Infrastructure and Servicing Assessment Report Ballantyne Road Oxidation Ponds Site, Wanaka Prepared for Queenstown Lakes District Council

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CONTENTS

EXECUTIVE SUMMARY

Duffill Watts Consulting Group (DWG) were engaged by Queenstown Lakes District Council to prepare an infrastructure and servicing assessment report for the planned Ballantyne Road Oxidation Ponds Site, 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 BROP site to be approximately 400m^3/d. Such a demand can be supplied by the existing infrastructure within the Beacon Point pressure zone if all available capacity were to be allotted to the site. A sensitivity analysis has revealed that if the demand was increased by 25%, the pressure in the Beacon Point pressure zone would fall below the minimum required 300 kPa. In this scenario, the Hawthenden reservoir, including the associated rising/falling mains, would be required to provide the required minimum residual pressure.

The wastewater assessment determined that it is reasonable for planning purposes to expect the peak wet weather flows for the BROP site to between 3.3 and 8.2l/sec. This compares to a design flow rate for the planned Riverbank Road pumping station of 260l/sec until the year 2021. It is confirmed that the expected BROP site flow rate can be serviced by all downstream components of the new infrastructure to be constructed as part of the “Project Pure” upgrades.

The stormwater assessment determined that it should be possible to convey stormwater from the elevated portions of the site down the north side of Ballantyne Road, via a storm sewer, and then underneath Riverbank Road and through to the Cardrona River. A second option would be to disperse the stormwater into the gravels underlying the BROP site. The lower sections of the site would need to drain southeast towards Riverbank Road (likely via the recently installed Cardrona Bypass storm sewer), and then either be conveyed in some manner to the Cardrona River, or dispersed into the underlying gravels. The assessment further determined that development of the BROP site will need to accommodate secondary stormwater flows by the use of features such as appropriately designed secondary flow paths, controlled flood plains, detention ponds and soak pits.

Representative supplies 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 Queenstown Lakes District Council to prepare an infrastructure and servicing assessment report for the planned development of the Ballantyne Road Oxidation Ponds Site, 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:

- NZS4404:2004 – 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 Ballantyne Road Oxidation Ponds (BROP) site is situated to the southeast of Lake Wanaka and covers an area of approximately 20 hectares (Reference Figure 1). It is located between the Wanaka-Luggate Highway (SH84) and the Ballantyne and Riverbank Roads. It is proposed to develop this site for industrial and recreational usage once the existing oxidation ponds have been decommissioned and removed.

Figure 1: Map showing location of BROP site. Map scale is 1:5000. Map coordinates are in NZMG 1949.

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, taking into account the QLDC proposed upgrades over forthcoming years, in order to convey potable water to the BROP site to cater for future development.

Water usage rates for the BROP site were assessed based on the information provided by Mitchell Partnerships in their project briefing letter, namely that the it is likely to accommodate recreational grounds, industrial activity, or a combination of both. The water usage rates assessed for the purposes of this report were based on the entire site being developed for industrial / commercial use, with the caveat that the site will most likely be contain a combination of light industrial / commercial and recreational usage areas.

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 development of the BROP site.

3.1 Existing / Planned Water Supply Infrastructure

The BROP site 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 the 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

The actual water demands for the proposed development are not known and will vary according to the nature of the final development. NZS 4404 provides a table (Table 5.2) of recommended peak industrial / commercial wastewater flow rates for cases where specific flow information is not available. These flow rates can be taken as reasonably comparable to water supply flow rates, but excluding any irrigation component. 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. The table in NZS 4404 is reproduced below in Table 1.

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

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

It is expected that the actual BROP site water usage will fall somewhere in between the light and medium usage category, most likely closer to the light category, especially considering that some of the site is expected to be used for recreation purposes. 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 the site.

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 standards, but is considered appropriate for this assessment, as the BROP site is of significant size and peak flows will consequently be modulated by the scale of the site's water supply network.

3.2.1 Assessed Water Supply Demands

Based on the above assessments, the range of expected ADFs and PHFs for the site is presented in Table 2.

Table 2: Assessed average daily and peak hourly water supply demands.

"Light" Commercial / Industrial		**"Medium" Commercial / Industrial**	
Average Daily Flow Rate (m^3/d)	**Peak Hourly Flow Rate** (l/sec)	**Average Daily Flow Rate** (m^3/d)	**Peak Hourly Flow Rate** (l/sec)
340	20	593	34

3.2.2 Review of Water Supply Demand Assessment

The water supply assessment provided in Section 3.2.1 has shown a variation in potential ultimate flows, with ADF estimates varying between 340m^3/d and 593m^3/d. The upper flow estimate is based on a "medium" industrial / commercial water usage and is considered for the purposes of this report to be an overly conservative estimate for the BROP site, particularly considering that part of the site is likely to be used for recreational purposes. The lower estimate of 340m^3/d was calculated assuming a "Light" industrial / commercial water usage.

Based on consideration of the above information, a value of 400m^3/d for the average daily flow is suggested as an appropriate number to adopt for planning purposes. Applying a peaking factor of 5 to this value provides a peak hourly flow of 23l/sec. These values are used in later sections of this report to assess likely effects on the water supply network and discuss implications of staging the development of the BROP site.

3.3 Tonkin & Taylor Wanaka Water Supply Modelling

These assessed flows were provided to Tonkin and Taylor for input to the 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 BROP site 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 of staging the development of the BROP site may have on the surrounding network.

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

- the availability of class W3/W4 fire flow, and
- the sensitivity of the Wanaka water supply network to assessed BROP site demands.

3.3.1 Modelling Methodology

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

The assessed demands for the proposed BROP site were added to the current WaterCAD network analysis model for Wanaka, which was last updated in September 2006.

The 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).

3.3.2 Modelling Results

The results from the 2006 Wanaka model indicated that there is sufficient pressure and flow in the Beacon Point pressure zone to supply the assessed demands for the BROP site.

The sensitivity analysis indicated that an increase of 25% (giving a flow rate of 40l/sec) in the water demand would cause the peak hour residual pressure in the Beacon Point pressure zone to drop below the minimum 300 kPa required by QLDC.

The model indicates that Class W3 fire fighting water supply requirements can be achieved with a 150mm diameter main supplying the BROP site from the Ballantyne Road 200mm diameter water main. To achieve Class W4 requirements, a 150mm diameter ring main within the site that loops back to Ballantyne Road water main is

required. Reference SNZ PAS 4509:2003 for a description of the different classes of fire fighting water supplies.

3.4 Summary

This assessment undertaken provides an insight into the potential effects of the BROP site on the existing and planned future infrastructure. A range of predicted flowrates was presented and discussed, and a value for planning purposes was suggested. It is worth noting, however, that it is not possible to determine a definitive water usage rate at this preliminary stage of the project. However, this assessment does provide an important tool for future planning for development of the BROP site, including determining appropriate staging of the development.

In conclusion, it is reasonable for planning purposes to expect the average daily flow water demand for the BROP site to be approximately 400m^3/d. Such a demand can be supplied by the existing infrastructure within the Beacon Point pressure zone, assuming all spare capacity is allotted to the site. A sensitivity analysis has revealed that if the demand was increased by 25%, the pressure in the Beacon Point pressure zone would fall below the minimum required 300 kPa. In this scenario, the Hawthenden reservoir, including the associated rising/falling mains, would be required to provide the required minimum residual pressure.

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 assessed development within the BROP site.

4.1 Existing / Planned Wastewater Infrastructure

There is currently a 600mm diameter gravity trunk sewer which runs down Ballantyne Road (toward the Cardrona River) and into the BROP site. This trunk main currently conveys all of Wanaka's wastewater to the Ballantyne Road oxidation ponds. It receives wastewater flows from The Pines wastewater pumping station, which is located at the top of Dungarvon Street. A 450/300mm diameter outlet pipe currently conveys the treated wastewater from the ponds along Riverbank Road and State Highway 6 to an outlet diffuser in the Clutha River near Albert Town.

A portion of a new foul sewer falling trunk main, termed the Cardrona Bypass foul sewer pipeline, was recently installed within the neighbouring Three Parks Development site. This pipeline is primarily located adjacent to the new Cardrona Bypass storm sewer pipeline, and currently terminates at an "end cap" near 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 planned to encompass the construction of 3 pumping stations, 1 falling trunk main, three rising trunk mains and a new wastewater treatment facility to be located adjacent to the Wanaka airport. The falling trunk main is to connect into the existing oxidation ponds inlet pipe and convey wastewater to the Riverbank Road pumping station.

The BROP site is situated such that any future wastewater flows will 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 Wastewater Generation Rates

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.

As for the water assessment, for the purposes of this report, it was taken that the entire site would be developed for industrial / commercial usage, with the caveat that the site will most likely be contain a combination of light industrial / commercial and recreational usage areas. Both the "light" and "medium" wastewater generation categories were assessed in order to determine a range of expected Peak Wet Weather Flows (PWWF), typically expressed in units of *l*/sec. 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 utilised to back calculate the assessed Average Dry Weather Flows (ADWF), typically expressed in units of m^3/d.

The assessed ADWF and PWWF for the site are presented in Table 3.

Table 3: Assessed average daily and peak hourly wastewater flow rates.

"Light" Industrial		"Medium" Industrial	
Average Dry Weather Flow (m^3/day)	**Peak Wet Weather Flow** (l/sec)	**Average Dry Weather Flow** (m^3/day)	**Peak Wet Weather Flow** (l/sec)
158	8.2	275	14.3

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 BROP site, as assessed for the Project Pure upgrades, is compared below in Table 4 with the BROP site assessed flows for the purpose of this report.

Table 4: Assessed wastewater flows for the BROP site.

Assessment Method	Average Daily Flow Rate (m^3/d)	Peak Wet Weather Flow Rate (l/sec)
BROP site plan change	158 – 275	8.2 – 14.3
Project Pure	82[1]	3.3[2]

[1]Based on a per capita generation rate of 250l/p/d
[2]Based on a peaking factor of 3.5

Clearly, as for the water supply assessment, there is a marked variation in the results of the various flow assessments. A key consideration in comparing flows with the earlier Project Pure assessment is that the Project Pure assessment assumed that this area of Wanaka would contain primarily a mixture of low-density housing and commercial, while the full development of the BROP site for industrial / commercial purposes would clearly represent a more intense use of the land.

Another consideration in comparing flows from the BROP site assessment with the earlier Project Pure assessment is that 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 QLDC standards (peaking factor of 4.5).

4.3.2 Review of Wastewater Generation Assessment

From a review of the above information, peak design flows from the BROP site of between 3.3 and 8.2l/sec are considered likely, particularly taking into account the following:

- The BROP site is likely to contain "light" industry / commercial, as this would keep the site in concert with the current industrial / commercial area on the other side of Ballantyne Road.

- Although the industrial / commercial wastewater flow scenarios are based on the site being completely developed for industrial / commercial usage, it is likely that part of the site will be used for recreational purposes.

The Project Pure design comfortably provides for this flow range, as it is within the design tolerance for the Project Pure wastewater trunk mains and pumping stations. In fact, even flows larger than 8.2l/sec can likely be catered for by the new Project Pure reticulation, including the new ponds falling main and the Riverbank Road pumping station.

Finally, to put this flow range in context, the peak measured flow rate for the whole of Wanaka (excluding Albert Town) for 30 December 2004 was 110l/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 of the new ponds falling main (into which the BROP site will feed) is 352l/sec, and the design capacity for the Riverbank Road pumping station (until 2021) is 260l/sec, with the design allowing for augmentation around 2021 if required. The ultimate design allows for a capacity of 348l/sec by 2040 for the Riverbank Road pumping station. This gives further confidence that the Project Pure infrastructure will adequately accommodate all foreseeable flows from the BROP site.

4.3.3 Summary

This assessment undertaken provides an insight into the potential effects of the BROP site on the existing and planned future infrastructure by providing a range of likely peak flow rates. 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 BROP site, including determining appropriate staging for its development.

In conclusion, it is reasonable for planning purposes to expect the peak wastewater flows for the BROP site to be between 3.3 and 8.2l/sec. This compares to design flow rates of 352l/sec for the planned ponds falling main and 260l/sec (until 2021) for the Riverbank Road pumping station. Finally, it is confirmed that the likely BROP site flow rates can be serviced by all downstream components of the new infrastructure to be installed 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 BROP site development.

The recently installed Cardrona By-Pass stormwater system was not designed to cater for flows from the BROP site. As there is no existing stormwater reticulation system to service the BROP site, stormwater from the site would either have to be collected and conveyed to a suitable water course, or dispersed into the underlying the gravels.

To determine the extent of the primary and secondary stormwater system that may be required, the anticipated stormwater runoff for particular storm events must first be determined.

5.1 Existing Stormwater Reticulation

There is currently no stormwater reticulation within the BROP site. All stormwater generated on the site currently is dispersed into the underlying gravels.

5.2 Stormwater Generation Assessment

Stormwater runoff rates for the BROP site were determined 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), and
- the area of the catchment.

The design storm event for the primary stormwater system was chosen to be 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 the within the BROP site was selected by making a valuation of the intended future industrial usage of the site. For the purposes of this assessment, it is assumed that no upstream catchments will feed into the BROP site.

5.3 Primary Stormwater System

The assessed primary system stormwater runoff rates are presented in Table 5.

Table 5: Assessed stormwater runoff rates for the primary stormwater system.

Catchment	Area (Ha)	Stormwater Runoff Rate (m^3/s)
BROP	20.7	0.5

A preliminary design of the stormwater infrastructure required to cater to future development cannot be undertaken until a development plan for the site is prepared. A topographical study of the site indicates that it should be possible to convey stormwater from the elevated portions of the site adjacent to Ballantyne Road down the north side of Ballantyne Road, via a storm sewer, and then underneath Riverbank Road and through to the Cardrona River. This may require a suitably sized culvert running under Riverbank Road and the procurement of a Services Easement corridor from Riverbank Road to the Cardrona River. A second option would be to disperse the stormwater into the gravels underlying the BROP site. Dispersal into the gravels is the current method for removing stormwater from the site, as well as for the currently developed sites along Ballantyne and Gordon Roads (via soak pits).

The lower sections of the site would need to drain southeast towards Riverbank Road (likely via the recently installed Cardrona Bypass storm sewer), and then either be conveyed in some manner to the Cardrona River, or dispersed into the underlying gravels.

5.4 Secondary Stormwater System

The assessed secondary system stormwater runoff rates are presented in Table 6.

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

Catchment	Area (Ha)	Stormwater Runoff Rate (m^3/s)
BROP	20.7	1.5

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 BROP site will need to accommodate the secondary flows identified in Table 6. This design may need to incorporate such features as appropriately designed secondary flow paths, controlled flood plains, detention ponds and soak pits.

6.0 TELECOMMUNICATION, POWER AND GAS ASSESSMENTS

In order to assess the serviceability of the BROP site 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 B . 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 BROP site. Telecom estimated the cost of installing the reticulation to be on the order of $112,500.00 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, the developer 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 BROP site.

Delta noted that there is a lack of usable cable routes along Ballantyne and Riverbank Roads to supply the site from the Wanaka substation, and recommends that the developer of the site establish additional supply corridors.

The developer 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 the BROP site. 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 Queenstown Lakes District Council to prepare an infrastructure and servicing assessment report for the planned Ballantyne Road Oxidation Ponds Site, 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 BROP site to be approximately 400m^3/d. Such a demand can be supplied by the existing infrastructure within the Beacon Point pressure zone if all available capacity were to be allotted to the site. A sensitivity analysis revealed that if the demand was increased by 25%, the pressure in the Beacon Point pressure zone would fall below the minimum required 300 kPa. In this scenario, the Hawthenden reservoir, including the associated rising/falling mains, would be required to provide the required minimum residual pressure.

7.2 Wastewater

The wastewater assessment determined that it is reasonable for planning purposes to expect the peak wet weather flows for the BROP site to be between 3.3 and 8.2//sec. This compares to a design flow rate for the planned Riverbank Road pumping station of 260//sec until the year 2021. It is confirmed that the expected BROP site 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

The stormwater assessment determined that it should be possible to convey stormwater from the elevated portions of the site down the north side of Ballantyne Road, via a storm sewer, and then underneath Riverbank Road and through to the Cardrona River. This may require a suitably sized culvert running under Riverbank

Road and the procurement of a Services Easement corridor from Riverbank Road to the Cardrona River. A second option would be to disperse the stormwater into the gravels underlying the BROP site. Dispersal into the gravels is the current method for removing stormwater from the site, as well as for the currently developed sites along Ballantyne and Gordon Roads (via soak pits).

The lower sections of the site would need to drain southeast towards Riverbank Road (likely via the recently installed Cardrona Bypass storm sewer), and then either be conveyed in some manner to the Cardrona River, or dispersed into the underlying gravels.

The assessment further determined that development of the BROP site will need to accommodate secondary stormwater flows 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.

7.4 Telecommunication, Power and Gas Services

Representative supplies 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 B.

Appendix A

Tonkin and Taylor Water Supply Modelling Report

Tonkin & Taylor

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 3	**Date:**	25 October 2006
Subject:	Water Modelling for Oxidation Pond Site, Ballantyne Road, 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 development of the Oxidation Pond 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 the proposed development of the Oxidation Pond site.

Methodology

We have added the demand of the proposed 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.

An Average Daily Flow (ADF) was calculated assuming 700 litres per day per person. The total estimated population for the proposed development of the Oxidation Pond site is 600 people. This equates to an ADF of 4.86 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

Results

The 2006 Wanaka model indicates that there is sufficient pressure and flow in the Beacon Point pressure zone to supply the developed Oxidation Pond site. However a 25% increase in the water demand of this site will cause the peak hour residual pressure in the Beacon Point pressure zone to drop below the minimum 300kPa required by QLDC.

The model indicates that Class W3 fire flow can be achieved with a 150mm diameter main supplying the Oxidation Pond site and to achieve Class W4 fire flow a 150mm ring main looping back to Ballantyne Road is required. We note a ring main is likely due to the proximity of the Three Parks Project.

The results (without a 25% increase or decrease) are shown below in Table 1.

Table 1 – Availability of Peak Hour Pressure and Fire Flow

Scenario	Residual Pressure (kPa)	Fire Flow Available(l/s)
Peak Hour Demand: (Beacon Point pressure zone)		
Node J-384	378 > 300 OK	N/A
Fire Flow (Class W3/W4): (Beacon Pt pressure zone)		
Node J-384 (150mm water main - single)	196 > 100 OK	43
Node J-384 (150mm water main - ring)	116 > 100 OK	52

Refer to Figure 1 for node locations.

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.

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 W3/W4 fire flow.

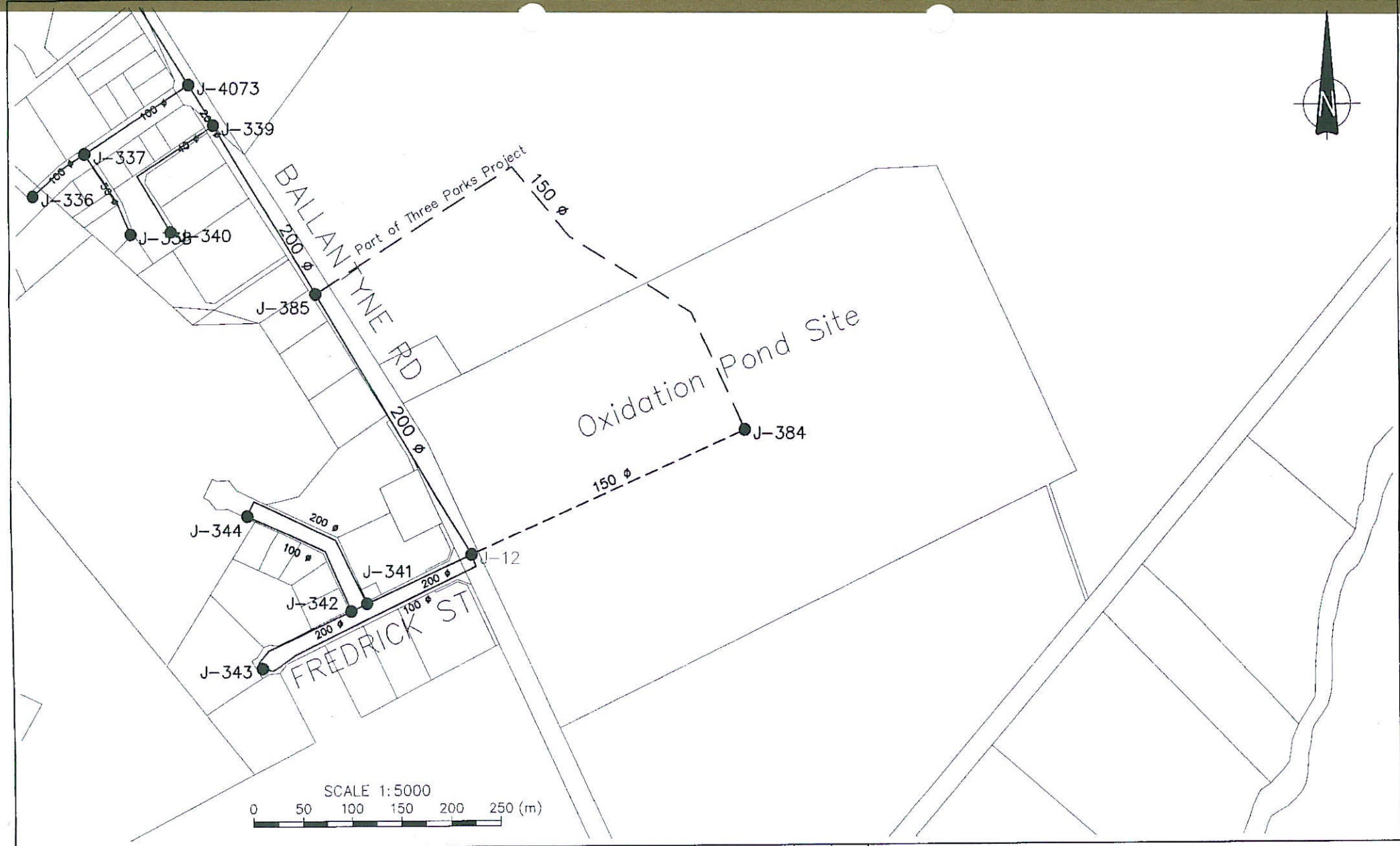
It should be noted that the model is a numerical representation of the physical reality, and subsequently bears some uncertainty. The determination of demands and peaking factors involved assumptions regarding the patterns of water use in the township, and are an approximation of the physical reality. 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



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.

Tonkin & Taylor
Environmental & Engineering Consultants
■ Christchurch
□ Auckland □ Hamilton
□ Nelson □ Wellington □ Whangarei

DRAWN	spr	Oct. 06
DRAFTING CHECKED		10/06
APPROVED		10/06
CADFILE : P\:50611.047\OxPd Fig1		
SCALES (AT A4 SIZE)	AS SHOWN	
PROJECT No.	50611.047	

DUFFILL WATTS & KING LTD
OXIDATION POND DEVELOPMENT
BALLANTYNE ROAD, WANAKA
Site Location Plan

FIG. No. Figure 1 – Not For Construction

REV. 0

Appendix B

Serviceability Confirmation Letters

Telecom

Telecom New Zealand Limited

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

Telephone : 03 214 8876
Facsimile : 03 214 4440

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

Telecom Ref : CS100516A
Your Ref :

Date: 28 March 2007

RE: Proposed Subdivision – Ballantyne Road Oxidation Ponds, Estimated 100 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 100 lots/units is approximately $112,500.00 (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

1692-20070320

Tuesday, March 20, 2007

Your ref:
Our ref: 1692L1

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

Dear Jude,

Availability of Electricity Supply to Proposed Ballantyne Ponds Development Ballantyne Road Wanaka

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

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

There is a lack of usable cable routes along Ballantyne Road to supply the development from the Wanaka substation. It is therefore highly likely that the developer will need to establish additional supply corridors.

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

DELTA **Utility Services Limited**, P O Box 1404, DUNEDIN
Phone (03) 474 0322, Fax (03) 479 6694

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 – Ballantyne Oxidation Ponds

Dear Jude,

Thank-you for your enquiry regarding the gas supply to the proposed Ballantyne Oxidation Ponds Development. Rockgas will certainly be interested in offering a reticulated supply to the proposed 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,

Mike Collins.

0274 344-299