ANNEX O

Sewer and Water Strategy

ADDENDUM REPORT

Sewer & Water Servicing Strategy

Project: **Fern Bay Seaside Village**

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DMS Survey Pty Ltd (DMS) have been engaged by the Aspen Group to review the sewer and water servicing strategy in relation to the Environmental Assessment Report (EAR) pursuant to Part 3A of the Environmental Planning and Assessment Act 1979 (EP & A). The EAR has been prepared to accompany the application for project approval for a residential subdivision consisting of 713 lots called 'Fern Bay Seaside Village'.

While there has been minor changes in the lot structure the overall footprint and layout of the Project Plan has not been altered and the Project Plan application is consistent with the Master Plan approval.

The addendum report has been provided to ensure fulfilment of the requirements of a Part 3A application.

Introduction

GHD Pty Ltd was engaged by The Winten Property Group and Continental Venture Capital in 2004 to produce a Sewerage and Water Supply Servicing Strategy for the development of Fern Bay Seaside Village. The Strategy was to address the fully developed requirements of the site, comprising of some 950 dwellings in regard to water supply and sewer servicing. The development required:

(i) The construction of lead in water mains from the existing Fern Bay Residential Area. The lead in mains were to be located along Nelson Bay Road and consist of a DN250mm diameter pipe,

(ii) The construction of a DN200mm diameter trunk ring main within the development,

(iii) The construction of internal servicing of allotments by DN150 and DN100 pipes,

(iv) Construction of a catchment based, gravity sewerage reticulation system servicing all allotments within the proposed development. Gravity sewerage reticulation would consist of access chambers and graded pipes of 150mm, 225mm and 300mm diameters, type SN8,

(v) Construction of waste water pump stations within each catchment,

(vi) Construction of associated rising mains from pump stations to other pump stations within the development,

(vii) Construction of a rising main from Fern Bay Waste Water Pump Station No.3 to the existing Fern Bay Residential Area.

GHD's Strategy modeled ultimate loadings of equivalent tenements for water supply needs, convential sewer system layout and loadings and water and sewer cost estimates.

The current layout of the residential areas of the Estate proposes to create ultimately 950 allotments consisting of residential and integrated housing. The 950 allotments include the existing 150 allotments created in Stages 1 and 2 of the development and the 33 lots approved, but not constructed in Stage 3. Therefore, the amended layout of the current proposal will have no impact upon the outcomes of GHD's Water and Sewer Servicing Strategy.

Completed Construction

As of the date of this Report, the following works have been completed:

- The lead in watermains from existing Fern Bay to the access road at Fern Bay Seaside Village consisting of a DN250mm diameter pipe,
- The trunk rising main along the Estate access road and through Stages 1 and 2 consisting of a DN200mm diameter pipe,
- Stages 1 and 2 have been internally serviced by the construction of DN150mm and DN100mm diameter pipes,
- Stages 1 and 2 have been serviced with 150mm diameter SN8 gravity sewer mains,
- Stages 1 and 2 have been serviced by the construction of internal rising mains and;
- Stages 1 and 2 have constructed two waste water pump stations at the low points of each stage.

Conclusion

Given the original Sewer and Water Servicing Strategy for the creation of 950 residential allotments at Fern Bay Seaside Village is consistent with the current proposal, the Sewer and Water Servicing Strategy prepared by GHD Pty Ltd in November 2004 is still current.

Existing lead in mains, water supply, gravity sewerage networks and waste water pump stations constructed in Stages 1 and 2 will not need to be modified under this proposal.

DMS SURVEY PTY LTD

PG MATHER
Registered Surveyor

Winten Property Group and CVC Ltd

Fern Bay

Sewer and Water Servicing Strategy

Report

November 2004

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1. Introduction

The Winten Property Group and Continental Venture Capital (CVC) propose to develop an area of land at Fern Bay for residential housing.

The development area fronts onto Nelson Bay Road opposite the intersection with Fullerton Cove Road (Ref Figure 1).

Ultimate development will total approximately 950 dwellings (Ref Figure 2). The actual numbers will vary as the precincts are finalised and will comprise conventional lots, integrated housing, villas and duplexes. The arrangements presented in this report have been based on a total load of 850 ET derived from reduced ET per lot for the housing types other than conventional.

Development Application approval has been obtained for 208 lots. Engineering design and bulk earthworks have been commenced for stages 1 and 2 totalling 98 lots. This will be closely followed by the remaining 110 lots. (Ref Figure 2 detailing the 98 lots approved as Stages 1 and 2).

Sewerage and water supply servicing strategies for the development covering initial and ultimate requirements are the subject of the following report.

2. Sewer System

2.1 Site

The site (Figure 3) is divided by a ridge rising to RL 15m AHD that runs north-east to south-west with another ridge and higher ground along the eastern edge. Between the ridges and to the west are large flat areas at low level (RL 2 and 3). The higher ground to the east is intersected by gullies down to RL 3.5. Significant portions of the low level area to the west are wet i.e. the ground level is below water table level.

2.2 Existing Services

There are no sewerage services existing at the site. It will be necessary to connect to the proposed Hunter Water Corporation (HWC) system at the corner of Rankin Road and Nelson Bay Road a distance of 2.3 km from the Fullerton Cove Road and Nelson Bay Road intersection.

Hunter Water Corporation has in place a regional wastewater servicing strategy developed to set a framework for the orderly role out of wastewater infrastructure serving the existing Fern Bay community and the broader growth identified in the vicinity. Due to the impacts of changed development timing (that has increased the certainty of development proceeding) and the Roads Traffic Authority requesting a reduction in the number of planned services in Nelson Bay Road, it has become necessary for Hunter Water to review the current wastewater servicing strategy.

In November 2004 Hunter Water completed their review and has confirmed that the connection location shall remain the same but with additional infrastructure and changes in flows and main sizes.

Should connection to sewer services be required prior to the planned completion of the other works being delivered by Hunter Water (mid 2006), it will become necessary for the developer to provide interim tankering services.

Design of the Priority Sewer Programme infrastructure by Hunter Water is programmed for completion in January 2005 and it will be necessary to proceed directly to tender and construction to minimise the need for tankering services.

2.3 Proposed Sewerage System Arrangement

It will be necessary to deliver sewage, via a collection system, to the west side of the development area for a transportation system, running along Nelson Bay Road, to convey it to the HWC connection point. An alternative route running to the east of the golf course was considered but was not investigated in detail due to access, environmental and ground elevation (in regard to the pipeline longitudinal section) issues.

In order to convey sewage to the west side of the development the collection system will need to cross the topographic features that generally run north-south through the site. A number of pumping stations will be required to achieve this (detailed in Section 2.6).

2.4 Options

Due to the site topography the following were considered:

- Conventional system;
- Common effluent pumping (CEP). CEP systems are those where individual houses are served by a septic tank upstream of a small tank that has a pump delivering into a common pumping main network;
- Low pressure sewer system (LPSS) where each house is provided with a grinder sewage pump station delivering into a common street main network; and
- Combination of conventional and LPSS.

CEP systems were not analysed in detail because all their benefits such as lower pumping rates and elimination of major WWPSs are available in the LPSS without the desludging and odour issues with CEP tanks.

2.5 Rate of Development

A lot release rate of approximately 120 per year was assumed based on information provided by the Winten Property Group.

2.6 Conventional System

A conventional system to serve the ultimate project area was developed comprising seven WWPS catchments. Figure 4 describes the probable catchment boundaries, while the schematic shown in Appendix B details the resulting gravity flows and PWWF generated from each of these catchments.

WWPS Nos. 2 to 7 deliver to the main WWPS No. 1 to be known as Fern Bay No. 3 (FB WWPS No. 3) that delivers into the transportation main to the existing HWC system. The rising mains from WWPSs 2 to 8 are all relatively short with commensurately low detention times and deliver into the gravity collection system of the downstream WWPS.

To cater for ultimate development FB WWPS No. 3 needs to be 86L/s capacity and its rising main 3.3km long to form a transportation system to the HWC connection point at Rankin Road. Future Fern Bay WWPS No. 4 will connect into the rising main approximately 2.1 km down stream from FB No. 3.Winten-CVC have commenced discussions with Hunter Water regarding the possible incremental upsizing of selected rising main (and water) assets. Further discussion will need to take place to confirm any possible funding to be offered by Hunter Water. Generally Hunter Water's reimbursement policy will provide a mechanism for other development to connect and contribute to the cost of the transfer scheme.

The long common rising main associated with this transfer scheme results in significant detention times for the sewage - giving rise to septicity and odour issues. This is further aggravated at initial development when loads are low compared to the ultimate that has to be catered for. The staging of the WWPS No. 1 rising main was therefore investigated.

Staging of the rising main presents a difficulty in accommodating the two smaller mains in the limited space available beside Nelson Bay Road. This together with cost considerations lead to the adoption of a single stage rising main catering for ultimate development.

The rising main detention times will be such that iron salt dosing will be required for sulphide and odour control. This will be considered during the concept design of the station.

2.7 Pressure Sewer Systems

An arrangement based on Eone grinder package pump stations (one for each dwelling) was prepared by consultants Environmental Group (Operations) Pty Ltd (EGL) for the complete development. A preliminary costing prepared for this option using Eone's estimated contract costs indicated that it was viable. Hunter Water is not in a position to approve a scheme of this order and has stated this position. Accordingly servicing of the full development with LPSS will not be investigated further.

The viability of LPSS systems, however, will be considered on a catchment by catchment basis. The adoption of LPSS systems for any of the catchments will result in the development being served by a combined LPSS and conventional system. It should be noted that Hunter Water has not yet considered any LPSS subsystem greater than approximately 50 lots in size and generally only where larger residential lots sizes would result.

Hunter Water is currently developing its design guidelines and associated administrative procedures for LPSS. It is expected these will evolve over the next 12 months to replace the CEP requirements.

2.8 Costs

Cost estimates and NPV analyses have been prepared and are included in Appendix C as follows:

- Conventional with WWPS No. 1 not staged;
- Conventional with WWPS No. 1 staged; and

The gravity sewer and rising main costs have been determined in accordance with HWC procedures for Preliminary Estimates. The WWPS estimates have been factored to be in line with construction costs for similar installations.

An allowance has been made for dewatering and no allowance has been made for rock excavation. Extremely hard ground can be found in the area appearing as cemented sand strata near ground water level. This would slow construction but it could not be classified as rock for excavation purposes.

The NPV analysis is based on the staging in Section 2.5 and for a discount factor of 7%.

A summary of the costs is shown in Table 2.1.

Table 2.1 Sewer Preliminary Cost Estimates Present Values

	Nett Present Value Cost		
Option	**Capital**	**O & M**	**Total**
Conventional – WWPS 1 not staged	$8,003,000	$1,400,000	$9,403,000
Conventional – WWPS 1 staged	$8,741,000	$1,400,000	$10,141,000

The single un-staged option is preferred due to its lower cost and the difficulty in accommodating additional mains in Nelson Bay Road.

3. Water System

3.1 Present System

There are no water supply services existing at the site. It will be necessary to connect to the existing Hunter Water Corporation (HWC) system initially at the eastern end of the Stockton Bridge a distance of approximately 3.3 km from the Fullerton Cove Road and Nelson Bay Road intersection. In order to provide security of supply in the form of two feeds to the site a second connection will be eventually required at Williamtown (intersection of Cabbage Tree Road and Nelson Bay Road) a distance of approximately 7.75 km from the Fullerton Cove Road and Nelson Bay Road intersection (Ref Figure 1). This has been confirmed by HWC.

3.2 Proposed System

The system proposed to serve the development as shown on Figure 5 comprises:

- DN250 and DN300 lead-in trunk mains from the connection points to the existing HWC system at Stockton and Williamtown. The DN250 from Stockton would be installed initially and the DN300 from Williamtown in 2008. Alternative routes are shown on Figure 1 for the main from Williamtown. The final location will be selected at the design stage of this main.

  Hunter Water has expressed interest in up sizing the 250mm trunk main to 300mm in diameter;
- DN200 trunk ring main with in the development;
- DN150 sub loop reticulation mains; and
- DN100 reticulation mains.

3.3 Design Criteria

3.3.1 Water Demands

- Average demand per residential dwelling (ET): 270 kL/annum.
- Average demand per residential flat/unit: 130 kL/annum
- Peak Day Demand (PDD) Factor: 2.25.
- Extreme Day Demand (EDD) Factor: 1.15.
- Unaccounted for Water: 0.15 X ADD.
- Diurnal Factors: Table 2.4, Appendix B of HWC Design Manual.

- Peak Day and Extreme Day Diversity Factor: 1.225 that was determined from a sub system size of 1400 EP (deemed to represent dwellings with significant outdoor water use) made up of 210 existing at Fern Bay plus the 1000 of the development and 200 for the caravan park.
- Fire Flow: 11 L/s.

3.3.2 Population Served

The system analysed extended between the connection points to the existing system at Williamtown and the Stockton Bridge.

Allowance was made for the following demands:

- Nominal allowance for the properties along Fullerton Cove Road: 50ET (at N30);
- Proposed retirement village at the intersection of Fullerton Cove Road and Nelson Bay Road: 200 units (Made up of 57 x 3 bed and 142 x 2 bed) – this is equivalent to 129ET (at N3);
- Caravan Park on Nelsons Bay Road: 200ET (at N4);
- Manufactured Home Village: 165ET (at N4); and
- Winten development: 1016ET (1000 residential, 3 commercial and 13 for school).

3.3.3 Minimum Residual Pressures

Table 3.1 Minimum Residual Pressures

Demand	Minimum Pressure (m)
Peak hour flow on a peak day.	20
Peak hour flow on an extreme day.	12
Peak hour flow on a peak day plus fire flow.	3
Peak hour flow on a peak day with a failure in one of the trunk lead-in mains.	12
Maximum pressure at any node.	70

3.4 Analysis

Analysis using Pipes++ modelling was carried out for the following cases:

- PDD;
- EDD;
- PDD + Fire; and
- PDD with one of the lead in trunk mains failed.

For each case the pressures at the connection points to the existing HWC system were as advised by HWC (Refer Appendix E).

The size of the lead-in mains was dictated by the failure analysis. The failure analysis simulated a pipe break discharging to atmosphere for 2 hours from 2:00 pm followed by no supply through the failed pipe for the rest of the day but with the discharge at the break stemmed.

The robustness of the DN200 trunk ring main was confirmed by applying a fire flow of 22L/s (11L/s at two different points) to the system.

Modelling results are shown in Table 3.2.

Table 3.2 Results of Modelling

Modelling Case			**Minimum Pressure**		**Maximum Velocity**	
Demand	**Time**	**Year**	**Value (m)**	**Node**	**Value (m/s)**	**Location**
PDD	20:00	2008	24.7	N17	1.08	Stockton DN250
PDD + Fire at N20	20:00	2008	17.2	N17	1.29	Stockton DN250
PDD	20:00	Ult	34.7	N17	0.68	W'town DN300
PDD + Fire at N20 & N22	20:00	Ult	26.9	N17	0.77	W'town DN300
EDD	20:00	Ult	33.9	N17	0.71	W'town DN300
PDD + Failure of DN250 from Stockton	20:00	Ult	20.5	N17	0.99	W'town DN300
PDD + Failure of DN300 from Williamtown	20:00	Ult	7.2	N17	1.48	Stockton DN250
			9.3	N10,N14		
			9.9	N21		
			10	N20		
			10.2	N7		
			10.5	N22		
			11	N19,N23,N24		
			11.3	N15		

All results meet the criteria set out in Section 3.3.3 except for the failure of the DN300 from Williamtown. The pressure at N17 is derived from a ground level of RL18 that is the existing natural surface. Ground shaping is expected to reduce this level but in any case only one property is affected. The other pressures of 9m and above are considered acceptable for this extreme case. For these reasons the system as proposed is considered satisfactory.

3.5 Rate of Development

A lot release rate of approximately 120 per year was assumed based on information provided by the Winten Property Group.

3.6 Costs

A cost estimate and NPV analysis has been prepared and is included in Appendix D.

The costs have been determined in accordance with HWC procedures for Preliminary Estimates.

The NPV analysis is based on the staging in Figure 2 and for a discount factor of 7%. It was assumed that the DN300 connection to Williamtown was installed in year 2008.

A summary of the costs is shown in Table 3.3.

Table 3.3 Water Preliminary Cost Estimates Present Values

Nett Present Value Costs		
Capital	**O & M**	**Total**
$6,567,000	$163,000	$6,730,000

The two lead in mains will benefit existing and future users in addition to the Winten – CVC development. Joint funding will be sought for these mains.

4. Conclusions and Recommendations

4.1 Sewerage

Preliminary concept designs have been prepared for conventional and low pressure sewerage systems to serve the proposed Winten – CVC development. The arrangement includes a transportation system delivering to the connection to the HWC system at the corner of Rankin and Nelson Bay Roads in Fern Bay.

Preliminary cost estimates for the LPSS showed it to be viable but because the system is the subject of ongoing discussion between HWC and EGL in respect of design criteria these costs are not presented here. Costs of the alternative conventional systems have produced the following NPVs when staging of the system to suit the assumed rate of development shown in Section 2.5 is taken into account:

Table 4.1 Sewer Preliminary Cost Estimates Present Values

	Nett Present Value Cost		
Option	**Capital**	**O & M**	**Total**
Conventional – WWPS. 1 not staged	$8,003,000	$1,400,000	$9,403,000
Conventional – WWPS. 1 staged	$8,741,000	$1,424,000	$10,165,000

Recommendation

- A conventional gravity sewerage system be adopted for the development. This means proceeding immediately with the design and construction of WWPS No.1 with a single un-staged rising main with a capacity of 86L/s.
- The gravity scheme shall be optimally arranged to facilitate its logical extension to upstream sub catchments within the development, minimising life cycle costs while maximising opportunity for the efficient expansion of the gravity scheme.
- Proceed with further investigation of the use of LPSS on a catchment by catchment basis with due regard to Hunter Water's evolving LPSS design requirements.
- Further discussion will be required with Hunter Water to confirm what funding may be offered for selected rising main upsizing. Reimbursements may be payable to the lead developer if other development utilise this infrastructure.

4.2 Water Supply

Preliminary concept designs have been prepared for a water supply system to serve the proposed Winten – CVC development. The arrangement includes lead-in mains from the existing HWC mains at Williamtown and Stockton Bridge (Ref Figure 1).

Costs of the alternative systems have produced the following NPVs when staging of the system to suit a lot release rate of approximately 120 per year:

Table 4.2 Water Preliminary Cost Estimates Present Values

Nett Present Value Costs		
Capital	**O & M**	**Total**
$6,567,000	$163,000	$6,730,000

Points to note are:

- The lead-in mains comprise a DN250 from Stockton Bridge and a DN300 from Williamtown. It is assumed that the DN250 would be installed initially with the DN300 to follow in 2008, based on the assumed development rate.
- The lead-in mains will benefit users other than Winten-CVC and so their provision should be on a joint funding basis.

Recommendation

- The water supply system arrangement shown on Figure 5 be adopted.
- Design and construction proceed for the DN250 lead-in main from Stockton Bridge as well as the DN200 trunk ring main and reticulation sufficient to serve development stages 1 and 2.
- The DN250 is to be upgraded to DN 300, subject to the prior agreement of Hunter Water to contribute an appropriate funding contribution to Winten – CVC.

Appendix A

Figures

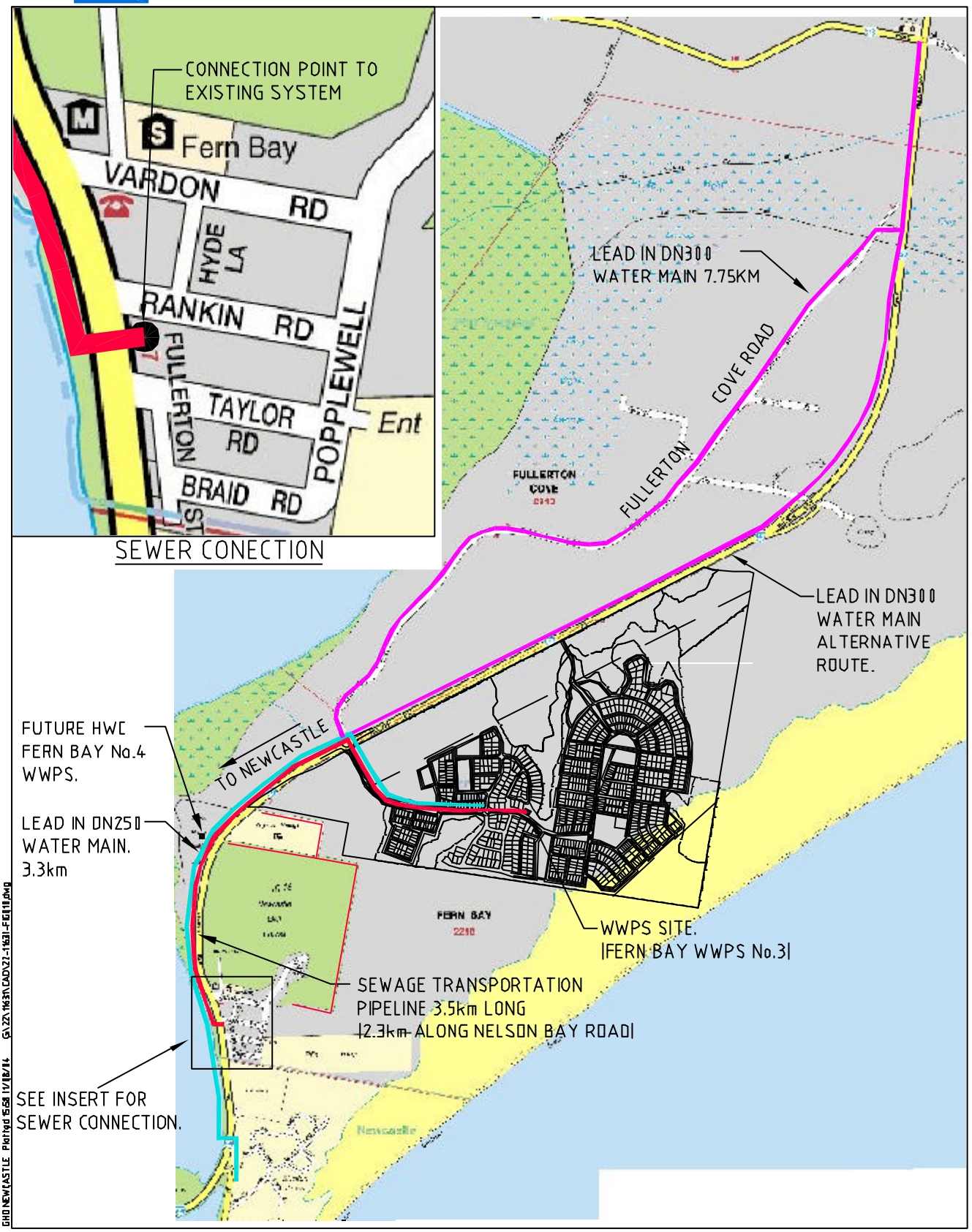


FIGURE 1
LOCATION OF PROPOSED WATER AND SEWER INFRASTRUCTURE FERNBAY

LEGEND

- Residential Integrated Housing
- Residential Villas 340 to 399
- Residential Premium 400 to 449
- Residential Courtyard 450 to 589
- Residential Conventional Lots 590 to 699
- Residential Conservation Lots 700 +
- Residential Duplex 750 +
- Approved Lots
- Part of Approved Development Footprint
- Recreational/Community Facilities
- Active Recreational Facilities
- Open Space Conservation Areas
- Open Space Landscaped areas; playground
- Community Nursery
- Aboriginal Heritage Reserve
- Temporary Sales office
- Fern Bay Study Area
- Fire Trail
- Major Walking Trail

ALLOTMENT TYPES AND NUMBERS

Residential Integrated Housing 3.82ha x 30/ha	114 units
Residential Villas	109 lots
Residential Premium	108 lots
Residential Courtyard	232 lots
Residential Conventional Lots	173 lots
Residential Conservation Lots	27 lots
Residential Duplex 39 lots (2 units per lot)	78 units
Existing DA	102 lots
Total	**943**

Source: Robertsday Town Planning Design

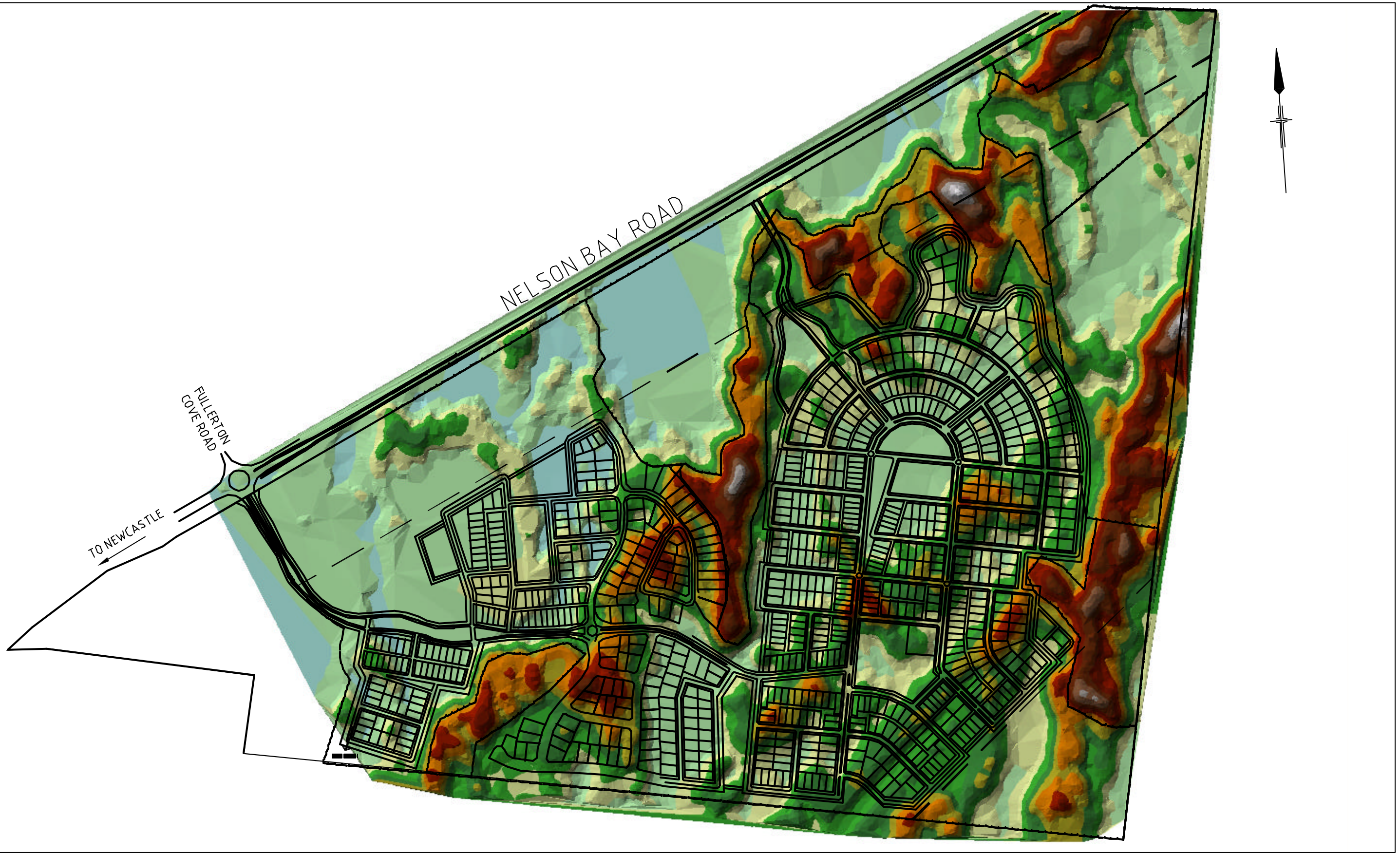
ERM

0 100m
Approximate only

Figure 2 **Concept Plan of Proposed Subdivision**

Winten Property Group - CVC Limited - Fern Bay Estate

22-11631-Rep2.CDR



GHD NEWCASTLE Plotted 14:29 02/04/04 G:\22\11631\CAD\22-11631-FIG004.dwg

7 0 14 21 28 35 0m

1:7000 for A3 Size Plot

FIGURE 3
PROPOSED DEVELOPMENT AND TOPOGRAPHY
FERNBAY

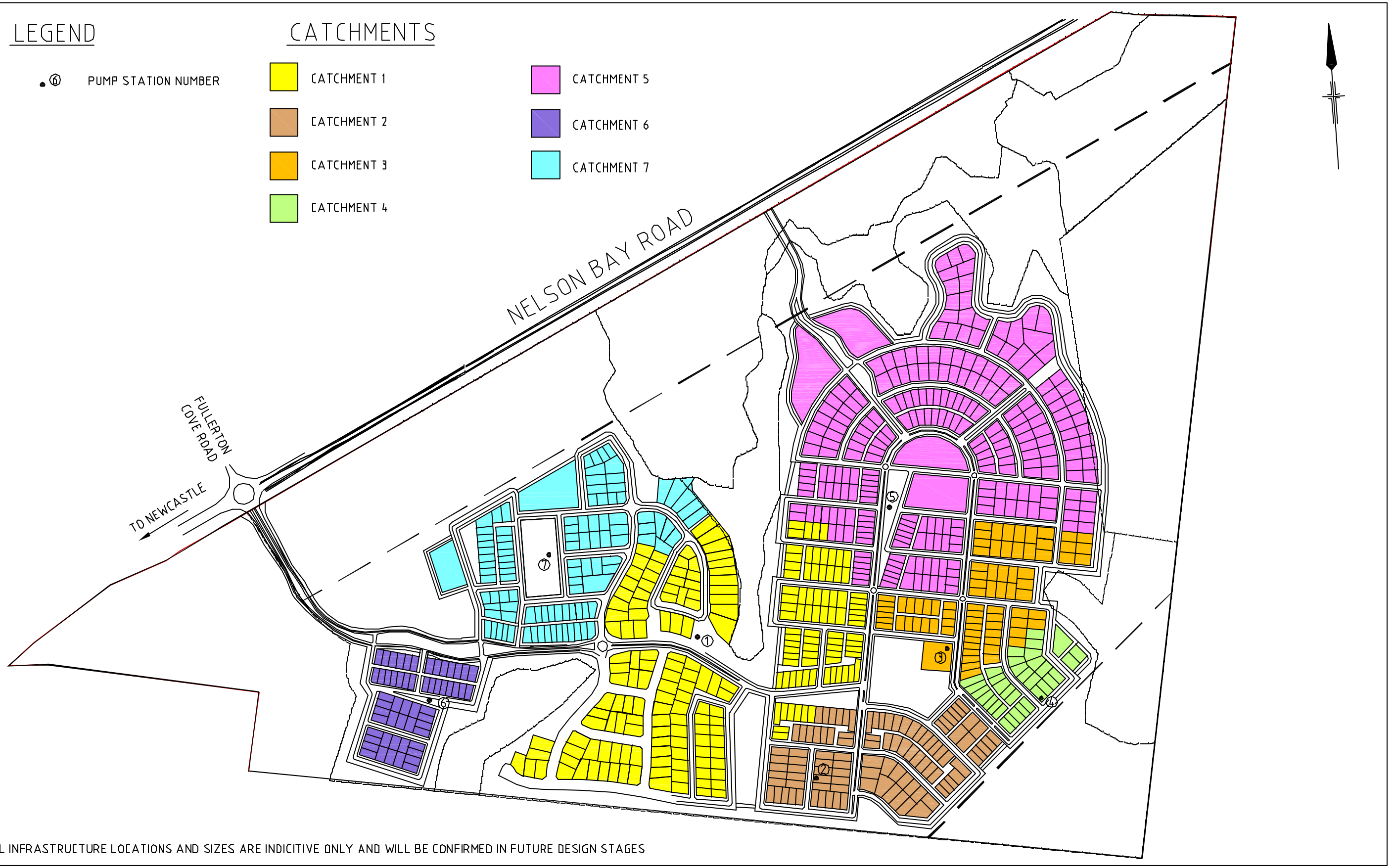
GHD NEWCASTLE Plotted 11:00 15/04/04 G:\22\11631\CAD\22-11631-FIG005.dwg

LEGEND

⑥ PUMP STATION NUMBER

CATCHMENTS

- CATCHMENT 1
- CATCHMENT 2
- CATCHMENT 3
- CATCHMENT 4
- CATCHMENT 5
- CATCHMENT 6
- CATCHMENT 7



NOTE: ALL INFRASTRUCTURE LOCATIONS AND SIZES ARE INDICITIVE ONLY AND WILL BE CONFIRMED IN FUTURE DESIGN STAGES

0 70 140 210 280 350m
1:7000 for A3 Size Plot

FIGURE 4
CONVENTIONAL SEWER LAYOUT
FERNBAY

GHD

LEGEND

DN 300

DN 250

DN 200

DN 150

DN 100

N22 PIPE++ NODE No.

DN 300 LEAD IN MAIN FROM WILLIAMTOWN

DN 250 LEAD IN MAIN FROM STOCKTON

NELSON BAY ROAD

FULLERTON COVE ROAD

100M

TO NEWCASTLE

920M

N2 N3 N4 N5 N6 N7 N10 N11 N12 N13 N14 N15 N17 N18 N19 N20 N21 N22 N23 N24 N25 N27 N28 N30

NOTE: ALL INFRASTRUCTURE LOCATIONS AND SIZES ARE INDICITIVE ONLY AND WILL BE CONFIRMED IN FUTURE DESIGN STAGES

7 14 21 28 350m

1:7000 for A3 Size Plot

GHD NEWCASTLE Plotted 15:58 11/18/04 G:\22\11631\CAD\22-11631-FIG008.dwg

FIGURE 5
WATER SUPPLY SYSTEM
FERNBAY

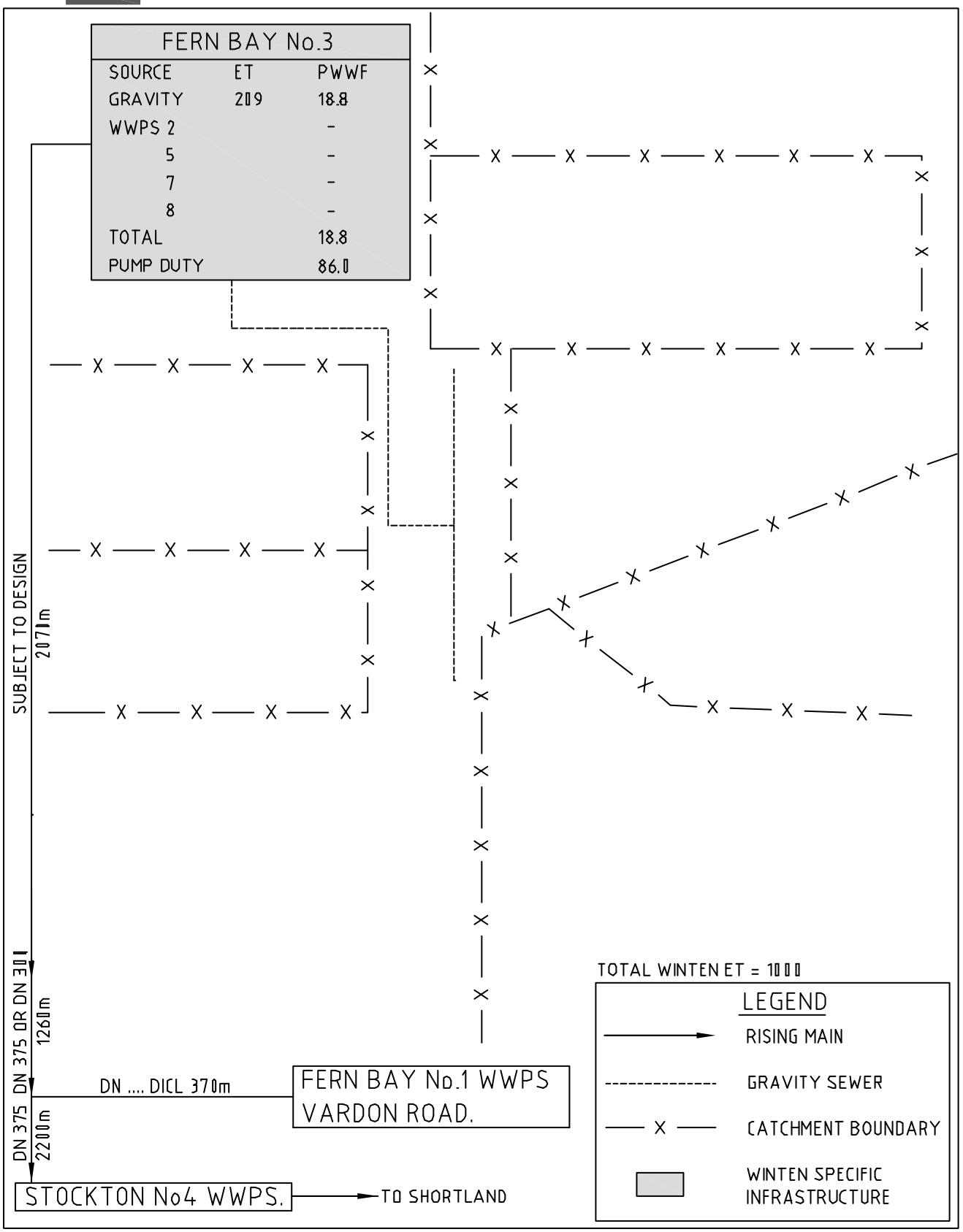
Appendix B

Sewer Loadings

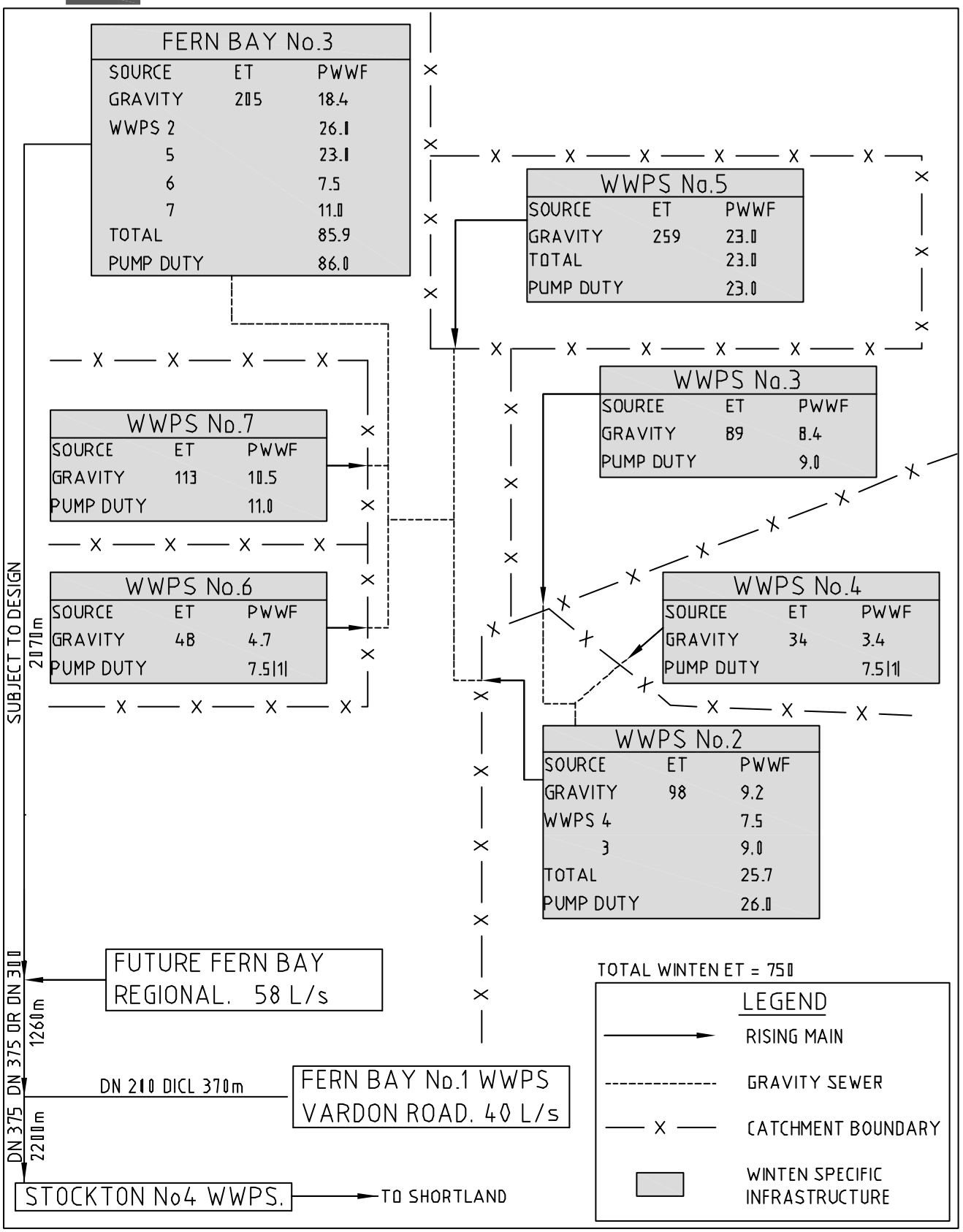
B1. Conventional Sewer System Layout and Loads - Stage 1

B2. Conventional Sewer System Layout and Loads – Ultimate

B3. Load Determination for Conventional System



APPENDIX B1
CONVENTIONAL SEWER SYSTEM LAYOUT & LOADS STAGE 1
WITH FUTURE FERN BAY REGIONAL WWPS'S
FERN BAY



APPENDIX B2
CONVENTIONAL SEWER SYSTEM LAYOUT & LOADS ULTIMATE WITH FUTURE FERN BAY REGIONAL WWPS'S
FERN BAY

NOTES

1. 7.5 L/S IS MINIMUM FLOW FOR DN100 RISING MAIN.

Load Determination for a Conventional System																			
															(1)	(2)	(3)	(4)	(5)	(6)
WWPS	Intergrated		Villas		Premium		Courtyard		Convetional		Conservation		Duplex		ET	ADWF	r	PDWF	SA	PWWF
Catchmen	No.	ET	No.	ET	No.	ET	No.	ET	No.	ET	No.	ET	No.	ET		=(1)*0.011		=(2)*(3)	=(1)*0.058	=(4)+(5)
		(X 0.67)		(X 0.67)		(X 1)		(X 1)		(X 1)		(X 1)		(X 0.67)						
1		0	22	15	20	20	50	50	108	108		0	18	12	205	2.25	2.90	6.53	11.88	18.41
2		0	11	7	20	20	48	48	15	15		0	12	8	98	1.08	3.27	3.54	5.71	9.24
3	17.1	11	6	4	11	11	27	27	32	32		0	5	3	89	0.98	3.32	3.25	5.15	8.40
4		0		0	9	9	12	12	12	12	1	1		0	34	0.37	3.92	1.47	1.97	3.44
5	57	38	30	20	14	14	82	82	81	81	24	24		0	259	2.85	2.79	7.97	15.04	23.01
6		0	15	10	13	13	13	13		0		0	18	12	48	0.53	3.69	1.95	2.79	4.74
7	39.9	27	24	16	23	23		0	30	30		0	25	17	113	1.24	3.19	3.96	6.53	10.48
														Total ET:	846					
Total Lots:	114		108		110		232		278		25		78	Total Lots:	945					
							(Note 1)						(Note 1)							
Notes:	1. Counts taken off Winten's "Concept Plan of Proposed Subdivision" adjusted to agree with numbers in the table "Allotment Types and Numbers" on that drawing.																			

Appendix C

Sewer Preliminary Cost Estimate

NPV Analysis

Conventional Sewer System WWPS No. 1 Staged — **DISCOUNT FACTOR** 7%

YEAR					2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	TOTAL
PERIOD NO					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	
Lots (TOTAL 1,000)						100	225	329	459	606	716	852	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
CAPITAL COSTS																																				
Pump Station Civils	**Number**		**Rate**																																	
WWPS No. 1	1		246522		$246,522	$246,522																														$246,522
WWPS No. 2	1		185232		$185,232				$185,232	$185,232																										$370,464
WWPS No. 3	1		193404		$193,404						$193,404																									$193,404
WWPS No. 4	1		171612		$171,612					$171,612																										$171,612
WWPS No. 5	1		193404		$193,404							$193,404																									$193,404
WWPS No. 6	1		171612		$171,612								$171,612																								$171,612
WWPS No. 7	1		193404		$193,404				$193,404																												$193,404
WWPS No. 8	1		217920		$217,920		$217,920																														$217,920
Pump Station Mechanicals	**Number**	**Power**	**Rate**																																	
WWPS No. 1	1	105	$38,817		$38,817	$38,817															$38,817															$77,634
	1		$61,971		$61,971				$61,971																											
WWPS No. 2	1	7.5	$14,301		$14,301					$14,301															$14,301											$28,602
WWPS No. 3	1	3	$10,896		$10,896						$10,896															$10,896										$21,792
WWPS No. 4	1	1	$10,896		$10,896					$10,896															$10,896										$21,792
WWPS No. 5	1	2.2	$10,896		$10,896							$10,896															$10,896									$21,792
WWPS No. 6	1	1	$10,896		$10,896								$10,896															$10,896								$21,792
WWPS No. 7	1	2.2	$10,896		$10,896				$10,896															$10,896											$21,792
WWPS No. 8	1	7.5	$14,301		$14,301		$14,301															$14,301														$28,602
Pump Station Electricals	**Number**	**Power**	**Rate**																																	
WWPS No. 1	1	210	$107,598		$107,598	$107,598															$38,817															$146,415
	1		$113,046		$113,046				$113,046																											
WWPS No. 2	1	15	$50,394		$50,394					$14,301															$14,301										$28,602
WWPS No. 3	1	6	$45,627		$45,627						$10,896															$10,896									$21,792
WWPS No. 4	1	2	$45,627		$45,627					$10,896															$10,896									$21,792
WWPS No. 5	1	5	$45,627		$45,627							$10,896															$10,896								$21,792
WWPS No. 6	1	2	$45,627		$45,627								$10,896															$10,896							$21,792
WWPS No. 7	1	5	$45,627		$45,627				$10,896															$10,896											$21,792
WWPS No. 8	1	20	$50,394		$50,394		$14,301															$14,301													$28,602
Rising Main	**Diameter**	**Length**	**Rate**																																	
WWPS No. 1	200	3500	$138		$484,313	$484,313																														$484,313
	250	3500	$158		$551,250				$551,250																											
WWPS No. 2	150	300	$114		$34,088					$34,088																										$34,088
WWPS No. 3	100	130	$104		$13,455						$13,455																									$13,455
WWPS No. 4	100	140	$104		$14,490					$14,490																										$14,490
WWPS No. 5 Rising Main	150	100	$114		$11,363							$11,363																								$11,363
WWPS No. 5 Carrier	225	170	$158		$26,775							$26,775																								$26,775
WWPS No. 6	100	150	$104		$15,525								$15,525																							$15,525
WWPS No. 7	100	570	$104		$58,995				$58,995																											$58,995
WWPS No. 8	150	390	$114		$44,314		$44,314																													$44,314
Reticulation Mains	**Diameter**	**Length**	**Rate**																																	
WWPS No. 1 Stage 1			$490,483		$490,483	$490,483																														$490,483
WWPS No. 1 Stage 2			$204,098		$204,098				$204,098																											$204,098
WWPS No. 2			$374,614		$374,614					$374,614																											$374,614
WWPS No. 3			$362,008		$362,008						$362,008																										$362,008
WWPS No. 4			$101,829		$101,829					$101,829																											$101,829
WWPS No. 5 Stage 1			$540,405		$540,405							$540,405																									$540,405
WWPS No. 5 Stage 2			$261,191		$261,191								$261,191																								$261,191
WWPS No. 6			$60,244		$60,244								$60,244																								$60,244
WWPS No. 7			$215,606		$215,606				$215,606																												$215,606
WWPS No. 8 Stage 1			$447,289		$447,289		$447,289																														$447,289
WWPS No. 8 Stage 2			$378,293		$378,293			$378,293																													$378,293
Miscellaneous																																				
Iron salt dosing. RC slab at WWPS No. 1					$5,000	$5,000																														$5,000
House connections	150	15	56		$840,000	$84,000	$105,000	$87,360	$109,200	$123,480	$92,400	$114,240	$124,320																								$1,680,000
Estimated Contract Value Sub Total					**$7,842,173**	**$1,456,733**	**$843,125**	**$465,653**	**$1,714,594**	**$1,055,739**	**$683,059**	**$907,979**	**$654,684**								**$77,634**	**$28,602**		**$21,792**	**$50,394**	**$21,792**	**$21,792**	**$21,792**								
Establishment & Disestablishment					$20,000	$20,000	$10,000	$10,000	$20,000	$20,000	$10,000	$10,000	$10,000								$4,000	$2,000		$2,000	$4,000	$2,000	$2,000	$2,000								
Estimated Contract Award Total					**$7,862,173**	**$1,476,733**	**$853,125**	**$475,653**	**$1,734,594**	**$1,075,739**	**$693,059**	**$917,979**	**$664,684**								**$81,634**	**$30,602**		**$23,792**	**$54,394**	**$23,792**	**$23,792**	**$23,792**								
Design Costs					$471,730	$147,673	$85,312	$47,565	$173,459	$107,574	$69,306	$91,798	$66,468								$12,245	$4,590		$3,569	$8,159	$3,569	$3,569	$3,569								
Design Management			10%		$47,173	$14,767	$8,531	$4,757	$17,346	$10,757	$6,931	$9,180	$6,647								$1,225	$459		$357	$816	$357	$357	$357								
Pre construction contingency			20%		$103,781	$32,488	$18,769	$10,464	$38,161	$23,666	$15,247	$20,196	$14,623								$2,694	$1,010		$785	$1,795	$785	$785	$785								
Construction management					$628,974	$147,673	$85,312	$47,565	$173,459	$107,574	$69,306	$91,798	$66,468								$12,245	$4,590		$3,569	$8,159	$3,569	$3,569	$3,569								
Construction contingency			20%		$1,572,435	$295,347	$170,625	$95,131	$346,919	$215,148	$138,612	$183,596	$132,937								$16,327	$6,120		$4,758	$10,879	$4,758	$4,758	$4,758								$1,630,672
TOTAL CAPITAL COSTS					**$10,686,265**	**$2,114,681**	**$1,221,674**	**$681,134**	**$2,483,938**	**$1,540,458**	**$992,461**	**$1,314,545**	**$951,827**								**$126,369**	**$47,372**		**$36,830**	**$84,202**	**$36,830**	**$36,830**	**$36,830**								**$9,769,767**
OPERATION & MAINTENANCE COSTS																																				
Pump Station Maintenance	**Base**	**Number**	**Rate**																																	
WWPS No. 1	$4,000	1	$2,000		$6,000		$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$174,000
WWPS No. 2	$4,000	1	$2,000		$6,000						$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$150,000
WWPS No. 3	$4,000	1	$2,000		$6,000							$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$144,000
WWPS No. 4	$4,000	1	$2,000		$6,000					$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$150,000
WWPS No. 5	$4,000	1	$2,000		$6,000							$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$138,000
WWPS No. 6	$4,000	1	$2,000		$6,000								$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$132,000
WWPS No. 7	$4,000	1	$2,000		$6,000					$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$156,000
WWPS No. 8	$4,000	1	$2,000		$6,000			$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$168,000
Pump Station Operation	**Power**	**Pump Rate**	**ADWF**	**Cost/kWh**																																
WWPS No. 1	105	103.5	10.2	0.15	$16,316		$2,230	$4,460	$6,690	$8,920	$11,150	$13,346	$15,610	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$16,316	$421,358
WWPS No. 2	7.5	27	2.58	0.15	$1,130						$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$28,251
WWPS No. 3	3	9.5	1.1	0.15	$548							$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$13,146
WWPS No. 4	1	7.5	0.35	0.15	$74						$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$1,840
WWPS No. 5	2.2	28.5	2.87	0.15	$349							$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$8,035
WWPS No. 6	1	7.5	0.29	0.15	$61									$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$1,341
WWPS No. 7	2.2	7.5	0.51	0.15	$236					$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$6,133
WWPS No. 8	10	17.5	2.12	0.15	$1,910			$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$53,485
Rising Main	**Diameter**	**Length**	**Rate**																																	
WWPS No. 1	200	3,500.0	$0.72		$2,520		$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$73,080
	250	3,500.0	$0.73		$2,559					$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$2,559	$66,544
WWPS No. 2	150	300.0	$0.71		$213						$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$5,334
WWPS No. 3	100	130.0	$0.71		$92							$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$2,200
WWPS No. 4	100	140.0	$0.71		$99						$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$2,468
WWPS No. 5 Rising Main	150	100.0	$0.71		$71								$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$1,636
WWPS No. 5 Carrier		170.0																																		
WWPS No. 6	100	150.0	$0.71		$106					$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$2,750
WWPS No. 7	100	570.0	$0.71		$402			$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$11,252
WWPS No. 8	150	390.0	$0.71																																	
Reticulation main O & M	**Diameter**	**Length**	**Rate**																																	
2005	150	2,100.0	$2.71		$5,687		$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$164,911
	225	160.0	$2.63		$421		$421		$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$11,782
	300	190.0	$2.55		$485		$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$14,076
	375	85.0	$2.48		$211		$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$6,118
2006	150	1,565.0	$2.71		$4,238			$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$118,660
	225	180.0	$2.63		$473			$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$13,255
2007	150	1,415.0	$2.71		$3,832				$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$103,455
	225		$2.63																																	
2008	150	1,790.0	$2.71		$4,847				$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$126,026
	225	470.0	$2.63		$1,236				$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$32,137
2009	150	2,365.0	$2.71		$6,404					$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$160,105
	225	460.0	$2.63		$1,210					$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$30,244
2010	150	2,120.0	$2.71		$5,741					$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$137,778
	225		$2.63																																	
2011	150	2,440.0	$2.71		$6,607								$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$151,967
	225	410.0	$2.63		$1,078								$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$24,800
2012	150	2,170.0	$2.71		$5,876									$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$129,275
	225	60.0	$2.63		$158									$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$3,471
Miscellaneous																																				
WWPS No. 1 iron salt dosing			30000		$30,000		$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$870,000
TOTAL OPERATING COSTS					$153,190		$47,554	$62,386	$68,869	$86,083	$109,443	$124,019	$140,389	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$4,008,911
TOTAL CAPITAL + OPERATING COSTS					$10,839,455	$2,114,681	$1,269,228	$743,521	$2,552,807	$1,626,541	$1,101,903	$1,438,564	$1,092,216	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$279,559	$200,561	$153,190	$190,020	$237,391	$190,020	$190,020	$190,020	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$153,190	$13,778,678
PRESENT VALUE of CAPITAL COSTS						$1,976,337	$1,067,058	$556,009	$1,894,985	$1,098,325	$661,318	$818,633	$553,972								$42,806	$14,997		$10,184	$21,759	$8,895	$8,313	$7,769								$8,741,359
PRESENT VALUE of O&M COSTS							$41,535	$50,926	$52,540	$61,376	$72,926	$77,233	$81,707	$83,325	$77,874	$72,779	$68,018	$63,568	$59,410	$55,523	$51,891	$48,496	$45,323	$42,358	$39,587	$36,997	$34,577	$32,315	$30,201	$28,225	$26,379	$24,653	$23,040	$21,533	$20,124	$1,424,438
PRESENT VALUE of COSTS						$1,976,337	$1,108,593	$606,934	$1,947,524	$1,159,701	$734,245	$895,865	$635,680	$83,325	$77,874	$72,779	$68,018	$63,568	$59,410	$55,523	$94,696	$63,493	$45,323	$52,542	$61,346	$45,892	$42,890	$40,084	$30,201	$28,225	$26,379	$24,653	$23,040	$21,533	$20,124	$10,165,797
		TOTALS																																		
CUM. PRESENT VALUE of CAPITAL COSTS		**$8,741,359**				$1,976,337	$3,043,395	$3,599,404	$5,494,388	$6,592,713	$7,254,032	$8,072,664	$8,626,637	$8,626,637	$8,626,637	$8,626,637	$8,626,637	$8,626,637	$8,626,637	$8,626,637	$8,669,442	$8,684,439	$8,684,439	$8,694,623	$8,716,382	$8,725,277	$8,733,590	$8,741,359	$8,741,359	$8,741,359	$8,741,359	$8,741,359	$8,741,359	$8,741,359	$8,741,359	
CUM. PRESENT VALUE of O&M COSTS		**$1,424,438**					$41,535	$92,461	$145,001	$206,376	$279,303	$356,535	$438,243	$521,568	$599,441	$672,221	$740,239	$803,807	$863,216	$918,739	$970,630	$1,019,126	$1,064,449	$1,106,807	$1,146,394	$1,183,392	$1,217,969	$1,250,283	$1,280,484	$1,308,709	$1,335,088	$1,359,741	$1,382,781	$1,404,313	$1,424,438	
CUM. PRESENT VALUE of COSTS		**$10,165,797**				$1,976,337	$3,084,930	$3,691,865	$5,639,389	$6,799,090	$7,533,334	$8,429,200	$9,064,879	$9,148,204	$9,226,078	$9,298,857	$9,366,875	$9,430,444	$9,489,853	$9,545,376	$9,640,072	$9,703,565	$9,748,888	$9,801,430	$9,862,777	$9,908,669	$9,951,559	$9,991,643	$10,021,844	$10,050,069	$10,076,447	$10,101,100	$10,124,140	$10,145,673	$10,165,797	
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	

NPV Analysis

Conventional Sewer System WWPS No. 1 Not Staged **DISCOUNT FACTOR** 7%

YEAR					2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	TOTAL
PERIOD NO					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	
Lots (TOTAL 1,000)						100	225	329	459	606	716	852	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
CAPITAL COSTS																																				
Pump Station Civils	**Number**		**Rate**																																	
WWPS No. 1	1		246522		$246,522	$246,522																													$246,522
WWPS No. 2	1		185232		$185,232				$185,232	$185,232																									$370,464
WWPS No. 3	1		193404		$193,404						$193,404																								$193,404
WWPS No. 4	1		171612		$171,612					$171,612																									$171,612
WWPS No. 5	1		193404		$193,404							$193,404																								$193,404
WWPS No. 6	1		171612		$171,612								$171,612																							$171,612
WWPS No. 7	1		193404		$193,404				$193,404																											$193,404
WWPS No. 8	1		217920		$217,920		$217,920																													$217,920
Pump Station Mechanicals	**Number**	**Power**	**Rate**																																	
WWPS No. 1	1	105	$61,971		$61,971	$61,971															$61,971														$123,942
WWPS No. 2	1	7.5	$14,301		$14,301					$14,301															$14,301										$28,602
WWPS No. 3	1	3	$10,896		$10,896						$10,896															$10,896									$21,792
WWPS No. 4	1	1	$10,896		$10,896					$10,896															$10,896									$21,792
WWPS No. 5	1	2.2	$10,896		$10,896							$10,896															$10,896								$21,792
WWPS No. 6	1	1	$10,896		$10,896								$10,896															$10,896							$21,792
WWPS No. 7	1	2.2	$10,896		$10,896				$10,896															$10,896											$21,792
WWPS No. 8	1	7.5	$14,301		$14,301		$14,301															$14,301													$28,602
Pump Station Electricals	**Number**	**Power**	**Rate**																																	
WWPS No. 1	1	210	$113,046		$113,046	$61,971															$61,971														$123,942
WWPS No. 2	1	15	$50,394		$50,394					$14,301															$14,301										$28,602
WWPS No. 3	1	6	$45,627		$45,627						$10,896															$10,896									$21,792
WWPS No. 4	1	2	$45,627		$45,627					$10,896															$10,896									$21,792
WWPS No. 5	1	5	$45,627		$45,627							$10,896															$10,896								$21,792
WWPS No. 6	1	2	$45,627		$45,627								$10,896															$10,896							$21,792
WWPS No. 7	1	5	$45,627		$45,627				$10,896															$10,896											$21,792
WWPS No. 8	1	20	$50,394		$50,394		$14,301															$14,301													$28,602
Rising Main	**Diameter**	**Length**	**Rate**																																	
WWPS No. 1	300	3500	$213		$745,500	$745,500																													$745,500
WWPS No. 2	150	300	$114		$34,088					$34,088																									$34,088
WWPS No. 3	100	130	$104		$13,455						$13,455																								$13,455
WWPS No. 4	100	140	$104		$14,490					$14,490																									$14,490
WWPS No. 5 Rising Main	150	100	$114		$11,363							$11,363																							$11,363
WWPS No. 5 Carrier	225	170	$158		$26,775							$26,775																							$26,775
WWPS No. 6	100	150	$104		$15,525								$15,525																						$15,525
WWPS No. 7	100	570	$104		$58,995				$58,995																										$58,995
WWPS No. 8	150	390	$114		$44,314		$44,314																												$44,314
Reticulation Mains	**Diameter**	**Length**	**Rate**																																	
WWPS No. 1 Stage 1			$490,483		$490,483	$490,483																													$490,483
WWPS No. 1 Stage 2			$204,098		$204,098				$204,098																										$204,098
WWPS No. 2			$374,614		$374,614					$374,614																									$374,614
WWPS No. 3			$362,008		$362,008						$362,008																									$362,008
WWPS No. 4			$101,829		$101,829					$101,829																									$101,829
WWPS No. 5 Stage 1			$540,405		$540,405							$540,405																							$540,405
WWPS No. 5 Stage 2			$261,191		$261,191								$261,191																						$261,191
WWPS No. 6			$60,244		$60,244								$60,244																						$60,244
WWPS No. 7			$215,606		$215,606				$215,606																										$215,606
WWPS No. 8 Stage 1			$447,289		$447,289		$447,289																												$447,289
WWPS No. 8 Stage 2			$378,293		$378,293			$378,293																											$378,293
			$3,436,059																																	
Miscellaneous																																				
Iron salt dosing. RC slab at WWPS No. 1					$5,000	$5,000																													$5,000
Estimated Contract Value Sub Total					**$6,565,695**	**$1,611,447**	**$738,125**	**$378,293**	**$879,127**	**$932,259**	**$590,659**	**$793,739**	**$530,364**								**$123,942**	**$28,602**		**$21,792**	**$50,394**	**$21,792**	**$21,792**	**$21,792**								
Establishment & Disestablishment					$20,000	$20,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000								$6,000	$2,000		$2,000	$4,000	$2,000	$2,000	$2,000								
Estimated Contract Award Total					**$6,585,695**	**$1,631,447**	**$748,125**	**$388,293**	**$889,127**	**$942,259**	**$600,659**	**$803,739**	**$540,364**								**$129,942**	**$30,602**		**$23,792**	**$54,394**	**$23,792**	**$23,792**	**$23,792**								
Design Costs					$395,142	$163,145	$74,812	$38,829	$88,913	$94,226	$60,066	$80,374	$54,036								$16,243	$4,590		$3,569	$8,159	$3,569	$3,569	$3,569								
Design Management			10%		$39,514	$16,314	$7,481	$3,883	$8,891	$9,423	$6,007	$8,037	$5,404								$1,624	$459		$357	$816	$357	$357	$357								
Pre construction contingency			20%		$86,931	$35,892	$16,459	$8,542	$19,561	$20,730	$13,215	$17,682	$11,888								$3,573	$1,010		$785	$1,795	$785	$785	$785								
Construction management					$526,856	$163,145	$74,812	$38,829	$88,913	$94,226	$60,066	$80,374	$54,036								$19,491	$4,590		$3,569	$8,159	$3,569	$3,569	$3,569								
Construction contingency			20%		$1,317,139	$326,289	$149,625	$77,659	$177,825	$188,452	$120,132	$160,748	$108,073								$25,988	$6,120		$4,758	$10,879	$4,758	$4,758	$4,758								$1,370,823
House Connections	150	15	56		$840,000	$84,000	$105,000	$87,360	$109,200	$123,480	$92,400	$114,240	$124,320																							
TOTAL CAPITAL COSTS					**$8,951,277**	**$2,420,232**	**$1,176,314**	**$643,395**	**$1,382,430**	**$1,472,794**	**$952,544**	**$1,265,194**	**$898,121**								**$196,862**	**$47,372**		**$36,830**	**$84,202**	**$36,830**	**$36,830**	**$36,830**								**$8,114,941**
OPERATION & MAINTENANCE COSTS																																				
Pump Station Maintenance	**Base**	**Number**	**Rate**																																	
WWPS No. 1	$4,000	1	$2,000		$6,000		$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$174,000
WWPS No. 2	$4,000	1	$2,000		$6,000						$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$150,000
WWPS No. 3	$4,000	1	$2,000		$6,000							$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$144,000
WWPS No. 4	$4,000	1	$2,000		$6,000						$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$150,000
WWPS No. 5	$4,000	1	$2,000		$6,000							$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$138,000
WWPS No. 6	$4,000	1	$2,000		$6,000								$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$132,000
WWPS No. 7	$4,000	1	$2,000		$6,000					$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$156,000
WWPS No. 8	$4,000	1	$2,000		$6,000		$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$168,000
Pump Station Operation	**Power**	**Pump Rate**	**ADWF**	**Cost/kWh**																																
WWPS No. 1	103	103.5	10.2	0.15	$16,006		$2,230	$4,460	$6,690	$8,920	$11,150	$13,346	$15,610	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$16,006	$414,538
WWPS No. 2	7.5	27	2.58	0.15	$1,130						$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$1,130	$28,251
WWPS No. 3	3	9.5	1.1	0.15	$548							$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$548	$13,146
WWPS No. 4	1	7.5	0.35	0.15	$74						$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$74	$1,840
WWPS No. 5	2.2	28.5	2.87	0.15	$349							$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$349	$8,035
WWPS No. 6	1	7.5	0.29	0.15	$61								$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$61	$1,341
WWPS No. 7	2.2	7.5	0.51	0.15	$236					$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$236	$6,133
WWPS No. 8	10	17.5	2.12	0.15	$1,910				$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$1,910	$53,485
Rising Main	**Diameter**	**Length**	**Rate**																																	
WWPS No. 1	300	3,500.0	$0.75		$2,608		$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$2,608	$75,618
WWPS No. 2	150	300.0	$0.71		$213						$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$213	$5,334
WWPS No. 3	100	130.0	$0.71		$92							$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$92	$2,200
WWPS No. 4	100	140.0	$0.71		$99						$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$99	$2,468
WWPS No. 5 Rising Main	150	100.0	$0.71		$71							$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$71	$1,636
WWPS No. 5 Carrier		170.0																																		
WWPS No. 6	100	150.0	$0.71		$106					$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$106	$2,750
WWPS No. 7	100	570.0	$0.71		$402			$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$402	$11,252
WWPS No. 8	150	390.0	$0.71																																	
Reticulation main O & M	**Diameter**	**Length**	**Rate**																																	
2005	150	2,100.0	$2.71		$5,687		$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$5,687	$164,911
	225	160.0	$2.63		$421		$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$421	$11,782
	300	190.0	$2.55		$485		$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$485	$14,076
	375	85.0	$2.48		$211		$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$211	$6,118
2006	150	1,565.0	$2.71		$4,238			$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$4,238	$118,660
	225	180.0	$2.63		$473			$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$473	$13,255
2007	150	1,415.0	$2.71		$3,832				$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$3,832	$103,455
	225		$2.63																																	
2008	150	1,790.0	$2.71		$4,847				$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$4,847	$126,026
	225	470.0	$2.63		$1,236				$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$1,236	$32,137
2009	150	2,365.0	$2.71		$6,404					$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$6,404	$160,105
	225	460.0	$2.63		$1,210					$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$1,210	$30,244
2010	150	2,120.0	$2.71		$5,741						$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$5,741	$137,778
	225		$2.63																																	
2011	150	2,440.0	$2.71		$6,607								$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$6,607	$151,967
	225	410.0	$2.63		$1,078								$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$1,078	$24,800
2012	150	2,170.0	$2.71		$5,876									$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$5,876	$129,275
	225	60.0	$2.63		$158									$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$158	$3,471
Miscellaneous																																				
WWPS No. 1 iron salt dosing			30000		$30,000		$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$870,000
TOTAL OPERATING COSTS					$150,407		$47,641	$62,474	$68,956	$83,611	$106,971	$121,547	$137,917	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$3,938,085
TOTAL COSTS					$9,101,684	$2,420,232	$1,223,956	$705,869	$1,451,386	$1,556,405	$1,059,515	$1,386,740	$1,036,038	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$347,270	$197,780	$150,408	$187,238	$234,610	$187,238	$187,238	$187,238	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$150,408	$12,053,026
PRESENT VALUE of CAPITAL COSTS						$2,261,899	$1,027,438	$525,202	$1,054,649	$1,050,082	$634,720	$787,899	$522,715								$66,684	$14,997		$10,184	$21,759	$8,895	$8,313	$7,769								$8,003,205
PRESENT VALUE of O&M COSTS							$41,612	$50,997	$52,606	$59,613	$71,279	$75,693	$80,269	$81,812	$76,460	$71,458	$66,783	$62,414	$58,331	$54,515	$50,948	$47,615	$44,500	$41,589	$38,868	$36,325	$33,949	$31,728	$29,652	$27,712	$25,900	$24,205	$22,622	$21,142	$19,759	$1,400,356
PRESENT VALUE of COSTS						$2,261,899	$1,069,050	$576,199	$1,107,255	$1,109,696	$705,999	$863,592	$602,984	$81,812	$76,460	$71,458	$66,783	$62,414	$58,331	$54,515	$117,632	$62,612	$44,500	$51,773	$60,628	$45,220	$42,262	$39,497	$29,652	$27,712	$25,900	$24,205	$22,622	$21,142	$19,759	$9,403,561
		TOTALS																																		
CUM. PRESENT VALUE of CAPITAL COSTS		**$8,003,205**				$2,261,899	$3,289,338	$3,814,540	$4,869,188	$5,919,271	$6,553,991	$7,341,890	$7,864,604	$7,864,604	$7,864,604	$7,864,604	$7,864,604	$7,864,604	$7,864,604	$7,864,604	$7,931,288	$7,946,285	$7,946,285	$7,956,469	$7,978,228	$7,987,123	$7,995,436	$8,003,205	$8,003,205	$8,003,205	$8,003,205	$8,003,205	$8,003,205	$8,003,205	$8,003,205	
CUM. PRESENT VALUE of O&M COSTS		**$1,400,356**					$41,612	$92,609	$145,215	$204,829	$276,108	$351,801	$432,070	$513,882	$590,341	$661,799	$728,582	$790,995	$849,326	$903,841	$954,789	$1,002,404	$1,046,904	$1,088,493	$1,127,362	$1,163,687	$1,197,636	$1,229,364	$1,259,016	$1,286,729	$1,312,628	$1,336,834	$1,359,455	$1,380,597	$1,400,356	
CUM. PRESENT VALUE of COSTS		**$9,403,561**				$2,261,899	$3,330,949	$3,907,148	$5,014,404	$6,124,099	$6,830,098	$7,693,691	$8,296,674	$8,378,486	$8,454,946	$8,526,403	$8,593,186	$8,655,600	$8,713,931	$8,768,445	$8,886,077	$8,948,689	$8,993,190	$9,044,962	$9,105,590	$9,150,810	$9,193,072	$9,232,570	$9,262,222	$9,289,934	$9,315,834	$9,340,039	$9,362,661	$9,383,802	$9,403,561	
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	

Appendix D

Water Preliminary Cost Estimate

NPV Analysis
Water Supply

YEAR							2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	TOTAL
PERIOD NO							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																																						
Lead In Mains	**Diameter**	**Length**	**Rate**																																			
From Stockton	250	3300	$200				$660,000	$660,000																													$1,320,000
From Williamtown	300	7750	$265				$2,053,750				$2,053,750																											$4,107,500
Trunk Ring Main																																						
Stage 1,2	200	797	$175				$139,475	$139,475																														
Stage 3,4,5	200		$175																																			
Stage 6	200		$175																																			
Stage 7	200	334	$175				$58,450				$58,450																											
Stage 8	200		$175																																			
Stage 9	200		$175																																			
Stage 10	200	2474	$175				$432,950							$432,950																								
Stage 11	200		$175																																			
		3605																																				
Thrust Bores	**Diameter**	**Length**	**Rate**																																			
Nelson Bay Rd at Stockton Bridge	250	50	$1,045				$52,250	$52,250																														$104,500
Nelson Bay Rd at Fullerton Cove Road	300	50	$1,125				$56,250					$56,250																										$112,500
Reticulation Mains																																						
Stage 1,2	150	371	$145				$53,795	$53,795																														
	100	1054	$135				$142,290	$142,290																														
Stage 3,4,5	150	238	$145				$34,510		$34,510																													
	100	1935	$135				$261,225		$261,225																													
Stage 6	150	455	$145				$65,975			$65,975																												
	100	1768	$135				$238,410			$238,410																												
Stage 7	150	259	$145				$37,555				$37,555																											
	100	2098	$135				$282,960				$282,960																											
Stage 8	150	504	$145				$73,080					$73,080																										
	100	2465	$135				$332,775					$332,775																										
Stage 9	150	574	$145				$83,230						$83,230																									
	100	1181	$135				$159,435						$159,435																									
Stage 10	150	308	$145				$44,660							$44,660																								
	100	2590	$135				$348,300							$348,300																								
Stage 11	150	721	$145				$104,545								$104,545																							
	100	1888	$135				$254,880								$254,880																							
		18395																																				
		22000																																				
Miscellaneous																																						
Connection at Stockton Bridge		1	10,000.0				$10,000	$10,000																														$20,000
Connection at Williamtown		1	10,000.0				$10,000					$10,000																										$20,000
Estimated Contract Value Sub Total							**$5,990,750**	**$1,057,810**	**$295,735**	**$304,385**	**$2,432,715**	**$472,105**	**$242,685**	**$825,910**	**$359,425**																								
Establishment & Disestablishment							$20,000	$20,000	$8,000	$10,000	$20,000	$10,000	$8,000	$10,000	$10,000																								
Estimated Contract Award Total							**$6,010,750**	**$1,077,810**	**$303,735**	**$314,385**	**$2,452,715**	**$482,105**	**$250,685**	**$835,910**	**$369,425**																								
Design Costs							$360,645	$107,781	$30,374	$31,439	$196,217	$48,211	$25,067	$83,591	$36,943																								
Design Management			10%				$36,065	$10,778	$3,037	$3,144	$19,622	$4,821	$2,507	$8,359	$3,694																								
Pre construction contingency			20%				$79,342	$23,712	$6,682	$6,916	$43,168	$10,606	$5,515	$18,390	$8,127																								
Construction management							$480,860	$107,781	$30,374	$31,439	$196,217	$48,211	$25,067	$83,591	$36,943																								
Construction contingency			20%				$1,202,150	$215,562	$60,747	$62,877	$490,543	$96,421	$50,133	$167,182	$73,885																								$2,419,500
TOTAL CAPITAL COSTS							**$8,169,811**	**$1,543,424**	**$434,949**	**$450,199**	**$3,398,482**	**$690,374**	**$358,952**	**$1,197,023**	**$529,017**																								$8,104,000
OPERATION & MAINTENANCE COSTS																																						
Lead In Mains	**Diameter**	**Length**	**Rate**																																			
From Stockton	250	3,300.0	$0.73				$2,413		$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$2,413	$72,394
From Williamtown	300	7,750.0	$0.75				$5,774					$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$5,774	$155,891
Trunk Ring Main																																						
Stage 1,2	200	797	$0.72				$574		$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$574	$17,215
Stage 3,4,5	200		$0.72																																			
Stage 6	200		$0.72																																			
Stage 7	200	334	$0.72				$240	$240	$240			$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$240	$8,974
Stage 8	200		$0.72																																			
Stage 9	200		$0.72																																			
Stage 10	200	2,474	$0.72				$1,781								$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$1,781	$42,751
Stage 11	200		$0.72																																			
Reticulation Mains																																						
Stage 1,2	150	371	$0.71				$264		$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$264	$7,916
	100	1054	$0.71				$743		$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$743	$22,292
Stage 3,4,5	150	238	$0.71				$169		$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$169	$4,909
	100	1935	$0.71				$1,364		$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364	$39,561
Stage 6	150	455	$0.71				$324		$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$324	$9,061
	100	1768	$0.71				$1,245			$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$1,245	$34,861
Stage 7	150	259	$0.71				$184				$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$184	$4,974
	100	2098	$0.71				$1,478				$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$1,478	$39,897
Stage 8	150	504	$0.71				$358					$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$9,320
	100	2465	$0.71				$1,738					$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$1,738	$45,183
Stage 9	150	574	$0.71				$408						$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$408	$10,206
	100	1181	$0.71				$833						$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$833	$20,815
Stage 10	150	308	$0.71				$219						$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$219	$5,258
	100	2580	$0.71				$1,819						$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$1,819	$43,654
Stage 11	150	721	$0.71				$513							$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$11,795
	100	1888	$0.71				$1,331							$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$1,331	$30,614
Miscellaneous																																						
TOTAL OPERATING COSTS							$23,772	$240	$4,234	$5,527	$7,096	$14,772	$16,868	$18,109	$21,929	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$635,542
							$8,193,584	$1,543,664	$439,183	$455,727	$3,405,578	$705,146	$375,821	$1,215,132	$550,945	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$23,772	$8,739,542
PRESENT VALUE of CAPITAL COSTS								$1,442,452	$379,901	$367,497	$2,592,888	$492,227	$239,185	$745,446	$307,892																							
PRESENT VALUE of O&M COSTS								$225	$3,698	$4,512	$5,414	$10,532	$11,240	$11,278	$12,763	$12,931	$12,085	$11,294	$10,555	$9,865	$9,219	$8,616	$8,053	$7,526	$7,033	$6,573	$6,143	$5,741	$5,366	$5,015	$4,687	$4,380	$4,093	$3,826	$3,575	$3,342	$3,123	
PRESENT VALUE of COSTS								$1,442,677	$383,599	$372,009	$2,598,089	$502,760	$250,425	$756,723	$320,655	$12,931	$12,085	$11,294	$10,555	$9,865	$9,219	$8,616	$8,053	$7,526	$7,033	$6,573	$6,143	$5,741	$5,366	$5,015	$4,687	$4,380	$4,093	$3,826	$3,575	$3,342	$3,123	
CUM. PRESENT VALUE of CAPITAL COSTS								$1,442,452	$1,822,353	$2,189,850	$4,782,535	$5,274,763	$5,513,948	$6,259,394	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	$6,567,286	
CUM. PRESENT VALUE of O&M COSTS								$225	$3,923	$8,435	$13,849	$24,381	$35,621	$46,899	$59,661	$72,592	$84,677	$95,971	$106,526	$116,391	$125,610	$134,226	$142,279	$149,804	$156,838	$163,411	$169,554	$175,296	$180,661	$185,676	$190,363	$194,743	$198,836	$202,662	$206,237	$160,179	$163,302	
CUM. PRESENT VALUE of COSTS								$1,442,677	$1,826,278	$2,198,285	$4,796,384	$5,299,144	$5,549,569	$6,306,292	$6,626,948	$6,639,878	$6,651,963	$6,663,257	$6,673,812	$6,683,677	$6,692,896	$6,701,512	$6,709,565	$6,717,091	$6,724,124	$6,730,697	$6,736,841	$6,742,582	$6,747,948	$6,752,962	$6,757,649	$6,762,029	$6,766,123	$6,769,948	$6,773,524	$6,727,466	$6,730,588	
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 FACTOR								4.0%	7.0%	10.0%																												
TOTAL PRESENT VALUE of COSTS								7564991	6730588	6036303																												

Appendix E

Hunter Water Corporation Correspondence

HUNTER WATER

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HUNTER WATER CORPORATION
PO BOX 5171 HRMC NSW 2310
426-432 KING STREET NEWCASTLE WEST
TEL: 1300 657 657 ABN: 46 228 513 446
www.hunterwater.com.au

22/11800 & 22/11631

26 October 2004 Ref: 2003-569

Monteath & Powys Pty Ltd
PO Box 726
Newcastle NSW 2300

Attention: Mr Greg Burnitt

Dear Sir

RE WINTEN, PROPOSED RESIDENTIAL SUBDIVISION FERN BAY
Revised Hunter Water Regional Wastewater Servicing Strategy

I make reference to our recent discussions regarding wastewater servicing arrangements for the proposed Winten residential development at Fern Bay and the broader servicing strategy undertaken by Hunter Water.

For some time now Hunter Water has had in place a wastewater servicing strategy covering the existing Fern Bay community and growth identified that may occur in the vicinity.

Development such as that being considered by Winten is included in the strategy proposed by Hunter Water, along with potential sewer loading being generated from nearby SEPP 5 land, proposed mobile home park and the existing Caravan Park. Based on relatively long periods of time between these developments proceeding, Hunter Water concluded that these later areas should pump via separate sewer rising mains to our proposed regional WWPS located within the existing Fern Bay residential precinct.

Up until recently Hunter Water, and Winten, has been proceeding with investigation and design of various wastewater transfer elements linking Fern Bay with Stockton 4 WWPS on the basis of the framework established in the original Hunter Water wastewater servicing strategy for Fern Bay.

A number of immerging issues, however, have necessitated Hunter Water revisiting the wastewater servicing strategy to ensure that it remains optimally configured: -

- Hunter Water has received revised development timing for the SEPP 5 development that brings forward their need for connection to wastewater services and increases Hunter Water's confidence that they will proceed;
- You will recall at our meeting with the Roads & Traffic Authority on 20 August 2004 they raised a number of concerns regarding the proposed road widening of Nelson Bay Road, the number of water and sewer services proposed to run parallel in this corridor, and the potential for service conflicts. The need to consolidate services has now arisen.

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HUNTER WATER CORPORATION
PO BOX 5171 HRMC NSW 2310
426-432 KING STREET NEWCASTLE WEST
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22/11800 & 22/11631

Ref: 2003-569

_ SUBDIVISION FERN BAY
stewater Servicing Strategy

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ay Winten is included in the strategy proposed

HUNTER WATER

caring for our community a environmen

26 October 2004

Monteath & Powys Pty Ltd
PO Box 726
Newcastle NSW 2300

Attention: Mr Greg Burnitt

Dear Sir

RE WINTEN, PROPOSED RESIDENTIAL
Revised Hunter Water Regional Wa

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Roads & Traffic Authority on 20 August 2004
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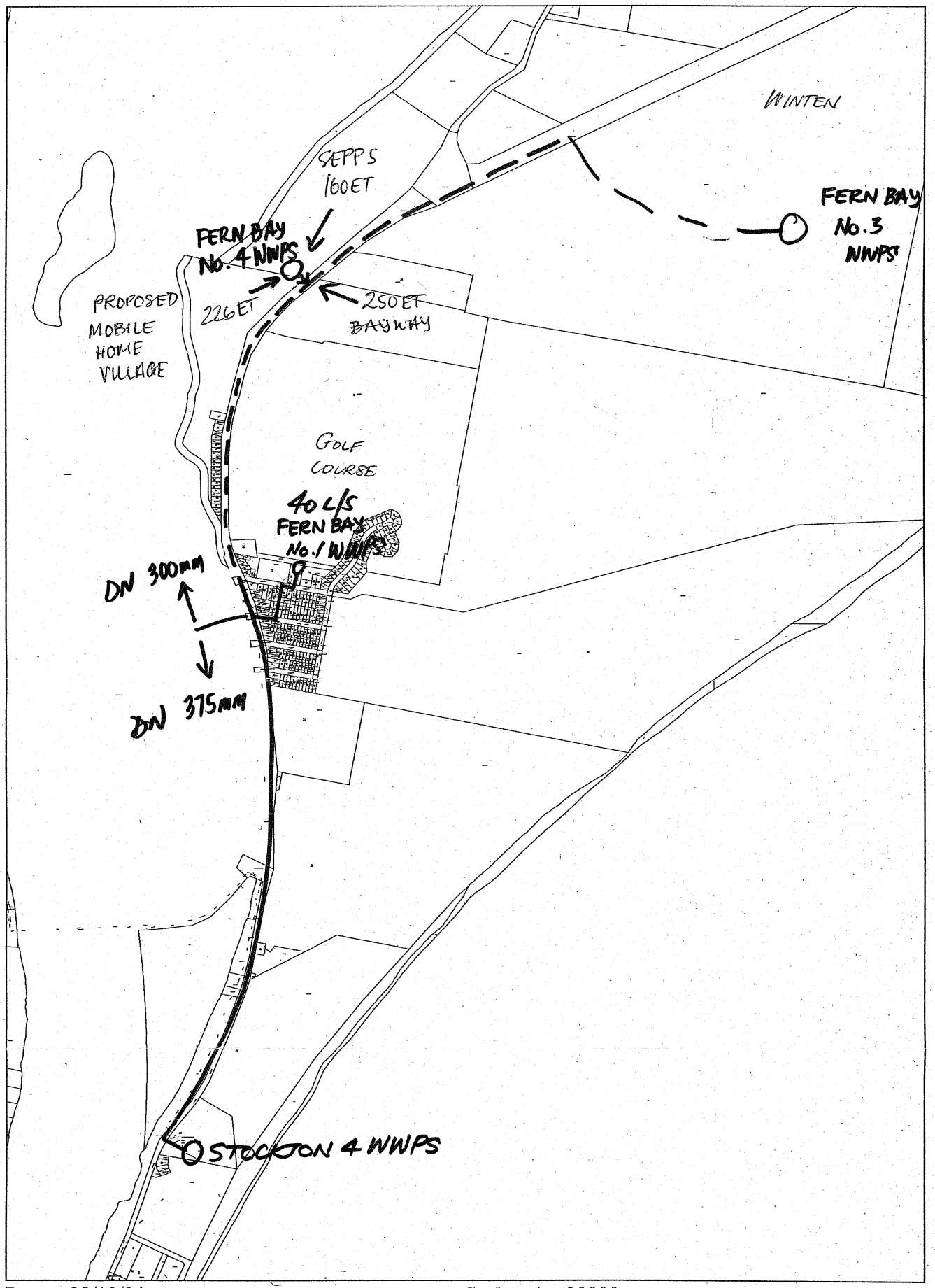


Date: 28/10/04 **Scale:** 1 : 20000

Notes: FERN BAY

HWC DOES NOT GUARANTEE THE ACCURACY OF THIS PLAN

HUNTER WATER

caring for our community and the environment

MEMO

To: **Bob Daniels - Business & Urban Development**
From: **Josh Chappelow - Planning**
CC:
Date: **18 March 2004**
File Ref: **P3083/20**

RE: LOT 16 DP 258848, NELSON BAY RD, FERN BAY - 208 LOT SUBDIVISION (WINTEN - FERNWOOD STAGE 1)

Bob,

In response to GHD's letter dated 16 February 2004 regarding the 208 lot subdivision of land at Lot 16 DP 258848, Nelson Bay Rd, Fern Bay (Winten - Fernwood Stage 1), Planning offers the following advice with respect to water and wastewater servicing requirements.

Water

An analysis of the existing water supply system was undertaken for various stages of the proposed development of the Winten site and Mobile Home Village sites. The nominated connection points are as per Planning's previous advice (6 November 2003) ie.

(1) 375mm CICL main in the Fullerton St roadway reserve near Stockton Bridge

(2) 300mm DICL main at the intersection of Cabbage Tree Rd and Nelson Bay Rd, Williamtown.

The available Hydraulic Grade Line Levels (HGL) for the various flow scenarios at the nominated points of connection are as follows:

Development Stage	Demand Scenario	HGL RL (m)
Winten 208 Lots	Average Day (Max)	65.2
(Single connection to 1.)	Peak Day (Peak Hour)	58.2
	Peak Day (Peak Hour)+ 11 L/s Fireflow	57.3
Winten 208 Lots	Average Day (Max)	65.2
Mobile Home Village 165 ET	Peak Day (Peak Hour)	57.7
(Single connection to 1.)	Peak Day (Peak Hour)+ 11 L/s Fireflow	57.0
Winten 1000 Lots	Average Day (Max)	65.2
Mobile Home Village 165 ET	Peak Day (Peak Hour)	55.2
(Single connection to 1.)	Peak Day (Peak Hour)+ 11 L/s Fireflow	54.5
Winten 1000 Lots	Average Day (Max)	(1) 65.2, (2) 65.0
Mobile Home Village 165 ET	Peak Day (Peak Hour)	(1) 58.1, (2) 67.5
(Dual connection to 1 & 2)*	Peak Day (Peak Hour)+ 11 L/s Fireflow	(1) 57.7, (2) 66.5

*Note: this option was modelled with the inclusion of a proposed 375mm trunk main from Tomago to Williamtown to service future industrial development at Williamtown.

Wastewater

Further to GHD's request for the connection point and head details of the future Winten WWPS to the Fern Bay Regional Wastewater Transportation System, I wish to advise the following:

1. The Fern Bay Regional WWPS is located at the rear of the Community Hall in Vardon Rd, Fern Bay. Ground level 3.30m, TWL -1.50m , BWL -2.80m, floor level -3.55m.

2. The rising main system from the Fern Bay Regional WWPS to Stockton No.4 WWPS consists of 370m of DN250 DICL PN20 and 2200m of DN300 DICL PN20. The common rising main section shared by the future Winten WWPS is the 2200m long DN300 section commencing at the intersection of Rankin Rd and Nelson Bay Rd and terminating at Stockton No.4 WWPS. A hardcopy plan has been attached to illustrate the proposed layout and point of connection (which is located at the intersection of Rankin Rd and Nelson Bay Rd).

3. The proposed Fern Bay Regional WWPS will have an average duty of 95.0 L/s @ 19.0m when pumping alone or 59.3 L/s @ 25.5m when pumping together with the Winten WWPS (a copy of the Fern Bay Regional WWPS rising main system and pump curves can be supplied upon request). The assumed duty of the Winten WWPS is 83.3 L/s @ 31.5m (pumping together with the Fern Bay Regional WWPS). It has also been assumed that the rising main from the Winten WWPS would comprise of 3100m of DN300.

4. The average head conditions at the point of connection estimated to be.

- Fern Bay Regional WWPS only pumping: HGL RL 11.2m
- Fern Bay Regional WWPS and Winten WWPS pumping together: HGL RL 20.8m

Note: These figure were calculated using: HGL = (TWL + BWL)/2 + Pump Head (Average Duty) - Station Losses - Rising Main Losses (370m of DN250) - RM minor losses

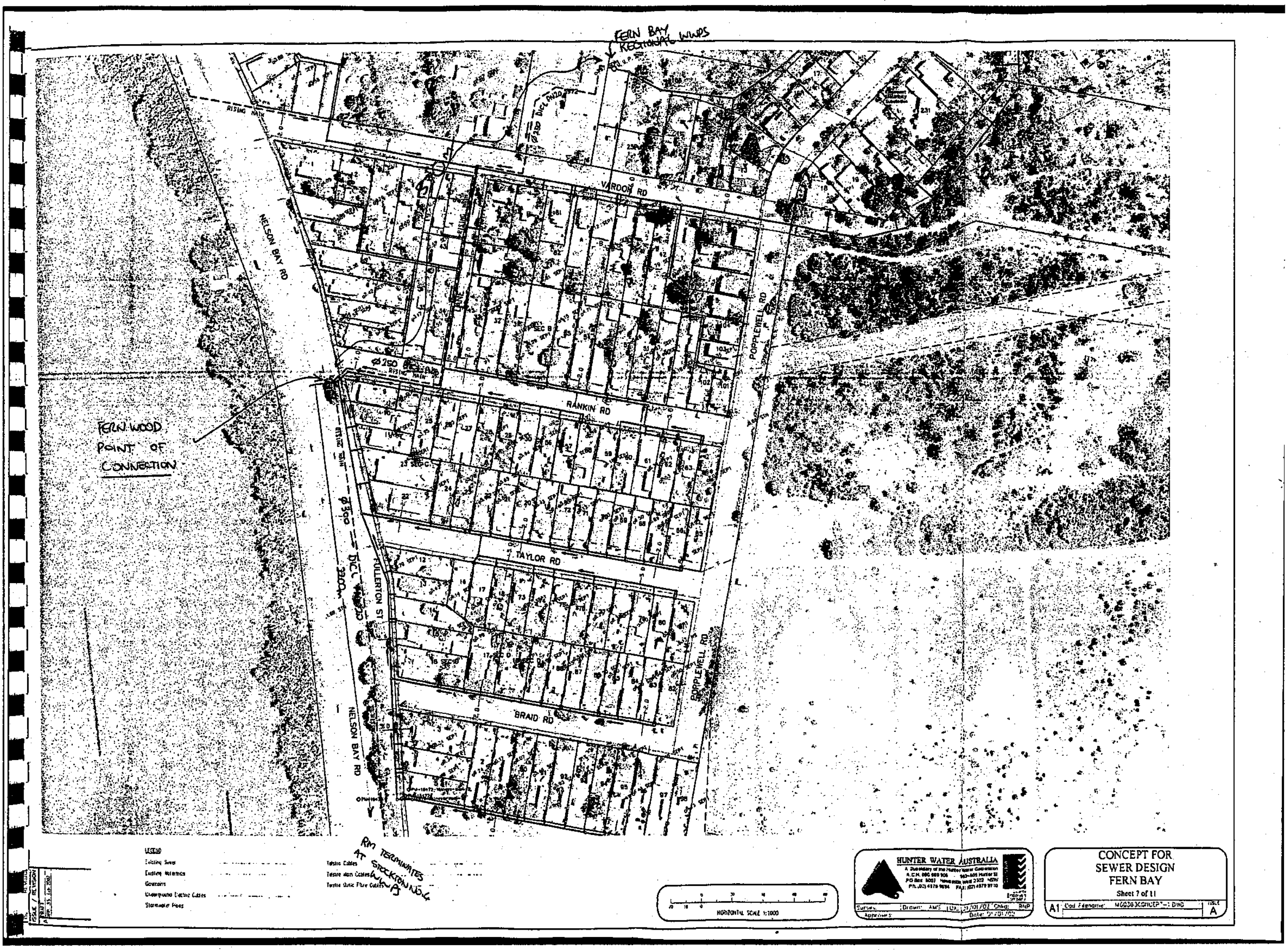
Please do not hesitate to contact me if you require clarification on any of the information provided above.

Josh Chappelow
Engineer, Planning

25/3/04
Stuart Horvath
Water Distribution Planning Engineer

18/3/04
Julia Irwin
Wastewater Distribution Planning Engineer

25.3.04
Greg Bone
Planning Engineer


FERN BAY REGIONAL WWPS
FERN WOOD POINT OF CONNECTION
RM TERMINATES AT STOCKTON No.4 WWPS
NELSON BAY RD
VARDON RD
RANKIN RD
TAYLOR RD
BRAID RD
FULLERTON ST
POPPLEWELL RD
RISING MAIN
HORIZONTAL SCALE 1:1000
HUNTER WATER AUSTRALIA
CONCEPT FOR
SEWER DESIGN
FERN BAY
Sheet 7 of 11
A1
A

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HUNTER WATER CORPORATION
PO BOX 5171 HRMC NSW 2310
434-452 KING STREET NEWCASTLE WEST
TEL: 1300 657 657 ABN: 46 228 513 446
www.hunterwater.com.au

19 November 2003

Ref:2003-569

Winten Property Group
C/- Fagan Mather Duggan
P O Box 429
Nelson Bay NSW 2315

Dear Sir/Madam

Hunter Water's requirements for the provision of water and sewerage facilities to the Stage 1 subdivision of 1 lot into 208 lots and one residue lot at Lot 16 DP 258848, Nelson Bay Road, Fern Bay are as follows:

1 Payment of a **developer charge** of $1,436,248. (Refer page 5 of the attached guide).

For water the developer charge is $182,248.

In respect of sewer, as Fern Bay is currently an unserviced area, Hunter Water does not have a published developer charge for this area. Once final configuration and costs for the system are known, a Development Servicing Plan (DSP) will be prepared for the Fern Bay area and a charge registered. The charge will include a contribution to the costs of the sewer assets in the Fern Bay area, the sewer transfer pipeline to Shortland and the Shortland Wastewater Treatment Works. To assist with your feasibility assessment of this development in Fern Bay, the indicative sewer developer charge is estimated as $6,000 per equivalent tenement which for the Stage 1 development would be in the order of $1,254,000. Please note this charge is not final & may vary once the DSP for Fern Bay has been finalised. Hunter Water will then confirm the Developer Charge payable for sewer.

If the water developer charge that has been specified in this notice is not paid by 30 June 2004 the total will be adjusted for inflation from 1 July 2004. This adjustment will be based on the weighted average of the capital cities CPI for the 12 months to the end of March 2004; and

2 Construct **Major Works**, (refer to page 6 of the attached guide) on behalf of Hunter Water, to connect each of the lots to the existing water and sewer systems of Hunter Water.

- A new minimum 250mm diameter lead-in watermain would need to be constructed to service the proposed development (ultimate 1000 lots). The recommended point of connection to HWC's system is at the 375mm CICL watermain in the Fullerton Street roadway reserve near Stockton Bridge. Details of connection will have to be confirmed with Hunter Water prior to submission of designs. An opportunity may exist for the developer to upsize the 250mm main and construct a minimum 300mm diameter lead-in watermain under a joint arrangement with the owner of another proposed subdivision at Fern Bay. This proposal would represent cost savings to both developers compared to constructing separate watermains. This option should be discussed with Hunter Water prior to preparation of designs.

RECEIVED 24.11.03

Hunter Water requires the Developer to install infrastructure to provide adequate security of supply (detailed in section 2.1.4 of the design Manual). Options may exist to maintain adequate security of supply & the owner's design consultant should contact Hunter Water to discuss this issue. The Corporation is currently undertaking a risk assessment & regional water servicing strategy to ensure that an adequate security of supply is maintained for the Kooragang - Stockton region. The outcomes of these studies will be available in early 2005. Initially Stage 1 of the development will be allowed to proceed with the recommended 250mm diameter lead-in watermain, however you are advised that future security of supply works may be required, with the details likely to be available in early 2005.

- A sewer servicing strategy for the site will need to be undertaken, at the owner's cost, using an approved design consultant. The point of connection for the development is the proposed Fern Bay sewer reticulation system in the vicinity of the intersection of Rankin Road & Nelson Bay Road, Fern Bay, where a common rising main section (375mm) is planned as part of the proposed Fern Bay Regional WWPS. It will be necessary to confirm with Hunter Water flow & head conditions of this regional pump station in order that the proposed WWPS & rising main from the development site can be designed with both pump stations operating correctly..

  A Major Works assessment/administration fee of $1,783 should be paid when designs are submitted. Additional assessment fees will be required for wastewater pump station assessments ; and

3 Please note that Hunter Water requires 3 copies of the final plan of subdivision and a disk containing a DXF file of the subdivision with lot numbers and boundaries only, directly on the MGA grid. The lot boundaries should be produced directly from your calculation software and should be all edge matched and unbroken. The lot boundaries should also match as near as possible the final deposited plan of the subdivision. Preferably this information can be emailed to Hunter Water (contact point Peter Bartlett email address peter.bartlett@hunterwater.com.au at Hunter Water Australia).

  If you have submitted your data by email and have not received a response from Peter Bartlett within 2 working days please contact him on 02 4979 9698.

The above requirements, subject to finalisation of the DSP charges and CPI adjustment are valid for 12 months from the date of this letter, are specific to this development. Please refer to the attached *Guide to Hunter Water's Notice of Requirements for Developers*, which details the conditions under which water and sewer facilities are available to new customers.

Yours faithfully

JOHN O'HEARN
Manager Business & Urban Development

Enquiries: Robert Daniels
Tel: (02) 4979-9723
Fax: (02) 4979-9711

Notes: Figure 1 - Point of Connection to Water Service
FRAMME Web View

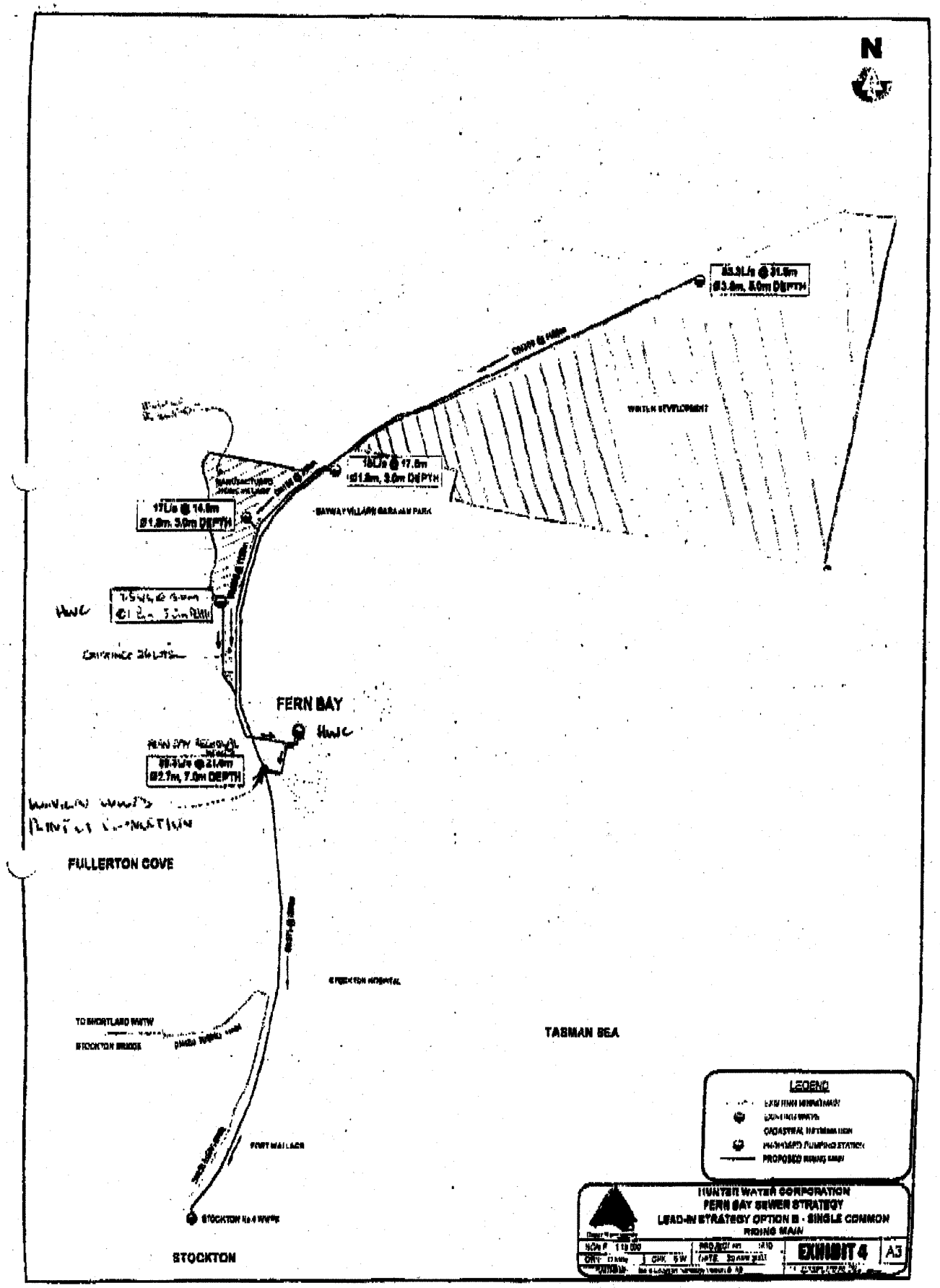
N
FERN BAY
FULLERTON COVE
TASMAN SEA
STOCKTON
LEGEND
HUNTER WATER CORPORATION
FERN BAY SEWER STRATEGY
LEAD-IN STRATEGY OPTION B - SINGLE COMMON RISING MAIN
EXHIBIT 4
A3

FIGURE 2

GHD Pty Ltd ABN 39 008 488 373

352 King St Newcastle NSW 2300
PO Box 5403 Hunter Region Mail Centre NSW 2310
T: (02) 4979 9999 F: (02) 4979 9988 E: ntlmail@ghd.com.au

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft	P M Simpson	G McDiarmid		T Kovats		
Draft 2	P M Simpson	G McDiarmid		T Kovats		6/4/04
Draft 3	P M Simpson	G McDiarmid		T Kovats		14/4/04
0	P M Simpson	G McDiarmid	*G McDiarmid*	T Kovats	*T Kovats*	3/5/04
1	P M Simpson	G McDiarmid		I Joliffe		30/8/04
2	P M Simpson	G McDiarmid	*G McDiarmid*	I Joliffe	*I Joliffe*	15/11/04