3.0 Water Demands

Based on the equivalent lot assessment outlined in Section 2 above, water demands were determined in accordance with the HWC Design Manual. Water demands determined were;

- Average Day Demand (ADD) – based on annual demand of 255kL
- Peak Day Demand (PDD) – ADD times peak day factor times Diversity Factor
- 95th Percentile Demand (95th %) – ADD times 95th Percentile Factor
- Peak Day Factor houses – 2.25
- Peak Day Factor units – 2.2
- Peak Day Factor commercial – 1.2
- 95th Percentile Factor houses – 1.8
- 95th Percentile Factor units – 1.76
- 95th Percentile Factor commercial – 1.14
- Diversity Factor = 2.653 x ET $^{-0.1067}$
- Extreme Day Demand (EDD) – PDD times 1.15
- HWC Diurnal variations were applied for the various development types

A water reticulation network was selected to service the proposed development. A PIPES++ model was then set up to analyse the proposed water reticulation system. The arrangement of the reticulation network and PIPES++ model is shown in Appendix C. The water demands applied for each node in the model are shown in Table 2 based on the demands and factors applied above.

Table 2 – Node water demands

Node	ET[1]	ADD (L/s)	PDD (L/s)	95th % (L/s)	EDD (L/s)	Unaccounted Water (L/s)
R1	0	0	0	0	0	0
R2	8	0.092	0.207	0.166	0.239	0.014
R3	4	0.046	0.104	0.083	0.119	0.007
R4	6	0.069	0.156	0.124	0.179	0.010
R5	16	0.184	0.415	0.332	0.477	0.028
R6	4	0.046	0.104	0.083	0.119	0.007
R7	5	0.058	0.130	0.104	0.149	0.009
R8	2	0.023	0.052	0.041	0.060	0.003
R9	6	0.069	0.156	0.124	0.179	0.010
R10	11	0.127	0.285	0.228	0.328	0.019
R11	9	0.104	0.233	0.187	0.268	0.016
R12	15	0.173	0.389	0.311	0.447	0.026
R13	12	0.138	0.311	0.249	0.358	0.021
R14	9	0.104	0.233	0.187	0.268	0.016
R15	0	0	0	0	0	0
R16	5	0.058	0.130	0.104	0.147	0.009
R17	8	0.092	0.207	0.166	0.239	0.014
R18	0	0	0	0	0	0

Node	ET[1]	ADD (L/s)	PDD (L/s)	95th % (L/s)	EDD (L/s)	Unaccounted Water (L/s)
R19	9	0.104	0.233	0.187	0.268	0.016
R20	5	0.058	0.130	0.104	0.149	0.009
R21	7	0.081	0.182	0.145	0.209	0.012
R22	9	0.104	0.233	0.187	0.268	0.016
R23	4	0.046	0.104	0.083	0.119	0.007
R24	6	0.069	0.156	0.124	0.179	0.010
R25	0	0	0	0	0	0
R26	6	0.069	0.156	0.124	0.179	0.01
R27	8	0.092	0.207	0.166	0.239	0.014
R28	6	0.069	0.156	0.124	0.179	0.010
R29	3	0.035	0.078	0.062	0.089	0.005
R30	0	0	0	0	0	0
R31	4	0.046	0.104	0.083	0.119	0.007
R32	6	0.069	0.156	0.124	0.179	0.010
R33	7	0.081	0.182	0.145	0.209	0.012
R34	0	0	0	0	0	0
A1	9	0.098	0.216	0.173	0.249	0.15
A2	11	0.122	0.269	0.215	0.309	0.018
A3	12	0.141	0.311	0.248	0.357	0.021
A4	15	0.169	0.382	0.298	0.428	0.025
A5	14	0.156	0.343	0.274	0.395	0.023
A6	12	0.141	0.311	0.248	0.357	0.021
A7	11	0.122	0.269	0.215	0.309	0.018
A8	9	0.98	0.216	0.173	0.249	0.015
A9	6	0.072	0.158	0.126	0.182	0.011
MARINA	41	0.469	0.563	0.535	0.468	0.070

1 – Marina and apartment ET determined in accordance with HWC "Equivalent Lot Assessment" and Paterson Britton "Morisset Park No.4 Wastewater Pumping Station Concept Design Report"

4.0 HWC Water Design Requirements

The water servicing system was modelled using PIPES++ version 2007.2 to calculate the residual pressures throughout the reticulation network and ensure they meet the requirements of the Hunter Water Corporation water design manual. These requirements are:

- Pressure not to exceed 70m
- Pressure for a peak hour flow on a peak day shall not to fall below 20m
- Pressure for a peak hour flow on a 95th percentile peak day plus fire fighting (at location of fire) not to fall below 12m
- Identify the number of properties expected to receive less than 12m H_2O pressure during a service failure.

HWC in the original Notice of Formal Requirements for the Trinity Point development advised the water modelling boundary conditions based on an development yield of 178 ET. These requirements are shown in Appendix D. From the loading assessment undertaken above, the current development proposal consists of 338ET. Consequently, HWC were asked to revise the water supply boundary conditions based on the new estimated development of the area. A copy of this advice is shown in Appendix E.

On the basis of the HWC advice, the model boundary conditions applied are shown in Table 3.

Table 3 – PIPES++ model boundary conditions

Condition	Minimum HGL (m)
Average Day Demand	53.3
95th Percentile Demand with fire	45.3
Peak Day Demand	47.7
Extreme Day Demand	47.4

The results of the PIPES++ modelling for the various conditions shown above are shown in Table 4.

Table 4 – PIPES++ modelling results

Condition	Minimum Pressure (m H_2O)	At Node
Peak Day Demand	35.7	R1
Extreme Day Demand	35.4	R1

The fire flow option within PIPES++ was used to evaluate the proposed system performance under fire flows at the peak domestic diurnal variation of 20:00 hrs and the peak commercial diurnal variation of 13:00hrs. The fire flows applied are in addition to the 95th percentile demand flows.

Flows of 10L/s were used for residential development with 20L/s at the marina. On the basis of the above fire flows and times, Table 5 shows the minimum residual pressures modelled by PIPES++.

Table 5 – Minimum residual pressures under fire flow

Condition	Minimum Pressure (mH_2O)	At Node
Time 20:00 (peak domestic diurnal variation)	33.8	R28
Time 13:00 (peak commercial diurnal variation)	34.5	R28

PIPES++ model results are shown in Appendix E.

5.0 Security of Supply

In order to investigate the security of water supply in the event of existing system failures, two failure scenarios were modelled under peak day and extreme day demands in PIPES++. These failure scenarios were;

- Scenario 1 - Failure of the leadin DN200 in Morisset Park Road Node R34 to R2
- Scenario 2 - Failure of the DN100 main in Charles Avenue Node R34 to R15

The network diagrams from PIPES++ for each of the above scenarios are shown in Appendix G.

The failure scenarios modelled are based on the assumption that the works required under HWC letter of 9th March 2007 (Appendix H) involving the cross connection of the DN200 and DN100 mains at Charles street have been completed. If these works have not been completed then they will be required.

The results of the failure scenarios are shown in Table 6

Table 6 – Failure scenario modelling

Condition	Minimum Pressure (mH_2O)	At Node
Scenario 1 – PDD	26.3	R13
Scenario 1 - EDD	24.9	R13
Scenario 2 – PDD	36.0	R13
Scenario 2 - EDD	35.6	R13

Accordingly, the proposed reticulation network can provided service pressures above the required 12m for both PDD and EDD.

6.0 Existing HWC System Upgrades

As outlined in Section 5.0 above, the failure scenarios modelled for security of supply rely on the construction of the DN200 to DN100 cross connection in Charles Street referred to in HWC letter of 9th March 2007. If this cross connection has not been made, the works are required to ensure adequate supply throughout the network.

Similarly, HWC advised in both their letter of 9th March 2007 and their subsequent email of the 12th November 2007 updating supply pressures (Appendix E & H) that the service pressures advised were predicated on the connection of the DN200 main to the delivery side of the Bonnells Bay Water Pumping Station (BBWPS). BBWPS is located on the eastern side of the intersection of Morisset Park Drive and Fishery Point Road. It is understood that this connection has not yet been made and will be required to service the development. HWC further advise that this connection is to include the provision of a reflux valve on the DN200 main on the western side of the connection to the delivery side of BBWPS. A flowmeter is to be provided with the flowmeter connected to telemetry to the HWC SCADA system. The correspondence indicating this arrangement is shown in Attachment 3 in Appendix H.

The provision of the above system upgrades provides suitable water supply for the remainder of the development.

7.0 Conclusions

Based on the water supply boundary conditions provided by HWC, a PIPES++ hydraulic model was prepared for the balance of the development on the site or 338ET. The results of this modelling indicate that the development can be serviced to HWC pressure requirements by a reticulation network consisting of DN150 and DN100 watermains. Minor existing network improvedments are required by means of cross connection of the DN200 leadin main to the deliversy side of Bonnells Bay WPS, the provision of a reflux valve and flowmeter and integration in HWC SCADA system. Cross connection of the DN200 leadin main into the DN100 main in Charles Street is also required. With these network upgrades, the proposed development can be adequately serviced for water supply under all demand criteria and fire flows.

8.0 References

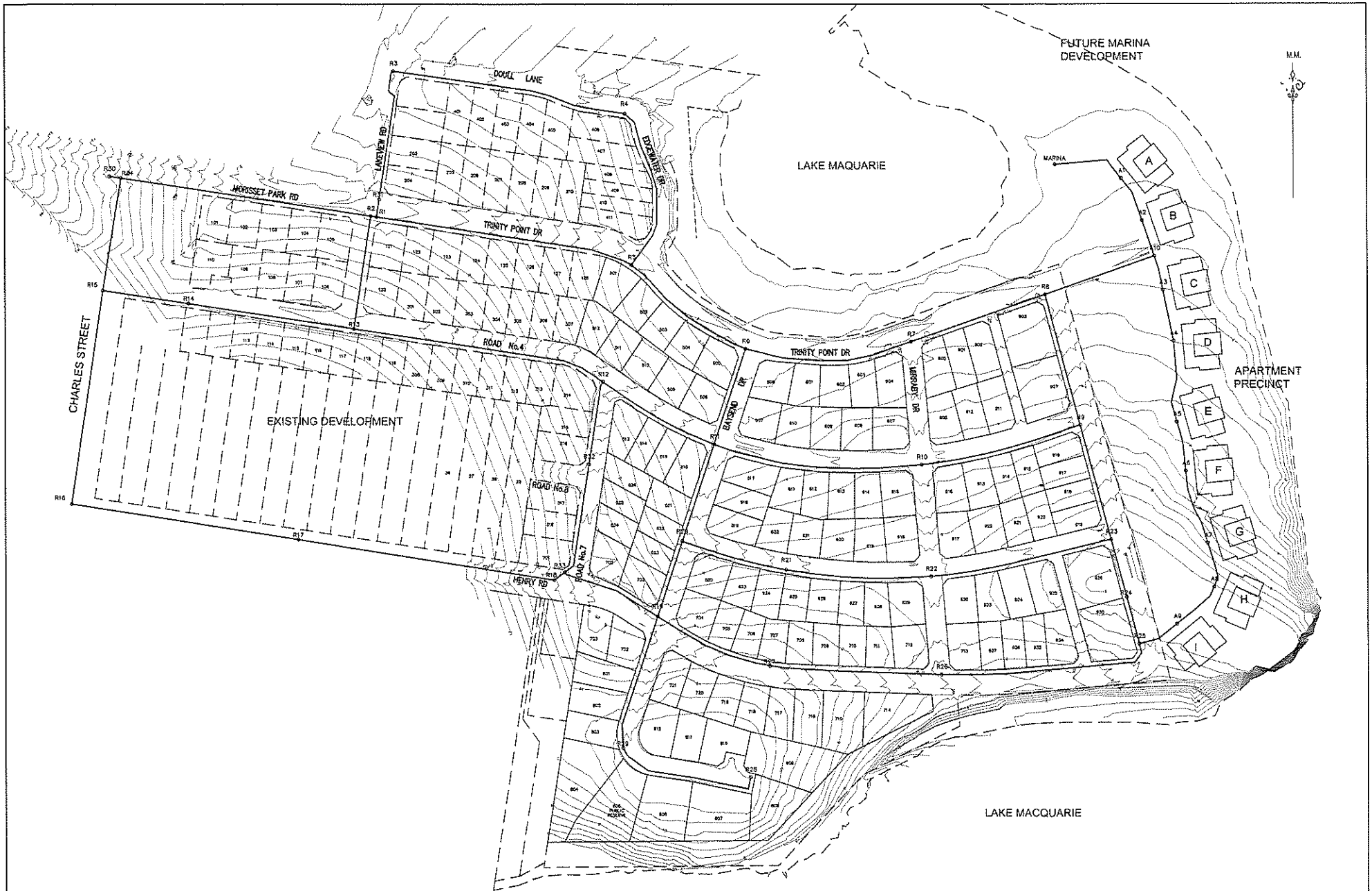
Hunter Water Corporation (1997 and as amended), *Water and Sewer Design Manual*, HWC, Newcastle.

Hunter Water Corporation (1997 and as amended), *Standard Technical Specifications*, HWC, Newcastle.

Patterson Britton & Partners (2007), *Morisset Park No.4 Wastewater Pumping Station – Draft Concept design report*, Newcastle

Watercom Pty.Ltd. (2003), *PIPES++ User Manual*, Sydney

Appendix A – Development Layout



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JOHNSON PARTNERS (NSW) Pty. Ltd. ABN 42 003 341 644
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QUALITY ASSURANCE DOCUMENT CONTROL

WHEN SIGNED IN RED THIS DRAWING IS CONTROLLED AND IF NOT SIGNED THIS PLAN MUST BE VERIFIED AGAINST A CONTROLLED COPY PRIOR TO USE TO ENSURE IT IS THE CURRENT ISSUE

No.	DATE	REVISIONS	APPD.
A	22/11/07	Preliminary Issue	H.W.

ALL DIMENS

PROJECT
WATER SERVICING STRATEGY
MORISSET PARK RD
TRINITY POINT

H.W. 50049R01[A].dwg

TITLE
PROPOSED DEVELOPMENT LAYOUT

1

Appendix B – Equivalent Lot Assessment

50049 - Trinity Point Water strategy

Water Loads from Apartments and Marina
Based on Water equivalent lot assessment guideline

Apartment Buildings	ET	Unit	Total No. of Apartments	A	B	C	D	E	F	G	H	I	Total ET
Penthouse - 4 bed (*)	1.281	No.	2				1	1					
3 bed	0.8207	No.	8			2	2	2	2				
2 bed	0.5767	No.	136	14	16	16	18	16	16	16	14	10	
1 bed + study	0.46	No.	12		2	2	2	2	2	2			
1 bed	0.46	No.	9	1	1	1	1	1	1	1	1	1	
Total Number of Apartments			167										
Sub-Total ET	3.5984			8.534	10.607	12.249	14.683	13.530	12.249	10.607	8.534	6.227	97.219

Note: Table based on the Trinity Point Resort schedule received 2 Feb 07
(*) HWC Standard does not provide ET assessment for the 4 bedroom unit. Penthouse (4 bed) ET loading was assumed summary of 3 bed & 1 bed unit

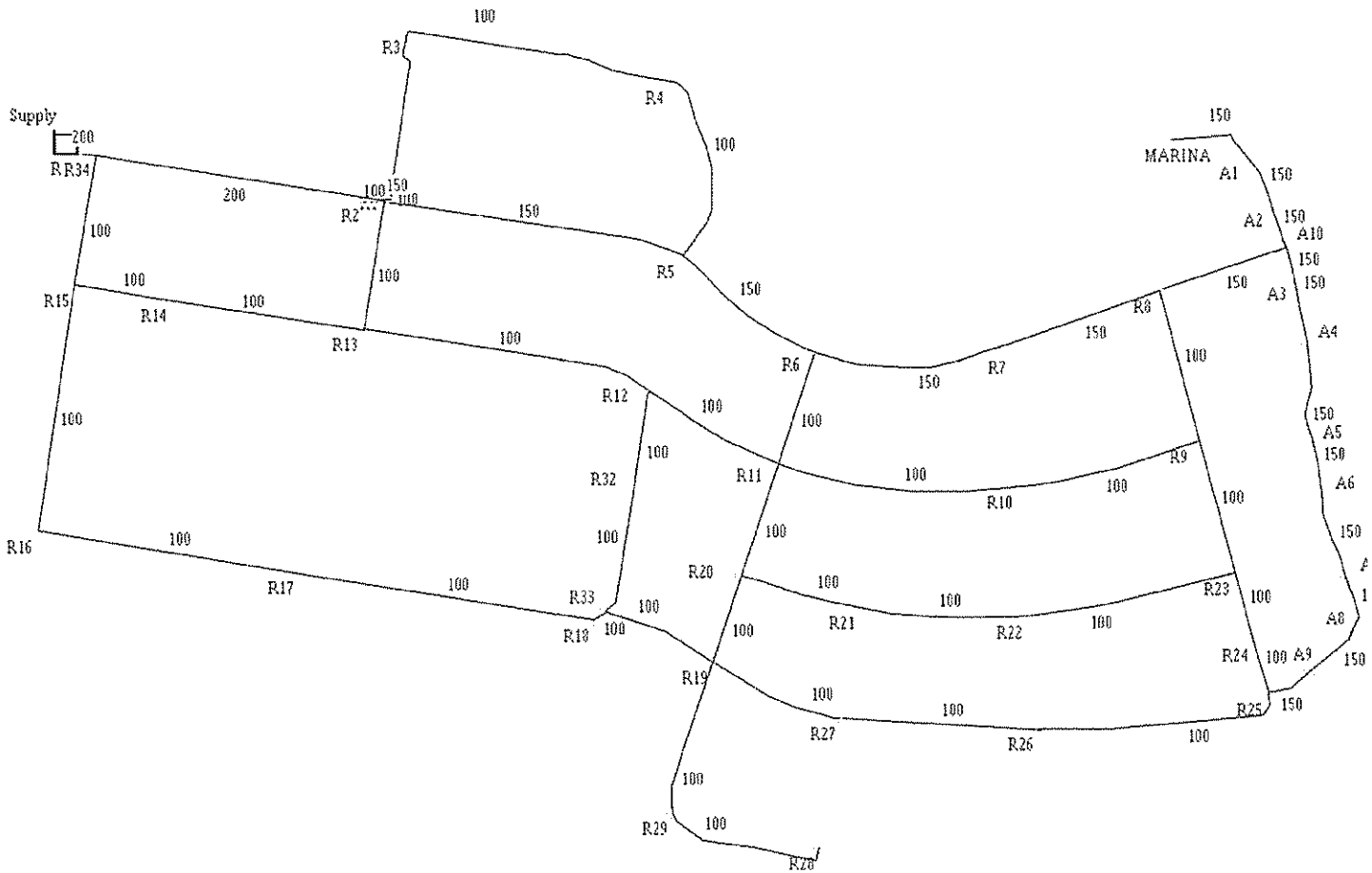
Marina		ET	PWWF
	Pump out facility	20	2 L/s
	TOTAL		**2 L/s**

Marina Village Centre	ET	Unit	Number	ET Sub-Total	Note
Gym& Fitness					
Showers	0.42	no.	2	0.84	HWC water equivalent lot assessment, gym/shower
Toilets	0.4141	no.	4	1.66	HWC water equivalent lot assessment, amenities
Beauty Salon & Spa					
Beauty Salon	0.5025	w.basin	2	1.01	HWC water equivalent lot assessment, hairdressing salon
Toilets	0.4141	no.	2	0.83	HWC water equivalent lot assessment, amenities
Showers	0.42	no.	2	0.84	HWC water equivalent lot assessment, gym/shower - water in sewer out
Café/Bistro					
Seats	0.0422	no.	45	1.90	HWC water equivalent lot assessment, restaurant
Chandlery					
Area	0.00313	m2	50	0.16	HWC water equivalent lot assessment, retail shop complex / offices
Bookshop / Newsagent / Internet / Chemist					
Area	0.00313	m2	30	0.09	HWC water equivalent lot assessment, retail shop complex / offices
Kitchen (Functions, Club & Restaurant / Café)					Included in Functions, Club & Restaurant/ Café
Restaurant					
Seats	0.0422	no.	180	7.60	HWC water equivalent lot assessment, restaurant
Offices					
Area	0.001	m2	260	0.26	HWC sewer equivalent lot assessment, offices
Boat Storage					No sewer loading
Boating Club Lounge - Lookout Bar - Meeting Rooms - Functions					
Toilets	0.4141	no.	10	4.14	HWC water equivalent lot assessment, amenities
Service Area + Workshop					
Area	0.001	m2	200	0.20	HWC sewer demand table, car yard
Total ET				**19.52**	

Note: Table based on the Accommodation and Area Schedule Rev 2 - 16 November 06 with updates provided by JPG on the 15 February 07

TOTAL MARINA & TOURISM DEVELOPMENT LOADING	**136.7**

Appendix C – Reticulation Network and PIPES++ Model Arrangement



Trinity Point Development
Proposed reticulation layout

Appendix D – Initial HWC Formal Notice of Requirements

HUNTER WATER

5 December 2006

Ref: 2004-246

Mr Bruce Gunn
Development Manager
Johnson Property Group
PO Box 34
COORANBONG LPO 2265

Dear Mr Gunn

RE: TRINITY POINT, MORISSET PARK
REQUEST FOR ADVICE ON MORISSET PARK NO.2 WWPS CAPACITY

Thank you for our meeting of 20 November 2006 regarding various issues related to the Trinity Point development (previously known as Kendall Grange). As discussed and agreed during this meeting, Hunter Water is to provide confirmation of the current available capacity in Morisset Park No.2 WWPS for initial stages of development within Trinity Point, and comments on the *Morisset Park WWPS No.2 Wastewater Servicing Strategy Options Assessment*.

In providing this information, Hunter Water has taken the opportunity to review the capacity of the existing water and wastewater infrastructure to cater for the various stages of development contained in Section 50 applications, and the preliminary advice offered by Johnson Property Group regarding the proposed marina and tourist development.

Assessed Development

The table on the following page summarises Hunter Water's assessment of the potential loading from the Trinity Point development.

Table 1 – Stage loadings

Stage	Lots	Residual	Credit Water	Credit Sewer	
1	28	2	12	6	1 Residual lot unusable and not included in totals
2	10	1	4		
3	19				Including 1 residual lot from Stage 1
4	9				Including 1 residual lot from Stage 2
5a	17	3			Including 1 residual lot from Stage 1
5b	9				Including 1 residual lot from Stage 5a
6a	16	2			Including 1 residual lot from Stage 5a
6b	14				Including 1 residual lot from Stage 6a
7	22	1			Including 1 residual lot from Stage 5a
8	12				Including 1 residual lot from Stage 7
9	37				Including 1 residual lot from Stage 6a
	193	**9**			**Total of 8 residual lots used.**

Additional ET (Water)	178
Additional ET (Sewer)	188

Please note that the above figures were used for the basis of design assessment and not developer contributions calculations. Furthermore, we note that the Section 50 application for Stage 9 is for 25 lots, however, we have used 37 lots as per Johnson Property Group's original concept plan, on the basis that a number of these lots are super lots to be further developed in the future.

Please also note that Hunter Water has assumed a loading of approximately 150 ET arsing from the proposed marina and tourist development.

The following information is offered on the basis of this assessment:

Water Delivery

The development area is located in the Morisset Wyee Water Supply System. Previous advice from Hunter Water for Stages 1-3 of this development required a new developer funded DN 200 mm watermain along Morisset Park Road to the development site. The development will be serviced from this new watermain. The maximum RL on the development site is approximately 12 m AHD. An additional water demand of 178 ET is expected for Stage 1 to 9 of the development.

The development is required to connect to the new DN 200 mm watermain and the existing DN 100 mm CICL watermain in Henry Road. A cross connection between the existing DN 100 mm CICL in Morisset Park Road and the new DN 200 mm at the Charles Avenue intersection is also required.

The results of the analysis of the Morisset Wyee Water Supply System for Peak Day Demand are shown in **Table 2**.

Table 2 - Result for Peak Day from new DN 200 mm watermain in Morisset Park Road

Demand	Minimum HGL (m)	Residual Pressure (m)
Additional 178 ET	50	38
95th Percentile Base + 10 L/s Fire Flow	46	34
95th Percentile Base + 20 L/s Fire Flow	42	30
95th Percentile Base + 30 L/s Fire Flow	36	24

These results indicate that there is sufficient capacity to supply the development under Peak Day Demands to meet the 20m minimum pressure requirement and the additional Fire Fighting demands to meet the 15m minimum requirement from the new DN 200 mm watermain in Morisset Park Road and existing DN 100 mm CICL watermain in Henry Road.

There is also sufficient capacity to satisfy security of supply from the 200 main for Stages 1-9 of the development. However, the proposed marina and tourist development will significantly increase development potential, and therefore you are required to prepare and submit a detailed water servicing strategy including all development stages (ultimate development loading) and proposed timing. Security of supply will also need to re-addressed.

Wastewater Transportation

The theoretical loading on the wastewater gravity system due to the proposed development is outlined in **Table 3**.

Table 3 - Theoretical Loadings

Description	Addt ET	ADWF (L/s)	PDWF (L/s)	PWWF (L/s)
Stages 1-9	189	2.1	6.1	28.9

The development is located within the Morisset Park 2 WWPS catchment. The current loading (2006) from the Dora Creek Servicing Strategy for this catchment is 123 ET. However, this includes an allowance of 23 ET for the St John of God School which will be demolished as part of this new development. Therefore the current loading on Morisset Park 2 WWPS has been taken to be 100 ET.

Pumping Capacity

Morisset Park 2 WWPS has a duty pumping capacity of 16.7 L/s. The current theoretical PWWF gravitating to this station is 9.4 L/s (current ET loading of 100 ET); and the station receives pumped flows from Morisset Park 3 WWPS of 3.4 L/s – which gives a total theoretical PWWF of 12.8 L/s. The additional loadings from submitted stages are shown in **Table 4**.

Table 4 - Total PWWF

Stages	Additional ET	Total ET WWPS	PWWF	Pumped Flow	Total PWWF
1-3	55	155	14.1	3.4	**17.5**
1-9	189	289	25.5	3.4	**28.9**

Although the connection of Stages 1, 2 and 3 will increase total PWWF beyond current pumping capacity; taking into account attenuation of the 3.4 L/s pumped flow from Morisset Park 3 WWPS, there is sufficient capacity in the WWPS for these stages. However, please note that there is no spare pumping capacity at Morisset Park 2 WWPS to service additional loads from any other stages of this development other than Stages 1, 2 and 3 at this time.

Emergency Storage

Morisset Park 2 WWPS has an emergency storage volume of 23.3 m^3 which equates to approximately 5 hours and 53 minutes at an ADWF of 1.1 L/s (100 ET). Stages 1, 2 and 3 (55 ET) of this development will reduce emergency storage to approximately 3 hours and 48 minutes. This is slightly less than the recommended 4 hours for this catchment, hence there is deemed to be sufficient capacity regarding emergency storage for Stages 1, 2 and 3 at this time.

Please note that there is insufficient capacity regarding emergency storage at Morisset Park 2 WWPS to service loads from any stages of this development other than stages 1, 2 and 3.
A wastewater servicing strategy investigating options for this development has been reviewed by Hunter Water and comments are offered in a subsequent section of this letter. However, in light of your advice regarding the proposed marina and tourist development and the significant increase in development potential, you are required to prepare and submit a revised detailed wastewater servicing strategy which is to:

- Include all proposed development within the Morisset Park No.2 WWPS and Morisset Park No.3 WWPS catchments (including all possible development within Trinity Point);
- Proposed staging and timing of all areas within Trinity Point;
- Investigate wastewater servicing options for the catchments; and
- Address emergency storage requirements.

Wastewater Treatment

The development is located within the Dora Creek WWTW Catchment. At present the treatment works has sufficient capacity to cater Stages 1-3 (additional 55 ET) of the proposed development. Capacity at the existing works to cater for Stages 4 - 9 and the proposed marina and tourism development would be catered for in the future upgrading of the WWTW planned for completion in 2009. Should this timing not suit your proposed schedule of development / occupation, please discuss this matter further with Hunter Water.

Options Report

The *Morisset Park No.2 Wastewater Servicing Strategy Option Assessment* (Patterson Britton, September 2006) has been reviewed. However, as previously noted in this letter, the proposed marina and tourist development will significantly increase the development potential. This potential was not considered by this report, hence the requirement to prepare and submit a new sewer servicing strategy. The following comments are still offered for your information, as some may be relevant to the new servicing strategy.

- Pg 4 – The report refers to a proposed subdivision size of 195 lots. From previous enquiries a loading of 250ET was assessed. Please confirm what the new development will be made of to confirm the new loading of 195ET is correct.
- Pg 4 – If gravity flows are proposed to be directed to Morisset Park 3 WWPS please confirm that this asset meets current design practices.
- You will need to confirm that the developer who constructed Morisset Park 3 WWPS is not planning to use the remaining capacity for redevelopment of the existing blocks connected to the pump station. This needs to be checked to confirm this option is feasible.
- Pg 8 - Need to provide an indicative plan which shows the option to interconnect the two pump stations and how you are going to achieve sufficient storage for both pump stations in the event of a power failure.
- Pg 8 – Please investigate a 4th option. This option would be the same as Option 1, however, install an actuated valve in the wet well such that once/twice a day the pumped flows are discharged through the existing rising main to maintain cleaning velocities in the existing gravity main. This option would require a VSG to be installed on the pumps so that the increased pump capacity does not cause surcharging downstream.

  It is preferable not to have two pump stations located next to each other from an operational perspective however if it is shown in the revised report that this is still the preferred strategy then Hunter Water will consider accepting this as the solution.
- Pg 10 – The vent proposed in Option 3 may impact on private property. Please investigate and address this impact. Consultation needs to be undertaken with the residents on Macquarie Road who will be impacted by the vent.
- The vent should be located at the access hole where the rising main terminates; otherwise please make a case for an arrangement that differs from the design manual.

- Pg 10 – For Option 3 please provide a plan which clearly shows the development areas which will drain to the existing Morisset No.2 WWPS and those to the new WWPS.
- Include NPV sheets in the report detailing how the O&M costs were determined so Hunter Water can check.

I trust this information satisfies your enquiry. If you require any additional information, please do not hesitate to contact me.

Yours faithfully

Brett Lewis
Manager Development Services

Enquiries: Malcolm Withers
Tel: 02 4979 9545
Fax: 02 4979 9711

Appendix E – Revised Boundary Conditions

Hugh Williams

From: Withers Malcolm [malcolm.withers@hunterwater.com.au]
Sent: Monday, 12 November 2007 4:45 PM
To: hughw@johnpart.com.au
Subject: Trinity Point Boundary Conditions

Good afternoon Hugh,

Please find attached the boundary conditions to be used for the water servicing strategy at Trinity Point. I apologise for the delay in getting this information to you.

The conditions are to be applied at the intersection of Charles Road and Trinity Point Drive and are based on the newly laid 200mm main along Morisset Park Drive coming off the delivery side of Bonnells Bay WPS rather than the suction side. The developer will have to arrange for this alteration around Bonnells Bay WPS to take place and will have to ensure that the new 200mm main has a reflux valve and flowmeter with telemetry to the SCADA like the rest of the mains on the delivery side of Bonnells Bay WPS.

If you have any questions, please do not hesitate to contact me.

Regards

Malcolm Withers

development services engineer | sales & business development | hunter water corporation
p: 02 4979 9545 | **f:** 02 4979 9711 | **e:** malcolm.withers@hunterwater.com.au

---

From: Hugh Williams [mailto:hughw@johnpart.com.au]
Sent: Tuesday, 6 November 2007 12:51 PM
To: Withers Malcolm
Subject: Trinity Point

Mal
Any luck with the amended service pressures for Trinity Point? I am trying to get this off my desk.

Cheers

Hugh

Hugh Williams - Civil Engineer
JOHNSON PARTNERS
2 Bounty Close TUGGERAH NSW 2259
Ph: (02) 4305 4310
Fax: (02) 4305 4399
Mob: 0413 804 603
e-mail: hughw@johnpart.com.au

Appendix F – PIPES++ Model Results

Trinity Point - Peak Day Demand

Node	Min.HGL	Min.Pressure	Max.HGL	Max.Pressure	Avg.HGL	Avg.Pressure
R2	47.55	40.5	47.69	40.7	47.64	40.64
R3	47.43	42.4	47.69	42.7	47.59	42.59
R5	47.3	44.6	47.68	44.9	47.54	44.79
R6	47.16	45.2	47.68	45.7	47.48	45.48
R8	47.02	45	47.67	45.7	47.43	45.43
MARINA	46.98	46.5	47.67	47.2	47.41	46.91
A1	46.98	46	47.67	46.7	47.41	46.41
A2	46.98	45.7	47.67	46.4	47.41	46.16
A3	46.98	45	47.67	45.7	47.41	45.41
A4	46.97	44.5	47.67	45.2	47.41	44.91
A5	46.97	43.5	47.67	44.2	47.41	43.91
A6	46.97	43	47.67	43.7	47.41	43.41
A7	46.97	42.5	47.67	43.2	47.41	42.91
A8	46.97	39.5	47.67	40.2	47.41	39.91
A9	46.97	39.5	47.67	40.2	47.41	39.91
R25	46.97	39	47.67	39.7	47.41	39.41
R23	46.99	39.5	47.67	40.2	47.42	39.92
R9	47.01	42.5	47.67	43.2	47.43	42.93
R11	47.07	44.1	47.67	44.7	47.45	44.45
R19	47.03	40	47.67	40.7	47.43	40.43
R28	47.02	38	47.67	38.7	47.43	38.43
R26	46.97	41	47.67	41.7	47.41	41.41
R22	46.99	40.5	47.67	41.2	47.42	40.92
R10	47.02	43	47.67	43.7	47.43	43.43
R7	47.08	45.1	47.67	45.7	47.45	45.45
R18	47.06	38.1	47.67	38.7	47.45	38.45
R16	47.29		47.68		47.54	
R1	47.53	35.5	47.69	35.7	47.63	35.63
R31	47.52	40.5	47.69	40.7	47.63	40.63
R12	47.08	42.1	47.67	42.7	47.46	42.46
R13	47.41	36.4	47.69	36.7	47.59	36.59
R14	47.43		47.69		47.6	
R20	47.03	42.3	47.67	42.9	47.43	42.68
R29	47.02	38	47.67	38.7	47.43	38.43
R27	46.98	38	47.67	38.7	47.42	38.42
R24	46.98	39	47.67	39.7	47.41	39.41
R21	47.01	41.5	47.67	42.2	47.43	41.93
R4	47.34	45.3	47.68	45.7	47.56	45.56
R15	47.46		47.69		47.61	
R17	47.15		47.68		47.49	
R30	47.7	35.7	47.7	35.7	46.89	34.89
R32	47.07	40.1	47.67	40.7	47.45	40.45
R33	47.06	38.1	47.67	38.7	47.45	38.45
A10	46.98	45.2	47.67	45.9	47.41	45.66
R34	47.69		47.7		47.7	
	Min Pressure	**35.5**				

Trinity Point - Extreme Day Demand

Node	Min.HGL	Min.Pressure	Max.HGL	Max.Pressure	Avg.HGL	Avg.Pressure
R2	47.2	40.2	47.39	40.4	47.32	40.32
R3	47.05	42	47.39	42.4	47.26	42.26
R5	46.89	44.1	47.38	44.6	47.2	44.45
R6	46.7	44.7	47.37	45.4	47.13	45.13
R8	46.53	44.5	47.36	45.4	47.06	45.06
MARINA	46.48	46	47.36	46.9	47.03	46.53
A1	46.48	45.5	47.36	46.4	47.03	46.03
A2	46.48	45.2	47.36	46.1	47.03	45.78
A3	46.47	44.5	47.36	45.4	47.03	45.03
A4	46.47	44	47.36	44.9	47.03	44.53
A5	46.46	43	47.36	43.9	47.03	43.53
A6	46.46	42.5	47.36	43.4	47.03	43.03
A7	46.46	42	47.36	42.9	47.03	42.53
A8	46.46	39	47.36	39.9	47.03	39.53
A9	46.46	39	47.36	39.9	47.03	39.53
R25	46.46	38.5	47.36	39.4	47.03	39.03
R23	46.49	39	47.36	39.9	47.04	39.54
R9	46.51	42	47.36	42.9	47.05	42.55
R11	46.59	43.6	47.37	44.4	47.08	44.08
R19	46.53	39.5	47.36	40.4	47.06	40.06
R28	46.52	37.5	47.36	38.4	47.06	38.06
R26	46.47	40.5	47.36	41.4	47.03	41.03
R22	46.49	40	47.36	40.9	47.04	40.54
R10	46.53	42.5	47.36	43.4	47.06	43.06
R7	46.6	44.6	47.37	45.4	47.09	45.09
R18	46.58	37.6	47.37	38.4	47.08	38.08
R16	46.87		47.38		47.2	
R1	47.19	35.2	47.39	35.4	47.32	35.32
R31	47.17	40.2	47.39	40.4	47.31	40.31
R12	46.61	41.6	47.37	42.4	47.09	42.09
R13	47.03	36	47.38	36.4	47.26	36.26
R14	47.06		47.39		47.27	
R20	46.54	41.8	47.36	42.6	47.06	42.31
R29	46.53	37.5	47.36	38.4	47.06	38.06
R27	46.48	37.5	47.36	38.4	47.04	38.04
R24	46.47	38.5	47.36	39.4	47.03	39.03
R21	46.51	41	47.36	41.9	47.05	41.55
R4	46.94	44.9	47.38	45.4	47.22	45.22
R15	47.09		47.39		47.28	
R17	46.7		47.37		47.13	
R30	47.4	35.4	47.4	35.4	47.43	35.43
R32	46.59	39.6	47.37	40.4	47.08	40.08
R33	46.57	37.6	47.37	38.4	47.08	38.08
A10	46.48	44.7	47.36	45.6	47.04	45.29
R34	47.39		47.4		47.39	
	Min Pressure	**35.2**				

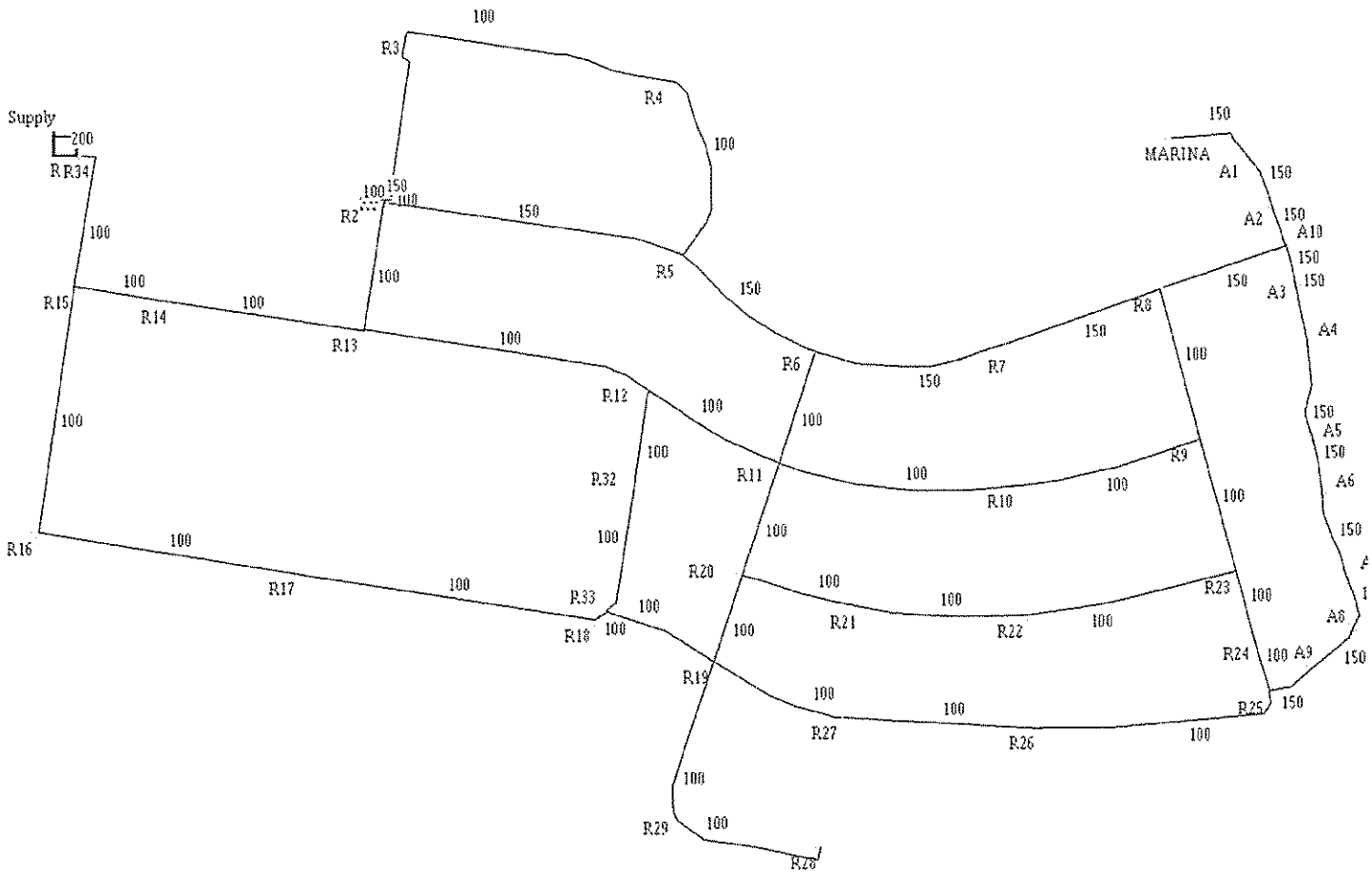
Trinity Point - 95th Percentile flow plus fire Time 20:00

Node	Min.HGL	Min.Pressure	Fire at Node	Fire Flow
R2	46.8	39.8	MARINA	20
R3	45.41	40.4	R3	10
R5	45.62	42.9	MARINA	20
R6	44.84	42.8	MARINA	20
R8	43.86	41.9	MARINA	20
MARINA	42.49	42	MARINA	20
A1	42.92	41.9	MARINA	20
A2	43.18	41.9	MARINA	20
A3	43.39	41.4	MARINA	20
A4	43.41	40.9	MARINA	20
A5	43.45	39.9	MARINA	20
A6	43.48	39.5	MARINA	20
A7	43.53	39	MARINA	20
A8	43.56	36.1	MARINA	20
A9	43.6	36.1	MARINA	20
R25	43.64	35.6	MARINA	20
R23	43.88	36.4	MARINA	20
R9	43.92	39.4	MARINA	20
R11	44.59	41.6	MARINA	20
R19	44.45	37.4	MARINA	20
R28	42.73	33.7	R28	10
R26	43.85	37.9	MARINA	20
R22	44.08	37.6	MARINA	20
R10	44.18	40.2	MARINA	20
R7	44.29	42.3	MARINA	20
R18	44.7	35.7	MARINA	20
R16	45.02		R16	10
R1	46.76	34.8	MARINA	20
R31	45.45	38.5	R31	10
R12	44.77	39.8	MARINA	20
R13	46.33	35.3	R13	10
R14	45.99		R14	10
R20	44.44	39.7	MARINA	20
R29	44.19	35.2	R29	10
R27	44.05	35	MARINA	20
R24	43.74	35.7	MARINA	20
R21	44.28	38.8	MARINA	20
R4	45.76	43.8	MARINA	20
R15	46.52		R14	10
R17	44.71		R17	10
R30	47.4	35.4	R2	10
R32	44.73	37.7	MARINA	20
R33	44.68	35.7	MARINA	20
A10	43.38	41.6	MARINA	20
R34	47.37		MARINA	20
	Min Pressure	**33.7**		

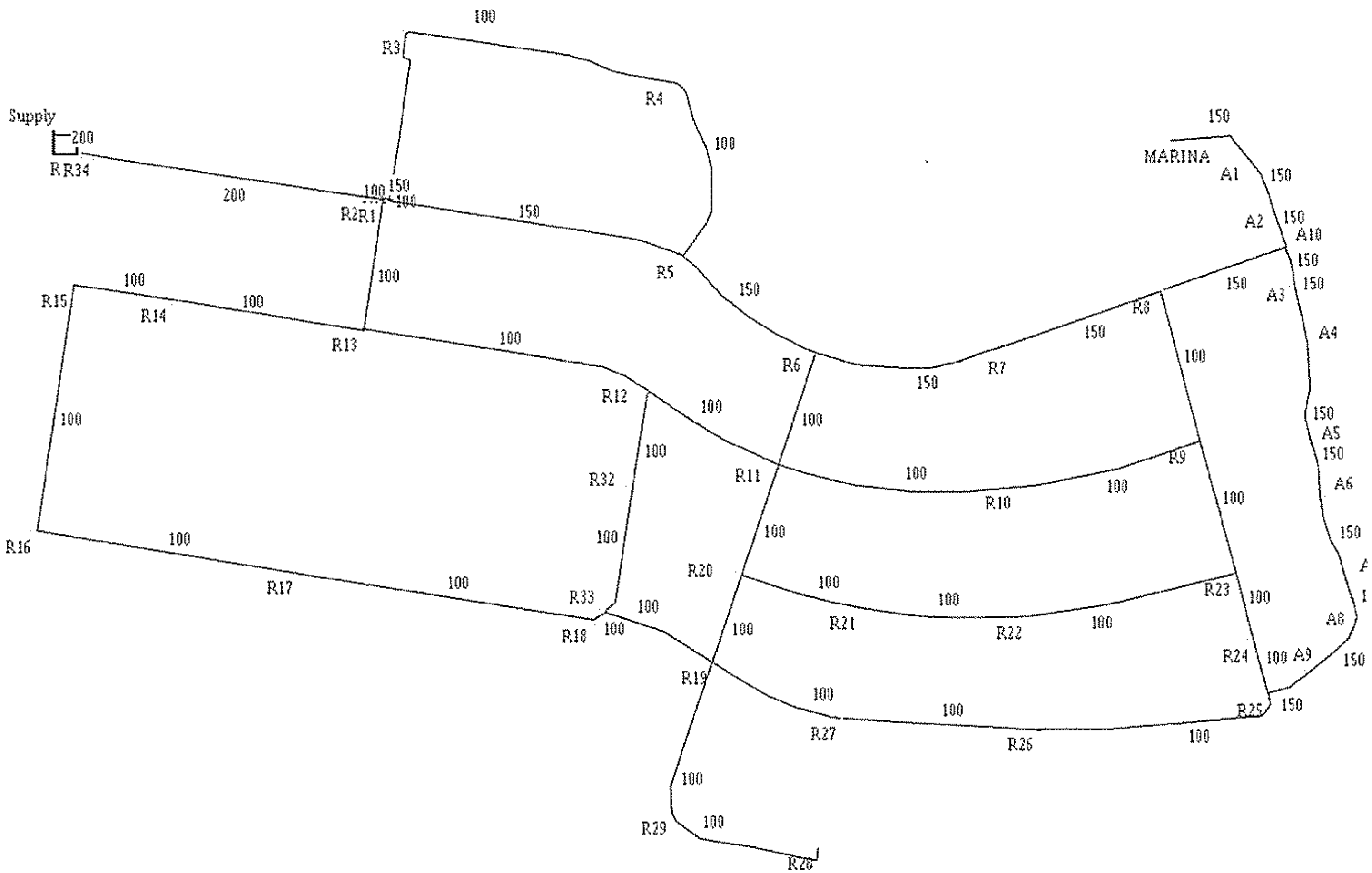
Trinity Point - 95th Percentile flow plus fire Time 13:00

Node	Min.HGL	Min.Pressure	Fire at Node	Fire Flow
R2	46.98	40	MARINA	20
R3	45.72	40.7	R3	10
R5	46.1	43.4	MARINA	20
R6	45.51	43.5	MARINA	20
R8	44.69	42.7	MARINA	20
MARINA	43.31	42.8	MARINA	20
A1	43.77	42.8	MARINA	20
A2	44.05	42.8	MARINA	20
A3	44.27	42.3	MARINA	20
A4	44.3	41.8	MARINA	20
A5	44.35	40.9	MARINA	20
A6	44.38	40.4	MARINA	20
A7	44.44	39.9	MARINA	20
A8	44.47	37	MARINA	20
A9	44.51	37	MARINA	20
R25	44.55	36.5	MARINA	20
R23	44.75	37.3	MARINA	20
R9	44.78	40.3	MARINA	20
R11	45.36	42.4	MARINA	20
R19	45.26	38.3	MARINA	20
R28	43.4	34.4	R28	10
R26	44.75	38.8	MARINA	20
R22	44.95	38.4	MARINA	20
R10	45.01	41	MARINA	20
R7	45.05	43.1	MARINA	20
R18	45.47	36.5	MARINA	20
R16	45.42		R16	10
R1	46.94	34.9	MARINA	20
R31	45.73	38.7	R31	10
R12	45.52	40.5	MARINA	20
R13	46.64	35.6	R13	10
R14	46.32		R14	10
R20	45.26	40.5	MARINA	20
R29	44.83	35.8	R28	10
R27	44.93	35.9	MARINA	20
R24	44.64	36.6	MARINA	20
R21	45.12	39.6	MARINA	20
R4	46.11	44.1	R4	10
R15	46.81		R14	10
R17	45.19		R17	10
R30	47.4	35.4	R2	10
R32	45.49	38.5	MARINA	20
R33	45.45	36.5	MARINA	20
A10	44.26	42.5	MARINA	20
R34	47.38		MARINA	20
	Min Pressure	34.4		

Appendix G – Network Diagrams – Failure Scenarios



Trinity Point Development
Failure Scenario 1



Trinity Point Development
Failure Scenario 2

Appendix G – HWC Advice on Existing DN100 Abandonment

9 March 2007 Ref: 2004-246

Mr Bruce Gunn
Development Manager
Johnson Property Group
PO Box 34
COORANBONG LPO 2265

Dear Mr Gunn

RE: WATER RETICULATION AMENDMENT – ABANDMENT OF 100MM WATER MAIN

I refer to your enquiry regarding the abandonment of a section of 100mm watermain in Morisset Park Road, Morisset Park. I sincerely apologise about the delay in replying.

To maintain adequate system operation and allow the existing 100mm watermain to be taken out of service, a connection must be provided between the new 200mm watermain and the existing 100mm watermain in Charles Street, as shown in **Attachment 1**. The preferred solution would be to abandon the entire length of 100mm watermain between Charles Avenue and Lakeview Road. Service connections for properties on Morisset Park Road will be to the new 200mm main.

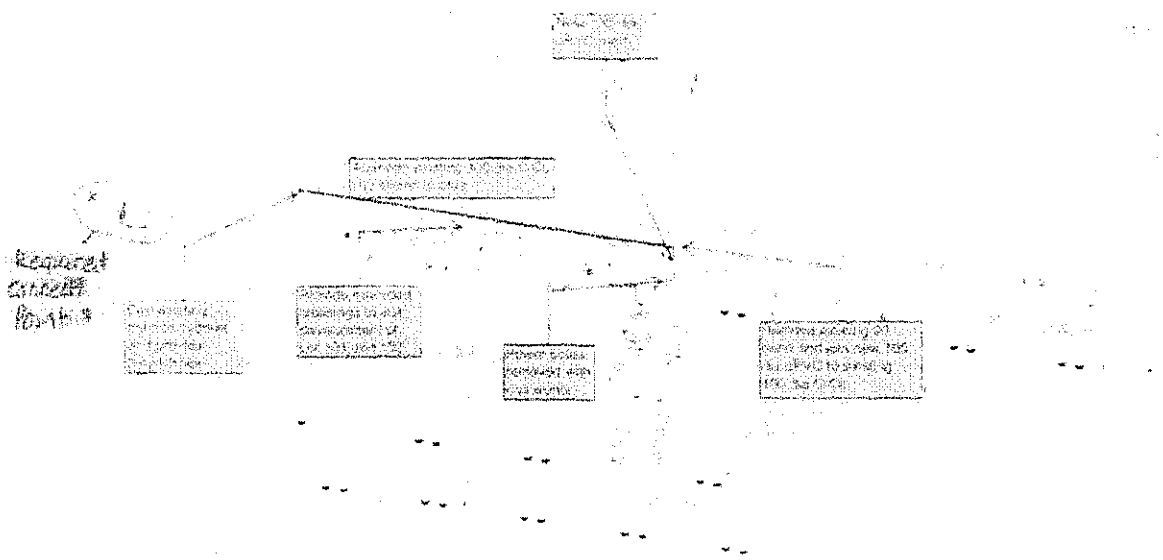
Interconnection of the 200mm main to the existing mains relies on connection of the trunk main to the delivery side of Bonnells Bay WPS. It has been identified that the approved plan for the 200mm watermain (shown as **Attachment 2**) does not include the new (2005) Bonnells Bay WPS. It should be verified that the connection to the water system is to the delivery side of Bonnells Bay WPS. A suitable connection arrangement is shown in **Attachment 3**. It should be noted that the three existing delivery watermains (150mm, 200mm and 375mm) from the WPS each have a reflux valve and flowmeter with telemetry to the SCADA, and it is expected this arrangement be duplicated for the new main.

I trust this information satisfies your enquiry. If you require any additional information, please do not hesitate to contact me.

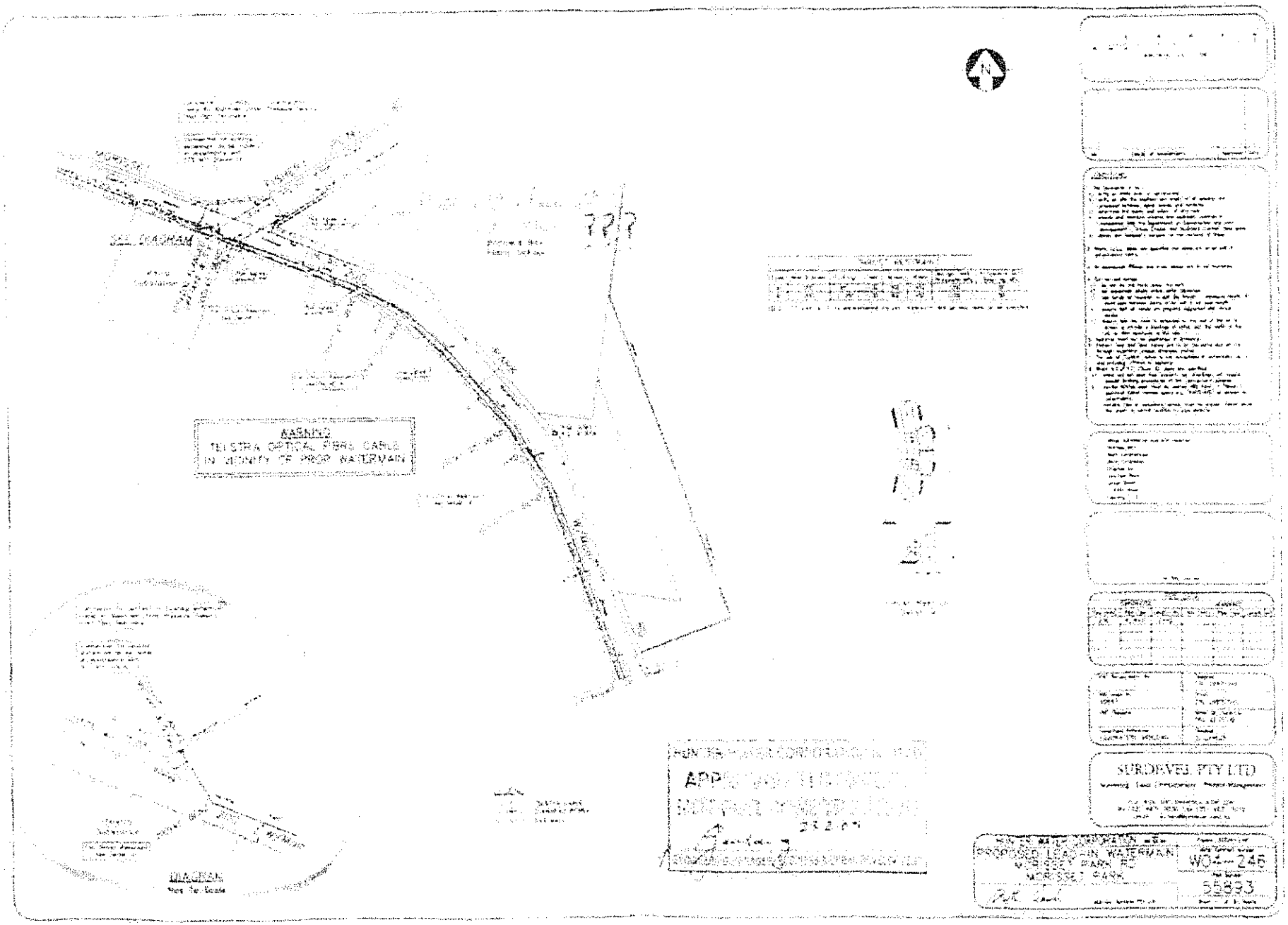
Yours faithfully

Brett Lewis
Manager Development Services

Enquiries: Malcolm Winners
Tel: 02 4979 9545
Fax: 02 4979 9711



SURDEVELPTY LTD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PROPOSED LEAD-IN WATERMAIN
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