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3001116.1 / 30012599.002

29 March 2019

Savills Australia
Stephanie Ballango
Level 25, Governor Phillip Tower 1
Farrer Place, Sydney NSW 2000

Dear Stephanie,

RE: Review of Water and Wastewater Servicing Strategies for the North Tuncurry Development Project

SMEC Australia Pty Ltd (SMEC) was commissioned by UrbanGrowth NSW, now Landcom, to develop the Water and Wastewater Servicing Strategies for a proposed new development at North Tuncurry known as the North Tuncurry Development Project (NTDP). Reports documenting the results of these investigations, which were finalised in 2014, are appended to this letter. Since 2014 several changes have occurred, including:

- The development Master Plan has been updated (copy attached);
- UrbanGrowth NSW, is now known as Landcom; and
- MidCoast Water (MCW), is now MidCoast Water Services (MCWS) part of MidCoast Council.

The purpose of this letter is to outline the status of the 2014 Water and Wastewater Servicing Strategies and to confirm their overall suitability to support development approval for the proposed development.

Water Servicing Strategy

A review of the key design considerations for the Water Servicing Strategy is summarised in the table below.

ITEM	CURRENT STATUS OF REPORT	CONCLUSION
Development Density	The expected Equivalent Tenement (ET) load for the development is marginally higher than documented in the 2014 report due to the change in the masterplan.	The increase is marginal and does not affect the overall servicing strategy or serviceability of the proposed development.
Water Demands	The demands applied in the 2014 report were in accordance with the MCW Design Manual, which was applicable at the time. Written advice from MCWS has confirmed that these guidelines are still current (see attached letter from MCWS).	No change to the serviceability.

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ITEM	CURRENT STATUS OF REPORT	CONCLUSION
Water Servicing - Trunk	It is proposed that the NTDP will be serviced as part of the Manning Water supply system, connecting to a DN600 DICL water main located on Lakes Way.	Given the marginal change in development density this connection is still considered suitable.
Water Servicing - Internal	The preliminary layout and sizing of the internal water mains are based on the previous masterplan.	Updates to the masterplan will affect the internal layout. However, this will not affect the serviceability of the development.

Wastewater Servicing Strategy

A review of the key design considerations for the Wasterwater Servicing Strategy is summarised in the table below.

ITEM	CURRENT STATUS OF REPORT	CONCLUSION
Development Density	The expected ET load for the development is marginally higher than documented in the 2014 report due to the change in the masterplan.	The increase is marginal and does not affect the overall servicing strategy or serviceability of the proposed development.
Sewer Loadings	The loadings applied in the 2014 report were in accordance with the MCW Design Manual, which was applicable at the time. Written advice from MCWS has confirmed that these guidelines are still current (see attached letter from MCWS).	No change to the serviceability.
Wastewater Servicing Strategy – Reticulation System	Two servicing options were considered for NTDP in the 2014 report; Gravity Sewerage System and Vacuum Sewerage System. This is still consistent with MCWS's expectation for the development, as outlined in the Hallidays Point Sewerage Scheme – Servicing Strategy (2016). A gravity reticulation sewerage system is preferable for the NTDP. The preliminary layout of the internal systems are based on the previous masterplan.	The assessment of these systems is still valid, with minimal changes due to the marginal change in load. Updates to the masterplan will also have a minimal effect on the internal layout. Overall these changes will not affect the serviceability of the development.

ITEM	CURRENT STATUS OF REPORT	CONCLUSION
Wastewater Servicing Strategy – Trunk Main	The NTDP is included in the catchment for the Hallidays Point Wastewater Treatment Plant (WWTP), with several options considered for transferring flows to the WWTP. These options are consistent with MCWS's expectation for the development, as outlined in the Hallidays Point Sewerage Scheme – Servicing Strategy (2016).	Given the marginal change in development loads this strategy is still considered suitable.
Servicing the Initial Stages of the Development	The initial stages of the development will be serviced via the Tuncurry No. 22 WWPS. This is consistent with the Hallidays Point Sewerage Scheme – Servicing Strategy (2016).	Changes to the masterplan may affect how many stages can be serviced via this WWPS. However, this will not affect the overall serviceability of the development.

Summary

In summary, while the 2014 Water and Wastewater Servicing Strategies will need to be updated as the development design is progressed, they are considered suitable for planning purposes and to support any necessary approvals.

Yours sincerely,

Marlène van der Sterren

Team Leader – Water Resources

ATTACH

- Attachment 1: North Tuncurry Masterplan
- Water Servicing Study, 30011196 Water Servicing Strategy_rev D, dated 17 October 2014
- Wastewater Servicing Study, 30011196 - Wastewater Servicing Study - 2014-Rev 1_final, dated 30 October 2014.
- MidCoast Water Letter – Water and Sewerage Development Standards, dated 18 February 2019

Attachment 1: North Tuncurry Masterplan

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File: 30011196 Water Servicing Strategy_rev D
Our ref:
Your ref:

17 October 2014

UrbanGrowth NSW
PO Box 718
Forster NSW 2428

Attention: Michael Pring

Dear Michael,

RE: North Tuncurry Development Project Water Servicing Study

1 INTRODUCTION

UrbanGrowth NSW has commissioned SMEC Australia Pty Ltd (SMEC) to undertake water servicing investigations for a new development in North Tuncurry.

The North Tuncurry Development Project (NTDP) involves the re-zoning and subdivision of a 615 ha site north of Tuncurry on the mid north coast of New South Wales (the Site). Refer locality plan on **Figure 1**.

It is the intention of UrbanGrowth NSW to develop the site in stages for a mix of land uses, including residential dwellings, employment land, retail and open space.

This study has been prepared to define the water servicing strategy for the new development and includes investigation of the following elements:

- Development description, refer **Section** 2.
- Study area (the natural catchment boundaries, topography, environmental conservation constraints etc.), refer **Section 3**.
- Planning context (references to Local Environmental Plan, development consent), refer **Section 4**.
- Preliminary water demand estimation, refer **Section 5**.
- Details of connection to the existing water supply system, refer **Section 6**.
- Preliminary water reticulation design, refer **Section 7**.
- Preliminary cost estimates, refer **Section 8**.
- Conclusion, refer **Section** 9.

2 DEVELOPMENT DESCRIPTION

UrbanGrowth NSW are proposing to deliver a mixed use development on the Site that meet's the NSW State Government's objectives to increase housing supply, provide community benefits and create jobs[1].

The NTDP specifically incorporates the following components[1]:

- the type and location of land uses within the site;
- dwelling yield / density (approximately 2,123 dwellings);
- proposed location of retail / commercial / community floor space within the site;
- identification and location of open space and drainage, environmental conservation lands, and local active and passive recreation facilities;
- transport network layout;
- utilities (including power, telecommunications and gas), infrastructure strategy, potable water strategy, sewer concept plan and water cycle management plan;
- location and dimensions of Bushfire Asset Protection Zones;
- appropriate conservation of European and Aboriginal heritage located on the site.

It is estimated that the site will be developed over thirty years. The stages of the residential development will proceed from the south to the north-west, then to the north and to the south-east. Stages E1 and E2 are employment land stages which will only be developed as demand emerges. The proposed Master Plan is shown on **Figure 2**.

[1] JBA –urban development services, (2014), "North Tuncurry Development Project Assessment Report"

3 STUDY AREA

The study area covers the 615 ha development site located north of Tuncurry on the mid north coast of New South Wales, refer **Figure 1**.

The study area is relatively flat and located within a rural landscape with a moderately dense coverage of small trees and costal scrub.

The site is bounded by:

- The Lakes Way road to the west;
- undeveloped bushland and the low density residential zone to the south;
- undeveloped bushland and Nature Reserve to the north; and
- Nine Mile Beach to the east.

The proposed finished surface level of the final development is at approximately RL 4 - 6m AHD.

Under developed conditions, typical groundwater levels are expected to range between 1.4 to 2.5m AHD, with the 100 year ARI groundwater level being approximately 4 to 5m AHD across the site. Note that the ground water level will vary across the site. The design philosophy adopted in this early stage of the project is to minimise the potential effects of groundwater levels (up to and including the 100 year ARI event) on the proposed development.

4 PLANNING CONTEXT

The proposed works are located within the Great Lakes Local Government Area (LGA).

The relevant environmental planning instrument is the Great Lakes Local Environmental Plan, 2014.

According to this plan, construction of public water infrastructure does not require local government consent. However, consultation with the local government is to be undertaken during the concept design stage.

5 WATER DEMANDS

The water servicing study is based on the NTDP Master Plan developed by UrbanGrowth NSW shown on **Figure 2**.

Table 5-1 provides a breakdown of proposed ultimate equivalent tenements (ETs). There is a small component of employment land loading, but the loadings are dominated by the residential dwellings. A nominal allocation has been made for the employment lots based on consultation with UrbanGrowth and on previous experience on similar projects.

Table 5-1 – Equivalent Tenements

	Equivalent Tenements (ET)
Residential Lots	**2,123**
Non-Residential Lots: **(comprising Employment Area E1 and Employment Area E2 North of Stage T)**	**90 (E1) + 90 (E2) = 180**
TOTAL	**2,303 ET**

Table 5-2 summarises water demands calculated in accordance with the MidCoast Water (MCW) Design Manual for the development site.

Table 5-2 – Conventional water design flows

Equivalent Tenements ET	Peak Day Demand PDD (L/s)	Peak Instantaneous Demand PID (L/s) - Trunk Mains	Peak Instantaneous Demand PID (L/s) - Reticulation Mains
2303	74.6	230	276

Peak Instantaneous Demand	PID (L/s) =	0.10 (L/s/ET) x 2303 ET = 230 L/s (Trunk Mains)
	PID (L/s) =	0.12 (L/s/ET) x 2303 ET = 276 L/s (Reticulation Mains)
Peak Day Demand	PDD (L/s) =	2800 (L/day/ET) x 2303 ET = 6.448 x 10^6 L/day = 74.6 L/s

6 WATER SERVICING - TRUNK

The NTDP will be serviced as part of the Manning Water supply system.

The NTDP will be serviced from a 4.5ML reservoir north of Tuncurry at Rainbow Flat. The Reservoir has a two-thirds Top Water Level (TWL) of 74.7 metres AHD. Assuming friction losses of 3m/km in trunk mains, this leaves a residual pressure at the site of approximately 30 metres, which is compliant with the MCW Design Manual (MCW Design Manual requires a desirable minimum pressure head of 20 metres for domestic applications which is achievable with the above residual pressure at the site boundary).

MCW has previously indicated that the DN600 DICL water main located along the Lakes Way has sufficient capacity to supply the NTDP.

At this stage SMEC understands that staging of the development will proceed from the south to the north. Therefore, the water connection would logically be constructed near the southern portion of the development. The proposed water main would then most likely run from the existing water main located on the eastern side of Manning Street across the road and along Northern Parkway.

If required, a second connection could be constructed to increase the security of supply at a later stage of the development. This main would most likely connect the northern portion of the development site to the existing DN600 water main running along the Lakes Way.

The proposed water connections are shown on **Figure 3**.

For the purpose of this study a preliminary sizing has been undertaken, refer **Table 6-1**.

Table 6-1 – Water Main Connection

ET	Preliminary Pipe Size	Approximate Pipe Length
Connection 1	DN450	400 m
Connection 2	DN450	450 m

7 WATER SERVICING - INTERNAL

For the purpose of this study a preliminary sizing of water mains has been undertaken and is included in **Appendix B**. The preliminary design of the reticulation water system consists of DN100-DN300 main and is shown on **Figure 3**.

Water mains will be sized more accurately during the concept design stage of the development.

8 PRELIMINARY COST ESTIMATES

A preliminary capital cost estimate is included in **Appendix A** and summarised in **Table 8-1**.

Table 8-1 – Preliminary Cost Estimate

Project Size	Preliminary Capital Cost	Cost / ET
2303 ET	$5.9 M	$2.6 K

Note:

The cost estimates within this study are based on the Hunter Water Cost Estimating Manual. Use of a common estimating framework allows for cost estimates to be compared between options, but cost estimates cannot be guaranteed as SMEC has no control over contractor's prices, market forces and competitive bids from tenderers. The cost estimates may exclude items which should be considered in a cost plan. Cost estimates are not to be relied upon in any way. If reliable cost estimates are required, then an appropriately qualified Quantity Surveyor should be engaged.

9 CONCLUSION

The North Tuncurry Development Project is to be serviced as part of the Manning Water supply system. The NTDP will be serviced from a 4.5ML reservoir north of Tuncurry at Rainbow Flat.

MidCoast Waster has indicated that the DN600 DICL water main located along The Lakes Way has a capacity to supply the NTDP.

Two DN450 connections to the existing water main have been proposed. Initial stages of the development would be supplied from the connection constructed near the southern portion of the development site.

A second connection could be constructed to increase the security of supply at a later stage of the development. This main would connect the northern portion of the development site to the existing DN600 water main running along The Lakes Way.

Based on a preliminary assessment, the water reticulation system would consist of DN150 to DN300 mains.

A preliminary capital cost estimate of $5.9M ($2.6K per ET) utilising the Hunter Water Cost Estimating Manual has been developed.

10 REFERENCES

- Water Supply Code of Australia (WSA03) – MidCoast Water Edition, Version 2.2
- Hunter Water Pipeline and Pumping Station Estimating Guideline, Hunter Water Corporation, version 2.03
- North Tuncurry Development Project Assessment Report, JBA – urban development services, 2014

We trust the enclosed information enables an informed decision regarding preparation of the concept design.

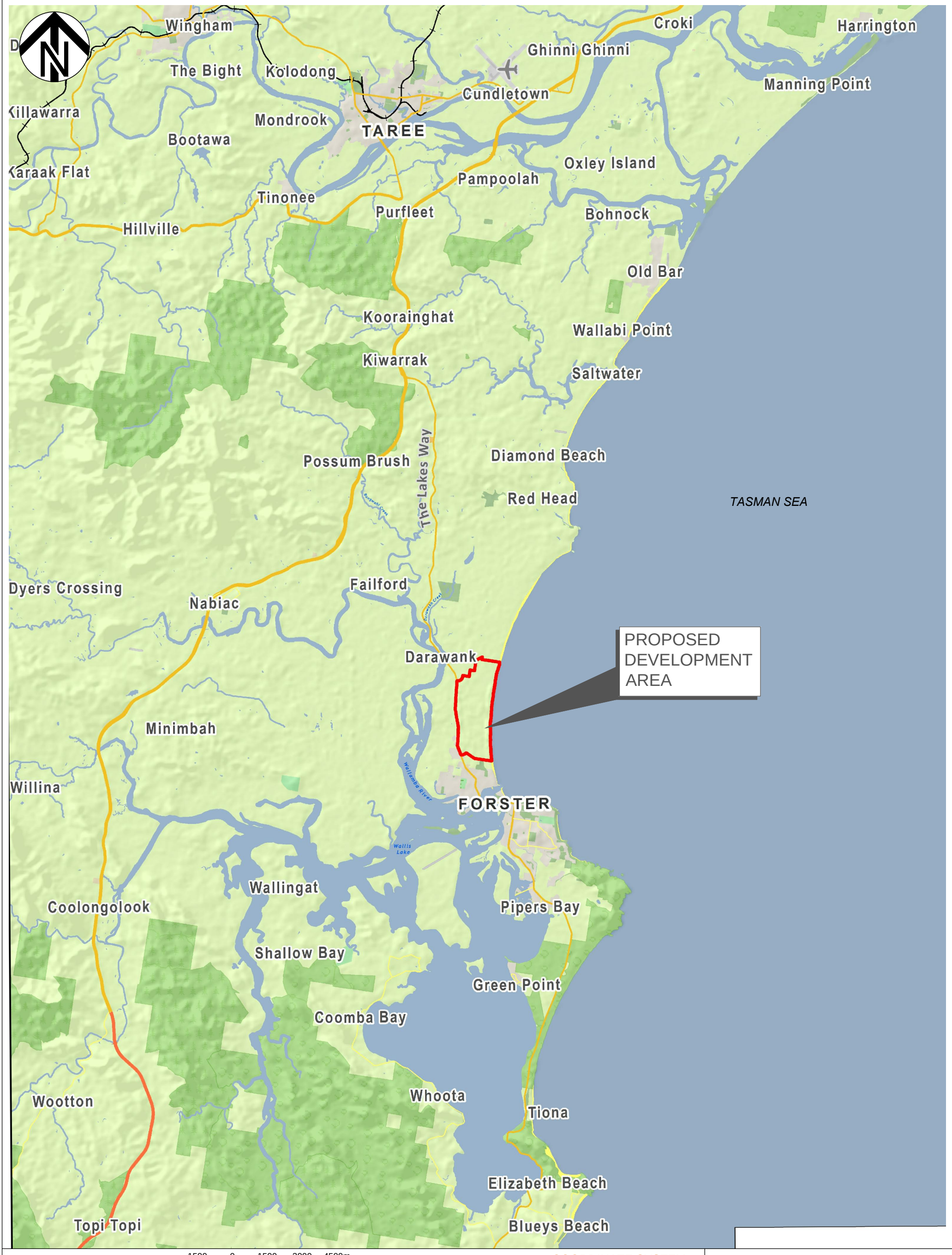
Please do not hesitate to contact the undersigned with any further questions.

Yours sincerely,

Marketa McCarty

Senior Water Infrastructure Engineer

FIGURES



DATE 10/04/14		PAGE SIZE A3	COORDINATE SYSTEM MGA
PROJECT NO. 30011196	PROJECT TITLE	NORTH TUNCURRY DEVELOPMENT - WATER	
FIG NO. 1	FIGURE TITLE	LOCALITY PLAN	
CREATED BY S.DRUERY	SOURCES	-	

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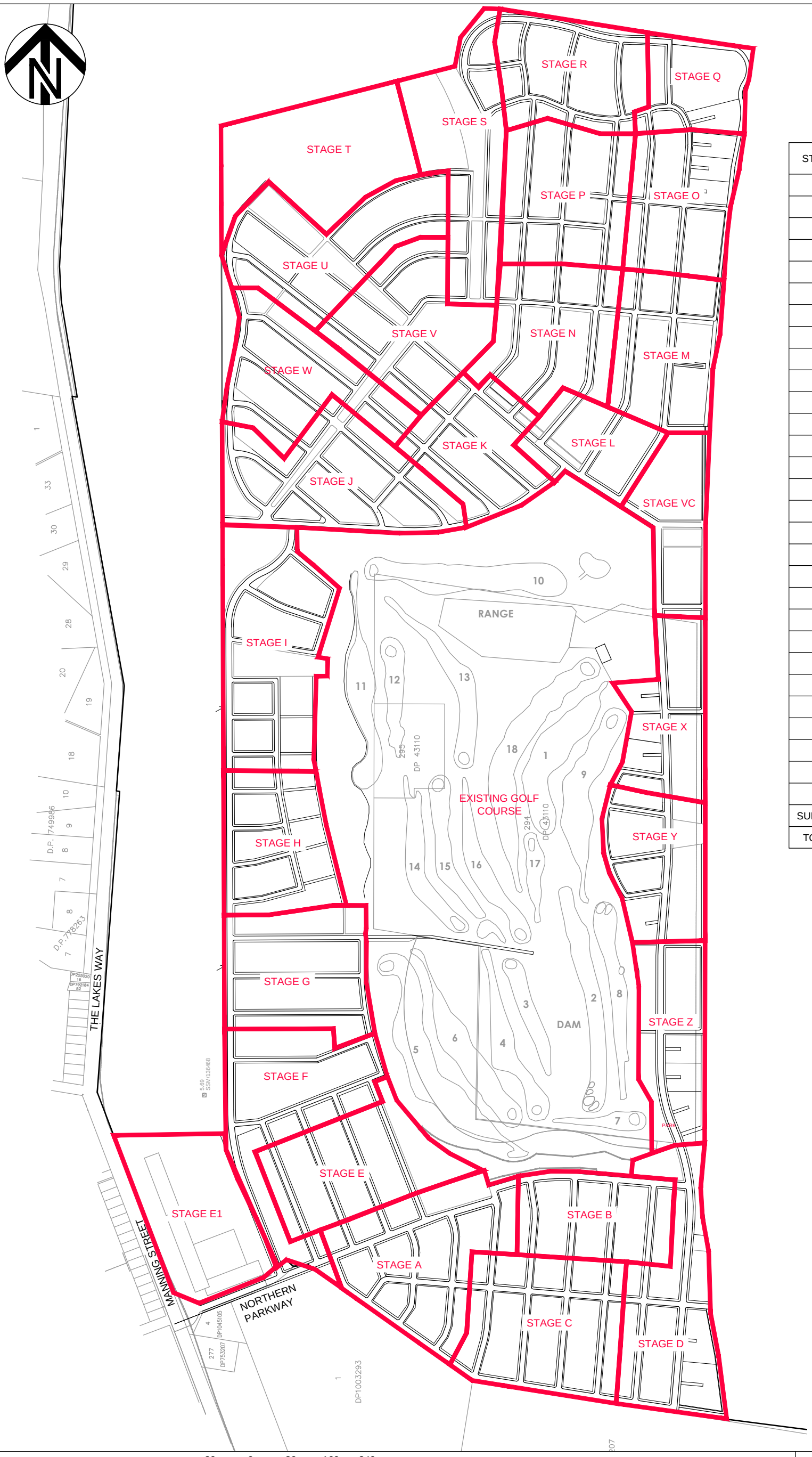

STAGE	LOTS ET	UNITS ET	EMPLOYMENT ET
A	85		
B	76		
C	82		
D	67	58	
E	76		
F	91		
G	75		
H	74		
I	74		
J	75		
K	64		
L	76		
VC	55	98	
M	73		
N	82		
O	63		
P	69		
Q	42		
R	70		
S	76		
T	80		
U	75		
V	72		
W	78		
X	65	44	
Y	66		
Z	42		
E1			90
E2			90
SUB-TOT	1923	200	180
TOTAL	2303		

80 0 80 160 240m
SCALE 1:8000

DATE 10/04/14

PAGE SIZE A3

COORDINATE SYSTEM MGA

PROJECT NO. 30011196

PROJECT TITLE NORTH TUNCURRY DEVELOPMENT - WATER

FIG NO. 2

FIGURE TITLE STAGING PLAN

CREATED BY S.DRUERY

SOURCES -

SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

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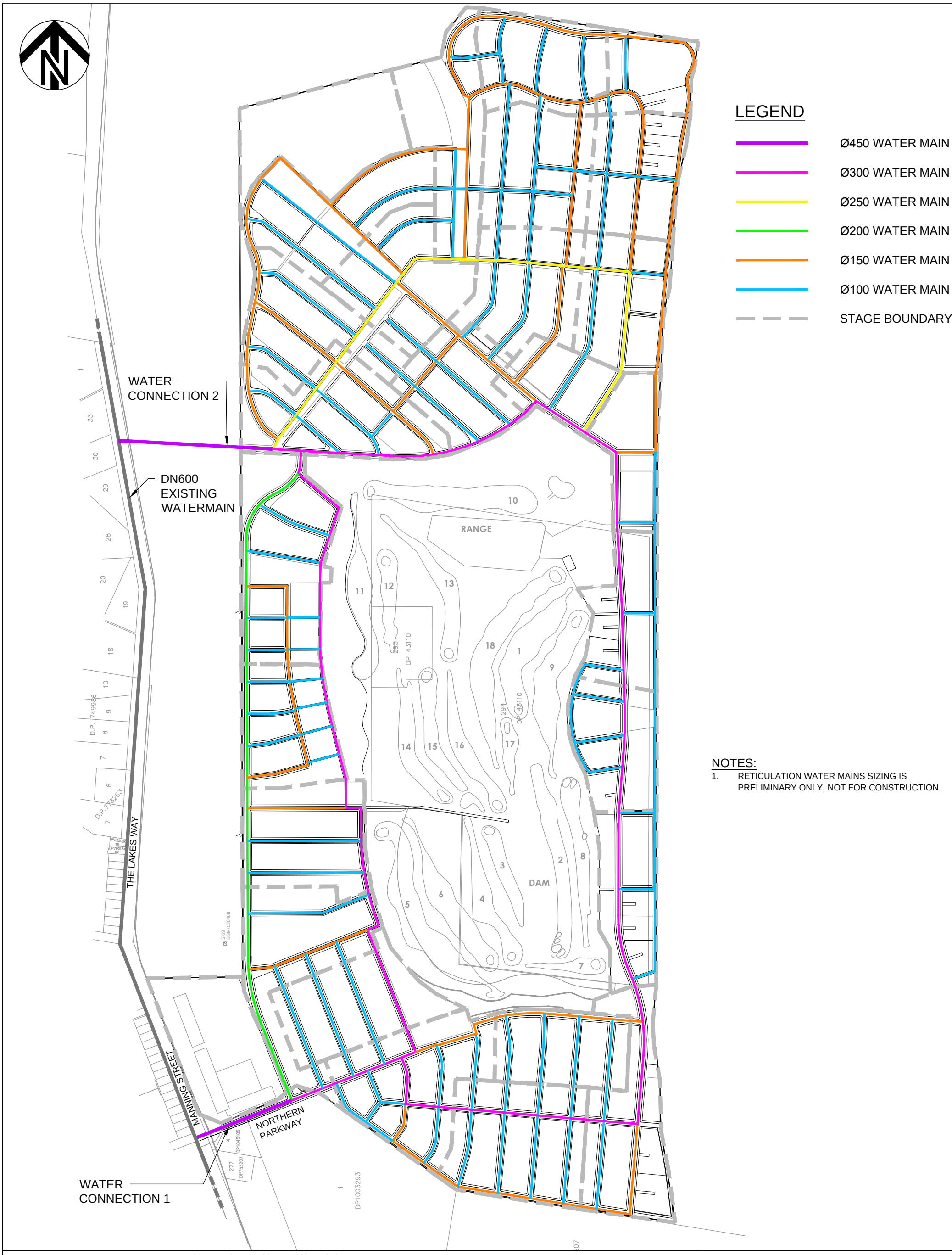

NOTES:

1. RETICULATION WATER MAINS SIZING IS PRELIMINARY ONLY, NOT FOR CONSTRUCTION.

DATE 10/04/14		PAGE SIZE A3	COORDINATE SYSTEM MGA
PROJECT NO. 30011196	PROJECT TITLE	NORTH TUNCURRY DEVELOPMENT - WATER	
FIG NO. 3	FIGURE TITLE	PRELIMINARY RETICULATION WATER SYSTEM PLAN	
CREATED BY S.DRUERY	SOURCES	-	

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APPENDIX A – COST ESTIMATES

PROJECT DESCRIPTION: North Tuncurry Development Project - Water System - all stages

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	$ 70,774.00	$ 70,774.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 24,000.00	$ 24,000.00	**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	$ 54,000.00	$ 54,000.00	**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	$ 12,000.00	$ 12,000.00	**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	$ 36,186.88	$ 36,186.88	**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 watermains are specified

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWW001	Service Location	Item	Lump Sum	$ 13,080.65	$ 13,080.65	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -	Payment: Percentage of valves and flowmeters supplied. Submit: Relevant Quality Records including Compliance Certificates.
HWW003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWW004	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.
20AVSS	Nominal DN100 PVC pipe	13556	m	$ 14.00	$ 189,784.00	
20FVSS	Nominal DN150 PVC pipe	8842	m	$ 28.00	$ 247,576.00	
214VSS	Nominal DN200 PVC pipe	1747	m	$ 49.00	$ 85,603.00	
21EVSS	Nominal DN300 PVC pipe	4306	m	$ 90.00	$ 387,540.00	
22DESS	Nominal DN450 PE pipe	800	m	$ 275.00	$ 220,000.00	
219VSS	Nominal DN250 PVC pipe	1360	m	$ 63.00	$ 85,680.00	
HWW005	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>.
20AVSS	Nominal DN100 PVC (Trench type B)	13556	m	$ 48.40	$ 656,110.40	
20FVSS	Nominal DN150 PVC (Trench type B)	8842	m	$ 56.40	$ 498,688.80	
214VSS	Nominal DN200 PVC (Trench type B)	1747	m	$ 63.40	$ 110,759.80	
21EVSS	Nominal DN300 PVC (Trench type B)	4306	m	$ 81.25	$ 349,862.50	
22DESS	Nominal DN450 PE (Trench type B)	800	m	$ 289.25	$ 231,400.00	
219VSS	Nominal DN250 PVC (Trench type B)	1360	m	$ 71.40	$ 97,104.00	
HWW006	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>.
HWW007	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>.
HWW008	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>.
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05		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>.
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95		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>.
HWW012	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>.
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50		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>.

HWW014	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>.
HWW015	Supply & place ballast			$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HWW016	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>.**
HWW017	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>.**
HWW018	Road / creek crossings					**Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.**
HWW019	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>.**
HWW020	Supply & installation of river crossing includes supply of MSCL 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>.**
HWW021	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>.**
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			**Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.**
HWW023	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>.**
HWW024	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>.
HWW025	EMPTY					
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each			Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWW027	Preparation of line sheets	30611	m	$ 1.00	$ 30,611.00	**Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.**
HWW028	Acceptance testing - reticulation main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWW029	**Miscellaneous**					
HWW000	***Sub Total***				$3,203,800	

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	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**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	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**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	$ 244,888.00	$ 244,888.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 3,705,649.03

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 444,677.88
HW0017	Project Management of Design	$ 98,935.58
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 543,613.46
	Pre construction contingency (30% of B1)	$ 163,084.04
	TOTAL PRE-CONSTRUCTION COST (B)	$ 706,697.50

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 3,705,649.03
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)	$ 296,451.92
	Sub Total (C1)	$ 4,002,100.95
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 1,200,630.29
	TOTAL CONSTRUCTION COST (C)	$ 5,202,731.24

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 5,909,428.74

APPENDIX B – PRELIMINARY DESIGN CALCULATIONS

North Tuncurry Development Project

PRELIMINARY WATER MAIN SIZING

Temperature(°C) 15

Kinematic Viscosity (m^2/s) 1.14E-06

WATER CONNECTION TO THE SITE

Stage	Number of Lots	Preliminary sizing based on Table 3.1 of the Desig Manual	PID (m3/s)	Length of Pipe (m)	Pipe Size (DN)	Pipe Material	Pipe Size ID (mm)	Roughness (mm)	Velocity (m/s)	Max Velocity (m/s)	Velocity Head (m)	Reynold's Number	Friction Factor	Friction Slope (m/km)	Max Head Loss in Manual (m/km)		PDD (L/s)	Velocity (m/s)	Min Velocity in Manual (m/s)
	2303		0.27636	1000.00	300	DICL	322	0.500	3.39	2	0.59	958510	0.0222	40.6	3		75	0.9	0.5
	2303		0.27636	1000.00	375		401	0.500	2.19	2	0.24	769677	0.0212	12.9	3		75	0.6	0.5
	2303		0.27636	1000.00	**450**		480	0.500	1.53	2	0.12	643001	0.0204	5.1	3		75	0.4	0.5
	1065		0.1278	1000.00	300	DICL	322	0.500	1.57	2	0.13	443254	0.0225	8.8	3		35	0.4	0.5
	1065		0.1278	1000.00	375		401	0.500	1.01	2	0.05	355929	0.0216	2.8	3		35	0.3	0.5
	1065		0.1278	1000.00	**450**		480	0.500	0.71	2	0.03	297349	0.0209	1.1	3		35	0.2	0.5
	1238		0.14856	1000.00	300	DICL	322	0.500	1.82	2	0.17	515257	0.0225	11.8	3		40	0.5	0.5
	1238		0.14856	1000.00	375		401	0.500	1.18	2	0.07	413747	0.0215	3.8	3		40	0.3	0.5
	1238		0.14856	1000.00	**450**		480	0.500	0.82	2	0.03	345651	0.0208	1.5	3		40	0.2	0.5

INTERNAL DELIVERY RING

Stage	Number of Lots	Preliminary sizing based on Table 3.1 of the Desig Manual	PID (m3/s)	Length of Pipe (m)	Pipe Size (DN)	Pipe Material	Pipe Size ID (mm)	Roughness (mm)	Velocity (m/s)	Max Velocity (m/s)	Velocity Head (m)	Reynold's Number	Friction Factor	Friction Slope (m/km)	Max Head Loss in Manual (m/km)		PDD (L/s)	Velocity (m/s)	Min Velocity in Manual (m/s)
	1152	300-375	0.13818	1000.00	375	PVC-O	403.8	0.500	1.08	2	0.06	382170	0.0215	3.2	3		37	0.3	0.5
	1152		0.13818	1000.00	**300**		326.3	0.500	1.65	2	0.14	472940	0.0224	9.6	3		37	0.4	0.5
	1152		0.13818	1000.00	250		270.5	0.500	2.40	2	0.29	570500	0.0234	25.5	3		37	0.6	0.5
	576	250	0.06909	1000.00	375	PVC-O	403.8	0.500	0.54	2	0.01	191085	0.0221	0.8	3		19	0.1	0.5
	576		0.06909	1000.00	**300**		326.3	0.500	0.83	2	0.03	236470	0.0229	2.4	3		19	0.2	0.5
	576		0.06909	1000.00	250		270.5	0.500	1.20	2	0.07	285250	0.0238	6.5	3		19	0.3	0.5

Stages A-D Sub-Ring

Stage	Number of Lots	Preliminary sizing based on Table 3.1 of the Desig Manual	PID (m3/s)	Length of Pipe (m)	Pipe Size (DN)	Pipe Material	Pipe Size ID (mm)	Roughness (mm)	Velocity (m/s)	Max Velocity (m/s)	Velocity Head (m)	Reynold's Number	Friction Factor	Friction Slope (m/km)	Max Head Loss in Manual (m/km)		PDD (L/s)	Velocity (m/s)	Min Velocity in Manual (m/s)
	131	150	0.01569	1000.00	100	PVC-O	114.7	0.500	1.52	2	0.12	152770	0.0300	30.8	5		4	0.4	0.5
	131		0.01569	1000.00	**150**		167.2	0.500	0.71	2	0.03	104801	0.0276	4.3	5		4	0.2	0.5
	131		0.01569	1000.00	200		219.3	0.500	0.42	2	0.01	79903	0.0264	1.1	3		4	0.1	0.5

Stages E-I Sub-Ring

Stage	Number of Lots	Preliminary sizing based on Table 3.1 of the Desig Manual	PID (m3/s)	Length of Pipe (m)	Pipe Size (DN)	Pipe Material	Pipe Size ID (mm)	Roughness (mm)	Velocity (m/s)	Max Velocity (m/s)	Velocity Head (m)	Reynold's Number	Friction Factor	Friction Slope (m/km)	Max Head Loss in Manual (m/km)		PDD (L/s)	Velocity (m/s)	Min Velocity in Manual (m/s)
	195	200	0.0234	1000.00	100	PVC-O	114.7	0.500	2.26	2	0.26	227840	0.0298	67.9	5		6	0.6	0.5
	195		0.0234	1000.00	150		167.2	0.500	1.07	2	0.06	156299	0.0272	9.4	5		6	0.3	0.5
	195		0.0234	1000.00	**200**		219.3	0.500	0.62	2	0.02	119167	0.0258	2.3	3		6	0.2	0.5

Stages I-H Sub-Ring

Stage	Number of Lots	Preliminary sizing based on Table 3.1 of the Desig Manual	PID (m3/s)	Length of Pipe (m)	Pipe Size (DN)	Pipe Material	Pipe Size ID (mm)	Roughness (mm)	Velocity (m/s)	Max Velocity (m/s)	Velocity Head (m)	Reynold's Number	Friction Factor	Friction Slope (m/km)	Max Head Loss in Manual (m/km)		PDD (L/s)	Velocity (m/s)	Min Velocity in Manual (m/s)
	74	150	0.00888	1000.00	100	PVC-O	114.7	0.500	0.86	2	0.04	86462	0.0306	10.1	5		2	0.2	0.5
	74		0.00888	1000.00	**150**		167.2	0.500	0.40	2	0.01	59314	0.0286	1.4	5		2	0.1	0.5
	74		0.00888	1000.00	200		219.3	0.500	0.24	2	0.00	45222	0.0277	0.4	3		2	0.1	0.5

Stages J, U-W Sub-Ring

Stage	Number of Lots	Preliminary sizing based on Table 3.1 of the Desig Manual	PID (m3/s)	Length of Pipe (m)	Pipe Size (DN)	Pipe Material	Pipe Size ID (mm)	Roughness (mm)	Velocity (m/s)	Max Velocity (m/s)	Velocity Head (m)	Reynold's Number	Friction Factor	Friction Slope (m/km)	Max Head Loss in Manual (m/km)		PDD (L/s)	Velocity (m/s)	Min Velocity in Manual (m/s)
	150	150	0.018	1000.00	**150**	PVC-O	167.2	0.500	0.82	2	0.03	120230	0.0275	5.6	5		5	0.2	0.5
	150		0.018	1000.00	200		219.3	0.500	0.48	2	0.01	91667	0.0262	1.4	3		5	0.1	0.5
	150		0.018	1000.00	250		270.5	0.500	0.31	2	0.01	74316	0.0255	0.5	3		5	0.1	0.5

Stages O-W Sub-Ring

Stage	Number of Lots	Preliminary sizing based on Table 3.1 of the Desig Manual	PID (m3/s)	Length of Pipe (m)	Pipe Size (DN)	Pipe Material	Pipe Size ID (mm)	Roughness (mm)	Velocity (m/s)	Max Velocity (m/s)	Velocity Head (m)	Reynold's Number	Friction Factor	Friction Slope (m/km)	Max Head Loss in Manual (m/km)		PDD (L/s)	Velocity (m/s)	Min Velocity in Manual (m/s)
	625	250-300	0.075	1000.00	200	PVC-O	219.3	0.500	1.99	2	0.20	381944	0.0248	22.8	3		20	0.5	0.5
	625		0.075	1000.00	**250**		270.5	0.500	1.31	2	0.09	309650	0.0237	7.6	3		20	0.4	0.5
	625		0.075	1000.00	300		326.3	0.500	0.90	2	0.04	256698	0.0228	2.9	3		20	0.2	0.5

North Tuncurry Development Project

PRELIMINARY PRESSURE CALCULATIONS - Peak Day Demand Flow

U/S Head m		ET	Design Flow PDD L/s	Pipe Data Pipe DN	Pipe ID mm	Pipe Roughness mm	Pipe Length m	Pressure Head Calculations Velocity full pipe m/s	Reynolds No.	Friction Factor	Friction Loss m	k Factor	Pressure Head Change m	Total Head m
30	A-I, X-Z	1065	34.51	300	284.5	0.3	240	0.54	154,462	0.0218	0.28	3	0.05	29.68
29.68	E	390	12.64	300	284.5	0.3	240	0.20	56,564	0.0240	0.04	2	0.00	29.63
29.63	F	314	10.18	300	284.5	0.3	240	0.16	45,541	0.0246	0.03	2	0.00	29.60
29.60	G	223	7.23	300	284.5	0.3	224	0.11	32,343	0.0259	0.01	2	0.00	29.59
29.59	H	148	4.80	300	284.5	0.3	280	0.08	21,465	0.0279	0.01	0	-	29.58
29.58	I	74	2.40	300	284.5	0.3	440	0.04	10,733	0.0322	0.00	2	0.00	29.58

Including Fire Flow 20 L/s

30	A-I, X-Z	1065	54.51	300	284.5	0.3	240	0.86	243,969	0.0212	0.67	3	0.11	29.22
29.22	E	195	26.32	300	284.5	0.3	240	0.41	117,789	0.0222	0.16	2	0.02	29.04
29.04	F	157	25.09	300	284.5	0.3	240	0.39	112,278	0.0223	0.15	2	0.02	28.87
28.87	G	112	23.61	300	284.5	0.3	224	0.37	105,679	0.0224	0.12	2	0.01	28.73
28.73	H	74	22.40	300	284.5	0.3	280	0.35	100,240	0.0225	0.14	0	-	28.59
28.59	I	37	21.20	300	284.5	0.3	440	0.33	94,873	0.0226	0.20	2	0.01	28.38

Conservative scenario - 1 connection supplying whole site

U/S Head m		ET	Design Flow PDD L/s	Pipe Data Pipe DN	Pipe ID mm	Pipe Roughness mm	Pipe Length m	Pressure Head Calculations Velocity full pipe m/s	Reynolds No.	Friction Factor	Friction Loss m	k Factor	Pressure Head Change m	Total Head m
30	A-Z	2303	74.63	300	284.5	0.3	240	1.17	334,015	0.0209	1.24	3	0.21	28.55
28.55	E	1628	52.76	300	284.5	0.3	240	0.83	236,117	0.0212	0.63	2	0.07	27.85
27.85	F	1552	50.30	300	284.5	0.3	240	0.79	225,094	0.0213	0.57	2	0.06	27.21
27.21	G	1461	47.35	300	284.5	0.3	224	0.74	211,896	0.0213	0.48	2	0.06	26.68
26.68	H	1386	44.92	300	284.5	0.3	280	0.71	201,018	0.0214	0.54	0	-	26.15
26.15	I	1312	42.52	300	284.5	0.3	440	0.67	190,286	0.0215	0.76	2	0.05	25.34

25.34	J	1238	40.12	250	252.9	0.3	440	**0.80**	**201,988**	**0.0219**	**1.24**	2	**0.07**	**24.04**
24.04	V	870	28.19	250	252.9	0.3	320	**0.56**	**141,947**	**0.0224**	**0.45**	2	**0.03**	**23.55**
23.55	N	489	15.85	300	284.5	0.3	240	**0.25**	**70,922**	**0.0233**	**0.06**	1	**0.00**	**23.49**
23.49	M	331	10.73	300	284.5	0.3	40	**0.17**	**48,007**	**0.0245**	**0.00**	0	-	**23.48**
23.48	O	249	8.07	300	284.5	0.3	440	**0.13**	**36,114**	**0.0255**	**0.03**	2	**0.00**	**23.45**
23.45	Q	42	1.36	300	284.5	0.3	440	**0.02**	**6,091**	**0.0371**	**0.00**	0	-	**23.45**

North Tuncurry Development Project

PRELIMINARY PRESSURE CALCULATIONS - Peak Instantaneous Demand Flow

U/S Head		ET	Design Flow	Pipe Data				Pressure Head Calculations						
			PID	Pipe DN	Pipe ID	Pipe Roughness	Pipe Length	Velocity full pipe	Reynolds No.	Friction Factor	Friction Loss	k Factor	Pressure Head Change	Total Head
m			L/s		mm	mm	m	m/s			m		m	m
30	A-I, X-Z	1065	127.80	300	284.5	0.3	240	2.01	571,951	0.0205	3.57	3	0.62	25.81
25.81	E	390	46.80	300	284.5	0.3	240	0.74	209,447	0.0213	0.50	2	0.06	25.26
25.26	F	314	37.68	300	284.5	0.3	240	0.59	168,632	0.0216	0.33	2	0.04	24.90
24.90	G	223	26.76	300	284.5	0.3	224	0.42	119,761	0.0222	0.16	2	0.02	24.72
24.72	H	148	17.76	300	284.5	0.3	280	0.28	79,482	0.0230	0.09	0	-	24.63
24.63	I	74	8.88	300	284.5	0.3	440	0.14	39,741	0.0251	0.04	2	0.00	24.59
Including Fire Flow 20 L/s														
30	A-I, X-Z	1065	147.80	300	284.5	0.3	240	2.32	661,458	0.0204	4.76	3	0.83	24.42
24.42	E	195	43.40	300	284.5	0.3	240	0.68	194,231	0.0214	0.43	2	0.05	23.94
23.94	F	157	38.84	300	284.5	0.3	240	0.61	173,823	0.0216	0.35	2	0.04	23.55
23.55	G	112	33.38	300	284.5	0.3	224	0.53	149,387	0.0218	0.24	2	0.03	23.29
23.29	H	74	28.88	300	284.5	0.3	280	0.45	129,248	0.0220	0.23	0	-	23.06
23.06	I	37	24.44	300	284.5	0.3	440	0.38	109,378	0.0224	0.26	2	0.02	22.78

Taree office
2 Pulteney Street | PO Box 482
Taree NSW 2430

18 February 2019

Michael Pring
Development Director
Landcom
Level 14, 60 Station Street
Parramatta NSW 2150

Ref: A663854

Dear Michael

Water and Sewerage Development Standards

I confirm that Council's development standards for water and sewerage have not changed since we commenced discussing the project in 2011.

Yours sincerely

Brendan Guiney
Director Water Services