Report

Central Wellington Bulk Water Supply - Prince of Wales Park Site Selection Summary

Prepared for

Prepared by CH2M Beca Ltd

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Appendices

1 Robust and Reliable Water Supply for Central Wellington

Water supply networks are vital to cities worldwide. They are accepted as foundation stones for community wellbeing, health and prosperity.

Part of Wellington Water's job is investing on the public's behalf for a robust and reliable water supply. In Wellington City WWL works with Wellington City Council, Greater Wellington Regional Council, local communities, businesses and iwi to find solutions.

1.1 An Issue with Central Wellington's Bulk Water Storage?

Central Wellington's water supply, what is known as the Wellington "Low Level zone", has a specific need for improved and strengthened bulk water storage. The Low Level zone comprises Wellington Central Business District (CBD), Thorndon, Newtown, Mount Cook, Hataitai, Kilbirnie, Miramar, Strathmore and Seatoun, and serves around 70,000 residents and businesses with an average demand of 35 Million litres per day.

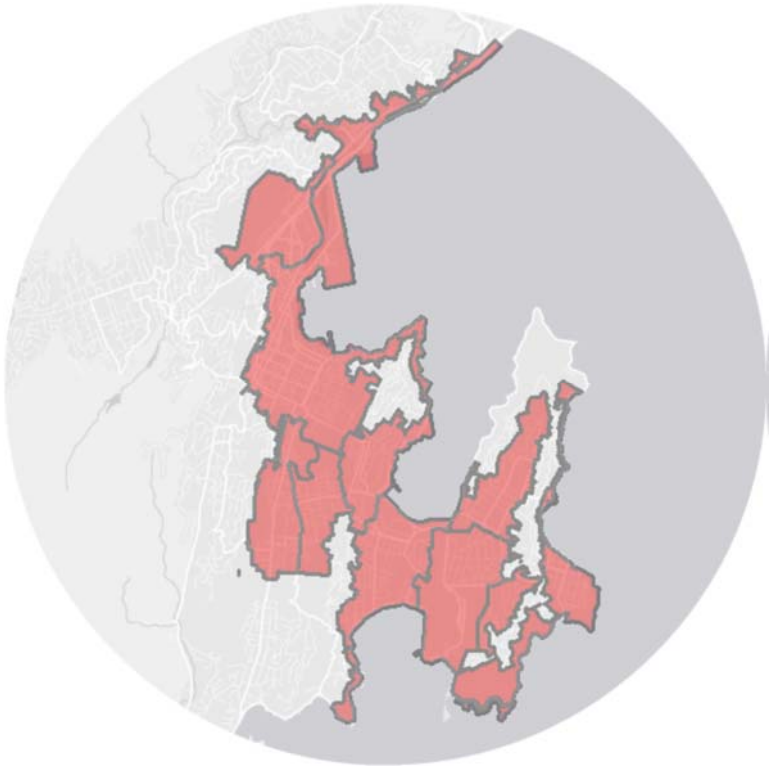

Figure 1: Wellington Low Level Water Supply Zone

WWL has developed Target Levels of Service (TLoS) for the operational resilience of its water supply network.

Operational resilience is the ability of the network to continue, or be able to be quickly restored to continue, service in response to reasonably predictable 'business as usual' water disruption events. For example if a pipe breaks, a water main is severed, a flood event occurs, a water treatment plant stops, water quality is compromised or the power fails, the network must maintain supply.

WWL expects that its customers should not notice any service interruption as a result of events that should be typically anticipated within a modern water supply service. The tap stays on. This is Operational Resilience.

WWL's TLoS for water supply storage operational resilience is currently set at 2 days (48 hours) in-zone storage. That is 2 days storage based on average daily demand within the water supply zone.

The three reservoirs within the Wellington low level zone currently provide an average of just 24 hours total storage in-zone (50% of TLoS).

WWL has also developed a TLoS for the strategic/disaster resilience of its water storage network, following a significant disaster event.

This has been developed and agreed around the network being sufficiently prepared to support a Survival & Stability State (from Days 8[1] to 30 after a large earthquake affecting the Wellington region) at a basic minimum level of service that consists of:

- Provision of 20 litres per person per day to residents via distribution points.
- Providing major hospitals and CD centres with a basic water supply from Day 8
- Providing Aged Care and Medical Services with a basic water supply from Day 14.
- Providing Education facilities with a basic water supply from Day 21.

Current in-zone water storage for the Wellington low level water supply zone is only capable of supplying rationed water at a basic minimum level of service to Day 19 (post event).

Accordingly, there is a need for additional storage in order to provide both operational and disaster resilience.

Without this additional storage, Wellington central's network of water reservoirs is currently not adequate for dealing with or providing for:

- Growth
  - Wellington's forecast population and business growth near the CBD.
- Reservoir maintenance and repair
  - Wellington's three existing low level zone reservoirs (Macalister, Carmichael and Aramoana Reservoirs) cannot readily be taken off line for maintenance, cleaning and repair work. Doing so will cause significant disruptions to local water supply services and impose significant local water restrictions/rationing.
- Operational resilience
  - Ensuring the local community, critical community facilities, and businesses have access to water supply storage within the Low Level zone, to buffer any temporary disruption that may arise to bulk water supply services into Wellington.
- Resilience to hazards
  - Meeting the local community's and critical community facilities' basic water needs following a significant disruption to Wellington's bulk water supply arising from a natural disaster, particularly earthquakes.

[1] From Day 0- Day 7 after a significant seismic, residents are be expected to be self-sufficient using their own personal storage of water, along with rain water, to get by.

A range of steps are being taken to improve things. These include promoting household and business water storage self-sufficiency for the first 7 days after a significant hazard event, promoting water conservation, reducing leaks in the piped networks, and other improvements in the network system.

These are all making a positive difference, but are not enough on their own. Studies[2] highlight a need to build a major new water reservoir close to the Wellington CBD, within the low level zone. This is needed to meet growth needs, and enhance the operational and strategic resilience performance of Wellington's water storage network.

WWL has identified that 35,000 m^3 of additional water storage is needed within the Wellington low level zone to meet the zone's operational and strategic/disaster resilience water storage needs.

WWL have determined that the best means for meeting this need is through the development of a new centralised bulk water storage reservoir facility, located in the CBD/ Mount Cook /Newtown area. Alternative 'methods', such as the development of a dispersed network of publicly and privately owned micro water storage facilities (i.e. local community water tanks, and privately owned onsite water storage tanks) within the zone, are not capable of delivering the cost efficiencies, service reliability, integrated network operation benefits, and community health and safety monitoring and management requirements demanded of a modern urban water storage and supply network.

Accordingly, an area to the immediate south-east of the CBD has formed the focus for finding a reservoir site. This is driven by the need for good linkages to the major water main pipe networks which are serving one of Wellington's higher growth areas. This area also includes key regional facilities, businesses, and organisations. Sites in other parts of the zone would not adequately address or service the needs of the zone.

We explain in more detail:

- The reasons water supply bulk storage upgrades are needed in central Wellington
- Factors shaping the choice of design and location of new water reservoir
- Options evaluated
- The proposed solution of a Prince of Wales Park bulk water reservoir.

[2] Wellington Water Strategic Case 2016, Wellington Low Level Zone technical reports (various 2007 to 2016).

2 Why Water Supply Bulk Storage Upgrades are needed for Central Wellington

2.1 Matching Water Supply and Storage to Wellington's Needs

A hallmark of good water supply networks is that they can cope with future population and business growth demands. They also need to be capable of providing reliable services to customers while undergoing maintenance, repair and upgrade, and need to be able to withstand, or be quickly repairable following, natural disasters such as earthquakes.

The Wellington City bulk water storage network for the low level water zone specifically covering the CBD, Mount Cook and Newtown areas needs attention on all counts.

2.2 Our Current Water Network

Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council. Wellington Water's role is to manage the drinking water, wastewater and storm water services of the council owners.

The bulk water supply for Wellington's business district and the city's southern and eastern suburbs comes from treatment plants in Wainuiomata and the Waterloo Water Treatment Plant. The water supply lines run mainly north to south due to Wellington's geography, and relative to many other cities have fewer cross connections. (Cross connections help with network resilience).

The total water supplied to all of Wellington City (including areas outside of the Low Water zone) is about 30 million m^3 (30 billion litres) per year. About 7 million m^3 is used for commercial / industrial purposes.

The water network across Wellington City includes:

- 81 reservoirs and tanks
- Over 1,000 km of pipes
- 33 pumping stations
- More than 100,000 fittings, valves and controls
- Major public investment in a gravity based network of water storage reservoirs near the CBD.

Wellington City's water distribution system is designed to make use of gravity as much as possible, however pumping is also required. The Wainuiomata treatment plant is higher than most of the area it supplies to, so gravity assists distribution.

Pumping stations are required however to boost flows in the pipelines when supply has to go 'uphill' (against gravity) or more quickly than gravity alone will allow. They help to provide a constant supply to all reservoirs, and this is a factor in looking at bulk water storage location near the CBD.

Both the Waterloo and Gear Island treatment plants (which also supply Wellington) incorporate distribution pumps. The need to pump bulk water to Wellington's water storage network makes Wellington's bulk water supply network one of the largest industrial users of power in Wellington. Approximately 17,000 megawatt-hours of electricity – equivalent to the usage of 2,200 households is used annually.

2.3 Water Demand from Population and Business Growth

The current Wellington City water network needs to be sized to deal with forecast increases in population and businesses. This includes how water is stored around the network to deal with peak demand, firefighting requirements, regular maintenance, and providing ability for the system to cope with any unplanned outages in the water treatment or piped system, or in case of a natural disaster.

Water use per person has generally been trending downwards for the last decade[3], however an overall increase in water demand is forecast in and around the Wellington CBD due to land zonings for business and residential development.

It is projected that by 2043, there will be 24,000 more jobs and 46,000 more people living in Wellington City[4]. Without improvements the current bulk water storage and network will be put under strain by this growth.

Development rules for Wellington in the District Plan allow for significant increases in apartment living, business growth and other development in and around the CBD. Wellington City Council identifies that as many as 10,000 new apartments and homes may be concentrated in and around the areas that are the focus of our investigations for new bulk water storage[5].

2.4 Climate Change

Climate change may also impact on water supply later this century, with predictions of extended dry periods affecting security of supply and extreme weather events affecting water supply assets[6]. Investing in bulk water storage capacity is a means of reducing these risks.

2.5 Improving Resilience

Investment is needed to strengthen the network to address two types of resilience weakness.

The first is disruption from events such as flooding and earthquakes. This is called hazard resilience.

Current in-zone water storage for the Wellington low level water supply zone is only capable of supplying rationed water to the community at a basic minimum level of service from Day 7 after a significant event to Day 19 (post event). WWL's TLoS for the strategic/disaster resilience of its water storage network, following a significant disaster event, is to support a Survival & Stability State at a basic minimum level of service out to Day 30. Additional water storage is needed to meet this shortfall.

The second resilience weakness relates to operational resilience.

Operational resilience is the ability of the network to continue service in response to reasonably predictable 'business as usual' water disruption events. For example if a pipe breaks, a water main is severed, a flood event occurs, a water treatment plant stops, water quality is compromised or the power fails, the network must

[3] Wellington Water - Water Trends Report, Cardno Limited 2016

[4] See http://forecast.idnz.co.nz/wellington and http://getwellymoving.co.nz/the-problem/

[5] See www.getwellymoving.co.nz/about/documents/ for growth plans and strategies

[6] http://www.gw.govt.nz/assets/Plans--Publications/LTP-2015-25/Long-Term-Plan-2015-18-Section-5-WATER-SUPPLY.pdf

maintain supply. Investment is needed to tackle existing shortcomings around maintaining the water supply system while keeping it operational.

WWL's TLoS for water supply storage operational resilience is currently set at 2 days (48 hours) in-zone storage. That is 2 days storage based on average daily demand within the water supply zone.

The three reservoirs within the Wellington low level zone currently provide an average of just 24 hours total storage in-zone (50% of TLoS).

For hazard resilience our understanding of how the region would be impacted by natural events such as earthquakes and other hazards is improving. Specific action plans are being pursued to address the issues, and these include water supply[7]. Due to our geography and water source locations, Wellington is vulnerable to the risk of supply interruption being prolonged in the event of a major shock to the water network. The water network serving Wellington City has long linear supply lines that cross known earthquake faults and have few or no alternative supply routes[8].

The Central Wellington water supply network's linear configuration combines with existing limited water storage in high demand areas. A significant outage would disrupt the water supply to a large number of residents, businesses and key regional facilities.

As the nation's Capital and one of New Zealand's largest financial, business, healthcare and educational centres, being able to withstand natural disasters is a key driver for improved bulk water storage. Wellington is recognised as one of New Zealand's leading creative industry and arts capitals. The Wellington region has the second highest GDP per capita, highest average income and highest portion of working age population of any region in New Zealand. As the centre of government in New Zealand, Wellington is expected to act as a command centre in the event of a national emergency. The smooth continuation of government functions through such an emergency is an important element of national resilience, and water supply security is part of this.

Resilience forms a key pillar of Wellington City Council's Long-Term Plan, with the council outlining a long-term view to work to ensure infrastructure can deal with significant disruption as a result of natural hazards. Wellington City has also joined the Rockefeller 100 Resilient Cities programme and is one of 100 cities actively building and implementing a resilience strategy (Phase 1 June 2016).

The Wellington City urban area is also strongly linked to Porirua, Upper Hutt, Lower Hutt, Kapiti and the wider region for jobs, health care and tertiary education. Together, this combined area forms New Zealand's equal second largest urban and economic area. A major earthquake severely damaging Wellington's water supply pipelines and water treatment plants, could result in a shortage of water for 70 days or more[9].

In this situation the bulk storage reservoirs become critical in helping lessen the economic, as well as health and wellbeing impacts of a disruption. The bulk water storage reservoirs are designed to cope with earthquakes, however vulnerabilities remain over limited storage capacity near the CBD, and improvements need to be made.

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[7] http://www.getprepared.org.nz/welg

[8] https://wellingtonwater.co.nz/your-water/regional-priorities/water-supply-resilience

[9] http://www.gw.govt.nz/assets/council-reports/Report_PDFs/2010_567_1_Report.pdf and www.dominion-post/wellington-suburbs-face-a-100day-wait-for-water-reconnection-after-quake

2.6 Economic Implications

The implications for Wellington are that, based on current estimates of 70 days or more before normal supply to most areas is restored, there is a significant economic risk to our region.

The Wellington region contributes some $33 billion[10] to the New Zealand economy (2nd = with Canterbury and one of largest regional economies after Auckland), which is around 14% of the country's Gross Domestic Product. The Wellington CBD is one of the largest components and any major disruption would raise concerns at an equivalent level to those arising from the Canterbury earthquakes. If it takes too long to return to a business-as-usual economic state, many of the professional and public services in the Wellington region that are not inherently tied to this geography may leave and not return.

As these long term economic risks are unacceptable, Wellington Water is working towards a situation where water supply to households and businesses would be restored from about 30 days (rather than 70 days)[11]. Hand in hand with this is investing in the bulk water storage network to enhance local resilience to disruptive hazard events, and to support recovery efforts.

A part of this investment focus is to improve Wellington CBD bulk water storage.

2.7 How Big does the Bulk Water Storage Reservoir need to be?

Assessments by Wellington Water show[12] that a 35,000 ML reservoir is the best design response, and essential in terms of volume for providing a high degree of reliability and serviceability, and meeting the operational and strategic resilience water storage needs of Wellington's low Level water supply zone. Design for a reservoir of this type enables WWL to minimise the risk of leakage and maintenance requirements.

The Wellington Low Level Zone is the largest single supply zone in Wellington with consumption of an average of 35 million litres of water. During times of peak demand, consumption may exceed 50 million litres a day.

The existing situation is that on any given day there is currently less than one day's storage in-zone to manage a significant network event in the Low Level Zone.

Adding an additional 35 ML CBD reservoir will double 'in zone' storage. This also provides benefits of giving additional time needed to repair instances of[13] major network disruption.

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[10] Statistics NZ 2016 figures

[11] https://wellingtonwater.co.nz/your-water/regional-priorities/water-supply-resilience

[12] Prince of Wales Reservoir, Summary Document, Wellington Water 2016

[13] www.newshub.co.nz/broken-pipe-almost-leaves-wellington-without-water 2016

3 What Factors Shape the Design and Location of a New Reservoir?

3.1 The Wellington Low Level Water Supply Zone Gravity Bulk Water Storage System

Gravity based water supply and storage systems are used internationally because they, amongst other things, have major advantages of minimising operating costs and increasing the reliability and resilience of the water supply for the communities they serve.

For the Wellington low level water supply zone servicing the CBD, Mount Cook and Newtown, decades of public investment underpin our largely gravity based water supply system. The result is a local gravity fed water supply network design, serviced by the Macalister (20 ML), Carmichael (7.8 ML) and Aramoana reservoirs (6.5 ML). These are located on sites that mean any new large reservoir needs a top water level of 92 m above sea level to balance the water distribution network, and allow the best contribution to the system by each reservoir.

A new reservoir situated at a lower elevation could not achieve this balance without the use of significant auxiliary pumping to support its operation. A range of additional risks and costs would be introduced by such a design. These are discussed below.

As a result, in order to keep an efficient, reliable and resilient gravity based water supply system, a key design requirement for any new central Wellington reservoir is to have its top water level of 92 metres above sea level.

The only potential sites at this elevation located centrally within the Wellington Low Level water supply zone are located in or around the Town Belt.

The Town Belt Act 2016 and Town Belt Management Plan 2013 both include provisions which anticipate the potential need to accommodate a reservoir within the Town Belt.

3.2 What about a Reservoir Site Outside the Town Belt?

Wellington Water has considered the option of new bulk water storage at lower elevations than the 92 metre above sea level design requirement. This has been rejected for a number of reasons, including:

- Pump station development
  - Lower elevation reservoir sites would require the development of a very large auxiliary pump station to supply water at an appropriate pressure into the local water supply network, and to deliver sufficient water into the network to meet peak demand water supply.
- Cost
  - Additional pumping costs would run into many millions of dollars over the lifetime of the reservoir, and would be passed on to the public and businesses. These costs are estimated of the order of $7 M for building the pump station and $0.5 M per year in annual on-going running costs[14].

[14] Beca preliminary concept design estimates 2017

- Reliability
  - All other things being equal, a system that is dependent on pumping is less reliable than a gravity based water supply system. A lower elevation reservoir introduces challenging operational complexities and risks for Wellington's water supply network associated with pumping control and management systems. These will materially increase management and system costs as well as potentially reducing the reliability of the water supply.
- Resilience
  - The requirement for pumping reduces the post-earthquake resilience of the CBD low level zone water supply network. It introduces an additional reliance on electricity to work the pumps, and would also require substantial fuel storage on site for the backup operation of standby diesel generators needed to support the reservoir in the event of a power outage or following a significant natural hazard event.
- Private land acquisition
  - A lower elevation reservoir is very likely to require purchase of existing developed private land, with the need to disrupt existing well established neighbourhoods or business areas.
- Construction effects
  - Construction effects are likely to affect more neighbours than a reservoir location in the town belt
- Operational Effects
  - A lower elevation reservoir would be likely to have adverse effects on the local environment (including noise and the need for operational visits for maintenance). Among other things, this would increase the potential for ongoing operational challenges. f

4 Options Evaluated

To address central Wellington's strategic water storage resilience and growth needs and maintain a workable gravity based water supply system, it is necessary for a new reservoir site within the Wellington low level zone to be able to accommodate a reservoir development that:

- is central to the zone, and able to appropriately service the CBD, Mount Cook and Newtown areas, and critical community services within this area which are reliant on a reliable water supply during and following an emergency event (e.g. councils, Capital Coast Health, Fire Service, Wellington Electricity and the NZ Transport Agency)
- is large enough to accommodate a 35,000m^3 reservoir structure,
- has a top water level of 92 metres above sea level.

This has shaped the series of evaluations completed to find the best potential sites.

4.1 What has been looked at in Assessing Reservoir Location Options?

Over the past two decades a range of sites have been identified and variously investigated[15]. Work by engineering company MWH (2011) assessed 10 sites for consideration. The positive and negative impacts at each location were considered to come up with a short list of options. Key criteria in evaluating the options included:

- Social
- Environmental
- Cultural
- Economic
- Locational factors.

Based on these factors, a short list of four sites was identified. These are shown shaded in Table 1 as part of the original full list of 10 sites:

Table 1: Bulk Water Supply Reservoir Initial 10 Site Evaluation & Selection Process, MWH

Alexandra Park (Wellington College Upper Playing Field)	Salamanca Road (Botanical Gardens north of Met Services Building)
Fever Hospital (Alexandra Road)	Prince of Wales Park (south of upper playing field)
Charles Plimmer Park	Torquay Terrace (150 m north-east of Macalister)
Scottish Harrier (South end POW Park)	Government House (Mt Victoria town belt land adjacent Government House
Bell Road (north of existing reservoir)	Carmichael Reservoir (south of existing reservoir)

[15] Wellington City Council Proposed CBD Reservoir Options Assessment, MWH for Capacity Infrastructure Services Ltd 24 March 2011.
Greater Wellington and Wellington City Council, Proposed Central Business District Reservoir report on preliminary investigations, SKM. June 2004
Wellington Regional Council, Wellington City Council, Low Level Zone Water Storage For Wellington City, Brickell Moss Ltd. 23 October 1987

:The MWH[16] report selected the four short listed sites for further evaluation, over the others, on the basis that these four sites had:

1. The best potential to be integrated into and contribute to strengthening the wider water supply network for the Wellington Low Level Zone.
2. A good ability to satisfy environmental and other considerations required under the Resource Management Act, Town Belt and other legislation. This includes matters such as landscape amenity, avoidance of high value natural areas, and cultural / social issues.
3. A practical ability to be constructed, and the costs associated with both reservoir and associated connecting pipework.

In order to evaluate the options against the criteria listed above (Social, Environmental, Cultural, Economic and Locational factors), an assessment was undertaken of the planning and engineering issues related to the construction and siting of a reservoir at the four short listed sites. Excavation volumes were calculated and preliminary site plans prepared. Planning, environmental and cultural issues were considered. Concept plans and cost estimates for inlet and outlet pipework and provisions for secure emergency supply issues and back-up connections to the bulk main further informed the evaluation.

A multi-criteria assessment (based on the five criteria above) was carried out to rank the short listed sites. The preferred site was the Prince of Wales Park site.

An overview of the rankings and key characteristics of each of the four sites follows in **Table 2**.

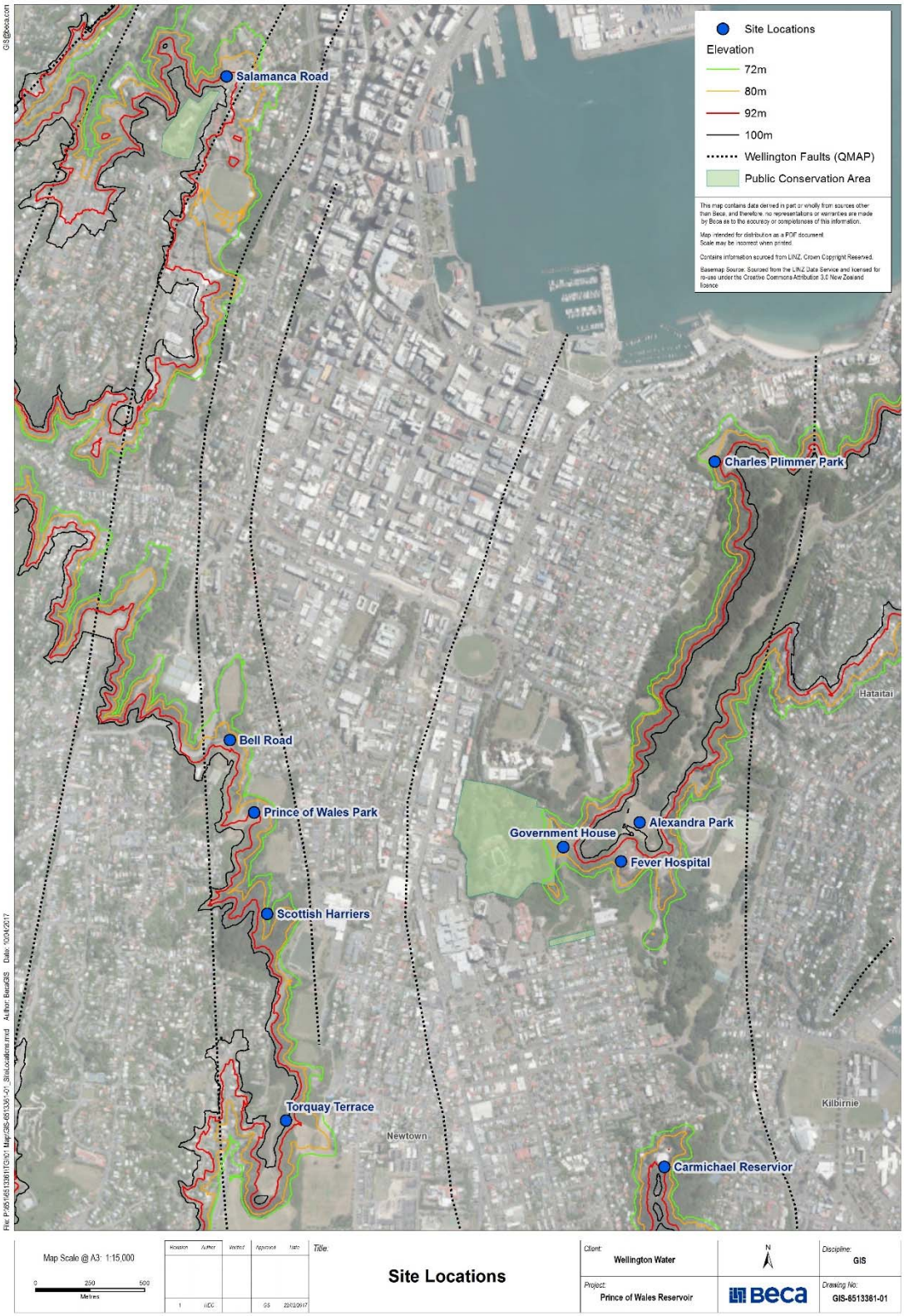
Table 2 - Bulk Water Reservoir Short List Rankings and Factors, MWH 2011

	Location	Short List Ranking Result
1.	Prince of Wales, vicinity of Dorking Road and Rolleston Street	The site is located in the Town Belt. It is judged to have reasonable construction access, availability of working areas and is not immediately adjacent to residential properties. It is centrally located with regard to the CBD and hospital, in close proximity to the bulk supply mains and is the strongest of the options in terms of network flexibility and from a hydraulic point of view. There is potential to reuse soil excavated to raise and improve the playing fields. The site has the lowest excavation volume requirements of the options. Excavation volumes are around 50,000 m^3. No significant planning, environmental or cultural issues were identified through the short list evaluation process. Cost estimates (2011) used were $13.4 m for the reservoir and $4.8 m for associated pipework for a total capital cost of $18.2 m. Relative to the other options considered, this site was the favoured location for a new reservoir due to the network flexibility it would offer, its lower excavation requirements, comparatively favourable environmental setting, and lower construction costs.
2.	Torquay, in Macalister Park between Finnimore Terrace and Torquay Terrace to the north-east of the existing Macalister reservoir	The site is located in the Town Belt. This location provides less network operational flexibility than Prince of Wales. Construction access options are reasonably available. An area of regenerating vegetation would need to be cleared. The site poses construction difficulties that are more complex than Prince of Wales Park. No other significant planning, environmental or cultural issues were identified through the short list evaluation process. Excavation volumes are around 60,000 m^3. Cost

	Location	Short List Ranking Result
		estimates (2011) were $14.3 m for the reservoir and $4 m for associated pipework for a total capital cost of $18.3 m.
3.	Government House	This site is located on the east side of the Government House boundary, to the east of the saddle between Wellington College and Wellington Hospital in Newtown. Access would be via a track from Mein Street or alternatively from Coromandel Road. The site requires excavation of about 84,000 m^3. The site is located further from existing bulk mains so would require more expensive pipe work to integrate effectively with the system. From a planning, environmental and cultural issues perspective, issues identified through the short list evaluation process focussed on the site's location within the Te Ranga a Hiwi Precinct. Additional consultation with iwi was identified as required. Cost estimates (2011) used were $16.1 m for the reservoir and $11.8 m for associated pipework for a total capital cost of $27.9 m.
4.	Carmichael	This site is located near Carmichael reservoir, between Crawford Road and Owen Street. Access would be via an existing winding track from the south end of Owen Street. There is very limited construction working area available. From a planning perspective the site is near residential properties and is likely to require specific mitigation measures to be put in place. No other significant environmental or cultural issues were identified through the short list evaluation process. Cost estimates (2011) used were $16.4 m for the reservoir and $15.1 m for associated pipework for a total capital cost of $31.3 m.

A location map showing the locations for the 10 original sites considered, and including the shortlisted options is provided in Figure 2.

Figure 2 - Initial 10 candidate sites including 4 shortlisted sites



5 The Proposed Solution at Prince of Wales Park

The general location and existing features of the reservoir site are shown in Figures 3 and 4.

Figure 3 – Proposed Reservoir Site Location

The Prince of Wales site was selected on the basis of:

- Its **central location** and proximity to the CBD, the communities of Mount Cook and Newtown and critical public facilities(relative to other options considered)
- Its **proximity to the bulk water supply mains** (relative to other options considered)
- Its favourable **elevation** for water supply purposes
- Its reasonable **working area** and **construction access** (relative to the other options considered)
- It was **not immediately adjacent to residential** properties (although it is visible from many areas)
- The site had the **lowest soil excavation requirements** of the options identified
- The site provided the greatest **network and operational flexibility** for the water supply network (relative to other options considered)
- Its **ability to be integrated into the surrounding landscape** with appropriate earth-working and landscape design, including by burying some or all of the reservoir (relative to other options considered)
- It required **minimal disturbance of valued vegetation** and **sensitive ecological sites** (relative to other options considered)
- The site's development having **minimal cultural impact**.

Development of the Prince of Wales reservoir requires approval under the Town Belt Act 2016, and consents under the Resource Management Act.

In recognition of community expectations, policy and other requirements of legislation, and to achieve a safe and efficient design, Wellington Water is requiring that Prince of Wales Park's reservoir design:

- Minimises the impacts of the proposed reservoir on the Town Belt

- Provides for the proposed reservoir to be placed underground, fully buried with existing landform matched as closely as practicable
- Is sited to minimise interference with existing features, facilities and plants
- Does not affect or change the recreational use of the area on completion
- Provides for any disturbance of the existing site during installation to be 'made good' immediately after completion.

Figure 4: Aerial View of Prince of Wales Park