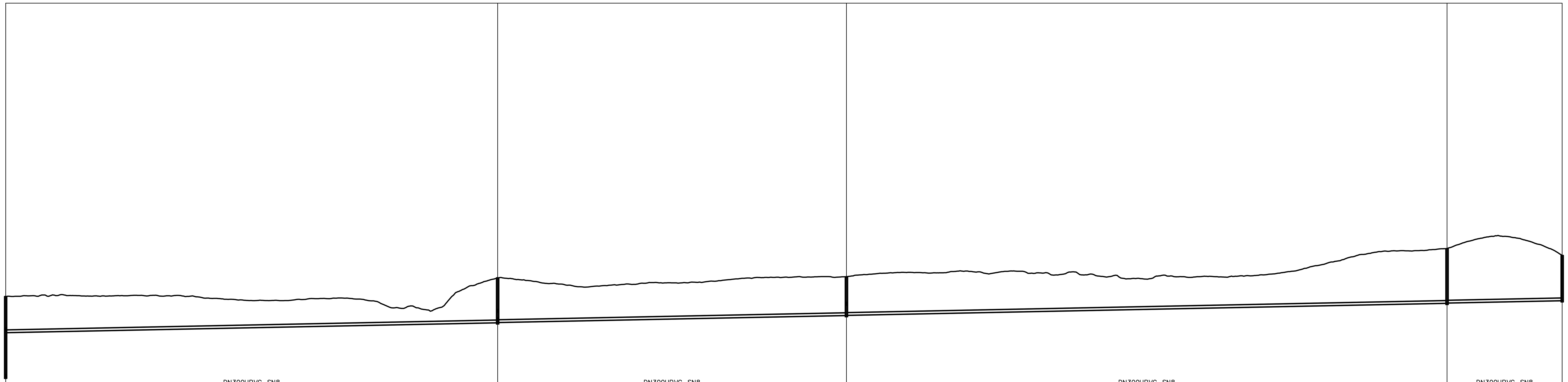
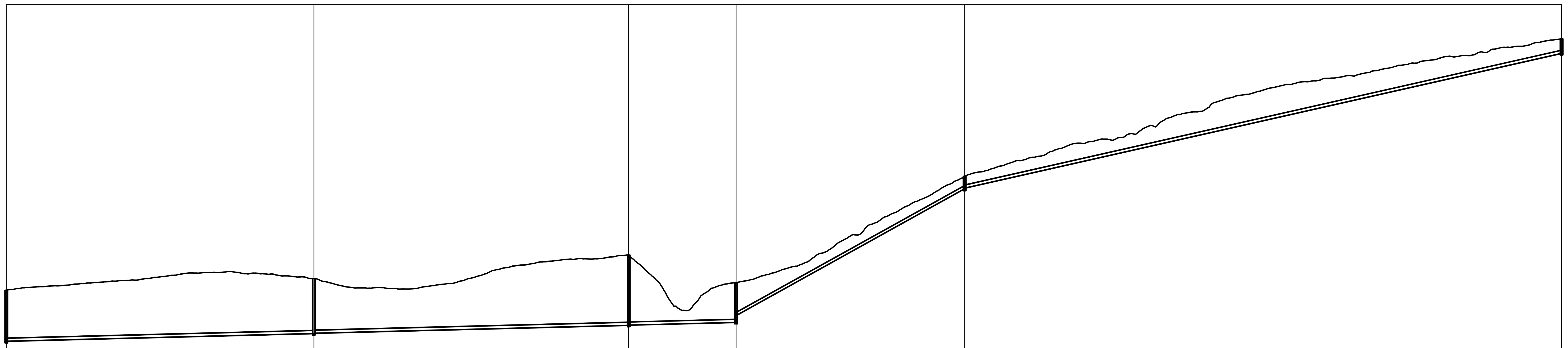
working beyond expectations



PIPE SIZE	DN300UPVC-SN8	DN300UPVC-SN8	DN300UPVC-SN8	DN300UPVC-SN8
GRADE	0.4%	0.4%	0.4%	0.4%
DATUM R.L. 7	284.2	201.5	346.95	66.53

DEPTH TO INVERT	9.327 4.173	5.199 5.169	4.440 4.410	6.325 6.295	5.226 5.196
INVERT LEVEL	15.594 20.749	21.886 21.916	22.722 22.752	24.139 24.169	24.435 24.465
FINISHED SURFACE LEVEL	25.055	27.085	27.162	30.465	29.661
CHAINAGE	0	284.2	485.71	832.65	899.18



PIPE SIZE	DN300UPVC-SN8	DN300UPVC-SN8	DN300UPVC-SN8	DN300UPVC-SN8	DN300UPVC-SN8
GRADE	0.5%	0.5%	0.5%	11%	4.5%
DATUM R.L.	157.04	160.8	54.86 17	116.71 31	304.88

DEPTH TO INVERT	5.226 5.196	5.613 5.583	7.176 7.146	4.076 3.326	1.313 1.172	1.496
INVERT LEVEL	24.435 24.465	25.251 25.281	26.085 26.115	26.389 27.139	39.977 40.118	53.838
FINISHED SURFACE LEVEL	29.661	30.864	33.261	30.465	41.29	55.334
CHAINAGE	899.18	1056.23	1217.02	1271.89	1388.6	1693.48

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
A	28.02.24	INITIAL ISSUE	CLA	CB	CO-ORDINATE SYSTEM: MGA 56	DATUM: N/A CONTOUR INTERVAL: 1m	0 100 200m SCALE: 1:4000 (FULL)	SURFACE LEVELS ARE INDICATIVE AND BASED OFF LIDAR DATA (SOURCED 2023)

drawing title:
FUTURE GRAVITY SEWER
INDICATIVE VERTICAL GEOMETRY

location: NEW ENGLAND HIGHWAY AND WYNDELLA ROAD, LOCHINVAR

council: MAITLAND CITY COUNCIL

dwg ref: 240332-STRAT-035

client: CPG ESTATES

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APPENDIX B

COST ESTIMATES

ESTIMATING SHEET

PROJECT DESCRIPTION: Wyndella Road Lochinvar (Pump South Water Dosing)

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 20,826.00	$ 20,826.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 85,000.00	$ 85,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 85,000.00	$ 85,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 13,000.00	$ 13,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 25,200.00	$ 25,200.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,600.00	$ 8,600.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 13,133.72	$ 13,133.72

Sewer Pumping Station 20kW

Item	***Pump Station -*** *Name*	Qty	Unit	Rate $/Unit	Amount $
HW0101	**Sewer Pumping Station 20kW 3m dia 2 Pump(s)**				
	Clear, excavate & backfill in OTR conditions, supply and construct pipework, pump station, includes sliding aluminium hatch covers, screens & ancillary metal work & fittings. Supply & place formwork, reinforcement, concrete, roof slab, thrust blocks. PE coating included.	Item	Lump Sum	$ 399,314.56	$ 399,314.56
HW0102	**Pumps for Pumping Stations** - Supply and install pumps and associated fittings, connection to pipework, testing and commissioning.	2	Lump Sum	$ 13,594.50	$ 27,189.00
HW0103.01	Pit and Conduit System	Item	Lump Sum	$ 7,300.00	$ 7,300.00
HW0103.02	LV Station Power Supply	Item	Lump Sum	$ 11,870.00	$ 11,870.00
HW0103.05	Switchboard	Item	Lump Sum	$ 51,375.00	$ 51,375.00
HW0103.06	PLC / Telemetry Hardware	Item	Lump Sum	$ 14,437.50	$ 14,437.50
HW0103.07	PLC / Telemetry / Scada Engineering and Software Development	Item	Lump Sum	$ 28,450.00	$ 28,450.00
HW0103.11	Installation/Cabling (Electrical)	Item	Lump Sum	$ 10,737.50	$ 10,737.50
HW0104	Odour Control				
HW0105	Empty				
HW0106	**Service Location**	Item	Lump Sum	$ 720.00	$ 720.00
HW0115.01	Initial testing for acid sulphate soils and prepare and submit report	5	per test	$ 140.00	$ 700.00

HW0122	Supply and install emergency storage structures	40	L/m	$ 1,620.00	$ 64,800.00
HW0128.01	easement	1	Each	$ 150,000.00	$ 150,000.00
HW0129	Preparation and submission of Operation and Maintenance Information	Item	Lump Sum	$ 4,800.00	$ 4,800.00
HW0130	Pre commissioning and commissioning	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0131	Preparation and submission of Work as Constructed Information	Item	Lump Sum	$ 7,200.00	$ 7,200.00
HW1SP	***Sub Total***				$786,894

Sewer Pipeline - Rising - section will be present if one or more rising mains are specified

Item	Construction of Sewer Rising Mains	Qty	Unit	Rate $/Unit	Amount $
HWR001	Service Location	Item	Lump Sum	$ 1,800.00	$ 1,800.00
HWR02.01	DN200 Valves / Flowmeters	Item	Lump Sum	$ 14,800.00	$ 14,800.00
HWR004	Supply all pipe materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
114VSS	Nominal DN200 PVC pipe	600	m	$ 50.16	$ 30,096.00
HWR005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to **1.5 m depth** to invert in OTR.				
114V03	Nominal DN200 PVC (Trench type 3)	600	m	$ 164.24	$ 98,544.00
HWR006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>1.5m to 3.0m** to invert in OTR.				
HWR007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>3.0m to 4.5m** to invert in OTR.				
HWR008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>4.5m** to invert in OTR.				
HWR009	EMPTY				
HWR018.01	Highway crossing	20	m	$ 1,264.35	$ 25,287.00

HWR020	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:				
HWR021	Supply and installation of pipe river crossing including supply of MSCL pipe, internal and external welding, testing of welds and 150 thick concrete encasement. Also includes mobilisation and demobilisation of dredge(if required) excavation & disposal of excavated material, backfilling, lay, bed and test for the following MSCL pipe sizes:				
HWR025	EMPTY				
HWR026	Supply and construct vent stacks	1	each	$ 10,500.00	$ 10,500.00
HWR027	Preparation of line sheets	600	m	$ 1.16	$ 696.00
HWR029	Odour Control	1	Each	$ 10,000.00	$ 10,000.00
HWR030	**Miscellaneous**				
HWR000	***Sub Total***				$191,723

Item No.	Item Description	Qty	Unit		Amount $
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 4,890.00	$ 4,890.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 1,234,266.28

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 148,111.95
HW0017	Project Management of Design	$ 45,622.39
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 193,734.34
	Pre construction contingency (30% of B1)	$ 58,120.30
	TOTAL PRE-CONSTRUCTION COST (B)	$ 251,854.65

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 1,234,266.28
HW0023	Construction Management (Table 11)		$ 172,797.28
	Sub Total (C1)		$ 1,407,063.56
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 422,119.07
	TOTAL CONSTRUCTION COST (C)		$ 1,829,182.63

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 2,081,037.27

ESTIMATING SHEET

PROJECT DESCRIPTION: Lochinvar 2 WWPS - zoned + unzoned land

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 34,776.00	$ 34,776.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 85,000.00	$ 85,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 85,000.00	$ 85,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 17,800.00	$ 17,800.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,200.00	$ 36,200.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 18,950.00	$ 18,950.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 20,457.36	$ 20,457.36

Sewer Pumping Station 90kW

Item	***Pump Station -*** *Name*	Qty	Unit	Rate $/Unit	Amount $
HW0101	**Sewer Pumping Station 90kW 3.8m dia 2 Pump(s)**				
	Clear, excavate & backfill in OTR conditions, supply and construct pipework, pump station, includes sliding aluminium hatch covers, screens & ancillary metal work & fittings. Supply & place formwork, reinforcement, concrete, roof slab, thrust blocks. PE coating included.	Item	Lump Sum	$ 536,664.23	$ 536,664.23
HW0102	**Pumps for Pumping Stations** - Supply and install pumps and associated fittings, connection to pipework, testing and commissioning.	2	Lump Sum	$ 30,567.75	$ 61,135.50
HW0103.01	Pit and Conduit System	Item	Lump Sum	$ 14,500.00	$ 14,500.00
HW0103.02	LV Station Power Supply	Item	Lump Sum	$ 25,680.00	$ 25,680.00
HW0103.05	Switchboard	Item	Lump Sum	$ 92,870.00	$ 92,870.00
HW0103.06	PLC / Telemetry Hardware	Item	Lump Sum	$ 14,437.50	$ 14,437.50
HW0103.07	PLC / Telemetry / Scada Engineering and Software Development	Item	Lump Sum	$ 28,450.00	$ 28,450.00
HW0103.11	Installation/Cabling (Electrical)	Item	Lump Sum	$ 19,812.50	$ 19,812.50
HW0104	Odour Control				
HW0105	Empty				
HW0106	**Service Location**	Item	Lump Sum	$ 1,155.20	$ 1,155.20

HW0108	Extra over Civil Works for **excavation in rock**:	311	m3	$ 120.00	$ 37,320.00
HW0115.01	Initial testing for acid sulphate soils and prepare and submit report	5	per test	$ 140.00	$ 700.00
HW0122	Supply and install emergency storage structures	40	L/m	$ 1,620.00	$ 64,800.00
HW0128.01	easement	1	Each	$ 150,000.00	$ 150,000.00
HW0129	Preparation and submission of Operation and Maintenance Information	Item	Lump Sum	$ 4,800.00	$ 4,800.00
HW0130	Pre commissioning and commissioning	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0131	Preparation and submission of Work as Constructed Information	Item	Lump Sum	$ 7,200.00	$ 7,200.00
HW1SP	***Sub Total***				$1,067,525

Sewer Pipeline - Rising - section will be present if one or more rising mains are specified

Item	Construction of Sewer Rising Mains	Qty	Unit	Rate $/Unit	Amount $
HWR001	Service Location	Item	Lump Sum	$ 1,800.00	$ 1,800.00
HWR02.02	DN250 Valves / Flowmeters	Item	Lump Sum	$ 15,800.00	$ 15,800.00
HWR004	Supply all pipe materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
119VSS	Nominal DN250 PVC pipe	600	m	$ 65.31	$ 39,187.50
HWR005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to **1.5 m depth** to invert in OTR.				
119V03	Nominal DN250 PVC (Trench type 3)	600	m	$ 175.60	$ 105,360.00
HWR006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>1.5m to 3.0m** to invert in OTR.				
HWR007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>3.0m to 4.5m** to invert in OTR.				
HWR008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>4.5m** to invert in OTR.				

HWR009	EMPTY				
HWR018.01	Highway crossing	20	m	$ 1,514.35	$ 30,287.00
HWR020	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:				
HWR021	Supply and installation of pipe river crossing including supply of MSCL pipe, internal and external welding, testing of welds and 150 thick concrete encasement. Also includes mobilisation and demobilisation of dredge(if required) excavation & disposal of excavated material, backfilling, lay, bed and test for the following MSCL pipe sizes:				
HWR025	EMPTY				
HWR026	Supply and construct vent stacks	1	each	$ 10,500.00	$ 10,500.00
HWR027	Preparation of line sheets	600	m	$ 1.16	$ 696.00
HWR029	Odour Control	1	Each	$ 10,000.00	$ 10,000.00
HWR030	**Miscellaneous**				
HWR000	***Sub Total***				$213,631

Sewer Pipeline - Gravity - section will be present if one or more gravity mains are specified

Item	Construction of Sewer Gravity Mains	Qty	Unit	Rate $/Unit	Amount $
HWG001	Service Location	Item	Lump Sum	$ 384.00	$ 384.00
HWG004	Supply all pipe materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
016VSS	Nominal DN225 PVC pipe	320	m	$ 35.00	$ 11,200.00
HWG005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to **1.5 m** depth to invert in OTR.				
HWG006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>1.5m** to **3.0m** depth to invert in OTR				
HWG007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>3.0m** to **4.5m** depth to invert in OTR				

HWG008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>4.5m** depth to invert in OTR				
016V03	Nominal DN225 PVC (Trench type 3)	320	m	$ 722.40	$ 231,168.00
HWG018.01	DN225 Directional Drill Rock	40	m	$ 1,456.03	$ 58,241.00
HWG020	Supply & installation of river crossing includes supply of MSCL pipe, welding, testing of welds, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation & disposal of excavated material, backfilling, lay, bed & test:				
HWG021	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:				
HWG027	Preparation of line sheets	320	Each	$ 1.25	$ 400.00
HWG029	Odour Control				
HWG030	**Miscellaneous**				
HWG000	***Sub Total***				$301,393

Item No.	Item Description	Qty	Unit		Amount $
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material	540	m3	$ 120.00	$ 64,800.00
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 7,498.00	$ 7,498.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 1,953,029.79

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 234,363.57
HW0017	Project Management of Design	$ 62,872.71
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 297,236.29
	Pre construction contingency (30% of B1)	$ 89,170.89
	TOTAL PRE-CONSTRUCTION COST (B)	$ 386,407.18

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 1,953,029.79
HW0022	Pump Station HV Power Supply	$ 187,500.00
HW0023	Construction Management (Table 11)	$ 273,424.17

Sub Total (C1)		$ 2,413,953.96
Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 724,186.19
TOTAL CONSTRUCTION COST (C)		$ 3,138,140.15

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 3,524,547.33

ESTIMATING SHEET

PROJECT DESCRIPTION: Lochinvar 2 WWPS - full development - Newquest

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 29,951.00	$ 29,951.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 85,000.00	$ 85,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 85,000.00	$ 85,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 17,800.00	$ 17,800.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,200.00	$ 36,200.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 19,700.00	$ 19,700.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 17,924.41	$ 17,924.41

Sewer Pumping Station 60kW

Item	***Pump Station -*** *Name*	Qty	Unit	Rate $/Unit	Amount $
HW0101	**Sewer Pumping Station 60kW 3.8m dia 2 Pump(s)**				
	Clear, excavate & backfill in OTR conditions, supply and construct pipework, pump station, includes sliding aluminium hatch covers, screens & ancillary metal work & fittings. Supply & place formwork, reinforcement, concrete, roof slab, thrust blocks. PE coating included.	Item	Lump Sum	$ 438,004.86	$ 438,004.86
HW0102	**Pumps for Pumping Stations** - Supply and install pumps and associated fittings, connection to pipework, testing and commissioning.	2	Lump Sum	$ 23,293.50	$ 46,587.00
HW0103.01	Pit and Conduit System	Item	Lump Sum	$ 9,800.00	$ 9,800.00
HW0103.02	LV Station Power Supply	Item	Lump Sum	$ 19,000.00	$ 19,000.00
HW0103.05	Switchboard	Item	Lump Sum	$ 77,000.00	$ 77,000.00
HW0103.06	PLC / Telemetry Hardware	Item	Lump Sum	$ 14,437.50	$ 14,437.50
HW0103.07	PLC / Telemetry / Scada Engineering and Software Development	Item	Lump Sum	$ 28,450.00	$ 28,450.00
HW0103.11	Installation/Cabling (Electrical)	Item	Lump Sum	$ 14,687.50	$ 14,687.50
HW0104	Odour Control				
HW0105	Empty				
HW0106	**Service Location**	Item	Lump Sum	$ 1,155.20	$ 1,155.20

HW0108	Extra over Civil Works for **excavation in rock**:	55	m3	$ 120.00	$ 6,600.00
HW0115.01	Initial testing for acid sulphate soils and prepare and submit report	5	per test	$ 140.00	$ 700.00
HW0122	Supply and install emergency storage structures	40	L/m	$ 1,620.00	$ 64,800.00
HW0128.01	easement	1	Each	$ 150,000.00	$ 150,000.00
HW0129	Preparation and submission of Operation and Maintenance Information	Item	Lump Sum	$ 4,800.00	$ 4,800.00
HW0130	Pre commissioning and commissioning	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0131	Preparation and submission of Work as Constructed Information	Item	Lump Sum	$ 7,200.00	$ 7,200.00
HW1SP	***Sub Total***				$891,222

Sewer Pipeline - Rising - section will be present if one or more rising mains are specified

Item	Construction of Sewer Rising Mains	Qty	Unit	Rate $/Unit	Amount $
HWR001	Service Location	Item	Lump Sum	$ 1,800.00	$ 1,800.00
HWR02.01	DN250 Valves / Flowmeters	Item	Lump Sum	$ 15,800.00	$ 15,800.00
HWR004	Supply all pipe materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
119VSS	Nominal DN250 PVC pipe	600	m	$ 65.31	$ 39,187.50
HWR005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to **1.5 m depth** to invert in OTR.				
119V03	Nominal DN250 PVC (Trench type 3)	600	m	$ 175.60	$ 105,360.00
HWR006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>1.5m to 3.0m** to invert in OTR.				
HWR007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>3.0m to 4.5m** to invert in OTR.				
HWR008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>4.5m** to invert in OTR.				

HWR009	EMPTY				
HWR018.01	Highway crossing	20	m	$ 1,514.35	$ 30,287.00
HWR020	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:				
HWR021	Supply and installation of pipe river crossing including supply of MSCL pipe, internal and external welding, testing of welds and 150 thick concrete encasement. Also includes mobilisation and demobilisation of dredge(if required) excavation & disposal of excavated material, backfilling, lay, bed and test for the following MSCL pipe sizes:				
HWR025	EMPTY				
HWR026	Supply and construct vent stacks	1	each	$ 10,500.00	$ 10,500.00
HWR027	Preparation of line sheets	600	m	$ 1.16	$ 696.00
HWR029	Odour Control	1	Each	$ 10,000.00	$ 10,000.00
HWR030	**Miscellaneous**				
HWR000	***Sub Total***				$213,631

Sewer Pipeline - Gravity - section will be present if one or more gravity mains are specified

Item	Construction of Sewer Gravity Mains	Qty	Unit	Rate $/Unit	Amount $
HWG001	Service Location	Item	Lump Sum	$ 2,250.00	$ 2,250.00
HWG004	Supply all pipe materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
01EVSS	Nominal DN300 PVC pipe	600	m	$ 68.00	$ 40,800.00
HWG005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to **1.5 m** depth to invert in OTR.				
01EV03	Nominal DN300 PVC (Trench type 3)	600	m	$ 235.74	$ 141,444.00
HWG006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>1.5m** to **3.0m** depth to invert in OTR				

HWG007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>3.0m** to **4.5m** depth to invert in OTR				
HWG008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth **>4.5m** depth to invert in OTR				
HWG018	Road / creek crossings				
HWG020	Supply & installation of river crossing includes supply of MSCL pipe, welding, testing of welds, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation & disposal of excavated material, backfilling, lay, bed & test:				
HWG021	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:				
HWG027	Preparation of line sheets	600	Each	$ 1.16	$ 696.00
HWG029	Odour Control				
HWG030	**Miscellaneous**				
HWG000	***Sub Total***				$185,190

Item No.	Item Description	Qty	Unit		Amount $
HW0009.07	Bitumen pavement	465	m2	$ 238.00	$ 110,670.00
HW0009.11	Grass seeding	300	m2	$ 7.90	$ 2,370.00
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 9,780.00	$ 9,780.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 1,704,437.97

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 204,532.56
HW0017	Project Management of Design	$ 56,906.51
HW0018	Land Matters	$ -

HW0024	Community Consultation		
	Sub Total(B1)	$	261,439.07
	Pre construction contingency (30% of B1)	$	78,431.72
	TOTAL PRE-CONSTRUCTION COST (B)	$	339,870.79

C.	**CONSTRUCTION COST**			
	Total Estimated Contract Award Sum (A)		$	1,704,437.97
HW0022	Pump Station HV Power Supply		$	100,000.00
HW0023	Construction Management (Table 11)		$	238,621.32
	Sub Total (C1)		$	2,043,059.29
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$	612,917.79
	TOTAL CONSTRUCTION COST (C)		$	2,655,977.07

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$	2,995,847.86

ESTIMATING SHEET

PROJECT DESCRIPTION: Newquest WWPS

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 17,000.00	$ 17,000.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 28,000.00	$ 28,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 28,000.00	$ 28,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 13,000.00	$ 13,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 25,200.00	$ 25,200.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 3,600.00	$ 3,600.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 11,124.85	$ 11,124.85

Sewer Pumping Station 10kW

Item	***Pump Station -*** *Name*	Qty	Unit	Rate $/Unit	Amount $
HW0101	**Sewer Pumping Station 10kW 2.4m dia 2 Pump(s)**				
	Clear, excavate & backfill in OTR conditions, supply and construct pipework, pump station, includes sliding aluminium hatch covers, screens & ancillary metal work & fittings. Supply & place formwork, reinforcement, concrete, roof slab, thrust blocks. PE coating included.	Item	Lump Sum	$ 294,195.74	$ 294,195.74
HW0102	**Pumps for Pumping Stations** - Supply and install pumps and associated fittings, connection to pipework, testing and commissioning.	2	Lump Sum	$ 11,169.75	$ 22,339.50
HW0103.01	Pit and Conduit System	Item	Lump Sum	$ 7,300.00	$ 7,300.00
HW0103.02	LV Station Power Supply	Item	Lump Sum	$ 10,620.00	$ 10,620.00
HW0103.05	Switchboard	Item	Lump Sum	$ 49,375.00	$ 49,375.00
HW0103.06	PLC / Telemetry Hardware	Item	Lump Sum	$ 14,437.50	$ 14,437.50
HW0103.07	PLC / Telemetry / Scada Engineering and Software Development	Item	Lump Sum	$ 28,450.00	$ 28,450.00
HW0103.11	Installation/Cabling (Electrical)	Item	Lump Sum	$ 10,737.50	$ 10,737.50
HW0106	**Service Location**	Item	Lump Sum	$ 460.80	$ 460.80
HW0115.01	Initial testing for acid sulphate soils and prepare and submit report	5	per test	$ 140.00	$ 700.00
HW0122	Supply and install emergency storage structures	40	L/m	$ 1,620.00	$ 64,800.00

HW0128.01	easement	1	Each	$ 150,000.00	$ 150,000.00
HW0129	Preparation and submission of Operation and Maintenance Information	Item	Lump Sum	$ 4,800.00	$ 4,800.00
HW0130	Pre commissioning and commissioning	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0131	Preparation and submission of Work as Constructed Information	Item	Lump Sum	$ 7,200.00	$ 7,200.00
HW1SP	***Sub Total***				$673,416

Sewer Pipeline - Rising - section will be present if one or more rising mains are specified

Item	Construction of Sewer Rising Mains	Qty	Unit	Rate $/Unit	Amount $
HWR001	Service Location	Item	Lump Sum	$ 1,500.00	$ 1,500.00
HWR02.02	DN150 Valves / Flowmeters	Item	Lump Sum	$ 13,500.00	$ 13,500.00
HWR004	Supply all pipe materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
10FVSS	Nominal DN150 PVC pipe	500	m	$ 35.53	$ 17,765.00
HWR005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to **1.5 m depth** to invert in OTR.				
10FV03	Nominal DN150 PVC (Trench type 3)	500	m	$ 131.70	$ 65,850.00
HWR026	Supply and construct vent stacks	1	each	$ 10,500.00	$ 10,500.00
HWR027	Preparation of line sheets	500	m	$ 1.16	$ 580.00
HWR029	Odour Control	1	Each	$ 10,000.00	$ 10,000.00
HWR030	**Miscellaneous**				
HWR000	***Sub Total***				$119,695

Item No.	Item Description	Qty	Unit		Amount $
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 4,075.00	$ 4,075.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 923,110.89

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 138,466.63
HW0017	Project Management of Design	$ 43,693.33
HW0024	Community Consultation	
	Sub Total(B1)	$ 182,159.96
	Pre construction contingency (30% of B1)	$ 54,647.99
	TOTAL PRE-CONSTRUCTION COST (B)	$ 236,807.95

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 923,110.89
HW0023	Construction Management (Table 11)		$ 203,084.40
	Sub Total (C1)		$ 1,126,195.29
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 337,858.59
	TOTAL CONSTRUCTION COST (C)		$ 1,464,053.87

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 1,700,861.82

APPENDIX C

NPV

Summary of Options

Wastewater Option	NET PRESENT VALUE (30yrs 4% Discount)	NET PRESENT VALUE (30yrs 7% Discount)	NET PRESENT VALUE (30yrs 10% Discount)
Strategy option (650 lots)	$ 2,069,599	$ 1,995,738	$ 1,951,913
Full development (1900 lots)	$ 3,740,417	$ 3,532,355	$ 3,413,455
Full - NQ + NQ (1900 lots)	$ 4,316,057	$ 3,865,761	$ 3,548,737

Wastewater Option	CAPITAL COST	
		Cost per lot
Strategy option (650 lots)	$ 1,829,183	$ 2,814
Full development (1750 lots)*	$ 3,138,140	$ 1,460
Full - NQ + NQ (1750 lots)*	$ 4,120,030	$ 1,916

*Allows for potential additional 400 lots from north and western gravity catchments

ADW Johnson
239954 Wastewater Strategy NPV Analysis
Wastewater Servicing Strategy - Preferred Option

Base year	2024																															
Discount Rate	7.0%																															
Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Period	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
CAPITAL COSTS																																
Total Estimated Construction Cost	$ 1,407,064.00																															
Contingency																																
Construction contingency	$ 422,119.20																															
TOTAL CAPITAL COST	**$1,829,183**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
O&M																																
WWPS Electricity Q (L/s) H (m) efficiency (%) Power (kWh/yr)	Stage 1	Stage 1	Stage 2	Stage 3	Stage 3	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate
L2 55.1 15.8 0.60 14.22	$564	$549	$1,096	$1,650	$1,643	$2,852	$2,857	$2,847	$2,837	$2,841	$2,843	$2,853	$2,853	$2,853	$2,853	$2,853	$2,853	$2,853	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132	$7,132
WWPS No. of Pumps Cost ($/yr)																																
L2 2 $ 10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
TOTAL O&M COST	$10,564	$10,549	$11,096	$11,650	$11,643	$12,852	$12,857	$12,847	$12,837	$12,841	$12,843	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132
TOTAL COSTS (Capital)	$1,829,183	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$10,564	$10,549	$11,096	$11,650	$11,643	$12,852	$12,857	$12,847	$12,837	$12,841	$12,843	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132
PV of costs (Capital)	$1,829,183	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$10,564	$9,859	$9,692	$9,510	$8,882	$9,163	$8,567	$8,000	$7,471	$6,985	$6,529	$6,106	$5,707	$5,334	$4,985	$4,658	$4,354	$5,424	$5,069	$4,737	$4,427	$4,138	$3,867	$3,614	$3,378	$3,157	$2,950	$2,757	$2,577	$2,408	$2,251	
Cumulative Present Value	$1,829,183	$1,839,042	$1,848,734	$1,858,244	$1,867,126	$1,876,289	$1,884,856	$1,892,857	$1,900,328	$1,907,312	$1,913,841	$1,919,948	$1,925,654	$1,930,988	$1,935,973	$1,940,631	$1,944,985	$1,950,408	$1,955,477	$1,960,215	$1,964,642	$1,968,780	$1,972,647	$1,976,261	$1,979,638	$1,982,795	$1,985,745	$1,988,502	$1,991,079	$1,993,487	$1,995,738	
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

NET PRESENT VALUE OF TOTAL COSTS	Discount Rate 4%	7%	10%
	$2,069,599	**$1,995,738**	$1,951,913

Sensitivity to discount rate	
PV of costs (4%)	**$2,069,598.87**
PV of costs (10%)	**$1,951,912.88**
PV of costs (7%)	**$1,995,737.54**

4% Discount Rate

4%

TOTAL COSTS (Capital)	$1,829,183	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$10,564	$10,549	$11,096	$11,650	$11,643	$12,852	$12,857	$12,847	$12,837	$12,841	$12,843	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132
PV of costs (Capital)	$1,829,183	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$10,564	$10,143	$10,259	$10,357	$9,952	$10,563	$10,161	$9,763	$9,380	$9,022	$8,676	$8,349	$8,028	$7,719	$7,422	$7,137	$6,862	$8,795	$8,457	$8,132	$7,819	$7,518	$7,229	$6,951	$6,684	$6,427	$6,179	$5,942	$5,713	$5,494	$5,282	
Cumulative Present Value	$1,829,183	$1,839,326	$1,849,585	$1,859,942	$1,869,894	$1,880,458	$1,890,619	$1,900,381	$1,909,761	$1,918,783	$1,927,459	$1,935,808	$1,943,836	$1,951,556	$1,958,978	$1,966,115	$1,972,977	$1,981,772	$1,990,229	$1,998,361	$2,006,180	$2,013,698	$2,020,927	$2,027,878	$2,034,562	$2,040,989	$2,047,168	$2,053,110	$2,058,823	$2,064,317	$2,069,599	

PV of costs **$2,069,599**

10% Discount Rate

10%

TOTAL COSTS (Capital)	$1,829,183	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$10,564	$10,549	$11,096	$11,650	$11,643	$12,852	$12,857	$12,847	$12,837	$12,841	$12,843	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$12,853	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132	$17,132
PV of costs (Capital)	$1,829,183	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$10,564	$9,590	$9,170	$8,753	$7,952	$7,980	$7,257	$6,593	$5,989	$5,446	$4,952	$4,505	$4,095	$3,723	$3,385	$3,077	$2,797	$3,390	$3,081	$2,801	$2,547	$2,315	$2,105	$1,913	$1,739	$1,581	$1,437	$1,307	$1,188	$1,080	$982	
Cumulative Present Value	$1,829,183	$1,838,773	$1,847,944	$1,856,696	$1,864,648	$1,872,628	$1,879,886	$1,886,478	$1,892,467	$1,897,913	$1,902,864	$1,907,369	$1,911,464	$1,915,188	$1,918,572	$1,921,649	$1,924,446	$1,927,836	$1,930,917	$1,933,718	$1,936,265	$1,938,580	$1,940,685	$1,942,598	$1,944,337	$1,945,919	$1,947,356	$1,948,663	$1,949,851	$1,950,931	$1,951,913	

PV of costs **$1,951,913**

ADW Johnson
239954 Wastewater Strategy NPV Analysis
Wastewater Servicing Strategy - Option Full catchment

Base year	2024																															
Discount Rate	7.0%																															
Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	
Period	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
CAPITAL COSTS																																
	Lochinvar 1 + incoming gravity from NQ																															
Total Estimated Construction Cost	$ 2,413,954.00																															
Contingency																																
Construction contingency	$ 724,186.20																															
TOTAL CAPITAL COST	**$3,138,140**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
O&M																																
	Stage 1	Stage 1	Stage 2	Stage 3	Stage 3	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate
WWPS Electricity Q (L/s) H (m) efficiency (%) Power (kWh/yr)																																
L2 142 39 0.60 90.45	$3,589	$3,492	$6,973	$10,495	$10,449	$18,143	$18,174	$18,110	$18,048	$18,071	$18,086	$18,148	$18,148	$18,148	$18,148	$18,148	$18,148	$18,148	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371	$45,371
WWPS No. of Pumps Cost ($/yr)																																
L2 2 $ 10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
TOTAL O&M COST	$13,589	$13,492	$16,973	$20,495	$20,449	$28,143	$28,174	$28,110	$28,048	$28,071	$28,086	$28,148	$28,148	$28,148	$28,148	$28,148	$28,148	$28,148	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371
TOTAL COSTS (Capital)	$3,138,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$13,589	$13,492	$16,973	$20,495	$20,449	$28,143	$28,174	$28,110	$28,048	$28,071	$28,086	$28,148	$28,148	$28,148	$28,148	$28,148	$28,148	$28,148	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371
PV of costs (Capital)	$3,138,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$13,589	$12,610	$14,825	$16,730	$15,600	$20,065	$18,774	$17,506	$16,324	$15,269	$14,278	$13,373	$12,498	$11,681	$10,916	$10,202	$9,535	$17,529	$16,382	$15,311	$14,309	$13,373	$12,498	$11,680	$10,916	$10,202	$9,535	$8,911	$8,328	$7,783	$7,274	
Cumulative Present Value	$3,138,140	$3,150,750	$3,165,575	$3,182,305	$3,197,905	$3,217,970	$3,236,744	$3,254,250	$3,270,574	$3,285,842	$3,300,120	$3,313,493	$3,325,991	$3,337,672	$3,348,588	$3,358,790	$3,368,325	$3,385,854	$3,402,236	$3,417,547	$3,431,856	$3,445,229	$3,457,726	$3,469,407	$3,480,323	$3,490,525	$3,500,060	$3,508,971	$3,517,298	$3,525,082	$3,532,355	
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

	Discount Rate		
	4%	7%	10%
NET PRESENT VALUE OF TOTAL COSTS	$3,740,417	**$3,532,355**	$3,413,455

Sensitivity to discount rate

PV of costs (4%)	**$3,740,417.01**
PV of costs (10%)	**$3,413,454.71**
PV of costs (7%)	**$3,532,355.43**

4% Discount Rate

4%

TOTAL COSTS (Capital)	$3,138,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
TOTAL COSTS (O&M)	$13,589	$13,492	$16,973	$20,495	$20,449	$28,143	$28,174	$28,110	$28,048	$28,071	$28,086	$28,148	$28,148	$28,148	$28,148	$28,148	$28,148	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	
PV of costs (Capital)	$3,138,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
PV of costs (O&M)	$13,589	$12,974	$15,692	$18,220	$17,480	$23,131	$22,267	$21,362	$20,494	$19,722	$18,974	$18,285	$17,581	$16,905	$16,255	$15,630	$15,029	$28,426	$27,333	$26,281	$25,271	$24,299	$23,364	$22,465	$21,601	$20,771	$19,972	$19,204	$18,465	$17,755	$17,072	
Cumulative Present Value	$3,138,140	$3,151,114	$3,166,806	$3,185,026	$3,202,506	$3,225,637	$3,247,903	$3,269,265	$3,289,759	$3,309,481	$3,328,455	$3,346,740	$3,364,321	$3,381,226	$3,397,481	$3,413,111	$3,428,140	$3,456,566	$3,483,898	$3,510,180	$3,535,450	$3,559,749	$3,583,113	$3,605,578	$3,627,180	$3,647,950	$3,667,922	$3,687,125	$3,705,590	$3,723,345	$3,740,417	

PV of costs **$3,740,417**

10% Discount Rate

10%

TOTAL COSTS (Capital)	$3,138,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
TOTAL COSTS (O&M)	$13,589	$13,492	$16,973	$20,495	$20,449	$28,143	$28,174	$28,110	$28,048	$28,071	$28,086	$28,148	$28,148	$28,148	$28,148	$28,148	$28,148	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	$55,371	
PV of costs (Capital)	$3,138,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
PV of costs (O&M)	$13,589	$12,266	$14,027	$15,398	$13,967	$17,474	$15,904	$14,425	$13,084	$11,905	$10,828	$9,866	$8,969	$8,154	$7,412	$6,738	$6,126	$10,955	$9,959	$9,054	$8,231	$7,482	$6,802	$6,184	$5,622	$5,111	$4,646	$4,224	$3,840	$3,491	$3,173	
Cumulative Present Value	$3,138,140	$3,150,406	$3,164,433	$3,179,831	$3,193,798	$3,211,272	$3,227,176	$3,241,601	$3,254,686	$3,266,590	$3,277,419	$3,287,284	$3,296,253	$3,304,407	$3,311,819	$3,318,558	$3,324,684	$3,335,639	$3,345,598	$3,354,651	$3,362,882	$3,370,364	$3,377,166	$3,383,350	$3,388,971	$3,394,082	$3,398,728	$3,402,951	$3,406,791	$3,410,281	$3,413,455	

PV of costs **$3,413,455**

ADW Johnson
239954 Wastewater Strategy NPV Analysis
Wastewater Servicing Strategy - Full catchment - Newquest to Lochinvar 1

Base year	2024
Discount Rate	7.0%

CAPITAL COSTS

	Total Estimated Construction Cost	Construction contingency
Lochinvar 2 (2024)	$ 1 650 469.00	$ 495 140.70
New Quest WWPS (2029)	$ 1 126 195.00	$ 337 858.50
DN300 gravity (2033)	$ 392 590.00	$ 117 777.00

O&M

WWPS Electricity	Q (L/s)	H (m)	efficiency (%)	Power (kWh/yr)
L2	115	28	0.60	52.59
Newquest	33	25	0.60	13.48

WWPS	No. of Pumps	Cost ($/yr)
L2	2	$ 10 000
Newquest	2	$ 10 000

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Period	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CAPITAL COSTS																
Total Estimated Construction Cost	Lochinvar 2 $ 1 650 469.00					New Quest WWPS $ 1 126 195.00				DN300 gravity $ 392 590.00						
Contingency Construction contingency	$ 495 140.70					$ 337 858.50				$ 117 777.00						
TOTAL CAPITAL COST	**$2,145,610**	**$0**	**$0**	**$0**	**$0**	**$1,464,054**	**$0**	**$0**	**$0**	**$510,367**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
O&M	Stage 1	Stage 1	Stage 2	Stage 3	Stage 3	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4	Stage 4
WWPS Electricity L2	$2 087	$2 031	$4 054	$6 102	$6 075	$10 549	$10 567	$10 530	$10 494	$10 507	$10 516	$10 552	$10 552	$10 552	$10 552	$10 552
WWPS L2	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000
WWPS Electricity Newquest							$2 707	$2 698	$2 689	$2 692	$2 694	$2 704	$2 704	$2 704	$2 704	$2 704
WWPS Newquest							$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000
TOTAL O&M COST	$12,087	$12,031	$14,054	$16,102	$16,075	$20,549	$33,275	$33,228	$33,182	$33,199	$33,210	$33,256	$33,256	$33,256	$33,256	$33,256
TOTAL COSTS (Capital)	$2.145.610	$0	$0	$0	$0	$1.464.054	$0	$0	$0	$510.367	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$12.087	$12.031	$14.054	$16.102	$16.075	$20.549	$33.275	$33.228	$33.182	$33.199	$33.210	$33.256	$33.256	$33.256	$33.256	$33.256
PV of costs (Capital)	$2.145.610	$0	$0	$0	$0	$1.043.850	$0	$0	$0	$277.606	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$12 087	$11 244	$12 275	$13 144	$12 264	$14 651	$22 172	$20 693	$19 312	$18 058	$16 882	$15 800	$14 766	$13 800	$12 897	$12 053
Cumulative Present Value	$2 145 610	$2 156 853	$2 169 129	$2 182 273	$2 194 537	$3 253 038	$3 275 210	$3 295 903	$3 315 215	$3 610 879	$3 627 761	$3 643 561	$3 658 327	$3 672 127	$3 685 024	$3 697 077
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Year	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Period	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
TOTAL CAPITAL COST	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
O&M	Stage 4	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate	Ultimate
WWPS Electricity L2	$10 552	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380	$26 380
WWPS L2	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000
WWPS Electricity Newquest	$2 704	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759	$6 759
WWPS Newquest	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000	$10 000
TOTAL O&M COST	$33,256	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139	$53,139
TOTAL COSTS (Capital)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$33.256	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139
PV of costs (Capital)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$11 265	$16 823	$15 722	$14 693	$13 732	$12 834	$11 994	$11 210	$10 476	$9 791	$9 150	$8 552	$7 992	$7 469	$6 981
Cumulative Present Value	$3 708 342	$3 725 165	$3 740 887	$3 755 580	$3 769 312	$3 782 146	$3 794 140	$3 805 350	$3 815 826	$3 825 617	$3 834 767	$3 843 319	$3 851 311	$3 858 781	$3 865 761
Year	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

	Discount Rate		
	4%	7%	10%
NET PRESENT VALUE OF TOTAL COSTS	$4,316,057	**$3,865,761**	$3,548,737

Sensitivity to discount rate

PV of costs (4%)	**$4.316.057.40**
PV of costs (10%)	**$3.548.737.18**
PV of costs (7%)	**$3.865.761.40**

4% Discount Rate

4%

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TOTAL COSTS (Capital)	$2 145 610	$0	$0	$0	$0	$1 464 054	$0	$0	$0	$510 367	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$12.087	$12.031	$14.054	$16.102	$16.075	$20.549	$33.275	$33.228	$33.182	$33.199	$33.210	$33.256	$33.256	$33.256	$33.256	$33.256
PV of costs (Capital)	$2 145 610	$0	$0	$0	$0	$1 203 345	$0	$0	$0	$358 577	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$12 087	$11 568	$12 994	$14 315	$13 741	$16 890	$26 297	$25 250	$24 246	$23 325	$22 436	$21 602	$20 771	$19 973	$19 204	$18 466
Cumulative Present Value	$2.145.610	$2.157.178	$2.170.172	$2.184.486	$2.198.228	$3.418.462	$3.444.760	$3.470.010	$3.494.256	$3.876.158	$3.898.594	$3.920.196	$3.940.968	$3.960.940	$3.980.145	$3.998.610

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
TOTAL COSTS (Capital)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$33.256	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139
PV of costs (Capital)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$17 755	$27 280	$26 231	$25 222	$24 252	$23 319	$22 422	$21 560	$20 731	$19 933	$19 167	$18 430	$17 721	$17 039	$16 384
Cumulative Present Value	$4.016.366	$4.043.646	$4.069.877	$4.095.099	$4.119.351	$4.142.671	$4.165.093	$4.186.653	$4.207.384	$4.227.317	$4.246.484	$4.264.914	$4.282.634	$4.299.674	$4.316.057

PV of costs $4.316.057

10% Discount Rate

10%

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TOTAL COSTS (Capital)	$2 145 610	$0	$0	$0	$0	$1 464 054	$0	$0	$0	$510 367	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$12.087	$12.031	$14.054	$16.102	$16.075	$20.549	$33.275	$33.228	$33.182	$33.199	$33.210	$33.256	$33.256	$33.256	$33.256	$33.256
PV of costs (Capital)	$2 145 610	$0	$0	$0	$0	$909 062	$0	$0	$0	$216 445	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$12 087	$10 937	$11 615	$12 098	$10 980	$12 759	$18 783	$17 051	$15 480	$14 080	$12 804	$11 656	$10 596	$9 633	$8 757	$7 961
Cumulative Present Value	$2.145.610	$2.156.547	$2.168.162	$2.180.260	$2.191.239	$3.113.060	$3.131.843	$3.148.894	$3.164.374	$3.394.899	$3.407.703	$3.419.359	$3.429.955	$3.439.588	$3.448.345	$3.456.307

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
TOTAL COSTS (Capital)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COSTS (O&M)	$33.256	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139	$53.139
PV of costs (Capital)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PV of costs (O&M)	$7 237	$10 513	$9 558	$8 689	$7 899	$7 181	$6 528	$5 934	$5 395	$4 905	$4 459	$4 053	$3 685	$3 350	$3 045
Cumulative Present Value	$3.463.544	$3.474.057	$3.483.615	$3.492.304	$3.500.202	$3.507.383	$3.513.911	$3.519.846	$3.525.241	$3.530.145	$3.534.604	$3.538.657	$3.542.342	$3.545.692	$3.548.737

PV of costs $3.548.737

APPENDIX D

PRELIMINARY SIZING

WWPS Preliminary Analysis

Project:	Wyndella Rd
Client:	Lindsay Bennelong
Prepared by:	S. Warburton
WWPS Name:	Option 2b
Date:	10/11/2022

Stage:	1	2	3	4	Ultimate
Catchment Loads:	50.00	100.00	150.00	260.00	650.00
Discharge location:					

Sewage Loads

Receiving pump flow (l/s)					
Estimated ADWF for pump flow (l/s)	0.0	0.0	0.0	0.0	0.0
Gravity Catchment (ET)	50.00	100.00	150.00	260.00	650.00
ADWF (l/s)	0.55	1.10	1.65	2.86	7.15
Diversity factor 'r'	3.7	3.3	3.0	2.8	2.4
PDWF (l/s)	2.0	3.6	5.0	8.0	17.4
SA (l/s) ** assumes all residential*	2.90	5.8	8.7	15.1	37.7
PWWF (l/s)	4.9	9.4	13.7	23.1	55.1
Design WWPS load (l/s)	4.9	9.4	13.7	23.1	55.1
4 hours ADWF (gravity) (m3)	7.9	15.8	23.8	41.2	103.0

WWPS Parameters (10 starts per hour)

Station DN	3000	3000	3000	3000	3000
Design duty flow (l/s)	4.9	9.4	13.7	23.1	55.1
Surface level (mAHD)	26.5	26.5	26.5	26.5	26.5
Local 1:100 flood level (mAHD)	25.8	25.8	25.8	25.8	25.8
Estimated sewer entry level to well (mAHD)	22.7	22.7	22.7	22.7	22.7
TWL (mAHD)	22.55	22.55	22.55	22.55	22.55
MTWL (mAHD)	22.7	22.7	22.7	22.7	22.7
FAL (mAHD)	22.85	22.85	22.85	22.85	22.85
Required control volume (m3)	0.4	0.8	1.2	2.1	5.0
Required control depth (m)	0.10	0.20	0.20	0.30	0.80
BWL (mAHD)	21.75	21.75	21.75	21.75	21.75
Min pump submergence (mm)	500	500	500	500	500
Floor level (mAHD)	21.25	21.25	21.25	21.25	21.25
Station pipework DN	150	150	150	150	150
Station pipework velocity (m/s)	0.25	0.48	0.71	1.19	2.85
Velocity OK?	Check Velocity	Check Velocity	Check Velocity	Check Velocity	Velocity OK
Station minor loss (assumed K=4.65) (m)	0.02	0.06	0.12	0.34	1.92
Wet Well Emergency Storage (m3)	24.39	24.39	24.39	24.39	24.39
Time Pumping (hrs)	104.96	209.92	314.87	545.78	1364.45

Rising Main - Assume DICL

SRM DN	200	200	200	200	200
SRM ID (mm)	212	212	212	212	212
RM Velocity at duty (m/s)	0.14	0.27	0.39	0.65	1.56
Min desirable slime velocity (m/s)	1.00	1.00	1.00	1.00	1.00
Slime Velocity OK?	Check Velocity	Check Velocity	Check Velocity	Check Velocity	Slime OK
Solids velocity OK?	Solids OK	Solids OK	Solids OK	Solids OK	Solids OK
SRM Length (m)	600	600	600	600	600
IL highpoint (mAHD)	30.30	30.30	30.30	30.30	30.30
Design discharge (l/s)	4.9	9.4	13.7	23.1	55.1
Detention Time (hrs)	10.9	5.6	3.8	2.3	1.0
TWL (mAHD)	22.55	22.55	22.55	22.55	22.55
Pipe roughness TWL 'k' (mm)	0.00060	0.00060	0.00060	0.00060	0.00015
Friction factor 'f'	0.03053	0.02860	0.02783	0.02709	0.01946
Minor loss "k"	10	10	10	10	10
Minor loss (m)	0.0	0.0	0.1	0.2	1.2
Friction loss to discharge	0.1	0.3	0.6	1.7	6.8
Static lift (m)	7.75	7.75	7.75	7.75	7.75
Duty Head TWL (m)	7.8	8.1	8.4	9.6	15.8

Pump Station Power (kW)	0.416284387	0.817962621	1.249483967	2.398455036	9.421547227
Pump Shaft Power (kW) (assume 70% efficiency)	0.594691982	1.168518029	1.784977095	3.426364338	13.45935318
Assumed pump power (kW)	20	20	20	20	20
Energy Consumed (kWh)	2099.151321	4198.302642	6297.453964	10915.58687	27288.96718
Energy Consumed (MWh)	2.10	4.20	6.30	10.92	27.29

WWPS Preliminary Analysis

Project:	
Client:	CPG Estates
Prepared by:	CB
WWPS Name:	Lochinvar 2 WWPS
Date:	26/10/2023

Stage:	Year 1	CPG Wyndella Rd site	Full Strategy load	NEWQUEST (ex gavity to L1)	CPG - Rural Land	FEHER
Catchment Loads:	50	260	650.00	1000.00	1550.00	1750.00
Discharge location:						

Sewage Loads

Receiving pump flow (l/s)	0	0	0	0	0	0
Estimated ADWF for pump flow (l/s)	0.0	0.0	0.0	0.0	0.0	0.0
Gravity Catchment (ET)	50.00	260.00	650.00	1000.00	1550.00	1750.00
ADWF (l/s)	0.55	2.86	7.15	11.00	17.05	19.25
Diversity factor 'r'	3.7	2.8	2.4	2.3	2.2	2.1
PDWF (l/s)	2.0	17.4	17.4	25.3	37.0	41.1
SA (l/s) ** assumes all residential*	2.90	15.08	37.70	58.0	89.9	101.5
PWWF (l/s)	4.9	32.5	55.1	83.3	126.9	142.6
Design WWPS load (l/s)	4.9	32.5	55.1	83.3	126.9	142.6
4 hours ADWF (gravity) (m3)	7.9	41.2	103.0	158.4	245.5	277.2

WWPS Parameters (10 starts per hour)

Station DN	3800	3800	3800	3800	3800	3800	
Design duty flow (l/s)	4.9	32.5	55.1	83.3	126.9	142.6	
Surface level (mAHD)	25.3	25.3	25.3	25.3	25.3	25.3	
Local 1:100 flood level (mAHD)	26	26	26	26	26	26	
Estimated sewer entry level to well (mAHD)	16.8	16.8	16.8	16.8	16.8	16.8	
TWL (mAHD)	16.65	16.65	16.65	16.65	16.65	16.65	
MTWL (mAHD)	16.8	16.8	16.8	16.8	16.8	16.8	
FAL (mAHD)	16.95	16.95	16.95	16.95	16.95	16.95	
Required control volume (m3)	0.4	2.9	5.0	7.5	11.4	12.8	
Required control depth (m)	0.10	0.30	0.50	0.70	1.10	1.20	
BWL (mAHD)	16.55	16.35	16.15	15.95	15.55	15.45	
Min pump submergence (mm)	500	500	500	500	500	500	
Floor level (mAHD)	16.05	15.85	15.65	15.45	15.05	14.95	10.35
Station pipework DN	200	200	200	200	200	200	
Station pipework velocity (m/s)	0.14	0.92	1.56	2.36	3.59	4.04	
Velocity OK?	Check Velocity	Check Velocity	Check Velocity	Velocity OK	Velocity OK	Check Velocity	
Station minor loss (assumed K=4.65) (m)	0.00	0.20	0.58	1.32	3.06	3.87	
Wet Well Emergency Storage (m3)	92.43	92.43	92.43	92.43	92.43	92.43	
Time Pumping (hrs)	105.19	547.00	1364.45	1389.75	1413.51	1419.74	

Rising Main - Assume DICL

SRM DN	225	225	225	225	225	225
SRM ID (mm)	239	239	239	239	239	239
RM Velocity at duty (m/s)	0.11	0.72	1.23	1.86	2.83	3.18
Min desirable slime velocity (m/s)	1.01	1.01	1.01	1.01	1.01	1.01
Slime Velocity OK?	Check Velocity	Check Velocity	Slime OK	Slime OK	Slime OK	Slime OK
Solids velocity OK?	Solids OK	Solids OK	Solids OK	Solids OK	Solids OK	Solids OK
SRM Length (m)	600	600	600	600	600	600
IL highpoint (mAHD)	30.30	30.30	30.30	30.30	30.30	30.30
Design discharge (l/s)	4.9	32.5	55.1	83.3	126.9	142.6
Detention Time (hrs)	13.8	2.9	1.2	0.9	0.6	0.6
TWL (mAHD)	16.65	16.65	16.65	16.65	16.65	16.65
Pipe roughness TWL 'k' (mm)	0.00060	0.00053	0.00024	0.00010	0.00006	0.00006
Friction factor 'f'	0.03042	0.02529	0.02091	0.01739	0.01577	0.01565
Minor loss "k"	10	10	10	10	10	10
Minor loss (m)	0.0	0.3	0.8	1.8	4.1	5.2
Friction loss to discharge	0.0	1.7	4.0	7.7	16.1	20.2
Static lift (m)	13.65	13.65	13.65	13.65	13.65	13.65
Duty Head TWL (m)	13.7	15.6	18.5	23.1	33.9	39.0

Pump Station Power (kW)	1	5	11	21	46	60
Pump Shaft Power (kW) (assume 70% efficiency)	1	8	16	30	66	86
Assumed pump power (kW)	20	20	20	30	70	90
Energy Consumed (kWh)	2104	10940	27289	41693	98946	127777
Energy Consumed (MWh)	2	11	27	42	99	128

WWPS Preliminary Analysis

Project:	
Client:	CPG Estates
Prepared by:	CB
WWPS Name:	Lochinvar 2 WWPS
Date:	26/10/2023

Stage:	Newquest	Total - Newquest
Catchment Loads:		1750.00
Discharge location:		

Sewage Loads

Receiving pump flow (l/s)	0	0
Estimated ADWF for pump flow (l/s)	0.0	0.0
Gravity Catchment (ET)	350.00	1400.00
ADWF (l/s)	3.85	15.40
Diversity factor 'r'	2.7	2.2
PDWF (l/s)	10.3	33.8
SA (l/s) ** assumes all residential*	20.30	81.2
PWWF (l/s)	30.6	115.0
Design WWPS load (l/s)	30.6	115.0
4 hours ADWF (gravity) (m3)	55.4	221.8

WWPS Parameters (10 starts per hour)

Station DN	2400	3800
Design duty flow (l/s)	30.6	115.0
Surface level (mAHD)	25.3	25.3
Local 1:100 flood level (mAHD)	26	26
Estimated sewer entry level to well (mAHD)	22	19
TWL (mAHD)	21.85	18.85
MTWL (mAHD)	22	19
FAL (mAHD)	22.15	19.15
Required control volume (m3)	2.8	10.4
Required control depth (m)	0.70	1.00
BWL (mAHD)	21.15	17.85
Min pump submergence (mm)	500	500
Floor level (mAHD)	20.65	17.35
Station pipework DN	150	200
Station pipework velocity (m/s)	1.58	3.26
Velocity OK?	Check Velocity	Velocity OK
Station minor loss (assumed K=4.65) (m)	0.59	2.52
Wet Well Emergency Storage (m3)	13.35	67.48

Time Pumping (hrs)	1324.75	1408.17

Rising Main - Assume DICL

SRM DN	150	225
SRM ID (mm)	157	239
RM Velocity at duty (m/s)	1.58	2.56
Min desirable slime velocity (m/s)	0.96	1.01
Slime Velocity OK?	Slime OK	Slime OK
Solids velocity OK?	Solids OK	Solids OK
SRM Length (m)	500	600
IL highpoint (mAHD)	30.30	30.30
Design discharge (l/s)	30.6	115.0
Detention Time (hrs)	0.9	0.7
TWL (mAHD)	21.85	18.85
Pipe roughness TWL 'k' (mm)	0.00015	0.00006
Friction factor 'f'	0.02090	0.01588
Minor loss "k"	10	10
Minor loss (m)	1.3	3.4
Friction loss to discharge	8.5	13.4
Static lift (m)	8.45	11.45
Duty Head TWL (m)	18.2	28.2

Pump Station Power (kW)	6	35
Pump Shaft Power (kW) (assume 70% efficiency)	9	50
Assumed pump power (kW)	10	60
Energy Consumed (kWh)	13247	84490
Energy Consumed (MWh)	13	84