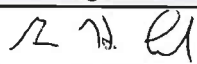
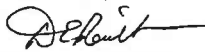



Infrastructure and Servicing
Assessment Report
Three Parks Development
Wanaka
Prepared for
Willowridge Developments Ltd

**Infrastructure and Servicing Assessment Report
Three Parks Development, Wanaka
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APPENDIX A

Three Parks Draft Development Plan

APPENDIX B

Tonkin and Taylor Water
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APPENDIX C

Marked-up Storm Sewer Plan
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APPENDIX D

Serviceability Confirmation Letters

EXECUTIVE SUMMARY

Duffill Watts Consulting Group (DWG) were engaged by Willowridge Developments Ltd to prepare an infrastructure and servicing assessment report for the planned Three Parks Development, Wanaka, to form part of a section 32 plan change analysis. In this report, DWG were directed to include the following elements:

- an assessment of what the development servicing requirements are likely to be in terms of sewage treatment and dispersal, stormwater dispersal, water supply, power and telecommunications,
- a determination of the capability of existing services to accommodate the anticipated development, and
- the identification of the potential need, as required, for upgrading existing infrastructure to accommodate proposed development in accordance with the plan change.

The water supply assessment determined that it is reasonable for planning purposes to expect the peak population daily flow demand for the Three Parks Development to be approximately 2,500m³/d. Such a demand can be supplied by the Hawthenden Reservoir that is programmed by Council to come on stream in 2008. However, a new trunk main, of 250mm to 300mm diameter, between Cardrona Valley Road and Ballantyne Road will be required to convey the water to the Three Parks site. Approximately 24% of the planned Three Parks development can be supplied by the existing Beacon Point pressure zone, assuming all of the existing spare capacity in the system is allotted to Three Parks.

The wastewater assessment determined that it is reasonable for planning purposes to expect the average dry weather flow for the Three Parks Development to be approximately 1,136m³/d, and the peak wet weather flow to be 46l/sec. It is confirmed that the expected Three Parks flow rate can be serviced by all downstream components of the new infrastructure to be constructed as part of the "Project Pure" upgrades.

This stormwater assessment determined that there is sufficient capacity within the existing stormwater network, subject to some care being taken to the selection of where runoff from the development is injected into the existing Cardrona Bypass storm sewer. The assessment further determined that the Cardrona Bypass storm sewer is not designed to accommodate secondary stormwater flows. The detailed design of the Three Parks Development will need to accommodate the secondary flows identified in this report by the use of features such as appropriately designed secondary flow paths, controlled flood plains, detention ponds and soak pits.

Representative suppliers of telecommunication, power and gas services, were contacted and asked to determine whether they were capable of servicing the proposed development, based on the level of development indicated in the draft development plan. All contacted suppliers confirmed the serviceability of the development with regards to their respective network.

1.0 INTRODUCTION

Duffill Watts Consulting Group (DWG) have been engaged by Willowridge Developments Ltd to prepare an infrastructure and servicing assessment report for the planned Three Parks Development, Wanaka, to form part of a section 32 plan change analysis. In this report, DWG were directed to include the following elements:

- an assessment of what the development servicing requirements are likely to be in terms of sewage treatment and dispersal, stormwater dispersal, water supply, power and telecommunications,
- a determination of the capability of existing services to accommodate the anticipated development, and
- the identification of the potential need, as required, for upgrading existing infrastructure to accommodate proposed development in accordance with the plan change.

The assessments in this report are based on the criteria contained within the following Standards:

- NZS 4404:2004 – Land Development and Subdivision Engineering, including QLDC amendments, and
- SNZ PAS 4509:2003 – New Zealand Fire Service Fire Fighting Water Supplies Code of Practice.

2.0 BACKGROUND

The Wanaka area has experienced significant growth in recent years. The QLDC Community Plan anticipates that the population (residents and visitors) will continue to increase at an annual growth rate of 4% in the forthcoming years. Inevitably, this anticipated growth will place considerable pressure on the existing infrastructure, as well as the land available for development into residential, retail, commercial and industrial usages. The Wanaka Structural Plan (2004) recognised that the existing Wanaka CBD has particular growth management issues.

The Three Parks site has been identified as a suitable location for a new central hub for future commercial, large-scale retail, service, employment, mixed use and residential land uses.

The Three Parks site is situated to the south east of Lake Wanaka and covers an area of approximately 110 hectares. It is located between the State Highway 84 and Ballantyne and Riverbank Roads. It is intended to include commercial, mixed use and residential development. A Draft Development Plan (reference Appendix A) has been developed which locates specific activity areas within the site.

3.0 WATER SUPPLY DEMAND ASSESSMENT

The objective of the water supply demand assessment is to determine the pipe asset upgrades that may be required to the existing Wanaka water supply network, in addition to the QLDC currently proposed upgrades in the forthcoming years, to supply potable water to the Three Parks Development.

Water usage rates for the proposed development were first assessed. These usage rates were then used to establish average daily and peak hourly flow rates, which were supplied to Tonkin & Taylor for input into their existing WaterCAD model of the Wanaka water supply system. Tonkin & Taylor used the output of their model to determine the necessary water supply reticulation upgrades to service the proposed Three Parks Development.

3.1 Existing / Planned Water Supply Infrastructure

The Three Parks area is currently located within the Beacon Point pressure zone and is supplied by the Beacon Point reservoir. The intake for the Beacon Point reservoir is the Beacon Point intake, which is located near the outlet of Lake Wanaka.

A strategic review of the Wanaka Water Supply System was performed in 2005/06. This focus of this strategic review was determining existing and future (out to 2026) capacity issues. The review combined detailed growth projections, district plan zoning, dwelling capacity, water demand and capacity modelling.

The results of this review are presented in the following two reports:

- "LTCCP Water Supply Modelling Report, Wanaka 2026" prepared by Tonkin & Taylor Ltd., Feb 2006.
- "QLDC Strategic Water Review – Bores, Intakes, Pump Stations, Rising Mains, Treatment & Storage" prepared by MWH New Zealand Ltd., Feb 2006.

The Tonkin and Taylor report focuses on reticulation modelling while the MWH New Zealand report focuses on the non-pipe elements of reservoirs, pump stations and treatment facilities.

The key future developments for the Wanaka water supply system identified in these reports are the construction of the Hawthenden reservoir in 2008, Upper Hawthenden reservoir in 2019 and associated systems to service projected growth in the Wanaka West and South areas. The Hawthenden reservoir is to be constructed above Mount Aspiring Road and is required to provide extra capacity to the Beacon Point Pressure Zone. Concurrent to this network upgrade, a falling trunk main is to be installed to connect the reservoir to the Cardrona Valley Road.

3.2 Determination of Water Usage Rates per Activity Area

The Three Parks Draft Development Plan (refer to Appendix A) indicates that the proposed development will contain a number of activity areas. These activity areas include such uses as commercial, retail, leisure, hospitality, high density residential and residential. Each of these activities generates a unique water supply demand, and this demand needs to be assessed in order to determine the likely effects on the surrounding water supply network.

3.2.1 Commercial Flow Rates

The actual water demands for the proposed development are not known and will vary according to the nature of the final development. Commercial water demands have therefore been assessed using two different methodologies to establish the most likely water demands and wastewater generation rates:

1. NZS 4404 recommended (refer Table 5.2) peak industrial / commercial flows rates. Both the "light" and "medium" water usage categories were investigated for the Three Parks development. For the purposes of this study, the peak flow rates were first discounted by a peaking factor to convert them to average daily flow rates. Table 5.2 of NZS 4404 is reproduced below in Table 1 for reference.
2. The second methodology involved populating the commercial/medium density residential activity areas (areas 2 – 5) in the proposed Three Parks Development with representative businesses, and then assessing an expected demand from these businesses based on existing water demand data for businesses in the Dunedin area. The Dunedin area was selected because there was water usage data readily available for comparable activities. This approach was undertaken as per a recommendation in NZS 4404 that states where available, specific flow information should be considered when determining design flow rates.

Table 1: Peak Industrial / commercial wastewater flow rates. Reproduced from Table 5.2 in NZS 4404.

Industry Type (Water usage)	Design Flow (//sec/Ha)
Light	0.4
Medium	0.7
Heavy	1.3

It is expected that the actual Three Parks water usage will fall somewhere in between the light and medium usage, possibly closer to the light category. The wastewater flow rates provided in Table 1 were first augmented by 20% (to allow for irrigation usage) and then utilised to represent the Average Daily Flowrate (ADF) for activity areas 2, 3 and 4.

A peaking factor of 5.0 was then applied to the ADF to provide the peak hourly flow rate (PHF). This value is lower than the 6.6 factor provided for Wanaka in QLDC's amendments to NZS 4404, but is considered appropriate for this assessment, as the Three Parks Development is a significant development and peak flows will consequently be modulated by the scale of the development water supply network.

3.2.2 Residential Flow Rates

The water supply demands for the residential areas were determined by applying the QLDC amendments to NZS 4404 specifications to ascertain the ADF per section. The total flow per section was calculated at 2100//section/d, based on a flow of 700//person/d, and an average dwelling occupancy of 3 persons. A section density for each zone was chosen by estimating the number of sections per hectare, assuming a representative section size of 625m² (16 sections per Ha) for medium to high-density housing and 1250m² (8 sections per Ha) for low density housing. Note that these representative section sizes include for such areas as streets and reserves, and hence will be larger than the expected actual section size in these areas.

A peaking factor of 5.0 was then applied to the ADF to provide the peak hourly flow rate, as before.

3.2.3 Assessed Water Supply Demands, Methodology 1

Based on the above assessments, The ADF and PHF for each activity area are presented in Table 2.

Table 2: Assessed average daily and peak hourly water supply demands based on "Medium" commercial water usage category.

Activity Area	Size (Ha)	Number of Equivalent Dwellings	"Light" Commercial Average Daily Flow Rate (m ³ /d)	Peak Hourly Flow Rate (l/sec)	"Medium" Commercial Average Daily Flow Rate (m ³ /d)	Peak Hourly Flow Rate (l/sec)
1	10.8	-	0	0	0	0
2	0.9	-	22	1.3	39	2.3
3	29.3	-	729	42	1,276	74
4	24.7	-	615	36	1,075	62
5	10.7	171	359	21	359	21
6	35.5	284	596	35	596	35
Total	111.9	-	2,321	135	3,345	194

3.2.4 Assessed Water Supply Demands, Methodology 2

A summary of average daily and peak hourly flows assessed using the second methodology is provided in Table 3. The flowrates for activity area 6 were computed using the method described in Section 3.2.2.

Table 3: Assessed average daily and peak hourly water supply demands using alternative assessment method.

Area	Average Daily Flow Rate (m ³ /d)	Peak Hourly Flow Rate (l/sec)
1	0	0
2	0.8	0.05
3	358	21
4	538	31
5	231	13
6	596	35
Total	1,724	100

The second methodology produced ADFs and PHFs approximately 25% less than the flows computed using the first methodology, and demonstrates the potential variation in demand for the proposed development. It is reasonable to conclude that actual flows are likely to fall within the bounds of the two assessments.

3.3 Review of Water Supply Demand Assessment

The water supply assessment provided in Section 3.2 has shown a wide variation in potential ultimate flows, with ADF estimates varying between 1,724m³/d and 3,345m³/d. The upper flow estimate is based on a "medium" commercial water usage and residential usage to the requirements of the QLDC amendments to NZS 4404, and is considered for the purposes of this report to be an overly conservative estimate for Three Parks. The lower estimate of 1,724m³/d is based on

the use of actual flow measurements from representative businesses to predict Three Parks water usage. A third value of 2,321m³/d was calculated assuming a “light” commercial water usage and residential usage to the requirements of the QLDC amendments to NZS 4404.

Based on the above assessment, an average daily flow of 2,500m³/d is judged to be appropriate for planning purposes. Applying a peaking factor of 5 to this value provides a peak hourly flow of 145l/sec. These values are used in later sections of this report to assess likely effects on the water supply network and determine staging implications.

3.4 Tonkin & Taylor Wanaka Water Supply Modelling

Water demands based on the above assessment were provided to Tonkin and Taylor for input to their Wanaka water supply WaterCAD model. Tonkin and Taylor were instructed to model the sensitivity of the Wanaka water supply model to variations in the demands for the proposed Three Parks Development by applying a factor of ±25% to the assessed demands. The purpose of this undertaking was to both provide a range of water demand scenarios to acquire an understanding of the effects that staging the construction of the Three Parks Development may have on the surrounding network.

The primary objectives of the water supply modelling were to determine:

- The water pressure during the peak hour demand period.
- The availability of class W3/W4 fire flow.
- The sensitivity of the Wanaka water supply network to assessed Three Parks Development demands.

3.4.1 Modelling Methodology

The following is paraphrased from the Tonkin & Taylor report. A copy of the report is provided for reference in Appendix B.

The assessed demands for the proposed Three Parks Development were added to the current WaterCAD network analysis model for Wanaka, which was last updated in September 2006. The assessed demands were also put into a WaterCAD model built to represent Wanaka in 2009, which is essentially the 2006 model with the addition of the previously discussed proposed Hawthenden Reservoir and associated falling/trunk mains that are to allow for growth in the area of the Three Parks Development.

Each model was run to determine what infrastructure upgrades were required (if any) to provide the following:

- Residual pressure during the peak hourly demand of at least 300 kPa, and
- Class W3/W4 fire flow is available to meet required QLDC standards (minimum residual pressure of 100 kPa).

3.4.2 Modelling Results

Tonkin and Taylor’s modelling show that there is insufficient pressure and flow in the Beacon Point pressure zone to supply the entire Three Parks Development. However, this modelling indicates that there is a spare capacity of approximately 35l/sec within the existing water supply network serving Three Parks and adjacent

areas. Flows beyond this will decrease the residual pressure in the Beacon Point pressure zone to below the required minimum 300 kPa.

If all of this spare capacity were made available to Three Parks, approximately 24% of the development (based on an ADF of 2,500m³/d and PHF of 145//sec) could be supplied by the existing infrastructure.

The results from the Wanaka 2009 model, which includes the Hawthenden Reservoir and falling main, indicate that a further 250mm diameter trunk main between Cardrona Valley Road and Ballantyne Road will be required to supply the entire Three Parks Development water demand, and provide the required Class W3/W4 fire fighting water supply flow rates (as per SNZ PAS 4509:2003). A 300mm diameter water main would be required if higher design flows were to be provided for.

3.5 Summary

The assessment undertaken provides an insight into the potential effects of the Three Parks development on the existing and planned future infrastructure. A range of predicted flowrates was presented and discussed, and a value for planning purposes was identified. While it is not possible to determine a definitive water usage rate at this preliminary stage of the project, this assessment does provide an important tool for future planning of the Three Parks development, including determining appropriate staging of the development.

In conclusion, it is reasonable for planning purposes to expect the peak population daily flow demand for the Three Parks Development to be approximately 2,500m³/d. Such a demand can be supplied by the Hawthenden Reservoir that is programmed by Council to come on stream in 2008. However, a new trunk main, of 250mm to 300mm diameter, between Cardrona Valley Road and Ballantyne Road will be required to convey the water to the Three Parks site. Actual sizing will depend on the requirements of the other potential developments in the area.

Approximately 24% of the planned Three Parks development can be supplied by the existing Beacon Point pressure zone, assuming all of the existing spare capacity in the system is allotted to Three Parks. Once this capacity is reached, the Hawthenden reservoir, including the associated rising/falling mains, will be required to provide a minimum residual pressure of 300 kPa.

4.0 WASTEWATER GENERATION ASSESSMENT

The objective of the wastewater generation assessment is to determine if pipe asset upgrades to the existing Wanaka wastewater network (taking into account the QLDC proposed upgrades in the forthcoming years) would be required to treat and disperse wastewater from the Three Parks Development.

4.1 Existing / Planned Wastewater Infrastructure

A portion of a new foul sewer trunk main, termed the Cardrona Bypass foul sewer pipeline, was recently installed within the Three Parks Development site. It is generally located adjacent to the new Cardrona Bypass storm sewer pipeline. The foul sewer pipeline currently terminates at an "end cap" just beyond Riverbank Road.

When commissioned, this pipeline will divert wastewater flows from the area around Andersons Road, which currently drains to the Pembroke Park wastewater pumping station located adjacent to the CBD, to a wastewater pumping station which is planned for Riverbank Road. This new pumping station is part of the planned "Project Pure" upgrades to the Wanaka wastewater reticulation. These upgrades are to encompass the construction of three pumping stations, one falling trunk main, three rising trunk mains and a new wastewater treatment facility to be located adjacent to the Wanaka airport.

The alignment of the Cardrona Bypass foul sewer pipeline is such that it should be able to cater for a large portion of the proposed Three Parks Development. Other sections of the development will likely be provided for by the planned new falling trunk main that will link the current inlet to the Ballantyne Road Oxidation Ponds to the aforementioned pumping station in Riverbank Road.

4.2 Determination of Generation Rates per Activity Area

A similar approach to the one taken for assessing the water demand was used for assessing the expected wastewater generation rates. This approach is discussed below.

The Three Parks Draft Development Plan (refer to Appendix A) indicates that the proposed development will contain a number of activity areas. These activity areas include such uses as commercial, retail, leisure, hospitality, high-density residential and residential. Each of these activity areas will generate a unique wastewater generation rate, and this rate needs to be assessed in order to determine the likely effects on the surrounding wastewater network.

Three flow scenarios have been assessed for the development in order to determine likely wastewater generation rates. They are:

- Case 1: "medium" commercial wastewater generation, plus residential to QLDC standards.
- Case 2: "light" commercial wastewater generation, plus residential to QLDC standards.
- Case 3: Flows previously derived from the Dunedin study (Section 3.2.4), plus residential to QLDC standards.

A review of servicing implications for the three flow scenarios is presented in Section 4.3, with particular comparison to the flow allowances currently provided for the "Project Pure" wastewater infrastructure upgrade for Wanaka.

4.2.1 Commercial Flow Rates

As introduced above, flow rates for the commercial areas of the Three Parks Development have taken into account three flow scenarios. The first two derive from wastewater flows recommended by NZS 4404 (refer Table 1) for peak industrial / commercial flows rates, while the third scenario is based on flows previously derived from the Dunedin study. For the first two scenarios, the Peak Wet Weather Flow (PWWF), typically expressed in units of l/sec, was first calculated. A peaking factor of 4.5 (from the QLDC standard), representing the summation of a factor of 2 for diurnal fluctuations and 2.5 for infiltration, was then utilised to back calculate the assessed Average Dry Weather Flow (ADWF), typically expressed in units of m³/d. For the third scenario, the ADWF was first calculated and then a peaking factor of 4.5 was applied to give the PWWF.

4.2.2 Residential Flow Rates

The wastewater generation rates for the residential areas were determined by applying the QLDC amendments to NZS 4404 specifications to ascertain the assessed ADWF per section. The per section ADWF was calculated to be 1050 l/section/d, based on a flow of 300 l/person/d, and an average dwelling occupancy of 3.5 persons (note the QLDC standards provide for different dwelling occupancies for water demand and wastewater generation calculation purposes). A section density for each zone was selected by estimating the number of sections per hectare, assuming a representative section size of 650m² (16 sections per Ha) for medium to high-density housing, and 1250m² (8 sections per Ha) for low density housing. Note that these representative section sizes include for such areas as streets and reserves, and hence will be larger than the actual average section size in these areas.

The ADWF for the residential activity areas (e.g. areas 5 and 6) were determined by multiplying the daily flow per section by the representative number of sections within a particular area. The PWWF was then determined by applying a peaking factor of 4.5 to the ADWF.

4.2.3 Assessed Wastewater Flow Rates

The assessed daily and peak hourly flow rates for each of the three flow scenarios, broken down by activity area, are presented in Table 4.

Table 4: Assessed peak population daily and peak hourly wastewater flow rates.

Area	Flow Scenario					
	Case 1		Case 2		Case 3	
	PPDWF (m ³ /d)	PWWF (l/sec)	PPDWF (m ³ /d)	PWWF (l/sec)	PPDWF (m ³ /d)	PWWF (l/sec)
1	0	0	0	0	0	0
2	31	1.6	8	0.4	0.5	0.03
3	403	21	230	12	232	12
4	327	17	192	10	349	18
5	180	9.4	180	9.4	180	7.3
6	298	16	298	16	298	15
Total	1,239	65	908	48	1,060	52

Notes: PPDWF – Peak Population Dry Weather Flow
PWWF – Peak Hourly Wet Weather Flows

4.3 Assessment of Impact on Surrounding Infrastructure

4.3.1 Design Criteria for Project Pure

As part of the design process for the proposed Project Pure wastewater infrastructure, a study was carried out to estimate the expected future demand on the new infrastructure. This demand was determined by assuming representative section sizes and occupancy rates for the currently undeveloped sections of Wanaka that are to be catered for by the new infrastructure, and assessing the expected per section flow contribution. The contribution to this demand arising from the Three Parks site, as assessed for the Project Pure upgrades, is compared below in Table 5 to the three flow scenarios identified in Table 4.

Table 5: Assessed wastewater flows for the Three Parks site.

Assessment Method	Peak Population Daily Flow Rate (m ³ /d)	Peak Wet Weather Flow Rate (l/sec)
Three Parks Development	908 – 1,239	48 – 65
Project Pure	1,136 ¹	46 ²

¹Based on a per capita generation rate of 250l/p/d

²Based on a peaking factor of 3.5

Clearly, as for the water supply assessment, there is a variation in the results from the various flow assessments. A key consideration in comparing flows from the Three Parks assessment with the earlier Project Pure assessment is that Council has adopted a higher per capita wastewater generation rate (300l/p/d) subsequent to the Project Pure assessment being completed. The per capita generation rate utilised in the Project Pure assessment was 250l/p/d. Also, the peaking factor utilised in the Project Pure assessment (3.5 x Average Dry Weather Flow) was based on actual observed peak wastewater flowrates, as opposed to the QLDC standards.

4.3.2 Review of Wastewater Generation Assessment

Based on the assessment presented in Sections 4.2.3 and 4.3.1, the wastewater generation rate for Three Parks adopted for design purposes for Project Pure is confirmed as being appropriate. This generally equates to the average dry weather flow somewhere between the “light” and “medium” commercial usage, with a peaking

factor of 3.5 applied to give the peak wet weather flow. The 3.5 peaking factor is considered more appropriate than the QLDC standard peaking factor of 4.5, as the former is based on actual measurements of Wanaka wastewater flows.

Further, to put these design flows into context, the peak measured flow rate for the whole of Wanaka (excluding Albert Town) for 30 December 2004 was 110//sec. This flow rate was generated during a time of peak residential and visitor occupancy, combined with a very large rainfall event. By comparison, the design capacity for the Riverbank Road pump station (until 2021) is 260//sec, with the design allowing for augmentation around 2021 if required. The ultimate design allows for a capacity of 348 //sec by 2040. This gives further confidence to the figures adopted for Three Parks.

4.3.3 Likely Impact on Surrounding Infrastructure

The Project Pure pumping stations and main trunk pipelines that will convey wastewater out to the new treatment plant can cater for the assessed likely wastewater flows from Three Parks.

Predicting future populations in a high-growth tourist destination centre such as Wanaka is an inherently challenging undertaking, and hence the new facilities installed as part of “Project Pure” have been designed to have in-built flexibility to cater for potential variations in flow predictions. Some of the in-built flexibility of the Project Pure facilities, in relation to the Three Parks development, includes:

- The augmentation planned for 2021 can be brought forward, if required, to increase the capacity of the Riverbank Road pumping station and rising main to cater for additional wastewater flows.
- The future augmentation could provide, if required, for a larger third pump and/or increase in size of the planned second rising main.
- Future replacement of the installed pumps with larger model pumps.
- The future construction of flow buffering facilities to manage possible high but short-term peak flow conditions. Such facilities could further reduce the “peaking factor”.

4.3.4 Summary

The assessment undertaken provides an insight into the potential effects of the Three Parks development on the existing and planned future infrastructure. A range of predicted flowrates was presented and discussed, and a value for planning purposes was identified. While it is not possible to determine a definitive wastewater generation rate at this preliminary stage of the project, this assessment does provide an important tool for future planning of the Three Parks development, including determining appropriate staging of the development.

In conclusion, it is reasonable for planning purposes to expect the average dry weather flow for the Three Parks Development to be approximately 1,136m³/d, and the peak wet weather flow to be 46//sec. This compares to a design flow rate for the planned Riverbank Road pumping station of 260//sec until the year 2021. Finally, it is confirmed that the expected Three Parks flow rate can be serviced by all downstream components of the new infrastructure to be constructed as part of the “Project Pure” upgrades.

5.0 STORMWATER GENERATION ASSESSMENT

The objective of the stormwater generation assessment is to determine whether pipe asset upgrades to the existing Wanaka stormwater network (taking into account the QLDC proposed upgrades in the forthcoming years) would be required to service the planned Three Parks Development.

It is worth noting that Willowridge Developments Ltd has taken a proactive approach to stormwater management for Three Parks, and has worked with Council to optimise the alignment of a stormwater main recently installed within the site. This stormwater main is discussed further in Section 5.1 below.

5.1 Existing Stormwater Reticulation

The recently installed Cardrona Bypass stormwater pipeline, which passes through the Three Parks site, was installed to divert stormwater runoff from catchments to the east of Anderson Road to the Cardrona River. Prior to the installation of this pipeline, runoff from the reticulated portions of these catchments was conveyed down SH 84 to Lake Wanaka via the CBD.

The Cardrona Bypass pipeline was designed by Opus International Consultants to cater for flows from both the Three Parks site and neighbouring upstream catchments. It was designed in accordance with the requirements set forth in NZS 4404 for primary stormwater systems to provide sufficient capacity for a design storm event with a 5-year Average Return Interval (ARI) (i.e. 20% Annual Exceedance Probability (AEP)) of 20-minute duration. The design included for a high-flow diversion weir to be installed in the existing Anderson Road stormwater reticulation to limit the flow rate of stormwater runoff directed into the Cardrona Bypass pipeline from upstream catchments upstream of SH 84 to a maximum of 0.55m³/s.

For the catchments upstream of SH 84, the design calls for secondary flows generated from design storm events up to 100-year ARI (1% AEP) to be channelled via overland flow paths down the north side of SH 84 towards Lake Wanaka and the CBD. Flow paths for secondary flows generated in the catchments downstream of SH 84 (including the Three Parks site) were not included in the design.

5.2 Three Parks Stormwater Generation Assessment

To determine what impact the proposed Three Parks Development will have on the existing stormwater reticulation system, the development stormwater generation was assessed to determine whether the existing reticulation has sufficient capacity to cater for the development flows.

Stormwater runoff rates for the proposed Three Parks Development were determined for each of the activity zones identified on the Draft Development Plan (refer to Appendix A) using the Rational Method (RM). The RM is a simple mathematical representation of the proportion of rainfall which produces direct runoff, resulting in a peak flow which flows in constructed systems of pipes, detention basins and open channels, or in natural stream and rivers. The RM calculates only the peak flow resulting from what is termed the critical storm for the catchment area under consideration. Inputs to the RM are:

- The average intensity of the design rainfall event.
- A coefficient of runoff which is a function of the surface types within the catchment (i.e. paved surfaces, pastures, grassed surfaces, roof surfaces, etc).
- The area of the catchment.

The design storm event for the primary stormwater system was chosen to be the same as for that in the Opus design report for the Cardrona Bypass storm sewer, namely a 5-year Average Return Interval (ARI) storm event of 20-minute duration. A 5-year ARI event is the design storm recommended in NZS 4404 for the design of primary stormwater systems residential, commercial and industrial areas. The rainfall depth associated with this event was supplied from the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS), Version 2.00.

The design storm event for the secondary stormwater system was chosen to be a 100-year ARI storm event of 20-minute duration.

The coefficient of runoff for each activity zone within the proposed Three Parks Development was selected by making a valuation of the intended activities within each zone. The coefficients of runoff for the sub-catchments upstream of the Three Parks development (feeding into the Cardrona Bypass pipeline) were chosen to be the same as those used in the Opus design.

5.3 Primary Stormwater System

The assessed primary system stormwater runoff rates for each of the sub-catchments are presented in Table 6.

Once the stormwater runoff rates were computed, critical sections of the existing Cardrona Bypass storm sewer pipeline were first identified, and then analysed, to determine whether the existing pipeline has sufficient capacity to cater to the assessed flows presented in Table 6. Refer to the marked-up stormwater plan in Appendix C for the location of the sub-catchments listed in the table.

Table 6: Assessed stormwater runoff rates for the primary stormwater system.

Sub-Catchment	Area (Ha)	Stormwater Runoff rate (m ³ /s)
Upstream Catchments		
A	37.3	1.50 ¹
B	29.4	1.00
C	43.0	1.11
Sub-Total for Upstream Catchments	109.7	3.61
Development Catchments		
3	32.9	0.89
4/5	39.0	1.20
6A	26.8	0.60
Sub-Total for Development Catchments	98.7	2.69
Total to Cardrona Bypass Pipeline	208.4	6.30
6B (Not collected by Cardrona Bypass)	12.3	0.32

¹A portion of which will be diverted down SH 84 as discussed in Section 5.1 of this report.

This analysis determined that there is sufficient capacity within the existing reticulation, subject to some care being taken to the selection of where runoff from the proposed Three Parks Development is injected into the existing pipeline. Stormwater runoff from some of the sub-catchments within the development may

need to be conveyed along secondary storm sewer mains for some distance before flowing into the primary (Cardrona Bypass) main.

Due to topographic constraints, sub-catchment 6B likely cannot all be picked up by the Cardrona Bypass storm sewer. Instead, some surface runoff from this sub-catchment will need to be channelled in some manner to the Cardrona River, somewhere in the vicinity of Ballantyne Road, or conversely be dispersed into the gravels underlying the Three Parks site. Dispersal into the gravels is the current method for removing stormwater from the Three Parks site, as well as for the developed sites along Ballantyne and Gordon Roads (via soak pits).

Although the entirety of the Ballantyne Road Oxidation Ponds site is shown as draining towards the intersection of Ballantyne and Riverbank Road in the marked-up plan, in reality it is likely that the lower portions of the site (primarily in the NE corner) will drain into the Cardrona Bypass storm sewer, possibly by a system of overland streams and ponds. Since these flows would likely enter the pipeline below the previously identified critical section of the pipeline (indicated as pipe section 14 in the marked-up storm sewer plan in Appendix C) there should be sufficient capacity in the Cardrona Bypass sewer to cater to these flows.

5.4 Secondary Stormwater System

The assessed secondary system stormwater runoff rates for each of the sub-catchments are presented in Table 7.

Table 7: Assessed stormwater runoff rates for the secondary stormwater system.

Sub-Catchment	Area (Ha)	Stormwater Runoff rate (m ³ /s)
Upstream Catchments		
A	37.3	2.77
B	29.4	1.84
C	43.0	2.04
Total	109.7	6.65
Development Catchments		
3	32.9	1.65
4/5	39.0	2.21
6A	26.8	1.10
6B	12.3	0.60
Total	111.0	5.56

These flows were determined by first calculating the surface runoff due to a 100-year ARI storm event of 20-minute duration, and then subtracting off from this the portion of the surface runoff that is diverted by the primary stormwater system. This leaves the portion of the expected runoff that needs to be conveyed by secondary flow paths. Secondary flow paths are typically roadways and appropriately graded open spaces such as access-ways, parks and reserves.

The detailed design of the Three Parks Development will need to accommodate the secondary flows identified in Table 7. This design should incorporate such features as appropriately designed secondary flow paths, controlled flood plains, detention ponds and soak pits. Otherwise attention would need to be paid to conveying secondary flows beneath Riverbank Road and on to the Cardrona River. This could require either the obtainment of easements through, or the purchase of, land between Riverbank Road and the Cardrona River.

6.0 TELECOMMUNICATION, POWER AND GAS ASSESSMENTS

In order to assess the serviceability of the Three Parks Development in terms of telecommunication, power and gas, representative suppliers of these services were contacted, supplied with the draft developmental plan and asked to determine whether they were capable of servicing the proposed development, based on the development indicated.

All contacted suppliers confirmed the serviceability of the development with regards to their respective network. Their written confirmations are provided for reference in Appendix D. A summary of their responses is provided below.

6.1 Telecommunications Supply

Telecom New Zealand confirmed in its letter that it would be able to provide telephone reticulation for the proposed the Three Parks Development. Based on the provided draft development plan, Telecom estimated the cost of installing the reticulation to be on the order of \$1,130,000.00 inclusive of GST. It was noted that this cost included a contribution towards Telecom's total cost of extending its network and infrastructure to the lots presented in the draft plan, including the cost of design, supervision of installation and of telecommunication specific materials. In addition to this charge, Willowridge Developments Ltd will be required to provide trenches and the installation (under supervision) of telecommunications infrastructure within the boundaries of the development.

6.2 Power Supply

Delta Utility Services Ltd confirmed that assuming typical demand requirements, Aurora (the Local Supply Authority) can make an electricity supply available from the substation on Ballantyne Road to the proposed Three Parks development.

Delta also noted that the Three Parks site lies along the path of Aurora's 66kV sub transmission line, and that careful consideration will need to be given to the moving of this line. Delta further noted that there is a lack of usable cable routes along Ballantyne and Riverbank Roads to supply the development from the Wanaka substation, and recommends that Willowridge establish additional supply corridors.

Willowridge will be responsible for any resource consents and provision of easements for Aurora plant if required. The funding of the required works will be in accordance with Aurora's Capital Contribution Policy (NS5.2).

6.3 Gas Supply

Rockgas Limited confirmed that are capable of providing a reticulated gas supply to Three Parks. They state that their current network covers most of the Wanaka CBD and the Anderson and Plantation Road areas, and that they plan to extend their network down Ballantyne Road in the near future.

7.0 SUMMARY

Duffill Watts Consulting Group (DWG) were engaged by Willowridge Developments Ltd to prepare an infrastructure and servicing assessment report for the planned Three Parks Development, Wanaka, to form part of a section 32 plan change analysis. In this report, DWG were directed to include the following elements:

- an assessment of what the development servicing requirements are likely to be in terms of sewage treatment and dispersal, stormwater dispersal, water supply, power and telecommunications,
- a determination of the capability of existing services to accommodate the anticipated development, and
- the identification of the potential need, as required, for upgrading existing infrastructure to accommodate proposed development in accordance with the plan change.

DWG first assessed the development demands, then discussed the capability of existing and planned future services to meet these demands, in terms of water supply, wastewater and stormwater.

Representative suppliers of telecommunication, power and gas services were contacted and asked to confirm their capability to service likely development demands.

7.1 Water Supply

The water supply assessment determined that it is reasonable for planning purposes to expect the peak population daily flow demand for the Three Parks Development to be approximately 2,500m³/d. Such a demand can be supplied by the Hawthenden Reservoir that is programmed by Council to come on stream in 2008. However, a new trunk main, of 250mm to 300mm diameter, between Cardrona Valley Road and Ballantyne Road will be required to convey the water to the Three Parks site. Actual sizing will depend on the requirements of the other potential developments in the area.

Approximately 24% of the planned Three Parks development can be supplied by the existing Beacon Point pressure zone, assuming all of the existing spare capacity in the system is allotted to Three Parks. Once this capacity is reached, the Hawthenden reservoir, including the associated rising/falling mains, will be required to provide a minimum residual pressure of 300 kPa.

7.2 Wastewater

The wastewater assessment determined that it is reasonable for planning purposes to expect the average dry weather flow for the Three Parks Development to be approximately 1,136m³/d, and the peak wet weather flow to be 46l/sec. This compares to a design flow rate for the planned Riverbank Road pumping station of 260l/sec until the year 2021. Furthermore, it is confirmed that the expected Three Parks flow rate can be serviced by all downstream components of the new infrastructure to be constructed as part of the "Project Pure" upgrades.

7.3 Stormwater

This stormwater assessment determined that there is sufficient capacity within the existing stormwater network, subject to some care being taken to the selection of where runoff from the development is injected into the existing Cardrona Bypass storm sewer. Stormwater runoff from some of the sub-catchments within the development may need to be conveyed along secondary storm sewer mains for some distance before being injected into the primary trunk main.

Due to topographic constraints, sub-catchment 6B likely cannot all be picked up by the Cardrona Bypass storm sewer. Instead, some surface runoff from this sub-catchment will need to be channelled in some manner to the Cardrona River, somewhere in the vicinity of Ballantyne Road, or conversely be dispersed into the gravels underlying the Three Parks site. Dispersal into the gravels is the current method for removing stormwater from the Three Parks site, as well as for the developed sites along Ballantyne and Gordon Roads (via soak pits).

The assessment further determined that the Cardrona Bypass storm sewer is not designed to accommodate secondary stormwater flows. The detailed design of the Three Parks Development will need to accommodate the secondary flows identified in this report by the use of features such as appropriately designed secondary flow paths, controlled flood plains, detention ponds and soak pits. Otherwise attention would need to be paid to conveying secondary flows beneath Riverbank Road and on to the Cardrona River. This could require either the obtainment of easements through, or the purchase of, land between Riverbank Road and the Cardrona River.

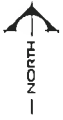
7.4 Telecommunication, Power and Gas Services

Representative suppliers of telecommunication, power and gas services, were contacted and asked to determine whether they were capable of servicing the proposed development, based on the level of development indicated in the draft development plan.

All contacted suppliers confirmed the serviceability of the development with regards to their respective network. A summary of their responses is included in Section 6.0 of this report, and a copy of their correspondence is provided for reference in Appendix D.

Appendix A

Three Parks Draft Development Plan



Proposed Activity Areas Boundaries

- 1 - Open Space - 10.8 ha
- 2 - Highway Service Area - 0.9ha
- 3 - Mixed Use, Retail/Leisure/Hospitality - 29.3 ha
- 4 - Mixed Use, Office/Light Industry/Commercial - 24.7 ha
- 5 - High Density Residential/Visitor Accommodation - 10.7 ha
- 6 - Residential - 35.5 ha

Potential alignment of link to Gordon Road

Open Space outside site boundary but identified in accordance with structure plan

0 100m 200m



1 Hectare



- Buildings (Illustrative Only)
- Roads
- Service Lanes/Car Parking
- Service Only Roads
- Open Space
- Combined Footpath/Cycleway
- Footpath
- Trees
- Planting
- Site Boundary

Three Parks Project Wanaka

Draft Development Plan

24 July 2006

Scale: 1:2,500 (A1), 1:5,000 (A3)

Urban Design Credits: (c) 1999-2006 Boffa Miskell Limited

DRAFT

Appendix B

Tonkin and Taylor Water Supply Modelling Report

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Tonkin & Taylor

FILE			
DUFFILL WATTS & KING LTD - DUNEDIN			
25 OCT 2006			
DIR	REF	REF	ACT
	DEC		

Fax

To:	Duffill Watts & King Ltd	Your fax no:	03 477 4236
Attention:	Derrick Railton	T&T job no:	50611.047
From:	Simon Rodwell	Reply fax no:	03-353 4401
Page:	1 of 4	Date:	24 October 2006
Subject:	Water Modelling for Three Parks Project, Wanaka		

Derrick,

Following your letter, 15 September 2006, and in accordance with your request and our conditions of engagement, we have completed the water supply modelling with regard to checking residual pressures and availability of Class W3/W4 fire flow at the proposed Three Parks Project (including the Oxidation Ponds site), Ballantyne Road, Wanaka.

The objective of the work was to determine:

- Pressure during the Peak Hour Demand period is at least 300 kPa.
- Class W3/W4 fire flow is available to meet the required Queenstown Lakes District Council standards.
- The sensitivity of the Wanaka water supply network by applying a factor of +/- 25% to the assessed water demands of Three Parks Project.

Methodology

We have added the demand of the proposed Three Parks Project (including the Oxidation Pond site), based on the projected populations as provided by Duffill Watts & King into the current Watercad network analysis model for Wanaka last updated September 2006. The water demands were also put into a Watercad model built to represent Wanaka in 2009, which primarily is the 2006 model with the proposed Hawthenden Reservoir and the associated falling/trunk mains that are to allow for growth in the area of the Three Parks Project.

An Average Daily Flow (ADF) was calculated assuming 700 litres per day per person. The total estimated population for Three Parks is 3,910 people. This equates to an ADF of 31.7 l/s.

The model was run for the scenarios mentioned above. The demand criterion for the Wanaka reticulation during modelling was: 6.6 x Average Daily Flow (ADF) to meet the 300 kPa minimum pressure and 3.3 x ADF, to meet Class W3/W4 fire flow and 100 kPa minimum residual pressure at the hydrant.

The demand condition used for the Wanaka reticulation during fire flow modelling is 3.3 x ADF which equates to the peak daily flow. Fire flow requirements are in accordance with the New Zealand Fire Service Fire Fighting Water Supplies Code of Practice, SNZ PAS 4509:2003.

Tonkin & Taylor Ltd - Environmental & Engineering Consultants, 155 Kilmore St, Christchurch, New Zealand
PO Box 13-055, Christchurch, Ph: 64-3-353 4400, Fax: 64-3-353 4401, Email: chch@tonkin.co.nz, Website: www.tonkin.co.nz

All the information contained in this message is confidential, intended only for the above named recipient(s). If you are not the intended recipient(s), you may not use any material in this message or pass it on to others. Please notify us promptly if you have received this message in error. Please telephone the person at the number above and destroy the original message. Thank you.

T&T job no: 50611.047

Results

The 2006 Wanaka model indicates that there is insufficient pressure and flow in the Beacon Point pressure zone to supply the Three Parks Project (with or without the Oxidation Pond site included), even with a 25% reduction in the assessed water demand the project will draw.

The 2009 Wanaka model with the Hawthenden Reservoir and the falling/trunk main constructed from the reservoir to Cadrona Valley Road as forecast by the Queenstown Lakes District Councils LTCCP 2026 report, indicates that a further trunk main (300mm) is required between Cadrona Valley Road and Ballantyne Road to supply the Three Parks Project (as shown in Figure 1 attached). The model indicates that if 25% less water is required by Three Parks this additional trunk main can be down sized to 250mm in diameter, whereas if 25% more water is required then a 375mm diameter pipe is required.

The results of the 2009 model with a 300mm diameter additional trunk main with water demands as assessed are shown below in Table 1.

Table 1 – Availability of Peak Hour Pressure and Fire Flow

Scenario	Residual Pressure (kPa)	Fire Flow Required (l/s)
Peak Hour Demand: (Hawthenden pressure zone)		
Node J-406 (Zone 2)	370 > 300 OK	N/A
Node J-402 (Zone 3)	320 > 300 OK	
Node J-403 (Zone 3)	300 > 300 OK	
Node J-404 (Zone 3)	304 > 300 OK	
Node J-399 (Zone 4)	337 > 300 OK	
Node J-400 (Zone 4)	332 > 300 OK	
Node J-401 (Zone 4)	307 > 300 OK	
Node J- 407 (Zone 5)	330 > 300 OK	
Node J-411 (Zone 5)	321 > 300 OK	
Node J-408 (Zone 6)	350 > 300 OK	
Node J-409 (Zone 6)	335 > 300 OK	
Node J-410 (Zone 6)	331 > 300 OK	
Node J-412 (Zone 6)	344 > 300 OK	
Node J-414 (Oxidation Ponds Site)	347 > 300 OK	
Fire Flow (Class W4): (Hawthenden pressure zone)		
Node J-406 (Zone 2)	365 > 100 OK	50
Node J-402 (Zone 3)	336 > 100 OK	
Node J-403 (Zone 3)	143 > 100 OK	
Node J-404 (Zone 3)	270 > 100 OK	
Node J-399 (Zone 4)	352 > 100 OK	
Node J-400 (Zone 4)	359 > 100 OK	
Node J-401 (Zone 4)	353 > 100 OK	
Node J- 407 (Zone 5)	319 > 100 OK	
Node J-411 (Zone 5)	321 > 100 OK	
Node J-408 (Zone 6)	258 > 100 OK	
Node J-409 (Zone 6)	229 > 100 OK	
Node J-410 (Zone 6)	226 > 100 OK	
Node J-412 (Zone 6)	249 > 100 OK	
Node J-414 (Oxidation Ponds Site)	313 >100 OK	

Refer to Figure 1 for node locations.

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T&T job no: 50611.047

3

Summary of figures:

i. Figure 1 - Site location plan

Revision 0 Oct. 06

We recommend that connection to the Queenstown Lakes District Council network be made to the 200mm diameter water main in Ballantyne Road after the completion of the Hawthenden Reservoir and associated falling/trunk mains between the reservoir and Cadrona Valley Road. We also recommend an additional 300mm water main between Cadrona Valley Road and Ballantyne Road be constructed to supply the Three Parks Project (including the Oxidation Pond site).

Providing the above recommendations are complied with modelling undertaken by Tonkin & Taylor has identified the network adjoining the proposed development is satisfactory for both residual pressure and Class W4 fire flow.

It should be noted that the model is a numerical representation of the physical reality, and subsequently bears some uncertainty. The determination of demands and peaking factors involved assumptions regarding the patterns of water use in the township, and are an approximation of the physical reality. We hope this answers your questions; if you wish to discuss these results please contact Simon Rodwell on 03 353 4400.

Yours faithfully,

TONKIN & TAYLOR LTD

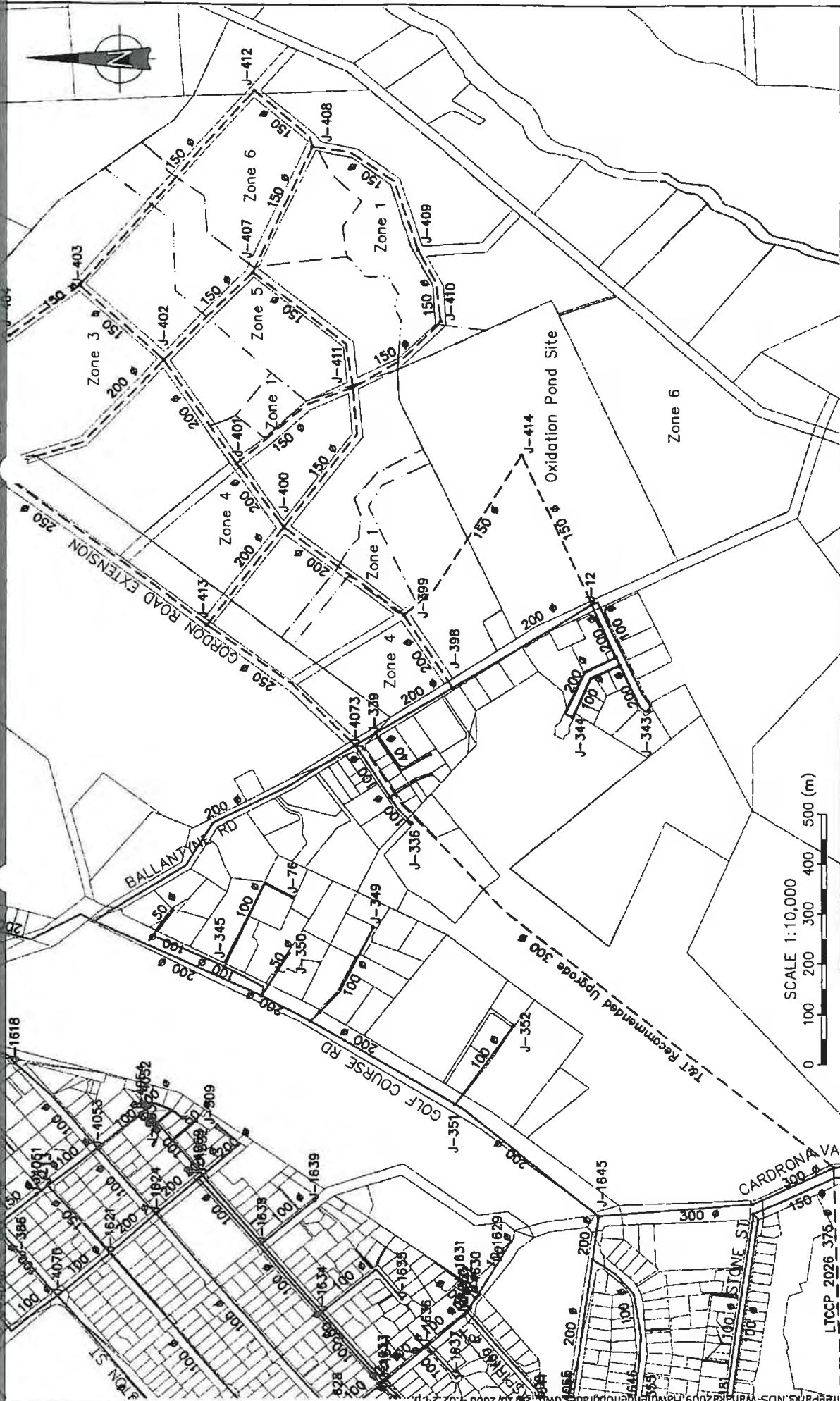


Grant Lovell

CHRISTCHURCH GROUP MANAGER

24 October 2006 P:\50611\50611.047spr-threeparks-waterchk-fax1.doc

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Duffill Watts & King Ltd
 Three Parks Development
 Ballantyne Road, Wanaka
 Site Location Plan

FIG. No. **Figure 1 - NOT FOR CONSTRUCTION** REV. **0**

DRAWN	SPR	DCL 06
DRAFTING CHECKED	10/06	10/06
APPROVED	10/06	10/06

CADFILE :
 SCALES (AT A4 SIZE)
 AS SHOWN

PROJECT No.
 50611.047

Tonkin & Taylor
 Environmental & Engineering Consultants

Auckland
 Christchurch
 Hamilton
 Wellington
 Whangarei

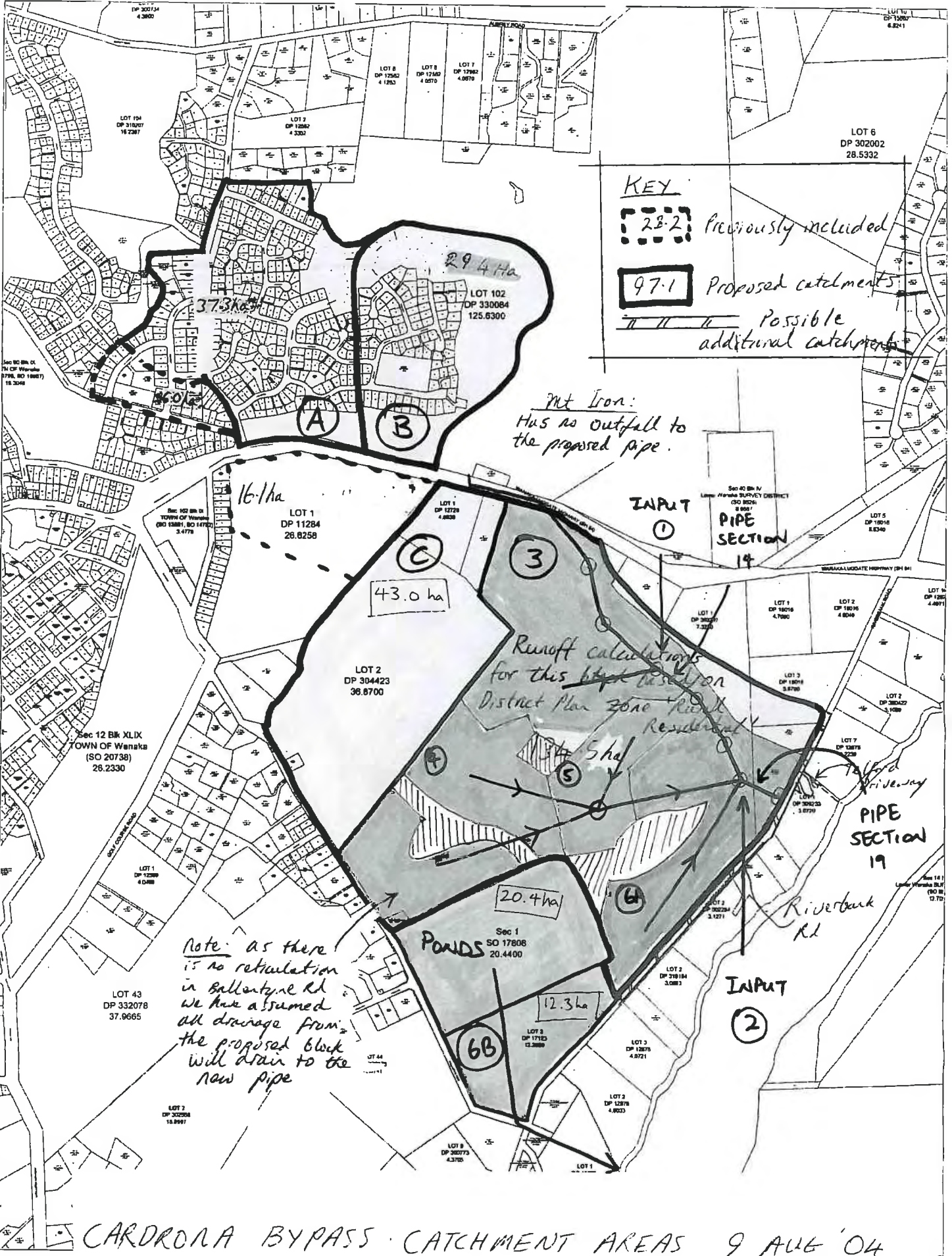
Notes:
 1. Roads shown are legal roads only and may not be formed.
 2. Legal boundary information is Crown copyright reserved.
 3. Position of pipes within street is indicative only.
 4. This figure is intended as a guide only and is not a construction drawing.

SCALE 1:10,000
 0 100 200 300 400 500 (m)

LTCCP 2026 376

Appendix C

**Marked-up Storm Sewer Plan
Original Plan provided by Opus
Marked-ups provided by DWG**



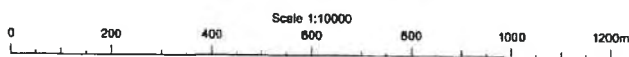
KEY
 [---] Previously included
 [] Proposed catchments
 [///] Possible additional catchments

Mt Iron:
 Has no outfall to the proposed pipe.

Note: as there is no reticulation in Ballantyne Rd we have assumed all drainage from the proposed block will drain to the new pipe

CARDRONA BYPASS CATCHMENT AREAS 9 AUG '04

6XQ015-07



097

Appendix D
Serviceability Confirmation Letters



Telecom New Zealand Limited
Service Delivery
Level 2 Telecom Exchange Building
10 The Crescent
Private Bag 90119
INVERCARGILL

Three Parks Development
c/o Duffill Watts Consulting Group
1st John Wickliffe House
P O Box 910
DUNEDIN 9054
Attention: Jude Weggery

Telephone : 03 214 8876
Facsimile : 03 214 4440

Telecom Ref : CS100516
Your Ref :

Date: 28 March 2007

RE: Proposed Subdivision - Three Parks. Activity Areas 1-6, Estimated 1004 Lots/Units/Dwellings/Buildings

Telecom New Zealand Limited, hereafter referred to as Telecom, will be able to provide telephone reticulation for your client's subdivision, which will be designed according to Telecom design policies. The design will commence when the attached "Contract for the Supply and Installation of Telecommunications Infrastructure" and the prescribed fees are received by Telecom. Copies of Telecom's telephone reticulation design plans and lay specification, which is normally completed within four weeks, will be sent to you when the design has been completed.

The charge for Telecom to provide services to this subdivision of an estimated 1004 lots/units is approximately \$1,129,500.00 (G.S.T inclusive). This charge comprises a contribution toward Telecom's total costs of extending its network and infrastructure to the lots in the draft plan, including the cost of design, supervision of installation and supply of telecommunication specific materials.

In addition to this charge your client is required to provide trenches and the installation (under supervision) of telecommunications infrastructure within the boundaries of the development. This can be in a common trench, as long as all required clearances and covers are adhered to. Please refer to attached documentation. Alternatively, Telecom may provide this trench, however full cost will be charged at current construction sales rates that are additional to the above fees. A quote will be provided on request.

The above quotes are valid for 90 days from the date of this letter. Cheques are payable to Telecom New Zealand Ltd, and should be forwarded to the writer at the above address. Telecom retains ownership of all installed plant.

Please do not hesitate to direct any enquiries to the writer.

Yours faithfully

Innes Forbes

Delivery Specialist

Encl: Contract for the Supply and Installation of Telecommunications Infrastructure
Telecom Standard Subdivision Lay Specifications

815-20070320



Tuesday, March 20, 2007

Your ref:
Our ref: 815L1

Jude Weggery
1st Floor, John Wickliffe House
265-269 Princes Street
PO Box 910
Dunedin 9054

Dear Jude,

**Availability of Electricity Supply to Proposed Three Parks Development
Ballantyne & Riverbank Roads Wanaka**

Thank you for your enquiry about the availability of an electricity supply to the proposed Three Parks Development in Wanaka.

Assuming typical demand requirements Aurora can make an electricity supply available for the development from the Wanaka substation on Ballantyne Road.

As you are probably aware the Three Parks site lies on the path of Aurora's 66kV sub transmission line. Careful consideration will need to be given to the moving of this line. There is also a lack of usable cable routes along Ballantyne and Riverbank Road to supply the development from the Wanaka substation. It is therefore highly likely that the developer will need to establish additional supply corridors.

Given these issues Aurora would appreciate early consultation for both distribution and sub-transmission designs.

The developer will be responsible for any resource consents and provision of easements for Aurora plant if required. The creation of easements is mandatory and a condition of supply availability for both new existing plant.

Funding of the required works shall be in accordance with Aurora's Capital Contribution Policy (NS5.2). A copy of this policy is available on request.

Yours faithfully


Rob Douglas
ASSISTANT ENGINEER

FILE			
DUFFILL WATTS & KING LTD - DUNEDIN			
21 MAR 2007			
DIR	REF	REF	ACT
	JW		



ROCKGAS LIMITED

119 Gorge Road
PO Box 215
Queenstown

Telephone (03) 442-9979
Facsimile (03) 442-9987

27/04/07

Duffill Watts
Po Box 910
Dunedin 9054.

Attn. Jude Weggery.

Re – Three Parks Development

Dear Jude,

Thank-you for your enquiry regarding the gas supply to the proposed Three Parks Development. Rockgas will certainly be interested in offering a reticulated supply to the Three Parks Development.

Our Wanaka reticulation network currently covers most of the Wanaka CBD and the Anderson Rd and Plantation Rd areas. We also plan to extend our network in the near future down Ballantyne Rd.

When the time is right we will be happy to put forward a proposal to your client.

If you have any further questions please contact me direct.

Kind Regards,

A handwritten signature in black ink, appearing to read "Mike Collins". The signature is written in a cursive style and is positioned above the printed name.

Mike Collins.

0274 344-299